Industry Profiles

Catalog of Investment Information and Opportunities

Volume IV

Office of Development Finance and Private Enterprise
Agency for International Development
Washington, DC 20523

Catalog of Investment Information and Opportunities
Industry Profile Index

VOLUME I

66040	Plywood
66041	Particle Board
66042	Wooden Ice Cream Spoons and Sticks
66043	Bedroom and Dining Room Furniture
66044	Upholstered Occasional Chairs
66045	Foam Rubber and Polyurethane Foam
66046	Metal Filing Cabinets - MISSING
66047	Folding Chairs
66048	Corrugated Fiber Boxes
66049	Fiberboard
66050	Caustic Soda

VOLUME II

66051	Ramie Decortication
66052	Men's Work Pants
66053	Wooden Shoe Lasts
66054	Overstuffed Furniture
66055	Envelopes
66056	Cardboard Boxes and Paper Products
66057	Insecticides
66058	Meat Processing
66059	Slaughtering and Meat Packing
66060	Smoked Meat
66061	Citrus Fruit - Whole Sections, Canned
66062	Men's Work Shirts
66063	Planning Mill
66064	Rough Sawing of Logs
66065	Barrels
66066	Fertilizer Mixing
66067	Asphalt Floor Tiles
66068	Rubber Soled Fabric Shoes
66069	Rubber Floor Tiles
66070	Plastic Moldings
66071	Vinyl Floor Tiles
66072	Leather Tanning
66073	Men's Dress Shoes
66074	Ladies' Handbags and Leather Specialties
66075	Glass Containers
66076	Beverage Boxes
66077	Block Ice
66078	Boxes and Shooks
66079	Coarse Wrapping Paper (6,000) Tons Annually
66080	Coarse Wrapping Paper (12,500) Tons Annually
66081	Corrugated Paper Cartons
66082	Customers, Lamps and Picture Frames

66126 Abrasive Wheels
66127 Agricultural Implements
66128 Aluminum Architectural Specialties
66129 Aluminum Cooking Utensils
66130 Asbestos-Cement Siding
66131 Automobile and Truck Leaf Springs
66132 Building Bricks
66133 Cement
66134 Ceramic Dinnerware
66135 Coil Springs
66136 Kitchen Earthenware
66137 Metal Spinning
66138 Mineral Wool
66139 Ornamental Ironwork
66140 Pharmaceutical Glass from Purchased Tubing
66141 Plating
66142 Plows
66143 Rice Paddy Cultivators
66144 Sanitary Ware
66145 Small Ceramics Shop
66146 Split Gib-Head Keys, and Taper Pins
66147 Stainless Steel utensils
66148 Storage Bins
66149 Superphosphates
66150 Two-Burner Gas Plates

VOLUME IV

66151 Adhesive Tape
66152 Automobile Batteries
66153 Bicycles
66154 Brooms
66155 Cloth Bags for Agricultural Products
66156 Concrete Blocks
66157 Concrete Pipe
66158 Concrete Slabs
66159 Dry Cleaning
66160 Electric Motors, 1/6 to 10 Horsepower
66161 Gold Jewelry
66162 Job Machine Shop
66163 Laundry
66164 Lead Pencils
66165 Motor Starters
66166 Paint and Varnish Brushes
66167 Potato Flakes
66168 Refrigerated Walk-In Coolers

66212 Electrodes for Neon Lights
66213 Enameled Plates, Teapots and Kettles
66214 Hand Tools
66215 Heaters, Kerosene Asbestos Type
66216 Centrifugal Blowers
66217 Kitchen Equipment
66218 Lemon Oil
66219 Book Matches
66220 Portable Cooking Stoves
66221 Pumps, small Hand and Power Driven
66222 Saccharin
66223 Vegetable Canning (Commercial)
66224 Vegetable Canning (Cooperative)
66225 Welded Pipe
66226 Artificial Teeth
66227 Artists' Oil Paints
66228 Automobile Mufflers
66229 Automobile Tires
66230 Automobile Tires and Tubes
66231 Canned Beet
66232 Canned Tuna Fish
66233 Carbide
66234 Sulfuric Acid
66235 Compressors, 1/4 Horsepower Sealed Unit
66236 Cotton Yarn
66237 Gray from Jobbing Foundry
66238 Cotton Yarn (Small Plant)
66239 Soda-Line Window Glass, 5,500 Tons Annually
66240 Soda-Line Window Glass, 7,500 Tons Annually
66241 Soda-Line Window Glass, 10,500 Tons Annually
66242 Plastic Eyeglass Frames
66243 Steel Bars and Shapes, 15,000 Tons Annually
66244 Steel Bars and Shapes, 30,000 Tons Annually
66245 Steel Billets
66246 Electroplating
66247 Specular Reflectors
66248 Textbook Publishing
66249 Straight Pins
66250 Women's Shoes

VOLUME VI

67251 Stretch Socks for Men and Children
67252 Toilet Seats and Lids
67253 Dehydrated Blackstrap Molasses
67254 Innerspring Mattresses and Box Springs

67255	Shock Absorbers, Automobile and Truck
67256	Industrial Hand trucks and Skids
67257	Standard Sports Stockings
67258	Bookcases, Corner Cabinets and Secretaries
67259	Poultry Farm (Egg Production)
67260	Cast Iron Soil Pipe
67261	Fig and Date Processing
67262	Wooden Wardrobes
67263	Dryers, Laundry, Household
67264	Bentwood Chairs
67265	Bathrobes
67266	Coffee Tables, End Tables, and Bed Stands
67267	Ladies Cotton Broadcloth Dresses
67268	Men's Wash and Wear Pants
67269	Castor Oil and Meal
67270	Lawn Furniture
67271	Reinforced Concrete Construction Products
67272	Church Furniture
67273	Gloves, Vinyl Treated Fabric
67274	Radio Receiving Sets
67275	Brief Cases, Leather
67276	Prawn Processing Plant
67277	Mechanical Springs
67278	Soybean Oil and Meal
67279	Pajamas, Cotton
67280	Optical or Precision Glass
67281	Souvenirs and Small Jewelry
67282	School Furniture
67283	Dry Cleaning, Self-Service, Coin Operated
67284	Plating of Automobile Parts
67285	Concrete Posts
67286	Ready-Mixed Concrete in Bags
67287	Oxygen and Acetylene, Bottles
67288	Cocoa Butter
67289	Wooden Handles
67290	Electric Outlets, Switches and Fuse Boxes
67291	Neon Signs
67292	Meet Canning Plant
67293	Brewer's Flakes
67294	Raisins, Dehydrated Grapes
67295	Walnut Veneer
67296	Wash Tubs and Pails
67297	Self-Service Laundry
67298	Metal Lockers

67299 10-Horsepower Utility Riding Tractors
67300 Power Lawn Mower

VOLUME VII

67301 Slip Covers for Furniture
67302 Brass Table Lamps
67303 Tile Roofing, Clay
67304 Canned Fish
67305 Cattle Feed from Manioc Pulp
67306 Laundry Bags
67307 Portable Sawmill
67308 Aluminum Foundry
67309 Foundry Pattern Making
67310 Jigs and Fixtures
67311 Processed Seafood
67312 Canned Dehydrated Onions
67313 Glucose from Cassava Starch
67314 High Alumina Refractory Brick and Cement
67315 Potato Chips
67316 Sheet Steel, Hot Rolled
67317 Starch, Oil and Feed from Sorghum Grain
67318 Fish Oil and Fish Meal Plant-Evaporation Process (Processing 20 Tons of Raw Fish Per Hour)
67319 Bottled Milk
67320 Flashlight and Radio Batteries
67321 Creosoted Wood Products
67322 Washing Machines, Household
67323 Liquefied Petroleum Gas (Distribution)
67324 Liquefied Petroleum Gas (Manufactured)
67325 Dimension Hardwood
67326 Canned Cherries
67327 Canned Asparagus
67328 Canned Beets
67329 Canned Peaches
67330 Canned Hominy
67331 Canned Okra
67332 Canned Sweet Potatoes
67333 Canned Strawberries
67334 Canned Sliced Apples
67335 Canned Blueberries
67336 Canned Apricots
67337 Canned Cream Style Corn
67338 Canned Dry Beans
67339 Canned Spinach
67340 Canned Wax Beans

67341 Canned Blackeyed Peas
67342 Canned Tomatoes
67343 Canned Cream of Celery Soup, Ready to Serve
67344 Canned Cream of Asparagus Soup, Ready to Serve
67345 Gloves - Plastic Fronts, Canvas Backs
67346 Non-Ferrous Metals Foundry
67347 Men's Wash and Wear Shirts
67348 Men's and Youths' Suits
67349 Kerosene Lanterns
67350 Bicycle Tires and Innertubes

VOLUME VIII

67351 Canned Cauliflower
67352 Canned Pumpkin
67353 Canned Whole Kernel Corn
67354 Canned Green Beans
67355 Canned Onions
67356 Canned Apple Sauce
67357 Canned Pears
67358 Burlap Cloth from Jute
67359 Wallboard from Gypsum and Fiber
67360 Restaurant and Cafeteria Furniture
67361 Venetian Blinds
67362 Men's Sport Shirts
67363 Rice Bran Oil and Bran Meal
67364 Canned Red Raspberries
67365 Canned Tomato Soup, Ready to Serve
67366 Canned Pea Soup, Ready to Serve
67367 Canned Pork and Beans
67368 Candy and Confectionery
67369 Women's and Misses' Suits
67370 Shoe Repair Shop
67371 Grocery Carts
67372 Zinc Die Castings
67373 Wood Stake Truck Bodies
67374 Poultry Farm (Broiler Production)
67375 Pearl Starch
67376 Chocolate Dipped Products
67377 Fish Oil and Fish Meal Plant - Evaporation Process (Processing 40 tons of Raw Fish Per Hour)
67378 Slips, Women's Misses'; Children's
67379 Pottery, Eartherware
67380 Glazed Fruit and Fruit Peel
67381 Canned Cranberries
67382 Canned Green Peas

67383	Canned Sliced Pineapple
67384	Canned Lima Beans
67385	Assorted Nuts, Processed and Packaged
67386	Canned Squash
67387	Canned Plums
67388	Food Processing, General
67389	Canned Carrots
67390	Canned Kale Greens
67391	Canned Broccoli
67392	Canned Tomato Soup
67393	Canned Bean Soup, Ready to Serve
67394	Canned Cream of Corn Soup, Ready to Serve
67395	Canned Cream of Mushroom Soup, Ready to Serve
67396	Canned Sardines
67397	Women's and Misses' Cotton Gingham Dresses
67398	Nurses' Washable Service Apparel
67399	Light Bulb Assembly Plant
67400	Rockers, Wood, Upholstered

ADHESIVE TAPE

I. P. No. 66151

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

ADHESIVE TAPE: Standard Industrial Classification 3842

A. PRODUCT DESCRIPTION

Surgical adhesive tape, made with a heavy, unbleached muslin backcloth and containing a waterproof layer. Adhesives used vary and are considered "trade secrets". Selection of adhesive formula depends on particular properties desired, producer's experience, availability of raw materials. Finished product should be exceptionally clean and free from impurities, and should be capable of sterilization at high temperature without change of adhesive properties. Tape is manufactured in rolls 36" wide and distributed to buyers in standard size, 12" by 10 yards.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this industry are relatively modest. The product is used primarily for surgical purposes. Though it can be used for other purposes, it would generally be considered too expensive for uses other than surgical. Quality is a highly important consideration. In an area that has a well-developed and expanding medical service, this industry seems to have considerable promise. Once established, the plant could easily expand into manufacture of related products, such as electrical insulating tape, packaging adhesive tape, etc., if sufficient local demand exists.

C. MARKET ASPECTS

1. USERS. Hospitals, private physicians. Individuals usually only buy such tape when it has been reduced to narrow widths and suitably packaged.

2. SALES CHANNELS AND METHODS. Wholesale druggists. Some direct sales to hospitals and clinics.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Product is very easy to handle and transport costs are insignificant. Domestic market will normally be nation-wide. b. Export. Market is world-wide.

4. COMPETITION. a. Domestic Market. Competition from imports may be taken. Quality is highly important in the case of such a product. b. Export Market. Plant described could not normally compete in general export trade with large-scale producers with their well-established foreign sales organizations.

5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend on the extent to which modern medical services have been established. Where these are reasonably well developed, a plant of this size could probably find a market in most areas, unless the population is unusually small.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY- ONE-SHIFT OPERATION : 30,000 Yards, 36 Inches Wide

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 2,500 sq. ft.		$ --
Building. One story, 30'x'40.		7,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 31,000	
Other tools & equipmt.	1,500	
Furniture & fixtures	500	33,000
Total (excl. Land)		$ 40,000

Principal Items. Adhesive mixing machine, mixing & solution pots, applicators, gages & pumps, fabric rolls, pressure rolls, pull rolls & motors, slicer, conditioning & processing equipment, dirt & dust filtering equipment, quality control equipment, experimental laboratory equipment.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 7,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	500
Training Costs		1,700
Total Working Capital		$ 10,000

c. TOTAL CAPITAL (EXCL. LAND) $ 50,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements		Annual Cost
Fabric	30,000	yds.	$ 3,000
Adhesive	9,000	lbs.	500
Prime coat, waterproof coat, & anti-offset coating layers			1,450
Retail packaging			450
Total			$ 5,400

b. Supplies	
Lubricants & hand tools	$ 200
Laboratory supplies	200
Maintenance & repair parts	400
Office supplies	200
Total	$ 1,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 40 hp.	$ 1,200
b. Fuel. Gas for production, oil or other boiler fuel for heating.	$ 1,200
c. Water. For production, sanitation & fire protection.	$ 300

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled working foreman	1	$ 7,000
Semi-skilled	2	10,000
Unskilled	2	$ 8,000
Total	5	$ 25,000
b. Indirect Labor		
Manager	1	$ 9,000
Office	1	4,000
Total	2	$ 13,000

c. Training Needs. Manager & working foreman should be fully experienced They should be able to do all necessary labor training.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

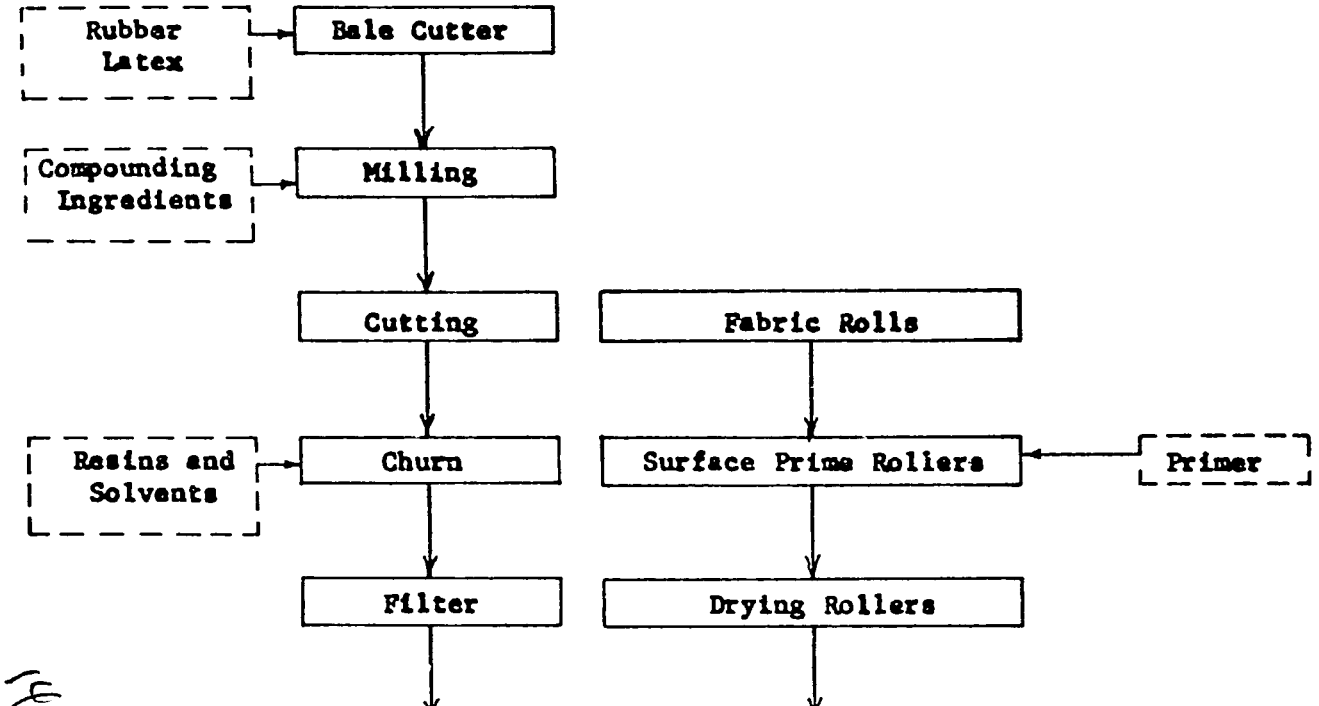
a. Annual $ Costs	
Direct Materials	$ 5,400
Direct Labor	25,000
Manufacturing Overhead(a)	16,700
Admin. Costs(b), Contingencies	3,200
Sales Costs(c), Bad Debts,	3,500
Depreciation on Fixed Capital	3,800
Total	$ 57,600

b. Annual Sales Revenue $ 75,000

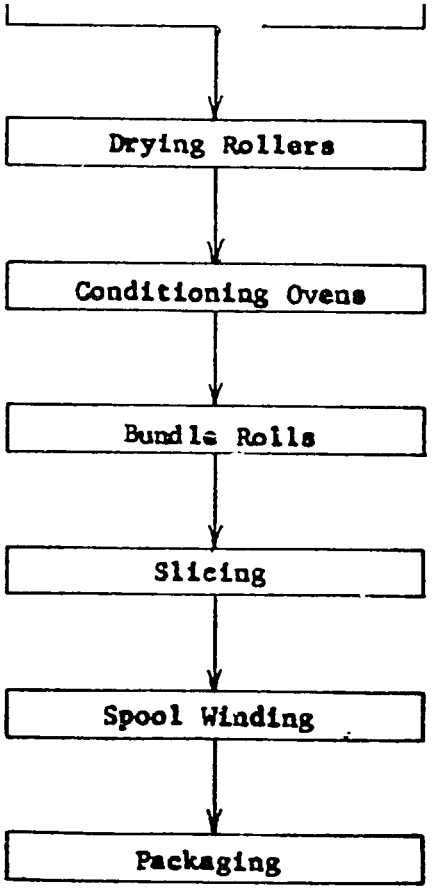
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT

ARROWS INDICATE FLOW OF WORK



ADHES



Building

One Story—30 ft. × 40 ft.

ADHESIVE TAPE: S. I. C. 3842

SELECTED REFERENCES

I. TEXTBOOKS

A Adhesion and Adhesives. G. Salomon and R. Houwink, eds. 2nd revised edition. 2 vols. Vol. 1, 1965, Vol. II, 1966. $24.00. each.
American Elsevier Publishing Co., Inc.
52 Vanderbilt Avenue, New York, N. Y. 10017

B. Handbook of Adhesives. I. Skeist. 1962. $23.50.
Reinhold Publishing Corporation
430 Park Avenue, New York, N. Y. 10022

C. Adhesive Bonding of Reinforced Plastics. H. A. Perry and Richard H. Wagner. 1959. 267 p. Illus. $9.75.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

D. Adhesion and Adhesives. N. A. De Bruyne and R. Houwink. 1951. 518 p. Illus. $13.50.
D. Van Nostrand Company, Inc.
120 Alexander Street
Princeton, New Jersey 08540

II. U. S. GOVERNMENT PUBLICATION

A. Adhesive Tapes. IR-30360. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICAL

A. Industrial and Engineering Chemistry. Monthly. Non-Members $5.00.
American Chemical Society
1155 16th Street, N. W.,
Washington, D. C. 20036
Presents latest developments and information in the industrial and engineering chemistry fields, including adhesives, rubber base cements, their uses.

IV. U.S. PATENTS

Available U.S. Patent Office
Washington, D.C. 20231 $.25 each.

A. U. S. Patent No. 2,877,115. 1959. 6 p.
Process for making adhesive material for medical purposes.

B. Patent No. 2,855,925. 1958. 4 p.
Method of making pressure sensitive adhesive tape.

C. Patent No. 2,824,559. 1958. 4 p.
Method of producing adhesive material for bandages, tapes, and similar products.

V. TRADE ASSOCIATIONS

A. Manufacturers Surgical Trade Association
342 Madison Avenue
New York, N. Y. 10017

B. American Surgical Trade Association
176 West Adams Street
Chicago, Ill. 60603

VI. ENGINEERING COMPANIES

A. William Garrigue and Company, Inc.
7 South Clinton
Chicago, Ill. 60606
Chemical engineering consulting.

B. Foster D. Snell, Inc.
29 West 5th Street
New York, N. Y. 10003
Consulting, chemical, designing, research, physical testing.

VII. DIRECTORY

A. Buyers Guide of Chemical Week. Annual. Gratis with subscription to Chemical Week at $25.00/year.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
Lists chemicals manufacturers and supplies.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

AUTOMOBILE BATTERIES

I. P. No. 66152

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

AUTOMOBILE BATTERIES: Standard Industrial Classification 3691

.A PRODUCT DESCRIPTION

Simple lead-acid automobile batteries.

B. GENERAL EVALUATION

Capital requirements for this industry are moderate, and very little skilled labor is needed. Capital requirements could be further somewhat reduced by eliminating the casting, pasting, and filling machines and performing such work by hand. Given efficient operation, with maintenance of high quality and reasonable manufacturing costs, the plant should be able to compete with imports. It could easily expand into related fields, such as production of battery cables, battery cases, and industrial batteries. This industry appears to hold promise for many developing areas.

C. MARKET ASPECTS

1. USERS. Automobile owners.

2. SALES CHANNELS AND METHODS. Sales are made to automotive accessories distributors, and also direct to quantity users, such as taxi fleet owners, government departments. A distinctive trade name should be chosen. Very active sales promotion may be needed in the early stages.

3. GEOGRAPHICAL EXTENT OF MARKET. Batteries need to be rather carefully packed, but transport charges do not severely restrict the potential market area. Batteries are shipped all over the world.

4. COMPETITION. a. Domestic Market. Competition from imports may be keen. However, given reasonable costs and close attention to quality, plant described should be able to operate profitably in the domestic market.
   b. Export Market. This plant would not normally be able to compete in international trade with large-scale manufacturers.

5. MARKET NEEDED FOR PLANT DESCRIBED. Most large cities even in the less developed areas have sufficient automobile traffic to provide this plant with a market. If arrangements can be made to supply batteries for use in new cars, the market will be considerably larger than if the product is used only as a replacement.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 24,000 Units

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 16,000 sq. ft.		$ --
Building. One story, with area 7,800 sq. ft.		47,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$20,200	
Other tools & equipmt.	2,000	
Furniture & fixtures	700	
Transportation equipmt.	2,500	25,400
Total (excl. Land)		$ 72,400

Principal Items. Casting machine & lead melting pot, paste mixer & pasting machine, grid molds, molds & mold stands, burning rack, sealing compound melting pot, charging equipment, acid tanks, spray equipment, filling machine, lift truck & skids, hand trucks, conveyor belts, paint rollers, lead melting pot with burner, 1-ton pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 36,400
Admin. Costs(b), Contingencies Sales Costs(c)	30	1,900
Training Costs		4,800
Total Working Capital		$ 43,100

c. TOTAL CAPITAL (EXCL. LAND) $115,500

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Antimonial lead	125 tons	$ 42,000
Positive & negative oxides	125 tons	42,000
Sealing compound		300
Cases	24,000 units	30,000
Sets of covers	24,000 units	12,000
Vents	72,000 units	1,500
Separators		12,000
Sulphuric acid		4,000
Shipping cartons	24,000	2,400
Paint		150
Lacquer		250
Total		$146,600

b. Supplies

Maintenance & repair parts	$ 1,000
Propane gas	2,400
Office supplies	400
Total	$ 3,800

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 175 hp.	$ 3,600
b. Fuel. About 8,500 gals. oil, for heating & general purposes.	$ 1,000
c. Water. Purified water is required for use in batteries. About 400,000 gals of water needed annually for all purposes.	$ 1,200

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton truck for pickup & deliveries.	$ 1,000
b. External Transport Facilities. Good highway necessary.	

5. MANPOWER

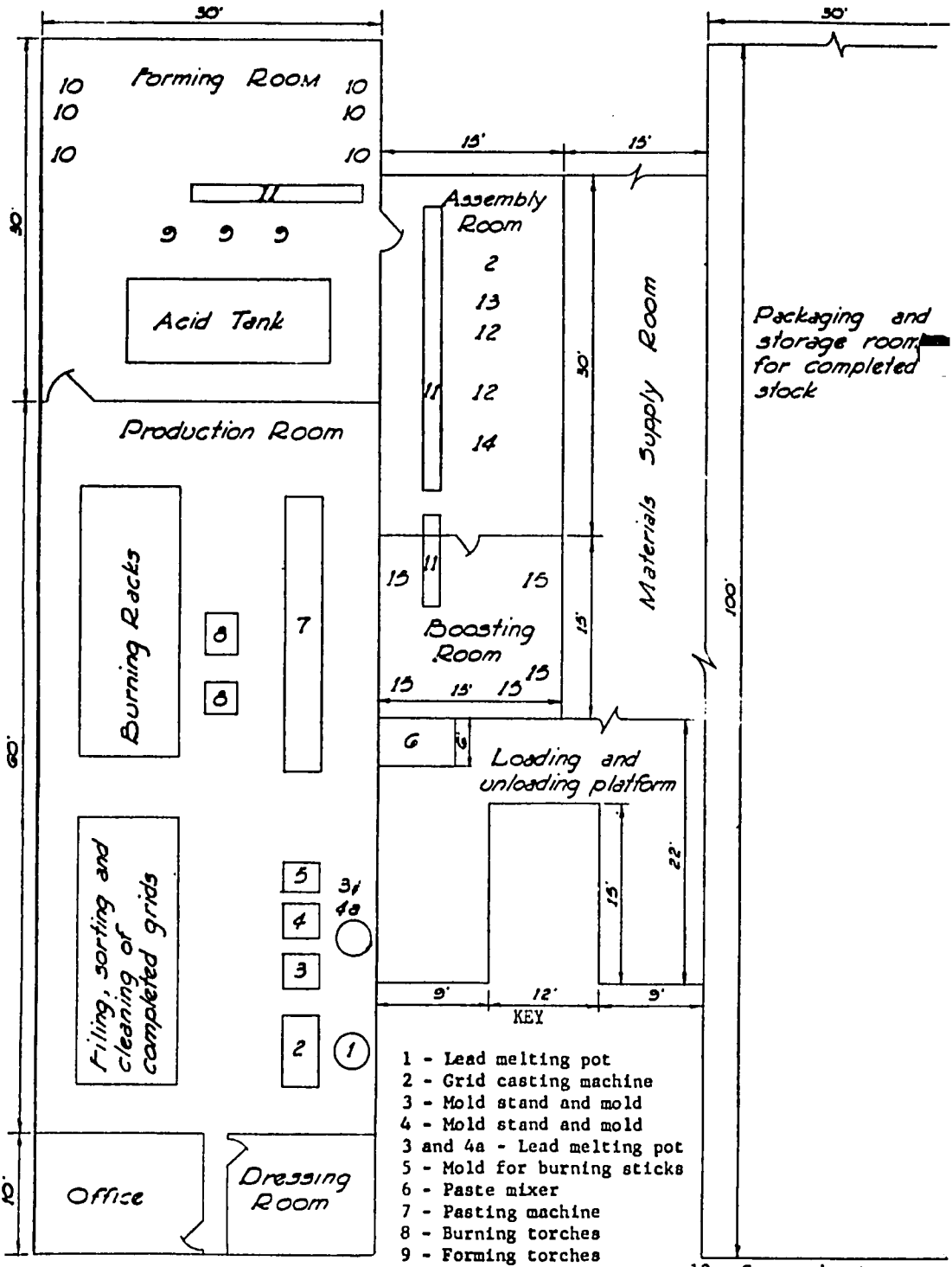
	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 6,000
Unskilled	9	36,000
Total	10	$ 42,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Other	1	4,000
Total	3	$ 19,000

c. Training Needs. Manager & 1 skilled worker should be fully experienced. They should be able to carry out all necessary training. Plant should reach full production in 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$146,600
Direct Labor	42,000
Manufacturing Overhead(a)	29,600
Admin. Costs(b) Contingencies	10,000
Sales Costs(c), Bad Debts	13,000
Depreciation on Fixed Capital	5,500
Total	$246,700
b. Annual Sales Revenue	$285,000

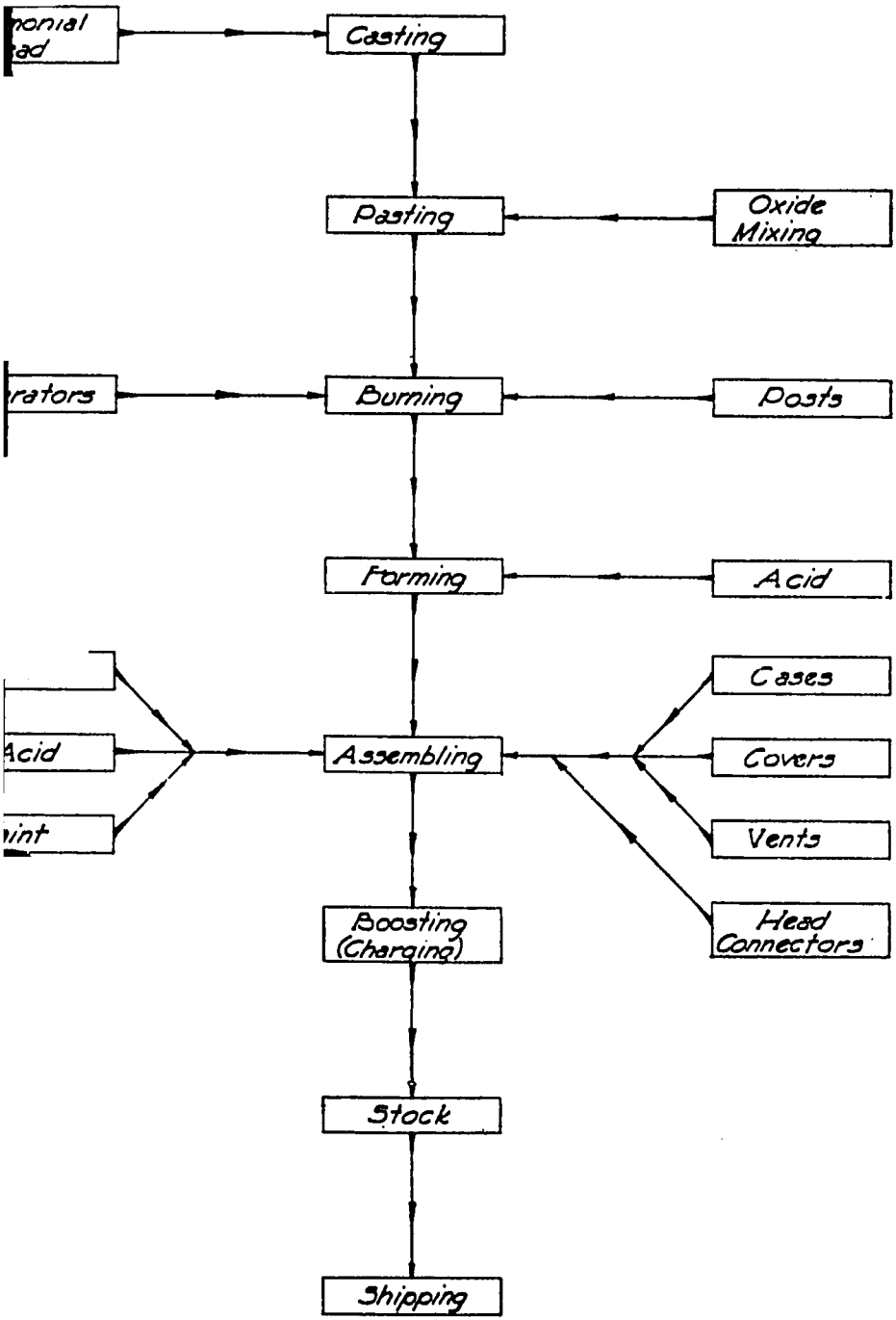
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.


30'
Forming Room
10
10
10
10
10
10
9
9
9
Acid Tank
Production Room
30'
60'
10'
Burning Racks
8
8
7
Filling, sorting and cleaning of completed grids
5
4
3
2
1
3a
4a
Office
Dressing Room
15'
15'
Assembly Room
2
13
12
11
12
14
30'
Materials Supply Room
Packaging and storage room for completed stock
50'
100'
11
15
15
Boosting Room
15
15
15
15
15'
6
6
Loading and unloading platform
22'
15'
9'
12'
9'
KEY
1 - Lead melting pot
2 - Grid casting machine
3 - Mold stand and mold
4 - Mold stand and mold
3 and 4a - Lead melting pot
5 - Mold for burning sticks
6 - Paste mixer
7 - Pasting machine
8 - Burning torches
9 - Forming torches
10 - Rectifiers (chargers)
11 - Conveyor belt
12 - Assembling torches
13 - Compound pot
14 - Filling machine
15 - Final chargers

22

PLANT LAYOUT AND FLOW OF WORK

AUTOMOBILE BATTERIES: S. I.C. 3691



AUTOMOBILE BATTERIES: S.I.C. 3691

SELECTED REFERENCES

I. TEXTBOOKS

A. Essentials of Electricity. William H. Timble and Arthur Pike. 3rd edition. 1963. Illus. $6.50.
John Wiley and Sons, Inc.
605 3rd Avenue
New York, N. Y. 10016
Electrical power and energy, including batteries and electrochemical action.

B. Storage Batteries. G. H. Vinal. 4th edition. 1955. 446 p. $12.50.
John Wiley and Sons, Inc.
605 3rd Avenue
New York, N. Y. 10016
Materials and methods of manufacturing.

C. Life Testing of Automobile Batteries. Gratis.
Battery Division
Electrochemical Society
1860 Broadway
New York, N. Y. 10023

II. U. S. GOVERNMENT PUBLICATIONS

A. Automobile Batteries. IR-23988. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Automobile Batteries. IR-24066. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

C. Production of Automobile Batteries IR-11953. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICAL

A. The Battery Man. Monthly. $3.00/year.
Independent Battery Manufacturers of America, Inc.
2939 Los Altos Drive
Largo, Fla. 33540
Provides subscribers with news, technical and market information, and developments in the battery industry.

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,757,222. July 31, 1956. 2 p.
Electric storage batteries, particularly those wherein the electrochemically active medium is present under pressure.

B. Patent No. 2,684,396. July 22, 1954. 5 p.
Battery plates, particularly for batteries of the silver-zinc-alkali type.

V. TRADE ASSOCIATIONS

A. Association of American Battery Manufacturers
19 N. Harrison Street
East Orange, New Jersey 07012
Provides members with news and information on latest developments and markets in the battery trade.

B. Independent Battery Manufacturers of America
2939 Los Altos Drive
Largo, Fla. 33540

VI. ENGINEERING COMPANIES

A. Vacudyne Corporation
Torrence Avenue
Chicago, Ill. 60633
Electrical-Chemical and Mechanical-Structural.

B. Chemical Construction Corporation
525 West 43rd Street
New York, N. Y. 10036

VII. DIRECTORY

A. Thomas' Register of American Manufacturers. $30.00.
Thomas Publishing Company
461 Eighth Avenue
New York, N. Y. 10001
Lists manufacturers and suppliers of machinery, equipment, materials, and services.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

BICYCLES

I. P. No. 66153

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

BICYCLES: Standard Industrial Classification 3751

A. PRODUCT DESCRIPTION

Sturdy, good quality 26-inch bicycles, with diamond frame for men and drop frame for women. Smaller 24-inch bicycles and children's bicycles can be made in the plant, if demand for them is large enough. Also, with this machinery and equipment more elaborate mechanisms can be made, if demand for such models exists in the market area.

B. GENERAL EVALUATION

Capital and skilled labor requirements are moderate. The work consists largely of assembling from purchased parts. The economic feasibility of the industry will depend principally on labor costs in the area concerned.

C. MARKET ASPECTS

1. USERS. Individuals, postal and telegraph authorities, police, etc.

2. SALES CHANNELS AND METHODS. Most sales are made to retail stores. Some sales may be made direct to organizations such as those mentioned above. A well-chosen brand name is desirable. Regular advertising, e.g., in journals and on billboards, is commonly necessary.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Product is fairly easy to handle and transport costs are not particularly high in relation to unit value. Market may be nation-wide. b. Export. World-wide market.

4. COMPETITION. a. Domestic Market. Competition from imports will normally be keen. b. Export Market. A plant of the size described would be unable to compete with major producers in, e.g., Japan, U.K. and other Western European countries, in export business.

5. MARKET NEEDED FOR PLANT DESCRIBED. Extent of demand for bicycles will depend on income level and how far bicycles are an appropriate means of transport in the area concerned. In many areas, bicycles continue to be a very popular form of transportation and demand for them is steady. In such areas the output of this plant would probably meet the demand for additions to and replacements of the stock of bicyles of a community numbering about 2 million people with an average growth rate.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 12,000 Bicycles

. CAPITAL REQUIREMENTS

. FIXED CAPITAL

		Cost
Land. About 40,000 sq. ft.		$ --
Building. One story, 40'x100'.		$ 24,000
Equipment, Furniture & Fixtures.		
Progn. tools & equipmt.	$12,000	
Furniture & fixtures	1,000	
Transportation equipmt.	2,500	15,500
Total (excl. Land)		$ 39,500

Principal Items. Bench grinder, power hacksaw, bench drill press, metal band saw, bender, electric drills, flexible tube grinder, welding kits, spray booth, degreasing vats, fixtures, forms, dies, vises, hand tools, cutting tools, 1-ton truck.

WORKING CAPITAL

	No. of Days	
Direct Materials	90	$ 59,100
Direct Labor, Mfg. Overhead(a)	60	19,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,200
Training Costs		8,800
Total Working Capital		$ 90,200

. TOTAL CAPITAL (EXCL. LAND) $129,700

2. MATERIALS AND SUPPLIES

	Annual Cost
a. Direct Materials	
Purchased parts	$215,000
Tubing for frames	10,800
Seat posts	1 000
Carbon steel for rear frame lugs	500
Shipping cartons	9,000
Total	$236,300
Supplies	
Welding rods	$ 1,000
Acetylene gas	2,200
Oxygen	2,700
Enamel	2,400
Grinding, polishing & cutting tools	300
Caustic soda, hand tools, & office supplies	300
Total	$ 8,900

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 25 hp.	$ 800
b. Fuel. Small boiler needed for hot water for degreasing and for heating.	$ 400
c. Water. For boiler, sanitation & fire protection.	$ 100

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton truck for pickup & delivery.	$ 800
b. External Transport Facilities. No special requirements.	

5. MANPOWER

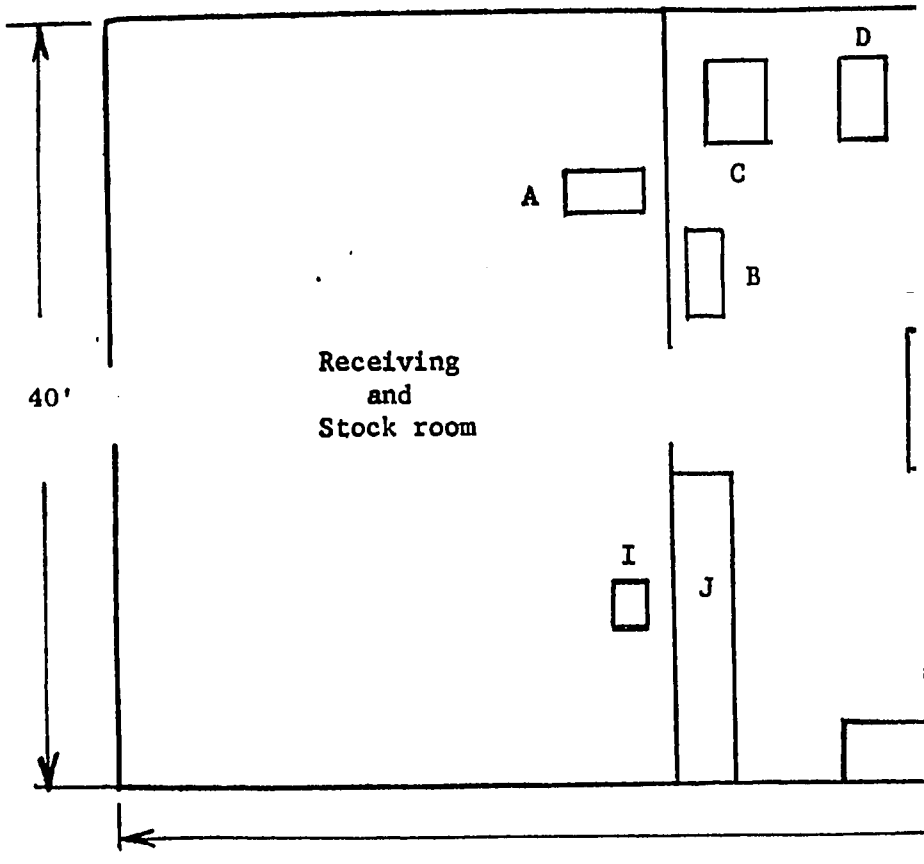
	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Unskilled	16	64,000
Total	19	$ 82,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	2	9,000
Other	1	4,000
Total	4	$ 23,000

c. Training Needs. Manager & 3 skilled men should be fully experienced. They should be able to train all other workers. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$236,300
Direct Labor	82,000
Manufacturing Overhead(a)	34,000
Admin. Costs(b), Contingencies	9,000
Sales Costs(c), Bad Debts	30,000
Depreciation on Fixed Capital	3,100
Total	$394,400
b. Annual Sales Revenue	$450,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

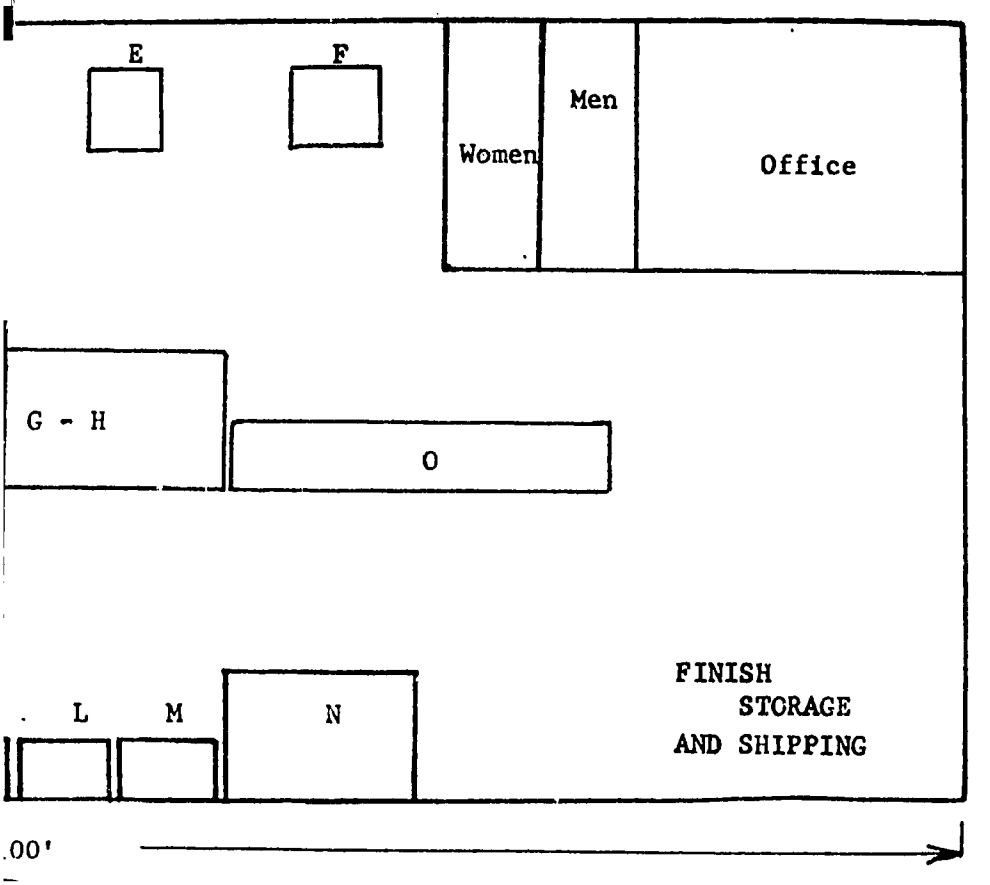


All parts except frame and wheels

A. Power hack saw
B. Bender
C. Punch press
D. Milling machine
E. Drill press
F. Bench grinder

I.C. 3751

YOUT



Wheels

omplete wheel assembly

Frame

I. Band saw
J. Frame welding
K. Grind and polish frame
L. Degrease frame
M. Rinse frame
N. Enamel frame
O. All parts to final assembly

BICYCLES: S. I. C. 3751

SELECTED REFERENCES

I. TEXTBOOKS

A. Fundamentals of manufacturing processes and materials. 1965. $10.50.
C. Edgar.
Addison-Wesley Publishing Co., Inc.
Reading, Mass. 01867

B. Materials and Processes in Manufacturing. 2nd edition. Illus. 1962.
Paul E. De Farmo. $10.95.
Macmillan Co.
60 5th Avenue
New York, N. Y. 10011

C. Principles of Manufacturing Materials and Processes. J. B. Campbell.
1961. $10.50.
McGraw-Hill Book Co. Inc.,
330 W. 42nd Street, New York, N. Y. 10036

D. Oxy-Acetylene Welding and Its Applications. 1958. 74 p. Gratis.
International Acetylene Association
30 East 42nd Street, New York, N. Y. 10017

II. U.S. GOVERNMENT PUBLICATION

A. Bicycles, TI-3. April 1958. 36 p. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523
Provides general information for establishing a plant to produce bicycles.

III. PERIODICALS

A. The Bicycle Journal. Monthly. $2.00/year.
Bill Quinn Publishing Company
606 South Main Street
Fort Worth, Texas 76104
News and supply sources in bicycling industry in the United States.

B. The American Bicyclist and Motorcyclist. Monthly. $3.00/year.
Cycling Press, Inc.
461 Eighth Avenue
New York, N. Y. 10001
News for the bicycling industry on developments in materials, supplies, processes. marketing.

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,227,232. December 31, 1960. 1940. 3 p.
Bicycle sprocket mounting.

B. Patent No. 2,353,712. July 18, 1944. 4 p.
Bicycle frame employing in its construction tubular frame elements.

C. Patent No. 2,531,750. November 28, 1950. 3 p.
Metallic brake elements, particularly brake devices such as coaster brakes for bicycles in which high unit pressure and high temperature are of common occurrence.

V. TRADE ASSOCIATIONS

A. Bicycle Institute of America
122 East 42nd Street
New York, N.Y. 10017

B. Cycle Parts and Accessories Association
122 East 42nd Street
New York, N.Y. 10017

C. Bicycle Manufacturers Association
122 East 42nd Street
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

A. Master Machine and Tool Company
921 West North Avenue
Chicago, Ill. 60622
Designing, industrial.

B. Armour-Portes Company
324 Grove Street
Worcester, Mass. 01605
Welding.

VII. DIRECTORY

A. Roster of the National Machine Tool Builders' Association. April 1958.
70 p. $1.00.
National Machine Tool Builders' Association
2071 East 102nd Street
Cleveland, Ohio 44106
Listings by producer and by product of machine tools and related products.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

BROOMS

I. P. No. 66154

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

BROOMS: Standard Industrial Classification 3981

A. PRODUCT DESCRIPTION

Plant can produce parlor brooms, standard brooms, warehouse brooms, whisk brooms, and hearth or toy brooms. Broomcorn is listed as the basic material, but local grasses or fibers may be suitable substitutes. Synthetic fibers of nylon and plastic are also increasingly used.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are modest. Locally produced broomcorn, or substitute materials, and wooden handles would generally be an advantage. The plant described is of mininum size for mechanized operations. If demand within the potential market area would not support the output of such a plant, possibility of economic operation with less mechanization might be worth examining. Products are in general demand and this industry would be suitable for many developing areas.

C. MARKET ASPECTS

1. USERS. Households, all kinds of building occupants.

2. SALES CHANNELS AND METHODS. Bulk of the sales to wholesale distributors, some to large retail establishments.

3. GEOGRAPHICAL EXTENT OF MARKET. Brooms are easily transported and freight charges are not especially onerous. However, since they can be easily made and materials are widely available, small makers can often compete effectively with factory products brought from a distance. This tends to restrict the market area. For this reason also brooms are not important in international trade.

4 COMPETITION. a. Domestic Market. Competition from imports is unlikely to be significant. Competition will come mainly from very small producers. With rising income and greater availability of electric power, vacuum cleaners may constitute competition. b. Export Market. Some export to nearby foreign areas might be possible but it is very unlikely that the plant could develop an important export trade.

5. MARKET NEEDED FOR PLANT DESCRIBED. In the average conditions of less developed areas, this plant would probably be able to produce sufficient brooms to meet the needs of a total population of the order of a million people.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 150,000 Brooms

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 7,500 sq. ft.		$ --
Building. One story, 40'x60'.		14,400
Equipment, Furniture & Fixtures		
Prodn. tools & equipmt.	$5,200	
Furniture & fixtures	700	5,900
Total (excl. Land)		$ 20,300

Principal Items. Stitcher, winder, hand clipper, bundle cutter, scraper or seeder, hand tools, tables, bins & racks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 20,400
Admin. Costs(b), Contingencies, Sales Costs (c)	30	1,800
Training Costs		2,300
Total Working Capital		$ 24,500

c. TOTAL CAPITAL (EXCL. LAND) $ 44,800

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requmts.	Annual Cost
Broomcorn	222,000 lbs.	$ 50,000
Handles	150,000 pieces	13,750
Wire	10,500 lbs.	1,850
Labels, paint, dye & packaging		1,000
Total		$ 66,600

b. Supplies	
Maintenance & spare parts	$ 800
Lubricants & tools	100
Office supplies	200
Total	$ 1,100

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 15 hp.	$ 300
b. Fuel. 2,000 gals oil annually for heating, if necessary.	$ 300
c. Water. 800,000 gals. annually for general purposes.	$ 200

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. Good highway desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	2	10,000
Unskilled	2	8,000
Total	7	$ 36,000
b. Indirect Labor		
Manager	1	$ 9,000
Bookkeeper	1	5,000
Other	1	4,000
Total	3	$ 18,000

c. Training Needs. Manager must be experienced and with help of 1 skilled operator must train all workers. Plant should reach full production in 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

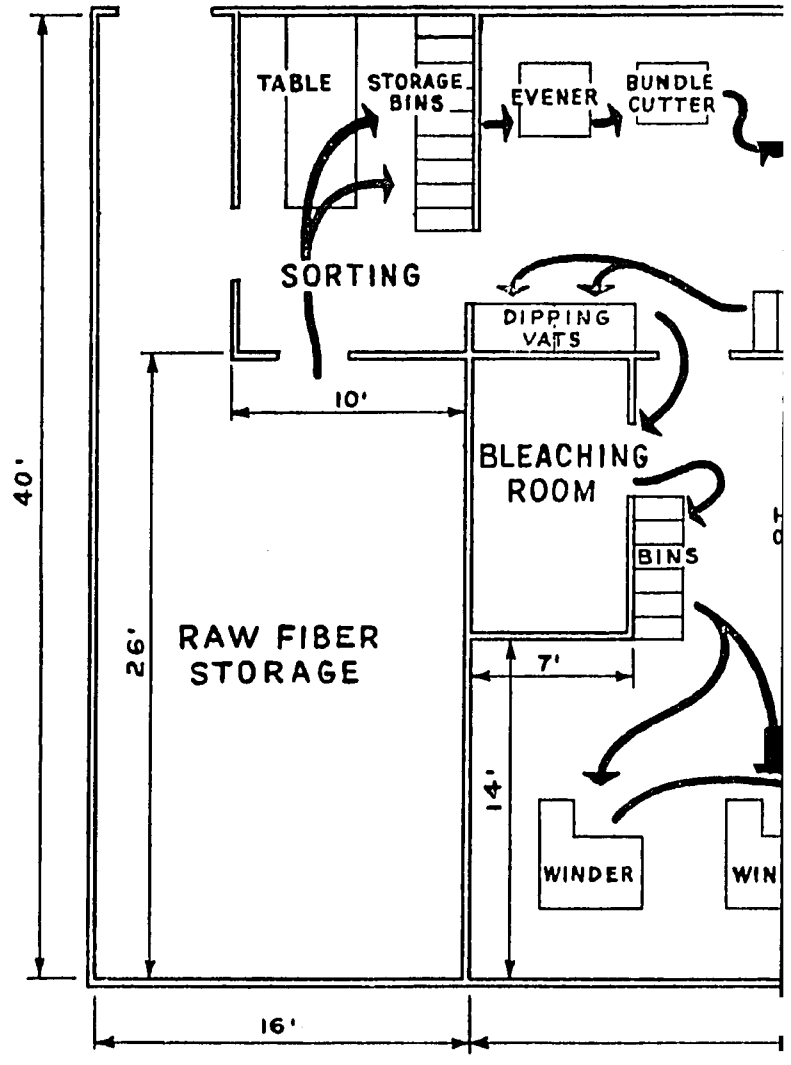
a. Annual Costs	
Direct Materials	$ 66,600
Direct Labor	36,000
Manufacturing Overhead(a)	19,900
Admin. Costs(b), Contingencies	8,000
Sales Costs(c), Bad Debts	13,000
Depreciation on Fixed Capital	1,300
Total	$144,800
b. Annual Sales Revenue	$165,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

BROOMS:

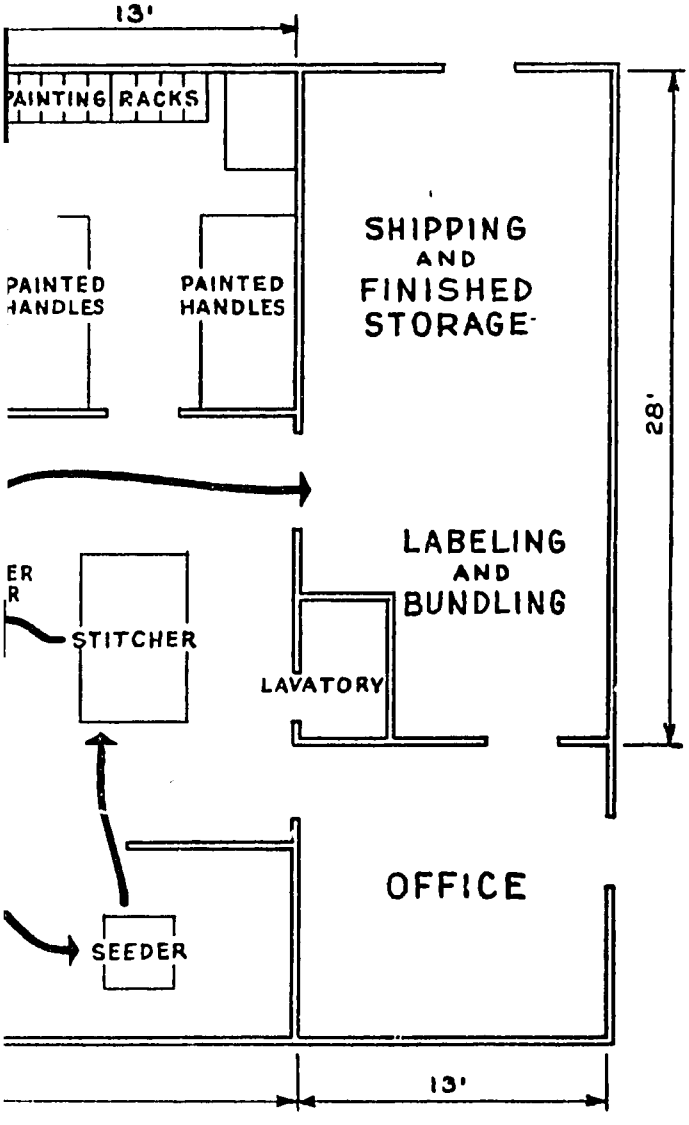
PLANT

ARROWS IN



1981

FLOW


13'
PAINTING RACKS
PAINTED HANDLES
PAINTED HANDLES
SHIPPING AND FINISHED STORAGE
28'
LABELING AND BUNDLING
ER R
STITCHER
LAVATORY
OFFICE
SEEDER
13'

BROOMS: S.I.C. 3981

SELECTED REFERENCES

I. TEXTBOOK

A. Buyers' Guide. Published by Brushware. $3.00.
Trade Press Publishing Company
407 East Michigan Street, Milwaukee, Wisconsin 53202
Furnishes a complete list of sources for all types of materials, equipment and supplies used in the manufacture of brushes, brooms and mops.

II. PERIODICALS

A. Broom and Broomcorn News. Weekly. $7.00/year.
National Broom Manufacturing and Allied Industries.
Arcola, Ill. 61910
Supplies subscribers with news, development, and information on broom manufacturing and related supplies.

B. Brushware. Monthly. $4.00/year. (U.S.A.). $5.00/year. (Foreign).
Trade Press Publishing Company
407 East Michigan Street
Milwaukee, Wisconsin 53202
National magazine for the brush, broom, and mop industries.

III. U. S. PATENTS

Available U.S. Patent Office
Washington, D.C. 20231 $.25 each.

A. Patent No. 2,313,037. March 1, 1943. 4 p.
Apparatus for making brooms from various sorts of fibers and for assembling and securing the same in very simple and efficient manner.

B. Patent No. 2,258,936. Oct. 14, 1941. 5 p,
A novel and improved broom sewing machine.

C. Patent No. 2,186,378. Jan. 8, 1940. 6 p.
Broom sewing apparatus capable of rotating, from normal position to sewing position, the vise which grips the broom.

IV. TRADE ASSOCIATIONS

A. National Broom Manufacturers and Allied Industries Association
P. O. Box 387, Arcola, Ill. 61910

B. National Broom Corn and Supply Dealers Association
P. O Box 487
Arcola, Ill. 61910

V. ENGINEERING COMPANIES

A. Baltimore Broom Machine Company
2800 Sisson Street
Baltimore, Md. 21211
Broom winders, material handling equipment, clippers.

B. Johnson Equipment Company
P. O. Box 88
Wichita, Kansas 67201
Hand and power driven broom clippers, broom corn bundle cutters, foot operated broom banders.

VI. DIRECTORIES

A. MacRea's Blue Book. $15.00.
W. J. Brown
18 East Huron Street
Chicago, Ill. 60611

B. Conover-Mast Purchasing Directory. $30.00.
205 East 42nd Street
New York, N. Y. 10017

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

CLOTH BAGS FOR AGRICULTURAL PRODUCTS

I. P. No. 66155

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions

CLOTH BAGS FOR AGRICULTURAL PRODUCTS: Standard Industrial Classification 2393

A. PRODUCT DESCRIPTION

Bags made from 10 ounce jute burlap (other soft fibers may be substituted for jute according to local availability), 28 inches in width and 42 inches in length, suitable for bagging agricultural products such as coffee.

B. GENERAL EVALUATION

While paper in many areas has become a strong competitor of cloth bagging for agricultural products, it has by no means supplanted it. There are many areas where jute or other fibers are available, and where agricultural products frequently bagged in jute or other fiber bags, such as rice and coffee, are grown. Any of these areas would offer a market for a cloth bagging manufacturer. Some areas, such as India, have already built up a burlap industry that can meet competition in the international market because of the domestic availability of jute and low labor costs. Newly established manufacturers might not be able to compete with these older producers. However, they should be able to supply local needs. Capital requirements are moderate. Very little skilled labor is needed.

C. MARKET ASPECTS

1. USERS. Agricultural producers, traders and exporters; food processors, such as rice mills, and some industries.

2. SALES CHANNELS AND METHODS. Direct sales to large users. Sales to wholesalers for distribution to small users.

3. GEOGRAPHICAL EXTENT OF MARKET. Product is easily transported. Distribution generally will be nationwide. These bags are common in international trade.

4. COMPETITION. a. Domestic Market. Paper is not as important a competitor in the less developed areas where income is relatively low and purchased but disposable packing materials are a luxury. Cloth bags can be reused. However, their use is feasible only where quantities of products sold are fairly substantial, so that the weight and value involved justify the use of a durable material. Competition will come from some of the established manufacturers of bags located in nearby areas. b. Export Market. Plant could not compete in the world market where established manufacturers are supplying major consumers, but sales in surrounding territory not having bag manufacturing facilities might be possible.

5. MARKET NEEDED FOR PLANT DESCRIBED. Market for this plant should be measured in terms of agricultural production rather than in terms of population. Even there, however, the consumption of bags will differ according to sales methods used. These bags are intended primarily for bulk sale. Several million pounds of agricultural products being sold in bulk would be required to support the output of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 720,000 Bags

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 50,000 sq. ft.		$ --
Building. One story, 100'x100'. No windows in wall. Well ventilated & humidified.		60,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$80,000	
Other tools & equipmt.	2,000	
Furniture & fixtures	1,000	83,000
Total (excl. Land)		$143,000

Principal Items. Softener, breaking card, finisher card, first drawing frame, second drawing frame, roving frame, spinning frame-single-sided, twisting frame, sampling reel, winding machine, cop winding machine, dressing machine, looms, cropping machine, bag-making machine.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 42,900
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,100
Training Costs		11,000
Total Working Capital		$ 56,000

c. TOTAL CAPITAL (EXCL. LAND) $199,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Jute fiber	830,000 lbs.	$116,000

b. Supplies

Process oil	$ 600
Fittings	600
Maintenance & spare parts	6,000
Office supplies	400
Total	$ 7,600

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 134 hp.	$ 4,000
b. Fuel. About 4,500 gals. oil annually for steam for production & heating.	$ 600
c. Water. About 1.2 mn. gals. annually for production, sanitation & fire protection.	$ 300

4. TRANSPORTATION

a. Own Transport Equipment. None needed.

b. External Transport Facilities. Total in & out shipments about 70 tons a month. Good highway & railroad transport desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 6,000
Semi-skilled	3	15,000
Unskilled	18	90,000
Total	22	$111,000
b. Indirect Labor		
Manager	1	$ 9,000
Office	2	9,000
Total	3	$ 18,000

c. Training Needs. Manager must be fully experienced. With 1 skilled worker and 1 weaver he should be able to do all necessary labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

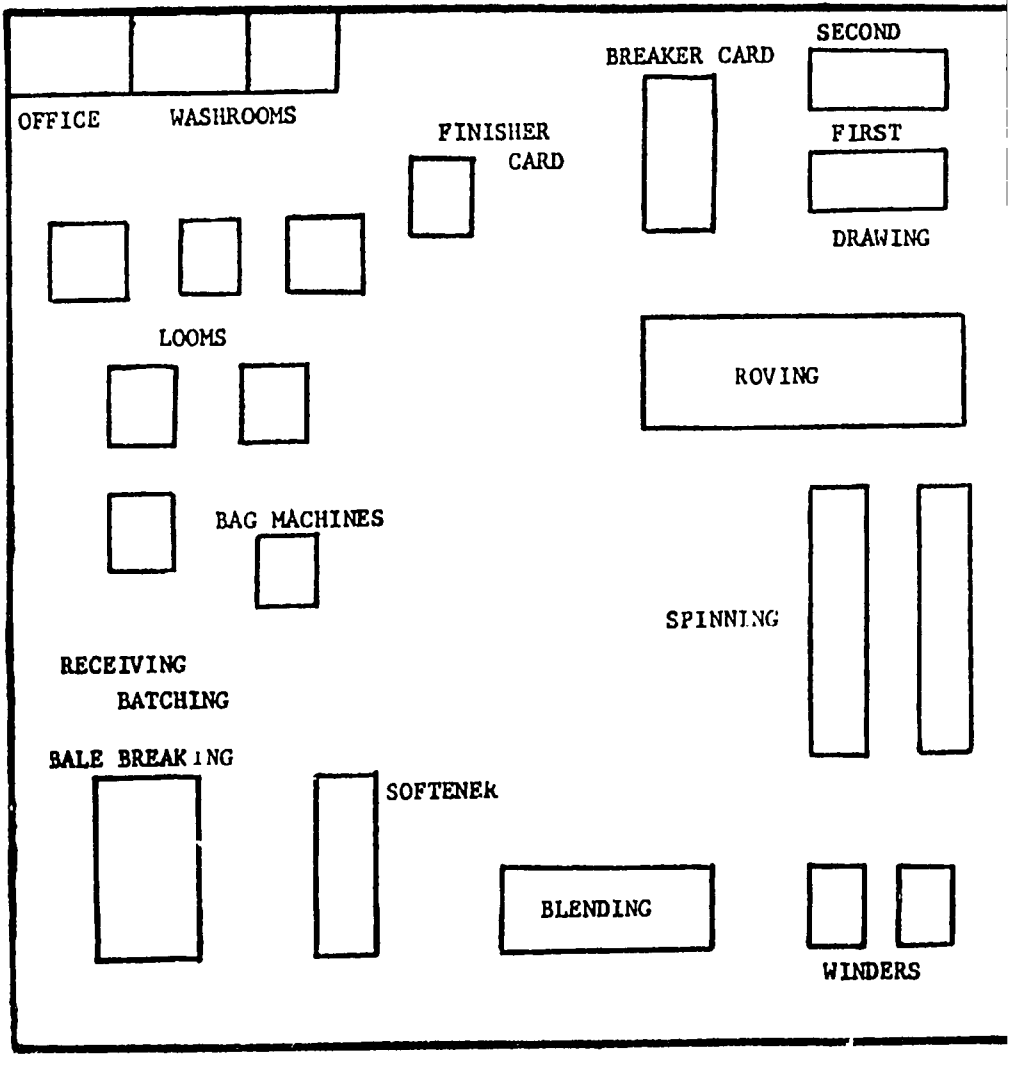
a. Annual Costs

Direct Materials	$116,000
Direct Labor	111,000
Manufacturing overhead(a)	30,500
Admin. Costs(b), Contingencies	11,000
Sales Costs(c), Bad Debts	14,000
Depreciation on Fixed Capital	11,600
Total	$294,100

b. Annual Sales Revenue $350,000

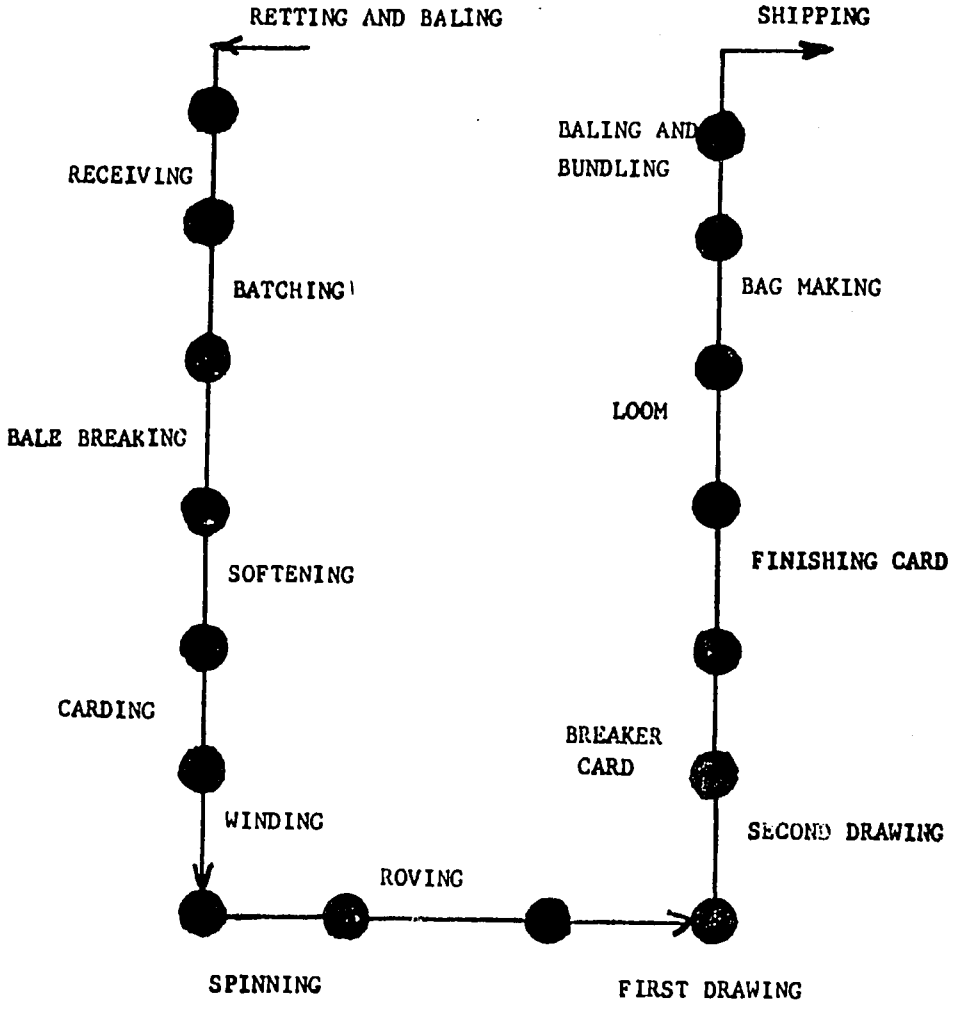
NOTES : (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAY


OFFICE
WASHROOMS
FINISHER CARD
BREAKER CARD
SECOND
FIRST
DRAWING
LOOMS
ROVING
BAG MACHINES
SPINNING
RECEIVING
BATCHING
BALE BREAKING
SOFTENER
BLENDING
WINDERS
100 feet

URAL PRODUCTS: S.I.C. 2393

ND WORK FLOW



CLOTH BAGS FOR AGRICULTURAL PRODTCTS: S.I.C. 2393

SELECTED REFERENCES

I. TEXTBOOKS

A. Textiles: Origins and Usage. 1964. $8.95.
Macmillan Co.
60 Fifth Avenue, New York, N. Y. 10011

B. Introduction to Textiles. Evelyn E. Stout. 2nd edition. 1965. $7.50.
John Wiley and Sons, Inc.
605 Third Avenue, New York, N. Y. 10016

C. Fibre to Fabric. M. D. Potter and B. P. Corbman. 1959. 302 p. Illus. $5.20.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

D. Handbook of Textile Fibers. J. Gordon Cook. 1955. $5 50.
Textile Book Service
257 Park Avenue, So.
New York, N. Y. 10010

E. Breaking Strength of Jute Fibers and Its Relation to Spinning Quality. 1959. 50 p. Gratis.
Indian Central Jute Committee
Calcutta, India

II. U. S. GOVERNMENT PUBLICATION

A. Cloth Bags for Agricultural Products. TI-50. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Textile World. Monthly. $15.00/year.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
News and technical information on machinery, materials, management and engineering.

B. America's Textile Reporter. Weekly. $4.00/year.
Frank P. Bennet and Company, Inc.
60 East 42nd Street
New York, N. Y. 10047
Markets, sources of materials and supplies, machinery, and equipment.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,972,799. 1961. 4p.
Woven cotton or burlap bag and method of forming same.

B. Patent No. 2,869,589. 1959. 3 p.
Process for making woven material for bags and other agricultural items.

V. TRADE ASSOCIATIONS

A. Textile Research Institute
P. O. Box 625
Princeton, New Jersey 08540

B. Southern Textile Association
218 West Morehead Street
Charlotte, North Carolina 28202

VI. ENGINEERING COMPANIES

A. Union Special Machine Company
402 North Franklin
Chicago, Ill. 60610
Bag sewing machines.

B. Bemis Brothers Bag Company
305 27th Street
Minneapolis, Minn. 55408
Bag sewing machines.

VII. DIRECTORY

A. Annual Buyers Guide. $1.00.
W. R. C. Smith Publishing Company
806 Peachtree Street
Atlanta, Georgia 30308
Annual review of all new products, services, and literature in the textile industry.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

CONCRETE BLOCKS

I. P. No. 66156

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

CONCRETE BLOCKS: Standard Industrial Classification 3271

A. PRODUCT DESCRIPTION

Production volume is expressed in terms of standard units, 8" by 8" by 16" hollow concrete blocks. Actual sizes and shapes produced will vary according to construction needs in particular market. Adaptation of equipment to production of different sizes and shapes is simple and inexpensive, principal change required being in mold or form used. Blocks vary considerably in weight according to kind of aggregates used.

B. GENERAL EVALUATION

Capital requirements are modest, and little skilled labor is needed. Many developing areas have established cement plants, and the other direct materials needed will commonly be available from local sources. It would generally be possible to operate economically even if cement has to be imported, provided the plant is located near the port of importation. Use of concrete blocks in construction of many different types of buildings is growing. Such blocks are comparatively cheap and are also easy to use. This industry appears to be suitable for many developing areas and to have good prospects of future expansion.

C. MARKET ASPECTS

1. USERS. Building and public works contractors. Individuals may purchase small quantities for repairs and minor jobs.
2. SALES CHANNELS AND METHODS. Sales to building and public works contractors, and to building supplies warehouses and stores. Salesmen should be thoroughly familiar with use of product and able to advise prospective customers.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. In U. S. these products are seldom sold beyond a radius of about 75 miles, because of high transport costs. However, where plants are few and located at great distance from each other, products may in some cases be sold farther afield, especially if there is an extensive system of inland waterways providing cheap transport for heavy and bulky goods. b. Export. Because of high freight costs, these products are seldom exported. Most countries possess alternative construction materials that would be cheaper than imported concrete blocks.
4. COMPETITION. a. Domestic Market. High freight costs usually give local producer effective protection against competition from imports. Competition comes mainly from alternative construction materials. Concrete blocks, however, are generally cheaper than brick or stone, and their use is tending to s read. b. Export Market. For reason stated in 3b., exports are insignificant.
5. MARKET NEEDED FOR PLANT DESCRIBED. Size of market needed, in terms of total population, will depend on rate of new construction within market area and the extent of competition from other materials. Where there are no special preferences for other building materials and where there are no other manufacturers of concrete blocks in the field, an urban area containing possibly half a million people, with fairly active development taking place in industry and trade, and with construction keeping place with growing needs, could probably provide a large enough market for this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 500,000 Blocks

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 5 acres.		$ --
Building. One story. About 2,000 sq. ft. floor space for production building, cement storage & office.		12,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$34,200	
Other tools & equipmt.	2,000	
Furniture & fixtures	800	
Transportation equipmt.	4,000	41,000
Total (excl. Land)		$ 53,000

Principal Items. Elevator conveyor, material bins, batch bin & scale, lift truck, mixer, skip loader, block machine, pallets, racks, curing room, boiler, delivery truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 15,500
Admin. & Sales Costs(b), Contingencies,	30	1,200
Training Costs		2,000
Total Working Capital		$ 18,700

c. TOTAL CAPITAL (EXCL. LAND) $ 71,700

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Cement	7,500 brls.	$ 25,000
Coarse aggregates	6,000 tons	15,000
Sand	2,000 tons	4,000
Total		$ 44,000
b. Supplies		
Maintenance materials & repair parts		$ 1,000
Lubricants & hand tools		100
Office supplies		200
Total		$ 1,300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 15 hp.	$ 500
b. Fuel. About 17,000 gals. oil annually.	$ 2,000
c. Water. About 800,000 gals. annually.	$ 200

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 5-ton delivery truck.	$ 1,200

b. External Transport Facilities. Total in & out shipments about 2,000 tons a month. Plant should be located on good all-weather highway and close to railroad.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 6,000
Semi-skilled	1	5,000
Unskilled	3	12,000
Total	5	$ 23,000
b. Indirect Labor		
Manager	1	$ 9,000
Office	1	5,000
Other	2	7,000
Total	4	$ 21,000

c. Training Needs. Manager should be experienced. With aid of 1 skilled workers, he should be able to do all necessary training. Plant should reach full production in 1 month.

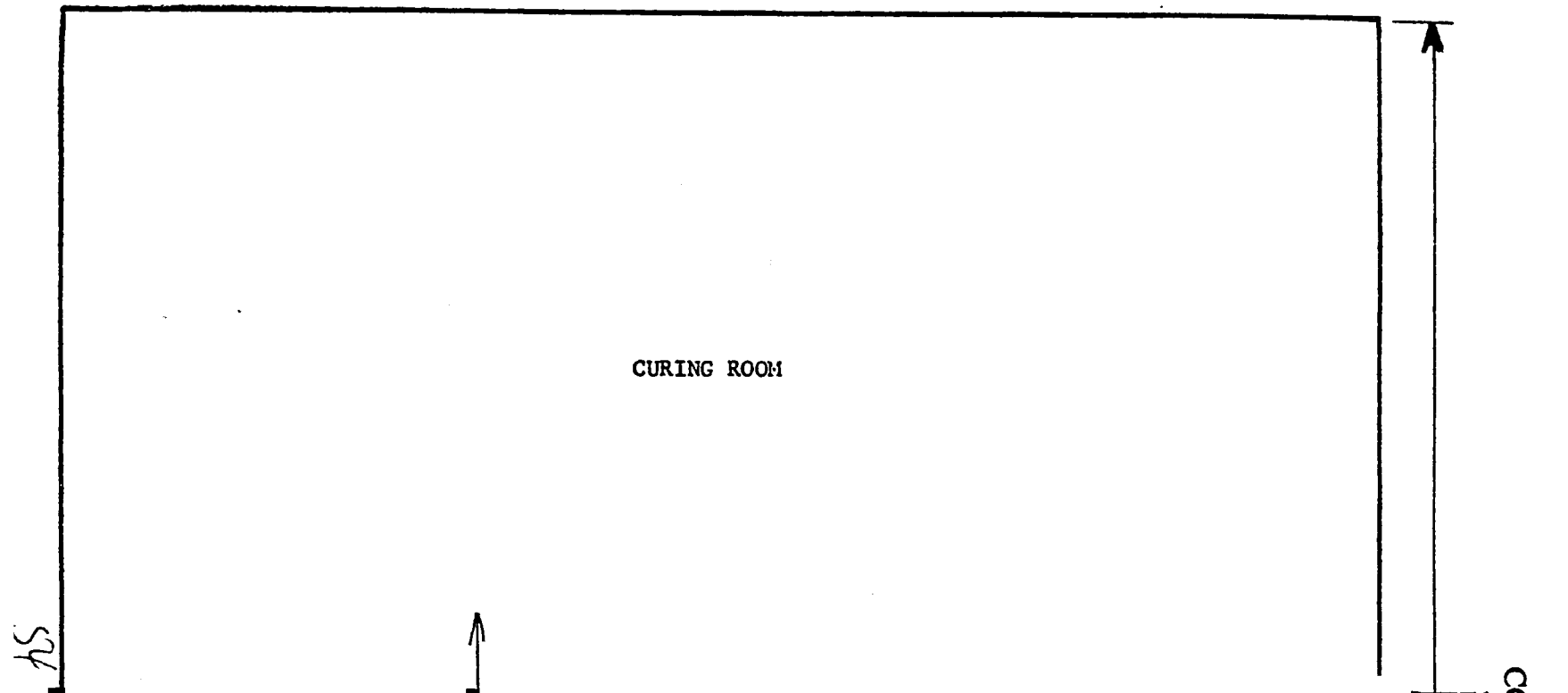
6. TOTAL ANNUAL COSTS AND SALES REVENUE

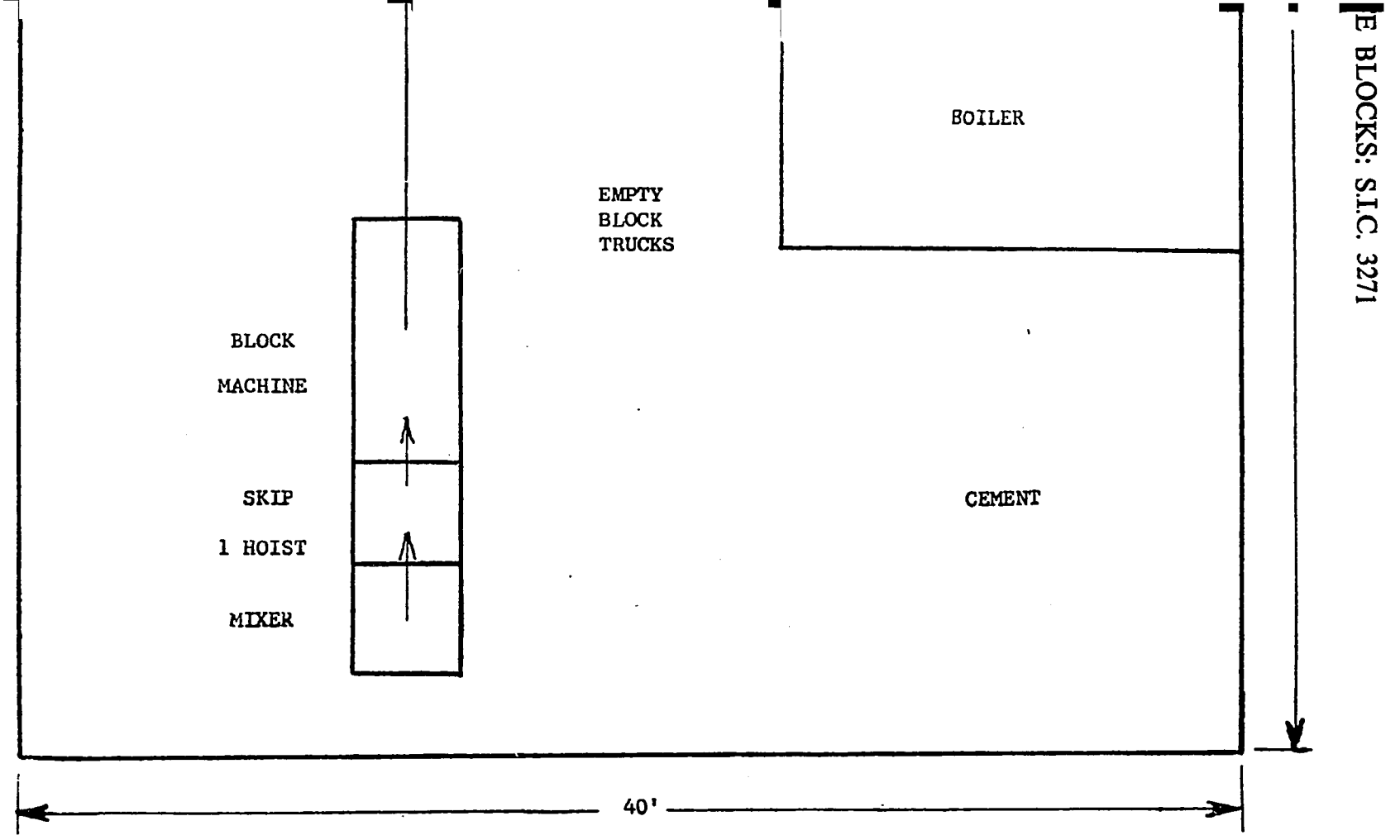
a. Annual Costs	
Direct Materials	$ 44,000
Direct Labor	23,000
Manufacturing Overhead(a)	26,200
Admin. & Sales Costs(b), Bad Debts, Contingencies	14,000
Depreciation on Fixed Capital	6,100
Total	$113,300
b. Annual Sales Revenue	$140,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges, Sales Commissions, Freight Out, Travel.

PLANT LAYOUT

ARROWS INDICATE FLOW OF WORK





E BLOCKS: S.I.C. 3271

CONCRETE BLOCKS: S.I.C. 3271

SELECTED REFERENCES

I. TEXTBOOKS

A. Concrete Technology and Practice. W. H. Taylor. 1965. $15.00.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue, New York, N. Y. 10017

B. Compositions and Properties of Concrete. G. E. Troxell and H. E. Davis. 1956. 433 p. Illus. $9.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

C. Theory and Practice of Reinforced Concrete. C. W. Dunham. 1953. 449 p. Illus. 2 vols. $9.75.
McGraw Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

A. The Manufacturing of Concrete Block. E-187. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Concrete Block. IR29814. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

C. Concrete Products. IR-23945 EP. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Concrete. Monthly. $6.00/year. (U.S.A.)
Concrete Publishing Corporation
400 West Madison Street
Chicago, Ill. 60606
Journal for producers of precast and prestressed concrete products.

B. Pit and Quarry. Monthly. $10.00/year. (Pan American). $15.00/year (Other)
Pit and Quarry Publications, Inc.
431 South Dearborn, Chicago, Ill. 60605
For producers and manufacturers of cement, and other non-metallic minerals.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each

A. Patent No. 2,708,783. May 24, 1955. 7 p.
Method for fabricating a block having a lateral surface of irregularly bulging surface.

B. Patent No. 2,706,322. April 19, 1955. 11 p.
Method in which controlled vibration and compression are utilized to produce concrete blocks of uniform density and superior strength.

C. Patent No. 2,601,532. June 24, 1952. 7 p.
Method of making faced building blocks and the like.

D. Patent No. 2,596,052. May 6, 1952. 12 p.
This invention relates particularly to the commercial production of concrete building blocks or tiles.

V. TRADE ASSOCIATIONS

A. National Building Material Distributors Association
22 West Menroe Street
Chicago, Ill. 60603
Members are supplied with news of developments in all building materials.

B. Portland Cement Association
33 West Grand Avenue
Chicago, Ill. 60610
Technical research and information.

VI. ENGINEERING COMPANY

A. General Engines Company, Inc.
Thorofare, New Jersey 08086

B. Columbia Machine Company
107 Grand Boulevard
Vancouver, Washington 98661

VII. DIRECTORIES

A. Thomas' Register of American Manufacturers. $30.00.
Thomas Publishing Company
461 Eighth Avenue
New York, N. Y. 1001
Lists of manufacturers and suppliers of machinery, equipment, materials, and services.

CONCRETE BLOCKS: S.I C. 3271

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

CONCRETE PIPE

I. P. No. 66157

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

CONCRETE PIPE: Standard Industrial Classification 3272

A. PRODUCT DESCRIPTION

Plain bell and spigot pipe, 4" to 24" diameter; reinforced bell and spigot pipe 12" to 36"; plain and reinforced tongue and groove pipe, 12" to 36". Pipe above 36" can be made with hand cast molds. On big and distant jobs, molds can be moved and pipe (42" and up) can be made on the job. Production capacity is expressed in feet of pipe of average diameter, on basis of U. S. experience of demand for different sizes.

B. GENERAL EVALUATION

Capital requirements for this industry are fairly high. On the other hand, the manufacturing operations are comparatively simple and skilled labor requirements are modest. Many developing areas have plans to develop their economic infrastructure whose implementation would involve considerable use of concrete pipe. Where such plans are being actively pursued, unless the area and population are unusually small, demand for this product should be large enough to justify establishment of a plant of the size described. This industry would appear to have a promising future in many developing areas.

C. MARKET ASPECTS

1. USERS. Construction contractors engaged in water supply, irrigation, drainage, sewerage, road construction and similar projects; also railroads, and public works departments, for work carried out with their own staffs.
2. SALES CHANNELS. Sales direct to construction contractors, railroads, public works departments.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. In U. S. there are several hundred concrete pipe plants scattered throughout the country, so as to be as close to users as possible, to save transport costs and speed deliveries. Purchases will normally be made from nearest plant, but, since product is more or less essential to certain types of construction work, transport costs will not directly limit demand where project is deemed to be necessary. In developing areas where plants are few, pipe may have to be transported long distances. As pointed out above, if it is more economical to do so, pipe can be made at the project site. b. Export. Since certain construction projects are often deemed essential, and concrete pipe is indispensable to their execution, recourse may be had to importation where locally produced supplies are non-existent or inadequate.
4. COMPETITION. a. Domestic Market. High freight costs should give local producer effective protection against imports. For certain types of work, if delivered costs of concrete pipe are unusually high, substitutes may be used, but for most uses cheap and effective substitutes are not available. b. Export Market Where imports are necessary, proximity will usually be the ruling factor in the choice of a supplier. Plant described might possibly make some sales in nearby areas of neighboring countries.
5. MARKET NEEDED FOR PLANT DESCRIBED. Market will depend on activity in development and maintenance of public works of types referred to. There should be no great difficulty in estimating demand for some period ahead, due account being taken of past performance in actual implementation of planned projects. Any area where plans are being put into operation for development of roads, railroads, airports, irrigation works, water supply systems and the like, should be able to provide a market for the output of a plant of this type and size.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 500,000 Feet

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 7 acres.		$ --
Building. One story, 150'x160'		144,000
Equipment. Funiture & Fixtures.		
Prodn. tools & equipmt.	$ 73,000	
Other tools & equipmt.	3,500	
Furniture & fixtures.	1,000	
Transportation equipmt.	4,000	81,500
Total (excl. Land)		$225,500

Principal Items. Two mixers, dual packer-head machine for pipe up to 18", concrete pipe machine for pipe up to 36", attachments for pipe machines, boiler, fork truck, delivery truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 33,300
Admin. & Sales Costs(b), Contingencies	30	1,800
Training Costs		11,300
Total Working Capital		$ 46,400

c. TOTAL CAPITAL (EXCL. LAND) $271,900

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Cement	7,500 bls.	$ 25,000
Coarse aggregates	5,000 tons	10,000
Sand	5,000 tons	9,000
Reinforcing wire mesh	60 tons	12,000
Total		$ 56,000
b. Supplies		
Maintenance & repair parts		$ 1,000
Welding rods & cutting tools		300
Lubricants & hand tools		200
Office supplies		200
Total		$ 1,700

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power, Connected load about 108 hp.	$ 3,000
b. Fuel. About 30,000 gals. oil annually.	$ 3,600
c. Water. About 1.5 mn. gals. annually.	$ 400

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 5-ton truck.	$ 1,200

b. External Transport Facilities. Total in & out shipments about 2,500 tons a month. Plant should be located on good all-weather highway and, if possible, close to railroad.

5. MANPOWER

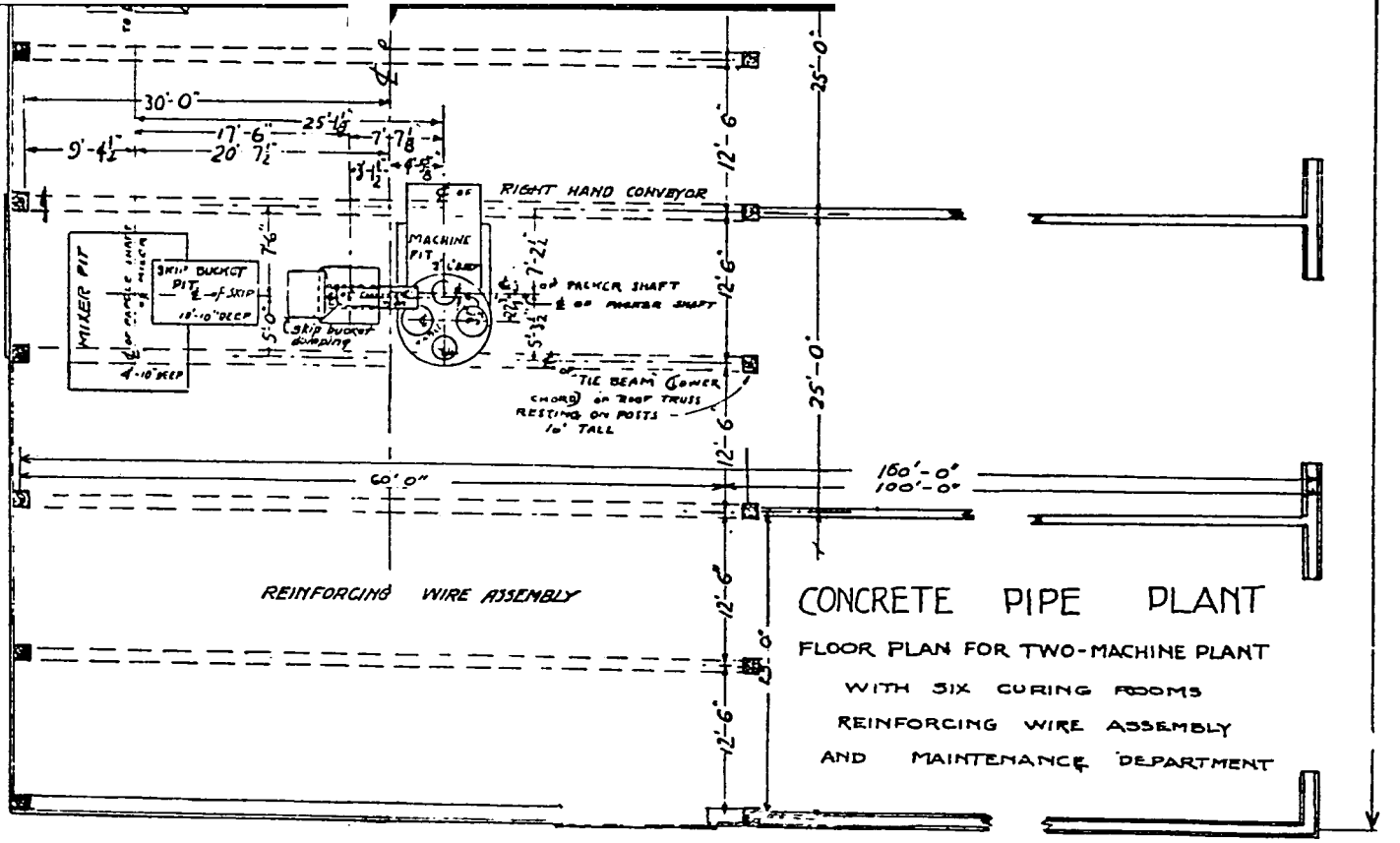
	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	4	20,000
Unskilled	16	64,000
Total	23	$102,000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office	1	5,000
Other	2	9,000
Total	5	$ 32,000

c. Training Needs. Manager & supervisor should be experienced. Together with 2 skilled workers, they should be able to do all training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 56,000
Direct Labor	102,000
Manufacturing Overhead(a)	41,900
Admin. & Sales Costs(b), Bad Debts, Contingencies	21,000
Depreciation on Fixed Capital	16,300
Total	$237,200
b. Annual Sales Revenue	$290,000

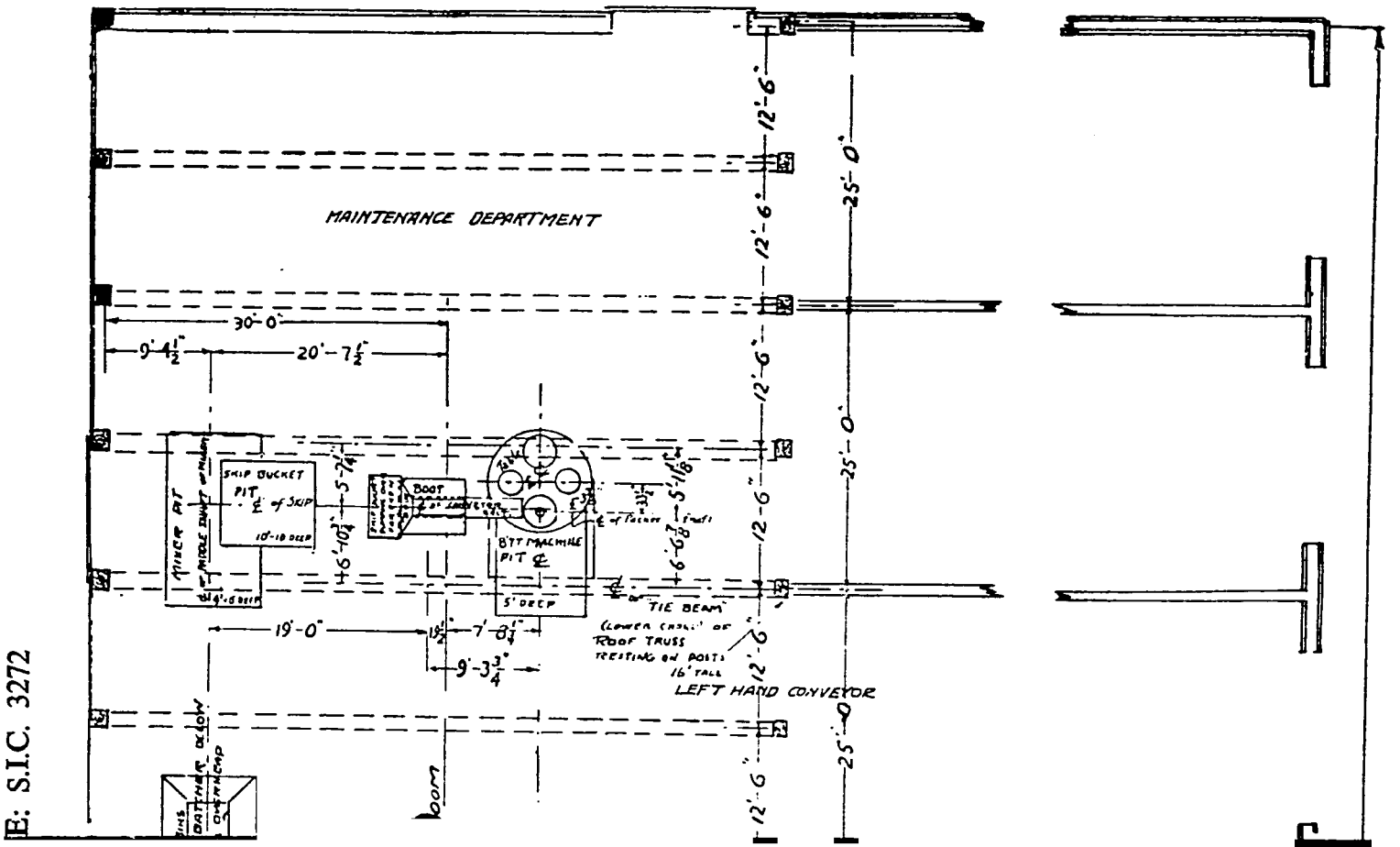
NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges, Sales Commissions, Freight Out, Travel.



Work Flow

Batcher
Pipe Machines
Curing Rooms

PLANT LAYOUT



E: S.I.C. 3272

CONCRETE PIPE: S.I C. 3272

SELECTED REFERENCES

I. TEXTBOOKS

A. Concrete Technology and Practice. W. H. Taylor. 1965. $15.00.
American Elsevier Publishing Co., Inc.
52 Vanderbilt Avenue
New York, N. Y. 10017

B. Compositions and Properties of Concrete. G. E. Troxell and H. E. Davis.
1956. 433 p. Illus. $9.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street,
New York, N. Y. 10036

C. Theory and Practice of Reinforced Concrete. C. W. Dunham. 1953.
449 p. Illus. 2 vols $9.75.
McGraw-Hill Book Company, Inc.
330 West 42nd Street,
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

A. Mannfacture of Concrete Pipe. IR-11078. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Concrete Products. IR-23945EP. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Concrete. Monthly. $6.00/year (U.S.A.)
Concrete Publishing Corporation
440 West Madison Street
Chicago, Ill. 60606
Journal for producers of precast and prestressed concrete products

B. Pit and Quarry. Monthly. $10.00/year (Pan-American). $15.00/year (Other).
Pit and Quarry Publications, Inc.
431 South Dearborn
Chicago, Ill. 60605
For producers and manufacturers of cement and non-metallic minerals.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,932,874 April 19, 1960 14 p.
Apparatus for manufacturing concrete pipe centrifugally.

B. Patent No. 2,585,756. Feb. 12, 1952. 7 p.
Method and apparatus for forming concrete pipes.

C. Patent No. 2,533,579. Dec. 12, 1950. 10 p.
Method of and apparatus for the formation of concrete pipes.

D. Patent No. 2,216,896. Oct. 8, 1940. 4 p.
This invention relates to bell and spigot type concrete pipe and a method of making same.

V. TRADE ASSOCIATIONS

A. American Concrete Institute
P. O. Box 4754, Redford Station
Detroit, Michigan 48219

C. Concrete Pipe Association
228 N. LaSalle Street
Chicago, Ill. 60601

C. Pipe Fittings Manufacturers Association
60 East 42nd Street
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

A. General Engines Company
Thorofare, New Jersey 08086

B. Columbia Machine Company
107 Grand Boulevard
Vancouver, Washington 98661

C. Lock Joint Pipe Company
P. O. Box 269
East Orange, N. J. 07019

VII. DIRECTORY

A. Thomas' Register of American Manufacturers. $30.00.
Thomas Publishing Company
461 Eighth Avenue
New York, N. Y. 10001
Lists manufacturers and suppliers of machinery, equipment, materials and services.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

CONCRETE SLABS

I. P. No. 66158

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

CONCRETE SLABS: Standard Industrial Classification 3271

A. PRODUCT DESCRIPTION

Concrete slabs, reinforced with wire mesh, mainly suitable for non-bearing walls, ordinarily designed for specific structures by the architect. Plant capacity is given in terms of slabs of commonest size, viz., 8′ wide by 10′ high by 5″ thick, weight 2½ to 3 tons each. Where slabs are required for bearing walls, they are usually too heavy to cast at a plant and are poured at the construction site and lifted into position by cranes or other means.

B. GENERAL EVALUATION

Capital and skilled labor requirements are modest and a plant of the type described would be within the economic and technical capacity of many developing areas. The main problem to be examined is whether there is likely to be sufficient demand to absorb the production of the plant over a reasonable period of time. Many developing areas may not need large buildings, such as this type of construction material is suited for, on such a scale that they will need to seek substitutes for materials they have been accustomed to using in the past. Furthermore, developments in building techniques arouse some doubts as to the future prospects of this material even in the types of building for which it is adapted. Sufficient demand for the plant's products will probably exist only in somewhat special situations. Very careful preliminary investigation not only of current demand but also of future possibilities should be made before investing in this industry.

C. MARKET ASPECTS

1. USERS. Building contractors.

2. SALES CHANNELS AND METHODS. Sales are made direct to building contractors.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Because of the great weight and bulk of these products, the market is generally almost entirely local. b. Export. Because of high freight costs, and also because slabs are usually made to particular specifications for the job in hand, there is virtually no export trade in these products.

4. COMPETITION. Concrete slabs are generally used only in construction of large buildings. For this purpose they often have an advantage in price over older types of suitable materials. However, even in this field there is now some tendency for concrete blocks to be superseded by still newer materials and construction designs.

5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend on the extent to which construction of large buildings is going on and the relative cost and convenience of using concrete blocks as compared with alternatives. Esthetic preferences, however, may sometimes outweigh any cost advantages and turn the scale in favor of older materials, particularly in the case of major public buildings. In view of the specialized character of the demand, and the great variations in style and construction of large buildings in different countries, no useful generalization can be made about the size of the market needed. Since the market will necessarily have to be limited to a relatively small geographic area and to a limited section of the construction industry, investigation of the market situation should present no great problem.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 5,000 Slabs (400,000 Square Feet)

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 10 acres.		$ --
Building. One story, including cement storage & office, 200'x200'. Roof over production & form area.		20,000
Equipment. Furniture & Fixtures.		
Prodn. tools & equipmt.	$41,000	
Other tools & equipmt.	2,500	
Furniture & fixtures	700	
Transportation equipmt.	4,000	48,200
Total (excl. Land)		$ 68,200

Principal Items. Elevator conveyor, materials bin, batch bin & scale, lift truck, curing room & boiler, mixer, dump bucket & hoist, monorail, steel forms, portable vibrators, electric welding set, delivery truck.

b. WORKING CAPITAL

	No of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	$ 26,800
Admin. & Sales Costs (b), Contingencies,	30	1,800
Training Costs		1,600
Total Working Capital		$ 30,200

c. TOTAL CAPITAL (EXCL. LAND) $ 98,400

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Cement	7,500 bls.	$ 25,000
Coarse aggregates	6,225 tons	12,500
Sand	3,125 tons	5,600
Reinforcing wire mesh	120 tons	24,000
Total		$ 67,100
b. Supplies		
Maintenance & spare parts		$ 1,000
Lubricants & hand tools		100
Office supplies		200
Total		$ 1,300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load 15 hp.	$ 500
b. Fuel. About 27,000 gals. oil annually.	$ 3,200
c. Water. About 1.5 mn. gals annually.	$ 400

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 5-ton delivery truck.	$ 1,200

b. External Transport Facilities. Total in & out shipments about 2,500 tons a month. Plant should be located on good all-weather highway and, if possible, close to railroad.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	2	10,000
Unskilled	8	32,000
Total	13	$ 60,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Other	3	12,000
Total	5	$ 27,000

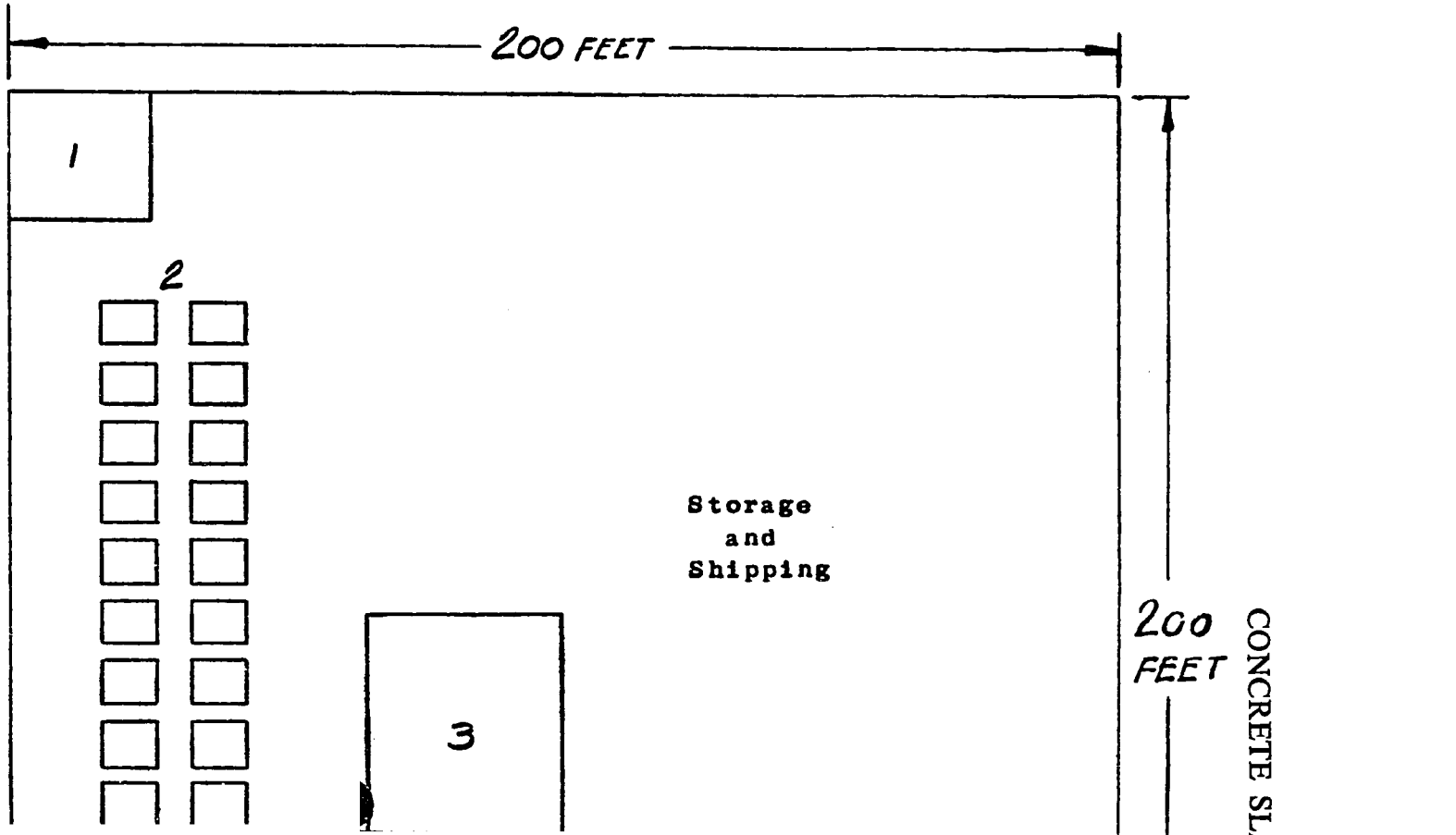
c. Training Needs Manager should be experienced. With assistance of 2 skilled workers he should be able to do all necessary training. Plant should reach full production in 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 67,100
Direct Labor	60,000
Manufacturing Overhead (a)	33,600
Admin. & Sales Costs (b), Bad Debts, Contingencies	21,000
Depreciation on Fixed Capital	6,700
Total	$188,400
b. Annual Sales Revenue	$220,000

NOTES : (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal and Audit Charges, Sales Commissions, Freight Out, Travel.

PLANT LAYOUT



Key

1. Office - 625 square feet.
2. Forms - 3,250 square feet.
3. Kilns - 1,740 square feet.
4. Mixer - 28 square feet.
5. Mixer, skip hoist, and block machine - 192 square feet.
6. Maintenance - 160 square feet.
7. Rest Room - 224 square feet.
8. Aggregate bin - 336 square feet.
9. Cement storage - 256 square feet.
10. Boiler - 160 square feet.

Sequence of Operation

6 and 7 Aggregate and cement
4 Mixer
5 Skip hoist and block machine
2 Forms
3 Kilns
11 Storage and shipping

CONCRETE SLABS: S. I. C. 3271

SELECTED REFERENCES

I. TEXTBOOKS

A. Concrete Technology and Practice W. H. Taylor. 1965 $ 15.00.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue
New York, N. Y. 10017

B. Compositions and Properties of Concrete. G. E. Troxell and H.E. Davis. 1956. 433 p. Illus. $.9.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

C. Theory and Practice of Reinforced Concrete. C. W. Dunham. 1953. 449 p. Illus. 2 vols. $9.75.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATION

A. Concrete Products. IR-23945 EP. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Concrete. Monthly. $6.00/year (U. S. A.)
Concrete Publishing Corporation
400 West Madison Street
Chicago, Ill. 60606
Journal for producers of precast and prestressed concrete products.

B. Pit and Quarry. Monthly. $10.00/year (Pan-American). $15.00 (Other).
Pit and Quarry Publications, Inc.
431 South Dearborn
Chicago, Ill. 60605
For producers and manufacturers of cement and non-metallic minerals.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,886,876. May 19, 1959. 5 p.
Improvements in apparatus for molding and curing concrete building slabs.

B. Patent No. 2,655,710. Oct. 20,1953. 9 p.
The manufacture of reinforced concrete panels and improvements in the process for making them.

C. Patent No. 2,651,096 Sept. 8, 1953. 5 p.
Portable mold of the type for producing slabs of plastic material such as concrete.

D. Patent No. 2,531,990. Nov. 28, 1950. 3 p.
Method of molding concrete building units, particularly large heavy concrete slabs or sections of buildings.

V. TRADE ASSOCIATIONS

A. American Concrete Institute
P. O. Box 4754, Redford Station
Detroit, Michigan 48219

B. Portland Cement Association
33 West Grand Avenue
Chicago, Ill. 60610

VI. ENGINEERING COMPANIES

A. General Engines Company
Thorofare, New Jersey 08086

B. Columbia Machine Company
107 Grand Boulevard
Vancouver, Washington 98661

VII. DIRECTORY

A. Thomas' Register of American Manufacturers. $30.00.
Thomas Publishing Company
461 Eighth Avenue
New York, N.Y. 10001
Lists manufacturers and suppliers of machinery, equipment, materials and services.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

DRY CLEANING

I. P. No. 66159

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

DRY CLEANING: Standard Industrial Classification 7216

A. DESCRIPTION OF SERVICE

Dry cleaning of clothes, bedding, draperies and other household articles, using a synthetic solvent such as perchlorethylene, and ironing and pressing after cleaning.

B. GENERAL EVALUATION

In recent years dry cleaning services have been increasingly offered in developing areas mostly by very small establishments operating with the minimum of equipment, and often as a side-line to a laundry business. There is evidence, therefore, of growing demand in such areas, though increasing use of new kinds of washable materials both for men's and women's apparel and for other articles impose some check on future growth. Not much capital is required even for a well-equipped modern dry cleaning plant and the labor skill demanded is not of a high order, though good management is necessary. This industry appears to offer reasonably good prospects for the small business man in a growing number of developing areas.

C. MARKET ASPECTS

Where there is already a demand for dry cleaning service that is being met by very small and technically deficient establishments a modern plant such as that described should be able to compete effectively through its ability to offer superior workmanship. Regarding the size of the market needed for the plant described, no useful generalization in terms of total population, can be made. The number of people who can afford commercial dry cleaning service will vary greatly in different areas. Other factors influencing demand for dry cleaning service include climate, type of clothes worn, type of accessories used in households. In such matters there are great differences between different areas. Only through investigation of local conditions would it be possible to judge whether the volume of business required for profitable operation of this plant, viz., 430 articles a week to be cleaned on the average, would be forthcoming in a particular community.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 23,500 Articles

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land.		$ --
Building. One story, about 24'x60',		8,700
Equipment.		
Prodn. equipmt.	$ 18,500	
Transport equipmt.	3,000	21,500
Total (excl. Land)		$ 30,200

Principal Items. Dry cleaning machine, press, shoulder press, steam gun, garment dryer, tub, bag sleever, form, puff irons, scale, compressors, vacuum system, boiler, sewing machines, assembly hooks, rail-hangers & pipe, fans, panel truck.

b. WORKING CAPITAL

	No. of Days	
Direct Labor, Mfg. Overhead(a)	30	$ 1,600
Admin. & Sales Costs(b), Contingencies,	15	200
Total Working Capital		$ 1,800

c. TOTAL CAPITAL (EXCL. LAND) $ 32,000

2. SUPPLIES

	Annual Cost
b. Supplies	
Solvent	$ 800
Spotting chemicals	400
Soaps & detergents	400
Tailor supplies	100
Hangers, boxes & bags	550
Tags & invoice tickets	300
Staples & staplers	50
Total	$ 2,600

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 8 hp.	$ 300
b. Fuel. Oil to heat small steam generator.	$ 300
c. Water. Needed for steam generator & for general purposes.	$ 100

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Panel truck for pickup and deliveries.	$ 1,000

b. External Transport Facilities. All deliveries will be local & therefore external transport presents no problem.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Manager	1	$ 7,000
Operators	2	8,000
Total	3	$ 15,000

b. Training Needs. Manager should be fully experienced in dry cleaning work & be able to train the 2 operators. Full operation should be possible almost from the start. Pickup & delivery man receives part of extra delivery charges as commission which is charged to sales costs.

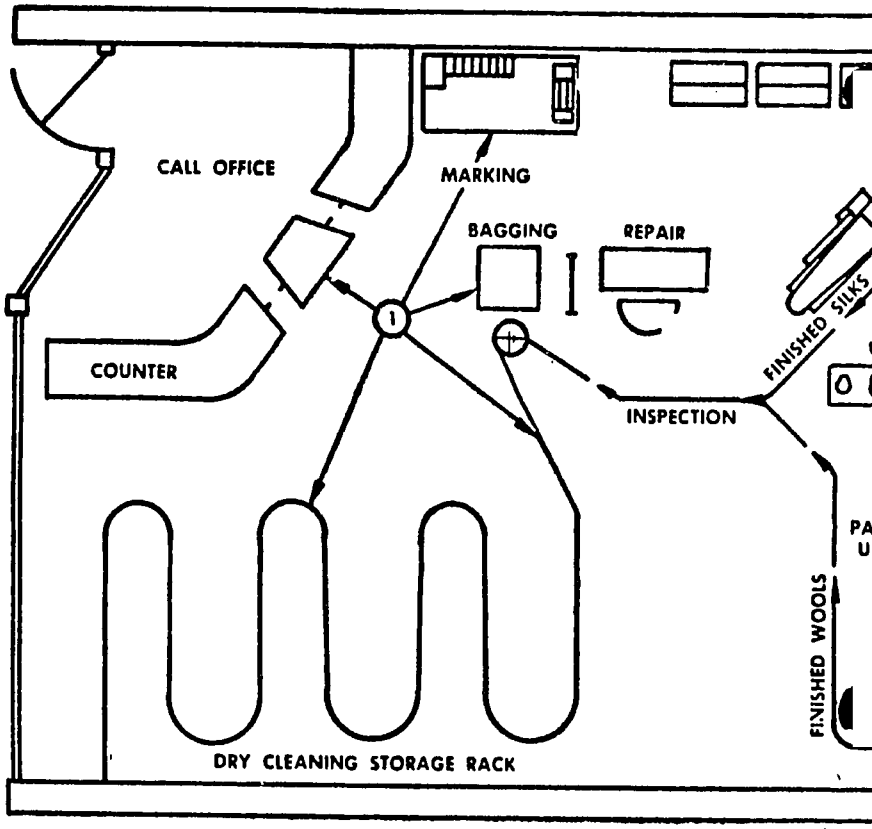
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Labor	$ 15,000
Manufacturing Overhead(a)	4,300
Admin. & Sales Costs(b), Bad Debts, Contingencies	4,000
Depreciation on Fixed Capital	3,000
Total	$ 26,300
b. Annual Sales Revenue	$40,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation. (b) Includes Interest, Insurance, Legal and Audit Charges, Sales Commissions.

DRY CL

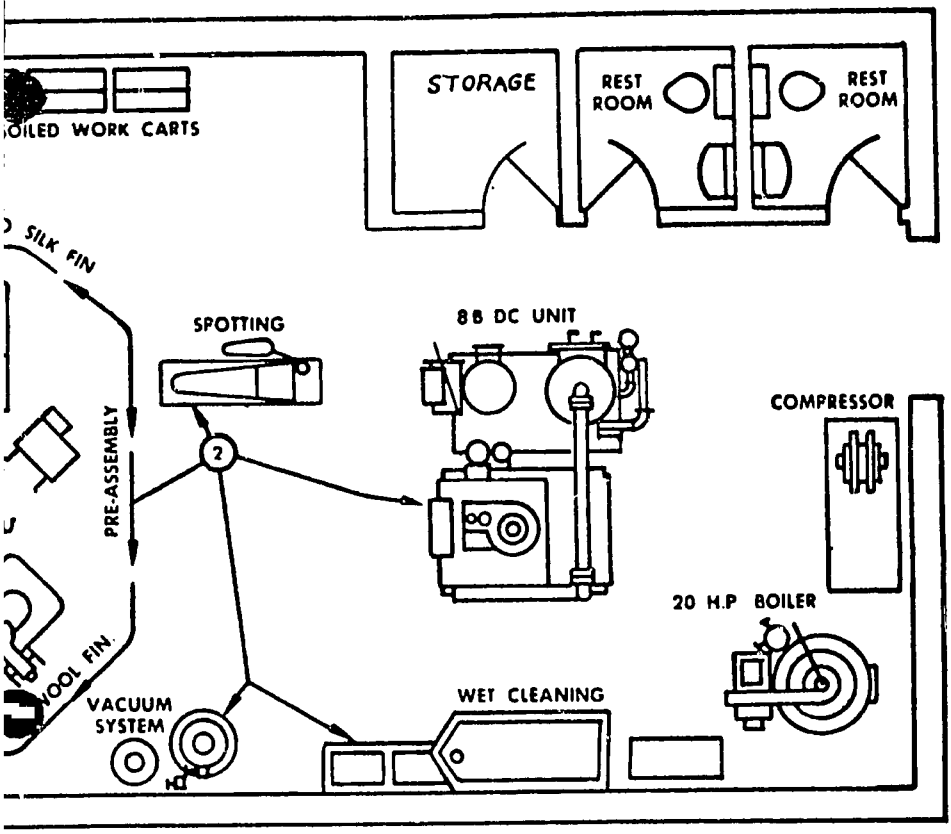
ARROWS SHOW FLOW OF



G: S.I.C. 7216

AYOUT

NG STARTING WITH SPOTTING



ding Dimensions

DRY CLEANING: S.I.C. 7216

SELECTED REFERENCES

I. TEXTBOOKS

A. How to Clean Everything. A. C. Moore. 1961. $3.75
Simon and Schuster, Inc.
630 Fifth Avenue
New York, N. Y. 10020
Materials, equipment, and processes used in dry cleaning establishments.

B. Drycleaning: Technology and Theory. National Institute of Drycleaning. 1958. 450 p. Illus. $6.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
Plant, equipment, compounds, and methods for drycleaning enterprises.

C. Surface Active Agents and Detergents. Vol. 2. A. M. Schwartz, J. W. Perry, J. Berch. 1957. 856 p. Illus. $19.50.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
Covers uses of detergents in the drycleaning industry.

D. Applied Science for Drycleaners. Geo. P. Fulton. 1951. 389 p. $6.50
The National Institute of Drycleaning
909 Burlington Avenue
Silver Spring, Maryland 20910

II. U. S. GOVERNMENT PUBLICATIONS

A. Dry Cleaning and Laundry Business. - Accounting and Operation. IR-21708. Gratis.
Office of Technical Cooperation and Research
Agency for International Development, Washington, D.C. 20523

B. Laundry and Dry Cleaning - Bibliography. SBB-40.
Office of Technical Cooperation and Research
Agency for International Development, Washington, D. C. 20523

III. PERIODICALS

A. The National Cleaner. Monthly. $6.00/year.
The Reuben H. Donnelley Corporation
304 East 45th Street, New York, N. Y. 10017
News of processes, methods and operational advancements in dry cleaning.

B. Chemical Industries and Engineering. Monthly. $4.20/year.
E. G. Holt Publishing Company
49 Clarence Street, Sydney, Australia
World wide coverage of technological advances in various chemical industries and related fields, including detergents and cleaning.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,986,918. 1961. 4 p.
Laundry and dry cleaning apparatus.

B. Patent No. 2,974,514. 1961. 3 p.
Dry cleaning equipment and process.

C. Patent No. 2,940,751. 1960. 4 p.
Laundry and dry cleaning folding machines.

V. TRADE ASSOCIATIONS

A. National Institute of Dry Cleaning
909 Burlington Avenue
Silver Spring, Maryland 20910

B. Laundry and Cleaners Allied Trades Association
1180 Raymond Boulevard
Newark, New Jersey 07102

C. Bureau of Laundry and Dry Cleaning Standards
914 20th Street, N. W.,
Washington, D. C. 20006

VI. ENGINEERING COMPANY

A. Richard Bristow
4856 Cordell Avenue
Bethesda, Maryland 20014
Design, engineer, and provide construction supervision for dry cleaning plants.

VII. DIRECTORY

A. Cleaning Laundry Supplier. $5.00
Cahir Publishing Company
10 East 40th Street
New York, N.Y. 10016

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

ELECTRIC MOTORS, 1/6TO 10 HORSEPOWER

I. P. No. 66160

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

ELECTRIC MOTORS, 1/6 to 10 HORSEPOWER: Standard Industrial Classification 3621

A. PRODUCT DESCRIPTION

Small electric motors, size and type adaptable to requirements of particular market. Plant capacity is given in terms of motors of average horsepower. It is assumed that commutators, carbon brushes, brush holder assemblies, switching mechanisms, bearings, and bushings, name plates, and attaching hardware, will be purchased from subcontractors, and that other components will be manufactured in the plant.

B. GENERAL EVALUATION

Skilled labor requirements for this plant are rather high It is desirable, though not indispensable, to have local subcontractors to supply components not made in the plant. On the marketing side, it is obviously necessary, firstly, to have a potential market area where there is a good supply of electric power at reasonable rates, and, secondly, an already fairly well developed and varied industrial complex, with many relatively small-scale secondary industries.

C. MARKET ASPECTS

1. USERS. Mainly industries. Private individuals mny buy a few such motors.
2. SALES CHANNELS AND METHODS. Most sales will be made direct to user industries. A few may be made through retail distributors. Satesmen should have sufficient technical knowledge and experience to be able to advise potential customers on the types and sizes of motors appropriate to their needs.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are high enough in value to bear transport costs for long distances. With a reasonably good transport network, the potential domestic market may be very extensive. Small electric motors are also widely exported, by the major machinery producing countries.
4. COMPETITION. a. Domestic Market. Competition from imported motors may be keen. Where there is a good supply of cheap electric power, small electric motors are commonly the preferred type of motive equipment in small industrial establishments and do not have to fear competition from other types. b. Export Market. A plant of this size and type would be unable to compete in international trade with large-scale producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these small electric motors will depend on the extent and efficiency of the electric power network and the cost of electricity, and on how far the development of industry, particularly rather small scale secondary industry, has gone. No useful generalization can be made about the size of the market needed for this plant, in terms of total population or otherwise.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 3,000 Units

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 15,000 sq. ft.		$ - -
Building. One story, 10,000 sq. ft.		60,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$42,000	
Other tools & equipmt.	6,000	
Furniture & fixtures	1,000	
Transportation equipmt.	2,500	51,500
Total (excl. Land)		$111,500

Principal Items. 75-ton press, 40-ton press, 20-ton press, 5-ton press, forming rolls, lathe, drill press, metal shear, coil taping machine, coil spreader, arbor press, scale, spray booth, air compressor, insulation former, screw machine, rotor coil winder, power hack saw, welding equipment, baking oven, dust collector system, conveyor system, 1-ton pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 51,700
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,700
Training Costs		15,000
Total Working Capital		$ 70 400

c. TOTAL CAPITAL (EXCL. LAND) $181,900

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Steel	110 tons	$ 18,000
Sheet aluminum	2,800 lbs.	14,400
Cooper	1,700 lbs.	70,000
Varnish		5,400
Purchased parts		27,400
Packaging materials		2 400
Total		$137,200
b. Supplies		
Lubricants & hand tools		$ 400
Cleaning materials		1,000
Cutting tools		500
Maintenance & repair parts		2,800
Office supplies		300
Total		$ 5,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 200 hp.	$ 6,000
b. Fuel. About 4,400 gals. oil annually.	$ 500
c. Water. About 800,000 gals. annually.	$ 200

4. TRANSPORTATION

	Annually Operating Cost
a. Own Transport Equipment. Pickup truck for general purposes	$ 1,000

b. External Transport Facilities. Total in & out shipments about 25 tons a month. No special requirements.

5. MANPOWER

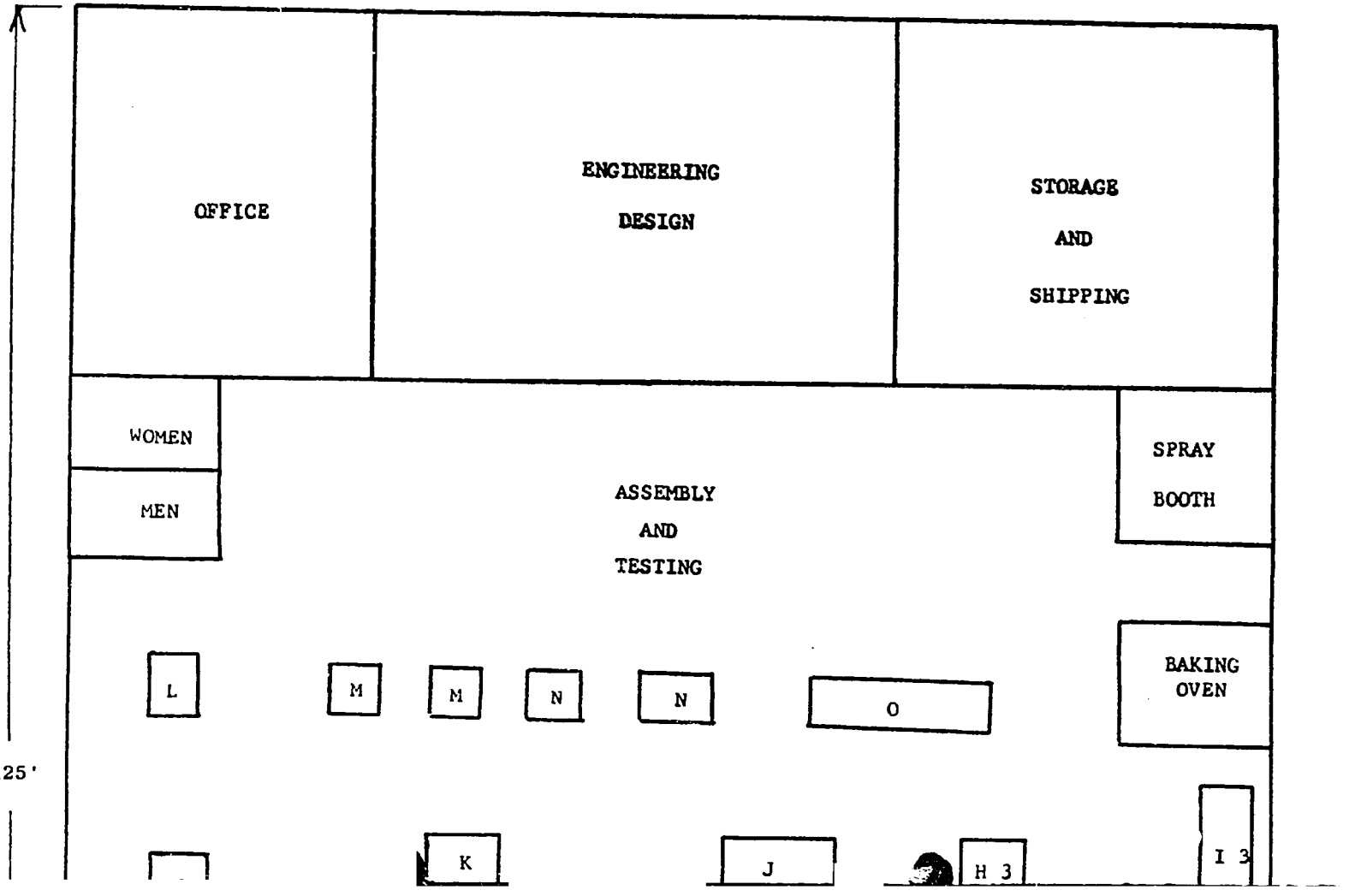
	Number	Annual Cost
a. Direct Labor		
Skilled	8	$ 48,000
Semi-skilled	8	40,000
Unskilled	5	20 000
Total	21	$108.000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office	3	14,000
Other	5	20,000
Total	10	$ 52,000

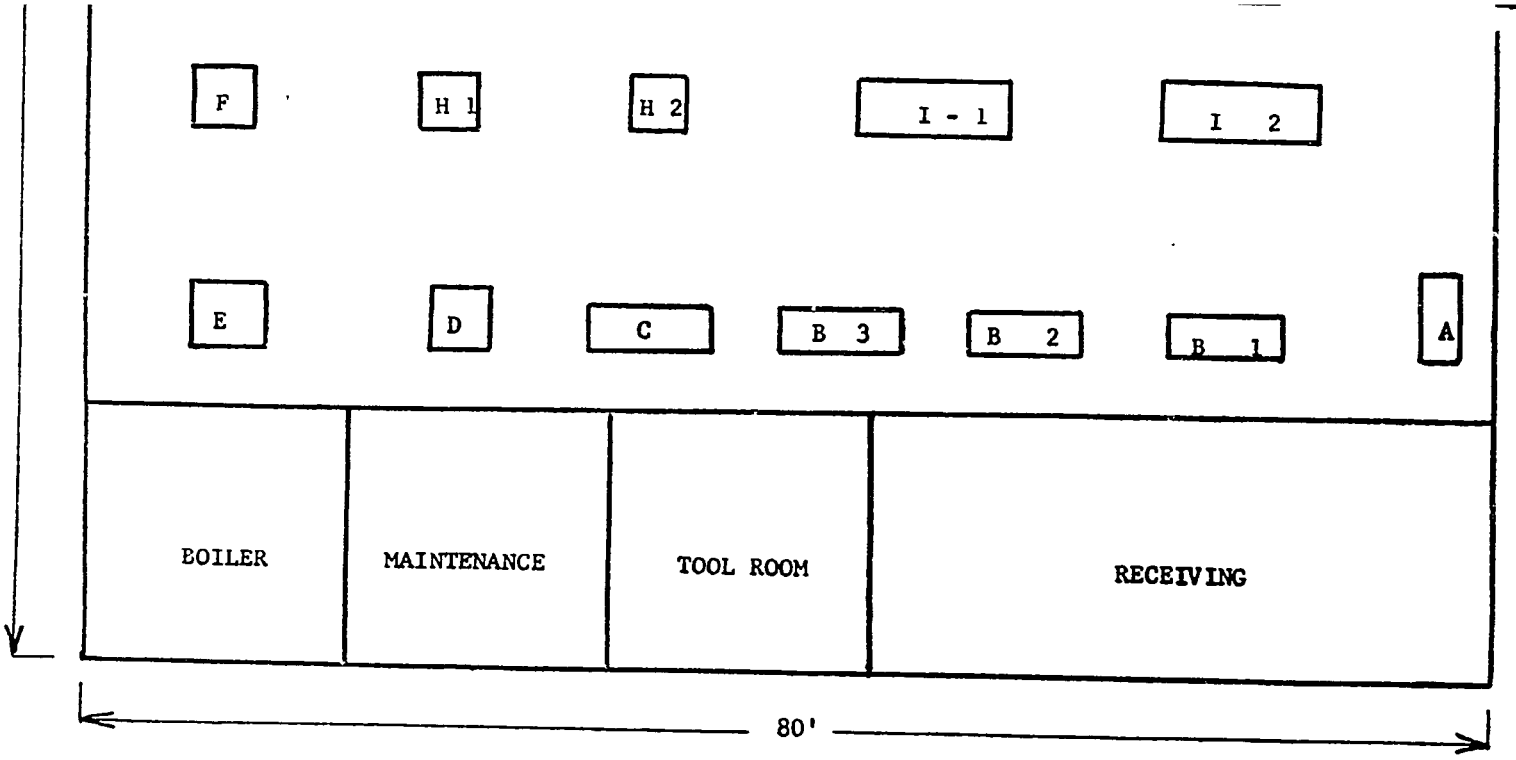
c. Training Needs. Manager & supervisor should be fully experienced. With 2 experienced operators, they should be able to carry out all labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$137,200
Direct Labor	108,000
Manufacturing Overhead(a)	64,700
Admin. Costs(b), Contingencies	14,000
Sales Costs(c), Bad Debts	30,000
Depreciation on Fixed Capital	9,100
Total	$363,000
b. Annual Sales Revenue	$420,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor, (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.


OFFICE
ENGINEERING
DESIGN
STORAGE
AND
SHIPPING
WOMEN
MEN
ASSEMBLY
AND
TESTING
SPRAY
BOOTH
BAKING
OVEN
L
M
M
N
N
O
K
J
H 3
I 3
125'
98
ELECTRIC MOTORS 1/6 to 10 HO



A. Hack saw
B. Shear
C. Forming rools
D. 75-ton press
E. 40-ton press
F. 20 ton press
G. 5 ton press
H. Drillpresses
I. Lathes
J. Screw machine
K. Coil winder
L. Welding
M. Grinding
N. Buffing
O. Cleaning vat

ELECTRIC MOTORS 1/6 TO 10 HORSEPOWER: S. I. C. 3621

SELECTED REFERENCES

I. TEXTBOOKS

A. Electrical Machines. J. Hindmarsh. 1965. $6.50.
Pergamon Press
44-01 Twenty-first Street
Long Island, N. Y. 11101

B. Manual of Electromechanical Devices. Douglas Greenwood. 1965. $12.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

C. Electrical Machinery and Control. Irving L. Kosow. 1964. $17.00.
Prentice-Hall, Inc.
Englewood Cliffs, N. J. 07632

D. The General Theory of Electrical Machines. B. Adkins. 1958. 236 p. Illus. $8.75.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016

II. U. S. GOVERNMENT PUBLICATION

A. Fractional and Small Horsepower Electric Motors and Direct Starters for Squirrel-Cage Motors. TI-12. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Electrical Light and Power. Semi-Monthly. $10.00/year.
Haywood Publishing Company
6 North Michigan Avenue
Chicago Ill. 60602
Electrical apparatus, transmission systems, and costs.

B. Electrical World. Weekly. $6.00/year.
McGraw-Hill Publishing Company
330 West 42nd Street
New York, N. Y. 10036
Covers current happenings and developments in the electrical industry.

IV. U. S. PATENTS

Available U.S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,959,721. 1960. 12 p.
Method of production of multi-phase induction motors.

B. Patent No. 2,911,549. 1958. 4 p.
Electric motor with new and improved brake mechanism.

C. Patent No. 2,839,712. 1958. 4 p.
New and improved electric motor with novel control circuit.

D. Patent No. 2,791,735. 1957. 5 p.
Production method for a dynamically braked polyphase electric induction motor.

V. TRADE ASSOCIATION

A. Motor and Equipment Manufacturers Association
250 West 57th Street
New York, N. Y. 10019

VI. ENGINEERING COMPANIES

A. Electrofab Company
2133 North Meridian Street
Indianapolis, Indiana 46202
Electrical manufacturing plant design, engineering, and construction.

VII. DIRECTORY

A. Directory of Verified Electrical Wholesale Distributors. Biennial. $35.00.
McGraw-Hill Publishing Company
330 West 42nd Street
New York, N. Y. 10036
Data on electrical distributors.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

GOLD JEWELRY

I. P. No. 66161

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

GOLD JEWELRY: Standard Industrial Classification 3911

A. PRODUCT DESCRIPTION

Rings, bracelets, scatter pins made partly or wholly from gold, with and without the use of other metals.

B. GENERAL EVALUATION

The investment needed f - this plant is small. The degree of labor skill required is relatively high, but this type of product is produced in many areas for home consumption as well as for the tourist trade, and the skill would be available in many places. Ability to develop new designs and to execute orders according to customers' special requirements are necessary in this business.

C. MARKET ASPECTS

1. USERS. Individuals, particularly women.

2. SALES CHANNELS AND METHODS. Plant would sell to jewelry stores, department stores, and gift shops.

3. GEOGRAPHICAL EXTENT OF MARKET. The finished product is easily transported although care has to be taken in packaging it for shipment.

4. COMPETITION. a. Domestic Market. If the level of income is sufficiently high to support purchases of this kind, other jewelry and knick-knacks, including imported items, would compete. b. Export Market. If the designs have a local character, export trade through tourist purchases or through direct shipments abroad is feasible. The size of this plant would be no barrier to export trade, particularly where sales abroad can be made through exporters and do not depend upon the personal efforts of the manufacturer.

5. MARKET NEEDED FOR PLANT DESCRIBED. The sale of these items in lower income areas might depend very heavily upon tourist trade. Therefore no estimate of population needed to support the output of this plant can be given. However, even a small volume of tourist trade could absorb the modest output of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 8,000 Pieces

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1,000 sq. ft.		$ --
Building. One story, 20'x30'.		3,600
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$2,300	
Other tools & equipmt.	200	
Furniture & fixtures	500	3,000
Total (excl. Land)		$ 6,600

Principal Items. Model makers' tools, rubber mold making equipment, wax pattern making equipment, vacuum machine mixer, wax burn-out equipment, melting furnace & tools, casting machine, polishing equipment, milling equipment, soldering equipment.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 5,100
Admin. Costs(b), Contingencies, Sales Costs(c)	30	500
Training Costs		500
Total Working Capital		$ 6,100

c. TOTAL CAPITAL (EXCL. LAND) $ 12,700

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Gold - 14 carat	170 ounces	$ 6,000
Silver, copper, other metal		2,000
Total		$ 8,000
b. Supplies		
Maintenance & hand tools		$ 450
Mold rubber		450
Molding wax		1,200
Office supplies		200
Total		$ 2,300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 3 hp.	$ 150
b. Fuel. Production & heating.	$ 200
c. Water. For sanitation and fire protection.	$ 50

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 6,000
Semi-skilled	1	5,000
Total	2	$ 11,000
b. Indirect Labor		
Manager - buys, sells, keeps books, supervises	1	$ 9,000

c. Training Needs. Manager must be fully experienced. With aid of 1 skilled worker, he should reach full production in 2 weeks.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

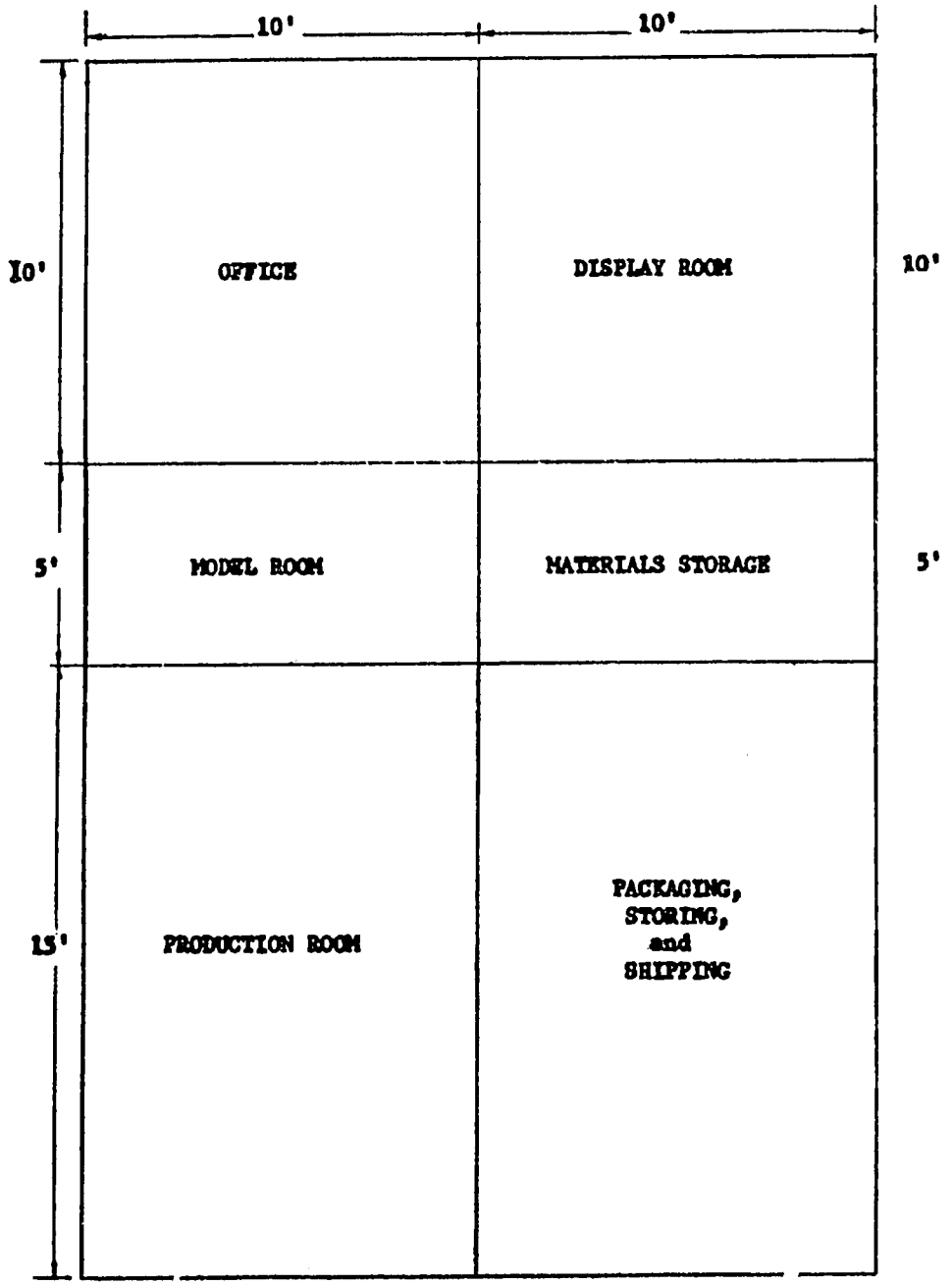
a. Annual Costs	
Direct Materials	$ 8,000
Direct Labor	11,000
Manufacturing Overhead(a)	11,700
Admin. Costs(b), Contingencies	2,000
Sales Costs(c), Bad Debts	3,800
Depreciation on Fixed Capital	500
Total	$ 37,000
b. Annual Sales Revenue	$ 48,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

GOLD JE

PLANT LAYOUT

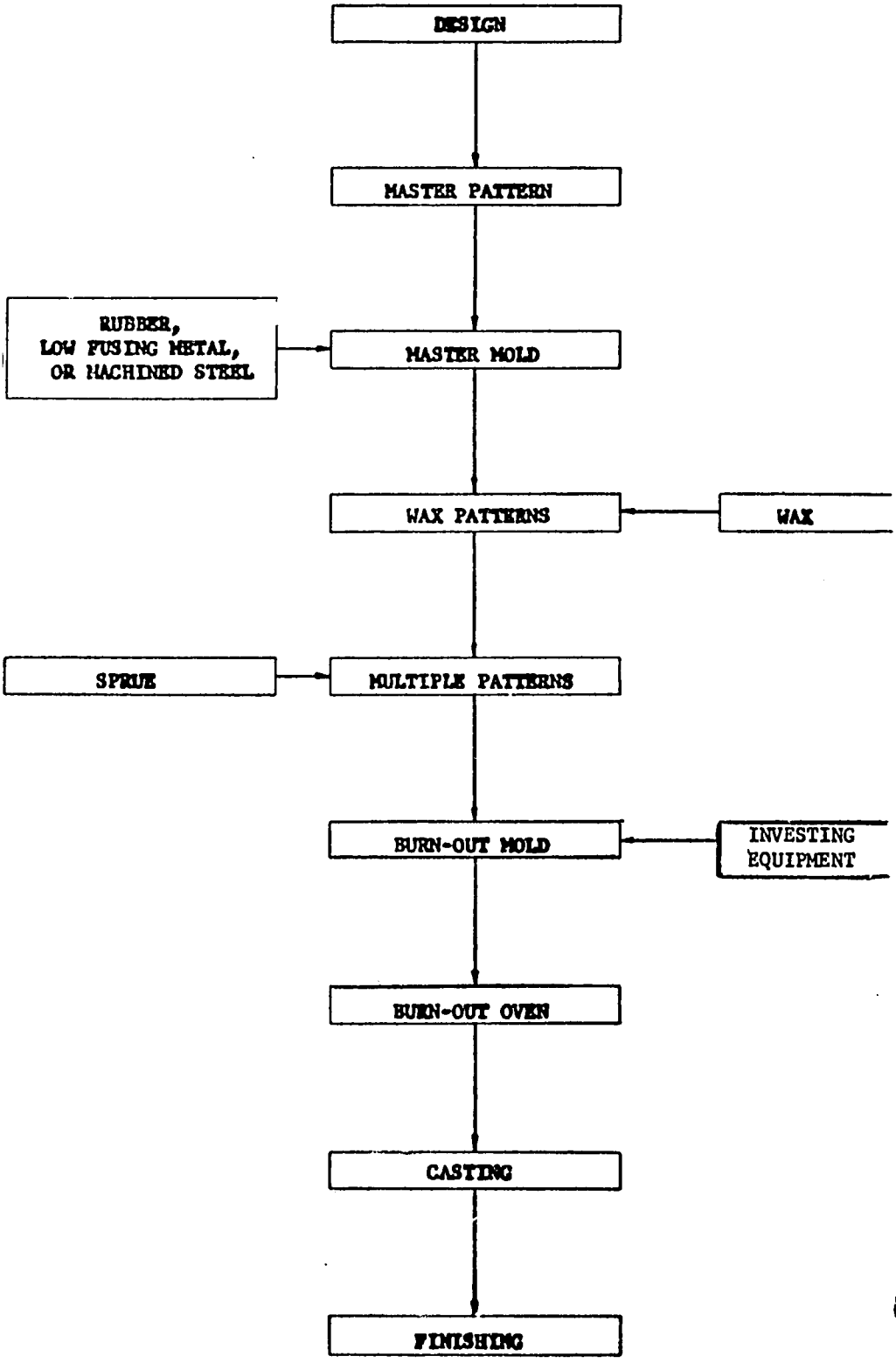
ARROWS



94

: S. I. C. 3911

E WORK FLOW



GOLD JEWELRY: S. I. C. 3911

SELECTED REFERENCES

I. TEXTBOOKS

A. Jewelry. Claude Fregnac. 1965. $4.95.
G P. Putnam's Sons
200 Madison Avenue, New York, N. Y. 10016

B. Jewelry. L. Giltay-Nijssen. 1964. $2.75. Paper $1.95.
Universe Book Inc.
381 Park Avenue South
New York, N. Y. 10016

C. The Goldsmith's and Silversmith's Handbook. Stanton Abbey. 1953.
105 p. Illus. $5.00.
D. Van Nostrand Company, Inc.
120 Alexander Street, Princeton, N. J. 08540

D. Jewelry, Gem Cutting, and Metalcraft. Wm. T. Baxter. 3rd edition.
1950. 360 p. $7.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. PERIODICAL

A. The Manufacturing Jeweler. Monthly. $3.00/year.
Walter B. Frost and Company, Inc.
42 Weyborset Street
Providence, Rhode Island 02903
Serving jewelry manufacturers.

III. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,976,607. 1961. 4 p.
Method of making telescopic bracelet from gold and other noble metals.

B. Patent No. 2,948,041. 1960. 2. p.
Applying the jewelry art to an ear clip and its components.

C. Patent No. 2,902,749. 1959 5 p.
Method of making a gold finger ring.

D. Patent No. 2,871,556. 1959. 3 p.
Method of making gold mesh fabric for jewelry purposes.

E. Patent No. 2,852,923. 1958. 5 p.
Gold jewelry link and chain construction.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATION

A. Jewelry Industry Council
608 Fifth Avenue
New York, N. Y. 10020

V. ENGINEERING COMPANIES

A. C. and E. Marshall Company
1445 West Jackson Boulevard
Chicago, Ill. 60607
Soldering, welding, plating.

B. Kerr Manufacturing Company
6681 - 12th Street
Detroit, Michigan 48208
Casting of precious metals.

VI. DIRECTORY

A. Jewelers Buyers Guide. Annual. $7.50.
Sherry Publishing Company, Inc.
1475 Broadway
New York, N. Y. 10036
Lists manufacturers, wholesalers, importers, suppliers, and equipment sources.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

JOB MACHINE SHOP

I. P. No. 66162

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

JOB MACHINE SHOP: Standard Industrial Classification 3591

A. OUTPUT DESCRIPTION

Shop is equipped for following types of special machining and repair work: Machine building, including some electrical work; tools, dies and fixtures; sheet metal work; welding and cutting; production work for industry.

B. GENERAL EVALUATION

With the expansion of mechanized industry, increasing production of electric power and consequent increased use of electrical machinery and appliances, as well as greater use of automobiles and other consumers' durable items, demand for precision work that is beyond the capacity of very small workshops is generally increasing. The prospects for an efficiently run job machine shop of the kind described in some developing urban centers appear good. It must be emphasized, however, that the essential for successful and profitable operation is expert management.

C. MARKET ASPECTS

1. USERS. Construction contractors, industries, mining and quarrying enterprises, repair services for automobiles and mechanical equipment of various kinds.

2. SALES CHANNELS AND METHODS. Sales are made direct to those requiring services. Some general advertising of services available is commonly desirable, in newspapers, periodicals, trade directories, etc.

3. GEOGRAPHICAL EXTENT OF MARKET. Job machine shops of this type locate in urban centers near potential customers. Market is mainly local.

4. COMPETITION. Very small workshops may provide competition for some jobs not requiring a high degree of precision. Otherwise competition will come only from rival machine shops of a similar type to the one under consideration.

5. MARKET NEEDED FOR PLANT DESCRIBED. To provide sufficient work for a shop of this size a fairly large and comparatively modern urban center is needed, with some development of mechanized industry and considerable use of such goods as automobiles and electrical appliances.

D. PRODUCTION REQUIREMENTS

ANNUAL AVERAGE GROSS SALES - ONE-SHIFT OPERATION: $230,000

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land.		$ --
Building. One story, 85'x60'.		30,600
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$83,000	
Other tools & equipmt.	400	
Furniture & fixtures	1,500	
Transport equipmt.	2,500	87,400
Total (excl. Land)		$118,000

Principal Items. Power hack saw, 2 engine lathes, milling machine, cutter grinder, surface grinder, radial drill, drill press, contour saw, foot shear, hand brake, former rolls, welding equipment, job crane, cutting tools, micrometers, calipers, surface gages, hand tools, hand trucks, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 25,000
Admin. & Sales Costs(b), Contingencies,	30	1,700
Training Costs		11,300
Total Working Capital		$ 38,000

c. TOTAL CAPITAL (EXCL. LAND) $156,000

2. MATERIALS AND SUPPLIES

	Annual Cost
a. Direct Materials. Will vary in accordance with type of work available. Average annual cost of direct materials for job machine shop of this capacity is about.	$ 50,000
b. Supplies	
Cutting tools & wheels	$ 1,000
Hand tools	200
Welding rods & gas	200
Lubricants	100
Office supplies	300
Total	$ 1,800

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 830 kw-hr a day.	$ 5,000
b. Fuel. For production & general purposes.	$ 1,000
c. Water. About 800,000 gals. annually for production & general purposes.	$ 200

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton pickup & delivery truck.	$ 1,000

b. External Transport Facilities. Combined in & out shipments not above 25 tons a month. No special requirements.

5. MANPOWER

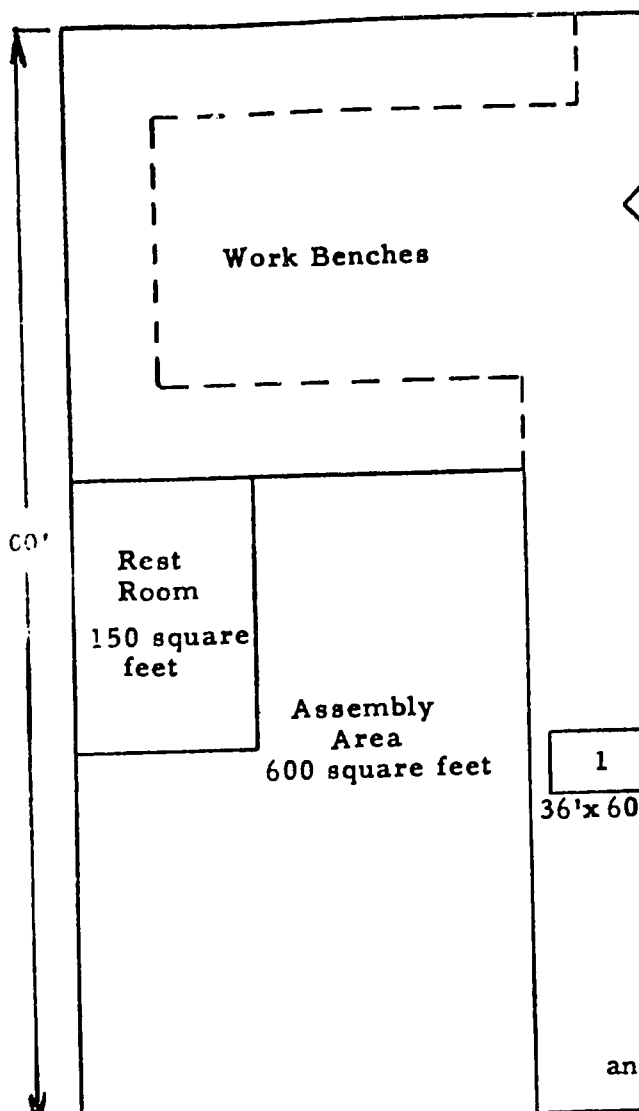
	Number	Annual Cost
a. Direct Labor		
Skilled	6	$ 36,000
Semi-skilled	4	20,000
Unskilled	2	8,000
Total	12	$ 64,000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office staff	1	5,000
Other	1	4,000
Total	4	$ 27,000

c. Training Needs. Manager & supervisor must be fully experienced in operating job machine shop & be able to estimate cost of repair work accurately. They must be able to train all workers. Plant should reach full production in about 3 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 50,000
Direct Labor	64,000
Manufacturing Overhead(a)	36,000
Admin. & Sales Costs(b), Bad Debts, Contingencies	20,000
Depreciation on Fixed Capital	19,000
Total	$189,000
b. Annual Sales Revenue	$230,000

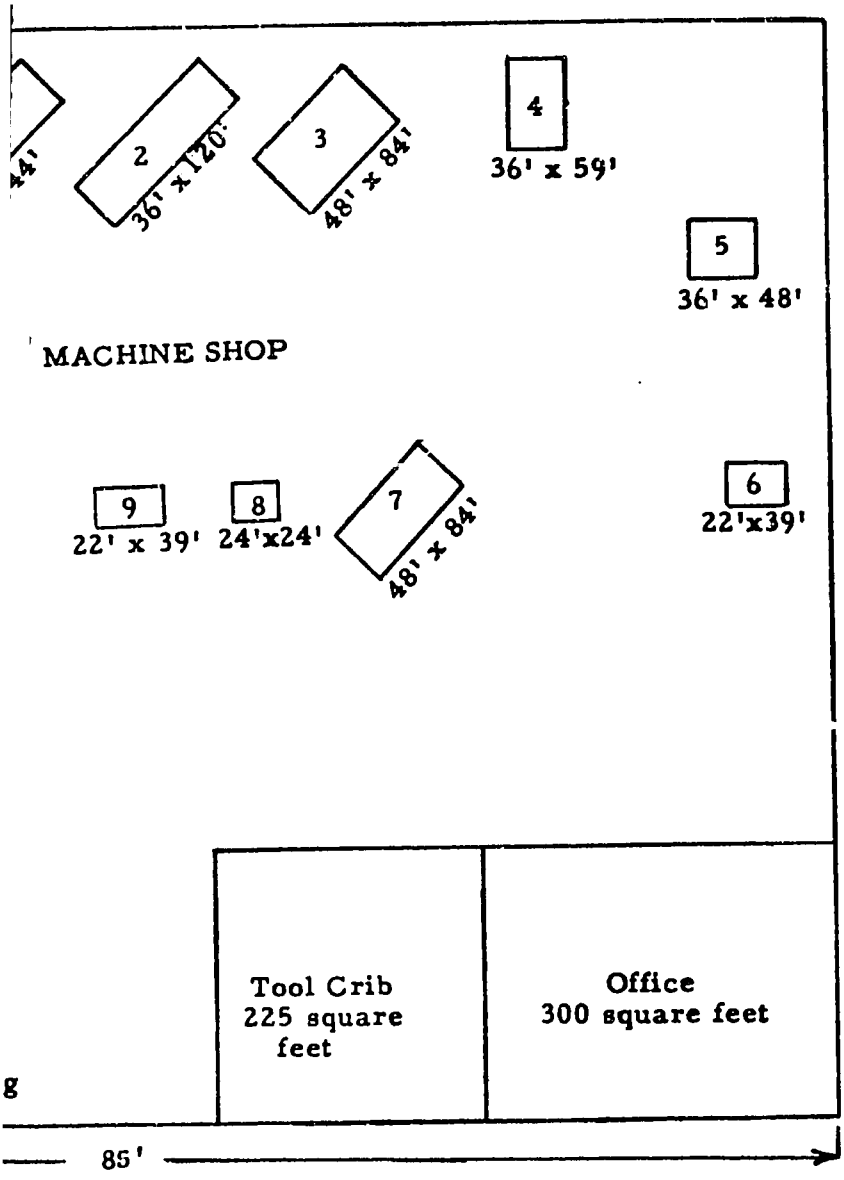
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges, Sales Commissions, Freight Out, Travel.



1. Power-Hack-Saw
2. 20″ × 96″ lathe
3. 16″ × 78″ lathe
4. Milling machine
5. Radial
6. Contou
7. Drill p

SHOP : S.I.C. 3591

T LAYOUT



8. Surface grinder
9. Cutter grinder
10. Drill press

JOB MACHINE SHOP: S.I.C. 3591

SELECTED REFERENCES

I. TEXTBOOKS

A. Machine Shop Training. S. F. Krar and J. E. St. Armand. 1963. Illus. $3.95.
McGraw-Hill Book Co., Inc.
330 West 42nd Street
New York, N. Y. 10036

B. Modern Machine Tools. Frank H. Habicht. 1963. Illus. $6.50.
D. Van Nostrand Co., Inc.
Princeton, N. J. 08540

C. Fundamentals of Machine Shop Practice. E. Stieri. 1956. 322 p. Illus. $6.65.
Prentice-Hall Inc.
Englewood Cliffs, New Jersey 07632

D. Machine Shop Operations and Setups. H. W. Porter and others. 1954. 397 p. Illus. $5.50.
American Technical Society
848 East 58th Street
Chicago, Ill. 60637

E. Machine Tools at Work. C. O. Herb. 1953. 584 p. Illus. $6.50.
The Industrial Press
93 Worth Street
New York, N. Y. 10013

F. Machine-Shop Technology. C. A. Felker. 1952. 491 p. Illus. $4.80.
Bruce Publishing Company
400 North Broadway
Milwaukee, Wisconsin 53201

II. U. S. GOVERNMENT PUBLICATION

A. Job Machine Shop. IR-15623. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Machine and Tool Blue Book. Monthly. $5.00/year.
Hitchcock Publishing Company
222 East Willow Avenue
Wheaton, Ill. 60187

B. Machinery. Monthly. $4.00/year.
Industrial Press
93 Worth Street
New York, N. Y. 10013
Covers tools used in modern machine shop.

IV. TRADE ASSOCIATIONS

A. National Tools, Die and Precision Machinery Association
907 Public Square Building
Cleveland, Ohio 44113

B. National Machine Tool Builders' Association
2139 Wisconsin Avenue, N. W.
Washington, D. C. 20007

C. Tool and Die Institute
3435 North Laramie Avenue
Chicago, Ill. 60639

V. ENGINEERING COMPANY

A. Daystrom, Inc.
753 Main Street
Poughkeepsie, New York
Development, design, engineering and manufacturing of complete facilities in the mechanical field.

VII. DIRECTORY

A. Hitchcock's Machine and Tool Directory. Annual. $10.00.
Hitchcock Publishing Company
222 East Willow Avenue
Wheaton, Ill. 60187
Lists machine tools, machine tool producers, and associations.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

LAUNDRY

I. P. No. 66163

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

LAUNDRY: Standard Industrial Classification 7211

A. DESCRIPTION OF WORK

Washing, drying and ironing of flat work and apparel.

B. GENERAL EVALUATION

The plant described is, for a mechanized laundry, a small affair, and does not need much capital. Skilled labor requirements are moderate. It must be recognized, however, that, although there is an increase in demand for commercial laundry service in some less developed areas, laundry work in such areas is still very largely done at home. Therefore the demand for such services initially might come largely from institutions, some restaurants, and hotels. Also, where wages are low, hand laundries compete with commercial laundries. This is a highly competitive business, and a careful survey of costs and commpetition should be made before any investment is made in it.

C. MARKET ASPECTS

1. USERS. Hotels, restaurants, hospitals, various institutions, doctors, dentists, industries, ships, individuals, etc.

2. SALES CHANNELS AND METHODS. Business is done directly with users. A central location is highly desirable.

3. GEOGRAPHICAL EXTENT OF MARKET. Market is entirely local.

4. COMPETITION. Competition from hand laundries for the available commercial business may be keen.

5. MARKET NEEDED FOR PLANT DESCRIBED. A market for a laundry of this kind could probably be found in almost any reasonably prosperous and developing city with a population over half a million.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 220,000 Pounds Flat Work, 50,000 Shirts, 100,000 Pieces Other Wearing Apparel

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. 10,000 sq. ft. Central location.		$ --
Building. One story, 50'x60',		18,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipment.	$26,500	
Other tools & equipment.	500	
Furniture & fixtures	1,000	
Transportation equipment.	3,500	31,500
Total (excl. Land)		$ 49,500

Principal Items. Washer 25 lbs., washer 60 lbs., extractor, 3 dryers, boiler, shelves, flat work 2-roll ironer, wearing apparel ironing unit, shirt finishing unit, marking machine, air compressor, sorting tables & bins, baskets, panel truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 9,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	600
Training Costs		4,300
Total Working Capital		$ 14,500

c. TOTAL CAPITAL (EXCL. LAND) $ 64,000

2. MATERIALS AND SUPPLIES

	Annual Cost
a. Direct Materials	
Soaps	$ 2,400
Alkalis	2,400
Bleach	2,800
Scour	2,400
Starch	1,200
Wrapping	800
Total	$ 12,000
b. Supplies	
Lubricants & hand tools	$ 100
Maintenance & repair parts	700
Office supplies	200
Total	$ 1,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 30 hp.	$ 900
b. Fuel. About 10,000 gals. oil annually.	$ 1,200
c. Water. About 2 million gals. annually for operating & general purposes.	$ 500

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Panel truck for deliveries	$ 1,200

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	2	9,000
Unskilled	2	7,000
Total	6	$ 28,000
b. Indirect Labor		
Manager - buys, sells, keeps books & supervises	1	$ 9,000
Other	1	4,000
Total	2	$ 13,000

c. Training Needs. Manager must be fully experienced. With 2 skilled workers, he should be able to do all labor training. Plant should reach full production in 2 months.

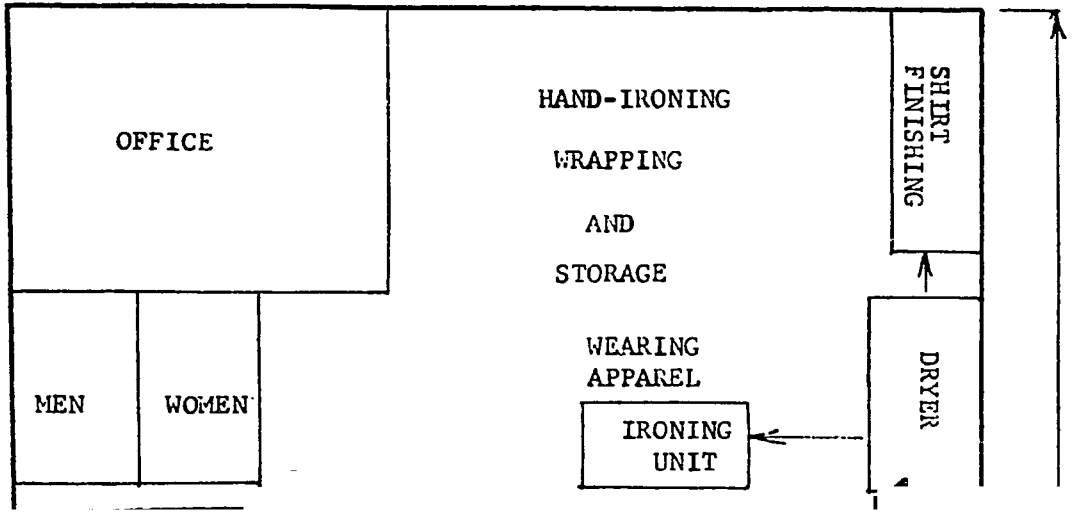
6. TOTAL ANNUAL COSTS AND SALES REVENUE

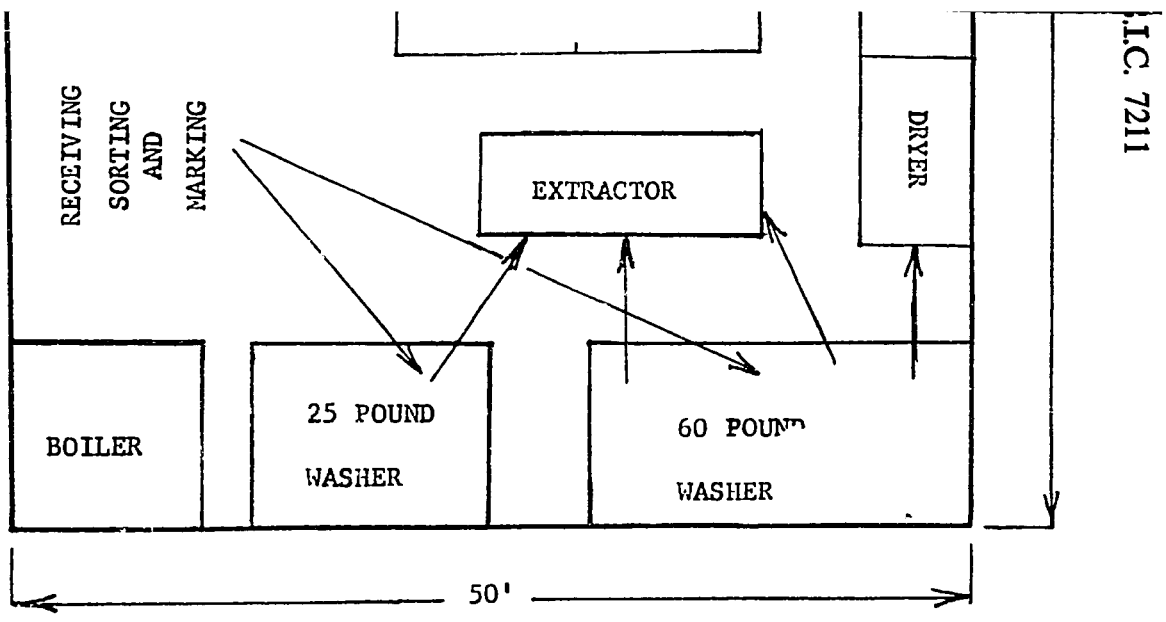
a. Annual Costs	
Direct Materials	$ 12,000
Direct Labor	28,000
Manufacturing Overhead(a)	17,800
Admin. Costs(b), Contingencies	2,400
Sales Costs(c), Bad Debts	4,200
Depreciation on Fixed Capital	4,600
Total	$ 69,000
b. Annual Sales Revenue	$100,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT

ARROWS INDICATE WORK FLOW




RECEIVING
SORTING
AND
MARKING
EXTRACTOR
DRYER
BOILER
25 POUND
WASHER
60 POUND
WASHER
50'

LAUNDRY: S. I. C. 7211

SELECTED REFERENCES

I. TEXTBOOKS

A. Laundry Work. H. M. Lancaster. 1956. 186 p. Illus $3.00.
Pitman Publishing Corporation
2 West 45th Street
New York, N. Y. 10036

B, Let's Talk Laundry. F. F. DeArmond. 1957. 155 p. Illus. $1.50.
Mycroft Press
2043 South Scenic Drive
Springfield, Missouri 65804

C. Practical Laundrywork. M. E. Cox. 1959. 147 p. Illus. $1.75.
Griffin and Company, Ltd.
42 Drury Lane
London W.C. 2, England

D. Principles of Laundering. W. Brown. 1955. 104 p. Illus. $2.25.
Heywood and Company, Ltd.
Tower House, Southampton Street
London W. C. 2, England

II. U.S. GOVERNMENT PUBLICATIONS

A. Automatic Laundries. BSB-187. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Laundry and Drycleaning—Bibliography. SBB-40. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D.C. 20523

III. PERIODICALS

A. Pacific Laundry and Cleanning Journal. Monthly. $3.00/year.
Miller Freeman Publications
500 Howard Street
San Francisco, Calif. 94105
Current laundry supplies and processes.

B. Starchroom Laundry Journal. Monthly. $4.00/year.
Reuben H. Donnelley Corporation
305 East 45th Street
New York, N. Y. 10017
Machniery, supplies, new products and techniques.

IV. TRADE ASSOCIATIONS

A. American Institute of Laundering
Doris and Chicago Avenues
Joliet, Illinois 60433

B. Laundry and Cleaners Allied Trades Association
1180 Raymond Boulevard
Newark, New Jersey 07102

C. Bureau of Laundry and Dry Cleaning Standards
914 20th Street, N. W.
Washington, D. C. 20006

V. ENGINEERING COMPANY

A. Troy Laundry Machinery
48 Thomas Street
East Moline, Ill. 61244
Engineering service for plant layouts for plants of all sizes.

VI. DIRECTORY

A. Membership Roster-American Institute of Laundering.
American Institute of Laundering
Joliet, Ill. 60433
Lists laundry firms, suppliers, and allied trade members.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

NDUSTRY PROFILES

LEAD PENCILS

I. P. No. 66164

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

LEAD PENCILS: Standard Industrial Classification 3952

A. PRODUCT DESCRIPTION

Lead pencils made from purchased slats, leads, ferrules, etc.

B. GENERAL EVALUATION

This plant requires a moderate amount of capital and a fair amount of skilled labor. Competition in sale of lead pencils is keen, and quality is highly important. It is essential to make a thorough study of the competitive situation before embarking on this industry.

C. MARKET ASPECTS

1. USERS. Schools, government departments, businesses, individuals.

2. SALES CHANNELS AND METHODS. Sales are almost always made to stationery suppliers. A distinctive brand name is almost always used. Some general advertising is desirable.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Transport costs are insignificant, and market is normally nation-wide. b. Export. The major manufacturing concerns export pencils all over the world.

4. COMPETITION. a. Domestic Market. Competition from imports may be strong. Users develop preferences for particular brands and, since unit price is small, are not easily induced to change, even if their preferred brand is more expensive. Mechanical pencils compete with ordinary lead pencils. b. Export Market International competition is keen, and there are some large and long-established makers who are firmly entrenched in international markets. Plant under consideration would have little chance in general competition with these concerns, though some regional sales might be possible if a good quality article at a low price can be produced.

5. MARKET NEEDED FOR PLANT DESCRIBED. The size of the market needed, in terms of total population, will depend on the degree of literacy attained, the number of schools and the period of schooling, the development of government and business activities, the age structure of the population, etc. In many developing areas the plant described could probably meet the needs for lead pencils of a total population of the order of 20 million people.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 125,000 Gross

1. CAPITAL REQUIREMENTS.

a. FIXED CAPITAL

		Cost
Land. About 9,000 sq. ft.		$ --
Building. One story, 50'x70'.		21,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$38,000	
Other tools & equipmt.	4,000	
Furniture & fixtures	1,000	43,000
Total (excl. Land)		$ 64,000

Principal Items. Grooving machine, slat gluing machine, slat press - compressor, 500 drying clamps, slat end sander, shaper, 2 paint machines, 2 double belt conveyors, heading machine, 2 tipping machines, single line foil stamper.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	$ 49,400
Admin. & Sales Costs (b), Contingencies,	30	3,500
Training Costs		10,900
Total Working Capital		$ 63,800

c. TOTAL CAPITAL (EXCL. LAND) $127,800

2. MATERIALS AND SUPPLIES

	Annual Cost
a. Direct Materials	
Pencil slats	$ 68,000
Leads	39,000
Ferrules	29,000
Erasers	28,000
Glue, lacquer, boxes	3,200
Total	$167,200
b. Supplies	
Type slugs & foil	$ 800
Maintenance & repairs	2,200
Lubricants & hand tools	400
Office supplies	200
Total	$ 3,600

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 350 hp.	$ 2,000
b. Fuel. Any fuel may be used.	$ 1,000
c. Water. For glue preparation, & for general purposes.	$ 400

4. TRANSPORTATION

a. Own Transport Equipment. None needed.

b. External Transport Facilities. No special requirements.

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	6	$ 36,000
Semi-skilled	7	35,000
Unskilled	6	24,000
Total	19	$ 95,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	2	9,000
Other	2	8,000
Total	5	$ 27,000

c. Training Needs. Manager should be fully experienced. With assistance of 4 skilled workers he should be able to train all the workers. Plant should reach full production in about 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

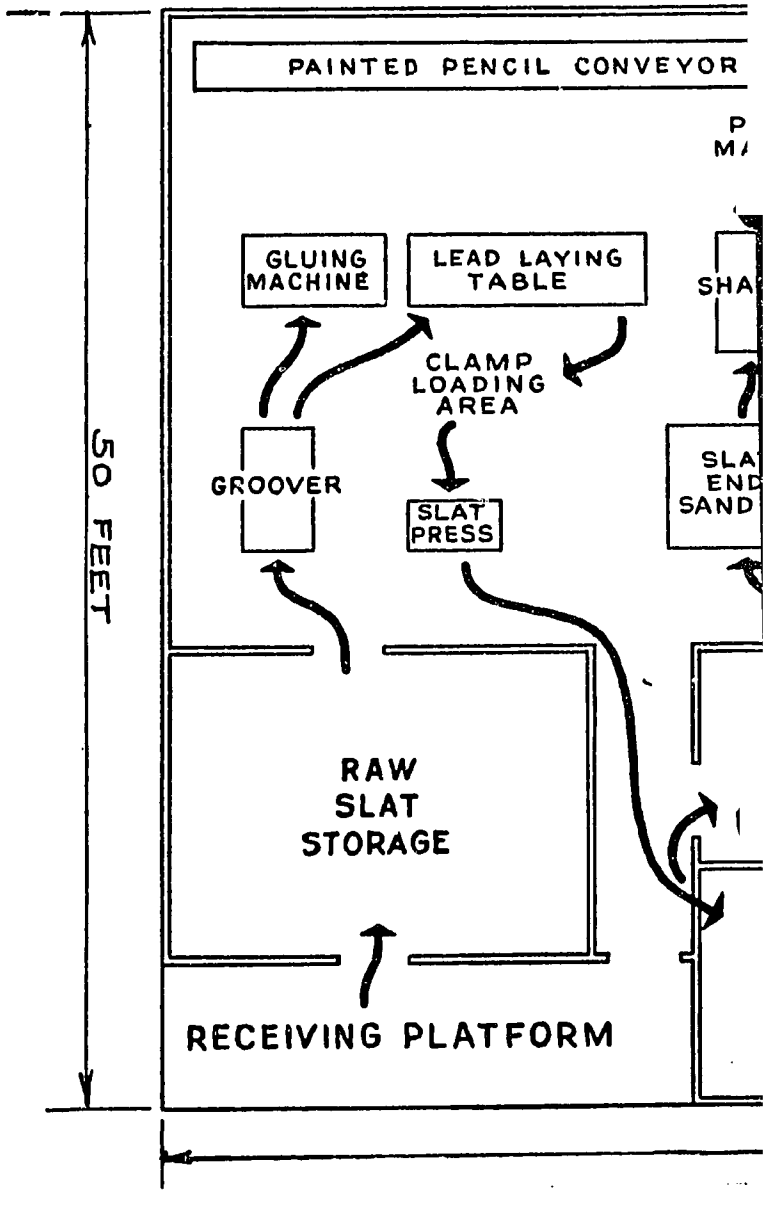
a. Annual Costs	
Direct Materials	$167,200
Direct Labor	95,000
Manufacturing Overhead (a)	34,000
Admin. & Sales Costs (b), Bad Debts, Contingencies	42,000
Depreciation on Fixed Capital	5,800
Total	$344,000
b. Annual Sales Revenue	$400,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges, Sales Commissions, Freight Out, Travel.

LEAD PE

PL

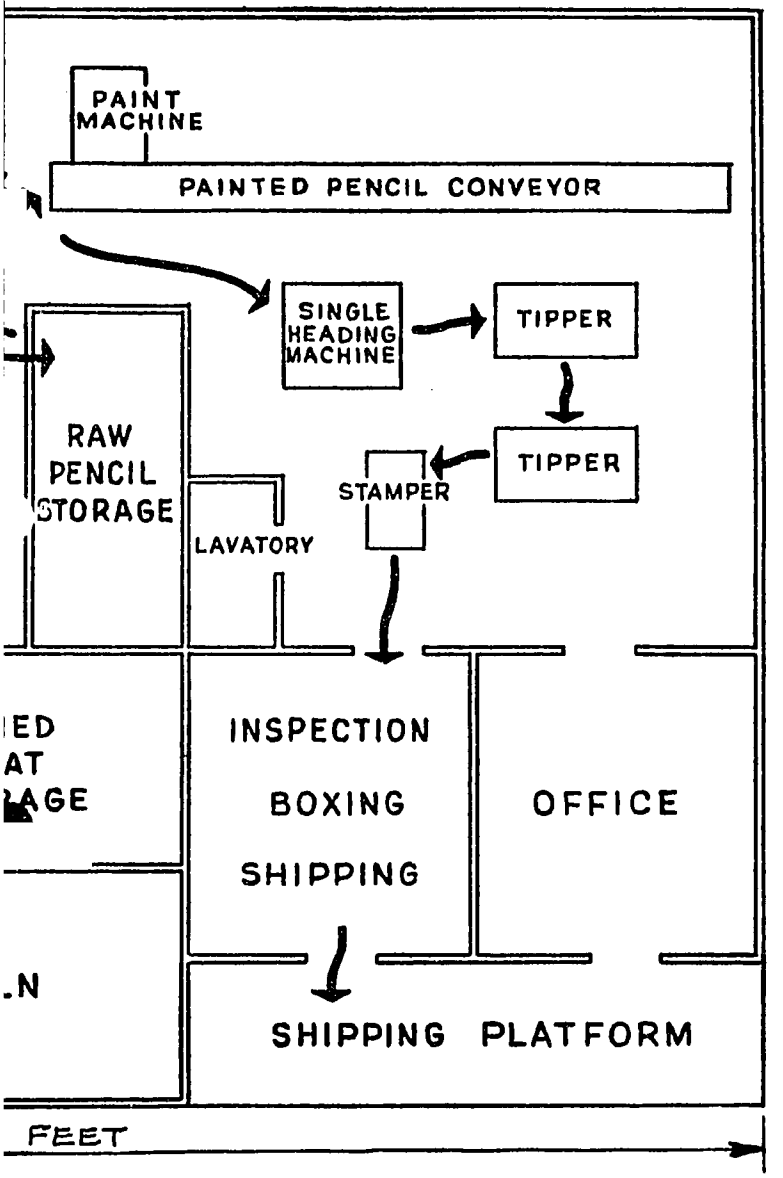
ARROWS IND



S.I.C. 3952

OUT

OW OF WORK



LEAD PENCILS: S. I. C. 3952

SELECTED REFERENCES

I. TEXTBOOKS

A. Industrial Arts Woodworking. John L. Fevier. 1965. $5.20.
Chas. A. Bennett Co. Inc.
237 N. Monroe Street
Peoria, Ill. 61602

B. Woodworking With Machines. J. H. Douglass. 1960. 181 p. Illus. $4.20.
Taplinger Publishing Co. Inc.
119 W. 57th Street
New York, N. Y. 10019

C. Woodworking for Industrial Arts. I. C. Madden. 1959. 224 p. Illus. $4.00.
Goodheart-Wilcox Company, Inc.
1322 South Wabash Avenue
Chicago, Ill. 60605

D. Woodwork Tools and Their Uses. W. Coventon. 1953. 304 p. Illus. $5.90.
Hutchinson and Company
62 East 83rd Street, New York, N. Y. 10028

II. U.S. GOVERNMENT PUBLICATIONS

A. Pencil Manufacture. IR-30788. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Pencil Manufacturing - Bibliography. IR-25512. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Midwest Engineer. Monthly. $3.00/year.
Western Society of Engineers.
84 West Randolph Street
Chicago, Ill. 60601
Frequently has articles and data relating to lead pencils.

B. Industrial Arts and Vocational Education. Monthly. $4.00/year.
Bruce Publishing Company
400 North Broadway, Milwaukee, Wisconsin 53201
Includes production and marketing data on pencils.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,893,109. 1959. 3 p.
The manufacture of lead pencils.

B. Patent No. 2,713,364. 1955. 5 p.
Method of treating wood slats for the manufacture of lead pencils.

V. TRADE ASSOCIATIONS

A. Lead Pencil Manufacturers Association
500 Fifth Avenue
New York, N. Y. 10036

B. Pencil Makers Association
50 West 44th Street
New York, N. Y. 10036

VI. ENGINEERING COMPANIES

A. Manufacturers Engineers Company
4949 South East 25 Avenue
Portland, Oregon 97202
Engineers for wood proceesing companies.

B. Consolidated Engineers Enterprises
3067 North Elston Avenue
Chicago, Ill. 60618
Mechancial and industrial engineering and plant layouts.

VII. DIRECTORY

A. Handbook and Directory of the Forest Industries. Annual. $.17.00.
Miller Freeman Publications
500 Howard Street
San Francisco, California 94105
Information on firms in every field of forest industry for the major producing areas of the United States.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

MOTOR STARTERS

I. P. No. 66165

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

MOTOR STARTERS: Standard Industrial Classification 3694

A. PRODUCT DESCRIPTION

Motor starters for squirrel-cage induction motors. Equipment listed can be used to produce different kinds of starters, e.g. manual across-the-line starters, reduced voltage type starters, transformer type or auto-starters. Production can be adapted to demand, the latter depending on types and sizes of motors used, as well as certain technical factors such as the power source and local electricity regulations.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this industry are moderate. Generally speaking, one would expect such a plant as this to be set up only where electric motors are being produced (see Industry Profile on Electric Motors, 1/6 to 10 h.p.: S.I.C. 3591).

C. MARKET ASPECTS

1. USERS. Industries, individuals.

2. SALES CHANNELS AND METHODS. Sales will be made direct to producers of electric motors, and to wholesale and retail distributors of electrical equipment.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products have a high unit value and are able to bear transport costs over long distances. They require some care in packing and handling. b. Export. These products are shipped world-wide.

4. COMPETITION. a. Domestic Market. Competition from imports may be keen. b. Export Market. A plant of this size would stand no chance in world trade in competition with large-scale producers.

5. MARKET NEEDED FOR PLANT DESCRIBED. A plant of this kind would normally need to have electric motor manufacturers in the vicinity to provide a market.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 4,200 Starters

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 5,000 sq. ft.		$ --
Building. One story, 40'x80'		19,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$20,000	
Other tools & equipmt.	3,000	
Furniture & fixtures	500	
Transportation equipmt.	2,500	26 000
Total (excl. Land)		$ 45 000

Principal Items. 40 ton press, 15 ton press, drill press, metal shear, small lathe, electric grinder, electric buffer, spray equipment, air compressor, welding equipment, coil winder, ceramic kiln, baking oven, dust collector, 1-ton truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 27,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,900
Training Costs		9,000
Total Working Capital		$ 38,500

c. TOTAL CAPITAL (EXCL. LAND) $ 83,500

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Steel	37 tons	$ 7,300
Copper	10 tons	6,700
Ceramics	8.5 tons	5,600
Paint & finish		400
Purchased parts (castings, bolts, nuts, washers, etc.)		36,400
Packaging materials		600
Total		$ 57,000
b. Supplies		
Lubricants & hand tools		$ 100
Welding materials		300
Molding supplies		1,300
Cleaning materials		900
Maintenance & repair parts		1,200
Office supplies		200
Total		$ 4,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 100 hp.	$ 3,000
b. Fuel. About 3,000 gals. oil, or equivalent in other fuel, annually.	$ 400
c. Water. About 400,000 gals. annually for general purposes.	$ 100

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton pickup & delivery truck.	$ 1,000
b. External Transport Facilities. No special requirements.	

5. MANPOWER

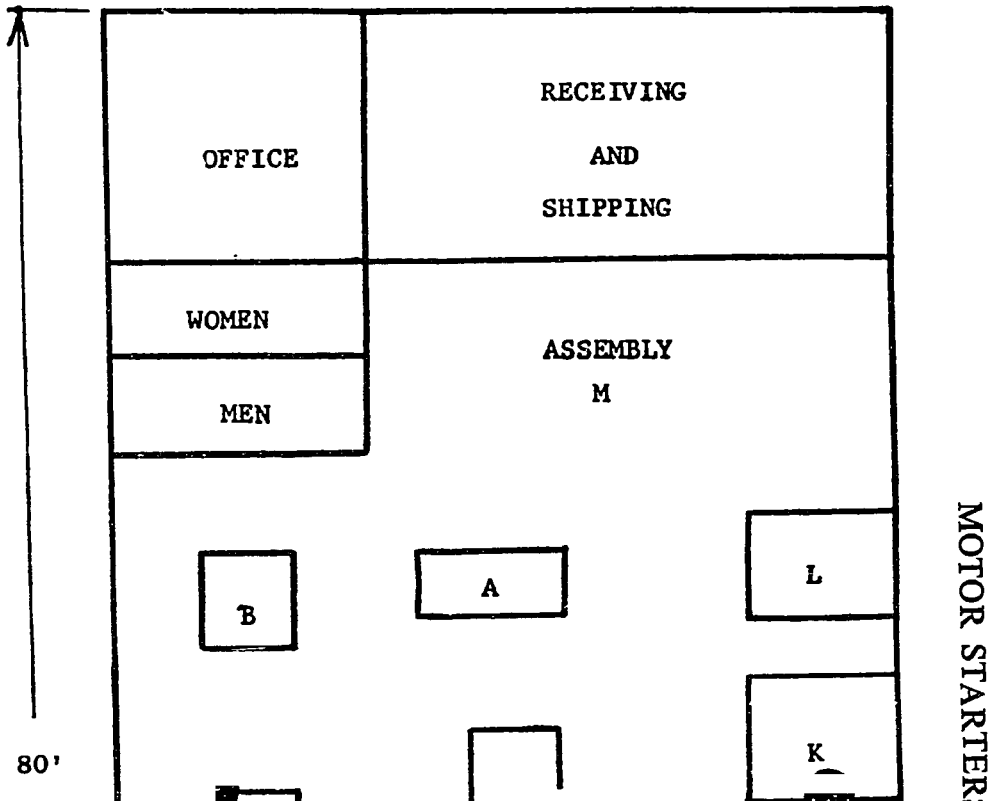
	Number	Annual Cost
a. Direct Labor		
Skilled	4	$ 24,000
Semi-skilled	4	20,000
Unskilled	4	16,000
Total	12	$ 60,000
b. Indirect Labor		
Manager & supervisor	2	$ 19,000
Office	2	9,000
Other	3	12,000
Total	7	$ 40,000

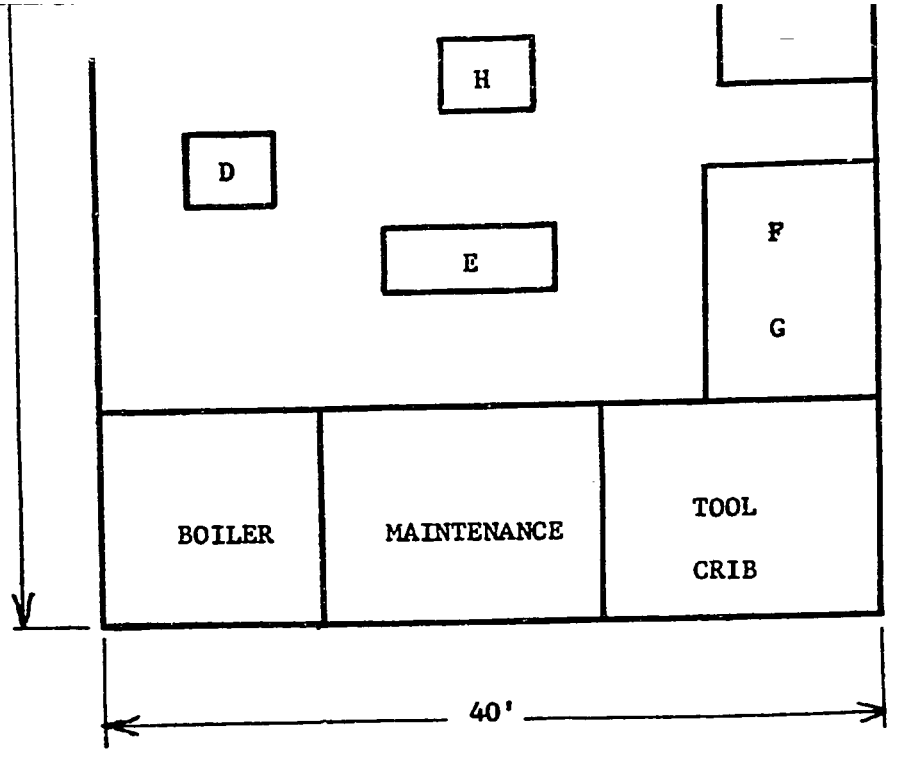
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 57,000
Direct Labor	60,000
Manufacturing Overhead(a)	48,500
Admin. Costs(b), Contingencies	6,000
Sales Costs (c), Bad Debts	16,200
Depreciation on Fixed Capital	4,300
Total	$192,000
b. Annual Sales Revenue	$225,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT





A. Metal shear
B. 40-ton press
C. 15-ton press
D. Drill press
E. Lathe
F. Electric grinder
G. Electric buffer
H. Welding
I. Coil winder
J. Ceramic kiln
K. Baking oven
L. Spray booth
M. Assembly

MOTOR STARTERS: S. I. C. 3694

SELECTED REFERENCES

I. TEXTBOOKS

A. Manual of Electromechanical Devices. Douglas Greenwood. 1965. $12.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

B. Electric Machinery and Control. Irving L. Kosow. 1964. $17.00.
Prentice-Hall Inc.
Englewood Cliffs, N. J. 07632

C. Automotive Fuel and Ignition Systems. I. A. Frazee. 1953. 503 p. Illus. $6.95.
American Technical Society
348 East 58th Street
Chicago, Ill. 60637

D. Control of Electric Motors. P. B. Harwood. 1952. 538 p. Illus. $9.50.
John Wiley and Sons, Inc.
605 Third Avenue, New York, N. Y. 10016

II. U. S. GOVERNMENT PUBLICATION

A. Fractional and Small Horsepower Electric Motors and Direct Starters for Squirrel-Cage Motors. TI-12. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Electrical Engineering. Monthly. $12.00/year.
American Institute of Electrical Engineers
33 West 39th Street
New York, N. Y. 10018
Contains information on main kinds of electrical supplies, equipment, and markets.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,997,996. 1961. 10 p.
Control device for motor starter and circuit.

B. Patent No, 2,997,995. 1961. 4 p.
Starter for automobile and other kinds of motors.

C. Patent No. 2,993,487. 1961. 3 p.
Starting device for motors.

D. Patent No. 2,989,958. 1961. 9 p.
Motor starter, starter switch, and transmission control.

E. Patent No. 2,988,079. 1961. 11 p.
starter mechanism and motor control circuit.

V. TRADE ASSOCIATION

A. National Electrical Manufacturers Association
155 East 44th Street
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

A. O. E. Szekely and Associates, Inc.
Commerce. Georgia 30529
Automotive and electro-mechanical engineering.

B. Thoren Engineering Company
325 West 7th Street
Hazelton, Penn. 18201
Electro-mechanical engineering.

VII. DIRECTORY

A. Electrical West Manufacturers Directory. Annual. $1.00.
Electrical West
68 Post Street
San Francisco, Calif. 94104
Lists manufacturers, distributors, sales outlets of electrical supplies and services.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

PAINT AND VARNISH BRUSHES

I. P. No. 66166

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

PAINT AND VARNISH BRUSHES: Standard Industrial Classification 3981

A. PRODUCT DESCRIPTION

Paint and varnish brushes, size one to six inches.

B. GENERAL EVALUATION

This plant does not require much skilled labor, though experienced management is necessary. Careful inspection of materials used and of finished products is necessary, since it is essential to assure high quality. Technically, the industry is one suited to the conditions of many areas. The main problem is likely to be marketing. Usually no possibility will exist of a significant volume of exports, and the major outlet must be the local market. Only where appreciable progress has already been made in factory industry and where large urban areas exist is the local market likely to be large enough to absorb the production of a mechanized paint brush plant. For some purposes rollers and sprayers are being increasingly used and as these are comparatively simple and low-cost devices may have adverse effects on demand for paint brushes.

C. MARKET ASPECTS

1. USERS. Shipyards, ships, railroads, large variety of industries, military forces, professional decorators, home owners, other small users.
2. SALES CHANNELS AND METHODS. Sales chiefly to wholesalers, some direct to large buyers, such as shipyards, military forces, railroads. Products are commonly branded.
3. GEOGRAPHICAL EXTENT OF MARKET. a Domestic. Transport costs are low in relation to value of product and handling is easy. Market may be very extensive. b. Export. World-wide.
4. COMPETITION. a. Domestic Market. Quality is highly important in case of paint brushes. If local industry can produce good quality product, it should be able to compete effectively with imports. Competition from other paint applicators (rollers, sprayers) is increasing and must be taken into account in estimating future demand. b Export Market. Given favorable cost conditions, plant might be able to develop some regional exports. In general, however, large producers in advanced industrial areas will give stiff competition in export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for this product is likely to be small where per capita income is low, but it is likely to rise sharply with any general improvement in living standards. Demand, however, cannot be estimated in terms of population and per capita income, since it is strongly influenced by many special factors. Among these are the types of industry, the extent of maritime activity, the size of military establishment, and building styles.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 1,425,000 Brushes.

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land.		$ --
Building. One story, 90'x125'x15'.		67,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$31,000	
Other tools & equipmt.	300	
Furniture & fixtures	700	
Transportation equipmt.	2,500	34,500
Total (excl. Land)		$101,500

Principal Items. Sterilizing machines, mixing machines, vulcanizing oven, clinching machine, nailing machine, 2 beating-out machines including blower systems.

b. WORKING CAPITAL

	No. of Days	
Direct Materials	90	$ 22,300
Direct Labor, Mfg. Overhead(a)	60	29,400
Admin. & Sales Costs(b), Contingencies	30	7,000
Training Costs		22,000
Total Working Capital		$ 80,700

c. TOTAL CAPITAL (EXCL. LAND) $182,200

2. MATERIALS AND SUPPLIES

a. Direct Materials

	Annual Requirements	Annual Cost
Bristles	1,070,000 lbs.	$ 42,800
Wooden handles	1,425,000	28,500
Ferrules	1,425,000	14,300
Other, incl. vulcanizing rubber		3,600
Total		$ 89,200

b. Supplies

Lubricants	$ 100
Hand tools	500
Maintenance & repairs	1,600
Office supplies	300
Total	$ 2,500

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 390 kw-hr a day.	$ 2,500
b. Fuel. Production & heating. Any locally available boiler fuel may be used.	$ 1,800
c. Water. Production & general purposes.	$ 700

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton pickup truck.	$ 800

b. External Transport Facilities. In & out shipments about 150 tons a year. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	8	40,000
Unskilled	21	84,000
Total	32	$142,000
b. Indirect Labor		
Manager	1	$ 9,000
Office	2	9,000
Other	2	8,000
Total	5	$ 26,000

c. Training Needs. Manager & inspector should be fully experienced. With 3 skilled workers, they should be able to train all workers. Plant should reach full production in 3 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs

Direct Materials	$ 89,200
Direct Labor	142,000
Manufacturing Overhead(a)	34,300
Admin. & Sales Costs(b), Bad Debts, Contingencies	84,000
Depreciation on Fixed Capital	7,200
Total	$356,700

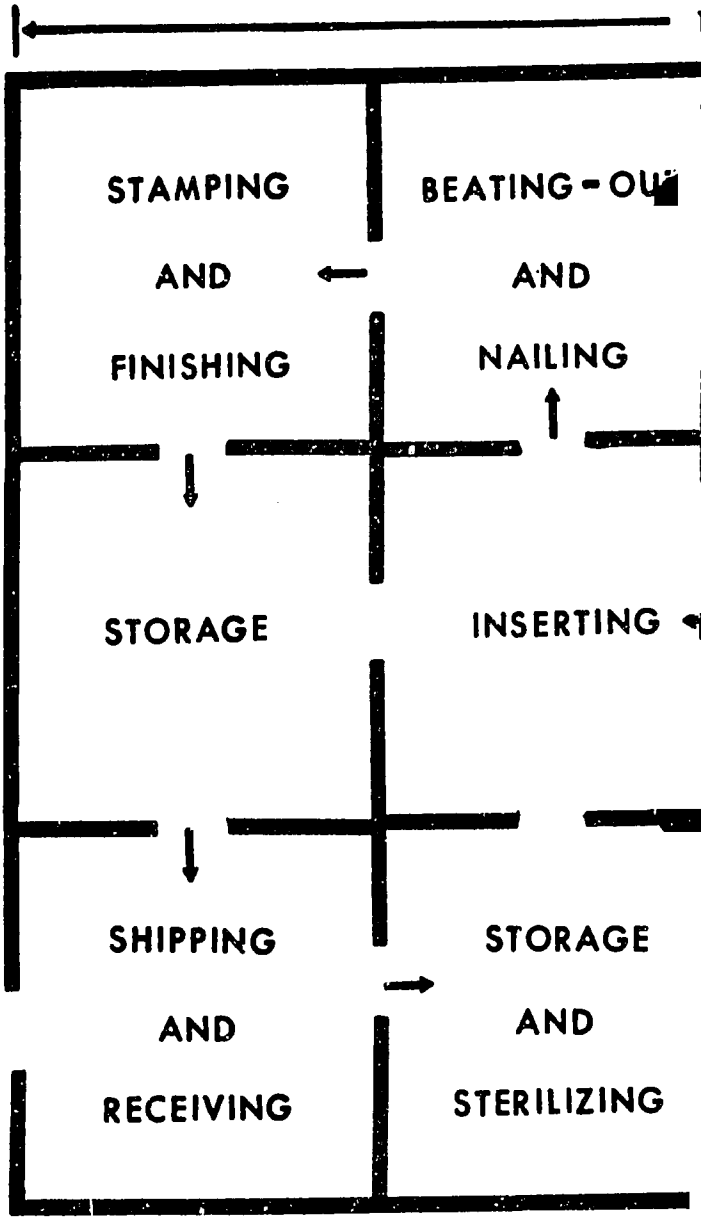
b. Annual Sales Revenue $420,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Travel, Freight Out.

PAINT AND VAR

PL

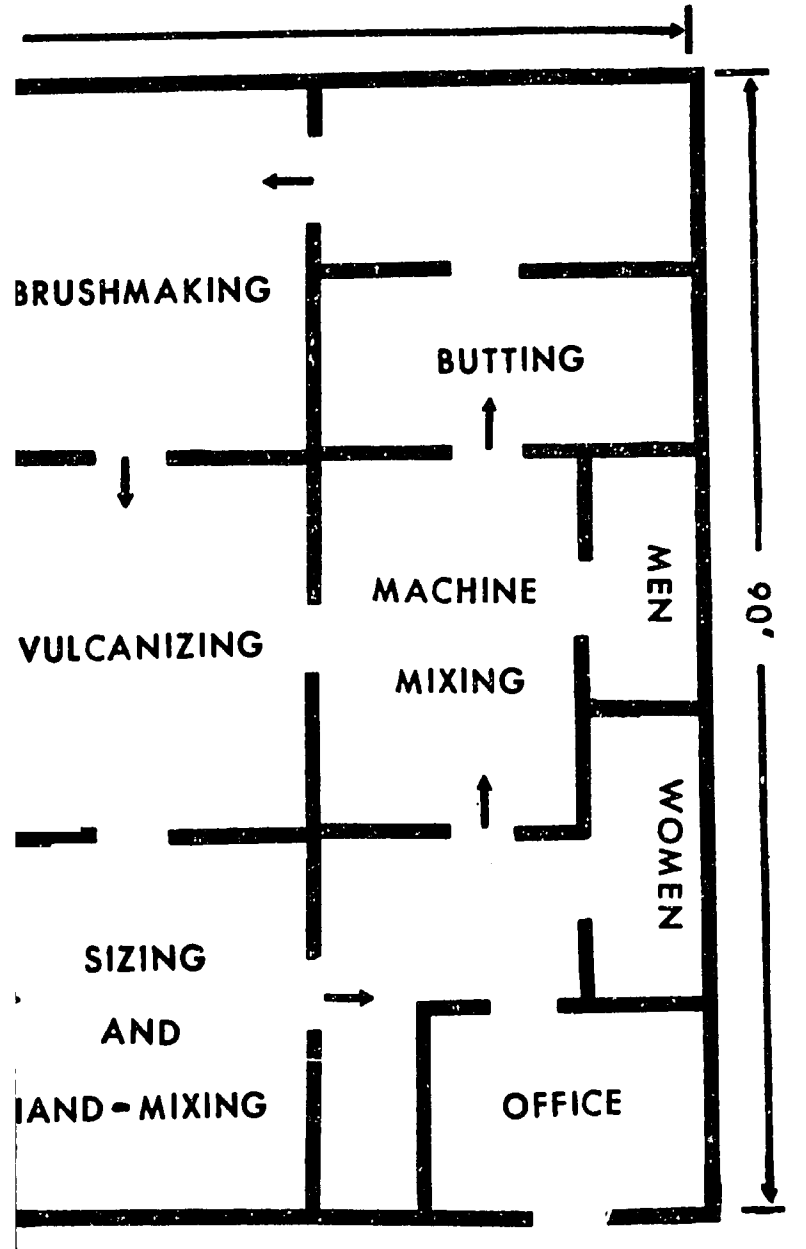
ARROWS IND



H BRUSHES: S.I.C. 3981

LAYOUT

E FLOW OF WORK



PAINT AND VARNISH BRUSHES: S.I.C. 3981

SELECTED REFERENCES

I. PERIODICALS

A. Brushware. Monthly. $3.00/year.
Trade Press Publishing Company
407 East Michigan Street
Milwaukee, Wisconsin 53202

B. Factory Management. Monthly. $5.00/year.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U.S. PATENTS

Available U.S. Patent Office
Washington, D.C. 20231 $.25 each.

A. Patent No. 2,790,986. May 7, 1957. 3 p.
A brush for applying liquid, particularly the latex emulsion type, or water paint, to a surface.

B. Patent No. 2,763,883. Sept. 25, 1950. 4 p.
Process and composition for making treated paint brush less subject to the adverse effects of residual amounts of the coating than brushes not so treated.

C. Patent No. 2,512,997. June 27, 1950. 14 p.
Integral brush assembly for manufacture of paint brushes especially.

III. TRADE ASSOCIATIONS

A. Painting and Decorating Contractors of America
2625 West Peterson Avenue
Chicago, Ill. 60645

B. American Brush Manufacturers Association
1900 Arch Street
Philadelphia, Pa. 15203

C. National Paint, Varnish and Lacquer Association
1500 Rhode Island Avenue
Washington, D.C. 20005

IV. ENGINEERING COMPANIES

A. Onsrud Machine Works, Inc.
Woodworking Machine Division
3913 Palmer Street
Chicago, Ill. 60647

B. Carlson Tool and Machine Co.
West State at Anderson
Geneva, Ill. 60134

C. Fisher Brush Machinery Corporation
167 W. West
Baltimore, Maryland 21230
Automatic and semi-automatic brush machinery.

V. DIRECTORY

A. MacRae's Blue Book. $15.00.
W. J. Brown
18 East Huron Street
Chicago, Ill. 60611
Industries, equipment, products, materials.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

POTATO FLAKES

I. P. No. 66167

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

POTATO FLAKES: Standard Industrial Classification 2034

A. PRODUCT DESCRIPTION

Dehydrated mashed potato flakes packaged for institutional and bulk sales. Packaging costs are based on 50% of production in institutional size packages and 50% sold in bulk for repackaging.

B. GENERAL EVALUATION

An adequate assured local supply of high solids, low sugar potatoes is essential. The plant would operate on a three shift basis for about 200 days a year during the period of the potato harvest. The product has been gaining acceptance in recent years but active sales promotion continues to be necessary. A thorough study of market potential should be made before establishing this plant.

C. MARKET ASPECTS

1. USERS. Households and eating places.

2. SALES CHANNELS AND METHODS. Sales to wholesale distributors, repackagers, and possibly direct to some institutions.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Shipping presents no great problem and transport cost is not unduly burdensome. The domestic market may be nationwide. b. Export. There is a growing export market for the product.

4. COMPETITION. a. Domestic Market. The competitive situation will depend partly on the relative cost of the product compared with fresh potatoes, as well as the ready availability of the latter. b. Export Market. Quality and delivered cost will determine the plant's ability to compete in the export market.

5. MARKET NEEDED FOR PLANT DESCRIBED. In the United States a total population of the order of 6 million would generally provide a market for the output of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION FOR 200 DAYS A YEAR: 4.2 Million Pounds

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. 3 acres.		$ --
Building. One story, 19,000 sq. ft.		134,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$180,000	
Other tools & equipmt.	5,000	
Furniture & fixtures	1,000	
Transportation equipmt.	72,000	258,000
Total (excl. Land.)		$392,000

Principal Items Conveyors, washer, peeler, precooker, cooler, slicer, cooker, ricer, drum dryer with breaker, meters, mixers, packaging & cartoning equipment.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$128,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	15,200
Training Costs		3,300
Total Working Capital		$147,000

c. TOTAL CAPITAL (EXCL. LAND) $539,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Potatoes	15,000 tons	$450,000
Skim milk powder or dry whey	80,000 lbs.	8,800
Sulfite	1,500 lbs.	100
Myverol 18.07	29,000 lbs.	11,600
Sodium acid pyrophosfate	13,000 lbs.	1,600
Tenox IV	2,200 lbs.	3,500
Sodium hydroxide	120,000 lbs.	4,800
Packaging-bulk cartons & liners	36,000	
institutional cartons	165,000	
inner bags	990,000	50,000
Total		$530,400
b. Supplies		
Lubricants & hand tools		$ 200
Maintenance & spare parts		15,000
Office supplies		300
Total		$ 15,500

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 200 hp. connected load.	$ 1,000
b. Fuel. 250,000 gals. fuel oil annually.	$ 21,000
c. Water. For production, sanitation & fire protection.	$ 3,000

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 4 truck tractors-8 trailers (potatoes trucked from nearby fields).	$ 10,000

b. External Transport Facilities. Good highways & proximity to railroad desirable.

5. MANPOWER

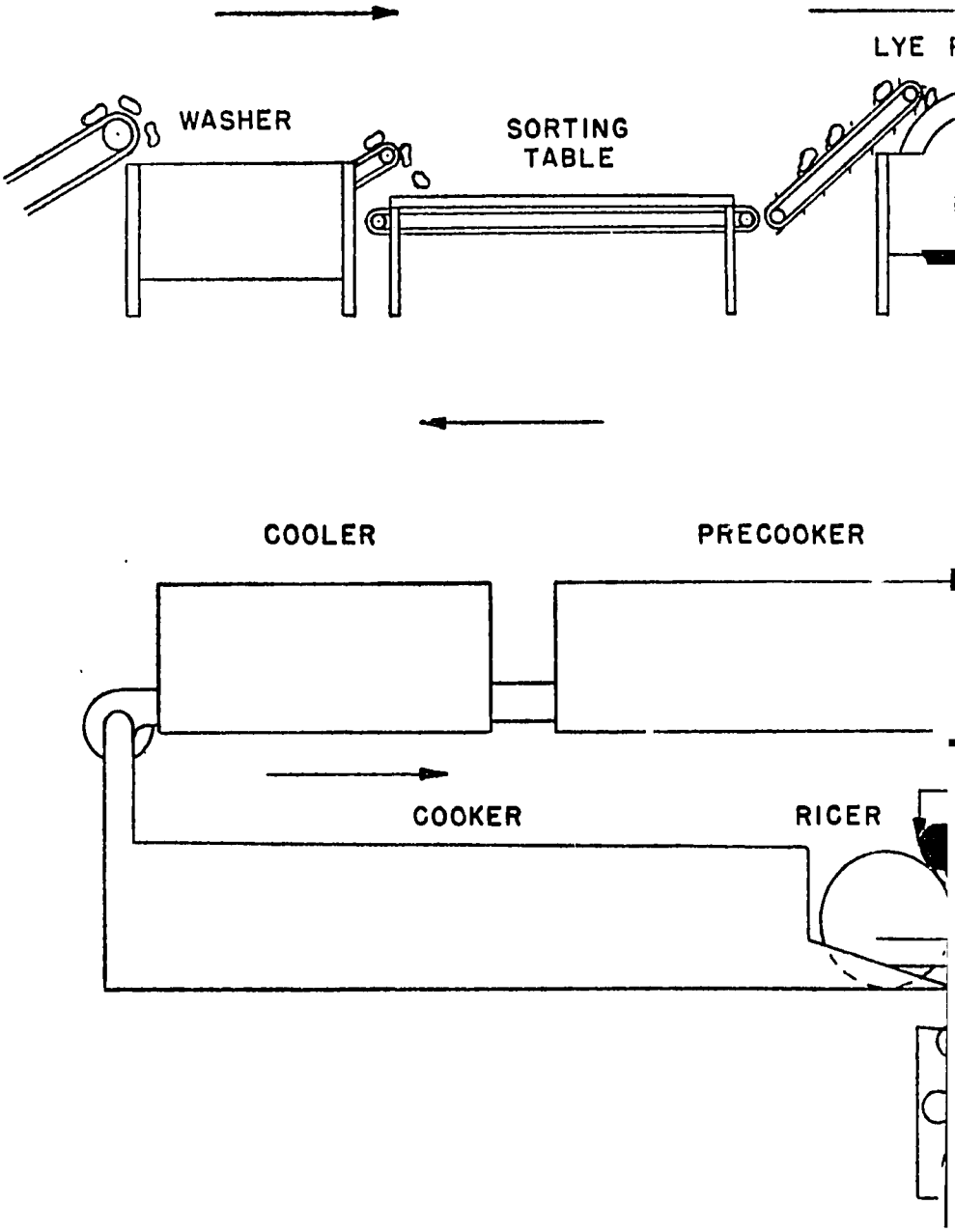
	Number	Annual Cost
a. Direct Labor		
Skilled	9	$ 29,000
Semi-skilled	20	49,000
Unskilled	36	63,000
Total	65	$141,000
b. Indirect Labor		
Manager & Supervisor	2	$ 17,000
Office & inspectors	6	18,000
Truck drivers & maintenance	7	24,000
Total	15	$ 59,000

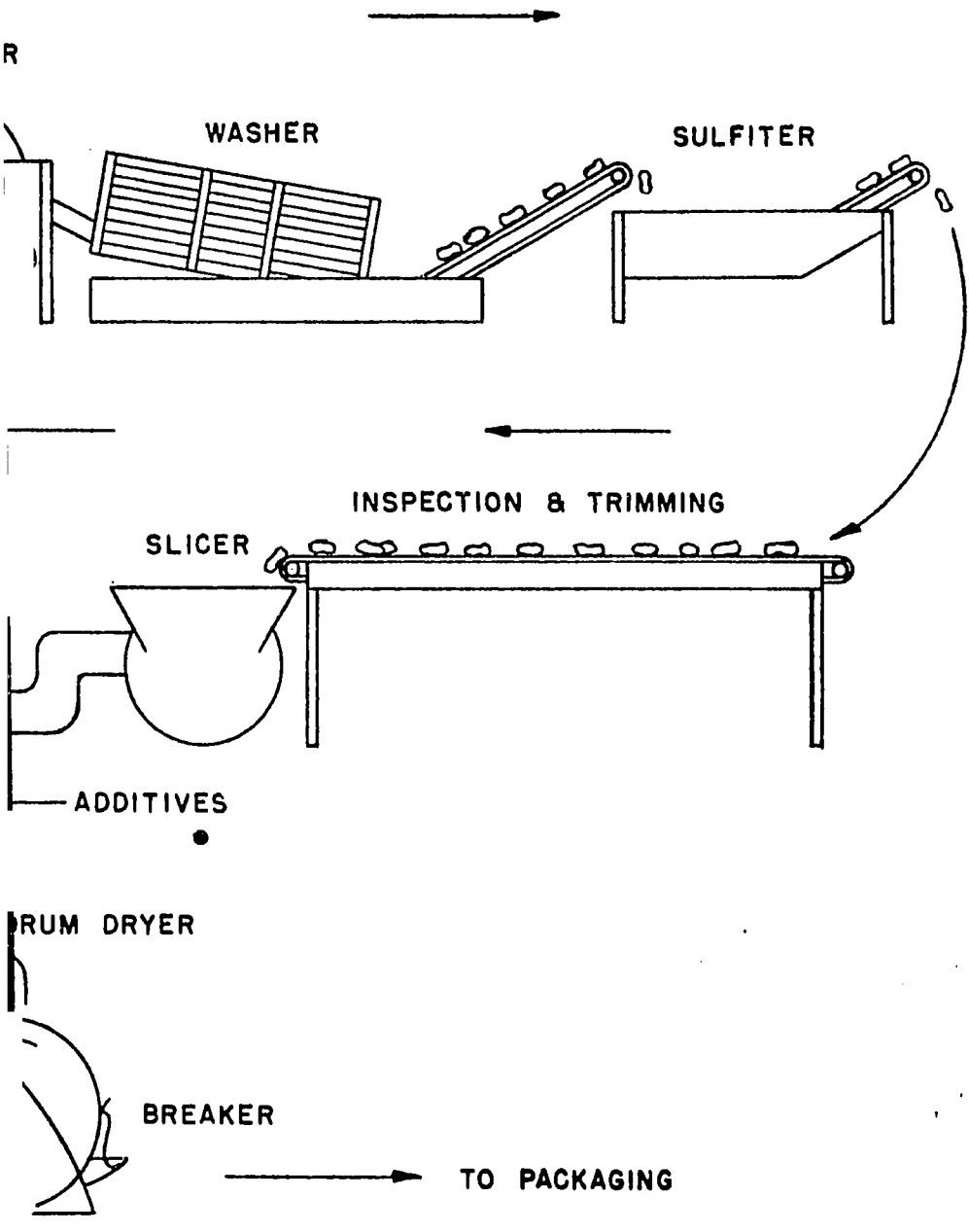
c. Training Needs. Manager & supervisor must be fully experienced. With the 9 skilled workers, they should be able to train all workers & reach full production in 15 days, once a pilot plant operation has established optimum processing conditions for the available raw material.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$530,400
Direct Labor	141,000
Manufacturing Overhead(a)	109,500
Admin. Costs(b), Contingencies	42,000
Sales Costs(c), Bad Debts	49,000
Depreciation on Fixed Capital	43,800
Total	$915,700
b. Annual Sales Revenue	$1,200,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.


LYE
WASHER
SORTING
TABLE
COOLER
PRECOOKER
COOKER
RICER


R
WASHER
SULFITER
INSPECTION & TRIMMING
SLICER
ADDITIVES
RUM DRYER
BREAKER
TO PACKAGING

POTATO FLAKES: S.I.C. 2034

SELECTED REFERENCES

I. TEXTBOOKS

A. Potato Processing. W. F. Talburt and O. Smith. 1959. $9.50.
The AVI Publishing Co. Inc.
Westport, Connecticut 06880

B. Modern Potato Products. Gratis.
Victor Chemical Works
Division of Stauffer Chemical Co.
155 N. Wacker Drive
Chicago, Ill. 60606

C. American Potato Yearbook. C. S. MacFarland Jr. 1965. $2.00.
Branden Press Inc.
36 Melrose Street
Boston, Mass. 02116

II. U.S. GOVERNMENT PUBLICATIONS

A. Potato Flakes: A New Form of Dehydrated Mashed Potatoes. II. Some factors influencing Texture. J. Cording Jr., M. J. Willard, Jr., and others. ARS-73-9.
United States Department of Agriculture
Agricultural Research Service
Washington, D. C. 20250

B. Potato Flakes: A New Form of Dehydrated Mashed Potatoes. P. B. Devoskin and M. Jacobs. 1957. Marketing Research Dept. 186.
U. S. Department of Agriculture
Agricultural Marketing Service
Washington, D. C. 20250

III. PERIODICAL

A. American Potatoes Journal. Monthly. $4.00/year.
Potato Association of America
New Brunswick, New Jersey 08901

IV. TRADE ASSOCIATIONS

A. Instant Potato Products Association
333 North Michigan Avenue
Chicago, Ill. 60601

B. Potato Association of America
New Jersey Agricultural Experiment Station
New Brunswick, New Jersey 08901

C. Institute of Food Technologists
176 West Adams Street
Chicago, Ill. 60603

IV. TRADE ASSOCIATIONS (Cont.)

D. National Potato Council
741 Munsey Building
Washington, D. C. 20004

V. ENGINEERING FIRMS

A. The Austin Company
450 West First Avenue
Roselle, New Jersey 07203

B. Food Processing Consultants
P. O. Box 1203
Greenwich, Conn. 06830

VI. DIRECTORIES

A. Vegetable Growers Buyers Guide. 25 c.
American Fruit Growers Publishing Co.
Willoughby, Ohio 44094

B. Canner/Packer Yearbook. $1.00.
Triad Publishing Company
Chicago, Ill. 60603

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

REFRIGERATED WALK-IN COOLERS

I. P. No. 66168

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

REFRIGERATED WALK-IN COOLERS: Standard Industrial Classification 3585

A. PRODUCT DESCRIPTION

Commercial coolers made from wooden panel sections of varying sizes, insulated with fiberglass. Such coolers are made to customers' requirements, and are constructed at the customers' places of business. Different finishes can be supplied to suit customers' need. The refrigeration units are purchased from manufacturers of such equipment either by the client or by the cooler manufacturer on his behalf.

B. GENERAL EVALUATION

This plant requires only a modest amount of capital. Skilled labor requirements are rather high, but technically the industry should not be beyond the capabilities of many developing areas. However, a market for the output of the plant described will only exist where there is a large urban area with a considerable demand for modern facilities for preserving food and other commodities. In general, demand for refrigeration facilities is increasing, and this is an industry with potential for growth.

C. MARKET ASPECTS

1. USERS. Butchers, sellers of dairy produce, drug suppliers, florists, and various other trades handling perishable commodities.

2. SALES CHANNELS AND METHODS. Sales are made direct to users.

3. GEOGRAPHICAL EXTENT OF MARKET. This industry usually necessitates construction work at the purchaser's premises. Normally the great majority of the orders will be local.

4. COMPETITION. These coolers are special-purpose products and competition from alternatives hardly exists. Normally there will be no competition from imports, though imported components may figure in the business.

5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend on climatic conditions, type of food commonly eaten, and income levels. Annual sales of 84 coolers, at an average value of about $2,000 each, will generally only be possible where there is a large urban development, with a considerable percentage of the population with moderately high incomes.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 84 Coolers

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 50'x100'.		30,000
Equipment. Furniture & Fixtures.		
Prodn. tools & equipmt.	$9,500	
Furniture & fixtures	800	10,300
Total (excl. Land)		$ 40,300

Principal Items. Trim saw, radial saw, cutoff saw, jointer, planer, belt sander, 2 electric drills electric saw, 2 wrench kits, hand trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 17,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,000
Training Costs		5,000
Total Working Capital		$ 23,200

c. TOTAL CAPITAL (EXCL. LAND) $ 63,500

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Lumber	200,000 bd. ft.	$ 26,000
Fiberglass	265,000 sq. ft.	2,700
Corkboard	12,000 sq. ft.	600
Moisture-proof paper	32,000 sq. ft.	700
Hardware	84 sets	4,600
Steel	4,800 lbs.	500
Shellac	600 gals.	1,800
Total		$ 36,900
b. Supplies		
Lubricants & hand tools		$ 100
Cutting tools		200
Maintenance & spare parts		700
Glue		200
Office supplies		300
Total		$ 1,500

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 20 hp.	$ 600
b. Fuel. Scrap lumber may be used. A little additional fuel might have to be purchased.	$ 100
c. Water. For general purposes.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. Reasonably good highway access needed to plant.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	7	$ 42,000
b. Indirect Labor		
Manager	1	$ 9,000
Office	2	9,000
Other	1	4,000
Total	4	$ 22,000

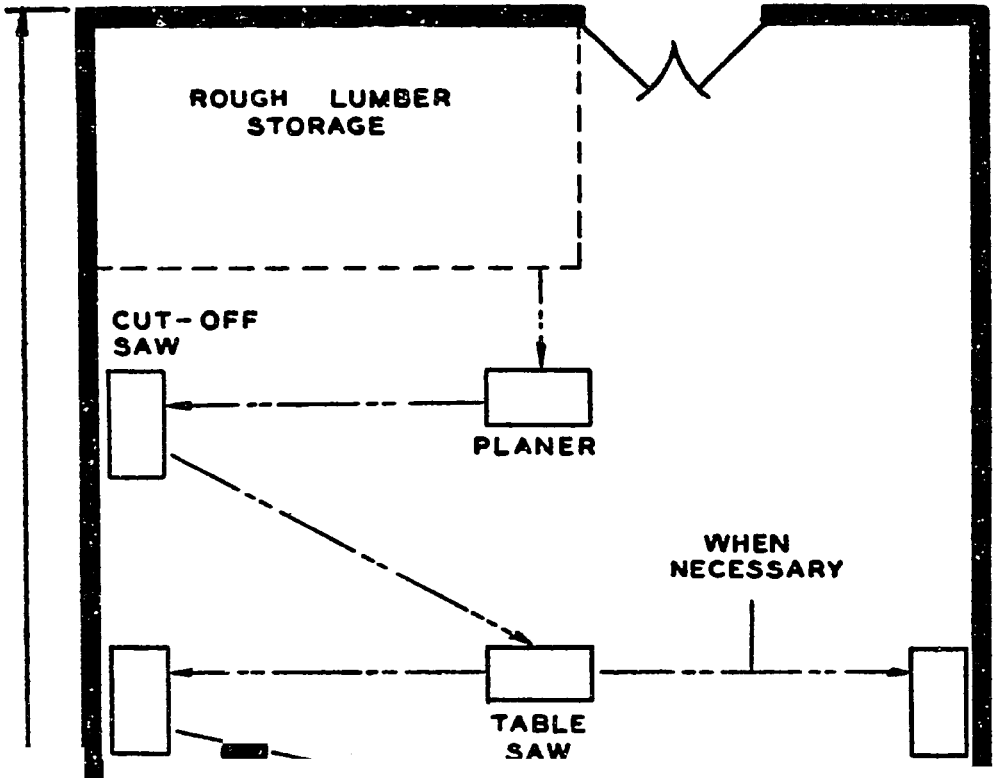
c. Training Needs. Manager should be experienced. With aid of 2 skilled workers, he should be able to carry out all necessary labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

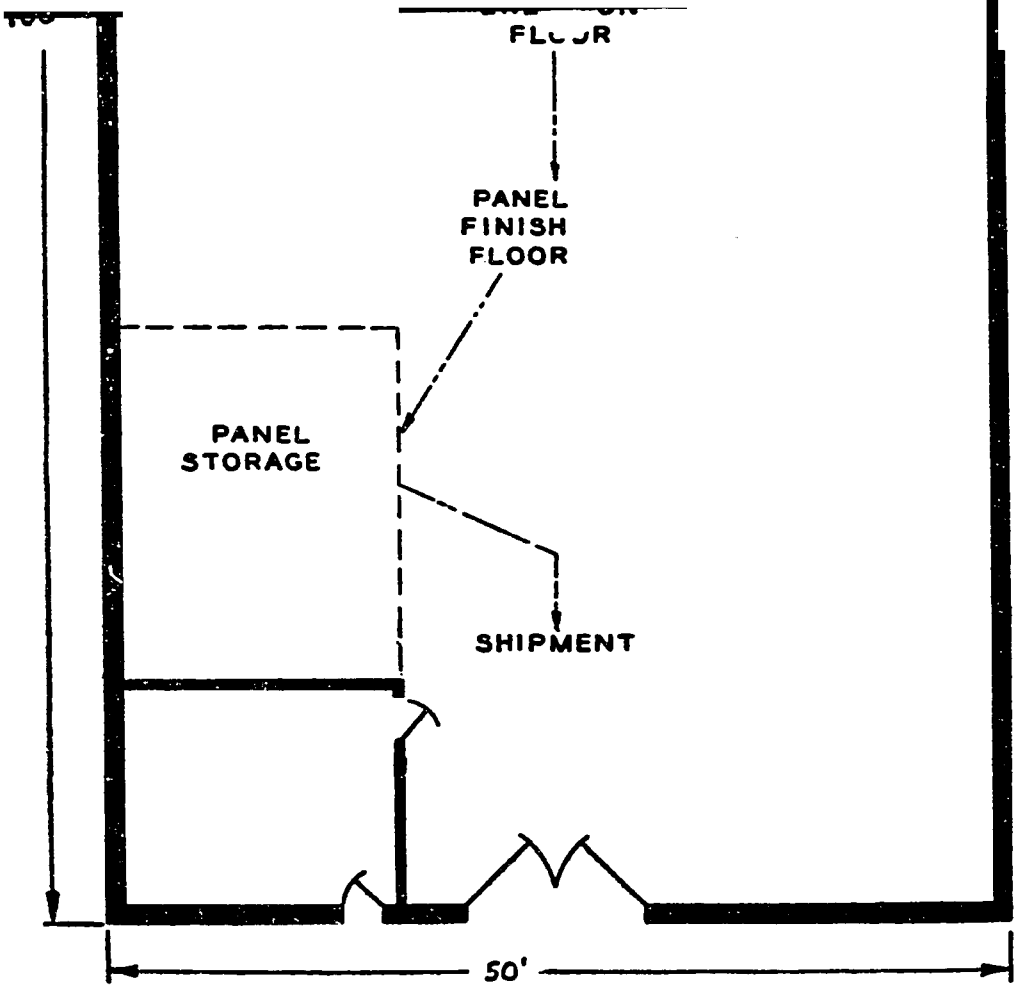
a. Annual Costs	
Direct Materials	$ 36,900
Direct Labor	42,000
Manufacturing Overhead(a)	24,300
Admin. Costs(b), Contingencies	4,500
Sales Costs(c), Bad Debts	7,300
Depreciation on Fixed Capital	3,500
Total	$118,500
b. Annual Sales Revenue	$150,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight out, Travel.

ARROWS INDICATE FLOW OF WORK



REFRIGERATEL



LK-IN COOLERS: S.I.C. 3585

REFRIGERATED WALK-IN COOLERS: S. I. C. 3585

SELECTED REFERENCES

I. TEXTBOOKS

A. Principles of Refrigeration. Roy J. Dossat. 1961. $10.50.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N.Y. 10016

B. Mechancial Refrigeration. N.R. Sparks and C. C. Dillio. 1959. 276 p. Illus. $9.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

C. Industrial Arts Woodworking. John L. Fevier. 1965. $5.20.
Chas. A. Bennett Company, Inc.
237 North Monroe Street, Peoria, Ill. 61602

D. General Woodworking. 2nd edition. C.H. Groneman. 1959. 256 p. Illus. $6.75.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

A. Refrigerators, IR-18735. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D.C. 20523

B. Refrigerator—Bibliography. IR-25531. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III PERIODICALS

A. The Wood-Worker. Monthly. $2.00/year.
S. H. Smith
2232 North Meridian Street
Indianapolis, Indiana 46207

B. Hitchcock's Wood Working. Monthly. $4.00/year.
Hitchcock Publishing Company
Wheaton, Ill. 60187

IV. U. S. PATENT

Available U. S. Patent Office
Washington, D. C. 20231 S.25 each.

A. Patent No. 2,793,963. 1957. 2 p.
Freezer room.

V. TRADE ASSOCIATIONS

A. Woodworking Machinery Manufacturers Association
1900 Arch Street
Philadelphia, Penn. 19103

B. American Society of Heating, Refrigerating and Air Conditioning Engineers
United Engineering Center
345 East 47th Street
New York, N.Y. 10017

VI. ENGINEERING COMPANIES

A. United States Machinery Company, Inc.
90 Broad Street
New York, N.Y. 10004
Design and install woodworking plants.

B. Mattison Machine Works
200 Blackhawk Park Avenue
Rockford; Illinois 61101
Design and build a wide range of woodworking machinery.

VII. DIRECTORY

A. Hitchcock's Woodworking Directory. Annual. $10.00.
Hitchcock Publishing Company
Wheaton, Illinois 60187
Lists manufacturers of woodworking machinery and equipment.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

SHALLOW WELL HAND PUMPS

I. P. No. 66169

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

SHALLOW WELL HAND PUMPS: Standard Industrial Classification 3561

A. PRODUCT DESCRIPTION

Simple hand pump, made of gray cast iron, bore 2-5/16", piston movement 6", obtained by hand lever. Bottom casing tapped for 1-1/4" inside diameter pipe. Pump will deliver approximately 200 gallons per hour, with about 30 to 35 strokes a minute, from maximum depth of 22 feet.

B. GENERAL EVALUATION

Capital and skilled labor requirements in this industry are modest. The plant consists essentially of a foundry, with a tool room in which castings are machined. Such a plant can make other cast iron articles, e.g. pipes, valves, wheels, stands, troughs, plows. Thus, if the demand for pumps is insufficient, the plant can use some of its capacity to make other articles. A plant of this type appears to have good prospects for profitable business and growth in many developing areas.

C. MARKET ASPECTS

1. USERS. Farmers; and urban property owners, where piped water does not exist.

2. SALES CHANNELS AND METHODS. Sales will generally be made to wholesale and retail distributors.

3. GEOGRAPHICAL EXTENT OF MARKET. Thase products are fairly easily handled, and transport costs are unlikely to restrict the market area very severely. Where there is a reasonably will developed transport network, plant may send shipments over a wide area. There is a moderate volume of export business in equipment of this kind.

4. COMPETITION. a. Domestic Market. Unless costs are unusually high, local product should be able to compete with imports. b. Export Market. This plant would be too small to engage in general export business, but some sales to nearby areas of neighboring countries might be possible.

5. MARKET NEEDED FOR PLANT DESCRIBED. In the less developed areas pumps of the kind produced by this plant are often widely used both in urban and rural areas. With extension of modern systems of water supply in urban areas demand will of course tend to decline. Where pumps of this type are in general use, a population of the order of 4 million should provide an outlet for production of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 30,000 Units

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 10,000 sq. ft.		$ --
Building. One story, 40'x75'.		18,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$12,800	
Other tools & equipmt.	5,500	
Furniture & fixtures	700	19,000
Total (excl. Land)		$ 37,000

Principal Items. Cupola complete, turbo compressor, sand screener, sand mixer, optical pyrometer, flasks, core oven, grinder on stand, portable grinder, 2 lathes, thread cutter, drill press, band saw.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 17,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,400
Training Costs		5,000
Total Working Capital		$ 23,800

c. TOTAL CAPITAL (EXCL. LAND) $ 60,800

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requmts.	Annual Cost
Pig iron & scrap	750 tons	$ 30,000
Coke & flux	225 tons	8,000
Sand, core sand, nails, patterns		3,000
Valves, bolts, nuts, washers		1,000
Total		$ 42,000

b. Supplies	
Lubricants & hand tools	$ 100
Grinding wheels & cutting tools	400
Maintenance & spare parts	1,300
Office supplies	200
Total	$ 2,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 25 hp.	$ 800
b. Fuel. About 3,000 gals. oil annually.	$ 400
c. Water. About 400,000 gals. annually.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. Total in & out shipments about 120 tons a month. Plant should be located on good highway, and, if possible, near railroad.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	4	20,000
Unskilled	3	12,000
Total	9	$ 44,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Total	2	$ 15,000

c. Training Needs. Manager should be fully experienced. With aid of 2 skilled workers, he should be able to do all necessary labor training. Plant should reach full production in 2 months.

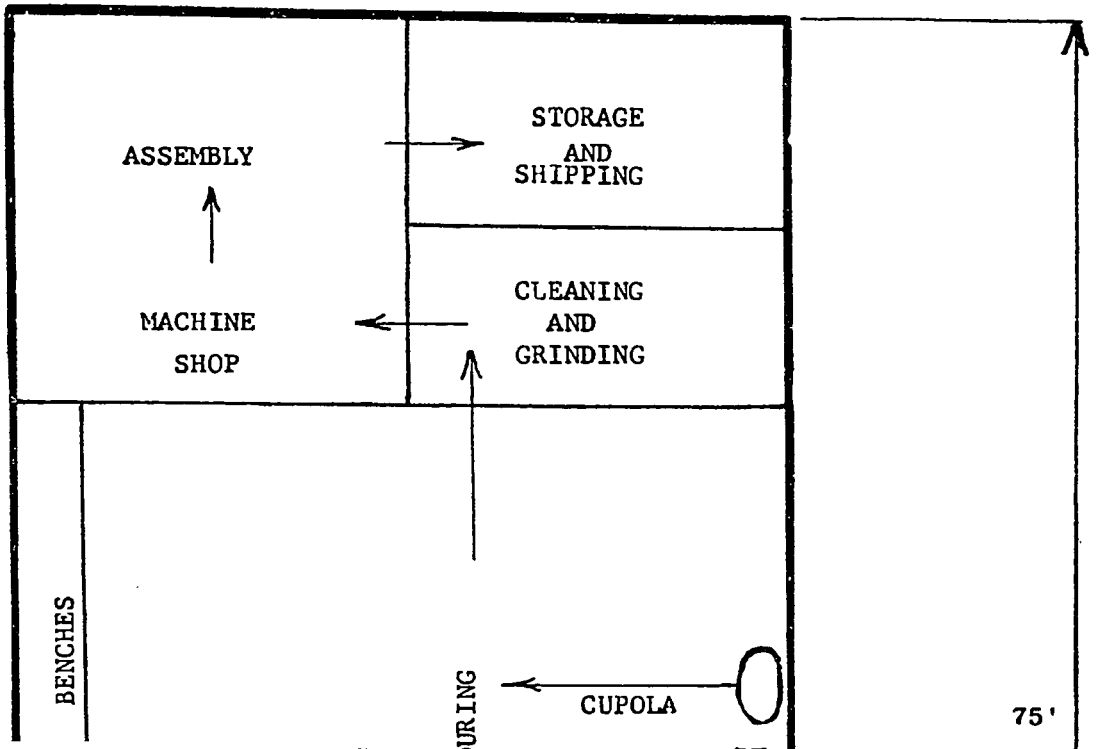
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 42,000
Direct Labor	44,000
Manufacturing overhead(a)	18,300
Admin. Costs(b), Contingencies	6,500
Sales Costs(c), Bad Debts	10,500
Depreciation on Fixed Capital	3,400
Total	$124,700
b. Annual Sales Revenue	$150.000

NOTES : (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

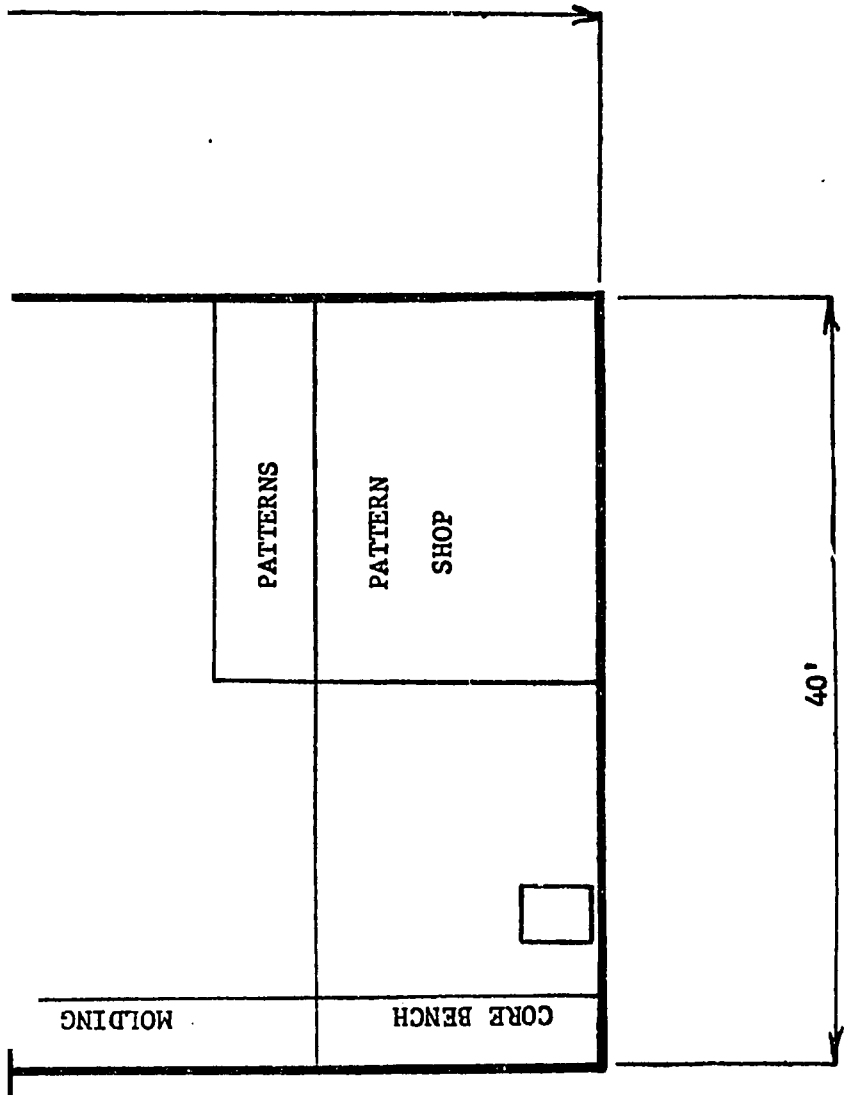
PLANT LAYOUT

ARROWS INDICATE FLOW OF WORK



SHALLOW WELL HAN

32


PATTERNS
PATTERN SHOP
40'
CORE BENCH
MOLDING

SHALLOW WELL HAND PUMPS: S.I.C. 3561

SELECTED REFERENCES

I. TEXTBOOKS

A. Pumps. Frank Kristal and F. A. Annett. 2nd ed. 1953. Illus. $.10.00.
McGraw-Hill Book Company Inc.
330 West 42nd Street
New York, N. Y. 10036

B. Foseco Foundryman's Handbook. 1965. $3.50.
Pergamon Press
44-01 Twenty-first Street
Long Island City, N. Y. 11101

C. Metallurgical Principles of Founding. V. Kondic. 1965.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue
New York, N. Y. 10017

D. Introduction to Foundry Technology. D. C. Ekey and W. P. Winter. 1958.
296 p. Illus. $7.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

A. Foundry Practices. IR-27681. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Pumps. IR-23519. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICAL

A. Foundry. Monthly. $20.00/year.
Penton Publishing Company
Penton Building
Cleveland, Ohio 44103
Foundry news and information primarily for management, production, technical, and purchasing personnel in foundries.

VI. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. $.25 each.

A. Patent No. 2,164,103. 1939. 3 p.
Hand pump for lifting water.

B. Patent No. 1,738,734. 1929. 6 p.
Construction of a small reciprocating pump.

C. Patent No. 1,699,726. 1929. 4 p.
Piston pump for shallow wells.

D. Patent No. 1,670,788. 1929. 8 p.
Simple pump of the piston type.

V. TRADE ASSOCIATIONS

A. Gray Iron Founders Society
National City-East Sixth Building
Cleveland, Ohio 44114

VI. ENGINEERING COMPANIES

A. National Engineering Company
610 Machinery Hall Building
Chicago, Ill. 60606

B. Jeffery Manufacturing Company
956 North 4th Street
Columbus, Ohio 43201
Sand handling and mold conveying and crushing.

VII. DIRECTORY

A. Standard Metal Directory. Biennial. $15.00.
National Business Press, Inc.
425 West 25th Street
New York, N. Y. 10001
Lists United States metal plants, including foundries.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

SHELL BUTTONS

I. P. No. 66170

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

SHELL BUTTONS: Standard Industrial Classification 3963

A. PRODUCT DESCRIPTION

Natural colored round buttons made of ocean shell or trocas or fresh water shells with 16, 18, 22, and 24 line diameters and of an average thickness of three millimeters. Any round design can be used.

B. GENERAL EVALUATION

Where shells are available locally a plant of this kind and size should be able to manufacture for export as well as supply local demand. Plant is fully mechanized. The sorting and classifying processes, as well as the cutting and polishing, are done by machine. The labor force required is mainly semi-skilled and therefore normally available even in areas without a highly trained labor-force. The output can be readily diversified by producing buttons of different shape and made from other materials, such as bone, vegetable ivory and the like. The most serious problem would be competition from plastic buttons, which are cheaper.

C. MARKET ASPECTS

1. USERS. Garment manufacturers, individuals.

2. SALES CHANNELS AND METHODS. Sales would be made to wholesalers and garment manufacturers and to exporters. Sales to most retailers would require that buttons be festened to cards, an expense and process not here provided for.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Transportation costs are insignificant and distribution could be nation-wide. b. Export. World wide market.

4. COMPETITION. a. Domestic Market. The main competition would come from cheaper, plastic buttons. b. Export Market. If located close to the source of raw material supply, the plant should be able to compete in the international market.

5. MARKET NEEDED FOR PLANT DESCRIBED. Domestic consumption of the output of this plant will depend upon many factors, particularly upon the style of clothing worn, the level of income and whether any significant portion of finished clothing, such as shirts and blouses, is imported. Assuming that most clothes are domestically produced, a population of three million would support the plant. However, since this plant can compete in the international market, size of local market needed might be much smaller, depending on the volume of exports.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 150,000 Gross

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 6,000 sq. ft.		$ --
Building. One story, 30'x70', plus overhead storage roof only, 30'x40'.		15,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$50,000	
Other tools & equipmt.	4,000	
Furniture & fixtures	1,000	
Total (excl. Land)		55,000
		$ 70,000

Principal Items. 20 ocean pearl cutting lathes, 2 blank splitting devices, classifying machine, 3 convex grinders, 2 polishing machines, 3 automatic facing & drilling machines, buffing churn, button sorting machine, 6 plate feeders, small fisheye.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 51,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,800
Training Costs		16,700
Total Working Capital		$ 70,500

c. TOTAL CAPITAL (EXCL. LAND) $140,500

2. MATERIALS AND SUPPLIES

	Annual Requmts.	Annual Cost
a. Direct Materials		
Ocean shells	150,000 lbs.	$110,000
Packaging		6,000
Total		$116,000
b. Supplies		
Lubricants & hand tools		$ 100
Cutting, grinding & polishing tools		400
Maintenance & repair parts		1,500
Office supplies		300
Total		$ 2,300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 100 hp.	$ 3,200
b. Fuel. For heating only.	$ 200
c. Water. About 400,000 gals. annually.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	24	120,000
Unskilled	3	12,000
Total	30	$150,000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office	2	9,000
Other	2	8,000
Total	6	$ 35,000

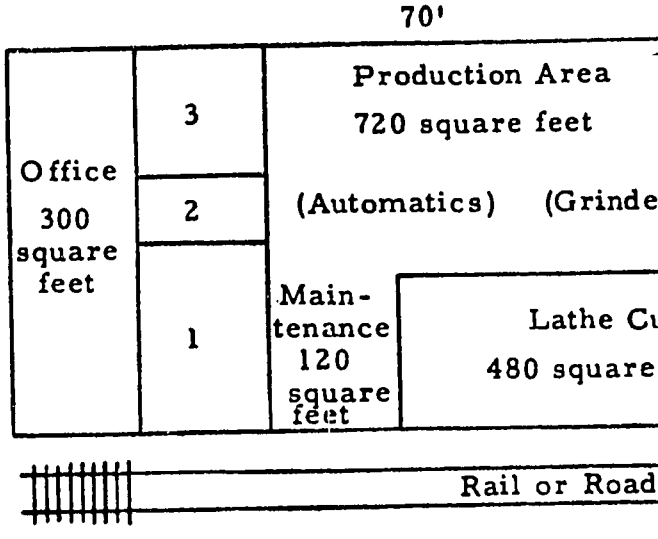
d. Training Needs. Manager & supervisor should be well experienced. With 2 skilled workers, they should be able to do all necessary labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$116,000
Direct Labor	150,000
Manufacturing Overhead(a)	40,800
Admin. Costs (b), Contingencies	9,000
Sales Costs (c), Bad Debts	24,000
Depreciation on Fixed Capital	6,700
Total	$346,500
b. Annual Sales Revenue	$400,000

NOTES : (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

SHELL B



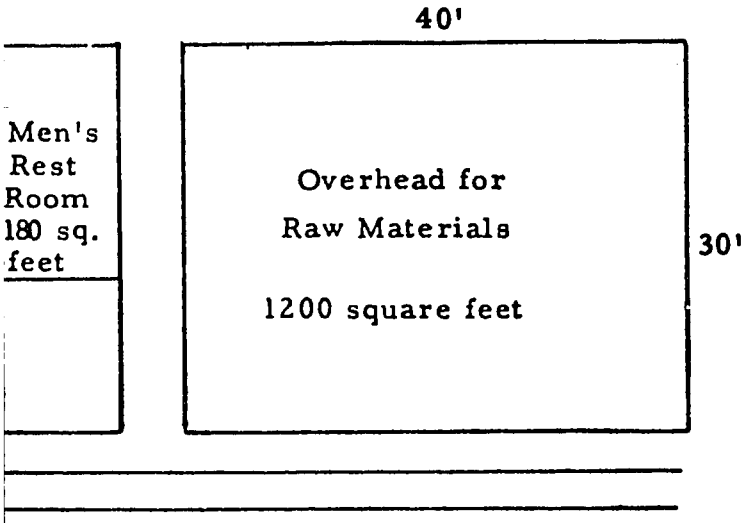
Key

1. Shipping and Rece
2. Finished goods - -
3. Ladies' Rest Room

Figure 8 - Prelimina

NS: S.I.C. 3963

AYOUT



ure feet

are feet

out

SHELL BUTTONS: S.I.C. 3963

SELECTED REFERENCES

I. TEXTBOOKS

A. Shell Art. Helen K. Krauss. 1965. Illus. $6.95.
Heathside Press Inc.
381 Park Avenue South
New York, N.Y. 10016

B. Marine Products of Commerce. D. K. Tressler and J. M. Lemon. 1951. 782 p. Illus. $20.00.
Reinhold Publishing Corporation
430 Park Avenue
New York, N.Y. 10022
Brief discussion of buttons and brief description of the manufacturing operation for shell buttons.

II. U. S. GOVERNMENT PUBLICATIONS

A. The Fresh-Water Mussel Shell and Button industry. Fisher Leaflet 246. (Revised). R. H. Wilson. 16 p. Gratis.
United States Department of the Interior
Fish and Wildlife Service
Wahington, D. C. 20240
Production statistics, methods of obtaining shells, preparation, processing and steps in manufacturing buttons.

III. PERIODICAL

A. Notion and Novelty Review. Monthly. $3.00/year.
Haire Publishing Company, Inc.
111 Fourth Avenue
New York, N.Y. 10003
Includes material on shell buttons.

IV. TRADE ASSOCIATION

A. Covered Button Association of New York
1133 Broadway
New York, N.Y. 10010

V. ENGINEERING COMPANIES

A. Standard Button Machine Company, Inc.
245 Franklin Street
Paterson, New Jersey 07524
Manufacturers of shell button machinery.

B. Barry Company
Muscatin, Iowa 52761
Manufacturers of button machinery.

VI. DIRECTORIES

A. Notion and Novelty Review Directory. Annual. $1.00.
Haire Publishing Company
111 Fourth Avenue
New York, N. Y. 10003
Covers the notion and novelty industry, which includes buttons.

B. Directory of the Variety Store Market. $35.00.
Variety Store Merchandiser
419 Fourth Avenue
New York, N. Y. 10016
Lists manufacturers and products for variety store merchandising.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

SMALL COMMUNITY ELECTRIC SYSTEM

I. P. No. 66171

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

SMALL COMMUNITY ELECTRIC SYSTEM: Standard Industrial Classification 4911

A. GENERAL EVALUATION

The electric generating and distribution system described is intended for a community of about 4,000 persons located in an area about two miles square, where power from any regional or national electricity network that may exist is not available and is unlikely to be available in the foreseeable future. The power generated would be used in homes, stores, industrial establishments, public buildings, and for street lighting. Since actual conditions will rarely, if ever, conform to the assumptions made above, the data given should be regarded only as a model that can be modified to suit particular situations.

It is improbable that an undertaking of this kind would attract private entrepreneurs, since the return on the investment would be too low. In a relatively prosperous community, with some small industries and a potential for expanding them and adding to their number, construction of such a system might be feasible as a cooperative enterprise. In many cases, however, it seems likely that government aid would be required to supply the necessary capital. Once established, the system should normally be self-supporting, particularly if labor costs, which constitute a large part of total operating costs, are low. In regard to labor, some difficulties may be encountered. Proper maintenance is essential and skilled and reliable operators are needed. It may be necessary to pay relatively high wages to obtain them and keep them in a small and possibly remote community.

Where economic conditions permit establishment of such an electric system, it should not only add to the amenities of the life of the community, but also provide a foundation for development of industrial activity, and consequent improvement in the general living standard.

B. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 610,000 Kw-hr

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		Cost
Land. 3,000 sq. ft.		$ --
Building. One story, 20'x20',		2,400
Equipment, Furniture & Fixtures.		
2 - 100 kw. diesel electric generators	$30,000	
Distribution system	58,000	
Other tools & equipmt.	2,500	
Furniture & fixtures	800	
Transportation equipmt.	2,500	93,800
Total (excl. Land)		$ 96,200

b. WORKING CAPITAL	No. of Days	
Direct Materials, Mfg. Overhead(a)	60	$ 3,250
Admin. Costs(b), Contingencies	30	250
Total Working Capital		$ 3,500

c. TOTAL CAPITAL (EXCL. LAND) $ 99,700

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements.	Annual Cost
Diesel oil	10,000 gals.	$ 1,500

b. Supplies	
Wire	$ 100
Lightning arresters & insulators	100
Friction tape, ground rods & clamps	50
Lubricants	50
Total	$ 300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. None.	
b. Fuel. See Direct Materials.	
c. Water. For sanitation and fire protection.	$ 100

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton truck for repair work & general purposes.	$ 1,000
b. External Transport Facilities. No special requirements.	

5. MANPOWER

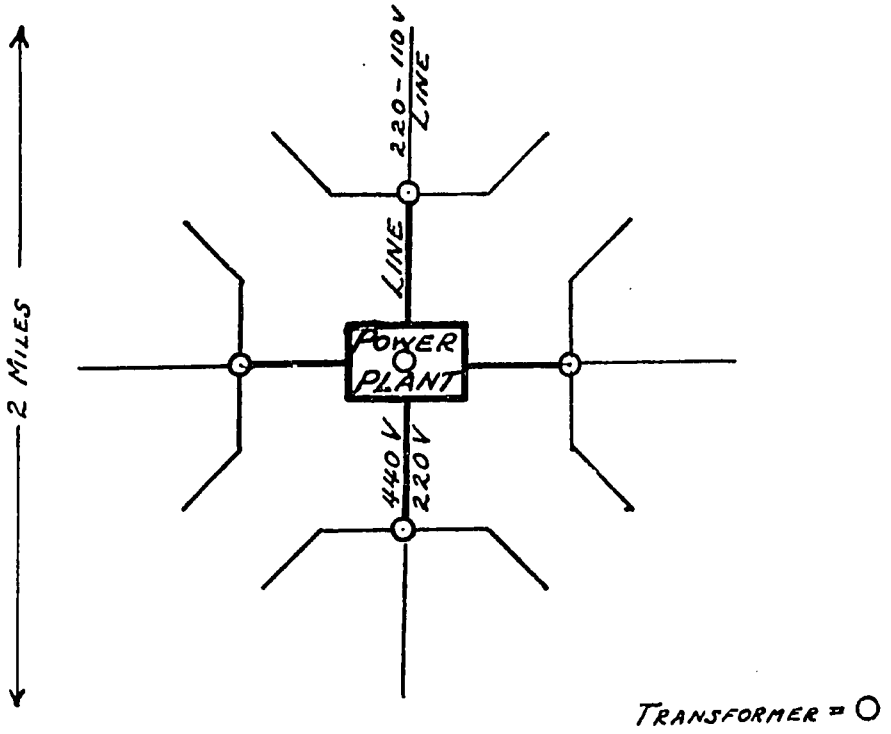
	Number	Annual Cost
a. Indirect Labor		
Manager	1	$ 10,000
Plant operators	2	12,000
Total	3	$ 22,000

b. Training Needs. Manager & operators must be skilled. No training time is allowed for.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

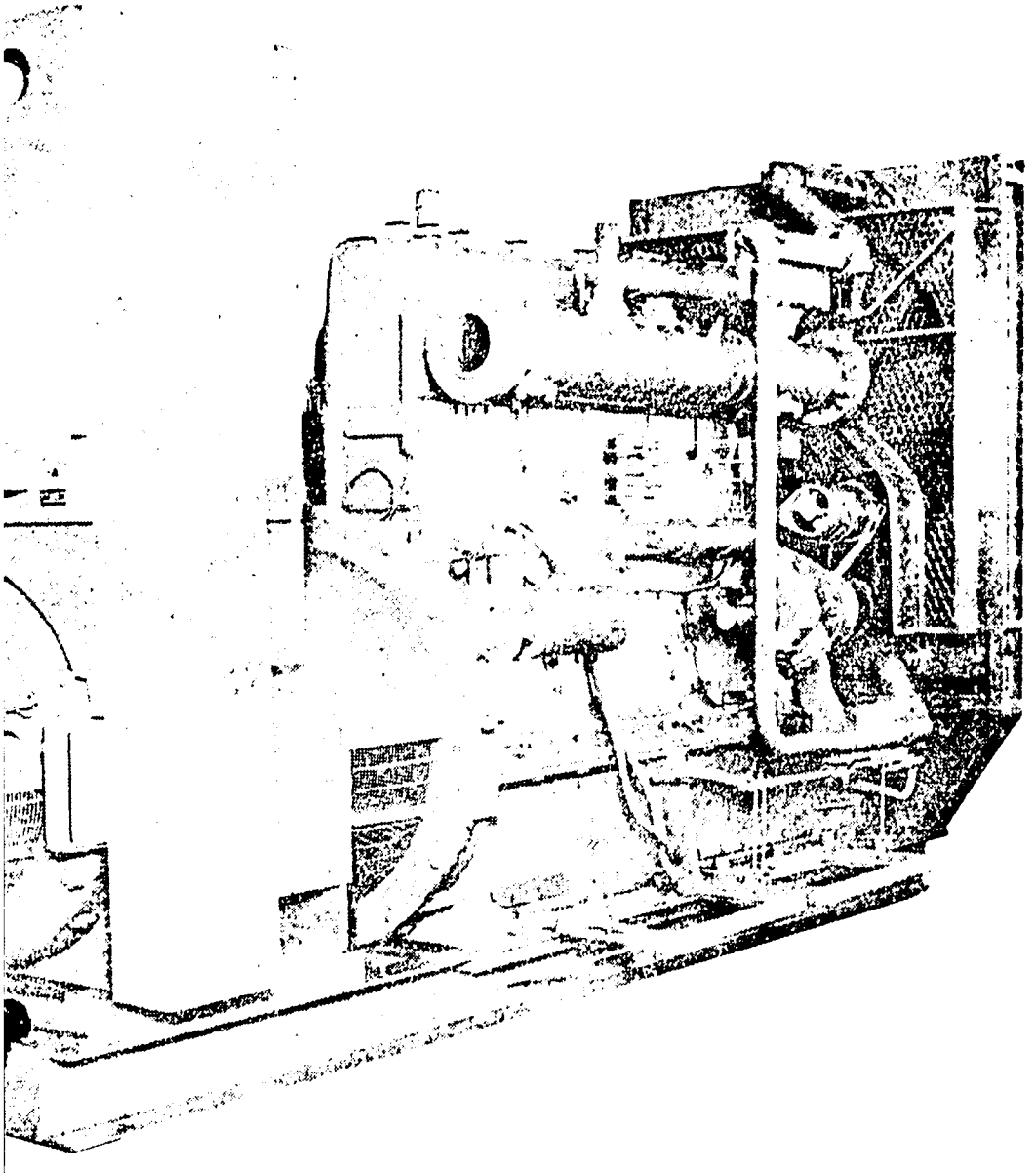
a. Annual Costs	
Direct Materials	$ 1,500
Manufacturing Overhead(a)	23,400
Admin. Costs(b), Bad Debts, Contingencies	2,800
Depreciation on Fixed Capital	10,100
Total	$ 37,800
b. Annual Sales Revenue	$ 42,000

NOTES. (a) Includes Supplies, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges.



DIAGRAMMATIC SKETCH OF THE POWER PLANT AND DISTRIBUTION SYSTEM

DISTRIBUTION LINES



100 KW GENERATOR SET

Two of these sets are used in power plant.

SMALL COMMUNITY ELECTRIC SYSTEM: S. I. C. 4911

SELECTED REFERENCES

I. TEXTBOOKS

A. Operational Economics of Electric Utilities. Constantine W. Bary. 1963 $12.50.
Columbia University Press
2960 Broadway, New York, N. Y. 10027

B. Electric Power Business. Edwin Vennard. 1962. $6.00
McGraw-Hill Book Company, Inc.
330 West 42nd Street, New York, N. Y. 10036

C. Principles of Electric Utility Engineering. C. A. Powel. 1955. 251 p. Illus. $10.00.
M. I. T. Press
Cambridge, Mass. 02142

D. Power Station Engineering and Economy. Bernhardt G. A. Skrotzki and William A. Vopat 1960. $13.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

E. Electric System Operation. Bernhardt G. A. Skrotzki. 1954. 370 p. Illus. $6.50
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. PERIODICALS

A. Electrical Construction and Maintenance. Monthly. $15.00/year.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
Plant construction and distribution developments.

B. Electric Light and Power. Semi-Monthly. $15/year.
Haywood Publishing Company
6 North Michigan Avenue
Chicago, Ill. 60602
Developments in generating machinery and equipment, and in distribution of electrical power.

III. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each

A. Patent No. 2,845,593. 1958. 6 p.
Generator control and protective system.

B. Patent No. 2,659,045. 1953. 5 p.
Self-regulating electric generator.

C. Patent No. 2,683,817. 1954. 9 p.
Electric power system

D. Patent No. 2,687,506. 1954. 8 p.
Electric generator.

E. Patent No. 2,824,275. 1958. 9 p.
Electric generator and regulator.

IV. TRADE ASSOCIATIONS

A. National Association of Electric Companies
1200 18th Street, N. W.
Washington, D. C. 20006

B. American Public Power Association
919 18th Street
Washington, D. C. 20006

C. National Rural Electric Cooperative Association
2000 Florida Avenue, N.W.
Washington, D. C. 20009

V. ENGINEERING COMPANY

A. Monument Engineering Company
16th and Bellefontaine Streets
Indianapolis, Indiana 46202
Electrical and mechanical engineering, design and layout of plants in the electrical generating field.

VI. DIRECTORY

A. Directory of Electric Utilities. $55.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards – CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

SURGICAL INSTRUMENTS

I. P. No. 66172

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

SURGICAL INSTRUMENTS: Standard Industrial Classification 3841

A. PRODUCT DESCRIPTION

Small, basic surgical instruments made of stainless steel, plated carbon tool steel, high speed steel and special nickel steels.

B. GENERAL EVALUATION

The instruments included in the production plan for this plant are the basic surgical tools used in any hospital. With the increase of medical facilities, this plant will have an expanding market in almost any developing area. The output of the plant can be readily increased and diversified by the addition of more machines. However, in order to keep capital expenditures and maintenance cost at a minimum, fully automatic facilities, such as would be used by large-scale manufacturers have been omitted. The degree of skill required in operating the machinery here provided can readily be acquired.

C. MARKET ASPECTS

1. USERS. Hospitals, doctors, dentists.

2. SALES CHANNELS. Plant would sell to wholesale distributors of medical supplies, and sometimes direct to large users.

3. GEOGRAPHICAL EXTENT OF MARKET. Transportation costs play a very minor role in the distribution costs of the product. Market should be nation-wide. These products are widely exported.

4. COMPETITION. The plant could normally compete with imported products in the domestic market. Since it can be readily expanded, and manufacture of other types of surgical instruments can easily be added, it is unlikely that competitive facilities would multiply very rapidly. Direct contact with users would also tend to establish the plant with its customers. The size of the plant as well as the absence of fully automatic equipment would keep it from competing in the international market. However, it might export to immediately surrounding areas where no production facilities exist.

5. MARKET NEEDED FOR PLANT DESCRIBED. As medical services are increasing not only on an absolute but also on a per capita basis, the size of the population needed to support the output of the plant would be decreasing. However, because of the many variables involved, the actual market in any particular area can be ascertained only by a survey of its medical services.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 7,500 Instruments

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1 acre.		$ ---
Building. One story, 75'x85',		$ 38,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$21,000	
Other tools & equipmt.	3,250	
Furniture & fixtures	750	25,000
Total (excl. Land)		$ 63,000

Principal Items. Small power cutoff saw, oil furnace, small forging machine, 24 die blocks, small trimming press, 24 trimming dies, annealing furnace, pickling tank, small milling machine, small drilling machine, small grinding machine, small buffing machine.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 8,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,100
Training Costs		3,500
Total Working Capital		$ 13,000

c. TOTAL CAPITAL (EXCL. LAND) $ 76,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Steel	2 tons	$ 7,200
b. Supplies		
Lubricants & hand tools		$ 100
Cutting tools & dies		1,000
Maintenance & repairs		600
Plating materials		400
Office supplies		200
Total		$ 2,300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 20 hp.	$ 600
b. Fuel. About 3,000 gals. oil annually for forges; any available fuel may be used for heating.	$ 400
c. Water. Small amount for production, sanitation & fire protection.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	2	10,000
Unskilled	2	8,000
Total	6	$ 30,000
b. Indirect Labor		
Manager does buying, selling, bookkeeping & supervision	1	$ 10,000

c. Training Needs. Manager must be fully experienced. With the help of 2 skilled workers he should be able to train all other personnel. Plant should reach full production in 2 months.

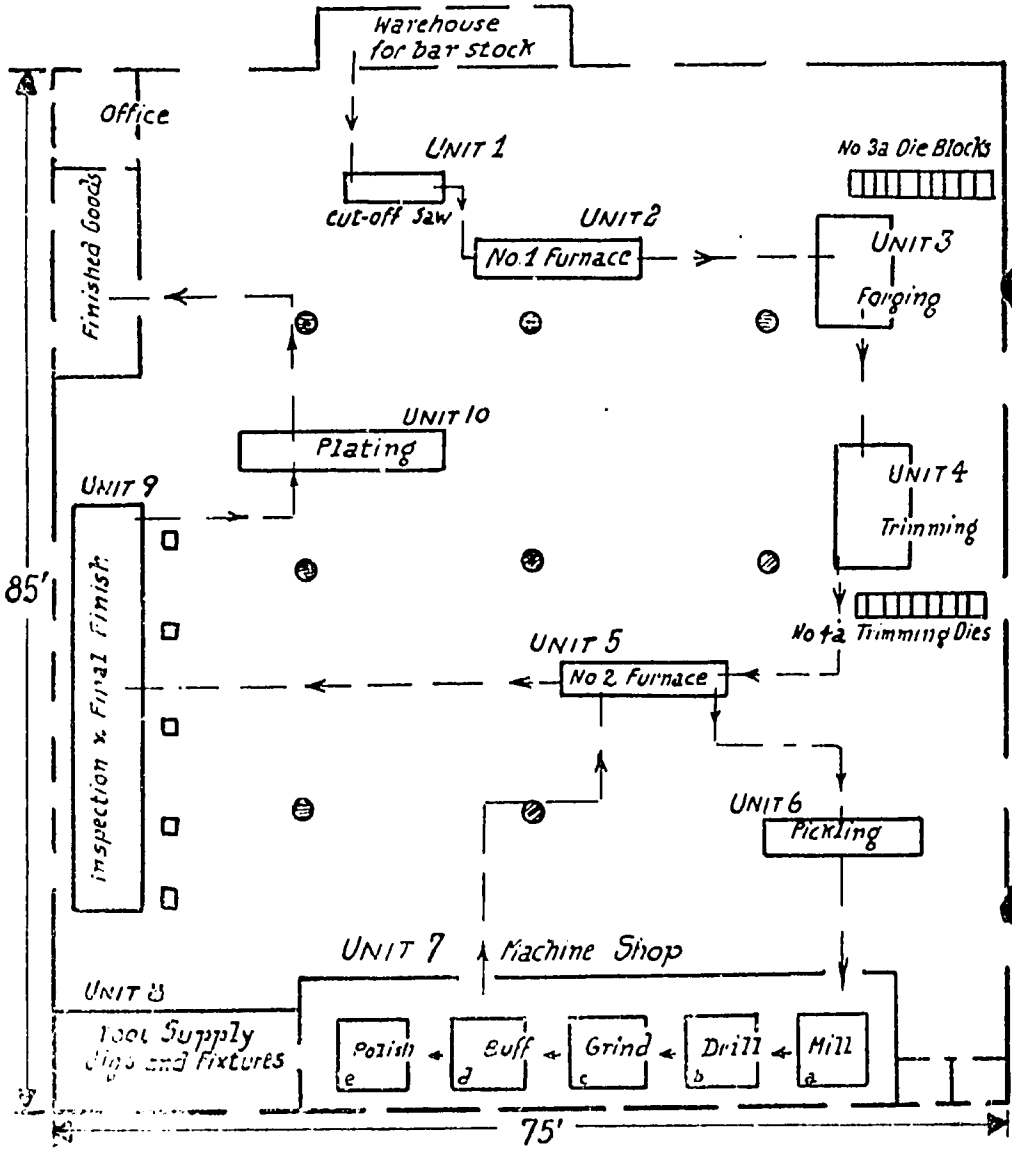
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 7,200
Direct Labor	30,000
Manufacturing Overhead(a)	13,400
Admin. Costs(b), Contingencies	4,500
Sales Costs(c), Bad Debts	8,000
Depreciation on Fixed Capital	4,700
Total	$ 67,800
b. Annual Sales Revenue	$ 90,000

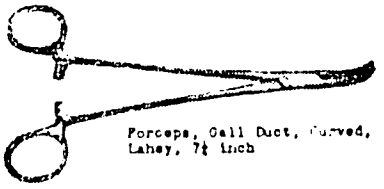
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT

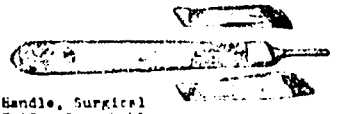
ARROWS INDICATE WORK FLOW



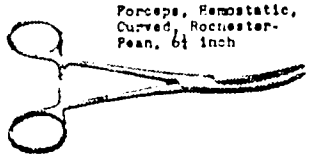
BASIC INSTRUMENTS SELECTED FOR MANUFACTURE



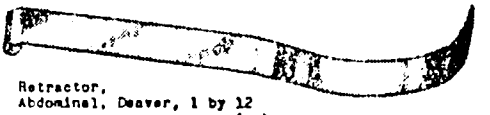
Forceps, Gall Duct, Curved, Lahey, 7½ inch



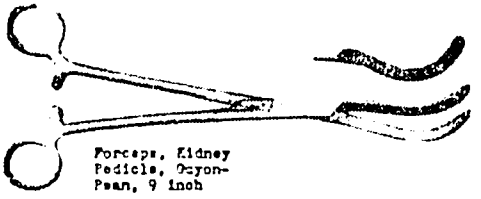
Handle, Surgical Knife, Detachable Blade, No. 3



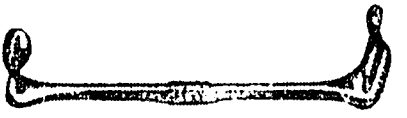
Forceps, Hemostatic, Curved, Rochester-Pean, 6½ inch



Retractor, Abdominal, Deaver, 1 by 12 inches

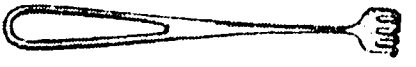


Forceps, Kidney Pedicle, Oxyon-Pean, 9 inch



Retractor Set, Abdominal, Double-Ended, Richardson-Eastman

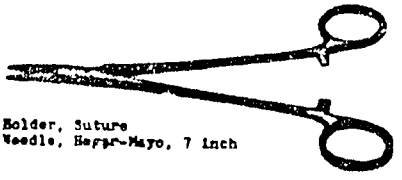
Forceps, Tissue, Tweezers, 5½ inch



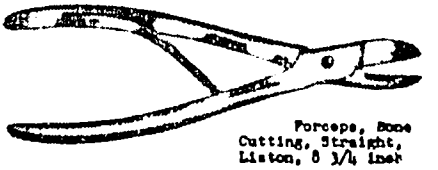
Retractor, General Operating, Volkmann, 4 Sharp Prongs

Forceps, Tissue, Straight, Allis, 6 inch

Elevator, Periosteal, Sharp, 7 3/4 inch



Holder, Suture Needle, Hegar-Mayo, 7 inch



Forceps, Bone Cutting, Straight, Liston, 8 3/4 inch

SURGICAL INSTRUMENTS: S. I. C. 3841

SELECTED REFERENCES

I. TEXTBOOKS

A. Instruments of Surgery. Francis Mitchell-Heggs and H. Guy Radcliffe
1963. Illus. $22.50.
Charles C. Thomas, Publisher
301 - 327 East Lawrence Avenue
Springfield, Ill. 62703

B. Forging and Welding. Robert E. Smith. 1958. Illus. $4.00.
Taplinger Publishing Co. Inc.
119 West 57th Street
New York, N. Y. 10019

C. Handbook of Industrial Electroplating. E. A. Ollard and E. B. Smith.
3rd edition. 1964. $12.00.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue
New York, N. Y. 10017

D. General Engineering Workshop Practice. 1963. $7.00.
Transatlantic Arts, Inc.
Hollywood-by-the-Sea, Florida 33020

II. PERIODICALS

A. Steel Processing and Conversion. Monthly. $2.50/year.
Steel Publications, Inc.
P. O. Box 477
Pittsburgh, Pa. 15230
Devoted to steel processing and heat treatment.

B. Products Finishing. Monthly. $5.00/year.
Garnder Publications, Inc.
431 Main Street
Cincinnati, Ohio 45202
Deals with finishing methods.

III. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 3,013,553. 1961. 3 p.
Trachelotome.

B. Patent No. 2,930,376. 1960. 4 p.
Surgical instrument.

C. Patent No. 2,845,072. 1958. 2 p.
Surgical knife.

D. Patent No. 2,803,252. 1957. 3 p.
Medical tweezers.

VI. TRADE ASSOCIATIONS

A. Instrument Society of America
Penn-Sheraton Hotel,
530 William Penn Place
Pittsburgh Pa. 15219

B. Drop Forging Association
1121 Illuminating Building
Cleveland, Ohio 44113

V. ENGINEERING COMPANIES

A. Scientific Control Laboratories, Inc.
13140 South Kolin Avenue
Chicago, Ill. 60658
Electroplating.

B. Ann Arbor Instrument Works
735 Packard
Ann Arbor, Michigan 48104
Instruments.

VI. DIRECTORY

A. Surgical Trade Buyers Guide. Annual. $3.00
Surgical Business, Inc.
432 4th Avenue
New York, N.Y. 10016
Lists manufacturers of surgical supplies and equipment.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

NDUSTRY PROFILES

TIRE RECAPPING

I. P. No. 66173

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country, This profile should help in reaching correct assumptions.

TIRE RECAPPING: Standard Industrial Classification 7534

A. PRODUCT DESCRIPTION

Salvaging used tires by applying a new rubber surface to the worn areas through a heat curing process.

B. GENERAL EVALUATION

With the increase of motor transportation in almost all areas, tire recapping has become an important factor in lowering the cost of maintenance of motorized equipment. Recapping can add from 60 to 100% to the lifetime of the tire at one-half to one-third of the cost of a new tire. Neither the investment nor the degree of skill required for this plant is great. Even where the raw materials are not available locally, recapping would still have a price advantage over new tires. However, care must be taken in the recapping process to maintain a high level of quality. In some areas climatic conditions, such as high humidity, migh require some changes in the manufacturing process, such as a longer drying time before the recapping process is started, to assure a satisfactory product.

C. MARKET ASPECTS

1. USERS. Passenger car and truck owners, trucking and bus companies.
2. SALES CHANNELS. Sales are made directly to car and truck owners, trucking and bus companies.
3. GEOGRAPHICAL EXTENT OF MARKET. Transportation costs are considerable; therefore the plant could compete only where no other recapping facilities are available. There would be no general export trade, but the plant might ship into immediately surrounding areas where no such facilities are available.
4. COMPETITION. a. Domestic Market. If the recapping is of good quality and if public acceptance for the product can be gained, the plant should find a ready market among tire owners. The relatively small capital requirement makes it easy to enter the field and might result in considerable domestic competition. An increase in income with an attendant increase in the numbers and use of motorized equipment would increase the plant's market. However, this could benefit the market for new tires at the expense of recapped ones. This will depand partly upon the public acceptance of the product. Imported recapped tires would offer competition only when large scale facilities are available in adjacent areas. b. Export Market. The plant could not compete in the international market except to ship to surrounding areas which do not have facilities.
5. MARKET NEEDED FOR PLANT DESCRIBED. This demand for tire replacement depends upon the mileage driven, the condition of the roads, the skill of the driver and the care he gives his equipment. Professional drivers, such as truck and bus drivers, usually can make better use of recapping facilities because the care they exercise preserves the tire casing although the mileage driven wears off the tread quickly. Also, acceptance of recaps as substitutes for new tires appears to be better among professional drivers. In the U. S. one out of every two replacement tires for trucks and buses and only one out of four passenger car tire replacement are recaps. In most conditions 7,200 trucks and buses and 21,000 passenger cars would be sufficient to support the output of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL OUTPUT - ONE-SHIFT OPERATION: Automobile Tires 5,400; Truck & Bus Tires 3,600

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. 5,000 sq. ft.		$ --
Building. One story, 30'x60'		10,800
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 12,000	
Other tools & equipmt.	2,000	
Furniture & fixtures	700	
Transportation equipmt.	2,500	17,200
Total (excl. Land)		$ 28,000

Principal Items. Tire spreader, tire buffing lathe, portable heavy duty flexible shaft buffer, 6 recapping machines with matrices, extra sets of matrices, spotter, boiler, air compressor, vulcanizer for truck and bus tires, tread roller, tire balancing machine, auxiliary tools, racks, repair equipment, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 18,100
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,100
Training Costs		3,300
Total Working Capital		$ 22,500

c. TOTAL CAPITAL (EXCL. LAND) $ 50,500

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Camelback	37,800 lbs.	$ 26,200
Cement		2,000
Cushion gum		700
Tread gum		600
Soap stone		100
Paint		400
Total		$ 30,000

b. Supplies

Lubricants & hand tools	$ 200
Maintenance & repair parts	1,000
Office supplies	200
Total	$ 1,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 20 hp.	$ 600
b. Fuel. 6,000 gals. oil annually.	$ 700
c. Water. For sanitation & fire protection only.	$ 100

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton pickup truck.	$ 1,000

b. External Transport Facilities. In & out shipments about 50 tires a day. Good highway desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	4	20,000
Unskilled	5	18,000
Total	12	$ 56,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Other	1	4,000
Total	3	$ 19,000

c. Training Needs. Manager must be experienced. With 2 skilled workers, he should be able to do all necessary labor training. Plant should reach full production in 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

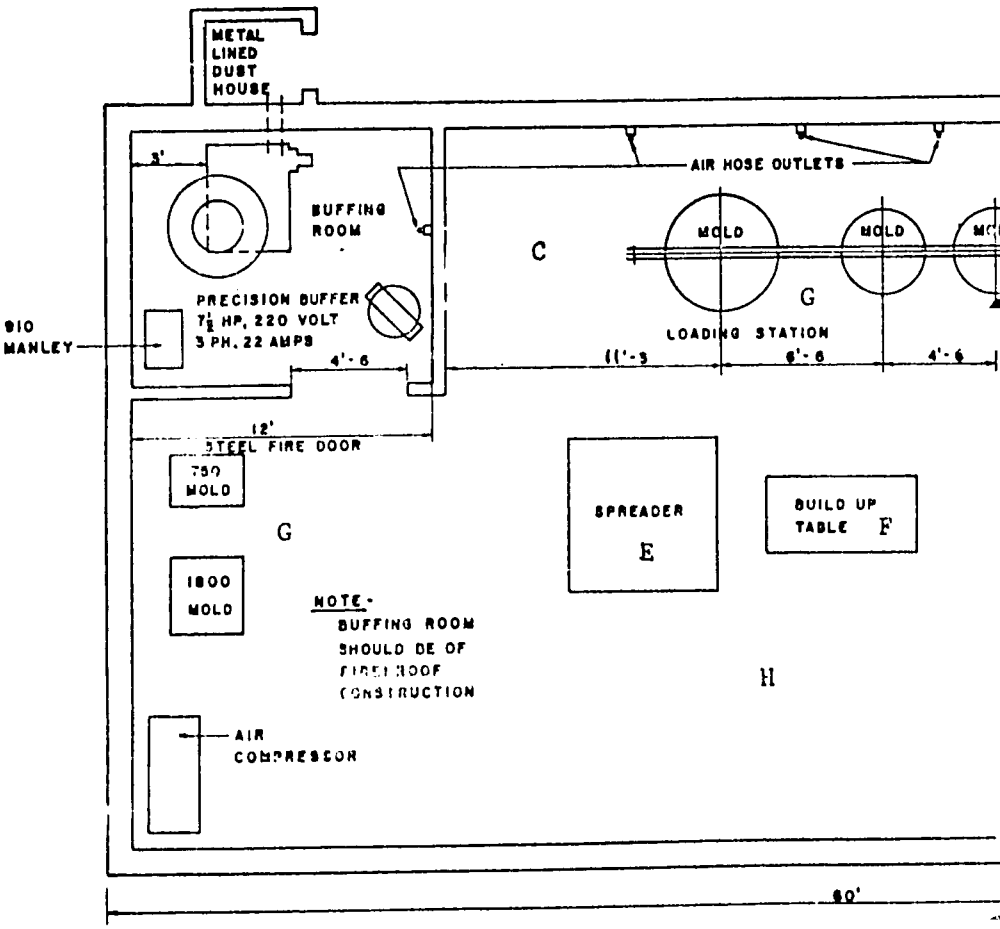
a. Annual Costs	
Direct Materials	$ 30,000
Direct Labor	56,000
Manufacturing Overhead(a)	22,800
Admin. Costs(b), Contingencies	4,500
Sales Costs(c), Bad Debts	9,000
Depreciation on Fixed Capital	2,900
Total	$ 125,200
b Annual Sales Revenue	$ 155,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

TIRE RECAPPING : S I.C. 7534

TIRE RECAPPING : S.I.C.

PLANT LAYOUT AND FLOW OF



A. Recovering

B. Primary inspection

C. Wet tire drying

D. Buffing and second inspection

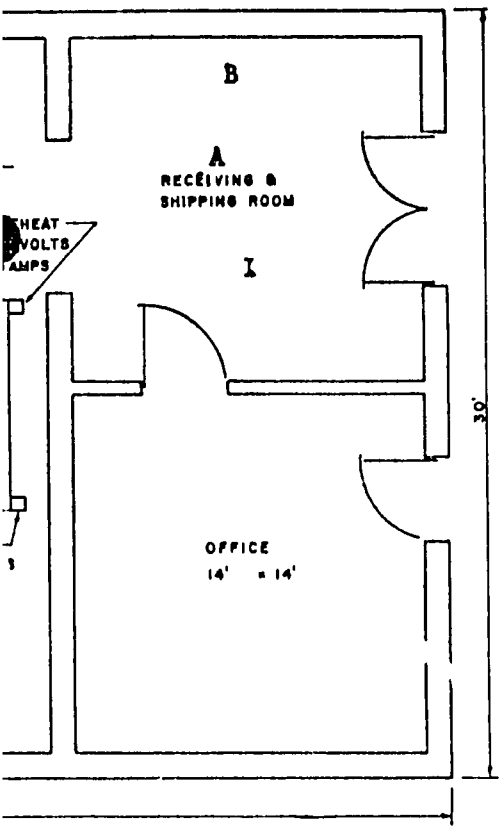
E. Consenting and drying

F. Buil

G. Mol

H. Trir

I. Ship



rping

inting

B
Primary Inspection

1. Redical cracks
2. Circumferential breaks
3. Weather checks
4. Bead failure
5. Tread cuts
6. Ply separation
7. Fabric fatigue
8. Impact breaks

TIRE RECAPPING: S. I. C. 7534

SELECTED REFERENCES

I. TEXTBOOKS

A. The Shop Operating Manual. National Tire Dealers and Retreaders Association. 1962. 100 p. illus. $5.50.
National Tire Dealers and Retreaders Assn.
1343 L. Street, N. W.
Washington, D. C. 20005
Technical information on the operation of a tire retreading business.

B. NTDRA Warehouse Manual. National Tire Dealers and Retreaders Association. 1958. 75 p. Illus. $2.50.
National Tire Dealers and Retreaders Assn.
1343 L. Street, N. W.
Washington, D. C. 20005
Warehousing, storing, and moving of tires.

C. Accounting Manual. National Tire Dealers and Retreaders Association. 1962. 100 p. Illus. $4.50.
National Tire Dealers and Retreaders Assn.
1343 L. Street, N. W.
Washington, D. C. 20005
Accounting aspects of the tire retreading business.

II. U. S. GOVERNMENT PUBLICATIONS

A. Tire Recapping. PO-14. August 1956. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Tire Recapping-Aircraft. IR-16692 EP. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Rubber Age. Monthly, $6.00/year.
Palmerton Publishing Company, Inc.
101 West 31st Street
New York, N. Y. 10001
Manufacture of rubber and rubber products.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,987,770. 1961. 9 p.
Semi-automatic recapping press.

B. Patent No. 2,938,100. 1960. 5 p.
Tire retreading.

C. Patent No. 2,903,742. 1959. 8 p.
Apparatus for retreading tires.

D. Patent No. 2,902,717. 1959. 8 p.
Tire retreading mold with centering machanism.

E. Patent No. 2,855,629. 1958. 5 p.
Tire retreading apparatus.

V. TRADE ASSOCIATIONS

A. National Tire Dealers and Retreaders Association
1343 L. Street, N. W.
Washington, D. C. 20005

B. Tire Retreading Institute
1343 L. Street, N. W.
Washington, D. C. 20005

VI. ENGINEERING COMPANIES

A. Branick Manufacturing Company, Inc.
Fargo North Dakota 58103
Suppliers of complete plants.

B. National Rubber Machinery Company
47-55 West Exchange
Akron, Ohio
Build and install complete plants.

VII. DIRECTORY

A. Rubber Red Book. Annual. $15.00.
Rubber Age
101 West 31st Street
New York, N. Y. 10001
Lists United States manufacturers of rubber, products made, sources of machinery and equipment.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410 12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards—CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services Inc., Washington, D. C.

INDUSTRY PROFILES

TRUCK MUFFLERS

I. P. No. 66174

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

TRUCK MUFFLERS: Standard Industrial Classification 3714

A. PRODUCT DESCRIPTION

Mufflers of various sizes for trucks and buses.

B. GENERAL EVALUATION

The making of truck mufflers is a specialized industry needing a fair amount of heavy and expensive equipment. A large number of skilled workmen is needed. Replacement business may in some cases provided a large enough market outlet, but prospects will, of course, be much better if there are manufacturers or assemblers of trucks and buses in the vicinity with whom contracts can be made to supply mufflers for new vehicles.

C. MARKET ASPECTS

1. USERS. Truck manufacturers and assemblers, garages and repair shops, individuals.

2. SALES CHANNELS AND METHODS. Sales would be made to truck manufacturers and assemblers, garages and repair shops, and to automobile parts distributors.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are easily handled and tranport cost is normally low in relation to their value. The potential domestic market area may be very extensive. b. Export. These products are exported worldwide by major automobile producing countries.

4. COMPETITION. a. Domestic Market. Competition from imports may be severe. Where imported vehicles are used, not only will such vehicles generally already be supplied with mufflers, but sales agents often import stocks of spare parts and draw on their foreign principals for replacements. b. Export Market. Some exports to nearby foreign areas might be possible in some cases, but this plant would not be able to compete in general export trade with large producers.

5. MARKET NEEDED FOR PLANT DESCRIBED. The demand for these produc will depend on whether there is any manufacture or assembly of trucks or buses in the area, and the number of trucks and buses in use for which it would be feasible to supply replacements from local production.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 54,000 Mufflers

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 50,000 sq. ft.		$ - -
Building. One story, 125'x180'.		135,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$163,700	
Other tools & equipmt.	5,300	
Furniture & fixtures	1,000	170,000
Total (excl. Land)		$305,000

Principal Items. Punch presses-30-ton (2) 40-ton, 60-ton (2), 100-ton (2), 200-ton (2), 2 rolls, 3 sheet welders, 2 seam welders, 10 arc welders, gas welder, 3 hydraulic arbor presses, 3 grinders & polishers, 2 conveyors, dies, lift truck, 30 pallets, 2 compressors-30 hp., spray booth.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 46,900
Admin. Costs(b), Contingencies, Sales Costs(c)	30	6,000
Training Costs		25,000
Total Working Capital		$ 77,900

c. TOTAL CAPITAL (EXCL. LAND) $382,900

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Sheet steel	220 tons	$ 40,000
Welding rods		5,500
Paint		5,000
Cartons		17,000
Total		$ 67,500

b. Supplies	
Lubricants & hand tools	$ 400
Welding gas	400
Cutting tools & dies	7,300
Maintenance & spare parts	3,000
Office supplies	300
Total	$ 11,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 170,000 kw-hr. annually.	$ 4,500
b. Fuel. About 6,000 gals. oil, or equivalent in other fuel, annually.	$ 700
c. Water. About 800,000 gals. annually	$ 200

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	22	$132,000
Unskilled	3	12,000
Total	25	$144,000
b. Indirect Labor		
Manager & supervisors	3	$ 26,000
Office	4	19,000
Other	2	8,000
Total	9	$ 53,000

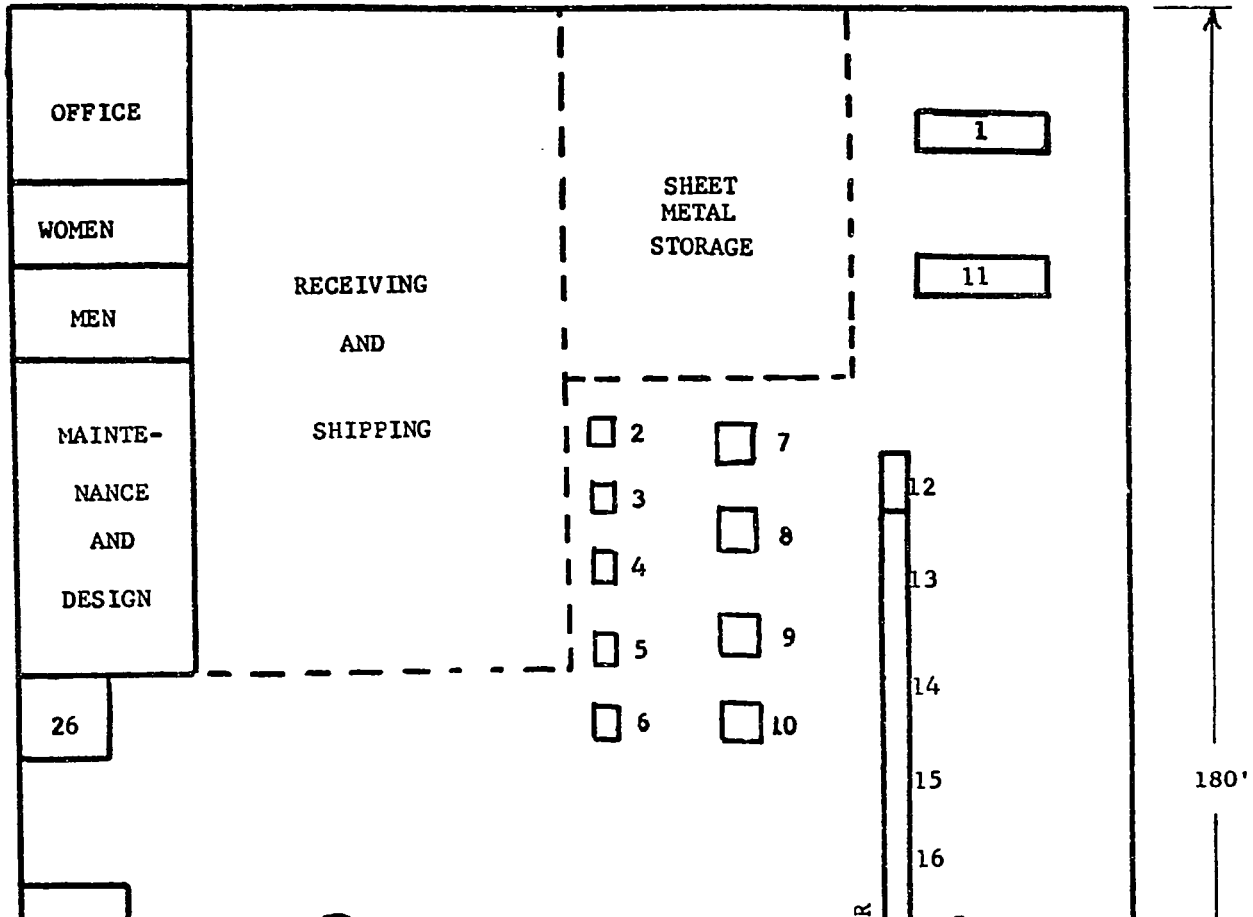
c. Training Needs. Manager, supervisors & 10 skilled workers should be able to do all labor training. Plant should reach full production in 3 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

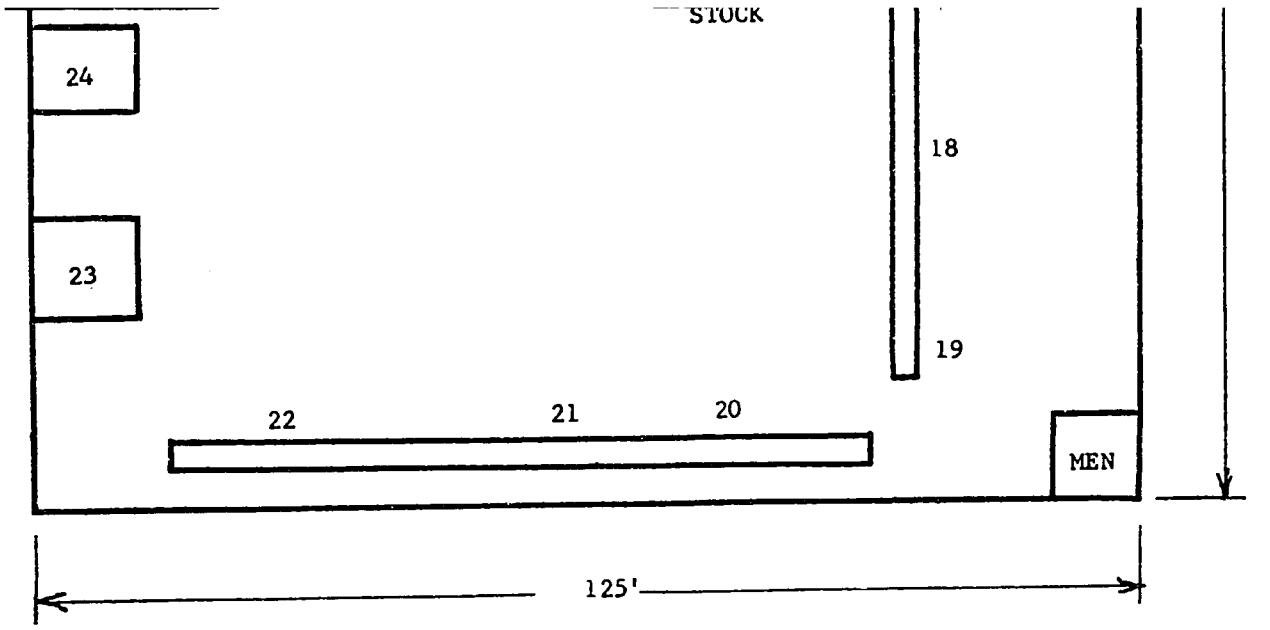
a. Annual Costs	
Direct Materials	$ 67,500
Direct Labor	144,000
Manufacturing Overhead(a)	69,800
Admin. Costs(b), Contingencies	22,000
Sales Costs(c), Bad Debts	50,000
Depreciation on Fixed Capital	24,300
Total	$377,600
b. Annual Sales Revenue	$480,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT



198



1 Square shears
2-3 30-ton punch presses
4 40-ton punch press
5-6 60-ton punch presses
7-8 100-ton punch presses
9-10 200-ton punch presses
11 Rolls
12 Spot weld bodies
13 Seam weld bodies
14 Roll and arc weld tubes
15 Assemble tubes to baffles and ends
16 Weld tubes to baffles and ends
17 Assemble tubes baffles and ends to body
18 Arc weld ends to body
19 Inspection
20 Plug gauge and adjust tubes to size
21 Test with air and water for leaks
22 Grind and polish welded ends
23 Degreases
24 Paint
25 Package and label
26 Compressor

: S.I.C. 3714

199

TRUCK MUFFLERS; S. I. C. 3714

SELECTED REFERENCES

I. TEXTBOOKS

A. Modern Machine Tools. Frank H. Habicht. 1963. Illus. $6.50.
D. Van Nostrand Co., Inc.
Princeton, N. J. 08540

B. Modern Welding. Andrew D. Althouse and others. 1965. Illus. $8.50
Goodheart-Wilcox Co., Inc.
18250 Harwood
Homewood, Ill. 60430

C. Machine Tools at Work. Charles O. Herbert. 2nd edition. 584 p.
Illus. $6.50.
The Industrial Press
93 Worth Street
New York, N. Y. 10013

D. Welding Assemblies. 60 p. Gratis.
American Welding and Manufacturing Co.
190 Dietz Road
Warren, Ohio 44483

II. U. S. GOVERNMENT PUBLICATION

A. Automobile and Truck Leaf Springs and Mufflers. TI-70. 56 p. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Mechanical Engineering. Monthly. $7.00/year.
American Society of Mechanical Engineers
29 West 39th Street
New York, N. Y. 10018
Covers all phases of mechanical engineering, including metalworking.

B. Journal of Applied Mechanics. Quarterly. $5.00/year.
American Society of Mechanical Engineers
29 West 39th Street
New York, N. Y. 10018

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,913,870. Nov. 24, 1959. 2 p.
Exhaust systems of internal combustion engines including mufflers employed in suppressing the noise and the dissipation of the products of combustion.

B. Patent No. 2,484,827. Oct. 18, 1949. 5 p.
Pulsation dampers which may include, for example, mufflers or exhaust silencers for combustion engines and particularly automotive engines.

C. Patent No. 2,445,045. July 13, 1948. 8 p.
Mufflers for internal combustion engines and the like.

V. TRADE ASSOCIATIONS

A. National Machine Tool Builders' Association
2139 Wisconsin Avenue, N. W.
Washington, D. C. 20007

B. Machinery and Allied Products Institute
1200 18th Street, N. W.
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

A. Monument Engineering Company, Inc.
16th and Bellefontaine
Indianapolis, Indiana 46202
Consulting and designing services.

B. Di-Arco Engineering Service
O'Neil-Irwin Manufacturing Company
Lake City, Minnesota 55041
Engineering service in metalworking industry.

VII. DIRECTORY

A. Hitchcock's Machine and Tool Directory. Annual. $10.00.
Hitchcock Publishing Company
Wheaton, Ill. 60187
Design and production techniques in the industrial metalworking field.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

WIRE NAILS

I. P. No. 66175

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

WIRE NAILS: Standard Industrial Classification 3315

A. PRODUCT DESCRIPTION

Common wire nails of varying sizes. Range of sizes will depend on machine models purchased, and the choice of these will depend, within limits, on the character of local demand. Wire nails range in size from 1/4 inch brads to 12 inch spikes, but this plant, with only two nail machines, would not make the larger sizes. An appropriate range might be from 1/4 to 3-1/2 inches.

B. GENERAL EVALUATION

Capital requirements for this industry are modest. The production process is highly mechanized and labor skills needed are not of a high order. The main questions for consideration are the size of the local market for nails and the relative cost of domestically produced nails compared with imports. Nails can be produced and delivered at low prices by large-scale producers, and in some economically less developed areas this industry might not be financially attractive. This is particularly so because a plant of this size could only make a limited range of sizes.

C. MARKET ASPECTS

1. USERS. Builders, many industries, government and other organizations, individuals.

2. SALES CHANNELS AND METHODS. Sales are made to wholesale distributors of metal products and building supplies, and sometimes direct to large organizational users and some retail establishments.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are easy to ship and transport charges are not usually an important limitation on the market area. In a country of moderate size and with a reasonably good transport network the potential domestic market area may be nationwide. b. Export. These products are shipped world-wide by major metal-producing countries.

4. COMPETITION. a. Domestic Market. Competition from imports is likely to be keen. b. Export Market. A plant of this size would have virtually no chance of making export sales.

5. MARKET NEEDED FOR PLANT DESCRIBED. To provide a market for the production of this plant a considerable volume of construction and a fair development of user industries are necessary. No estimate of the market needed can be given in terms of total population.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 500 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 5,000 sq. ft.		$ --
Building. One story, 40'x50'.		12,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$14,800	
Other tools & equipmt.	3,000	
Furniture & fixtures	700	18,500
Total (excl. Land)		$ 30,500

Principal Items. 2 nail machines, nail die grinder, nail tumbler, scales, steel containers, dies.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	$ 16,900
Admin. Costs (b), Contingencies, Sales Costs(c)	30	700
Total Working Capital		$ 17,600

c. TOTAL CAPITAL (EXCL. LAND) $ 48,100

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requmts.	Annual Cost
Wire	505 tons	$ 71,000
Kegs	10,000	4,000
Total		$ 75,000

b. Supplies

Lubricants & hand tools	$ 100
Dies	600
Maintenance & repair parts	600
Office supplies	200
Total	$ 1,500

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 10 hp.	$ 400
b. Fuel. Where heating is necessary, about 3,000 gals. oil or equivalent required annually.	$ 400
c. Water. For sanitation and fire protection.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. Total in & out shipments about 100 tons a month. Good highway & easy access to railroad desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 6,000
Semi-skilled	1	5,000
Unskilled	1	4,000
Total	3	$ 15,000
b. Indirect Labor		
Manager - buys, sells, keeps books, & supervises	1	$ 9,000

c. Training Needs. Manager should be experienced. With 1 skilled operator, he should be able to maintain full production while training other operators.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs

Direct Materials	$ 75,000
Direct Labor	15,000
Manufacturing Overhead (a)	11,400
Admin. Costs (b), Contingencies	3,000
Sales Costs (c), Bad Debts	6,000
Depreciation on Fixed Capital	2,800
Total	$113,200

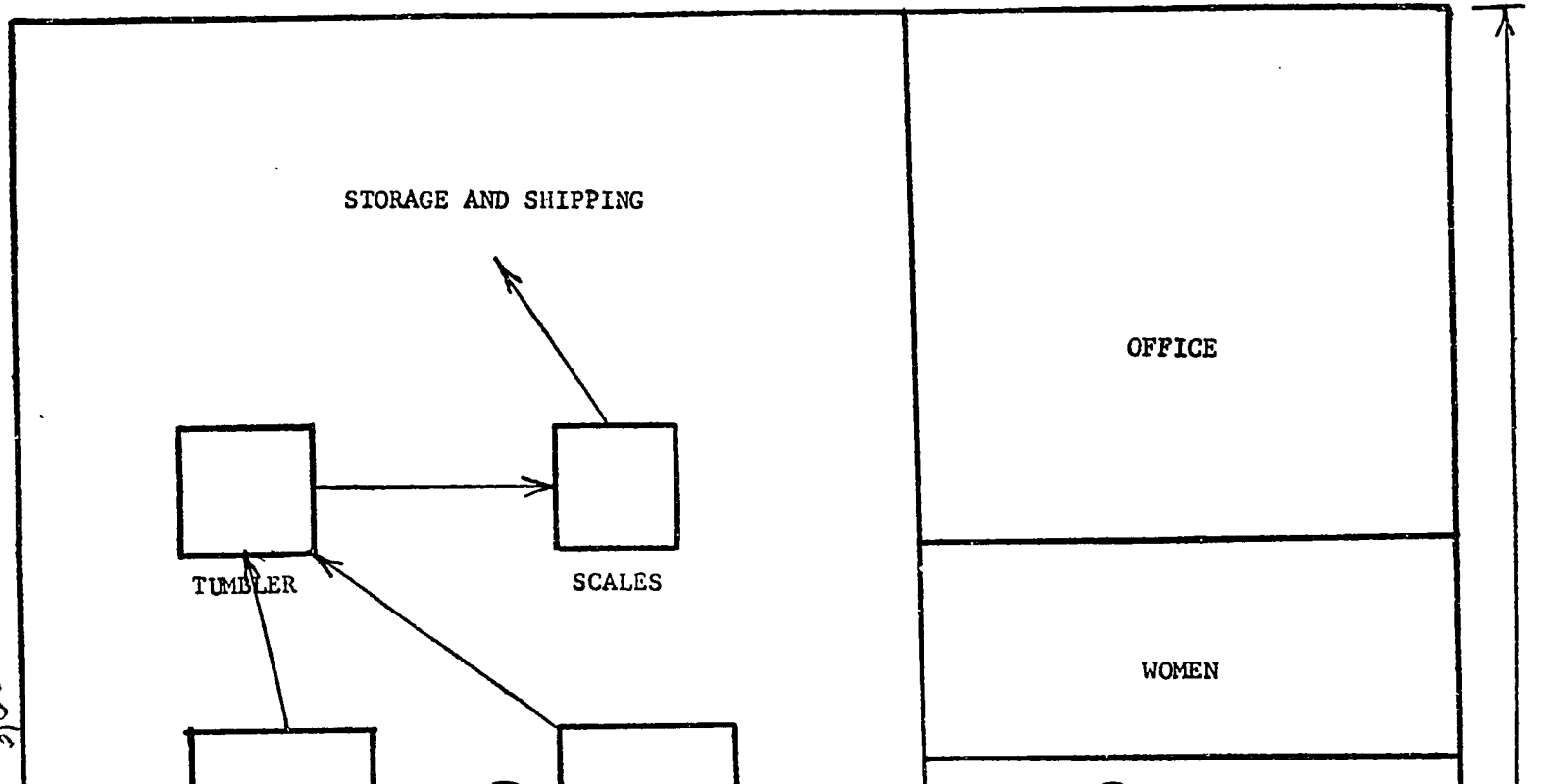
b. Annual Sales Revenue $140,000

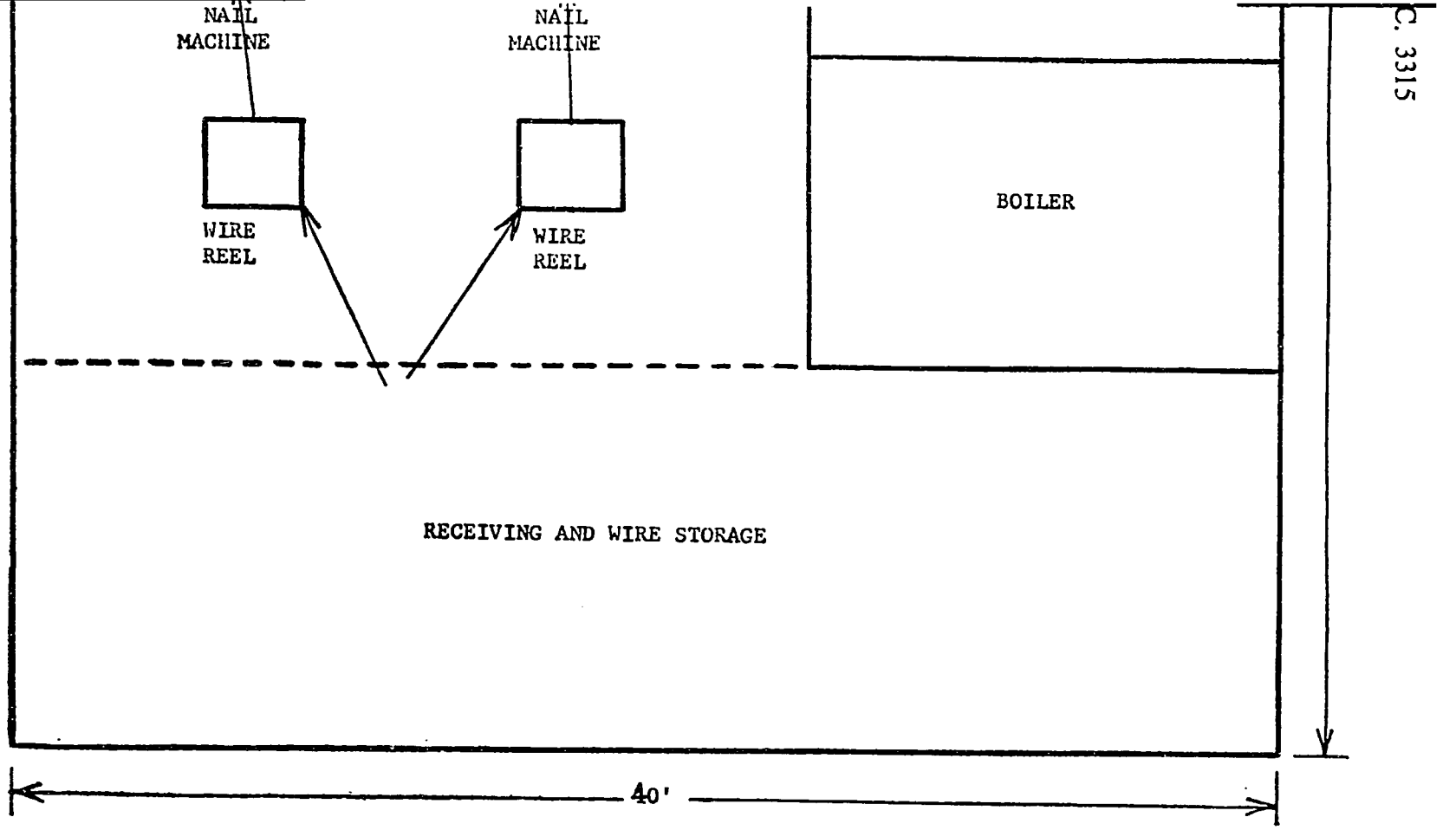
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight out, Travel.

WIRE NAILS: S.I.C. 3315

PLANT LAYOUT

ARROWS INDICATE WORK FLOW




NAIL MACHINE
NAIL MACHINE
WIRE REEL
WIRE REEL
BOILER
RECEIVING AND WIRE STORAGE
40'
20'

C. 3315

WIRE NAILS: S.I.C. 3315

SELECTED REFERENCES

I. TEXTBOOKS

A. Specifications for Wire Nails. Gratis.
William Glader Machine Works
200 North Racine Avenue
Chicago, Ill. 60607

II. U. S. GOVERNMENT PUBLICATIONS

A. Nail Manufacturing. IR-24293. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Simplified Practice Recommendation. Wire Nails and Staples. R-223-47. $.15.
Superintendent of Documents
Government Printing Office
Washington, D. C.

III. PERIODICALS

A. Metal Forming and Fabricating. Monthly. $10.00/year.
Watson Publications, Inc.
201 North Wells Street
Chicago, Ill. 60606
Covers methods of metal working, including stamping, drawing, extruding, rolling.

B. Machinery. Monthly. $4.00/year.
The Industrial Press
93 Worth Street
New York, N. Y. 10013
Industrial machinery and equipment used in the production of metal products.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,821,727, 1958. 8 p.
Nail making machine.

B. Patent No. 2,216,049. 1940. 6 p.
Nail machine and nail manufacture.

V. TRADE ASSOCIATIONS

A. Wire Association
299 Main Street
Stamford, Conn. 06901

B. Wire Machinery Builders Association
73 Cherry Street
Spencer, Mass. 01562

VI. ENGINEERING COMPANY

A. William Glader Machine Works
200 North Racine Avenue
Chicago, Ill. 60607
Manufacturers of special machinery, including machinery for making wire nails.

VII. DIRECTORY

A. Wire and Wire Products Buyers' Guide and Yearbook of the Wire Association. Annual. $5.00.
Quinn-Brown Publishing Corporation
453 Main Street
Stamford, Conn. 06901
Devoted to wire and wire products.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 6600i through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

ALUMINUM DIE CASTINGS

I. P. No. 66176

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

ALUMINUM DIE CASTINGS: Standard Industrial Classification 3361

A. PRODUCT DESCRIPTION

The exact products will depend on market requirements.

B. GENERAL EVALUATION

Die castings are made for end use and as components of products made by other industries. The potential demand can only be determined by a comprehensive survey. This is an industry with good growth prospects, and it should be suitable for developing areas where a fair measure of industrial progress has already been achieved and where there is a good chance of continued growth.

C. MARKET ASPECTS

1. USERS. Since the plant can produce end products as well as components to be used by industry, users could be both the general public and various industries.

2. SALES CHANNELS AND METHODS. Sales would be made to industries, wholesalers or stores, according to the type of product.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Since these aluminum castings would in no case be large, and the product would be light in weight the domestic market might be very extensive. b. Export. There is a world-wide export of these products.

4. COMPETITION. a. Domestic Market. For some purposes other kinds of castings may compete, but aluminum castings generally meet specialized requirements. If the plant is efficiently operated it should be able to compete with imported products. b. Export Market. This plant is too small to compete in general export business, but some sales to neighboring countries might be possible.

5. MARKET NEEDED FOR PLANT DESCRIBED. Since the type of castings produced will vary with the demand in the potential market area, no estimate of market size in terms of population or other simple measure can be given.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 400,000 Pounds of Castings

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. 1/2 acre		$ --
Building. One story, 40'x60'.		14,400
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 50,000	
Other tools & equipmt.	10,000	
Furniture & fixtures	700	60,700
Total (excl. Land)		$ 75,100

Principal Items. Two 300-ton casting machines, 7 drill presses with tapping attachments, 2 tapping machines, electric sander, 10 hp. air compressor, tumbling machine, dies for casting.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	$ 35,700
Admin. Costs (b), Contingencies, Sales Costs(c)	30	5,500
Training Costs		3,000
Total Working Capital		$ 44,200

c. TOTAL CAPITAL (EXCL. LAND) $119,300

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Aluminum alloy	410,000 lbs.	$106,600
Pacakging material		3,400
Total		$110,000

b. Supplies

Lubricants & hand tools	$ 700
Cutting tools & abrasives	300
Maintenance & spare parts	2,000
Office supplies	200
Total	$ 3,200

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric power. 20 hp. connected load, plus 30,000 kw-hr.	$ 600
b. Fuel. 25 million cu. ft. of gas.	$ 3,000
c. Water. Sanitation & fire protection.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. In & out shipments under 2 tons a day. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	4	$ 24,000
Semi-skilled	8	40,000
Unskilled	2	8,000
Total	14	$ 72,000
b. Indirect Labor		
Manager	1	$ 12,000
Office	2	9,000
Shipping clerk	1	4,000
Total	4	$ 25,000

c. Training Needs. Manager must be fully experienced. With 2 skilled workers, he should be able to train other workers & reach full production in 30 days.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs

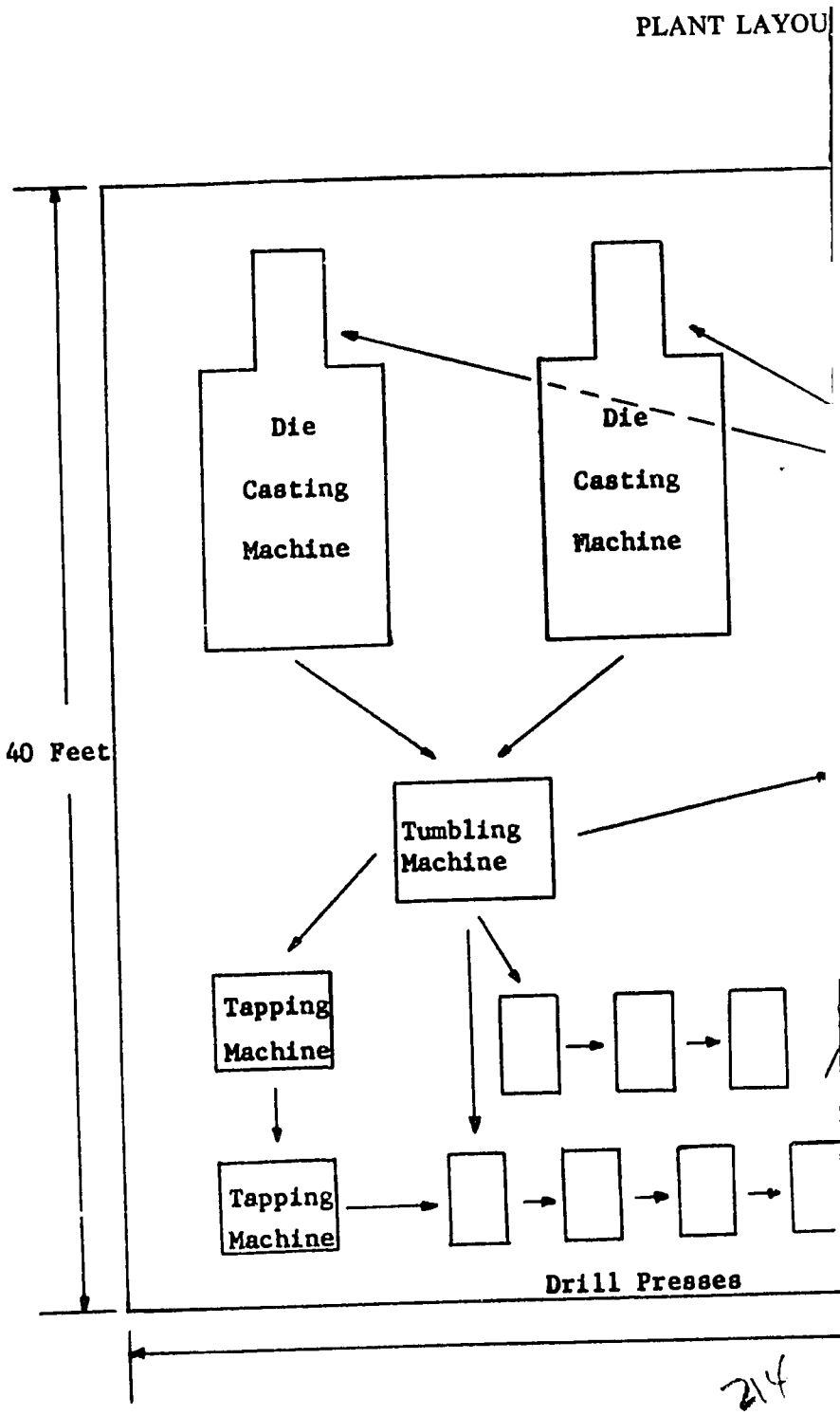
Direct Materials	$110,000
Direct Labor	72,000
Manufacturing Overhead(a)	31,900
Admin. Costs (b), Contingencies	24,000
Sales Costs(c), Bad Debts	42,000
Depreciation on Fixed Capital	7,800
Total	$287,700

b. Annual Sales Revenue $325,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

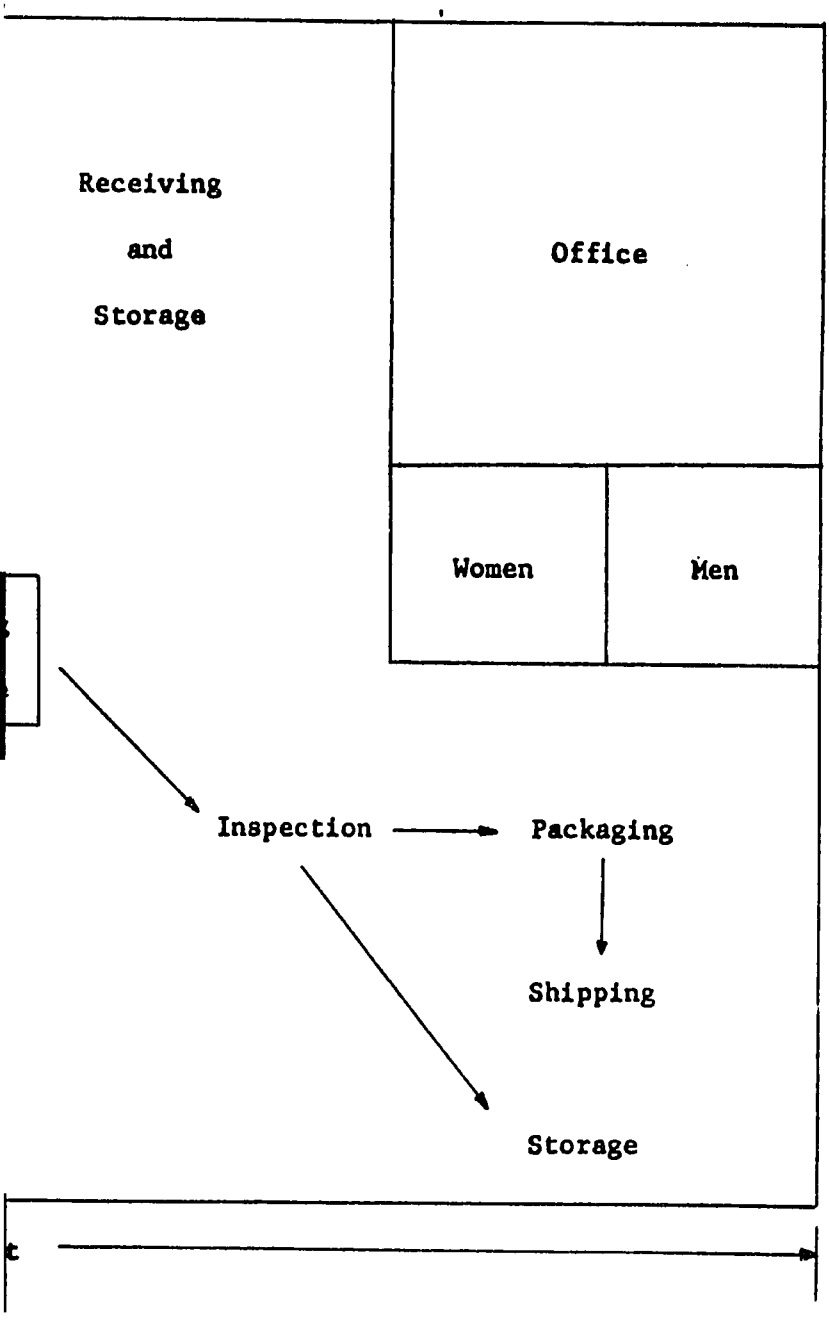
ALUMINUM DIE

PLANT LAYOU



NGS : S.I.C. 3361

VORKFLOW



215

ALUMINUM DIE CASTINGS: S.I.C. 3361

SELECTED REFERENCES

I. TEXTBOOKS

A. Die Methods. Paul B. Schubert. ed. 1965.
Industrial Preess
93 Worth Street
New York, N. Y. 10013

B. Fundamentals of Metal Casting. Richard A. Flinn. 1963. $10.75.
Addison-Wesley Publishing Co., Inc.
Reading, Mass. 01867

C. Die Castings. H. H. Dohler. 1951. 502 p. Illus. $15.00.
McGraw-Hill Book Co., Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

A. Die Casting Bibliography. CIR-1014. Gratis.
Office of Technical Cooperation and Research
Agency for International Deveiopment
Washington, D. C. 20523

B. Details of Die Casting. IR-5134. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICAL

A. Die Casting Engineer. Bi-monthly. $6.50/year in U. S. $8.00/year foreign.
The Society of Die Casting Engineers, Inc.
19382 James Couzens Highway
Detroit, Michigan. 48235
Information and news on all phases of die casting.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. D-166,249. April 8, 1952. 2 p.
Design for visor rearview mirrors and the like.

B. Patent No. D-162,328. May 15, 1951. 2 p.
Automobile license plate holder.

C. Patent No. D-162,154. Feb. 27, 1951. 2 p.
Automobile vehicles rear deck lid handle.

D. Patent No. D-160,761. Nov. 7, 1950. 2 p.
Housing for an automobile medallion.

V. TRADE ASSOCIATIONS

A. American Die Casting Institute
366 Madison Avenue
New York, N. Y. 10017
Keeps members informed of advancements, development, methods, markets in the industry.

B. Society of Die Casting Engineers, Inc.
19382 James Couzens Highway
Detroit, Michigan 48235
Provides members with technical information and news of the die casting industry.

C. Die Casting Research Foundation
366 Madison Avenue
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

A. Scholtz Engineering Works
200 West 6th Street
Waterloo, Iowa 50701
Tools, dies and special machinery.

B. Special Machine and Engineering Co.
20002 West Eight Mile Rd.
Detroit, Michigan 48219
Special machinery, tools and dies.

VII. DIRECTORY

A. Hitchcock's Assembly and Fastener Directory. $10.00.
Hitchcock Publishing Co.
Wheaton, Ill. 60187
Buyer's guide to products and supplies, engineering data, associations, distributors, trade names, etc.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

ASBESTOS-CEMENT PIPE

I. P. No. 66177

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

ASBESTOS-CEMENT PIPE: Standard Industrial Classification 3292

A. PRODUCT DESCRIPTION

Pipe made from asbestos fiber and portland cement, usually combined with some other material like silica. The most popular sizes range from 6" to 36". It is formed in lengths up to 13 feet.

B. GENERAL EVALUATION

The product's characteristics are durability, ease of handling and installation, imperviousness to seepage, and comparatively low cost. Prospects for this product are favorable in areas that are improving, expanding, or installing waterworks, irrigation and drainage systems, gas lines, electric power and telegraph networks, sewers, etc.

C. MARKET ASPECTS

1. USERS. Public works agencies, building contractors, utility companies, a variety of industries.

2. SALES CHANNELS AND METHODS. Sales to public works agencies, contractors industry, and building supplies store. Because the product is unfamiliar in some areas, salesmen should be well informed on its advantages and methods of application.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Product is fairly heavy and bulky in relation to its value, and transportation costs limit its market area. b. Export. Since freight costs are high in relation to value of product, and local substitutes are usually available, this product is not common in international trade.

4. COMPETITION. a. Domestic Market. Competition can be expected from pipe made of other materials. However, asbestos-cement pipe often has a cost advantage. Freight costs are usually high enough to enable the local product to compete successfully with imports. b. Export Market. Some sales might be possible to easily accessible areas of neighboring countries.

5. MARKET NEEDED FOR PLANT DESCRIBED. The market needed cannot be estimated in terms of total population. The general requirement is an accessible area where a substantial volume of construction activity of the type mentioned above is taking place or is firmly planned.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 370,000 10-Foot Pieces

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. 2 acres.		$ --
Building. One story, 100'x400'x14' sidewalls.		240,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$300,000	
Other tools & equipmt.	7,500	
Furniture & fixtures	1,500	
Transportation equipmt.	6,000	315,000
Total (excl. Land)		$555,000

Principal Items. Cement & asbestos handling unit, fiber processing plant, cement & asbestos blending unit, stock distributing system, forming machine, wet felt grinding & cleansing system, vacuum systems, pipe calendar & densifier, mandrel stripper, forming mandrels, hydraulic system, steam boiler & autoclaves, finisher & dry trimmer, pipe testing machine, motors, pumps & electrical system, pipe take-off & mandrel handling system, maintenance tools, skids, maintenance equipment, compressor, lift truck, 5-ton truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor Mfg. Overhead(a)	60	192,600
Admin, Costs(b), Contingencies, Sales Costs(c)	30	30,000
Training Costs		11,800
Total Working Capital		$234,400

c. TOTAL CAPITAL (EXCL. LAND) $789,400

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Asbestos	2,360 tons	$390,000
Portland cement	13,500 tons	300,000
Additive (silica)	1,015 tons	6,000
Total		$696,000

b. Supplies	
Lubricants & hand tools	$ 800
Maintenance & spare parts	15,000
Office supplies	300
Total	$ 16,100

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 150 hp. connected load.	$ 16,200
b. Fuel. Oil fired 40 hp. low pressure boiler, 240,000 gals. Bunker C oil.	$ 10,800
c. Water. Production, sanitation fire prevention, about 2 million gals.	$ 500

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 5-ton truck.	$ 1,200

b. External Transport Facilities. In & out shipments 135 tons a day. Plant should be located on good highway and, if possible, near railroad.

5. MANPOWER

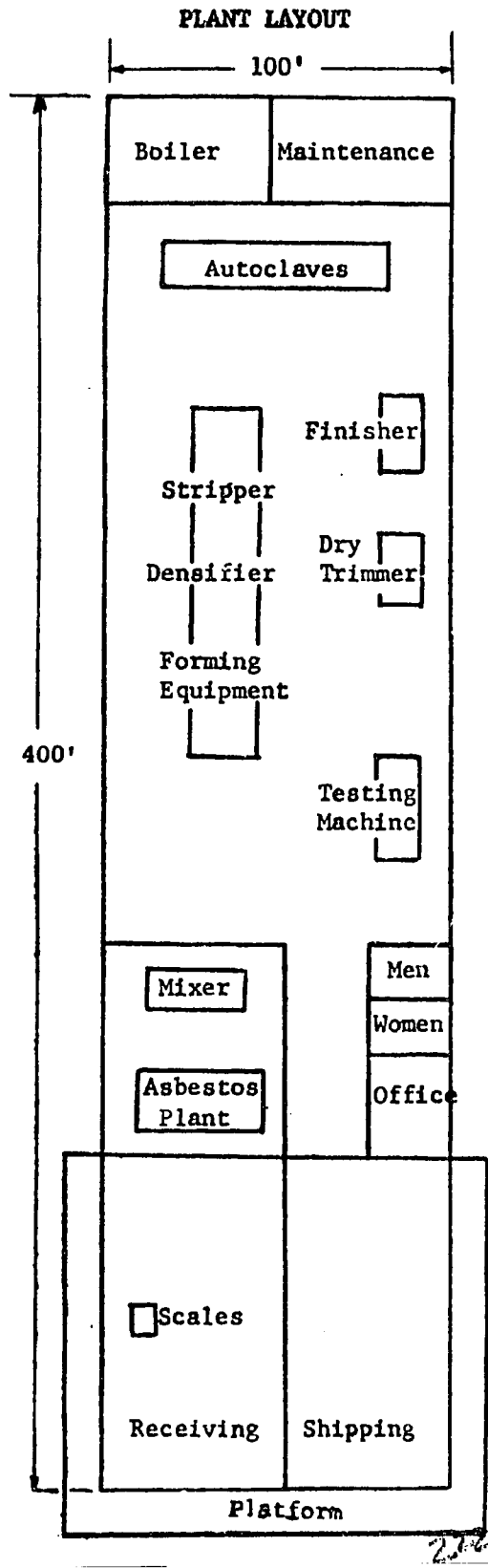
	Number	Annual Cost
a. Direct Labor		
Skilled	16	$ 96,000
Semi-skilled	27	135,000
Unskilled	13	52,000
Total	56	$283,000
b. Indirect Labor		
Manager & foreman	5	$ 48,000
Office	3	15,000
Other	26	84,000
Total	34	$147,000

c. Training Needs. Manager, superintendent & foreman should be experienced. With 10 skilled workers, they should be able to train all employees in 1 month.

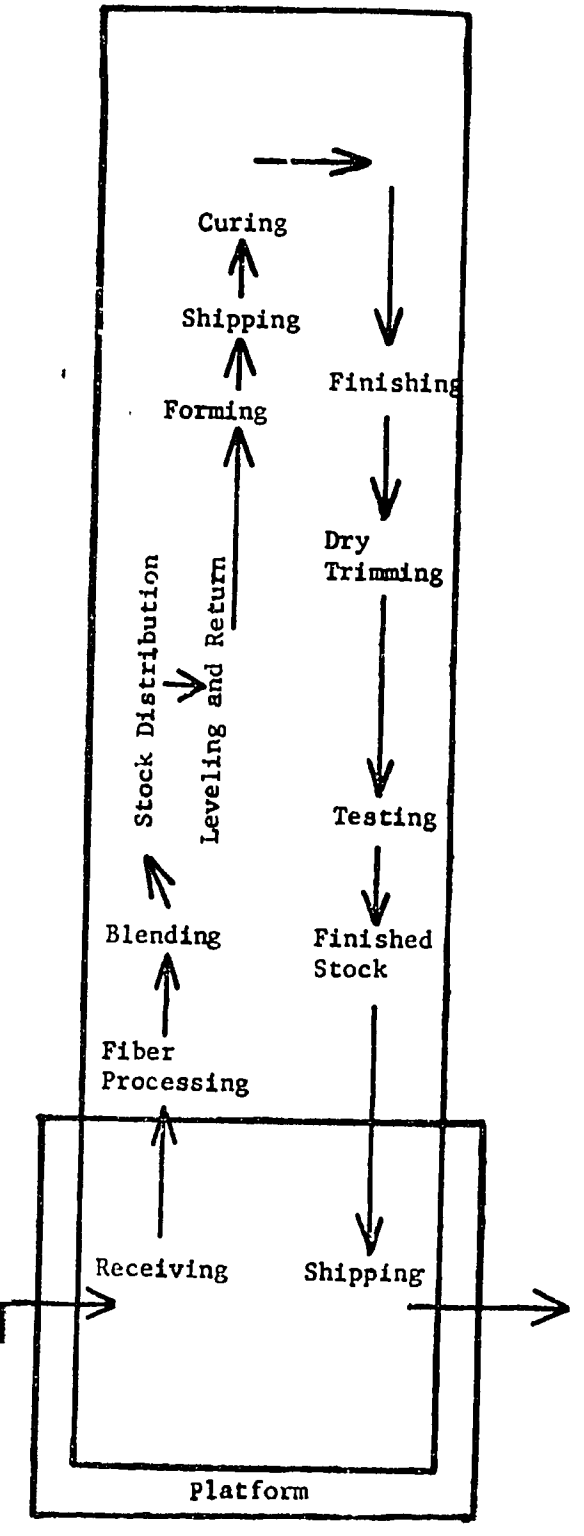
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$696,000
Direct Labor	283,000
Manufacturing Overhead(a)	191,800
Admin. Costs(b), Contingencies	120,000
Sales Costs(c), Bad Debts	240,000
Depreciation on Fixed Capital	45,200
Total	$1,576,000
b. Annual Sales Revenue	$1,800,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.


PLANT LAYOUT
100'
400'
Boiler
Maintenance
Autoclaves
Finisher
Stripper
Densifier
Dry Trimmer
Forming Equipment
Testing Machine
Mixer
Men
Women
Office
Asbestos Plant
Scales
Receiving
Shipping
Platform

PIPE : S.I.C. 3292
WORK FLOW DIAGRAM



ASBESTOS-CEMENT PIPE: S.I.C. 3292

SELECTED REFERENCES

I. TEXTBOOKS

A. Asbestos Fundamentals: Origin, Properties, Mining, Processing, Utilization. Hans Berger. tr. by Ralph E. Oesper. Illus. 1963. $6.00.
Tudor Publishing Co.
221 Park Ave. So.
New York, N. Y. 10003

B. Asbestos: Its Industrial Applications. D. V. Rosato. 1959. 220 p. $5.75.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022

C. Installation Guide, Transite Ring-Tite Pressure Pipe. Gratis.
Johns-Manville Corporation
22 West 40th Street
New York, N. Y. 10016

D. Transite Pressure Pipe. Gratis.
Johns-Manville Corporation
22 East 40th Street
New York, N. Y. 10016

II. U. S. GOVERNMENT PUBLICATIONS

A. Asbestos and Asbestos-Cement Products-Bibliography. IR-25807. Gratis
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Pipe: Asbestos-Cement, Sewer, Non-Pressure. Federal Specifications, SS-P-33la. Gratis.
Commissioner, Federal Supply Service
General Services Administration
Washington, D. C. 20405

III. PERIODICAL

A. Asbestos. Monthly. $2.00/year.
Secretarial Service
807 Western Saving Fund Building
Philadelphia, Penna. 19107
Contains news of new products, new uses, new developments in the asbestos industry.

IV. U. S. PATENT

Available U. S. Patent Office
Washington, D. C. 20231 $ 25.

A. Patent No. 2,694,349. 1954. 13 p.
Method and apparatus for the production of pipe formed from cement and a suitable aggregate, preferably asbestos fibre.

V. TRADE ASSOCIATION

A. Asbestos-Cement Products Association
509 Madison Avenue
New York, N. Y. 10022
Provides members with latest information on building materials and construction materials made of or related to asbestos-cement compounds.

VI. ENGINEERING COMPANIES

A. Industrial Service Company
51 Paterson Avenue
East Rutherford, New Jersey 07073
Specialists in the design, engineering, procurement and construction of bulk materials handling systems for conveying, screening, storing, blending, mixing.

B. Rust Engineering Company
930 Fort Duquesne Boulevard
Pittsburgh, Penna. 15222
Design, engineering, procurement and construction of industrial plants of all types.

VII. DIRECTORY

A. Pit and Quarry Directory. Annual $30.00.
Pit and Quarry Publications
431 South Dearborn Street
Chicago, Ill. 60605
Directory of Cement, gypsum, lime, sand, gravel, and crushed stone plants, and other non-metallic mineral industries.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

726

INDUSTRY PROFILES

CAMELBACK

I. P. No. 66178

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

CAMELBACK: Standard Industrial Classification 3011

A. PRODUCT DESCRIPTION

A sheet of rubber or rubber compound, unvulcanized and with a gummy surface on one side, which is applied to the outside of tire carcass; the opposite side is mold treaded, with the ribs of the tread running longitudinally and uniformly spaced.

B. GENERAL EVALUATION

The plant described is a small-scale enterprise, working on latex brought in from nearby plantations. Its production schedule would be geared to the rubber production cycle. Rubber harvesting takes place during a period of about five months. The camelback plant would utilize smoked sheet or latex as it became available and would operate during a period of six months. Capital requirements are moderate. Labor skill requirements, however, are high, with only skilled workers being employed, but since the labor force is small, it should generally be possible to staff the plant. As automobile use increases, the demand for recapped tires, and therefore for camelback, which is the basic recapping material, also increases. Recapping can be done locally on as small a scale as is desirable or economically feasible.

C. MARKET ASPECTS

1. USERS. Tire recapping establishments.
2. SALES CHANNELS AND METHODS. Sales directly to industry and to exporters.
3. GEOGRAPHICAL EXTENT OF MARKET. Product can be transporated easily. Nationwide distribution should normally be possible. Product is fairly common in international trade.
4. COMPETITION. a. Domestic Market. This plant is based on domestically supplied latex. It would therefore be established only in rubber-producing countries. b. Export Market. The plant might export to the immediately surrounding territory, where recapping facilities exist. However, the large industrialized countries with extensive motorized transport manufacture their own camelback from imported latex and rubber sheets. Export would therefore be restricted by competition of large-scale foreign producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. This plant manufactures sufficient camelback to retread 32,000 passenger car tires and 22,000 truck and bus tires. In the U.S. one out of every four passenger car replacement tires and one out of every two truck and bus replacement tires are recaps. Assuming that the total tire replacement for each category is slightly lower abroad than in the U.S. but that the proportion between recapped tires for replacement and new tires for replacement is the same as in the U.S., this camelback factory could supply recaps for 126,000 passenger cars and for 43,200 trucks and buses. In most rubber-producing countries, this would mean that the plant could supply a very large part or even the whole of the country's needs.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION - SIX MONTHS CYCLE : 240,000 Pounds

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 10,000 sq. ft.		$ --
Building. One story, 1,800 sq. ft.		11,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 46,200	
Other tools & equipmt.	10,200	
Furniture & fixtures	600	57,000
Total (excl. Land)		$ 68 000

Principal Items. 60-inch mill, 2 eleteric motors, extruder, die-head with interchangeable dies.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 30,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	900
Training Costs		300
Total Working Capital		$ 31,600

c. TOTAL CAPITAL (EXCL. LAND) $ 99,600

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Latex or smoked sheets	240,000 lbs.	$ 48,000
Chemicals		14,000
Total		$ 62,000
b. Supplies		
Lubricants & hand tools		$ 200
Maintenance & repair parts		1,000
Office supplies		200
Total		$ 1,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 40 hp. Plant operates only 6 months a year.	$ 1,200
b. Fuel. About 10,000 gals. oil, or equivalent in other fuel, annually.	$ 1,200
c. Water. About 800,000 gals. annually for production, sanitation & fire protection.	$ 200

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. Total in and out shipments about 35 tons a month. No special requirements.

5. MANPOWER

Six-Months Production Operations	Number	Annual Cost
a. Direct Labor		
Skilled	4	$ 12,000
b. Indirect Labor		
Manager - buys, sells, keep books & supervises	1	$ 10,000
Clerk	1	3,000
Total	2	$ 13,000

c. Training Needs. Workers work only 6 months. Manager works full time & must be fully experienced. With 2 skilled workers, he should be able to do all labor training. Plant should reach full production in 2 weeks.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

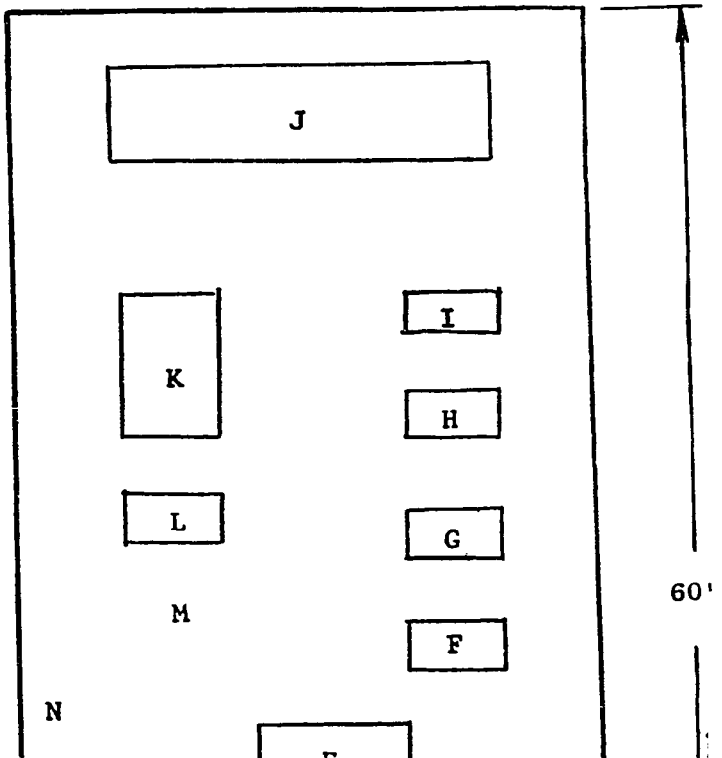
a. Annual Costs

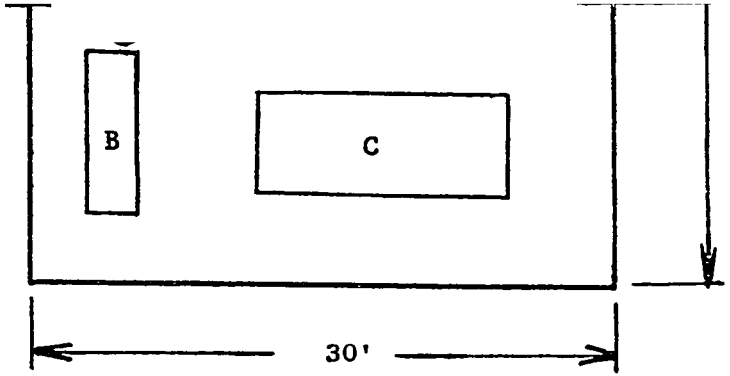
Direct Materials	$ 62,000
Direct Labor	12,000
Manufacturing Overhead(a)	17,000
Admin. Costs(b), Contingencies	3,000
Sales Costs(c), Bad Debts	2,200
Depreciation on Fixed Capital	7,300
Total	$103,500

b. Annual Sales Revenue $156,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT AND FLOW OF WORK





A. Receiving
B. Compounding
C. Rolling
D. Storage
E. Extruder
F. Ink and mark
G. Rubber cement application
H. Cushion gum
I. Thickness regulation
J. Cooling tank
K. Drying
L. Coiling
M. Packing
N. Shipping

2.3.1

CAMELBACK: S. I. C. 3011

SELECTED REFERENCES

I. TEXTBOOKS

A. Natural and Synthetic Rubbers. D. W. Huke. Illus. 1961. $5.00.
Tudor Publishing Co.
221 Park Avenue South
New York, N.Y. 10003

B. Rubber Chemicals. J. Van Alphen and others. 1956. 350 p. Illus. $6.25.
American Elsevier Publishing Co., Inc.
52 Vanderbilt Avenue
New York, N.Y. 10017

C. Chemistry of Natural and Synthetic Rubbers. H.L. Fisher. 1957. 425 p. Illus. $6.50.
Reinhold Publishing Corporation
430 Park Avenue
New York, N.Y. 10022

D. Engineering Uses of Rubber. A. T. McPherson and A. Klemin. 1956. 498 p. Illus. $12.50.
430 Park Avenue
New York, N. Y. 10022

II. U. S. GOVERNMENT PUBLICATION

A. Manufacture of Rubber Products. IR-15455. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D.C. 20523

III. PERIODICALS

A. Resins-Rubbers-Plastics. Monthly. $90.00/year.
Interscience Publishers, Inc.
250 Fifth Avenue
New York, N. Y. 10001
Developments in the processing of resins, rubbers, and plastics.

B. Rubber Age. Monthly. $5.00/year.
Palmerton Publishing Company, Inc.
101 West 31st Street
New York, N. Y. 1001
Covers industrial and processing developments in raw and reclaimed rubber.

V. U. S. PATENT

Available U. S. Patent Office
Washington, D. C. 20231 $.25.

A. Patent No. 2,722,405. 1955. 4 p.
Machine for mixing liquid materials including latex and reclaimed rubber.

V. TRADE ASSOCIATIONS

A. Rubber Manufacturing Association
444 Madison Avenue
New York, N. Y. 10022

B. Natural Rubber Bureau
1108 16th Street, N. W.
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

A. Farrel-Birmingham Co., Inc.
148 Maple Street
Ansonia, Conn. 06401
Machinery, design, engineering, plant layout, installation for plants in the rubber industry.

VII. DIRECTORY

A. Rubber Red Book. $12.50.
Rubber Age
101 West 31st Street
New York, N. Y. 10001

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards – CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

CENTRIFUGAL CAST IRON PIPE

I. P. No. 66179

...dustry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

CENTRIFUGAL CAST IRON PIPE: Standard Industrial Classification 3321

A. PRODUCT DESCRIPTION

Centrifugal cast iron pressure pipe in lengths of five to six meters and with inside dimensions of four, six, eight, and twelve inches, to withstand 50 to 300 psi pressure test and to conform to ISO/R13-1955, International Organization for Standardization.

B. GENERAL EVALUATION

The cast iron scrap for this plant should be available in most areas. The pig iron might have to be brought from a distance. Capital requirements are moderately high, but not much skilled labor is needed. This industry should be suitable for many developing areas where new public works are being undertaken and new industries are being started.

C. MARKET ASPECTS

1. USERS. Waterworks and industry. Waterworks use pressure pipe in water systems for delivering water to domestic and commercial users, and industry uses pressure pipe for conveying under pressure water and other liquids, including chemicals which do not corrode iron.

2. SALES CHANNELS AND METHODS. The plant would sell to public works, industry, construction contractors, and building supply houses.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. This product is heavy but not difficult to handle, and if adequate transportation facilities exist the market could be quite extensive. b. Export. This product is commonly exported.

4. COMPETITION. a. Domestic Market. Competition in the domestic market should come only from other plants making the product. b. Export Market. Export sales to nearby foreign countries which do not have plants of this type might be feasible. A plant of this size would not be able to compete in general international trade.

5. MARKET NEEDED FOR PLANT DESCRIBED. The market needed for this product will depend on the amount of waterworks construction being undertaken and upon the industrial use of centrifugal cast iron pipe. The market needed cannot be estimated in terms of total population.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 8,750 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. 5 acres, located near good water supply.		$ --
Building. One story, 100'x200'. 20' sidewalls in area of pipe machinery.		120,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$240,000	
Other tools & equipmt.	1,000	
Furniture & fixtures	1,000	242,000
Total (excl. Land)		$362,000

Principal Items. 2 reverberatory furnaces & refractories, weighing scale, 4 ladles, 4 core boxes, 12 molds, CO_2 equipment, muller, air compressor (10 hp.), monorail hoist (2 tons), electric machine hoist, pipe machine, cleaning equipment, hand lift truck, electric welder, platform scales, molding, equipment, flasks, patterns & accessories, 2 core racks, hand tools, cutting tools, bench grinders.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$121,000
Admin. Costs(b), Contingencies, Sales Costs (c)	30	11,300
Training Costs		6,000
Total Working Capital		$138,300

c. TOTAL CAPITAL (EXCL. LAND) $500,300

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Cast iron scrap	4,600 tons	$250,000
Pig iron	4,600 tons	320,000
Total		$570,000

b. Supplies

Lubricants & hand tools	$ 400
Welding rods	50
Maintenance & spare parts	13,000
Office supplies	200
Core sand	350
Carbon dioxide	400
Sodium silicate	500
Total	$ 14,900

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 160 hp. connected load.	$ 3,200
b. Fuel. Bunker C oil or gas, depending on availability.	$ 12,000
c. Water. 1,500 gals. a minute make-up water.	$ 1,000

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. In & out shipments average 70 tons a day. Good rail facilities & siding, & good highways necessary.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	4	$ 24,000
Semi-skilled	2	10,000
Unskilled	11	44,000
Total	17	$ 78,000
b. Indirect Labor		
Manager	1	$ 12,000
Office	2	10,000
Other	4	25,000
Total	7	$ 47,000

c. Training Needs. Manager should be fully experienced. With the skilled workers, he should be able to train the other workers & reach full production in 30 days.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs

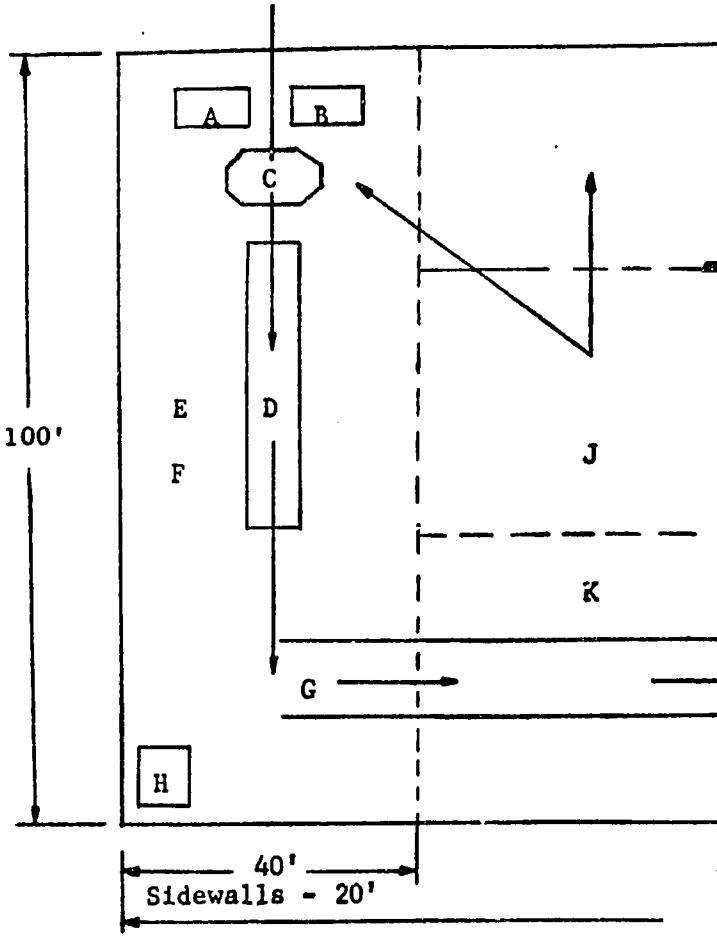
Direct Materials	$570,000
Direct Labor	78,000
Manufacturing Overhead(a)	78,100
Admin. Costs(b), Contingencies	45,000
Sales Costs(c), Bad Debts	90,000
Depreciation on Fixed Capital	30,300
Total	$891,400

b. Annual Sales Revenue $1,050,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

CENTRIFUGAL

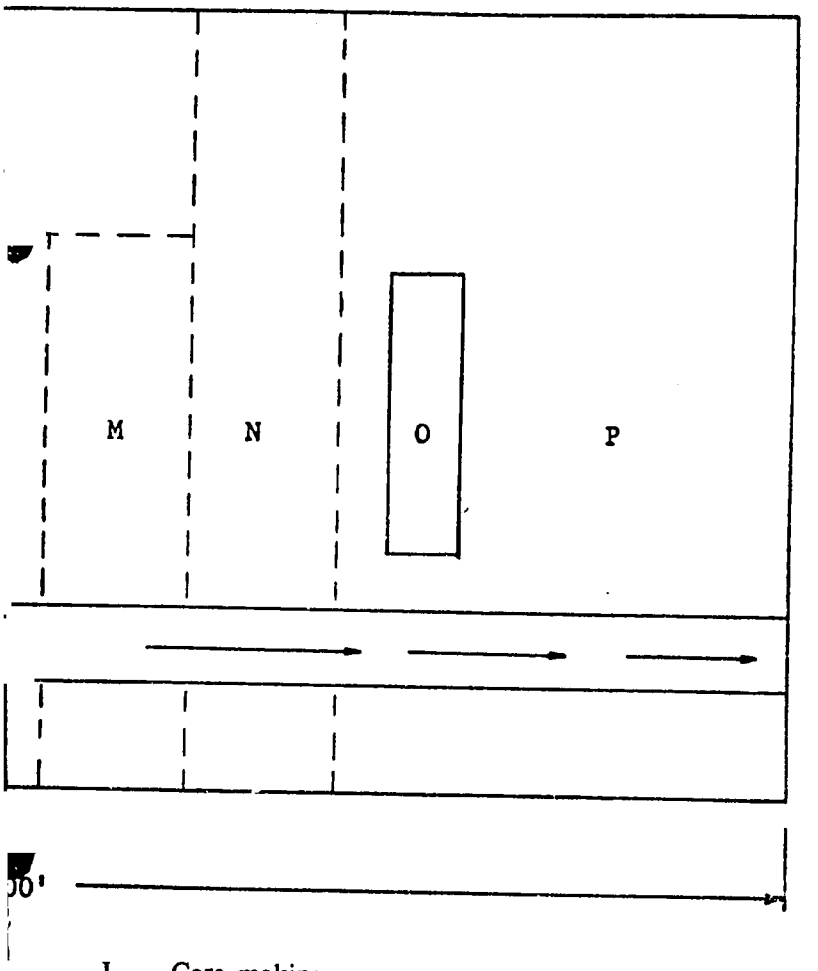
PLANT LA



A and B -- 2 Furnaces
C -- Loop track hoist
D -- Pipe machine
E -- Machine service hois
F -- Track hoist, pipe to
G -- Pipe rails
H -- Compressor
I -- Foundry for fittings

RON PIPE : S.I.C. 3321

ND WORKFLOW



J -- Core making
K -- Cooling area
L -- Cleaning area
M -- Testing area
N -- Cementing area
O -- Tar dip tank
P -- Tar coating area

CENTRIFUGAL CAST IRON PIPE: S.I C. 3321

SELECTED REFERENCES

I. TEXTBOOKS

A. Metallurgical Principles of Founding. V. Kondic. 1965.
American Elsevier Publishing Co., Inc.
52 Vanderbilt Avenue
New York, N. Y. 10017

B. Dictionary of Metallurgy. A. D. Merriman. 1959. $25.00.
Pitman Publishing Corporation
20 East 46th Street
New York, N. Y. 10017

C. Introduction to Foundry Technology. D. C. Ekey and W. P. Winter. 1958.
296 p. $7.95.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

D. Casting and Forming Processes in Manufacturing. James S. Campbell, Jr.
1950. 536 p. Illus. $8 95.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

A. Metal Working Industry Training Manual. TB-62. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Metalworking, Part III: Casting and Forging. SB-462.
U. S. Department of Commerce
Washington, D. C. 20230

III. PERIODICALS

A. Modern Castings. Monthly. $7.50/year.
American Foundrymen's Society
Golf and Wolf Roads
Des Plaines, Ill. 60016
Current reporting on techniques of metal casting, foundry management and operation, equipment, and materials handling.

B. Foundry. Monthly. $10.00/year (U.S.), $20.00/year (foreign).
Penton Publishing Company
1213 West 3rd Street
Cleveland, Ohio 44113
Supplies subscribers with news and covers all phases of foundry practice.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231. $.25 each.

A. Patent No. 2,956,322. 1960. 5 p.
Vents for centrifugal casting of iron and other metallic pipe.

B. Patent No. 2,948,934. 1960. 9 p.
Apparatus for the manufacture of centrifugally cast metal pipes.

C. Patent No. 2,948,933. 1960. 18 p.
Centrifugal cast iron pipe molding machine and method.

D. Patent No. 2,943,369. 1960. 8 p.
Apparatus for centrifugal casting of pipe.

V. TRADE ASSOCIATIONS

A. Cast Iron Pipe Research Association
3440 Prudential Plaza
Chicago, Ill. 60601

B. Foundry Equipment Manufacturers Association
5225 Manning Place, N. W.
Washington, D. C. 20016

VI. ENGINEERING COMPANIES

A. The Centrifugal Casting Machine Company
Post Office Box 947
Tulsa, Oklahoma 74101
Designs equipment, prepares plant layouts, sets up programs.

B. Atlantic Casting and Engineering Corporation
810 Bloomfield Avenue
Clifton, New Jersey 07012
Casting designers.

VII. DIRECTORY

A. Penton's Foundry List. $150.00.
Penton Publishing Company
1213 West 3rd Street
Cleveland, Ohio 44113
Comprehensive information on casting plants in the United States and Canada.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

CONCRETE CINDER BLOCKS

I. P. No. 66180

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

CONCRETE CINDER BLOCKS: Standard Industrial Classification 3271

A. PRODUCT DESCRIPTION

Building blocks, 8" x 8" x 16", made from portland cement and cinders.

B. GENERAL EVALUATION

Capital requirements are modest. The manufacturing operations are relatively simple and do not necessitate a highly skilled work force. The direct materials used normally would be produced locally. Since cinder blocks are not an export item, the plant would not have import competition. In a developing area where cinder blocks are commonly used for construction purposes, the prospects for this plant appear good.

C. MARKET ASPECTS

1. USERS Building contractors; railroads; military and public works construction contractors; builders of houses and fences.

2. SALES CHANNELS AND METHODS. The plant would sell directly to the users listed above and to building supply houses.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Cinder blocks are bulky and heavy, and the market is usually confined to a radius of about 100 miles, where a good highway trucking service is available. Where good railroad service is available, the market could be more extensive. b. Export. Cinder blocks are not normally exported.

4. COMPETITION. Other building materials would compete. The strength of the competition would depend on relative costs, preferences for different construction materials, etc.

5. MARKET REQUIRED FOR PLANT DESCRIBED. Demand for this product will depend upon the volume of construction within the market area and the type of construction materials in general use. The market for this product cannot be measured in terms of population.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 500,000 Blocks

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 5 acres.		$ --
Building. One story, about 2,000 sq. ft.		12,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipment	$34,300	
Other tools & equipmt.	2,000	
Furniture & fixtures	700	
Transportation equipmt.	4,000	41,000
Total (excl. Land)		$ 53,000

Principal Items. Elevator conveyor, material bins, batch bin & scale, lift truck, mixer, skip loader, block machine, pallets, racks, curing room & boiler, delivery truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 16,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,800
Training Costs		1,000
Total Working Capital		$ 19,300

c. TOTAL CAPITAL (EXCL. LAND) $ 72,300

2. MATERIALS AND SUPPLIES

	Annual Requmts.	Annual Cost
a. Direct Materials		
Cement	7,500 bls.	$ 28,000
Coarse aggregates	8,000 tons	17,000
Total		$ 45,000
b. Supplies		
Lubricants & hand tools		$ 100
Maintenance & spare parts		1,000
Office supplies		200
Total		$ 1,300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 15 hp.	$ 500
b. Fuel. About 17,000 gals. oil annually.	$ 2,000
c. Water. About 800,000 gals. annually.	$ 200

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Delivery truck.	$ 1,000

b. External Transport Facilities. In & out shipments about 80 tons a day. Good highways & rail facilities necessary.

5. MANPOWER

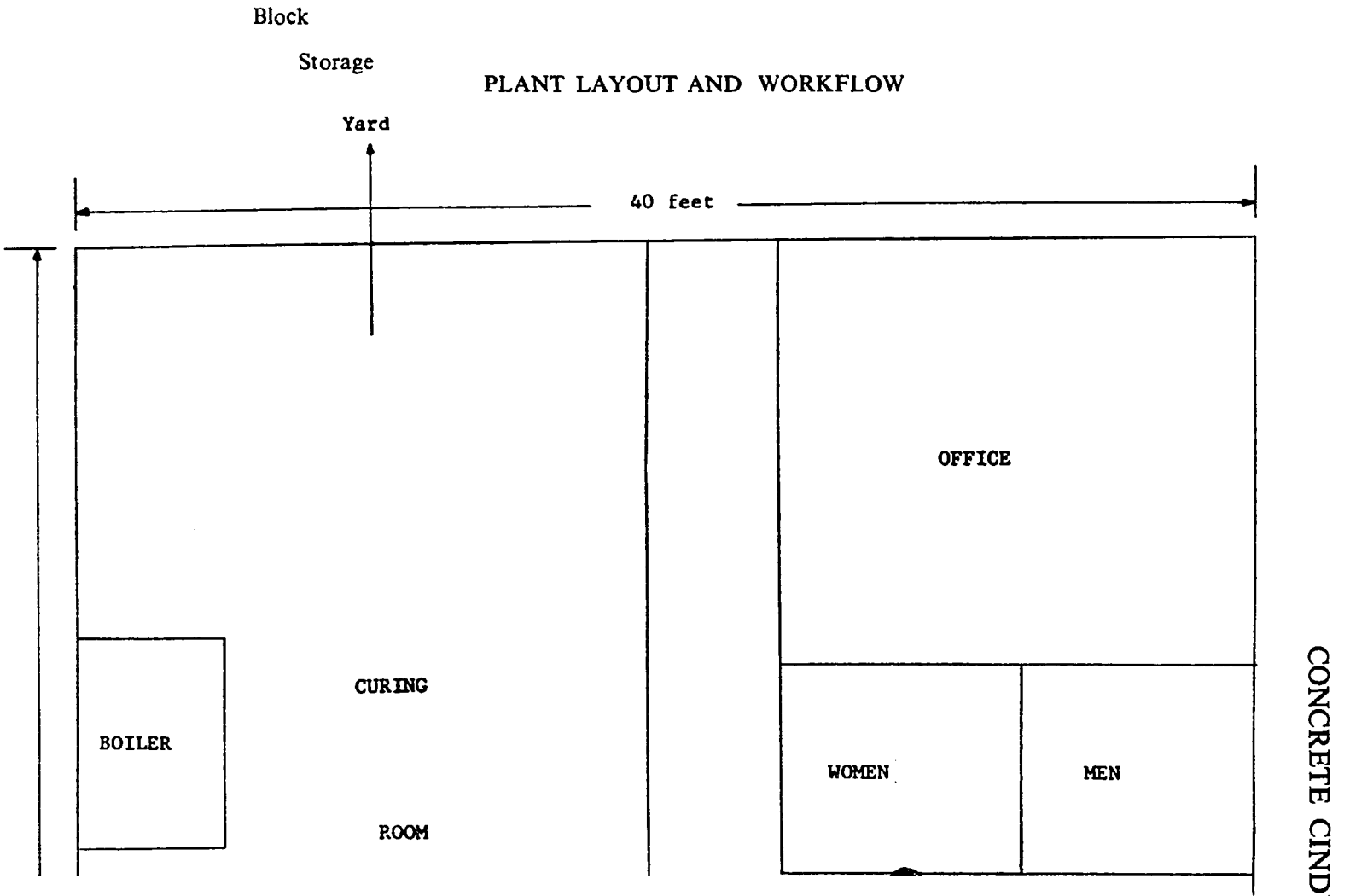
	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 6,000
Semi-skilled	1	5,000
Unskilled	3	12,000
Total	5	$ 23,000
b. Indirect Labor		
Manager	1	$ 11,000
Office	1	5,000
Maintenance & driver	2	10,000
Total	4	$ 26,000

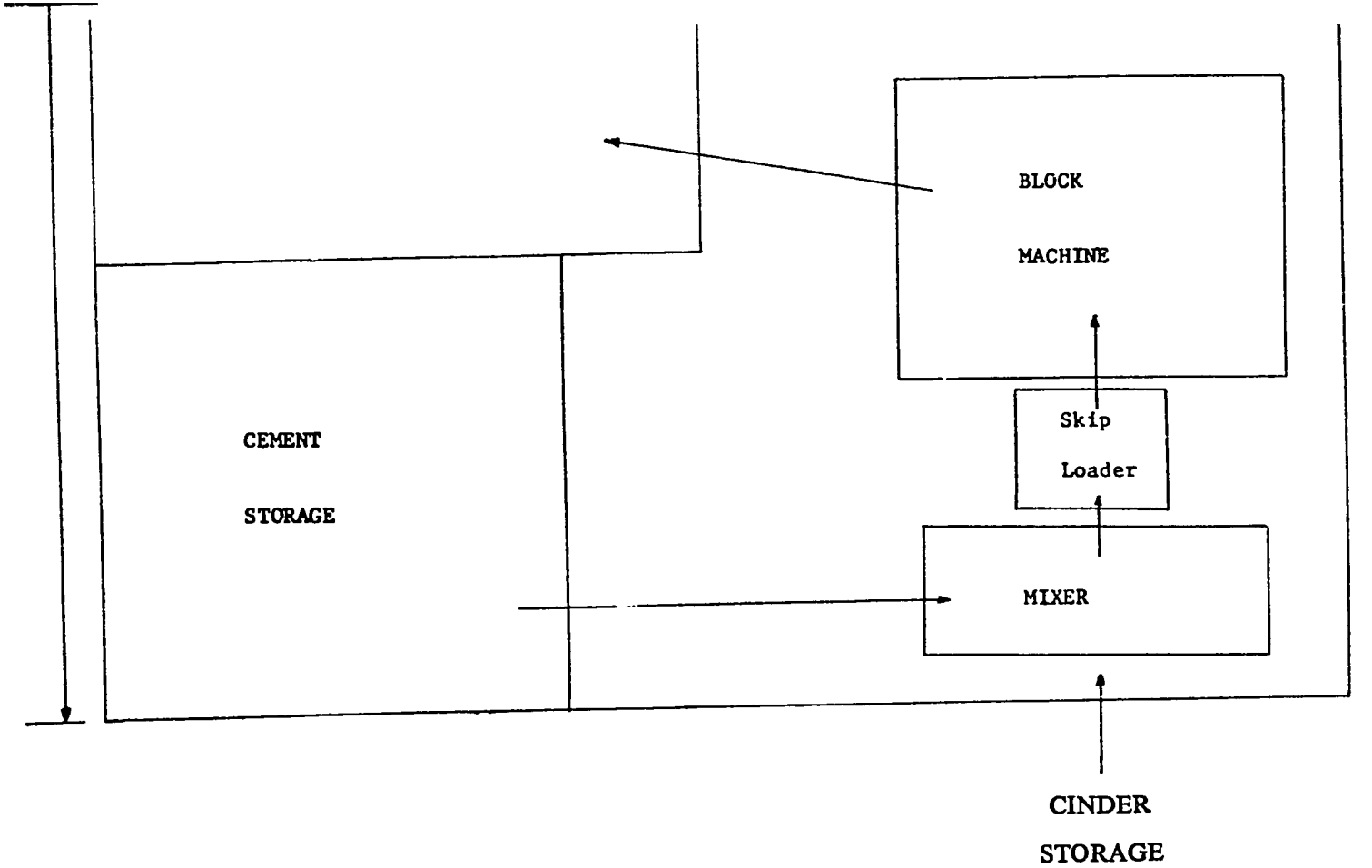
c. Training Needs. Manager should be experienced. With 1 skilled worker, he should be able to train the others & reach full production in 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 45,000
Direct Labor	23,000
Manufacturing Overhead(a)	31,000
Admin. Costs(b), Contingencies	10,000
Sales Costs(c), Bad Debts	11,000
Depreciation on Fixed Capital	5,600
Total	$125,600
b. Annual Sales Revenue	$150,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.


Block
Storage
PLANT LAYOUT AND WORKFLOW
Yard
40 feet
OFFICE
BOILER
CURING
ROOM
WOMEN
MEN
CONCRETE CIND


BLOCK
MACHINE
Skip
Loader
CEMENT
STORAGE
MIXER
CINDER
STORAGE

CONCRETE CINDER BLOCKS S.I.C. 3271

SELECTED REFERENCES

I. TEXTBOOKS

A. Concrete Technology and Practice. W. H. Taylor. 1965. $15.00.
American Elsevier Publishing Co., Inc.
52 Vanderbilt Avenue,
New York, N. Y. 10017

B. Properties of Concrete. A. M. Neville. 1963. $9.50.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016

C. Compositions and Properties of Concrete. G. E. Troxell and H. E. Davis. 1956. 433 p. Illus. $9.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. PERIODICALS

A. Concrete. Monthly. $6.00/year (U.S.A.)
Concrete Publishing Corporation
400 West Madison Street
Chicago, Ill. 60606
Journal for producers of precast and pre-stressed concrete products.

B. Pit and Quarry. Monthly. $10.00/year (Pan-American). $15.00/year (Other).
Pit and Quarry Publications, Inc.
431 South Dearborn
Chicago, Ill. 60605
For producers and manufacturers of cement, and other non-metallic minerals.

III. U.S. PATENTS

Available U.S. Patent Office
Washington, D.C. 20231 $.25 each.

A. Patent No. 2,708,783. May 24, 1955. 7 p.
Method for fabricating a block having a lateral surface of irregularly bulging surface.

B. Patent No. 2,706,322. April 19, 1955. 11 p.
Method in which controlled vibration and compression are utilized to produce concrete blocks of uniform density and superior strength.

IV. TRADE ASSOCIATIONS

A. American Concrete Institute
P. O. Box 4754, Redford Station
Detroit, Michigan 48219

B. Portland Cement Association
33 West Grand Avenue
Chicago, Ill. 60610

V. ENGINEERING COMPANIES

A. General Engines Company
Thorofare, New Jersey 08086

B. Columbia Machine Company
Vancouver, Washington 98661

VI. DIRECTORY

A. Thomas' Register of American Manufacturers. $30.00.
Thomas Publishing Company
461 Eighth Avenue
New York, N. Y. 10001
Lists manufacturers and suppliers of machinery, equipment, materials, and services.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

CUT GLASS

I. P. No. 66181

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

CUT GLASS: Standard Industrial Classification 3231

A. PRODUCT DESCRIPTION

Cut glass products of various shapes, sizes and designs made from purchased glass blanks.

B. GENERAL EVALUATION

This plant requires a moderate capital and not very much skilled labor. Good management is essential to assure product quality, make good designs, and keep up with innovations. Cut glass items are luxury products, and it would be essential to make a very careful study of the potential market. Old-established firms in this business would be likely to offer keen competition.

C. MARKET ASPECTS

1. USERS. Mainly individuals, though some sales might be possible to luxury establishments of various kinds.

2. SALES CHANNELS AND METHODS. Sales would be made to retail stores of various kinds.

3. GEOGRAPHICAL EXTENT OF MARKET. Freight costs would normally be low in relation to product value and the market might be nation-wide. b. Export. Cut glass products are quite commonly exported.

4. COMPETITION. a. Domestic Market. Good quality and design would be necessary in order to meet import competition. b. Export market. Ability to export will depend partly on price but particularly on quality and design.

5. MARKET NEEDED FOR PLANT DESCRIBED. It is clearly essential to have a large number of people with high incomes in the potential market area. Interest in cut glass products varies greatly in different countries, and demand is also affected somewhat by changes in fashion. However, there is a fairly steady demand for high-quality and well-designed cut glass in some areas.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 500,000 Pieces

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 80'x125'.		60,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 7,600	
Other tools & equipmt.	600	
Furniture & fixtures	800	9,000
Total (excl. Land)		$ 69,000

Principal Items. 21 lathes (complete with 3/4 hp. motors), 3 Dressing stone sets, 3 turntables (8'' diameter), 21 worktables, heater & ladle, 2 hand trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 54,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,800
Training Costs		22,000
Total Working Capital		$ 80,200

c. TOTAL CAPITAL (EXCL. LAND) $149,200

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Table accessory blanks	30,950 doz.	$ 93,000
Vase blanks	5,700 doz.	34,200
Gift & novelty item blanks	5,300 doz.	47,500
Abrasive wheels	315	1,600
Synthetic sponges	10,000	300
Polishing cork		100
Pumice & rotten stone		50
Lead & babbitt		100
Marking material		50
Packaging cartons		2,600
Total		$179,500

b. Supplies	
Lubricants & hand tools	$ 300
Cutting tools & abrasives	500
Maintenance & spare parts	300
Office supplies	300
Total	$ 1,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 16 hp. connected load.	$ 200
b. Fuel. For heating, if necessary.	$ 200
c. Water. production, sanitation, fire protection.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	7	35,000
Unskilled	18	$ 72,000
Total	28	$125,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	2	10,000
Total	3	$ 20,000

c. Training Needs. Manager & skilled workers must be experienced. They should be able to train other workers & reach full production in 4 months.

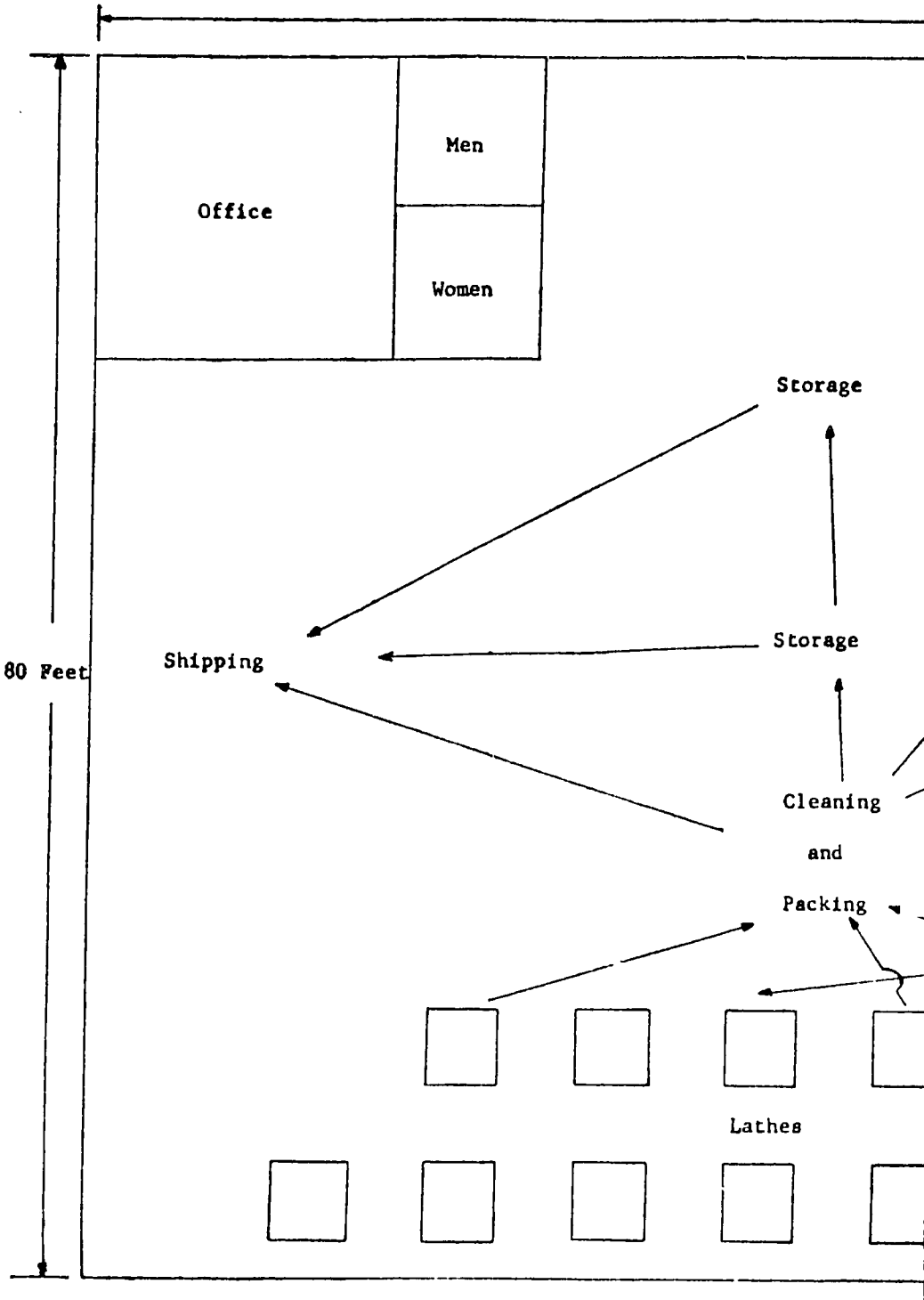
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$179,500
Direct Labor	125,000
Manufacturing Overhead(a)	21,900
Admin. Costs(b), Contingencies	17,000
Sales Costs(c), Bad Debts,	28,000
Depreciation on Fixed Capital	4,000
Total	$375.400
b. Annual Sales Revenue	$425,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

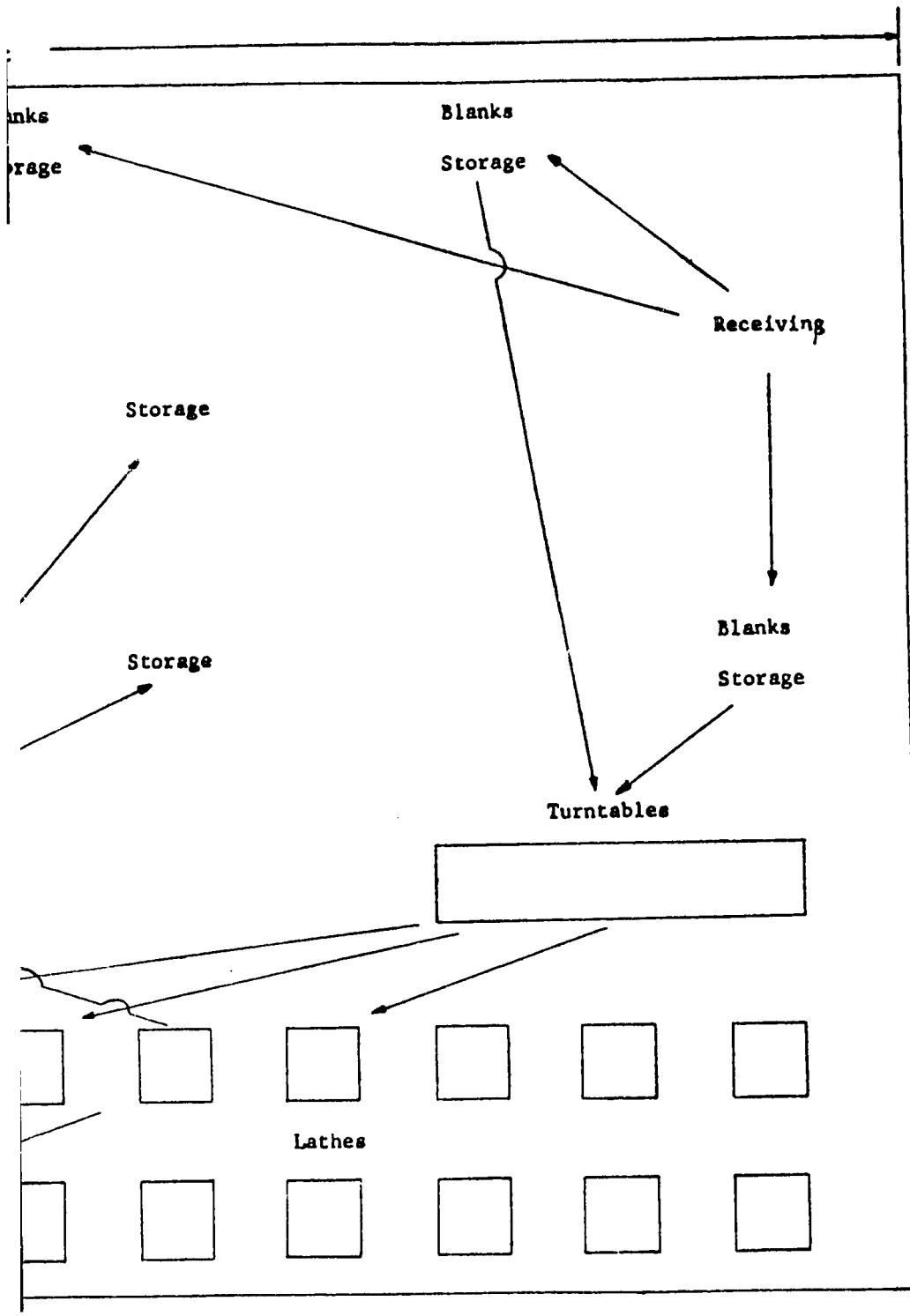
CUT GI

PLANT LAY(



.C. 3231

WORKFLOW



CUT GLASS: S.I.C. 3231

SELECTED REFERENCES

I. TEXTBOOKS

A. Cut and Engraved Glass 1771-1905. D. Daniel. Rev. ed. 1965. $12.50.
William Morrow and Co., Inc.
425 Park Avenue, South
New York, N. Y. 10016

B. Properties of Glass Surfaces. L. Holland. 1964. $15.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016

C. American Cut Glass. E. G. Warman. 1953. 108 p. Illus. $4.00.
Warman Publishing Company
8 Frankhoover Street
Uniontown, Penna. 15401

D. Handbook of Glass Manufacture. F. V. Tooley, editor. 2 vols. vol. 1, $15.00, vol. 2, $10.00.
Ogden Publishing Company
530 East 86th Street
New York, N. Y. 10028

E. The Properties of Glass. G. W. Morey. 1954. 600 p. Illus. $16.50.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022

II. U. S. GOVERNMENT PUBLICATION

A. Glass Industry-Bibliography. IR-25764. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Glass Industry. Monthly. $5.00/year.
Ogden Publishing Company
530 East 86th Street
New York, N. Y. 10028
Latest developments in the production and marketing of plain and cut glassware.

B. Crockery and Glass Journal. Monthly. $3.00/year.
Haire Publishing Company
111 Fourth Avenue
New York, N. Y. 10003
Current information about designs, new materials, processes and markets in the crockery and glass tableware fields.

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. Des. 189,678. 1961. 1 p.
Design and description of a cut glass drinking tumbler.

B. Patent No. Des. 187,604. 1960. 1 p.
Design for a cut glass salad bowl or similar article.

C. Patent No. Des. 181,340. 1957. 2 p.
Design and description of cut glass vanity set.

V. TRADE ASSOCIATIONS

A. American Glassware Association
630 Third Avenue
New York, N. Y. 10017

B. Glass Crafts of America
816-7 Empire Building
Pittsburgh, Penna. 15222

VI. ENGINEERING COMPANY

A. Toledo Engineering Company, Inc.
3001 West Sylvania Avenue
Toledo, Ohio 43613
Glass plants of all types, equipment, and engineering services.

VII. DIRECTORY

A. Crockery and Glass Journal Directory Issue. Annual. $1.00/year.
Haire Publishing Company
111 Fourth Avenue
New York, N. Y. 10003
Contains names of all crockery and glass products manufacturers in the United States.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

ELECTRIC FANS, 12-INCH OSCILLATING

I. P. No. 66182

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

ELECTRIC FANS, 12-INCH OSCILLATING: Standard Industrial Classification 3634

A. PRODUCT DESCRIPTION

Twelve-inch oscillating electric fans for home use.

B. GENERAL EVALUATION

Capital requirements for this plant are fairly small, but good management is required to assure product quality and to keep down costs in this highly competitive industry. For a plant of this size the market would probably be rather localized, and large-scale and well-known producers would be likely to offer severe competition.

C. MARKET ASPECTS

1. USERS. Households, offices, etc.

2. SALES CHANNELS AND METHODS. Sales to wholesalers and large retailers. An attractive brand name, active salesmanship, and some advertising are necessary.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. This product is relatively light and securely packaged in cardboard boxes. Shipping costs in relation to the value of the product are not excessive and the product is often shipped long distances. b. Export. There is a world-wide market for this product.

4. COMPETITION. a. Domestic Market. Imports from large-scale and well-known makers might offer severe competition. b. Export Market. This plant would be too small to compete in the international market.

5. MARKET NEEDED FOR PLANT DESCRIBED. Where power is available a population of one million people with a moderately high income level should absorb the output of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 10,000 Units

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 50'x100'.		30,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$18,500	
Other tools & equipmt.	1,300	
Furniture & fixtures	700	20,500
Total (excl. Land)		$ 50,500

Principal Items. Square shear, bending rolls, scroll shear, punch press (10 ton), drill press with tapping attachment, turret lathes, punch & notcher, riveting machine, welding machine, paint spray booth.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 25,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,400
Training Costs		2,000
Total Working Capital		$ 30,000

c. TOTAL CAPITAL (EXCL. LAND) $ 80,500

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
1/2 hp. Motors	10,000	$ 70,000
Sheet steel	50 tons	8,000
Steel rounds	6 tons	1,000
Bolts	10 kegs	3,000
Nuts	10 kegs	1,800
Rivets	5 kegs	1,800
Paint		600
Packaging material		1,000
Total		$ 87,200
b. Supplies		
Lubricants & hand tools		$ 200
Cutting tools & abrasives		400
Maintenance & spare parts		1,000
Welding supplies		300
Office supplies		300
Total		$ 2,200

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 60 hp. Connected load.	$ 1,000
b. Fuel. For heating, if necessary.	$ 200
c. Water. Sanitation & fire protection.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	3	15,000
Unskilled	3	12,000
Total	8	$ 39,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	2	9,000
Maintenance	1	5,000
Total	4	$ 24,000

c. Training Needs. Manager should be experienced. With 2 skilled workers he should be able to train other workers & reach full production in 30 days.

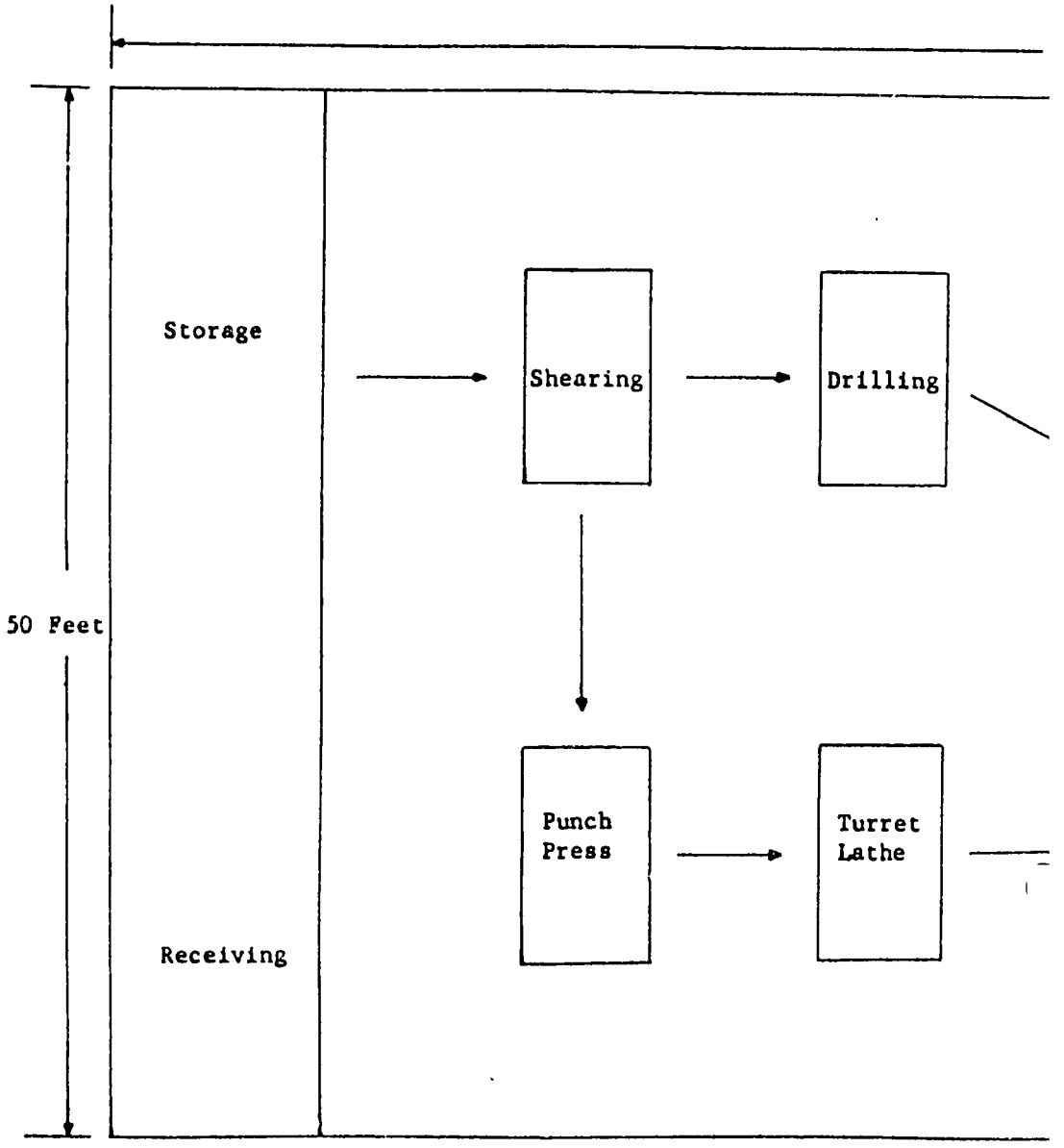
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 87,200
Direct Labor	39,000
Manufacturing Overhead(a)	27,500
Admin. Costs(b), Contingencies	11,000
Sales Costs(c), Bad Debts	17,000
Depreciation on Fixed Capital	3,700
Total	$185,400
b. Annual Sales Revenue	$220,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor, (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

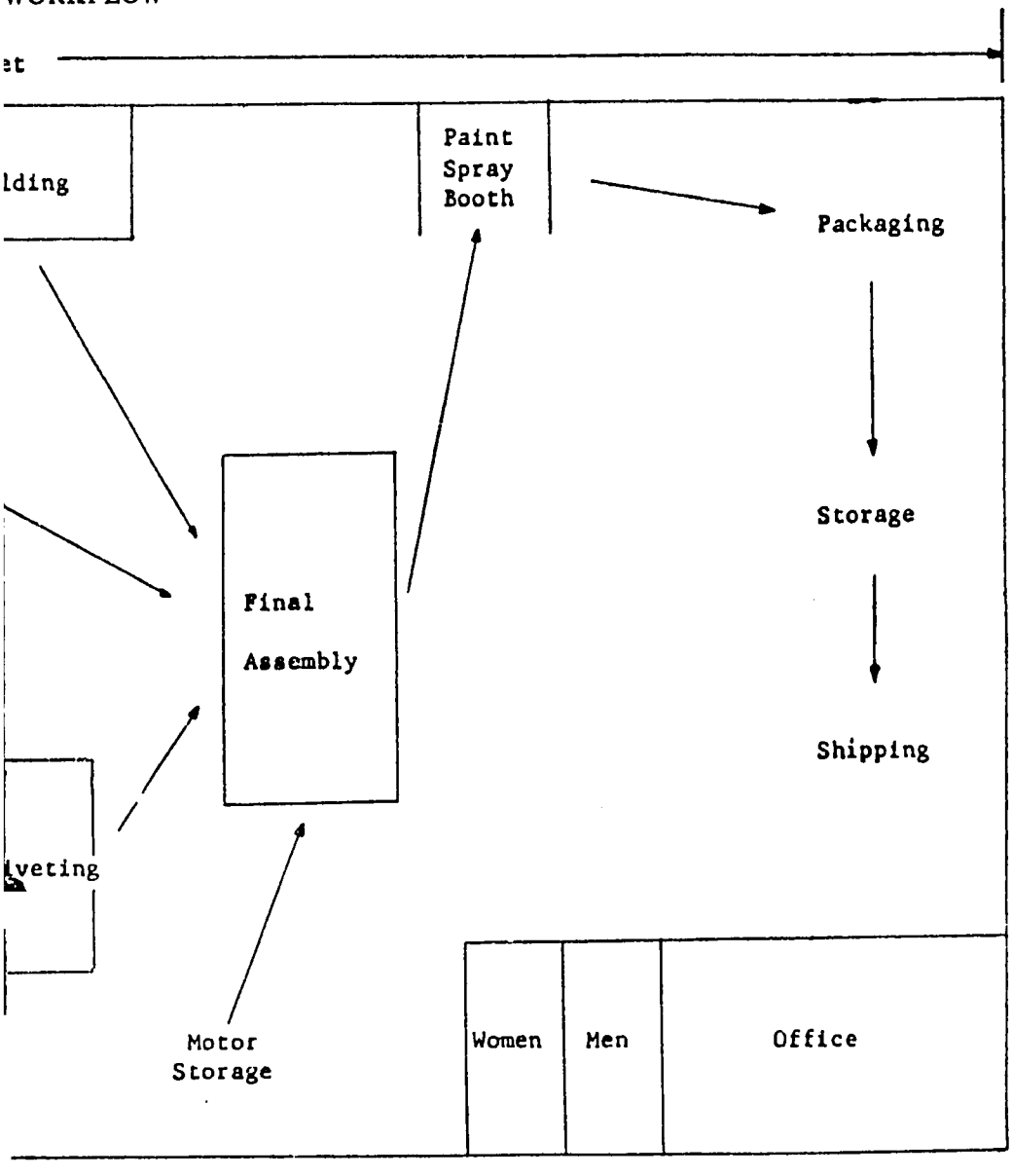
ELECTRIC FANS, 12-INC

PLANT LAYOU



:ILLATING : S.I.C. 3634

WORKFLOW



ELECTRIC FANS, 12-INCH OSCILLATING: S.I.C. 3634

SELECTED REFERENCES

I. TEXTBOOKS

A. Heating, Ventilating, Air Conditioning Guide. C. W. MacPhee. 2 vols., vol. 1. 1965, vol. 2-1964. $20.00 each to non-members, $12.00 each to members. American Society of Heating, Refrigerating and Air-Conditioning Engineers 345 E. 47th Street
New York, N. Y. 10017

B. A Century of Electric Fans. W. K. Skolfield. 1957. 152 p. $3.00.
General Electric Company
1285 Boston Avenue
Bridgeport, Conn. 06610

C. Mechanical and Electrical Equipment for Buildings. C. M. Gay and others. 1955. 564 p. illus. $8.50.
John Wiley and Sons, Inc.
605 3rd Avenue
New York, N. Y. 10016

D. Audels Home Appliance Service Guide. E. P. Anderson. 1954. 824 p. illus. $6.00.
Bobbs-Merrill Co., Inc.
3 W. 57th Street
New York, N. Y. 10019

II. U. S. GOVERENMENT PUBLICATION

A. Fans, Circulating, Bracket and Fan. WF 101 D. Gratis.
General Services Administration
Washington, D. C. 20405
Covers specifications and descriptions of circulating fans including those of the domestic, oscillating type.

III. PERIODICALS

A. Electrical World. Weekly. $6.00/year.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
Electrical equipment, products and markets.

B. Electrical Merchandizing. Monthly. $15.00/year.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

IV. U. S. PATENTS

Available U.S. Patent Office
Washington, D.C. 20231 $.25 each.

A. Patent No. 2,981,464. 1961. 4 p.
Process for the production of propellor fans.

B. Patent No. 2,978,167. 1961. 3 p.
Manufacture of a fan assembly with removable blades.

C. Patent No. 2,961,152. 1960. 5 p.
Portable fan unit and window adapter.

D. Patent No. 2,928,590. 1960. 4 p.
An improved fan with minimum amount of noise or vibration.

V. TRADE ASSOCIATIONS

A. Air Moving and Conditioning Association
2159 Guardian Building
Detroit, Michigan 48226

B. Air-Conditioning and Refrigeration Institute
1815 North Fort Myer Drive
Arlington, Virginia 22209

VI. ENGINEERING COMPANY

A. Allis-Chalmers Manufacturing Company
864 South 70th Street
Milwaukee, Wisconsion 53214
Manufactures equipment, designs and constructs plants for the making of electrical products.

VII. DIRECTORY

A. Directory of Verified Electrical Wholesale Distributors. Biennial. $35.00.
McGraw-Hill Publishing Company, Inc.
300 West 42nd Street
New York, N. Y. 10036
Data on distributors of electrical housewares.

ELECTRIC FANS, 12-INCH OSCILLATING: S.I.C. 3634

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards – CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

ELECTRIC SPACE HEATERS

I. P. No. 66183

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

ELECTRIC SPACE HEATERS: Standard Industrial Classification 3634

A. PRODUCT DESCRIPTION

A sheet metal electric space heater 14" by 16" by 7", with wire guards and connecting cord, capable of heating one large or two small rooms. The equipment listed is capable of producing larger or smaller heaters.

B. GENERAL EVALUATION

Capital and skilled labor requirements are moderate. Demand will depend on availability and cost of electric power, and, of course, on climate. With the expansion of electricity supply, this business should have good prospects in some developing areas.

C. MARKET ASPECTS

1. USERS. Households, offices, etc.

2. SALES CHANNELS AND METHODS. Sales are usually made direct to retail electrical appliance distributors. Some general advertising may be desirable.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The product is fairly easy to handle and the market area may be extensive. b. Export. This is a common export item with a world-wide market.

4. COMPETITION. a. Domestic Market. Competition from imports from large-scale, well-known producers may be keen. b. Export Market. The plant is too small to compete in general international trade.

5. MARKET NEEDED FOR PLANT DESCRIBED. The market needed will depend upon many factors, such as climatic conditions, availability of power, the per capita income of the people, and the type of local fuel available. In a temperate climate a moderately prosperous urban community of about a million people would generally provide a large enough outlet.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 25,000 Heaters

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 50'x80'.		24,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$31,500	
Other tools & equipmt.	3,300	
Furniture & fixtures	700	35,500
Total (excl. Land)		$ 59,500

Principal Items. Square shears, sheet metal brake, 2 punch presses, 2 drill presses, wire former, spot welder, spray booth, compressor, factory trucks, bench grinder, dies.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	$ 16,600
Admin. Costs (b), Contingencies, Sales Costs(c)	30	1,600
Training Costs		1,800
Total Working Capital		$ 20,000

c. TOTAL CAPITAL (EXCL. LAND) $ 79,500

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Sheet metal	132 tons	$ 20,000
Guard wire	7.3 tons	9,700
Heating element wire	2 tons	700
Terminals	50,000	800
Insulators	175,000	2,000
Connection cord		500
Screws		4,000
Cartons		6,000
Total		$ 43,700

b. Supplies	
Lubricants & hand tools	$ 100
Cutting tools & abrasives	400
Maintenance & spare parts	1,200
Office supplies	200
Total	$ 1,900

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 30 hp. connected load.	$ 400
b. Fuel. For heating, if necessary.	$ 300
c. Water. Sanitation & fire protection.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	2	10,000
Unskilled	4	16,000
Total	8	$ 38,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Total	2	$ 15,000

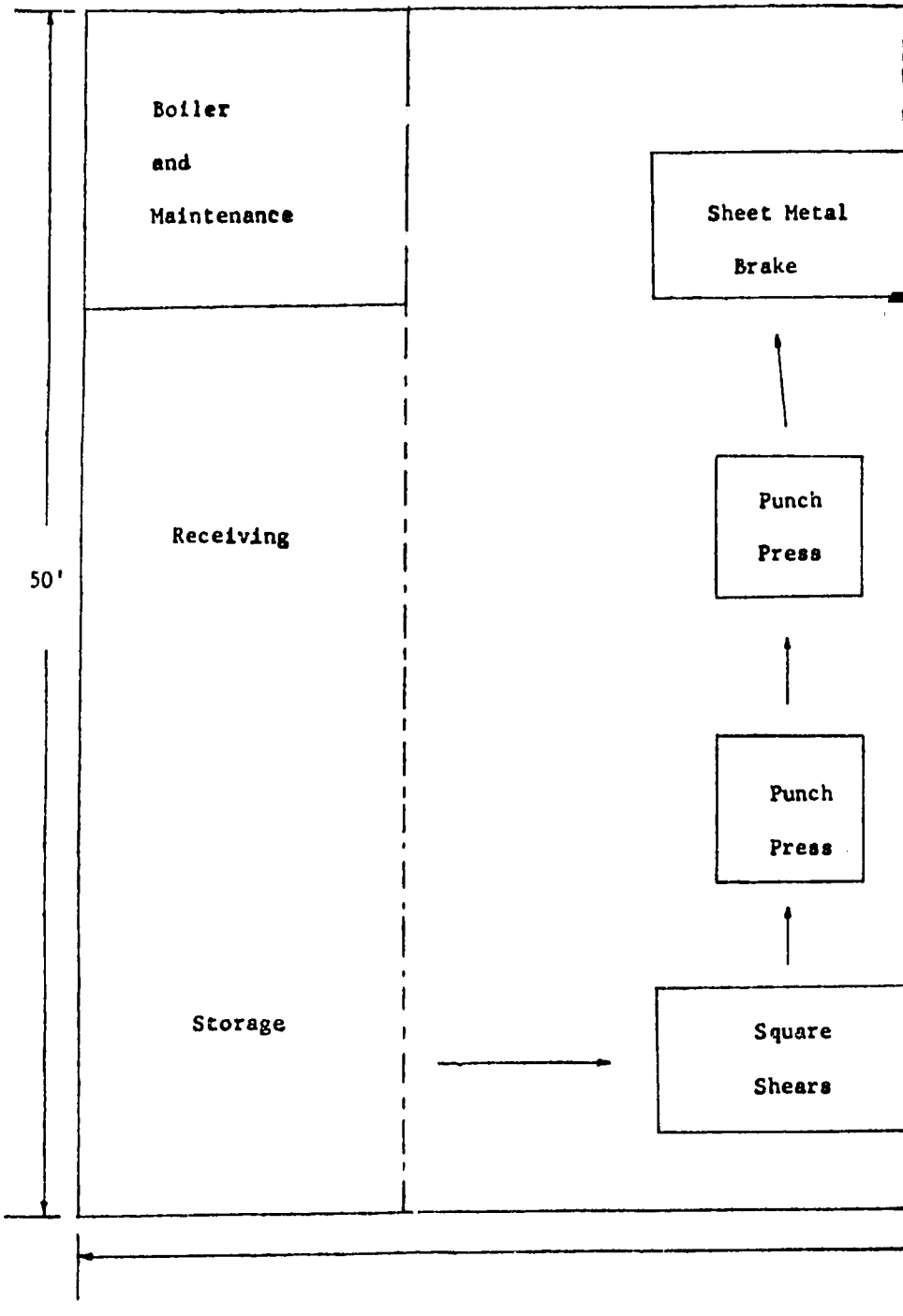
c. Training Needs. Manager must be fully experienced. With 2 skilled workers he should be able to train the other employees & reach full production in 30 days.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 43,700
Direct Labor	38,000
Manufacturing Overhead (a)	17,700
Admin. Costs (b), Contingencies	8,000
Sales Costs(c), Bad Debts	11,600
Depreciation on Fixed Capital	5,100
Total	$123,500

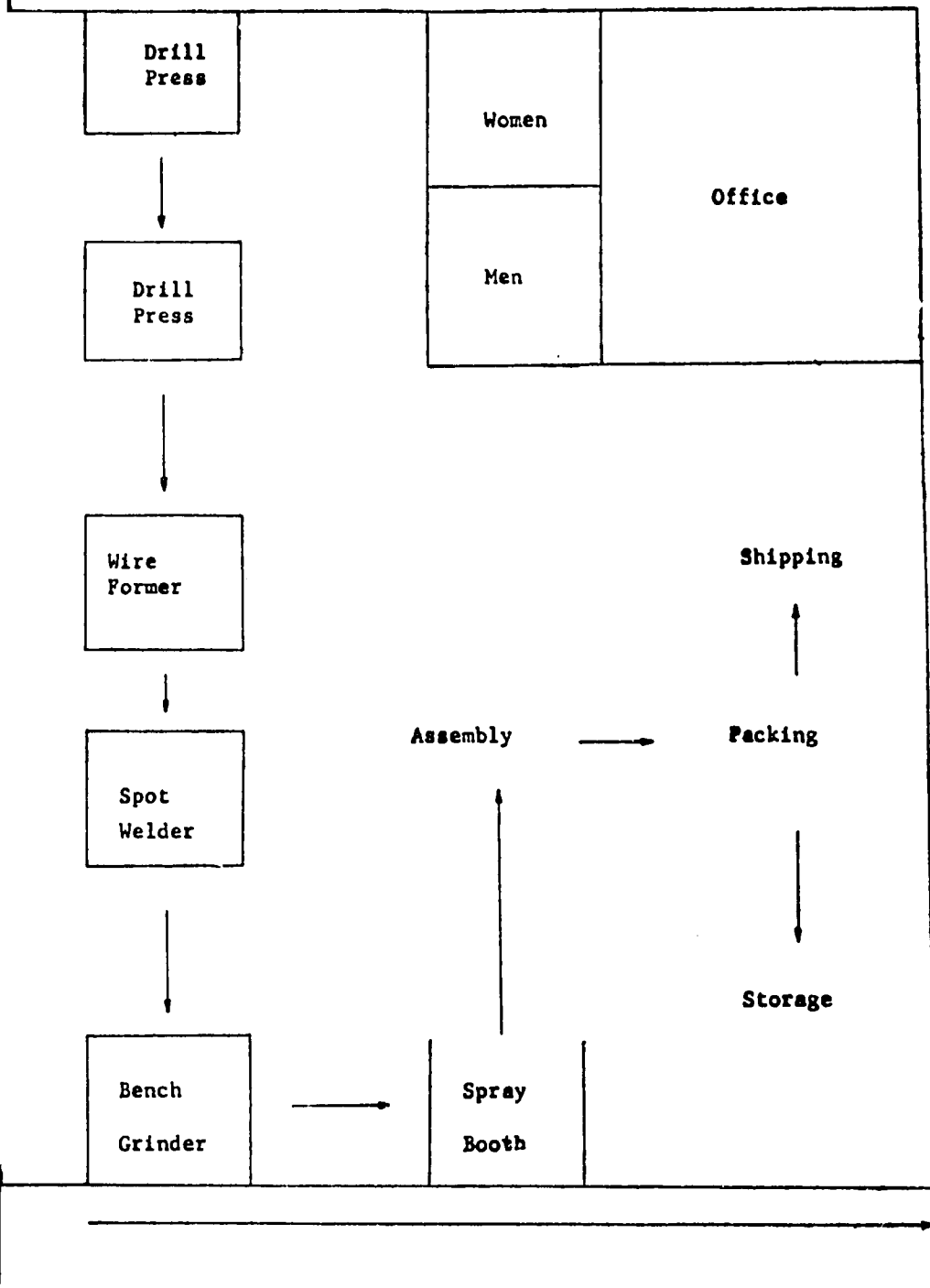
b. Annual Sales Revenue $150,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.


Boiler
and
Maintenance
Sheet Metal
Brake
Receiving
50'
Punch
Press
Punch
Press
Storage
Square
Shears

ATERS : S.I.C. 3634

D WORKFLOW



ELECTRIC SPACE HEATERS: S.I.C. 3634

SELECTED REFERENCES

I. TEXTBOOKS

A. Heating Handbook. R. H. Emerick. 1964. $14.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

B. Air Conditioning and Heating Practice. Julian M. Laub. 1962. $15.00.
Holt, Rinehart and Winston, Inc.
383 Madison Avenue
New York, N. Y. 10017

C. Handbook of Heating, Ventilating and Air Conditioning. John Porges. 1959. $10.80.
Transatlantic Arts, Inc.
Hollywood-by-the-Sea, Florida 33020

D. Heating, Ventilating, Air Conditioning Guide. American Society of Heating and Air-Conditioning Engineers. 1956. 1696 p. ilius. $12.00.
American Society of Heating, Refrigerating and Air Conditioning Engineers
345 E. 47th Street
New York, N. Y. 10017

II. U. S. GOVERNMENT PUBLICATIONS

A. Electrical Home Appliances. IR-26927. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Electric Heating Elements-Bibliography. IR-25617EP. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Domestic Engineering. Monthly. $5.00/year.
Domestic Engineering Company
1801 Prairie Avenue
Chicago, Ill. 60616
Manufacture and marketing of domestic appliances.

B. Heating, Plumbing, and Air Conditioning News. Monthly.
The Industrial Press
93 Worth Street
New York, N. Y. 10013
Processing, production, and marketing data on heating and related subjects.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each

A. Patent No. 2,992,312 1961. 6 p.
Method of construction of electric heaters.

B. Patent No. 2,988,625. 1961. 4 p.
Electric heater construction with novel mounting arrangement.

C. Patent No. 2,973,423. 1961. 3 p.
Method of manufacturing a magnetically supported electric heater assembly.

D. Patent No. 2,957,068. 1960. 3 p.
Electric space heating unit.

E. Patent No. 2,945,114. 1960. 6 p.
Process for making electrical resistance heaters.

V. TRADE ASSOCIATIONS

A. National Electrical Manufacturers Association
155 East 44th Street
New York, N. Y. 10017

B. National Electrical Contractors Association
610 Ring Building
Washington, D. C. 20006

VI. ENGINEERING COMPANY

A. Hartman Technical Service
Washington and Montgomery Road
Cincinnati, Ohio 45212
Design, develop, construct facilities for manufacture of mechanical, electrical, and other products.

VII. DIRECTORY

A. Air Conditioning, Heating and Refrigeration Directory. Annual. $1.00.
Business News Publishing Company
450 West Fort Street
Detroit, Michigan 48226
Lists manufacturers and wholesalers of air conditioning, heating, and refrigerating equipment. Listings include trade name listings, association listings, exporters.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

FLEXIBLE STEEL CONDUIT

I. P. No. 66184

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

FLEXIBLE STEEL CONDUIT: Standard Industrial Classification 3317

A. PRODUCT DESCRIPTION

Flexible steel conduit made by spirally winding galvanized steel strip on itself and interlocking it, so as to provide a round cross-section of high mechanical strength and great flexibility. Made in all standard sizes from ½ inch up to 2 inches inside diameter. Plant is capable of manufacturing similar products, e. g. flexible tubing and exhaust hose, with the same equipment. By adding some inexpensive equipment, the plant can manufacture moisture-proof conduit and tube, armored cables, parkway cables, and similar armored products.

B. GENERAL EVALUATION

Capital requirements for this industry are quite large. Manufacturing operations are not very complex, and skilled labor requirements are moderate. With the expansion of electric power facilities and the growth of modern cities, demand for this product is generally rising. However, the great bulk of sales will normally have to be local, and by no means all developing areas have reached the stage where an assured market exists for the production of a plant of the size and kind described.

C. MARKET ASPECTS

1. USERS. Building contractors, electrical contractors, industrial plants.

2. SALES CHANNELS AND METHODS. Sales are made direct to large-scale users, and also to distributors of building and electrical supplies.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. This product is easily handled and is of fairly high value in relation to weight and bulk. The potential market area may be fairly extensive. b. Export. This product is common in international trade and is exported world-wide by the major industrial countries.

4. COMPETITION. a. Domestic Market. Competition from imports may be fairly keen. However, the product is standardized and not very difficult to make. If costs are kept within reasonable bounds, it should generally be possible to withstand import competition. b. Export Market. This plant would not be able to compete with large-scale manufacturers, but it might possibly sell in conveniently located areas of neighboring countries.

5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for this product will depend, among other things, on how far an electric power network has been developed, the volume of construction activity, the extent of industrial development, as well as the regulations relating to covering electric wires. No useful estimate of the necessary market can be given in terms of total population, or other simple yardstick.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 1,300 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, steel frame, 95'x125', with loading platform 10'x125'.		75,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$250,000	
Other tools & equipmt.	5,500	
Furniture & fixtures	2,000	257,500
Total (excl. Land)		$332,500

Principal Items. 24" rotary slitter & trimmer, 100 metal "Take-off" spools, butt welder & grinder, pickle & wash tank complete, hot air drying tunnel complete, galvanizing bath complete, spray chamber complete, 2 hollow spindle spoolers, 2 armoring machines, 2 flexing machines, 2 measuring machines, 2 re-coilers, forming & coiling tools, 2 electric lift-trucks, 100 corrugated steel skids, portable butt welder, overhead 10-ton hoist & rail, battery charger for electric trucks, 2 platform scales 3,000 lb. capacity, 3 hand pallet trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 66,700
Admin. Costs(b), Contingencies, Sales Costs(c)	30	7,000
Training Costs		16,300
Total Working Capital		$ 90,000

c. TOTAL CAPITAL (EXCL. LAND) $422,500

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Hot-rolled steel strip	1,300 tons	$200,000
Zinc	65 tons	14,400
Aluminum	258 lbs.	100
Total		$214,500

b. Supplies		
Sulfuric acid	44,000 lbs.	$ 500
Sal Ammoniac	3,000 lbs.	300
Wire		300
Lubricants & hand tools		200
Safety equipment		600
Maintenance & repair parts		3,500
Office supplies		500
Total		$ 5,900

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 150 hp.	$ 4,000
b. Fuel. About 24,000 gals. oil annually.	$ 3,000
c. Water. About 4 mn. gals. annually.	$ 1,000

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. In and out shipments about 300 tons a month. Good highway necessary, and proximity to railroad desirable.

5. MANPOWER

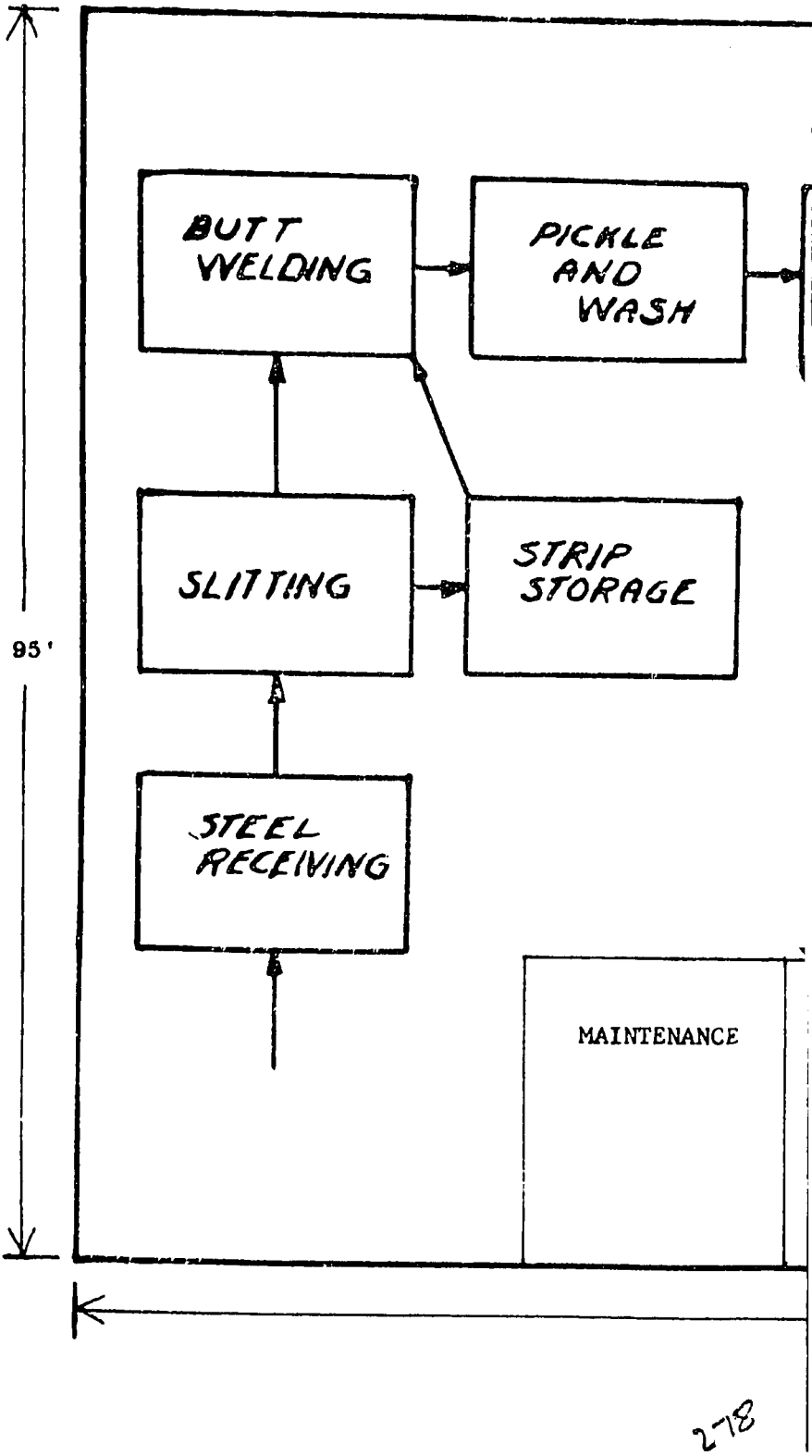
	Number	Annual Cost
a. Direct Labor		
Skilled	4	$ 24,000
Semi-skilled	8	40,000
Unskilled	2	8,000
Total	14	$ 72,000
b. Indirect Labor		
Manager & supervisors	4	$ 35,000
Office	2	9,000
Other	14	56,000
Total	20	$100,000

c. Training Needs. Manager & supervisors should be well experienced. Together with 4 skilled workers they should be able to carry out all necessary labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

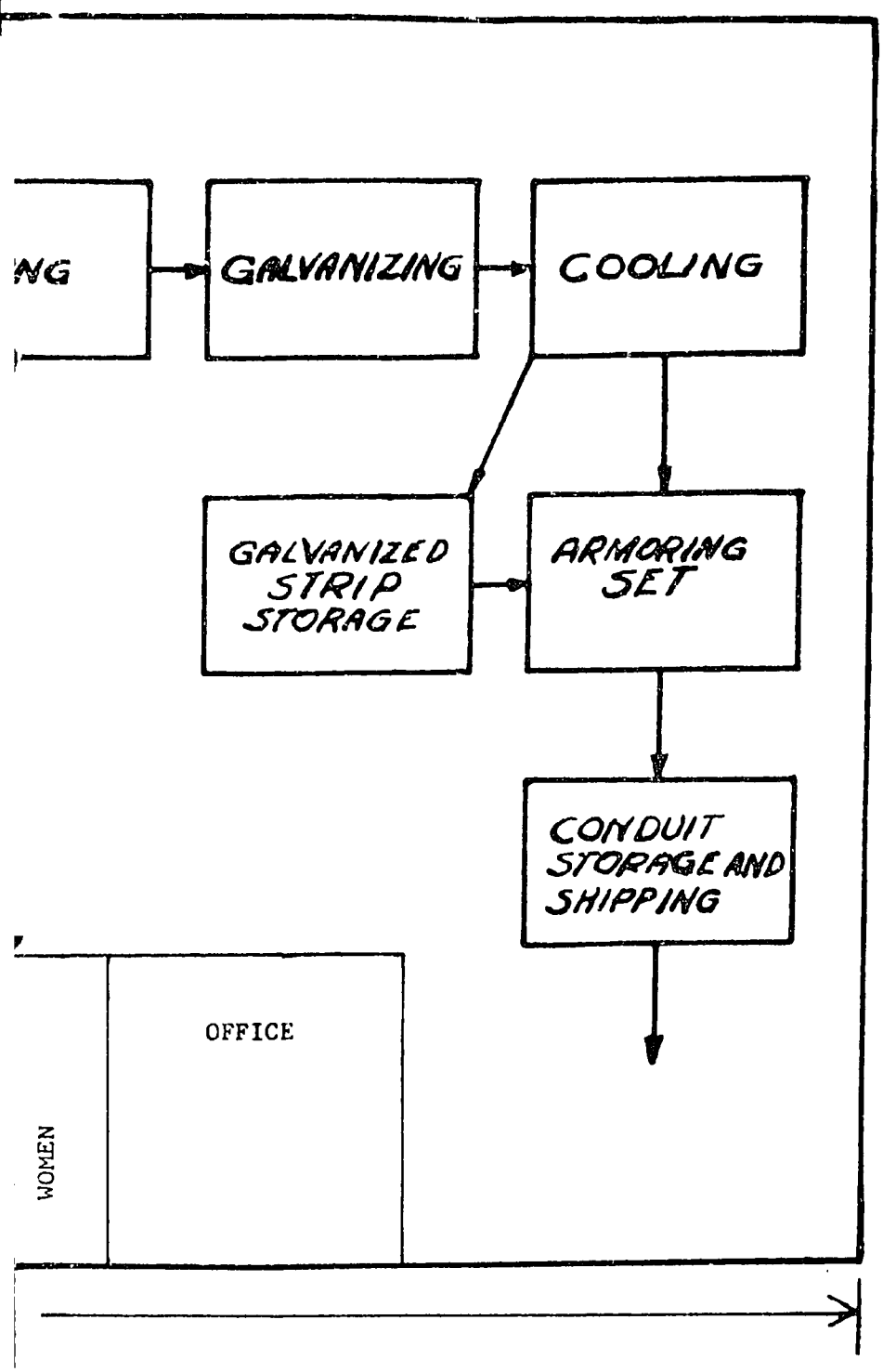
a. Annual Costs	
Direct Materials	$214,500
Direct Labor	72,000
Manufacturing Overhead(a)	113,900
Admin. Costs(b) Contingencies	38,000
Sales Costs(c), Bad Debts	45,000
Depreciation on Fixed Capital	30,300
Total	$513,700
b. Annual Sales Revenue	$656,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.


BUTT WELDING
PICKLE AND WASH
SLITTING
STRIP STORAGE
STEEL RECEIVING
MAINTENANCE
95'

FLOW OF WORK

NDUIT : S.I.C. 3317



FLEXIBLE STEEL CONDUIT: S.I.C. 3317

SELECTED REFERENCES

I. TEXTBOOKS

A. Modern Metalworking. John R. Walker. 1965. $6.96.
Goodheart-Wilcox Co. Inc.
18250 Harwood, Homewood, Ill. 60430

B. Metal Engineering - Processes. ASME Handbook. R. W. Bolz, editor. 1958. 448 p. Illus. $13.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

C. Handbook of Industrial Electroplating. E A. Ollard and E. B. Smith. 3rd edition. 1964. $12.00.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue, New York, N. Y. 10017

II. U. S. GOVERNMENT PUBLICATIONS

A. Electro Plating. IR-26946. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Metal-Working Industry Training Manual. TB-62. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

C. Metal Coatings. 1963. SB-409. Suppl. I
Department of Commerce
Washington, D. C. 20230

D. Directory of Metalworking Machinery. Published at irregular intervals. $6.75.
U. S. Government Printing Office
Division of Public Documents
Washington, D. C. 20402

III. PERIODICAES

A. American Machinist Bi-weekly. $25.00/year.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street, New York, 10036
A magazine of metalworking production, covering machinery, tools, design, production engineering problems, and management of metalworking industries. It is intended mainly for tecnnically qualified supervisory personnel.

B. Metal Forming and Fabricating. Monthly. $10.00/year.
Watson Publications, Inc.
201 North Wells Street, Chicago, Ill. 60606
Production journal, specializing in forming and tooling.

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,941,571. 1960. 7 p.
Method for manufacturing flexible steel conduit.

B. Patent No. 2,927,625. 1960. 6 p.
Method of making a reinforced flexible steel hose or conduit.

C. Patent No. 2,895,001. 1959. 6 p.
Flexible steel conduits and the manufacture thereof.

V. TRADE ASSOCIATION

A. American Electroplaters Society
443 Broad Street
Newark, New Jersey 07102

VI. ENGINEERING COMPANIES

A. U. S. Automatic Corporation
1000 Franklin Avenue
Amherst, Ohio 44001
Machinery designing and manufacturing.

B. The A. H. Nelson Machine Company
Shelton, Conn. 06484
Many kinds of metal forming machinery, including that for forming of coiled metal.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

GALVANIZED STEEL PIPE

I. P. No. 66185

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

GALVANIZED STEEL PIPE: Standard Industrial Classification 3317

A. PRODUCT DESCRIPTION

Standard galvanized steel pipe, 1/2" to 3" diameter, made from purchased hot-rolled steel strip and zinc, by the resistance welding method. Standard pipe is tested at 700 pounds per square inch though working pressures are usually kept below 150 pounds.

B. GENERAL EVALUATION

Capital requirements for this industry are substantial. Skilled labor requirements are also rather high. About 60 per cent of manufacturing costs is represented by purchases of steel. Chances of profitable operation would be enhanced if steel required is produced locally at lower cost than the landed cost of imported steel. Generally speaking, it is questionable whether this industry would be appropriate in industrially less developed areas unless a steel melting and rolling industry has already been established. The market for galvanized steel pipe produced in less developed areas would normally be largely, if not entirely, domestic. By no means all of them have markets large enough at this stage of their economic development to absorb the volume of pipe that the plant described is able to produce. On the other hand, where a demand develops in excess of the plant's capacity as described, it can readily be met by increasing the size of the welding transformer and increasing the speed of the pipe mill. If demand justifies, the resistance welding mill specified can be changed over to inductive welding, and the capacity of the plant could be increased by about 500 per cent.

C. MARKET ASPECTS

1. USERS. Construction contractors, engaged in the construction and repair of systems for transporting water, gas, oil, etc. Galvanized steel pipe is also used by building contractors and individuals in structural forms, as fence posts, scaffolding, railings, etc.
2. SALES CHANNELS AND METHODS. Sales are made to construction and building contractors, and to building supplies houses.
3. GEOGRAPHICAL EXTENT OF MARKET. Transport costs are normally important in limiting the market area for ordinary steel products, such as galvanized pipe. However, if the plant has ready access to coastal shipping services and/or inland waterways, such products may be sent long distances. Galvanized steel pipe is a common product in international trade.
4. COMPETITION. a. Domestic Market. Competition from imports will normally be severe. For some uses, and particularly for structural forms, competition from alternative materials is also likely to be strong. It is therefore necessary to pay close attention to production costs in this industry. b. Export Market. This plant, if it can produce at reasonable cost, might make some sales to nearby areas in neighboring countries. It could not compete in general export business with large-scale producers in advanced industrial areas.
5. MARKET NEEDED FOR PLANT DESCRIBED. The demand for this product will depend on the volume of activity in building and construction within the potential market area, which, in the less developed countries, will almost certainly be mainly within the country concerned. The product is not one for which the market needed can be indicated in terms of total population.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 10,500 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1 acre.		$ --
Building. One story, 70'x200', with steel frame.		84,000
Equipment, Furniture & Fixtures		
Prodn. tools & equipmt.	$430,000	
Other tools & equipmt.	13,000	
Furniture & fixtures	1,000	444,000
Total (excl. Land)		$528,000

Principal Items. Rotary gang slitter & trimmer, pickle & wash tanks (2 sets), drying table, cleaner & cooling table, galvanizing bath & conveyors, 2 threading machines, lift truck, maintenance machine shop, exhaust hoods, ducts, wiring & piping for equipment, overhead hoist.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$300,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	8,300
Training Costs		20,600
Total Working Capital		$329,100

c. TOTAL CAPITAL (EXCL LAND) $857,100

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Hot-rolled strip steel	10,500 tons	$1,400,000
Zinc	840 tons	190,000
Total		$1,590,000
b. Supplies		
Lubricants & hand tools		$ 200
Maintenance & repair parts		4,000
Sulfuric acid	185 tons	44,500
Cooling compound	3,000 gals.	2,400
Cutting compound	2,400 gals.	3,000
Zinc bath flux	6,000 lbs.	600
Office supplies		500
Total		$ 55,200

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 120 hp.	$ 4,000
b. Fuel. About 30,000 gals. oil annually.	$ 3,600
c. Water. About 1.2 mn. gals. annually for general purposes.	$ 300

4. TRANSPORTATION

a Own Transport Equipment. None necessary.

b. External Transport Facilities. In & out shipments about 2,200 tons a month. Plant should be located on good highway & near railroad.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	8	$ 48,000
Semi-skilled	14	70,000
Total	22	$118,000
b. Indirect Labor		
Manager & Supervisors	5	$ 44,000
Office	4	18,000
Other	16	68,000
Total	25	$130,000

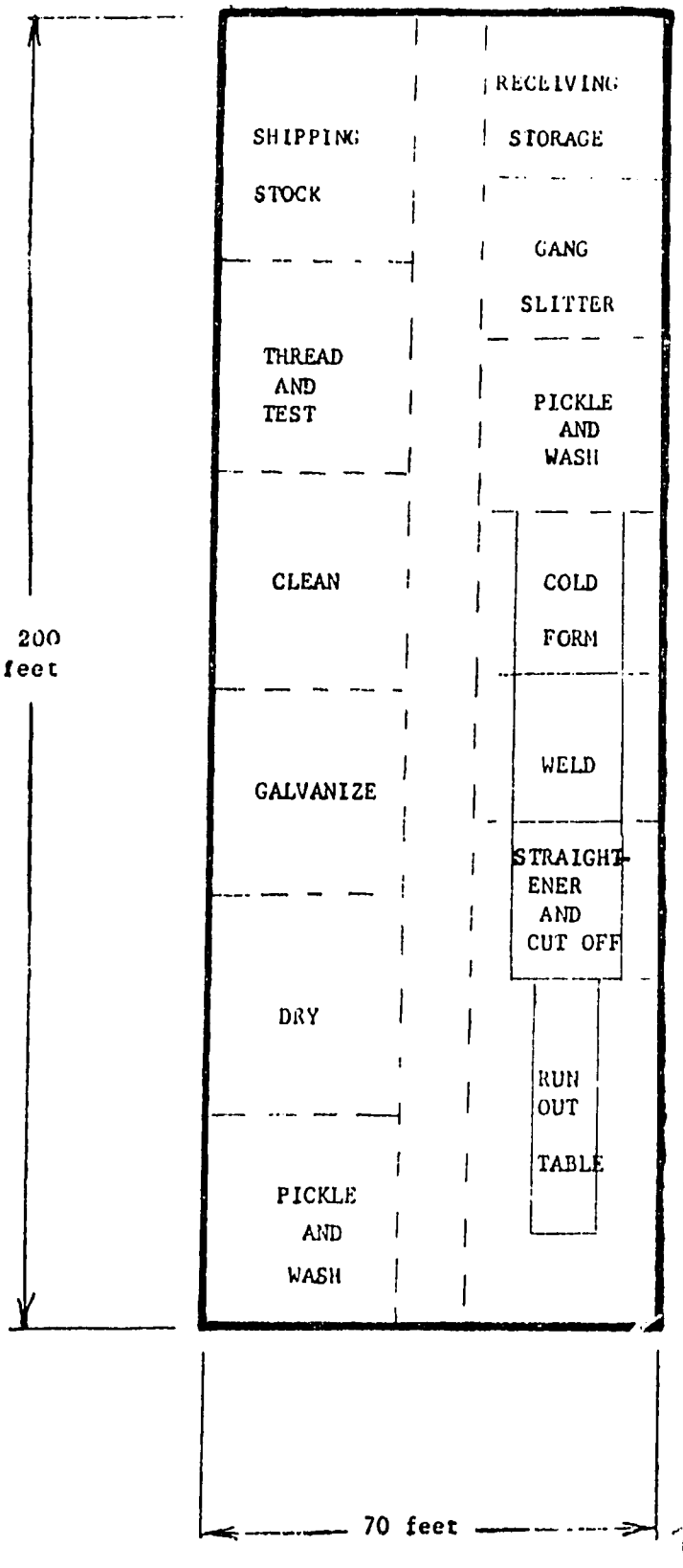
c. Training Needs. Manager & supervisors should be fully experienced. With aid of 4 skilled workers, chemist, & maintenance expert, they should be able to carry out all labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

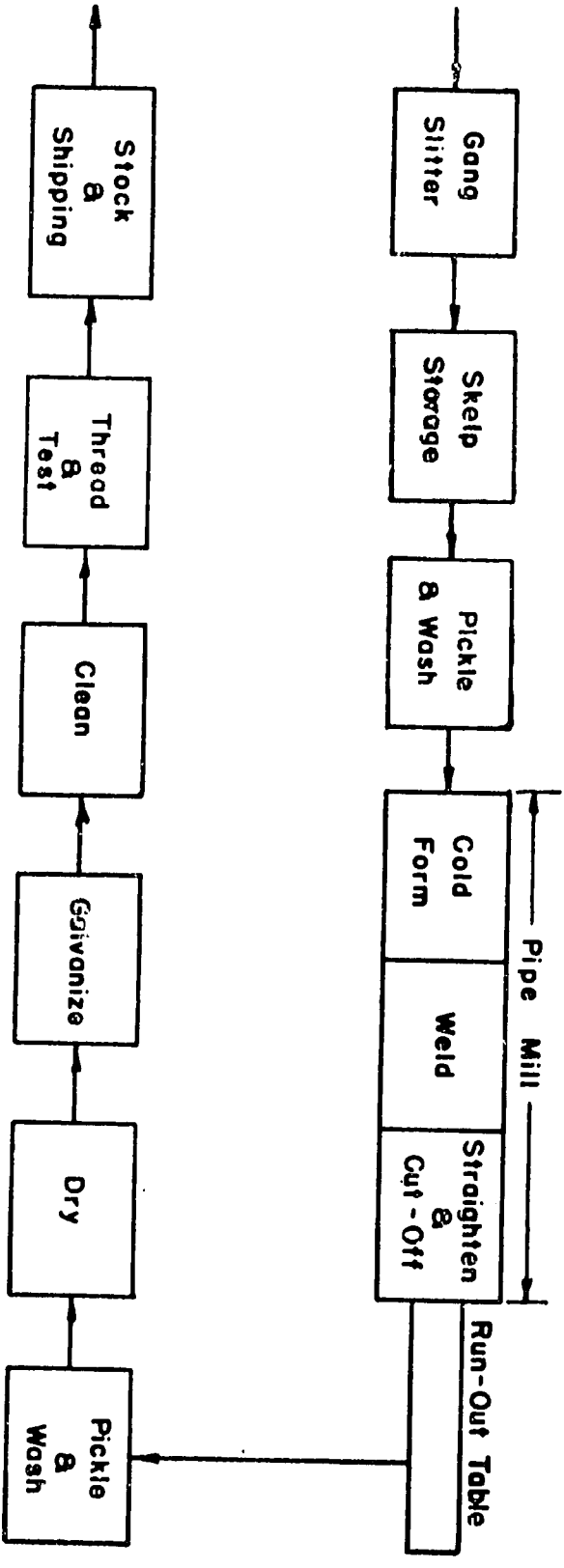
a. Annual Costs	
Direct Materials	$1,590,000
Direct Labor	118,000
Manufacturing Overhead(a)	193,100
Admin. Costs(b), Contingencies	50,000
Sales Costs(c), Bad Debts	50,000
Depreciation on Fixed Capital	49,900
Total	$2,051,000
b. Annual Sales Revenue	$2,400,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

GALVANIZED STEEL PIPE: S.I.C. 3317


RECEIVING
SHIPPING
STORAGE
STOCK
GANG
SLITTER
THREAD
AND
TEST
PICKLE
AND
WASH
CLEAN
COLD
FORM
200
feet
WELD
GALVANIZE
STRAIGHT-
ENER
AND
CUT OFF
DRY
RUN
OUT
TABLE
PICKLE
AND
WASH
70 feet

PE: S.I.C. 3317
W OF WORK



GALVANIZED STEEL PIPE: S. I. C 3317

SELECTED REFERENCES

I. TEXTBOOKS

A. Industrial Piping. Charles T. Littleton. 2nd edition. 1962. $11.50
McGraw-Hill Book Co. Inc.
230 West 42nd Street, New YorK, N. Y. 10036

B. Modern Welding. Andrew D. Althouse and others. 1965. $8.50.
Goodheart-Wilcox Co. Inc.
18250 Hardwood, Homewood, Ill. 60430

C. Metallurgy of We ing, Brazing and Soldering. J. F. Lancaster. 1965. $7.000.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue, New York, N. Y. 10017

D. Welding Processes and Procedures. J. L. Morris. 1954. 255 p. $8.25.
Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 07632

II. U. S. GOVERNMENT PUBLICATIONS

A. Galvanizing Steel Pipe, etc. IR-20973. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Directory of Metalworking Machinery. Published irregularly. $6.25.
U. S. Government Printing Office
Division of Public Documents
Washington, D. C. 20402

III. PERIODICALS

A. The Iron Age. Weekly. Western Hemisphere. $25.00/year. Other, $35.00/year.
Chilton Company
Chestnut and 56th Street, Philadelphia, Pa. 19139
Articles on production of metal products, including steel pipe making and galvanizing.

B. Steel. Weekly. $20.00/year.
Penton Publishing Company
Penton Building
Cleveland, Ohio 44113
Articles on production and other functions in metalworking plants, including those making galvanized steel pipe.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $25 each.

A. Patent No. 2,967,112. 1961. 4 p.
Method and apparatus for applying metal-depositing solutions.

B. Patent No. 2,957,782. 1960. 9 p.
Process for galvanizing ferrous metals.

C. Patent No. 2,953,472. 1960. 3 p.
Method of coating metallic surfaces with metals.

V. TRADE ASSOCIATIONS

A. American Welding Society
345 East 47th Street
New York, N. Y. 10017

B. American Hot-Dip Galvanizers Association
5225 Manning Place, N. W.,
Washington, D. C. 20016

VI. ENGINEERING COMPANY

A. Taylor Wilson Manufacturing Company
1611 Keenan Building
Pittsburgh, Pennsylvania 15222

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards – CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

HAND BLOWN GLASS AND FINE CAST CRYSTAL

I. P. No. 66186

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

HAND BLOWN GLASS AND FINE CAST CRYSTAL: Standard Industrial Classification 3229

A. PRODUCT DESCRIPTION

These products are of artistic design and frequently are made in several colors with distinctive decorations. There are no standard patterns.

B. GENERAL EVALUATION

The capital required for this plant is small, but good management and skilled work are needed. The products are luxuries and the industry is feasible only if the enterprise has ready access to a market with a substantial number of people in the higher income brackets.

C. MARKET ASPECTS

1. USERS. Individuals and a few luxury establishments.

2. SALES CHANNELS AND METHODS. Sales are usually made to jewelry stores, gift shops and other retail establishments.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The products usually are small and fragile, and therefore they must be packed carefully. If th products are of high quality the market area may be quite extensive. b. Export These products are fairly often exported.

4. COMPETITION. With products of this kind, competition comes not only from other makers of fine glassware but also from other types of luxury products. Ability to compete depends largely on the artistic merit and quality of the product.

5. MARKET NEEDED FOR PLANT DESCRIBED. An enterprise of this kind would generally be able to find a market only in a large and prosperous city or in a place with a large tourist trade.

D. PRODUCTION REQUIREMENTS

CAPACITY - ONE-SHIFT OPERATION: 200 Pounds a Day

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 30'x75'.		$ 13,500
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$17,000	
Other tools & equipmt.	2,000	
Furniture & fixtures	700	
Transportation equipmt.	2,400	22,100
Total (excl. Land)		$ 35,600

Principal Items. Wheelbarrow, scales, mixer, refractories, 2 glass workers benches, 24 blowpipes, electric turntable, air blower & gas booster, furnace, molds, bench grinders, benches, racks, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 5,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	500
Total Working Capital		$ 5,500

c. TOTAL CAPITAL (EXCL. LAND) $ 41,100

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Sand	18 tons	$ 400
Soda ash	7½ tons	500
Limestone	4½ tons	200
Cullet	4 tons	500
Color	1 ton	500
Pack materials		600
Total		$ 2,700
b. Supplies		
Lubricants & hand tools		$ 100
Maintenance & spare parts		1,000
Office supplies		200
Total		$ 1,300

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 15,000 kw-hr.	$ 600
b. Fuel. Natural gas, 500,000 cu. ft.; or oil.	$ 500
c. Water. Sanitation & fire protection.	$ 100

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Half-ton truck for pickup & delivery.	$ 800

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 6,000
Unskilled	2	8,000
Total	3	$ 14,000
b. Indirect Labor		
Manager	1	$ 10,000

c. Training Needs. Manager & skilled worker must be well experienced. No training is necessary.

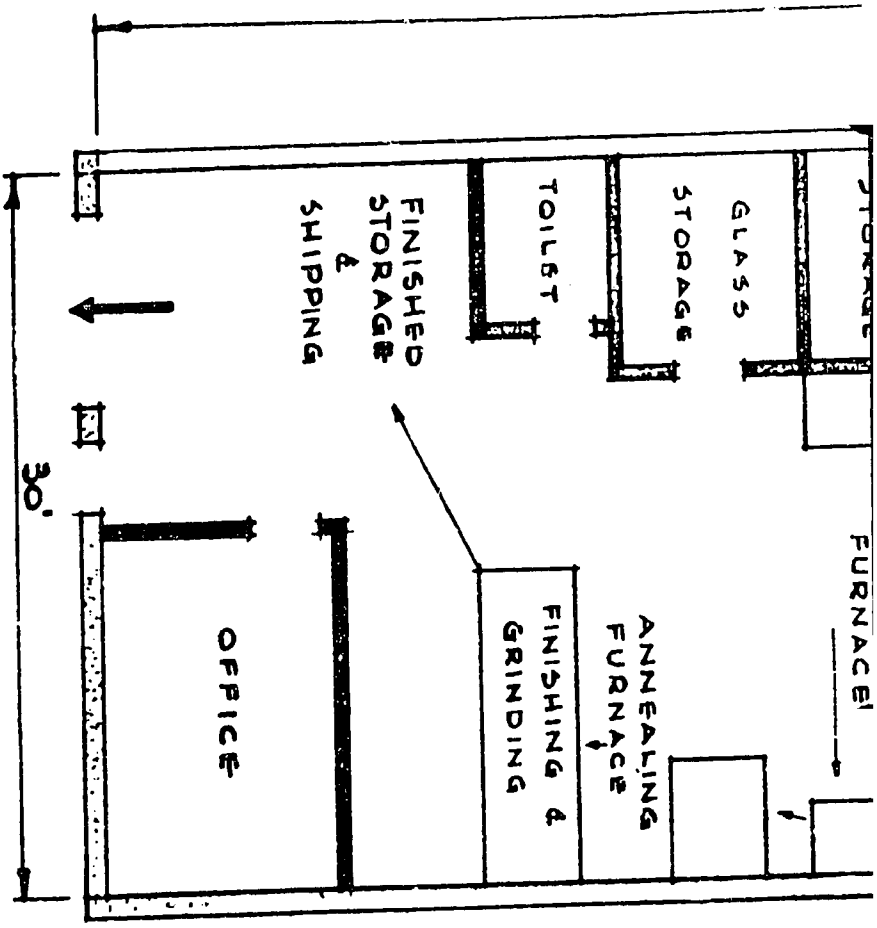
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 2,700
Direct Labor	14,000
Manufacturing Overhead(a)	13,300
Admin. Costs(b), Contingencies	3,000
Sales Costs(c), Bad Debts	3,000
Depreciation on Fixed Capital	3,500
Total	$ 39,500
b. Annual Sales Revenue	$ 60,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

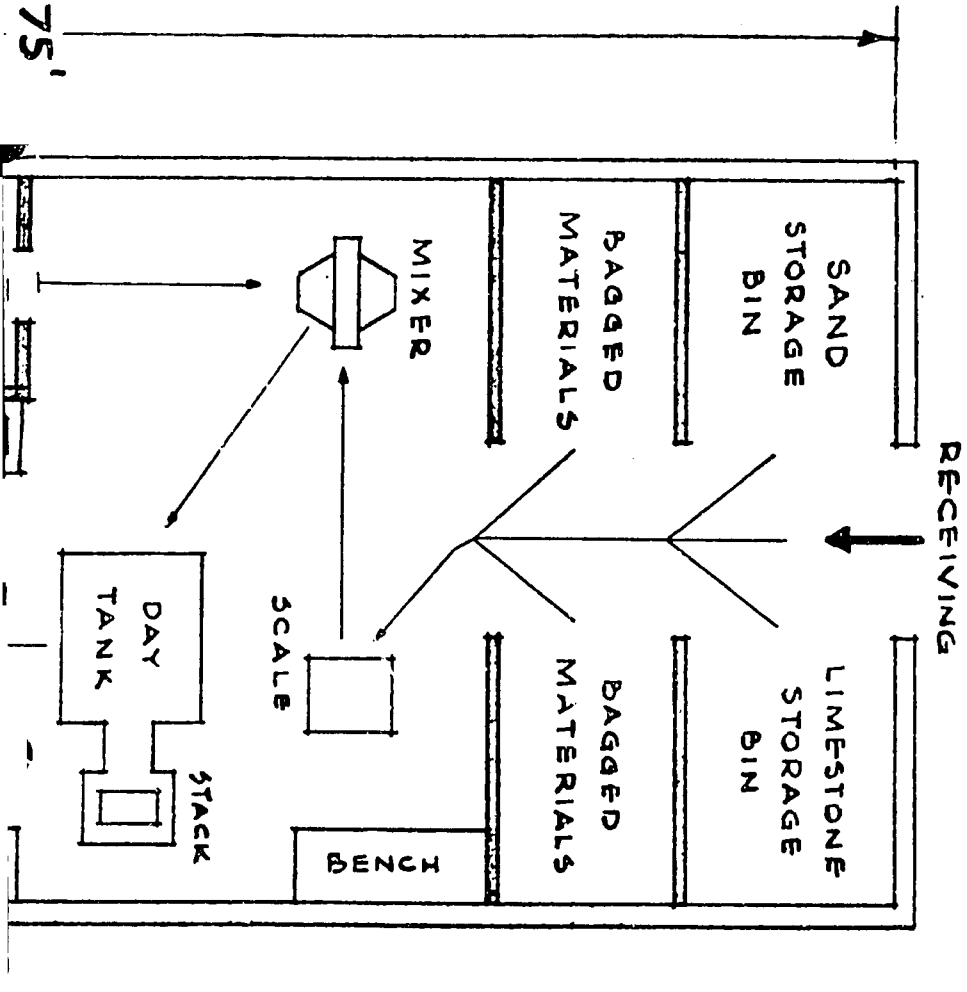
HAND BLOWN GLASS AN

PLANT LA



NE CAST CRYSTAL: S.I.C. 3229

AND WORKFLOW



HAND BLOWN GLASS AND FINE CAST CRYSTALS: S.I.C. 3229

SELECTED REFERENCES

I. TEXTBOOKS

A. Design with Glass. John Peter. 1965. Illus. $12.00.
Reinhold Publishing Corp.
430 Park Avenue
New York, N.Y. 10022

B. Glass Craft. Kay Kinney. 1961. Illus. $7.50.
Chilton Co.
East Washington Square
Philadelphia, Pa. 19106

C. Scientific Glass Blowing. E. L. Wheeler. 1958. 500 p. Illus. $12.00.
John Wiley and Sons, Inc.
605 Third Avenue
N.Y. 10016

D. Glass. G. O. Jones. 1956. 119 p. Illus. $2.25.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N.Y. 10016

II. U. S. GOVERNMENT PUBLICATION

A. Hand Blown Glass and Fine Cast Crystals. TI-61. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D.C. 20523

III. PERIODICALS

A. The Glass Industry. Monthly. $5.00/year.
Ogden Publishing Company
55 West 42nd Street
New York, N.Y. 10036
Articles relative to manufacturing processes and information pertinent thereto.

B. American Glass Review. Monthly. $10.00.
Ebel-Doctorow Publications, Inc.
9th and Linden Streets
Easton, Pa. 18042
Devoted to all phases of the glass industry.

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D.C. 20231 $.25 each.

A. Patent No. 2,972,212. 1961. 2 p.
Method for molding glass.

B. Patent No. 2,837,871. 1958. 3 p.
Glass blowing process.

C. Patent No. 2,790,994. 1957. 6 p.
Formation of hollow glass articles.

V. TRADE ASSOCIATIONS

A. National Association of Manufacturers of Pressed and Blown Glassware
815 Empire Building
Pittsburgh, Pa. 15222

B. American Glassware Association
630 Third Avenue
New York, N.Y. 10017

C. Glass Crafts of America
816-17 Empire Building
Pittsburgh, Pa. 15222

VI. ENGINEERING COMPANIES

A. Eisler Engineering Company, Inc.
758 South 13th Street
Newark, New Jersey 07103
Designers, engineers, manufacturers of equipment for the glass industry.

B. Frazier-Simplex, Inc.
436 East Beau Street
Washington, Pa. 15301
International designers and engineers for the glass industry.

VII. DIRECTORY

A. Glass Factory Directory. Annual. $3.00.
National Glass Budget
916 Empire Building
Pittsburgh, Pa. 15222
Lists glass manufacturers in the United States and Canada and their main products.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

IRON COOKING UTENSILS

I. P. No. 66187

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

IRON COOKING UTENSILS: Standard Industrial Classification 3322

A. PRODUCT DESCRIPTION

Various sizes of cast iron kettles and frying pans, with or without covers.

B. GENERAL EVALUATION

Cast iron kettles and frying pans are now used more in rural than in urban areas. Aluminum and stainless steel are replacing cast iron as a material for cooking utensils, and there are likely to be rather few areas where the prospects for a newly-established plant of this kind would be promising.

C. MARKET ASPECTS

1. USERS. Households, institutions.

2. SALES CHANNELS AND METHODS. The plant would sell to hardware stores and other retail stores, and to wholesale distributors.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The products are easily transported and the market may be very extensive. b. Export. These products are commonly exported, though most countries are capable of making cheap cooking utensils that are adequate for common use.

4. COMPETITION. a. Domestic Market. Competition with lighter cooking ware especially in the urban area would be keen and could be expected to increase as various designs of steel and aluminum ware are placed on the market. Lighter kitchenware is rapidly replacing cast iron kitchenware in homes. b. Export Market. No general export trade would be possible for a plant of this size, though some exports to neighboring countries might be made.

5. MARKET NEEDED FOR PLANT DESCRIBED. Where iron cooking utensils are in common use a total population of three to four million might provide a market outlet for the plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 100,000 Kettles; 100,000 Frying Pans

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 75'x100'		45,000
Equipment Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 44,000	
Other tools & equipmt.	6,200	
Furniture & fixtures	800	
Transportation equipmt.	2,400	53,400
Total (excl. Land)		$ 98,400

Principal Items. No. 3 cupola, charging hoist, platform scale, core oven, sand conditioning equipment, 5 molding machines, 2 air jolt hand roll-overs, three 250-lb. trolley ladles, 1-ton ladle, 3 ladles, 10 shanks & ladles, train rail, crane system (3-ton hoist), 12 aluminum flasks, 84 loose flasks, 1200 bottom boards, 500 cover plates, double grinder, tumbler, 2 air grinders, 2 chipping hammers, 2 exhaust fans, air compressor, drill press, milling machine, lathes, benches, hose, shovels, riddles, screens, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 57,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	4,800
Training Costs		5,200
Total Working Capital		$ 67,600

c. TOTAL CAPITAL (EXCL. LAND) $166,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Pig & scrap iron	2,000 tons	$150 000
Coke	120 tons	4,000
Core sand	500 tons	1,500
Molding sand	800 tons	4,500
Additives		5,000
Packaging materials		10,000
Total		$175,000
b. Supplies		
Lubricants & hand tools		$ 300
Cutting tools & abrasives		500
Maintenance & spare parts		3,400
Office supplies		200
Total		$ 4,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 60 hp.	$ 1,200
b. Fuel. Included in Direct Materials.	
c. Water. About 1.6 mn. gals.	$ 400

4. TRANSPORTATION

	Annual Operating Cost
a Own Transport Equipment. Pickup truck.	$ 1,000

b. External Transport Facilities. In & out shipments average about 25 tons a day. Good highway facilities needed & easy access to railroad desirable.

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	7	$ 42,000
Semi-skilled	6	30,000
Unskilled	13	52,000
Total	26	$124,000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office	2	9,000
Maintenance & driver	3	15,000
Total	7	$ 42,000

c. Training Needs. Manager & supervisor should be fully experienced. With 7 skilled workers they should be able to train other employees & reach full production in 30 days.

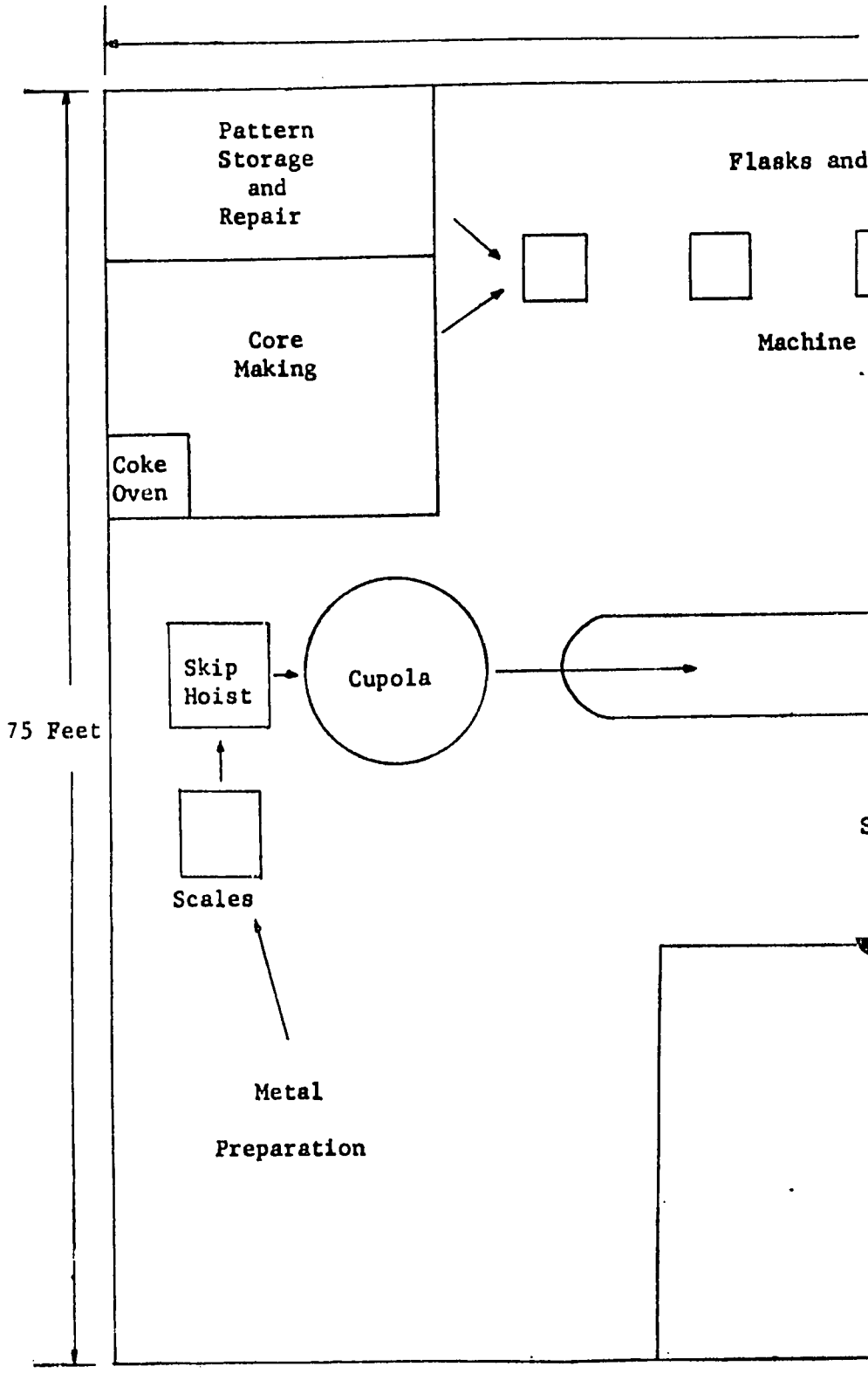
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$175,000
Direct Labor	124,000
Manufacturing Overhead(a)	48,000
Admin. Costs(b), Contingencies	24,000
Sales Costs(c), Bad Debts	36,000
Depreciation on Fixed Capital	8,000
Total	$415,000
b. Annual Sales Revenue	$480,000

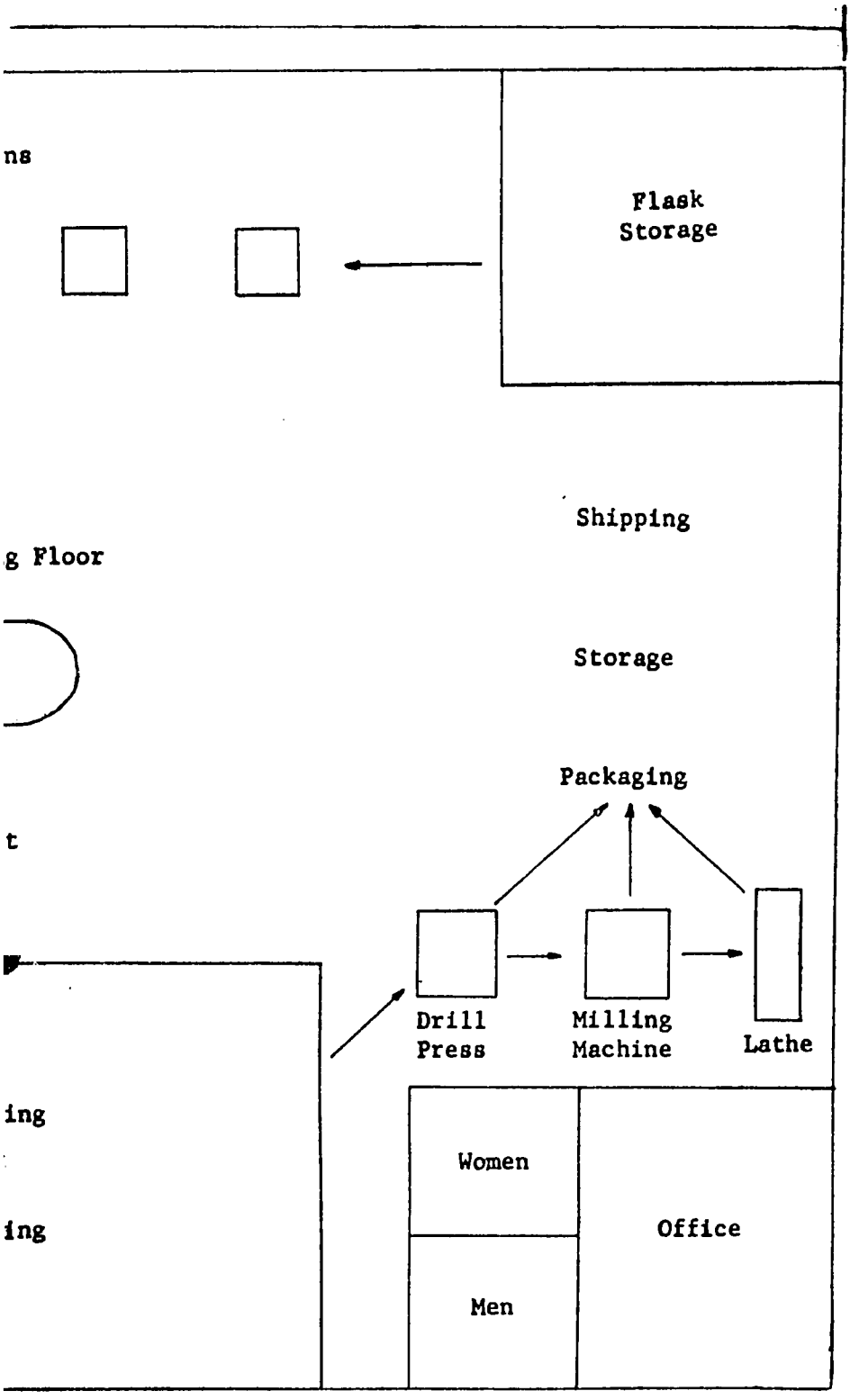
NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

IRON COOKING U

PLANT LAYOU



LS : S. I. C. 3322
WORKFLOW



IRON COOKING UTENSILS: S. I. C. 3322

SELECTED REFERENCES

I. TEXTBOOKS

A. Foseco Foundryman's Handbook. Foseco. 1965. $3.50.
Pergamon Press
44-01 Twenty-first Street
Long Island City, N. Y. 11101

B. Metallurgical Principles of Founding. W. Kondic. 1965.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue
New York, N. Y. 10017

C. Introduction to Foundry Technology. D. C. Ekey and W. P. Winter. 1958. 296 p. Illus. $7.95.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

D. Foundry Engineering. H. F. Taylor and others. 1959. 407 p. Illus. $8.75.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016

II. U. S. GOVERNMENT PUBLICATION

A. Planning a Gray Iron Foundry. E-134.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Foundry. Monthly. $10.00/year.
Penton Publishing Company
Penton Building
Cleveland, Ohio 44113

B. Precision Metal Molding. Monthly. $5.00/year.
Telenews Productions, Inc.
1240 Ontario Street
Cleveland, Ohio 44113
Materials, processes, products. and latest market news.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,994,320. 1961. 3 p.
Applying the culinary art to the making of kettles and pans.

B. Patent No. 2,824,348. 1958. 4 p.
Methods of casting iron and products thereof.

V. TRADE ASSOCIATIONS

A. National Foundry Association
4321 St. Charles Road
Bellwood, Illinois 60104

B. Foundry Equipment Manufacturers Association
5225 Manning Place, N. W.,
Washington, D. C. 20016

VI. ENGINEERING COMPANIES

A. Foundry and Mill Machinery Division
Blaw-Knox Company
1204 Blaw-Knox Building
Pittsburgh, Pa. 15222
Design, engineer, supply equipment for manufacture of ferrous products, including castings.

B. Atlantic Casting and Engineering Corp.
810 Bloomfield Avenue
Clifton, New Jersey 07012
Casting designers.

VII. DIRECTORY

A. American Foundrymen's Society Buyers Directory. Biennial. $10.00.
American Foundrymen's Society
Golf and Wolf Roads
Des Plaines, Ill. 60016
Lists major suppliers of products sold to foundries, under categories.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards – CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

NDUSTRY PROFILES

LUBRICATING OIL RECLAMATION

I. P. No. 66188

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

LUBRICATING OIL RECLAMATION: Standard Industrial Classification 2992

A. PRODUCT DESCRIPTION

Good grade of lubricating oil produced by refining used lubricating oil.

B. GENERAL EVALUATION

The feasibility of this enterprise will depend entirely on the availability of an adequate and regular supply of used oil at low cost. If this is available and the reclaimed oil can be produced at reasonable cost, there should normally be a market for it.

C. MARKET ASPECTS

1. USERS. Industries and owners of automobiles, trucks, tractors, diesel engines and other equipment using lubricating oil.

2. SALES CHANNELS AND METHODS. Sales to industries and lubricating oil distributors.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. This product is shipped in one quart and gallon cans, tank trucks and railroad tank cars. Transport costs are fairly onerous but the product is often shipped long distances. b. Export. The product has a wide international market.

4. COMPETITION. a. Domestic Market. The quality of scientifically-processed reclaimed lubricating oil is equal to that of newly-refined oil. The price would, of course, have to be competitive. b. Export Market. The plant is too small to do general export business but might make some sales to neighboring countries if its location is favorable.

5. MARKET NEEDED FOR PLANT DESCRIBED. In general, it is to be supposed that if sufficient used oil is procurable in the locality there should be a potential market for the reclaimed oil made from it.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 750,000 Gallons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 5 acres.		$ --
Building. One story, 40'x100'.		24,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$115,000	
Other tools & equipmt.	15,000	
Furniture & fixtures	700	
Transportation equipmt.	16,000	146,700
Total (excl. Land)		$170,700

Principal Items. Tank storage, 7,500 gallon charge still for distillation, heater, 10,000 gallon acid treating tank, 15,000 gallon dehydration tank, boiler (150 hp. - 125 S.P.I.), 36" plate & frame filter 30 plates (5,000 gallons capacity), packaging equipment, factory trucks, 3 tank trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 15,900
Admin. Costs(b), Contingencies, Sales Costs(c)		1,900
Training Costs		1,200
Total Working Capital		$ 19,000

c. TOTAL CAPITAL (EXCL. LAND) $189,700

2. MATERIALS AND SUPPLIES

	Annual Requirements.	Annual Cost
a. Direct Materials		
Used oil	1,250,000 gals.	$ 12,500
Sulfuric acid	37,500 gals.	5,600
Absorbent clay	90 tons	5,400
Steel drums	1,000	5,000
Cans, quart & gallon	75,000	3,800
Cartons		500
Total		$ 32,800
b. Supplies		
Lubricants & hand tools		$ 100
Cutting tools & abrasives		1,200
Maintenance & spare parts		1,200
Office supplies		500
Total		$ 3,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 75 hp. Connected load.	$ 300
b. Fuel. By-products used for fuel.	
c. Water. Cooling & sanitation (makeup).	$ 400

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. One 5,000 gal. truck, two 1,500 gal. trucks.	$ 3,000

b. External Transport Facilities. Shipments made by tank trucks & railroad tank cars. Railroad & good highways necessary.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	2	10,000
Unskilled	1	4,000
Total	5	$ 26,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Truck drivers	3	15,000
Total	5	$ 30,000

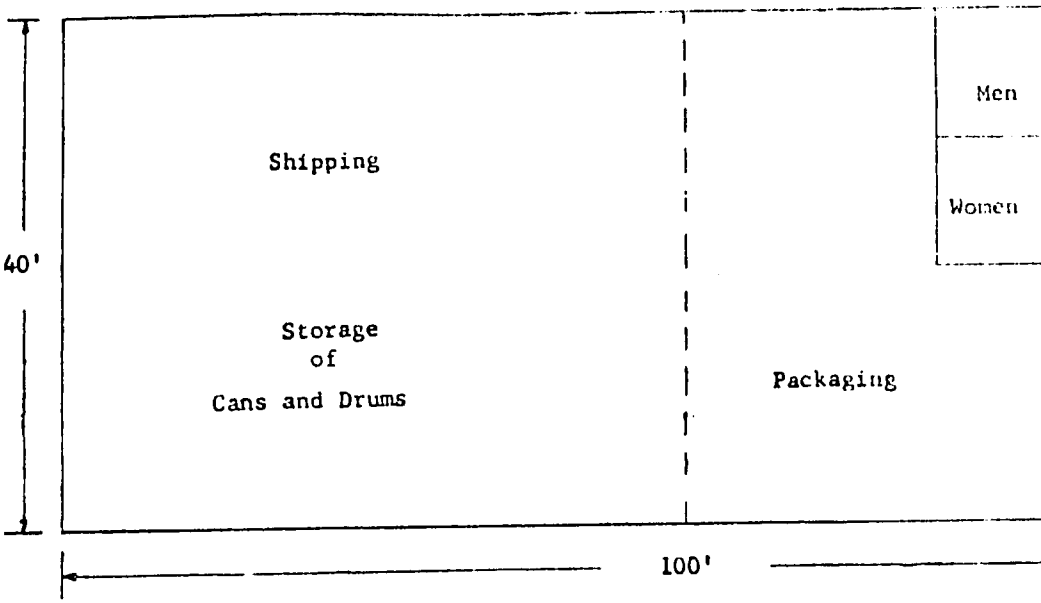
c. Training Needs. Manager should be fully experienced. With 2 skilled workers he should be able to train other employees & reach full production in 30 days.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 32,800
Direct Labor	26,000
Manufacturing Overhead(a)	36,700
Admin. Costs(b), Contingencies	12,000
Sales Costs(c), Bad Debts	12,000
Depreciation on Fixed Capital	19,800
Total	$139,300
b. Annual Sales Revenue	$180,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

LUBRICATING OIL
PLANT LA



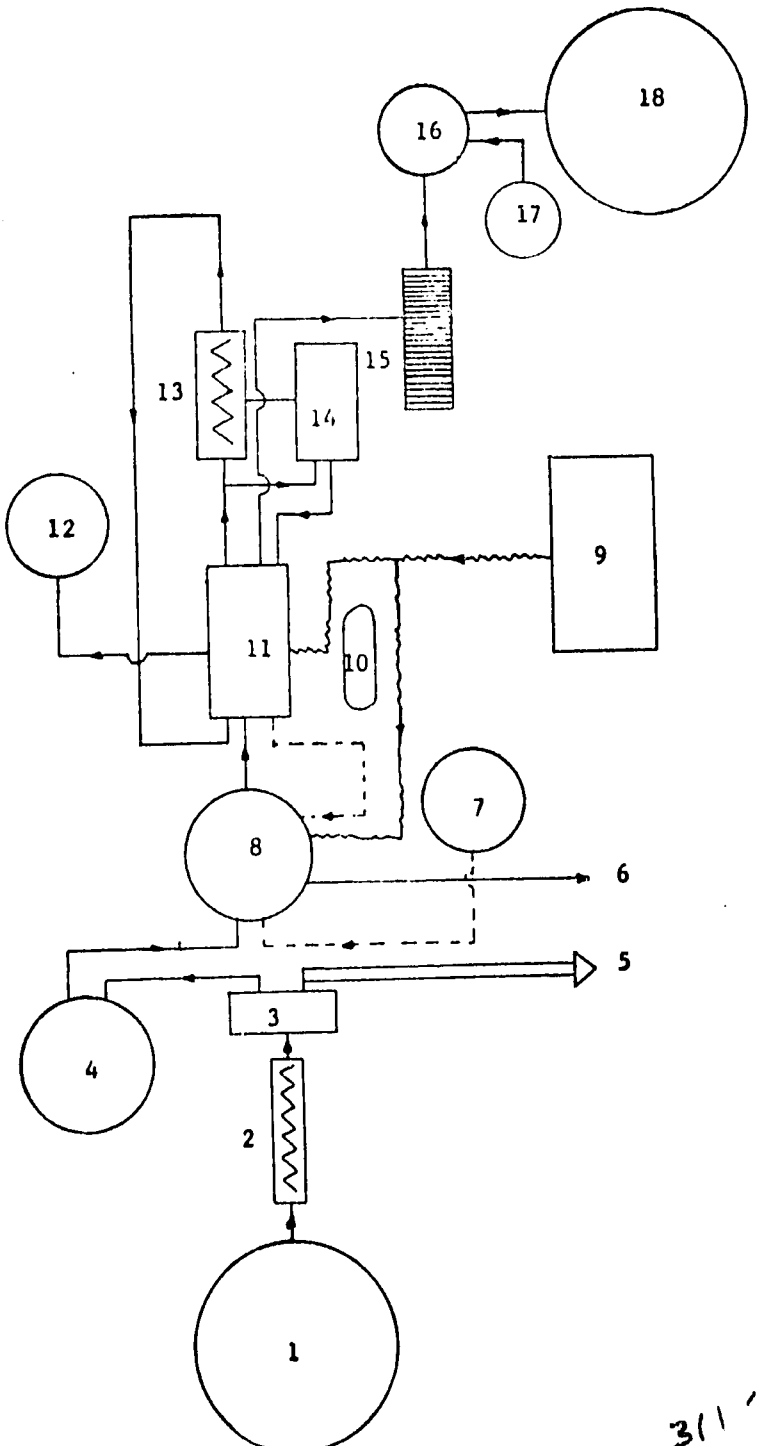
1. Charging stock storage
2. Heater
3. Dehydrator
4. Cooling tank
5. Sludge
6. Disposal
7. Chemical storage
8. Chemical treatment
9. 500 H. P. boiler
10. Neutralizer
11. Reactor
12. Condenser
13. Heater
14. Control room
15. Filter Press
16. Blending
17. Additive storage
18. Finished oil storage

Note : Of the above equipment, only the boiler is housed.

.MATION: S. I. C. 2992
D WORKFLOW

Lab

fice



311

LUBRICATING OIL RECLAMATION: S.I.C. 2992

SELECTED REFERENCES

I. TEXTBOOKS

A. Performance of Lubricating Oils. H. H. Zuidema. 1959. 205 p. Illus. $7.00.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022

B. Standards on Petroleum Products and Lubricants. American Society for Testing Materials. 1959. 446 p. Illus. $9.00.
American Society for Testing Materials
1916 Race Street
Philadelphia, Pa. 19103

C. Basic Lubrication Practice. A. F. Brewer. 1955. 300 p. Illus. $7.50.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022

D. Analysis of Lubricating Oils. E. E. Smith. 1953. 49 p. Gratis.
College of Engineering
Ohio State University
Columbus, Ohio 43210

II. PERIODICALS

A. The Refining Engineer. Monthly. $3.00/year.
The Petroleum Engineer Publishing Company
P. O. Box 1589
Dallas, Texas 75221
Developments in refining techniques, processes, and products.

B. Petroleum Refiner. Monthly. $2.00/year.
Gulf Publishing Company
3301 Buffalo
Houston, Texas 77001
Production, refining and marketing information.

III. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,922,758. 1960. 7 p.
Method for converting used crankcase and other oil into usable oil.

B. Patent No. 2,909,284. 1959. 3 p.
Refining used engine oil.

C. Patent No. 2,895,883. 1959. 5 p.
Oil Reclamation Plant.

IV. TRADE ASSOCIATIONS

A. Association of Petroleum Re-Refiners
1500 North Quincy Street
Arlington, Va. 22201

B. American Petroleum Institute
1271 Ave. of the Americas
New York, N. Y. 10020

V. ENGINEERING COMPANY

A. Technical Enterprises, Inc.
29 South Street
New York, N. Y. 10004
Complete chemical plants, process and product development.

VI. DIRECTORY

A. Refining, Construction, Petrochemical and Gas Processing Plants of the World. $18.00.
Midwest Oil Register
P. O. Drawer 7248
Tulsa, Oklahoma 74105
Lists types of refineries and products manufactured.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

MANGANESE

I. P. No. 66189

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

MANGANESE: Standard Industrial Classification 3313

A. PRODUCT DESCRIPTION

Manganese refined from ore with approximately 35% Mn content, by the sodium sulfate process.

B. GENERAL EVALUATION

Manganese processing, whatever method is employed, is highly complex. Furthermore, even a small plant, such as that described, requires a very substantial capital investment and a considerable number of skilled workers. It also needs a good supply of electric power and water. In the less developed areas this industry would only be appropriate if, in the first place, sizable and accessible deposits of good grade manganese ore exist. This alone, however, is not sufficient justification for establishment of the industry. If capital cannot be obtained at reasonable cost and if there are difficulties in obtaining skilled labor, power and water, it may be more advantageous to export the ore to user countries with refining facilities. Very careful comparison of the net proceeds likely to be obtained from exporting ore as compared with refining the ore locally is necessary before embarking on this industry. Due regard should be paid to the fact that the price of manganese in the world market is subject to fairly wide fluctuations.

C. MARKET ASPECTS

1. USERS. The steel industry is by far the largest user, but a wide range of other industries use manganese in one form or another, though in relatively small quantities. These include various chemicals, textiles, electrical batteries, paint, and wood preserving.
2. SALES CHANNELS AND METHODS. Sales are made to user industries.
3. GEOGRAPHICAL EXTENT OF MARKET. In relation to its value transport costs on manganese are not especially high, and the product is easily handled. Manganese is an essential material in various industrial processes, particularly steel making, and where necessary it is quite commonly shipped long distances both in and between countries.
4. COMPETITION. In the great majority of the industrially less developed areas the local market for manganese will be far too small to absorb the output of this plant. There is, however, normally no obstacle to entering the international market, where, of course, the industry will be subject to the competitive vicissitudes that affect such internationally traded commodities.
5. MARKET NEEDED FOR PLANT DESCRIBED. This plant could produce enough manganese to make about 400,000 tons of steel, or about 0.1 percent of the world's production Some manganese may also be sold for other uses. Some steel producing countries produce manganese from their own ores and give protection to domestic ore producers. However, there are several countries that are substantial importers of manganese, and there should normally be no special difficulty in finding a market for such a quantity as this plant can produce, even if there are virtually no domestic sales.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 2,500 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 20 acres.		$ --
Building. One story, 47,600. sq. ft. Structural steel frame, sheet metal roof & siding.		250,000
Equipment. Furniture & Fixtures.		
Prodn. tools & equipmt.	$700,000	
Other tools & equipmt.	210,000	
Furniture & fixtures	9,000	
Transportation equipmt.	28,000	947,000
Total (excl. Land)		$1,197,000

Principal Items. Crushing equipment, roasting equipment, leaching purification equipment, thickener equipment, hydrogen sulfide purification equipment, filtration equipment, iron purification equipment, magnesium removal equipment, electrolytic cell equipment, 6 trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$264,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	8,000
Training Costs		50,000
Total Working Capital		$322,000

c. TOTAL CAPITAL (EXCL. LAND) $1,519,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Manganese ore	8,840 tons	$700,000

b. Supplies

Lubricants & hand tools	$ 800
Maintenance & repair parts	6,000
Chemical	46,000
Office supplies	1,200
Total	$ 54,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 250 hp.	$ 20,000
b. Fuel. About 100,000 gals. oil annually.	$ 10,000
c. Water. Plant should be located near good supply where pumping will be only cost.	$ 2,000

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Three 5-ton trucks, 1 ammonia tank truck 1 sedan, 1 pickup truck for moving ore, etc.	$ 6,000

b. External Transport Facilities. Total in & out shipments about 1,000 tons a month. Plant must have rail facilities.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	51	$281,000
Semi-skilled	51	230,000
Unskilled	30	106,000
Total	132	$617,000
b. Indirect Labor		
Manager & supervisors	12	$ 98,000
Office	6	28,000
Other	12	50,000
Total	30	$176,000

c. Training Needs. Manager & supervisors should be fully experienced. With 17 skilled workers, they should be able to do all necessary labor training. Plant should reach full production in 2 months.

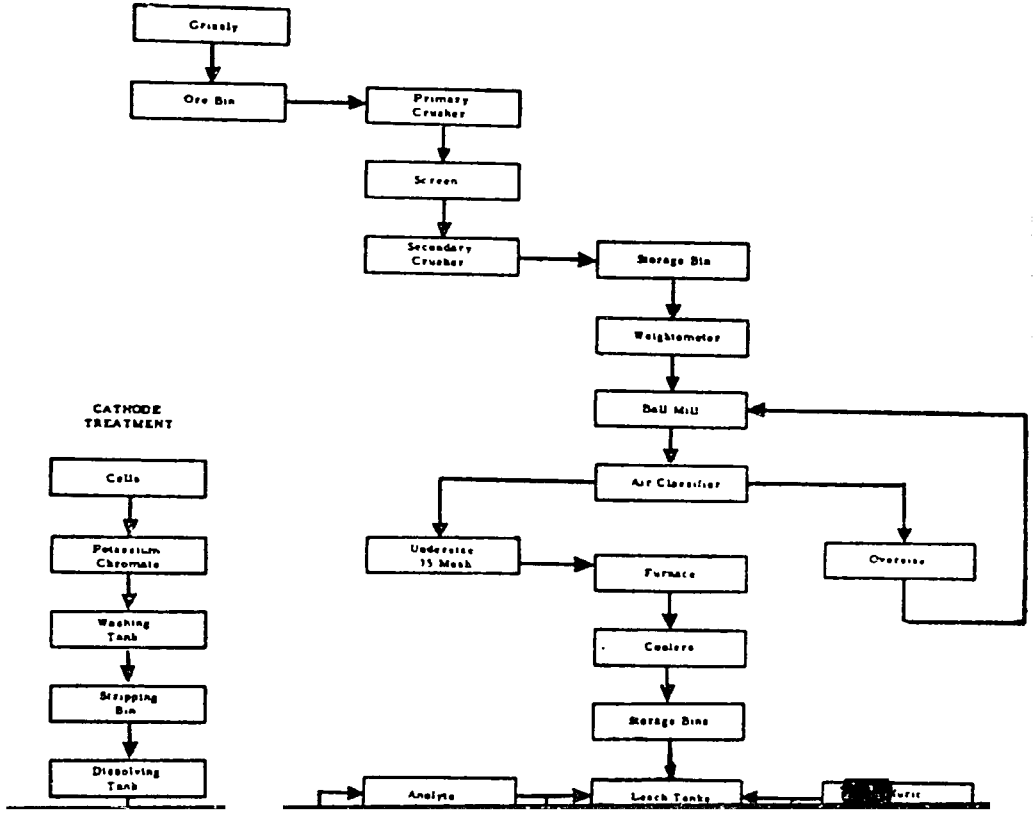
6. TOTAL ANNUAL COSTS AND SALES REVENUE

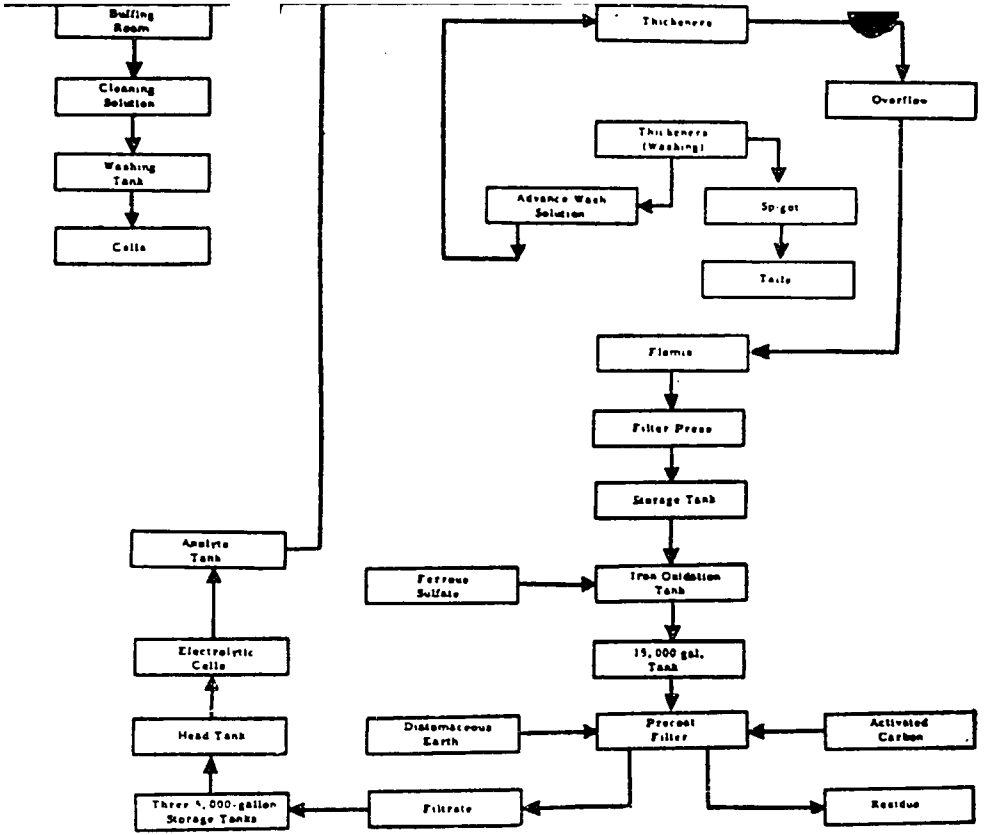
a. Annual Costs	
Direct Materials	$700,000
Direct Labor	617,000
Manufacturing Overhead(a)	268,000
Admin. Costs(b), Contingencies	30,000
Sales Costs(c), Bad Debts	29,000
Depreciation on Fixed Capital	132,400
Total	$1,776,400
b. Annual Sales Revenue	$2,000,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight out, Travel.

PLANT LAYOUT

ARROWS INDICATE FLOW OF WORK





BUILDING REQUIREMENTS - 47,600 SQ. FT.

SE: S.I.C. 3313

MANGANESE: S. I. C. 3313

SELECTED REFERENCES

I. TEXTBOOKS

A. Sedimentary Manganese Ores. I. M. Varentsov. $9.00.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue, New York, N. Y. 10017

B. Metallurgy of Non-Ferrous Metals. W. H. Dennis. 2nd edition 1961.
Pitman Publishing Corporation
20 East 46th Street, New York, N. Y. 10017

C. Metallurgy of the Rarer Metals, III. (Manganese). A. H. Sully. 1955.
305 p. $8.50.
Academic Press, Inc.
111 Fifth Avenue
New York, N. Y. 10003

D. Handbook of Nonferrous Metallurgy. M. D. Liddell, editor. Vol. 2.
721 p. Illus. $14.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. PERIODICAL

A. Journal of Metals. Monthly. $10.00/year.
American Institute of Mining, Metallurgical and Petroleum Engineers, Inc.
29 West 39th Street
New York, N. Y. 10018
Technological, engineering, and economic progress in all branches of the metals industry.

III. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,986,461 1961. 3 p.
Manufacture of refined manganese.

B. Patent No. 2,860,965. 1958. 2 p.
Process for producing pure manganese.

C. Patent No. 2,799,574. 1957. 4 p.
Electric smelting process for manganese ores.

IV. TRADE ASSOCIATION

A. American Manganese Producers Association
Woodstock, Va. 22664

V. ENGINEERING COMPANIES

A. Knapp Mills, Inc.
2317 Borden Avenue
Long Island City, New York 11101
Engineers to processing industries.

B. Western Machinery Company
Wemco Division
655 5th Street
San Francisco, California 94107
Ore processing equipment.

VI. DIRECTORY

A. Metal Statistics. Annual. $3.50.
Metal Statistics
18 Cliff Street
New York, N. Y. 10038

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards – CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

MARBLE CUTTING AND POLISHING

I. P. No. 66190

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country, This profile should help in reaching correct assumptions.

MARBLE CUTTING AND POLISHING: Standard Industrial Classification 3281

A. PRODUCT DESCRIPTION

Marble blocks and slabs of various shapes and sizes, rough or polished on one or more sides in accordance with specifications.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderate, and production presents no serious technical problems. Marble, however, is a luxury material, highly prized for its beauty and durability but sparingly used because of its high cost compared to other, though inferior, materials. It would be necessary to make a very careful survey of the existing market and future prospects before embarking on this enterprise.

C. MARKET ASPECTS

1. USERS. Construction firms and monument makers.

2. SALES CHANNELS AND METHODS. Sales would be made to building contractors and to enterprises which make products such as tombstones and civic monuments.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Transport costs are heavy but these products are often shipped long distances. b. Export. Marble is fairly commonly exported.

4. COMPETITION. The use of marble is limited by its high cost. Though marble may be preferred, other materials will be used if the price differential is too great

5. MARKET NEEDED FOR PLANT DESCRIBED. The market for marble is a variegated and fluctuating one. It cannot be measured by any simple yardstick. A careful survey of market prospects is necessary.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - TWO-SHIFT OPERATION: 30,000 Cubic Feet

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 40'x80'.		19,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$75,000	
Other tools & equipmt.	5,000	
Furniture & fixtures	700	
Transportation equipmt.	5,000	85,700
Total (excl. Land)		$104,700

Principal Items. Two gang saws, surfacing machine, 2 diamond saws, 3 polishers, 2 hand trucks, heavy duty fork lift truck, slab dollies, air compressor, dump truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 44,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	5,800
Training Costs		3,000
Total Working Capital		$ 53,400

c. TOTAL CAPITAL (EXCL. LAND) $158,100

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Structural marble	50,000 cu. ft.	$125,000
b. Supplies		
Lubricants & hand tools		$ 2,000
Cutting tools & abrasives		38,200
Maintenance & spare parts		1,000
Office supplies		500
Total		$ 41,700

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 200 hp. connected load.	$ 2,000
b. Fuel. For heating, if necessary.	$ 200
c. Water. For production, sanitation & fire protection.	$ 200

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1½ ton dump truck.	$ 1,200

b. External Transport Facilities. Good highway needed and railroad, if possible.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	$ 18,000
Semi-skilled	9	45,000
Unskilled	2	8,000
Total	14	$ 71,000
b. Indirect Labor		
Manager & supervisor	2	$ 17,000
Office	1	4,500
Truck driver	1	4,500
Total	4	$ 26,000

c. Training Needs. Manager & supervisor must be fully experienced. With 2 skilled workers they should be able to train other workers and reach full production in 30 days.

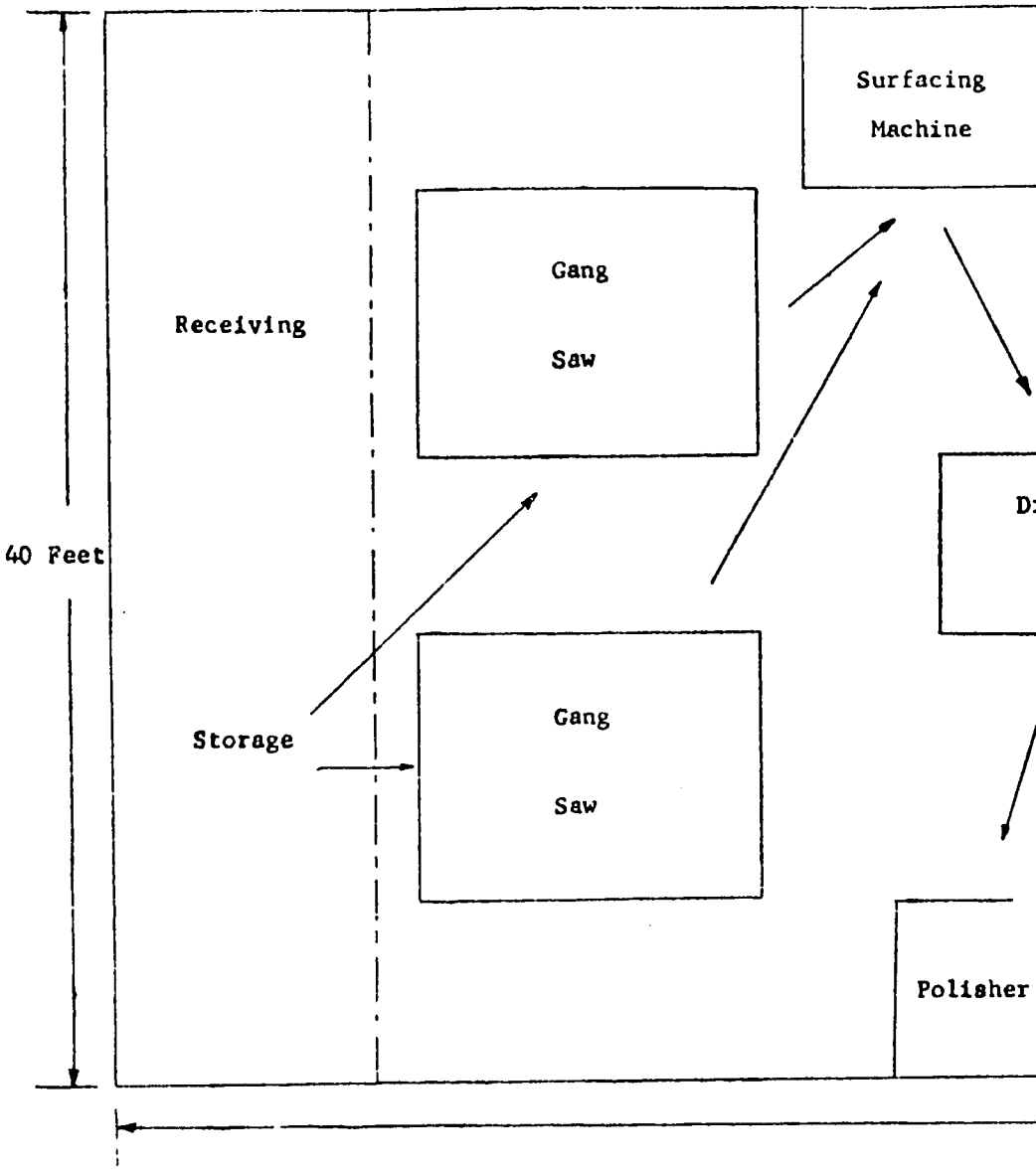
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$125,000
Direct Labor	71,000
Manufacturing overhead(a)	71,300
Admin. Costs(b), Contingencies	16,000
Sales Costs(c), Bad Debts	54,000
Depreciation on Fixed Capital	10,800
Total	$348,100
b. Annual Sales Revenue	$400,000

NOTES : (a) Includes Supplies, Power, Fuel, Water, Transportations, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

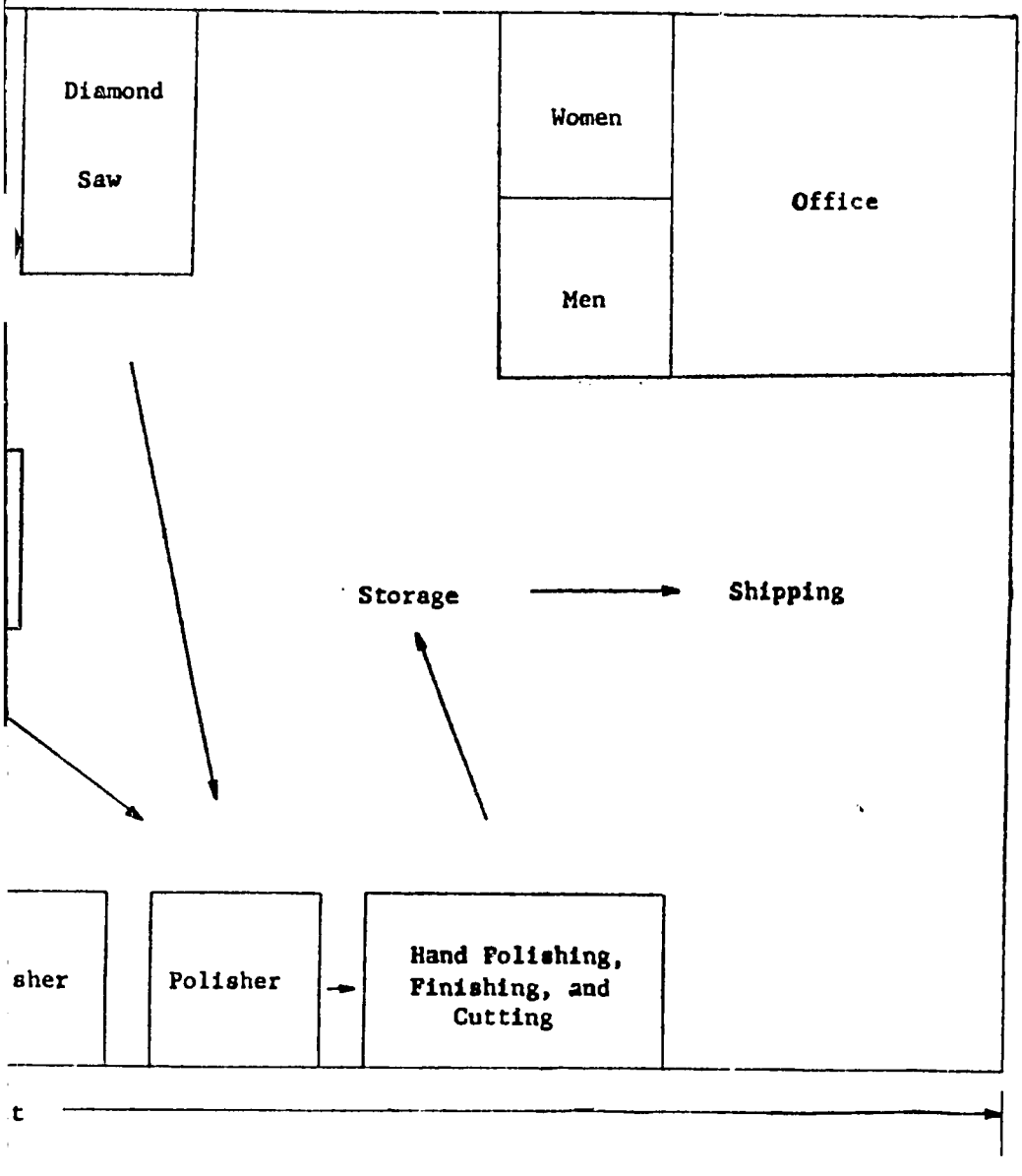
MARBLE CUTTING A

PLANT LAYO



LISHING: S.I.C. 3281

WORKFLOW



MARBLE CUTTING AND POLISHING: S.I.C. 3281

SELECTED REFERENCES

I. U. S. GOVERNMENT PUBLICATIONS

A. Marble. U. S. Department of the Interior, Bureau of Mines Information Circular 7829. Oliver Bowles. 1958. 31 p. Illus. Gratis.
Publications Distribution Section
Bureau of Mines, Region V
4800 Forbes Avenue
Pittsburgh, Pa. 15213

B. Stone Cutting and Polishing. U. S. Department of Interior, Bureau of Mines Information Circular 7863. Oliver Bowles. 1958. 26 p. Illus. $.25.
Superintendent of Documents
Government Printing Office
Washington, D. C. 20402

C. Marble Working Machinery. IR-15930. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

D. Marble - Working Machinery - Cutting, Dressing and Polishing. IR-19824. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

E. Stone Cutting Machines. IR-22896. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

II. FERIODICALS

A. Monumental News Review. Monthly. $6.00/year.
Elroy H. Whitaker Publishers, Inc.
429 Franklin Street
Buffalo, New York 14202

B. American Art in Stone. Monthly. $9.00/year.
Esther and Ford
343 Grant Street
Bramtrel, Masschusetts

III. U. S. PATENTS

Available U.S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,994,314. 1961. 13 p.
Stone cutting apparatus.

B. Patent No. 2,982,280. 1961. 11 p.
Stone cutting apparatus.

C. Patent No. 2,792,825. 1957. 5 p.
Stone cutting machine.

D. Patent No. 2,656,832. 1953. 10 p.
Machine for sawing stones and the like.

IV. TRADE ASSOCIATIONS

A. Marble Institute of America
32 South 5th Avenue
Mt. Vernon, N. Y. 10550

B. National Association of Marble Dealers
14269 Fleming
Detroit, Michigan 48212

C. National Association of Marble Producers
P. O. Box 718
Carthage, Missouri 64836

V. ENGINEERING COMPANIES

A. Patch-Wagner Company, Inc.
60 Howe Street
Rutland, Vermont 05701
Manufactures marble cutting machinery.

B. Ty-Sa-Man Machine Company, Inc.
P. O. Box 1269
Knoxville, Tennessee 37901
Manufactures marble cutting and polishing machinery and equipment.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410 12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards—CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services Inc., Washington, D. C.

INDUSTRY PROFILES

PLASTER OF PARIS, POTTERY PLASTER AND PLASTERBOARD

I. P. No. 66191

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country, This profile should help in reaching correct assumptions.

PLASTER OF PARIS, POTTERY PLASTER AND PLASTERBOARD: Standard Industrial Classification 3275

A. PRODUCT DESCRIPTION

The plaster is used by the pottery industry to make ceramic articles. The plaster boards are used principally for building construction.

B. GENERAL EVALUATION

This plant requires substantial capital and a fairly large amount of skilled labor. The plasterboard, which is its main product, is a material for which there is in general a growing demand, but in many developing areas it will be necessary to undertake a sustained sales campaign to develop a market for it. This is an industry which should, if the operation is efficiently run, have good long-run prospects in many areas.

C. MARKET ASPECTS

1. USERS. Building constructors, makers of ceramic products.

2. SALES CHANNELS AND METHODS. Sales mainly to construction firms, building material suppliers, and the ceramic industry. In some areas active salesmanship may be needed to promote the use of plasterboard.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Transport costs are a limiting factor, but the products are sometimes shipped fairly long distances. b. Export. These products are commonly exported.

4. COMPETITION. a. Domestic Market. Other materials compete with plasterboard, although use of the latter is growing. b. Export Market. If the plant is suitably located, some sales to neighboring countries might be possible.

5. MARKET NEEDED FOR PLANT DESCRIBED. The market for these products will depend upon the design of local building and the volume of construction, as well as the quantity of plaster used by local ceramic industries. The market for these products cannot be measured in terms of total population.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY: THREE-SHIFT OPERATION: 10,100 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. Two one-story buildings, steel frame construction, 60'x150' & 60'x350'.		180,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$305,000	
Other tools & equipmt.	2,000	
Furniture & fixtures	800	307,800
Total (excl. Land)		$487,800

Principal Items. Two crushers & feeders; screens; rock dryer; pulverizers & auxiliaries; heating kettle & equipment, bins for cooling & storage; elevators, conveyors, motors & attachments; mixing & packaging equipment; wallboard machine complete with transfer; dryer with heating equipment; other board making & packaging equipment, including lift trucks; welding equipment; maintenance tools & equipment.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 30,200
Admin. Costs (b), Contingencies, Sales Costs(c)	30	2,000
Training Costs		4,400
Total Working Capital		$ 36,600

c. TOTAL CAPITAL (EXCL. LAND) $524,400

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Plasterboard:		
Gypsum	5,670 tons	$ 17,000
Paper	282 tons	4,250
Additives	1,408 tons	5,650
Packaging materials		5,000
Pottery materials:		
Gypsum	2,430 tons	7,300
Additives	310 tons	1,300
Packaging material		3,000
Total		$ 43,500

b. Supplies	
Lubricants & hand tools	$ 150
Welding materials	50
Maintenance & spare parts	1,500
Office supplies	300
Total	$ 2,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 200 hp.	$ 5,700
b. Fuel. About 60,000 gals. bunker C oil annually.	$ 3,000
c. Water. Production, sanitation & fire protection, 800,000 gals. annually.	$ 200

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. In and out shipments about 70 tons a day. Plant should have railroad siding.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	6	$ 36,000
Semi-skilled	6	$ 30,000
Unskilled	10	40,000
Total	22	$106,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	4,500
Maintenance & superintendent	1	6,500
Total	3	$ 21,000

c. Training Needs. Manager & superintendent should be experienced. With 3 skilled workers, they should be able to train other workers & reach full production in about 1 month.

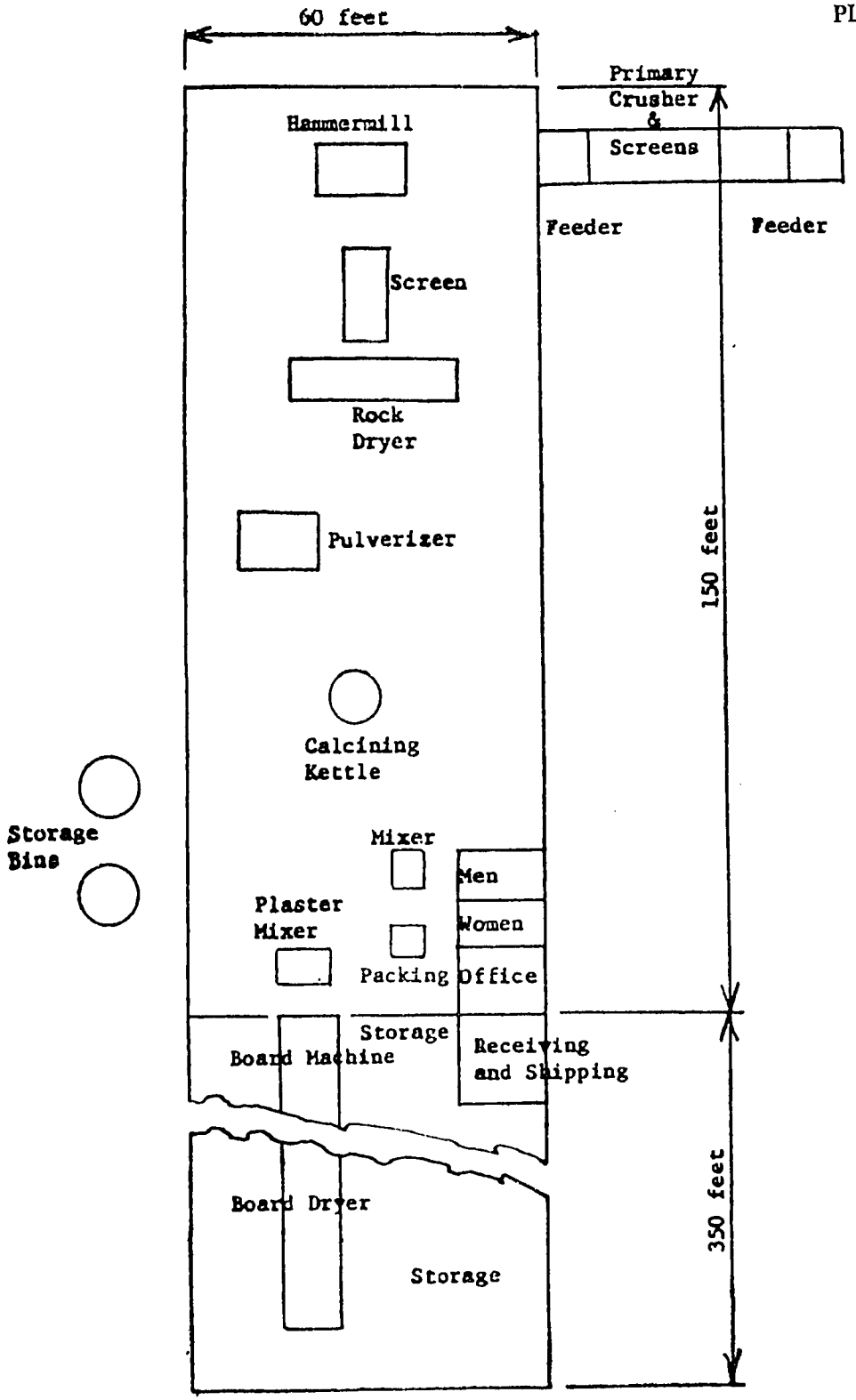
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 43,500
Direct Labor	106,000
Manufacturing Overhead (a)	31,900
Admin. Costs (b), Contingencies	11,000
Sales Costs (c), Bad Debts	14,000
Depreciation on Fixed Capital	40,100
Total	$246,500
b. Annual Sales Revenue	$350,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLASTER OF PARIS, POTTERY PLASTER AND PLASTERBOARD: S.I.C. 3275

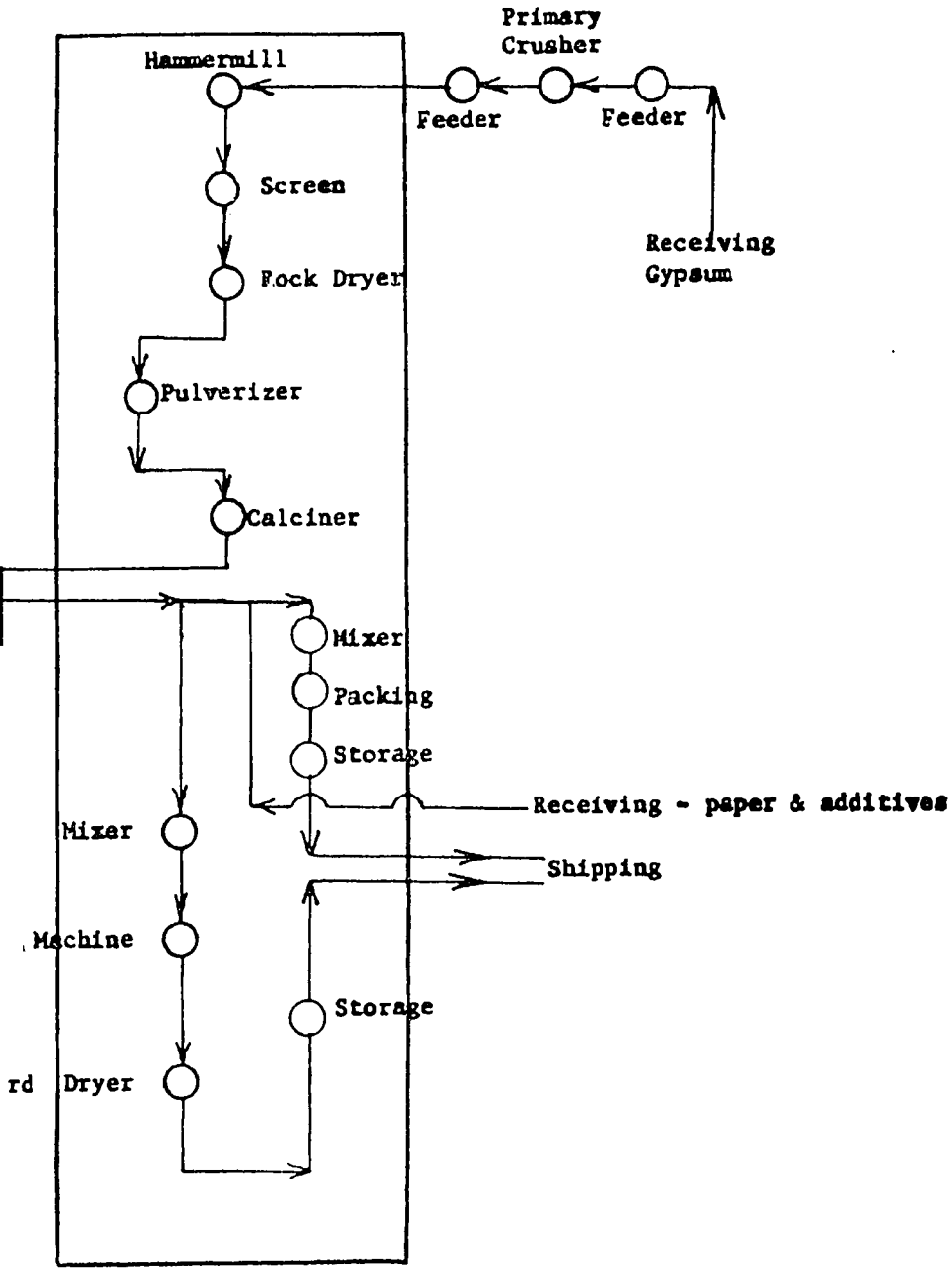
PLAN


60 feet
Primary
Crusher
&
Screens
Hammermill
Feeder
Feeder
Screen
Rock
Dryer
Pulverizer
150 feet
Calcining
Kettle
Storage
Bins
Mixer
Men
Plaster
Mixer
Women
Packing
Office
Storage
Board Machine
Receiving
and Shipping
Board Dryer
Storage
350 feet

Std

STER AND PLASTERBOARD : S.I.C. 3275

T AND WORKFLOW



SELECTED REFERENCES

I. TEXTBOOKS

A. Chemical Engineers' Handbook. John H. Perry. 1963. 7th edition. $23.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

B. Plastering Skill and Practice. Felecien Van Den Branden. 1958. 298 p. Illus. $5.95.
American Technical Society
848 East 58th Street
Chicago. Ill. 60637

C. Selected Process Industries. R. Norris Shreve. 195 p.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U.S. GOVERNMENT PUBLICATIONS

A. Plaster of Paris, Pottery Plaster, and Plasterboard. TI-74. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

B. Mineral Facts and Problems - Gypsum. Cat. No. 128.3 b:G998. $.10.
Superintendent of Documents
Government Printing Office
Washington, D. C. 20402

III. PERIODICAL

A. Rock Products. Monthly. $3.00/year.
Maclean-Hunter Publishing Corp.
79 West Monroe Street
Chicago, Ill. 60603

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,913,308. Nov. 17, 1958. 3 p.
This invention relates to an improved form of calcined gypsum having a low consistency and a very high strength.

B. Patent No. 2,633,441. March 31, 1953. 3 p.
Method of making perforated composition plasterboard.

V. TRADE ASSOCIATIONS

A. Gypsum Association
201 North Wells Street
Chicago, Ill. 60606

B. National Bureau for Lathing and Plastering
2000 K Street, N. W.,
Washington, D. C. 20006

VI. ENGINEERING COMPANY

A. J. B. Ehrsam and Sons Manufacturing Co.
108 North Factory
Enterprise, Kansas 67441
Designers and builders of plasterboard plants, materials handling plants.

VII. DIRECTORIES

A. Thomas' Register of American Manufacturers. $30.00.
Thomas Publishing Company
New York, N. Y. 10001
Equipment and materials.

B. MacRae's Blue Book. $15.00.
W. J. Brown
18 East Huron Street
Chicago, Ill. 60611
Industries, equipment, products, and materials.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards—CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services Inc., Washington, D. C.

338

INDUSTRY PROFILES

PORCELAIN ENAMEL CERAMIC WARE

I. P. No. 66192

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

PORCELAIN ENAMEL CERAMIC WARE: Standard Industrial Classification 3261

A. PRODUCT DESCRIPTION

This Profile is based on production of laboratory, lavatory and dental ware. Spark plug procelain and other items can be produced with additional materials and by adding the required molds.

B. GENERAL EVALUATION

This plant whose production could be adapted to the demands of the particular market for porcelain enamel ceramic ware, would be feasible only where considerable progress has already been made in developing modern facilities. A fairly large amount of capital and skilled labor is required, and good management is essential to assure maintenance of product quality and keep up with innovations in the industry.

C. MARKET ASPECTS

1. USERS. Households, offices, public buildings, laboratories, etc.

2. SALES CHANNELS AND METHODS. Sales would be made to construction contractors, industries, building supplies houses, and medical supplies distributors.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products would be well packaged and freight costs should be moderate in production to the value of the products. The market might be nation-wide. b. Export. These products are widely sold in international markets.

4. COMPETITION. a. Domestic Market. Competition could be expected from cast iron, sheet metal, and enameled products. b. Export Market. If costs are low enough, some export sales might be possible, although the plant is not large enough to do an extensive export business.

5. MARKET NEEDED FOR PLANT DESCRIBED. Access to a progressive community, or communities, which have already developed substantial modern facilities, and with a population of half a million up, would probably be needed to absorb this plant's output.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 25,000 Pieces

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1 acre.		$ --
Building. One story, 100'x200'.		120,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 150,000	
Other tools & equipmt.	18,000	
Furniture & fixtures	1,000	169,000
Total (excl. Land)		$289,000

Principal Items. Blungers, Vibrating screens, magnetic filters, storage tanks with agitators, tunnel kiln, ball mill, scales, material handling equipment, slip pumps, spraying equipment, conveyors, hoppers, work benches, boiler.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 58,000
Admin. Costs (b), Contingencies, Sales Costs (c)		3,000
Training Costs		5,000
Total Working Capital		$ 66,000

c. TOTAL CAPITAL (EXCL. LAND) $355,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements		Annual Cost
Kaolin	2,385	tons	$ 31,000
Ball clay	1,700	tons	30,000
Flint	1,770	tons	34,000
Feldspar	2,700	tons	46,000
Whiting	40	tons	1,500
Zinc oxide	25	tons	7,200
Other additives	10	tons	500
Molds	1,700		6,800
Packaging materials	25,200	units	6,300
Total			$ 163,300

b. Supplies

Lubricants & hand tools	$ 500
Cutting tools & abrasives	700
Maintenance & spare parts	5,000
Kiln lining replacements	10,000
Cones & testing materials	250
Office supplies	350
Total	$ 16,800

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 60 hp.	$ 900
b. Fuel. Gas for kiln (24 hour operation) & for heating.	$ 10,000
c. Water. For production, sanitation & fire protection.	$ 200

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. In & out shipments about 70 tons a day. Good highways & rail facilities necessary.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	8	$ 48,000
Semi-skilled	12	60,000
Unskilled	4	16,000
Total	24	$124,000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office	2	9,000
Maintenance	1	6,000
Total	5	$ 33,000

c. Training Needs. Manager & supervisor should be fully experienced. With 4 skilled workers, they should be able to train other workers & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs

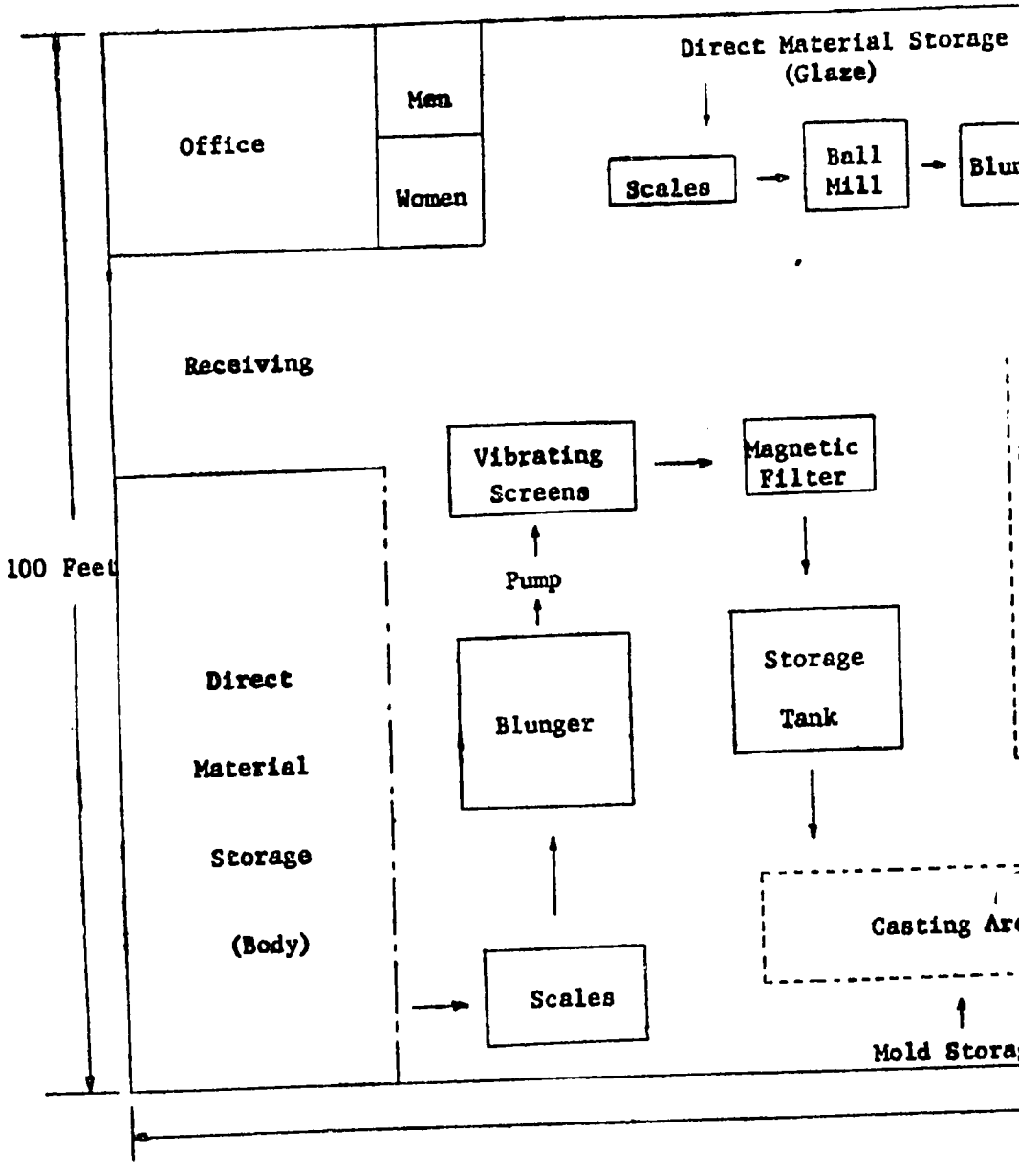
Direct Materials	$163,300
Direct Labor	124,000
Manufacturing Overhead (a)	60,900
Admin. Costs (b), Contingencies	17,000
Sales Costs (c), Bad Debts	21,000
Depreciation on Fixed Capital	24,700
Total	$410,900

b. Annual Sales Revenue $500,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

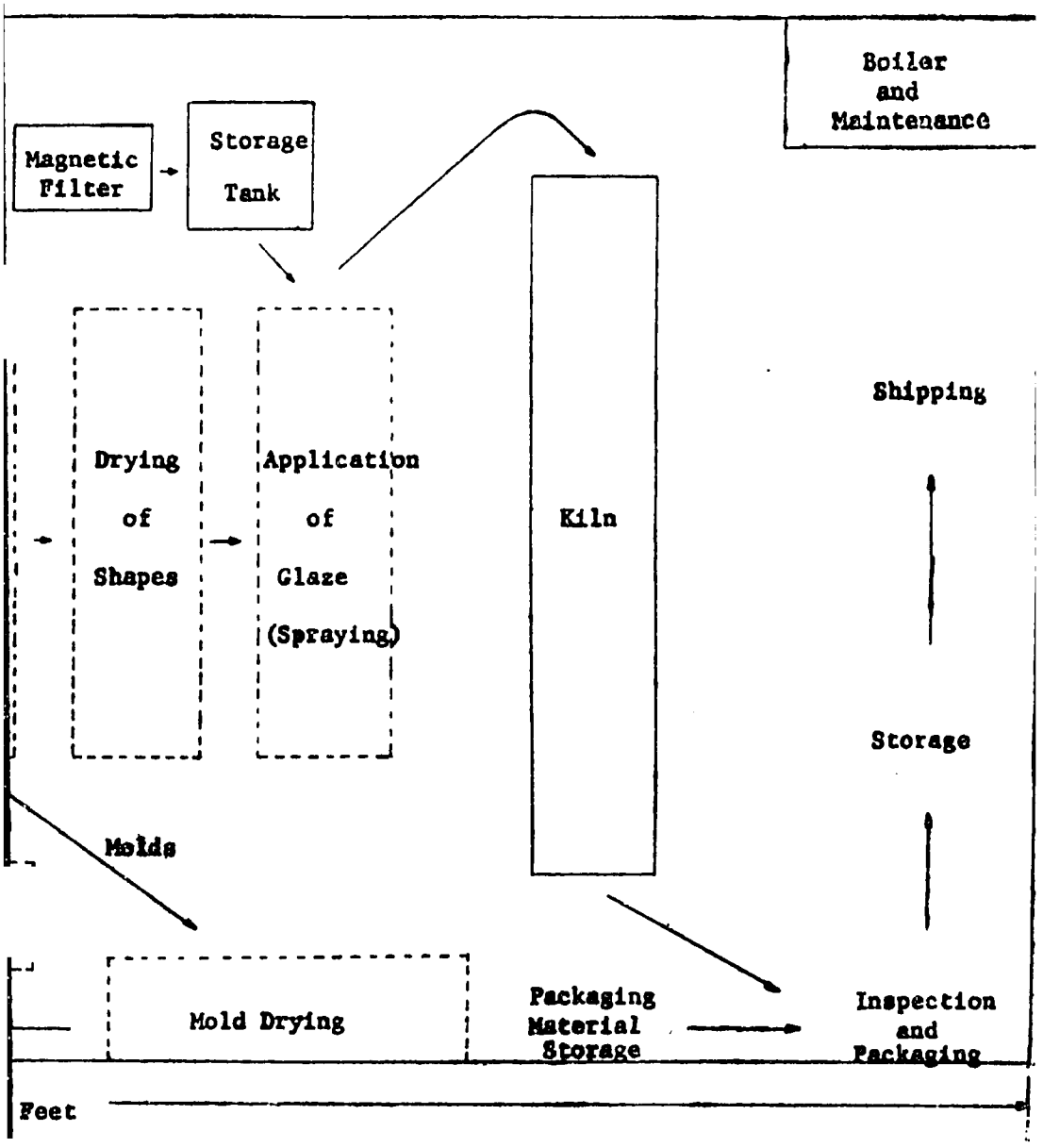
PORCELAIN ENAMEL

PLANT LAYO



AMIC WARE : S.I.C. 3261

D WORKFLOW



PORCELAIN ENAMEL CERAMIC WARE: S. I. C. 3261

SELECTED REFERENCES

I. TEXTBOOKS

A. Ceramics, Lewis Krevolin and Elizabeth Constantin. 1965. $1.00.
Pitman Publishing Corporation
20 East 46th Street
New York, N. Y. 10017

B. Industrial Ceramics. F. and S. Singer. 1965. $40.00.
Tudor Publishing Co.
221 Park Avenue South
New York, N. Y. 10003

C. Practical Pottery and Ceramics. K. I. Clark. 1964. $6.50.
Viking Press
625 Madison Avenue
New York, N. Y. 10022

D. Ceramic Fabrication Processes. W. D. Kingery, editor. 1958. 235 p. Illus. $9.50.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016

E. Porcelain Enameling Operations. E. E. Bryant. 1958. 113 p. $4.00.
Enamelist Publishing Corporation
4150 East 56th Street
Cleveland, Ohio 44105

II. U. S. GOVERNMENT PUBLICATION

A. Porcelain Enameling. IR-28107. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Ceramic Industry. Monthly. $8.00/year.
Industry Publications, Inc.
5 South Wabash Avenue
Chicago, Ill. 60603
Management, engineering, and production of porcelain enamel.

B. Ceramic Age. Monthly. $8.00/year.
Ceramic Publications, Inc.
Ninth-Chester Building
Cleveland, Ohio 44114
Production magazine covering industrial and electronic ceramics, porcelain enamel, raw materials, and equipment.

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each

A. Patent No. 2,995,468. 1961. 5 p.
Glaze and enamel compositions for ceramic bodies.

B. Patent No. 2,961,563. 1960. 3 p.
Method of making porcelain enamel spark plugs.

C. Patent No. 2,774,141. 1956. 6 p.
Material and method for making ceramic dental items.

D. Patent No. 2,741,565. 1956. 6 p.
Method of forming protective glaze on ceramic articles.

E. Patent No. 2,741,008. 1956. 2 p.
Method for producing glazed ceramic objects.

V. TRADE ASSOCIATION

A. Porcelain Enamel Institute
1145 19th Street, N. W.
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

A. Harrop Ceramic Service Company
S. E. Corner Pearl and Gay
Columbus, Ohio 43215
Ceramic design, plant construction, equipment, tests, analyses.

B. Ferro Corporation
Harvard and East 56th Street
Cleveland, Ohio 44105
Porcelain enameling furnace, kiln, and oven engineers and designers.

VII. DIRECTORY

A. Ceramic Data Book Buyers Directory. Annual. $2.50.
Industrial Publications, Inc.
5 South Wabash Avenue
Chicago, Ill. 60603
Lists manufacturers and suppliers of raw materials and equipment to the ceramic industry.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

-3,46

INDUSTRY PROFILES

RECLAIMED RUBBER SHEETS

I. P. No. 66193

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

RECLAIMED RUBBER SHEETS: Standard Industrial Classification 3031

A. PRODUCT DESCRIPTION

Reclaimed rubber sheets produced from used automobile and truck tires and tubes. They are rendered plastic by drastic treatment with heat and plasticizers. Reclaimed rubber can replace new rubber, wholly or in part, for packing materials, tire treads, shoe soles, matting, wire insulation, and many other products.

B. GENERAL EVALUATION

The economic feasibility of this plant depends on the local availability of an adequate and assured supply of used tires and tubes and the ability to produce reclaimed rubber at a price competitive with new rubber. If these necessary conditions exist, there should be no difficulty in selling the plant's production. The essential problem for such a plant will be to obtain an adequate price for its product.

C. MARKET ASPECTS

1. USERS. Various rubber-using industries.
2. SALES CHANNELS AND METHODS. Sales to industries and exporters.
3. GEOGRAPHICAL EXTENT OF MARKET. This is a standardized product which is easily transported and is of sufficiently high value to bear transport costs over a wide area, both domestic and foreign.
4. COMPETITION. Since sales, whether domestic or foreign, would have to be made at the prevailing market price, the competitive situation would be the same as for any standardized product with an international market.
5. MARKET NEEDED FOR PLANT DESCRIBED. In general it will be advantageous to have a local market for the production of the plant, but profitable operation may still be quite possible even if it is necessary to depend largely on exportation.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 2,100 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 5 acres.		$ --
Building. One story, 33'x246' head room 20' to 24.'.		60,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$334,000	
Other tools & equipmt.	8,000	
Furniture & fixtures	2,000	
Transportation equipmt.	3,000	347,000
Total (excl. Land)		$407,000

Principal Items. Cracking equipment, separating equipment, grinding equipment, mixing equipment, 2 reclamators, conveyors, tanks & bins, spare parts, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 38,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,700
Training Costs		1,900
Total Working Capital		$ 44,200

c. TOTAL CAPITAL (EXCL. LAND) $451,200

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Used tires & tubes	2,310 tons	$ 41,500
Sweller	96,600 lbs.	3,150
Permanent plasticizer	201,600 lbs.	6,550
Pine tar	201,600 lbs.	29,750
Asphaltic	193,200 lbs.	6,300
Peptizers	12,600 lbs.	350
Mineral filler	42,000 lbs.	400
Total		$88,000

b. Supplies	
Lubricants & hand tools	$ 300
Cutting tools & abrasives	200
Maintenance & spare parts	5,000
Office supplies	200
Total	$ 5,700

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 4.2 mn. kw-hr annually.	$ 27,300
b. Fuel. Heating, if necessary.	$ 400
c. Water. For cooling machinery & general purposes.	$ 2,000

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Truck to haul used tires when necessary.	$ 1,000

b. External Transport Facilities. In & out shipments about 19 tons a day. Good highways required, & easy access to railroad desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	6	$ 36,000
Unskilled	5	32,000
Total	11	$ 56,000
b. Indirect Labor		
Manager & supervisors	3	$ 27,000
Office	3	13,000
Maintenance & driver	2	11,000
Total	8	$ 51,000

c. Training Needs. Manager & supervisors must be fully experienced. With 6 skilled workers they should be able to train all workers & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$88,000
Direct Labor	56,000
Manufacturing Overhead(a)	87,400
Admin. Costs(b), Contingencies	22,000
Sales Costs(c), Bad Debts	24,000
Depreciation on Fixed Capital	39,000
Total	$316,400
b. Annual Sales Revenue	$420,000

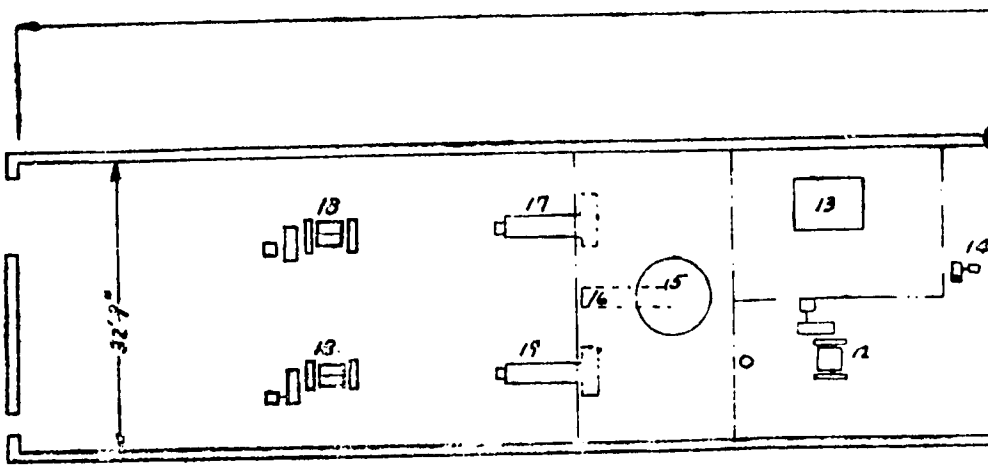
NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

RECLAIMED RUBBER SHEETS: S.I.C. 3031

RECLAIMED RUBBER

PLANT L

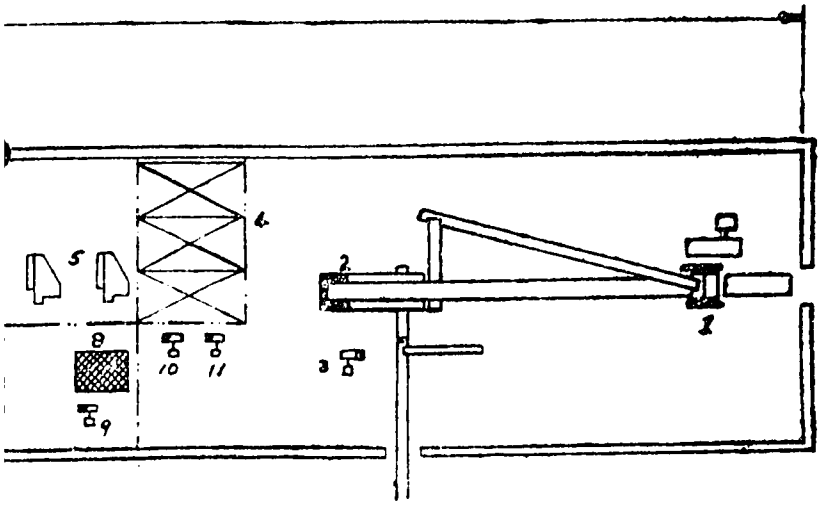
NUMBERS INDICA



1. CRACKER
2. VIBRATOR
3. CRACKED STOCK BLOWER
4. CRACKED STOCK STORAGE
5. AIR TABLES
6. HAMMER MILL
7. HIGH SPEED BEATER
8. OVERSTROM VIBRATOR
9. ASPIRATOR BLOWER
10. SEPARATOR SYS. RECYCLE

: S.I.C. 3031

LOW



11. RUBBER PRODUCT BLOWER
12. GRINDER
13. GYRO SIFTER
14. GROUND RUBBER BLOWER
15. GROUND RUBBER STORAGE
16. OIL MIXER
17. 6" RECLAIMATOR
18. REFINER
19. 2nd RECLAIMATOR

RECLAIMED RUBBER SHEETS: S. I. C. 3031

SELECTED REFERENCES

I. TEXTBOOKS

A. Rubber. Loren G. Polhamus. 1962. illus. $14.95.
John Wiley and Sons Inc.
605 Third Avenue
New York, N. Y. 10016

B. Natural and Synthetic Rubbers. D. W. Hake. 1961. illus. $5.00
Tudor Publishing Co.
221 Park Avenue South
New York, N. Y. 10003

C. Chemistry of Natural and Synthetic Rubbers. H. L. Fisher. 1957.
216 p. $6.50.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022

D. Manual of Reclaimed Rubber. 248 p. $5.00.
Rubber Reclaimers Association, Inc.
101 West 31st Street
New York, N. Y. 10001

E. The continous Method of Manufacturing Reclamatory Rubber. Gratis.
U. S. Rubber Reclaiming Company, Inc.
P. O. Box 356
Buffalo, N. Y. 14205

II. U. S. GOVERNMENT PUBLICATION

A. Reclaimed Rubber. TI-81. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Rubber World. Monthly. $5.00.
Bill Brothers Publishing Company
630 Third Avenue
New York, N. Y. 10017

B. Rubber Age. Monthly. $5.00.
Palmerton Publishing Company
101 West 31st Street
New York, N. Y. 10001

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D.C. 20231 $.25 each.

A. Patent No. 2,809,944. 1957. 10 p.
Process for reclaiming rubber and for the manufacture of products therefrom.

B. Patent No. 2,804,651. 1957. 4 p.
Economical and effective methods for the production of improved reclaimed rubber products.

V. TRADE ASSOCIATIONS

A. Rubber Reclaimers Association
101 West 31st Street
New York, N. Y. 10001

B. Rubber Manufacturers Association
444 Madison Avenue
New York, N. Y. 10022

VI. ENGINEERING COMPANIES

A. Foremost Machine Builders
83 Dorsa Avenue
Livingston, New Jersey 07039

B. Sprout-Waldron Manufacturing Engineers
Muncy, Penna. 17756

VII. DIRECTORIES

A. Rubber Red Book. $15.00.
Rubber Age
101 West 31st Street
New York, N. Y. 10001

B. Conover-Mast Purchasing Directory
205 East 42nd Street
New York, N. Y. 10017

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards—CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services Inc., Washington, D. C.

NDUSTRY PROFILES

REFRACTORY BRICKS

I. P. No. 66194

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country, This profile should help in reaching correct assumptions.

REFRACTORY BRICKS: Standard Industrial Classification 3255

A. PRODUCT DESCRIPTION

Various shapes and sizes of brick that resist intense heat and are used for lining furnaces, cupolas, kilns, and similar equipment.

B. GENERAL EVALUATION

This plant requires substantial capital, and, though the amount of skilled labor required in the manufacturing process is small, good management is needed to keep up with the technical developments that are taking place in the manufacture of refractories. The economic feasibility of the plant will, of course, depend on the existence of user industries within the potential market area.

C. MARKET ASPECTS

1. USERS. Industries using furnaces, kilns, cupolas, and other equipment requiring heat resistant linings.

2. SALES CHANNELS AND METHODS. Sales would be made direct to user industries and firms making and servicing furnaces, kilns, etc.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Since this is an indispensable item for some industries, the market may be very extensive if there is no alternative source of supply. b. Export. Refractory bricks are commonly exported by advanced industrial countries.

4. COMPETITION. a. Domestic Market. Where user industries are located in ports competition from imports may be keen. b. Export Market. A plant of this size, making only ordinary firebrick, might make some sales to easily accessible areas of neighboring countries but could not compete with large-scale makers in general international trade.

5. MARKET NEEDED FOR PLANT DESCRIBED. This plant would need a large complex of user industries within the market area in which it could compete. The extent of potential demand should be carefully surveyed.

. PRODUCTION REQUIREMENTS

NNUAL CAPACITY - ONE-SHIFT OPERATION: 1,875,000 Bricks.

CAPITAL REQUIREMENTS

FIXED CAPITAL		Cost
Land. About 15 acres with clay deposits.		$ --
Building. One story, 50'x400'; sheds with roof only, 40,000 sq. ft.		160,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$300,000	
Other tools & equipmt.	5,000	
Furniture & fixtures	1,000	
Transportation equipmt.	10,000	316,000
Total (excl. Land)		$476,000

Principal Items. 8 kilns, 2 drying pans (9'), 4 vibrating screens, 10 screen cloths, 1 dry press (190 tons), 3 automatic dry feeders, 1 one-half yard shovel, 2 fork lift trucks, 100 skids, mixer with conveyors, 1 temperature recorder, 10 wheelbarrows, 3 storage bins (40 ton capacity), conveyors, welding equipment, dump truck, flat bed trucks.

WORKING CAPITAL	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 28,100
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,100
Training Costs		3,200
Total Working Capital		$ 34,400
TOTAL CAPITAL (EXCL. LAND)		$510,400

MATERIALS AND SUPPLIES

Direct Materials	Annual Requirements	Annual Cost
Special grade of clay	400 tons	$ 2,400
Grog (broken & reject bricks)		0
Clay cones		100
Fine sand		200
Total		$ 2,700

Supplies	
Lubricants & hand tools	$ 250
Cutting tools & abrasives	200
Maintenance & spare parts	3,000
Office supplies	250
Total	$ 3,700

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 100,000 kw-hr annually.	$ 1,500
b. Fuel. About 8,000 tons coal annually.	$ 48,000
c. Water. About 2.5 million gals. annually.	$ 600

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1 flat bed & 1 dump truck.	$ 2,000

b. External Transport Facilities. Good highways necessary, & easy access to railroad desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	2	10,000
Unskilled	16	64,000
Total	20	$ 86,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Driver	2	9,000
Total	4	$ 24,000

c. Training Needs. Manager should be experienced. With 2 skilled workers, he should be able to do all training & reach full production in about 1 month.

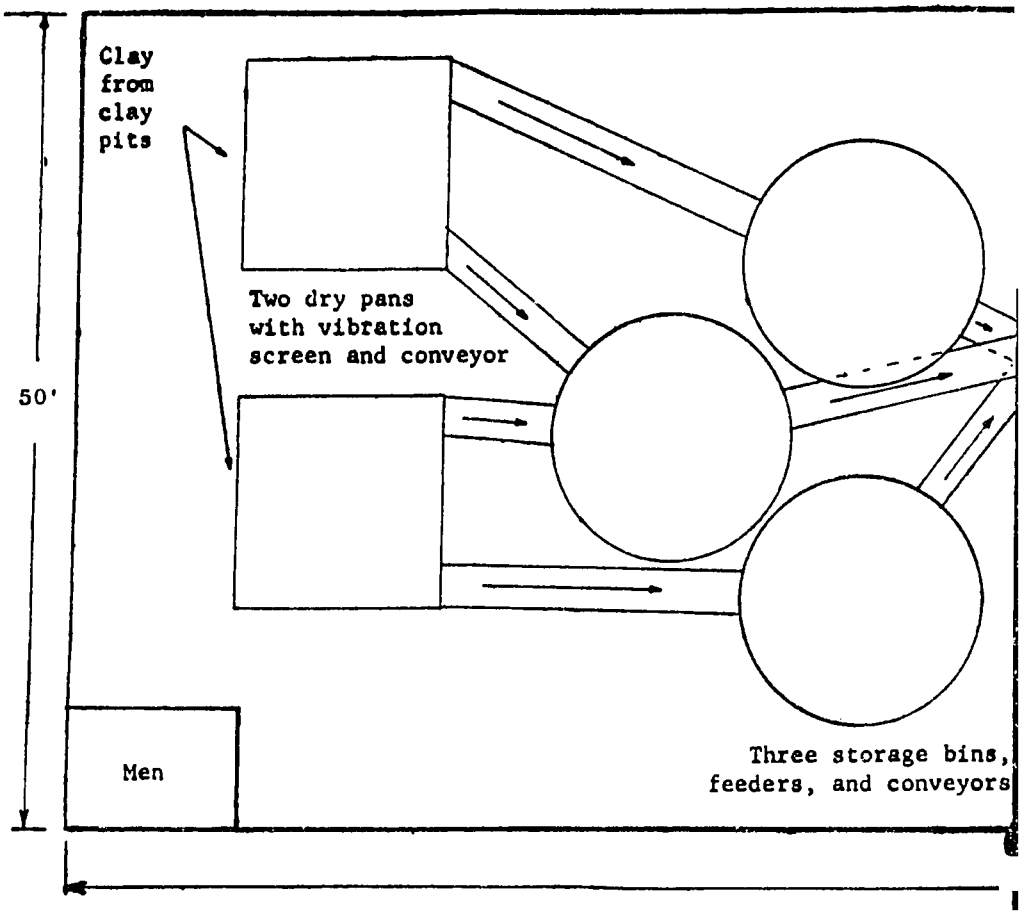
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 2,700
Direct Labor	86,000
Manufacturing Overhead(a)	79,800
Admin. Costs(b), Contingencies	21,000
Sales Costs(c), Bad Debts	18,000
Depreciation on Fixed Capital	41,600
Total	$249,100
b. Annual Sales Revenue	$320,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

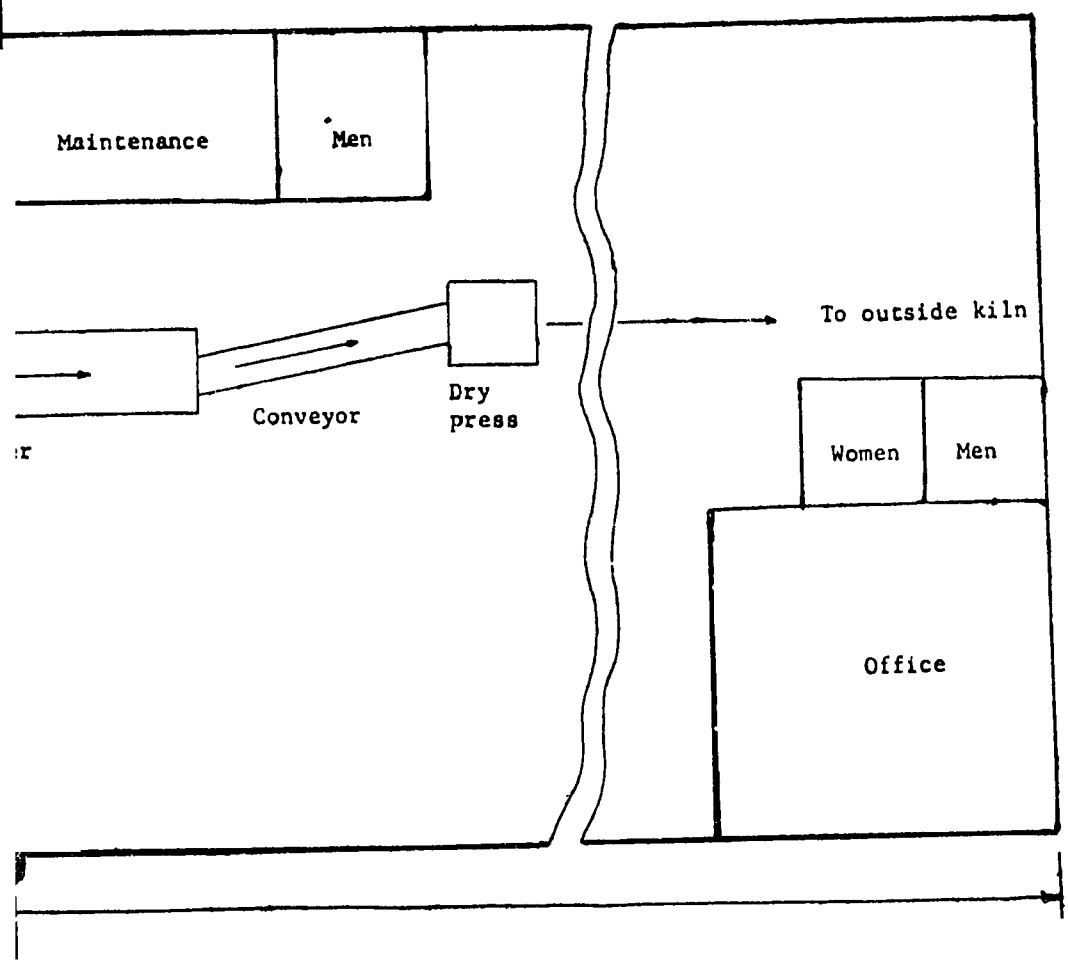
REFRACTORY BR

PLANT LAYOUT



I. C. 3255

FLOW


Maintenance
Men
To outside kiln
Conveyor
Dry
press
Women
Men
Office

REFRACTORY BRICKS: S.I.C. 3255

SELECTED REFERENCES

I. TEXTBOOKS

A. High Temperature Technology. I. E. Campbell. 2nd ed. 1965. $15.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016

B. Refractories. 3rd ed. F. H. Norton. 1949. 728 p. Illus. $15.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

C. Basic Refractories. J. R. Rait. 1950. 408 p. $10.00.
Interscience Publishers, Inc.
250 Fifth Avenue
New York, N. Y. 10001

II. U.S. GOVERNMENT PUBLICATION

A. Fire Bricks. IR-20200 with Attachment IR-17706-B. **Gratis.**
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Brick and Clay. Monthly. $7.00/year.
Industrial Publications, Incorporated
5 South Wabash Avenue
Chicago, Ill. 60603
Materials and manufacturing of brick refractories.

B. American Ceramic Society
4055 North High Street
Columbus, Ohio 43214
Research papers on ceramic materials, their manufacture, testing, and application.

360

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,949,704. 1960. 5 p.
Refractory materials.

B. Patent No. 2,725,226. 1955. 2 p.
Retarding disintegration of fire brick.

C. Patent No. 2,684,842. 1954. 4 p.
Refractory block.

D. Patent No. 2,289,911. 1942. 9 p.
Refractory brick structure.

V. TRADE ASSOCIATIONS

A. Refractories Institute
First National Bank Building
Pittsburgh, Penna. 15222

B. Special Refractories Association
271 North Avenue
New Rochelle, N. Y. 10801

VI. ENGINEERING COMPANIES

A. M. D. Magary Construction Company
2318 Tennessee Avenue
St. Louis, Missouri 63104
Refractory engineering and construction.

B. Metcut Research Associates, Inc.
3990 Rosslyn Drive
Cincinnati, Ohio 45209
Specialists in refractory and high strength materials.

VII. DIRECTORY

A. Ceramic Data Book Buyers' Directory. Annual. $2.50.
Industrial Publications, Inc.
5 South Wabash Avenue
Chicago, Ill. 60603
Lists manufacturers and suppliers of raw materials and equipment to the ceramics industry.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles*." The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410 12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards—CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services Inc., Washington, D. C.

-362-

INDUSTRY PROFILES

RUBBERIZED SHEETING

I. P. No. 66195

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

RUBBERIZED SHEETING: Standard Industrial Classification 3069

A. PRODUCT DESCRIPTION

Nylon cloth base with both sides coated with synthetic rubber. The product is flexible and completely waterproof.

B. GENERAL EVALUATION

Rubberized sheeting is a product with good possibilities in many developing areas, as increased attention is paid to health, sanitation and child care. Capital and skilled labor requirements are moderate. Though local production of some of the raw materials would generally be an advantage, operation on the basis of imported materials might well be economically feasible in some cases.

C. MARKET ASPECTS

1. USERS. Industries that manufacture products from rubberized sheeting, hospitals, institutions, nurseries, households.

2. SALES CHANNELS AND METHODS. Sales to user industries, wholesalers, and possibly large retailers.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. This product is easy to handle, and transport costs are not an important limiting factor with regard to the market area. The product could have a nationwide market. b. Export. There is growing, worldwide market for this product.

4. COMPETITION. a. Domestic Market. Unless costs are unsually high, the local product should be able to compete effectively with imports. Plastics, of the polyvinyl chloride type, may offer competition. b. Export Market. A plar of this size could not compete generally with large-volume producers. Some exports, however, might be possible to easily accessible areas of neighboring countries.

5. MARKET NEEDED FOR PLANT DESCRIBED. With more and more attention being given to the care of the aged, infirm, sick, and minors, to matter of sanitation, and to public health, hospital and institutional programs, an area with an urban middle-income class of one million persons should absorb the output of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY: ONE-SHIFT OPERATION: 1.25 Million Yards

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 20,000 sq. ft.		$ --
Building. One story, 50'x80'.		24,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$60,000	
Other tools & equipmt.	6,000	
Furniture & fixtures	1,000	67,000
Total (excl. Land)		$ 91,000

Principal Items. Compounding & weighing equipment, two-roll mixing mill - 60", piece cutter, solution mixer, applicator, drying chamber, vulcanizing chamber.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$120,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	7,300
Training Costs		2,400
Total Working Capital		$130,500

c. TOTAL CAPITAL (EXCL. LAND) $221,500

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Nylon cloth	1,250,000 yds.	$400,000
Butyl, grade one	625,000 lbs.	144,000
Titanium dioxide	250,000 lbs.	70,000
Soft clay	216,000 lbs.	2,200
Whiting	305,000 lbs.	7,000
Zinc oxide	31,000 lbs.	4,600
Petroleum oil	25,000 lbs.	1,500
Packaging material		3,000
Total		$632,300
b. Supplies		
Lubricants & hand tools		$ 200
Maintenance & spare parts		5,000
Office supplies		300
Total		$ 5,500

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load 25 hp.	$ 800
b. Fuel. About 6,500 gals. fuel oil annually.	$ 800
c. Water. Production, sanitation & fire protection.	$ 200

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. In and out shipments about 8 tons a day. Good highways required & easy access to railroad desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	4	20,000
Unskilled	6	24,000
Total	12	$ 56,000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office	1	5,000
Maintenance	1	6,000
Total	4	$ 29,000

c. Training Needs. Manager & supervisor must be well experienced. With 2 skilled workers, they should be able to train all workers & reach full production in about 1 month.

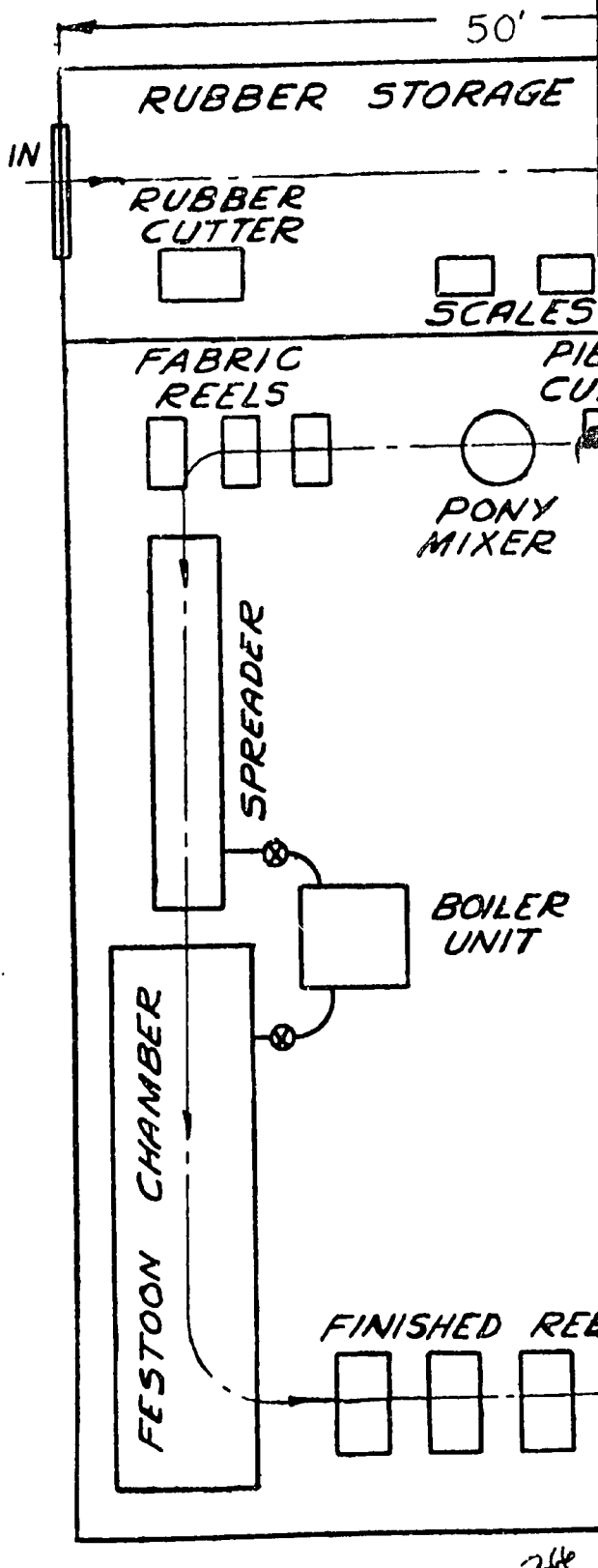
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$632,300
Direct Labor	56,000
Manufacturing Overhead(a)	36,300
Admin. Costs(b), Contingencies	38,000
Sales Costs(c), Bad Debts	55,000
Depreciation on Fixed Capital	8,500
Total	$826,100
b. Annual Sales Revenue	$900,000

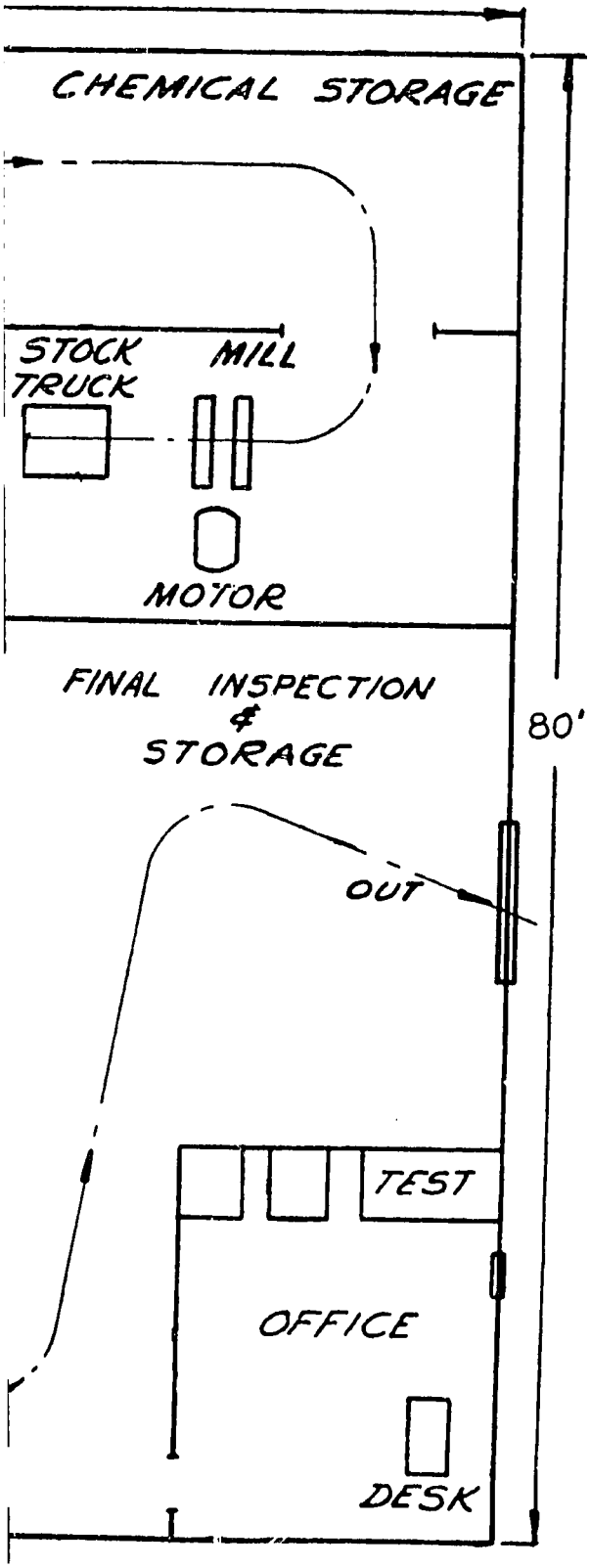
NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight out, Travel.

RUBBERIZED SHEETING: S. I. C. 3069

RUBBERIZED S
PLANT LAYOU



ING: S.I.C. 3069
WORKFLOW



RUBBERIZED SHEETING: S. I. C. 3069

SELECTED REFERENCES

I. TEXTBOOKS

A. Natural and Synthetic Rubbers. D. W. Hake. 1961. Illus. $5.00.
Tudor Publishing Co.
221 Park Avenue South
New York, N. Y. 10003

B. Latex in Industry. 2n. ed. R. J. Noble. 1955. 920 p. $16.00.
Palmerton Publishing Company, Inc.
101 West 31st Street
New York, N. Y. 10001

C. Rubber Technology. [illegible] C. W. Moakes and W. C. Wake. 1951. 199 p. $ 5.50.
Academic Press, Inc.
111 Fifth Avenue
New York, N. Y. 10003

D. Method of Chemical Analysis of Rubber Products. $.30.
American Society for Testing Materials
1916 Race Street
Philadelphia, Penna. 19103

II. U. S. GOVERNMENT PUBLICATION

A. Rubberized Fabrics. IR-30159. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Rubber Chemistry and Technology. Five issues a year. $8.00/year.
American Chemical Society
Division of Rubber Chemistry
Prince and Lemon Streets
Lancaster, Penna. 17603

B. Rubber Age. Monthly. $6.00/year.
Palmerton Publishing Company, Inc.
101 West 31 Street
New York, N. Y. 10001

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,839,443. 1958. 4 p.
Adhesion of textile fabric to rubber.

B. Patent No. 2,486,720. 1949. 2 p.
Adhesion of rubber to fibrous materials.

V. TRADE ASSOCIATIONS

A. Rubber Manufacturers Association
444 Madison Avenue
New York, N. Y. 10022

B. National Rubber Bureau
1108 16th Street, N. W.
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

A. National Rubber Machinery Company
47-55 West Exchange
Akron, Ohio 44308

B. McNeil Machine and Engineering Company
100 East Crosier
Akron, Ohio 44311

VII. DIRECTORY

A. Rubber Red Book. Annual. $15.00.
Rubber Age
101 West 31st Street
New York, N. Y. 10001
Lists manufacturers, products, plants, machinery, personnel, in the rubber industry.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

3/70

INDUSTRY PROFILES

RUBBER SOLES AND HEELS

I. P. No. 66196

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

RUBBER SOLES AND HEELS: Standard Industrial Classification 3069

A. PRODUCT DESCRIPTION

Rubber soles and heels made largely from reclaimed rubber.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are rather modest. Demand for the product generally is on the increase in developing areas. However, keen competition may be expected from large-scale producers of rubber products, who benefit from having a wide range of products and can maintain large sales organizations.

C. MARKET ASPECTS

1. USERS. Shoe manufacturers and repairers.

2. SALES CHANNELS AND METHODS. Sales would be made to shoe manufacturers and to wholesalers for distribution to shoe repair shops and stores.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are very easily transported and shipping costs are insignificant. The market may be nationwide. b. Export. These products are widely sold in international markets.

4. COMPETITION. a. Domestic Market. Leather soles and heels will compete if the price is low enough. Imports may also offer keen competition
b. Export Market. This plant would be too small to compete in general international trade.

5. MARKET NEEDED FOR PLANT DESCRIBED. Shoe-wearing practices vary too greatly from to place to make it possible to generalize on the size of population needed as a market. A careful preliminary survey of market possibilities should be made.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 200,000 Pounds

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1/2 acre.		$ --
Building. One story, 50'x70'.		21,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$20,000	
Other tools & equipmt.	1,300	
Furniture & fixtures	700	22,000
Total (excl. Land)		$ 43,000

Principal Items. Two-roll milling machine (36-inch) with motor, pre-form cutter, compounding equipment, hydraulic press, 30 individual type molds (soles), 30 individual type molds (heels).

b. WORKING CAPITAL

	No of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	$ 17,100
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,000
Training Costs		1,900
Total Working Capital		$ 21,000

c. TOTAL CAPITAL (EXCL. LAND) $ 64,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Smoked sheets	27,000 lbs.	$ 9,000
Reclaimed rubber	197,000 lbs.	19,700
Zinc oxide	5,000 lbs.	800
Carbon black	10,800 lbs.	900
Paraffin wax	1,900 lbs.	200
Stearic acid	1,900 lbs.	300
Antioxidant	1,000 lbs.	100
Sulfur	3,800 lbs.	500
Packaging material		2,500
Total		$ 34,000
b. Supplies		
Lubricants & hand tools		$ 200
Cutting tools & abrasives		200
Maintenance & spare parts		700
Office supplies		300
Total		$ 1,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 60 hp.	$ 800
b. Fuel. Production & heating.	$ 900
c. Water. For production, sanitation, & fire Protection.	$ 200

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	2	$ 12,000
Semi-skilled	5	25,000
Unskilled	2	8,000
Total	9	$ 45,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Maintenance	1	5,500
Total	3	$ 20,500

c. Training Needs. Manager must be fully experienced. With 2 skilled workers, he should be able to train other workers and reach full production in about 1 month.

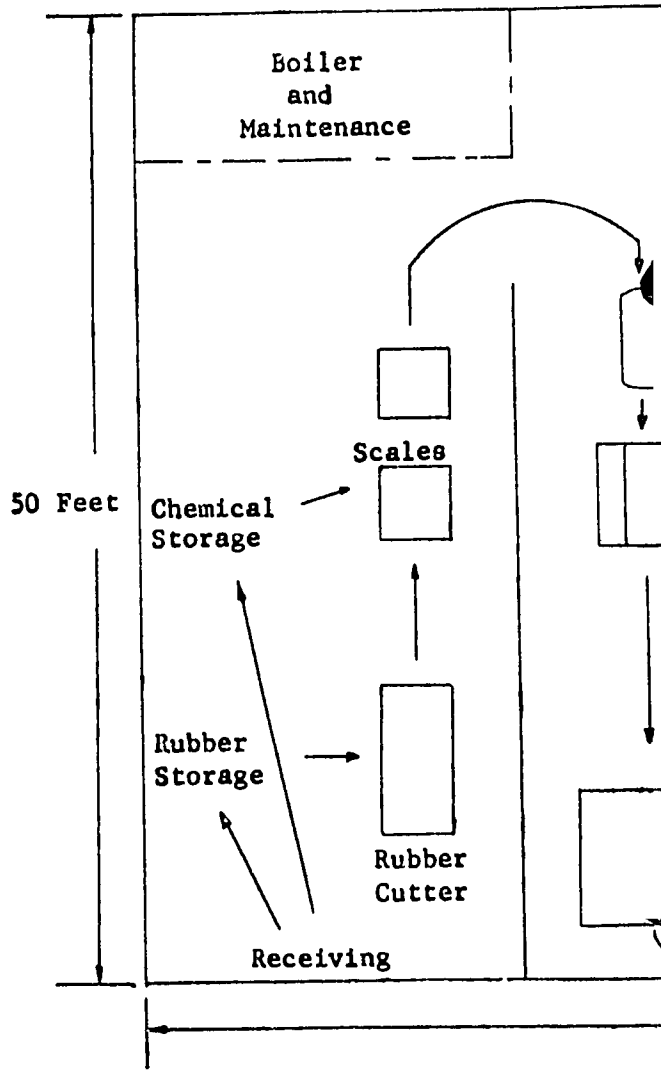
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	$ 34,000
Direct Labor	45,000
Manufacturing Overhead (a)	23,800
Admin. Costs (b), Contingencies	8,500
Sales Costs(c), Bad Debts	18,000
Depreciation on Fixed Capital	3,400
Total	$132,700
b. Annual Sales Revenue	$160,000

NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

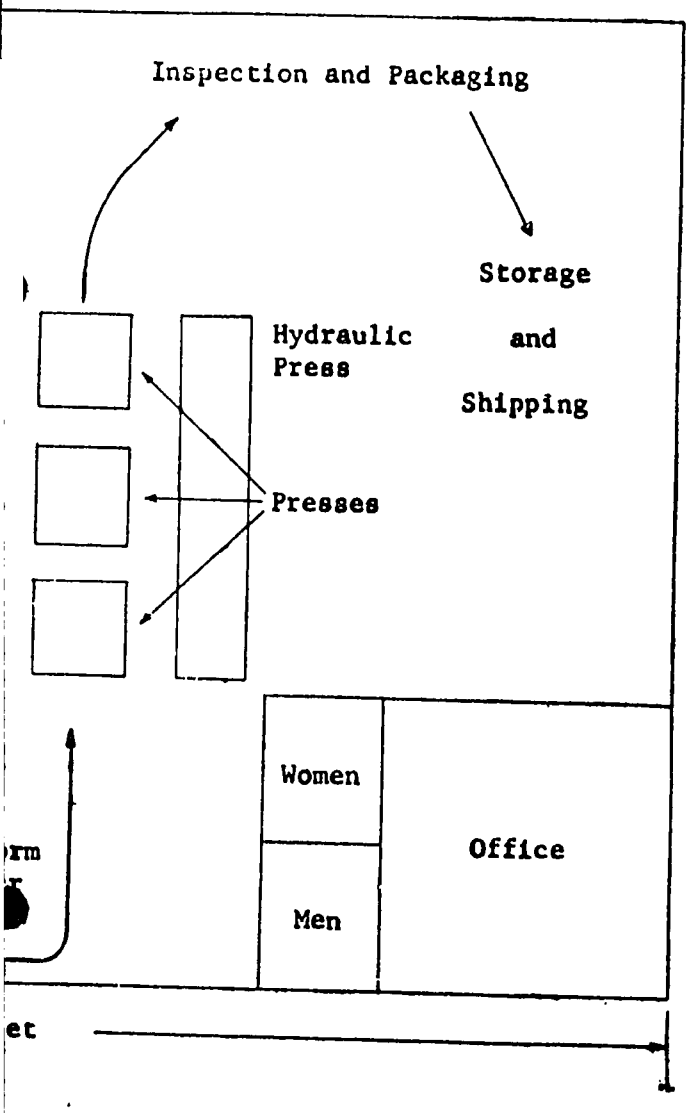
RUBBER SOLES

PLANT LAY



HEELS : S. I. C. 3069

D WORKFLOW



RUBBER SOLES AND HEELS: S.I.C. 3069

SELECTED REFERENCES

I. TEXTBOOKS

A. National and Synthetic Rubber. D. W. Huke. 1961. $5.00.
Tudor Publishing Co.
221 Park Avenue South
New York, N. Y. 10003

B. Rubber Technology. W. E. Burton. 1949. 461 p. $8.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

C. Modern Rubber Chemistry. H. Barron. 1948. 502 p. Illus. $10.00.
D. Van Nostrand Company, Inc.
120 Alexander Street
Princeton, New Jersey 08540

II. U. S. GOVERNMENT PUBLICATIONS

A. Visual Inspection Guide for Rubber Footwear. 1956. 36 p. Illus. $.30.
Catalog No. D7. 10.248.
Superintendent of Documents
Government Printing Office
Washington, D. C. 20402

B. Rubberized Fabrics - IR-30159. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Rubber World. Monthly. $7.00/year.
Bill Brothers Publishing Corporation
630 Third Avenue
New York, N. Y. 10017

B. Rubber Age. Monthly. $6.00/year.
Palmerton Publishing Company
101 West 31st Street
New York, N. Y. 10001

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 3,008,469. 1961. 5 p.
Molded outsole for footwear.

B. Patent No. 3,005,272. 1961. 3 p.
Pneumatic shoe sole.

C. Patent No. 2,985,972. 1961. 3 p.
Rubber heel.

D. Patent No 2,985,971. 1961. 3 p.
Rubber flexible soles and heels.

V. TRADE ASSOCIATIONS

A. Rubber Manufacturers Association
444 Madison Avenue
New York, N. Y. 10022

B. Rubber Heel and Sole Institute
10 Adams Drive
Princeton, New Jersey 08540

VI. ENGINEERING COMPANIES

A. Wiltrim Division of Ferry Machine Company
1422 West Main Street
Kent, Ohio 44240
Machines for trimming heels and soles.

B. McNeil Machine and Engineering Company
100 East Crosier
Akron, Ohio 44311
Machinery for production of many kinds of rubber products.

'II. DIRECTORY

A. Rubber Red Book. Annual. $15.00.
Rubber Age
101 West 31st Street
New York, N. Y. 10001
Information on United States rubber manufacturers, products, plants, machinery, and personnel.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

SANDPAPER

I. P. No. 66197

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services. patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

SANDPAPER: Standard Industrial Classification 3291

A. PRODUCT DESCRIPTION

Sandpaper in various grits and grades for industrial and household uses. Standard sheet size 9" x 10".

B. GENERAL EVALUATION

This plant requires a moderately large capital, and good management in order to maintain product quality. The big problem would be to find a market for the quantity of sandpaper that the plant is designed to produce. This may be possible in only a few developing areas.

C. MARKET ASPECTS

1. USERS. Woodworkers, metal finishers, painters, many industries, households.

2. SALES CHANNELS AND METHODS. Sales to industrial supply houses, hardware and variety stores, lumber dealers, etc.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The product can be very easily shipped and transport costs are small in relation to value. Sales may be nation-wide. b. Export. This is a common export item.

4. COMPETITION. a. Domestic Market. If the product is of good quality, it should be able to meet competition from imports. b. Export Market. If the plant is suitably located, it might be able to make some regional exports.

5. MARKET NEEDED FOR PLANT DESCRIBED. For an item such as sandpaper the plant's production is substaintial. Even in a fairly advanced area the quantity would meet the needs of probably upwards of five million people.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 12 Million Sheets size 9"x10"

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 1 acre.		$ --
Building. 60'x100',		40,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$55,000	
Other tools & equipmt.	8,500	
Furniture & fixtures	1,500	
Transportation equipmt.	4,000	69,000
Total (excl. Land)		$109,000

Principal Items. 3-stage coating machine, paper cut-off machine, conveyors or lift truck to handle rolls of paper, closed van.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 22,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,500
Training Costs		1,000
Total Working Capital		$ 26,000

c. TOTAL CAPITAL (EXCL. LAND) $135,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Paper	300,000 lbs.	$ 36,000
Grits	180,000 lbs.	9,000
Adhesive	15,000 gals.	11,500
Packing material	25,000 lbs.	2,500
Total		$ 59,000

b. Supplies	
Lubricants & hand tools	$ 1,500
Cutting tools & abrasives	500
Maintenance & spare parts	1,800
Office supplies	600
Total	$ 4,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 50,000 kw-hr annually.	$ 900
b. Fuel. Gas.	$ 700
c. Water. About 1.6 million gals. annually.	$ 400

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 2-ton closed van for pickup and delivery.	$ 1,000
b. External Transport Facilities. No special requirements.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	1	5,000
Unskilled	4	16,000
Total	7	$ 33,000
b. Indirect Labor		
Manager & supervisor	2	$ 18,000
Office	2	11,000
Other	2	9,000
Total	6	$ 38,000

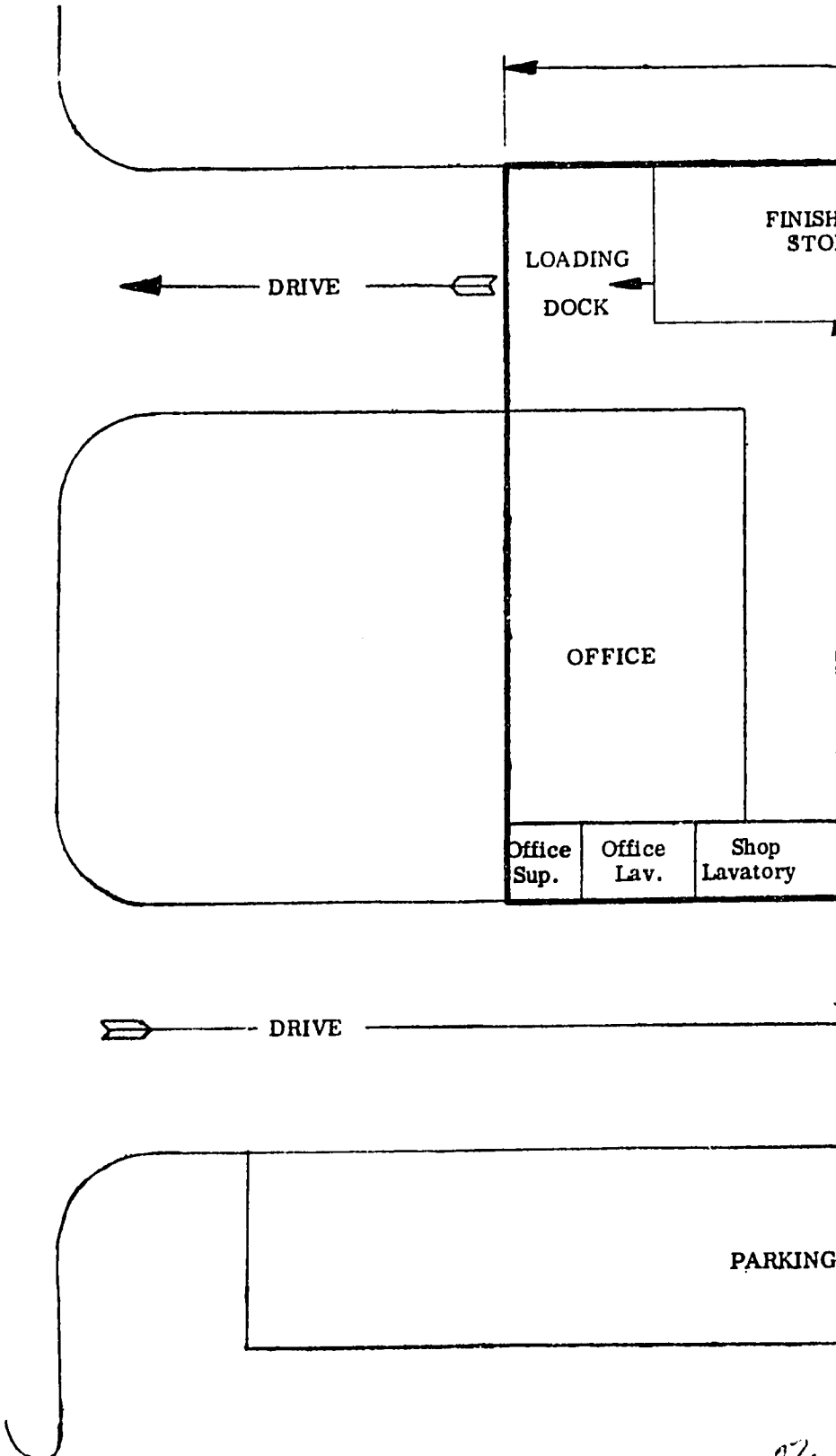
c. Training Needs. Manager should be fully trained. With supervisor and 2 skilled set up men, he should be able to do all labor training & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

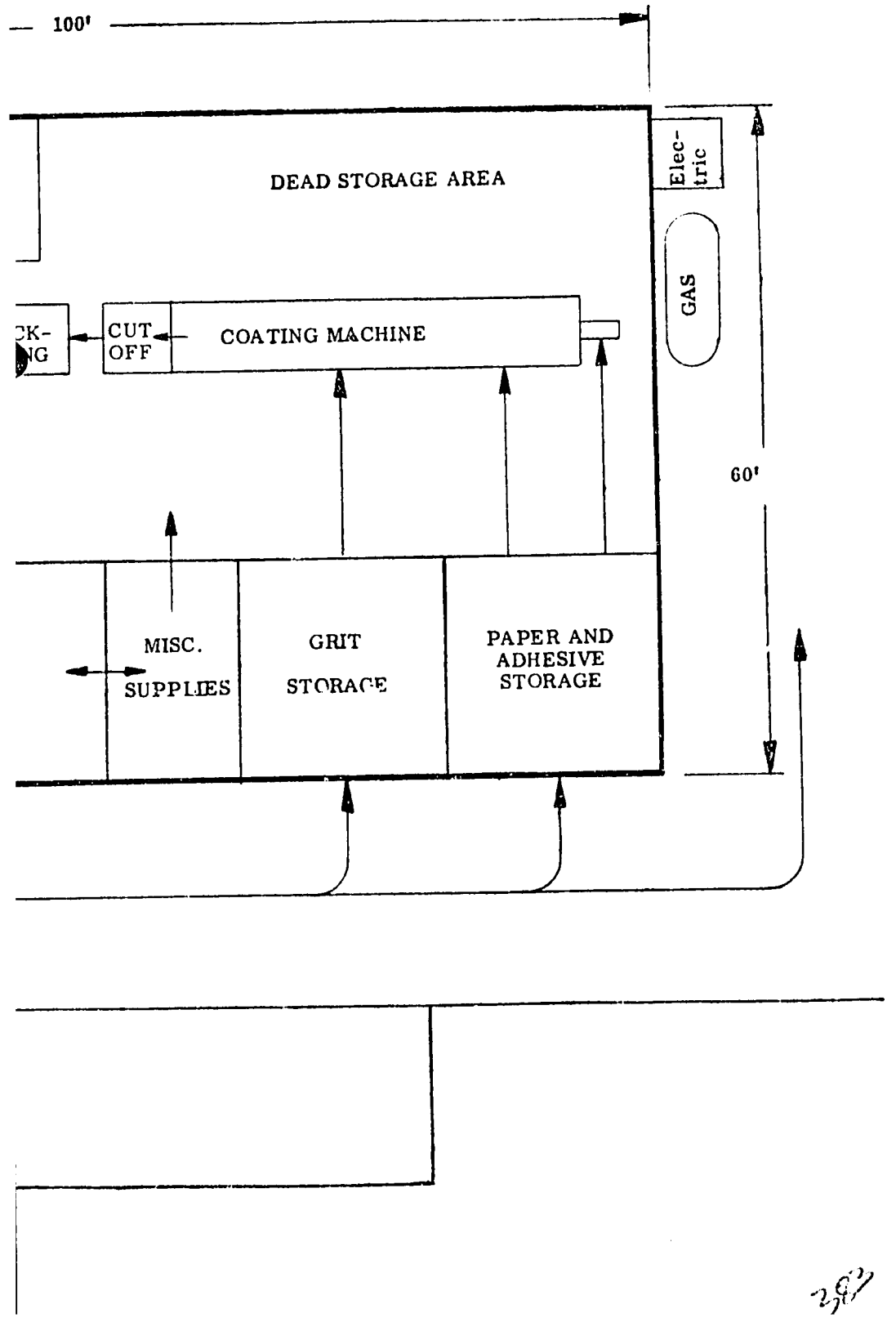
a. Annual Costs	
Direct Materials	$ 59,600
Direct Labor	33,000
Manufacturing Overhead(a)	45,400
Admin. Costs(b), Contingencies	28,000
Sales Costs (c), Bad Debts	33,000
Depreciation on Fixed Capital	10,400
Total	$208,800
b. Annual Sales Revenue	$250,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

SANDPAPER: S.I.C. 3291


FINISH
STO
LOADING
DOCK
DRIVE
OFFICE
Office
Sup.
Office
Lav.
Shop
Lavatory
DRIVE
PARKING

: S.I.C. 3291


100'
DEAD STORAGE AREA
Elec-
tric
GAS
CK-
NG
CUT
OFF
COATING MACHINE
60'
MISC.
SUPPLIES
GRIT
STORAGE
PAPER AND
ADHESIVE
STORAGE

SANDPAPER: S.I.C. 3291

SELECTED REFERENCES

I. TEXTBOOKS

A. Coated Abrasives. Coated Abrasives Manufacturers Institute. 1958. 426 p. Illus. $8.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
Covers machinery, equipment, materials, and processes used in the making of sandpaper.

B. Specialty Papers. Rebert H. Mosher, editor. 1950. 520 p. Illus. $10.00.
Chemical Publishing Company
212 Fifth Avenue
New York, N. Y. 10010
Describes the composition and preparation of functional and coated papers, including sandpaper.

C. Paper: Its Making, Merchanting and Usage. Samuel C. Gilmour. 1955. 324 p. Illus. $8.50.
Longmans, Green & Company, Inc.
55 Fifth Avenue
New York, N. Y. 10003
Data on manufacture and marketing of various kinds of paper, including sandpaper.

II. U. S. GOVERNMENT PUBLICATION

A. Manufacture of Sandpaper. IR-21762. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Paper and Paper Products. Semi-monthly. $5.00/year.
Walden, Sons & Mott Inc.
466 Kinderkamack Road
Oradell, New Jersey 07649

B. Paper Indurtry. Monthly. $3.00/year.
Fritz Publications, Inc.
431 South Dearborn Street
Chicago, Ill. 60605

IV. U.S. PATENTS

Available U.S. Patent Office
Washington, D.C. 20231 $.25 each.

A. Patent No. Re 22,419. Reissued 1944. 10 p.
Method for making sandpaper and other abrasive articles, and apparatus therefor.

B. Patent No. 2,609,284. 1952. 4 p.
Making of sandpaper wherein the binder is a modified starch adhesive.

V. TRADE ASSOCIATIONS

A. American Society for abrasives
120 North Fifth Street
Reading, Pennsylvania 19601

B. Coated Abrasives Manufacturers Institute
711 Third Avenue
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

A. Technology Engineering Co., Inc.
71 Forest Street
Brockton, Mass. 02402
Specializes in engineering and process equipment for paper and allied products.

B. Alvin H. Johnson & Co., Inc.
415 Lexington Avenue
New York, N. Y. 10017
Consulting and designing engineers for the paper industry.

VII. DIRECTORY

A. Paper Yearbook. Annual. $10.00.
Davidson Publishing Company
405 East Superior Street
Duluth, Minn. 55802
Lists and describes every type of paper and paper product and its manufacturers.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles*. Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

STEEL MECHANICAL TUBES

I. P. No. 66198

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

STEEL MECHANICAL TUBES: Standard Industrial Classification 3317

A. PRODUCT DESCRIPTION

Mechanical tubing, sizes ⅛" to 3" diameter, made from purchased steel sheets, by electric welding process.

B. GENERAL EVALUATION

This industry requires a moderately large capital investment. The equipment needed is heavy and expensive, and the building needed to house it must be of strong construction and will therefore be fairly costly. In economically less developed areas, the market for the product will almost certainly be domestic only. In these conditions, the plant will be economically feasible only if there already exists in the area a sizable complex of secondary industries using steel mechanical tubes. Furthermore, where the steel sheets need to be imported, the differences between the cost of importing steel sheets and manufacturing them into tubing locally may not compare very favorably with importing the finished tubes. The relative cost of local manufacture from imported sheets and of import of the finished products should be carefully examined. On the other hand, where a large internal market does exist it is worth noting that production in the plant described could be substantially expanded by working the machinery for a longer period than the 250 eight-hour days annually on which the quoted capacity figure is based. Also, an additional tube machine, possibly making a different range of sizes, could be operated by the same crew required to operate one machine.

C. MARKET ASPECTS

1. USERS. A large variety of industries, making furniture, household articles, and many other kinds of goods.

2. SALES CHANNELS AND METHODS. Sales are made chiefly direct to user industries. Some may be made to wholesale distributors of metal products.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are easy to handle. Value in relation to weight is fairly high, and transport costs are not generally very burdensome. With a reasonably good transport network, the potential domestic market may be nationwide. b. Export. These products are exported all over the world by the major industrial countries.

4. COMPETITION. a. Domestic Market. Competition from imports is likely to be strong. In some cases, alternative materials, e.g. wood, plastics, may compete. b. Export Market. A plant of this type and size, located in one of the less developed areas would stand little chance of developing an export market in competition with large-scale producers in advanced industrial areas.

5. MARKET NEEDED FOR PLANT DESCRIBED. The uses for these products are very varied. No useful generalization can be made about the size of the market required for this plant, in terms of total population, or other yardstick. In the conditions of the less developed areas, however, it will be necessary to have a fair-sized complex of user industries already existing within the potential domestic market area.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 11 Million Feet of Tube

. CAPITAL REQUIREMENTS

. FIXED CAPITAL		Cost
Land. About 1/2 acre.		$ --
Building. One story, 60'x250', steel frame construction, to support overhead travelling crane.		100,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$190,000	
Other tools & equipmt.	4,000	
Furniture & fixtures	800	194,800
Total (excl. Land)		$294,800

Principal Items. Slitter, welding machine, 4 sets of rolls, air compressor, electrical equipment, 5 ton crane, punch press.

WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 94,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	8,600
Training Costs		5,300
Total Working Capital		$108,700

. TOTAL CAPITAL (EXCL. LAND)	$403,500

. MATERIALS AND SUPPLIES

. Direct Materials	Annual Requirements	Annual Cost
Sheet steel	3,000 tons	$480,000
. Supplies		
Rolls		$ 12,000
Electrodes		2,500
Maintenance & repair parts		2,500
Lubricants		1,500
Office supplies		500
Total		$ 19,000

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 130 hp.	$ 4,000
b. Fuel. About 15,000 gals. oil, or equivalent in other fuels, annually for heating, etc.	$ 1,800
c. Water. About 2.4 million gals. annually for cooling in production process, & for general purposes.	$ 600

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. Total in & out shipments about 500 tons a month. Good highway & proximity to railroad necessary.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	3	15,000
Unskilled	3	12,000
Total	8	$ 39,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	2	10,000
Other	1	4,500
Total	4	$ 24,500

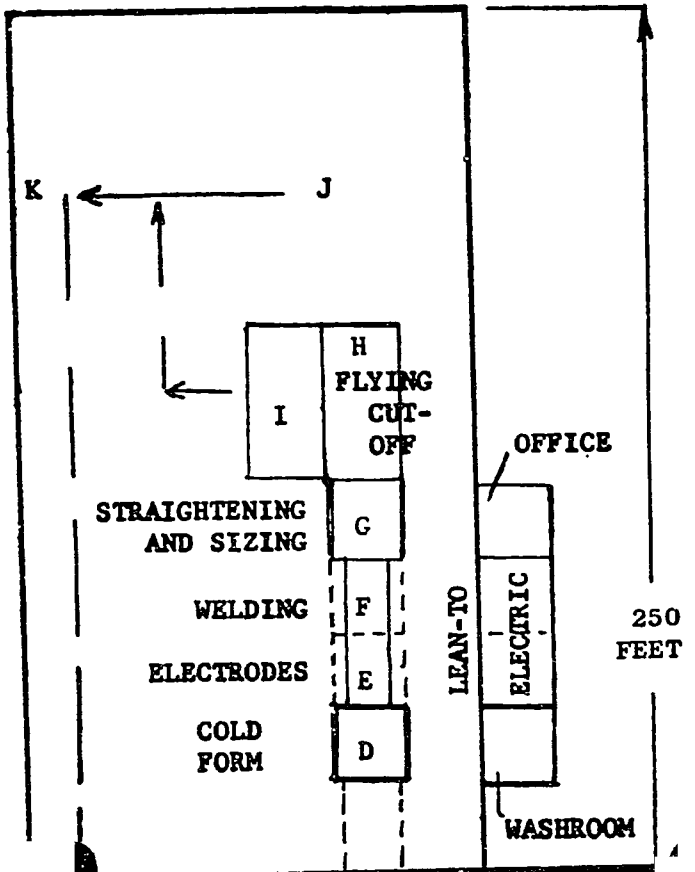
c. Training Needs. Manager should be fully experienced. Together with 2 skilled operators, he should be able to do all labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

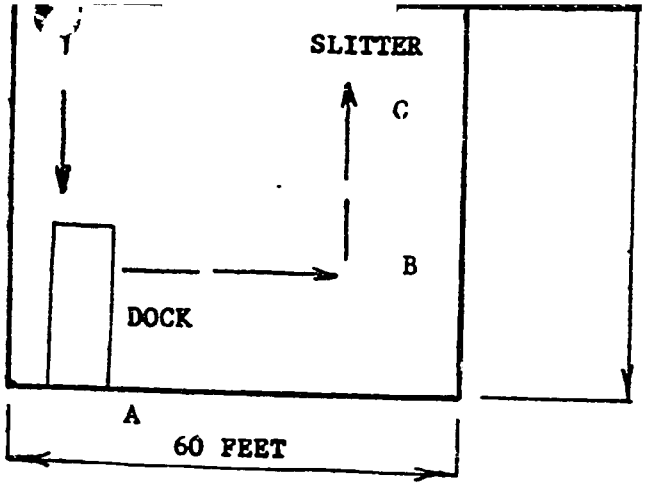
a. Annual Costs	
Direct Materials	$480,000
Direct Labor	39,000
Manufacturing Overhead(a)	49,900
Admin. Costs(b), Contingencies	36,000
Sales Costs(c), Bad Debts	75,000
Depreciation on Fixed Capital	24,900
Total	$704,800
b. Annual Sales Revenue	$825,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT AND WORK FLOW



STEEL MEC



A. Receiving and unloading
B. Sted sheet storage
C. Slitting
D. Cold forming
E. Tube closing and heating
F. Welding
G. Straightening and signing
H. Cutting
I. Bundling
J. Storage
K. Shipping

This is a continuous straight line operation.

STEEL MECHANICAL TUBES: S. I. C. 3317

SELECTED REFERENCES

I. TEXTBOOKS

A. Engineer's Guide to Steel. Albert Hanson and J. G. Parr. 1965. $13.75.
Addison-Wesley Publishing Co., Inc.
Reading, Mass. 01867

B. Metallurgy of the Ferrous Metals. W. H. Dennis. 1964. $16.50.
Pitman Publishing Corporation
20 East 46th Street
New York, N. Y. 10017

C. The Making, Shaping, and Treating of Steel. J. M. Camp and C. B. Francis. $7.50.
United States Steel Company
525 William Penn Place
Pittsburg, Penna. 15219

D. Formed Steel Tubing Handbook. $10.00.
Formed Steel Institute
Cleveland, Ohio 44114

E. The Procedure Handbook of Arc Welding Design and Practice. $3.00.
Lincoln Electric Company
Cleveland, Ohio 44114

F. Steel Products Manual is published by American Iron and Steel Institute, 350 Fifth Avenue, New York 1, New York, in pamphlet form at $.25 per pamphlet. There are thirty of these pamphlets, each covering a special area of steel manufacture.

II. U. S. GOVERNMENT PUBLICATION

A. Steel Mechanical Tubes. TI-57. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

A. Iron Age. Weekly. $25.00/year.
The Chilton Company
Chestnut and 56th Streets
Philadelphia, Penna. 19139

B. Steel. Weekly. $20.00/year.
Penton Publishing Company
1213 West 3rd Street
Cleveland, Ohio 44113

C. Metal Progress. Monthly. $7.00/year.
American Society for Metals
7301 Euclid Avenue
Cleveland, Ohio 44103

IV. U. S. PATENTS

Available U. S. Patent Office
Washington D. C. 20231 $.25 each.

A. Patent No. 2,901,818. 1959. 6 p.
Apparatus and process for making small size steel tubes.

B. Patent No. 2,889,721. 1959. 4 p.
Small steel tube processing machine.

C. Patent No. 2,775, 675. 1956. 4 p.
Method and equipment for making small diameter welded steel tubes.

V. TRADE ASSOCIATIONS

A. American Iron and Steel Institute
150 East 42nd Street
New York, N. Y. 10017

B. Steel Service Center Institute
540 Terminal Building
Cleveland, Ohio 44113

VI. ENGINEERING COMPANIES

A. The Yoder Company
5528 Walworth Avenue
Cleveland, Ohio 44102

B. Blaw-Knox Company
Farmers Bank Building
Pittsburgh, Penna. 15222

C. United Engineering and Foundry Company
948 Fort Duquesne Boulevard
Pittsburgh, Penna. 15222

VII. DIRECTORIES

A. Directory of Iron and Steel Plants. $16.00.
624 Grant Building
Pittsburgh, Penna. 15230

B. Dun and Bradstreet's Metal Work Directory. $150.00.
Dun and Bradstreet, Inc.
99 Church Street
New York, N. Y. 10008

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

UNBREAKABLE WATCH CRYSTALS

I. P. No. 66199

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

UNBREAKABLE WATCH CRYSTALS: Standard Industrial Classification 3079

A. PRODUCT DESCRIPTION

Watch crystals molded from plexiglas.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderate. The main problem would usually be to find a market for the output. However, the equipment could be used to make other plastic products if additional dies are purchased, and in many cases it might be more feasible to undertake the manufacture of a variety of products.

C. MARKET ASPECTS

1. USERS. Watch manufacturers and repairers.

2. SALES CHANNELS AND METHODS. Sales to watch manufacturers and wholesalers supplying watch repairers.

3. GEOGRAPHICAL EXTENT OF MARKET. Because of the ease with which the product can be shipped and the small transport cost in relation to product value, the market, both domestic and foreign, could be, and generally would have to be, extensive.

4. COMPETITION. It should normally be possible to meet any import competition, if the product is up to standard. If costs are low enough, some export business might well be possible.

5. MARKET NEEDED FOR PLANT DESCRIBED. If the plant makes only watch crystals, it is obvious that even where per capita income is high a population of many millions would be needed to absorb the plant's output. A careful market survey should be made to determine whether a market could be found for other items that the plant could make.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 2.5 Million Watch Crystals

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 10,000 sq. ft.		$ --
Building. One story, 50'x100'.		30,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$ 46,000	
Other tools & equipmt.	1,000	
Furniture & fixtures	700	
Transportation equipmt.	2,400	50,100
Total (excl. Land)		$ 80,100

Principal Items. Air compressor, dust eliminator, drying oven, granulator, injection molding machine, injection assembly, counting scale, 10 dies, drill press, heat treat oven, engine lathe, milling machine, bench grinder, arbor press, jigs & fixtures, die stock (sets), benches, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 11,500
Admin. Costs(b), Contingencies, Sales Costs (c)	30	2,000
Training Costs		1,100
Total Working Capital		$ 14,600

c. TOTAL CAPITAL (EXCL. LAND) $ 94,700

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Plexiglas	6,000 lbs.	$ 3,600
Envelopes	2,500,000	3,800
Boxes	50,000	1,500
Cartons	1,000	300
Total		$ 9,200

b. Supplies	
Lubricants & hand tools	$ 300
Maintenance & spare parts	2,000
Dies	8,000
Office supplies	300
Total	$ 10,600

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 120 hp.	$ 2,000
b. Fuel. For production, and heating, if necessary.	$ 1,200
c. Water. About 1.8 million gals. makeup, plus sanitation & fire protection.	$ 500

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton pickup truck.	$ 1,000

b. External Transport Facilities. No. special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	$ 7,000
Semi-skilled	3	15,000
Unskilled	1	4,000
Total	5	$ 26,000
b. Indirect Labor		
Manager	1	$ 9,000
Office	1	5,000
Truck driver	1	4,500
Total	3	$ 18,500

c. Training Needs. Manager should be fully experienced. With the skilled worker, he should be able to train others & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

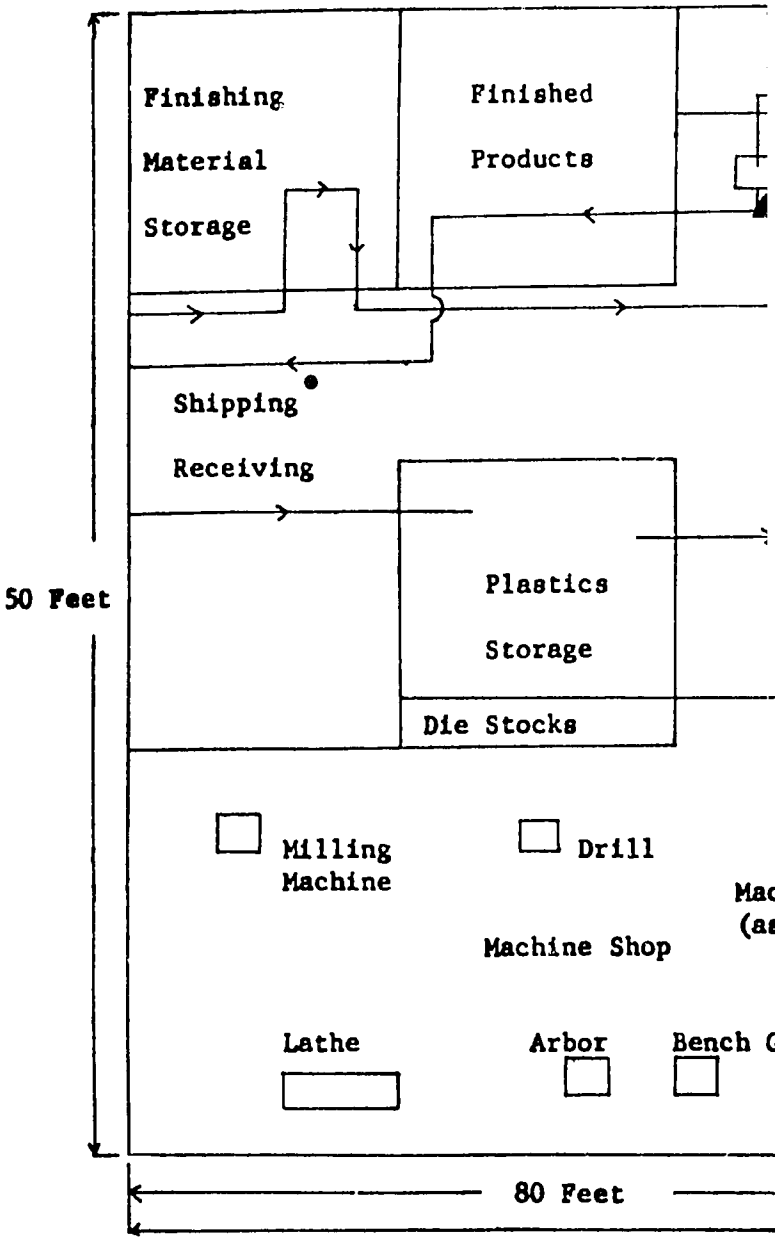
a. Annual Costs	
Direct Materials	$ 9,200
Direct Labor	26,000
Manufacturing Overhead(a)	33,800
Admin. Costs(b), Contingencies	11,000
Sales Costs(c), Bad Debts	14,000
Depreciation on Fixed Capital	6,800
Total	$100,800

b. Annual Sales Revenue	$130,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

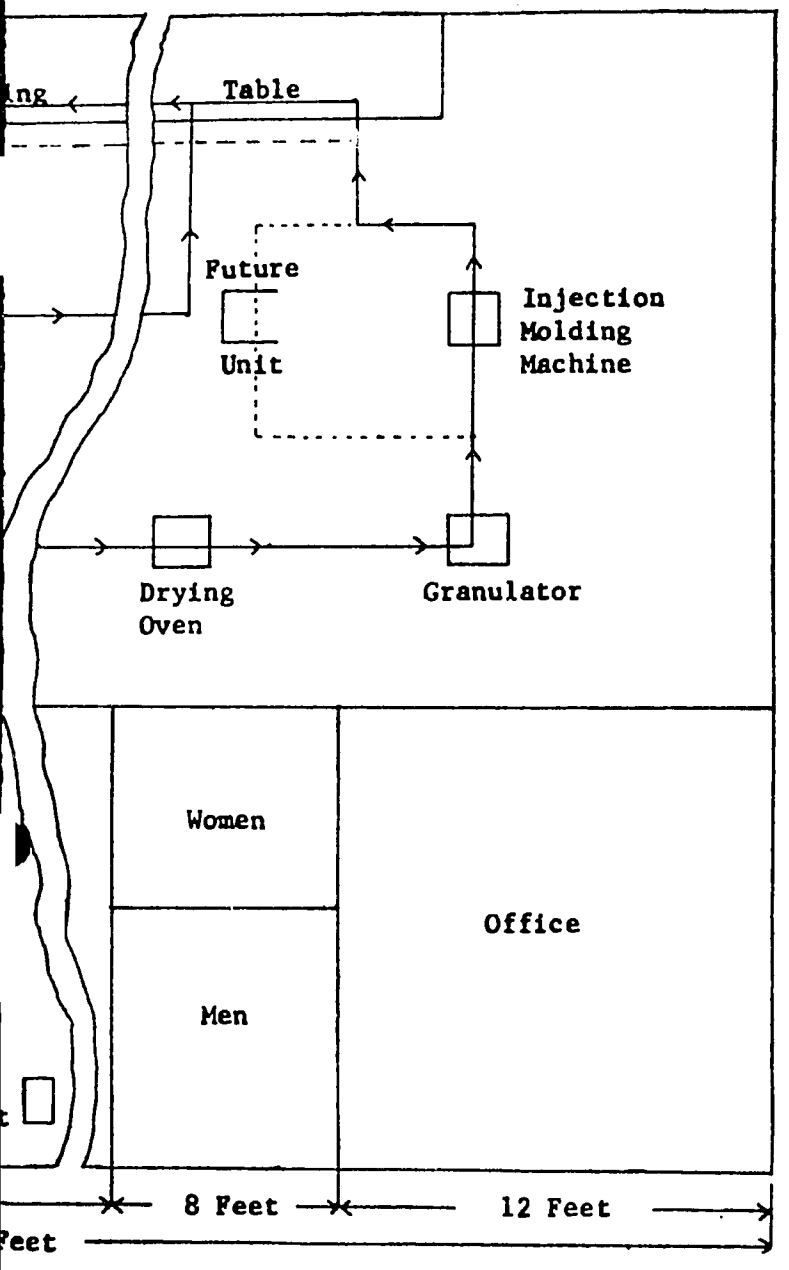
UNBREAKABLE W

PLANT LAY



RYSTALS S.I.C. 3079

WORKFLOW



UNBREAKABLE WATCH CRYSTALS: S.I.C. 3079

SELECTED REFERENCES

I. TEXTBOOKS

A. Industrial Arts Plastics. Lauton Edwards. 1964. $4.40.
Chas. A. Bennett Co., Inc.
237 North Monroe Street, Peoria, Ill. 61602

B. Plastics Today. Arnold Allcott. 1960. $3.40.
Oxford University Press, Inc.
417 Fifth Avenue, New York, N. Y. 10016

C. Plastics Engineering Handbook. The Society of the Plastics Industry. 625 p. 1960. $15.00.
Reinhold Publishing Corporation
430 Park Avenue, New York. N. Y. 10022

D. Technical Data on Plastics. F. G. Stevens. 1957. 213 p. $3.95.
Manufacturing Chemists' Association, Inc.
1625 Connecticut Avenue, N. W., Washington, D. C. 20009

II. U. S. GOVERNMENT PUBLICATION

A. Unbreakable Watch Crystals. TI-79. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICAL

A. Plastics Industry. Monthly. $5.00/year.
Vincent Edwards and Company
342 Madison Avenue, New York, N. Y. 10017

B. Modern Plastics. Monthly. $5.00/year.
Breskin Publications, Inc.
575 Madison Avenue, New York, N. Y. 10022

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,995,159. 1961. 6 p.
Portable plastic injection machine for use with dies, in stamping of small plastic articles.

B. Patent No. 2,991,504. 1961. 4 p.
Extrusion die and its use with plastic materials.

C. Patent No. 2,980,960. 1961. 16 p.
Press for use in continuous molding of plastic articles.

D. Patent No. 2,979,768. 1961. 13 p.
Apparatus for extrusion of plastics into molding dies.

V. TRADE ASSOCIATIONS

A. Plastic Products Manufacturers Association
1133 Broadway, New York, N. Y. 10010

B. National Association of Plastic Fabricators
1108 Standard Building, Cleveland, Ohio 44113

VI. ENGINEERING COMPANIES

A. Chemold Company
Colorado Avenue at 20th Street, Santa Monica, Calif. 90404
Plastic research, development, and production.

B. Rogers Corporation
Mill Street, Rogers, Conn. 06263
Design for plastic material and molding.

VII. DIRECTORY

A. Directory of the Plastic Industry. Annual. $1.00.
Cleworth Publishing Company
1 River Road, Cos Cob, Conn. 06807
Lists sources of materials, supplies, equipment, and services for the plastics industry.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards – CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

INDUSTRY PROFILES

WATER FILTERS, DOMESTIC

I. P. No. 66200

Industry Profiles are intended to promote the development of private industry in the developing countries by assembling economic and technical information in a professional analysis to support basic decisions in the establishment of small or medium-scale plants in a specific industry. The information contained in a profile is selected and organized for the guidance of the entrepreneur in the less developed country.

Industry Profiles contain basic information on market aspects, production rates, capital requirements, materials and supplies, utilities, manpower operating costs and sales revenues. Work-flow diagrams and, in some instances, machinery layouts are included along with references to sources of technical information, professional services, patents, materials and equipment.

The profiles adopt as a benchmark, productivity rates and costs which could be anticipated under conditions prevailing in the United States. Anticipated profits are before taxes. Since conditions vary widely from country to country, the entrepreneur using this profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

WATER FILTERS, DOMESTIC: Standard Industrial Classification 3589

A. PRODUCT DESCRIPTION

Water filters for domestic use made of heavy galvanized sheet, ten gallons capacity with spout at bottom of tank, and constructed so that the filter may be removed for cleaning.

B. GENERAL EVALUATION

Many places still lack a pure water supply, and with greater awareness of health requirements, the practice of filtering water for drinking purposes is growing. This enterprise should have good prospects in many developing areas.

C. MARKET ASPECTS

1. USERS. Households, offices, etc.
2. SALES CHANNELS AND METHODS. Sales to hardware and other stores.
3. GEOGRAPHICAL EXTENT OF MARKET. The filters are shipped in corrugated cartons and are fairly easy to handle. They are often shipped long distances both internally and internationally.
4. COMPETITION. Import competition may be expected, and it is essential to have a good quality product. If the product is a good one some sales to neighboring countries might be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. Where such filters are in common use a population of about half a million might provide a large enough market.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 25,000 Filters

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

		Cost
Land. About 10,000 sq. ft.		$ --
Building. One story, 40'x60'.		14,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	$20,000	
Other tools & equipmt.	2,300	
Furniture & fixtures	700	23,000
Total (excl. Land)		$ 37,000

Principal Items. Square shears, forming rolls, punch press, welding equipment, drill press with tapping equipment, spray booth, factory trucks, assembly benches, compressor, grinder & polisher.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	$ 22,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,700
Training Costs		1,600
Total Working Capital		$ 25,900

c. TOTAL CAPITAL (EXCL. LAND) $ 62,900

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Galvanized sheets	200 tons	$ 35,000
Filters	75,000	30,000
Faucets	25,000	10,000
Gaskets	25,000	800
Welding rods		500
Paint		700
Cartons		6,000
Total		$ 83,000

b. Supplies

Lubricants & hand tools	$ 100
Cutting tools & abrasives	200
Maintenance & Spare parts	1,200
Welding supplies	300
Office supplies	300
Total	$ 2,100

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load 20 hp.	$ 400
b. Fuel. For heating, if necessary.	$ 200
c. Water. For sanitation & fire protection.	$ 100

4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	$ 12,000
Semi-skilled	2	10,000
Unskilled	4	16,000
Total	8	$ 38,000
b. Indirect Labor		
Manager	1	$ 10,000
Office	1	5,000
Maintenance	1	5,000
Total	3	$ 20,000

c. Training Needs. Manager must be fully experienced. With 2 skilled workers he should be able to train other employees and reach full production in about 1 month.

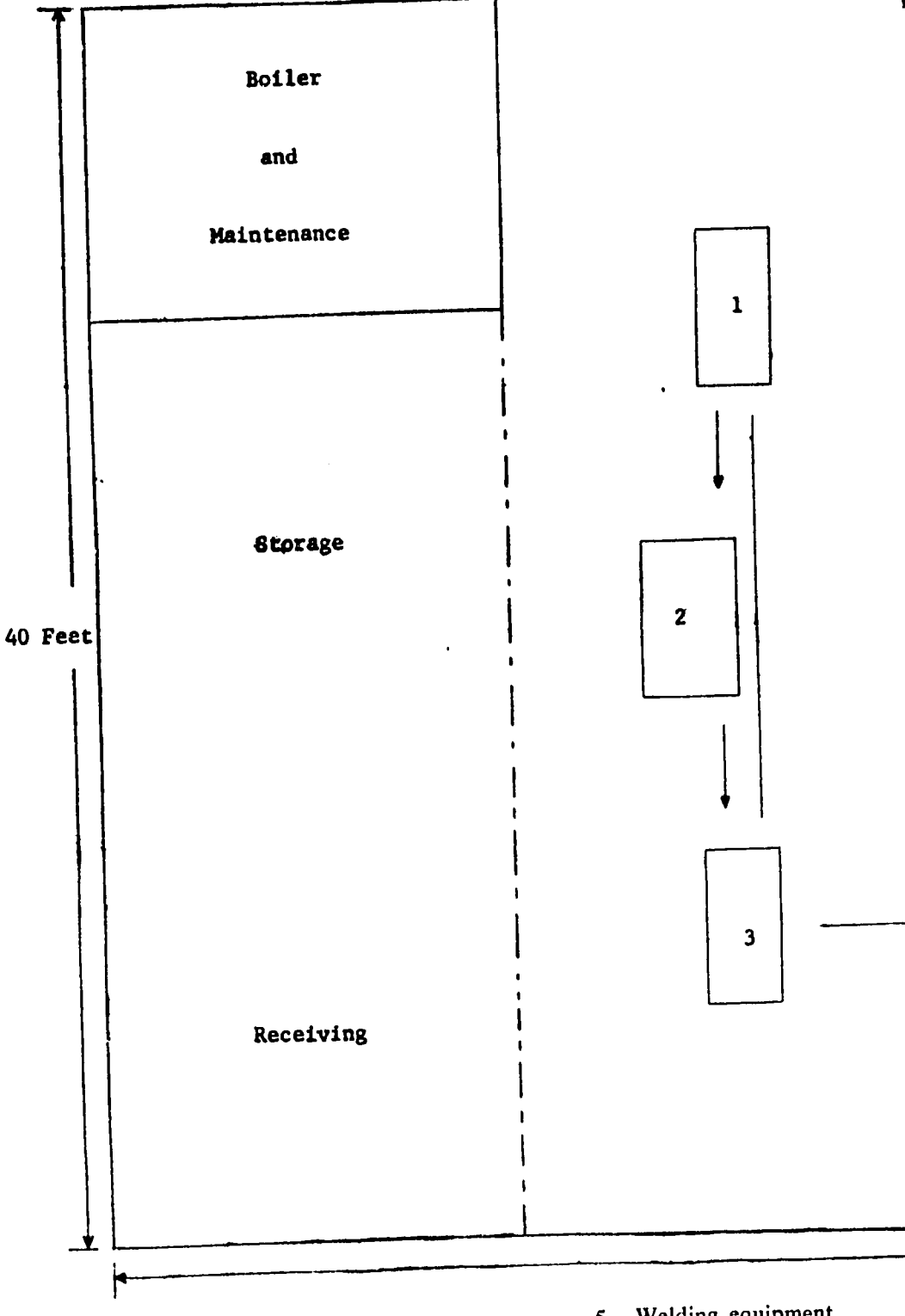
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs

Direct Materials	$ 83,000
Direct Labor	30,000
Manufacturing Overhead(a)	22,800
Admin. Costs(b), Contingencies	9,000
Sales Costs(c), Bad Debts	13,000
Depreciation on Fixed Capital	3,200
Total	$161,000

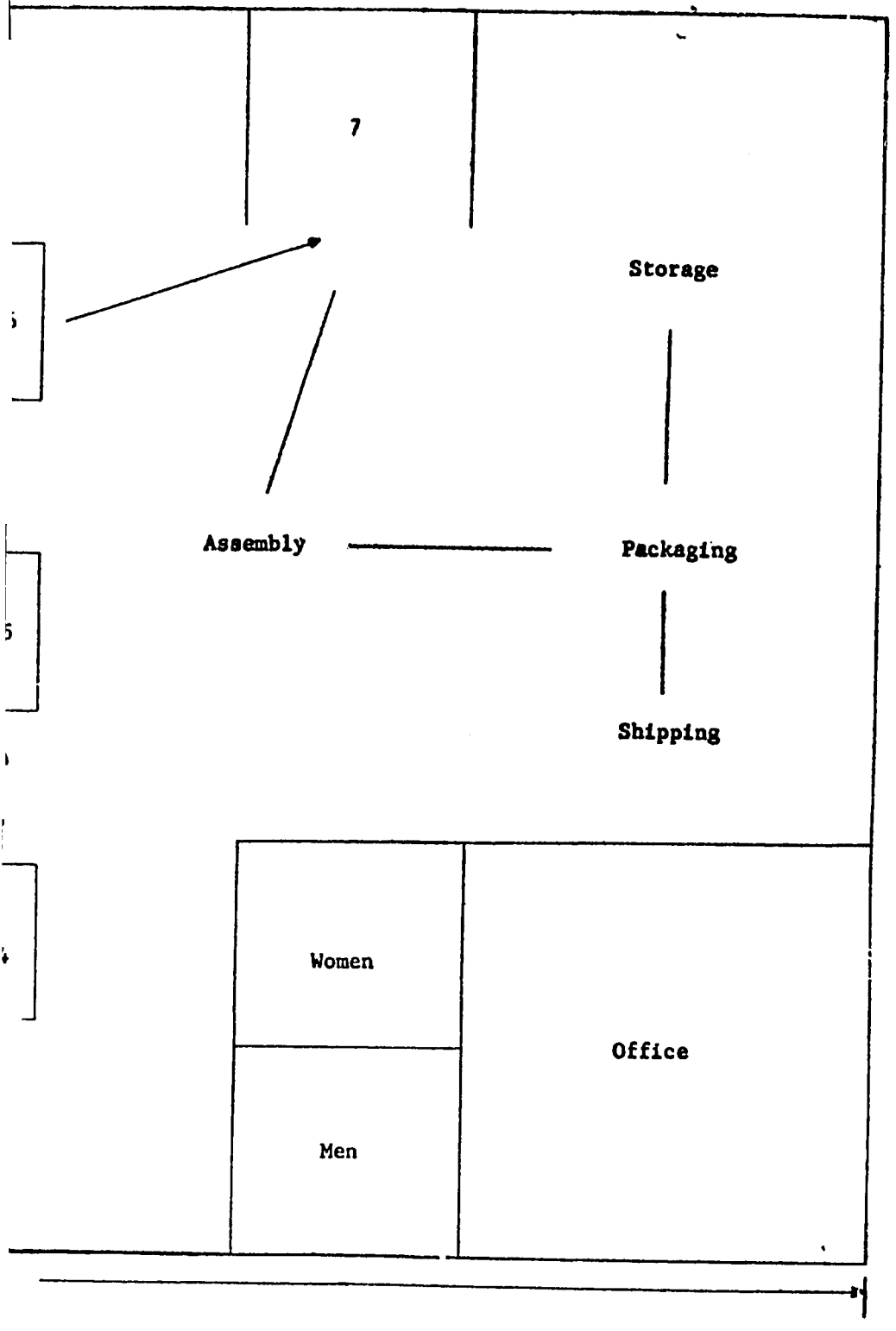
b. Annual Sales Revenue $200,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.



1. Square shear
2. Punch press
3. Forming rolls
4. Drill press with tapping equipment
5. Welding equipment
6. Grinder and polisher
7. Spray booth

ORKFLOW



WATER FILTERS, DOMESTIC: S.I.C. 3589

SELECTED REFERENCES

I. TEXTBOOKS

A. Basic Sheet Metal Work. Wray Youmans. 1964.
St. Martins Press, Inc.
175 Fifth Avenue, New York, N. Y. 10010

B. Sheet Metal Practice. W. Neundorf and C. Stevens. 1963. $2.95.
McGraw-Hill Book Company, Inc.
330 West 42nd Street, New York, N. Y. 10036

C. Die Methods. Paul B. Schubert, ed. 1965.
Industrial Press
93 Worth Street, New York, N. Y. 10013

D. ASTME Die Design Handbook. American Society of Tool and Manufacturing Engineers. 2nd Edn. 1965.
McGraw-Hill Book Company, Inc.
330 West 42nd Street, New York, N. Y. 10036

E. American Machinist Handbook. R. LeGrand. 1955. 1572 p. Illus. $15.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street, New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATION

A. Directory of Metal Working Machinery. Published irregularly. $6.75.
U. S. Government Printing Office
Division of Public Documents
Washington, D. C. 20402
Lists manufacturers of metal working machinery in the United States.

III. PERIODICALS

A. Mechanical Engineering. Monthly. $8.50/year.
American Society of Mechanical Engineers
29 West 39th Street, New York, N. Y. 10018

B. Machine and Tool Blue Book. Monthly. $5.00/year.
Hitchcock Publishing Company
Wheaton, Ill. 60187

IV. U.S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 $.25 each.

A. Patent No. 2,554,748· 1951. 4 p.
Water filter.

B. Patent No. 2,693,881. 1954. 7 p.
Filter housing and method of producing same.

C. Patent No. 2,372,520. 1945. 3 p.
Water filter.

V. TRADE ASSOCIATIONS

A. National Machine Tool Builders Association
2139 Wisconsin Avenue, N. W., Washington, D. C. 20007

B. National Tool, Die and Precision Machining Association
907 Public Square Building, Cleveland, Ohio, 44113

C. Tool and Die Institute
2435 North Laramie Avenue, Chicago, Ill. 60639

VI. ENGINEERING COMPANIES

A. M. J. Dalz and Sons, Inc.
541 Bank, Waterbury, Conn. 06702
Mechanical and consulting engineers.

B. Hungerford and Terry, Inc.
Atlantic Building, Clayton, New Jersey 08312
Engineering services for water softeners and filters.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

The foregoing information must be necessarily presented in concise form. Before an investment is made in a plant a feasibility study is suggested. The investor, for his planning, should have more information dealing with the specific locality contemplated. For obvious reasons, such information cannot be included in *Industry Profiles.* Such a study, therefore, should explore local factors and conditions, including costs, sources of raw materials and supplies, availability of utilities and fuel, manpower, transportation, etc.

The investor will need reasonably accurate information on Government and legal requirements, banking and financing, potential demand, competition, construction services, and manpower training requirements. Further, he should consider developing plans for management and production controls, operating procedures, and sales promotion.

ORDERING INSTRUCTIONS

The price of *Industry Profiles* is a minimum of $3.00 for from one to five "*Profiles.*" The purchaser may select up to five of any "*Profiles*" available.

Complete sets of the 250 *Industry Profiles* published in 1966, I. P. No. 66001 through I. P. No. 66250 consecutively, may be purchased for $125.00 per set. Complete sets of the 150 *Industry Profiles* to be published in 1967, I. P. No. 67251 through I. P. No. 67400 consecutively, may be purchased for $75.00 per set. The latter "*Profiles*" will automatically be shipped to full set purchasers upon release.

Address orders to: U.S. Department of Commerce
Clearinghouse for Federal Scientific and
Technical Information, 410.12
Springfield, Virginia 22151

Prepayment is required. Make check or money order payable to National Bureau of Standards — CFSTI. Clearinghouse deposit account holders may charge purchases to their accounts.

GENERAL INFORMATION

An *Index of Industry Profiles* is available on request from the Agency for International Development, AA/PRR, Washington, D. C. 20523.

This *Industry Profile* was prepared for the U. S. Agency for International Development by International Development Services, Inc., Washington, D. C.

410