

PN-ABY-473

Industry Profiles

Catalog of Investment Information and Opportunities

Volume V

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

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INDUSTRY PROFILES

PN ARY-473

AIR CONDITIONERS AND REFRIGERATORS

97069

I. P. No. 66201

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.

AIR CONDITIONERS AND REFRIGERATORS: Standard Industrial Classification 3585/3632

A. PRODUCT DESCRIPTION

Room air conditioners, and 13 cubic feet capacity refrigerators.

B. GENERAL EVALUATION

This is a small plant for this industry and it would have to meet the competition of some very large-scale and well-known makers. It could only hope to succeed if the necessary labor skills are available at low cost and if other costs are reasonable. Its market would almost certainly be predominantly local, which would mean that it must have easy access to a sizable and fairly prosperous urban community, with a good electric power supply.

C. MARKET ASPECTS

1. USERS. Homes, offices, hospitals, hotels, restaurants, clubs, etc.
2. SALES CHANNELS AND METHODS. Sales to wholesalers and large retail stores. An attractive brand name, general advertising, and active salesmanship are necessary.
3. GEOGRAPHICAL EXTENT OF MARKET. Though these products need careful packing and handling and are fairly bulky, they are commonly shipped long distances, both in domestic markets and internationally.
3. COMPETITION. Well-known makes of these products, whose manufacturers produce on a very large scale, are likely to offer severe competition both in the domestic and international markets. A plant of this size would, in fact, have virtually no chance of exporting. To meet the competition in the domestic market from internationally known brands, the plant would not only have to compete in quality, but probably have to sell at a lower price than large well-known makers in order to overcome the advantage that the latter have because of their entrenched position with consumers.
4. MARKET NEEDED FOR PLANT DESCRIBED. Provided that electric power is available, it should generally be possible to find a market for a plant of this kind in a developing urban community of about a million people in a warm country.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 3,000 Air Conditioners and 3,000 Refrigerators

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		<u>Cost</u>
Land. About 2 acres.	\$	--
Building. One story, 100'x100', Equipment, Furniture & Fixtures.	60,000	
Prodn. tools & equipmt.	\$155,000	
Other tools & equipmt.	7,500	
Furniture & fixtures	1,000	
Transportation equipmt.	2,400	165,900
Total (excl. Land)		\$225,900

Principal Items. Power square shears, power press brake, 4 power presses, milling machine, lathe, 2 drill presses, compressor, welding equipment, enamel spraying equipment, bench grinder, 3 flexible shaft grinders, dip tanks, assembly conveyor, dies & tools, laboratory & testing equipment, pickup truck.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 98,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	8,000
Training Cost		14,400
Total Working Capital		\$120,600

c. **TOTAL CAPITAL (EXCL. LAND)** **\$346,500**

2. MATERIALS AND SUPPLIES

	<u>Annual Requirements</u>	<u>Annual Cost</u>
a. <u>Direct Materials</u>		
Sheet metal	440 tons	\$ 68,000
Copper tubing	424,000 ft.	34,000
Sheet aluminum	240,000 sq. ft.	6,000
Plastic trays, dials, hose		9,000
Round metal wire		3,000
Wire mesh		3,000
Elec. wire & switches	6,000 sets	12,000
Insulation		4,000
Freon	9,000 gals.	4,500
Door fittings, name plates	3,000 sets	4,500
Fan motors, 1/10 hp.	3,000	33,000
Compr. mtrs., 3/4 hp.	3,000	75,000
Compr. mtrs., 1/4 hp.	3,000	60,000
Capacitors	6,000	24,000
Bolts, nuts & washers		2,000
Enamel		3,000
Shipping cartons	6,000	5,000
Total		\$350,000
b. <u>Supplies</u>		
Lubricants & hand tools		\$ 200
Cutting tools & abrasives		400
Maintenances spare parts		4,000
Welding supplies		500
Office supplies		300
Total		\$ 5,400

3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> About 250,000 kw-hrs annually.	\$ 5,000

b. <u>Fuel.</u> For heating, if necessary	\$ 500
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c. <u>Water.</u> For sanitation & fire protection.	\$ 200
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4. TRANSPORTATION

	<u>Annual Operating Cost</u>
a. <u>Own Transport Equipment.</u> Pickup & delivery truck.	\$ 1,000

b. External Transport Facilities. No special requirements.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor.</u>		
Skilled	6	\$ 36,000
Semi-skilled	12	60,000
Unskilled	20	80,000
Total	38	\$176,000

b. Indirect Labor

Manager & supervisor	2	\$ 21,000
Office	3	15,000
Maintenance	2	11,500
Truck driver	1	4,500
Total	8	\$ 52,000

c. Training Needs. Manager & supervisor must be fully experienced. With 6 skilled workers, they should be able to train other workers & reach full production in about 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs

Direct Materials	\$350,000
Direct Labor	176,000
Manufacturing Overhead(a)	64,100
Admin. Costs(b), Contingencies	40,000
Sales Costs (c), Bad Debts	58,000
Depreciation on Fixed Capital	20,700
Total	\$708,800

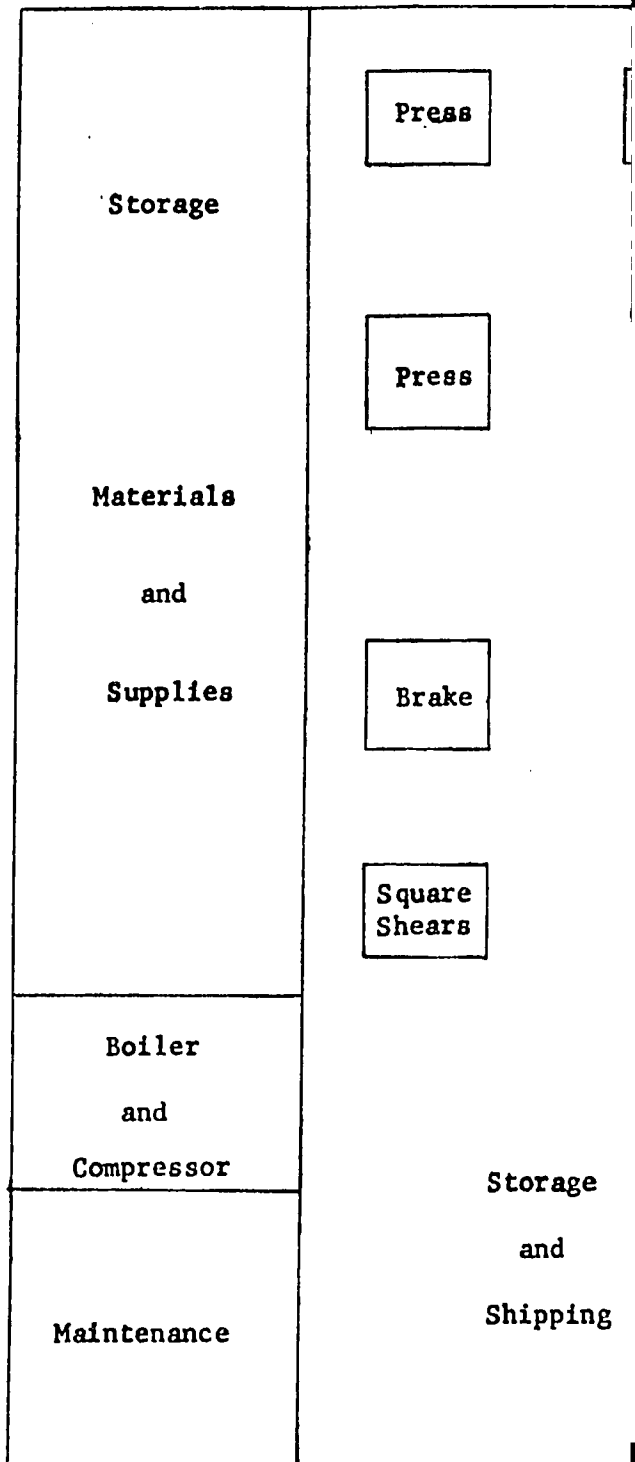
b. Annual Sales Revenue

\$800,000

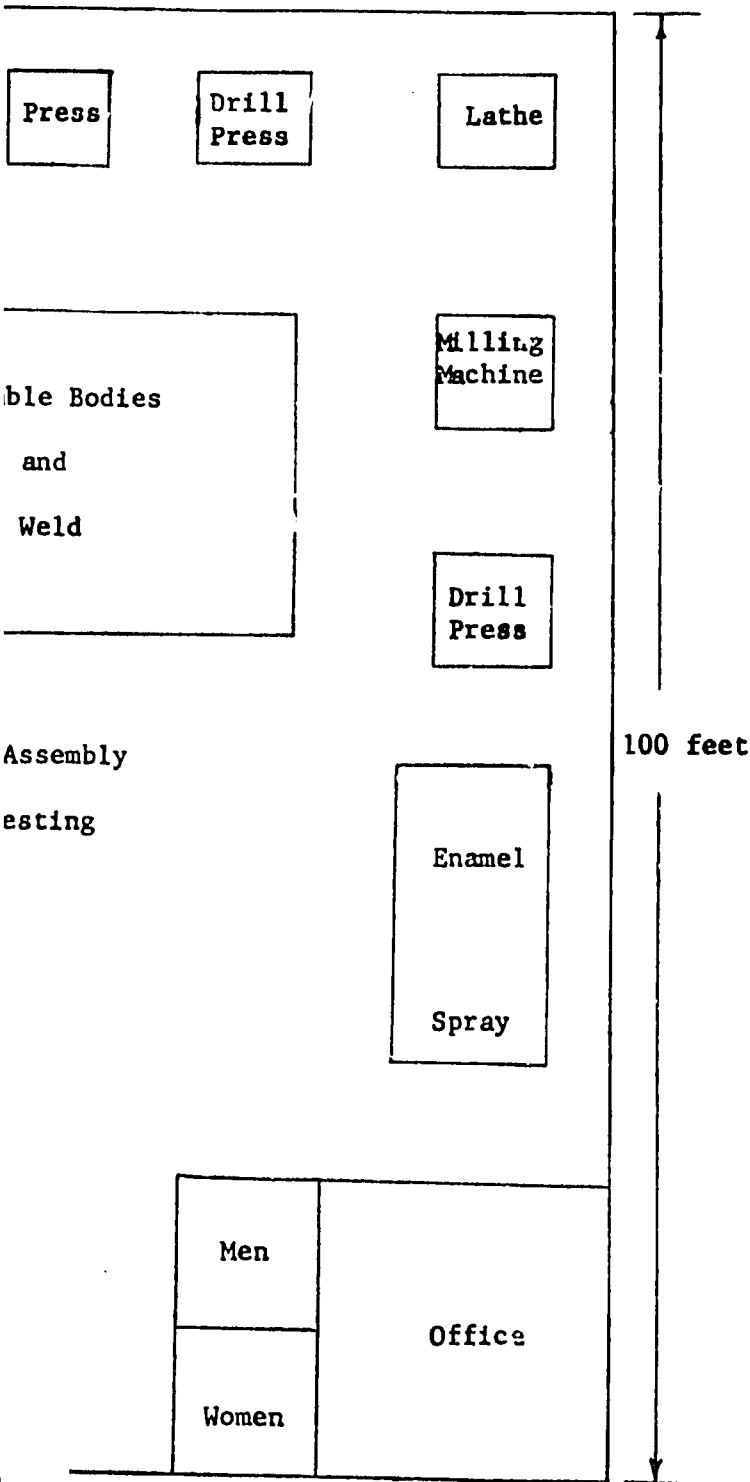
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

AIR CONDITIONERS AND REFRIGERATORS: S.I.C. 3585/3632

-13'



LAYOUT



AIR CONDITIONERS AND REFRIGERATORS: S.I.C. 3585/3632

SELECTED REFERENCES

I. TEXTBOOKS

- A. American Society of Heating, Refrigerating and Air Conditioning Engineers. ASHRAE Guide and Data Book. C. L. MacPhca, ed. 2 vols. Vol. I. 1964. Vol. II, 1965. \$20 each.
American Society of Heating, Refrigerating and Air Conditioning Engineers.
345 East 47th Street, New York, N. Y. 10017
- B. Air Conditioning. N. R. Sheridan and others. 1963. \$4.20.
Tri-Ocean Books
44 Brannan Street, San Francisco, Calif. 94107
- C. Modern Refrigeration and Air Conditioning. Andrew D. Althouse and C. H. Turnquist. Illus. 1960. \$7.45.
Goodheart-Wilcox Co. Inc.
18250 Harwood, Homewood, Ill. 60430
- D. Principles of Refrigeration. Roy J. Dossat. 1961. \$10.50.
John Wiley and Sons, Inc.
605 Third Avenue, New York, N. Y. 10016

II. U. S. GOVERNMENT PUBLICATIONS

- A. Bibliography on Air Conditioning. IR-16537. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523
- B. Air Conditioning. CTR-342.
United States Department of Commerce
Washington, D. C. 20230
- C. Refrigeration - Bibliography. IR-25531
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Metal Forming and Fabricating. Monthly. \$10.00/year.
Watson Publications, Inc.
201 North Wells Street
Chicago, Ill. 60606
- B. Air Conditioning, Heating and Refrigerating News. Weekly. \$6.00/year.
Business News Publishing Company
450 West Fort Street
Detroit, Michigan 48226

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,760,354. 1956. 3 p.
Portable air conditioning unit.
- B. Patent No. 2,753,695. 1956. 9 p.
Mechanical refrigerator for home or store use.
- C. Patent No. 2,727,361. 1955. 8 p.
Refrigerator system and assembly.
- D. Patent No. 2,717,508. 1955. 8 p.
Window mounted air conditioning unit.

V. TRADE ASSOCIATION

- A. Air Conditioning and Refrigeration Institute
1815 North Fort Myer Drive
Arlington, Va. 22209

VI. ENGINEERING COMPANIES

- A. E R D Company, Inc.
235 Ringgold Street
Waynesboro, Penn. 17268
Consulting, designing and industrial engineers.
- B. Production Control Units, Inc.
2200 West Dorothy Lane
Dayton, Ohio 45439
Consulting engineers for design, production machinery and equipment.

VII. DIRECTORY

- A. Air Conditioning, Heating and Refrigeration Directory. Annual. \$1.00.
Business News Publishing Company
450 West Fort Street
Detroit, Michigan 48226
Lists suppliers of air conditioning, heating and refrigeration materials
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.

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GENERAL INFORMATION

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

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ALUMINUM STORM WINDOWS AND DOORS

I. P. No. 66202

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ALUMINUM STORM WINDOWS AND DOORS: Standard Industrial
Classification 3442

A. PRODUCT DESCRIPTION

Storm windows and doors equipped with glass and screens, with the frame work made completely of aluminum.

B. GENERAL EVALUATION

This type of storm windows and doors has become popular. The frame work is left permanently in place and the glass or screen sections are used according to weather conditions. The capital and skilled labor requirements for this plant are rather small and manufacturing operations present no great problems. The market, however, will almost certainly be predominantly local, which means that there would have to be a sizable and prosperous urban community in the vicinity.

C. MARKET ASPECTS

1. USERS. Builders, householders.
2. SALES CHANNELS AND METHODS. Sales mainly direct to users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. For existing buildings the window and door openings have to be measured and the products are usually installed by the manufacturer. For new construction the products are usually built to specifications and installed by the construction contractor. For existing buildings the extent of the market would be within a radius of a few miles. For new building the market would be more extensive. b. Exports. These products are not usually exported.
4. COMPETITION. Wooden storm windows and doors would compete where cost was an important consideration.
5. MARKET NEEDED FOR PLANT DESCRIBED. The market for these products will depend on climate, the type of existing homes, and the volume of new construction. Demand is likely to vary greatly from area to area, and a careful preliminary market investigation would be necessary.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 9,000 Storm Windows, 2,250 Storm Doors

1. CAPITAL REQUIREMENTS

1. FIXED CAPITAL		Cost
Land. About 1/2 acre.		\$ --
Building. One story, 40'x80'.		19,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$5,000	
Other tools & equipmt.	800	
Furniture & fixtures	800	
Transportation equipmt.	2,400	
Total (excl. Land)		<u>\$ 28,000</u>

Principal Items. 2 drill presses, twin blade power saw, glass cutter, single blade power saw, 6 riveting presses, fixture for assembly of screens, work benches, pickup truck.

2. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 29,300
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,800
Training Costs		1,500
Total Working Capital		<u>\$ 32,600</u>

TOTAL CAPITAL (EXCL. LAND) \$ 60,600

MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
Direct Materials		
Extruded aluminum stock	530,000 ft.	\$ 84,000
Glass	130,000 sq. ft.	13,000
Hardware, including springs, rivets, braces	11,300 sets	6,800
Glazing channel	290,000 ft.	3,200
Aluminum screen wire	61,500 sq. ft.	7,400
Screen molding	145,000 ft.	700
Screws	170,000	900
Total		<u>\$116,000</u>

Supplies

Lubricants & hand tools	\$ 100
Cutting tools & abrasives	100
Maintenance & spare parts	400
Office supplies	200
Total	<u>\$ 800</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> 7 hp. connected load.	<u>\$ 100</u>
b. <u>Fuel.</u> For heating, if necessary.	<u>\$ 200</u>
c. <u>Water.</u> Sanitation and fire protection.	<u>\$ 100</u>

4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> Pickup & delivery truck.	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> No special requirements.	

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	1	\$ 6,000
Semi-skilled	6	\$ 30,000
Unskilled	1	4,000
Total	<u>8</u>	<u>\$ 40,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 10,000
Office	1	5,000
Truck driver	1	5,000
Total	<u>3</u>	<u>\$ 20,000</u>

c. Training Needs. Manager must be fully experienced. With the skilled worker, he should be able to train other workers & reach full production in about 1 month.

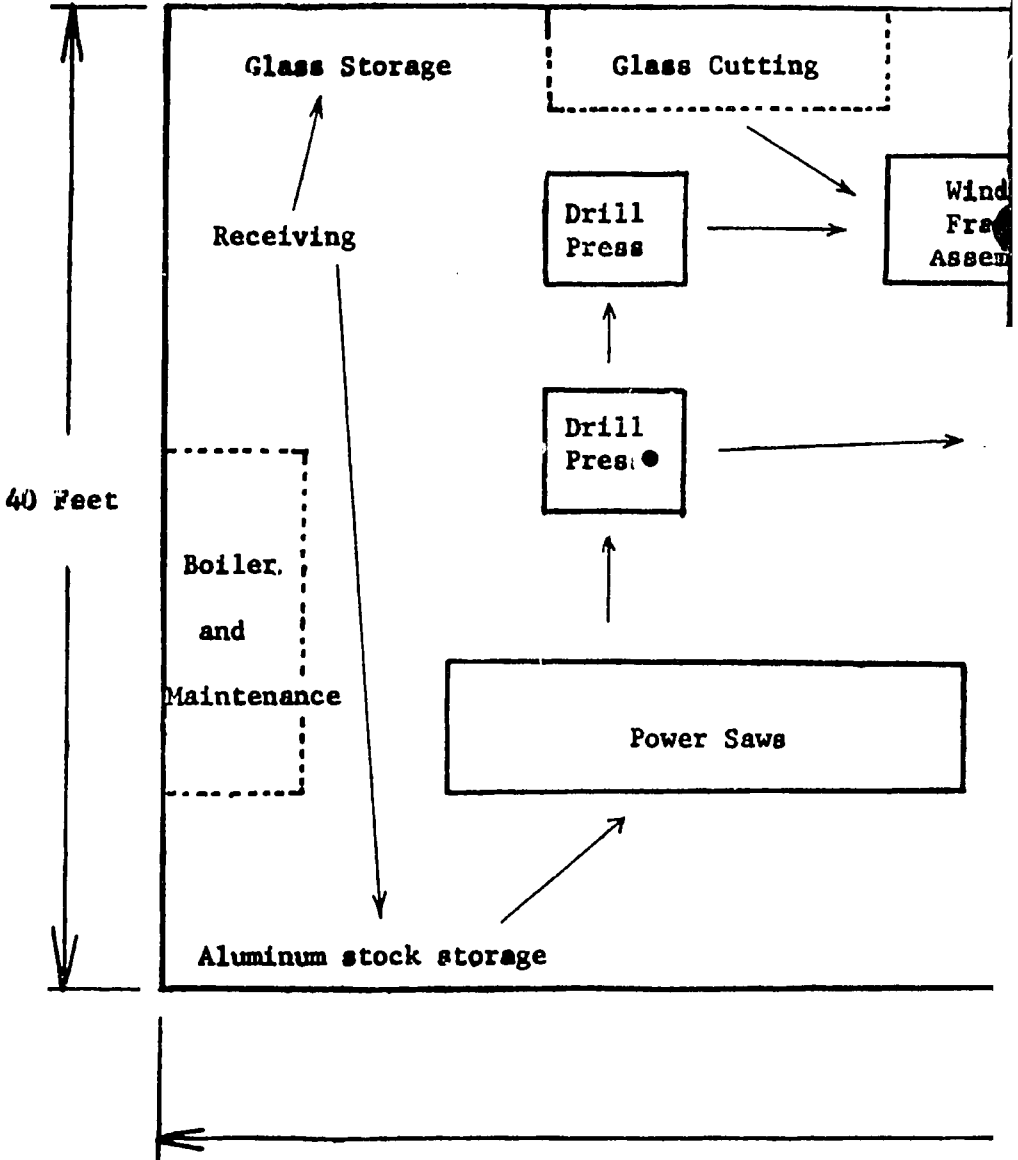
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$116,000
Direct Labor	40,000
Manufacturing Overhead(a)	22,200
Admin. Costs(b), Contingencies	9,000
Sales Costs(c), Bad Debts	15,000
Depreciation on Fixed Capital	2,300
Total	<u>\$204,500</u>
b. <u>Annual Sales Revenue</u>	<u>\$250,000</u>

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

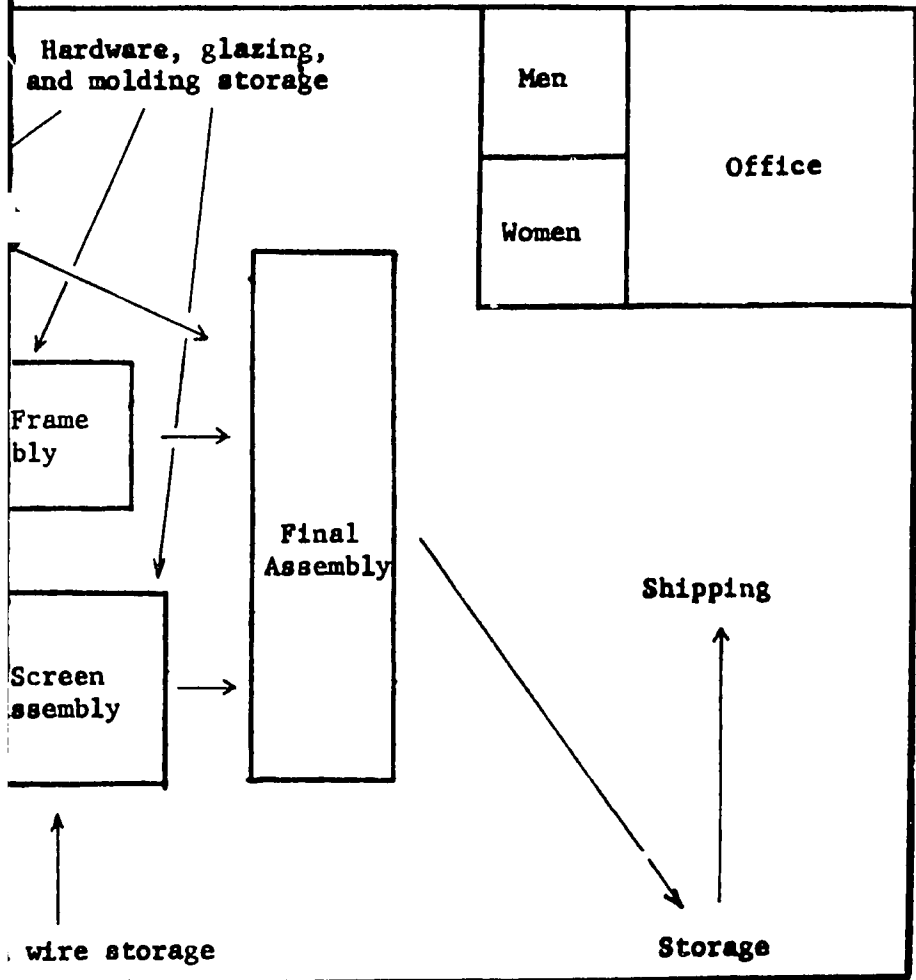
ALUMINUM STORM WINDOWS AND DOORS: S.I.C. 3442

ALUMINUM STORM WIND PLANT LAYOUT



D DOORS : S.I.C. 3442

WORKFLOW



ALUMINUM STORM WINDOWS AND DOORS· S.I.C. 3442

SELECTED REFERENCES

I. TEXTBOOKS

- A. Handbook of Fastening and Joining Metal Parts. Vallery H. Laughner and Augustus D. Hargan. 1958. 622 p. Illus. \$15 00.
McGraw-Hill Book Co., Inc.
330 W. 42nd Street
New York, N. Y. 10036
- B. Machine Shop Training Course. Franklin D. Jones. 1958. Vol. I, 570 p. Vol. II, 554 p. Two volume set \$9.00.
The Industrial Press
93 Worth Street
New York, N. Y. 10013

II. U.S. GOVERNMENT PUBLICATIONS

- A. Aluminum Door and Window Sash. TI-58. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523
- B. Aluminum Architectural Specialties. TI-2. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Modern Windows. Monthly. \$3.00/year.
Canton Publishers, Inc.
116 E. 16th Street
New York, N. Y. 10003
News items and technical advice on manufacturing and sales in the aluminum storm window and door trade.

IV. U. S. PATENTS

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

- A. Patent No. 2,740,173. April 3, 1956. 3 p.
Double hung storm window sashes wherein the sash is separate and positively sealed at their meeting rail when closed.
- B. Patent No. 2,761,498. Sept. 4, 1956. 6 p.
A combination self-storing storm window and screen.
- C. Patent No. 2,818,612. Jan. 7, 1958. 3 p.
Construction of storm window to be installed on the outside of an ordinary window casing and which includes upper and lower window frames in an aluminum or similar housing.

SELECTED REFERENCES (Continued)

V. TRADE ASSOCIATIONS

- A. National Association of Architectural Metal Mfrs.
228 N. La Salle St.
Chicago, Ill 60601
Keeps members informed of latest developments, processes, and other progress in architectural metal manufacturing.
- C. National Combination Storm Window and Door Inst.
2217 Tribune Tower
Chicago, Ill. 60611
Supplies members with latest information on production, processes, development, markets.
- C. Architectural Aluminum Manufacturers Association
35 East Wacker Drive
Chicago, Ill. 60601

VI. ENGINEERING COMPANIES

- A. Wells Aluminum Corporation
151 Wells
North Liberty, Indiana 46554
Contract designers, engineers and manufacturers of metal stampings, extrusions, assemblies, and new products of metal or wood.
- B. Palma-Knapp Associates
412 Thatcher Avenue
River Forest, Ill. 60305
Architectural design in aluminum.

VII. DIRECTORY

- A. Hitchcock's Assembly and Fastener Directory. \$10.00.
Hitchcock Publishing Company
Wheaton, Ill. 60187
Buyer's guide to products and supplies, engineering data, associations, distributors classified section, trade names, index to advertisers.

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

ASPHALT PAVING MATERIAL

I. P. No. 66203

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.

ASPHALT PAVING MATERIAL: Standard Industrial Classification 2951

A. PRODUCT DESCRIPTION

Asphalt paving material, composed of a mixture of asphalt and an aggregate of ground rock and sand, commonly called "black top".

B. GENERAL EVALUATION

This plant requires a moderate amount of capital. Skilled labor requirements are minor. Locally-produced asphalt would be an advantage but is not essential particularly if the plant is located in an ocean port. As road construction and improvement increases, opportunities for such a plant should develop in many areas.

C. MARKET ASPECTS

1. USERS. Public works contractors, public works departments, etc.
2. SALES CHANNELS AND METHODS. Sales direct to users.
3. GEOGRAPHICAL EXTENT OF MARKET. This product is not usually shipped very long distances because transport costs are high in relation to product value and because of the ease with which manufacturing facilities can be established near areas of major construction activity and the widespread occurrence of aggregates suitable for use with the asphalt. The product is not exported.
4. COMPETITION. If cement can be delivered cheaply enough, concrete may compete with "black top".
5. MARKET NEEDED FOR PLANT DESCRIBED. This material is commonly used in the construction, improvement and repair of urban roads, playgrounds, etc. and many growing urban areas might provide a sufficient market.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY : ONE-SHIFT OPERATION: 20,000 Tons

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		<u>Cost</u>
Land. About 1 acre.		\$ --
Building. One story, 100'x100', Equipment, Furniture & Fixtures.		60,000
Prodn. tools & equipmt.	\$70,000	
Other tools & equipmt.	11,000	
Furniture & fixtures	1,000	
Transportation equipmt.	18,000	100,000
<u>Total (excl. Land)</u>		<u>\$160,000</u>

Principal Items. Mixer, dryer, gradation unit, cold feeder, roller, finisher, dust collector tanks 3 dump trucks.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 30,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,000
Training Costs		3,000
<u>Total Working Capital</u>		<u>\$ 35,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$195,000

2. MATERIALS AND SUPPLIES

	<u>Annual Requirements</u>	<u>Annual Cost</u>
a. <u>Direct Materials</u>		
Asphalt	2,600 tons	\$ 26,000
Aggregate	18,500 tons	48,000
<u>Total</u>		<u>\$ 74,000</u>

b. Supplies

Lubricants & hand tools	\$ 200
Cutting tools & abrasives	100
Maintenance & spare parts	1,100
Welding rods & gas	200
Office supplies	200
<u>Total</u>	<u>\$ 1,800</u>

3. POWER, FUEL AND WATER

a. Electric Power. Connected load about 66 hp. Annual Cost
\$ 2,000

b. Fuel. 50 tons of Bunker C oil annually. \$ 600

c. Water. \$ 100

4. TRANSPORTATION

Annual Operating Cost

a. Own Transport Equipment. 3 dump trucks for local delivery. \$ 3,000

b. External Transport Facilities. In and out shipments average 1-10 tons a day. Good highways required & easy access to rail facilities desirable.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	1	\$ 6,000
Semi-skilled	5	25,000
Unskilled	10	40,000
<u>Total</u>	<u>16</u>	<u>\$ 71,000</u>

b. Indirect Labor

Manager	1	\$ 10,000
Office	1	5,000
Truck drivers	3	12,000
<u>Total</u>	<u>5</u>	<u>\$ 27,000</u>

c. Training Needs. Manager should be fully experienced. With 1 skilled worker he should be able to train employees and reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

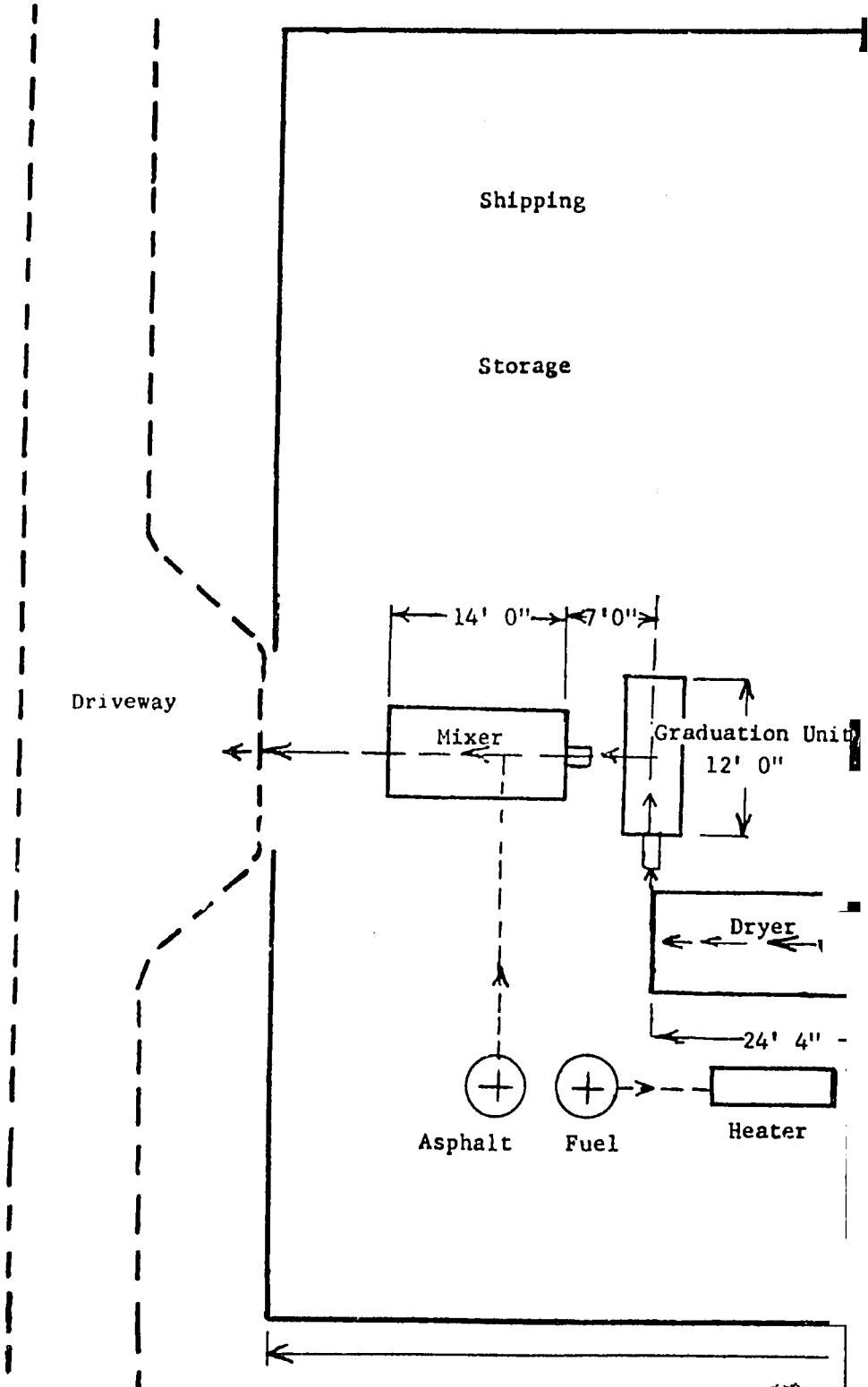
a. <u>Annual Costs</u>	
Direct Materials	\$ 74,000
Direct Labor	71,000
Manufacturing Overhead(a)	34,500
Admin. Costs(b), Contingencies	10,000
Sales Costs(c), Bad Debts	18,000
Depreciation on Fixed Capital	16,800
<u>Total</u>	<u>\$224,300</u>

b. Annual Sales Revenue \$280,000

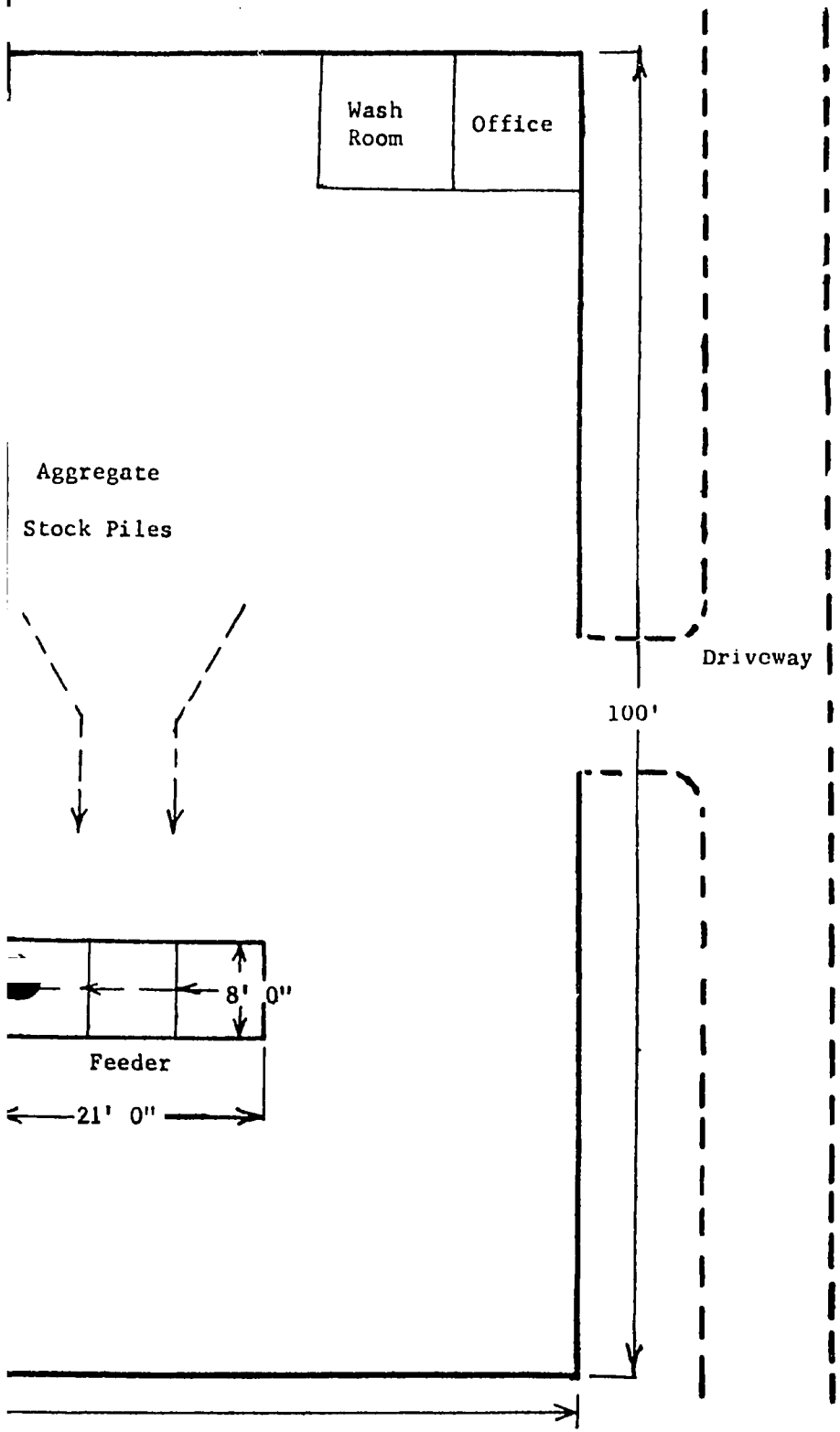
NOTES : (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight out, Travel.

ASPHALT PAVING MATERIAL : S. I. C. 2951

ASPHALT PAVING PLANT LAYOUT



TRIAL : S.I.C. 2951
WORKFLOW



ASPHALT PAVING MATERIAL: S. I. C. 2951

SELECTED REFERENCES

I. TEXTBOOKS

- A. Asphalt Paving for Parking Areas, Driveways and Walkways. Charles T. McGavin. 1964. \$2.00.
Cornell Hotel & Restaurant Administration Quarterly
Statler Hall
Cornell University
Ithaca, N.Y. 14851
- B. Asphalt: Composition, Properties and Uses. Ralph N. Traxler. 1961. \$10.00.
Reinhold Publishing Corporation
430 Park Avenue, New York, N. Y. 10022
- C. Design and Construction of Asphalt Pavements. J. Rogers Martin and Hugh A. Wallace. 1958. 298 p. illus. \$12.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- D. Asphalt Plant Manual. Manual Series No. 3. 2nd edition. 1959. 152 p. First copy gratis.
Asphalt Institute
Asphalt Institute Building
College Park, Maryland 20740

II. U. S. GOVERNMENT PUBLICATION

- A. Asphalts. 1949. 77 p. illus. \$.25.
Superintendent of Documents
Government Printing Office
Washington, D. C. 20402

III. PERIODICAL

- A. Roads and Streets. Monthly. \$5.00/year.
Gillette Publishing Company
22 West Maple Street
Chicago, Ill. 60610

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,772,179. Nov. 27, 1956. 5 p.
Improvements in bituminous compositions having improved adherence to damp or wet mineral aggregates and improvements in the method of making such compositions.
- B. Patent No. 2,677,620. May 4, 1954. 4 p.
Bituminous roadmaking compositions, specifically such compositions which contain components whereby the bituminous material is more securely bonded to a filler, termed the aggregate, and the bonded admixture is made more resistant to weathering.
- C. Patent No. 2,663,648. Dec. 22, 1953. 4 p.
Bituminous bonding compositions which may be used, for example, as bonding mineral aggregates in the construction of asphalt pavements.

V. TRADE ASSOCIATIONS

- A. Asphalt Institute
Asphalt Institute Building
College Park, Maryland 20740
- B. National Bituminous Concrete Association
6715 Kenilworth Avenue
Riverdale, Maryland 20840

VI. ENGINEERING COMPANIES

- A. White Manufacturing Company
1941 McKay
Elkhart, Indiana 46514
Portable and stationary asphalt plants.
- B. Pittsburgh Testing Laboratory
1330 Locust
Pittsburgh, Pa. 15219
Inspection for road building materials.

VII. DIRECTORY

- A. Membership Roster. Gratis.
National Bituminous Concrete Association
6715 Kenilworth Avenue
Riverdale, Maryland 20840
Lists producers and contractors who furnish and place bituminous concrete asphalt paving material used for all types of pavings.

ASPHALT PAVING MATERIAL: S.I.C. 2951

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

BRAKE LINING SETS

I. P. No. 66204

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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.

BRAKE LINING SETS: Standard Industrial Classification 3714

A. PRODUCT DESCRIPTION

Brake linings made of compressed asbestos, resin, fibers and other friction material, made to the exact sizes required to fit the brake bands of various designs of automobiles and trucks.

B. GENERAL EVALUATION

There are many variations in the materials and processes used in the production of brake linings. Most of the formulas and processes used are either covered by patents or are secret. Before establishing a plant of this kind existing manufacturers of this product should be consulted about the possibility of entering into licensing arrangements. If the plant develops its own formula and process it should make certain that there is no infringement on existing patents. The prospects for this plant will depend on whether there is a local automobile manufacturing or assembling industry and on the number of automobiles in use in the area. A careful survey of market potential should be made.

C. MARKET ASPECTS

1. USERS. Automobile industry, garages, repair shops, large trucking companies.
2. SALES CHANNELS AND METHODS. Sales to the automobile industry, auto parts distributors, wholesalers of automobile parts, and large trucking companies.
3. GEOGRAPHICAL EXTENT OF MARKET. Shipping of this product is easy and transport costs are insignificant. The product is commonly shipped long distances, both internally and internationally.
4. COMPETITION. Large-scale internationally-known makers are likely to offer severe competition. Some exports to neighboring countries might be possible, but the plant is too small to enter into general international trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. As can be seen from the plant capacity figures, the plant could provide brake linings for perhaps 100,000 vehicles, the exact number depending on local driving conditions. For many developing areas this is a large number, and it would be necessary to study closely the current market and the trend of development before establishing such a plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: Sets : Auto - 60,000; Light Truck - 50,000; Heavy Truck - 25,000

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 2 acres	\$ --
Building. One story, 9,000 sq. ft.	54,000
Equipment, Furniture & Fixtures	
Prodn. tools & equipmt. \$ 306,000	
Other tools & equipmt. 5,000	
Furniture & fixtures 3,000	314,000
Total (excl. Land)	<u>\$368,000</u>

Principal Items. 2 bed-type scales, mixing system, bench-type scale, hydraulic press, multiple platen press, 2 cooling tanks, 2 cut-off abrasive saws, double disc grinder, curing oven with molds, outside radius grinder, disc-type grinder, bench & measuring tools, 4 sensitive drills, bend machine, stenciling machine, firetube boiler, oil storage tank, compressor, small tools, hand trucks, pallets, tool grinder, diamond wheel press, absorption-type dynamometer for testing, inertia-type dynamometer for testing, cutting tools.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 92,300
Admin. Costs (b), Contingencies, Sales Costs (c)	30	7,500
Training Costs		4,500
Total Working Capital		<u>\$104,300</u>

c. TOTAL CAPITAL (EXCL. LAND) \$472,300

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Short fiber asbestos	695,000 lbs.	\$270,000
Phenol formaldehyde	200,000 lbs.	78,000
Abrasives-limestone	190,000 lbs.	21,000
Cardboard boxes	35,000	1,800
Cartons	2,000	2,200
Total		<u>\$373,000</u>

b. Supplies

Lubricants & hand tools	\$ 400
Cutting tools & abrasives	1,000
Maintenance & spare parts	5,000
Office supplies	300
Total	<u>\$ 6,700</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 360,000 kw-hr annually.	<u>\$ 5,500</u>
b. Fuel. About 20,000 gals. Bunker C oil annually	<u>\$ 1,000</u>
c. Water. About 2 million gals. annually.	<u>\$ 500</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments about 5 tons a day. Good highways & railroad siding desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	6	\$ 36,000
Semi-skilled	6	30,000
Unskilled	10	40,000
Total	<u>22</u>	<u>\$106,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 18,000
Office	4	18,000
Maintenance & other	7	25,000
Total	<u>13</u>	<u>\$ 61,000</u>

- c. Training Needs. Manager & supervisor should be experienced. With 6 skilled workers, they should be able to train all workers & reach full production in about 1 month.

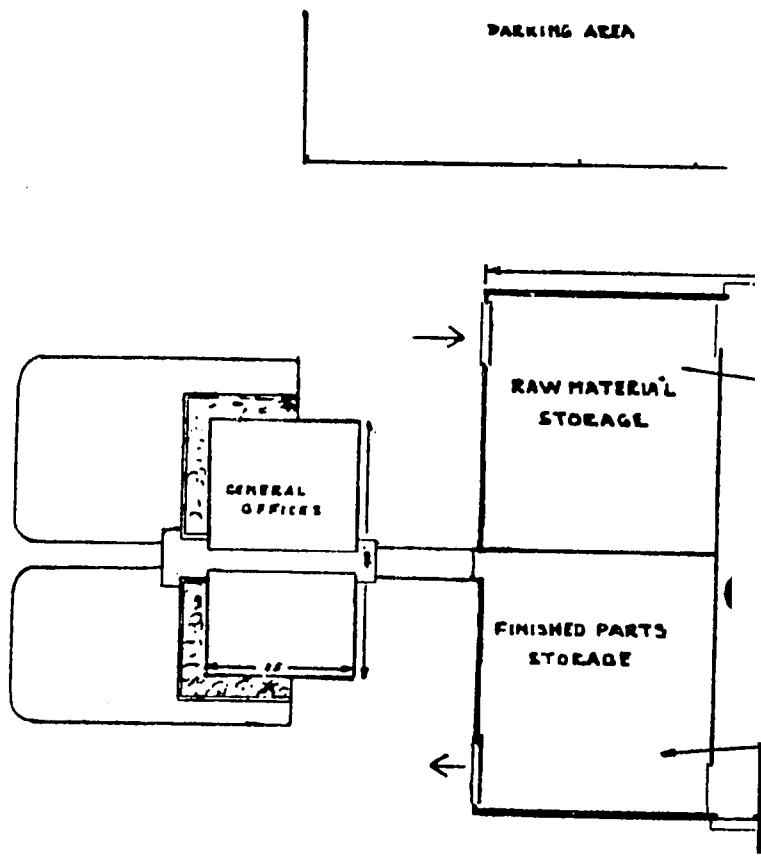
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	\$373,000
Direct Materials	106,000
Direct Labor	74,700
Manufacturing Overhead (a)	36,000
Admin. Costs (b), Contingencies	60,000
Sales Costs (c), Bad Debts	37,300
Depreciation on Fixed Capital	<u>\$687,000</u>
b. Annual Sales Revenue	<u>\$820,000</u>

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

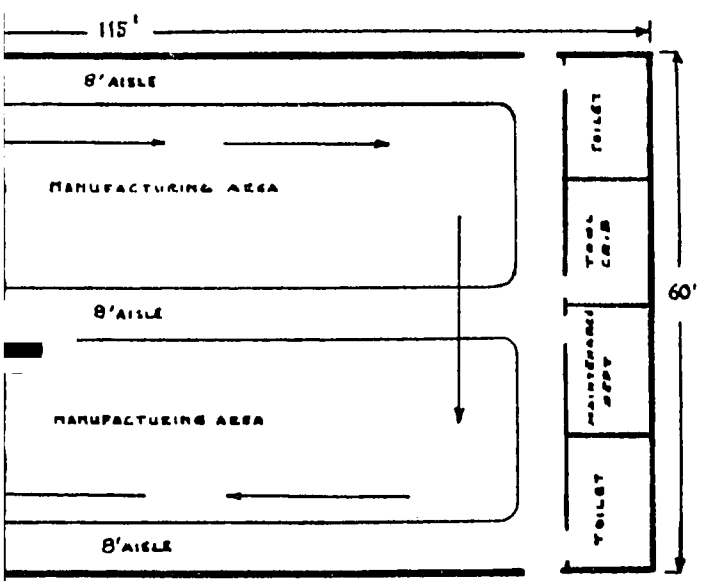
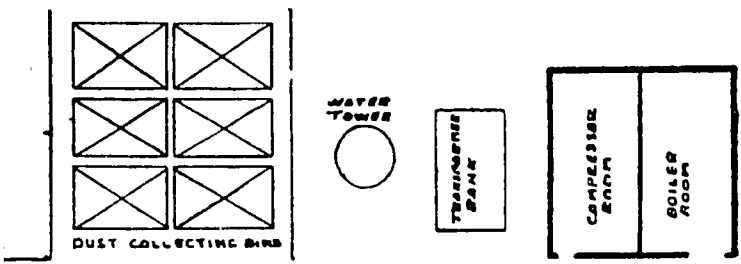
BRAKE LINING SETS: S.I.C. 3714

BRAKE LINI
PLANT LAYO



S: S.I.C. 3714

WORKFLOW



BRAKE LINING SETS: S.I.C. 3714

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Pergamon Press
44-01 21st Street
Long Island City, N. Y. 11101
- B. **Automotive Brakes and Power Transmission Systems.** Irving Frazee and others. 1956. \$6.95.
American Technical Society
848 E. 58th Street
Chicago, Ill. 60637
- C. **General Developments of Various Phases in Brake Lining Formulation, Manufacturing, and Testing Techniques as a Result of Higher Speeds of Cars and Greater Load Demands on Brakes.** H. Stolar. Gratis.
Bendix Aviation
Marshall-Eclipse Division
Troy, New York 12180

II. U. S. GOVERNMENT PUBLICATION

- A. **Brake Linings and Clutch Discs.** TI-59. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. **Motor Age.** Monthly. \$5.00/year.
Chilton Company
Chestnut and 56th Streets
Philadelphia, Pa. 19139
- B. **Motor Service.** Monthly. \$4.00/year.
Motor Service
549 West Washington Blvd.
Chicago, Ill. 60606

SELECTED REFERENCES (Continued)

IV. U.S. PATENTS

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

- A. Patent No. 2,973,842. Mar. 7, 1961 3 p.
This invention relates to friction elements and is particularly concerned with metallic friction elements for use in brakes, clutches, and the like.
- B. Patent No. 2,718,936. Sept. 27, 1955. 3 p.
Multi-strip brake lining of the type used in brakes of automotive and industrial equipment.
- C. Patent No. 2,554,548. May 29, 1951. 4 p.
A composite brake lining designed to resist the tendency of decomposition of organic substances with rising temperatures.

VI. TRADE ASSOCIATIONS

- A. Friction Materials Standards Institute
370 Lexington Avenue
New York, N. Y. 10017
- B. Society of Automotive Engineers
485 Lexington Avenue
New York, N. Y. 10017

VI. ENGINEERING COMPANY

- A. Rust Engineering Company
930 Fort Duquesne Boulevard
Pittsburgh, Pa. 15222

VII. DIRECTORY

- A. Directory of Machine Tools and Related Products. \$1.00.
National Machine Tool Association
2071 East 102nd Street
Cleveland, Ohio 44106

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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ORDERING INSTRUCTIONS

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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 PUMPS AND VALVES

I. P. No. 66205

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.

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**CENTRIFUGAL PUMPS AND VALVES: Standard Industrial Classification
3561/3494**

A. PRODUCT EVALUATION

Centrifugal motor-driven pumps, sizes from 1½" to 10", sold without motors. Wedge-type valves from 4" to 16". The pumps are shipped on skids, and the valves are usually crated.

B. GENERAL EVALUATION

These products are used by many industries and for waterworks systems and irrigation. Since it would normally be impossible for a plant of this size to export, prospects depend on potential demand within the area, and the local market possibilities should be carefully surveyed.

C. MARKET ASPECTS

1. USERS. Industries, public works, water supply and irrigation systems.
2. SALES CHANNELS AND METHODS. Sales to wholesale distributors and direct to large users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The pumps are shipped on skids and the valves are usually crated, and transportation presents no difficult problems. The market could be nation-wide. b. Export. These products are sold worldwide.
4. COMPETITION. a. Domestic Market. An efficiently operated plant producing a high-quality product should be able to compete with imports. b. Export Market. This plant is too small to compete in general international trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. This plant would need a large complex of user enterprises within the domestic market area. A careful preliminary survey of potential demand should be made.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 820 Pumps, 1½" to 10"; 1,900 Valves, 4" to 16"

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land, About 5 acres.	\$ -
Building, 220'x70', including 28'x70' storage shed at end.	90,000
Equipment, Furniture & Fixtures.	
Prod. tools & equipmt.	\$530,000
Other tools & equipmt.	21,000
Furniture & fixtures	1,000
Transportation equipmt.	3,000
Total (excl. Land)	<u>555,000</u>
	<u>\$645,000</u>

Principal Items, 3 milling planers, Universal milling machine, 2 slotters, three 48" vertical boring mills, three 20" horizontal boring mills, 4 turret lathes, 3 drill presses, radial drill (4' arm), dynamic balancer, testing equipment, 5 ton overhead crane, portable jib hoist, 12 flat bed trucks, delivery truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 73,800
Admin. Costs(b), Contingencies, Sales, Costs(c)	30	7,000
Training Costs		32,000
Total Working Capital		<u>\$112,800</u>

c. TOTAL CAPITAL (EXCL. LAND) \$757,800

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Gray iron castings	380 tons	\$153,600
Bronze fittings	30 tons	42,000
Steel rods	76 tons	11,400
Bolts, nuts & washers		2,500
Paint		2,500
Skids & crating material		5,200
Total		<u>\$217,200</u>
b. <u>Supplies</u>		
Lubricants & hand tools		\$ 500
Cutting tools & abrasives		700
Maintenance & spare parts		6,400
Office supplies		500
Total		<u>\$ 8,100</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power</u> , About 150,000 kw-hr annually.	\$ 3,000
b. <u>Fuel</u> , For heating, if necessary.	\$ 1,000
c. <u>Water</u> , For sanitation and fire protection.	\$ 200

4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Facilities</u>	
½ ton truck	\$ 1,000
b. <u>External Transport Facilities</u> , In & out freight averages over 4 tons a day. Some items are bulky. Good highway needed, railroad if possible.	

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	15	\$ 90,000
Semi-skilled	10	50,000
Unskilled	8	32,000
Total	<u>33</u>	<u>\$172,000</u>
b. <u>Indirect Labor</u>		
Manager & engineer	2	\$ 25,000
Office	2	10,000
Utility man	1	5,000
Total	<u>5</u>	<u>\$ 40,000</u>

c. Training Needs, Manager & engineer must be fully experienced. With 5 skilled workers they should be able to train the others & reach full production in about 3 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$217,200
Direct Labor	172,000
Manufacturing Overhead(a)	53,300
Admin. Costs(b), Contingencies	33,000
Sales Costs(c), Bad Debts	55,000
Depreciation on Fixed Capital	62,500
Total	<u>\$593,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$750,000</u>

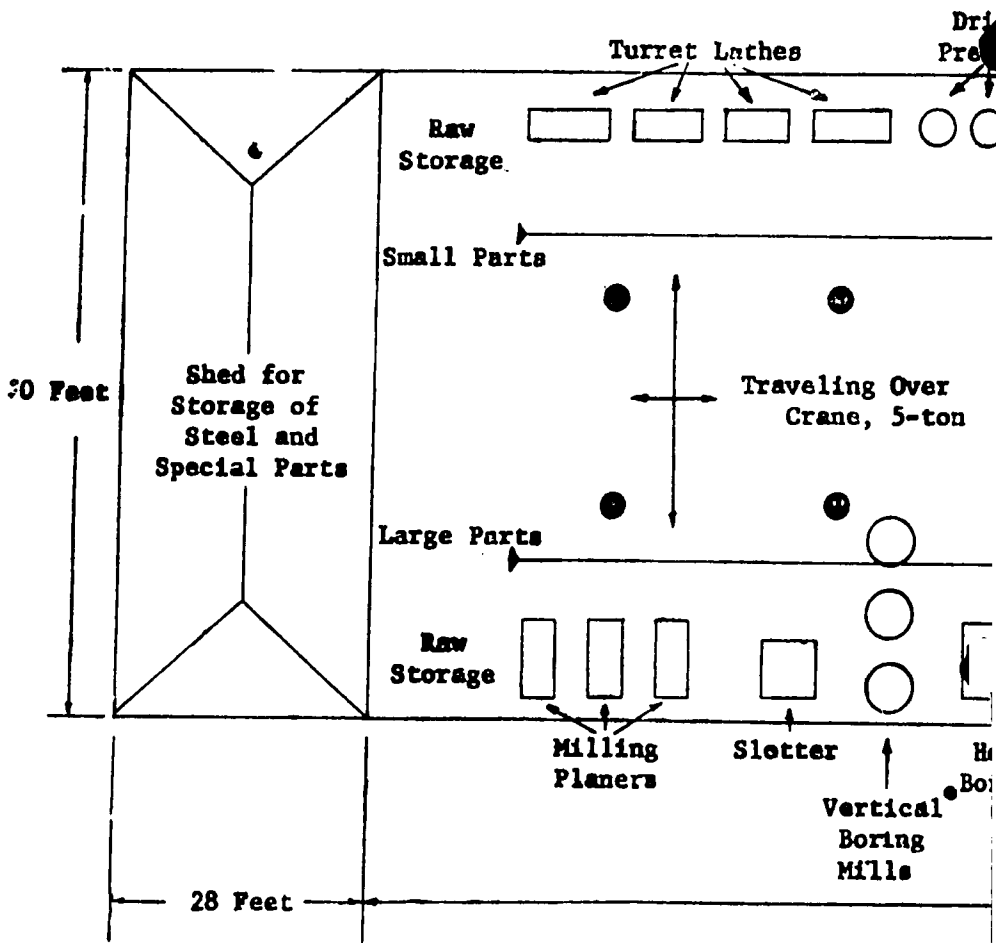
NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

CENTRIFUGAL PUMPS AND VALVES S.I.C. 3561/3494

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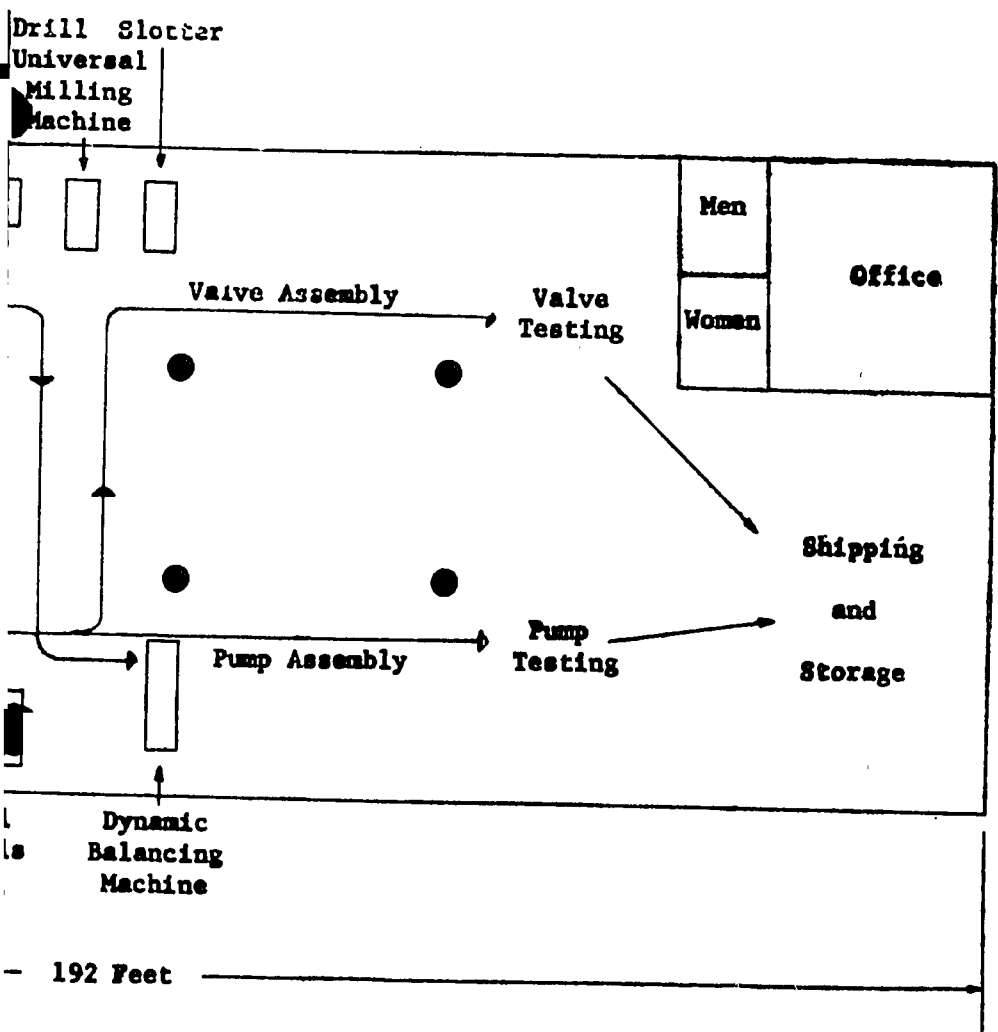
CENTRIFUGAL PUMPS

PLANT LAYO



VALVES: S.I.C. 3561/3494

WORKFLOW



CENTRIFUGAL PUMPS AND VALVES S. I. C. 3561/3494

SELECTED REFERENCES

I. TEXTBOOKS

- A. Pumps and Blowers. Alexy J. Stepanoff. Illus. 1965. \$12.50.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
- B. Engineer's Guide to Centrifugal Pumps. Igor Karassik. 1964. \$10.00.
McGraw-Hill Book Co., Inc.
300 W. 42nd St.
New York, N. Y. 10036
- C. Using Centrifugal Pumps, E. Allen. Illus. 1960. \$5.60.
Oxford University Press, Inc.
417 Fifth Avenue
New York, N. Y. 10016
- D. Centrifugal Pumps and Blowers. A. H. Church. 1944. 308 p. \$7.95.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
- E. Steel Castings Handbook. 511 p. \$4.00.
Steel Founders' Society of America
Terminal Building
Cleveland, Ohio 44113

II. U. S. GOVERNMENT PUBLICATIONS

- A. Centrifugal Pumps and Valves. TI-60. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523
- B. Metalworking Part II: Machine and Cutting Tools. 1961. 336 refs.
SB-461.
Office of Technical Services
U. S. Department of Commerce
Washington, D. C. 20230

III. PERIODICALS

- A. Domestic Engineering. Monthly. \$5.00/year.
Domestic Engineering Publishing Company
1801 Prairie Avenue
Chicago, Ill. 60616
- B. Reeves Plumbing and Heating Journal. Monthly. \$3.00/year.
John B. Reeves and Son
3665 South Vermont Avenue
Los Angeles, Calif. 90007

SELECTED REFERENCES (Continued)

IV. U.S. PATENTS

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

- A. Patent No. 2,862,451. Dec. 2, 1958. 5 p.
Centrifugal pump having a sealed fluid chamber effectively precluding leakage of pumped fluids as well as the ingress to the chamber of contaminants from outside the pump.
- B. Patent No. 2,759,427. Aug. 21, 1956. 10 p.
An improved centrifugal pump having a fluid chamber in which pumping action is produced by external manipulation of the chamber.

V. TRADE ASSOCIATION

- A. Contractors Pump Bureau
20th and E Streets, N. W.
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. Eastern Industries, Inc.
100 Skiff Street
Hamden, Conn. 06514
Specialists on small centrifugal pumps.
- B. Fairbanks Morse and Company
600 South Michigan Avenue
Chicago, Ill. 60605
Pump engineers and manufacturers.

VII. DIRECTORIES

- A. Directory of Iron and Steel Plants. \$16.00.
624 Grant Building
Pittsburgh, Penna. 15230
- B. Dun and Bradstreet Metal Work Directory. \$150.00.
Dun and Bradstreet, Inc.
99 Church Street
New York, N. Y. 10008

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INDUSTRY PROFILES

CHAIN-LINK FENCING

I. P. No. 66206

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CHAIN-LINK FENCING: Standard Industrial Classification 3481

A. PRODUCT DESCRIPTION

Galvanized woven wire chain-link fencing, heights 3 feet to 10 feet.

B. GENERAL EVALUATION

Capital requirements for this plant are moderately large, but not much skilled labor is needed. The market would be mainly local and such a type of fencing would find a sales outlet only in a fairly prosperous community. As the galvanizing of the fence wire would utilize only a small part of the galvanizing capacity, it would be advantageous to locate in an area where the plant could do galvanizing for other enterprises. The plant could also, with the addition of a cut-off machine and by purchasing black iron pipe and fittings, make complete fence units.

C. MARKET ASPECTS

1. USERS. Public works agencies, all kinds of industrial plants, estates, etc.
2. SALES CHANNELS AND METHODS. Sales to users or construction supplies dealers.
3. GEOGRAPHICAL EXTENT OF MARKET. The product is easy to handle and might be shipped fairly long distances in the domestic market. Since, however there are many kinds of fencing and most countries can produce satisfactory fencing themselves, there is not much international trade in this product.
4. COMPETITION. Other types of fencing, of which there are many, will compete. Relative cost will obviously be an important factor. Some sales to neighboring countries might be possible, but this plant could certainly not develop a large export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Since this is a relatively expensive type of fencing and since the market would almost certainly be mainly local, the plant would need to be located in or near a prosperous community with extensive public amenities, industries, estates, etc.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY: ONE-SHIFT OPERATION: 6.3 Million Sq. Ft.

1. CAPITAL REQUIREMENTS

	Cost
a. <u>FIXED CAPITAL</u>	
Land. About 2 acres.	\$ ---
Building. One story, 100'x218'.	130,000
Equipment, Furniture & Fixtures.	
Prod. tools & equipmt. \$ 35,000	
Other tools & equipmt. 12,000	
Furniture & fixtures 2,000	
Transportation equipmt. 6,000	
Total (excl. Land)	<u>\$185,000</u>

Principal Items. 2 weaving machines, galvanizing line, 2 portable welding machines, fork lift truck, 5-ton delivery truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 57,900
Admin. Costs (b), Contingencies, Sales Costs(c)	30	12,000
Training Costs		1,100
Total Working Capital		<u>\$ 71,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$256,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. <u>Direct Materials</u>		
Wire	1,000 tons	\$230,000
Zinc	80 tons	25,000
Pickle solution		3,000
Total		<u>\$258,000</u>

b. Supplies

Lubricants & hand tools	\$ 2,000
Cutting tools & abrasives	1,000
Maintenance & spare parts	4,000
Office supplies	800
Total	<u>\$ 7,800</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> About 475,000 kw-hr annually.	<u>\$ 9,000</u>
b. <u>Fuel.</u> About 250,000 gals. Bunker C oil annually.	<u>\$ 14,000</u>
c. <u>Water.</u> About 4 million gals. annually.	<u>\$ 1,000</u>

4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 5-ton flat bed truck for local deliveries.	<u>\$ 1,200</u>
b. <u>External Transport Facilities.</u> No special requirements.	

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Semi-skilled	1	\$ 5,000
Unskilled	4	16,000
Total	<u>5</u>	<u>\$ 21,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 10,000
Plant foreman	1	8,000
Maintenance	2	12,000
Clerical	1	5,000
Total	<u>5</u>	<u>\$ 35,000</u>

c. Training Needs. Little training should be needed. It should be possible to reach full production within a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$258,000
Direct Labor	21,000
Manufacturing Overhead (a)	68,000
Admin. Costs (b), Contingencies	38,000
Sales Costs (c), Bad Debts	36,000
Depreciation on Fixed Capital	14,000
Total	<u>\$435,100</u>
b. <u>Annual Sales Revenue</u>	<u>\$500,000</u>

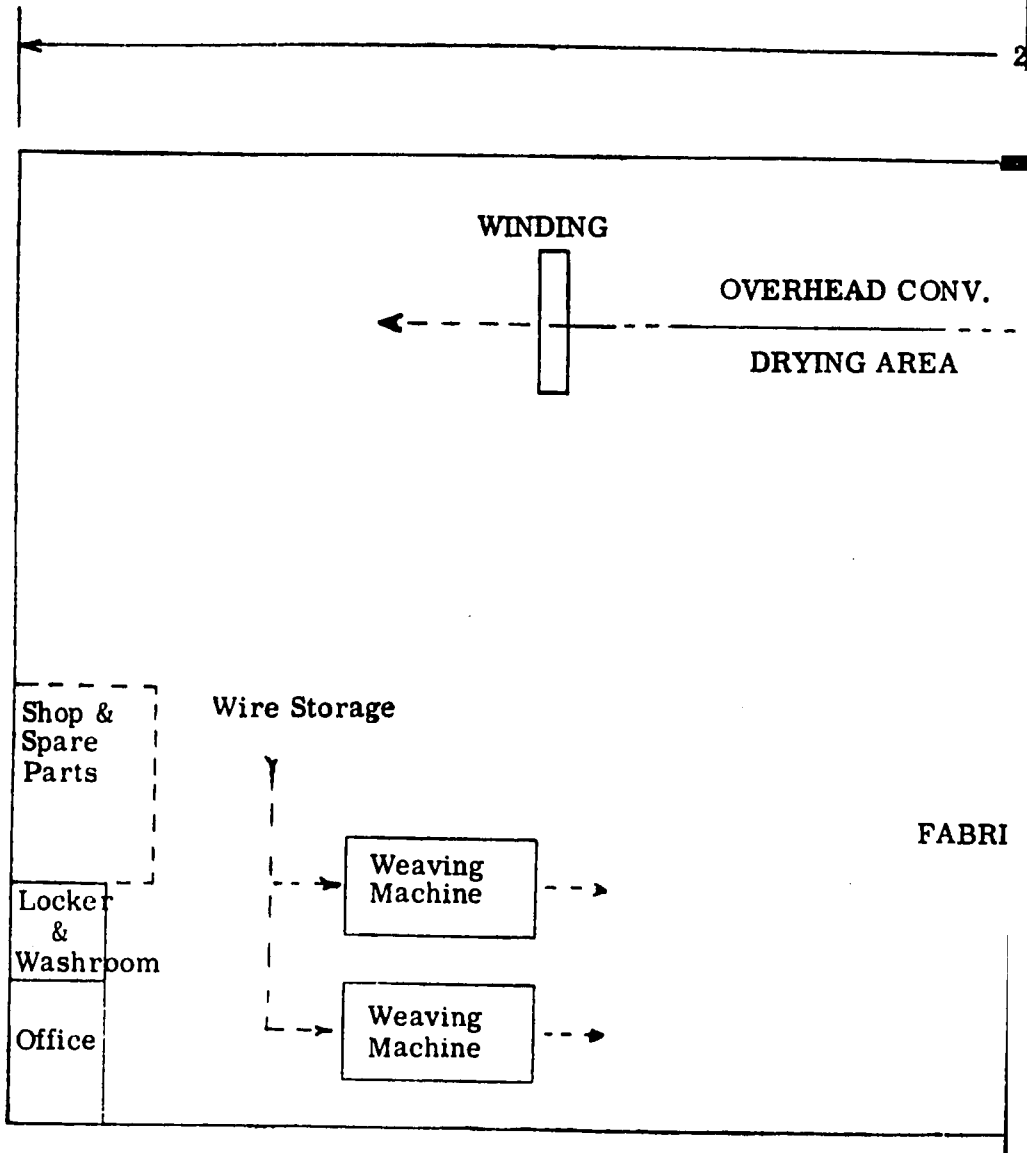
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

CHAIN-LINK FENCING : S.I.C. 3481

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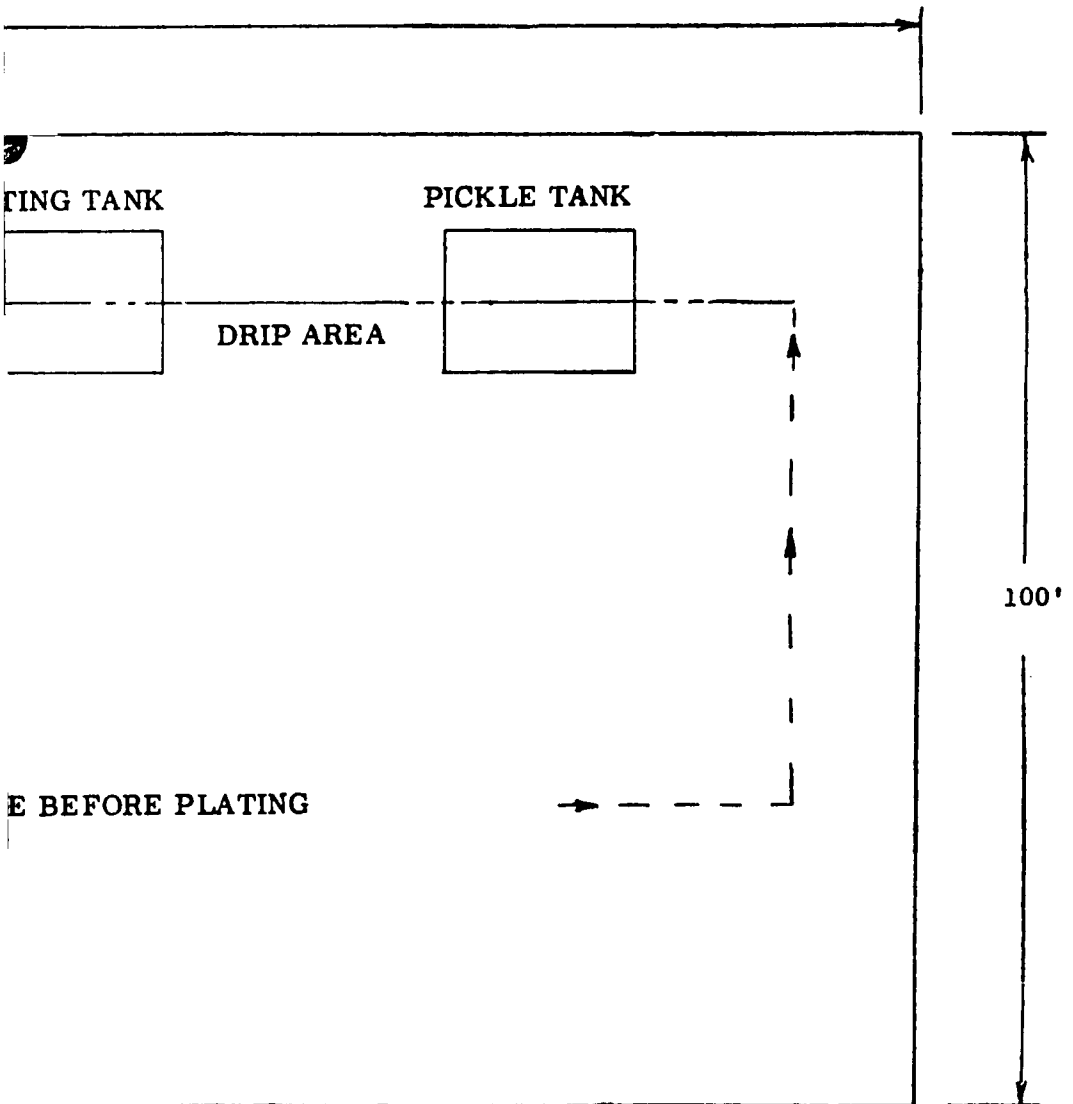
CHAIN-LINE

PLANT LA



NG : S.I.C. 3481

D WORKFLOW



55

CHAIN LINK FENCING: S.I.C. 3481

SELECTED REFERENCES

I. TEXTBOOKS

- A. Wire Industry Encyclopedic Handbook. 1962. Illus. \$6.50.
Wire Industry Ltd.
33 Furnival Street
London, E. C. 4, England
- B. Steel Wire in America. Kenneth B. Lewis. 1952. 351 p. Illus.
\$15.00.
Wire Association
543 Main Street
Stamford, Conn. 06901
- C. Manufacture and Properties of Steel Wire. Anton Pomp. 1954 385 p.
Illus. \$11.00.
Wire Industry Ltd.
33 Furnival Street
London E. C. 4, England.

II. U. S. GOVERNMENT PUBLICATION

- A. Wire Products. IR-26608/9/10. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Fence Industry Trade News. Monthly. \$5.00/year.
Ellison Publications, Inc.
127 North Dearborn Street
Chicago, Ill. 60605
- B. Wire and Wire Products. Monthly. \$8.00/year.
Quinn-Brown Publishing Company
229 Main Street
Stamford Connecticut, 06901

IV. U. S. PATENTS

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

- A. Patent No. 2,401,319. 1946. 14 p.
Manufacture of interwoven diagonal wire fencing.

SELECTED REFERENCES (Continued)

V. TRADE ASSOCIATION

- A. Chain Link Fence Manufacturers Institute
630 Third Avenue
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

- A. Door-Oliver, Inc.
39 Havemeyer Lane
Stamford, Conn. 06902
- B. Tampa Bay Engineering Co.
151 Treasure Island Causeway
St. Petersburg, Florida 33706

VII. DIRECTORY

- A. Wire and Wire Products Buyers' Guide and Yearbook of the Wire Association. Annual. \$5.00.
Quinn-Brown Publishing Corporation
299 Main Street
Stamford, Conn. 06901

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INDUSTRY PROFILES

CHALK WHITING

I. P. No. 66207

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CHALK WHITING: Standard Industrial Classification 3295

A. PRODUCT DESCRIPTION

Powdered chalk, made by pulverizing high grade chalk, purifying it, and carefully sizing the particles. Chalk whitening substitutes can be produced from limestone, marble, dolomite, or oyster shells, or by chemical precipitation (CaCO_3). The plant description that follows applies, however, only to manufacture from chalk proper.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this industry are moderate. Easily accessible deposits of good quality chalk are essential. Chalk whitening is used in a very wide range of industries. The plant described would probably have to find the bulk of its market within the country, or at least within a fairly restricted region. It will be necessary to have a considerable development of user industries within this potential market area.

C. MARKET ASPECTS

1. USERS. A wide range of industries. Chalk whitening is used as a filler extender in calcimine; as pigment in cold-water paints and putty; as ceramic raw materials; as filler in paint and rubber; as coating material for paper; as rubber reinforcing pigment; as a basic ingredient of metal polishes, toothpaste, white shoe dressing, white ink; and in manufacture of pastes, paper, oilcloth, linoleum, window shades, caulking compounds, fireworks, explosives, mouldings, mineral foods, dolls, cigarette papers, wire insulation, crayons, phonograph records, plastics, baking powder, leather goods, glass, roofing materials, dyes.
2. SALES CHANNELS AND METHODS. Sales will be made direct to user industries.
3. GEOGRAPHICAL EXTENT OF MARKET. For most uses chalk whitening represents only a very small part of total costs and the addition represented by freight costs is unlikely to check consumption and thus limit the geographical extent of the market, although buyers will, other things being equal, buy from the nearest source. Export business is done in this material, but since manufacture of substitutes is possible for most uses locally-produced whitening is available in adequate quantity in most industrially developed areas.
4. COMPETITION. Normally it should be easy to compete with imported chalk whitening. It should also be possible to compete for export business, at least within the region involved.
5. MARKET NEEDED FOR PLANT DESCRIBED. The economic feasibility of operating the plant described will evidently depend on whether sufficient user industries, such as those mentioned in paragraph 1 above, have been established in the region that the plant can expect to serve.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 4,600 Tons

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	Cost
<u>Land.</u> About 20,000 sq. ft.	\$ --
<u>Building.</u> One story, 1,800 sq. ft. floor space.	11,000
<u>Equipment, Furniture & Fixtures.</u>	
Prodn. tools & equipmt. \$33,600	
Other tools & equipmt. 700	
Furniture & fixtures 700	
	35,000
<u>Total (excl. Land)</u>	<u>\$ 46,000</u>

Principal Items. Ring roll mill, conveyor belt, dial scale for weighing dryer, 3 hand trucks, hand tools

d. WORKING CAPITAL

	No. of Days	
<u>Direct Materials, Direct Labor, Mfg. Overhead(a)</u>	60	\$ 11,600
<u>Admin. Costs(b), Contingencies, Sales Costs(c)</u>	30	1,800
<u>Training Costs</u>		2,200
<u>Total Working Capital</u>		<u>\$ 15,600</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 61,600

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Chalk	6,400 tons	\$ 26,000
Bags	256,000	9,000
Thread		1,000
<u>Total</u>		<u>\$ 36,000</u>
b. <u>Supplies</u>		\$ 1,000
Maintenance & repair parts		100
Lubricants & hand tools		200
Office supplies		200
<u>Total</u>		<u>\$ 1,300</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load about 40 hp.	<u>\$ 1,200</u>
b. <u>Fuel.</u> About 22,000 gals. oil annually.	<u>\$ 2,600</u>
c. <u>Water.</u> For general purposes.	<u>\$ 300</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 1,000 tons a month. Plant should be located on good all-weather highway and, if possible, near railroad.

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	1	\$ 6,000
Semi-skilled	2	9,000
Unskilled	1	4,000
<u>Total</u>	<u>4</u>	<u>\$ 19,000</u>

b. Indirect Labor
Manager 1 \$ 9,000

c. Training Needs. Manager must be experienced. With assistance of 1 skilled worker, he should be able to train all other workers. Plant should reach full production in about 2 months.

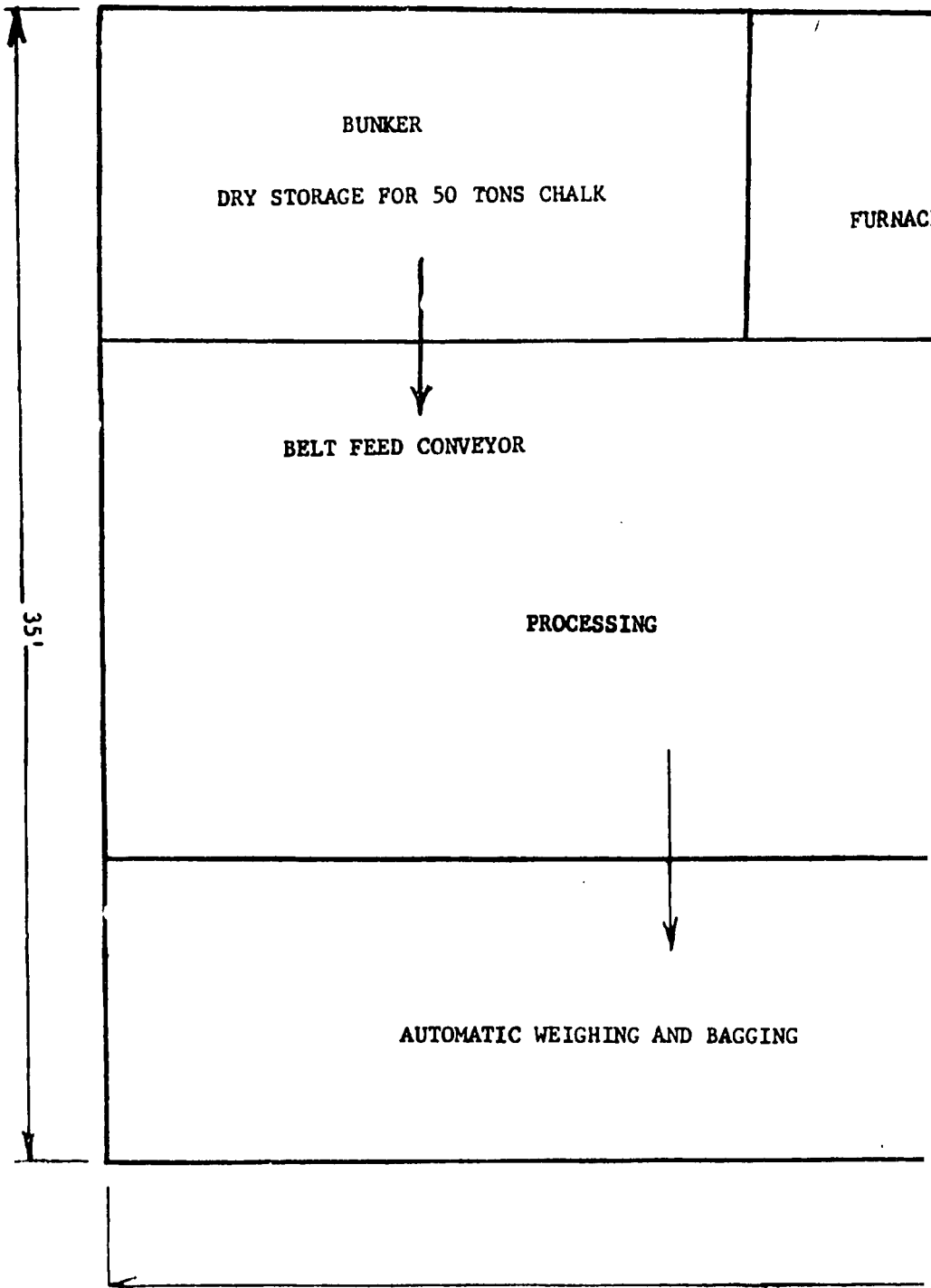
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
<u>Direct Materials</u>	\$ 36,000
<u>Direct Labor</u>	19,000
<u>Manufacturing Overhead(a)</u>	14,400
<u>Admin. Costs(b), Contingencies</u>	10,000
<u>Sales Costs(c), Bad Debts</u>	13,000
<u>Depreciation on Fixed Capital</u>	4,100
<u>Total</u>	<u>\$ 96,500</u>

b. Annual Sales Revenue \$135,000

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

CHALK WHITING: S.I.C. 3295



CHALK WHITING : S.I.C. 3295

PLANT LAYOUT

ARROWS INDICATE WORK FLOW

10'

30'

OFFICE

STORAGE 200 TON BAGGED WHITING

WOMEN

MEN

63

CHALK WHITING: S.I.C. 3295

SELECTED REFERENCES

I. TEXTBOOKS

- A. Selected Process Industries. R. N. Shreve. 1950. 842 p, Illus. \$7.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
Text on industrial processing, including that of whiting.
- B. Plant Design and Economics for Chemical Engineers. M. S. Peters.
1958. 511 p. Illus \$13.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATION

- A. Chalk and Whiting. Bowles and Oliver. Information Circular 7297. Gratis.
Bureau of Mines
U. S. Department of the Interior
Washington, D. C. 20240

III. PERIODICALS

- A. Chemical Engineering. Bi-weekly. \$25.00/year.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- B. Chemical Engineering Progress. Monthly. \$6.00/year.
American Institute of Chemical Engineers
25 West 45th Street
New York, N. Y. 10036

IV. U. S. PATENTS

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

- A. Patent No. 2,979,380. 1961. 10 p.
Carbonate manufacture.
- B. Patent No. 2,914,860. 1960. 5 p.
Method of producing finely divided CaCO_3 .
- C. Patent No. 2,865,781. 1958. 3 p.
Production of finely divided calcium carbonate.
- D. Patent No. 2,688,749. 1954. 6 p.
Process of preparing calcium carbonate composition.
- E. Patent No. 2,587,999. 1952. 6 p.
Manufacture of chalk.

SELECTED REFERENCES (Continued)

V. TRADE ASSOCIATIONS

- A. American Chemical Society
1155 16th Street, N. W.
Washington, D. C. 20036

VI. ENGINEERING COMPANIES

- A. Knapp Mills, Inc.
23-17 Borden Avenue
Long Island City, N. Y. 11101
- B. Lippman Engineering Works, Inc.
46th and Mitchell
Milwaukee, Wisconsin 53216

VII. DIRECTORY

- A. Green Book Buyers' Directory. Annual. \$5.00.
Schnell Publishing Company, Inc.
30 Church Street
New York, N. Y. 10007
Lists manufacturers and suppliers in the chemical, oil, paint, and
drug 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.

INDUSTRY PROFILES

COLD STORAGE FOR MEAT AND POULTRY

I. P. No. 66208

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.

COLD STORAGE FOR MEAT AND POULTRY: Standard Industrial
Classification 3585

A. PRODUCT DESCRIPTION

The production requirements listed in section D, are for the manufacture and installation of 50 units, 30' x 30' x 10' high, equipped with an electric cooling system with motor. Where electric power is not available, installations can be adapted to use with ice. The plant could produce installations of any required size.

B. GENERAL EVALUATION

The capital and skilled labor requirements for this plant are fairly high. To sell fifty units of this kind, or their equivalent, every year it would evidently be necessary to have a market of considerable size and with a rather rapid growth of modern food distribution facilities. Market prospects should be carefully investigated.

C. MARKET ASPECTS

1. USERS. Slaughter houses, meat packers, food distributors, warehouses, etc.
2. SALES CHANNELS AND METHODS. Sales would be made direct to the users.
3. GEOGRAPHICAL EXTENT OF MARKET. This business consists largely of construction work, and the market for an enterprise of this size would be predominantly local.
4. COMPETITION. The only direct competition would be from establishments in the same line of business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Factors influencing demand for these installations include climate and eating habits, as well as income level. In general, it would be necessary to have a sizable and fairly advanced urban community to provide an adequate market for this plant's production.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 50 Installations

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land, About 1 acre.	\$ --
Building, One story, 100'x100'.	60,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$37,800
Other tools & equipmt.	4,300
Furniture & fixtures	700
Transportation equipmt.	3,200
Total (excl. Land)	<u>\$106,000</u>

Principal Items. Cutoff saw, jointer, planer, rip saw, bandsaw, drill press, belt sander, molder, paint spray portable concrete mixer, rock wool blower compressor, monorail & hooks, factory trucks, trim saw, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials		
Labor, Mfg. Overhead(a)	60	\$ 89,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	5,000
Training Costs		4,200
Total Working Capital		<u>\$ 99,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$205,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Concrete blocks	75,000	\$ 21,000
Lumber	750,000 bd. ft.	95,000
Rock wool insulation		10,000
Celotex insulation		10,000
Cooling units, including motors		225,000
Nails, screws, bolts, washers, enamel		9,000
Total		<u>\$370,000</u>

b. Supplies

Lubricants & hand tools	\$ 200
Cutting tools & abrasives	400
Maintenance & spare parts	3,700
Office supplies	200
Total	<u>\$ 4,500</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 60 hp.	\$ 900
b. Fuel. Scrap lumber from plant.	
c. Water. For sanitation & fire protection.	<u>\$ 100</u>

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment.	
Pickup truck.	\$ 1,000
b. External Transport Facilities.	No special requirements.

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	5	\$ 30,000
Semi-skilled	6	30,000
Unskilled	14	56,000
Total	<u>25</u>	<u>\$116,000</u>
b. Indirect Labor		
Manager & supervisors	3	\$ 28,000
Office	2	9,000
Truck driver and maintenance	2	9,000
Total	<u>7</u>	<u>\$ 46,000</u>

c. Training Needs. Manager & supervisors must be experienced. With 5 skilled workers, they should be able to train others & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

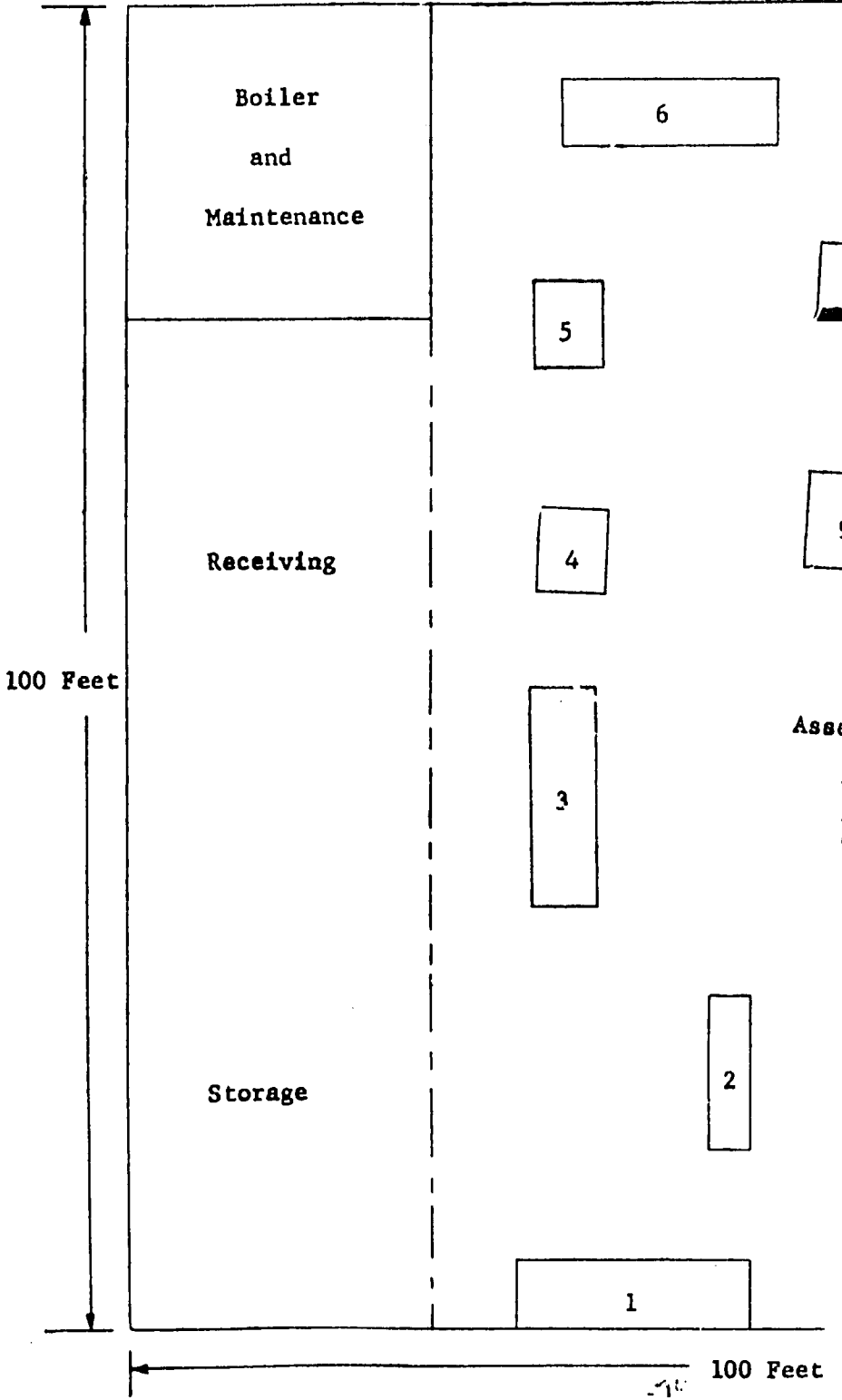
a. Annual Costs	
Direct Materials	\$370,000
Direct Labor	116,000
Manufacturing Overhead (a)	52,500
Admin. Costs(b), Contingencies	22,000
Sales Costs(c), Bad Debts	28,000
Depreciation on Fixed Capital	8,500
Total	<u>\$597,000</u>
b. Annual Sales Revenue	<u>\$ 700,000</u>

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

COLD STORAGE FOR MEAT AND POULTRY: S.I.C. 3585

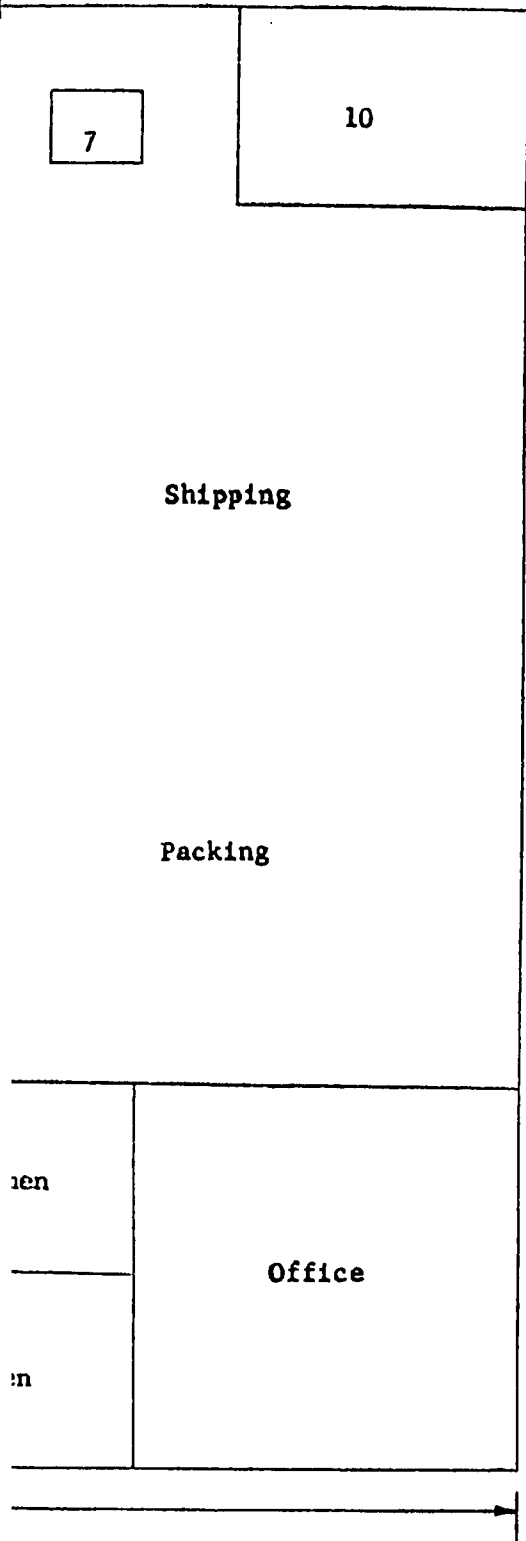
COLD STORAGE FOR ME

PLANT LAYOUT



D POULTRY : S.I.C. 3585

WORKFLOW



Numbers show approximate flow of work.

1. Cutoff saw
2. Jointer
3. Ripsaw
4. Planer
5. Trim saw
6. Molder
7. Drill press
8. Bandsaw
9. Sander
10. Spray booth

COLD STORAGE FOR MEAT AND POULTRY: 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. Carpentry for the Building Trades. A.A. Lair. 1953. 310 p. \$7.75.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- C. Concrete Block Construction for Home and Farm. J. R. Dalzell and
G. Townsend. 1957. 208 p. \$3.75.
American Technical Society
848 East 58th Street
Chicago, Ill. 60637

II. U. S. GOVERNMENT PUBLICATION

- A. Refrigerators. IR-18735. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Refrigeration. Bi-weekly. \$2.00/year.
John W. Yopp Publications, Inc.
1070 Spring Street, N. W.
Atlanta, Georgia 30309
- B. Industrial Refrigeration. Monthly. \$3.00/year.
Nickerson and Collins Company
433 North Waller Avenue
Chicago, Ill. 60644

IV. U. S. PATENTS

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

- A. Patent No. 2,948,623. 1960. 3 p.
Manner of cold storage preserving and handling of meat.
- B. Patent No. 2,942,429. 1960. 7 p.
Poultry chilling and preservation.
- C. Patent No. 2,930,707. 1960. 3 p.
Perservation of meet and similar products by refrigeration.

SELECTED REFERENCES (Continued)

V. TRADE ASSOCIATIONS

- A. National Association of Practical Refrigerating Engineers
312 San Antonio Road
Arcadia, Calif. 91006
- B. Refrigeration Research Foundation
12 North Meade Avenue
Colorado Springs, Colorado 80909

VI. ENGINEERING COMPANIES

- A. Gay Engineering Corporation of California
2863 East 11th Street
Los Angeles, Calif. 90023
Plans and specifications for cold storage plants.
- B. United States Machinery Company, Inc.
90 Broad Street
New York, N. Y. 10004

VII. DIRECTORY

- A. Engineers Product Files. Annual. \$12.50.
Domestic Engineering Company
1801 Prairie Avenue
Chicago, Ill. 60616
Lists heating, air conditioning, ventilating, refrigerating, piping, and plumbing supplies and products and their manufacturers.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

CONVEYORS AND PORTABLE ELEVATORS

I. P. No. 66209

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.

CONVEYORS AND PORTABLE ELEVATORS: Standard Industrial Classification
3535

A. PRODUCT DESCRIPTION

The production requirements listed in section D, are for standard gravity feed roller conveyors, 20 feet long by 15 feet wide, one-half heavy duty with solid rollers, and one-half light duty with tubing rollers. The capital equipment listed, however, could also produce power conveyors, portable elevators and other products of this kind, including hand and powered lift trucks. Powered conveyors and portable elevators are usually designed and constructed for specific purposes, and design costs are included in the purchase price. Such items include roller, chain, belt and bucket elevators and conveyors.

B. GENERAL EVALUATION

The capital and labor skills required for this plant are rather high. The market would probably be mainly a local one, and the enterprise would be feasible only where there is already a considerable development of industry and bulk trading. It might be necessary in some cases to use part of the plant's capacity to make other items for which the machinery and equipment are suitable, in order to achieve an adequate sales volume.

C. MARKET ASPECTS

1. USERS. Industrial and mining enterprises, railroads, wharves, etc.
2. SALES CHANNELS AND METHODS. These products are usually designed for specific purposes and sold direct to users.
3. GEOGRAPHICAL EXTENT OF MARKET. The market for these products, particularly in the case of a relatively small enterprise, tends to be localized.
4. COMPETITION. Competition would come only from other enterprises making similar products.
5. MARKET NEEDED FOR PLANT DESCRIBED. A market for this plant's production could be found only in an area where there is already a considerable development of industrial and transport enterprises. It should be noted that the equipment in this plant could produce other items if there is need to diversify in order to find an adequate market.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 4,750 Conveyors

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	<u>Cost</u>	
Land. 1/2 acre.	\$ --	
Building. One-story, 80'x100'.	48,000	
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$42,000	
Other tools & equipmt.	3,800	
Furniture & fixtures	700	
Transportation equipmt.	2,500	49,000
Total (excl. Land)		<u>\$ 97,000</u>

Principal Items: Power hack saw, square shears, power rolls, sheet metal brake, punch press, metal band saw, turret lathe, engine lathe, milling machine, flexible shaft grinder, 2 drill presses, welding equipment, monorail & hoist, spray booth, hand lift truck, skids, pedestal grinder, pickup truck.

b. <u>WORKING CAPITAL</u>	<u>No. of days</u>	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	\$ 48,200
Admin. Costs (b), Contingencies, Sales Costs (c)	30	2,000
Training Costs		2,800
Total Working Capital		<u>\$ 53,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$150,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Angle iron	580 tons	\$129,000
Flat bars	4 tons	1,000
Rollers, solid & tubes	260 tons	46,000
Pins & bushings		1,400
Bolts & nuts		600
Crating material		1,000
Total		<u>\$179,000</u>

b. <u>Supplies</u>		
Lubricants & hand tools	\$ 200	
Cutting tools & abrasives	300	
Maintenance & spare parts	1,300	
Office supplies	200	
Total		<u>\$ 2,000</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> 50 hp. connected load.	<u>Annual Cost</u>
	\$ 600
b. <u>Fuel.</u> For heating, if necessary.	<u>\$ 300</u>
c. <u>Water.</u> For sanitation & fire protection.	<u>\$ 100</u>

4. TRANSPORTATION

Annual Operating Cost

a. <u>Own Transport Equipment.</u>	
Pickup truck for general purposes.	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> In & out shipments average about 6 tons a day. Good highway necessary & ready access to railroad desirable.	

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	4	\$ 24,000
Semi-skilled	5	25,000
Unskilled	5	20,000
Total	<u>14</u>	<u>\$ 69,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 18,000
Office	2	9,000
Maintenance & driver	2	10,000
Total	<u>6</u>	<u>\$ 37,000</u>

c. Training Needs. Manager & supervisor should be experienced. With 4 skilled workers they should be able to train the others & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

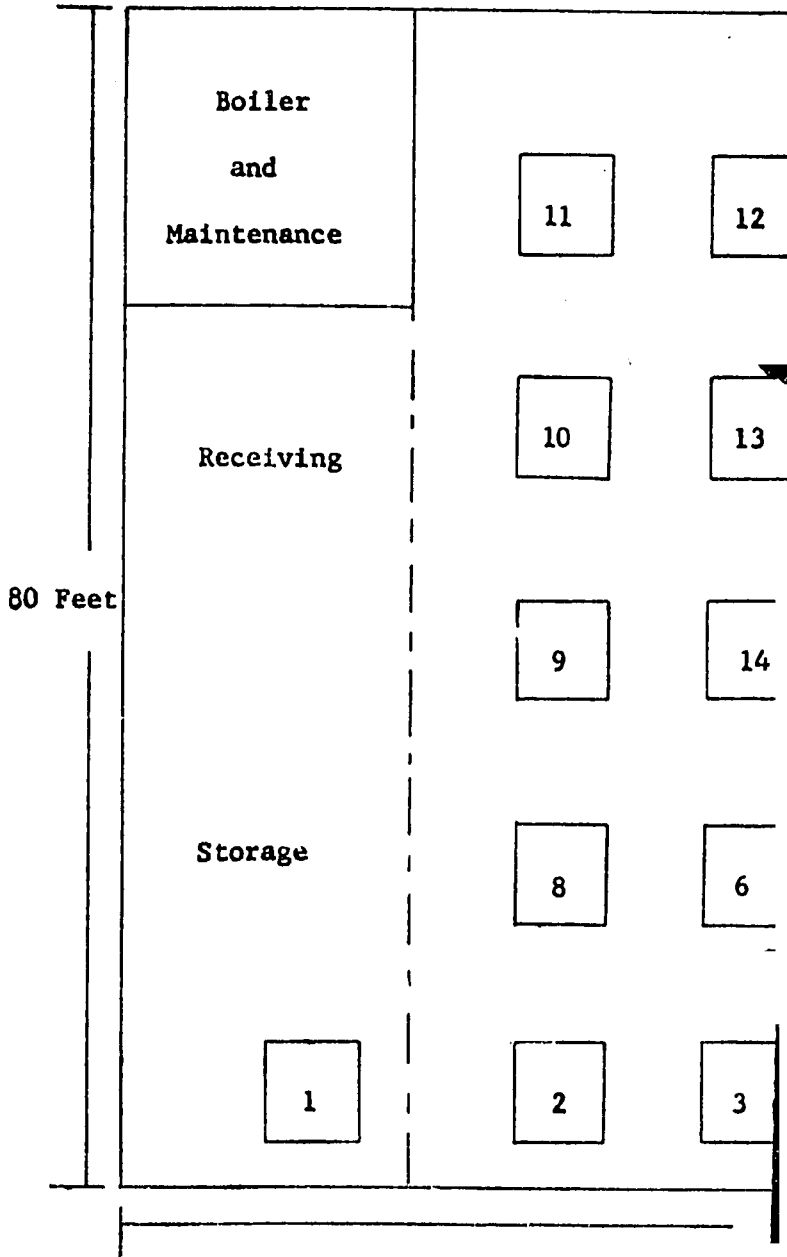
a. <u>Annual Costs</u>	
Direct Materials	\$179,000
Direct Labor	69,000
Manufacturing Overhead(a)	41,000
Admin. Costs(b), Contingencies	12,000
Sales Costs(c), Bad Debts	13,000
Depreciation on Fixed Capital	8,000
Total	<u>\$322,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$380,000</u>

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

CONVEYORS AND PORTABLE ELEVATORS: S.I.C. 3535

CONVEYORS AND PORTABLE

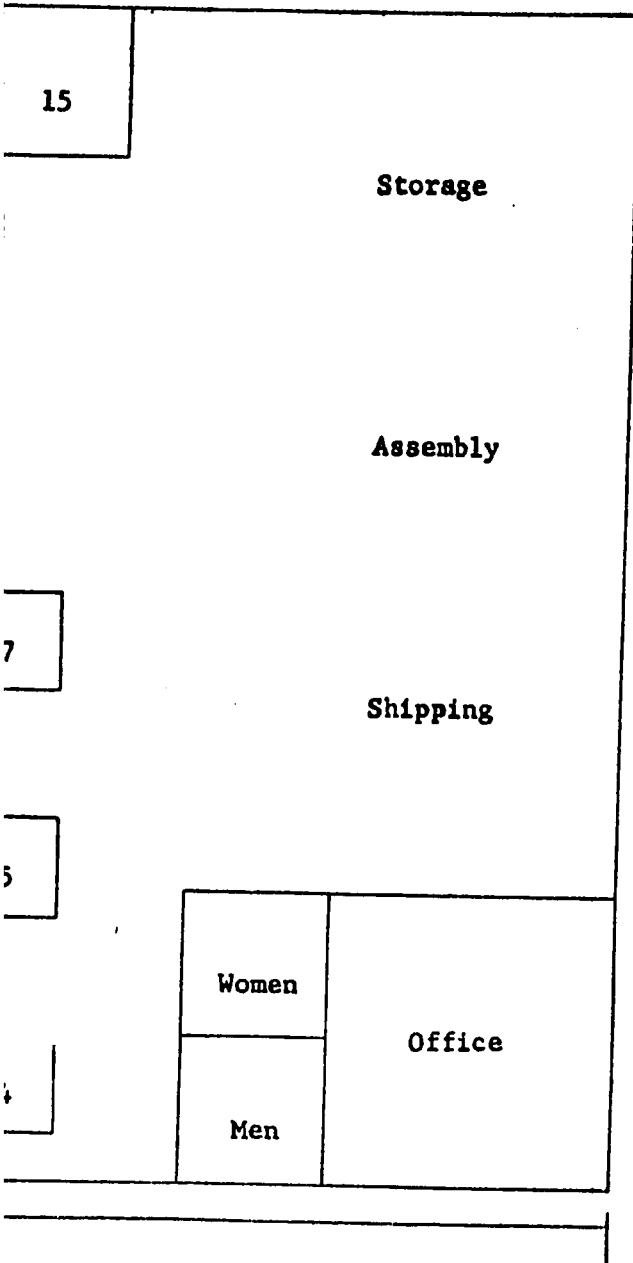
PLANT LAYOUT A



Numbers show approximate flow of work.

- | | |
|----------------------|---------------------------|
| 1. Power hack saw | 5. Power rolls |
| 2. Square shears | 6. Drill press |
| 3. Metal band saw | 7. Flexible shaft grinder |
| 4. Sheet metal brake | 8. Punch press |

CFLOW



- Milling machine
- Engine lathe
- Turret lathe
- Drill press
- 13. Pedestal grinder
- 14. Welding equipment
- 15. Spray booth

CONVEYORS AND PORTABLE ELEVATORS: S.I.C. 3535

SELECTED REFERENCES

I. TEXTBOOKS

- A. **Conveyors and Related Equipment.** W. G. Hudson. 3rd edition. 1954. 524 p. Illus. \$9.75.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N.Y. 10016
- B. **Materials Handling.** J. R. Immer. 1953. 570 p. Illus. \$9.95.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N.Y. 10036
- C. **New American Machinist's 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 PUBLICATIONS

- A. **Materials Handling Equipment.** SSS-5. Gratis.
Agency for International Development
Washington, D.C. 20523
- B. **Materials Handling, Storage, Containers, Packaging.** SB-476.
U.S. Department of Commerce
Washington, D.C. 20230
- C. **Improving Materials Handling.** SBA 1.12:4. \$.20.
Small Business Administration
Washington, D.C. 20416

III. PERIODICALS

- A. **New Equipment Digest.** Monthly. \$10.00/year.
Penton Publishing Company
Penton Building
Cleveland, Ohio 44113
- B. **Materials Handling Engineering.** Monthly. \$10.00/year.
Industrial Publishing Corporation
812 Huron Road
Cleveland, Ohio 44115

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,987,104. 1961. 16 p.
Materials handling belt conveyor.
- B. Patent No. 2,966,996. 1961. 5 p.
Portable elevator and loading mechanisms.
- C. Patent No. 2,931,524. 1960. 6 p.
Stacking machines and vertical conveyors.
- D. Patent No. 2,930,477. 1960. 12 p.
Bulk material conveyor through vertical or horizontal paths.

V. TRADE ASSOCIATION

- A. Conveyor Equipment Manufacturers Association
1 Thomas Circle
Washington, D.C. 20005

VI. ENGINEERING COMPANIES

- A. Stephens-Adamson Manufacturing Company
275 Ridgeway Avenue
Aurora, Ill. 60506
Specialists in materials handling using conveyors and elevators.
- B. Link-Belt Company
Prudential Plaza
Chicago, Ill. 60601
Materials handling experts.

VII. DIRECTORY

- A. Thomas Registry of American Manufacturers. Annual. \$20.00.
Thomas Publishing Company
461 Eighth Avenue
New York, N.Y. 10001
Lists manufacturers and fabricators of machinery and equipment.

CONVEYORS AND PORTABLE ELEVATORS: S.I.C. 3535

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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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

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

INDUSTRY PROFILES

COOKING AND HEATING STOVES

I. P. No. 66210

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COOKING AND HEATING STOVES: Standard Industrial Classification 3631

A. PRODUCT DESCRIPTION

Cast iron cooking stoves with four plates, an oven and a hot water reservoir; and cast iron heating stoves with one cooking plate. Any type of solid fuel can be used in them.

B. GENERAL EVALUATION

This plant requires a fair amount of capital and skilled labor. With the development of electric power and gas supply, use of stoves burning solid fuel tends to decline. However, such stoves continue to be used largely in rural areas, and in some areas also stoves of this kind may be an advance on even more primitive cooking and heating arrangements. The existing market should be closely investigated and future prospects carefully weighed before establishing an enterprise of this kind.

C. MARKET ASPECTS

1. USERS. Households, restaurants, offices, etc.
2. SALES CHANNELS AND METHODS. Sales would be made to wholesale hardware distributors and to large retail stores.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are fairly easy to handle and may be shipped considerable distances. But most countries can make adequate cooking and heating stoves using solid fuel, and these products are not common in international trade.
4. COMPETITION. If gas and/or electricity are available, stoves using these heat sources will compete, depending on relative cost.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these stoves will depend upon many factors, including the type of fuel available, climate, eating habits, etc. Where such stoves are in common household use, a population of about a million might provide a large enough sales outlet.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 25,000 Stoves

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land, About 1 acre.	\$ --
Building, One story, 75'x150'.	68,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipment	\$43,800
Other tools & equipmt.	6,000
Furniture & fixtures	700
Transportation equipmt	2,500
<u>Total (excl. Land)</u>	<u>53,000</u>
	\$121,000

Principal Items. Cupola complete, charging, hoist, balanced type car, platform scales, blower, core oven, sand conditioning equipment, 2 molding machines, air jolt hand rollover, ladles, tramrail & hoist, flasks, grinder, tumbler, air compressor, drill press, lathe, milling machine, wood trim saw, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 47,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,800
Training Costs		5,700
<u>Total Working Capital</u>		<u>\$ 56,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$177,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Pig iron	600 tons	\$ 42,000
Scrap	650 tons	26,000
Coke	75 tons	2,600
Core sand	325 tons	1,000
Molding sand	460 tons	1,400
Additives		3,000
Wires, rods & chaplets		1,000
Packaging materials		12,000
<u>Total</u>		<u>\$ 89,000</u>

b. Supplies

Lubricants & hand tools	\$ 200
Cutting tools & abrasives	500
Maintenance & spare parts	1,600
Office supplies	200
<u>Total</u>	<u>\$ 2,500</u>

3. POWER, FUEL AND WATER

a. Electric Power, 75 hp. connected load. Annual Cost
\$ 1,200

b. Fuel. Included in materials.

c. Water. For sand conditioning & sanitation. Annual Cost
\$ 200

4. TRANSPORTATION

a. Own Transport Equipment. Pickup truck for general purposes. Annual Operating Costs
\$ 1,000

b. External Transport Facilities. In & out shipments average about 14 tons a day. Good highways necessary & ready access to railroad desirable.

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	6	\$ 36,000
Semi-skilled	12	60,000
Unskilled	12	48,000
<u>Total</u>	<u>30</u>	<u>\$144,000</u>

b. Indirect Labor

Manager, 2 supervisors	3	\$ 28,000
Office	2	9,000
Maintenance & driver	2	10,000
<u>Total</u>	<u>7</u>	<u>\$ 47,000</u>

c. Training Needs. Manager & supervisors must be experienced. They should be able to train the other employees & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 89,000
Direct Labor	144,000
Manufacturing Overhead(a)	51,900
Admin. Costs(b), Contingencies	15,000
Sales Costs(c), Bad Debts	21,000
Depreciation on Fixed Capital	9,700
<u>Total</u>	<u>\$330,600</u>

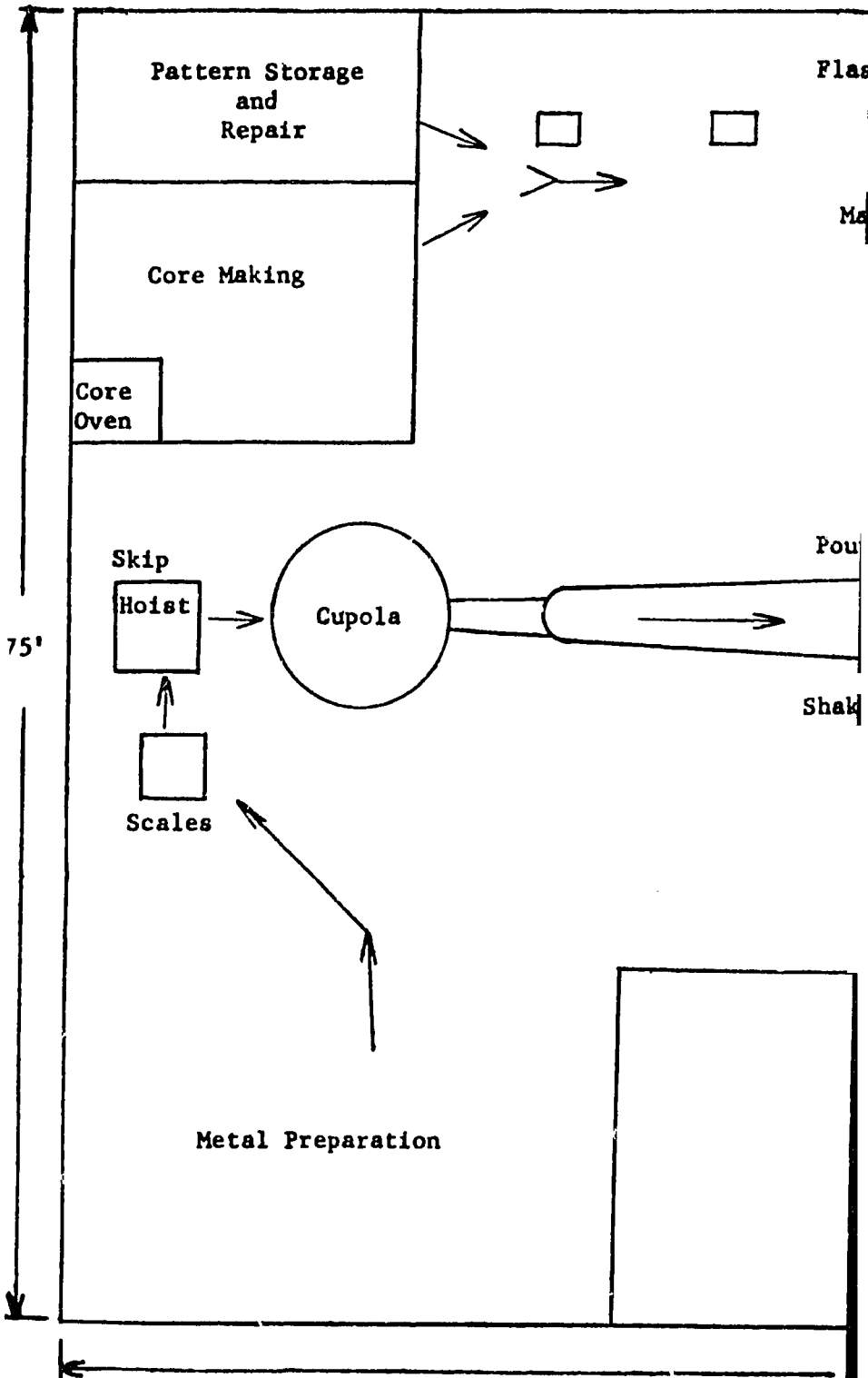
b. Annual Sales Revenue \$380,000

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

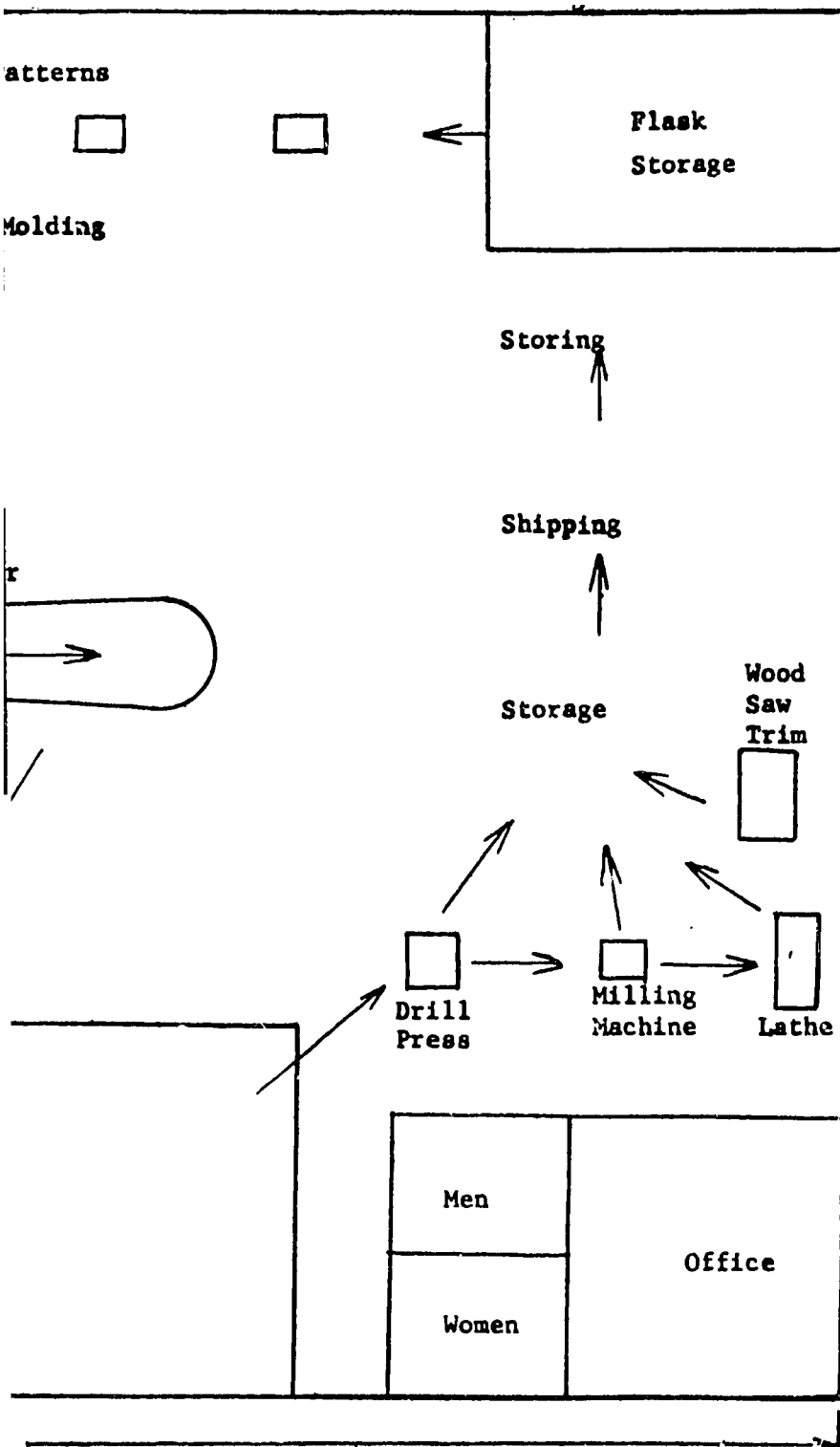
COOKING AND HEATING STOVES: S.I.C. 3631

COOKING AND HEAT

PLANT LAYOUT



WORKFLOW



COOKING AND HEATING STOVES: S.I.C. 3631

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. V. Kondic. 1965.
American Elsevier Publishing Co., Inc.
52 Vanderbilt Avenue
New York, N. Y. 10017
- C. Introduction to Foundry Technology. Ekey and Winter. 1958. 296 p. Illu
\$7.95.
McGraw-Hill Book Co , Inc.
330 West 42nd Street
New York, N. Y. 10036
- D. Fundamentals in the Production and Design of Castings. 1950. 383 p Illu
\$5.25.
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. Gratis.
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. Iron Age, Weekly. \$5.00/year.
Chilton Company
Christnut and 65th Streets
Philadelphia, Penna. 19139

IV. U. S. PATENTS

- Available U. S. Patent Office
Washington, D. C. 20231 \$.25 each.
- A. Patent No. 2,705,947. 1955. 8 p.
Construction of a cast iron range.
 - B. Patent No. 2,698,373. 1954. 6 p.
Method of producing a cooking range including deep well cooker.
 - C. Patent No. 2,632,434. 1953. 7 p.
Cooking and heating stove and construction thereof.

SELECTED REFERENCES (Continued)

V. TRADE ASSOCIATIONS

- A. Foundry Equipment Manufacturers Association
5225 Manning Place, N. W.
Washington, D. C. 20016

VI. ENGINEERING COMPANIES

- A. Newaygo Engineering Company
Muskegon Street
Newaygo, Michigan 49337
Complete line of foundry equipment.
- B. Jeffrey Manufacturing Company
956 North Fourth Street
Columbus, Ohio
Complete line of foundry equipment.

VII. DIRECTORY

- A. Penton's Foundry List. Biennial. \$10.00.
Penton Publishing Company
1213 West 3rd Street
Cleveland, Ohio 44113
Lists foundries in the United States and Canada.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

DRY MIXTURE CONCRETE IN BAGS

I. P. No. 66211

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A. PRODUCT DESCRIPTION

Portland cement mixed with sand and gravel, to be mixed with water by the user to make concrete. The production requirements listed in D are for 100,000 twenty-five pound, 200,000 forty-five pound, and 300,000 eighty pound bags.

B. GENERAL EVALUATION

This plant requires a fairly high expenditure on fixed capital. Skilled labor requirements are moderate. The product is convenient to use but its use is mainly confined to areas where urbanization is fairly advanced and where there is a concentration of modern houses and other buildings. In general, this is a product which is increasingly utilized and for which future prospects are good.

C. MARKET ASPECTS

1. USERS. The product is used wherever small quantities of concrete are needed for minor construction and repairs.
2. SALES CHANNELS AND METHODS. Sales are usually made to building supplies distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. Transport costs on this product are heavy in relation to product value and, as in the case of cement, it is not usually shipped far, unless there is cheap transport by water. (See Industry Profile I. P. 66133, Cement, S. I. C. 3241).
4. COMPETITION. Direct competition will come only from similar establishments in the same general area.
5. MARKET NEEDED FOR PLANT DESCRIBED. A market outlet for this plant could generally only be found in a large urban community with modern buildings and a fairly high income level.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 17,750 Tons.

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL	Cost	
<u>Land.</u> About 2½ acres.	\$	--
<u>Building.</u> One story, 50'x100', and 2 silos.		60,000
<u>Equipment, Furniture & Fixtures.</u>		
Prod'n. tools & equipmt.	\$100,000	
Other tools & equipmt.	22,500	
Furniture & fixtures	1,000	
Transportation equipmt.	2,500	126,000
<u>Total (excl. Land)</u>		<u>\$186,000</u>

Principal Items. Elevators, heater, batcher, bag batcher, bagging machine, platform lift trucks, pallets, tools & testing equipment, delivery truck.

b. WORKING CAPITAL

	<u>No. of Days</u>	
<u>Direct Materials, Direct Labor, Mfg. Overhead(a)</u>	60	\$ 28,300
<u>Admin. Costs(b), Contingencies, Sales Costs(c)</u>	30	8,000
<u>Training Costs</u>		1,700
<u>Total Working Capital</u>		<u>\$ 38,000</u>

c. **TOTAL CAPITAL (EXCL. LAND)** \$224,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Portland Cement	2,600 tons	\$ 52,000
Sand	5,200 tons	10,400
Gravel	10,400 tons	23,400
Bags	600,000	5,200
<u>Total</u>		<u>\$ 91,000</u>

b. Supplies

Lubricants & hand tools	\$ 400
Maintenance & spare parts	1,500
Office supplies	300
<u>Total</u>	<u>\$ 2,200</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> 65 hp. connected load.	<u>Annual Cost</u>
	\$ 2,500
b. <u>Fuel.</u> About 39,000 cu. ft. gas annually.	\$ 4,700
c. <u>Water.</u> For sanitation and fire protection.	\$ 100

4. TRANSPORTATION

	<u>Annual Operating Cost</u>
a. <u>Own Transport Equipment.</u> 1-ton pickup truck.	\$ 1,000
b. <u>External Transport Facilities.</u> In & out shipments average 120 tons a day. Tractor & enclosed trailer facilities should be available.	

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	2	\$ 12,000
Semi-skilled	2	10,000
Unskilled	4	16,000
<u>Total</u>	<u>8</u>	<u>\$ 38,000</u>
b. <u>Indirect Labor</u>		
Suprintendent	1	\$ 9,000
Foreman inspector	1	7,500
Clerk, utility men	3	13,500
<u>Total</u>	<u>5</u>	<u>\$ 30,000</u>

c. Training Needs. Superintendent & foreman should be fully experienced. They should be able to train the others & have the plant in full production in about 1 month.

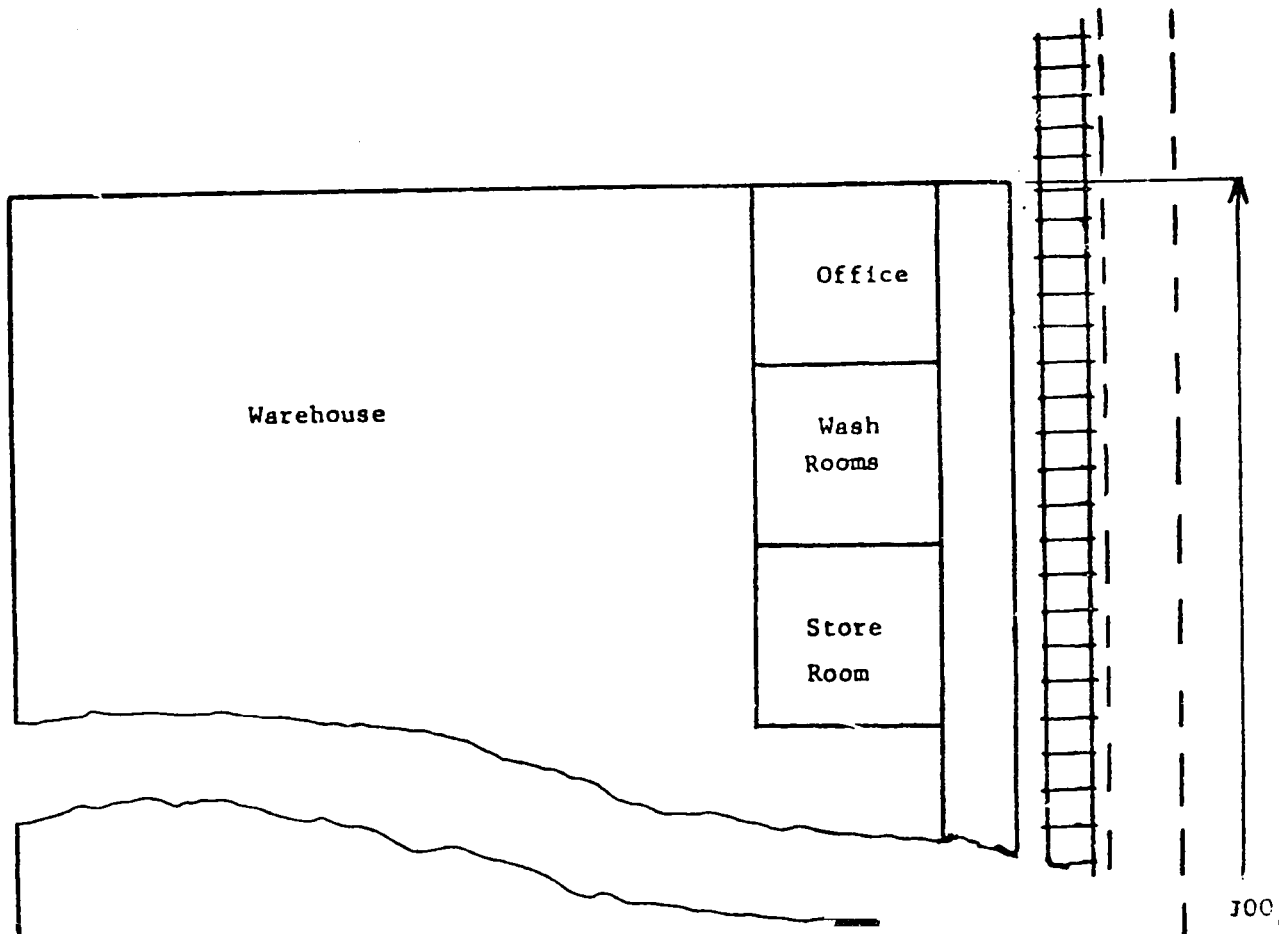
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 91,000
Direct Labor	38,000
Manufacturing Overhead(a)	40,500
Admin. Costs(b), Contingencies	16,000
Sales Costs(c), Bad Debts	90,000
Depreciation on Fixed Capital	18,200
<u>Total</u>	<u>\$293,700</u>
b. <u>Annual Sales Revenue</u>	<u>\$360,000</u>

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

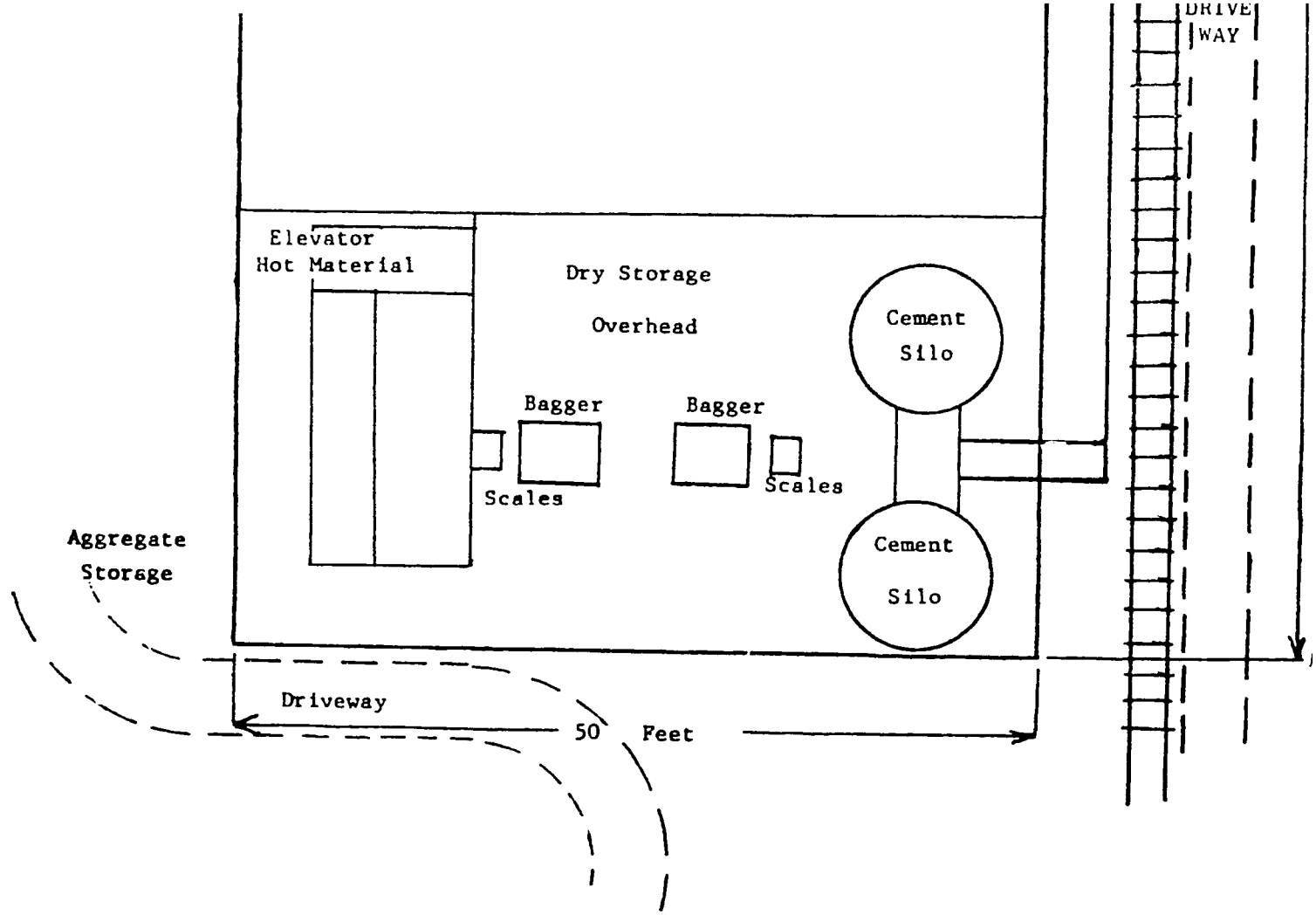
DRY MIXTURE CONCRETE IN BAGS: S.I.C. 3273

PLANT LAYOUT AND WORKFLOW



DRY MIXTURE C

HP



82

DRY MIXTURE CONCRETE IN BAGS: S. I. C. 3273

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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. Composition and Properties of Concrete. G. E. Troxell and H. E. Davis.
1956. 434 p. illus. \$9.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- D. Significance of Tests and Properties of Concrete and Concrete Aggregates.
1956. 387 p. \$6.00.
American Society for Testing Materials
1916 Race Street
Philadelphia, Penna. 19103
- E. The Technology of Cement and Concrete. R. F. Blanks and
H. L. Kennedy. 1955. 442 p. illus. \$11.75.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N.Y. 10016

II. PERIODICALS

- A. Concrete. Monthly. \$6.00/year.
Concrete Publishing Corporation
400 West Madison Street
Chicago, Ill. 60606
- B. Modern Concrete. Monthly. \$2.00/year.
Pit and Quarry Publications, Inc.
431 South Dearborn Street
Chicago, Ill. 60605

SELECTED REFERENCES (Continued)

III. U. S. PATENTS

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

- A. Patent No. 2,960,412. 1960. 3 p.
Curing compositions for dry mixture concrete.
- B. Patent No. 2,890,965. 1959. 8 p.
Additive for binding agents hardened by hydration, such as concrete and similar substances.
- C. Patent No. 2,880,100. 1959. 2 p.
Methods for the manufacture of light-weight concrete.

IV. TRADE ASSOCIATION

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

V. ENGINEERING COMPANY

- A. Hewitt-Robins, Inc.
664 Glenbrook Road
Stamford, Conn. 06906
Design, engineering, procurement, and construction of bulk materials handling systems, including cement and concrete.

VI. DIRECTORY

- A. American Concrete Industry Directory. Biennial. \$5.00.
American Concrete Institute
P. O. Box 4574, Redford Station
Detroit, Michigan 48219
Lists engineers, scientists, builders, manufacturers, and representatives in the field of concrete.

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INDUSTRY PROFILES

ELECTRODES FOR NEON LIGHTS

I. P. No. 66212

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ELECTRODES FOR NEON LIGHTS: Standard Industrial Classification 3624

A. PRODUCT DESCRIPTION

Electrodes for neon lights made from glass tubing and metal electrodes. Half of the electrodes have an attached exhaust tube.

B. GENERAL EVALUATION

This plant needs little capital and only a small amount of skilled labor. Though a small enterprise, it would clearly only be economically feasible if it is located in or near a populous urban area where there is widespread use of neon signs.

C. MARKET ASPECTS

1. USERS. Manufactures of neon signs.
2. SALES CHANNELS AND METHODS. Sales to electrical equipment wholesalers and possibly direct to users.
3. GEOGRAPHICAL EXTENT OF MARKET. This product is light and, though it needs careful handling, easily transportable. It is commonly shipped long distances both in domestic markets and to foreign countries.
4. COMPETITION. The only competition will come from rival establishments. This plant is too small to compete in general international trade but might make some sales to neighboring countries.
5. MARKET NEEDED FOR PLANT DESCRIBED. The plant would obviously need to be in or close to a large urban area where neon signs are in common use.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 800,000 Units

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	Cost	
Land. About 6,000 sq. ft.	\$	--
Building. One story, 30'x40', Equipment, Furniture & Fixtures		7,000
Prodn. tools & equipmt.	\$	7,500
Other tools & equipmt.		300
Furniture & fixtures		700
<u>Total (excl. Land)</u>		<u>\$ 15,500</u>

Principal Items. Glass cutting machine, 8-head stem machine, rotary annealer, gas booster, glass strain detector, hand trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 9,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	800
Training Costs		1,500
<u>Total Working Capital</u>		<u>\$ 11,500</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 27,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Glass tubing	16,400 lbs.	\$ 4,500
Exhaust tubing	1,500 lbs.	500
Metal electrodes	800,000	16,000
Packing materials		6,000
<u>Total</u>		<u>\$ 27,000</u>

b. Supplies

Lubricants & Hand tools	\$	200
Cutting tools & abrasives		200
Maintenance & spare parts		1,000
Office supplies		200
<u>Total</u>		<u>\$ 1,600</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> Connected load 1½ hp. plus lighting.	Annual Cost
	\$ 250
b. <u>Fuel.</u> About 75 cu. ft gas per day.	\$ 200
c. <u>Water.</u> For sanitation & fire protection.	\$ 50

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	1	\$ 6,000
Semi-skilled	2	10,000
<u>Total</u>	<u>3</u>	<u>\$ 16,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 9,000

c. Training Needs. Manager must be experienced. With the skilled worker, he could train the others & reach full production in about 1 month.

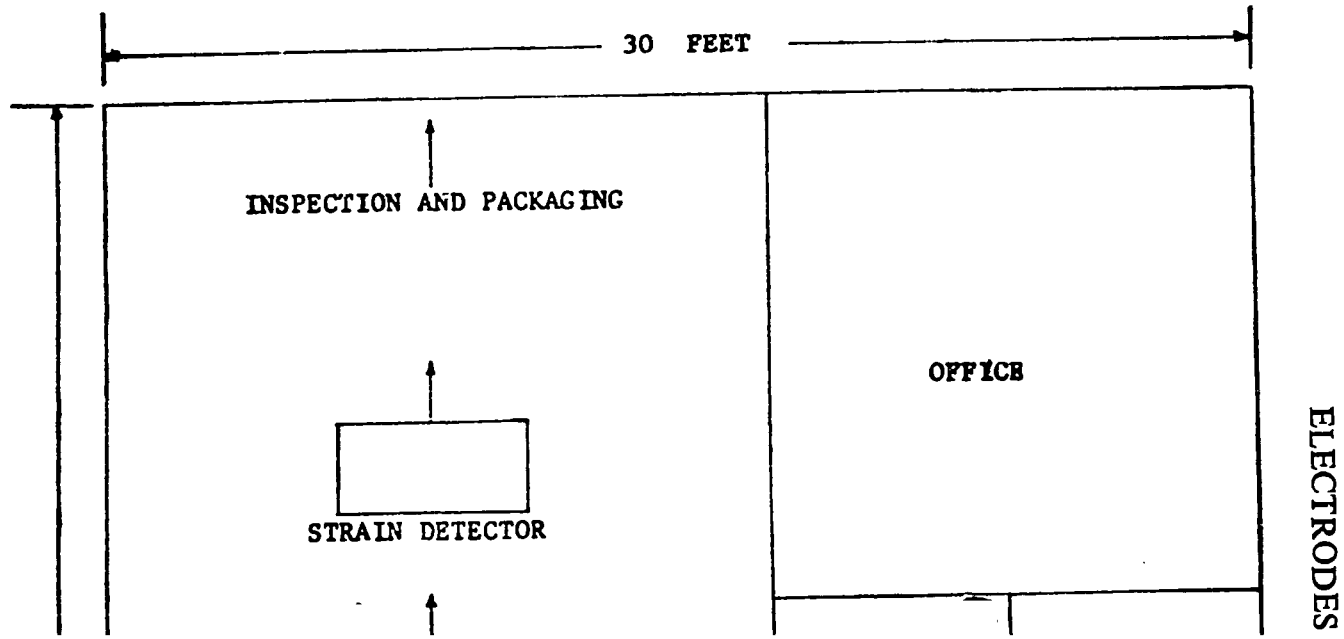
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 27,000
Direct Labor	16,000
Manufacturing Overhead (a)	11,100
Admin. Costs (b), Contingencies	4,000
Sales Costs (c), Bad Debts	6,400
Depreciation on Fixed Capital	1,600
<u>Total</u>	<u>\$ 66,100</u>
b. <u>Annual Sales Revenue</u>	<u>\$ 80,000</u>

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

ELECTRODES FOR NEON LIGHTS: S.I.C. 3624

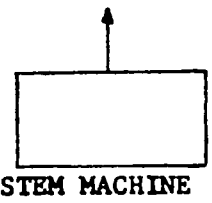
PLANT LAYOUT AND WORKFLOW



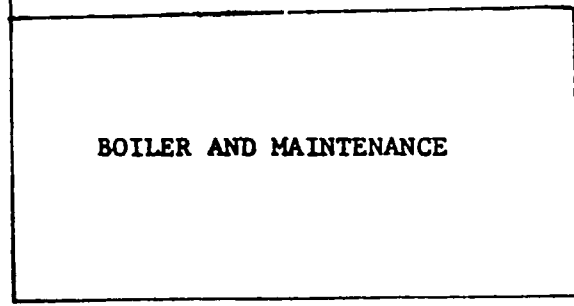
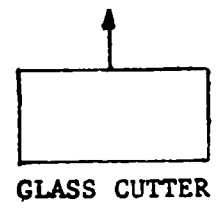
NEON LIGHTS : S.I.C. 3624

40
FEET

BOOSTER



STOCK STORAGE



103

ELECTRODES FOR NEON LIGHTS: S.I.C. 3624

SELECTED REFERENCES

I. TEXTBOOKS

- A. Properties of Glass Surfaces. L. Holland. 1964. \$15.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
- B. Glass Engineering Handbook. E. B. Shand. 1955. 285 p. \$5.50.
Corning Glass Works
Corning, N. Y. 14830
- C. Light, Photometry, and Illuminating Engineering. W. E. Barrows. 1951. (415 p. illus. \$9.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- D. Scientific Glassblowing. E. L. Wheeler. 1958. 500 p. \$12.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016

II. U.S. GOVERNMENT PUBLICATION

- A. Electrodes. T1-80. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Glass Industry. Monthly. \$5.00/year.
Ogden Publishing Company
55 West 42nd Street
New York, N. Y. 10036
- B. Electrical West. Monthly. \$3.00/year.
Mc-Graw-Hill Publishing Company
330 West 42nd Street
New York, N. Y. 10036

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,980,816. 1961. 8 p.
Method of preparing electroluminescent lamp and components.
- B. Patent No. 2,919,365. 1959. 6 p.
Components and their assembly in making electric vapor lamps.
- C. Patent No. 2,911,376. 1959. 4 p.
Activating material for electrodes in electric discharge devices.

V. TRADE ASSOCIATION

- A. National Electric Sign Association
10912 South Western Avenue
Chicago, Ill. 60643

VI. ENGINEERING COMPANY

- A. Eisler Engineering Company, Inc.
750 South 13th Street
Newark, New Jersey 07103
Designing and manufacture of components and machinery for the production of electrodes for neon lights.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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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

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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

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

INDUSTRY PROFILES

ENAMELED PLATES, TEAPOTS AND KETTLES

I. P. No. 66213

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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~~ ^{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.

A. PRODUCT DESCRIPTION

Various sizes and shapes of cooking utensils made of sheet metal and coated with porcelain enamel.

B. GENERAL EVALUATION

Capital requirements for this plant are substantial and a fair amount of skilled labor is needed. Quality maintenance is very important in this business, which is keenly competitive. Competition from utensils made of other materials will be probable, and it is necessary to pay close attention to manufacturing and distributing costs. If the plant is well managed however, the prospects for this business should be reasonably good in many developing areas.

C. MARKET ASPECTS

1. USERS. Households, restaurants.
2. SALES CHANNELS AND METHODS. Sales generally to wholesalers, sometimes to large retailers. A brand name is generally desirable.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are easy to handle and are often shipped long distances, both in domestic and international markets.
4. COMPETITION. There is a large manufacture of these products in some countries with low wage levels. Competition in the domestic and international markets may be keen. Utensils of other materials will also compete and quality and price are highly important in creating and keeping a market.
5. MARKET NEEDED FOR PLANT DESCRIBED. A developing area with a population of perhaps three million, where average income is not excessively low, might provide a large enough market outlet.

1050

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 600,000 Pieces.

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		<u>Cost</u>
Land. About 1 acre.		\$ --
Building. One story 165'x100'. Equipment, Furniture & Fixtures.	100,000	
Prodn. tools & equipmt.	\$160,000	
Other tools & equipmt.	21,500	
Furniture & fixtures	1,000	
Transportation equipmt.	2,500	185,500
<u>Total (excl. Land)</u>		<u>\$285,000</u>

Principal Items. Spot welders, double seamer steel tanks, acid proof tanks, hoists & monorails, monel pickle baskets, 125 hp. boiler, roll mills, scales, dip tanks, beading wheels, drier box furnace, roller conveyors, belt conveyors, laboratory equipment, work benches, storage racks, pumps, delivery truck.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials	Direct	
Labor, Mfg. Overhead(a)	60	\$ 71,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	15,500
Training Costs		5,300
<u>Total Working Capital</u>		<u>\$ 92,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$377,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	<u>Annual Requirements</u>	<u>Annual Cost</u>
Black metal shapes	975 tons	\$175,000
Pickling liquid	90 tons	2,000
Ground coat material	79,000 lbs.	19,000
White coat	212,000 lbs.	77,000
Packaging materials	50,000 boxes	10,000
<u>Total</u>		<u>\$283,000</u>

b. Supplies

Lubricants & hand tools	\$ 200
Cutting tools & abrasives	100
Maintenance & spare parts	3,000
Welding gas & rods	100
Office supplies	200
<u>Total</u>	<u>\$ 3,600</u>

3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. Electric Power. 37 kw. connected load.	\$ 1,500
b. Fuel. About 70,000 gals. bunker C oil annually.	\$ 3,500
c. Water. About 1,600 gals. a minute.	\$ 300

4. TRANSPORTATION

	<u>Annual Operating Cost</u>
a. Own Transport Equipment. Light truck.	\$ 1,000
b. External Transport Facilities. In & out shipments average 8 tons a day. Good highway facilities needed.	

5. MANPOWER

a. Direct Labor	<u>Number</u>	<u>Annual Cost</u>
Skilled	6	\$ 36,000
Semi-skilled	10	50,000
Unskilled	10	40,000
<u>Total</u>	<u>26</u>	<u>\$126,000</u>
b. Indirect Labor		
Manager & supervisors	2	\$ 18,000
Office	2	9,000
Truck driver & maintenance	2	10,000
<u>Total</u>	<u>6</u>	<u>\$ 37,000</u>

c. Training Needs. Manager & supervisor must be experienced. With 3 skilled workers they should be able to train other employees & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$283,000
Direct Labor	126,000
Manufacturing Overhead (a)	46,900
Admin. Costs(b), Contingencies	18,000
Sales Costs(c), Bad Debts	75,000
Depreciation on Fixed Capital	26,000
<u>Total</u>	<u>\$574,900</u>
b. Annual Sales Revenue	<u>\$680,000</u>

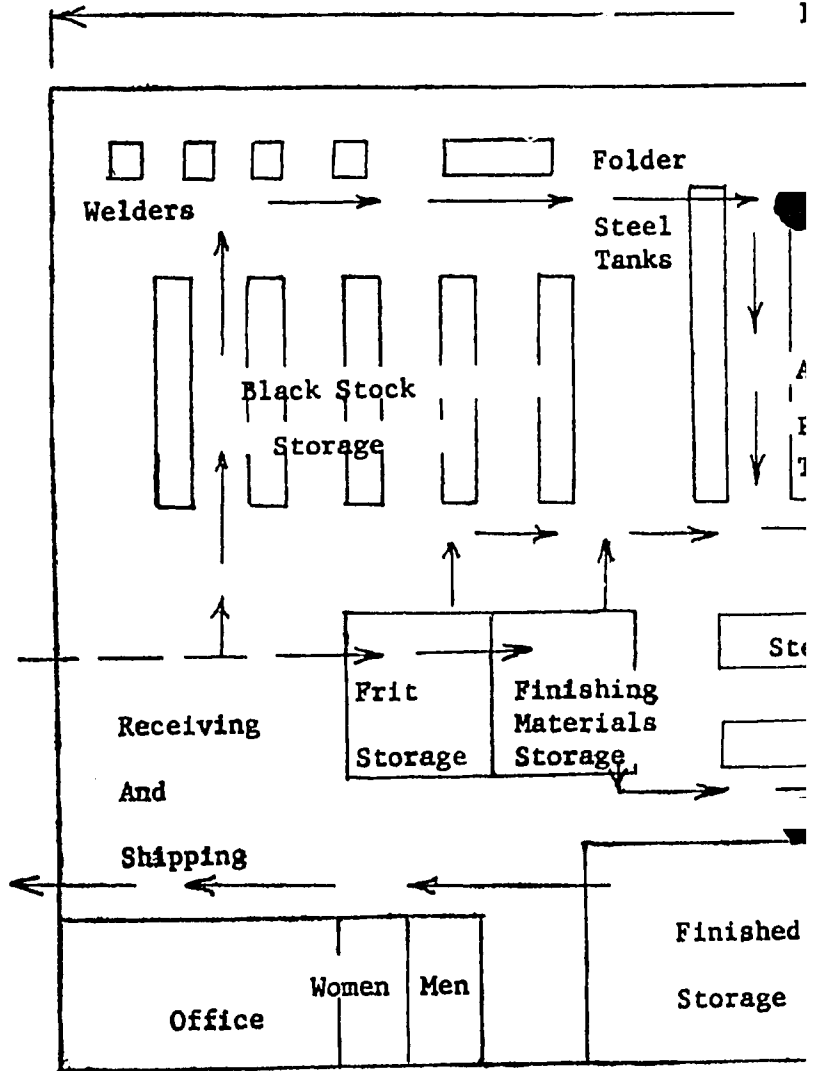
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

ENAMELED PLATES, TEAPOTS AND KETTLES: S.I.C. 3479

100

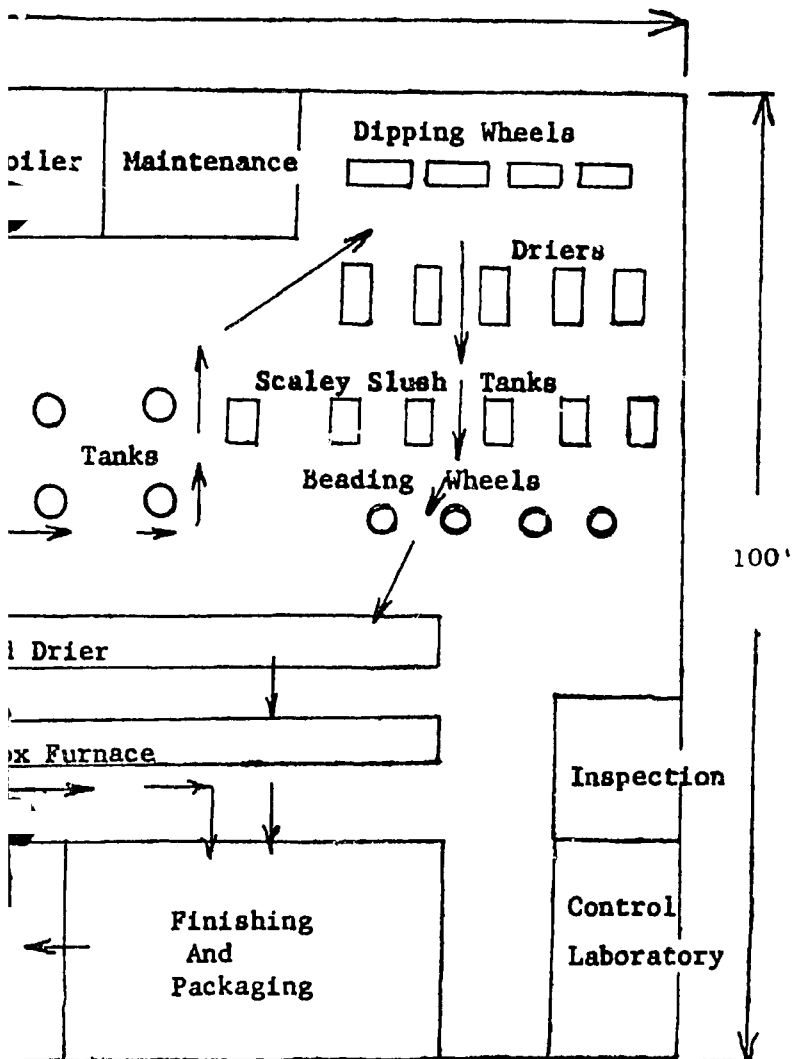
ENAMELED PLATES, TEA

PLANT LAYOUT



ND KETTLES: S. I. C. 3479

WORKFLOW



ENAMELED PLATS, TEAPOTS AND KETTLES· S.I.C. 3479

SELECTED REFERENCES

I. TEXTBOOKS

- A. Metal Work and Enameling. H. Maryon, 4th revised edition, 1959. \$8.50.
Dover Publications, Inc.
180 Varick Street
New York, N. Y. 10014
- B. Enameling on Metal. O. Untracht. 1957. 191 p. illus. \$7.50.
Chilton Company
568 East Chestnut Street
Philadelphia, Penna. 19106
- C. Porcelain Enamels. A. I. Andrews. 1961. 633 p. illus. \$12.50.
Garrard Press
510-22 North Hickory Street
Champaign, Ill. 61820
- D. 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. Relation Between Roughness of Interface and Adherence of Porcelain Enamel to Steel. J. C. Richmond, D. C. Moore, H. B. Kirkpatrick, W. N. Harriscn. 1957. 98. p. Gratis.
U. S. Bureau of Standards
Washington, D. C. 20234

III. PERIODICALS

- A. Metal Progress. Monthly. \$10.50/year.
American Society for Metals
7301 Euclid Street
Cleveland, Ohio 44103
- B. Ceramic Industry. Monthly. \$8.00/year.
Industrial Publications, Inc.
5 South Wabash Avenue
Chicago, Ill. 60603

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,994, 369. 1961. 3 p.
Method of enameling metallic surfaces by chemical reduction.
- B. Patent No. 2,957,782. 1960. 9 p.
Process for coating or enameling ferrous metals.
- C. Patent No. 2,953,472. 1960. 3 p.
Method of coating metallic articles with metal.

V. TRADE ASSOCIATION

- A. Porcelain Enamel Institute
1145 19th Street, N. W.
Washington, D. C. 20006

VI. ENGINEERING COMPANY

- A. Mathewson Machine and Engineering Works, Inc.
78 Hancock Street
Quincy, Mass. 02171
Design, engineering, development and manufacturing.

VII. DIRECTORY

- A. General Enamellers List. Gratis.
Porcelain Enamel Institute
1145 19th Street
Washington, D. C. 20006

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

HAND TOOLS

I. P. No. 66214

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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 TOOLS: Standard Industrial Classification 3423

A. PRODUCT DESCRIPTION

The production requirements listed in D are based on the manufacturers of 25,000 hammers, 50,000 monkey wrenches, 50,000 pliers, 75,000 screw drivers, 50,000 wrecking bars, 25,000 tin snips, and 225,000 open wrenches. The product mix can be varied according to market demand.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderately high. The enterprises will be suitable only for an area that has already achieved a fairly high level of development. Where a sufficiently large market exists to justify starting a business of this kind, prospects of expansion are usually fairly good, as developing communities usually have an increasing demand for hand tools.

C. MARKET ASPECTS

1. USERS. Industries, farms, repair establishments, households, etc.
2. SALES CHANNELS AND METHODS. Sales to hardware wholesalers and possibly direct to large retail stores, government agencies, and some industrial establishments. A brand name is desirable.
3. GEOGRAPHICAL EXTENT OF MARKET. The products are very easy to handle and may be shipped long distances both in the domestic and the international market.
4. COMPETITION. The only competition will be from rival establishments in the same market area. If the quality of the tools is high and the cost reasonable some exports may be possible, though the relatively small size of the plant rules out the possibility of doing much international business.
5. MARKET NEEDED FOR PLANT DESCRIBED. The size of the market in population terms will vary greatly according to the amount of industrialization, etc. In an area where modern facilities are fairly widespread a population of the order of two million might provide a sufficient market outlet.

11/18

D. PRODUCTION REQUIREMENTS

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

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land, about 1 acre.	\$ ---
Building, One story, 70'x90'.	38,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt.	\$78,000
Other tools & equipmt.	4,700
Furniture & fixtures	800
Transportation equipmt.	2,500
Total (excl. Land)	<u>\$124,000</u>

Principal Items. Power hack saw, alligator shears, 2 forging hammers, 2 forge furnaces, drill press, sensitive drill press, grinder, bench grinder, milling machine, 2 turret lathes, bench lathe, heat treat oven, arbor press, spray booth, welding equipment, air compressor, jib crane, punch press, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 48,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,000
Training Costs		5,800
Total Working Capital		<u>\$ 57,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$181,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Steel	500 tons	\$ 80,000
Wood handles	125,000	10,000
Lacquer	1,000 gals.	3,000
Packaging materials		4,000
Total		<u>\$ 97,000</u>

b. Supplies

Lubricants & hand tools	\$ 200
Cutting tools & abrasives	800
Maintenance & spare parts	1,700
Office supplies	300
Total	<u>\$ 3,000</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 132 hp. connected load.	\$ 1,500
b. Fuel. About 14,000 gals. bunker C oil annually.	\$ 700
c. Water. About 900,000 gals. annually for general purposes.	\$ 200

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Pickup truck for local service.	\$ 1,000
b. External Transport Facilities. In & out freight about 4 tons a day. Good highway necessary.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	6	\$ 36,000
Semi-skilled	16	80,000
Unskilled	5	20,000
Total	<u>27</u>	<u>\$136,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 18,000
Office	1	5,000
Maintenance & driver	2	11,000
Total	<u>5</u>	<u>\$ 34,000</u>

c. Training Needs. Manager should be experienced. With 2 skilled workers, he should be able to train other workers & reach full production in about 1 month.

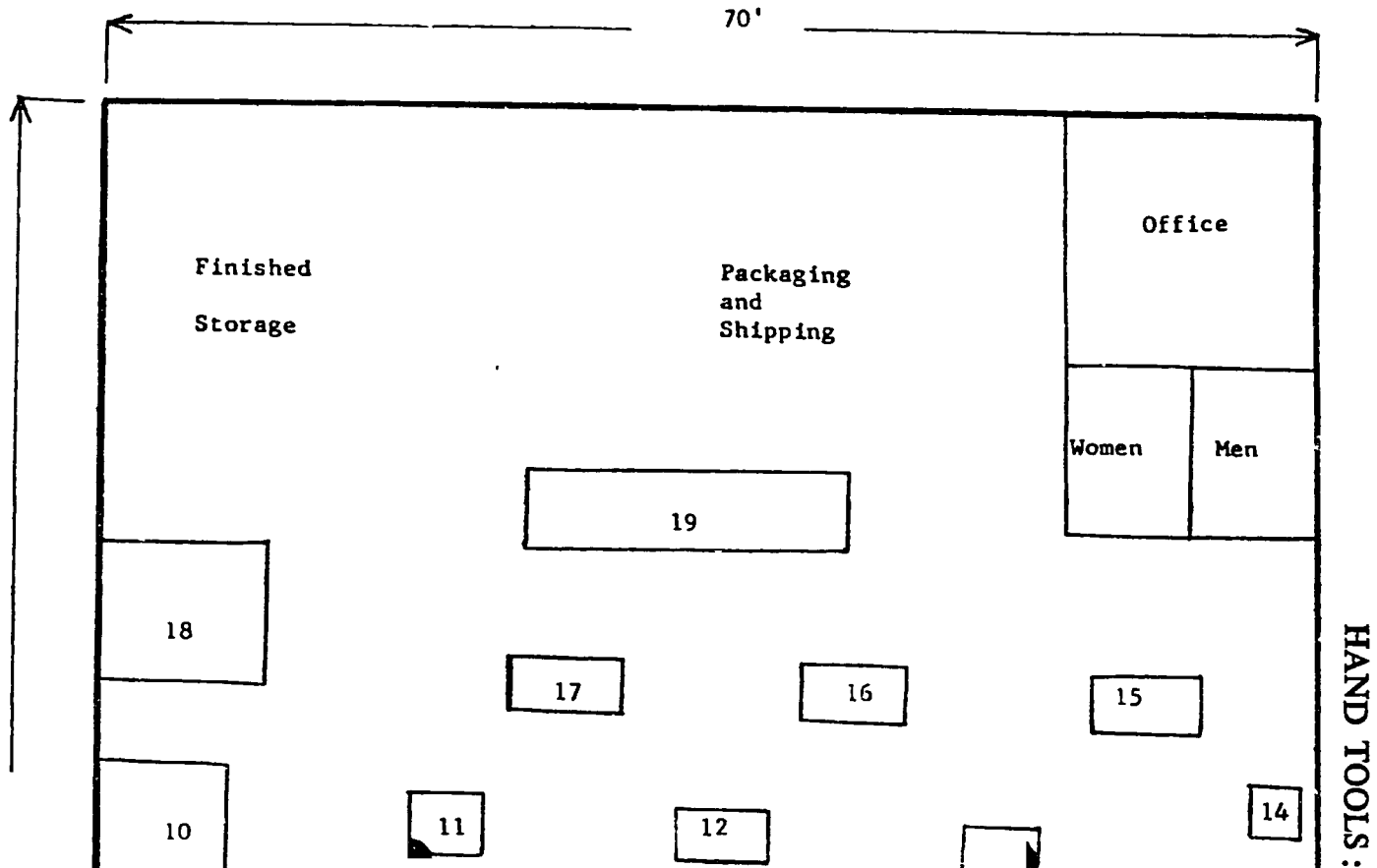
6. TOTAL ANNUAL COSTS AND SALES REVENUE

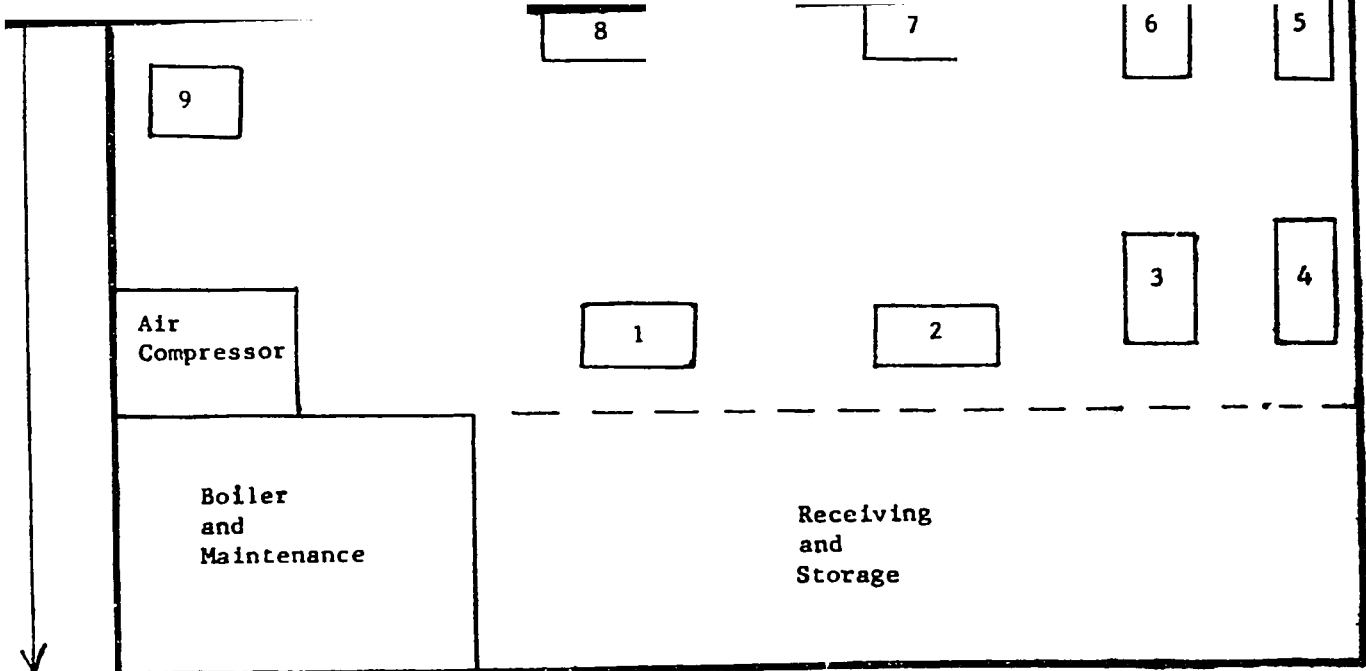
a. Annual Costs	
Direct Materials	\$ 97,000
Direct Labor	136,000
Manufacturing Overhead(a)	40,400
Admin. Costs(b), Contingencies	15,000
Sales Costs(c), Bad Debts	25,000
Depreciation on Fixed Capital	11,300
Total	<u>\$324,700</u>
b. Annual Sales Revenue	<u>\$390,000</u>

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 TOOLS: S.I.C. 3423

PLANT LAYOUT AND WORKFLOW





- | | |
|----------------------|----------------------|
| 1. Power hacksaw | 10. Heat treat oven |
| 2. Alligator shears | 11. Wet grinder |
| 3. Drop forge hammer | 12. Arbor press |
| 4. Forge furnace | 13. Bench grinder |
| 5. Forge furnace | 14. Sensitive drill |
| 6. Drop forge hammer | 15. Bench lathe |
| 7. Punch press | 16. Turret lathe |
| 8. Milling machine | 17. Turret lathe |
| 9. Drill press | 18. Spray booth |
| | 19. Inspection bench |

The workflow will be about as shown by machine number with some exception for varied products.

HAND TOOLS: S.I.C. 3423

SELECTED REFERENCES

I. TEXTBOOKS

- A. Forging and Welding. R.E. Smith. 1958. \$4.00.
Taplinger Publishing Co., Inc.
119 West 57th Street
New York, N. Y. 10019
- B. Forging and Forming Metals. S. E. Rusinoff. 1952. \$4.50.
The American Technical Society
848 East 58th Street
Chicago, Ill. 60637
- C. Modern Machine Tools. Frank H. Habicht. 1963. \$6.50.
D. Van Nostrand Co., Inc.
Princeton, N. J. 08540

II. PERIODICALS

- A. Metal Forming and Fabricating. Monthly. \$10.00/year.
Watson Publications, Inc.
201 North Wells Street
Chicago, Ill. 60606
- B. Metal Products Manufacturing. Monthly. \$10.00/year.
Dana Chase Publications
York Street at Park Avenue
Elmhurst, Ill. 60126

III. U.S. PATENTS

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

- A. Patent No. 2,977,824. 1961. 3 p.
Process for making hand tools of the wrench type.
- B. Patent No. 2,920,927. 1960. 3 p.
Pivoted, jawed hand tool, and method of making.
- C. Patent No. 2,884,816. 1959. 7 p.
Making an impact tool of the claw hammer type.
- D. Patent No. 2,732,733. 1956. 3 p.
Manufacturing hand pliers with spring between cheeks of same.
- E. Patent No. 2,672,006. 1954. 3 p.
Manufacturing a screw driver with handle attachment.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATION

- A. National Metal Trades Association
222 West Adams Street
Chicago, Ill. 60606

V. ENGINEERING COMPANIES

- A. Consolidated Welding and Engineering Co.
2452 South Ashland Avenue
Chicago, Ill. 60608
Complete engineering and contacting services specializing in weldments.
fabricating, machining.
- B. Continental Industrial Engineers, Inc.
2321 West Hubbard Street
Chicago, Ill. 60612

VI. DIRECTORY

- A. American Machinist/Metalworking Manufacturing Buyers Guide and
Production Preview. Annual. \$1.50.
McGraw-Hill Publishing Company
330 West 42nd Street
New York, N. Y. 10036

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INDUSTRY PROFILES

HEATERS, KEROSENE ASBESTOS TYPE

I. P. No. 66215

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HEATERS, KEROSENE ASBESTOS TYPE; Standard Industrial Classification 343:

A. PRODUCT DESCRIPTION

Sheet metal room heaters, kerosene asbestos type, size 16 inches by 20 inches by 7 inches, with wire guards, pressure pumps and kerosene tanks. The equipment listed in section D can be used to produce larger or smaller heaters.

B. GENERAL EVALUATION

This plant requires a moderate amount of capital and skilled labor. The market area would probably be rather localized, and the plant would be economically feasible only in an area where kerosene is commonly used for heating. Speaking generally, kerosene heaters tend to be supplanted by other forms of heating, and areas where future prospects for a kerosene heater plant are bright are probably few.

C. MARKET ASPECTS

1. USERS. Households, stores, etc.
2. SALES CHANNELS AND METHODS. Sales are usually made to wholesale distributors and to large retailers. A brand name may be useful.
3. GEOGRAPHICAL EXTENT OF MARKET. Heaters of this type are sometimes shipped fairly long distances. There is not much international trade in them, however, since most countries can make heaters of some kind suitable for local conditions.
4. COMPETITION. Other types of heaters will compete, the strength of such competition depending on relative cost of both fuel and equipment.
5. MARKET NEEDED FOR PLANT DESCRIBED. Where such heaters are common use an area containing about a million people would probably provide a large enough market.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 25,000 Heaters

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	<u>Cost</u>
Land. About 1/2 acre.	\$ ---
Building. One story, 50'x80'.	24,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$31,000
Other tools & equipmt.	3,200
Furniture & fixtures	800
<u>Total (excl. Land)</u>	<u>\$ 35,000</u>
	<u>\$ 59,000</u>

Principal Items. Square shears, sheet metal brake, 2 drill presses, wire former, spot welder, spray booth, compressor, 2 punch presses, factory trucks, dies.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 21,900
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,600
Training Costs		1,500
<u>Total Working Capital</u>		<u>\$ 25,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 84,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Sheet metal	150 tons	\$ 28,000
Guard wire	8 tons	11,000
Valves & pipe	25,000	8,500
Pressure pumps	25,000	12,500
Oil tank & brackets	25,000	7,500
Asbestos felt pads	25,000	2,000
Paint		1,000
Bolts & nuts		500
Cartons		4,000
<u>Total</u>		<u>\$ 75,000</u>

b. Supplies

Lubricants & hand tools	\$ 100
Cutting tools & abrasives	400
Maintenance & spare parts	1,400
Office supplies	300
<u>Total</u>	<u>\$ 2,200</u>

3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> 30 hp. connected load.	\$ 400
b. <u>Fuel.</u> For heating, if necessary.	\$ 300
c. <u>Water.</u> For sanitation & fire protection.	\$ 100

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments average about 2 tons a day. Good highways necessary.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	2	\$ 12,000
Semi-skilled	2	10,000
Unskilled	4	16,000
<u>Total</u>	<u>8</u>	<u>\$ 38,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 10,000
Office	1	5,000
<u>Total</u>	<u>2</u>	<u>\$ 15,000</u>

- c. Training Needs. Manager must be experienced. With 2 skilled workers, he should be able to train the others & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

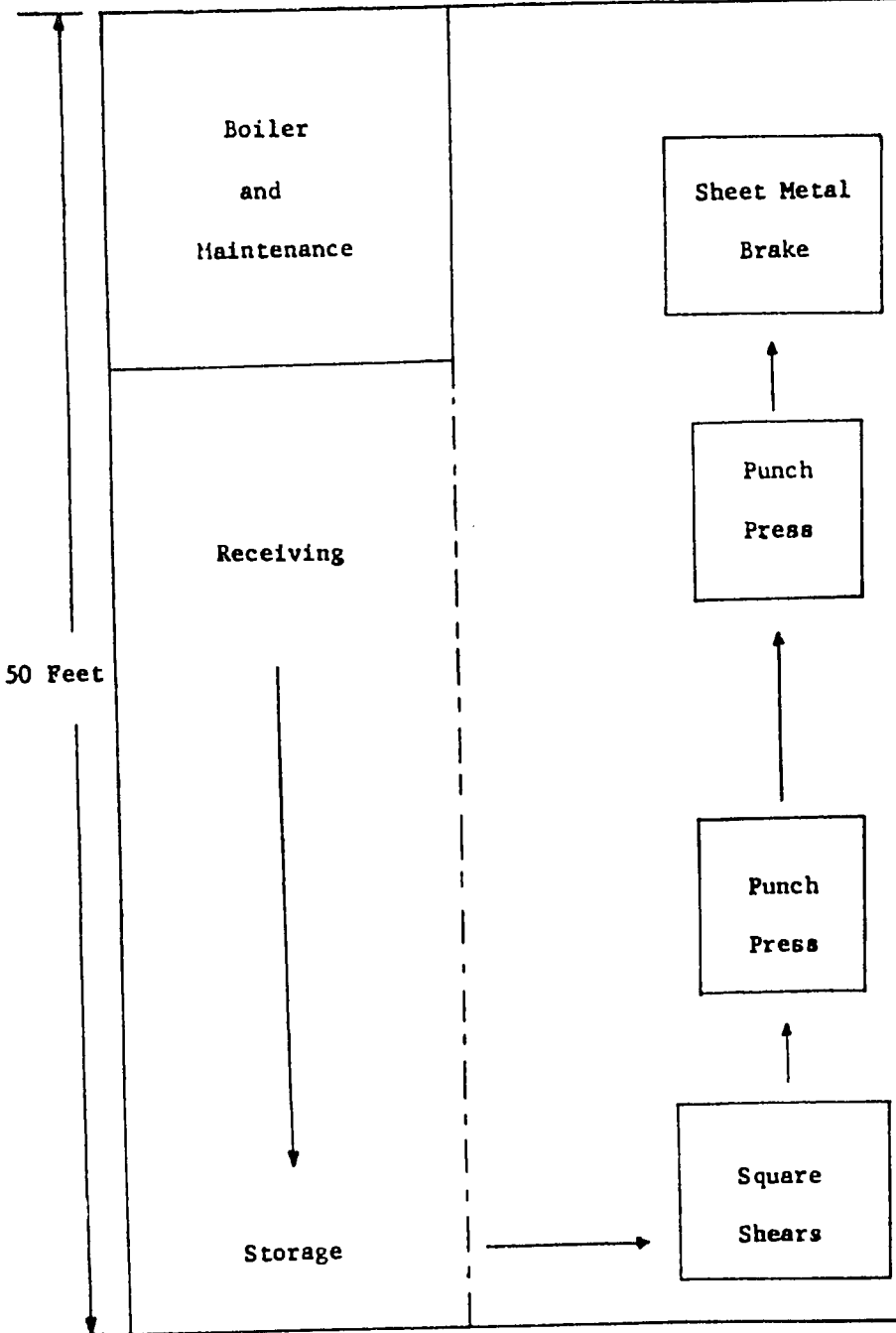
a. <u>Annual Costs</u>	
Direct Materials	\$ 75,000
Direct Labor	38,000
Manufacturing Overhead(a)	18,000
Admin. Costs(b), Contingencies	8,000
Sales Costs(c), Bad Debts	13,000
Depreciation on Fixed Capital	5,000
<u>Total</u>	<u>\$157,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$200,000</u>

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

HEATERS, KEROSENE ASBESTOS TYPE: S.I.C. 3433

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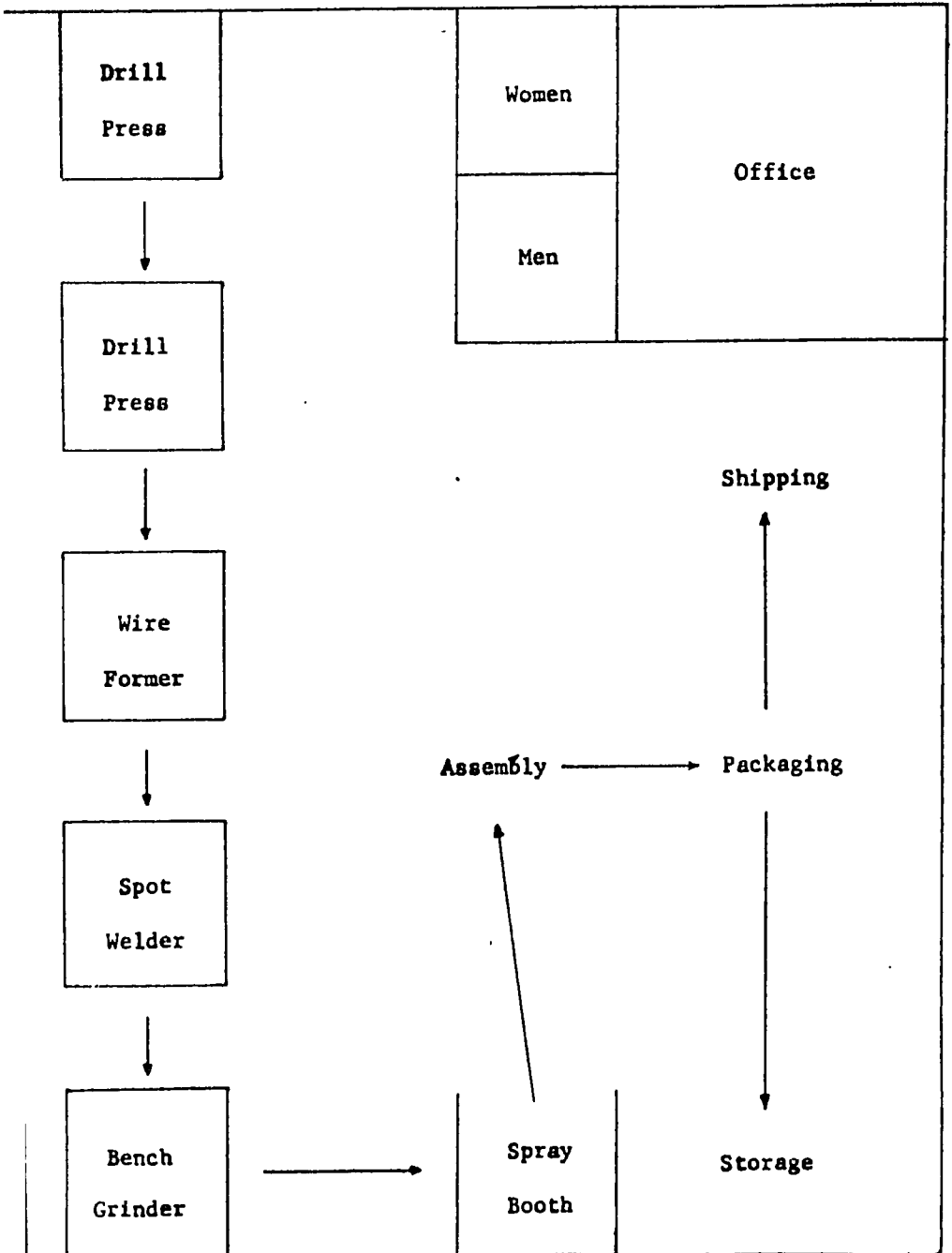
HEATERS, KEROSENE
PLANT LAYOUT



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OS ; TYPE : S.I.C. 3433

WORKFLOW



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HEATERS, KEROSENE ASBESTOS TYPE: S.I.C. 3433

SELECTED REFERENCES

I. TEXTBOOKS

- A. Metalwork Technology and Practice. O. A. Ludwig. 1958. \$6.00.
Taplinger Publishing Co., Inc.
119 West 57th Street
New York, N. Y. 10019
- B. Sheet Metal Shop Practice. L. F. Bruce. 1951. 251 p. Illus. \$4.00.
American Technical Society
848 East 58th Street
Chicago, Ill. 60637
- C. Principles and Methods of Sheet Metal Fabrication. G. Sachs. 1951. 537 p.
\$11.00.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022

II. PERIODICALS

- A. Machinery. Monthly. \$4.00/year.
Industrial Press
93 Worth Street
New York, N. Y. 10013
- B. Metal Products Manufacturing. Monthly. \$10.00/year.
Dana Chase Publications
York Street at Park Avenue
Elmhurst, Ill. 60126

III. U. S. PATENTS

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

- A. Patent No. 2,988,887. 1961. 10 p.
Vaporizing oil burner.
- B. Patent No. 2,973,033. 1961. 5 p.
Fluid burning heater.
- C. Patent No. 2,931,431. 1960. 7 p.
Fuel burner and igniter arrangement.
- D. Patent No. 2,879,762. 1959. 4 p.
Fuel burner and control circuit.
- E. Patent No. 2,876,763. 1959. 13 p.
Multiple fuel burner and sapace heater.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATION

- A. Better Heating-Cooling Council
250 Park Avenue
New York, N. Y. 10017

V. ENGINEERING COMPANIES

- A. Lyon Machinery Builders, Inc.
904 Hotop Street
Kalamazoo, Michigan 49001
Machinery and engineering service for metal working industry.
- B. Engineering Tool Company
18th at Wagner Avenue
Philadelphia, Penna. 19141
Designers and manufacturers of tooling for metal industries.

VI. DIRECTORY

- A. Tool Engineers Suppliers Directory Issue. Annul. \$4.50.
American Society of Tool and Manufacturing Engineers
10,700 Puritan Avenue
Detroit, Michigan 48238
Lists products, their manufacturers, sales offices.

HEATERS, KEROSENE ASBESTOS TYPE: S.I.C. 3433

12^c

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 locality⁴ 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

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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 BLOWERS

I. P. No. 66216

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CENTRIFUGAL BLOWERS: Standard Industrial Classification 3564

A. PRODUCT DESCRIPTION

Centrifugal blowers for industrial purposes, with a capacity of 25,000 cubic feet a minute each. The plant could produce smaller or larger blowers. The production requirements listed under D are for blowers only, without motors. A 15 horsepower motor is required to operate the blower.

B. GENERAL EVALUATION

The capital requirements for this plant are moderate, though skilled labor needs are relatively high. A market for the plant's output could be found only in an area where new industrial plants are being established on a fairly large scale. A careful study would need to be made of the probable trend of demand for the product.

C. MARKET ASPECTS

1. USERS. Mainly industrial plants.
2. SALES CHANNELS AND METHODS. Sales to users and to machinery and equipment suppliers.
3. GEOGRAPHICAL EXTENT OF MARKET. Where a blower is an essential requirement for an industry it may be shipped a long distance, either within a country or to a foreign country. However, a plant such as this would probably be located in an industrial center of some size, and most sales would probably be local.
4. COMPETITION. Competition would come only from rival establishments in the same line of business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Generally speaking, a plant of this kind could find a market only in an area where new industries are being established, though there would perhaps be some demand for replacements and expansion from existing industrial establishments.

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D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 300 Centrifugal Blowers

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		<u>Cost</u>
Land. About 1/2 acre.	\$	--
Building. One story, 80'x125'.		60,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$	32,200
Other tools & equipmt.		2,000
Furniture & fixtures		800
<u>Total (excl. Land)</u>		<u>\$ 95,000</u>

Principal Items. 2 welding machines, square shears, scroll shears, drill press, lathe (10' bed), paint spray, acetylene torch, fork lift truck, keyway cutter, milling machine, portable electric grinder, mono-rail hoist, power hacksaw.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 23,300
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,500
Training Costs		2,200
<u>Total Working Capital</u>		<u>\$ 29,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$124,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
10 gauge steel	200 tons	\$ 32,000
3/8" flat iron	21 tons	3,000
2 3/16" cold rolled shaft		5,500
2 3/16" ball bearings		1,000
Nuts & bolts 1 1/2"x5/8"		50
Keys & set screws		100
Hub castings		18,750
Grease		100
Paint		200
<u>Total</u>		<u>\$ 60,700</u>

b. Supplies

Lubricants & hand tools	\$	300
Cutting tools & abrasives		300
Maintenance & spare parts		1,400
Welding rods & fuel		700
Office supplies		300
<u>Total</u>		<u>\$ 3,000</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> 40 hp. connected load.		<u>Annual Cost</u>
	\$	600
b. <u>Fuel.</u> For heating, if necessary.		\$ 200
c. <u>Water.</u> For sanitation & fire protection.		<u>\$ 100</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments average only about 3 tons a day, but each item is heavy. Railroad facilities necessary.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	6	\$ 36,000
Semi-skilled	2	10,000
Unskilled	1	4,000
<u>Total</u>	<u>9</u>	<u>\$ 50,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 11,000
Office	3	14,000
<u>Total</u>	<u>4</u>	<u>\$ 25,000</u>

- c. Training Needs. Manager must be fully experienced. With 2 skilled workers he should be able to train the others & reach full production about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 60,700
Direct Labor	50,000
Manufacturing Overhead (a)	28,900
Admin. Costs(b), Contingencies	20,000
Sales Costs(c), Bad Debts	25,000
Depreciation on Fixed Capital	6,700
<u>Total</u>	<u>\$191,300</u>
b. <u>Annual Sales Revenue</u>	<u>\$255,000</u>

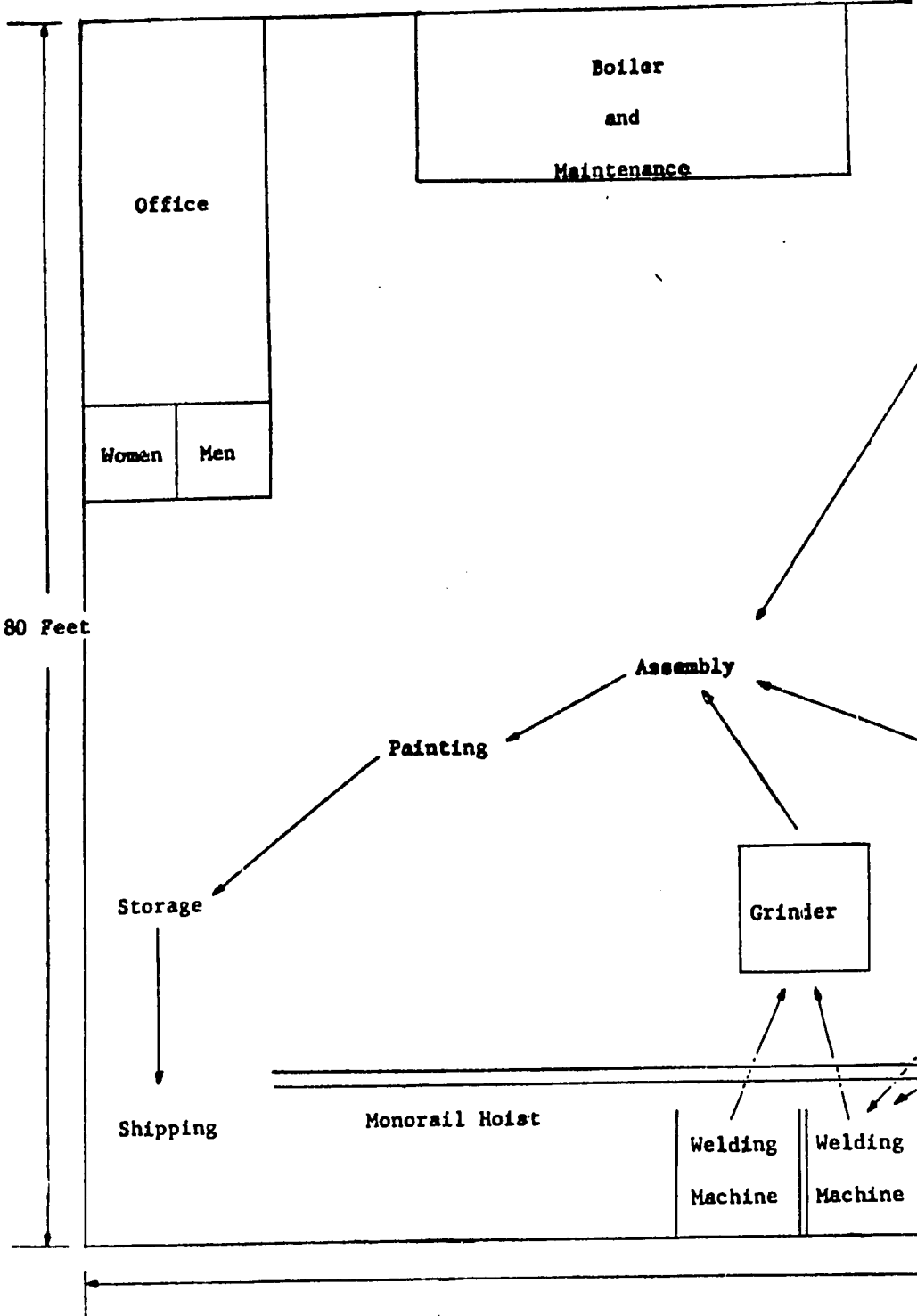
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

CENTRIFUGAL BLOWERS: S.I.C. 3564

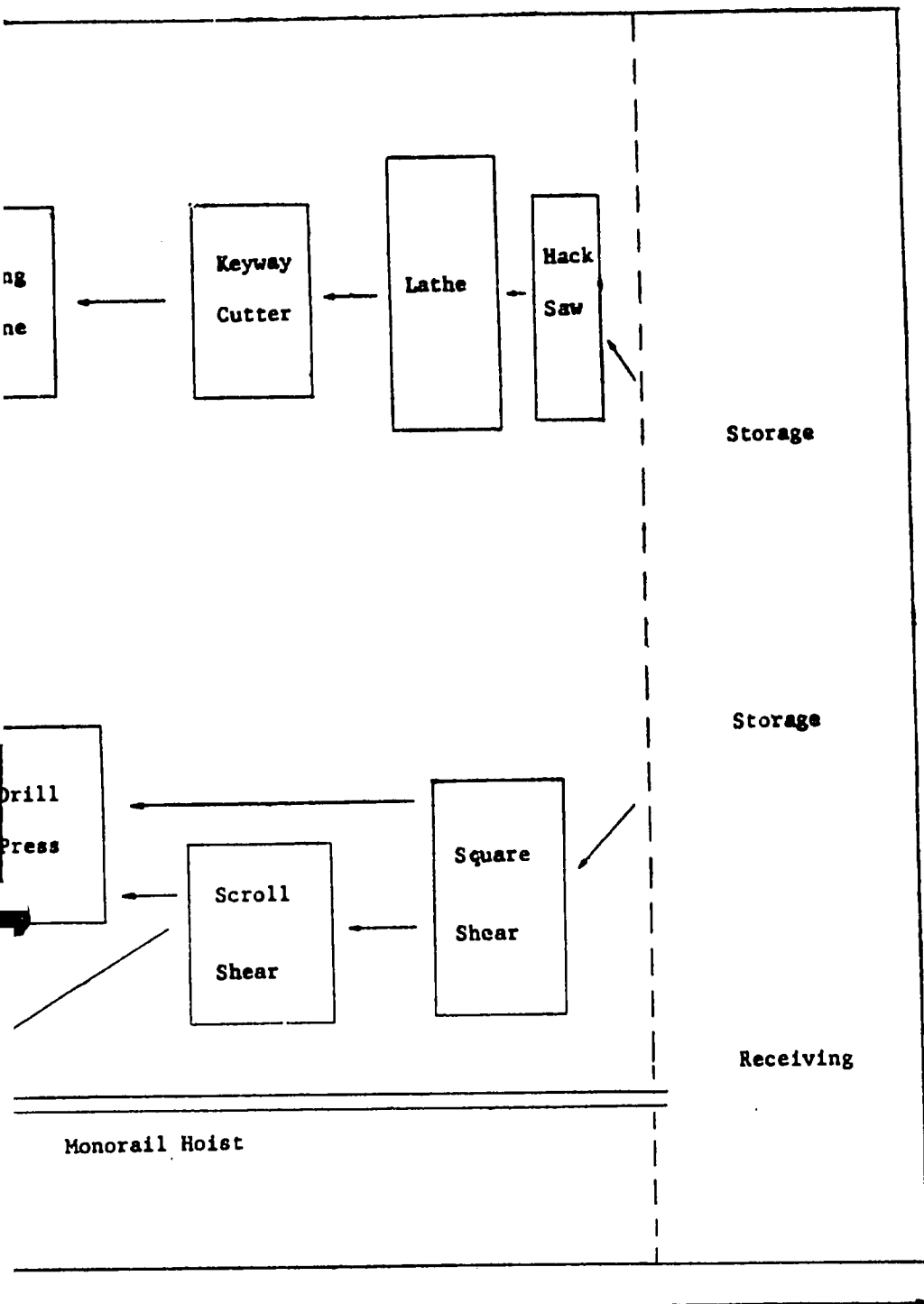
12/27

CENTRIFUGAL

PLANT LAY



WORKFLOW



CENTRIFUGAL BLOWERS: S.I.C. 3564

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I. TEXTBOOKS

- A. Modern Welding. A. D. Althouse and others. 1965. \$8 50.
Goodheart-Willcox Company, Inc.
1322 South Wabash Avenue
Chicago, Ill. 60605
- B. Manufacturing Processes: Production. R. E. Rusinoff. 1958. 560 p.
\$7.25.
American Technical Society
848 East 58th Street
Chicago, Ill. 60637
A presentation of the techniques currently used in the fabrication of metal parts.
- C. Metal Machining. L. E Doyle. 1953. 511 p. \$10.00.
Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 07632

II. U.S. GOVERNMENT PUBLICATIONS

- A. Job Machine Shop. IR-15623. Gratis.
Agency for International Development
Washington, D. C. 20523
- B. Metal Working, Part II: Maching and Cutting Tool. SB-461.
Office of Technical Services
Department of Commerce
Washington, D. C. 20230

III. PERIODICALS

- A. American Machinist. Biweekly, \$25.00/year.
McGraw-Hill Publishing Company, Inc.
330 West 42 Street
New York, N. Y. 10036
- B. Machine and Tool Bluebook. Monthly. \$6.00/year.
Hitchcock Publishing Company
Wheaton, Ill. 60187

SELECTED REFERENCES (Continued)

IV. U.S. PATENTS

- Available U. S. Patent Office
Washington, D. C. 20231 \$25 each.
- A. Patent No. 2,905,377. 1957. 6 p.
Manufacture of an industrial fan.
 - B. Patent No. 2,757,987. 1956. 4 p.
Making industrial blowers.
 - C. Patent No. 2,620,970. 1952. 4 p.
Industrial fan and assembly therefor.
 - D. Patent No. 2,562,388. 1951. 4 p.
Industrial blower and its fabrication.
 - E. Patent No. 2,548,615. 1951. 4 p.
Process for manufacturing industrial blower.

V. TRADE ASSOCIATIONS

- A. National Tool, 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

VI. ENGINEERING COMPANIES

- A. Consolidated Welding and Engineering Company
2452 South Ashland Avenue
Chicago, Ill. 60608
Complete engineering and contracting service specializing in welding,
fabricating, machining
- B. Continental Industrial Engineers, Inc.
2321 West Hubbard Street
Chicago, Ill. 60612

VII. DIRECTORY

- A. Hitchcock's Machine and Tool Directory. Annual. \$10.00.
Hitchcock Publishing Company
Wheaton, Ill. 60187
Lists machine tool products, producers, and trade associations.

CENTRIFUGAL BLOWERS: S.I.C. 3564

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INDUSTRY PROFILES

KITCHEN EQUIPMENT

I. P. No. 66217

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KITCHEN EQUIPMENT: Standard Industrial Classification 3461

A. PRODUCT DESCRIPTION

Can openers, slicers, juicers, egg beaters, graters, knife sharpeners and grinders. numbers of each product shown in section D are illustrative only. The product can be varied according to market demand, and other items could be made with equipment.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderately high. Good management is needed to maintain quality, keep a close watch on production costs and keep up with new developments in the industry. A well-run plant should have good prospects in many developing areas, since demand for these products tends to rise fairly quickly with any rise in living standards.

C. MARKET ASPECTS

1. USERS. Households, restaurants, etc.
2. SALES CHANNELS AND METHODS. Sales would be made to wholesalers and large retailers. A brand name would be an advantage.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are very easily transported and are shipped long distances both in domestic market and in international trade.
4. COMPETITION. This industry is highly competitive, and it is necessary to give constant attention to quality and price. If the plant can produce good articles at a moderate price it might be able to make some exports to neighboring countries, though it is too small to enter into general international trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. A moderately prosperous community with a population of the order of half a million would probably provide a sufficiently large market for this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 20,000 Can Openers, 5,000 Slicers, 10,000 Juicers, 10,000 Egg Beaters, 20,000 Graters, 20,000 Knife Sharpeners, 10,000 Grinders

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL	Cost
Land, about 1/2 acre.	\$ ---
Building, 60'x100'.	36,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$42,500
Other tools & equipmt.	5,700
Furniture & fixtures	800
Total (excl. Land)	<u>49,000</u>
	<u>\$85,000</u>

Principal Items. Square shear, metal band-saw, turret lathe, drill press, sensitive drill press, milling machine, cutter grinder, surface grinder, hand brake, forming rolls, riveting machine, spot welder, arbor press, bench grinder, polisher, punch press, spray booth, heat treat furnace, factory trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 23,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,600
Training Costs		5,300
Total Working Capital		<u>\$ 31,400</u>

c. **TOTAL CAPITAL (EXCL. LAND)** \$116,400

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Sheet steel	80 tons	\$ 18,000
Castings	12 tons	5,000
Rivets, bolts, nuts		2,000
Packaging materials		6,000
Total		<u>\$ 31,000</u>

b. Supplies

Lubricants & hand tools	\$ 300
Cutting tools & abrasives	1,500
Maintenance & spare parts	2,000
Office supplies	200
Total	<u>\$ 4,000</u>

3. POWER, FUEL AND WATER

a. Electric Power. about 500,000 kw-hr annually.	Annual Cost
	<u>\$ 10,000</u>
b. Fuel. For heat treating & heating building.	<u>\$ 600</u>
c. Water. For sanitation & fire protection.	<u>\$ 400</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	5	\$ 30,000
Semi-skilled	5	25,000
Unskilled	2	8,000
Total	<u>12</u>	<u>\$ 63,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 18,000
Office	3	14,000
Total	<u>5</u>	<u>\$ 32,000</u>

- c. Training Needs. Manager & supervisor must be experienced. With 5 skilled workers they should be able to train other employees & reach full production in about 2 months.

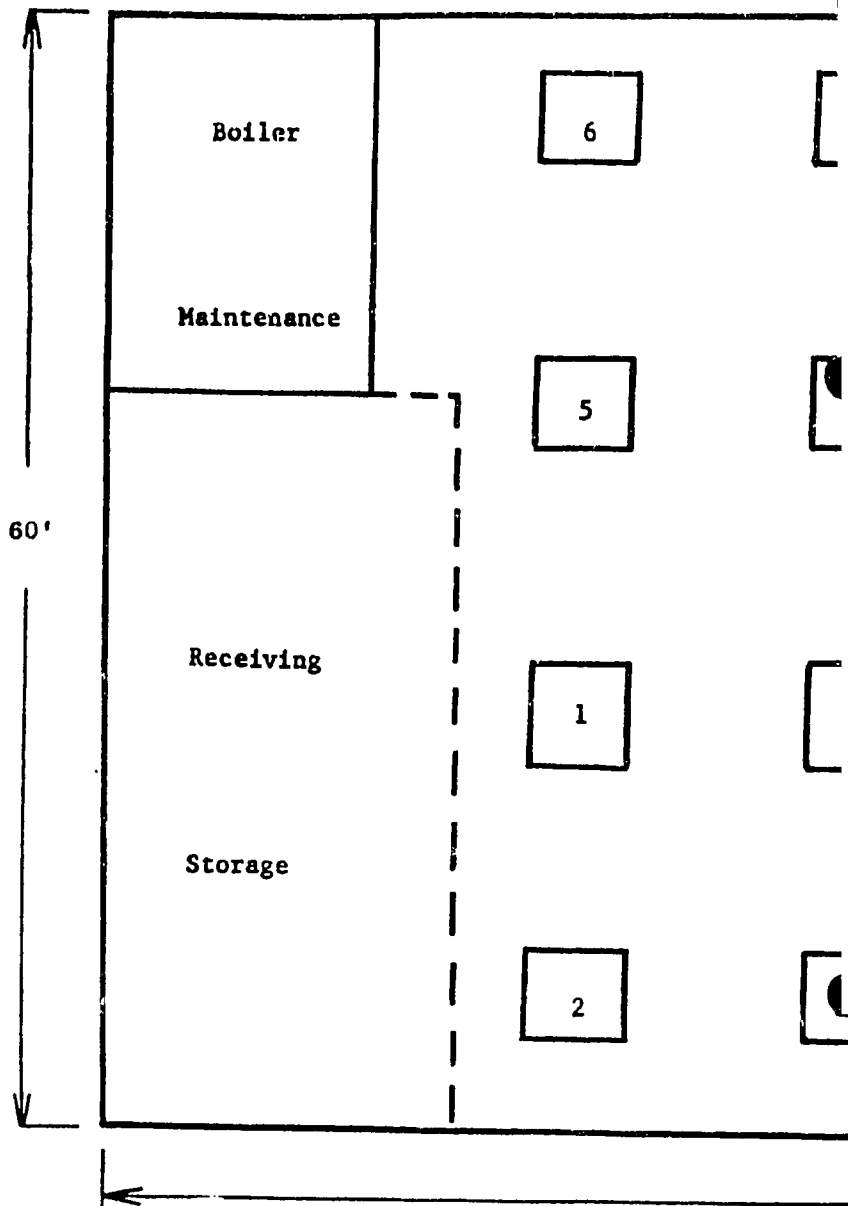
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$ 31,000
Direct Labor	63,000
Manufacturing Overhead(a)	46,700
Admin. Costs(b), Contingencies	17,000
Sales Costs(c), Bad Debts	19,000
Depreciation on Fixed Capital	7,300
Total	<u>\$ 184,000</u>
b. Annual Sales Revenue	<u>\$225,000</u>

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

KITCHEN EQUIPMENT: S.I.C. 3461

KITCHEN
PLANT



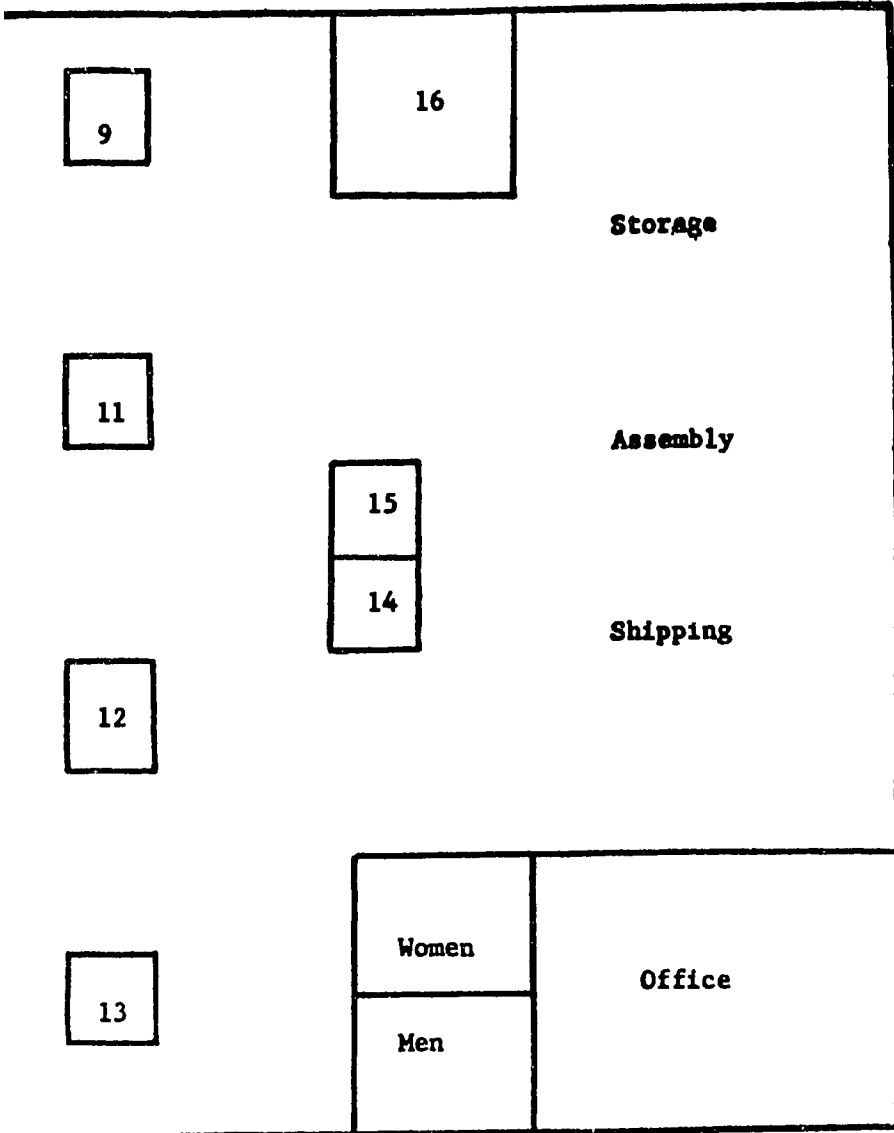
- | | |
|------------------|--------------------|
| 1. Square shears | 5. Forming rods |
| 2. Punch press | 6. Drill press |
| 3. Metal bandsaw | 7. Surface grinder |
| 4. Hand brake | 8. Cutter grinder |

Since seven different items are produced an exact workflow ca

142

NT: S.I.C. 3461

WORKFLOW



- | | |
|---------------------|-------------------|
| 9. Turret lathe | 13. Spot welder |
| 10. Arbor press | 14. Polisher |
| 11. Sensitive drill | 15. Bench grinder |
| 12. Riveter | 16. Spray booth |

lished. The principal workflow will be as the equipment is numbered.

VE

KITCHEN EQUIPMENT: S. I. C. 3461

SELECTED REFERENCES

I. TEXTBOOKS

- A. Modern Machine Tools. Frank H. Habicht. 1963. \$6.50.
D. Van Nostrand Co., Inc.
Princeton, N. J. 08540
- B. The New American Machinists' Handbook. Rupert Le Grand. 1955. 1572 p.
Illus. \$15.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- C. Machine Tool Operations. H. D. Burghardt and others. 1954. 677 p. Illus.
\$9.25.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- D. Machine Shop Technology. C. A. Felker. 1952. 491 p. Illus. \$4.80.
Bruce Publications Company
403 North Broadway
Milwaukee, Wisconsin 53201

II. PERIODICALS

- A. Modern Machine Ship. Monthly. \$5.00/year.
Gardner Publications, Inc.
431 Main Street
Cincinnati, Ohio 45202
- B. Housewares Review. Monthly. \$3.00/year.
Haire Publishing Company, Inc.
111 Fourth Avenue
New York, N. Y. 10003

III. U.S. PATENTS

Available U.S. Patent Office
Washington, D.C. 20231 \$2.25 each.

- A. Patent No. 2,867,865. 1959. 3 p.
The manufacture of can openers.
- B. Patent No. 2,804,896. 1957. 4 p.
Process used in making rotary household grater.
- C. Patent No. 2,798,290. 1957. 6 p.
Method for making a combined kitchen tool.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATIONS

- A. National Housewares Manufacturers Association
1130 Merchandise Mart
Chicago, Ill. 60654
- B. Metal Cookware Manufacturers Association
P. O. Box 1136
LaGrange Park, Ill. 60528

V. ENGINEERING COMPANY

- A. Dorr-Oliver, Inc.
100 Barry Place
Stamford, Conn. 06902

VI. DIRECTORY

- A. Housewares Directory. Annual. \$1.00.
Haire Publishing Company
111 Fourth Avenue
New York, N. Y. 10003
Lists houseware 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.

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ORDERING INSTRUCTIONS

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

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GENERAL INFORMATION

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INDUSTRY PROFILES

LEMON OIL

I. P. No. 66218

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.

LEMON OIL: Standard Industrial Classification 2899

A. PRODUCT DESCRIPTION

Lemon oil extracted from lemon peel.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are fairly modest. The plant would have to be associated with a plant engaged in producing lemon juice, and it might in fact form part of such an operation. Lemon oil is a fairly standard product with a market price over which the individual producer has little control. The enterprise could therefore expect to succeed only if it has a favorable production cost situation and is able to support price fluctuations which may be fairly large.

C. MARKET ASPECTS

1. USERS. A variety of Industries.
2. SALES CHANNELS AND METHODS. Sales are made to other industries and to exporters.
3. GEOGRAPHICAL EXTENT OF MARKET. The product is of high value in relation to its bulk and weight, and it can be transported fairly easily. It is often shipped long distances both in the domestic and the international market.
4. COMPETITION. Competition will come only from other producers, domestic and foreign. A more or less standard internationally-traded commodity of this kind is subject to price fluctuations which may be fairly wide.
5. MARKET NEEDED FOR PLANT DESCRIBED. For a product of this kind a market can almost always be found. The market problem encountered is usually that of obtaining a remunerative price.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION - 8 MONTHS: 45,000 Pounds

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		Cost
Land. About 6,000 sq. ft.		\$ --
Building. One story, 30'x50', including cold storage.	10,000	
Equipment, Furniture & Fixtures.		
Prodn. tools & equipment	\$ 32,300	
Other tools & equipment	3,000	
Furniture & fixtures	700	
Total (excl. Land)		\$ 46,000

Principal Items. Scarifier with stainless steel rolls & nylon brushes, stainless steel surge tank, two 650 gal. stainless steel tanks, shaker screen, 200 gal. stainless steel tank, centrifuge, pumps, pipes & fittings.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 8,000
Admin. Costs(b), Contingencies Sales Cost(c)	30	1,200
Training Costs		800
Total Working Capital		\$ 10,000

c. TOTAL CAPITAL (EXCL. LAND) \$ 56,000

2. MATERIALS AND SUPPLIES

a. Direct Materials		Annual Cost
Lemon oil is a by-product from lemons purchased for producing lemon juice. The Lemon Oil Plant would pay the Lemon Juice Plant annually		
100 specially lined oil drums		\$ 10,000
Total		\$ 12,000
b. Supplies		
Lubricants & hand tools	\$ 100	
Cutting tools & abrasives	200	
Maintenance & spare parts	1,100	
Office supplies	200	
Total		\$ 1,600

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 20 hp. connected load.	\$ 500
b. Fuel. For production & heating.	\$ 300
c. Water. For production & sanitation.	\$ 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	2	\$ 9,000
Semi-skilled	2	6,500
Unskilled	1	2,500
Total	5	\$ 18,000
b. Indirect Labor		
Manager	1	\$ 10,000
Office	1	5,000
Total	2	\$ 15,000

- c. Training Needs.** Manager & 1 skilled worker should be able to train other workers & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

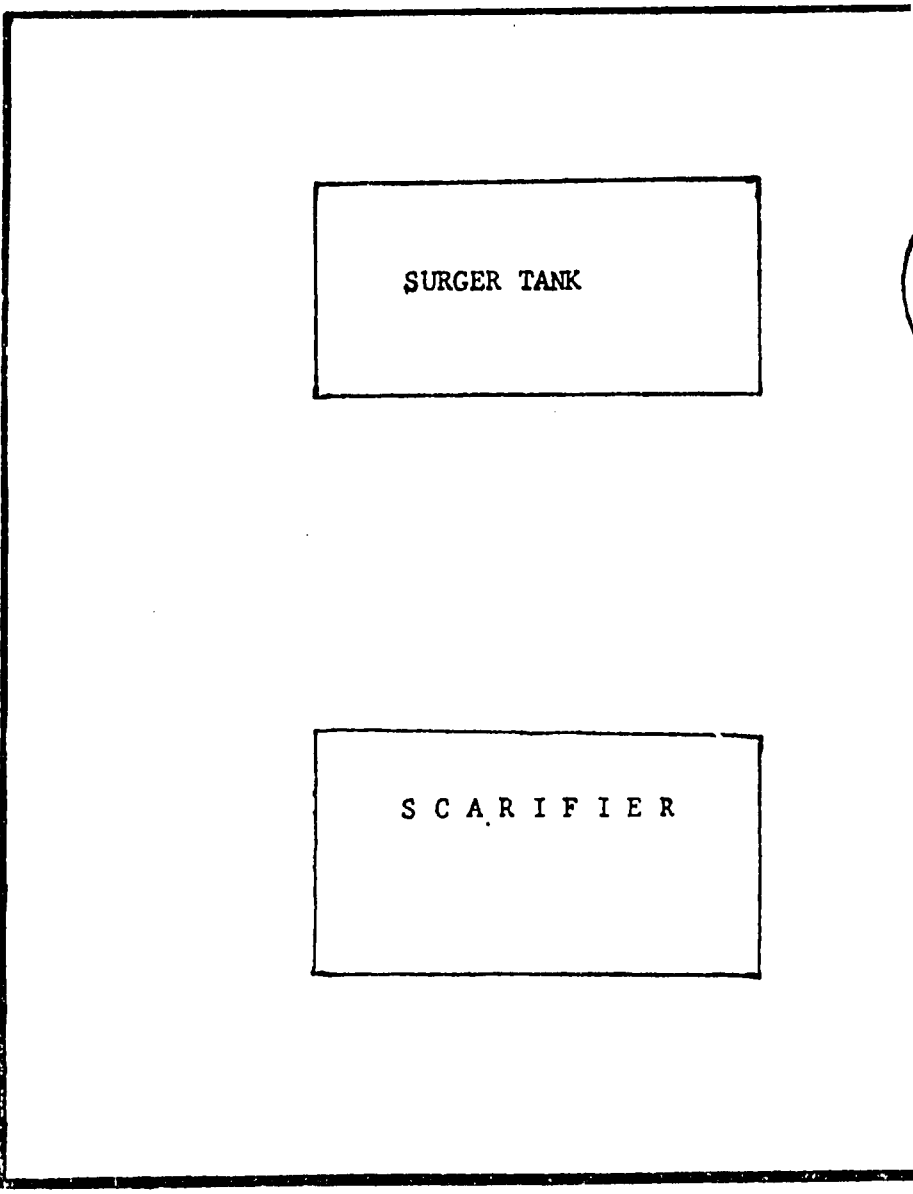
a. Annual Costs		
Direct Materials		\$ 12,000
Direct Labor		18,000
Manufacturing Overhead(a)		17,600
Admin. Costs(b), Contingencies		6,000
Sales Cost(c) Bad Debts		10,000
Depreciation on Fixed Capital		4,400
Total		\$ 68,000
b. Annual Sales Revenue		\$100,000

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

LEMON OIL: S.I.C. 2899

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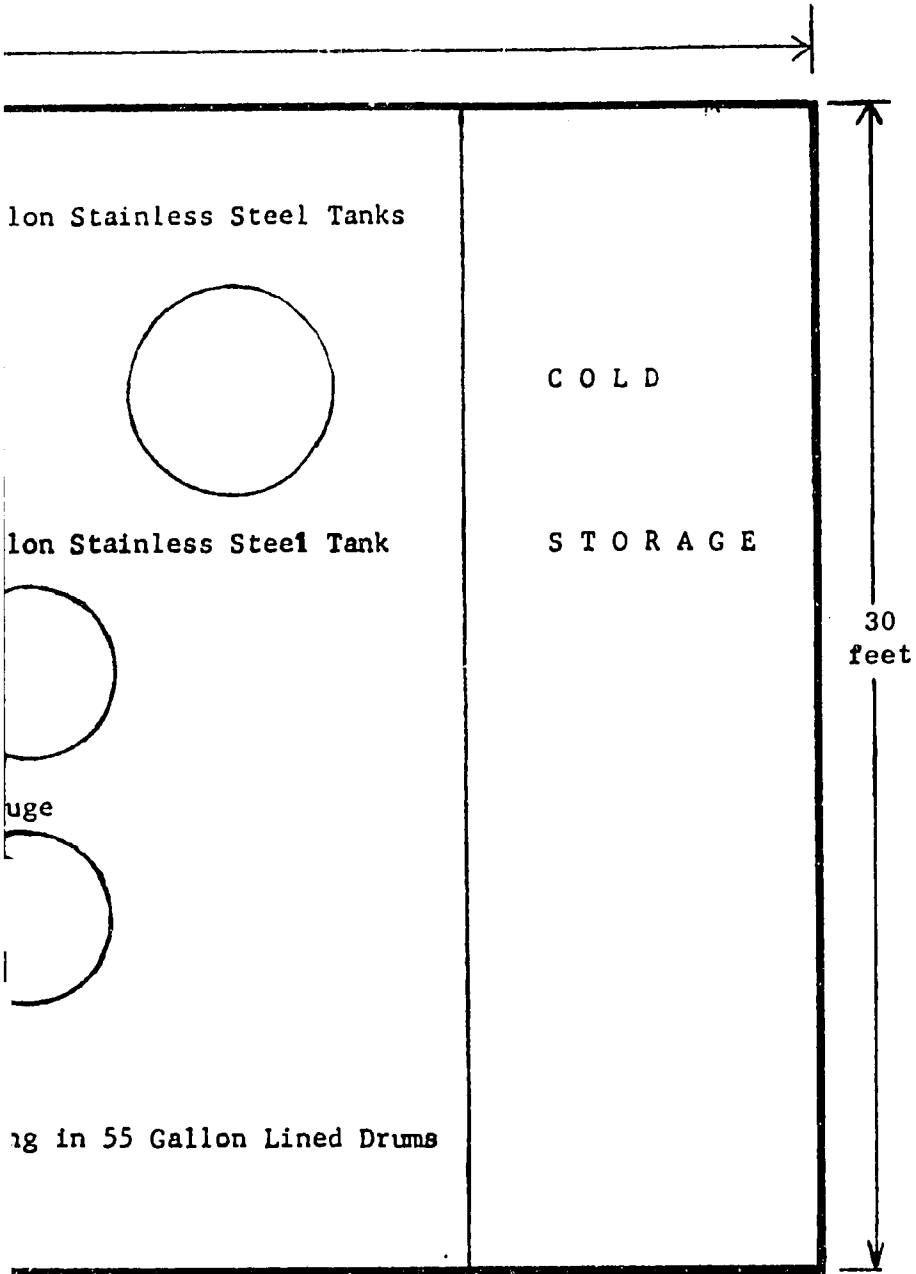
LEMON
PLA



SURGER TANK

SCARIFIER

2899



LEMON OIL: S.I.C. 2899

SELECTED REFERENCES

I. TEXTBOOKS

- A. Citrus Production. J. B. S. Braverman. 1949. 483 p. Illus. \$12.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
Deals with extraction of citrus oils and utilization of citrus peels.
- B. Essential Oils. Ernest Guenther. 1949. 805 p. Illus. \$13.50.
D. Van Nostrand Company, Inc.
120 Alexander Street
Princeton, New Jersey 08540
- C. Essential Oils from Florida Citrus. J. W. Kesterson & Hendrickson.
Bulletin 521. 1953. 70 p. Illus. Gratis.
Agriculture Experimental Station
University of Florida
Gainesville, Florida 32603

II. U. S. GOVERNMENT PUBLICATIONS

- A. Orange, Ginger and Lemon Oil. IR-24831. Gratis.
Agency for International Development
Washington, D. C. 20523
- B. Citrus Fruit By-Products. IR-16680. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICAL

- A. American Oil Chemists' Society Journal. Monthly. \$9.00/year.
American Oil Chemists' Society
35 East Wacker Drive
Chicago, Ill. 60601

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,980,717, April 18, 1961.
Relates to the extraction and purification of oils.
- B. Patent No. 2,942,985. June 28, 1960.
Relates to the preparation of flavor bases from whole citrus fruits.
- C. Patent No. 2,506,776, May 9, 1950.
Relates to the extraction of essential oil of pulp and skin material of citrus fruits.
- D. Patent No. 2,708,627. October 21, 1950.
Relates to the method of extracting peel oil and other waste products.
- E. Patent No. 2,485,279. October 18, 1949.
Relates to the preparation of extracts from citrus fruit peels.

V. TRADE ASSOCIATIONS

- A. Essential Oil Association of the U. S.
2 Lexington Avenue
New York, N. Y. 10010

VI. ENGINEERING COMPANIES

- A. American Machinery Company
P. O. Box 3228
Orlando, Florida 32802
Designs and builds complete lemon oil plants.
- B. Technical Enterprises, Inc.
31 South Street
New York, N. Y. 10004
Chemical consulting engineers.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

BOOK MATCHES

I. P. No. 66219

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BOOK MATCHES: Standard Industrial Classification 3983

A. PRODUCT DESCRIPTION

Standard size book matches, each book containing 20 matches.

B. GENERAL EVALUATION

Capital requirements in this industry are large, even for the minimum plant size that is economically feasible. Skilled labor needs are fairly small but careful supervision is needed to maintain product quality. This enterprise would need a population of considerable size with a not excessively low average income level to provide it with a market.

C. MARKET ASPECTS

1. USERS. Individuals.

2. SALES CHANNELS AND METHODS. Sales to wholesalers and to large firms using book matches for advertising.

3. GEOGRAPHICAL EXTENT OF MARKET. Freight costs are not important in limiting the market. International trade in matches tends to diminish because more and more countries are making their own and often give protection to local producers.

4. COMPETITION. Direct competition will come only from other producers. Unless production costs are abnormally high the plant should be able to compete effectively with imports.

5. MARKET NEEDED FOR PLANT DESCRIBED. Where such matches are in common use this plant could supply the needs of a total population of the order of three million.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: FIVE DAYS A WEEK: 120 Million Books

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 1 acre.	\$ --
Building. 100'x300'x20' wall, brick construction, with fire sprinkler system.	210,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$510,000
Other tools & equipmt.	50,000
Furniture & fixtures	1,000
Transportation equipmt.	4,000
Total (excl. Land)	<u>\$775,000</u>

Principal Items. Slitter & friction machine, comb match splint & dipping machine (with automatic crimper), 5 assembly machines, printing press, paper cutter, composition grinder, paint grinder, mixers, tanks, kettles, measuring pots, 5 hand trucks, 2 lift trucks, skids, 1½ ton delivery truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 71,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	17,400
Training Costs		6,100
Total Working Capital		<u>\$ 95,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$870,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Glue & ground glass	44,000 lbs.	\$ 10,000
Lead hydrosulfate	3,600 lbs.	3,100
Wax	80,000 lbs.	3,000
Potassium chlorate	72,000 lbs.	10,000
Dye & ink	1,400 lbs.	3,700
Phosphorus	2,250 lbs.	1,600
Stapling wire	11,000 lbs.	3,000
Comb board-cover stock	660 tons	98,000
Starch, sulfur, rosin, zinc oxide, carbon black		1,800
Packaging materials		100,000
Total		<u>\$234,200</u>
b. Supplies		
Lubricants & hand tools		\$ 500
Cutting tools & abrasive		500
Maintenance & spare parts		4,500
Office supplies		500
Total		<u>\$ 6,000</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 50 hp. connected load.	\$ 1,000
b. Fuel. Bunker C oil for heating & steam making.	\$ 500
c. Water. For production, sanitation & fire protection.	\$ 400

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1½ ton pickup truck.	\$ 1,000
b. External Transport Facilities. In & out freight averages about 7 tons a day. Good highways necessary.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	6	\$ 36,000
Semi-skilled	6	30,000
Unskilled	20	80,000
Total	<u>32</u>	<u>\$146,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 22,000
Office	2	9,000
Truck driver & maintenance	2	9,000
Total	<u>6</u>	<u>\$ 40,000</u>

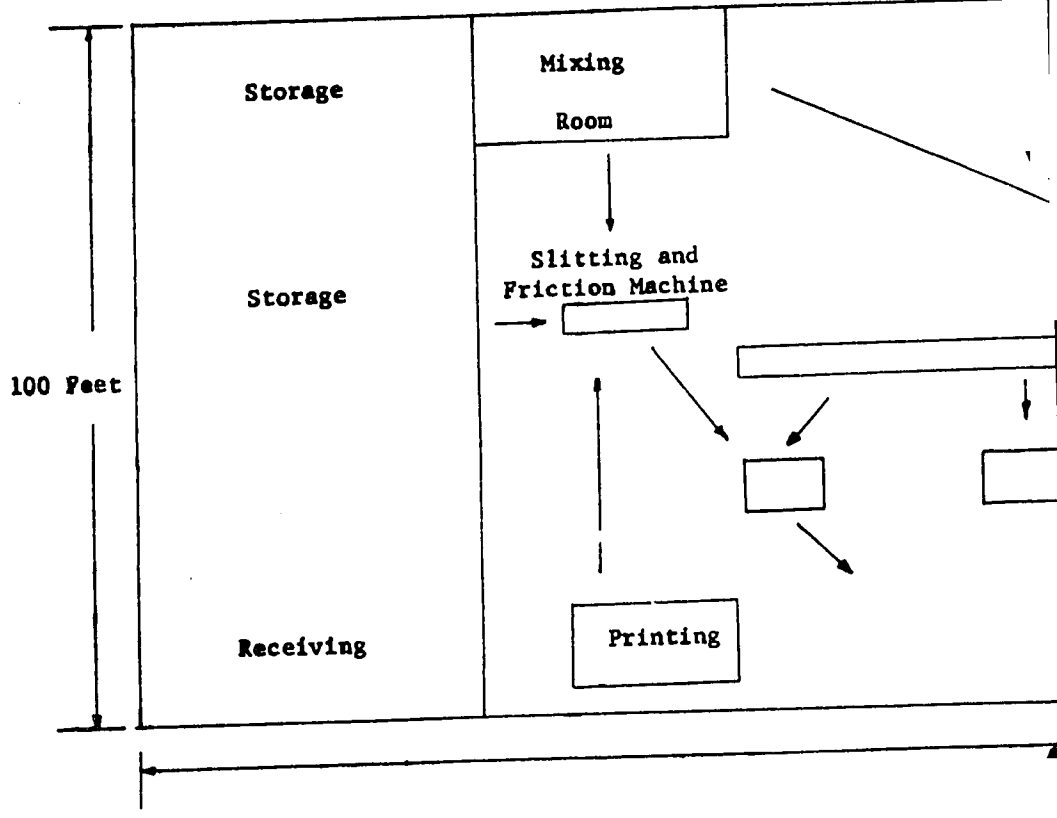
c. Training Needs. Manager & supervisor must be experienced. With 6 skilled workers they should be able to train the others & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$234,200
Direct Labor	146,000
Manufacturing Overhead (a)	48,900
Admin. Costs(b), Contingencies	105,000
Sales Costs (c), Bad Debts	115,000
Depreciation on Fixed Capital	72,600
Total	<u>\$721,700</u>
b. Annual Sales Revenue	\$1,000,000

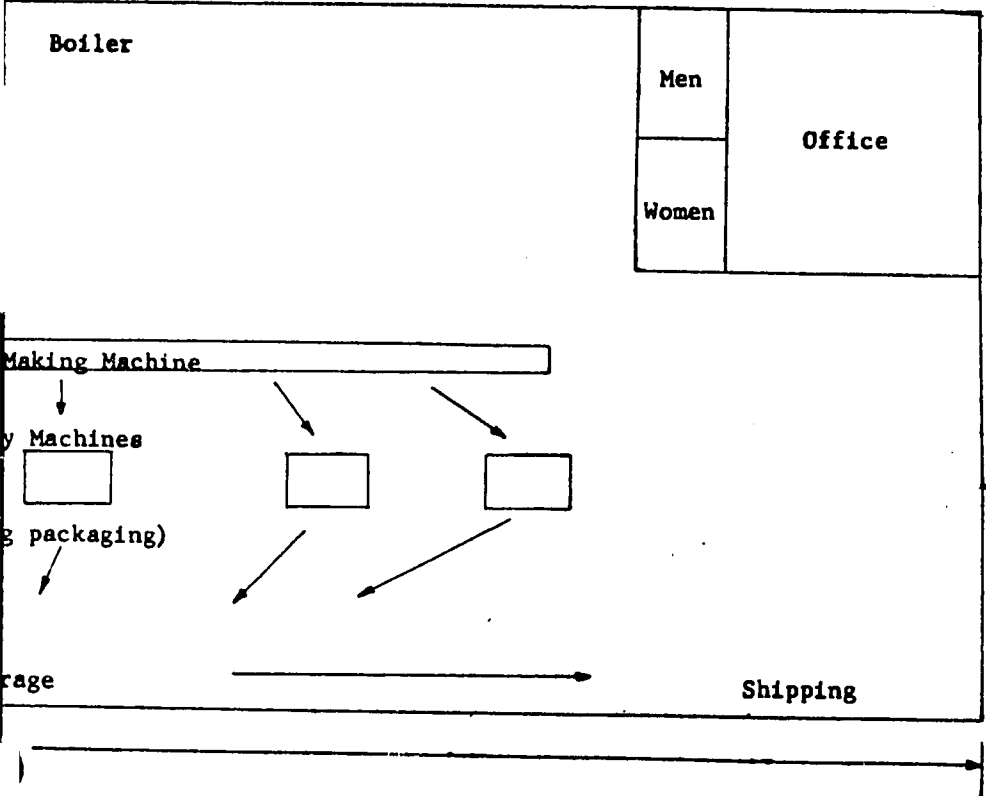
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

**BOOK MAT
PLANT LAYO**



I.C. 3983

WORKFLOW



BOOK MATCHES: S. I. C. 3983

SELECTED REFERENCES

I. U. S. GOVERNMENT PUBLICATION

- A. Safety Matches (Wooden). Methods and Formulas for Manufacture.
IR-21555. Gratis.
Agency for International Development
Washington, D. C. 20523

II. U. S. PATENTS

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

- A. Patent No. 2,566,560. 1951. 3 p.
Permanent match.
- B. Patent No. 2,432,220. 1947. 4 p.
Match.
- C. Patent No. 2,246,427. 1941. 3 p.
Book matches.

III. TRADE ASSOCIATION

- A. Match Institute
342 Madison Avenue
New York, N. Y. 10017

SELECTED REFERENCES (Continued)

IV. ENGINEERING COMPANIES

- A. Universal Match Company, Inc.
1202 South Eutaw Street
Baltimore, Maryland 21230
Manufacturer of machinery for the production of matches.

- B. Columbia Match Company
1810 Keith Building
Cleveland, Ohio 44115
Manufacturers of machinery for the production of matches.

- C. Young Engineering Company
2737 North Sheffield
Chicago, Ill. 60614
Consulting engineering services to the match industry and manufacturers of
machinery for the production of paper matches.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

PORTABLE COOKING STOVES

I. P. No. 66220

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A. PRODUCT DESCRIPTION

One-burner portable cooking stoves, pressure type, solid steel frame, using kerosene as fuel.

B. GENERAL EVALUATION

This is a plant of modest size requiring only a small capital and little skilled labor. The stoves are intended primarily for camping, though they might sometimes be used in households. Demand for them will evidently depend on the extent of camping that goes on in the area it is feasible to serve. The equipment listed in section D could be used to make other products, including other types of stoves, and in some cases it might be feasible to establish a plant of the kind only if additional products are made, so as to bring the sales volume to a profitable level.

C. MARKET ASPECTS

1. USERS. Used principally for outdoor cooking when camping.
2. SALES CHANNELS AND METHODS. Most sales would be to wholesale distributors but some might be made direct to large retail stores.
3. GEOGRAPHICAL EXTENT OF MARKET. When they are packed in cartons, transport of these stoves is fairly easy and they may be shipped long distances in the domestic market. There is some export trade in this kind of stove.
4. COMPETITION. If the stoves are well made they should be able to compete with imports without great difficulty. Some exports to neighboring countries might be possible but the plant is too small to do a large volume of export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. The market would probably be extensive and variegated, and it is not possible to indicate its size by any simple yardstick.

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D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 25,000 Stoves

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 1/2 acre.	\$ ---
Building. One story, 40'x50'.	12,000
Equipment, Furniture & Fixtures,	
Prodn. tools & equipmt. \$16,000	
Other tools & equipmt. 1,300	
Furniture & fixtures 700	18,000
Total (excl. Land)	<u>\$30,000</u>

Principal Items. Punch press, square shears, bench lathe, threading dies, drill press, bench grinder, spray booth, assembly bench, factory trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 19,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,900
Training Costs		900
Total Working Capital		<u>\$ 23,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$53,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Sheet steel	195 tons	\$ 30,000
Burners	25,000	10,000
Valves & pipes	25,000	8,500
Pressure pumps	25,000	12,500
Oil tanks & brackets	25,000	7,500
Paint		1,000
Bolts & nuts		1,000
Cartons		3,500
Total		<u>\$ 74,000</u>

b. Supplies

Lubrication & hand tools	\$ 200
Cutting tools & abrasives	100
Maintenance & spare parts	800
Office supplies	200
Total	<u>\$ 1,300</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 30 hp. connected load.	\$ 300
b. Fuel. For heating, if necessary.	\$ 200
c. Water. For sanitation & fire protection.	<u>\$ 100</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments average about 3 tons a day. Good highways necessary.

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	1	\$ 6,000
Semi-skilled	2	10,000
Unskilled	2	8,000
Total	<u>5</u>	<u>\$ 24,000</u>

b. Indirect Labor

Manager	1	\$ 10,000
Office	1	5,000
Total	<u>2</u>	<u>\$ 15,000</u>

- c. Training Needs. Manager must be experienced. With 1 skilled worker he should be able to train others & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

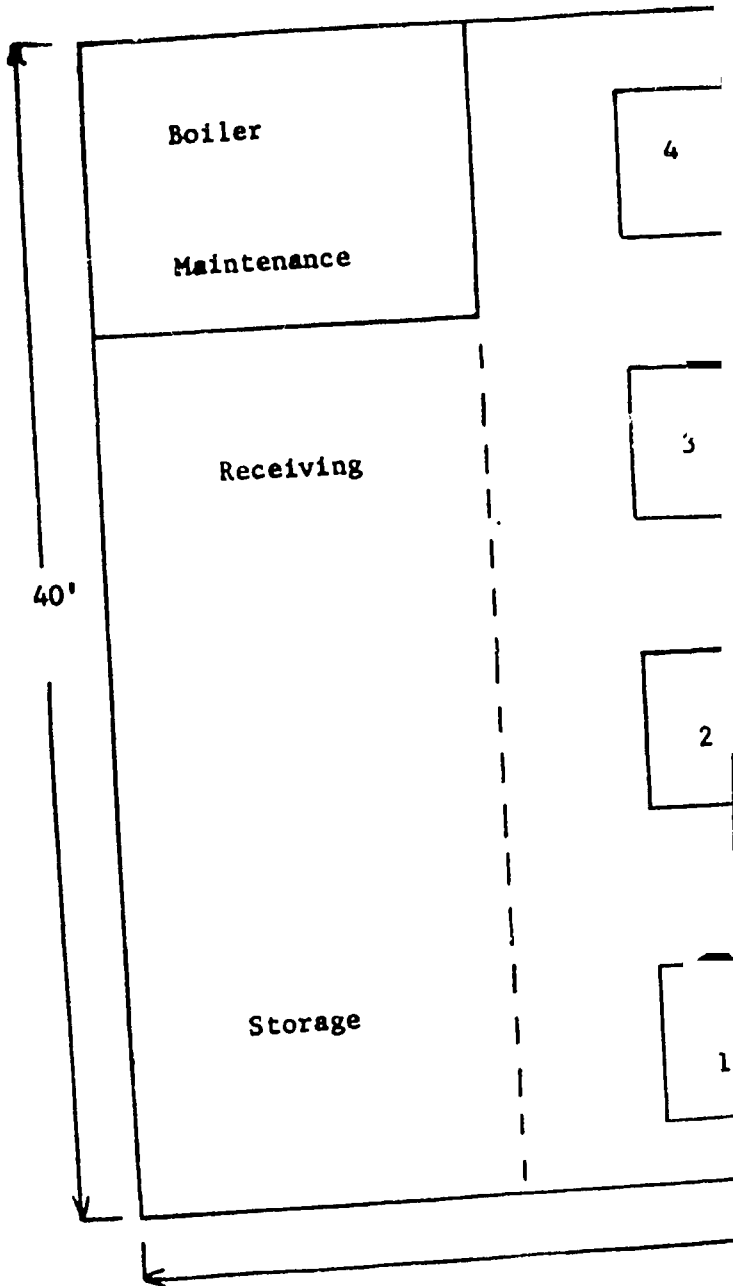
a. Annual Costs	
Direct Materials	\$ 74,000
Direct Labor	24,000
Manufacturing Overhead(a)	16,900
Admin. Costs(b), Contingencies	9,000
Sales Costs (c), Bad Debts	11,000
Depreciation on Fixed Capital	2,500
Total	<u>\$137,400</u>

b. Annual Sales Revenue \$170,000

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

PORTABLE COOKING STOVES: S.I.C. 3631

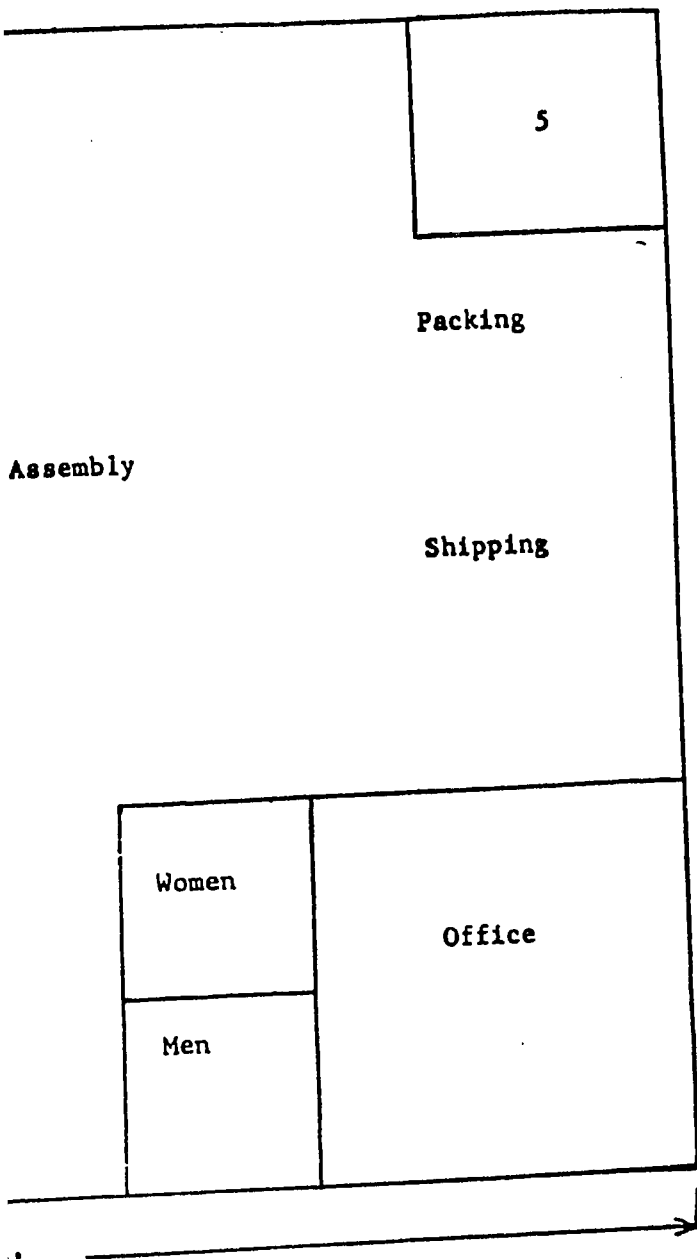
PORTABLE COOKII PLANT LAYOUT



1. Square shears
2. Punch press
3. Bench lathe

VES: S.I.C. 3631

WORKFLOW



- 4. Drill press
- 5. Spray booth

PORTABLE COOKING STOVES: S.I.C. 3631

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St. Martin's Press Inc.
175 Fifth Avenue, New York, N. Y. 10070
- 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. Principles and Methods of Sheet Metal Fabricating. G. Sachs. 1951.
537 p. Illus. \$11.00.
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- D. Sheet Metal Shop Practice. L. F. Bruce. 1951. 251 p. Illus. \$5.50.
American Technical Society
848 East 58th Street
Chicago, Ill. 60637

II. U. S. GOVERNMENT PUBLICATIONS

- A. Metal Working Industry Training Manual. TB-62. Gratis.
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- B. Directory of Metalworking Machinery. Published irregularly. \$6.25.
Government Printing Office
Division of Public Documents
Washington, D. C. 20402

III. PERIODICALS

- A. American Machinist. Bi-weekly. \$25.00/year.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- B. Metal Forming and Fabricating. Monthly. \$10.00/year.
Watson Publications, Inc.
201 North Wells Street
Chicago, Ill. 60606

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Washington, D. C. 20231 \$.25 each

- A. Patent No. 2,994,316. 1961. 3 p.
Method of making gas burner, portable cooking stove.
- B. Patent. No. 2,988,082. 1961. 3 p.
Portable cooking stove with gas burner.
- C. Patent No. 2,893,373. 1959. 6 p.
Portable cook stove.

VI. TRADE ASSOCIATIONS

- A. American Metal Stamping Association
3673 Lee Road
Shaker Heights, Ohio 44120

VI. ENGINEERING COMPANIES

- A. Mathewson Machine and Engineering Works, Inc.
78 Hancock Street
Quincy, Mass. 02171
Design engineering, development and manufacturing.
- B. Hasse Machine and Manufactunrig Co., Inc.
224 Quincy Street
Boston, Mass. 02138

PORTABLE COOKING STOVES: S I.C. 3631

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PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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GENERAL INFORMATION

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

INDUSTRY PROFILES

PUMPS, SMALL HAND AND POWER DRIVEN

I. P. No. 66221

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.

PUMPS, SMALL HAND AND POWER DRIVEN: Standard Industrial
Classification 3561

A. PRODUCT DESCRIPTION

Conventional hand and power driven pumps with cast iron casings. The production requirements in section D are based on half the production being hand operated and the other half power-driven. The proportion can, however, be varied to suit demand.

B. GENERAL EVALUATION

This plant requires a fairly large capital. Not much skilled labor is needed, but good management and supervision are necessary to assure maintenance of quality standards. Such pumps are increasingly in demand for rural and industrial development, and there should be quite a number of developing areas where a plant of this kind could operate successfully.

C. MARKET ASPECTS

1. USERS. Farmers, construction contractors, certain industries, etc.
2. SALES CHANNELS AND METHODS. Sales would generally be made to machinery and equipment distributors, though some might be made direct to industrial enterprises.
3. GEOGRAPHICAL EXTENT OF MARKET. These pumps are easily handled and are often transported long distances. They are a common export item.
4. COMPETITION. If the pumps are well made and costs are reasonable, it should be possible to compete with imported pumps. Some sales to neighboring countries might be possible, but the operation is on too small a scale to enter into general international trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. The market is likely to be extensive and variegated. Demand will depend on the degree of prosperity in rural areas and the extent to which user industries are developing in the area.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 9,000 Hand Pumps, 9,000 Motor Driven Pumps

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land.	\$ --
Building. One story, 60'x100',	36,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$ 46,000
Other tools & equipmt.	1,200
Furniture & fixtures	800
Transportation equipment	5,000
Total (excl. Land)	\$ 89,000

Principal Items. Pedestal grinder, lathe, arbor press, milling machine, drill press, boring machine, hacksaw, welding equipment, wet grinder, turret lathe, pipe threaders, pipe threading dies.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 87,300
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,900
Training Costs		4,800
Total Working Capital		\$ 96,000

c. TOTAL CAPITAL (EXCL. LAND) \$185,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Castings	450 tons	\$ 87,700
Steel shapes	50 tons	12,500
Wood handles	9,000	1,800
Gaskets, fittings	18,000 sets	6,300
Nuts, washers, bolts	18,000 sets	7,200
Belts	9,000	4,500
Fractional hp. motors	9,000	225,000
Total		\$345,000

b. Supplies

Lubricants & hand tools	\$ 400
Cutting tools & abrasives	3,800
Maintenance & spare parts	1,200
Patterns	900
Office supplies	300
Total	\$ 6,600

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 200 hp. connected load.	\$ 3,000
b. Fuel. About 10,000 gals. oil annually.	\$ 1,200
c. Water. About 9 million gals. annually.	\$ 2,200

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Truck for local deliveries.	\$ 1,000
b. External Transport Facilities. In & out shipments about 3 tons a day. Good highways desirable.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	\$ 18,000
Semi-skilled	10	50,000
Unskilled	12	48,000
Total	25	\$ 116,000
b. Indirect Labor		
Manager & supervisors	3	\$ 27,000
Office	1	5,000
Maintenance & driver	3	16,000
Total	7	\$ 48,000

c. Training Needs. Manager & supervisors must be experienced. With 2 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	\$ 345,000
Direct Labor	116,000
Manufacturing Overhead(a)	62,000
Admin. Costs(b), Contingencies	21,000
Sales Costs(c), Bad Debts	30,000
Depreciation on Fixed Capital	8,000
Total Annual Costs	\$ 582,000
b. Annual Sales Revenue	\$ 650,000

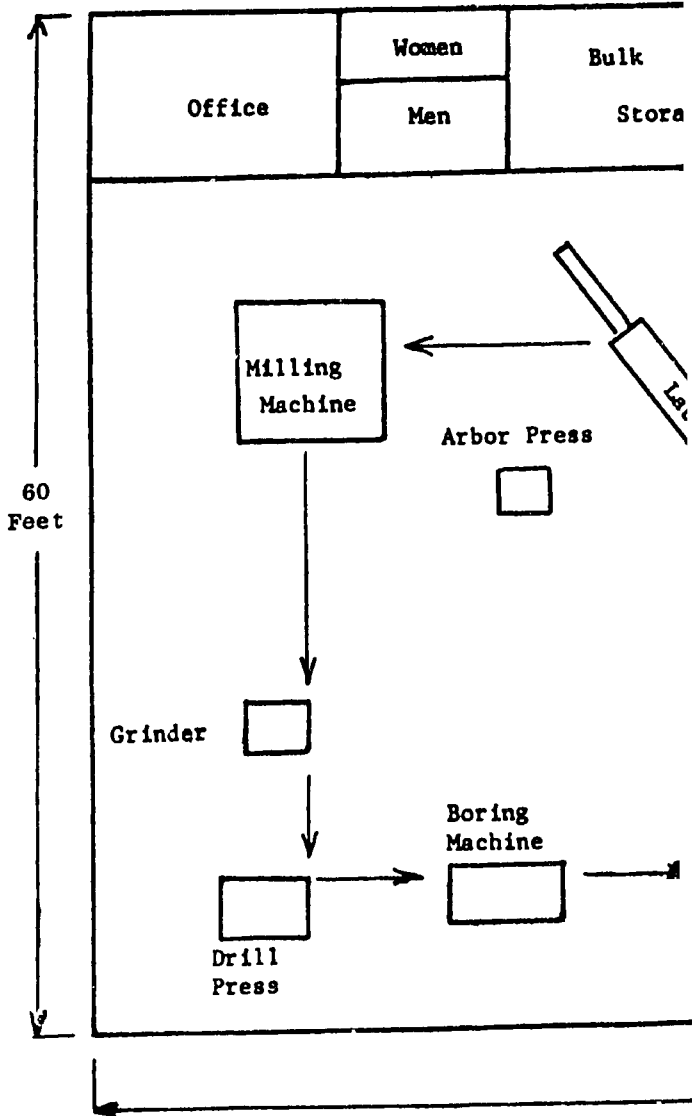
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PUMPS, SMALL HAND AND POWER DRIVEN: S.I.C. 3561

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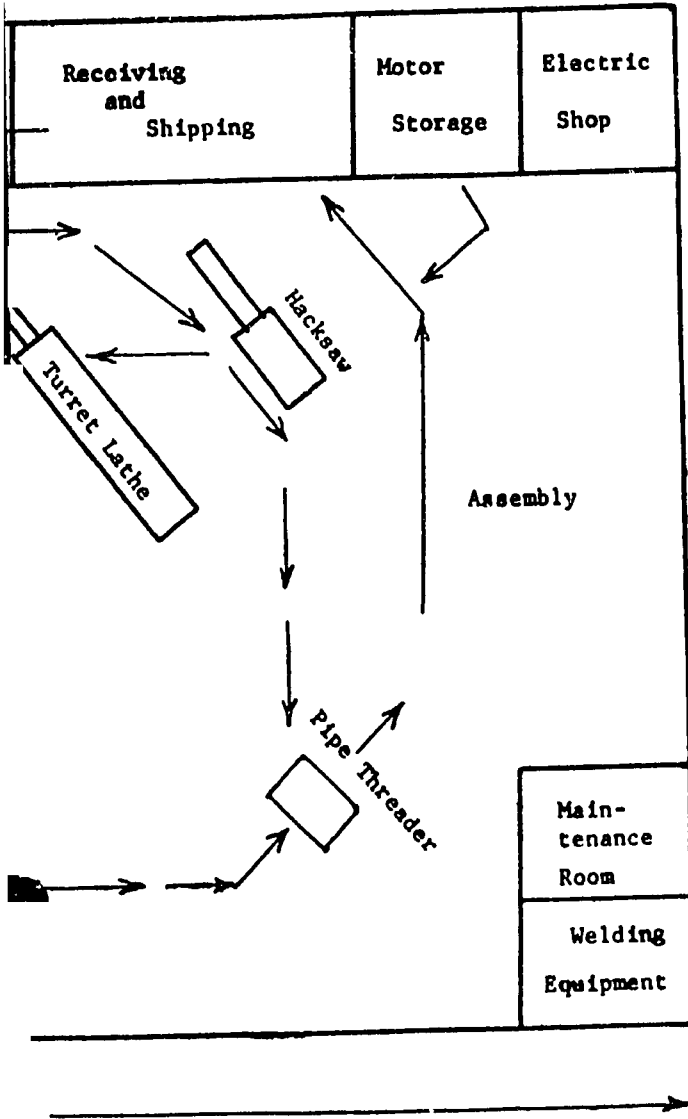
PUMPS, SMALL HAND A

PLANT LAYO



WER DRIVEN : S.I.C. 3561

WORKFLOW



PUMPS, SMALL HAND AND POWER DRIVEN: S.I.C. 3561

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- A. Pumps: Types, Selection, Installation, Operations, and Maintenance.
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New York, N. Y. 10036
- B. ASME Handbook of Metals Engineering Design. O. J. Horger, editor.
2nd edition, 1965. \$22.50.
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330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATION

- A. Manufacture of Hand Pumps. IR-30634. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Materials in Design Engineering. Monthly. \$15.00/year.
Reinhold Publishing Corporation
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New York, N. Y. 10022
- B. Machinery. Monthly. \$7.00/year.
Industrial Press
93 Worth Street
New York, N. Y. 10013

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Washington, D.C. 20231 \$.25 each.

- A. Patent No. 2,954,736. 1960. 4 p.
A low lift pump for liquids.
- B. Patent No. 2,910,008. 1959. 5 p.
Fluid pump of the piston type.
- C. Patent No. 2,627,816. 1953. 8 p.
An electrically driven pump.

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V. TRADE ASSOCIATION

- A. Sump-Pump Manufacturers Association
Mills Building, N. W.,
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. Fulflo Specialties Company, Inc.
410 Fancy Avenue
Blanchester, Ohio 45107
Pump engineers.

VII. DIRECTORY

- A. American Foundrymen's Society Buyers' Guide. Biennial. \$10.00.
American Foundrymen's Society
Golf and Wolf Roads
Des Plaines, Ill. 60018
Lists major suppliers of products sold to foundries.

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INDUSTRY PROFILES

SACCHARIN

I. P. No. 66222

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SACCHARIN: Standard Industrial Classification 2899

A. PRODUCT DESCRIPTION

Powdered saccharin, a white crystalline odorless or faintly aromatic product which in dilute aqueous solution is 300 to 500 times as sweet as sucrose. It is packed in 100 pound drums.

B. GENERAL EVALUATION

Capital requirements for this plant are moderate and little skilled labor is needed. It is a small operation by the standards of the industry and would normally have a mainly local market. It would therefore have to be located in the vicinity of user industries such as mentioned in C I below. The uses for saccharin are increasing, and in general the prospects for this industry are fairly good.

C. MARKET ASPECTS

1. USERS. Manufacturers of food products, pharmaceuticals, plastics, petroleum additives, organic synthesizers, etc.; also electroplating establishments.
2. SALES CHANNELS AND METHODS. Sales to user industries.
3. GEOGRAPHICAL EXTENT OF MARKET. Freight costs in relation to product value are normally small and the product is often shipped long distances, both in domestic markets and internationally.
4. COMPETITION. Competition from large-scale chemical companies is likely to be keen and a plant of this size would probably be able to market only locally, or at best regionally.
5. MARKET NEEDED FOR PLANT DESCRIBED. The plant's output is relatively small but it would evidently be necessary to have a number of modern industrial establishments of the type mentioned above in the locality of the plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 26,400 Pounds

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 3 acres.	\$ --
Building. One story, 125'x60'	45,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt.	\$57,500
Other tools & equipmt.	1,000
Furniture & fixtures	500
	59,000
Total (excl. Land)	\$164,000

Principal Items. Glass lined reaction vessel with agitator & cooling jacket, refrigeration equipment, stainless steel reaction vessels with agitators & heating jackets, centrifuges, filter, autoclave, cabinet dryer, holding tanks for raw material & finished goods, boiler, ventilating equipment, laboratory equipment.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 9,700
Admin. Costs(b), Contingencies Sales Costs(c)	30	4,100
Training Costs		1,200
Total Working Capital		\$ 15,000

c. TOTAL CAPITAL (EXCL. LAND) \$119,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Toluene	60,000 lbs.	\$ 3,500
Chlorosulfonic acid	208,000 lbs.	8,700
Ammonium chloride	44,250 lbs.	4,400
Sulfuric acid	77,500 lbs.	2,100
Sodium hydroxide	23,400 lbs.	1,000
Oxidizer (K ₂ CR O ₇)	22,900 lbs.	3,800
Fiber drums	450	1,000
Total		\$ 24,500

b. Supplies

Lubricants & hand tools	\$ 100
Maintenance & spare parts	500
Office supplies	200
Total	\$ 800

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> 50 hp. Connected load.	\$ 3,000
b. <u>Fuel.</u> Gas.	\$ 600
c. <u>Water.</u> About 250,000 gals. annually.	\$ 100

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
 b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	1	\$ 6,000
Semi-skilled	1	5,000
Unskilled	1	4,000
Total	3	\$ 15,000
b. <u>Indirect Labor</u>		
Manager	1	\$ 9,500
Office	1	4,500
Total	2	\$ 14,000

- c. Training Needs. Manager should be experienced, able to train other workers & to reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

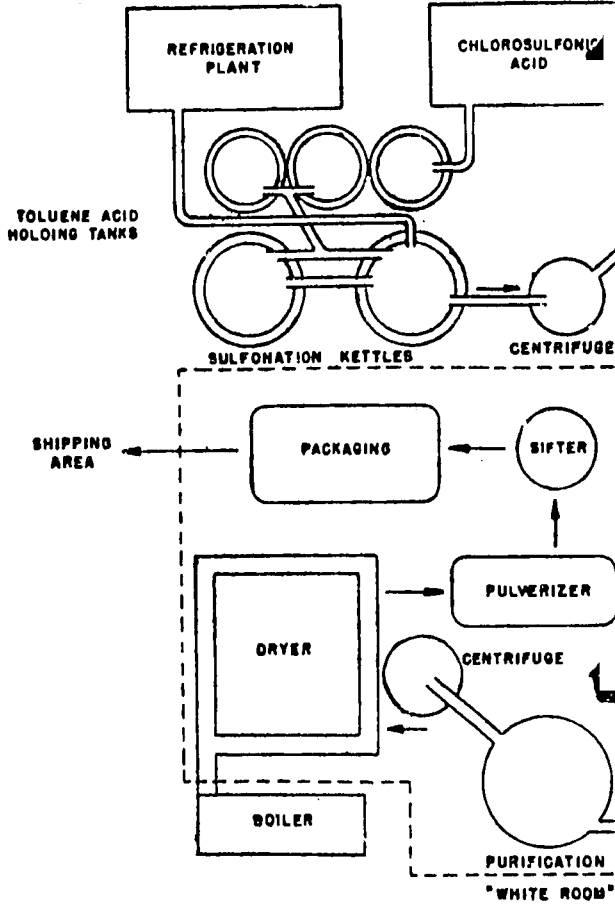
a. <u>Annual Costs</u>	\$ 24,500
Direct Materials	15,000
Direct Labor	18,500
Manufacturing Overhead(a)	3,000
Admin. Costs(b), Contingencies	2,500
Sales Costs(c), Bad Debts	8,300
Depreciation on Fixed Capital	8,300
Total	\$ 71,800
b. <u>Annual Sales Revenue</u>	\$100,000

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

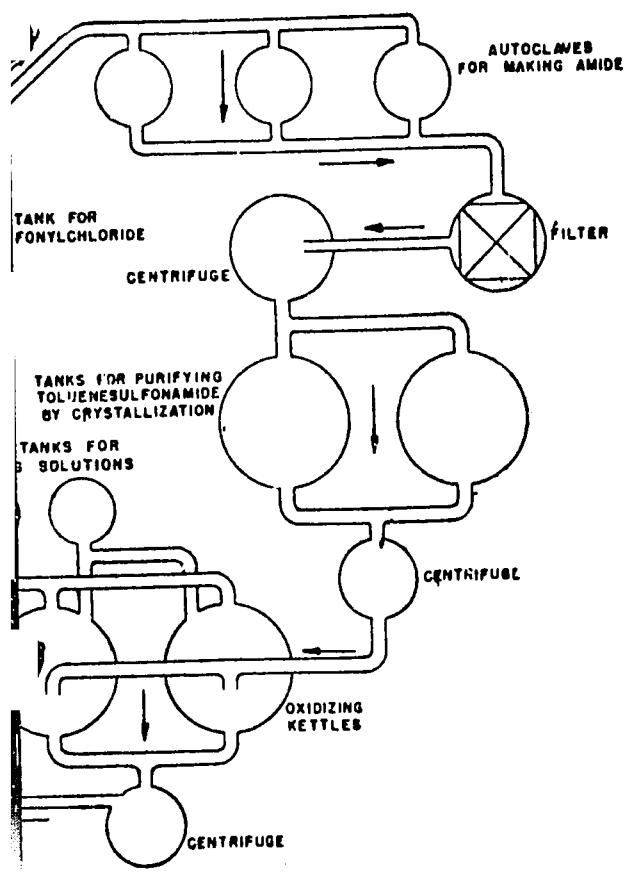
SACCHARIN: S.I.C. 2899

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SACCHA



I.C. 2899



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- A. This is Liquid Sugar. Refined Sugars and Syrups Inc. 1955.
Rand McNally and Co.
536 South Clark Street
Chicago, Ill. 60605
Describes the family of liquid sugars and sugar substitutes.

II. PERIODICALS

- A. Chemical Engineering.
American Institute of Chemical Engineers
345 East 47th Street
New York, N. Y. 10017
- B. Chemical Week
McGraw-Hill Publishing Co.
New York, N. Y. 10036
- C. American Chemical Society Journal
American Institute of Chemical Engineers
345 East 47th Street
New York, N. Y. 10036
- D. Technical Report Series
Sugar Research Foundation
52 Wall Street
New York, N. Y. 10005

III. TRADE ASSOCIATION

- A. Sugar Research Foundation Inc.
52 Wall Street
New York, N. Y. 10005

SELECTED REFERENCES (Continued)

IV. ENGINEERING COMPANIES

- A. Blaw-Knox Co.
1543 Fillmore Avenue
Buffalo, N. Y. 14211

- B. Centrico, Inc.
75 W, Forrest Avenue
Englewood, N. J. 07631

SACCHARIN: S. I. C. 2899

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INDUSTRY PROFILES

VEGETABLE CANNING (COMMERCIAL)

I. P. No. 66223

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VEGETABLE CANNING (COMMERCIAL): Standard Industrial Classification 2033

A. PRODUCT DESCRIPTION

Vegetables in No. 2 size cans (diameter 3 7/16 inches, height 4 9/16 inches), produced in a plant using centralized steam-generating equipment.

B. GENERAL EVALUATION

The fixed investment required for this plant is small, and comparatively little skilled labor is needed. Initial working capital requirements, however, are relatively high because production takes place only during the harvesting season, and expenditure for raw materials and direct labor is concentrated in this period, while sales small income is spread over the whole year. The plant here described can use only size 2 cans. However, it can be easily adapted to different size cans by the addition of power sealers and flange reformers. Such an addition would not greatly increase the fixed capital expenditure. The centralized steam generating equipment prescribed for this plant determines the size of the plant; it is not economically feasible to use it in smaller plants. Processing food for preservation and to permit consumption to be spread over the whole year is desirable in some areas. However, the particular kind of food preservation dealt with here may not be economically feasible in many of them. Most vegetables are relatively low-priced foods, and with canned vegetables the value of the can frequently exceeds that of the contents. In low income areas this may put canned vegetables out of the reach of the great majority of the people. In warm climates, where fresh vegetables are generally available throughout the year, the price disadvantage might eliminate virtually all prospect of a market. In most conditions, vegetable canning is likely to be profitable only where there is a production of vegetables of an uncommon and high-priced kind, for which there is a potential foreign market and possibly some market among the wealthier section of the local community for consumption out of season. The equipment here described can be used for canning foods other than vegetables, such as fruit, meat and fish.

C. MARKET ASPECTS

1. USERS. Households, restaurants, military services, institutions of various kinds.
2. SALES CHANNELS AND METHODS. Sales are generally made to wholesale and the larger retail establishments. Some sales may be made direct to large users, e. g., the military services.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The product is easily shipped because no special care is required in handling canned goods once they are boxed. Although heavy, their value is fairly high in relation to their weight. Distribution may be feasible on a national scale. b. Export. Only the rarer and more expensive canned vegetables are at all common in international trade.
4. COMPETITION a. Domestic Market. The major competition would come from fresh vegetables. The longer the growing season, the stronger this competition. In the tropics, where fresh vegetables are available most of the time, no domestic market would probably exist for such canned items. Even where vegetables are not always available, the low level of income would generally eliminate the possibility of selling canned vegetables. In areas where freezing facilities are available, frozen vegetables would compete b. Export Market. This plant could compete in the export market only if some special, high value vegetable were being canned.
5. MARKET NEEDED TO SUPPORT PLANT DESCRIBED. Consumption of canned vegetables will vary with climate, level of income and degree of urbanization. If the level of income is relatively high, the degree of urbanization considerable, and the climate cold enough so that fresh vegetables are not available the greater part of the year, an urban population of between 100,000 and 200,000 should be enough to support the output of this plant,

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION, MANUFACTURE DURING FOUR MONTHS ANNUALLY : 400,000 No. 2 Size Cans of Vegetables

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 2 acres.	\$ --
Building. One story. 50'x90'.	27,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$16,000
Other tools & equipmt.	2,200
Furniture & fixtures	800
<u>Total (excl. Land)</u>	<u>\$ 46,000</u>

Principal Items. 20 hp. boiler complete, 3 retorts complete, 3 power sealers, exhaustor, 2 atmospheric cookers, steam blancher, cooling tank, can reformer, can flanger, can double seamer, hoist & track, 3 steam jacketed kettles, 4 sinks complete, 3 flange reformers, 9 stock pots, 2 scales, air compressor, ventilating fan, vegetable processing equipment.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60(d)	\$ 47,500
Admin. Costs(b), Contingencies, Sales costs(c)	30	500
Training Costs		1,000
<u>Total Working Capital</u>		<u>\$ 49,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 95,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Vegetables for 400,000 cans.		\$ 14,000
Cans, cartons & labels		18,000
<u>Total</u>		<u>\$ 32,000</u>

b. Supplies

Lubricants & hand tools	\$ 100
Maintenance & repair parts	700
Office supplies	200
<u>Total</u>	<u>\$ 1,000</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 20 hp.	\$ 250
b. Fuel. About 6,000 gals. oil or equivalent in other fuel, annually.	\$ 700
c. Water. About 1 million gals. annually for production & general purposes.	\$ 250

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary
- b. External Transport Facilities. Vegetables are purchased delivered at plant. Good highway desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	\$ 6,000
Semi-skilled	5	8,000
Unskilled	24	30,000
<u>Total</u>	<u>32</u>	<u>\$ 44,000</u>
b. Indirect Labor		
Manager-buys & sells	1	\$ 9,000
Office	1	5,000
Other	1	3,000
<u>Total</u>	<u>3</u>	<u>\$ 17,000</u>

- c. Training Needs. Manager should be well experienced. With aid of 3 skilled workers, he should be able to do all necessary labor training. Plant should reach full production in about 2 weeks.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

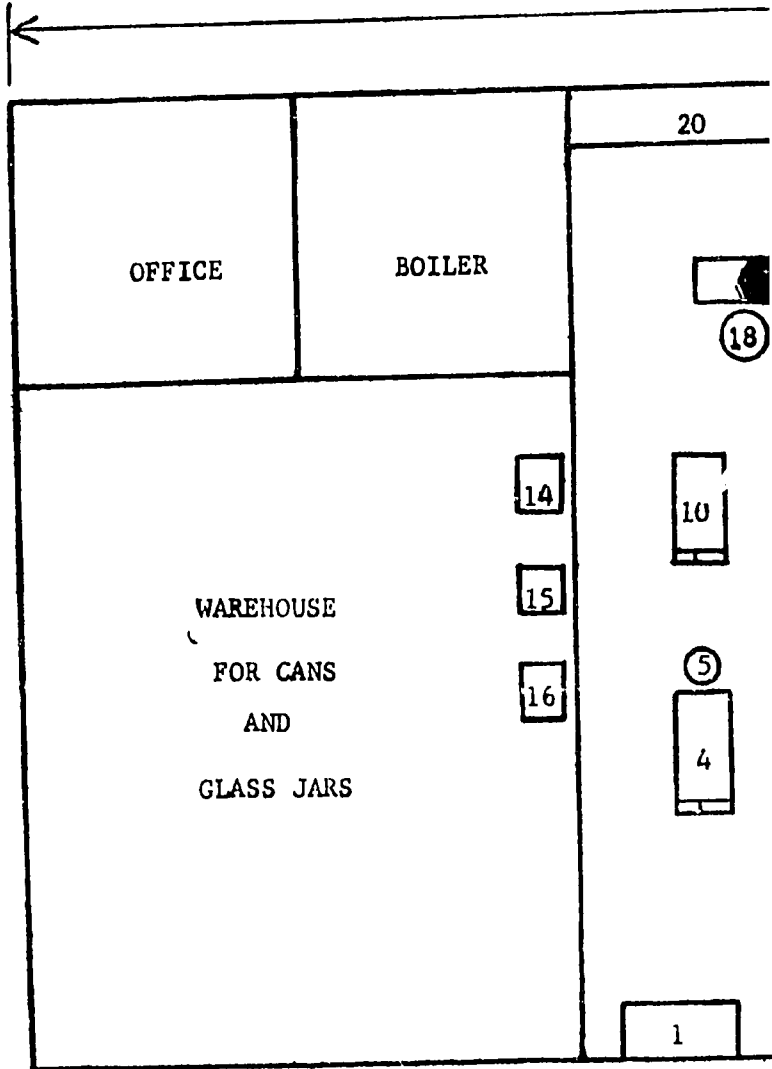
a. Annual Costs	
Direct Materials	\$ 32,000
Direct Labor	44,000
Manufacturing Overhead(a)	19,200
Admin. Costs(b), Contingencies	2,000
Sales Costs(c), Bad Debts	4,000
Depreciation on Fixed Capital	3,500
<u>Total</u>	<u>\$104,700</u>
b. Annual Sales Revenue	\$130,000

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel. (d) Half costs of 4 month operating period.

VEGETABLE CANNING (COMMERCIAL): I.S.C. 2033

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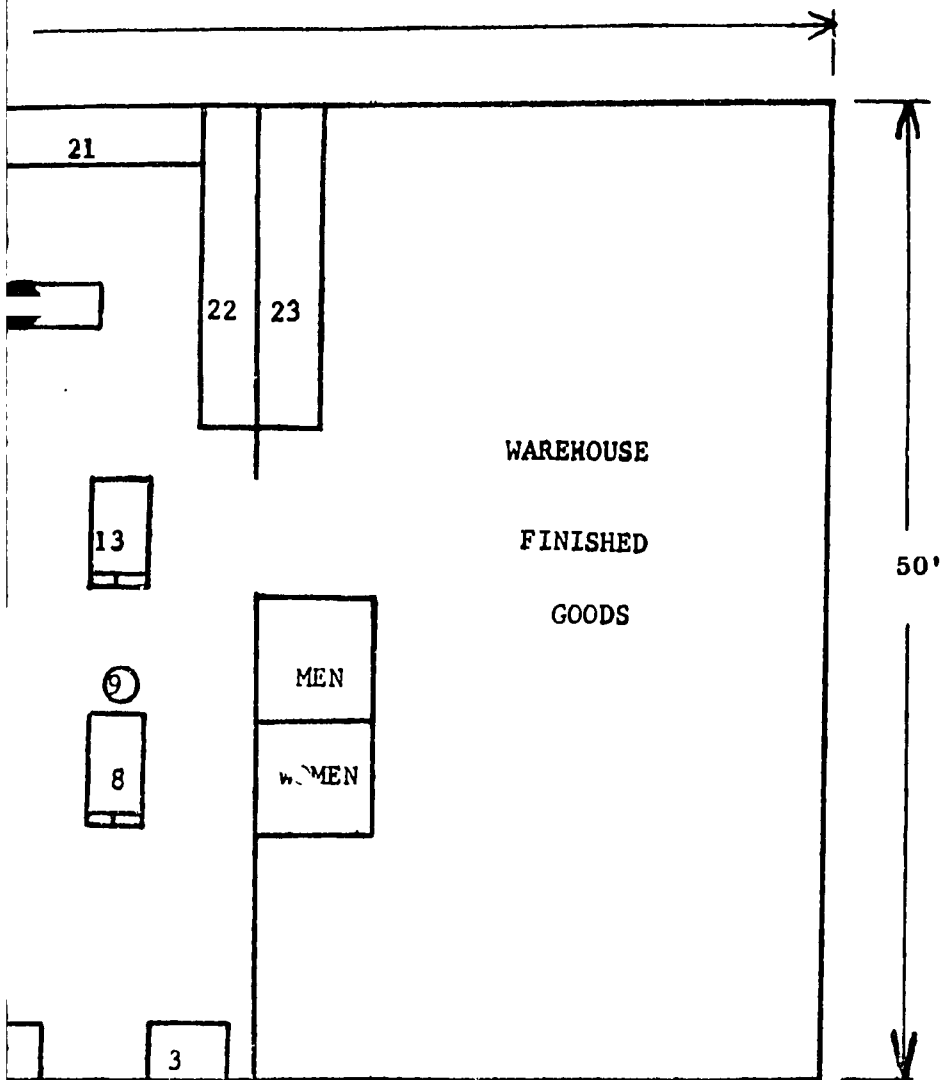
VEGETABLE CAN



- | | | | |
|---|----------------------------------|----|-------------|
| 1 | Corn huller | 9 | Atmospher |
| 2 | Huller | 10 | Galvanized |
| 3 | Peeler | 11 | Felting tab |
| 4 | Galvanized table and double sink | 12 | Kettle |
| 5 | Atmospheric blancher | 13 | Galvanized |
| 6 | Steam blancher | 14 | Can reform |
| 7 | Table type tilting kettle | 15 | Can flange |
| 8 | Galvanized table and double sink | 16 | Double se |

(COMMERCIAL) : S.I.C. 2033

LAYOUT



- double sink 17 Preparation tables
- double sink 18 Steam jacketed kettle
- 19 Power operated lime exhauster
- 20 Retorts
- 21 Atmospheric cookers
- 22 External cooling spray
- 23 Labeling bench

VEGETABLE CANNING (COMMERCIAL): S.I.C. 2033

SELECTED REFERENCES

I. TEXTBOOKS

- A. Commercial Fruit and Vegetable Products. W. V. Cruess. 1958. 884 p. Illus. \$16.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- B. Canned Foods: An Introduction to their Microbiology. A. C. Hersom and E. D. Hulland. 1964. \$10.00.
Tudor Publishing Company
221 Park Avenue South
New York, N. Y. 10003
- C. The Technology of Food Preservation. N. W. Desrosier. 1959. 418 p. \$9.50.
The Avi Publishing Company, Inc.
P. O. Box 388, Westport, Connecticut 06881

II. U S. GOVERNMENT PUBLICATIONS

- A. Food Processing Feasibility Study. ID-14. Gratis.
Agency for International Development
Washington, D. C. 20523
- B. Processed Foods. FP-38. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Western Canner and Packer. Monthly. \$4.00/year, including yearbook.
Miller Freeman Publications
500 Howard Street
San Francisco, Calif. 94105
- B. The Canner and Freezer. Bi-weekly. \$10.00/year.
The Canner Publishing Company
105 West Adams Street
Chicago, Ill. 60603

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,989,403. 1961. 2 p.
Canning process.
- B. Patent No. 2,941,889. 1960. 6 p.
Process for preserving vegetables.
- C. Patent No. 2,906,628. 1959. 2 p.
Method of preserving vegetable color.

V. TRADE ASSOCIATIONS

- A. National Cannery Association
1135 20th Street, N. W.
Washington, D. C. 20006
- B. Canning Machinery and Supply Association
7758 Wisconsin Avenue
Washington, D. C. 20014

VI. ENGINEERING COMPANIES

- A. A. K. Robins and Company, Inc.
713 East Lombard Street
Baltimore, Maryland 21202
Food processing equipment.
- B. Technical Enterprises, Inc.
29-31 South Street
New York, N. Y. 10004
Installations of complete canning plants.

VII. DIRECTORY

- A. Canner/Packer Yearbook. Annual. \$1.00.
Triad Publishing Company
59 East Monroe Street
Chicago, Ill. 60603
Contains buyers guide for food equipment and supplies and reports on
the food industry.

VEGETABLE CANNING (COMMERCIAL): S.I.C. 2033

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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

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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

VEGETABLE CANNING (COOPERATIVE)

I. P. No. 66224

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.

VEGETABLE CANNING (COOPERATIVE): Standard Industrial Classification
2033

A. PRODUCT DESCRIPTION

Vegetables canned in No. 2 size cans (diameter 3 7/16 inches, height 4 9/16 inches), with commercial equipment of moderate size.

B. GENERAL EVALUATION

This is a plant of moderate size, using commercial pressure cookers (retorts) which are individually heated, not supplied with centrally generated steam. The fixed capital expenditure is very small. Funds for this equipment are supplied by the vegetable growers. In some countries, governments will be willing to lend funds to cooperatives for such purposes, making such a plant feasible on a cooperative basis even where the growers do not have such sums available for capital investment. Working capital requirements are small, since the plant does not incur expenditure for direct labor and for the purchase of vegetables. Both of these items are supplied by the individual growers. After the growers or their hired labor have completed the canning operations, they remove the finished cans from the plant and market the product themselves. The only exceptions arise in cases where the grower is unable to pay the stipulated fee per can for the use of the facilities and, as a substitute, turns over part of the canned pack to the plant. Otherwise the only services provided by the plant are those of the supervisor and the maintenance worker. The plant also furnishes cans. While the size of the investment and the degree of skill required for this operation are within the capacity of most of the less developed areas, the marketability of the product is more open to doubt. As pointed out in the discussion of commercial canning operations (see Industry Profile on Vegetable Canning (Commercial): S. I. C. 2033), the value of most vegetables is rather low relative to the price of the can. The market is further limited in warmer areas where either vegetables or vegetable substitutes are available in fresh form throughout the year. Therefore such canning operation would be most likely to be successful in areas of moderate climate, where there is an urban population with relatively high income. The plant described here can also be used for canning items other than vegetables.

C. MARKET ASPECTS

1. USERS. Households, restaurants.
2. SALES CHANNELS AND METHODS. That part of the pack not consumed at home is sold to wholesalers.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The product, even though heavy, is easily transported. Value is fairly high in relation to weight. Therefore distribution may be on a national scale. b. Export. Only the rarer and more expensive vegetables are at all common in international trade.
4. COMPETITION. a. Domestic Market. Competition in the domestic market would come primarily from fresh vegetables. Where freezing facilities are available, frozen vegetables would also compete. In warm climates and in very low income countries, a domestic market will be virtually non-existent either because of the availability of fresh vegetables the year round or because the low level of income makes consumption of such high-priced items impossible. b. Export Market. This plant could compete in the export market only if very high priced vegetables, not available in other countries, are canned.
5. MARKET NEEDED FOR PLANT DESCRIBED. The market needed to support this plant will depend largely upon the climate and the level of income. In temperate zones with some degree of urbanization a population of between 50,000 and 100,000 should be able to absorb the output of this plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: MANUFACTURE DURING FOUR MONTHS ANNUALLY, 200,000 Cans of Vegetables

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 1 acre.	\$ --
Building. One story, 50'x60'.	18,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$ 4,600	
Other tools & equipmt. 1,000	
Furniture & fixtures 400	6,000
Total (excl. Land)	<u>\$ 24,000</u>

Principal Items. 4 retorts, 2 power sealers, exhauster, kettle, 4 stainless steel tables, 3 sinks, cooling tank, can reformer, can flanger, double seamer, 3 flange reformers, 4 stock pots, 4 aluminum pans, boiler, hand hoist 1/2 ton, external cooling spray, blanch tank burner, scald & blanch tank, cold dip tank, ventilating fan.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Mfg. Overhead(a)	60(c)	\$ 7,800
Admin. Costs(b), Contingencies,	30	200
Total Working Capital		<u>\$ 8,000</u>

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

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Cans, labels & cartons	200,000	<u>\$ 9,000</u>

b. Supplies

Lubricants & hand tools	\$ 50
Maintenance & repair parts	350
Office supplies	100
Total	<u>\$ 500</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 10 hp.	<u>\$ 125</u>
b. Fuel. About 3,000 gals. oil, or equivalent in other fuel, annually.	<u>\$ 350</u>
c. Water. About 500,000 gals. annually for production & general purposes.	<u>\$ 125</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Growers bring vegetables to plant for canning & remove canned goods at end of process. Good highway desirable.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
No direct labor is hired by plant. Growers do their own canning or, where necessary, hire labor. Canning is done only during harvest season, assumed here to last 4 months.		
b. Indirect Labor		
Plant supervisor-6 months-administers plant, schedules canning operations, purchases cans & supplies, keeps books, supervises.	1	\$ 4,000
Other-6 months	1	1,500
Total	<u>2</u>	<u>\$ 5,500</u>

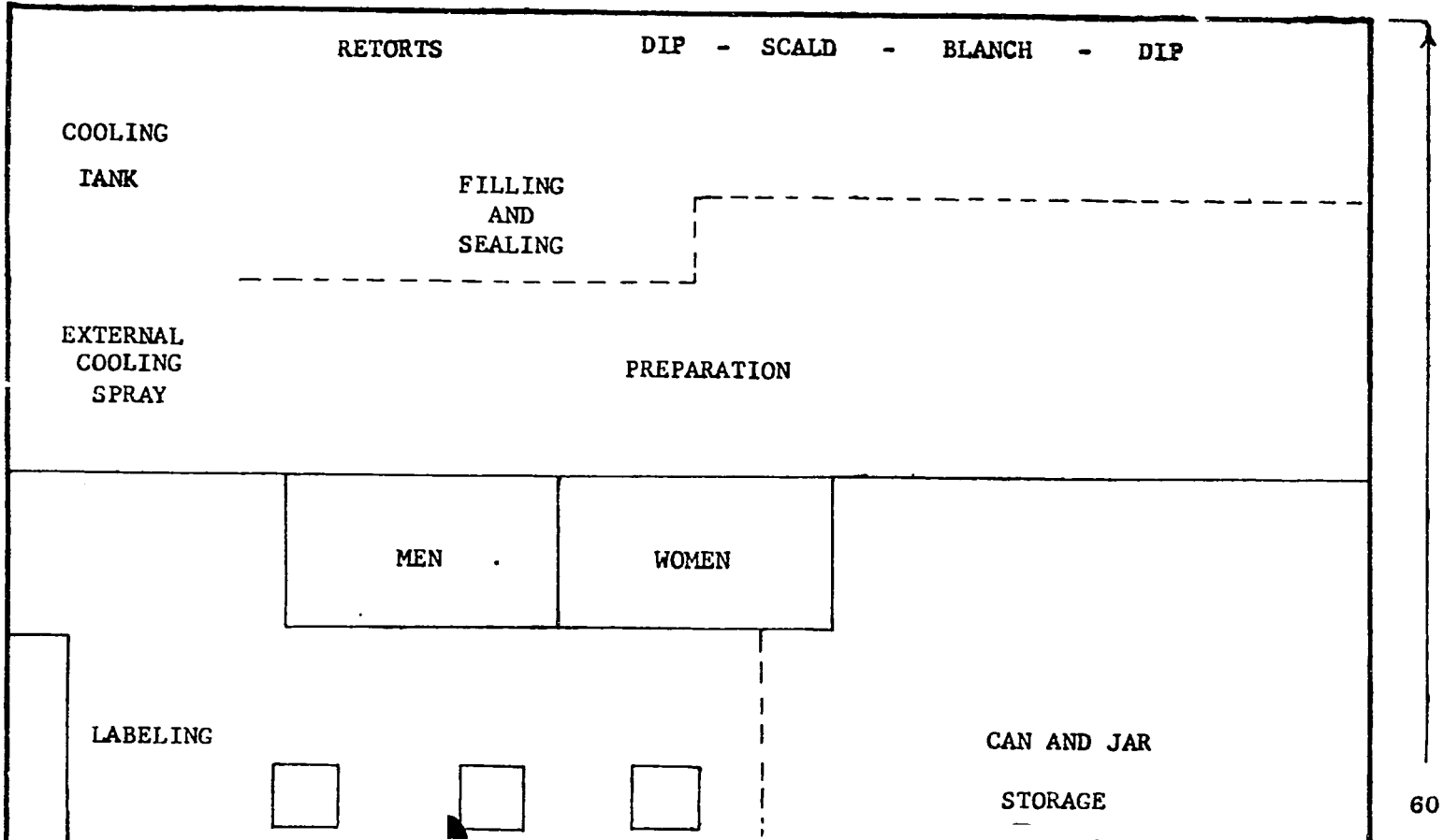
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$ 9,000
Manufacturing Overhead(a)	6,600
Admin. Costs(b), Contingencies	1,200
Depreciation on Fixed Capital	1,600
Total	<u>\$ 18,400</u>
b. Annual Sales Revenue	<u>\$ 20,000</u>
10 cents per can charged to grower for use of canning facilities. All surpluses remaining after costs are distributed among cooperative members.	

NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Half Costs of 4 month operating period.

VEGETABLE CANNING (COOPERATIVE): S.I.C. 2033

PLANT LAYOUT



RETORTS

DIP - SCALD - BLANCH - DIP

COOLING
TANK

FILLING
AND
SEALING

EXTERNAL
COOLING
SPRAY

PREPARATION

MEN

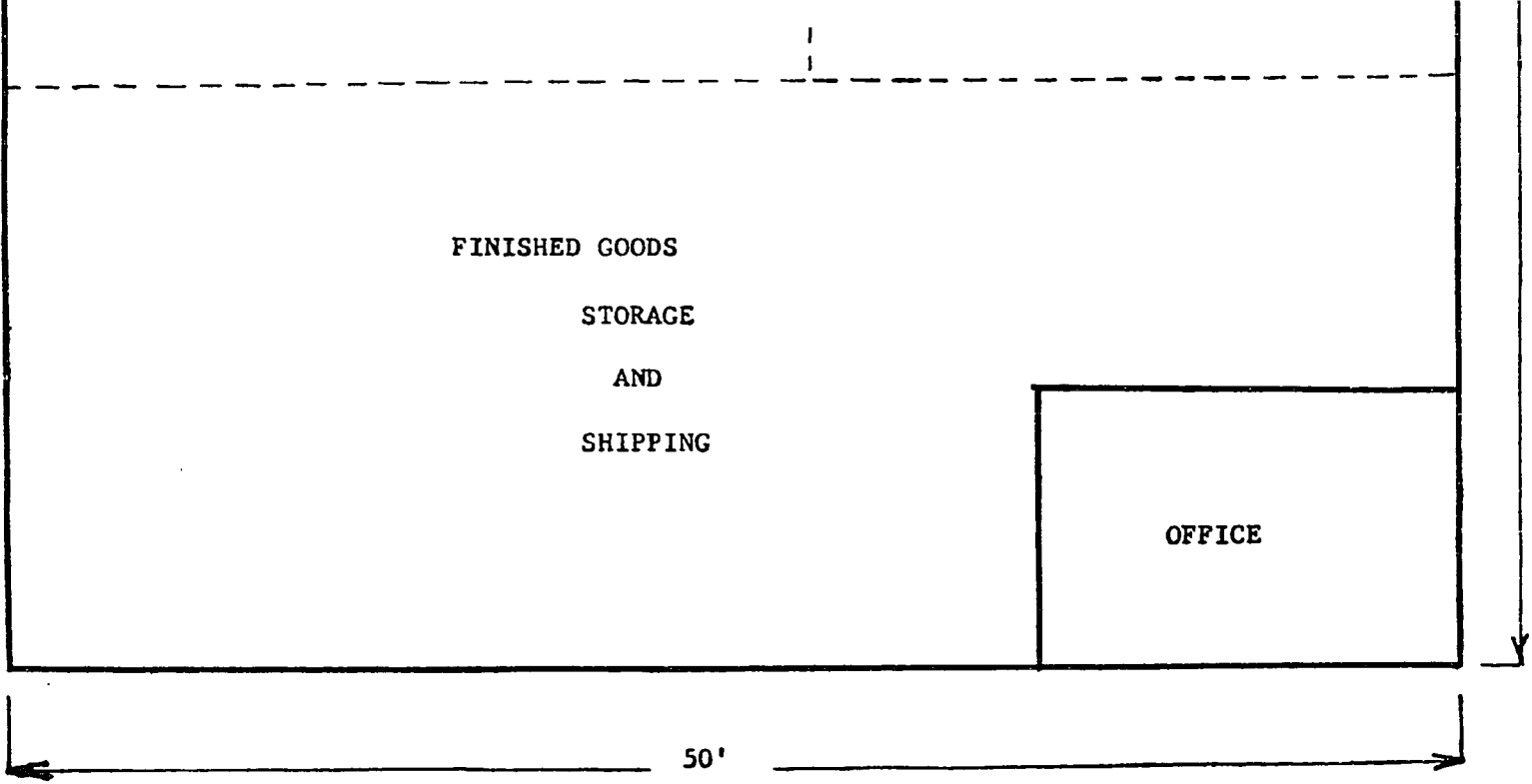
WOMEN

LABELING

CAN AND JAR
STORAGE

60'

VEGETABLE CANNING



Hand

VEGETABLE CANNING (COOPERATIVE): S. I. C. 2033

SELECTED REFERENCES

I. TEXTBOOKS

- A. Commercial Fruit and Vegetable Products. W. V. Cruess. 1958. 884 Illus. \$16.50.
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VEGETABLE CANNING (COOPERATIVE): S. I. C. 2033

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

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INDUSTRY PROFILES

WELDED PIPE

I. P. No. 66225

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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.

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WELDED PIPE: Standard Industrial Classification 3317

A. PRODUCT DESCRIPTION

Pipe formed from sheet steel in various diameters and lengths and welded in an automatic electric welding machine.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderately high. It would be essential to make a careful survey to determine the area within which the plant could profitably sell at a delivered cost no higher than that of other producers, who may not necessarily be in the same locality, and to determine whether there is enough demand in this natural market area, existing and potential. In areas of rapid development prospects for this industry are usually fairly good.

C. MARKET ASPECTS

1. USERS. Public works departments, construction contractors, some industries.
2. SALES CHANNELS AND METHODS. Sales would be made direct to users.
3. GEOGRAPHICAL EXTENT OF MARKET. Freight costs are an important limiting factor on the extent of the market area, as is the case with all more or less standardized steel products.
4. COMPETITION. Any particular plant will usually have a market area delimited by the delivered price. Within that area it should normally be able to meet competition from less favorably located plants.
5. MARKET NEEDED FOR PLANT DESCRIBED. The natural market as delimited by the delivered cost to the user would, of course, have to be an area in which there is a volume of construction and industrial activity sufficient to absorb the plant's output. How far this is so could be determined only by a careful market survey.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 750 Tons

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		<u>Cost</u>
Land. About 1 acre.	\$	--
Building. One story, 60'x225'. Office & utility area, 30'x90'. Equipment, Furniture & Fixtures.		100,000
Prod'n. tools & equipmt.	\$79,000	
Other tools & equipmt.	10,200	
Furniture & fixtures	800	90,000
<u>Total (excl. Land)</u>		<u>\$190,000</u>

Principal Items. Plate bending roll, radio-graph (plate burning equipment), 4 5-ton cranes, 2-ton crane, sheet steel brake, automatic welding machine with attachments, testing equipment, air compressor.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	\$ 33,800
Admin. Costs (b), Contingencies, Sales Costs (c)	30	2,500
Training Costs		2,200
<u>Total Working Capital</u>		<u>\$ 38,500</u>

c. TOTAL CAPITAL (EXCL. LAND) \$228,500

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements.</u>	<u>Annual Cost</u>
1/2" steel plate	785 tons	\$120,000
Flux (powdered)	5,500 lbs.	700
Electrode coil	6,000 lbs.	1,300
<u>Total</u>		<u>\$122,000</u>

b. Supplies

Lubricants & hand tools	\$	700
Cutting tools & abrasives		500
Maintenance & spare parts		3,500
Office supplies		300
<u>Total</u>	\$	<u>5,000</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> 120 hp. connected load.	<u>Annual Cost</u>
	\$ 1,200
b. <u>Fuel.</u> For heating, if necessary.	\$ 600
c. <u>Water.</u> For sanitation and fire protection.	\$ 200

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments about 7 tons a day. Good highways necessary.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	6	\$ 36,000
Semi skilled	3	15,000
<u>Total</u>	<u>9</u>	<u>\$ 51,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 18,000
Office	1	5,000
<u>Total</u>	<u>3</u>	<u>\$ 23,000</u>

- c. Training Needs. Manager & supervisor must be fully experienced. With 2 skilled workers, they should be able to train other workers & reach full production in about 1 month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

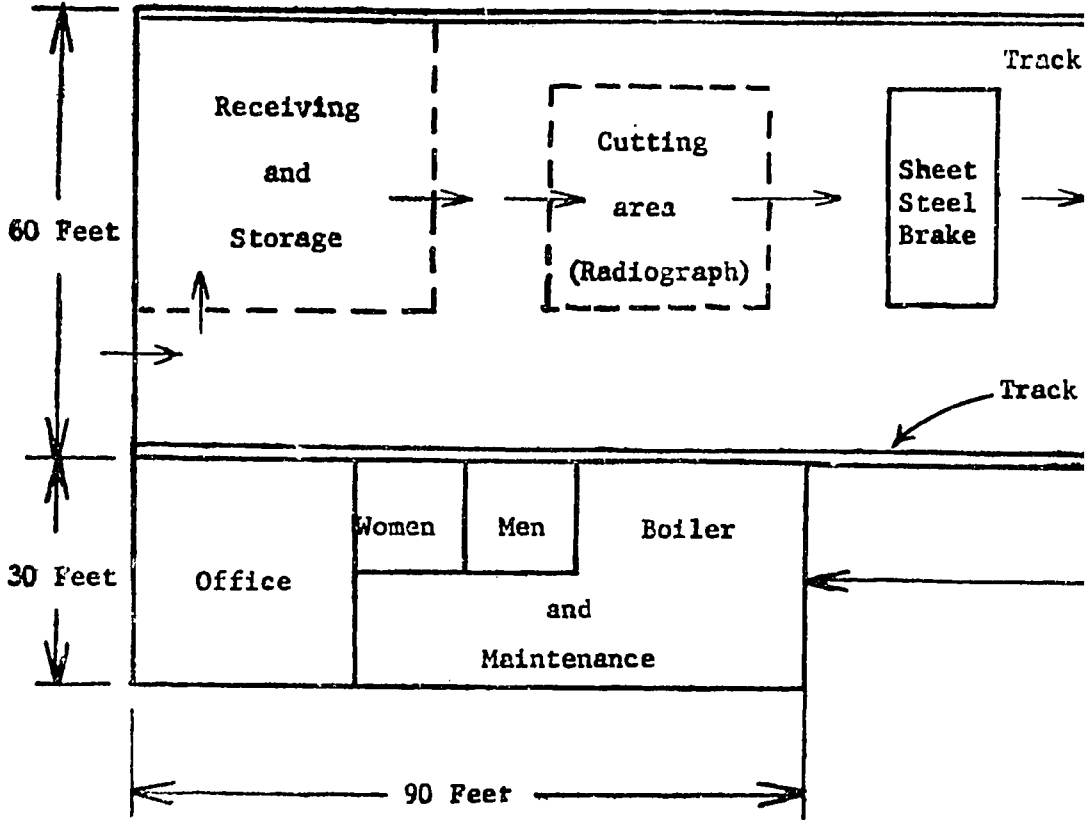
a. <u>Annual Costs</u>	
Direct Materials	\$122,000
Direct Labor	51,000
Manufacturing Overhead (a)	30,000
Admin. Costs (b), Contingencies	12,000
Sales Costs (c), Bad Debts	21,000
Depreciation on Fixed Capital	15,000
<u>Total</u>	<u>\$251,000</u>
b. <u>Annual Sales Revenue</u>	\$320,000

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

WELDED PIPE: S.I.C. 3317

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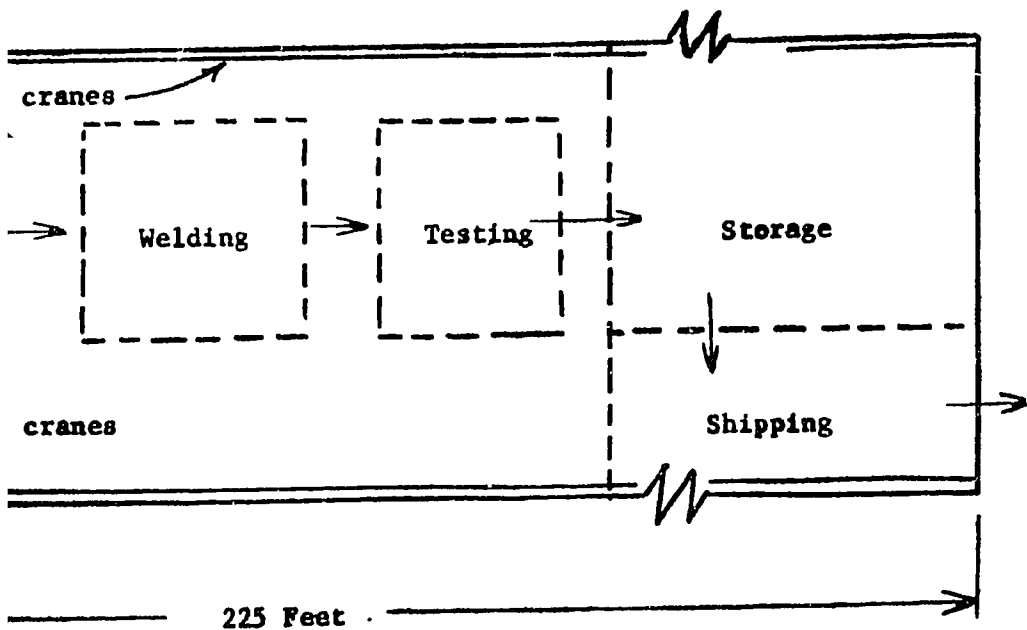
WELDED
PLANT LAYC



2/26

C. 3317

WORKFLOW



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WELDED PIPE: S.I.C. 3317

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American Technical Society
848 East 58th Street
Chicago, Ill. 60637
- C. The Procedure Handbook of Arc Welding
Design and Practice. Lincoln Electric Company, 1957. \$3.00.
Lincoln Electric Company
Cleveland, Ohio 44117
- D. Welding Principles for Engineers. J. L. Morris. 1951. 511 p. \$9.50.
Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 07632
- E. Industrial Arc Welding. \$.50.
Lincoln Arc Welding Foundation
Cleveland, Ohio 44117

II. PERIODICALS

- A. Welding Engineers. Monthly. \$15.00/year.
Welding Engineer Publications, Inc.
P. O. Box 28
Morton Grove, Ill. 60053
- B. The Welding Journal. Monthly. \$8.50/year.
American Welding Society
20th and Northampton Streets
Easton, Penn. 18042

III. U. S. PATENTS

- Available U. S. Patent Office
Washington, D. C. 20231 \$.25 each.
- A. Patent No. 2,884,958. 1959. 3 p.
Rolled tube.
 - B. Patent No. 2,817,364. 1957. 7 p.
Welded tubing.
 - C. Patent No. 2,730,135. 1956. 4 p.
Tubing or method of making tubing.

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SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATIONS

- A. National Certified Pipe Welding Bureau
666 Third Avenue
New York, N. Y. 10017
- B. Pipe Fabrication Institute
992 Perry Highway
Pittsburgh, Pa. 15237

V. ENGINEERING COMPANIES

- A. Welding Apparatus Company
2752 West Van Buren Street
Chicago, Ill. 60612
Manufacturers arc welding equipment.
- B. The Lincoln Electric Company
22801 Saint Clair Avenue
Cleveland, Ohio 44117
Manufacturers arc welding equipment and supplies.

VI. DIRECTORY

- A. Welding Directory. Annual. \$10.00.
Industrial Publishing Corporation
812 Huron Road
Cleveland, Ohio 44115
Lists manufacturers of welded products and welding supply distributors.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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ORDERING INSTRUCTIONS

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Clearinghouse for Federal Scientific and
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Springfield, Virginia 22151

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GENERAL INFORMATION

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

INDUSTRY PROFILES

ARTIFICIAL TEETH

I. P. No. 66226

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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.

ARTIFICIAL TEETH: Standard Industrial Classification 3843

A. PRODUCT DESCRIPTION

Artificial teeth made of porcelain and of plastic. The plant requirements listed in section D are for a production of approximately two-thirds porcelain and-third plastic teeth, but the proportion can be modified to suit the demand of the particular market.

B. GENERAL EVALUATION

Capital requirements for this plant are moderately high, and a great deal of skilled labor is needed. It is evident that to sell a million artificial teeth annually it would be necessary to have access to a very populous market with widespread facilities for dental care. If skilled labor is available at relatively low wage rates and good quality products can be produced at low cost, it might be possible to develop an export market. In general, there is an expanding market for these products, as dental services increase.

C. MARKET ASPECTS

1. USERS. Dentists.
2. SALES CHANNELS AND METHODS. Sales would be made to dental laboratories which supply dentists with plates, bridges, etc.
3. GEOGRAPHICAL EXTENT OF MARKET. The product can be very easily transported and shipping costs do not impose any limit on the market area, domestic or foreign.
4. COMPETITION. Competition would come only from other producers. This plant is large enough to enter into international trade, but in foreign markets domestic producers, if any, are likely to be well entrenched. Since the cost of artificial teeth constitutes only a minor part of the total costs to the ultimate user, price differentials are not very important as a competitive weapon.
5. MARKET NEEDED FOR PLANT DESCRIBED. So many variables exist in the demand for these products that it is impossible to indicate the market needed in terms of total population. Market potential would need to be carefully investigated.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY : 1 Million Teeth

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		<u>Cost</u>	<u>Annual Cost</u>
Land. About 1 acre.		\$ --	
Building. One story, 100'x100'.		60,000	
Equipment, Furniture & Fixtures.			
Prodn. tools & equipmt.	\$110,000		
Other tools & equipmt.	10,000		
Furniture & fixtures	1,000	121,000	
Total (excl. Land)		<u>\$181,000</u>	
Principal Items. Drill press, miller, grinder, shaper, sieves, mixer, heater furnaces, presses, high pressure boiler, chrome plating.			

WORKING CAPITAL

No. of Days

Direct Materials, Direct Labor, Mfg. Overhead(a)	60	58,200
Admin. Costs(L), Contingencies, Sales Costs(c)	30	2,000
Training Costs		11,800
<u>Total Working Capital</u>		<u>\$ 72,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$253,000

2. MATERIALS AND SUPPLIES

t. <u>Direct Materials</u>		<u>Annual Requirements</u>	<u>Annual Cost</u>
Silica sand	2 tons		\$ 40
Ground felspar	2 tons		60
Gold plated pins	800,000		8,000
Methyl methacrylate			2,000
Packaging materials			1,500
<u>Total</u>			<u>\$ 11,600</u>

s. Supplies

Lubricants & hand tools	200
Cutting tools & abrasives	100
Maintenance & spare parts	1,500
Office supplies	200
<u>Total</u>	<u>\$ 2,000</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> Connected load 60 hp.	<u>\$ 1,200</u>
b. <u>Fuel.</u> For production & heating.	<u>\$ 1,600</u>
c. <u>Water.</u> For production & sanitation.	<u>\$ 100</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. No special requirements.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	15	\$ 90,000
Semi-skilled	15	75,000
Unskilled	29	115,000
<u>Total</u>	<u>59</u>	<u>\$280,000</u>
b. <u>Indirect Labor</u>		
Manager & superintendents	3	\$ 28,000
Office	4	19,000
Maintenance	1	5,500
<u>Total</u>	<u>8</u>	<u>\$ 52,500</u>

- c. Training Needs. Manager with 2 supervisors & 15 skilled workers should be able to do all labor training necessary & reach full production in about a month.

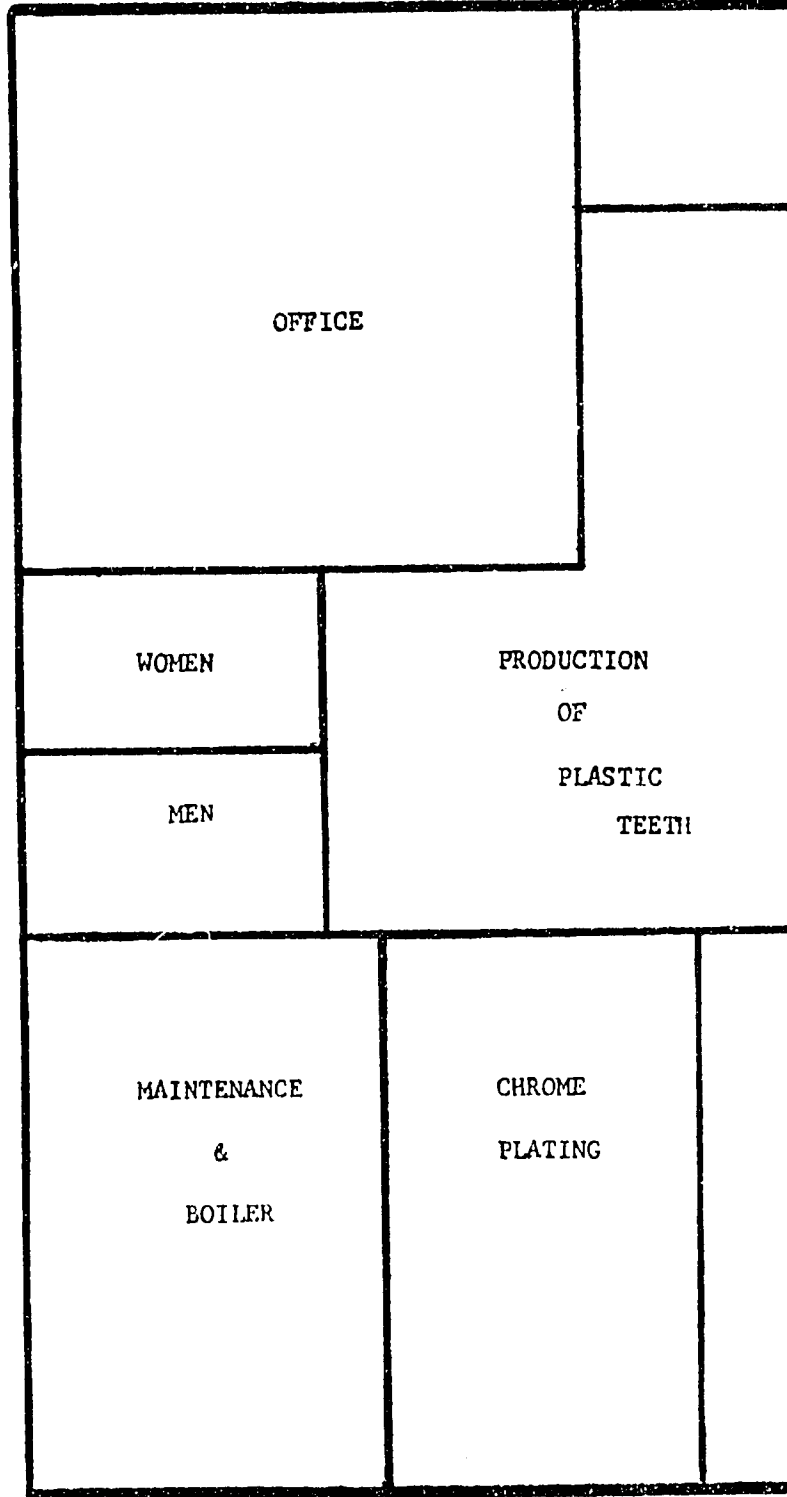
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 11,600
Direct Labor	280,000
Manufacturing Overhead(a)	57,400
Admin. Costs(b), Contingencies	10,000
Sales Costs(c), Bad Debts	17,000
Depreciation on Fixed Capital	15,600
<u>Total</u>	<u>\$391,600</u>
b. <u>Annual Sales Revenue</u>	
	<u>\$450,000</u>

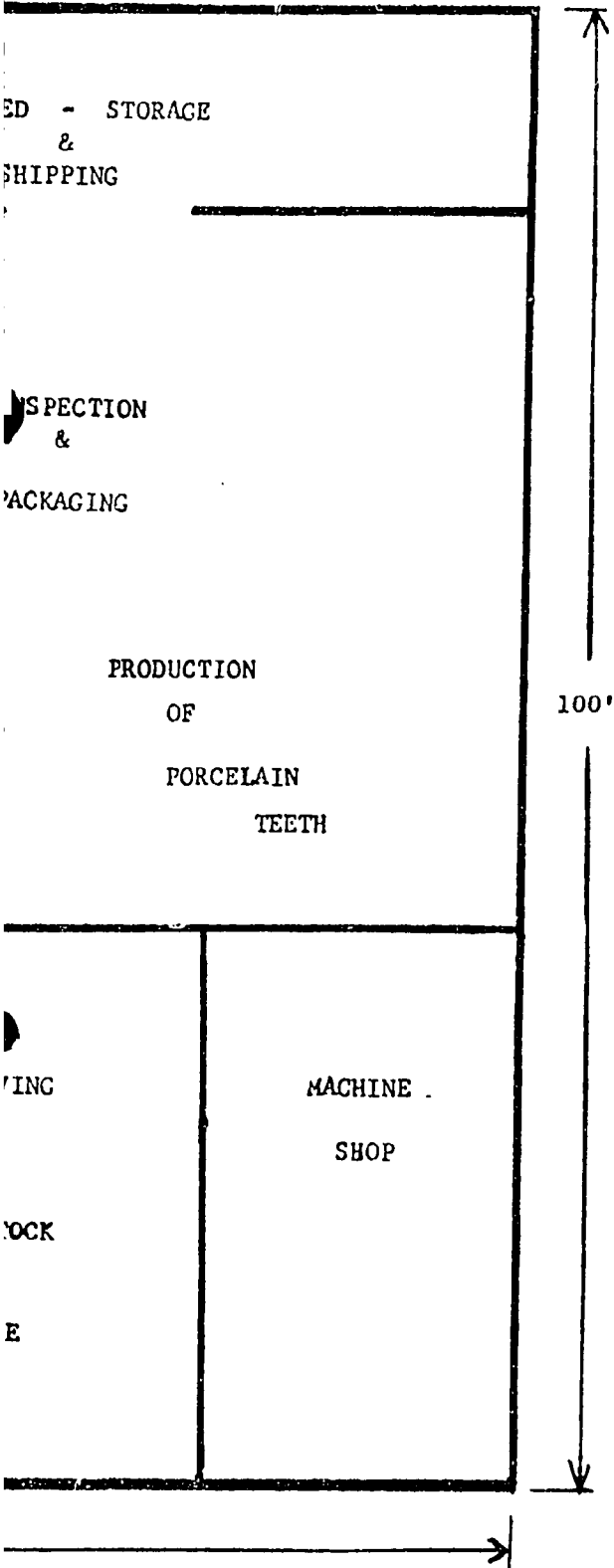
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

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ARTIFICIAL TEETH
PLANT LAYOUT



← 100' 214



ARTIFICIAL TEETH: S.I.C. 3843

SELECTED REFERENCES

I. TEXTBOOKS

- A. **Partial Dentures.** Louis G. Terkla and William R. Laney. 3rd edition. 1963. \$11.50.
C. V. Mosby Company
3207 Washington Boulevard
St. Louis, Mo. 63103
- B. **Full Dentures.** Chester Landy. 1958. \$5.85.
C. V. Mosby Co.
3207 Washington Blvd.
St. Louis, Mo. 63103
- C. **Approach to Dental Prosthetics.** David C. Berry and J. K. Wilkie. 1964. \$4.75.
Pergamon Press
44-01 Twenty-first Street
Long Island City, N. Y. 11101
- D. **The Science of Dental Materials.** Eugene W. Skinner. 4th ed. rev. 1954. \$7.50.
W. B. Saunders Company
West Washington Square
Philadelphia, Pa. 19105

II. PERIODICAL

- A. **The Journal of the American Dental Association.** Monthly. \$7.00/year.
American Dental Association
222 East Superior Street
Chicago, Ill. 60611

III. U. S. PATENTS

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

- A. Patent No. 3,126,429. Mar. 1964. 3 p.
Method of casting teeth having differently colored layers. This invention relates to the manufacture of plastic artificial teeth.
- B. Patent No. 3,069,773. Dec. 1962. 3 p.
Dental porcelains. This invention relates to the art of ceramic dentistry.
- C. Patent No. 3,052,982. Sept. 1962. 9 p.
Fused porcelain-to-metal teeth. This invention relates to an artificial tooth structure.
- D. Patent No. 2,846,725. Aug. 1958. 5 p.
Apparatus for making combination artificial teeth and display carrier.
- E. Patent No. 2,849,794. Sept. 1958. 3 p.
Artificial molars. This invention relates to improvement in artificial molar teeth for dentures for example, plates.
- F. Patent No. 2,793,436. May 1957. 7 p.
Artificial teeth. This invention relates to a method of manufacturing artificial teeth, which is suitable both for mass production and for individual teeth.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATIONS

- A. American Dental Association
222 East Superior Street
Chicago, Ill. 60611
- B. American Dental Trade Association
1010 Vermont Avenue, N. W.,
Washington, D.C. 20005
- C. Dental Manufacturers of America
1118A Land Title Building
Philadelphia, Pa. 19110

V. ENGINEERING COMPANY

- A. Technical Enterprises, Inc.
31 South Street
New York, N.Y. 10004

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

ARTISTS' OIL PAINTS

I. P. No. 66227

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.

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ARTISTS' OIL PAINTS: Standard Industrial Classification 3952

A. PRODUCT DESCRIPTION

Artists' oil paints, made from linseed oil and pigments, packed in metal tubes of standard size, approximately 2.5 by 10 centimeters overall, and containing not less than 37 ML of paint, in accordance with the U. S. Bureau of Standards Commercial Standard DS98-62 of November 15, 1962.

B. GENERAL EVALUATION

This is a small operation, requiring only a modest amount of capital and skilled labor. Maintenance of product quality is, however, extremely important in this business, and good management is essential. A plant of this size would almost certainly have a rather localized market. To meet the competition of well-known, large-scale makers who have world markets, it would be necessary not only to produce an article of equal quality but probably also sell at a somewhat lower price.

C. MARKET ASPECTS

1. USERS. Artists.
2. SALES CHANNELS AND METHODS. Sales would be made to artists' supplies stores, and possibly also to schools.
3. GEOGRAPHICAL EXTENT OF MARKET. Since transportation costs are insignificant and shipping presents no difficulty, these products are transported long distances, both domestically and internationally.
4. COMPETITION. Competition would come from large-scale and well-known producers who have world-wide markets. This plant would have little chance of doing export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. A market could be found only in areas where there is a considerable amount of cultural activity. Though rather few at present, there are some metropolises in developing countries where interest in oil painting is keen and growing.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 200,000 Tubes

CAPITAL REQUIREMENTS

FIXED CAPITAL

	Cost
Land. About 1/2 acre.	\$ ---
Building. One story, 50'x60'.	18,000
Equipment. Furniture & Fixtures.	
Prodn. tools & equipmt. \$15,000	
Other tools & equipmt. 2,500	
Furniture & fixtures 1,000	18,500
Total (excl. Land)	\$ 36,500

Principal Items. Grinder, rolling mill, mixer, tubing machine.

WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 9,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	500
Training Costs		1,200
Total Working Capital		\$ 11,500
TOTAL CAPITAL (EXCL. LAND)		\$ 48,000

MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
Direct Materials		
Linseed oil 1,000 lbs.		\$ 1,400
Pigments 14,000 lbs.		21,000
Dryers		500
Tubes & packaging materials		3,600
Total		\$ 26,500

Supplies

Lubricants & hand tools	\$ 100
Maintenance & spare parts	800
Office supplies	200
Total	\$ 1,100

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load 15 hp.	\$ 500
b. <u>Fuel.</u> For production & heating.	\$ 300
c. <u>Water.</u> For general purposes.	\$ 100

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. No special requirements.

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	1	\$ 6,000
Semi-skilled	1	5,000
Unskilled	1	4,000
Total	3	\$ 15,000

b. <u>Indirect Labor</u>		
Manager - buys, sells & supervises	1	\$ 10,000
Office	1	5,000
Total	2	\$ 15,000

- c. Training Needs. Manager must be experienced. With the skilled worker, he should be able to do all necessary labor training & reach full production in about 2 weeks.

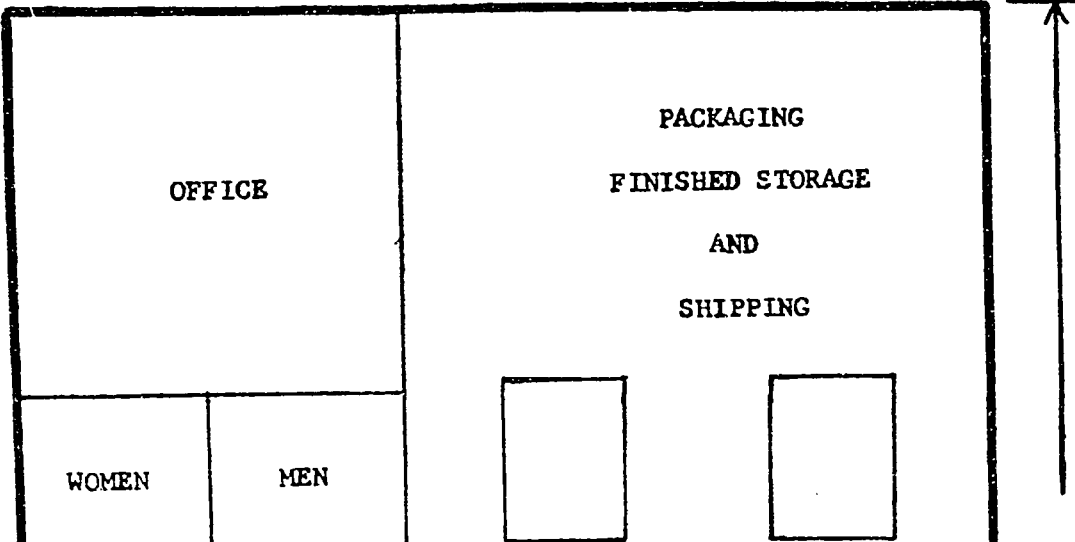
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 26,500
Direct Labor	15,000
Manufacturing Overhead(a)	17,000
Admin. Costs(b), Contingencies	3,000
Sales Costs(c), Bad Debts	3,500
Depreciation on Fixed Capital	3,000
Total	\$ 68,000
b. <u>Annual Sales Revenue</u>	\$ 90,000

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

ARTISTS' OIL PAINTS : S.I.C. 3952

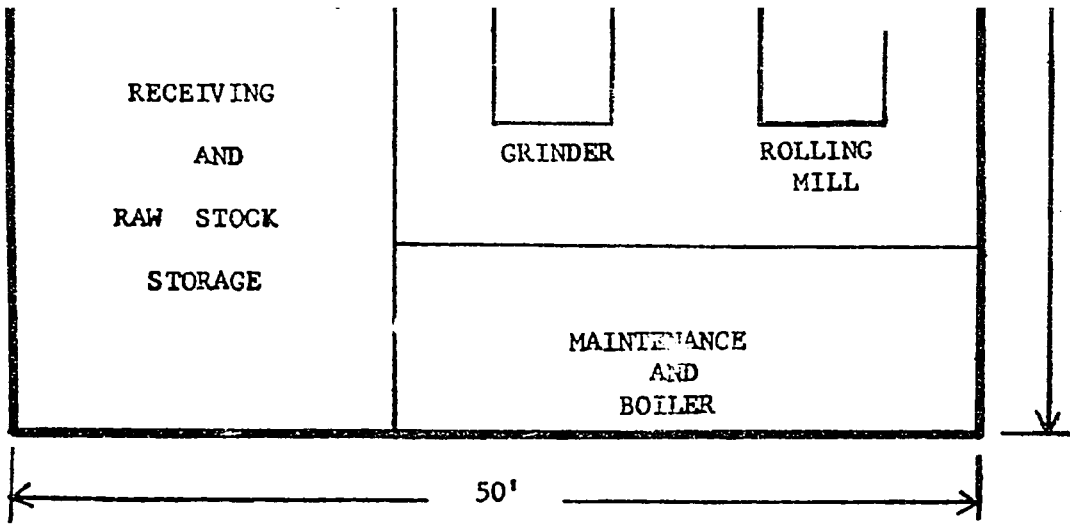
PLANT LAYOUT



ARTISTS' OIL P

22

I.C. 3952



RECEIVING
AND
RAW STOCK
STORAGE

GRINDER

ROLLING
MILL

MAINTENANCE
AND
BOILER

50'

200

ARTISTS' OIL PAINTS: S. I. C. 3952

SELECTED REFERENCES

I. TEXTBOOKS

- A. Artists' Methods and Materials. Maria Bazzi. 1960. \$6.00.
Pitman Publishing Corporation
20 East 46th Street
New York, N. Y. 10017
- B. Artists' Hand Book on Materials and Techniques. Ralph E. Mayer.
rev. 1957. \$6.95.
Viking Press
625 Madison Avenue
New York, N. Y. 10022
- C. Oil Painting. Stephen Bone. 1956. Illus. \$4.75.
D. Van Nostrand Company, Inc.
120 Alexander Street
Princeton, New Jersey 08540

II. U. S. GOVERNMENT PUBLICATION

- A. Commerical Standard C. S. 98 - 12 Artists' Oil Paints. Nov. 1962
\$.15.
Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

III. PERIODICAL

- A. Oil, Paint and Drug Reporter. Weekly.
100 Churh Street
New York, N. Y. 10007

IV. TRADE ASSOCIATIONS

- A. National Art Materials Trade Association
157 West 57th Street
New York, N. Y. 10019
- B. Art Materials Board of Trade
276 Fifth Avenue
New York, N. Y. 10001

SELECTED REFERENCES (Continued)

V. ENGINEERING COMPANY

- A. Technical Enterprises, Inc.
31 South Street
New York, N. Y. 10004

VI. DIRECTORIES

- A. Annual Buyers' Guide of Commercial Artists. Annual. \$10.00.
Art Directors
19 West 44th Street
New York, N. Y. 10003
- B. Buyers Guide of Selected Artists' Materials. Annual.
Watson Guphill Publications, Inc.
20 West 40th Street
New York, N. Y. 10018
Lists suppliers of artists' materials.

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AUTOMOBILE MUFFLERS

I. P. No. 66228

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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 MUFFLERS: Standard Industrial Classification 3714

A. PRODUCT DESCRIPTION

Automobile mufflers of various sizes and shapes, to suit the demand in the particular market.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderate. The major problem would be to keep costs low enough to meet the competition of large-scale makers in advanced industrial areas, since this is a business in which economies of scale are marked.

C. MARKET ASPECTS

1. USERS. Automobile manufacturers and assemblers, automobile repair establishments.
2. SALES CHANNELS AND METHODS. Sales are made to users and to automobile parts distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are easy to ship and freight costs are normally rather low in relation to product value. They are commonly shipped long distances, both domestically and internationally.
4. COMPETITION. Competition from large-scale producers, whose amount of business permits volume production of particular items and consequently low unit production costs, is likely to be very keen. A plant of this size would have virtually no chance of doing any export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. This plant could evidently find a market only in an area where there is a fairly large number of automobiles and possibly some manufacture or assembly of automobiles. In view of the competition from large-scale producers, the areas where a plant of this kind would be feasible, without a prohibitive tariff or restrictions on competitive imports, would probably be few.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 40,000 Mufflers

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	<u>Cost</u>	
Land. About 20,000 sq. ft.	\$	--
Building. One story, 100'x100', fire proof material.		65,000
Equipment, Furniture & Fixtures.		
Prod'n. tools & equipmt. \$58,000		
Other tools & equipmt. 1,000		
Furniture & fixtures 1,000		60,000
<u>Total (excl. Land)</u>		<u>\$125,000</u>

Principal Items. Square shear, 4 punch presses, lockseaming machine, 3 hydraulic presses, 2 spot welders, 3 arc welders, grinder & polisher, spray booth, conveyor, 2 compressor-, dies, lift truck 12 pallets, hand tools, cutting tools, bench grinder, spare parts.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 27,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,200
Training Costs		3,500
<u>Total Working Capital</u>		<u>\$ 34,500</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 159,500

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Sheet steel	160 tons	\$ 27,000
Welding rods		2,000
Paint		3,000
Cartons	40,000	14,000
<u>Total</u>		<u>\$ 46,000</u>
b. <u>Supplies</u>		
Lubricants & hand tools		\$ 200
Cutting tools & abrasives		3,600
Maintenance & spare parts		1,000
Office supplies		200
<u>Total</u>		<u>\$ 5,000</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> About 90,000 kw-hr annually.	<u>Annual Cost</u>
	\$ 1,800
b. <u>Fuel.</u> For heating.	\$ 600
c. <u>Water.</u> For sanitation & fire protection.	\$ 200

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
 b. External Transport Facilities. No special requirements.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	2	\$ 12,000
Semi-skilled	11	55,000
Unskilled	4	16,000
<u>Total</u>	<u>17</u>	<u>\$ 83,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 10,000
Office	3	14,000
Maintenance	1	6,000
<u>Total</u>	<u>5</u>	<u>\$ 30,000</u>

- c. Training Needs. Manager should be experienced. With 2 skilled workers, he should be able to train other workers & reach full production in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

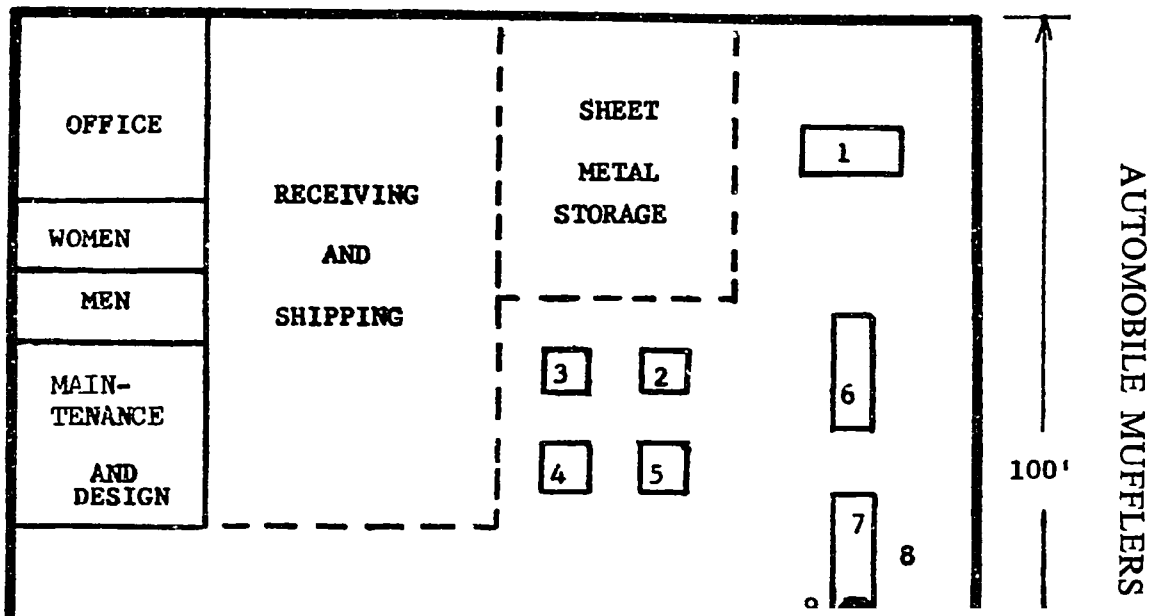
a. <u>Annual Costs</u>	
Direct Materials	\$ 46,000
Direct Labor	83,000
Manufacturing Overhead(a)	37,600
Admin. Costs(b), Contingencies	9,000
Sales Costs(c), Bad Debts	14,000
Depreciation on Fixed Capital	9,400
<u>Total</u>	<u>\$ 199,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$ 250,000</u>

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

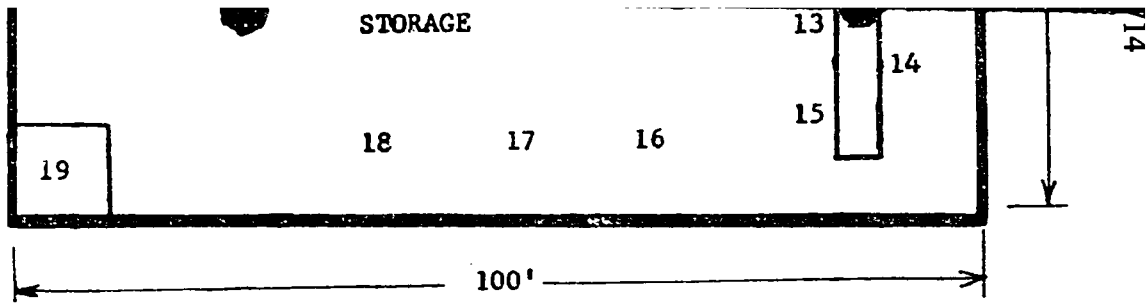
AUTOMOBILE MUFFLERS: S.I.C. 3714

229

PLANT LAYOUT AND WORK FLOW



28



- | | |
|-------------------------------|---------------------------------------|
| 1 Square shears | 10 Assemble tubes and baffles to body |
| 2 Punch press 30 ton | 11 Spot weld |
| 3 Punch press 40 ton | 12 Assemble ends |
| 4 Punch press 60 ton | 13 Arc weld |
| 5 Punch press 100 ton | 14 Assemble outlet pipe |
| 6 Lockseaming machine | 15 Arc weld |
| 7 Conveyor | 16-17 Grind ends |
| 8 Assemble tubes and baffles | 18 Inspect |
| 9 Spot weld tubes and baffles | 19 Spray paint |

Numbers indicate machines and workflow.

221

AUTOMOBILE MUFFLERS: S. I. C 3714

SELECTED REFERENCES

I. TEXTBOOKS

- A. Modern Machine Tools. Frank H. Habicht. 1963. \$6.50.
D. Van Nostrand Co. Inc.
Princeton, N. J. 08540
- B. Machine Tools - What They Are and How They Work. Herbert D. Hall
and Horace E. Linsley. 1957. 448 p. Illus. \$6.50.
The Industrial Press
93 Worth Street
New York, N Y. 10013
- C. Chilton Automotive Buyers' Guide. \$4.00.
Chilton Company
Chestnut and 56th Streets
Philadelphia, Pa. 19139
- 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. Gratis.
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
- B. Journal of Applied Mechanics. Quarterly. \$5.00/year.
American Society of Mechanical Engineers
29 West 39th Street
New York, N. Y. 10018

SELECTED REFERENCES (Continued)

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 ASSOCIATION

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

VI. ENGINEERING COMPANIES

- A. Monument Engineering Company, Inc.
16th and Bellefontaine
Indianapolis, Indiana 46202
- B. Di-Arco Engineering Service
O'Neil-Irwin Manufacturing Company
Lake City, Minn. 55041

VII. DIRECTORY

- A. Hitchcock's Machine and Tool Directory. Annual. \$10.00.
Hitchcock Publishing Company
Wheaton, Ill. 60187
Covers design, production, economy and techniques in the industrial metal-working field.

AUTOMOBILE MUFFLERS: S. I. C. 3714

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

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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

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

INDUSTRY PROFILES

AUTOMOBILE TIRES

I. P. No. 66229

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 TIRES : Standard Industrial Classification 3011

A. PRODUCT DESCRIPTION

Four-ply 750 x 14 high grade tires.

B. GENERAL EVALUATION

This plant, though not large by the standards of the industry, requires a very substantial capital investment, plus skilled management and supervision. Production requirements, as listed in section D, are based on manufacture of one size of tire, but other sizes could be made with the addition of the necessary molds and presses. The plant would have to meet the competition of large-scale and well-known producers, with their well-developed international sales organizations. It would evidently be necessary to have an automobile manufacturing or assembly industry and/or a very substantial number of automobiles in use. It would also be necessary to have a favorable production cost situation. In view of all the requirements for profitable operation, the number of developing areas for which this plant would be suitable are probably rather few.

C. MARKET ASPECTS

1. USERS. Automobile manufacturers and assemblers, automotive repair establishments, automobiles owners.
2. SALES CHANNELS AND METHODS. Sales to user industries, and tire distributors. Publicity and active salesmanship are essential.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are easy to ship and transport costs are normally fairly low in relation to product value. They are often shipped long distances in both domestic and international trade.
4. COMPETITION. Competition in the domestic market from imports by large-scale and well-known manufacturers is likely to be keen. The plant is too small to enter into general international trade, though in favorable circumstances it might make some sales to neighboring countries.
5. MARKET NEEDED FOR PLANT DESCRIBED. Though a domestic automobile manufacturing or assembly industry is not essential to provide a market, it would clearly be necessary otherwise to have a very large number of automobiles in use in the market area, taking into account the competition to be expected, if the plant is to have a large enough outlet for its production.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - TWO-SHIFT OPERATION: 200,000 Tires

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	<u>Cost</u>
Land. About 2 acres.	\$ --
Building. One story, 100'x500'	400,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$3,500,000	
Other tools & equipmt. 40,000	
Furniture & fixtures 2,000	
Transportation equipmt. 3,000	3,545,000
<u>Total (excl. Land)</u>	<u>\$3,945,000</u>

Principal Items. Bandbury mill (mixer), tread tuber, bias cutter, tire building machines, tire drums, molds, air bag, presses, bead building machine, Waldron (dip) machine, four-roll calender (coater), band building machine, mill & extruder (tread), fork lift trucks, hand trucks, delivery truck.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$315,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	30,000
Training Costs		40,000
<u>Total Working Capital</u>		<u>\$385,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$4,330,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Natural rubber	220 tons	\$ 145,000
Synthetic rubber	1,020 tons	470,000
Reclaimed rubber	250 tons	50,000
Rayon fabric	270 tons	334,000
Carbon black	560 tons	84,000
Sulfur	25 tons	2,000
Wire	100 tons	35,000
Chemicals	240 tons	135,000
<u>Total</u>		<u>\$ 1,255,000</u>

b. Supplies

Lubricants & hand tools	\$ 500
Cutting tools & abrasives	1,000
Maintenance & spare parts	29,000
Office supplies	500
<u>Total</u>	<u>\$ 31,000</u>

3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 800 hp.	\$ 29,000
b. <u>Fuel.</u> About 40,000 gals. oil annually.	\$ 4,500
c. <u>Water.</u> For cooling (make up) and general purposes.	\$ 2,500

4. TRANSPORTATION

Annual Operating Cost

a. <u>Own Transport Equipment.</u> Pickup & delivery truck.	\$ 1,000
b. <u>External Transport Facilities.</u> In & out shipments average about 20 tons a day. Good highways & rail facilities necessary.	

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	8	\$ 52,000
Semi-skilled	70	385,000
Unskilled	16	56,000
<u>Total</u>	<u>94</u>	<u>\$ 493,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisors	4	\$ 39,000
Office	4	20,000
Maintenance & drivers	3	16,000
<u>Total</u>	<u>11</u>	<u>\$ 75,000</u>

c. Training Needs. Manager & supervisors must be fully experienced. With assistance of skilled workers they should be able to do all labor training & reach full production in about a month.

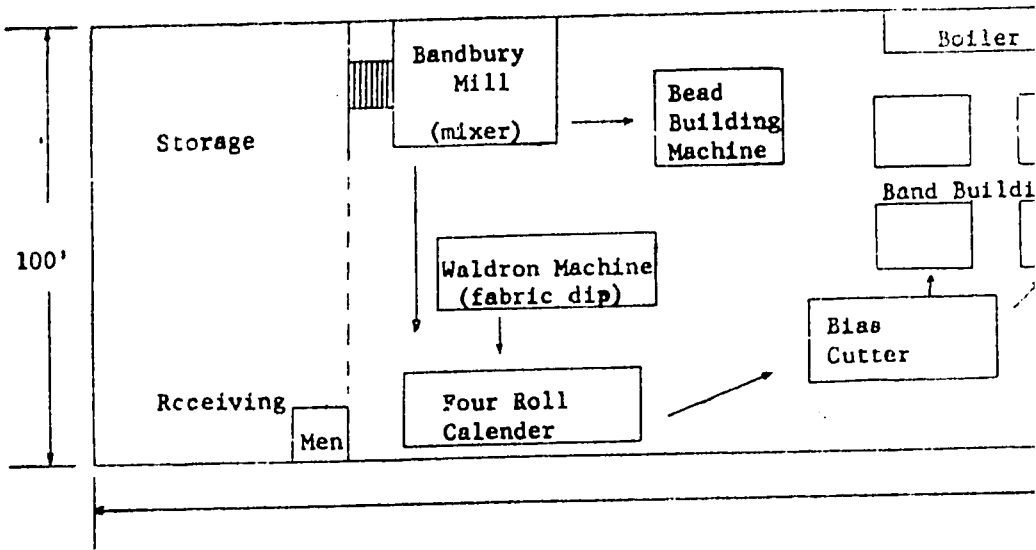
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$1,255,000
Direct Labor	493,000
Manufacturing Overhead(a)	143,000
Admin. Costs(b), Contingencies	180,000
Sales Costs(c), Bad Debts	200,000
Depreciation on Fixed Capital	379,000
<u>Total</u>	<u>\$2,650,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$3,400,000</u>

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

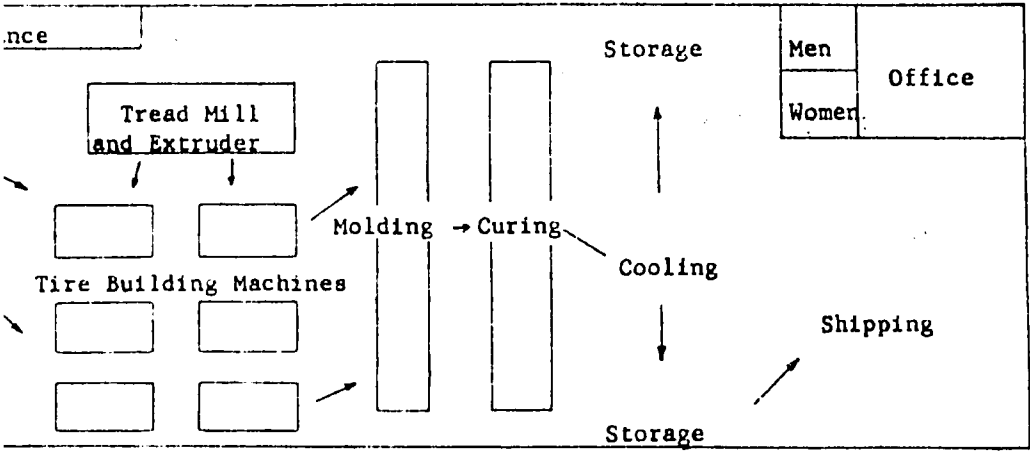
AUTOMOBILE TIRES : S I.C. 3011

AUTOMOBILE
PLANT LAYOUT



S.I.C. 3011

WORKFLOW



AUTOMOBILE TIRES: S.I.C. 3011

SELECTED REFERENCES

I. TEXTBOOKS

- A. Rubber. Loren G. Polhamus. Illus 1962. \$14.95.
John Wiley & Sons, Inc.
605 Third Ave., New York, N.Y. 10016
- B. Natural and Synthetic Rubbers. D.W. Huke. Illus. 1961. \$5.00
Tudor Publishing Co.
221 Park Avenue South
New York, N.Y. 10003
- C. Engineering and Design with Rubber. A.R. Payne and J.R. Scott. 1960.
\$8.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N.Y. 10016
- D. Introduction to Rubber Technology. Maurice Morton Illus. 1959. \$11.50.
Reinhold Publishing Corporation
430 Park Avenue
New York, N.Y. 10022

II. U. S. GOVERNMENT PUBLICATIONS

- A. Rubber. June 1956. Supplement. Aug. 1957. 242 refs. CTR-321.
- B. Rubber. Supplement to CTR-321. Feb. 1962. 455 refs. SB-494.
U.S. Department of Commerce
Washington, D.C. 20230
- C. Manufacture of Rubber Products. 1R-17218
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, Penn. 17603
- B. Rubber Age. Monthly. \$6.00/year.
Palmerton Publishing Company, Inc.
101 West 31st Street
New York, N.Y. 10001
- C. Rubber World. Monthly. \$7.00/year.
Bill Brothers Publishing Corporation
630 Third Avenue
New York, N.Y. 10017

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office

Washington, D.C. 20231 \$.25 each.

- A. Patent No. 2,997, 738. 1961. 7 p.
Apparatus and method for positioning a tire in a curing press.
- B. Patent No. 2,981, 304. 1961. 7 p.
Pneumatic tires - relates to such tires having treads characterized by very greatly improved resistance to abrasive wear.
- C. Patent No. 2,980,950. 1961. 7 p.
Tire chuck.
- D. Patent No. 2,978,749. 1961. 5 p.
Tire manufacture.
- E. Patent No. 2,978,741. 1961. 11 p.
Mechanism for holding and inflating tires after vulcanization.
- F. Patent No. 2,964,083. 1960. 15 p.
Pneumatic tires and thread stock composition.
- G. Patent No. 2,949,952. 1960. 8 pp.
Tubeless tire.

V. TRADE ASSOCIATIONS

- A. Rubber Manufacturers 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. National Rubber Machinery Company
47-55 West Exchange Street
Akron, Ohio 44308
- B. McNeil Machine and Engineering Company
100 East Crosier Street
Akron, Ohio 44311

II. 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.

AUTOMOBILE TIRES : S.I.C. 3011

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

AUTOMOBILE TIRES AND TUBES

I. P. No. 66230

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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.

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AUTOMOBILE TIRES AND TUBES: Standard Industrial Classification 3011

A. PRODUCT DESCRIPTION

Automobile and truck tires of various sizes made from rubber-coated cord fabric built up in plies, extruded tread stock, and fabricated wire bead, on collapsible mandrel tire-building machines, with the air bag inserted and "cured" in vulcanizing presses. Inner tubes made from extruded tubing, cut to length, skived and spliced, with the valve inserted and "cured" in vulcanizing presses.

B. GENERAL EVALUATION

This plant, though small by the standards of the industry, requires a fairly substantial capital, as well as skilled management and technical supervision. A plant of this kind, making tires and tubes from purchased materials, may have a certain advantage in being able to adapt its products fairly readily to market requirements. But competition in this industry is keen, and there may be rather few developing areas in which it would be possible to operate such a plant profitably. If demand proves to be large enough, production could easily be increased by working more than one shift. (For a plant making automobile tires from raw rubber see Industry Profile No. 1P66229, Automobile Tires: S. I. C. 3011).

C. MARKET ASPECTS

1. USERS. Automobile manufacturers and assemblers, automobile repair establishments, automobile owners.
2. SALES CHANNELS AND METHODS. Sales are made to automobile manufacturers and assemblers and to tire distributors. Active salesmanship and publicity are necessary.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are easy to ship and transport costs are normally low in relation to product value. They are often shipped long distances in both domestic and international markets.
4. COMPETITION. Competition in the domestic market from imports by large-scale and well-known manufacturers is likely to be keen. The plant would have very little chance of doing export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. In view of the competition to be expected it would be necessary to have a fairly large number of automobiles in use in the domestic market. The market prospects, would of course, be greatly improved if a domestic automobile manufacturing or assembly industry has been established.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 24,000 Tires and 32,000 Tubes

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 2 acres.	\$ --
Building. One story, 100'x125',	100,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$368,000	
Other tools & equipmt. 50,000	
Furniture & fixtures 1,500	
Transportation equipmt. 6,500	426,000
Total (excl. Land)	<u>\$526,000</u>

Principal Items. 3 tire building machines, 6 tire vulcanizing presses, 2 rubber mills, tuber, cooling tank conveyor, 4 tube vulcanizing presses, air compressor, steam & hot water boilers, generator, fuel oil storage tank, work tables, hand trucks, piping, wiring & fittings, stock stands, storage racks & skids, five-ton truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	\$ 65,000
Admin. Costs (b), Contingencies, Sales Costs (c)	30	5,000
Training Costs		10,000
Total Working Capital		<u>\$ 80,000</u>

c. **TOTAL CAPITAL (EXCL. LAND)** \$606,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Tire carcass materials	240,000 lbs.	\$ 89,000
Camel back tread stock	154,000 lbs.	34,000
Bead, breaker strip, etc.	14,000 lbs.	5,100
Tube slab stock	270,000 lbs.	51,000
Valves, cement, etc.		3,400
Packaging materials		2,500
Total		<u>\$185,000</u>

b. Supplies

Lubricants, solvents & cleaners	\$ 2,000
Cutting tools & abrasives	500
Maintenance & spare parts	18,500
Office expenses	500
Total	<u>\$ 21,500</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 2.4 million kw-hr annually (captive, from surplus steam).	<u>\$ 18,000</u>
b. Fuel. About 100,000 gals. bunker C oil annually.	<u>\$ 6,000</u>
c. Water. About 50 million gals. annually for cooling. Make-up water & water for general purposes estimated to cost annually about	<u>\$ 3,000</u>

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 5-ton truck for local deliveries.	<u>\$ 1,500</u>
b. External Transport Facilities. Good trucking facilities and/or easy access to railroad necessary.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	\$ 19,500
Semi-skilled	6	33,000
Unskilled	15	52,500
Total	<u>24</u>	<u>\$105,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 23,000
Maintenance & driver	3	17,000
Office	2	10,000
Total	<u>7</u>	<u>\$ 50,000</u>

c. **Training Needs.** Manager & supervisor should be fully experienced in rubber shop techniques & operation. With aid of skilled men they should be able to do all necessary labor training & reach full production in about 6 weeks.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$185,000
Direct Labor	105,000
Manufacturing Overhead (a)	100,000
Admin. Costs (b), Contingencies	40,000
Sales Costs (c), Bad Debts	25,000
Depreciation on Fixed Capital	54,000
Total	<u>\$509,000</u>
b. Annual Sales Revenue	<u>\$620,000</u>

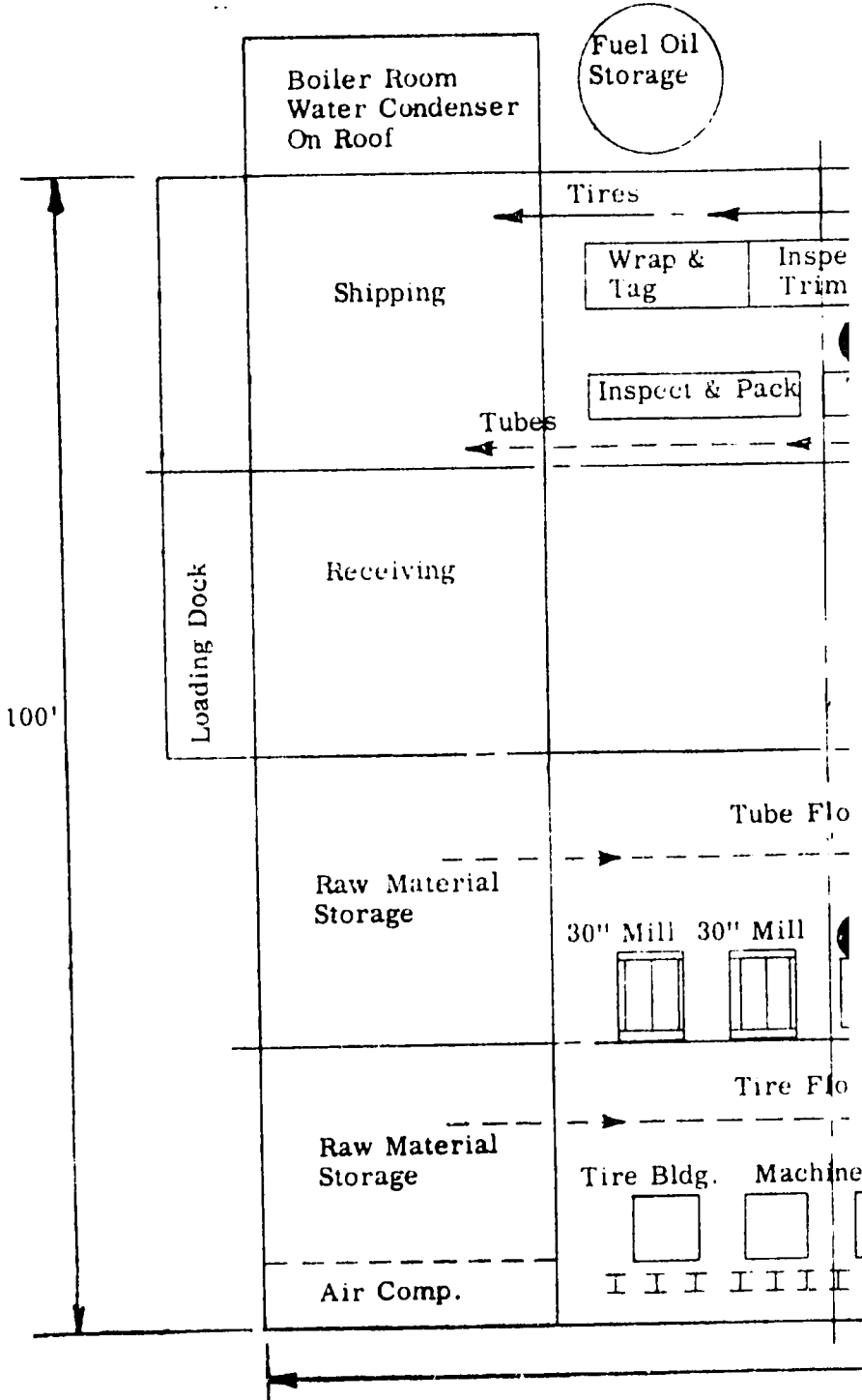
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AUTOMOBILE TIRES AND TUBES: S.I.C. 3011

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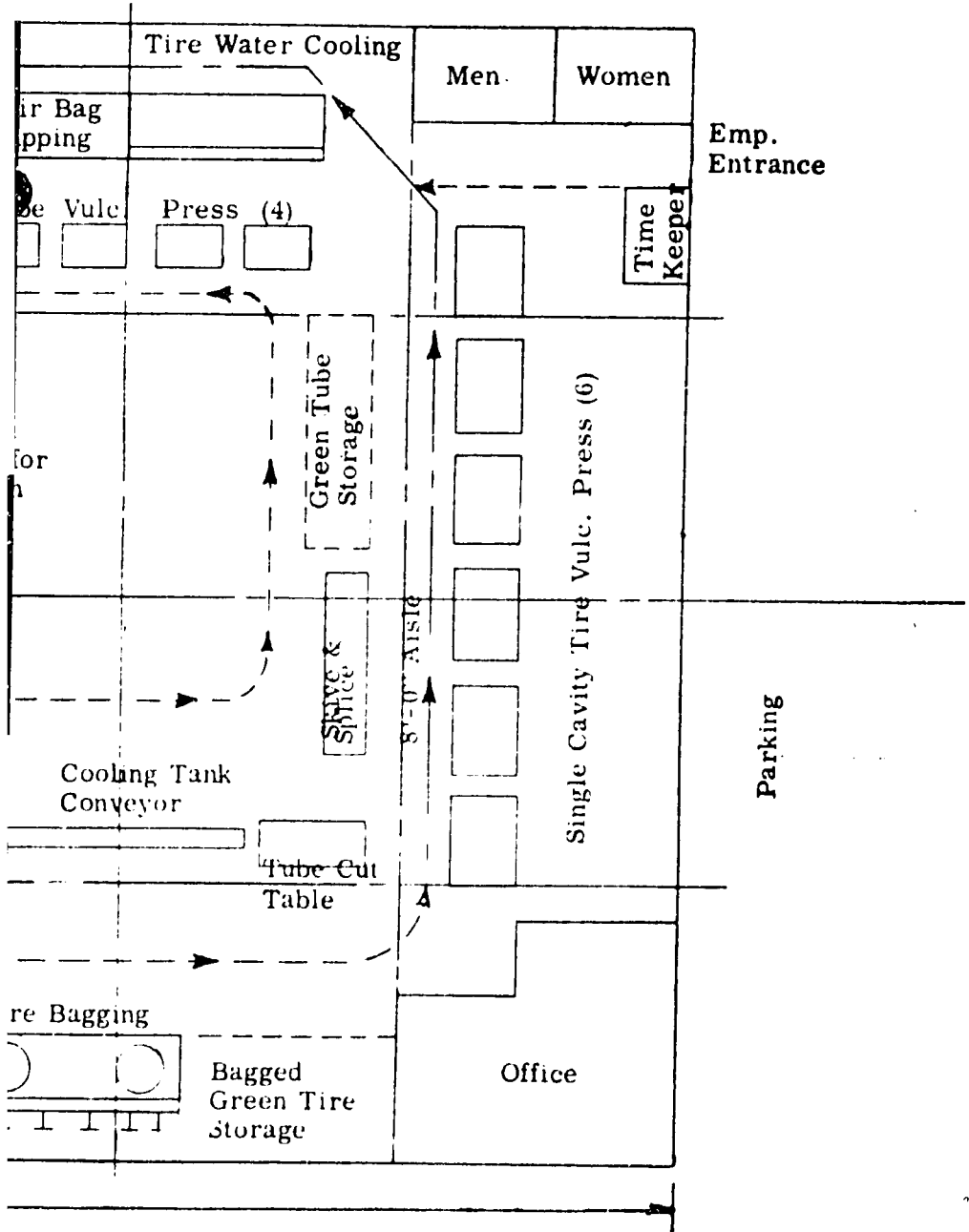
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AND TUBES : S.I.C. 3011

T AND WORKFLOW



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AUTOMOBILE TIRES AND TUBES: S. I. C. 3011

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- A. Rubber. Loren G. Polhamus. Illus. 1962. \$14.95.
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- B. Natural and Synthetic Rubbers. D. W. Huke. Illus. 1961. \$5.00.
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U. S. Department of Commerce
Washington, D. C. 20230
- C. Manufacture of Rubber Products IR-17218.
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, Pa. 17603
- B. Rubber Age. Monthly. \$6.00/year.
Palmerton Publishing Company, Inc.
101 West 31st Street
New York, N. Y. 10001
- C. Rubber World. Monthly. \$7.00/year.
Bill Brothers Publishing Corporation
630 Third Avenue
New York, N. Y. 10017

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IV. U.S. PATENTS

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Apparatus and method for positioning a tire in a curing press.
- B. Patent No. 2,981,304. 1961. 7 p.
Pneumatic tires with treads having very greatly improved resistance to abrasive wear.
- C. Patent No. 2,980,950. 1961. 7 p.
Tire chuck.
- D. Patent No. 2,978, 749. 1961. 5 p.
Tire manufacture.
- E. Patent No. 2,978,741. 1961. 11 p.
Mechanism for holding and inflating tires after vulcanization.
- F. Patent No. 2,964,083. 1960. 15 p.
Pneumatic tires and thread stock composition.
- G. Patent No. 2,592,724. 1952. 7 p.
Inner tube for pneumatic tires and method of making.

V. TRADE ASSOCIATION

- A. Rubber manufacturers Association
444 Madison Avenue
New York, N. Y. 10022

VI. ENGINEERING COMPANIES

- A. National Rubber Machinery Company
47-55 West Exchange Street
Akron, Ohio 44308
- B. McNeil Machine and Engineering Company
100 East Crosier Street
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

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ORDERING INSTRUCTIONS

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GENERAL INFORMATION

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

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INDUSTRY PROFILES

CANNED BEEF

I. P. No. 66231

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CANNED BEEF: Standard Industrial Classification 2013

A. PRODUCT DESCRIPTION

Canned beef in No. 2½ size cans (dimensions 4 1/16 inches in height, 4 11/16 inches in diameter).

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderate. Locally produced beef at a low price is almost indispensable. In meat producing areas the demand for canned beef may be quite limited, and the latter may have a market only in rather remote areas or with the military forces. The plant is small by the standards of the industry and would probably not be in a good competitive position for doing export trade.

C. MARKET ASPECTS

1. USERS. Households, eating establishments, military forces.
2. SALES CHANNELS AND METHODS. Sales would be made to wholesale distributors, large retail stores, and possibly direct to the military forces. An attractive brand name is desirable.
3. GEOGRAPHICAL EXTENT OF MARKET. Canned meat is easily transported and can bear a fair amount of freight cost. It is often shipped long distances, both in domestic markets and internationally.
4. COMPETITION. The price would need to be low in order to compete with fresh meat, where the latter is readily available. It is unlikely that a plant of this size could export except possibly to neighboring countries, if its location is favorable.
5. MARKET NEEDED FOR PLANT DESCRIBED. If canned beef is commonly eaten, a comparatively small population could absorb the plant's output. However, canned beef is mostly consumed only in situations where fresh meat cannot be obtained, e. g. by troops on active service, campers, etc. There will, therefore, be wide variations in market size.

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D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 450,000 No. 2½ Size Cans

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL	Cost
Land. About 1½ acres.	\$ --
Building. One story, 100'x50',	30,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$ 31,000	
Other tools & equipmt. 2,800	
Furniture & fixtures 700	
Transportation equipmt. 2,500	37,000
Total (excl. Land)	\$ 67,000

Principal Items. 20 hp. boiler, 5 retorts, 3 power sealers, 2 exhausters, hoist & truck, 5 cutting tables, 4 sinks, flange former, can reformer, flanger & seamer, 2 scales, air compressor, meat bandsaw, processing equipment. refrigerato. with overhead conveyor & methooks, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 52,600
Admin. Costs(b), Contingencies, Sales Cost(s)	30	2,000
Training Costs		2,400
Total Working Capital		\$ 57,000

c. **TOTAL CAPITAL (EXCL. LAND)** \$124,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Beef	600 tons	\$180,000
Cans, labels & cartons		21,000
Total		\$201,000

b. Supplies

Lubricants & hand tools	\$ 200
Maintenance & spare parts	900
Office supplies	300
Total	\$ 1,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 20 hp.	\$ 900
b. Fuel. About 15,000 gals. oil, or equivalent in other fuel, annually.	\$ 1,800
c. Water. About 2 millions gals. annually of potable water for production & general purposes.	\$ 500

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton pickup truck for general purposes.	\$ 1,000
b. External Transport Facilities. No special requirements.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	3	\$ 18,000
Semi-skilled	3	15,000
Unskilled	12	48,000
Total	18	\$ 81,000
b. Indirect Labor		
Manager & supervisor	2	\$ 18,000
Office	1	5,000
Driver	1	5,000
Total	4	\$ 28,000

c. **Training Needs.** Manager & supervisor should be experienced. With aid of the skilled workers, they should be able to do all necessary labor training & reach full production in about a month.

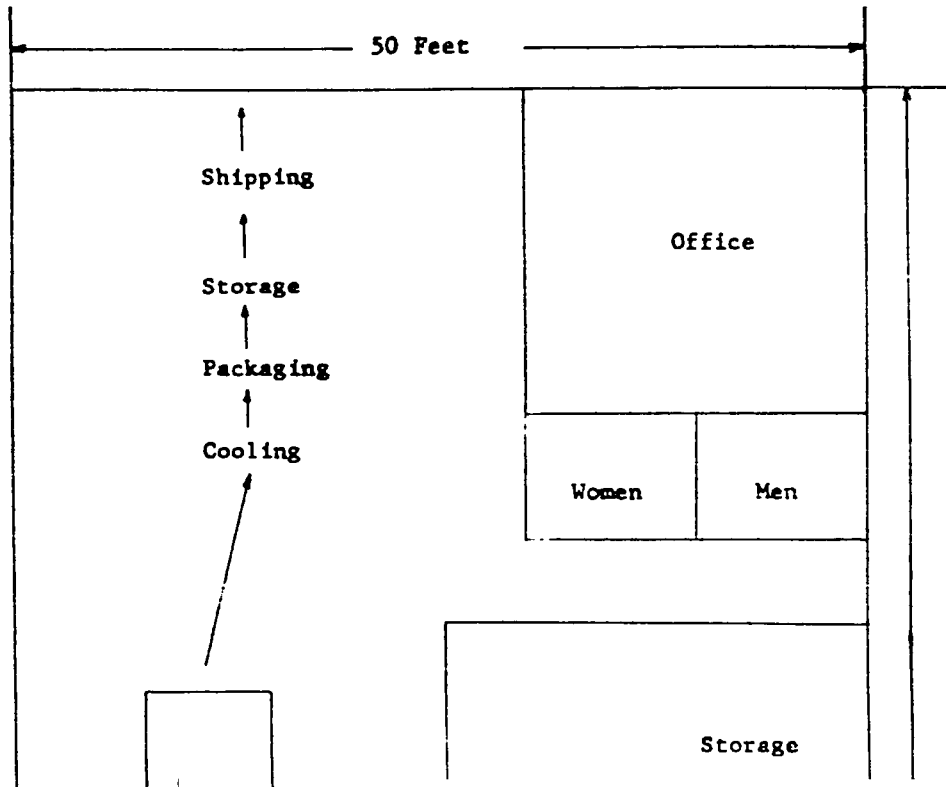
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$201,000
Direct Labor	81,000
Manufacturing Overhead(a)	33,600
Admin. Costs(b), Contingencies	11,000
Sales Costs(c), Bad Debts	16,000
Depreciation on Fixed Capital	6,400
Total	\$349,000
b. Annual Sales Revenue	\$400,000

NOTES. (a) Includes Supplies, Electric Power, Fuel, Water, Transportation, Indirect Labor.

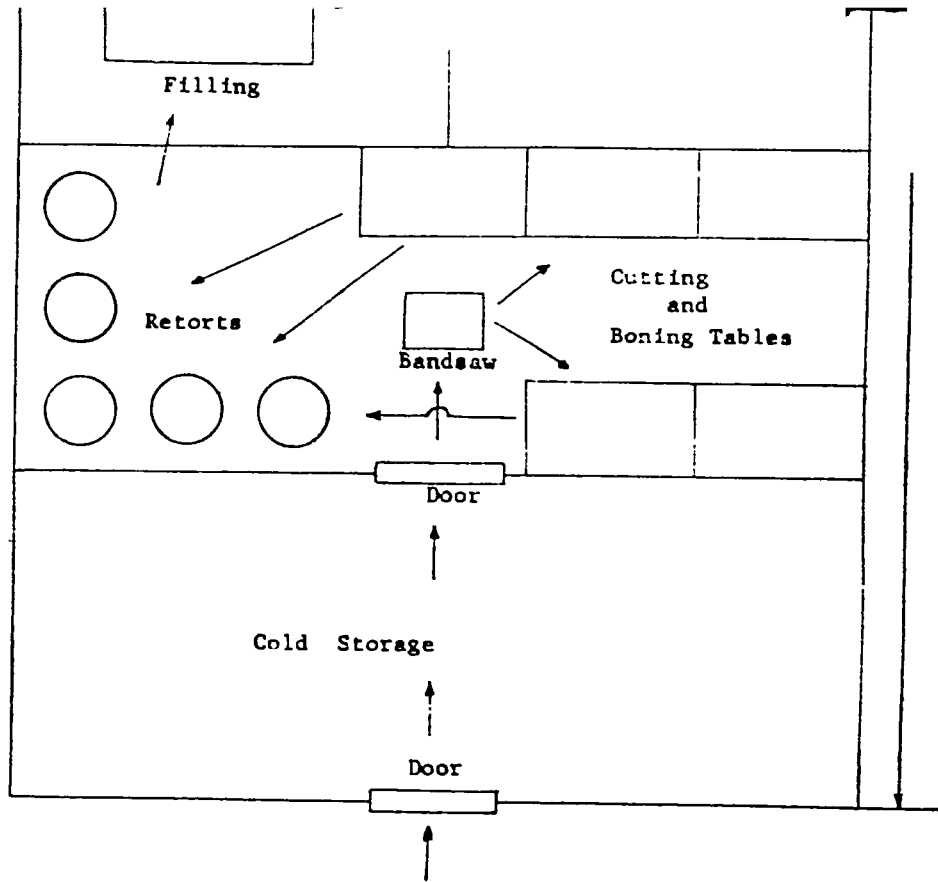
(b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PLANT LAYOUT AND WORKFLOW



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CANNED 1



I. C. 2013

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CANNED BEEF: S.I.C. 2013

SELECTED REFERENCES

I. TEXTBOOKS

- A. Science of Meat and Meat Products. American Meat Institute Foundation. 1960. 435 p. Illus. \$9.60.
W. H. Freeman and Company
660 Market Street
San Francisco, Calif. 94104
Scientific data on meat and meat products including section on meat canning.
- B. Chemical Analysis of Food and Food Products. M. B. Jacobs, editor. 1958. \$18.00.
D. Van Nostrand Co. Inc.
Princeton, New Jersey 08540
- C. Handbook of Food and Agriculture. F. C. Blanck, editor. 1955. 1,048 p. Illus. \$15.00.
Reinhold Publishing Company
430 Park Avenue
New York, N. Y. 10022
Has material on effect of canning on the nutritive values of foods, including meat.
- D. Meat and Meat Foods. L. B. Jensen. 1949. 218 p. Illus. \$5.00.
Ronald Press Company
15 East 26th Street
New York, N. Y. 10010
The rise of applied science in the preservation of meat, including the processing and care of canned meats.

II. U. S. GOVERNMENT PUBLICATION

- A. United States Inspected Meat Processing Plants. 1961. Gratis.
U. S. Department of Agriculture
Washington, D. C. 20250
Covers meat canning installations and products.

III. PERIODICALS

- A. Food Engineering. Monthly. \$20.00/year.
McGraw-Hill Publishing Company
330 West 42nd Street
New York, N. Y. 10036
Processing and marketing news of food products.
- B. The National Provisioner. Weekly. \$6.00/year.
The National Provisioner, Inc.
15 West Huron Street
Chicago, Ill. 60610
Production and marketing information for the meat industry.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231 \$0.25 each.

- A. Patent No. 2,940,862. 1960. 3 p.
Method of preparing meat for canning.
- B. Patent No. 2,912,337. 1959. 2 p.
Method of processing meat product for canning.
- C. Patent No. 2,822,276. 1958. 2 p.
Process for improving texture of meat being canned.

V. TRADE ASSOCIATION

- A. National Meat Canners Association
727 National Press Building
Washington, D. C. 20004

VI. ENGINEERING COMPANIES

- A. Capital Engineering and Manufacturing Corp.
5839 South Ashland Avenue
Chicago, Ill. 60636
Food processing equipment and related engineering services.
- B. Baker Engineering Company
1006 East 5th Street
Muscatine, Iowa 52761
Canning equipment, design, and engineering.

VII. DIRECTORY

- A. Canner/Packer Yearbook Number. Annual. \$1.00.
Triad Publishing Company
59 East Monroe Street
Chicago, Ill. 60603
Data on food equipment and supplies, food industry trade associations,
and on packers of canned and dry foods.

CANNED BEEF : S.I.C. 2013

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PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

CANNED TUNA FISH

I. P. No. 66232

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CANNED TUNA FISH: Standard Industrial Classification 2031

A. PRODUCT DESCRIPTION

Tuna fish in cans Nos. 1/4 (3-3/16 inches in height, 2-12/16 inches diameter), 1/2 (3-7/16 inches in height, 1-13/16 inches diameter), and 4(2-10/16 inches in height, 2-11/16 inches diameter), in solid, chunk or flake packs.

B. GENERAL EVALUATION

This plant requires a very large capital. Skilled labor needs are comparatively modest, but good management is necessary to keep down costs in this competitive industry. The canned tuna industry is highly organized, and a new venture would need to be favorably located for obtaining adequate and regular supplies of fish and for marketing its output, to stand a chance in competition with established producers with their well-organized sales networks.

C. MARKET ASPECTS

1. USERS. Households, eating establishments.
2. SALES CHANNELS AND METHODS. Sales would be made to wholesale distributors, export houses, and possibly to large chain stores. A distinctive and attractive brand name and active salesmanship are necessary.
3. GEOGRAPHICAL EXTENT OF MARKET. The product is easily transported and is often shipped very long distances, both in domestic markets and to foreign countries.
4. COMPETITION. Competition from established and well-known producers is likely to be keen, both in domestic and foreign markets. This enterprise would in most cases be obliged to compete in international trade in order to dispose of its production.
5. MARKET NEEDED FOR PLANT DESCRIBED. Where canned tuna is a customary part of the diet, this plant could supply the needs of around ten million people.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION, 200 DAYS A YEAR : 22,000 Tons of Fresh Fish

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 5 acres.	\$ --
Building. One story, 80,000 sq. ft.	500,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$450,000
Other tools & equipmt.	5,500
Furniture & fixtures	1,500
Transportation equipmt.	5,000
Total (excl. Land)	<u>\$962,000</u>

Principal Items. Conveyors, trays & racks, steam cookers, can fillers, can closers, retorts, coolers, filled can washer, labelers, unscramblers, packer & case sealer, fork lift trucks, cleaning tables, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$1,444,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	25,000
Training Costs		29,000
Total		<u>\$1,498,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$2,460,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Tuna fish	22,000 tons	\$5,500,000
Soybean oil	2,270 tons	770,000
Salt	252 tons	10,000
Cans, labels & cartons		1,500,000
Total		<u>\$7,780,000</u>

b. Supplies

Hand tools	\$ 2,400
Maintenance & spare parts	30,000
Office supplies	600
Total	<u>\$ 33,000</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 500 hp.	<u>\$ 3,000</u>
b. Fuel. About 150,000 gals. oil annually.	<u>\$ 18,000</u>
c. Water. For production, sanitation & fire protection.	<u>\$ 1,000</u>

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Pickup truck for general purposes.	<u>\$ 1,000</u>
b. External Transport Facilities. Dock facilities for tuna ships, railroada spur, & reasonably good highway necessary.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	20	\$ 80,000
Semi-skilled	40	120,000
Unskilled	200	500,000
Total	<u>260</u>	<u>\$700,000</u>
b. Indirect Labor		
Manager & supervisors	5	\$ 45,000
Office & inspectors	12	40,000
Maintenance men & driver	12	40,000
Total	<u>29</u>	<u>\$125,000</u>

c. Training Needs. Manager, supervisors & inspectors should be experienced. They should be able to do all necessary labor training & reach full production in about 2 weeks.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$7,780,000
Direct Labor	700,000
Manufacturing Overhead(a)	181,000
Admin. Costs(b), Contingencies	200,000
Sales Costs(c), Bad Debts	120,000
Depreciation on Fixed Capital	72,500
Total Annual Costs	<u>\$9,053,500</u>
b. Annual Sales Revenue	<u>\$10,000,000</u>

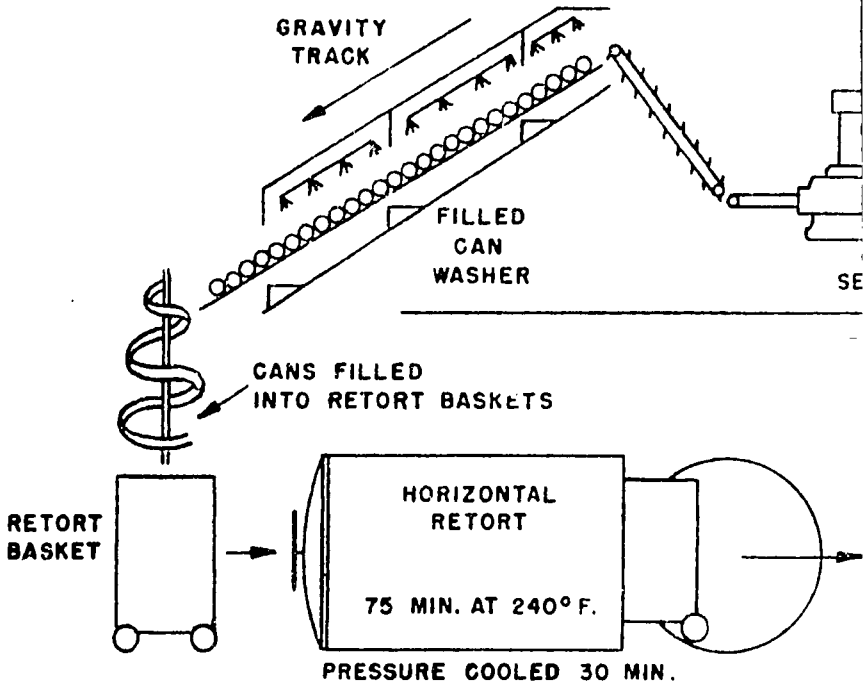
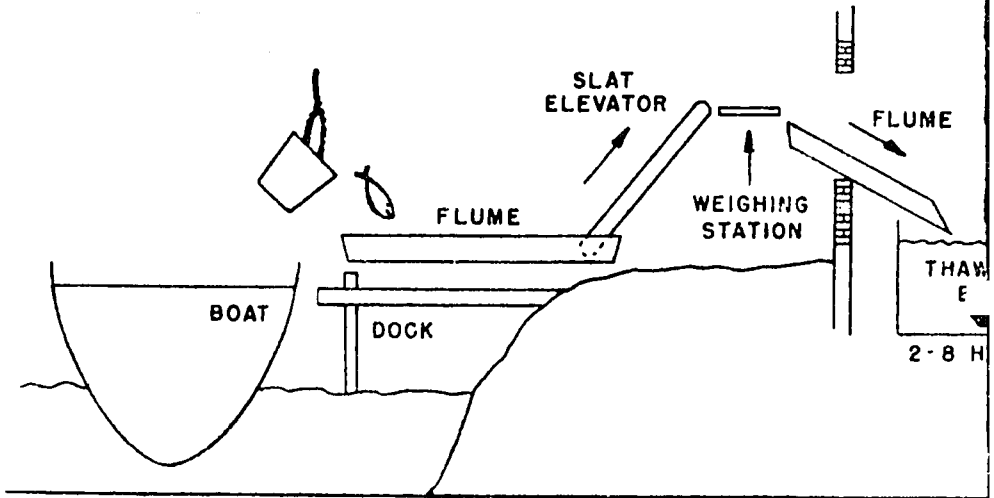
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

CANNED TUNA FISH: S.I.C. 2031

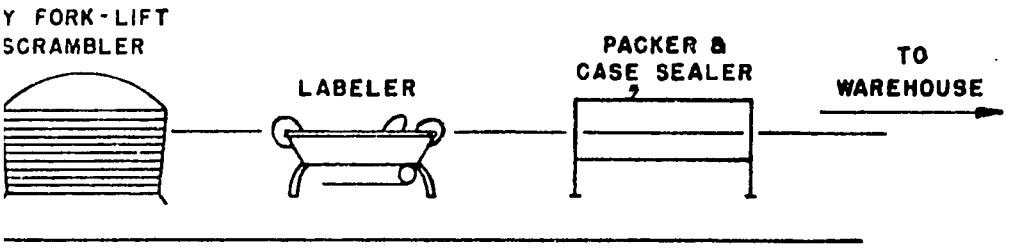
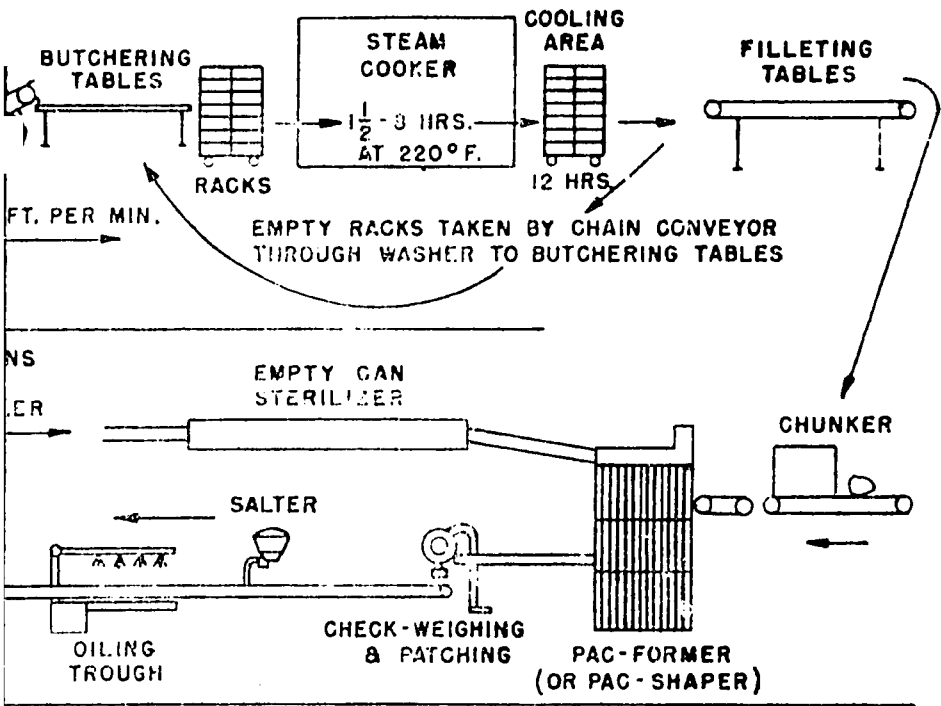
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CANNED TUNA

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CANNED TUNA FISH: S.I.C. 2031

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I. TEXTBOOKS

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Goods Packaging
121 Second Street
San Francisco, Calif. 94105
- B. Chemical Analysis of Food and Food Products. M. B. Jacobs. 1958.
\$18.00.
D. Van Nostrand Co., Inc.
Princeton, N. J. 08540
- C. Marine Products of Commerce. D. K. Tressler. 2nd ed. 1951. 800 pp.
Reinhold Publishing Corporation
30 Park Avenue
New York, N. Y. 10022

II. U. S. GOVERNMENT PUBLICATIONS

- A. The Processing of Shrimp. E-185. Gratis.
Agency for International Development
Washington, D. C. 20523
- B. Canning of Fish. E-248. Gratis.
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Washington, D. C. 20523
- C. Commercial Fisheries Review. Monthly.
Fish & Wildlife Service
Department of the Interior
Washington, D. C. 20240
- D. Principles & Methods in the Canning of Fishery Products. N. Jarvis.
Research Report 7. 1943.
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Department of the Interior
Washington, D. C. 20240
- E. List of Fishery Associations in the U. S. & Alaska. Gratis
Fish & Wildlife Service
Department of the Interior
Washington, D. C. 20240

SELECTED REFERENCES (Continued)

III. PERIODICALS

- A. Pacific Fisherman. Monthly, \$3.00/year.
(Also prints Pacific Fisherman International for circulation outside U.S.A.).
Miller Freeman Publications
71 Columbia Street
Seattle, Washington, 98104
- B. National Fisherman. Monthly. \$4.00/year.
National Fisherman
Goffstown, New Hampshire 03045

IV. U. S. PATENTS

Available U. S. Patent Office
Washington, D. C. 20231

- A. Patents concerning processing & processing improvement:

Patent No. 2,937,096.	2,870,075.
2,680,076.	2,644,757.
2,602,030.	2,555,236.
2,544,625.	2,493,586.
- B. Patents concerning machinery & equipment designed especially for the tuna canning industry:

Patent No. 2,926,985.	2,669,378.
2,630,390.	2,627,345.
2,601,093.	

V. TRADE ASSOCIATIONS

- A. National Fisheries Institute, Inc.
1614 20th Street, N. W.
Washington, D. C. 20009
- B. California Fish Cannery Association
Ferry Building
Terminal Island, Calif. 90731
- C. Columbia River Salmon and Tuna Packers Association
P. O. Box 60
Astoria, Oregon 97103

VI. ENGINEERING COMPANIES

- A. National Five Point, Inc.
305 West Romneya Drive
Anaheim, Calif. 92801
Consulting engineers, designers, and builders of equipment for major tuna canners.
- B. E. H. Carruthers Company
Warrenton Oregon 97146
Engineers,,designers and leasers of specialized equipment.

CANNED TUNA FISH: S.I.C. 2031

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INDUSTRY PROFILES

CARBIDE

I. P. No. 66233

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CARBIDE: Standard Industrial Classification 2819

A. PRODUCT DESCRIPTION

Commercial grade calcium carbide.

B. GENERAL EVALUATION

Capital requirements for this plant are moderately high. Manufacturing operations are fairly simple. The market for a plant of this size and kind would be predominantly local, and it would be necessary to have a fairly large complex of user industries and construction activity in the vicinity. Where industrial development is taking place, demand for carbide increases, and in general the prospects for this industry should be reasonably good.

C. MARKET ASPECTS

1. USERS. Industrial plants for cutting and welding metals, construction firms, manufacturers of oxygen.
2. SALES CHANNELS AND METHODS. Sales would be made chiefly to the users.
3. GEOGRAPHICAL EXTENT OF MARKET. This product is fairly easy to ship but transport costs are rather onerous in relation to the product value and tend to limit the market area. Since, however, this is an indispensable product for some operations, it may be shipped long distances.
4. COMPETITION. Competition would come only from other producers. If raw materials are available cheaply from local sources, it should not be difficult to meet import competition.
5. MARKET NEEDED FOR PLANT DESCRIBED. The market would be predominantly local and it would be necessary to have easy access to a complex of user industries and construction enterprises.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 1,200 Tons

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	<u>Cost</u>	
<u>Land.</u> About 1 acre.	\$	--
<u>Buildings.</u> One story, 80'x100',		50,000
<u>Equipment, Furniture & Fixtures.</u>		
<u>Prodn. tools & equipmt.</u>	\$	150,000
<u>Other tools & equipmt.</u>		9,300
<u>Furniture & fixtures</u>		700
<u>Total (excl. Land)</u>		<u>\$210,000</u>

Principal Items. Carbide furnaces, cast iron molds, crusher, screen, electric equipment.

b. WORKING CAPITAL

	<u>No. of Days</u>	
<u>Direct Materials, Direct Labor, Mfg. Overhead(a)</u>	60	\$ 20,500
<u>Admin. Costs(b), Contingencies, Sales Costs(c)</u>	30	2,500
<u>Training Costs</u>		2,000
<u>Total Working Capital</u>		<u>\$ 25,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$235,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
<u>Lime</u>	1,400 tons	\$ 9,200
<u>Charcoal</u>	900 tons	11,000
<u>Packaging materials</u>		4,800
<u>Total</u>		<u>\$ 25,000</u>

b. Supplies

<u>Lubricants & hand tools</u>	\$	100
<u>Cutting tools & abrasives</u>		200
<u>Maintenance & spare parts</u>		1,500
<u>Office supplies</u>		200
<u>Total</u>		<u>\$ 2,000</u>

3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> 480 hp. connected load.	\$ 30,200
b. <u>Fuel.</u> For heating, if necessary.	\$ 600
c. <u>Water.</u> For sanitation & fire protection.	\$ 100

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments about 8 tons a day. Good highways necessary, & railroad facilities desirable

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
<u>Skilled</u>	2	\$ 13,000
<u>Semi-skilled</u>	3	17,000
<u>Unskilled</u>	3	11,000
<u>Total</u>	<u>8</u>	<u>\$ 41,000</u>
b. <u>Indirect Labor</u>		
<u>Manager</u>	1	\$ 12,000
<u>Office</u>	1	5,500
<u>Maintenance</u>	1	6,500
<u>Total</u>	<u>3</u>	<u>\$ 24,000</u>

- c. Training Needs. Manager must be fully experienced. With 2 skilled workers, he should be able to train other workers & reach full production in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

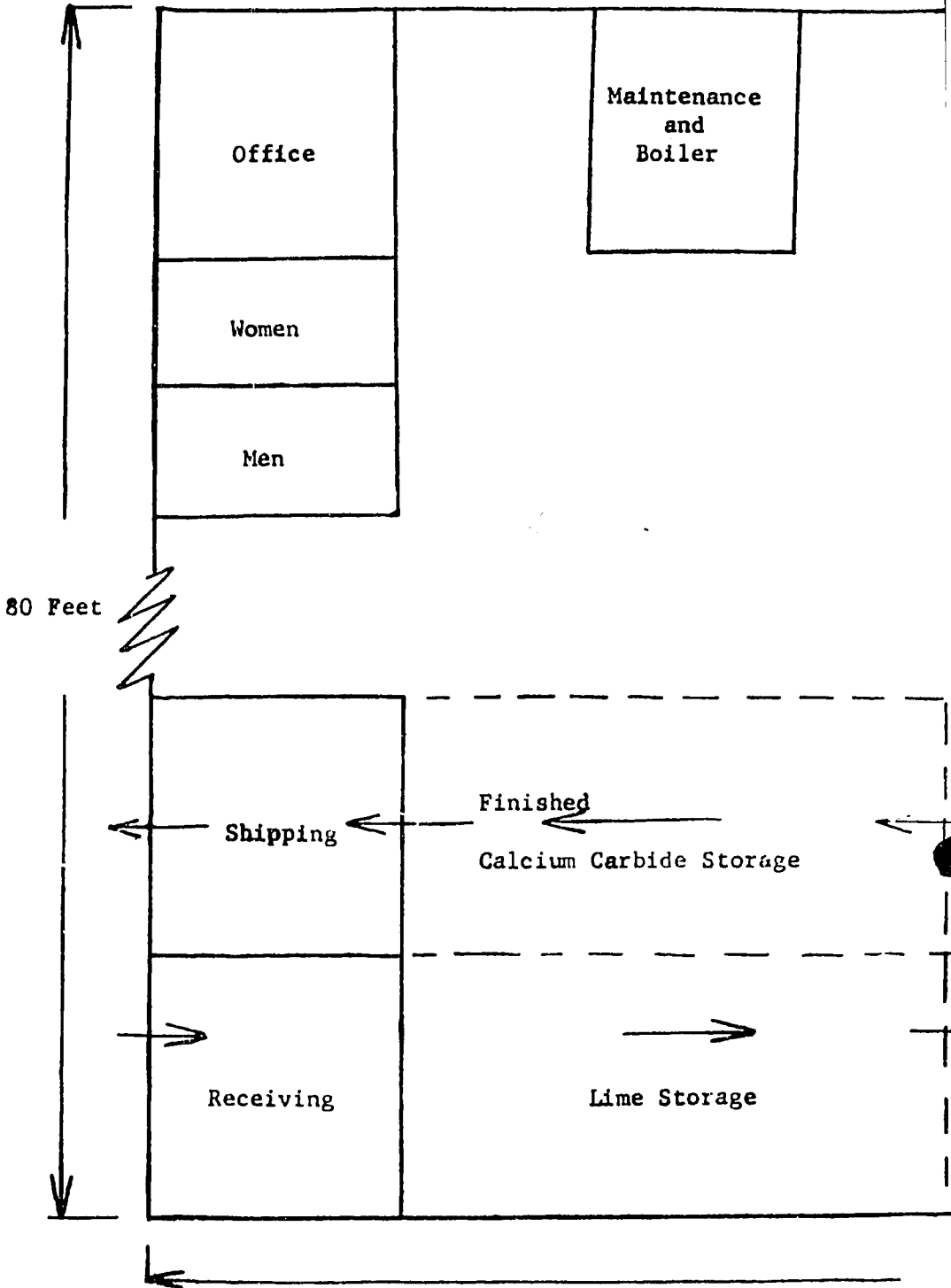
a. <u>Annual Costs</u>	
<u>Direct Materials</u>	\$ 25,000
<u>Direct Labor</u>	41,000
<u>Manufacturing Overhead (a)</u>	56,900
<u>Admin. Costs(b), Contingencies</u>	16,000
<u>Sales Costs(c), Bad Debts</u>	17,000
<u>Depreciation on Fixed Capital</u>	19,400
<u>Total</u>	<u>\$4,175,300</u>
b. <u>Annual Sales Revenue</u>	<u>\$ 240,000</u>

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

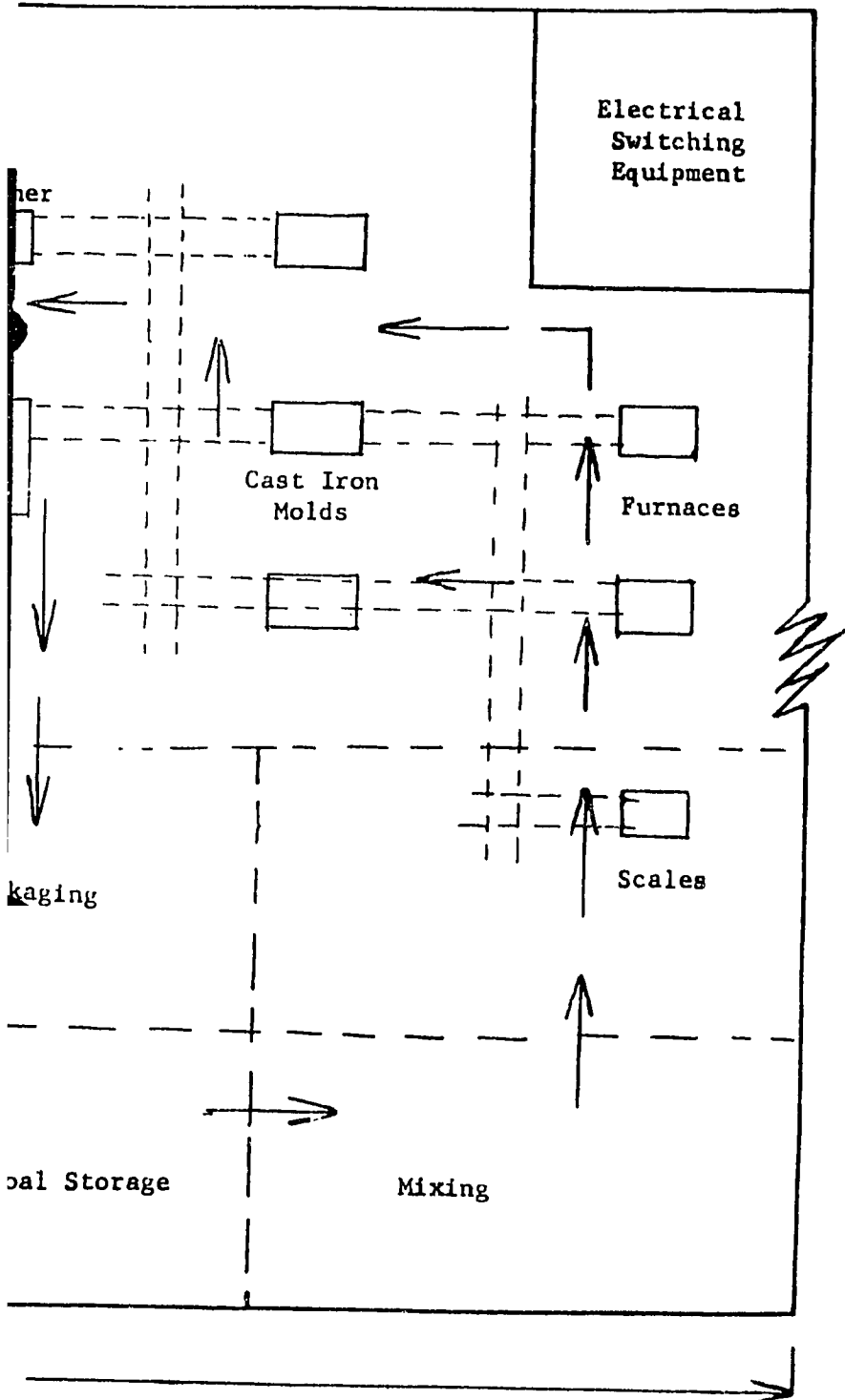
CARBIDE: S.I.C. 2819

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CARBIDE : S
PLANT LAYOUT AN



LOW



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- A. Chemical Engineering. Paul P. De Rienzo. 1964. \$7.00.
Macmillan Company
60 Fifth Avenue
New York, N. Y. 10011
- B. Electrochemical Engineering. C. L. Mantell. 4th edition. 1960.
680 p. \$17.50.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- C. Plant Design and Economics for Chemical Engineers. M. S. Peters.
1958. 511 p. Illus. \$12.00.
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

- A. Lime (including calcium). 1956. Catalog No. I 28.3/b:L629. \$.10.
Superintendent of Documents
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Washington, D. C. 20402
- B. Manufacture of Calcium Carbide and Production of Drums for its Storage
and Transport. IR 24642-3. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Chemical Engineering. Bi-weekly. \$3.00/year. (U.S.)
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
- B. Industrial and Engineering Chemistry. Monthly. \$5.00/year. (U.S.)
American Chemical Society
1155 16th Street, N. W.
Washington, D. C. 20005

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IV. U. S. PATENTS

Available U. S. Patent Office

Washington, D. C. 20231 \$.25 each.

- A. Patent No. 2,962,388. 1960. 12 p.
Process for the production of carbide coatings.
- B. Patent No. 2,942,951. 1960. 1 p.
Method for the production of calcium, aluminum, and other carbides.
- C. Patent No. 2,886,454. 1959. 3 p.
Process for the manufacture of carbide.
- D. Patent No. 2,886,411. 1959. 2 p.
Manufacturing calcium carbide.

V. TRADE ASSOCIATIONS

- A. American Institute of Chemical Engineers
345 East 47th Street
New York, N. Y. 10017
- B. American Chemical Society
1155 16th Street, N. W.
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. Davidson-Kennedy Associates Company
2623 Chicago Road
Chicago Heights, Ill. 60414
Chemical engineering, design, contracting.
- B. Foster D. Snell, Inc.
29 West 15th Street
New York, N. Y. 10011
Chemical designing, chemical research, physical testing.

VII. DIRECTORY

- A. Library Guide for the Chemist. Byron A. Soule. \$5.75.
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

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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

SULFURIC ACID

I. P. No. 66234

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.

SULFURIC ACID: S.I.C. 2819

A. PRODUCT DESCRIPTION



B. GENERAL EVALUATION

This industry requires a substantial amount of capital and relatively high managerial and labor skills. Its economic feasibility will depend entirely on the extent to which user industries have been established in the potential market area.

C. MARKET ASPECTS

1. USERS. Many industries, including chemicals, petroleum, coal products, iron and steel, paints and pigments, rayon and cellulose film.
2. SALES CHANNELS AND METHODS. Sales are normally made direct to industry users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Normally plants will be established close to industrial complexes containing a group of user industries. However, the product is sometimes transported over long distances. b. Export. Since countries that have a large demand for sulfuric acid, i.e., are highly industrialized, will certainly have their own sulfuric acid plants, and since the product is relatively difficult and expensive to transport, the amount going into foreign trade in this form is small.
4. COMPETITION. a. Domestic Market. Competition from imports is unlikely to be important. b. Export Market. Shipments to nearby foreign areas might be possible in some cases, but it is unlikely that any large volume of exports could be developed.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend entirely on the extent to which user industries have been developed in the locality concerned.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 15,000 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	<u>Cost</u>
Land. About 1 acre.	\$ ---
Building. One story, 100'x200'.	100,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$330,000
Other tools & equipmt.	18,000
Furniture & fixtures	1,000
Total (excl. Land)	<u>\$349,000</u>
Total	\$449,000

Principal Items. Unloading conveyor, melter, filter, burner, gas filter, converter, 2 boilers, economizer, absorber, blower, drier, cooler, pumps, storage tank, laboratory.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 38,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,700
Training Costs		7,700
Total		\$ 48,000

c. TOTAL CAPITAL (EXCL. LAND) **\$497,000**

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Sulfur	5,300 tons	\$125,000

b. Supplies

Lubricants & hand tools	100
Laboratory supplies	200
Maintenance	1,000
Office supplies	300
Total	\$ 1,600

3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 20 hp.	<u>\$ 2,000</u>
b. <u>Fuel.</u> About 20,000 gals. fuel oil annually.	<u>\$ 2,400</u>
c. <u>Water.</u> About 2.8 million gals. annually for production & general purposes.	<u>\$ 700</u>

4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 1,500 tons a month. Special containers, tank trucks & tank railroad cars are required for shipment of sulfuric acid. Plant must be located on rail siding & on good highway.

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	6	\$ 36,000
Semi-skilled	6	30,000
Unskilled	3	12,000
Total	<u>15</u>	<u>\$ 78,000</u>
b. <u>Indirect Labor</u>		
Manager-bookkeeper	1	\$ 12,000
Chemical engineer	1	10,000
Total	<u>2</u>	<u>\$ 22,000</u>

- c. Training Needs. Manager & chemical engineer must be fully experienced. With aid of 3 skilled workers, they should be able to do all labor training. Plant should reach full production in 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

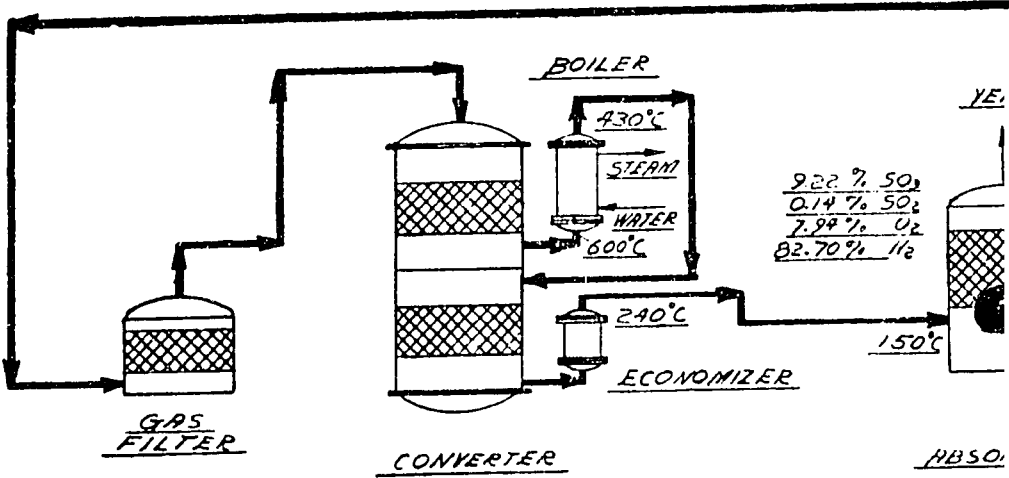
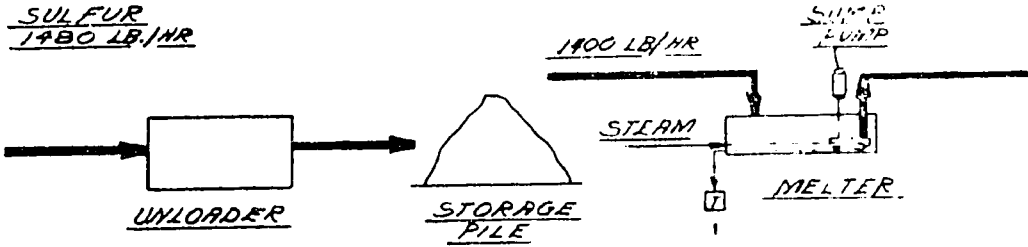
a. <u>Annual Costs</u>	
Direct Materials	\$125,000
Direct Labor	78,000
Manufacturing Overhead(a)	28,700
Admin. Costs(b), Contingencies	11,000
Sales Costs(c), Discts., Bad Debts	10,000
Depreciation on Fixed Capital	42,600
Total	<u>\$295,300</u>
b. <u>Annual Sales Revenue</u>	<u>\$365,000</u>

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

SULFURIC ACID : S.I.C. 2819

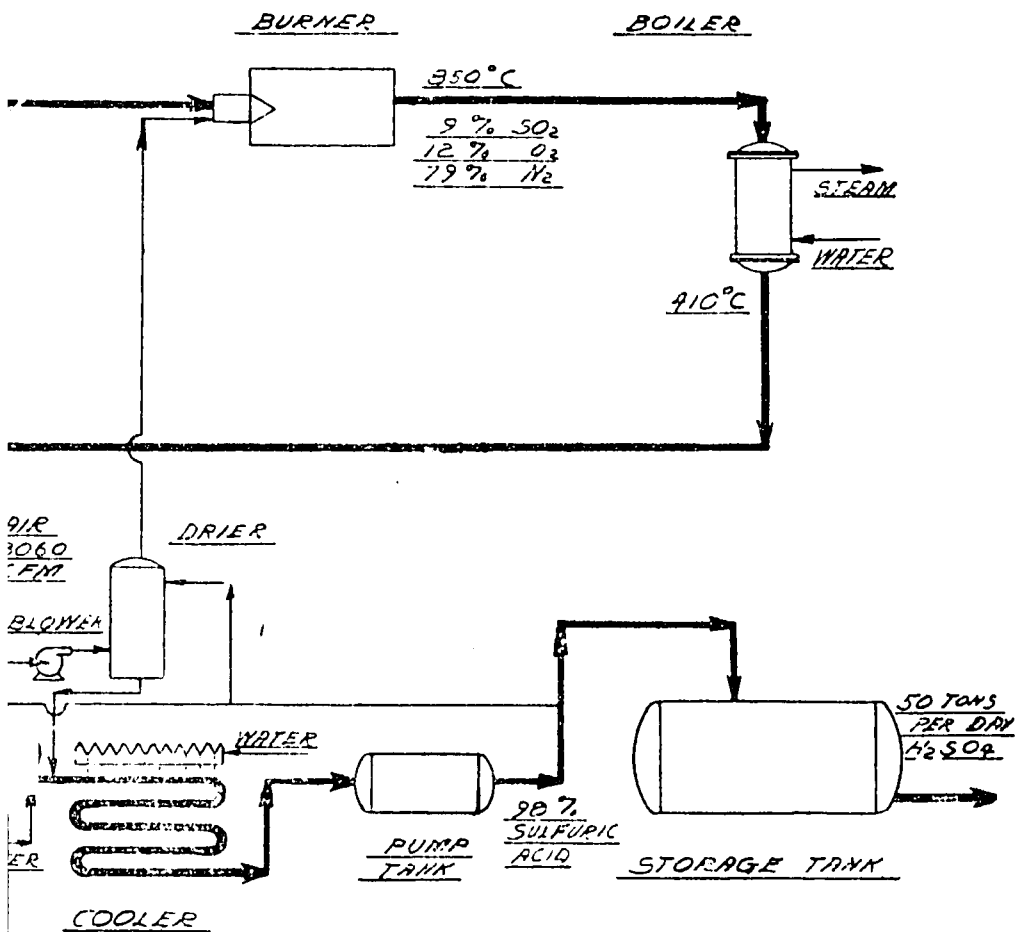
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LDING 100' x 200'

SULFURIC ACID: S.I.C. 2819

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- A. Sulfuric Acid: Use and Handling. O. Fasullo. 1964.
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New York, N. Y. 10036
- B. The Manufacture of Sulfuric Acid. W. W. Duecker and J. R. West. 1959.
475 p. \$15.00.
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430 Park Avenue
New York, N. Y. 10022
- C. Organic Chemistry. L. J. Desha. 1952. 565 p. Illus. \$8.50.
McGraw-Hill Book Company, Inc.
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New York, N. Y. 10036
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- A. Utilization of Spent Sulfuric Acid. IR-23051. Gratis.
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Washington, D. C. 20523
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Washington, D. C. 20523

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- B. Chemical Processing. Monthly. \$35.00/year.
Putman Publishing Company
111 East Delaware Place
Chicago, Ill. 60611

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Washington, D. C. 20231 \$.25 each.

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- B. Patent No. 2,819,947. 1958. 2 p.
Process for the production of sulfuric acid.
- C. Patent No. 2,809,095. 1957. 4 p.
Production of sulfuric acid.
- D. Patent No. 2,793,935. 1957. 3 p.
Manufacture of sulfuric acid.

V. TRADE ASSOCIATION

- A. Sulphur Institute
1725 K Street, N. W.,
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. Brill Equipment Company
35 Jabez Street
Newark, New Jersey 07105
Provides complete chemical plants.
- B. Consolidated Products Company, Inc.
156 Observer Highway
Hoboken, New Jersey 07030
Chemical processing equipment, complete plant installations.

VII. DIRECTORY

- A. Chemical Engineering Catalog. Annual.
Reinhold Publishing Company
430 Park Avenue
New York, N. Y. 10022
Lists firms engaged in the manufacturing, processing and supply of chemical engineering products and services.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

COMPRESSORS, 1/4 HORSEPOWER SEALED UNIT

I. P. No. 66235

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.

COMPRESSORS, 1/4 HORSEPOWER SEALED UNIT: Standard Industrial
Classification 5063

A. PRODUCT DESCRIPTION

Sealed motor compressor units of 1/4 horsepower, for air conditioners and 10 to 12 cubic feet refrigerators.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderately high. The economic feasibility of the operation would depend almost entirely on the plant's being associated with local manufacture of air conditioners and refrigerators. In fact it might in some cases be feasible to establish it as an integral part of such manufacture. (See Industry Profile I. P. 66201, Air Conditioners and Refrigerators: S. I. C. 3585/3632).

C. MARKET ASPECTS

1. USERS. Manufacturers and repairers of air conditioners and refrigerators.
2. SALES CHANNELS AND METHODS. Sales would be made direct to users.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are comparatively easy to ship, and freight costs are normally low in relation to product value. Although a small plant would normally locate as close as possible to user industries, these products may be shipped long distances, both domestically and internationally.
4. COMPETITION. Competition from imports made by large-scale producers in advanced industrial areas may be keen. A plant of this size would have little chance of doing any export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. It would be essential for a plant of this kind to be closely associated with local manufacturers of air conditioners and refrigerators with a production volume large enough to absorb the major part of its output.

D. PRODUCTION REQUIREMENTS

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

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	<u>Cost</u>
Land. About 1 acre.	\$ --
Building. One story, 80'x100'	48,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$80,000	
Other tools & equipmt. 5,500	
Furniture & fixtures 1,000	
Transportation equipmt. 2,500	89,000
Total (excl. Land)	<u>\$137,000</u>

Principal Items. 100-ton drawing press ;
10-ton press ; dies ; square shears ; welding
equipment ; boring machine ; drill press, floor ;
2 drill presses, bench ; engine lathe ; 2 bench
lathes ; surface grinder ; 2 bench grinders ;
crankshaft grinder ; 2 milling machines ;
honing machine ; coil winder ; air compressor ;
electric oven 3 KVA ; high vacuum pump ; in-
spection equipment ; spray booth ; benches,
bins, tables ; factory truck ; delivery truck.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct		
Labor, Mfg. Overhead(a)	60	\$ 55,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,300
Training Costs		5,900
Total Working Capital		<u>\$ 64,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$201,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	<u>Annual Requirements</u>	<u>Annual Cost</u>
Sheet metal	100 tons	\$ 16,000
Castings	120 tons	43,000
Crankshaft forgings	12,000 units	30,000
Pistons & pins	12,000 units	10,000
Silicon steel sheets	42 tons	8,000
Copper magnet wire	18 tons	24,000
Lead wire & terminals	36,000 units	400
Aluminum	3,000 lbs.	800
Slot paper	384,000 units	500
Copper tubing, 1/4"	48,000 ft.	5,000
Enamel		800
Springs, gaskets, neoprene seals, fiber blocks & washers, bolts & nuts		3,500
Packaging materials		3,000
Total		<u>\$145,000</u>
b. Supplies		
Lubricants & hand tools		\$ 300
Cutting tools abrasives & welding		1,000
Maintenance & spare parts		2,500
Office supplies		200
Total		<u>\$ 4,000</u>

3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> 75 hp. Connected load.	<u>\$ 2,000</u>
b. <u>Fuel.</u> For heating, if necessary.	<u>\$ 400</u>
c. <u>Water.</u> For production, sanitation & fire protection	<u>\$ 200</u>

4. TRANSPORTATION

	<u>Annual Operating Cost</u>
a. <u>Own Transport Equipment.</u> 1-ton truck for general purposes.	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> No special requirements.	

5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	6	\$ 36,000
Semi-skilled	10	50,000
Unskilled	14	56,000
Total	<u>30</u>	<u>\$142,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 19,000
Office	2	10,000
Maintenance & driver	2	11,000
Total	<u>6</u>	<u>\$ 40,000</u>

d. Training Needs. Manager & supervisor & the 6 skilled workers should be able to train other workers in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

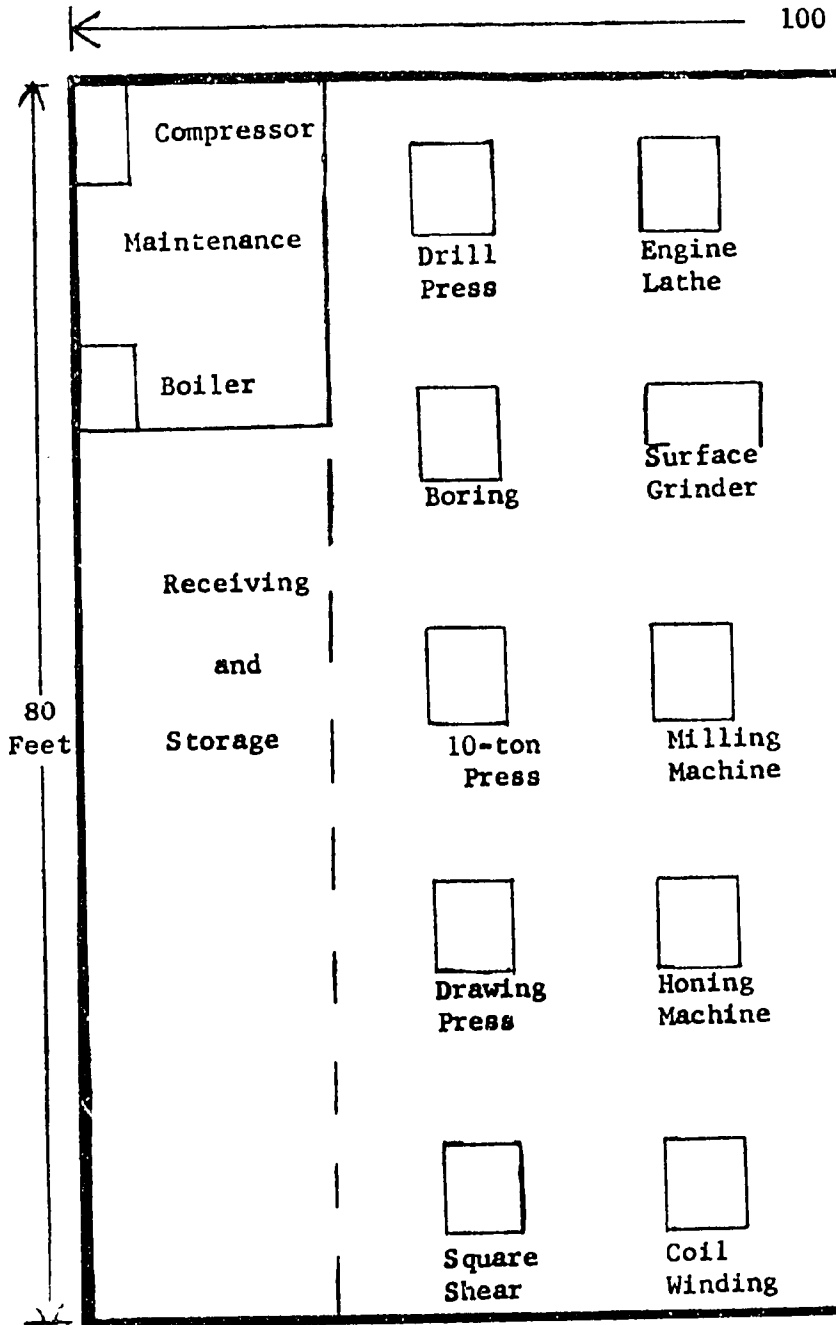
a. <u>Annual Costs</u>	
Direct Materials	\$145,000
Direct Labor	142,000
Manufacturing Overhead(a)	47,600
Admin. Costs (b), Contingencies	15,000
Sales Costs (c), Bad Debts	16,000
Depreciation on Fixed Capital	11,200
Total	<u>\$376,800</u>
b. <u>Annual Sales Revenue</u>	<u>\$450,000</u>

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

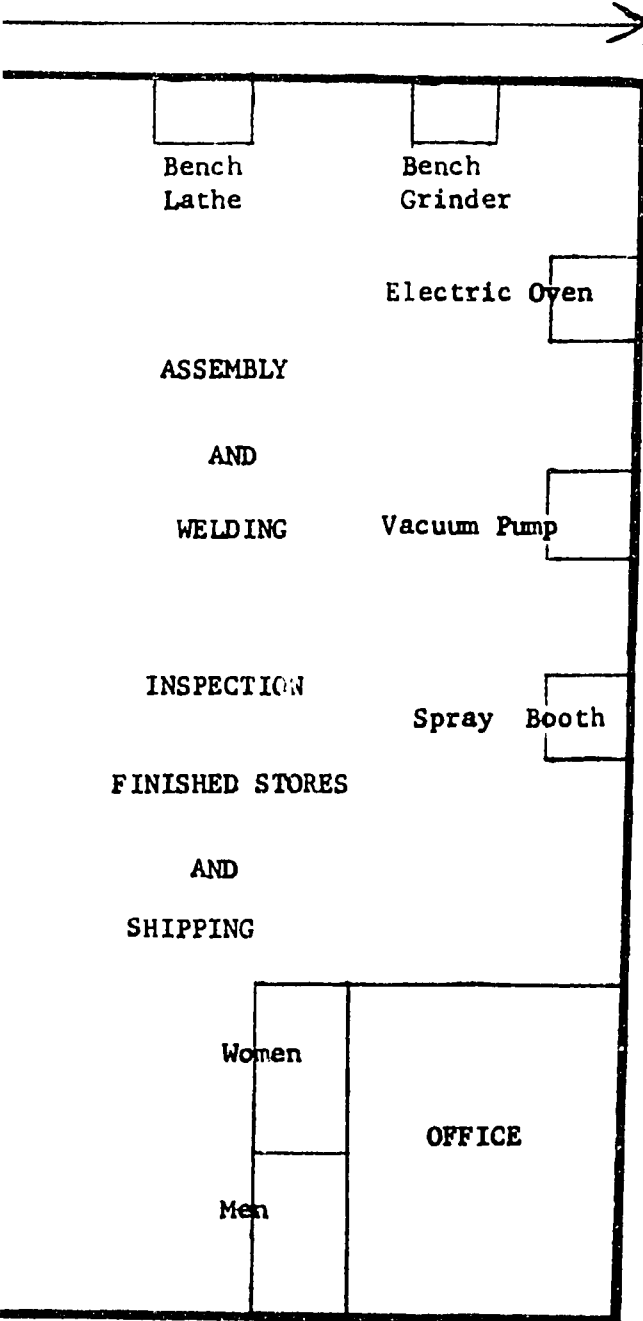
COMPRESSORS, 1/4 HORSEPOWER SEALED UNIT. S.I.C. 5063

COMPRESSORS, 1/4 HORSEPOWER

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COMPRESSORS, 1/4 HORSEPOWER SEALED UNIT: S.I.C. 5063

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44 Brannan Street
San Francisco, Calif. 94107
- C. Modern Refrigeration and Air Conditioning. Andrew D. Althouse and C. H. Turnquist. 1960. \$7.45.
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18250 Harwood
Homewood, Ill. 60430
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New York, N. Y. 10016

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Washington, D. C. 20523
- B. Air Conditioning. CTR 312.
United States Department of Commerce
Washington, D. C. 20230

III. PERIODICALS

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New York, N. Y. 10013
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The American Society of Refrigeration Engineers
234 Fifth Avenue
New York, N. Y. 10001

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IV. U. S. PATENTS

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

- A. Patent No. 3,018,638. 1962. 5 p.
Portable type sealed refrigeration unit.
- B. Patent No. 2,914,927. 1959. 5 p.
Separate sealed motor compressor combination.

V. TRADE ASSOCIATION

- A. Air Conditioning and Refrigeration Institute
1815 North Fort Myer Drive
Arlington, Va. 22209

VI. ENGINEERING COMPANIES

- A. E. R. D. Company, Inc.
235 Ringgold Street
Waynesboro, Pa. 17268
- B. Production Control Units, Inc.
2200 West Dorothy Lane
Dayton, Ohio 45439

VII. DIRECTORY

- A. Air Conditioning, Heating and Refrigeration Directory. Annual. \$1.00.
Business News Publish.. g Company
450 West Fort Street
Detroit, Michigan 48226
Lists suppliers of air conditioning, heating and refrigeration materials and equipment.

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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

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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

COTTON YARN

I. P. No. 66236

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.

COTTON YARN : Standard Industrial Classification 2281

A. PRODUCT DESCRIPTION

Cotton yarn for weaving.

B. GENERAL EVALUATION

This plant, though it has only 8,000 spindles and is therefore small by the standards of the cotton spinning industry, requires a fairly large capital. Good management is needed, though skilled labor requirements are relatively small. The production requirements listed in section D are based on the manufacture of half 30 count and half 40 count, i. e. medium yarns. In view of the competition from large-scale producers in an industry where the advantages of large-scale production are marked, a plant of this size is likely to be profitable only if raw material and labor costs are low.

C. MARKET ASPECTS

1. USERS. Cotton weaving establishments.
2. SALES CHANNELS AND METHODS. Sales are made to weavers or to wholesale distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. The products are easily shipped and transport costs are normally low in relation to product value. They are often shipped long distances both in domestic and international trade.
4. COMPETITION. Competition from imports from the major textile manufacturing countries is likely to be keen. There is growing competition from man-made fibres. A plant of this size would be very unlikely to do any export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Consumption of cotton goods varies widely not only because of variations in their use for clothing but also because of wide variations in household and industrial uses. In developing areas where cotton fabrics are the principal fabrics used for clothing, this plant could supply the yarn requirements of a population of the order of half a million.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION, 300 DAYS A YEAR : 1.56 Million Pounds

1. CAPITAL REQUIREMENTS

FIXED CAPITAL		
Land. About 1 acre.		\$ ---
Building. One story, 100'x200'.		120,000
Equipment, Furniture & Fixtures.		
Prod'n. tools & equipmt.	\$800,000	
Other tools & equipmt.	36,000	
Furniture & fixtures	1,000	837,000
Total (excl. Land)		\$957,000

Principal Items. Opening machinery, picking machinery, 48 carding machines, 24 drawing machines, roving machines, spinning frames, under frame cleaners, spooling machines, humidifiers, boiler.

2. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$127,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	5,000
Training Costs		18,500
Total Working Capital		\$151,000

3. TOTAL CAPITAL (EXCL. LAND) \$1,108,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
1. Direct Materials		
Cotton	1.8 million lbs.	\$550,000
Packaging material		5,000
Total		\$555,000

3. Supplies

Lubricants & hand tools	\$ 300
Maintenance & spare parts	6,000
Office supplies	300
Total	\$ 6,600

3 POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 80 hp.	\$ 7,000
b. Fuel. About 9,000 gals. oil annually.	\$ 1,100
c. Water. About 1 2 million gals. annually for general purposes.	\$ 300

4. TRANSPORTATION

- a. **Own Transport Equipment.** None necessary.
- b. **External Transport Facilities.** In & out shipments average about 175 tons a month. Reasonably good highways necessary.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	7	\$ 40,000
Semi-skilled	17	78,000
Unskilled	8	30,000
Total	32	\$148,000
b. Indirect Labor		
Manager & supervisors	3	\$ 28,000
Office	2	10,000
Other	2	9,000
Total!	7	\$ 47,000

- c. **Training Needs.** Manager & supervisors should be experienced. With aid of skilled workers, they should be able to do all necessary labor training & reach full production in about 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

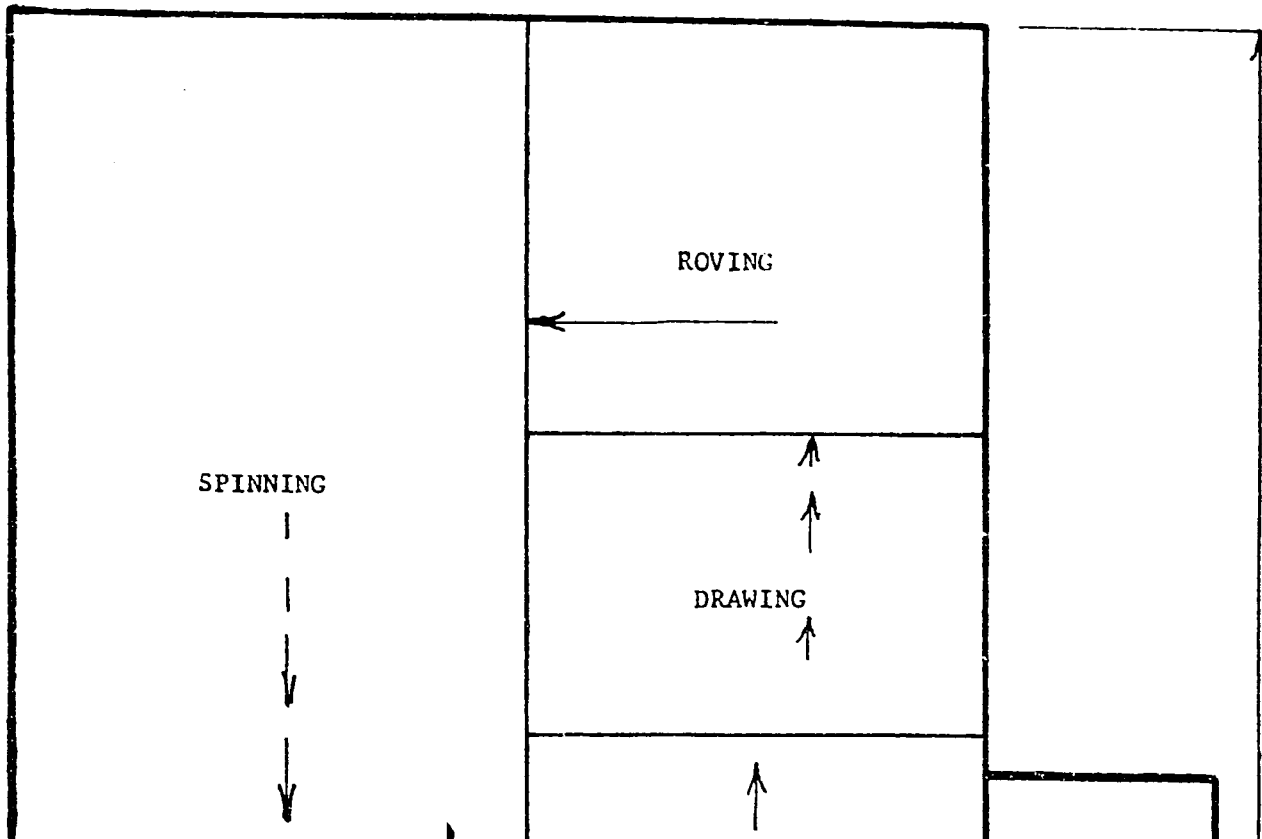
a. Annual Costs	
Direct Materials	\$555,000
Direct Labor	148,000
Manufacturing Overhead(a)	62,000
Admin. Costs(b), Contingencies	40,000
Sales Costs (c), Bad Debts	25,000
Depreciation on Fixed Capital	93,000
Total	\$923,000
b. Annual Sales Revenue	\$1,200,000

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

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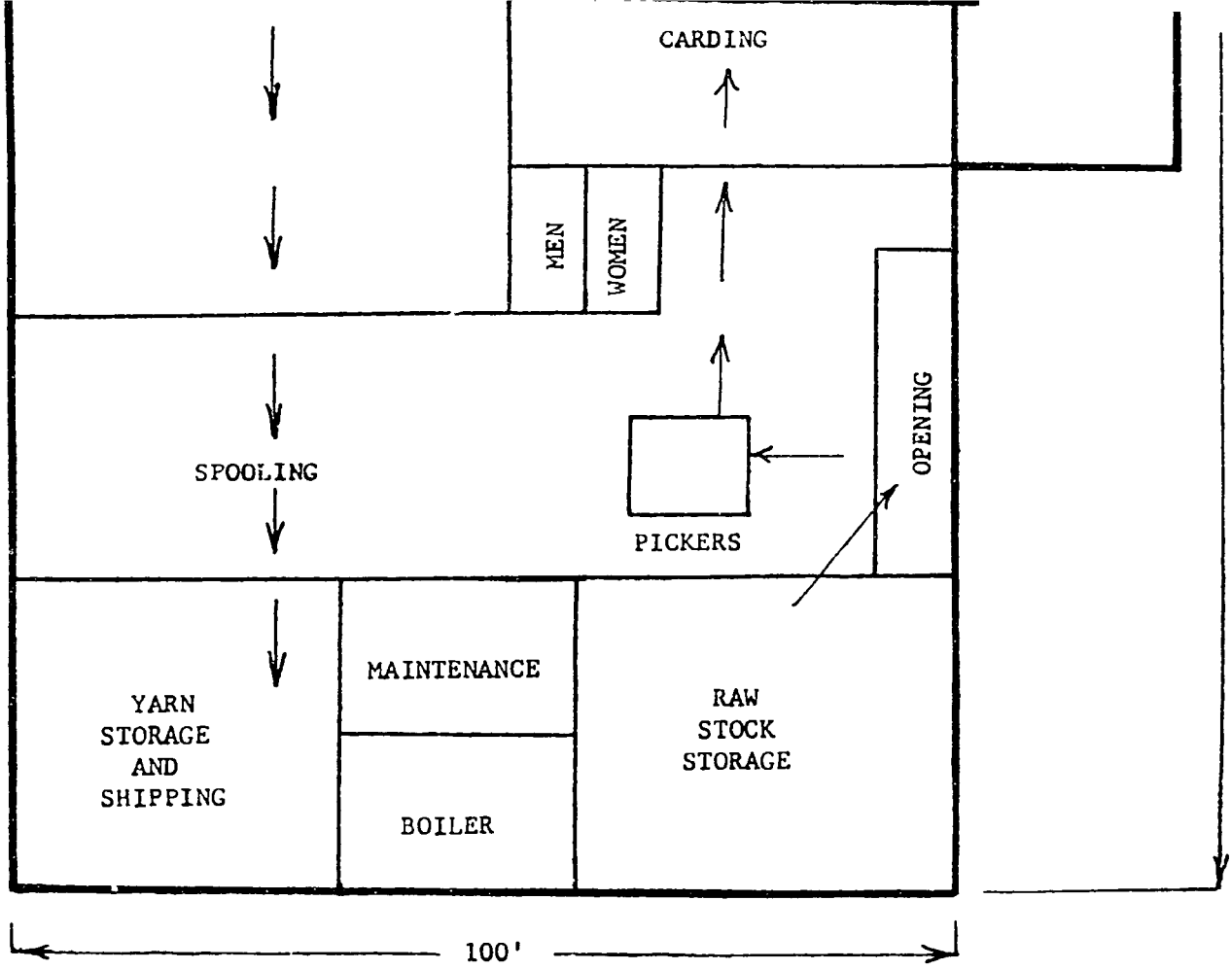
PLANT LAYOUT

ARROWS INDICATE FLOW OF WORK



COTTON Y

250



I. C. 2281

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COTTON YARN: S.I.C. 2281

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I. TEXTBOOKS

- A. Textile Fibres and Their Use. K. P. Hess. 6th ed. 1958. \$6.95.
J. B. Lippincott Company
East Washington Square, Philadelphia, Pa. 19105
Machinery, equipment, processing, cotton and other yarns.
- B. Cotton Drawing and Roving. G. R. Merrill. 1956. Illus. \$3.50.
Textile Book Service
257 Park Avenue, New York, N. Y. 10010
- C. Handbook of Textile Fibres. J. G. Cook. 1954. 356 pp. Illus. 5.50,
Textile Book Service
257 Park Avenue, New York, N. Y. 10010
- D. Cotton Ring Spinning. G. R. Merrill. \$5.00.
Textile Book Service
257 Park Avenue, New York, N. Y. 10010
- E. Cotton Spinner's Handbook. R. Jagannathan. \$3.00.
Textile Book Service
257 Park Avenue, New York, N. Y. 10010

II. U. S. GOVERNMENT PUBLICATIONS

- A. Cotton Spinning Mill - Bibliography. IR-30739. Gratis.
- B. Spinning Mills, IR-26414. Gratis.
- C. Production Control and Productivity in Cotton Spinning. IR-24287 E P.
Gratis.
- D. Cotton Spinning, Thread Dyeing and Polishing. IR-16859. Gratis.
- E. Testing of Cotton Yarn, Bibliography. IR-15288. Gratis.
- F. Operation of Yarn Spinning Mills. IR-10536. Gratis.
- G. Spinning Coarse Cotton into Yarn. IR-5637. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Cotton Trade Journal. Weekly. \$6.00/year.
Cotton Trade Journal, Inc.
Hickman Building, Memphis, Tennessee 38103
- B. America's Textile Reporter. Weekly. \$6.00/year.
Frank P. Bennet and Company, Inc.
268 Congress Street, Boston, Mass. 02110
- C. Textile World.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street, New York, N. Y. 10036
- D. Textile Research Journal
Textile Research Institute
Box 625, Princeton, New Jersey 08540

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office

Washington, D. C. 20231 \$.25 each.

- A. Patent No. 3,115,001. Dec. 24, 1963. 7 pp.
Relates to a spinning apparatus and more particularly to an apparatus for drawing and twisting rovings to form yarn.
- B. Patent No. 2,972,220. 1961. 5 pp.
Process and apparatus for spinning cotton yarns.
- C. Patent No. 2,930,538. 1960. 9 pp.
Stop motion mechanism for cotton yarn winding machine.
- D. Patent No. 2,911,783. 1959. 6 pp.
Process and apparatus for preparation of cotton.
- E. Patent No. 2,889,679. 1959. 2 pp.
Spinning ring for production of cotton and other yarns.
- F. Patent No. 2,884,679. 1959. 4 pp.
Cotton yarn stretching apparatus.
- G. Patent No. 2,867,074. 1959. 4 pp.
Doffing mechanism for yarn spinning and twisting machines.
- H. Patent No. 2,843,997. 1958. 25 pp.
Twisting spindle control for yarn production.
- I. Patent No. 2,836,955. 1958. 3 pp.
Method and machine for spinning cotton yarns.

V. TRADE ASSOCIATIONS

- A. American Textile Machinery Association
P. O. Box 96, Vienna, Va. 22180
- B. National Cotton Council of America
1918 Parkway, Memphis, Tennessee 38112
- C. Combed Yarn Spinners' Association
427 West Franklin Avenue, Gastonia, North Carolina 28052
- D. Textile Research Institute
P. O. Box 625, Princeton, N. J. 08540

VI. ENGINEERING COMPANIES

- A. Textile Machine Works
Reading, Pa. 19603
- B. Whitin Machine Works
Whitinsville, Mass. 01588
- C. Rust Engineering Company
980 Fort Duquesne Boulevard, Pittsburgh, Pa. 15222

VII. DIRECTORIES

- A. Davison's Textile Blue Book. Annual. \$9.75.
Davison Publishing Company, Ridgewood, N. J. 07450
- B. Skinner's Cotton Trade Directory. \$15.00.
Thomas Skinner and Company Publishers Ltd.
111 Broadway, New York, N. Y. 10006

COTTON YARN: S.I.C. 2281

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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GRAY IRON JOBGING FOUNDRY

I. P. No. 66237

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GRAY IRON JOBBING FOUNDRY: Standard Industrial Classification 3321

A. PRODUCT DESCRIPTION

Gray iron castings, made from patterns supplied by customers.

B. GENERAL EVALUATION

This plant requires a moderately large capital and a relatively high number of skilled workers. However, iron castings are needed by a wide range of industries, and an efficient local jobbing foundry is a highly desirable adjunct wherever a sufficiently large industrial and transport complex has been built up to provide it with a market. Since castings are made in such foundries according to customers' special requirements, a local source of supply is clearly advantageous to users, provided that the foundry is efficiently run and the products meet required standards. Where a sufficiently high level of industrial development has been reached, the prospects for a gray iron foundry should be good.

C. MARKET ASPECTS

1. USERS. A wide range of industries, construction and public works contractors, shipyards, railroads, etc.
2. SALES CHANNELS AND METHODS. Sales are always made direct to users.
3. GEOGRAPHICAL EXTENT OF MARKET. Though the products are heavy, they are usually small enough to be easily handled, and they are often shipped long distances. Iron castings are quite commonly exported to countries that do not have foundries or have insufficient foundry capacity. However, customers normally prefer to order from a nearby plant, both because, for products made to particular specifications, it is more convenient to do so, and also because deliveries can be made more speedily and with less transport cost.
4. COMPETITION. An efficient gray iron foundry will normally have little to fear from import competition. Uses of iron castings are fairly specialized and for most purposes there are no practicable substitutes. This plant might possibly make some sales to nearby foreign areas if it is favorably located but would be very unlikely to develop a sizable export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Since demand for these products depends entirely on the extent to which user industries have been established and public works are being carried out in the area which it is feasible to serve, no useful generalization can be made as to the market size in terms of any simple yardstick. An ad hoc study is indispensable in each particular market area, covering present users, existing supply sources, and plans for industrial and public facilities expansion.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 4 Million Pounds

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	Cost
Land. About 1/2 acre.	\$ --
Building. One story, 75'x100'. Monitor roof with 16' sidewalls. Fireproof construction.	50,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$44,000
Other tools & equipmt.	1,700
Furniture & fixtures	800
Transportation equipmt.	2,500
Total (excl. Land)	<u>\$ 99,000</u>

Principal Items. Cupola, cupola lining blower, charging hoist, balanced type car, platform scale, core oven, molding machines, hand roll-overs, ladles, tram rail, crane system, flask equipment, grinder, tumbler, air compressor, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials,	90	\$ 42,200
Direct Labor, Mfg. Overhead(a)	60	31,800
Admin. & Sales Costs(b), Contingencies	30	5,000
Training Costs		24,000
Total Working Capital		<u>\$103,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$202,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Metals	2,060 tons	\$150,000
Coke	360 tons	10,000
Core sand	530 tons	1,600
Molding sand	800 tons	2,400
Other		5,000
Total		<u>\$169,000</u>
b. <u>Supplies</u>		
Maintenance materials		\$ 1,400
Lubricants & hand tools		600
Office supplies		400
Total		<u>\$ 2,400</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> Connected load about 45 hp.	Annual Cost
	<u>\$ 1,200</u>
b. <u>Fuel.</u> See Direct Materials.	
c. <u>Water.</u> For production, sanitation & fire protection	<u>\$ 400</u>

4. TRANSPORTATION

a. <u>Own Transport Equipment.</u> 1-ton pickup truck.	Annual Operating Cost
	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> Total in & out shipments about 800 tons a month. Good highways needed, & railroad siding, if possible.	

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	14	\$ 86,000
Semi-skilled	8	40,000
Unskilled	4	16,000
Total	<u>26</u>	<u>\$142,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 19,000
Office	2	10,000
Other	3	14,000
Total	<u>7</u>	<u>\$ 43,000</u>

c. Training Needs. Manager & supervisor should be fully experienced. With assistance of 6 skilled workers, they should be able to do all necessary labour training. Plant should reach full operation in about 3 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

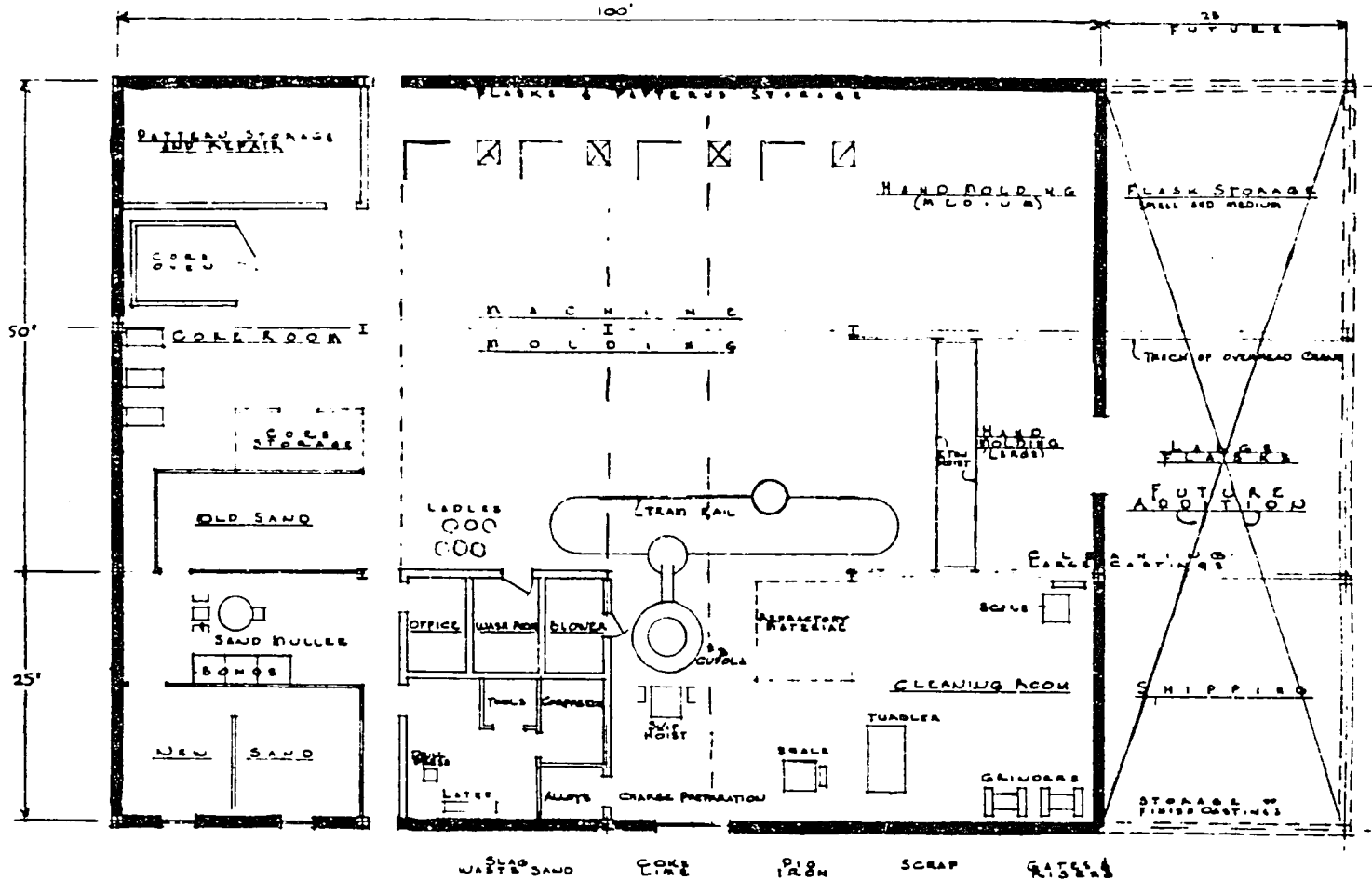
a. <u>Annual Costs</u>	
Direct Materials	\$169,000
Direct Labor	142,000
Manufacturing Overhead(a)	48,000
Admin. & Sales Costs(b), Bad Debts, Contingencies	60,000
Depreciation on Fixed Capital	8,000
Total	<u>\$427,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$500,000</u>

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

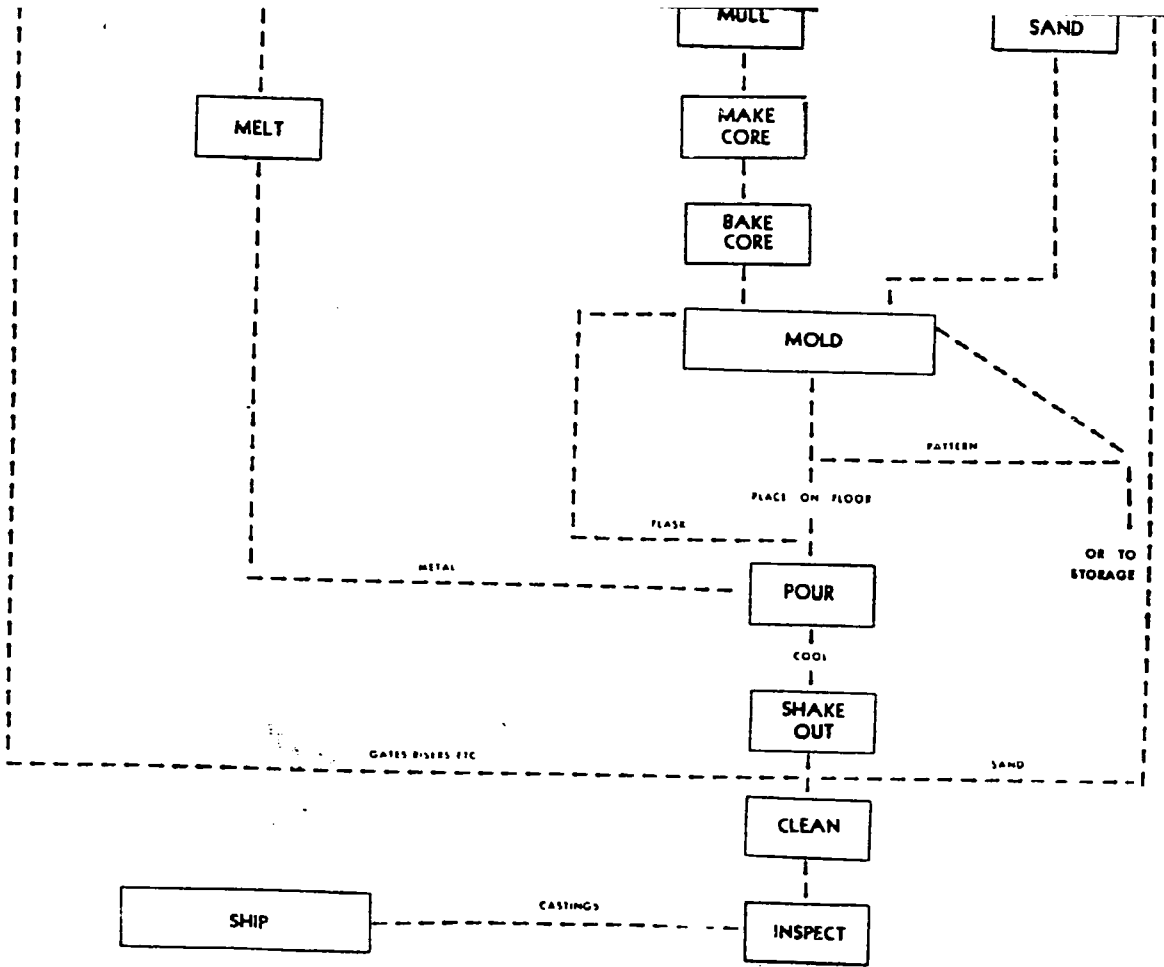
GRAY IRON JOBBING FOUNDRY: S.I.C. 3321

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PLANT LAYOUT AND WORK FLOW



GRAY IRON JOBBING FOUNDRY



10/10/55

GRAY IRON JOBBING FOUNDRY: S. I. C. 3321

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- A. Foseco Foundryman's Handbook. Foseco. 1965. \$3.50.
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44-01 21st Street
Long Island City, N. Y. 11101
- B. Principles of Metal Casting. Richard W. Heine and Phillip C. Rosenthal.
1955. 639 p. Illus. \$8.95.
McGraw-Hill Book Company
330 West 42nd Street
New York, N. Y. 10036
- C. Foundry Engineering. Howard F. Taylor, Merton C. Fleming and John Wolff. 1950. 407 p. Illus. \$8.75.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
- D. The Cupola and its Operation. 2nd edition. 1954. 300 p. \$9.50.
American Foundrymen's Society
Golf and Wolf Roads
Des Plaines, Ill. 60016

II. U. S. GOVERNMENT PUBLICATION

- A. Planning a Gray Iron Foundry. E-134. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICAL

- A. Iron Age. Weekly. Western Hemisphere. \$25.00/year.
Chilton Company
Chestnut and 56th Street
Philadelphia, Pa. 19139

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office

Washington, D. C. 20231 \$.25 each

- A. Patent No. 2,987,789. 1961. 7 p.
Methods and apparatus for making iron and other castings.
- B. Patent No. 2,983,973. 1961. 3 p.
Methods and equipment for casting iron and similar metals.
- C. Patent No. 2,970,349. 1961. 6 p.
Equipment and methods for molding iron.
- D. Patent No. 2,946,103. 1960. 3 p.
Facility and process for casting iron and other metals.
- E. Patent No. 2,824,348. 1958. 4 p.
Method of casting metals and equipment therefor.

V. TRADE ASSOCIATIONS

- A. Association of Iron and Steel Engineers
1010 Empire Building
Pittsburgh, Pa. 15222
- B. American Iron and Steel Institute
150 East 42nd Street
New York, N. Y. 10017
- C. Institute of Scrap Iron and Steel
1729 H Street, N. W.,
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. National Engineering Company
610 Machinery Hall Building
Chicago, Ill. 60606
Sand preparing, molding, and handling.
- B. Jeffery Manufacturing Company
956 North Fourth Street
Columbus, Ohio 43201
Handling equipment design and construction.

VII. DIRECTORY

- A. American Foundrymen's Society Buyers Directory. \$10.00.
American Foundrymen's Society
Golf and Wolf Roads
Des Plaines, Ill. 60016
Lists major suppliers of products sold to foundries, under product classifications.

GRAY IRON JOBBING FOUNDRY: S. I. C. 3321

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INDUSTRY PROFILES

COTTON YARN (SMALL PLANT)

I. P. No. 66238

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COTTON YARN (SMALL PLANT): Standard Industrial Classification 2281

A. PRODUCT DESCRIPTION

Cotton yarn for weaving.

B. GENERAL EVALUATION

This is an extremely small plant by the standards of the cotton spinning industry. Capital requirements are moderate. Good management is needed, but skilled labor requirements are small. The plant would be economically feasible only in somewhat special circumstances, e.g. where there is a modest local production of cotton that cannot otherwise be easily and profitably disposed of. Local weaving facilities would be essential. (For a larger mill see Industry Profile IP66236, Cotton Yarn: S.I.C. 2281).

C. MARKET ASPECTS

1. USERS. Weaving establishments.
2. SALES CHANNELS AND METHODS. Sales are made to weavers and to wholesale distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. The products are easily shipped and transport costs are normally low in relation to product value. They are often shipped long distances both in domestic and international trade.
4. COMPETITION. Competition from imports from the major textile manufacturing countries is likely to be keen. Man-made fibers increasingly compete. A plant of this size could almost certainly do no export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Consumption of cotton goods varies widely not only because of variations in their use for clothing but also because of wide differences in household and industrial uses. In developing areas where cotton cloth is the principal fabric used for clothing this plant could supply the yarn requirements for a population of the order of a hundred thousand.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION 300 DAYS A YEAR : 260,000 Pounds

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About $\frac{1}{2}$ acre.	--
Building. One story, 50'x100'.	\$ 30,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$135,000	
Other tools & equipmt. 6,500	
Furniture & fixtures 500	142,000
Total (excl. Land)	\$172,000

Principal Items. Opening machinery, picking machinery, 8 carding machines, 4 drawing machines, roving machines, spinning frames, under frame cleaners, cone winder, tube or spring winder, 4 skein winders.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 25,300
Admin. Costs(b), Contingencies, Sales Costs(c)	30	700
Training Costs		3,000
Total Working Capital		\$ 29,000

c. TOTAL CAPITAL (EXCL. LAND) \$211,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Cotton	300,000 lbs	\$ 91,700
Packaging		800
Total		\$ 92,500

b. Supplies

Lubricants & hand tools	\$ 100
Maintenance & repair parts	1,000
Office supplies	100
Total	\$ 1,200

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 30 hp	\$ 1,200
b. Fuel. About 2,400 gals. oil annually.	\$ 300
c. Water. For general purposes.	\$ 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	\$ 11,000
Semi-skilled	3	14,000
Unskilled	3	10,000
Total	8	\$ 35,000
b. Indirect Labor		
Manager & supervisor	2	\$ 16,000
Office	1	5,500
Total	3	\$ 21,500

c. Training Needs. Manager & supervisor must be experienced. With aid of skilled workers, they should be able to do any necessary labor training & reach full production in about 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$ 92,500
Direct Labor	35,000
Manufacturing Overhead(a)	24,300
Admin. Costs(b), Contingencies	5,400
Sales Costs(c), Bad Debts	3,500
Depreciation on Fixed Capital	16,300
Total	\$177,000
b. Annual Sales Revenue	\$200,000

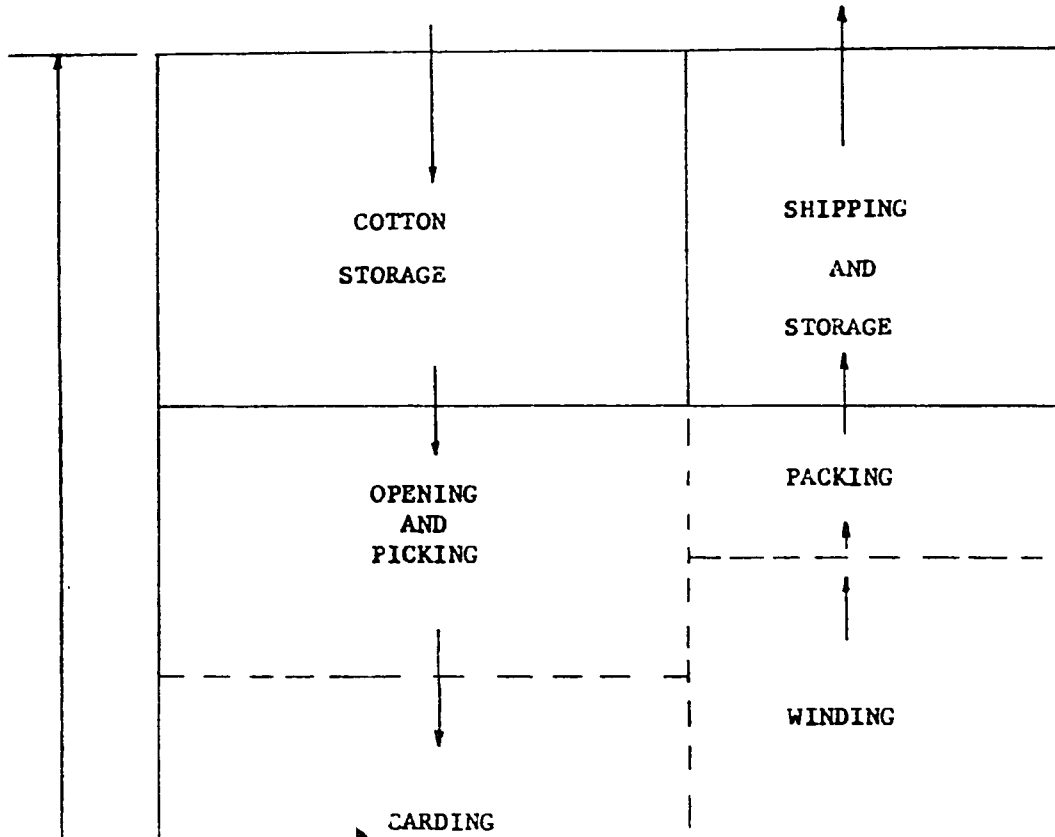
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

COTTON YARN (SMALL PLANT): S.I.C. 2281

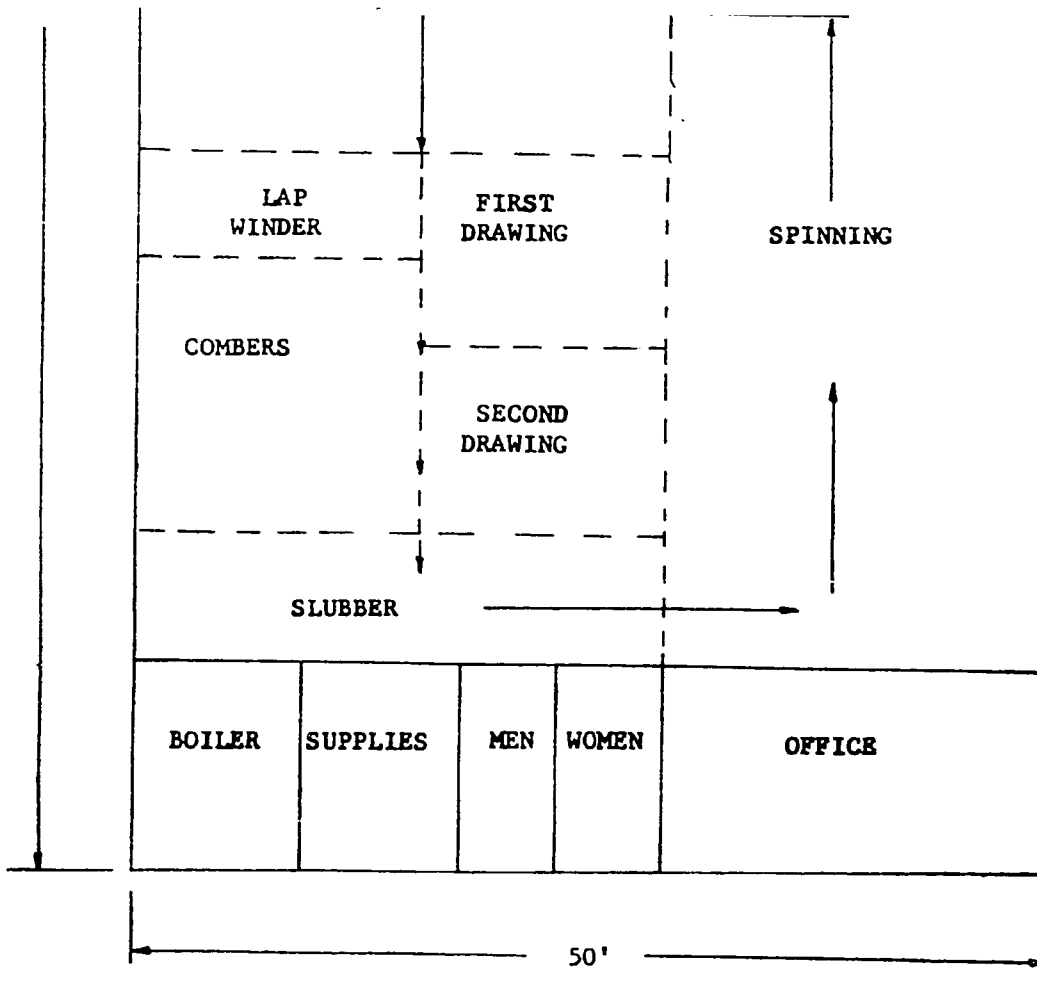
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PLANT LAYOUT

ARROWS INDICATE WORK FLOW



COTTON YARN



PLANT : S.I.C. 2281

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COTTON YARN (SMALL PLANT): S.I.C. 2281

SELECTED REFERENCES

I. TEXTBOOKS

- A. Textile Fibers and Their Use. K. P. Hess. 6th ed. 1958. \$6.95.
J. B. Lippincott Company
East Washington Square, Philadelphia, Pa. 19105
- B. Cotton Drawing and Roving. G. R. Merrill. 1956. Illus. \$3.50.
Textile Book Service
257 Park Avenue, New York, N. Y. 10010
- C. Handbook of Textile Fibers. J. G. Cook. 1954. 356 pp. Illus. \$5.50.
Textile Book Service
257 Park Avenue, New York, N. Y. 10010
- D. Cotton Ring Spinning. G. R. Merrill. \$5.00.
Textile Book Service
257 Park Avenue, New York, N. Y. 10010
- E. Cotton Spinner's Handbook. R. Jagannathan. \$3.00.
Textile Book Service
257 Park Avenue, New York, N. Y. 10010

II. U. S. GOVERNMENT PUBLICATIONS

- A. Cotton Spinning Mill - Bibliography. IR-30739. Gratis.
- B. Spinning Mills. IR-26414. Gratis.
- C. Production Control and Productivity in Cotton Spinning. IR-24287EP. Gratis
- D. Cotton Spinning, Thread Dyeing and Polishing. IR-16859. Gratis.
- E. Testing of Cotton Yarn, Bibliography. IR-15288. Gratis.
- F. Operation of Yarn Spinning Mills. IR-10536. Gratis.
- G. Spinning Coarse Cotton into Yarn. IR-5637. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Cotton Trade Journal. Weekly. \$6.00/year.
Cotton Trade Journal, Inc.
Hickman Building, Memphis, Tennessee 38103
- B. America's Textile Reporter. Weekly. \$6.00/year.
Frank P. Bennett and Company, Inc
268 Congress Street, Boston, Mass. 02110
- C. Textile World.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street, New York, N. Y. 10036
- D. Textile Research Journal
Textile Research Institute
Box 625, Princeton, New Jersey 08540

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SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

Available U. S. Patent Office

Washington, D. C. 20231 \$.25 each.

- A. Patent No. 3,115,001. Dec. 24, 1963. 7 pp.
Relates to a spinning apparatus and more particularly to an apparatus for drawing and twisting rovings to form yarn.
- B. Patent No. 2,972,220. 1961. 5 pp.
Process and apparatus for spinning cotton yarns.
- C. Patent No. 2,930,538. 1960. 9 pp.
Stop motion mechanism for cotton yarn winding machine.
- D. Patent No. 2,911,783. 1959. 6 pp.
Process and apparatus for preparation of cotton.
- E. Patent No. 2,889,679. 1959. 2 pp.
Spinning ring for production of cotton and other yarns.
- F. Patent No. 2,884,679. 1959. 4 pp.
Cotton yarn stretching apparatus.
- G. Patent No. 2,867,074. 1959. 4 pp.
Doffing mechanism for yarn spinning and twisting machines.
- H. Patent No. 2,843,997. 1958. 25 pp.
Twisting spindle control for yarn production.
- I. Patent No. 2,836,955. 1958. 3 pp.
Method and machine for spinning cotton yarns.

V. TRADE ASSOCIATIONS

- A. American Textile Machinery Association
P. O. Box 96, Vienna, Va. 22180
- B. National Cotton Council of America
1918 Parkway, Memphis, Tennessee 38112
- C. Combed Yarn Spinners' Association
427 West Franklin Avenue, Gastonia, North Carolina 28052
- D. Textile Research Institute
P. O. Box 625, Princeton, N. J. 08540

VI. ENGINEERING COMPANIES

- A. Textile Machine Works
Reading, Pa. 19603
- B. Whitin Machine Works
Whitinsville, Mass. 01588
- C. Rust Engineering Company
980 Fort Duquesne Boulevard, Pittsburgh, Pa. 15222

VII. DIRECTORIES

- A. Davison's Textile Blue Book. Annual. \$9.75.
Davison Publishing Company, Ridgewood, N. J. 07450
- B. Skinner's Cotton Trade Directory. \$15.00.
Thomas Skinner and Company Publishers Ltd.
111 Broadway, New York, N. Y. 10006

COTTON YARN (SMALL PLANT): S.I.C. 2281

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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

SODA-LIME WINDOW GLASS, 5,500 TONS ANNUALLY

I. P. No. 66239

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.

SODA-LIME WINDOW GLASS, 5,500 TONS ANNUALLY. Standard
Industrial Classification 3211

A. PRODUCT DESCRIPTION

Common single strength window glass 0.091 inches (2 millimetres) thick. Made by melting together silica, alkali, scrap and stabilizing ingredients, usually consisting of SiO_2 , Al_2O_3 , CaO , MgO , Na_2O , and Fe_2O_3 (if the sand contains no iron impurities), with small amounts of manganese and selenium oxides as decolorizers, and sodium sulphate or salteke as fining agents. The plant could also make double strength glass.

B. GENERAL EVALUATION

This plant, though comparatively small by the standards of the flat glass industry, needs a substantial capital investment and a relatively large number of technical personnel. Its prospects depend on the existence within the potential market area, which, as this is a standardized product, will be delimited by the delivered price (factory price plus freight cost), of sufficient demand for window glass. (For plants with higher capacities, viz. 7,500 and 10,500 tons annually, see Industry Profiles Nos. IP66240 and IP66241 respectively).

C. MARKET ASPECTS

1. USERS. Construction enterprises, households, building owners, etc.
2. SALES CHANNELS AND METHODS. Sales are made direct to construction enterprises and building supplies establishments.
3. GEOGRAPHICAL EXTENT OF MARKET. This product requires great care in handling and freight costs on it are onerous. Nevertheless, since economies of large-scale operation are marked in this industry, production is mainly concentrated in a few large plants, and the product therefore is often shipped long distances both in domestic markets and in international trade.
4. COMPETITION. An efficient plant has a natural advantage in its own vicinity, because of the high freight costs on the product. Within its natural market area, as delimited by freight costs, it should be able to compete effectively provided it maintains the necessary standard of quality.
5. MARKET NEEDED FOR PLANT DESCRIBED. It will evidently be necessary to have within the potential market area, which will be delimited by delivered price, a volume of construction of modern type buildings and existing buildings requiring window glass for repair capable of absorbing the plant's output. A very careful study of transport costs needs to be made in connection with the necessary market survey.

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D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION : 5,500 Tons (Gross)

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL	Cost
Land. About 2-1/2 acres.	\$ --
Building. One story, 140'x220'.	350,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipment	\$500,000
Other tools & equipmt.	30,000
Furniture & fixtures	6,000
Transportation equipmt.	12,000
Total (excl. Land)	<u>\$548,000</u>

Principal Items. Raw material bins with delivery spouts, material scales, melting pots, flattening, rough & finish cutting tables, glass continuous sheet conveyor & rolls, annealing oven, inspection & pack table & conveyor, fuel oil tank, pump, regulators, pipe, valves & fittings, generator, fork lift truck, 2 five-ton trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$103,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	11,200
Training Costs		12,000
Total Working Capital		<u>\$127,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$1,025,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Silica sand	2,200 tons	\$ 8,500
Sodium carbonate	500 tons	32,500
Calcium carbonate	275 tons	3,000
Magnesium carbonate	110 tons	27,000
Potassium carbonate	55 tons	9,000
Manganese oxide	55 tons	9,000
Selenium oxide	28 tons	9,000
Trace elements	28 tons	9,000
Cullet	2,200 tons	5,000
Packaging materials		120,000
Total		<u>\$232,000</u>

b. Supplies

Lubricants & hand tools	\$ 1,000
Cutting tools & abrasives	3,000
Maintenance & spare parts	25,000
Office supplies	1,000
Total	<u>\$ 30,000</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 750,000 kw-hr annually.	<u>\$ 15,000</u>
b. Fuel. About 850,000 gals. Bunker C oil annually.	<u>\$ 43,000</u>
c. Water. About 55 million gals. annually for cooling, plus water for general purposes.	<u>\$ 11,000</u>

4. TRANSPORTATION

Annual Operating Cost

a. Own Transport Equipment. 2 five-ton trucks for pickup & delivery.	<u>\$ 3,000</u>
b. External Transport Facilities. In & out shipments average 1,000 tons a month. Good highways & ready access to rail facilities necessary.	

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	15	\$ 90,000
Semi-skilled	5	25,000
Unskilled	22	88,000
Total	<u>42</u>	<u>\$203,000</u>
b. Indirect Labor		
Manager & supervisors	4	\$ 38,000
Laboratory & batch technician	2	16,000
Office	4	22,000
Drivers	2	10,000
Total	<u>12</u>	<u>\$ 86,000</u>

c. Training Needs. As manufacturing processes are largely automated, use of 5 skilled men a shift should permit full production to be reached in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

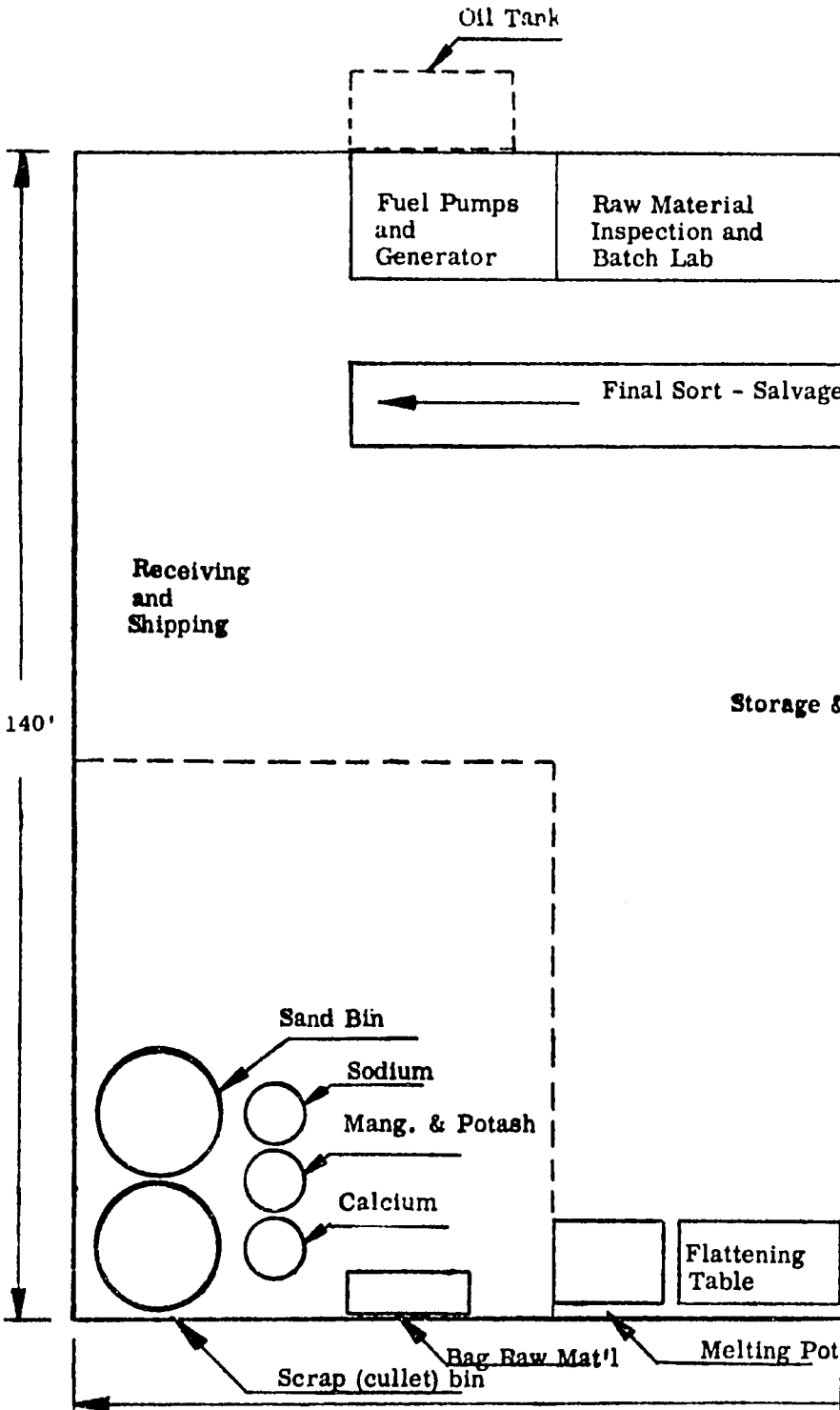
a. Annual Costs	
Direct Materials	\$232,000
Direct Labor	203,000
Manufacturing Overhead(a)	188,000
Admin. Costs(b), Contingencies	75,000
Sales Costs(c), Bad Debts	70,000
Depreciation on Fixed Capital	79,000
Total	<u>\$847,000</u>
b. Annual Sales Revenue	<u>\$1,050,000</u>

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

SODA-LIME WINDOW GLASS, 5,500 TONS ANNUALLY: S.I.C. 3211

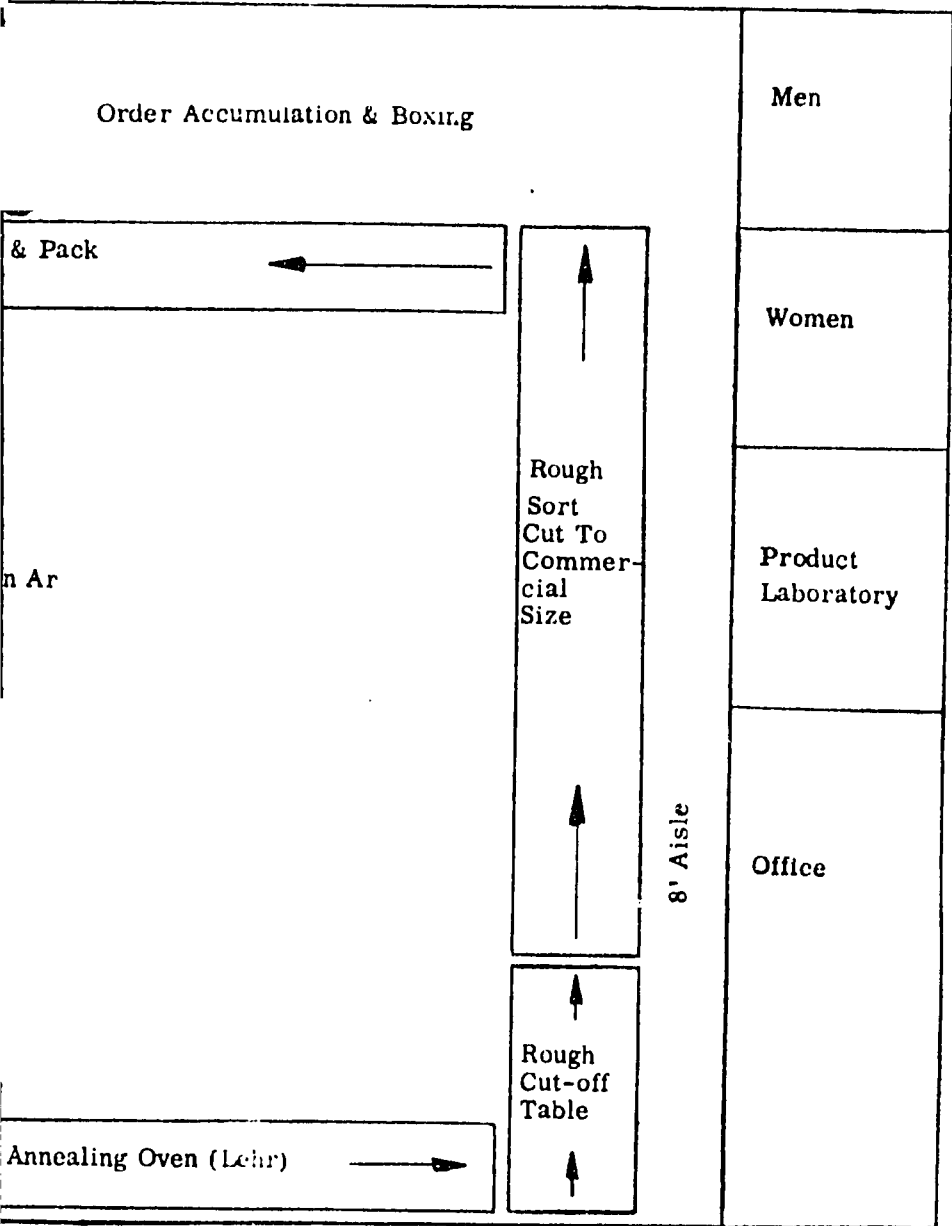
SODA-LIME WINDOW GLASS

PLANT LAYOUT



TONS ANNUALLY : S.I.C. 3211

WORKFLOW



SODA-LIME WINDOW GLASS, 5,500 TONS ANNUALLY: S.I.C. 3211

SELECTED REFERENCES

I. TEXTBOOKS

- A. Properties of Glass Surfaces. L. Holland. 1964. \$15.00.
John Wiley and Sons, Inc.
605 Third Avenue
New York, N. Y. 10016
- B. Glass Engineering Handbook. E. B. Shand. 2nd ed. 1959. Illus. \$12.50.
McGraw-Hill Book Company, Inc.
330 W. 42nd Street, New York, N. Y. 10036
- C. Handbook of Glass Manufacture. F. V Tooley, ed. 1959. 2 vols.
Vol 1, \$15.00; Vol 2, \$10.00.
Ogden Publishing Company
530 E. 86th Street, New York, N. Y. 10036

II. U.S. GOVERNMENT PUBLICATIONS

- A. Glass. April 1959. 198 refs. CTR-370.
- B. Glass. Supplement to CTR-370. Aug. 1961. 292 refs. SB-478.
U.S. Department of Commerce
Washington, D. C. 20230
- C. Manufacture of Window Glass. E-199. Gratis.
- D. Making High Grade Window Glass. E-230. Gratis.
- E. Window Glass - Bibliography. IR-24841. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Glass Industry. Monthly. \$5.00/year.
Ogden Publishing Company
530 E. 86th Street, New York, N. Y.
Devoted to glass technology, engineering materials, and glass factory
equipment and operation.
- B. Glass Digest. Monthly. \$4.00/year.
Ashlee Publishing Company, Inc.
130 West 57th Street, New York, N. Y. 10019
General magazine for the glass industry.
- C. National Glass Budget. Weekly. \$5.00/year.
National Glass Budget.
916 Empire Building, Pittsburgh, Pa. 15222
Materials and markets for glass products.

2/20/60

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 3,245, 772. Apr. 12, 1966. 6 pp.
Method of heat treating glass sheets while being conveyed.
- B. Patent No. 3,199,966. Aug. 10, 1965. 6 pp.
Method and apparatus for treating sheet glass.
- C. Patent No. 2,957,275. 1960. 3 pp.
Method and apparatus for producing sheet glass.
- D. Patent No. 2,948,989. 1960. 5 pp.
Apparatus for producing sheet glass

V. TRADE ASSOCIATION

- A. National Glass Dealers Association
1000 Connecticut Avenue, Suite 601
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. Frazier-Simplex, Inc.
428 East Beau Street
Washington, Penn. 15301
Builds complete glass factories.
- B. H. R. Dreshman and Sons, Inc.
West 16th and Hays Streets
Homestead, Penn. 15120
Manufacturers of glass making machinery.
- C. Toledo Engineering Company, Inc.
3001 West Sylvania Avenue
Toledo, Ohio 43613
Glass plants of all types, equipment, and engineering services.

VII. DIRECTORIES

- A. Glass Factory Directory. Annual. \$3.00.
National Glass Budget
916 Empire Building
Pittsburgh, Penn. 15222
Lists glass manufacturing firms.
- B. American Glass Review - Glass Factory Directory Issue. Annual. \$4.00.
Ebel Doctrow Publications, Inc.
3 West 29th Street
New York, N. Y. 10001
Lists glass producers, their products, their trade and brand names. Includes a buyers' guide section of glass industry suppliers.

SODA-LIME WINDOW GLASS, 5,500 TONS ANNUALLY : S.I.C. 3211

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.

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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.

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

INDUSTRY PROFILES

SODA-LIME WINDOW GLASS, 7,500 TONS ANNUALLY

I. P. No. 66240

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.

S ODA-LIME WINDOW GLASS, 7,500 TONS ANNUALLY: Standard Industrial Classification 3211

A. PRODUCT DESCRIPTION

Common single strength window glass 0.091 inches (2 millimetres) thick. Made by melting together silica, alkali, scrap and stabilizing ingredients, usually consisting of SiO_2 , Al_2O_3 , CaO , MgO , Na_2O , and Fe_2O_3 (if the sand contains no iron impurities), with small amounts of manganese and selenium oxides as decolorizers, and sodium sulphate or salteke as fining agents. The plant could also make double strength glass.

B. GENERAL EVALUATION

This plant, though comparatively small by the standards of the flat glass industry, needs a substantial capital investment and a relatively large number of technical personnel. Its prospects depend on the existence within the potential market area, which, as this is a standardized product, will be delimited by the delivered price (factory price plus freight cost), of sufficient demand for window glass. (For a plant with a somewhat lower capacity, viz. 5,500 tons annually, and one with a somewhat higher capacity, viz. 10,500 tons annually, see Industry Profiles Nos. IP66239 and IP66241 respectively).

C. MARKET ASPECTS

1. USERS. Construction enterprises, households, building owners, etc.
2. SALES CHANNELS AND METHODS. Sales are made direct to construction enterprises and building supplies establishments.
3. GEOGRAPHICAL EXTENT OF MARKET. This product requires great care in handling and freight costs on it are onerous. Nevertheless, since economies of large-scale operation are marked in this industry, production is mainly concentrated in a few large plants, and the product therefore is often shipped long distances both in domestic markets and in international trade.
4. COMPETITION. An efficient plant has a natural advantage in its own vicinity, because of the high freight costs on the product. Within its natural market area, as delimited by freight costs, it should be able to compete effectively provided it maintains the necessary standard of quality.
5. MARKET NEEDED FOR PLANT DESCRIBED. It will evidently be necessary within the potential market area, which will be delimited by delivered price, a volume of construction of modern type buildings and existing buildings requiring window glass for repair capable of absorbing the plant's output. A very careful study of transport costs needs to be made in connection with the necessary market survey.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION : 7,500 Tons (Gross)

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	Cost
Land. About 3 acres.	\$ --
Building. One story, 160'x250'.	420,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt.	\$686,000
Other tools & equipmt.	40,000
Furniture & fixtures	8,000
Transportation equipmt.	12,000
Total (excl. Land)	<u>\$1,166,000</u>

Principal Items. Raw material bins with delivery spouts, material scales, melting pots, flattening, rough & finish cutting tables, glass continuous sheet conveyor & rolls, annealing oven, inspection & pack table & conveyor, fuel oil tank, pump, regulators, pipe, valves & fittings, generator, fork lift truck, 2 five-ton trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$140,700
Admin. Costs(b), Contingencies, Sales Costs (c)		13,300
Training Costs		12,000
Total Working Capital		<u>\$166,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$1,332,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Silica sand	3,000 tons	\$ 12,000
Sodium carbonate	750 tons	44,000
Calcium carbonate	375 tons	4,100
Magnesium carbonate	150 tons	36,800
Potassium carbonate	75 tons	12,300
Manganese oxide	75 tons	12,300
Selenium oxide	38 tons	12,000
Trace elements	38 tons	12,000
Cullet	3,000 tons	7,500
Packaging materials		165,000
Total		<u>\$318,000</u>
b. <u>Supplies</u>		
Lubricants & hand tools		\$ 1,500
Cutting tools & abrasives		4,000
Maintenance & spare parts		38,000
Office supplies		1,500
Total		<u>\$45,000</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> About 800,000 kw-hr annually.	<u>\$ 16,000</u>
b. <u>Fuel.</u> About 1.1 million gals. Bunker C oil annually.	<u>\$ 55,000</u>
c. <u>Water.</u> About 70 million gals. annually for cooling, plus water for general purposes.	<u>\$ 15,000</u>

4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 2 five-ton trucks for pickup & delivery.	<u>\$ 3,000</u>
b. <u>External Transport Facilities.</u> In & out shipments average 1,400 tons a month. Good highways & ready access to rail facilities necessary.	

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	16	\$ 96,000
Semi-skilled	8	40,000
Unskilled	42	168,000
Total	<u>66</u>	<u>\$304,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisors	4	\$ 40,000
Lab. & batch technician	2	16,000
Office	4	22,000
Drivers	2	10,000
Total	<u>12</u>	<u>\$ 88,000</u>

c. Training Needs. As manufacturing processes are largely automated, use of 5 skilled men a shift should permit full production to be reached in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

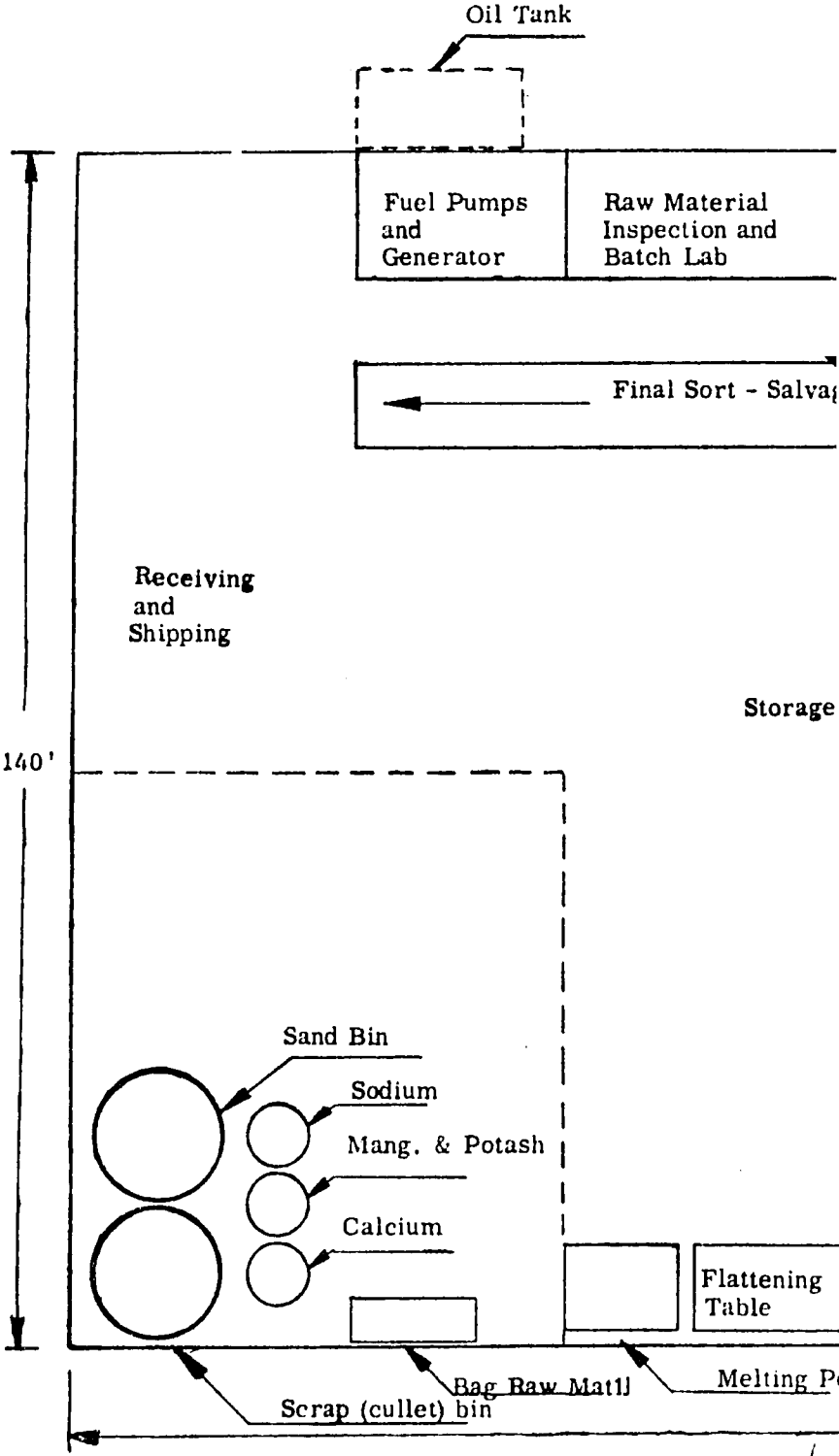
a. <u>Annual Costs</u>	
Direct Materials	\$318,000
Direct Labor	304,000
Manufacturing Overhead(a)	222,000
Admin. Costs(b), Contingencies	100,000
Sales Costs(c), Bad Debts	90,000
Depreciation on Fixed Capital	101,000
Total	<u>\$1,135,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$1,450,000</u>

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

SODA-LIME WINDOW GLASS, 7,500 TONS ANNUALLY: S.I.C. 3211

SODA-LIME WINDOW GLASS PLANT

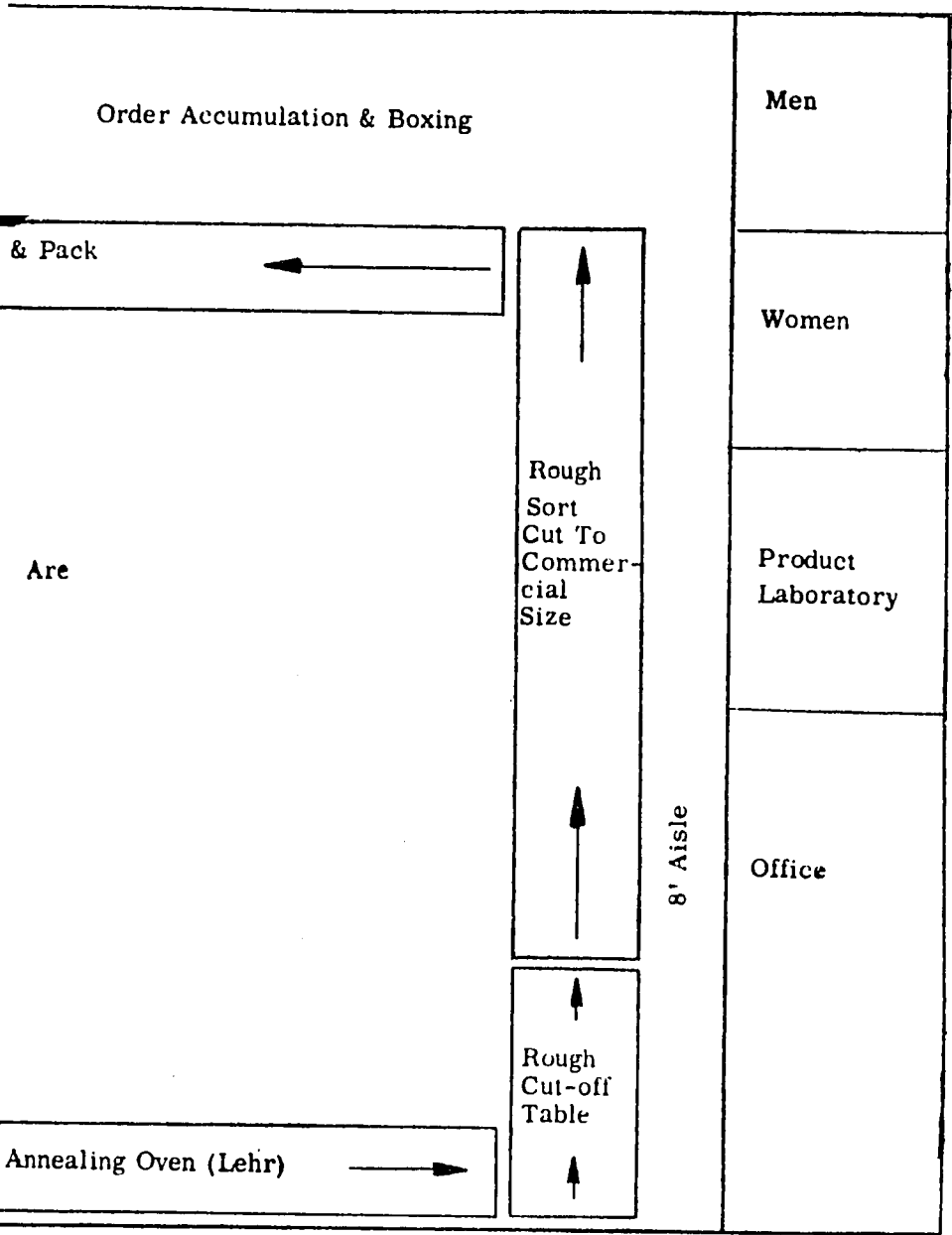
PLANT



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10 TONS ANNUALLY : S.I.C. 3211

ND WORKFLOW



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I. TEXTBOOKS

- A. Properties of Glass Surfaces. L. Holland. 1964. \$15.00
John Wiley and Sons, Inc.
605 Third Avenue
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- B. Glass Engineering Handbook. E. B. Shand. 2nd ed. 1959. Illus. \$12.50.
McGraw-Hill Book Company, Inc.
330 W. 42nd Street, New York, N.Y. 10036
- C. Handbook of Glass Manufacture. F. V. Tooley, ed. 1959. 2 vols.
Vol. 1, \$15.00; Vol. 2, \$10.00.
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II. U. S. GOVERNMENT PUBLICATIONS

- A. Glass. April 1959. 198 refs. CTR-370.
- B. Glass. Supplement to CTR-370. Aug. 1961. 292 refs. SB-478.
U.S. Department of Commerce
Washington, D.C. 20230
- C. Manufacture of Window Glass. E 199. Gratis.
- D. Making High Grade Window Glass. E-230. Gratis.
- E. Window Glass - Bibliography. IR-24841. Gratis.
Agency for International Development
Washington, D.C. 20523

III. PERIODICALS

- A. Glass Industry. Monthly. \$5.00/year.
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General magazine for the glass industry.
- C. National Glass Budget. Weekly. \$5.00/year.
National Glass Budget.
916 Empire Building, Pittsburgh, Pa. 15222
Materials and markets for glass and glass products.

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SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 3,245,772. Apr. 12, 1966. 6 pp.
Method of heat treating glass sheets while being conveyed.
- B. Patent No. 3,199,966. Aug. 10, 1965. 6 pp.
Method and apparatus for treating sheet glass.
- C. Patent No. 2,957,275. 1960. 3 pp.
Method and apparatus for producing sheet glass.
- D. Patent No. 2,948,989. 1960. 5 pp.
Apparatus for producing sheet glass.

V. TRADE ASSOCIATION

- A. National Glass Dealers Association
1000 Connecticut Avenue, Suit 601
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

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- B. H. R. Dreshman and Sons, Inc.
West 16th and Hays Streets
Homestead, Penn. 15120
Manufacturers of glass making machinery.
- C. Toledo Engineering Company, Inc.
3001 West Sylvania Avenue
Toledo, Ohio 43613
Glass plants of all types, equipment, and engineering services.

VII. DIRECTORIES

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916 Empire Building, Pittsburgh, Penn. 15222
Lists glass manufacturing firms.
- B. American Glass Review - Glass Factory Directory Issue. Annual. \$4.00.
Ebel-Doctrow Publications, Inc.
3 West 29th Street
New York, N.Y. 10001
Lists glass producers, their products, their trade and brand names.
Includes a buyers' guide section of glass industry suppliers.

SODA-LIME WINDOW GLASS, 7,500 TONS ANNUALLY : S.I.C. 3211

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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

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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

SODA-LIME WINDOW GLASS, 10,500 TONS ANNUALLY I. P. No. 66241

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.

SODA-LIME WINDOW GLASS, 10,500 TONS ANNUALLY: Standard Industrial Classification 3211

A. PRODUCT DESCRIPTION

Common single strength window glass 0.091 inches (2 millimetres) thick. Made by melting together silica, alkali, scrap and stabilizing ingredients, usually consisting of SiO_2 , Al_2O_3 , CaO , MgO , Na_2O , and Fe_2O_3 (if the sand contains no iron impurities), with small amounts of manganese and selenium oxides as decolorizers, and sodium sulphate or salteke as fining agents. The plant could also make double strength glass.

B. GENERAL EVALUATION

This plant, though comparatively small by the standards of the flat glass industry, needs a substantial capital investment and a relatively large number of technical personnel. Its prospects depend on the existence within the potential market area, which, as this is a standardized product, will be delimited by the delivered price (factory price plus freight cost), of sufficient demand for window glass. (For plants with lower capacities, viz. 5,500 tons and 7,500 tons annually, see Industry Profiles Nos. IP66239 and IP66240 respectively).

C. MARKET ASPECTS

1. USERS. Construction enterprises, households, building owners, etc.
2. SALES CHANNELS AND METHODS. Sales are made direct to construction enterprises and building supplies establishments.
3. GEOGRAPHICAL EXTENT OF MARKET. This product requires great care in handling and freight costs on it are onerous. Nevertheless, since economies of large-scale operation are marked in this industry, production is mainly concentrated in a few large plants, and the product therefore is often shipped long distances both in domestic markets and in international trade.
4. COMPETITION. An efficient plant has a natural advantage in its own vicinity, because of the high freight costs on the product. Within its natural market area, as delimited by freight costs, it should be able to compete effectively provided it maintains the necessary standard of quality.
5. MARKET NEEDED FOR PLANT DESCRIBED. It will evidently be necessary to have within the potential market area, which will be delimited by delivered price, a volume of construction of modern type buildings and existing buildings requiring window glass for repair capable of absorbing the plant's output. A very careful study of transport costs needs to be made in connection with the necessary market survey.

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D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 10,500 Tons (Gross)

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	Cost	
Land. About 4 acres.	\$	--
Building. One story, 190'x300'.		580,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$808,000	
Other tools & equipmt.	50,000	
Furniture & fixtures	10,000	
Transportation equipmt.	12,000	880,000
Total (excl. Land)		<u>\$1,460,000</u>

Principal Items. Raw material bins with delivery spouts, material scales, melting pots, flattening, rough & finish cutting tables, glass continuous sheet conveyor & rolls, annealing oven, inspection & pack table & conveyor, fuel oil tank, pump, regulators, pipe, valves & fittings, generator, fork lift trucks, 2 five-ton trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$181,200
Admin. Costs(b), Contingencies, Sales Cost(c)	30	18,800
Training Costs		12,000
Total Working Capital		<u>\$212,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$1,672,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Silica sand	4,200 tons	\$ 17,000
Sodium carbonate	1,050 tons	65,000
Calcium carbonate	525 tons	5,500
Magnesium carbonate	210 tons	53,000
Potassium carbonate	105 tons	18,000
Manganese oxide	105 tons	15,500
Selenium oxide	53 tons	17,000
Trace elements	53 tons	17,000
Cullet	4,200 tons	10,000
Packaging materials		200,000
Total		<u>\$418,000</u>

b. Supplies

Lubricants & hand tools	\$ 1,800
Cutting tools & abrasives	4,500
Maintenance & spare parts	40,000
Office supplies	1,700
Total	<u>\$ 48,000</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> About 1 million kw-hr annually.	<u>\$ 20,000</u>
b. <u>Fuel.</u> About 1.5 million gals. Bunker C oil annually	<u>\$ 75,000</u>
c. <u>Water.</u> About 90 million gals. annually for cooling, plus water for general purposes.	<u>\$ 18,000</u>

4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 2 five-ton trucks for pickup & delivery.	<u>\$ 3,000</u>
b. <u>External Transport Facilities.</u> In & out shipments average 2,000 tons a month. Good highways & ready access to rail road facilities necessary.	

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	18	\$108,000
Semi-skilled	10	50,000
Unskilled	60	240,000
Total	<u>88</u>	<u>\$398,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisors	6	\$ 58,000
Lab. & batch technician	2	16,000
Drivers	2	10,000
Office	4	23,000
Total	<u>14</u>	<u>\$107,000</u>

c. Training Needs. As manufacturing processes are largely automated, use of 6 skilled men a shift should permit full production to be reached in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$418,000
Direct Labor	398,000
Manufacturing Overhead(a)	271,000
Admin. Costs(b), Contingencies	125,000
Sales Costs(c), Bad Debts	120,000
Depreciation on Fixed Capital	124,000
Total	<u>\$1,456,000</u>

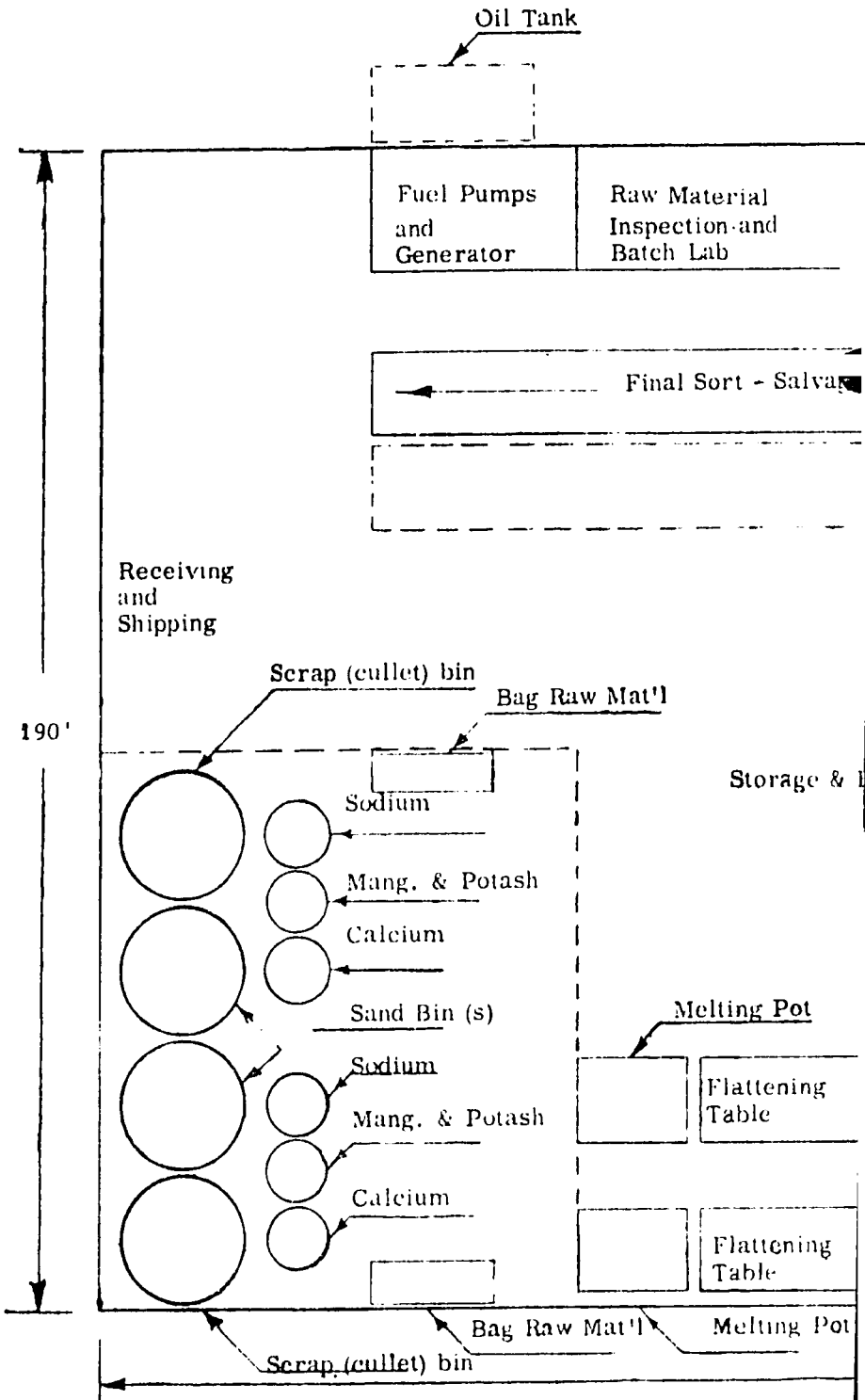
b. Annual Sales Revenue \$2,000,000

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

SODA-LIME WINDOW GLASS, 10,500 TONS ANNUALLY: S.I.C. 3211

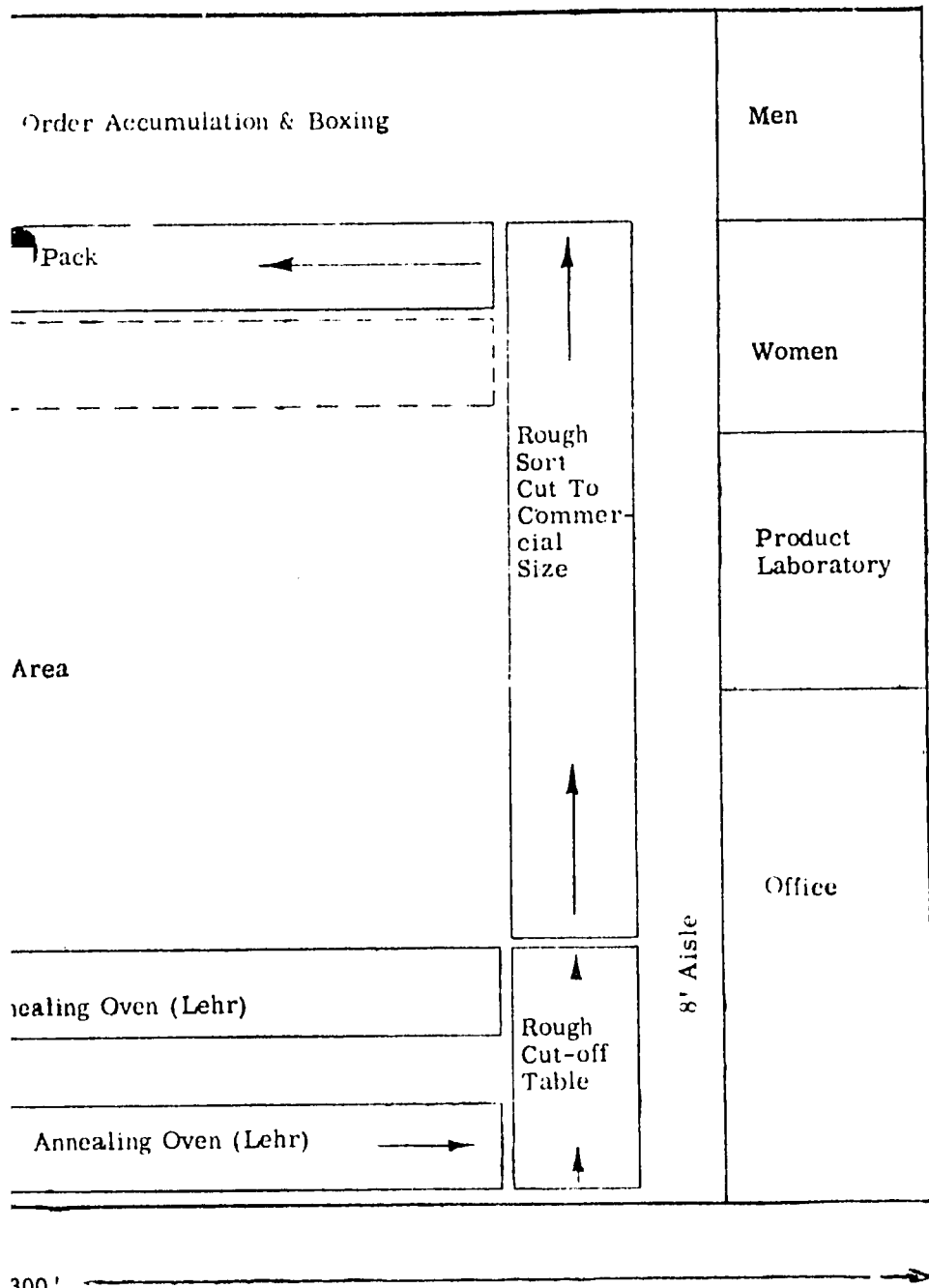
SODA-LIME WINDOW GLASS

PLANT LAYOUT



0 TONS ANNUALLY : S.I.C. 3211

WORKFLOW



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SODA-LIME WINDOW GLASS, 10,500 TONS ANNUALLY: S. I. C. 3211

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- A. Properties of Glass Surfaces. L. Holland. 1964. \$15.00.
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SODA-LIME WINDOW GLASS, 10,500 TONS ANNUALLY: S. I. C. 3211

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INDUSTRY PROFILES

PLASTIC EYEGLASS FRAMES

I. P. No. 66242

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PLASTIC EYEGLOSS FRAMES: Standard Industrial Classification 3851

A. PRODUCT DESCRIPTION

Plastic eyeglass frames of various sizes and shapes made by the molding process.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are rather small, although good management is needed to assure product quality and keep up with developments in the industry. With the extension of optical care that is generally taking place, this enterprise might have good prospects in many developing areas.

C. MARKET ASPECTS

1. USERS. Individuals.
2. SALES CHANNELS AND METHODS. Sales would be made to optical companies and manufacturers of sun glasses.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are very easy to ship and transport costs are usually insignificant. International trade in these products tends to be limited to the higher quality frames.
4. COMPETITION. If costs are reasonable, there should be no great difficulty in competing with imports of the cheaper kind. There would be little chance of export business for a plant of this kind and size.
5. MARKET NEEDED FOR PLANT DESCRIBED. Factors influencing demand for these products include the extensiveness of optical services, climate, and income level. A population of the order of a million would generally be large enough to provide a market.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 120,000 Frames

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		Cost
Land, About 5,000 sq ft.	\$	0
Building, One story, 30'x50'.		9,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$	53,500
Other tools & equipmt.		2,700
Furniture & fixtures		800
Total (excl. Land)	\$	57,000
Total (excl. Land)	\$	66,000
Principal Items. Molding machine, dies, drill press, 2 riveting machines, 2 buffing wheels, 2 assembling benches, storage bins.		

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 12,300
Admin. Costs(b), Contingencies, Sales Costs (c)	30	2,300
Training Costs		1,400
Total Working Capital		\$ 16,000

c. **TOTAL CAPITAL (EXCL. LAND)** \$ 82,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Thermoplastic material	2,000 lbs.	\$ 1,000
Tissue paper		200
Cartons	900	200
Metal hinges & fittings	330,000 pairs	6,600
Total		\$ 8,000

b. Supplies

Lubricants & hand tools	\$	100
Cutting tools & abrasives		100
Maintenance & spare parts		10,000
Office supplies		200
Total	\$	10,400

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 20 hp. connected load.	\$ 300
b. Fuel. About 8,000 gals. oil annually.	\$ 1,000
c. Water. For cooling & general purposes.	\$ 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	1	\$ 6,000
Semi-skilled	3	15,000
Unskilled	3	12,000
Total	7	\$ 33,000
b. Indirect Labor		
Manager	1	\$ 10,500
Office	1	5,000
Maintenance	1	5,500
Total	3	\$ 21,000

- c. **Training Needs.** The manager, together with 1 skilled worker & the maintenance man, should be able to train all workers and reach full production in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$ 8,000
Direct Labor	33,000
Manufacturing Overhead(a)	32,900
Admin. Costs(b), Contingencies	15,000
Sales Costs(c), Bad Debts	17,000
Depreciation on Fixed Capital	6,400
Total	\$112,300

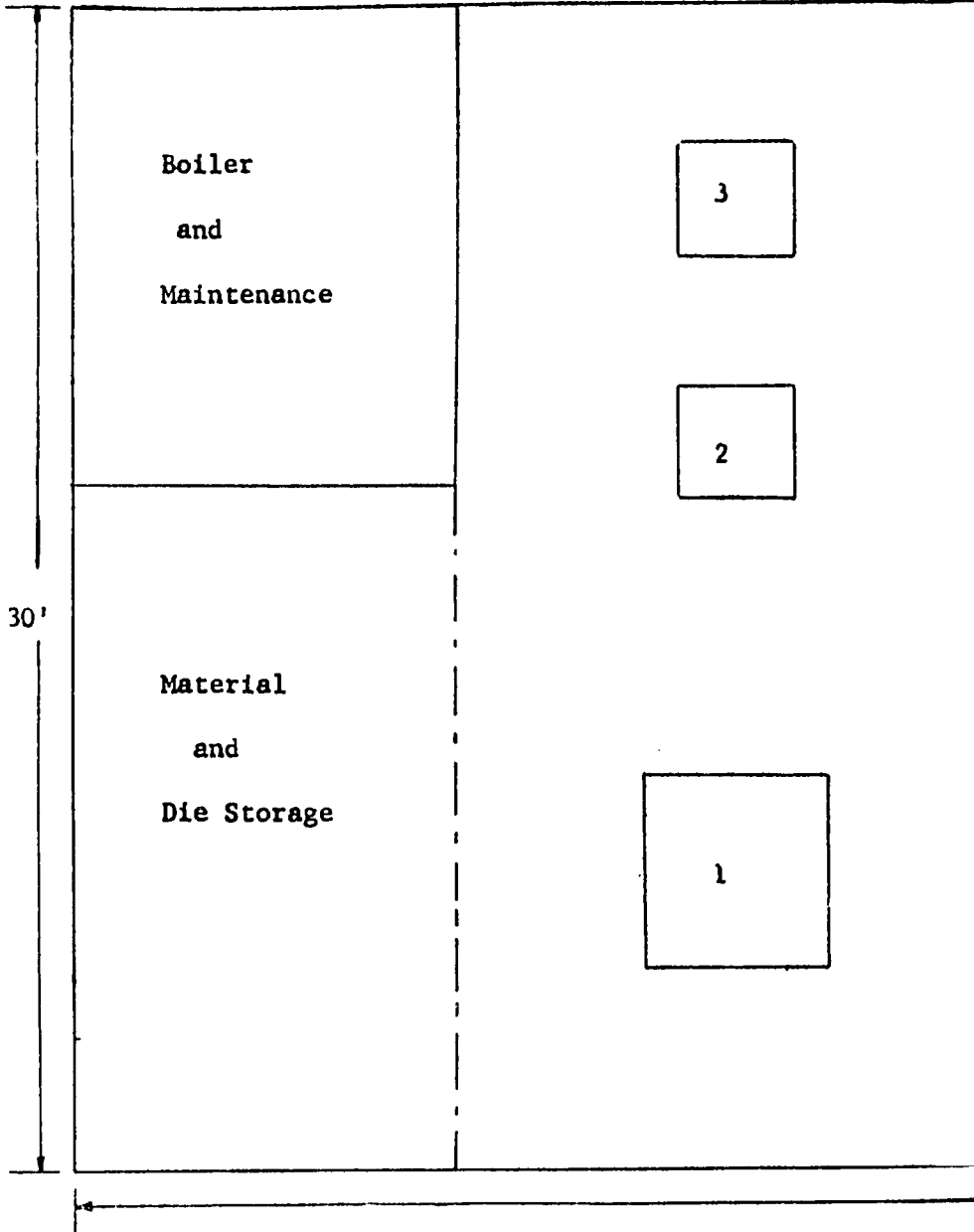
b. **Annual Sales Revenue** \$150,000

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

PLASTIC EYEGLASS FRAMES: S.I.C. 3851

PLASTIC EYEGLASS

PLANT LAYOUT



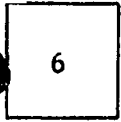
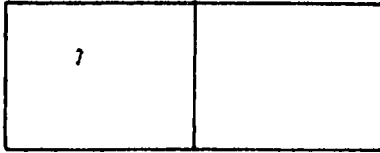
Sequence of numbers indicates flow of work.

- 1. Molding machine
- 2. Buffing machine

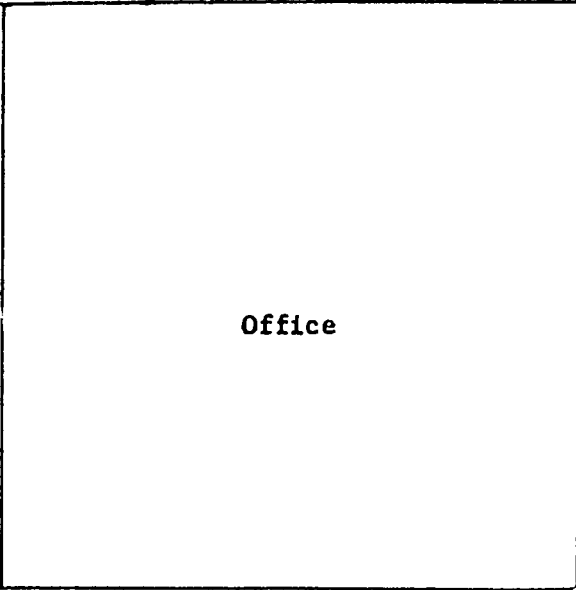
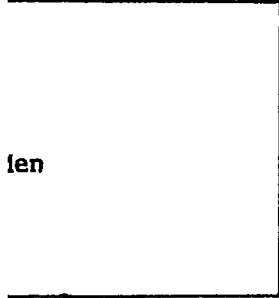
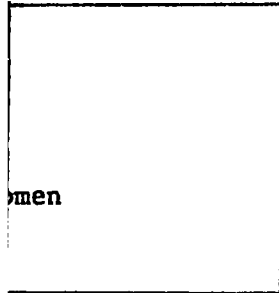
- 3. Drill press
- 4. Riveting machine

S. I. C. 3851

KFLOW



**Packaging, Storage
and
Shipping**



ng machine
; machine

7. Assembly bench

Handwritten mark

PLASTIC EYEGLOSS FRAMES: S. I. C. 3851

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- A. Engineering Design for Plastics. E. Baer. 1964. \$29.75.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022
- B. Industrial Arts Plastics. Louton Edwards. 1964. \$4.40.
Chas. A. Bennett Co., Inc.
237 N. Monroe Street
Peoria, Ill. 61602
- C. Manufacture of Plastics. W. M. Smith. 1964. \$18.00.
Reinhold Publishing Corporation
430 Park Avenue
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- D. Engineering Properties and Application of Plastics. C. F. Kinney.
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II. U. S. GOVERNMENT PUBLICATION

- A. Plastics - Sources of Up-to-Date Information. IR-21687. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Modern Plastics. Monthly. \$20.00/year.
Breskin Publications, Inc.
Emmett Street
Bristol, Conn. 06011
- B. Plastics Industry. Monthly. \$5.00/year.
Vincent Edwards and Company
130 Clarendon Street
Boston, Mass. 02116

SELECTED REFERENCES (Continued)

IV. U.S. PATENTS

Available U. S. Patent Office

Washington, D. C. 20231 \$.25 each.

- A. Patent No. 2,955,159. 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. Society of Plastics Engineers
65 Prospect Street
Stamford, Conn. 06902
- C. 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.

PLASTIC EYEGLASS FRAMES: S. I. C. 3851

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 BARS AND SHAPES, 15,000 TONS ANNUALLY I. P. No. 66243

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.

ST I I I BARS AND SHAPES, 15,000 TONS ANNUALLY: Standard Industrial
Classification 3312

A. PRODUCT DESCRIPTION

Hot-rolled reinforcing bars and merchant shapes, made from steel billets or ingots.

B. GENERAL EVALUATION

This plant requires a considerable capital and a fairly large amount of skilled labor, even though it is a small operation by steel industry standards. The market area of such a plant would almost certainly be wholly domestic and possibly somewhat localized even in the domestic market. Within the area delimited by the delivered price at which it would be possible to sell in competition with producers in other locations, there would need to be a sufficient volume of construction and industrial activity to absorb the plant's output. A project such as this should be preceded by a full-scale feasibility study which should include a detailed investigation of freight rates and transport facilities and of delivered prices of the products coming from other producing areas.

C. MARKET ASPECTS

1. USERS. Construction enterprises, industries, metal products merchants.
2. SALES CHANNELS AND METHODS. Sales are made direct to users and to wholesale merchants.
3. GEOGRAPHICAL EXTENT OF MARKET. In some countries transport charges set comparatively narrow limits to the domestic market area within which it is possible for a particular plant to sell its products in competition with other suppliers. However, where supply points are located very far apart, or where, as in the case of some countries, there is only one supply point, steel products may be sent very long distances, particularly if inland waterways or coastal shipping provide low-cost transport. Steel-products of this type are a common export of the major steel-producing countries.
4. COMPETITION. Competition from imports is likely to be keen. In some developing areas demand for steel for construction purposes may be limited by competition from substitute materials available at low cost. It is very unlikely that a plant of this size would be able to do any export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. As indicated above, the market area is likely to be comparatively restricted in size. Within the area in which it is feasible to sell profitably there would evidently have to be a considerable volume of construction activity and a fair measure of industrial development.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION : 15,000 Tons

I. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		Cost
Land. About 5 Acres.		\$ --
Building. One story, 50'x300'.		100,000
Side wall on 200' only.		
Equipment, Furniture & Fixtures.		
Prodn. tools & equipment	\$480,000	
Other tools & equipmt.	6,000	
Furniture & fixtures	1,000	
Transportation equipmt.	8,000	495,000
Total (excl. Land)		\$595,000

Principal Items. Reheating furnace, 16-inch mill, three 10-inch mills, cold shear & bar former, fork lift truck, boiler, 5-ton truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$333,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	6,000
Training Costs		36,000
Total Working Capital		\$375,000

c. TOTAL CAPITAL (EXCL. LAND) \$970,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Steel billets (less scrap sales)	16,500 tons	\$1,550,000

b. Supplies

Lubricants & tools	\$ 7,000
Maintenance, repair parts & replacements	50,000
Office supplies	500
Total	\$ 57,500

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 900 hp.	\$ 25,000
b. Fuel. About 1,000 tons of bunker C oil annually.	\$ 12,500
c. Water. About 15 million gals. annually for production & general purposes.	\$ 1,500

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

4. TRANSPORTATION

a. Own Transport Equipment.	Annual Operating Cost
5-ton truck for general purposes.	\$ 1,500

b. External Transport Facilities.
In and out shipments average about 3,000 tons a month. Good highways & rail facilities necessary.

5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	6	\$ 36,000
Semi-skilled	15	75,000
Unskilled	39	156,000
Total	60	\$267,000

b. Indirect Labor

Manager, & supervisors	3	\$ 29,000
Office	3	\$ 14,000
Other	7	\$ 38,000
Total	13	\$ 81,000

c. Training Needs. Manager & supervisors, with aid of skilled workers, should be able to do all necessary labor training & reach full production in about 2 months.

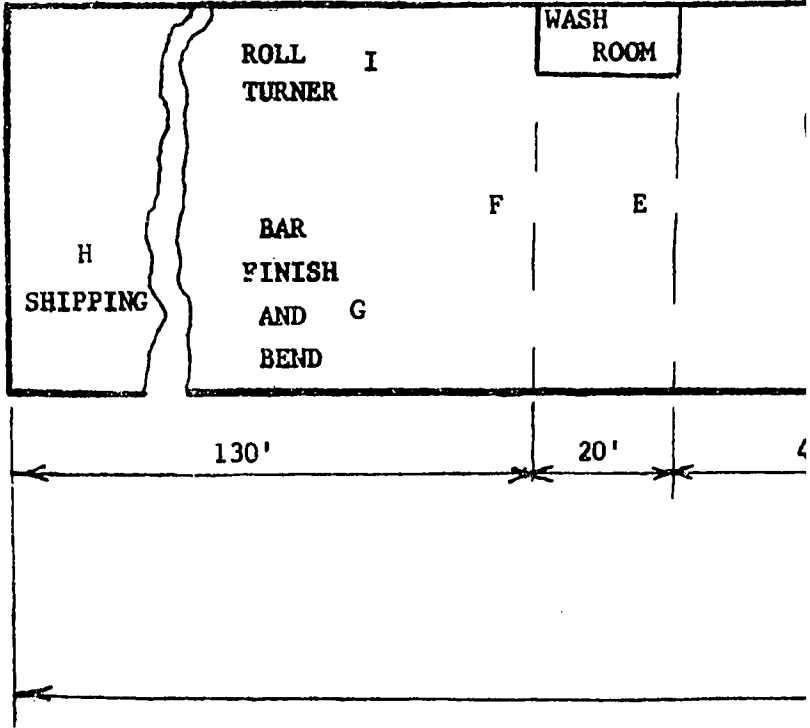
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs		
Direct Materials		\$1,550,000
Direct Labor		267,000
Manufacturing Overhead(a)		179,000
Admin. Costs(b), Contingencies		35,000
Sales Costs(c), Bad Debts		40,000
Depreciation on Fixed Capital		56,000
Total		\$2,127,000
b. Annual Sales Revenue		\$2,325,000

STEEL BARS AND SHAPES, 15,000 TONS ANNUALLY: S.I.C. 3312

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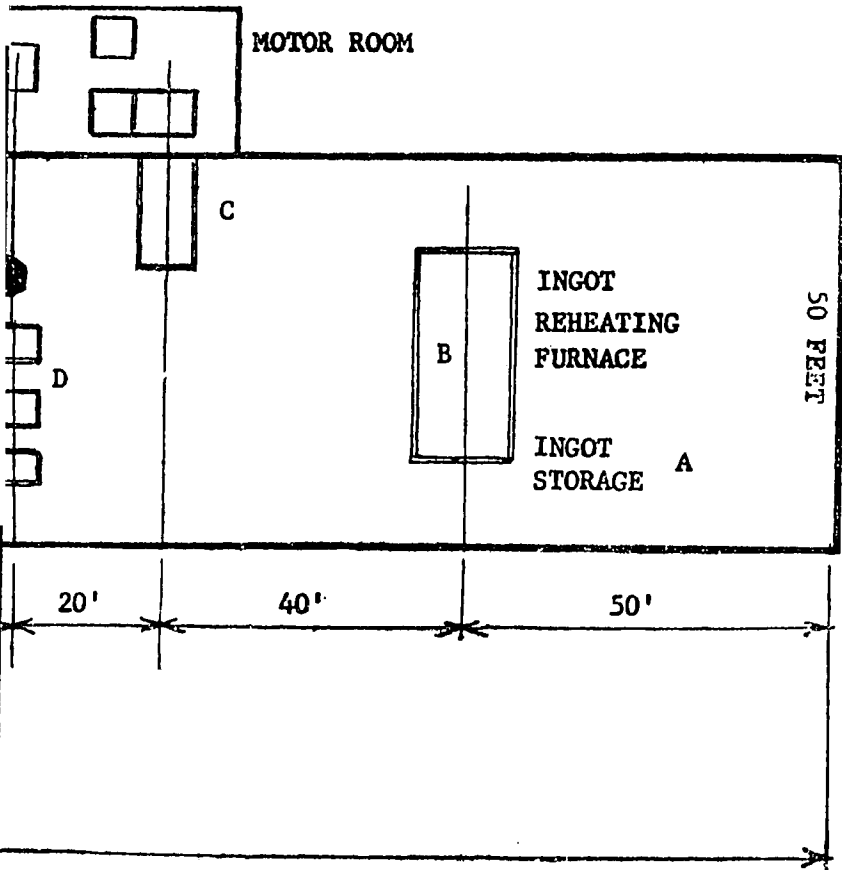
STEEL BARS AND SHAPES
PLANT LAYO



- A. Ingot storage
- B. Reheating furnace
- C. Rough roll stand 16"
- D. 3-roll stands 10"
- E. Cooling floor

S ANNUALLY : S. I. C. 3312

ORK FLOW



- F. Cut to length
- G. Bend if specified
- H. Bundling and Shipping
- I. Roll turning

STEEL BARS AND SHAPES, 15,000 TONS ANNUALLY: S. I. C. 3312

SELECTED REFERENCES

I TEXTBOOKS

- A. Elements of Steelmaking Practice. J. D. Sharp. 1965.
Pergamon Press
44-01 21st Street, Long Island City, N. Y. 11101
- B. Engineers's Guide to Steel. Albert Hanson and J. G. Parr. 1965. \$13.75.
Addison-Wesley Publishing Co., Inc.
Reading, Mass. 01867
- C. Metallurgy of the Ferrous Metals. W. H. Dennis. 1964. \$16.50.
Pitman Publishing Corporation
20 East 46th Street, New York, N. Y. 10017
- D. Dictionary of Metallurgy. A. D. Merriman. 1959. \$25.00.
Pitman Publishing Corporation
20 East 46th Street, New York, N. Y. 10017
- E. The Making, Shaping and Treating of Steel. J. M. Camp and C. B. Francis. 7th Edition, 1957. \$7.50.
United States Steel Company
525 William Penn Place, Pittsburgh, Pa. 15219
- F. Encyclopedia of the Iron and Steel Industry. A. K. Osborne. \$25.00.
Philosophical Library
15 East 40th Street, New York, N. Y. 10016
- G. Ferrous Process-Metallurgy. J. L. Gray. 1954. \$6.50.
John Wiley and Sons, Inc.
605 Third Avenue, New York, N. Y. 10016
- H. Steel Products Manual of the American Iron and Steel Institute. About
30 pamphlets, each covering a special area of the steel industry. \$.25 each.
American Iron and Steel Institute
350 Fifth Avenue, New York, N. Y. 10001

II. U. S. GOVERNMENT PUBLICATION

- A. Method of Steel Processing. IR-10172. Gratis.
Agency for International Development
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- A. The Iron Age. Weekly. \$25.00/year.
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- B. Steel. Weekly. \$20.00/year.
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- C. Metal Progress. Monthly. \$7.00/year.
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- G. Patent No. 2,400,690. May 21, 1948. 8 pp.
Rolling of metal bars of various sectional shapes, commonly known as merchant bars or shapes.
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Rolling mills and the construction and arrangement of mills for rolling metal bars of various cross sections, commonly known as merchant bars.

V. TRADE ASSOCIATIONS

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- B. American Institute of Steel Construction
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- B. Blaw-Knox Company
Farmers Bank Building, 301 Fifth Avenue, Pittsburgh, Pa. 15222
- C. Mesta Machine Company
West Homestead, Pittsburgh, Pa. 15212

VII. DIRECTORY

- A. Standard Metal Directory
National Business Press, Inc,
425 West 25th Street, New York, N. Y. 10001

STEEL BARS AND SHAPES, 15,000 TONS ANNUALLY: S. I. C. 3312

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

STEEL BARS AND SHAPES, 30,000 TONS ANNUALLY

I. P. No. 66244

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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.

A. PRODUCT DESCRIPTION

Hot-rolled reinforcing bars and merchant shapes, made from steel billets or ingots.

B. GENERAL EVALUATION

This plant requires a very substantial capital and a considerable amount of skilled labor, even though by the standards of the steel industry it is a comparatively small operation. The market area of such a plant would almost certainly be mainly domestic and possibly somewhat localized even in the domestic market. Within this geographical area, which would be delimited by the delivered price at which it would be possible to sell in competition with producers in other locations, there would need to be a sufficient volume of construction and industrial activity to absorb the plant's output. A project such as this should be preceded by a full-scale feasibility study which should include a detailed investigation of freight rates and transport facilities and of delivered prices of the products coming from other producing areas.

C. MARKET ASPECTS

1. USERS. Construction enterprises, industries, metal manufacturers merchants.
2. SALES CHANNELS AND METHODS. Sales are made direct to users and to wholesale merchants.
3. GEOGRAPHICAL EXTENT OF MARKET. In some countries transport charges set comparatively narrow limits to the domestic market area within which it is possible for a particular plant to sell its products in competition with other supplies. However, where supply points are located very far apart, or where, as in the case of some countries, there is only one supply point, steel products may be sent very long distances, particularly if inland waterways or coastal shipping provide low-cost transport. Steel products of this type are a common export of the major steel-producing countries.
4. COMPETITION. Competition from imports is likely to be keen. In some developing areas demand for steel for construction purposes may be limited by competition from substitute materials available at low cost. This plant might, if advantageously located, make some sales in neighboring countries but is too small to embark on general international trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. As indicated above, the market area is likely to be comparatively restricted in size. Within the area in which it is feasible to sell profitably there would evidently have to be a considerable volume of construction activity and a fair measure of industrial development.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 30,000 Tons

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 10 acres.	\$ --
Building. One story, 60'x400'x18' high to provide for bridge crane, steel frame, sheet metal sides & roof. Building 30'x60' for electrical equipment. Office, 1,000 sq. ft.	200,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$920,000
Other tools & equipmt.	10,000
Furniture & fixtures	1,000
Transportation equipmt.	8,000
<u>Total (excl. Land)</u>	<u>\$1,139,000</u>

Principal Items. Reheating furnace with pusher, 16-inch mill complete, 10-inch mill train complete, mill run-out trough, flying shear, pinch rolls, 110 ft. hot bed, cold shear, shear run-out & dump table, cradles, floor plates, crane, roll lathe, bar bender, tools, 5-ton truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$650,000
Admin. Costs(b), Contingencies, Sales Costs (c)	30	10,000
Training Costs		60,000
<u>Total Working Capital</u>		<u>\$720,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$1,859,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. <u>Direct Materials</u>		
Steel billets	33,000 tons	
(less scrap sales)		\$3,100,000

b. Supplies

Lubricants & tools	\$ 12,000
Maintenance, repair parts & replacements	100,000
Office supplies	500
<u>Total</u>	<u>\$112,500</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power</u> . Connected load about 1,500 hp.	\$ 45,000
b. <u>Fuel</u> . About 2,000 tons of bunker C oil annually.	\$ 25,000
c. <u>Water</u> . About 30 million gals. annually for production & general purposes.	\$ 7,000

4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment</u> . 5-ton truck for general purposes.	\$ 1,500
b. <u>External Transport Facilities</u> . In & out shipments average about 6,000 tons a month. Good highways & rail facilities necessary.	

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	12	\$ 72,000
Semi-skilled	24	120,000
Unskilled	72	288,000
<u>Total</u>	<u>108</u>	<u>\$480,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisors	4	\$ 39,000
Office	4	20,000
Other	12	72,000
<u>Total</u>	<u>20</u>	<u>\$131,000</u>

c. Training Needs. Manager & supervisors, with aid of skilled workers, should be able to do all necessary labor training & reach full production in about 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

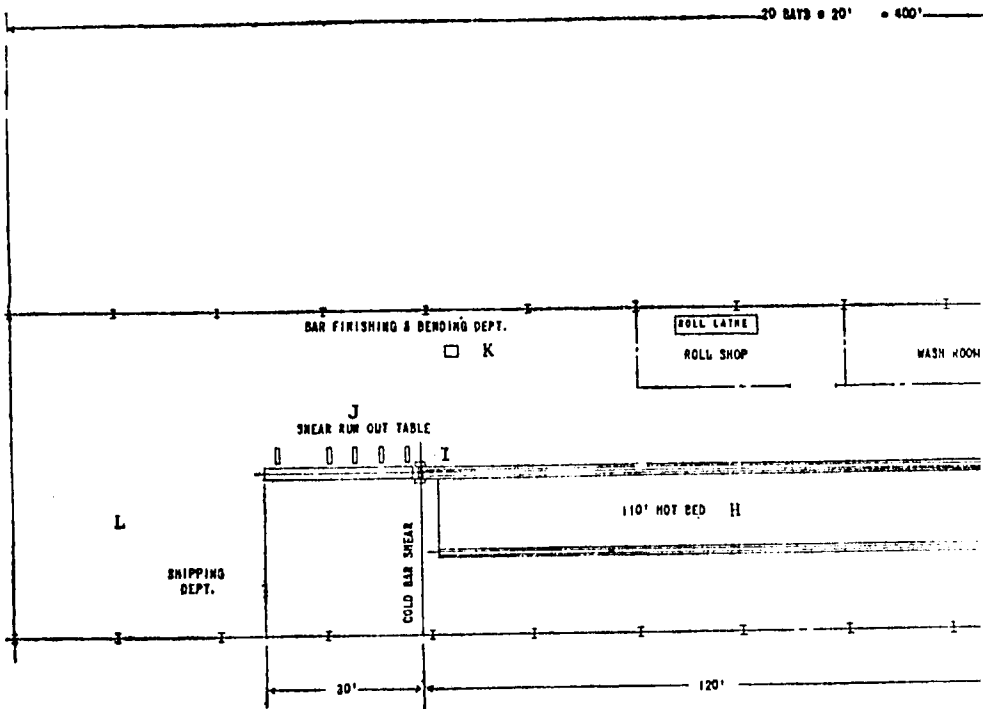
a. <u>Annual Costs</u>	
Direct Materials	\$3,100,000
Direct Labor	480,000
Manufacturing Overhead(a)	322,000
Admin. Costs(b), Contingencies	60,000
Sales Costs (c), Bad Debts	70,000
Depreciation on Fixed Capital	106,000
<u>Total</u>	<u>\$4,138,000</u>
b. <u>Annual Sales Revenue</u>	\$4,650,000

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

STEEL BARS AND SHAPES, 30,000 TONS ANNUALLY: S.I.C. 3312

STEEL BARS AND SHAPES

PLANT LA



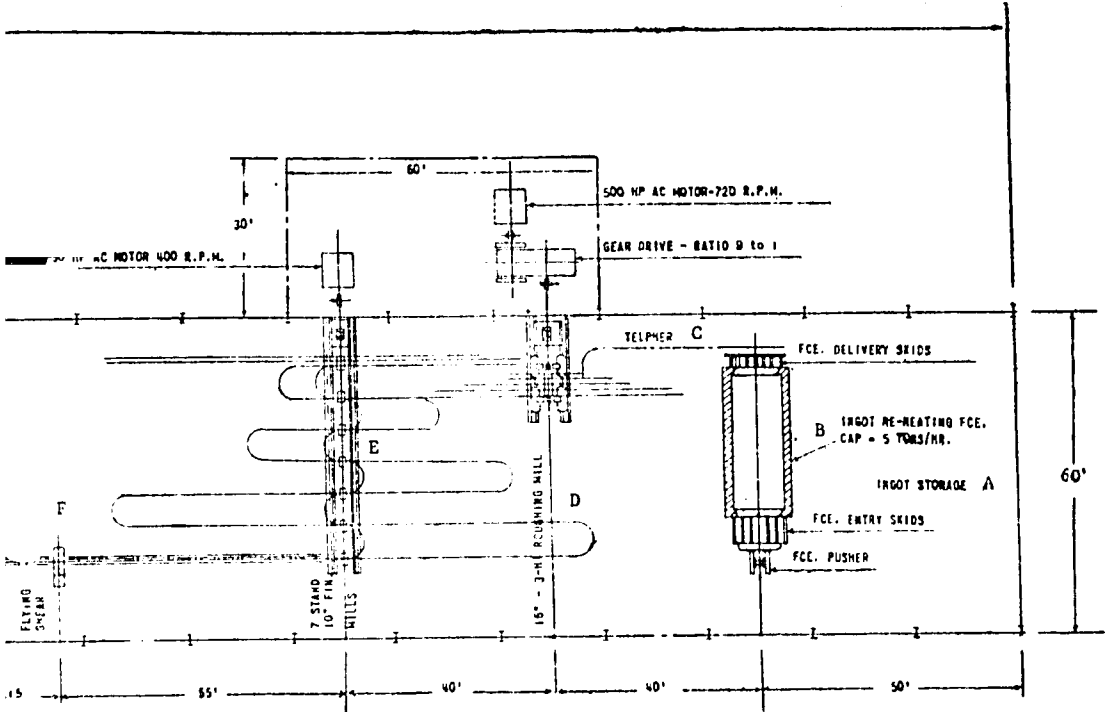
- A. Ingot storage
- B. Ingot reheating furnace
- C. Telfer - hot ingots to furna

- G. Pinch rolls feeds bars to hot
- H. Hot bed
- I. Cuts cold bars to length

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00 TONS ANNUALLY : S.I.C. 3312

AND WORK FLOW



- D. Rough roll stand 16"
- E. 7-10" finish roll stands
- F. Flying shears cuts bars to foot length

- J. Bundle bars that one shipped straight
- K. Bend bars as required
- L. Finished stock and shipping

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STEEL BARS AND SHAPES, 30,000 TONS ANNUALLY: S.I.C. 3312

SELECTED REFERENCES

I. TEXTBOOKS

- A. Elements of Steelmaking Practice. J. D. Sharp. 1965.
Pergamon Press
44-01 21st Street, Long Island City, N. Y. 11101
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- H. Steel Products Manual of the American Iron and Steel Institute. About
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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

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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 BILLETS

I. P. No. 66245

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2/6/57

STEEL BILLETS: Standard Industrial Classification 3312

A. PRODUCT DESCRIPTION

Steel billets or ingots manufactured from steel scrap, for use in a rolling mill making bars and shapes.

B. GENERAL EVALUATION

A plant of this type and size would normally be economically feasible only where steel rolling facilities exist in close proximity. The plant described might, in fact, be considered as a possible adjunct to such a plant as is described in Industry Profile No. IP66269, Steel Bars and Shapes, S.I.C. 3312. While an assured market in the form of associated or nearby rolling facilities is indispensable, it will also generally be the case that, if the plant is to operate profitably, at least the major part of the steel scrap used must be procured at low cost from local sources. Though this is a small plant by the standards of the steel industry, capital and skilled labor requirements are moderately high. Profitable running of steel plants, even those of an elementary character such as that described, presents many problems, and a full-scale feasibility study should be made before starting such a venture.

C. MARKET ASPECTS

As stated above, the direct market outlet would have to be associated or nearby rolling mill facilities. Unless the plant is organized as an integral part of the rolling mill operation, it would have to compete directly with large-scale producers and be able to sell at a delivered price competitive with theirs. It would, of course, have a freight cost advantage over producers distant from the rolling mill facilities and also possibly some advantage through being able to deliver more speedily. These advantages could, however, be easily negated if production costs become too high.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION : 20,000 Tons of Billets

1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		<u>Cost</u>
Land. About 10 acres.		\$ --
Building. One story, 60'x350'x35' high, to permit bridge crane. Steel construction.	150,000	
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$200,000	
Furniture & fixtures	1,500	
Transportation equipmt.	4,500	
<u>Total (excl. Land)</u>		<u>\$356,000</u>

Principal Items. Six-ton furnace, ingot casting molds, 2 ten-ton ladles, charging equipment including magnet, charging buckets & closing stands, chemical analysis equipment, pickup truck.

b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$245,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	8,500
Training Costs		15,000
<u>Total Working Capital</u>		<u>\$269,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$625,000

2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Steel scrap	22,000 tons	\$1,100,000
Ferrous alloys, iron ore		45,000
Lime or limestone		10,000
Magnesite & dolomite		10,000
<u>Total</u>		<u>\$1,165,000</u>

b. Supplies

Furnace linings, electrodes & spare parts	\$ 50,000
Ladle stopper rods & repairs	20,000
Oxygen, lubricants, tools	5,000
Stripping equipment, stools & mold preparation materials & chemicals	5,000
Office supplies	200
<u>Total</u>	<u>\$ 80,200</u>

3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> About 500 kw-hr an hour.	<u>Annual Cost</u>
	<u>\$ 80,000</u>
b. <u>Fuel.</u> For heating office, also plant when furnace not operating.	<u>\$ 500</u>
c. <u>Water.</u> For production, sanitation & fire protection.	<u>\$ 500</u>

4. TRANSPORTATION

	<u>Annual Operating Cost</u>
a. <u>Own Transport Equipment.</u> 2-ton truck for general purposes.	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> Total in & out shipments about 4,000 tons a month. Good highways & rail facilities necessary.	

5. MANPOWER

a. <u>Direct Labor</u>	<u>Number</u>	<u>Annual Cost</u>
Skilled	9	\$ 54,000
Semi-skilled	3	15,000
Unskilled	9	36,000
<u>Total</u>	<u>21</u>	<u>\$105,000</u>
b. <u>Indirect Labor</u>		
Manager & Chemist	2	\$ 22,000
Office	2	10,000
Other	2	9,000
<u>Total</u>	<u>6</u>	<u>\$ 41,000</u>

c. Training Needs. Manager & chemist should be experienced. With assistance of 3 skilled operators, they should be able to do all necessary labor training. Plant should reach full production in about 2 months.

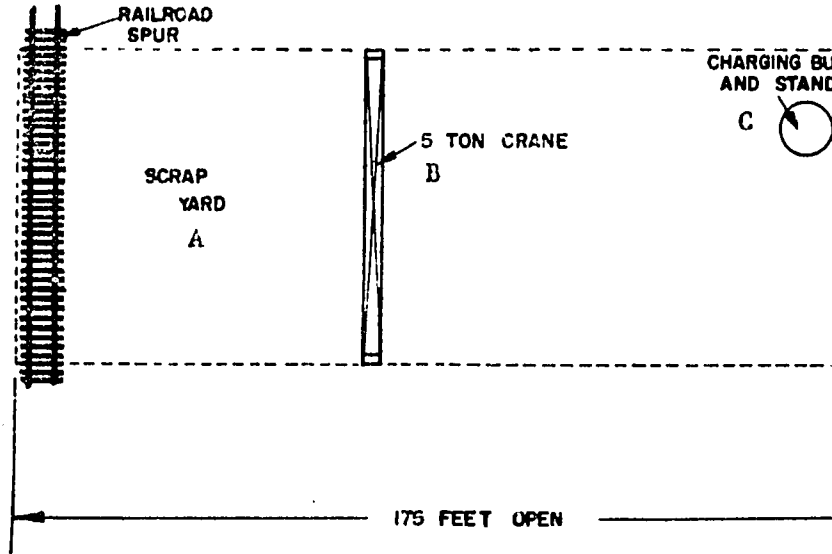
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$1,165,000
Direct Labor	105,000
Manufacturing Overhead (a)	203,200
Admin. & Sales Costs (b), Contingencies, Bad Debts,	100,000
Depreciation on Fixed Capital	28,800
<u>Total</u>	<u>\$1,602,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$1,800,000</u>

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

STEEL

PLANT LA



THE FLOW OF PRODUCTION IS CONTINUOUS FROM THE SCRAP YARD TO THE INGOT TRANSFER. THERE IS NO BACK TRACKING

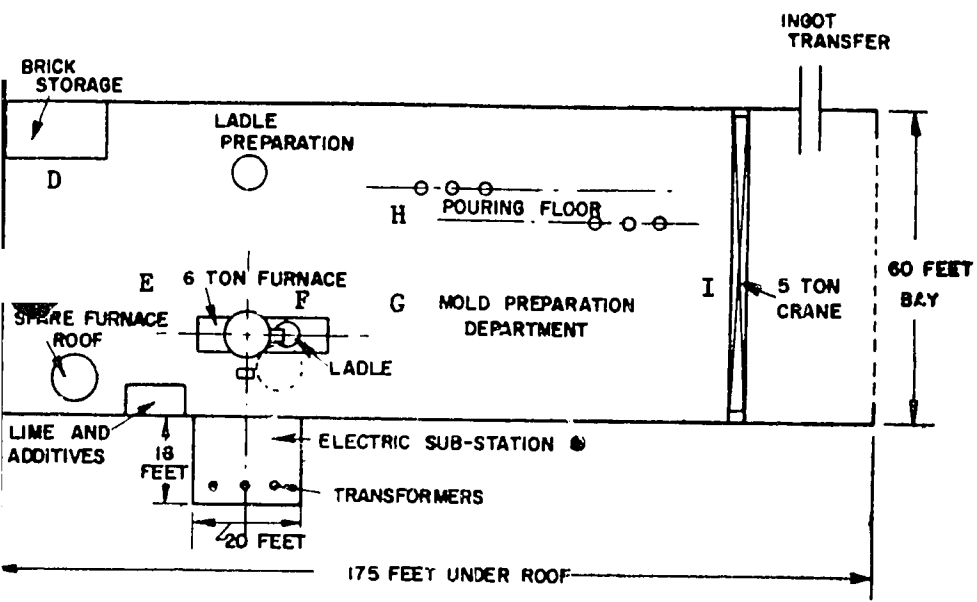
- A. Scrap yard
- B. 5-ton traveling crane
- C. Charging bucket loaded here
- D. Refractory brick storage
- E. 6-ton furnace

- F. Po
- G. M
- H.
- I.

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ETS S.I.C. 3312

AND WORK FLOW



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paration
olds
for pouring and removing fillets

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STEEL BILLETS: S.I.C. 3312

SELECTED REFERENCES

I. TEXTBOOKS

- A. Elements of Steelmaking Practice. J. D. Sharp. 1965.
Pergamon Press
44-01 21st Street, Long Island City, N. Y. 11101
- B. Engineer's Guide to Steel. Albert Hanson and J. G. Parr. 1965. \$13.75.
Addison-Wesley Publishing Co., Inc.
Reading, Mass. 01867
- C. Metallurgy of the Ferrous Metals. W. H. Dennis. 1964. \$16.50.
Pitman Publishing Corporation
20 East 46th Street, New York, N. Y. 10017
- D. Dictionary of Metallurgy. A. D. Merriman. 1959. \$25.00.
Pitman Publishing Corporation
20 East 46th Street, New York, N. Y. 10017
- E. The Physical Chemistry of Steel Making. J. F. Elliott. 1958. 258 pp.
Illus. \$17.50.
The M.I.T. Press
Cambridge, Mass. 02142
- F. The Making, Shaping and Treating of Steel. J. M. Camp and C. B.
Francis. 7th edition. 1957. \$7.50.
United States Steel Company
525 William Penn Place, Pittsburgh, Pa. 15219
- G. Encyclopedia of the Iron and Steel Industry. A. K. Osborn. \$25.00.
Philosophical Library
15 East 40th Street, New York, N. Y. 10016
- H. Ferrous Process-Metallurgy. J. L. Gray. 1954. \$6.50.
John Wiley and Sons, Inc.
605 Third Avenue, New York, N. Y. 10016
- I. Steel Products Manual of the American Iron and Steel Institute. About
30 pamphlets, each covering a special area of the steel industry. \$.25 each.
American Iron and Steel Institute
350 Fifth Avenue, New York, N. Y. 10001

II. U. S. GOVERNMENT PUBLICATION

- A. Method of Steel Processing. IR-19172. Gratis.
Agency for International Development
Washington, D. C. 20523

SELECTED REFERENCES (Continued)

III. PERIODICALS

- A. The Iron Age. Weekly. \$25.00/year.
Chilton Company
Chestnut and 56th Streets, Philadelphia, Pa. 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. 3,197,988. Aug. 3, 1965. 3 pp.
Apparatus for hot rolling slabs and structural shapes.
- B. Patent No. 2,959,992. Nov. 15, 1960. 5 pp.
Master control device for rolling mills and the like.

V. TRADE ASSOCIATIONS

- A. American Iron and Steel Institute.
150 East 42nd Street, New York, N. Y. 10017
- B. American Institute of Steel Construction
101 Park Avenue, New York, N. Y. 10017
- C. Steel Service Center Institute
540 Terminal Tower, Cleveland, Ohio 44113

VI. ENGINEERING COMPANIES

- A. Albert Curry and Company, Inc.
941 Oliver Building, Pittsburgh, Pa. 15222
- B. Blaw-Knox Company
Farmers Bank Building, 301 Fifth Avenue, Pittsburgh, Pa. 15222
- C. Mesta Machine Company
West Homestead, Pittsburgh, Pa. 15212

VII. DIRECTORIES

- A. Penton's Foundry List. \$15.00.
Penton Publishing Company
1213 West 3rd Street
Cleveland, Ohio 44113
- B. Standard Metal Directory
National Business Press, Inc.
425 West 25th Street, New York, N. Y. 10001

STEEL BILLETS: S.I.C. 3312

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INDUSTRY PROFILES

ELECTROPLATING

I. P. No. 66246

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ELECTROPLATING: Standard Industrial Classification 3471

A. PRODUCT DESCRIPTION

Nickel plating and anodizing of various kinds of metals. Plating with other metals, as zinc, chrome, tin and copper, can be done in this plant by adding suitable tanks.

B. GENERAL EVALUATION

Capital requirements for this plant are modest. Export management is required, and a fairly large proportion of the labor must be skilled. This industry has a wide range of potential customers, including a variety of industries needing plated machinery, jewelry manufacturers requiring items to be plated, etc. Production can be readily expanded at small cost if demand grows. Many developing areas should be able to support a plant of this kind, as industry develops. (For a small plant of this kind, see Industry Profile No. IP66141, Plating: S. I. C. 3471).

C. MARKET ASPECTS

1. USERS. A variety of industries and machinery repair establishments, individuals for non-industrial items.
2. SALES CHANNELS AND METHODS. Sales are mostly made direct to users. Retail establishments may farm out work to be done for their customers. Publicity in trade directories and journals is usually desirable.
3. GEOGRAPHICAL EXTENT OF MARKET. The market for such work is predominantly a local one.
4. COMPETITION. Competition will generally be confined to similar establishments, if any, located in the same market area. Large industrial plants which have a regular and large need for plating often have their own plating departments.
5. MARKET NEEDED FOR PLANT DESCRIBED. An area with a considerable number of machine and other metal using industries would be needed to provide a market.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: \$ 150,000 of Job Work

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		Cost
Land.	About 1/2 acre.	\$ --
Building.	One story, 60' x 100'	30,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$ 20,000	
Other tools & equipmt.	1,000	
Furniture & fixtures	500	
Transportation equipmt.	2,500	24,000
Total (excl. Land)		<u>\$ 54,000</u>

Principal Items. 6 solution tanks, 3 cleaning tanks, 3 rinse tanks, anodizing tanks, 2 converters, refrigeration unit, boiler, air filter & blower, exhaust fan, buffing wheel, titanium rack, benches, delivery truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct		
Labor, Mfg. Overhead(a)	60	\$ 15,600
Admin. Costs(b), Contingencies,		
Sales Costs(c)	30	1,000
Training Costs		4,400
Total Working Capital		<u>\$ 21,000</u>

c. **TOTAL CAPITAL (EXCL. LAND)** \$ 75,000

2. MATERIALS AND SUPPLIES

a. Direct Materials		Annual Requirements	Annual Cost
Nickel sulfate	17,300 lbs		\$ 5,700
Nickel chloride	3,400 lbs		1,020
Boric acid	2,300 lbs		120
Anodizing dyes			60
Packing materials			300
Total			<u>\$ 7,200</u>

b. Supplies

Lubricants & hand tools	\$ 100
Cutting tools & abrasives	100
Maintenance & spare parts	1,000
Office supplies	200
Total	<u>\$ 1,400</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 120,000 kw-hr annually.	<u>\$ 2,400</u>
b. Fuel. About 14,000 gals. oil annually.	<u>\$ 1,700</u>
c. Water. About 3.2 million. gals. annually for production & general purposes.	<u>\$ 800</u>

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Small truck for delivery & pickup.	<u>\$ 1,000</u>
b. External Transport Facilities. No special requirements.	

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	5	\$ 30,000
Semi-skilled	5	25,000
Unskilled	1	4,000
Total	<u>11</u>	<u>\$ 59,000</u>
b. Indirect Labor		
Manager	1	\$ 10,000
Office	1	5,000
Driver	1	5,000
Total	<u>3</u>	<u>\$ 20,000</u>

c. **Training Needs.** Manager, with aid of skilled workers, should be able to do any necessary labor training & reach full operation in about a month.

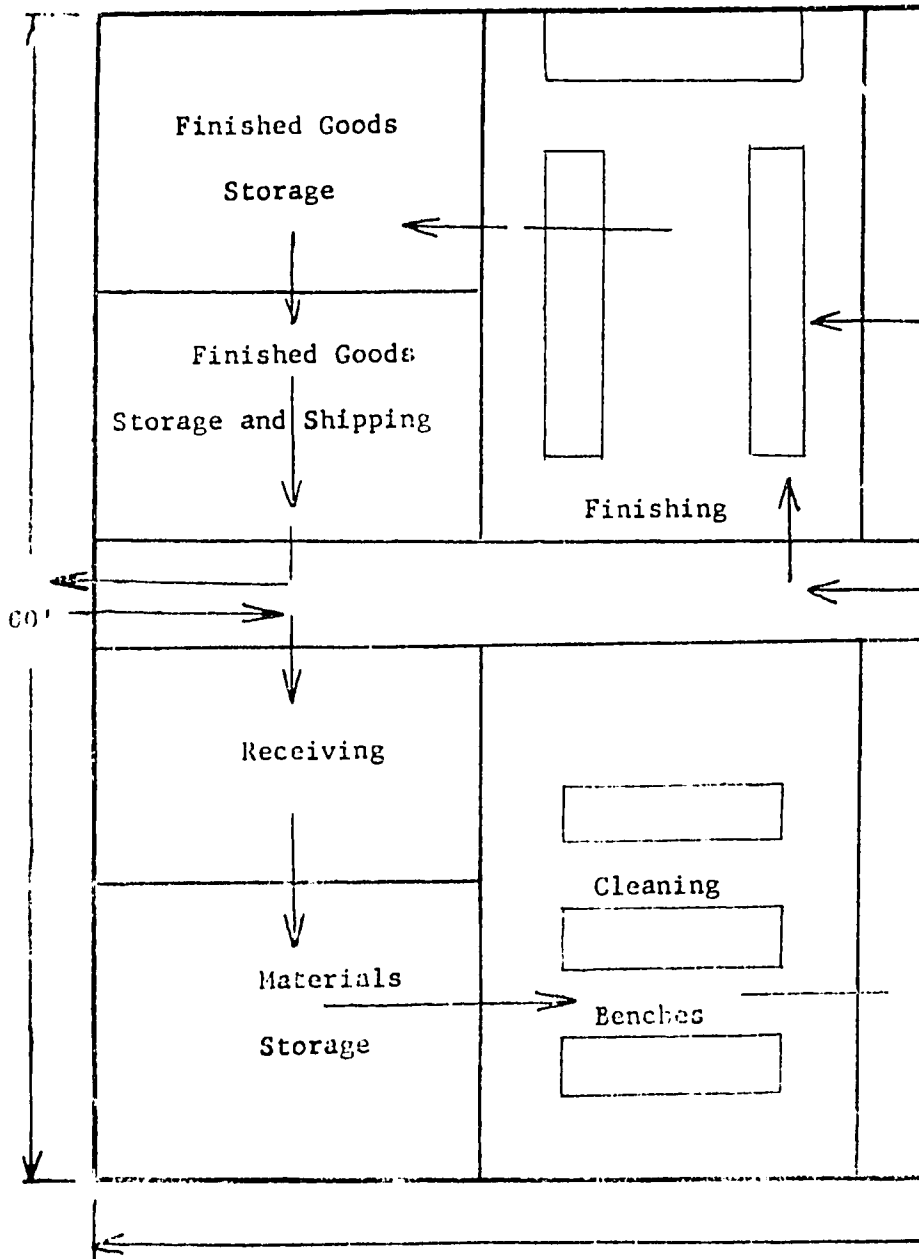
6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs		
Direct Materials		\$ 7,200
Direct Labor		59,000
Manufacturing Overhead(a)		27,300
Admin. Costs(b), Contingencies		7,000
Sales Costs(c), Bad Debts		6,000
Depreciation on Fixed Capital		4,400
Total		<u>\$110,900</u>

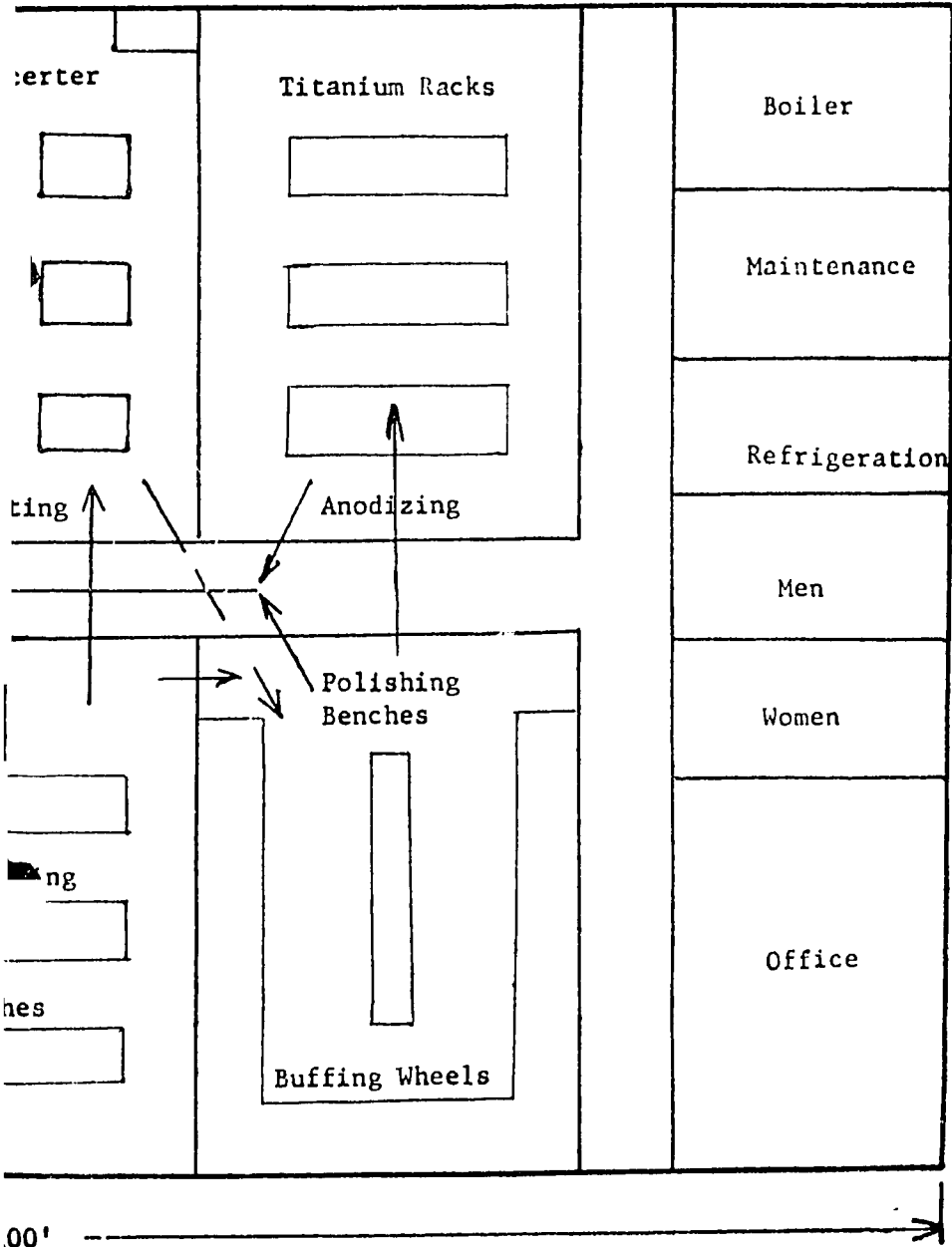
b. **Annual Sales Revenue** \$150,000

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

ELECTROP
PLANT LAY



: S. I. C. 3471
WORKFLOW



ELECTROPLATING: S. I. C. 3471

SELECTED REFERENCES

I. TEXTBOOKS

- A. Handbook of Industrial Electroplating. E. A. Allard and E. B. Smith. 3rd edition. 1964. \$12.00.
American Elsevier Publishing Co. Inc.
52 Vanderbilt Avenue, New York, N. Y. 10017
- B. Modern Electroplating. Frederick A. Lowenheim. 2nd edition. 1963. \$16.00.
John Wiley and Sons, Inc.
605 Third Avenue, New York, N. Y. 10016
- C. Protective Coatings for Metals. R. M. Burns and W. W. Bradley. 1955. 657 p. Illus. \$12.50.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022
- D. Electroplating Engineering Handbook. A K. Graham, editor. 1955. 650 p. \$10.00.
Reinhold Publishing Corporation
430 Park Avenue, New York, N. Y. 10022

II. U. S. GOVERNMENT PUBLICATIONS

- A. Electroplating. IR 29956. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523
- B. Electroplating - Bibliography. CIR-1081. Gratis.
Office of Technical Cooperation and Research
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Metal Finishing. Monthly. \$10.00/year.
Metals and Plastics Publications, Inc.
381 Broadway, Westwood New Jersey 07675
Plating of metals as well as other finishing processes and methods.
- B. Plating. Monthly. \$8.00/year.
American Electroplaters' Society, Inc.
445 Broad Street, Newark, New Jersey 07102
Devoted to the advancement of metal finishing, electroplating, and allied arts.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,986,498. 1961. 4 p.
Process for the production of metal electro-deposits.
- B. Patent No. 2,975,120. 1961. 3 p.
Electroplating apparatus.
- C. Patent No. 2,973,308. 1961. 8 p.
Complexed plating electrolyte and method of plating therewith.
- D. Patent No. 2,888,387. 1959. 2 p.
Process for electroplating.
- E. Patent No. 2,873,233. 1959. 4 p.
Method of electrodepositing metals.

V. TRADE ASSOCIATION

- A. American Electroplaters Society
443 Broad Street
Newark, N. J. 07102

VI. ENGINEERING COMPANIES

- A. Gates Engineering Company
50 Kern Avenue
Wilmington, Delaware 19899
Chemical and corrosion protection.
- B. Morrill and Moeller, Inc.
2305 West 18th Street
Chicago, Ill. 60616
Finishing, coating, and spraying engineers.
- C. Metal Electric Processing Company
705 Miami Street
Toledo, Ohio 43605
Design, engineering and construction of electrical metal processing plants.

VII. DIRECTORY

- A. Metal Finishing Guidebook Directory. Annual. \$5.00.
Metals and Plastics Publishers, Inc.
381 Broadway
Westwood, New Jersey 07675
Lists suppliers and manufacturers to the metal finishing field.

PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

SPECULAR REFLECTORS

I. P. No. 66247

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SPECULAR REFLECTORS: Standard Industrial Classification 3642

A. PRODUCT DESCRIPTION

Specular reflectors, 12 inches in diameter and 2 inches deep, made from sheet aluminum and vacuum-metalized. Other sizes of specular reflectors, as well as sealed beam reflector units for automobiles and motorcycles, can be made with the equipment.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderately low. Manufacturing operations are fairly simple. The uses for these reflectors are many, and in areas where transport and other facilities are being developed the prospects for a plant of this kind should be reasonably good.

C. MARKET ASPECTS

1. USERS. Automobiles of all kinds, motorcycles, railroads, harbors, airports, parks, advertising sign makers, etc.
2. SALES CHANNELS AND METHODS. Sales are made to users and to wholesalers. An active sales force is necessary to promote use of the products.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are easy to handle and transport costs are low in relation to product value. They are often shipped long distances, both domestically and internationally.
4. COMPETITION. If costs are reasonable it should be possible to meet import competition. The plant might make some exports to neighboring countries but is too small to develop any large volume of export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Since the market would almost certainly be predominantly local, the plant would need to have easy access to a fairly large and reasonably prosperous urban community, where transport and other kinds of development are taking place.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 75,000 Reflectors

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land. About 1/2 acre.	\$ ---
Building. One story, 60'x100'.	36,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$51,000	
Other tools & equipmt. 8,700	
Furniture & fixtures 800	
Transportation equipmt. 2,500	
Total (excl. Land)	\$ 99,000

Principal Items. 3 spinning lathes, 3 lathe modifiers, square shears, circle cutter, portable electric drill, bench grinder, welding equipment, gas annealer, compressor, 6 rack trucks, 48" vacuum metalizer, baking oven, lacquer dip tank, power punch, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 42,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	6,300
Training Costs		3,500
Total Working Capital		\$ 52,000

c. TOTAL CAPITAL (EXCL. LAND) \$151,000

2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
.064" sheet aluminum	75,000 14" sqs.	\$ 9,000
Tallow & degreaser		300
Lacquer & reducer	1,500 gals.	3,750
Lamps	75,000	56,250
Elec. fittings	75,000	15,000
Lens & lens clamps	75,000 ea.	22,500
Steel bars for U-clamps	75,000	3,700
Bolts & sealer		6,000
Tungsten & aluminum wire		1,500
Packaging		15,000
Total		\$133,000

b. Supplies

Lubricants & hand tools	\$ 400
Maintenance & spare parts	2,000
Dies	1,000
Welding rods	200
Office supplies	300
Total	\$ 3,900

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 30 hp. connected load.	\$ 800
b. Fuel. Gas for production & heating.	\$ 500
c. Water. For production, sanitation & fire protection.	\$ 100

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton truck for general purposes.	\$ 1,000
b. External Transport Facilities. requirements.	No special

5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	4	\$ 24,000
Semi-skilled	9	45,000
Unskilled	3	12,000
Total	16	\$ 81,000
b. Indirect Labor		
Manager & supervisor	2	\$ 18,000
Driver	1	5,500
Office	2	10,000
Total	5	\$ 33,500

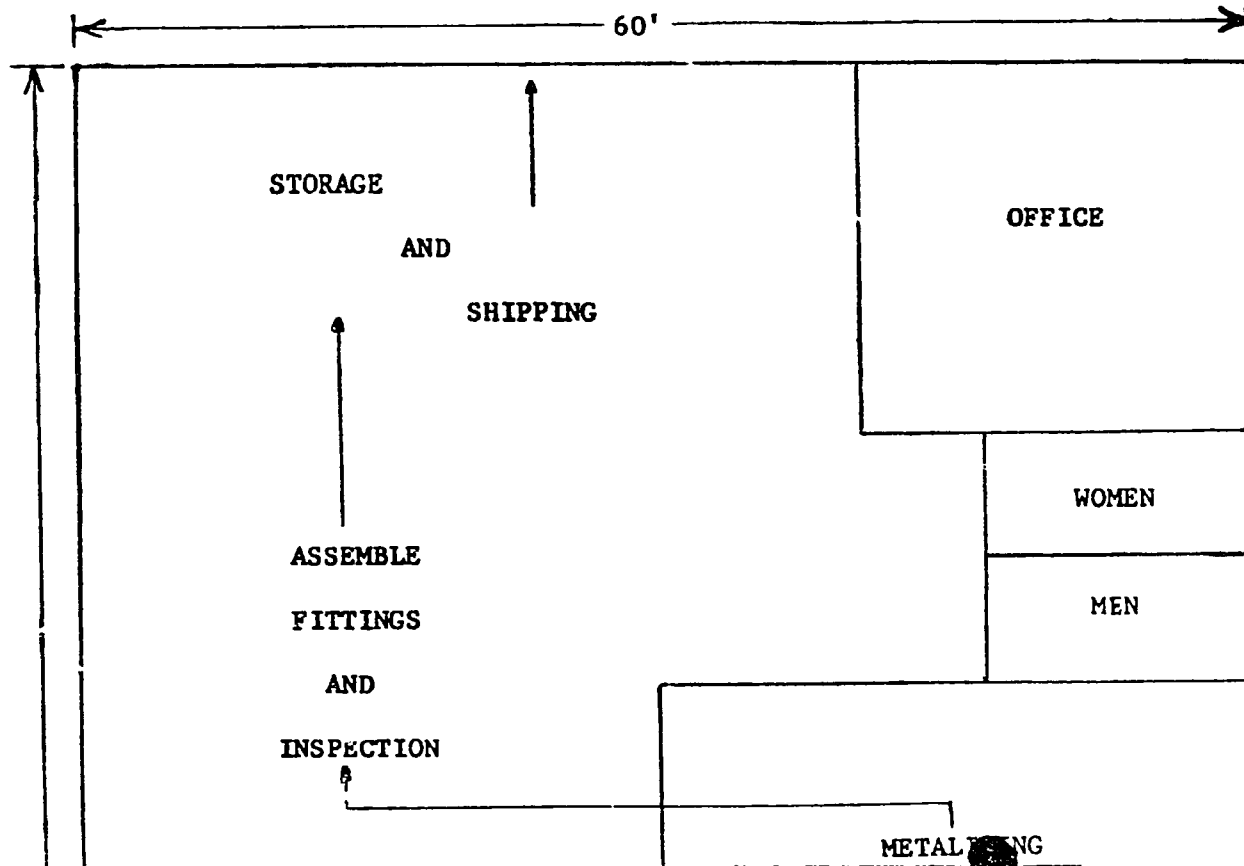
c. Training Needs. Manager & foreman should be experienced. With 4 skilled workers they should be able to train others & reach full production in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$133,000
Direct Labor	81,000
Manufacturing Overhead(a)	39,800
Admin. Costs(b), Contingencies	35,000
Sales Costs(c), Bad Debts	45,000
Depreciation on Fixed Capital	9,400
Total	\$343,200
b. Annual Sales Revenue	\$400,000

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

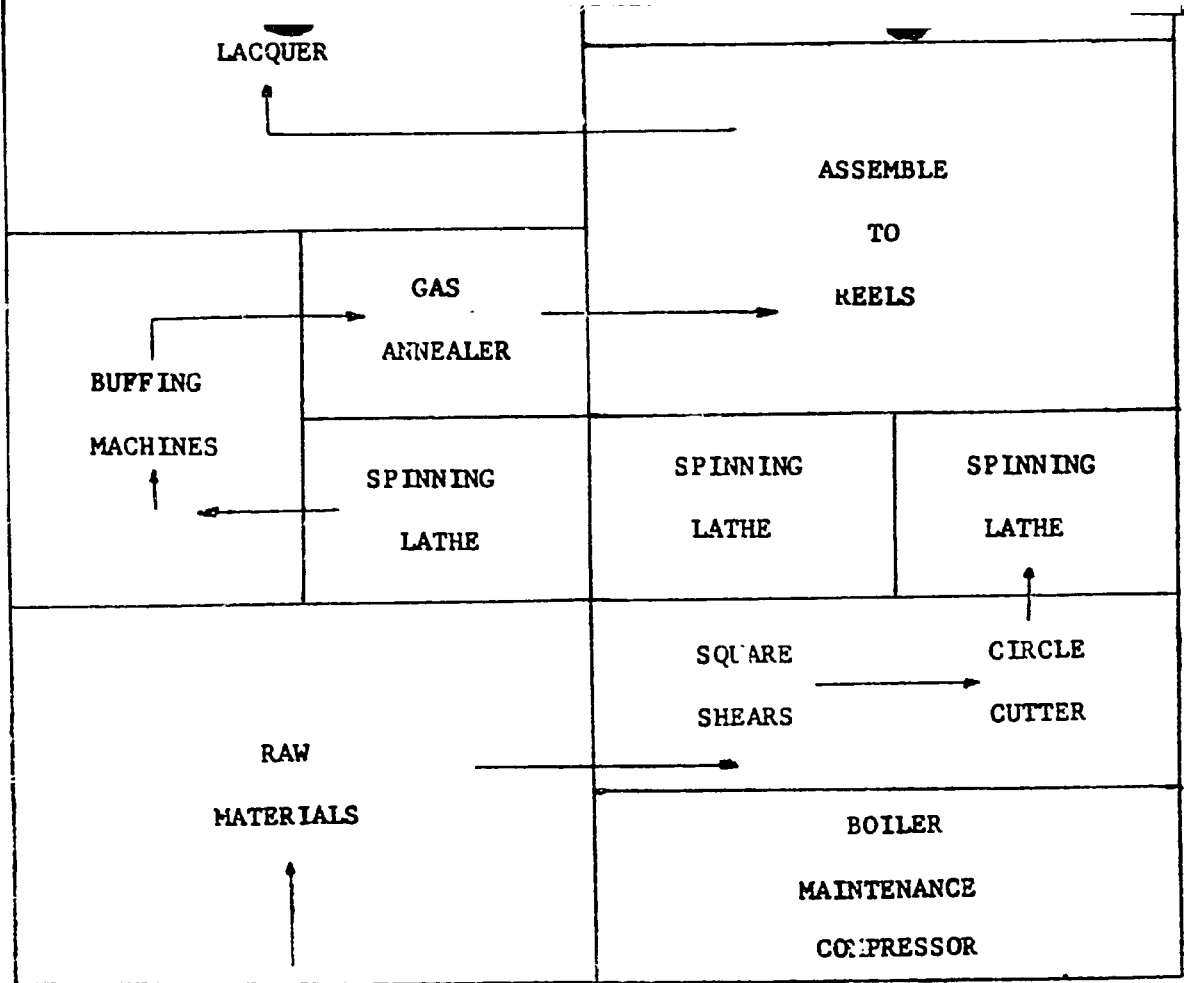
PLANT LAYOUT AND WORKFLOW



SPECULAR REF

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100'



S : S. I. C. 3642

SPECULAR REFLECTORS: S. I. C. 3642

SELECTED REFERENCES

I. TEXTBOOK

- A. Fabricated Materials and Parts. T. C. DuMond. 1953. 338 p.
\$6.50.
Reinhold Publishing Corporation
430 Park Avenue
New York, N. Y. 10022
Production and design factors, description of processes used in fabricatio
of spun metal articles.

II. U. S. GOVERNMENT PUBLICATION

- A. Specular Reflectors. TI-82. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Machinery. Monthly. \$7.00/year.
Industrial Press
93 Worth Street
New York, N. Y. 10013
- B. American Machinist. Bi-weekly. \$25.00/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. 2,997,760. 1961. 8 p.
Continuous vacuum metal casting process.
- B. Patent No. 2,991,518. 1961. 5 p.
Apparatus and method of casting in which the vacuum process is used.
- C. Patent No. 2,960,950. 1960. 6 p.
Method of making reflectors by metal spinning process.

V. TRADE ASSOCIATION

- A. National Metal Spinners Association
130 Clinton Street
Brooklyn, N. Y. 11201

SELECTED REFERENCES (Continued)

VI. ENGINEERING COMPANIES

- A. Lyon Machinery Builders, Inc.
904 Hotop Street
Kalamazoo, Mich. 49001
Machinery and engineering service for metal-working industry.
- B. F. J. Stokes Corporation
5500 Tabor Road
Philadelphia, Pa. 19120
Vacuum metalizing equipment and machinery and engineering services
connected therewith.

VII. DIRECTORY

- A. American Machinist/Metalworking Manufacturing Buyer's Guide and
Production Review. Annual. \$1.50.
McGraw-Hill Publishing Company, Inc.
330 West 42nd Street
New York, N. Y. 10036
Lists manufacturers of machinery, equipment, materials, and supplies to
the metalworking 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

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GENERAL INFORMATION

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INDUSTRY PROFILES

TEXTBOOK PUBLISHING

I. P. No. 66248

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.

TEXTBOOK PUBLISHING: Standard Industrial Classification 2731

A. PRODUCT DESCRIPTION

Various types and sizes of textbooks and workbooks.

B. GENERAL EVALUATION

This plant requires a large amount of capital and skilled labor, as well as competent management. In advanced countries competition in this business is keen and well-organized sales promotion is indispensable. Careful study of the market is an essential preliminary. In some cases a start may have been made in the business on a small scale, and a plant such as this might be appropriate to the situation where an existing concern wishes to expand. With the spread of education, there may be good prospects for a plant of this kind in a number of developing areas.

C. MARKET ASPECTS

1. USERS. Schools, libraries, offices, individuals.
2. SALES CHANNELS AND METHODS. Sales to distributors and direct to large users. An active sales force and advertising are necessary.
3. GEOGRAPHICAL EXTENT OF MARKET. Textbook distribution may be nation-wide. Large textbook houses often do a significant volume of export business.
4. COMPETITION. a. Domestic Market. Competition is usually keen, and a firm's competitive position depends on the quality and suitability of its products and the vigor with which sales promotion is carried on. b. Export Market. Export possibilities will depend on the type of textbooks produced. Language-teaching books are exported in substantial volume, and there are also overseas sales for advanced textbooks on scientific subjects, etc.
5. MARKET NEEDED FOR PLANT DESCRIBED. Conditions vary so widely in different areas in relation to demand for textbooks that no generalization is possible. A very careful survey of market prospects is called for.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - TWO-SHIFT OPERATION: 5 Million Textbooks and Workbooks

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		Cost
Land. About 3 acres.		\$ --
Building. One story, 290'x175', with utilities & maintenance facilities in basement.	240,000	
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$450,000	
Other tools & equipmt.	5,000	
Furniture & fixtures	5,000	
Transportation equipmt.	12,000	
	472,000	
Total (excl. Land)	<u>\$712,000</u>	

Principal Items. Letterpress rotaries, large offset press, small offset press, automatic typesetting machines, folders, gathering machine, stitching machine, binder, building in machine, cutters, drills, packing machines, stencil machine, addressing machine, fork lift trucks, 3 delivery trucks.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$396,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	12,500
Training Costs		70,000
Total Working Capital		<u>\$479,000</u>

c. **TOTAL CAPITAL (EXCL. LAND)** \$ 1,191,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Paper	1,350 tons	\$864,000
Ink	220 tons	18,000
Typesetting materials		8,200
Thread		1,200
Fabric		104,000
Cardboard		4,800
Glue		800
Packaging materials		5,000
Total		<u>\$1,006,000</u>

b. Supplies

Lubricants	\$ 400
Maintenance & spare parts	15,000
Office supplies	2,300
Total	<u>\$ 17,700</u>

3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 63,000 kw-hr annually.	
	<u>\$ 1,200</u>
b. Fuel. About 7,500 gals. oil annually.	
	<u>\$ 800</u>
c. Water. About 1 million gals. annually for general purposes.	
	<u>\$ 300</u>

4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 3 delivery trucks.	
	<u>\$ 3,000</u>

b. External Transport Facilities. In & out shipments average about 250 tons a month. Good highways & truck service necessary.

5. MANPOWER

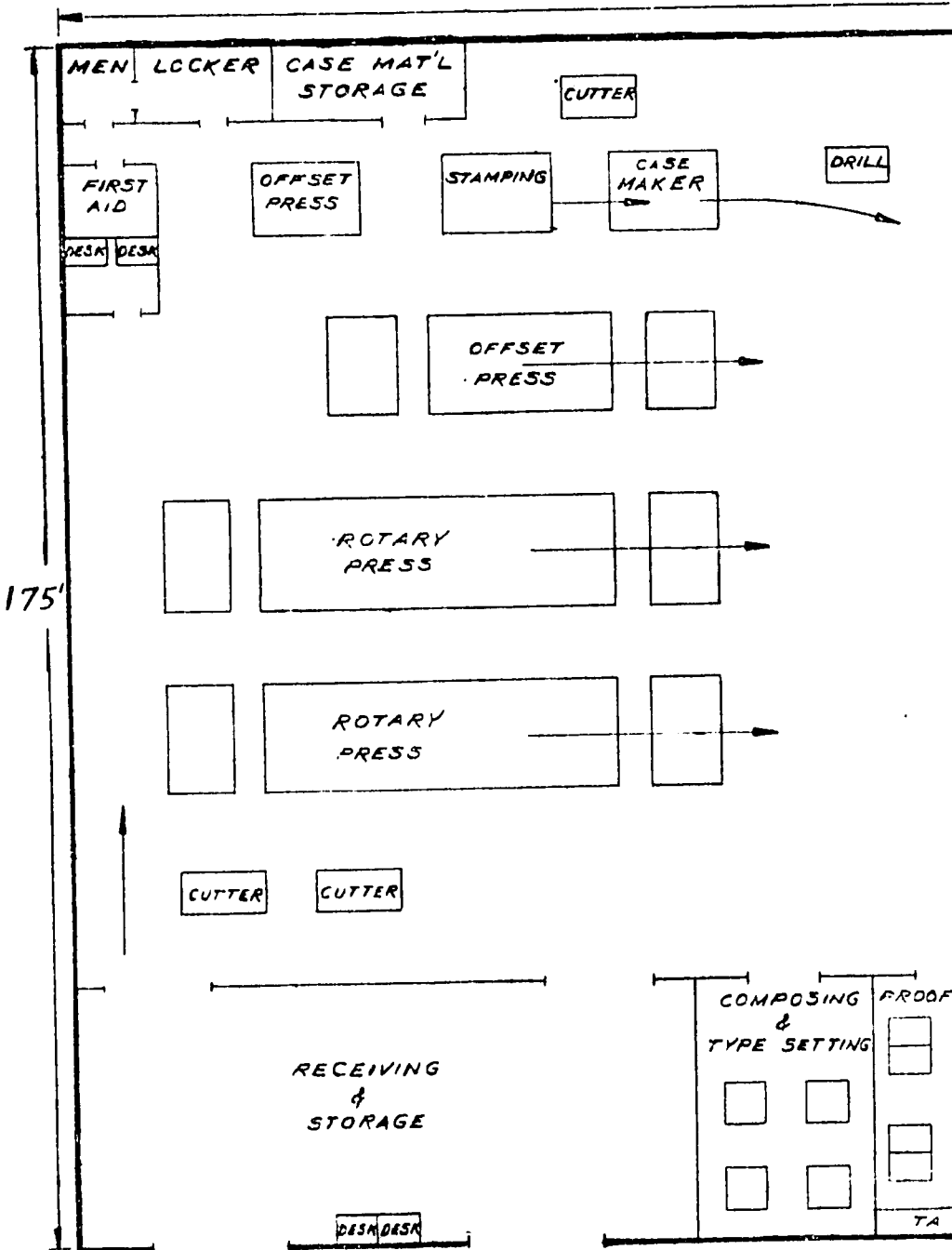
	Number	Annual Cost
a. Direct Labor		
Skilled	56	\$336,000
Semi-skilled	28	140,000
Unskilled	139	556,000
Total	<u>223</u>	<u>\$1,032,000</u>
b. Indirect Labor		
Manager & supervisors	4	\$ 45,000
Office	25	157,000
Maintenance, drivers, other	20	116,000
Total	<u>49</u>	<u>\$318,000</u>

c. Training Needs. Manager & supervisors should be experienced. The skilled men should need only to familiarize themselves with requirements. Others could receive on-the-job training. Full operation should be reached in about 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs		
Direct Materials		\$1,006,000
Direct Labor		1,032,000
Manufacturing Overhead(a)		341,000
Admin. Costs(b), Contingencies		74,000
Sales Costs(c), Bad Debts		100,000
Depreciation on Fixed Capital		62,000
Total		<u>\$2,615,000</u>
b. Annual Sales Revenue		<u>\$3,000,000</u>

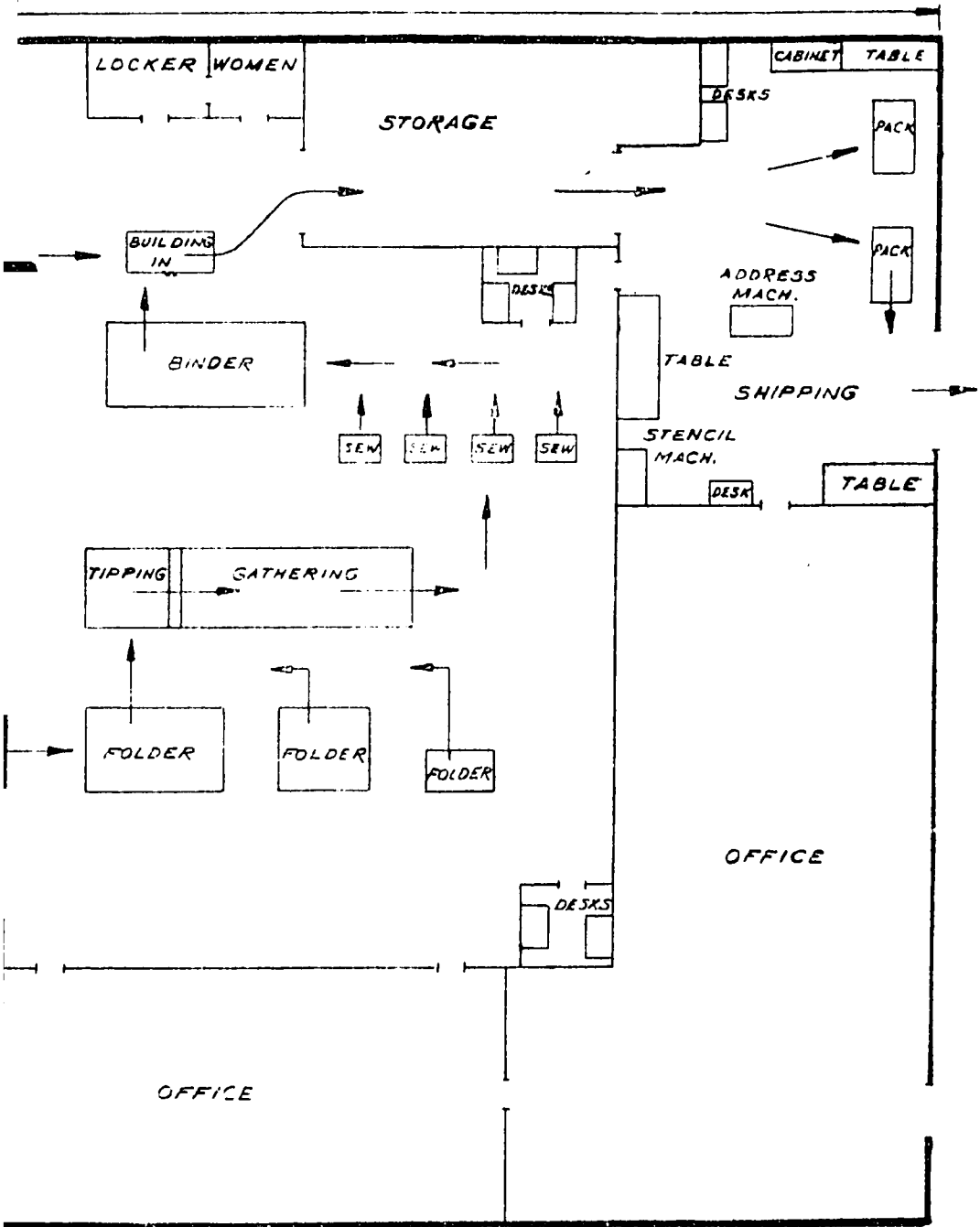
NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.



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NG : S. I. C. 2731

D WORKFLOW



TEXTBOOKS PUBLISHING: S.I.C. 2731

SELECTED REFERENCES

I. TEXTBOOKS

- A. Evolution of American Secondary School Textbooks. John A. Nietz. Illus. 1965. \$5.95.
Charles E. Tuttle Co.
28 S. Main Street
Rutland, Vermont 05701
- B. Guidelines for Textbook Selection. National Education Association and American Textbook Publishers Institute. 1963. \$.35.
National Education Association
1201 16th Street, N.W.
Washington, D.C. 20036
- C. College Textbooks. Jane Clapp, comp. 1960. \$25.00.
Scarecrow Press, Inc.
257 Park Avenue South
New York, N.Y. 10010
- D. Textbooks in Print. Phyllis B. Steckler, ed. rev. annually. \$4.00.
5 year subscription. \$15 00.
R. R. Bowker Co
1180 Avenue of the Americas
New York, N.Y. 10036

II. U.S. GOVERNMENT PUBLICATIONS

- A. Book Production. IR-23394. Gratis.
- B. Book Making - Bibliography. IR-25748. Gratis.
Agency for International Development
Washington, D.C. 20523

III. PERIODICALS

- A. Book Production. Monthly. \$5.00/year.
Book Production
405 Fourth Avenue
New York, N.Y. 10016
Business paper devoted to the design, printing and binding of books, pamphlets, catalogs and allied products.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATIONS

- A. Book Manufacturers Institute
25 West 43rd Street
New York, N.Y. 10036
- B. American Textbook Publishers Institute
432 Park Avenue South
New York, N.Y. 10016
- C. National Association of State Text Book Directors
State Board of Education
386 Education Building
Raleigh, N.C. 27603

V. ENGINEERING COMPANIES

- A. F.P. Rosback Company
Benton Harbor, Michigan 49022
Book binders' machinery and equipment.
- B. T.W. and C.B. Sheridan Company
135 Lafayette
New York, N.Y. 10013
Machinery for all phases of bookbinding.

VI. DIRECTORY

- A. MacRae's Blue Book. Annual. \$17.50.
MacRae's Blue Book
18 East Huron Street
Chicago, Ill. 60611

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PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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INDUSTRY PROFILES

STRAIGHT PINS

I. P. No. 66249

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.

STRAIGHT PINS: Standard Industrial Classification 3964

A. PRODUCT DESCRIPTION

Straight pins of standard sizes for household and tailoring use, in packets each containing 300 pins.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are modest, and the manufacturing process is simple. Its feasibility turns almost entirely on the availability of a market. It should be noted that a variety of new types of fastenings tend to limit the expansion of demand for straight pins, though for some uses they remain indispensable.

C. MARKET ASPECTS

1. USERS. Households, dressmaking and tailoring establishments, offices, etc.
2. SALES CHANNELS AND METHODS. Sales would be made to wholesalers of various kinds.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are extremely easy to handle and the market area can be, and usually has to be, very extensive.
4. COMPETITION. Competition will come from other producers. Various new fastening devices offer some competition to straight pins.
5. MARKET NEEDED FOR PLANT DESCRIBED. The output of this plant could generally meet the needs of at least two million people, and in some cases very many more.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - TWO-SHIFT OPERATION: 1.6 Million Packets

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL		Cost
Land. About 1/2 acre.	\$	--
Building. One story, 50'x50'.	20,000	
<u>Equipment, Furniture & Fixtures.</u>		
Prodn. tools & equipmt.	\$25,000	
Other tools & equipmt.	6,500	
Furniture & fixtures	1,500	
Transportation equipmt.	3,000	36,000
Total (excl. Land)		\$ 56,000

Principal Items: 4 pin making machines - 500 min. cap.; tin plating machine - 100 lb./day capacity; panel truck.

b. WORKING CAPITAL		No. of days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	\$ 15,300	
Admin. Costs (b), Contingencies, Sales Costs(c)	30	3,500	
Training Costs		2,200	
Total Working Capital		\$ 21,000	

c. TOTAL CAPITAL (EXCL. LAND) \$ 77,000

2. MATERIALS AND SUPPLIES

a. Direct Materials		Annual Requirements	Annual Cost
Wire	11,200 lbs.		\$ 9,000
Tin plate	500 lbs.		500
Fluxes, etc.	100 lbs.		100
Boxes or packages	1,600,000		8,000
Cartons, etc.	16,000		400
Total			\$ 18,000

b. Supplies		\$
Lubricants & hand tools	500	1,500
Cutting tools & abrasives		500
Maintenance & spare parts		1,500
Office supplies		500
Total		\$ 4,000

3. POWER, FUEL AND WATER

		Annual Cost
a. Electric Power. About 50,000 kw-hr annually.		\$ 1,000
b. Fuel. Gas.		\$ 700
c. Water. About 600,000 gals. annually for general purposes.		\$ 200

4. TRANSPORTATION

		Annual Operating Cost
a. Own Transport Equipment. 1-ton panel truck for pickup & delivery.		\$ 1,000
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	3		12,000
Total	7		\$ 34,000
b. Indirect Labor			
Manager	1		\$ 10,000
Office	3		14,000
Other	3		14,000
Total	7		\$ 38,000

c. Training Needs. Manager should be fully trained. With 2 set-up supervisors & 2 operators, he should be able to do any necessary labor training & reach full production in about a month.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

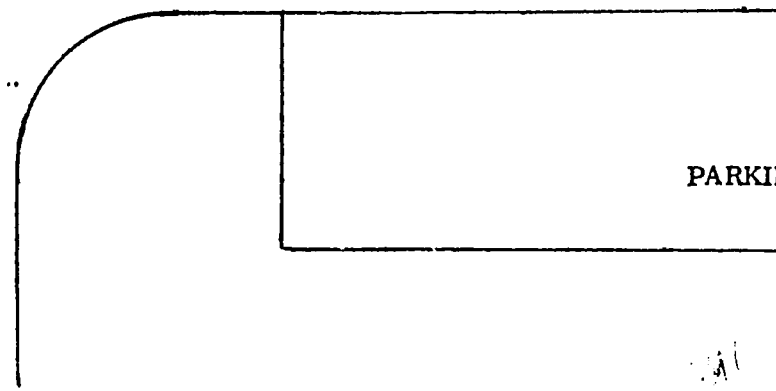
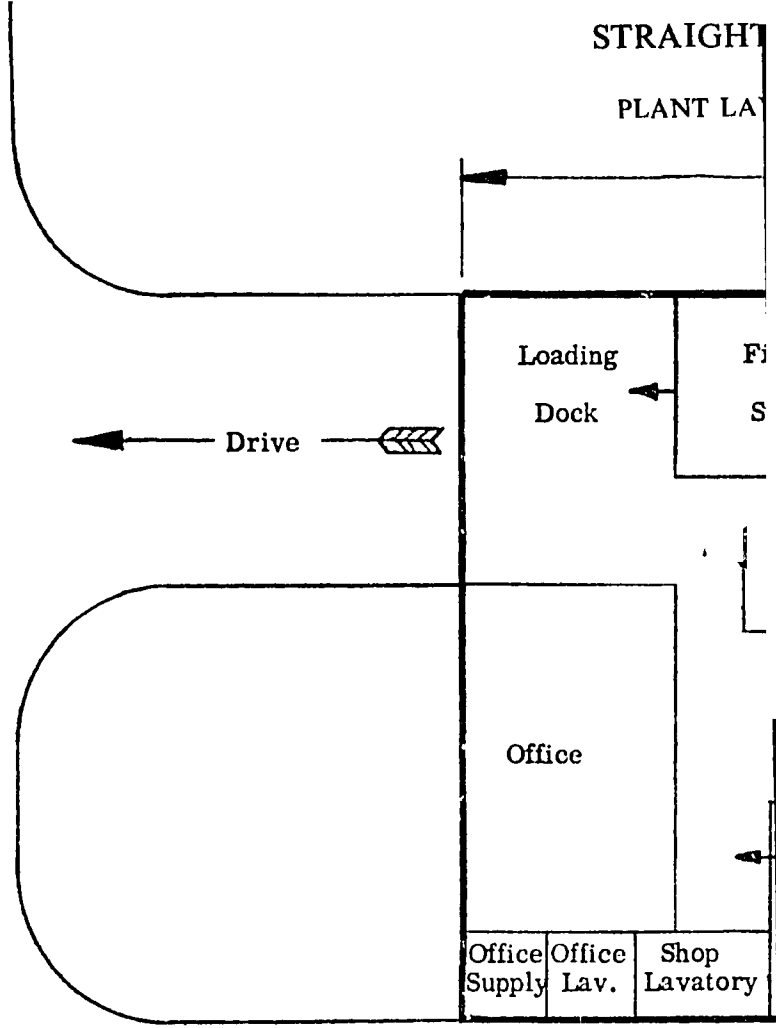
a. Annual Costs		
Direct Materials		\$ 18,000
Direct Labor		34,000
Manufacturing Overhead(a)		44,900
Admin. Costs(b), Contingencies		19,000
Sales Costs(c), Bad Debts		29,000
Depreciation on Fixed Capital		5,700
Total		\$150,600
b. Annual Sales Revenue		\$190,000

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

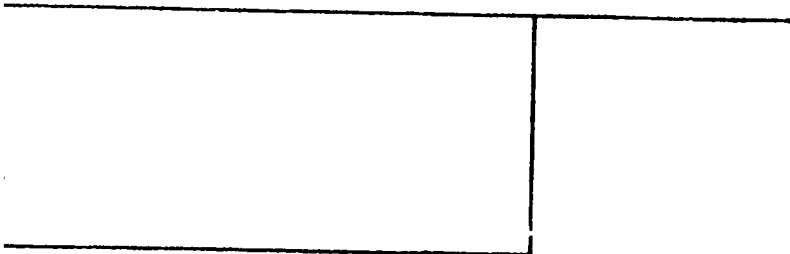
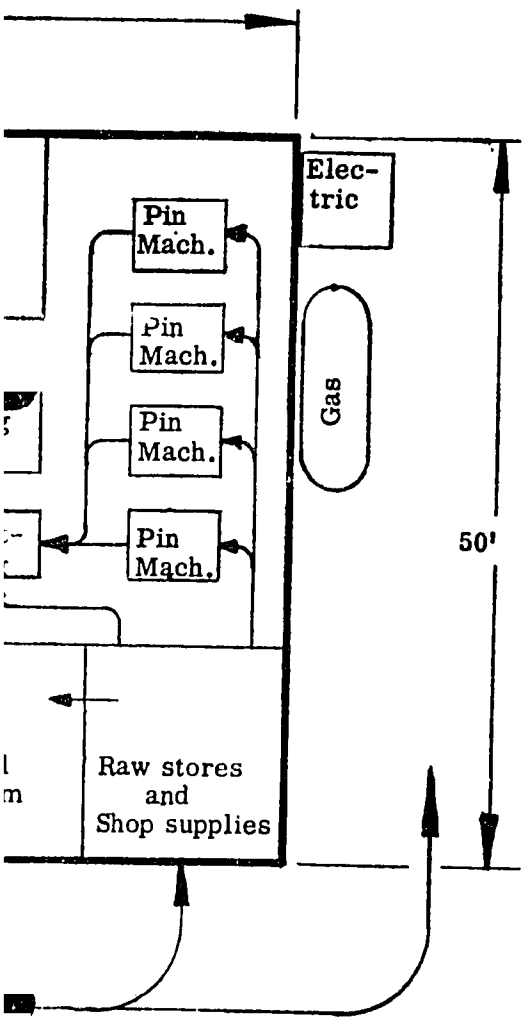
STRAIGHT PINS: S.I.C. 3964

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STRAIGHT
PLANT LA



ND WORKFLOW



STRAIGHT PINS: S. I. C. 3964

SELECTED REFERENCES

I. TEXTBOOKS

- A. Manufacturing Processes. Samuel E. Rusinoff. 1962. 753 p. Illus. \$10.75.
American Technical Society
848 East 58th Street
Chicago, Ill. 60637
Describes manufacturing processes and equipment applicable to the production of pins and related articles.
- B. Wire Industry Encyclopaedic Handbook. 1956. 250 p. \$3.75.
Wire Industry Ltd.
33 Furnival Street
London, E.C. 4., England
Machinery and processes used in the manufacture of the different kinds of wire and wire products.
- C. Industrial Chemistry. E. Raymond Riegel. Edited by J. A. Kent. 1962. \$20.00.
Reinhold Publishing Company
430 Park Avenue
New York, N. Y. 10022
Includes information relating to the processing of wire and the fabrication of wire products.

II. U. S. GOVERNMENT PUBLICATION

- A. Pins and Needles. IR-24294. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. Notion and Novelty Review. Monthly. \$3.00/year.
Haire Publishing Company
111 Fourth Avenue
New York, N. Y. 10003
Current developments in the manufacture and marketing of pins, needles and other notions.
- B. Wire and Wire Products. Monthly. \$8.00/year.
Quinn-Brown Publishing Company
299 Main Street
Stamford, Conn. 06901

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 1,659,216. 1928. 4 p.
Apparatus, material and the art of making pins.
- B. Patent No. 2,076,655. 1937. 2 p.
Process and equipment for producing pins.

V. TRADE ASSOCIATION

- A. National Notions Association
286 Fifth Avenue
New York, N. Y. 10001

VI. ENGINEERING COMPANIES

- A. Salem-Brosins Inc.
12 Arch Street
Carnegie, Pa. 15106
Metal working plant specialists in design, engineering, and construction supervision.
- B. Consolidated Engineering Enterprises
9445 Third Street
Jacksonville, Florida 32208
Mechanical and industrial engineers in metal working and related fields.

VII. DIRECTORY

- A. Notions and Novelty Review Directory. Annual. \$1.00.
Haire Publishing Company
111 Fourth Avenue
New York, N. Y. 10003
Lists manufacturers of pins, needles and other notions.

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INDUSTRY PROFILES

WOMEN'S SHOES

I. P. No. 66250

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.

WOMEN'S SHOES: Standard Industrial Classification 3141

A. PRODUCT DESCRIPTION

Women's shoes in various styles and sizes made by the cementing process.

B. GENERAL EVALUATION

Capital and skilled labor requirements for this plant are moderately high. Good management is needed in order to keep with fashion changes and produce attractive styles of shoes. Competition is likely to range from the large mass-producing manufacturers to the small shoemaker producing shoes to individual order. A well-managed plant of this kind should, however, have reasonably good prospects in some developing areas that are becoming increasingly urbanized and where income levels tend to rise.

C. MARKET ASPECTS

1. USERS. Women and girls.
2. SALES CHANNELS AND METHODS. Sales mainly to retail stores. Active and intelligent salesmen, able to report on trends in fashion and demand, are necessary. An attractive brand name and some advertising are required.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are very easily shipped and transport costs on them are normally low in relation to product value. They may be shipped long distances. However, women's shoes are commonly made in every locality where there is a demand for them and this has a tendency to localize the market. The types of shoes that are transported long distances and that go into international trade are usually either the very cheap mass-produced articles or high-priced high quality shoes with a very limited market.
4. COMPETITION. In a market where shoes are available in a wide range of prices a particular producer must rely on quality, style and price to market his wares. As indicated above, this type of shoe is unlikely to find any market abroad.
5. MARKET NEEDED FOR PLANT DESCRIBED. Factors affecting demand for these products are income level, shoe-wearing habits, availability and price of other types of shoes, etc. In the conditions of most developing areas it might be necessary to have a total population of more than three million to provide a market outlet for the plant.

D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 250 DAYS A YEAR : 125,000 Pairs

1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL

	Cost
Land, About 1 acre.	\$ --
Building, One story 200'x125', with utilities & maintenance facilities in basement.	150,000
Equipment, Furniture & Fixtures, Prodn. tools & equipmt. \$ 145,000	
Other tools & equipmt.	11,500
Furniture & fixtures	1,000
Transportation equipmt.	2,500
Total (excl. Land)	160,000
	\$310,000

Principal Items. 3 cutters, sole splitter, sole pounder, edge trimmer, shank reducer, outsole rounder, sole blacker, sole cement applicator, unishank molder, upper splitter, skiving machine, cementer, perforator, marker, assembling machine, pulling over machine, heel lasting machine, side lasting machine, trimmer, roughing machine, bottom cementer, heel cementer, buffing machine, finishing machine, last puller, wooden last, racks, work tables, skids, pickup truck.

b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	\$ 94,800
Admin. Costs (b), Contingencies, Sales Costs (c)	30	4,500
Training Costs		18,700
Total Working Capital		\$118,000

c. **TOTAL CAPITAL (EXCL. LAND)** \$428,000

2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Leather	125,000 sq.ft.	\$ 75,000
Linings	37,000 sq.ft.	7,000
Heels, thread, cement, wire, ink, etc		25,000
Cardboard boxes		14,000
Total		\$ 121,000
b. Supplies		
Lubricants		\$ 500
Pattern materials & supplies		4,000
Maintenance & repair parts		3,400
Office supplies		500
Total		\$ 8,400

3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load about 150 hp.	\$ 5,000
b. <u>Fuel.</u> About 10,000 gals. oil annually.	\$ 1,200
c. <u>Water.</u> About 1.5 million gals. annually.	\$ 400

4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 1-ton truck for general purposes.	\$ 1,000
b. <u>External Transport Facilities.</u>	No special requirements.

5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	10	\$ 55,000
Semi-skilled	42	185,000
Unskilled	25	100,000
Total	77	\$340,000
b. <u>Indirect Labor</u>		
Manager & supervisors	4	\$ 32,000
Office	5	28,000
Other	6	32,000
Total	15	\$ 92,000

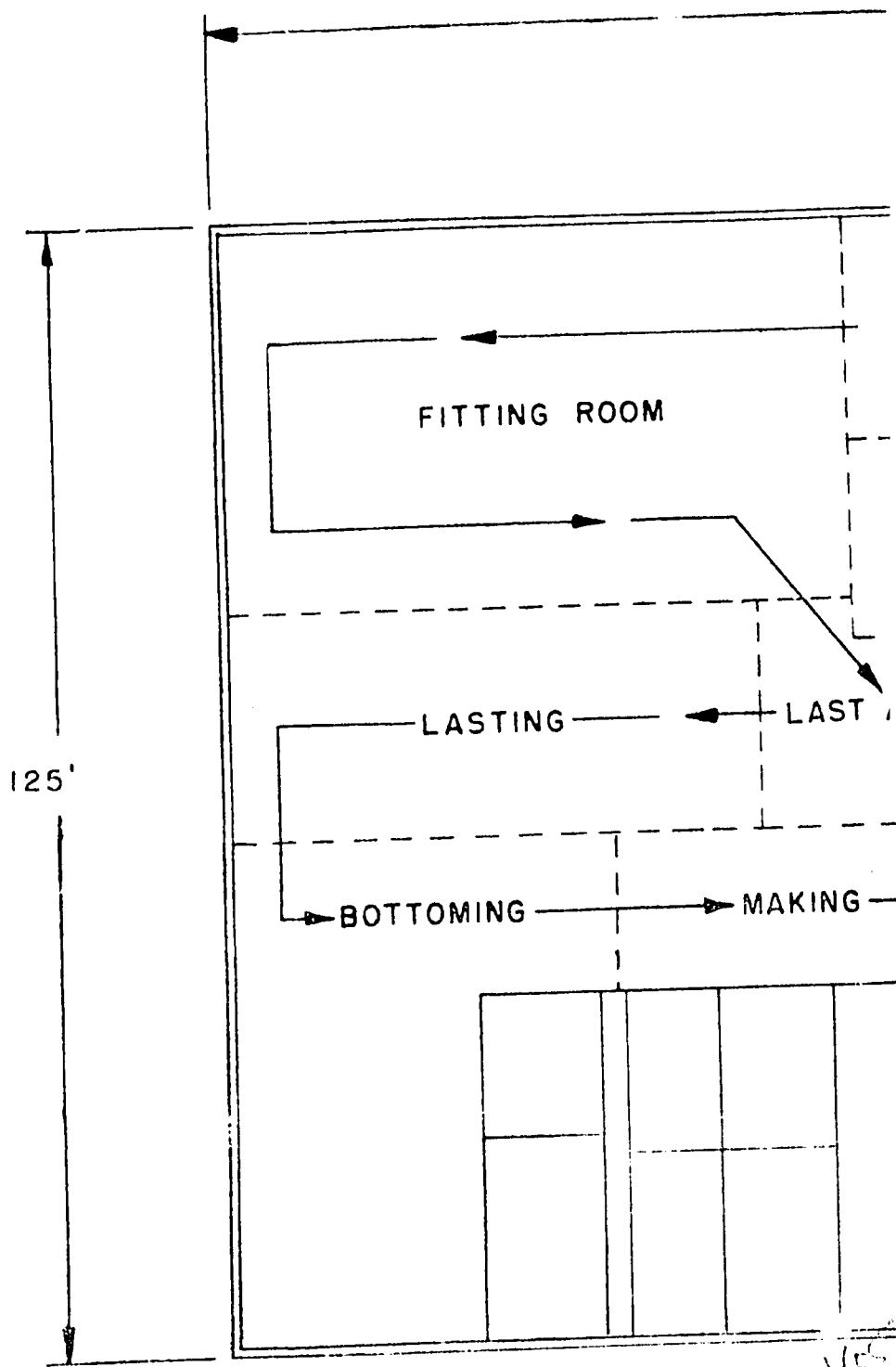
c. Training Needs. Manager & supervisors should be able, with assistance of skilled workers, to do all necessary labor training. Full operation should be reached in about 2 months.

6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$121,000
Direct Labor	340,000
Manufacturing Overhead (a)	108,000
Admin. Costs (b), Contingencies	26,000
Sales Cost (c), Bad Debts	30,000
Depreciation on Fixed Capital	25,000
Total	\$ 650,000
b. <u>Annual Sales Revenue</u>	\$ 750,000

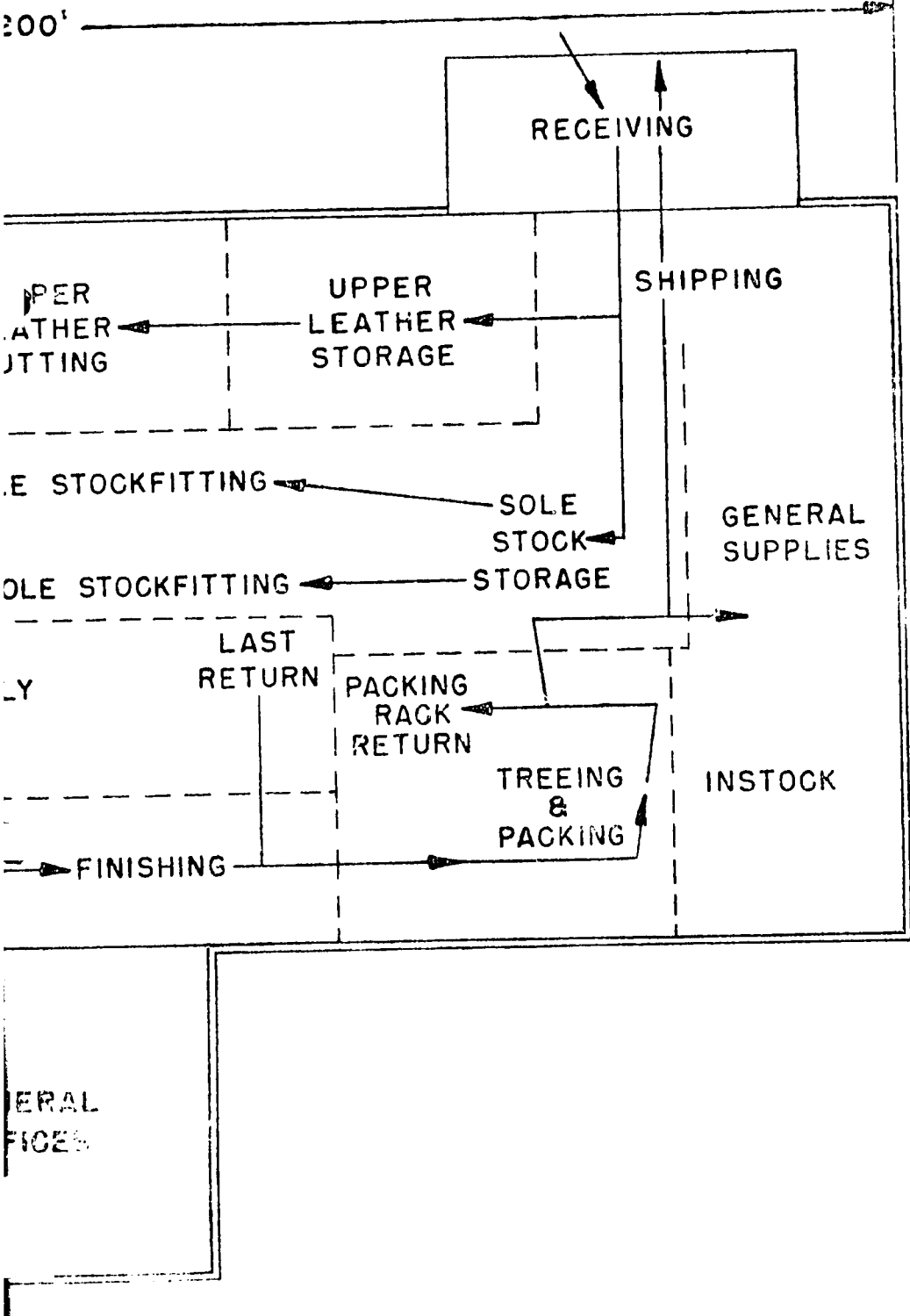
NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Travel, Freight Out, Travel.

WOMEN'S
PLANT LAY



S. I. C. 3141

WORKFLOW



WOMEN'S SHOES: S.I.C. 3141

SELECTED REFERENCES

I. TEXTBOOKS

- A. *Made in Footwear*. R. T. Wilcox. 1958. 463 pp. Illus. \$5.95.
Charles Scribner's Sons
597 Fifth Avenue
New York, N.Y. 10017
- B. *Textbook of Footwear Manufacture*. J. H. Thornton. 1954. 551 pp.
Illus. \$13.50.
Transatlantic Arts, Inc.
Hollywood-by-the-Sea, Florida 33020
- C. *Boot and Shoe Production*. J. Korn. 1953. 627 pp. Illus. \$11.00.
Pitman Publishing Corporation
20 E. 46th Street
New York, N. Y. 10017

II. U.S. GOVERNMENT PUBLICATIONS

- A. *Shoe, Leather, Hides*. Oct. 1961. 100 refs. SB-483. Gratis.
U. S. Department of Commerce
Washington, D. C. 20230
- B. *Shoe Factories*. IR-27804. Gratis.
Agency for International Development
Washington, D. C. 20523

III. PERIODICALS

- A. *American Shoemaking*. Weekly. \$3.00/year.
Shoe Trades Publishing Company
683 Atlantic Avenue, Boston, Mass. 02111
Materials, production methods, and markets of the shoe industry.
- B. *Leather and shoes*. Weekly. \$6.00/year.
Rumpf Publishing Company
300 West Adams Street
Chicago, Ill. 60606
Covers the shoe and leather manufacturing field.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 3,168,754. Feb. 9, 1965. 5 pp.
Method of attaching an outside and a shoe bottom by using an adhesive.
- B. Patent No. 3,116,501. Jan. 7, 1964. 3 pp.
Method of making shoes - relates to improvements in methods of making shoes and, more particularly, to improvement in methods of adhesively bonding soles, heels or soles and heels to shoe uppers.
- C. Patent No. 3,056,984. Oct. 9, 1962. 4 pp.
Method of cementing soles to shoes.
- D. Patent No. 3,021,543. Feb. 20, 1962. 6 pp.
Methods of making shoes - relates to improved methods of cement shoemaking employing rubbery outsides.

V. TRADE ASSOCIATIONS

- A. Designer Shoe Guild
40 West 27th Street
New York, N. Y. 10001
- B. National Shoe Manufacturers Association
342 Madison Avenue
New York, N. Y. 10017

VI. ENGINEERING COMPANY

- A. Ward Machine Company, Inc.
970 Main Street
Brockton, Mass. 02401
Design, engineering, manufacture.

VII. DIRECTORY

- A. Leather and shoes Blue Book. Annual. \$5.00.
Rumpf Publishing Company
300 West Adams Street
Chicago, Ill. 60606
Manufacturers, market outlets, and material and equipment suppliers.

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.

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