

# **Industry Profiles**

## **Catalog of Investment Information and Opportunities**

### **Volume III**

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

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## **BRASS FOUNDRY**

**I. P. No. 66101**

*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.

## BRASS FOUNDRY: Standard Industrial Classification 3362

### A. PRODUCT DESCRIPTION

Principally copper-base alloy castings, but same facilities may also be used for making castings of other non-ferrous metals.

### B. GENERAL EVALUATION

Amount of capital required is relatively modest, but number of skilled workers needed is fairly high. Good management and careful supervision are necessary, in order to make accurate estimates of costs for pricing purposes and to assure that customers' requirements are exactly met. Some non-ferrous scrap should commonly be available from local sources. Under normal conditions it should be possible to operate economically even though most of the materials need to be brought from a distance. Where mechanized industries are developing, and where there is increasing use of consumers' durable goods, prospects for this industry appear to be good.

### C. MARKET ASPECTS

1. USERS. Wide variety of industries making producers' goods or durable consumers' goods that need non-ferrous castings as components. Demand also exists for replacement parts, from machinery users themselves, or from machinery repair establishments. Also some demand exists for artistic castings, e.g., ornamental doors grill-work, and novelties that plant can produce as complete finished products.
2. SALES CHANNELS AND METHODS. Sales generally direct to users, though some may be made to wholesale houses. Success in business of this type usually depends primarily on building up a reputation for sound workmanship, but some publicity in business directories and trade journals may be helpful.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Value of products in relation to weight and bulk is comparatively high and transport costs do not usually place close limit on extent of domestic market. However, castings are chiefly made to individual specifications, and customers normally prefer nearby manufacturer with whom they can easily maintain touch. b. Export. These products are fairly commonly exported. However, other things being equal, purchasers usually prefer local manufacturer.
4. COMPETITION. a. Domestic Market. Producer has considerable degree of natural protection against imports, arising from his ability to provide more convenient service. Competition from substitutes is insignificant. b. Export Market. Some exports to nearby areas of neighboring countries might be feasible, but they are very unlikely to constitute any large proportion of total sales.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend essentially on how far industries using non-ferrous castings have been developed in area concerned. By U. S. standards, for a well-equipped modern non-ferrous metals foundry, plant is of modest size, and there are many hundreds of such foundries as large or larger scattered throughout the U. S. However, where industry is still mainly confined to processing of raw materials and foodstuffs, market for output of even one such foundry may be difficult to find. Usually it will not be very difficult to make a survey of at least the principal local users of non-ferrous castings and their current sources of supply. In the minor field of artistic wares and novelties opportunity may exist of developing a market that did not exist before.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 400,000 Pounds

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<b>Cost</b>
Land. About 9,000 sq. ft.		\$ --
Building. One story, 45'x90'.		24,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$12,000	
Furniture & fixtures	1,000	
Transportation equipmt.	3,000	16,000
<b>Total (excl. Land)</b>		<b>\$ 40,000</b>

**Principal Items.** Melting furnace, ladles, crucibles, chain hoist, flasks, tumbling barrel, scales, portable grinder, core oven, tram rail, molding tools, pickup truck.

### b. WORKING CAPITAL

	<b>No. of Days</b>	<b>Cost</b>
Direct Materials	90	\$ 33,200
Direct Labor, Mfg. Overhead(a)	60	21,200
Admin. & Sales Costs(b), Contingencies,	30	1,600
Training Costs		9,000
<b>Total Working Capital</b>		<b>\$ 65,000</b>

**c. TOTAL CAPITAL (EXCL. LAND) \$105,000**

### 2. MATERIALS AND SUPPLIES

	<b>Annual Requirements</b>	<b>Annual Cost</b>
<b>a. Direct Materials</b>		
Copper, ingot	120,000 lbs.	\$ 34,800
Copper, melting scrap	200,000 lbs.	48,000
Zinc, ingot		7,100
Zinc, melting scrap	40,000 lbs.	3,600
Tin, ingot	24,000 lbs.	23,800
Brass, melting scrap	32,000 lbs.	5,800
Aluminum, ingot	16,000 lbs.	4,000
Magnesium, ingot	8,000 lbs.	2,600
Alloying briquettes		3,300
<b>Total</b>		<b>\$133,000</b>

### b. Supplies

Molding sand	\$ 1,200
Core sand	1,300
Parting sand	500
Sea coal	1,300
Pitch, corn flour, core oil, molasses	500
Fuel oil core oven	600
Core wires, rods, chaplets	900
Maintenance	600
Office supplies	200
<b>Total</b>	<b>\$ 7,100</b>

### 3. POWER, FUEL AND WATER

	<b>Annual Cost</b>
<b>a. Electric Power.</b> Consumption about 300 kw-hr a day.	\$ 500
<b>b. Fuel.</b> About 37,000 gals. oil annually for production & heating.	\$ 3,700
<b>c. Water.</b> For heating, sanitation and fire protection.	\$ 200

### 4. TRANSPORTATION

	<b>Annual Operating Cost</b>
<b>a. Own Transport Equipment.</b> 1-ton truck for pickup & deliveries.	\$ 1,000
<b>b. External Transport Facilities.</b> Total in & out shipments about 25 tons a month. No special requirements.	

### 5. MANPOWER

	<b>Number</b>	<b>Annual Cost</b>
<b>a. Direct Labor</b>		
Skilled	6	\$ 36,000
Semi-skilled	4	20,000
Unskilled	6	24,000
<b>Total</b>	<b>16</b>	<b>\$ 80,000</b>
<b>b. Indirect Labor</b>		
Manager & supervisor	2	\$ 19,000
Office	2	8,000
Other	2	8,000
<b>Total</b>	<b>6</b>	<b>\$ 35,000</b>

**c. Training Needs.** Manager & supervisor should be fully experienced. With 3 skilled operators, they should be able to do all necessary labor training. Plant should reach full operation in 2 months.

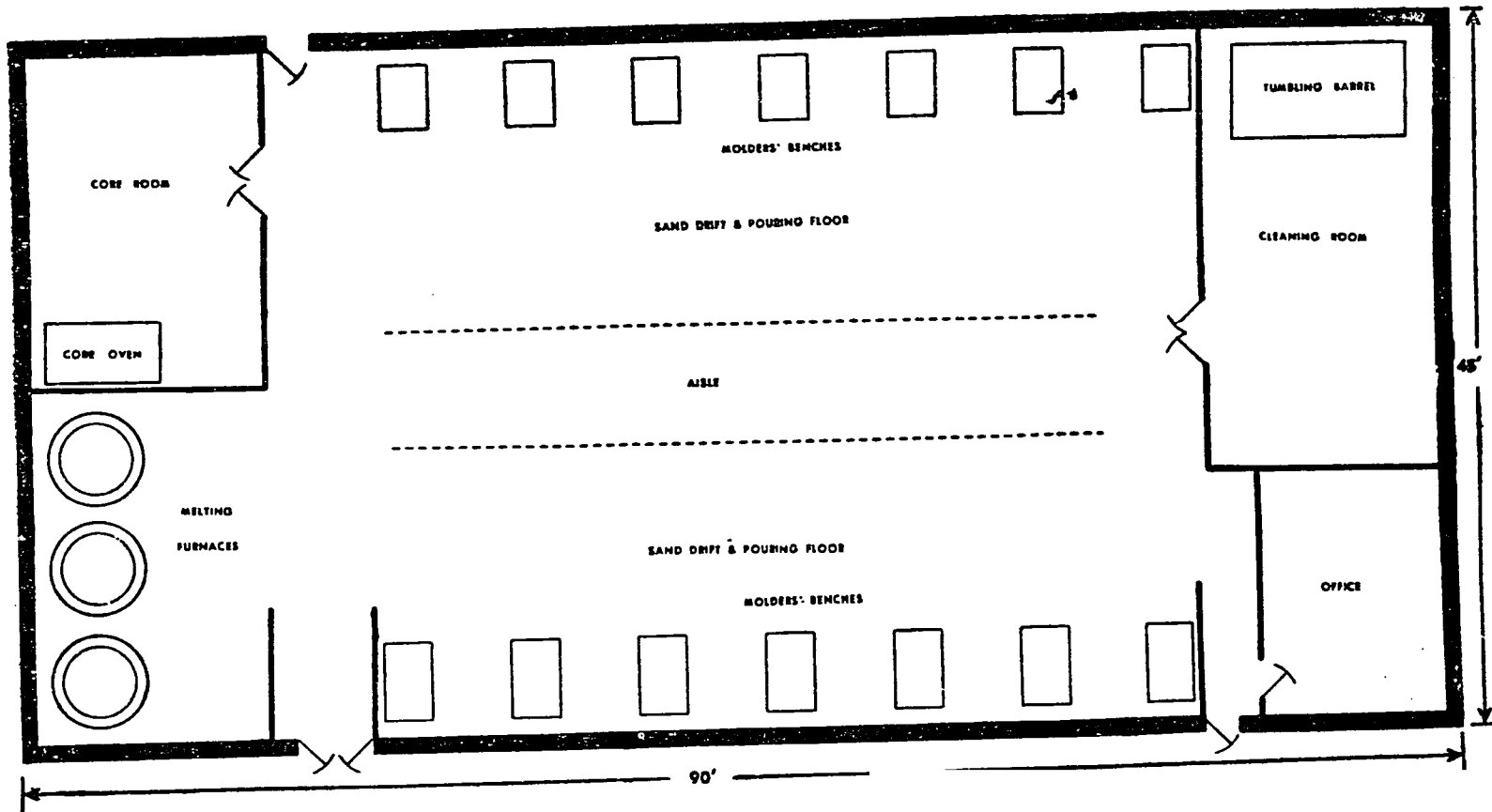
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

<b>a. Annual Costs</b>	
Direct Materials	\$133,000
Direct Labor	80,000
Manufacturing Overhead(a)	47,500
Admin. & Sales Costs(b), Bad Debts, Contingencies	20,000
Depreciation on Fixed Capital	3,300
<b>Total</b>	<b>\$283,800</b>
<b>b. Annual Sales Revenue</b>	<b>\$340,000</b>

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

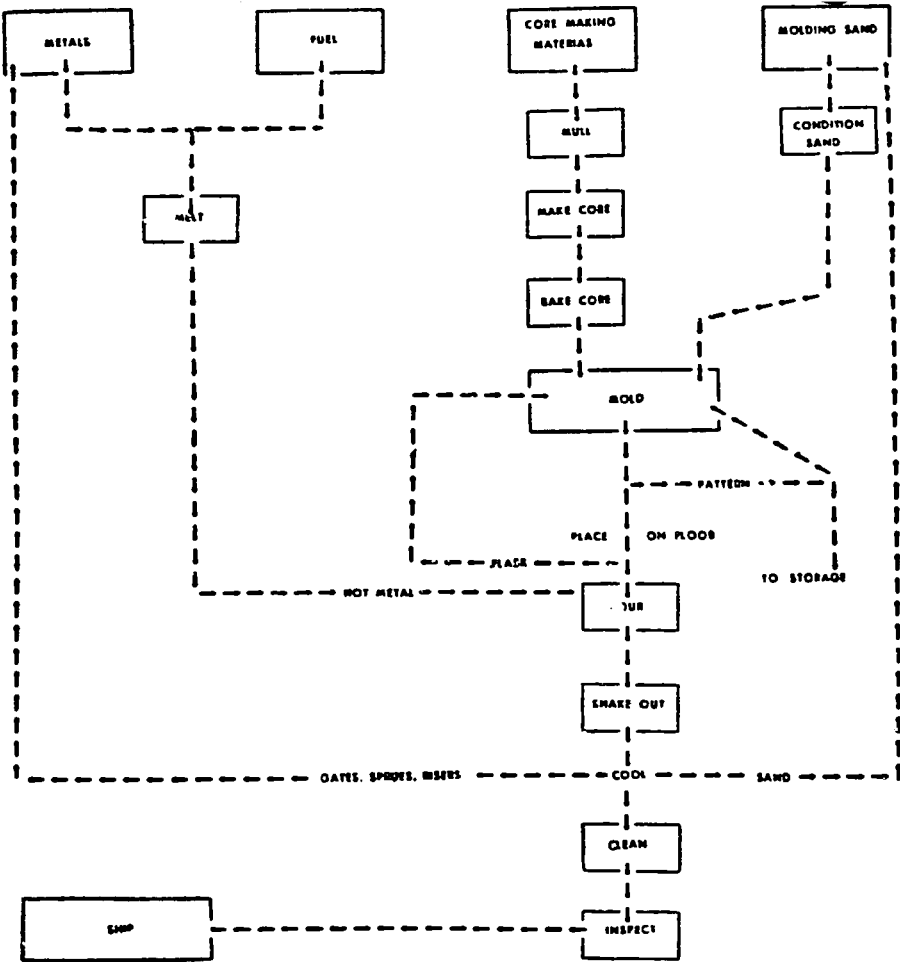
BRASS FOUNDRY: S.I.C. 3362

# PLANT LAYOUT



FLOW CHAIN

BRASS FOUNDRY : S.I.C. 3362



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## BRASS FOUNDRY: S.I.C. 3362

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Patternmaking. Joseph A. Shelley. 341 p. Illus. \$6.00.  
The Industrial Press  
93 Worth Street  
New York, N. Y. 10013  
Treatise on patternmaking which includes types of patterns and their relation to molding problems, tools and procedures used.
- B. Foundry Engineering. Howard F. Taylor, Merton C. Fleming, and John Wulff. 1959. 507 p. Illus. \$8.75.  
John Wiley and Sons, Inc.  
605 3rd Avenue  
New York, N. Y. 10016  
Text using operational and scientific terminology to cover foundry engineering, emphasizing fundamentals that apply to all cast metals.

#### II. U.S. GOVERNMENT PUBLICATIONS

- A. Metal Working Industry Training Manual. TB-62. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

#### III. PERIODICALS

- A. Foundry. Monthly. \$10.00/year in U.S.A., \$20.00/year, foreign.  
Penton Publishing Co.  
Penton Building  
Cleveland, Ohio 44113  
Supplies subscribers with news and thoroughly covers all phases of foundry practice, both technically and non-technically.
- B. Modern Castings. Monthly. \$7.50/year.  
American Foundrymen's Society  
Golf and Wolf Roads  
Des Plaines, Illinois 60016  
Current reporting on modern techniques of metal casting, foundry management and operations, equipment and materials handling.

#### IV. U. S. PATENTS

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

- A. Patent No. 2,887,374. May 19, 1959. 2 p.  
This invention relates generally to copperbase alloys and more particularly to a brass alloy having superior characteristics with respect to biofouling and corrosion effects.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS (Continued)

- B. Patent No. 2,863,398. Dec. 9, 1958. 7 p.  
This invention relates to a mold conveyor system and particularly to a novel indexing mechanism for accurately positioning a mold conveyor at a predetermined station.
- C. Patent No. 2,859,498. Nov. 11, 1958. 70 p.  
An automatic method and apparatus for making castings.

### V. TRADE ASSOCIATIONS

- A. Copper Development Association  
25 Broadway  
New York, N. Y. 10004
- B. International Copper Research Association  
1271 Ave. of the Americas  
New York, N. Y. 10020
- C. Foundry Equipment Manufacturers Association  
5225 Manning Place, N. W.,  
Washington, D. C. 20016

### VI. ENGINEERING COMPANIES

- A. C. O. Bartlett and Snow Co.  
6250 Harvard Avenue  
Cleveland, Ohio 44105  
Designers, engineers, fabricators, and erectors of foundry equipment.

### VII. DIRECTORIES

- A. Penton's Foundry List. \$150.00.  
Penton Building  
Cleveland, Ohio 44113  
Comprehensive information on metal casting plants in the U. S. and Canada (including die casters).

## 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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Clearinghouse for Federal Scientific and  
Technical Information, 410.12  
Springfield, Virginia 22151

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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.

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

# INDUSTRY PROFILES

## BUILDING HARDWARE

I. P. No. 66102

*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.

## **BUILDING HARDWARE. Standard Industrial Classification 3429**

### **A. PRODUCT DESCRIPTION**

Padlocks, door locks, door knob sets, hinges, T-hinges, hasps, flat corners, inside corners, T-plates, mending plates. Padlocks, door locks, doorknobs are made of zinc castings. Remaining items made of hot rolled steel sheet, or wire.

### **B. GENERAL EVALUATION**

The market required for a mechanized plant in this industry may be quite large in terms of population. Though the products are comparatively simple, this plant requires experienced management and a fair number of skilled workers, for die setting, machine setup and tool dressing. Competition from imports in the hardware business is generally keen. In general, the industry is suitable only for areas that have already reached a fairly high level of economic development.

### **C. MARKET ASPECTS**

1. USERS. Building contractors, individual property owners.
2. SALES CHANNELS AND METHODS. Sales almost always to wholesalers, who supply building contractors and retail stores.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Transport costs are low in relation to unit value and handling is easy. Potential market nationwide. b. Export. Products are exported all over world.
4. COMPETITION. a. Domestic Market. Competition from imports may be strong. b. Export Market. Plant of size and type described might possibly make some sales in neighboring countries but normally could not compete in general export trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. Assuming average rates of economic growth and population increase, population required to absorb production of this plant would be of the order of 6 million.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 300,000 Dozen Pieces

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<u>Cost</u>
Land. About 10,000 sq. ft.		\$ --
Building. One story, 60'x60'		21,600
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$128,000	
Other tools & equipmt.	1,000	
Furniture & fixtures	1,000	
Transportation equipmt.	3,000	133,000
Total (excl. Land)		<u>\$154,600</u>

Principal Items. Die casting machine, 50-ton press, 75-ton presses (5), shears, drill press - floor (2), drill press - bench (2), heat treat furnaces (2), hand screw machine, stand grinder, universal grinder, rivet spinner, zinc melting furnace, pickup truck.

### b. WORKING CAPITAL

	<u>No. of Days</u>	<u>Annual Cost</u>
Direct Materials	90	\$ 29,000
Direct Labor, Mfg. Overhead(a)	60	38,400
Admin. & Sales Costs(b), Contingencies	30	5,000
Training Costs		23,000
Total		<u>\$ 95,400</u>

c. TOTAL CAPITAL (EXCL. LAND) \$250,000

### 2. MATERIALS AND SUPPLIES

	<u>Annual Requirements</u>	<u>Annual Cost</u>
<b>a. Direct Materials</b>		
Zinc alloy	158 tons	\$ 49,000
Cold rolled steel	280 tons	33,600
Bright wire round	53 tons	7,400
Bright wire square	33 tons	4,000
Spring steel	1.5 tons	1,800
Plating cadmium	3.5 tons	14,000
Packing materials		5,800
Total		<u>\$115,600</u>

### b. Supplies

Cutting tools	\$ 500
Dies	5,000
Lubricants & hand tools	700
Repairs & maintenance	1,000
Office supplies	300
Total	<u>\$ 7,500</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
<b>a. Electric Power.</b> 830 kw-hr a day.	
	<u>\$ 4,800</u>
<b>b. Fuel.</b> Oil is used for heat treat furnace & for boiler. Annual requirements about 30,000 gals.	
	<u>\$ 3,000</u>
<b>c. Water.</b> Heating, sanitation, fire protection.	
	<u>\$ 300</u>

### 4. TRANSPORTATION

	<u>Annual Operating Cost</u>
<b>a. Own Transport Equipment.</b> 1-ton pickup & delivery truck.	
	<u>\$ 1,000</u>
<b>b. External Transport Facilities.</b> In & out shipments about 90 tons monthly. No special requirements.	

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
<b>a. Direct Labor</b>		
Skilled	10	\$ 60,000
Semi-skilled	18	90,000
Unskilled	3	12,000
Total	<u>31</u>	<u>\$162,000</u>

### b. Indirect Labor

Manager	1	\$ 10,000
Office	3	12,000
Other	6	30,000
Total	<u>10</u>	<u>\$ 52,000</u>

c. Training Needs. Manager should be fully experienced. With 2 foremen & 4 skilled operators, he should be able to train all workers. Plant should reach full production in 3 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

<b>a. Annual Costs</b>		
Direct Materials		\$115,600
Direct Labor		162,000
Manufacturing Overhead(a)		68,600
Admin. & Sales Costs(b), Bad Debts, Contingencies		64,000
Depreciation on Fixed Capital		14,900
Total		<u>\$425,100</u>

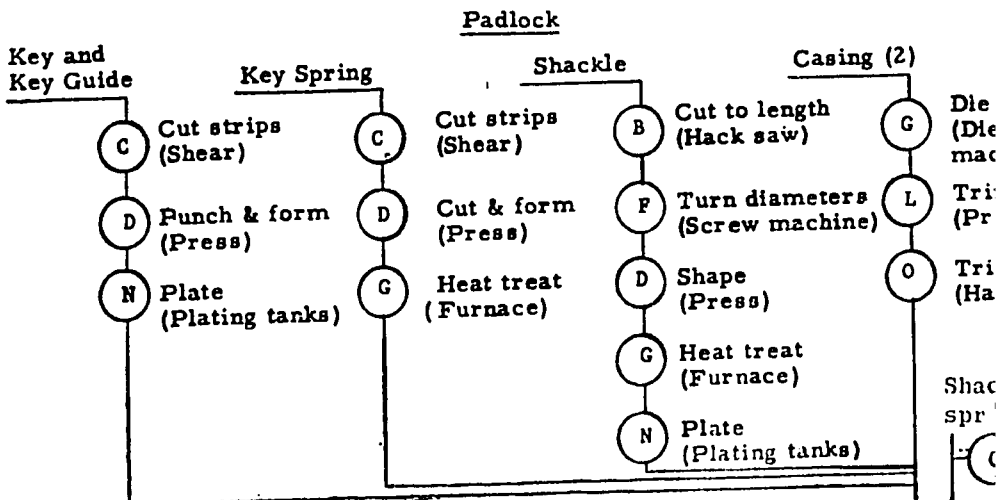
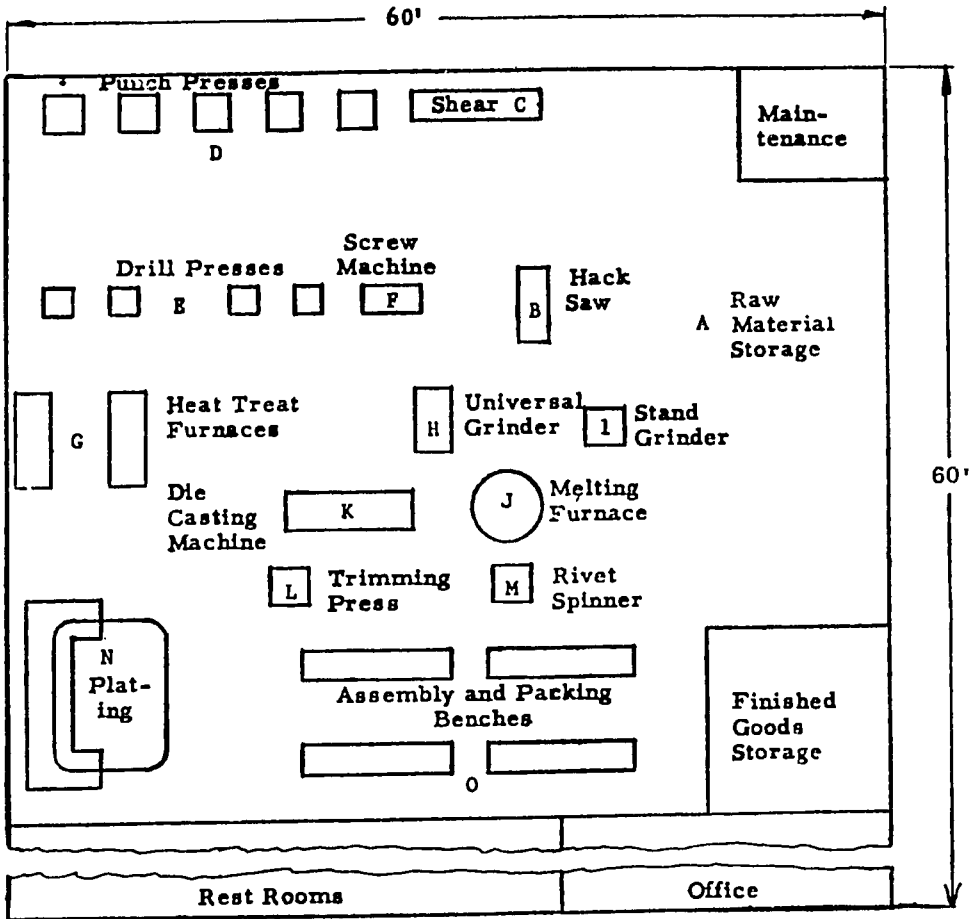
b. Annual Sales Revenue \$480,000

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

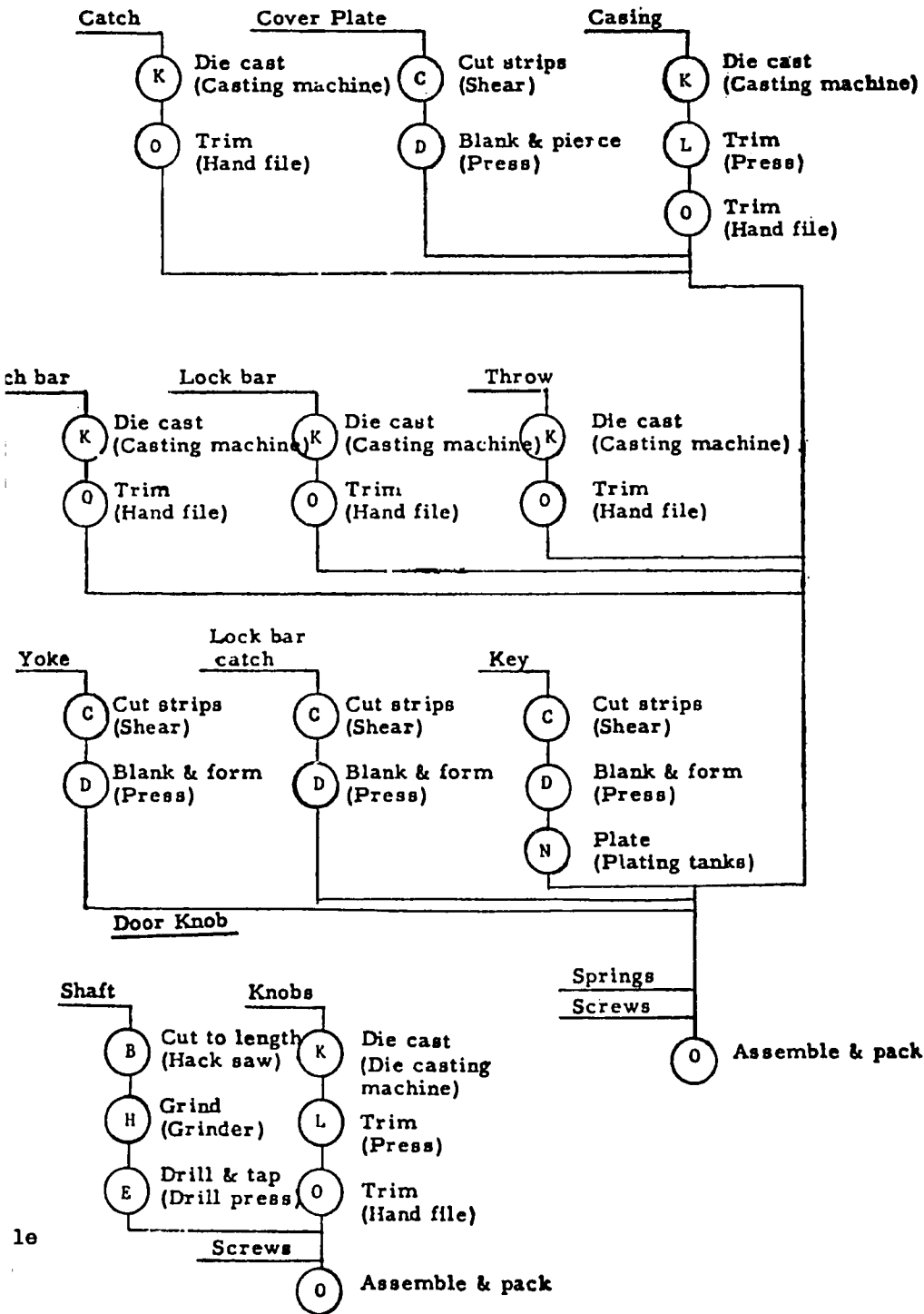
BUILDING HARDWARE: S.I.C. 3429

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BUILDING HARDWARE  
PLANT LAYOUT AND



Door Lock





## BUILDING HARDWARE: S. I. C. 3429

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. **Pressworking of Metal.** C. W. Hinman. 1950. 551 p. Illus. \$9.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Presents over 1,000 press tool designs, types of presses, attachments, and pressroom accessories, and tells how to use them in die engineering practice.
- B. **Builders' Hardware Handbook.** 1956. 234 p. Illus. \$6.40.  
Chilton Company  
East Washington Square  
Philadelphia, Pennsylvania 19106  
The complete outline for the study of builders' hardware: products, metals, and finishes.
- C. **Metal Finishing.** 604 p. 1956. \$3.50.  
Finishing Publications, Inc.  
381 Broadway  
Westwood, N. J. 07675  
Guidebook and directory devoted exclusively to metallic surface treatments.

#### II. U. S GOVERNMENT PUBLICATIONS

- A. **Machining Occupations.** 1958. 20 p. Illus. Catalog No. L2. 3:1215-9.  
\$.20.  
Superintendent of Documents  
Government Printing Office  
Washington, D. C. 20402  
Includes all-round machinists, tool and die makers, machine tool operators, setup men, and layout men.

#### III. PERIODICALS

- A. **Mechanical Engineering.** Monthly. \$7.00/year.  
The American Society of Mechanical Engineers  
20th and Northampton Streets  
Easton, Pennsylvania 18042  
Devoted to mechanical, industrial and management engineering.
- B. **Hardware Trade.** Monthly. \$2.00/year.  
Bruce Publishing Company  
2642 University Avenue  
St. Paul, Minnesota 55114  
Current information on materials and products.

## SELECTED REFERENCES (Continued)

### IV. U.S. PATENTS

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

- A. Patent No. D-161,831. Feb. 6, 1958. 2 p.  
Design for bolt type fastener.
- B. Patent No. 2,345,562. April 4, 1944. 4 p.  
This invention relates to hinges and is particularly concerned with improved methods of making hinge members.
- C. Patent No. 2,288,013. June 30, 1942. 5 p.  
Efficient and economical method of constructing connectors, such as hinges.
- D. Patent No. D-118,119. Dec. 19, 1939. 2 p.  
Design for door plate.

### V. TRADE ASSOCIATION

- A. National Builders Hardware Association  
1290 Avenue of the Americas  
New York, N. Y. 10019  
Provides members with latest technical information and news in the builders' hardware industry.

### VI. ENGINEERING COMPANY

- A. Sholtz Engineering Works  
200 West 6th Street  
Waterloo, Iowa 50701  
Tools, dies, special machinery.

### VII. DIRECTORY

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

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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

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

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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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# INDUSTRY PROFILES

## BUCKETS, PAILS AND PANS

I. P. No. 66103

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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.

## BUCKETS, PAILS AND PANS: Standard Industrial Classification 3411

### A. PRODUCT DESCRIPTION

Plant can produce a variety of small metal articles for use in factories, restaurants, households, etc. and on farms. Products include buckets, wash basins, drinking cups, cake and pie pans, graters, sifters, etc. They are made from steel sheets that are galvanized (zinc coated) or tin plated in the plant. The capacity figure given assumes that half of total production is accounted for by galvanized products and half by tinplated products. Product mix can, however, be readily varied to suit local demand for different products.

### B. GENERAL EVALUATION

Capital and skilled labor requirements are moderate. Products are in wide demand. Distribution over a fairly wide area should normally be feasible. Provided that the market is sufficiently large, this industry seems appropriate to the conditions of many areas that are in the early stages of industrial development.

### C. MARKET ASPECTS

1. USERS. Factories, farms, restaurants, many kinds of commercial and service establishments, private dwellings, military forces.
2. SALES CHANNELS AND METHODS. Factories normally sell to wholesalers. Some direct sales may be made to large-scale users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are convenient to handle and transport costs are not likely to impose a close limit on extent of domestic market area. In countries of moderate size and with reasonably good transport network potential market may be nation-wide for at least some of the products. b. Export. The volume of foreign trade in these products is small. Many countries produce such articles for themselves or use low-priced substitutes.
4. COMPETITION. a. Domestic Market. Freight costs on the imported articles usually give the domestic producer a fair amount of natural protection against imports. Unless manufacturing costs are abnormally high, little or no tariff protection or other government assistance should be needed. The products are simple in character and there should be no great difficulty in producing articles capable of competing with imports in quality. Woden buckets may provide competition in some areas. Plastic buckets are also beginning to provide some competition. b. Export Market. Some sales to easily accessible areas in nearby countries might be possible but a plant of the size described would not be able to develop a general export trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. Products in question are used for such a variety of purposes, both in urban and rural areas, that it is possible to mention only a few of the factors that may influence demand. In the countryside the demand for buckets will vary according to the importance of livestock, especially dairy cattle, goats and horses, in the country's agriculture. In urban areas demand for buckets will be influenced by the extent to which buildings have piped-in water. In this case a rising standard of living, accompanied by an extension of modern water-supply and sanitary facilities, may cause a decline in demand. Use of the pans and other cooking utensils that plant can produce will depend on the type of food eaten and the cooking methods commonly used. In the conditions of less economically developed areas the market required for this plant, in terms of total population, might be of the order of two million people.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 350,000 Pieces

### 1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	Cost	
Land. About 8,000 sq. ft.	\$	--
Building. One story, 60'x60'		21,600
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$53,200	
Other tools & equipmt.	2,500	
Furniture & fixtures.	1,200	
Transportation equipmt.	3,000	59,900
<u>Total (excl. Land)</u>		<u>\$ 81,500</u>
Principal Items. 50" shear, 45-ton press, bead and flange machine, side and bottom seamer, riveting machine, galvanizing equipment, wiring & pickling equipment, lathe, drill press, wire forming dies.		

### b. WORKING CAPITAL

	No. of Days	
Direct Materials	90	\$ 16,700
Direct Labor, Mfg. Overhead(a)	60	19,100
Admin. Costs(b), Contingencies, Sales Costs (c)	30	4,200
Training Costs		12,500
<u>Total Working Capital</u>		<u>\$ 52,500</u>

c. TOTAL CAPITAL (EXCL. LAND) \$134,000

### 2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Steel cold rolled sheet	160 tons	\$ 23,400
Steel wire - 16 gauge	3 tons	600
Zinc prime western	40 tons	8,800
Tin	15 tons	27,600
Chemicals		1,600
Packing materials		5,000
<u>Total</u>		<u>\$ 67,000</u>

### b. Supplies

Lubricants & belting	\$	500
Maintenance materials & parts		600
Tools		200
Office supplies		500
<u>Total</u>		<u>\$ 1,800</u>

### 3. POWER, FUEL AND WATER

a. <u>Electric Power, Connected load about 60 hp.</u>	Annual Cost
	\$ 1,800
b. <u>Fuel.</u> Any boiler fuel may be used with suitably adapted boiler. Cost should not exceed	\$ 900
c. <u>Water.</u> Good supply necessary for galvanizing & trimming operations. Cost for production & general purposes should not exceed	\$ 300

### 4. TRANSPORTATION

a. <u>Own Transport Equipment.</u> 1-ton truck for pickup & delivery.	Annual Operating Cost
	\$ 1,000
b. <u>External Transport Facilities.</u> Total in & out shipments less than 50 tons a month. No special requirements.	

### 5. MANPOWER

a. <u>Direct Labor</u>	Number	Annual Cost
Skilled	6	\$ 36,000
Semi-skilled	7	35,000
Unskilled	1	4,000
<u>Total</u>	<u>14</u>	<u>\$ 75,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 18,000
Office	2	9,000
Other	2	7,000
<u>Total</u>	<u>6</u>	<u>\$ 34,000</u>

c. Training Needs. Manager & chemist-foreman must be fully experienced. With 2 skilled workers, they should be able to train all workers. Plant should reach full production in 3 months.

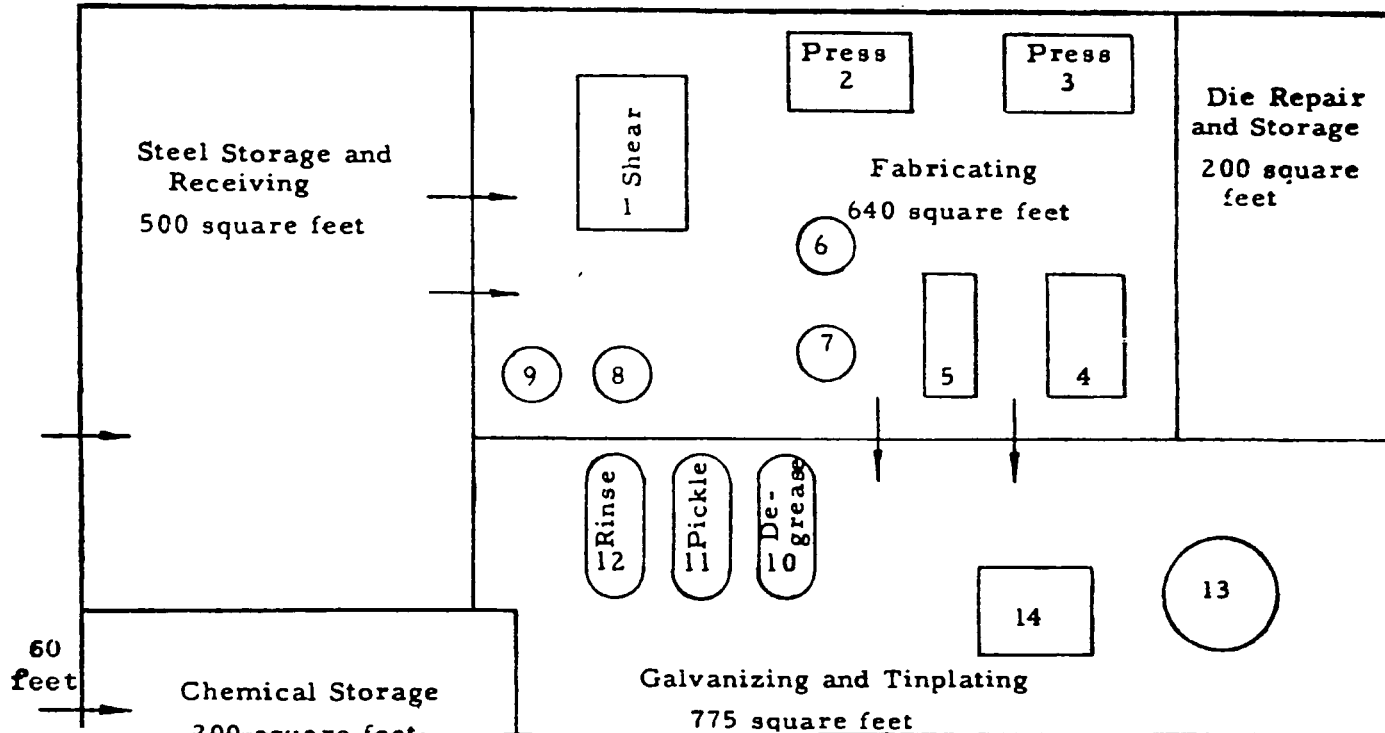
### 6. TOTAL ANNUAL COSTS AND SALES

<u>REVENUE</u>	
a. <u>Annual Costs</u>	
Direct Materials	\$ 67,000
Direct Labor	75,000
Manufacturing Overhead(a)	39,800
Admin. Costs(b), Contingencies	20,000
Sales Costs(c), Bad Debts	30,000
Depreciation on Fixed Capital	7,800
<u>Total</u>	<u>\$239,600</u>
b. <u>Annual Sales Revenue</u>	<u>\$280,000</u>

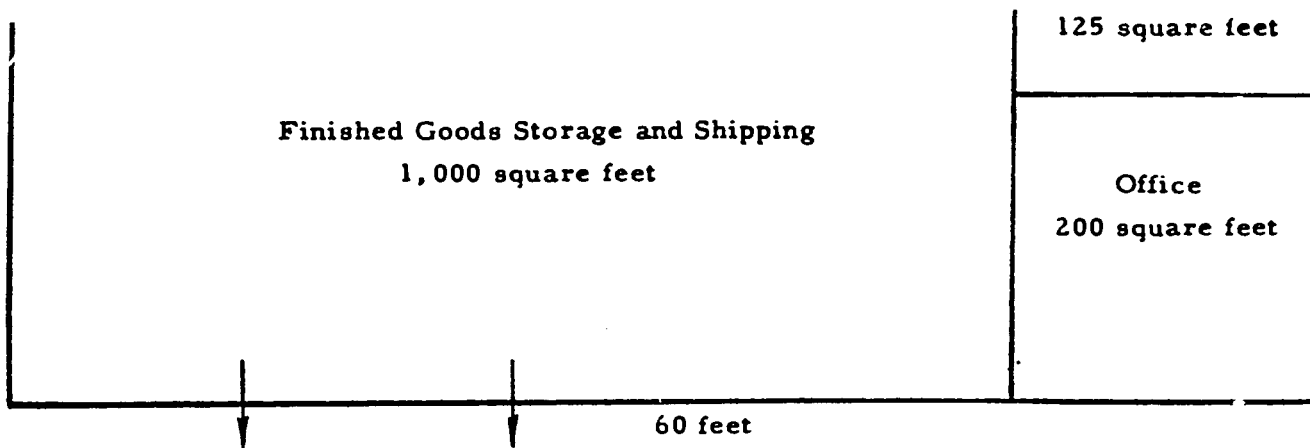
NOTES: (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

BUCKETS, PAILS AND PANS: S. I. C. 3411

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BUCKETS, PAILS AND



NOTE: Arrows indicate material flow

Key

- |                                 |                        |
|---------------------------------|------------------------|
| 1. Shear                        | 8. Riveting machine    |
| 2. Press - 45 ton               | 9. Wire former         |
| 3. Press - 45 ton               | 10. Degrease tank      |
| 4. Forming rolls                | 11. Pickle tank        |
| 5. Beading and flanging machine | 12. Rinse tank         |
| 6. Side seamer                  | 13. Galvanizing kettle |
| 7. Bottom seamer                | 14. Tinning pot        |



BUCKETS, PAILS AND PANS: S.I.C. 3411

SELECTED REFERENCES

I. TEXTBOOKS

- A. Machine Shop Practice. O. J. Benedict, Jr. 249 p. Illus. 1944.  
\$3.75.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Covers all vital material on machine shop practice.
- B. ASME Handbook. American Society of Mechanical Engineers. 1956.  
714 p. Illus. \$17.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Collection of up-to-date tables generally recognized as standard but not often found in handbooks.
- C. The New American Machinists' Handbook. Edited by Rupert LeGrand.  
1572 p. Illus. \$13.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036
- D. Audels Sheet Metal Workers' Handy Book. F. D. Graham and E. D. Anderson. 388 p. \$1.00.  
Bobbs-Merrill Co., Inc.  
3 W. 57th Street  
New York, N. Y. 10019
- E. Machine Shop: Theory and Practice. A. M. Wagener and H. R. Arthur.  
2nd edition. Illus. 1950. \$4.80.  
D. V. Van Norstrand Co., Inc.  
120 Alexander Street  
Princeton, N. J.

II. PERIODICALS

- A. Metal Forming and Fabricating. Monthly. \$7.50/year.  
Watson Publications, Inc.  
201 North Wells Street  
Chicago, Illinois 60606  
Production journal, specializing in presses, forming equipment, tooling, materials, and methods of metal working.
- B. Metal Finishing. Monthly. \$10.00/year.  
Metal and Plastics Publications, Inc.  
381 Broadway  
Westwood, New Jersey 07675  
Such operations as polishing, buffing, cleaning, plating and enameling of metal products.

## SELECTED REFERENCES (Continued)

### III. U. S. PATENTS

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

- A. Patent No. 2,624,304. 1953. 5 p.  
Method of manufacture of baking pans and the like.
- B. Patent No. 2,300,533. 1945. 3 p.  
Method and apparatus for manufacture of pails and similar articles made of sheet steel.

### IV. TRADE ASSOCIATIONS

- A. American Iron and Steel Institute  
150 East 42nd Street  
New York, N. Y. 10017
- B. American Zinc Institute  
292 Madison Avenue  
New York, N. Y. 10017
- C. Tin Research Institute  
483 West 6th Avenue  
Columbus, Ohio 43201

### V. ENGINEERING COMPANIES

- A. John Mohr and Sons  
3202 East 96th Street  
Chicago, Illinois 60617  
Technical engineering on plant design.

### VI. DIRECTORIES

- A. Conover-Mast Purchasing Directory. Semi-Annual. \$25.00.  
Conover-Mast Purchasing Directory  
205 East 42nd Street  
New York, N. Y. 10017  
For production, purchasing, and engineering executives.

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Springfield, Virginia 22151

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# INDUSTRY PROFILES

## CASTOR OIL HYDROGENATED

I. P. No. 66104

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## CASTOR OIL HYDROGENATED: Standard Industrial Classification 2899

### A. PRODUCT DESCRIPTION

Hydrogenated castor oil chilled and chipped packed in 50 lb. bags.

### B. GENERAL EVALUATION

This plant requires substantial capital and a fair amount of skilled labor. It is essential to have an assured supply of cheap castor oil. The product is a specialized one used by comparatively few industries, and a single plant can usually supply the needs of a very large territory. Since shipping of the product is fairly easy and it is commonly exported, competition in both domestic and foreign markets may be keen, and a careful survey of market potential should be made to determine whether there is need for the additional capacity represented by the plant.

### C. MARKET ASPECTS

1. USERS. Manufacturers of lubricating grease, protective coatings, metal castor oil soap, plasticizer for plastics.
2. SALES CHANNELS AND METHODS. Sales to user industries and exporters. In many cases it may be necessary to use an export agent or agents in order to develop a large enough market.
3. GEOGRAPHICAL EXTENT OF MARKET. This may be very extensive, since shipping the product is fairly easy. In most situations, in fact, long-distance shipments will have to be made, since local industries are unlikely to provide a sufficient market.
4. COMPETITION. a. Domestic Market. Competition from imports may be keen and careful cost estimates should be made to ascertain whether it can be met. b. Export Market. If the plant's price is competitive, an active export agent should be able to find some export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. The major users are manufacturers of lubricating grease protective coatings, and the plant will need to have within its potential market area a fairly numerous group of such users.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFTS, 250 DAYS: 2,210,000 Lbs.

### 1. CAPITAL REQUIREMENTS

	Cost
a. <u>FIXED CAPITAL</u>	
Land. 3 acres.	\$ --
Building. One story, 125'x200'.	150,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipment	\$100,000
Other tools & equipment	20,000
Furniture & fixtures	1,000
Transportation equipmt.	4,000
<u>Total (excl. Land)</u>	<u>\$275,000</u>

Principal Items. Caustic scrubber, gas circulator, charge tank, gas cooler, hot catch all, hardening machine, catalyst storage tank, pumps, hydrogen & castor oil storage tanks, chilling roll & chipping machine, conveyors & bagging equipment, 2 fork lift trucks, 2-ton truck.

### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 95,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	4,000
Training Costs		3,000
<u>Total Working Capital</u>		<u>\$102,000</u>

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

### 2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. <u>Direct Materials</u>		
Castor oil	2,200,000 lbs.	\$396,000
Hydrogen	2,500,000 cu. ft.	18,000
Nickel catalyst	600 lbs.	2,700
Paper bags, double strength 50 lbs	50,000	5,000
<u>Total</u>		<u>\$421,700</u>

### b. Supplies

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

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> 200 hp. connected load.	\$ 12,000
b. <u>Fuel.</u> Gas.	\$ 5,000
c. <u>Water.</u> About 5 million gals.	\$ 1,200

### 4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> One 2-ton truck.	\$ 1,000

b. External Transport Facilities. Good highways necessary, and easy access to railroad, if possible.

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	6	\$ 30,000
Semi-skilled	8	32,000
Unskilled	8	24,000
<u>Total</u>	<u>22</u>	<u>\$ 86,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 18,000
Office & inspector	3	12,000
Truck driver	2	8,000
<u>Total</u>	<u>7</u>	<u>\$ 38,000</u>

c. Training Needs. Manager & supervisor must be fully experienced. With 6 skilled workers they should be able to train other men and reach full production in 15 days.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$421,700
Direct Labor	86,000
Manufacturing Overhead(a)	61,700
Admin. Costs(b), Contingencies	30,000
Sales Costs(c), Bad Debts	22,000
Depreciation on Fixed Capital	18,800
<u>Total</u>	<u>\$640,200</u>

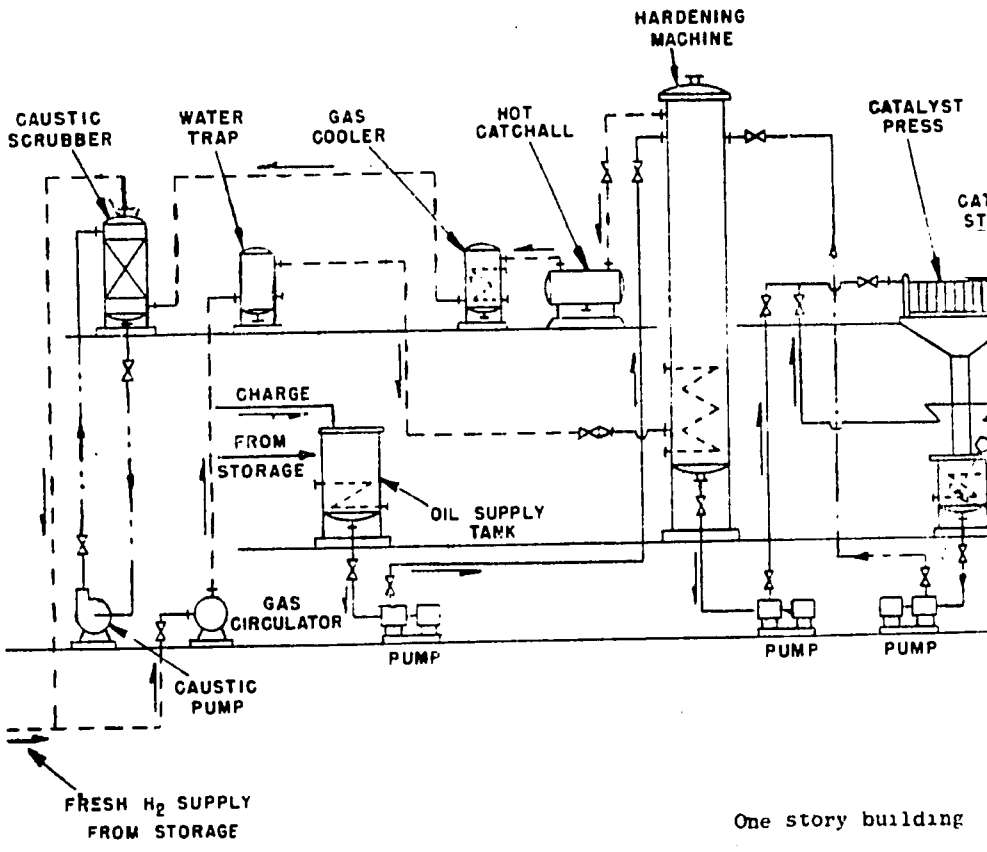
b. Annual Sales Revenue \$700,000

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

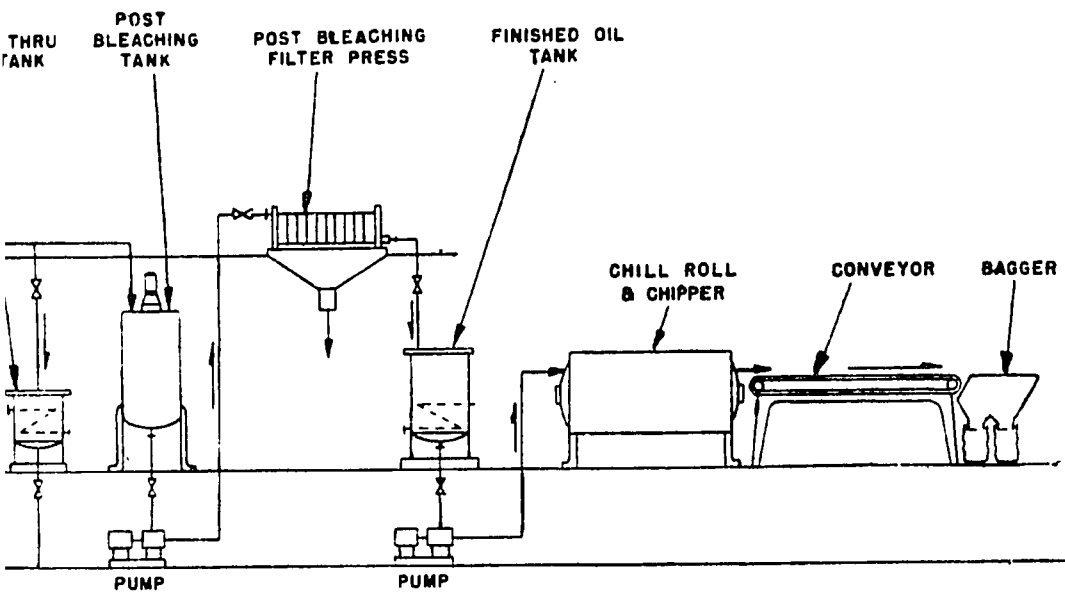
CASTOR OIL HYDROGENATED: S.I.C. 2899

31

CASTOR OIL H



ENATED: S.I.C. 2899



00' or about 25,000 square feet.

29'



CASTOR OIL HYDROGENATED: S.I.C. 2899

SELECTED REFERENCES

I. TEXTBOOKS

- A. Vegetable Fats and Oils. 2nd edition. E. W. Eckey. 1954. 864 p. \$17.50.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Devoted exclusively to vegetable oils and fats.
- B. Industrial Oil and Fat Products. 2nd edition. A. E. Bailey. 1951. 991 p. Illus. \$18.00. 3rd edition by David Swerm in preparation.  
John Wiley & Sons, Inc.  
605 3rd Avenue  
New York, N. Y. 10016  
Nature of fats and oils; raw materials; industrial utilization, including pharmaceutical and medicinal; unit processes, including extraction, refining, and bleaching.
- C. The Chemical Constitution of Natural Fats. 3rd edition. T. P. Hilditch. 1956. 664 p. \$16.00.  
John Wiley and Sons, Inc.  
605 3rd Avenue  
New York, N. Y. 10016  
Description of the composition of about 1,000 natural fats from all parts of the animal and vegetable kingdoms. Information on laboratory synthesis of fats is included.

II. U. S. GOVERNMENT PUBLICATIONS

- A. Castor Oil. IR-23458. April 1959. Gratis.  
Office of Technical Cooperation and Research.  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICALS

- A. American Oil Chemists' Society Journal. Monthly. \$9.00/year.  
American Oil Chemists' Society  
35 East Wacker Drive  
Chicago, Illinois 60601  
Technical articles on chemistry of oils of plant and animal origin with particular reference to applications.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,733,131. 1956. 4 p.  
Apparatus for the extraction of oils from vegetable matter.
- B. Patent No. 2,707,712. 1955. 12 p.  
Method and apparatus for the extraction of oils from animal and vegetable products.
- C. Patent No. 2,630,754. 9 p.  
Solvent extraction of oils, fats, and waxes from particles of vegetable matter (seeds).

### V. TRADE ASSOCIATIONS

- A. National Institute of Oil Seed Products  
1026 17th Street, N. W.,  
Washington, D. C. 20006

### VI. ENGINEERING COMPANIES

- A. Allis-Chalmers Manufacturing Company  
864 South 70th Street  
Milwaukee, Wisconsin 53214  
Manufacturers of machinery and equipment. Consulting engineers.
- B. French Oil Milling Machinery Co.  
1088 Green Street  
Piqua, Ohio 45356  
Manufacturers of machinery and equipment. Consulting engineers.

## 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

## COPPER TUBING

I. P. No. 66105

*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.

## COPPER TUBING: Standard Industrial Classification 3351

### A. PRODUCT DESCRIPTION

Tubing made from purchased copper ingots by the extrusion method.

### B. GENERAL EVALUATION

This industry requires a substantial investment even for a plant of the size described, which is about the minimum feasible. Manufacturing operations do not, on the other hand, call for large amounts of high-grade labor. The tubing described has thin walls compared with standard copper pipe. Use of this material has been increasing in recent years, because it can be used with solder type fittings requiring no threads and can be readily bent and curved. There appear to be two situations in which this industry might be appropriate to the conditions of developing areas. Where copper is mined and refined, the plant might be associated with a copper refining plant and, benefiting from low material costs, might be able to find a general market. In the second case, an area may be sufficiently advanced economically to be able to provide a domestic market large enough to justify establishing a copper tubing plant based on copper ingots brought from a distance. A plant such as that described could be complemented by a copper wire drawing plant, since the copper tube extruder could be used for the extrusion of copper wire rod suitable for wire drawing, thus effecting considerable savings. (See Industry Profile on Copper Wire: S. I. C. 3351). If this is done, there will probably be additional areas in which economic operation becomes feasible.

### C. MARKET ASPECTS

1. USERS. Building contractors, industries.
2. SALES CHANNELS AND METHODS. Sales are mainly made direct to users, but some are also made to warehouses supplying metal products.
3. GEOGRAPHICAL EXTENT OF MARKET. Copper tubing is a sufficiently high value product to be able to bear the cost of transporting it long distances. In a country of moderate size and with a reasonably good transport network the potential domestic market area may be nation-wide. This product is exported world-wide.
4. COMPETITION. a. Domestic Market. Competition from imports is likely to be fairly strong in most cases. Competition from substitute products made of alternative materials will also almost certainly be present. Its strength will depend to a great extent on relative prices. b. Export Market. Competition from large-scale producers may be formidable. Given a favorable production cost situation, however, regional, if not general, export sales should be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. In circumstances favoring low cost production, the plant might be able to operate successfully even if it had to rely very largely on export business. If the production cost situation necessitates dependence mainly on domestic outlets, it is evident that a substantial volume of local construction and industrial activity will be necessary. The size of the domestic market required cannot, however, be indicated in terms of total population or any other simple measure.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 1,875 Tons

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<b>Cost</b>
Land. About 1 acre	\$	--
Building. One story, 6,000 sq. ft. area, steel structure. Concrete floor, rating 500 lbs. per sq. ft.	48,000	
Equipment, Furniture & Fixtures.		
Prod'n. tools & equipmt.	\$184,000	
Other tools & equipmt.	17,000	
Furniture & fixtures	5,000	206,000
<b>Total (excl. Land)</b>		<b>\$254,000</b>

Principal Items. Reverberatory oil-fired furnace, ladles (3), overhead crane, billet molds, rail conveyor, rotary saw, tunnel type furnace, conveyor, extrusion press, coiling capstan, lift truck.

### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	\$270,000
Admin. Costs (b), Contingencies, Sales Costs(c)	30	22,000
Training Costs		13,000
<b>Total Working Capital</b>		<b>\$305,000</b>

**c. TOTAL CAPITAL (EXCL. LAND)** \$559,000

### 2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Copper	1,900 tons.	\$1,400,000

### b. Supplies

Lubricants	\$ 500
Hand tools	600
Tools, dies & fixtures	15,000
Maintenance & repair parts	16,000
Office supplies	1,500
<b>Total</b>	<b>\$ 33,600</b>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric power. Connected load about 250 hp.	\$ 8,000
b. Fuel. About 300,000 gals. oil annually.	\$ 30,000
c. Water. Water is re-used. Make-up water, & water for general purposes, about 5.6 mn. gals. annually.	\$ 1,400

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 350 tons a month. Railroad facilities desirable.

### 5. MANPOWER

	Number	Annual Cost
<b>a. Direct Labor</b>		
Skilled	2	\$ 12,000
Semi-skilled	8	40,000
Unskilled	5	22,000
<b>Total</b>	<b>15</b>	<b>\$ 74,000</b>
<b>b. Indirect Labor</b>		
Manager & supervisors	3	\$ 26,000
Office	2	9,000
Other	8	37,000
<b>Total</b>	<b>13</b>	<b>\$ 72,000</b>

- c. Training Needs. Manager & supervisors should have long experience. With aid of 2 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

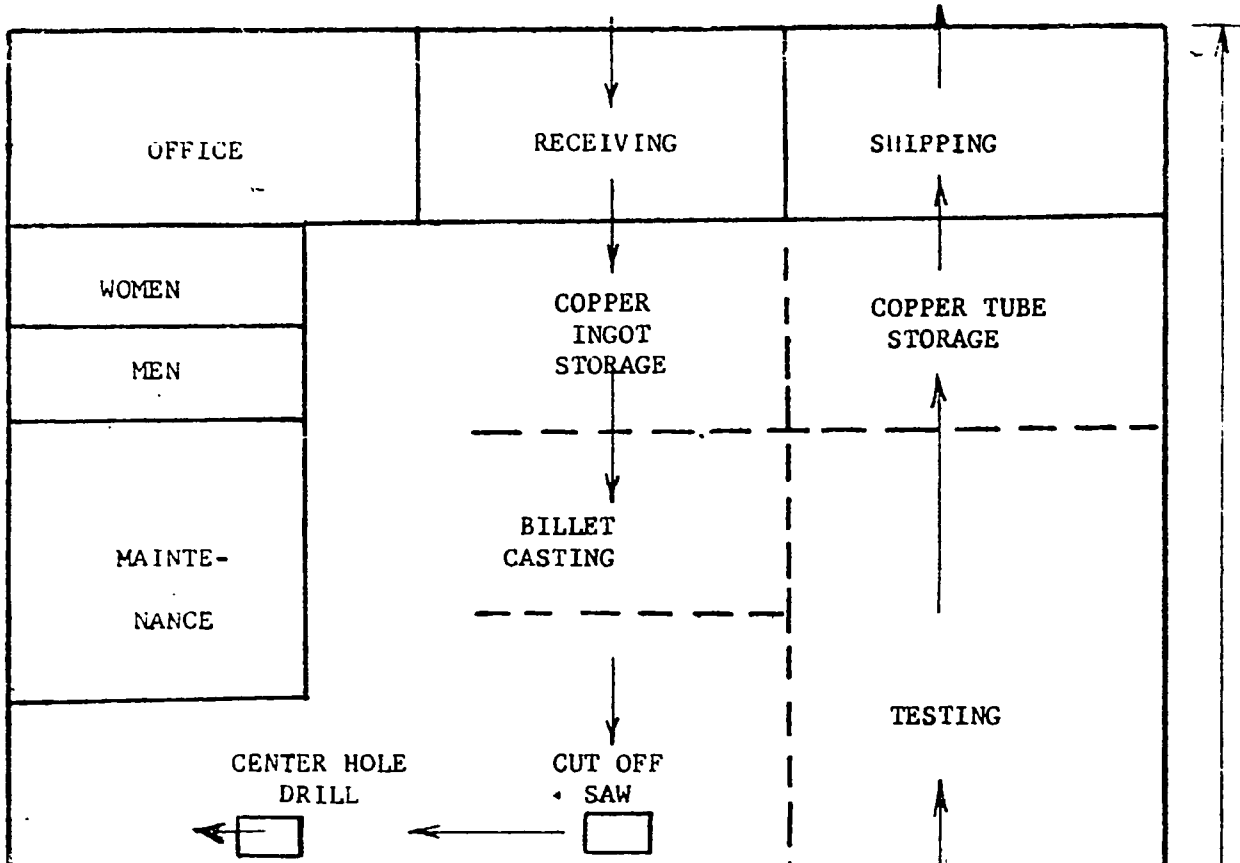
<b>a. Annual Costs</b>	
Direct Materials	\$1,400,000
Direct Labor	74,000
Manufacturing Overhead(a)	145,000
Admin. Costs (b), Contingencies	64,000
Sales Costs(c), Bad Debts	200,000
Depreciation on Fixed Capital	25,000
<b>Total</b>	<b>\$1,908,000</b>
<b>b. Annual Sales Revenue</b>	
	<b>\$2,400,000</b>

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

COPPER TUBING: S.I.C. 3351

45

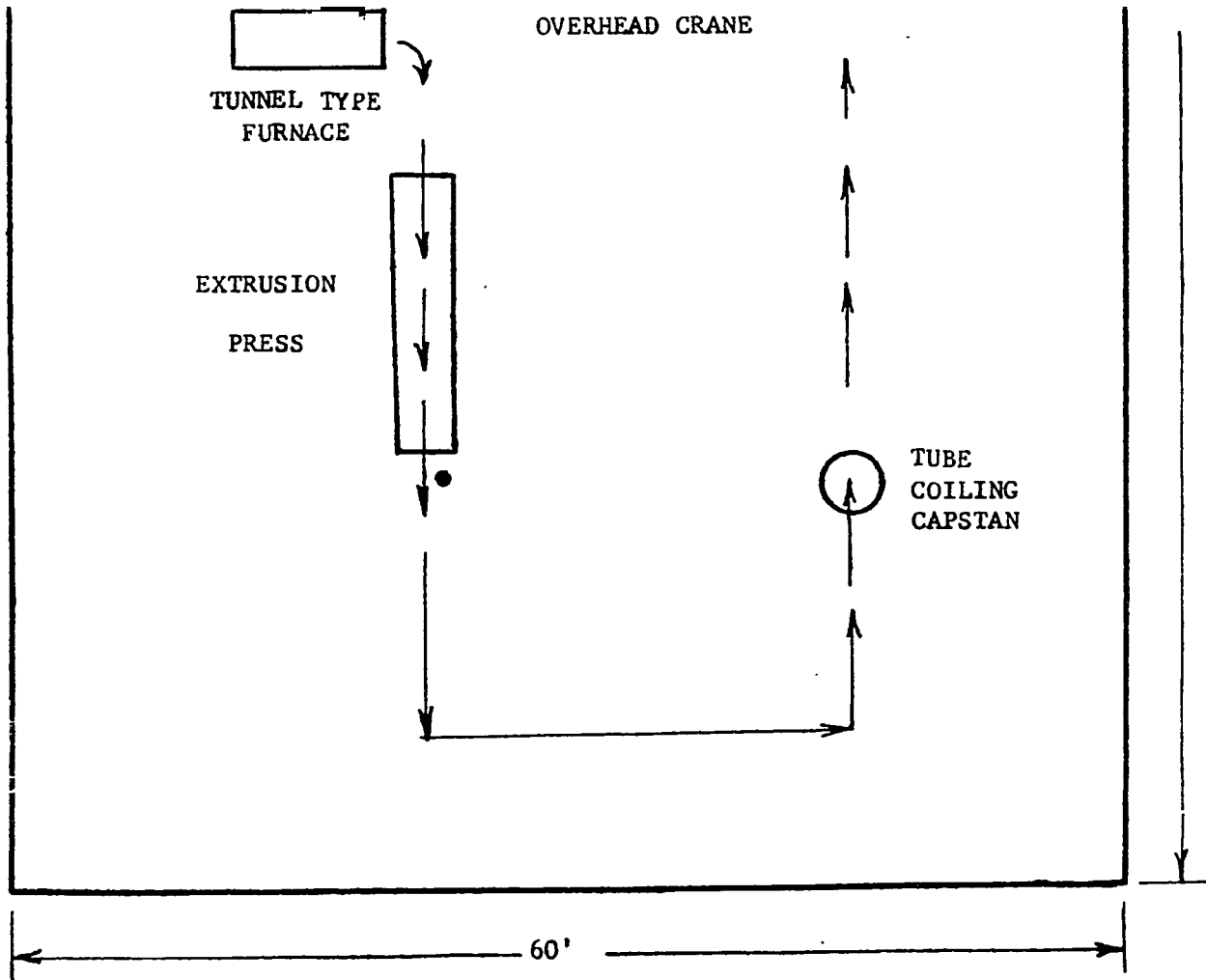
PLANT LAYOUT



46

COPPER TU

S.I.C. 3351



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## COPPER TUBING: S. I. C. 3351

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#### I. TEXTBOOKS

- A. Copper. A. Butts, editor. 1954. 936 p. Illus. \$22.75  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Equipment and processes in the manufacture of various copper products.
- B. Modern Uses of Nonferrous Metals. C. H. Mathewson, editor. 1953.  
530 p. Illus. \$7.00.  
American Institute of Mining, Metallurgical and Petroleum Engineers, Inc.  
29 West 39th Street  
New York, N. Y. 10018  
Survey of current uses and production methods relevant to nonferrous  
metals including copper.
- C. Nonferrous Physical Metallurgy. J. R. Raudebaugh. 1952. 345 p.  
Illus. \$7.00.  
Pitman Publishing Corporation  
20 E. 46th Street  
New York, N. Y. 10017  
Various techniques employed in the fabrication of such nonferrous metals  
as copper.
- D. Extrusion of Plastics, Rubber, and Metals. H. R. Simonds and others.  
1952. 454 p. Illus. \$11.00.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Extruding equipment, manufacturers of such equipment, and pertinent  
exerusion processes.
- E. Extrusion. A. B. Tesmen. Metal Progress. October 1959. Vol. 76,  
No. 4. p. 114-118. \$.75.  
American Society for Metals  
7301 Euclid Avenue  
Cleveland, Ohio 44103

#### II. U. S. GOVERNMENT PUBLICATION

- A. Copper Tubing. May 1957. OD-8. 11 p.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Describes layout, equipment, and related items for a copper tube plant  
used for the minimal economic production of extruded copper tubing.

## SELECTED REFERENCES (Continued)

### III. PERIODICALS

- A. Metal Progress. Monthly. \$7.00/year.  
American Society for Metals  
7301 Euclid Avenue  
Cleveland, Ohio 44103  
Contemporary improvements in the industrial and other uses of metals.
- B. The Tool and Manufacturing Engineer. Monthly. \$2.00/year.  
American Society of Tool Engineers  
10700 Puritan Avenue  
Detroit, Michigan 48238  
Developments in tool production and in various fields of manufacturing.

### IV. U.S. PATENTS

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

- A. Patent No. 2,959,077. 1960. 4 p.  
Mill for extruding metal tubing.
- B. Patent No. 2,633,765. 1953. 7 p.  
Forming press for manufacturing copper tubing.

### V. TRADE ASSOCIATIONS

- A. Copper Institute  
50 Broadway  
New York, N. Y. 10004
- B. United States Copper Association  
50 Broadway  
New York, N. Y. 10004

### VI. ENGINEERING COMPANY

- A. Feller Engineering Company  
1158 Empire Building  
Pittsburgh, Pa., 15222  
Engineering and design work pertaining to extruding plants.

### VII. DIRECTORY

- A. Standard Metal Directory. \$15.00.  
National Business Press, Inc.  
425 West 25th Street  
New York, N. Y. 10001  
Thorough listing of United States producers of metal products, equipment used and products made.

COPPER TUBING: S. I. C. 3351

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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Clearinghouse for Federal Scientific and  
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Springfield, Virginia 22151

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# INDUSTRY PROFILES

## COPPER WIRE

I. P. No. 66106

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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.

## COPPER WIRE: Standard Industrial Classification 3351

### A. PRODUCT DESCRIPTION

Copper wire, principally 8, 10, 12 and 14 gauge, made from purchased 5/16" coiled hot rolled copper rod. Part of the production will be processed into insulated wire. Plant capacity is given in terms of production half of bare and half of insulated wire. This proportion can be varied in accordance with demand.

### B. GENERAL EVALUATION

This industry requires only a modest capital investment. Labor skills needed are of a fairly high order, but number of workers required is very small. Possibilities of profitable operation will be enhanced if the wire drawing plant is associated with a copper tube plant (see Industry Profile on Copper Tubing: S.I.C. 3351).

### C. MARKET ASPECTS

1. USERS. Building contractors, industries, government agencies, individuals.
2. SALES CHANNELS AND METHODS. Most sales will probably be made to wholesale distributors. Some may be made direct to large users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic Market. This product is easily handled and has a high value in relation to bulk and weight. In most countries the potential domestic market will be nation-wide.  
b. Export Market. This product is exported world-wide by large-scale producers in advanced industrial countries.
4. COMPETITION. a. Domestic Market. Competition from imports may be keen. For some purposes, aluminum wire is competitive. b. Export Market. This plant would normally be unable to compete in the international market with large-scale producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. The demand for copper wire varies greatly according to the degree of development of electric power, telecommunications and various user industries. It also depends on the relative cost of substitutes and how far they are available. In the conditions of most economically less developed areas, this plant could probably serve a total population of the order of five million people.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 120 Tons

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<u>Cost</u>
Land. About 10,000 sq. ft.	\$	--
Building. One story, 40'x100', fireproof.		24,000
Equipment, Furniture & Fixtures		
Prod'n. tools & equipmt.	\$	40,000
Other tools & equipmt.		9,000
Furniture & fixtures		1,000
<u>Total (excl. Land)</u>		<u>\$ 74,000</u>

Principal Items. Pickle tank complete, wire drawing machine, pointing machine, annealing furnace, extruder complete, rewinder, spooler, hydraulic lift truck, skids, bench lathe, bench grinder, hand tools.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 24,700
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,000
<u>Total Working Capital</u>		<u>\$ 26,700</u>

**c. TOTAL CAPITAL (EXCL. LAND) \$100,700**

### 2. MATERIALS AND SUPPLIES

<b>a. Direct Materials</b>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Hot drawn copper rod	120 tons	\$102,600
Vinylite insulation	6,264 lbs.	1,800
<u>Total</u>		<u>\$104,400</u>

### b. Supplies

Sulfuric acid	\$	200
Spools		3,600
Wire dies		400
Lubrication & hand tools		100
Office supplies		200
<u>Total</u>		<u>\$ 4,500</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
<b>a. Electric Power.</b> Connected load about 500 hp.	\$ 1,200
<b>b. Fuel.</b> About 30,000 gals. oil annually.	\$ 3,600
<b>c. Water.</b> About 1.5 mn. gals. annually for production, sanitation & fire protection.	\$ 400

### 4. TRANSPORTATION

- a. Own Transport Equipment.** None necessary.
- b. External Transport Facilities.** Total in & out shipments about 25 tons a month. No special requirements.

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
<b>a. Direct Labor</b>		
Skilled	2	\$ 12,000
<b>b. Indirect Labor</b>		
Manager, who also acts as bookkeeper	1	\$ 10,000
Foreman	1	8,000
Receiving & shipping clerk	1	4,000
<u>Total</u>	<u>3</u>	<u>\$ 22,000</u>

**c. Training Needs.** All personnel except the receiving & shipping clerk must be experienced. No training time required.

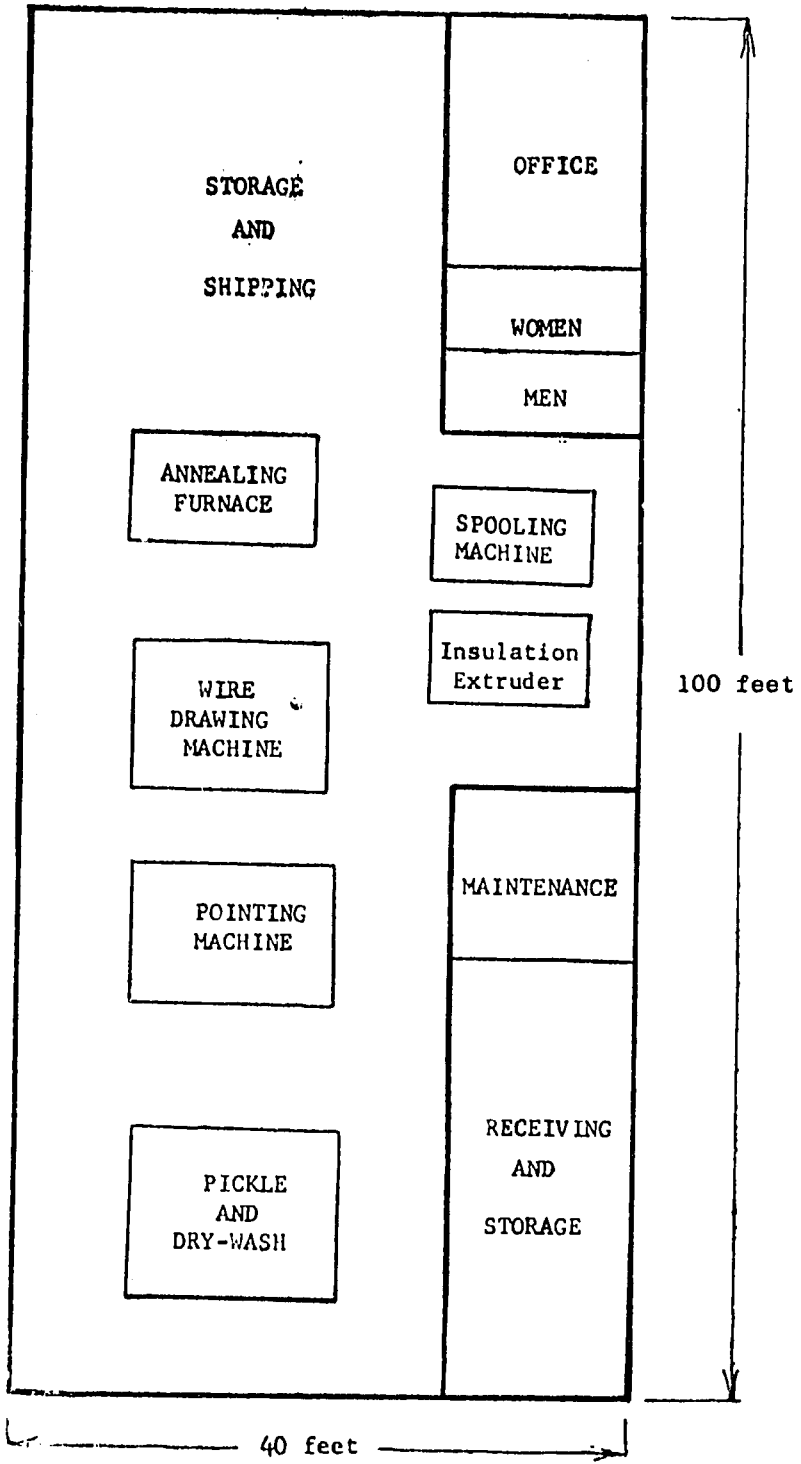
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

<b>a. Annual Costs</b>	
Direct Materials	\$104,400
Direct Labor	12,000
Manufacturing Overhead (a)	31,700
Admin. Costs (b), Contingencies	11,100
Sales Costs (c), Bad Debts	14,000
Depreciation on Fixed Capital	8,800
<u>Total</u>	<u>\$182,000</u>
<b>b. Annual Sales Revenue</b>	<u>\$220,000</u>

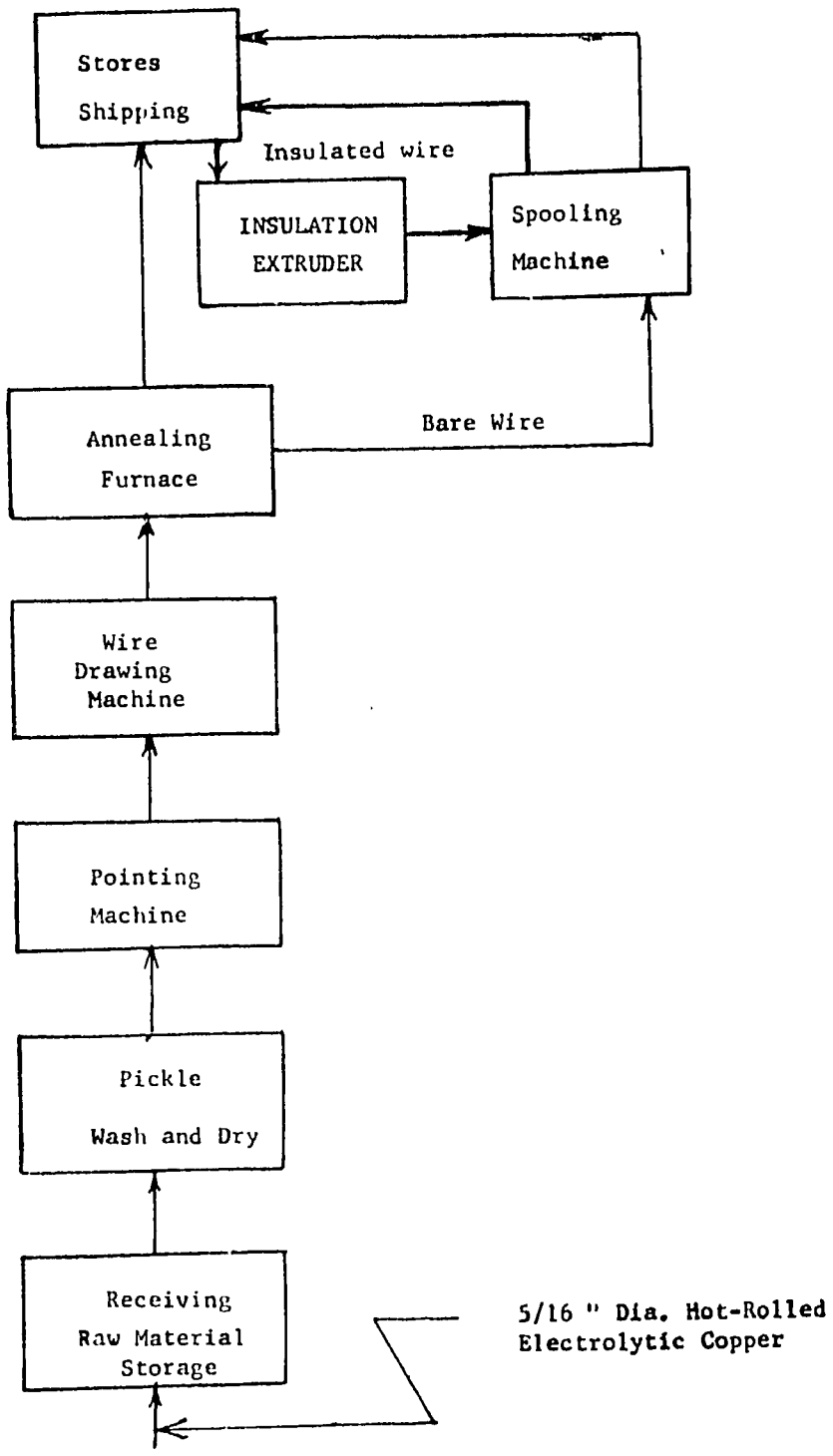
**NOTES.** (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

COPPER WIRE: S.I.C. 3351

53'



WORK FLOW



55



COPPER WIRE: S.I.C. 3351

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- B. Modern Uses of Nonferrous Metals. C. H. Mathewson, editor. 1953. 530 p. Illus. \$7.00.  
American Institute of Mining, Metallurgical, and Petroleum Engineers.  
29 West 39th Street  
New York, N. Y. 10018  
Includes section on the processing and fabrication of copper products.
- C. Metallurgy. C. G. Johnson and W. R. Weeks. 1956. 545 p. Illus. \$5.50.  
American Technical Society  
848 East 58th Street  
Chicago, Illinois 60637  
Contains section on the shaping and forming of copper products.
- D. Basic Engineering Metallurgy. C. A. Keyser. 1959. 384 p. Illus. \$10.75.  
Prentice-Hall, Inc.  
Route 9W  
Englewood Cliffs, New Jersey 07632  
Methods of fabricating and finishing light metals, including copper.
- E. Trends in Copper and Copper Alloy Rod and Wire. R. J. Christine. Wire and Wire Products, October 1959. Vol. 34, No. 10 p. 1285 ff. \$.75.  
Quinn-Brown Publishing Company  
453 Main Street  
Stamford, Connecticut 06901

II. U. S. GOVERNMENT PUBLICATIONS

- A. Copper Wire Drawing and Insulating. OD-9. May 1957. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Indicates equipment, materials, work force, and operational process to produce 1,000 pounds of copper wire per eight-hour day.

## SELECTED REFERENCES (Continued)

### III. PERIODICALS

- A. Journal of Applied Physics. Monthly. \$14.00/year.  
American Institute of Physics  
325 East 45th Street  
New York, N. Y. 10017  
Scientific advances in equipment and apparatus and their components in physics.
- B. Mechanical Engineering. Monthly. \$7.00/year.  
American Society of Mechanical Engineers  
29 West 39th Street  
New York, N. Y. 10018  
Has sections on metals and production engineering, also articles on the most recent developments in metals processing.

### IV. U. S. PATENTS

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

- A. Patent No. 2,940,588. 1960. 3 p.  
Wire drawing machine.
- B. Patent No. 2,927,444. 1960. 9 p.  
Wire drawing and winding machine.
- C. Patent No. 2,909,275. 1959. 4 p.  
Continuous wire-drawing machine.
- D. Patent No. 2,885,777. 1959. 3 p.  
Methods of and apparatus for insulating wires and other filamentary articles.

### V. TRADE ASSOCIATIONS

- A. Copper Development Association  
25 Broadway, Room 1745  
New York, N. Y. 10004
- B. International Copper Research Association  
1271 Avenue of the Americas  
New York, N. Y. 10020
- C. Wire Machinery Builders Association  
73 Cherry Street  
Spencer, Massachusetts 01562

### VI. ENGINEERING COMPANY

- A. E. W. Bliss Company  
1382 Raff Road, S. W.  
Canton, Ohio 44710  
Design machinery and plants for drawing and insulating metals.

### VII. DIRECTORY

- A. Wire and Wire Products Buyers' Guide and Yearbook of the Wire Association. \$15.00  
Quinn-Brown Publishing Corporation  
453 Main Street  
Stamford, Connecticut 06901  
Lists manufacturers of fabricated wire products, machinery, equipment and supplies used in the wire industry.

COPPER WIRE: S.I.C. 3351

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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

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

### ORDERING INSTRUCTIONS

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

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

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

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

### GENERAL INFORMATION

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

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

# INDUSTRY PROFILES

## DRY ICE

I. P. No. 66107

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

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

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

## DRY ICE: Standard Industrial Classification 2813

### A. PRODUCT DESCRIPTION

Dry ice, solid carbon dioxide (CO<sub>2</sub>), used mostly as a refrigerant.

### B. GENERAL EVALUATION

Capital requirements for this plant are rather high. With the expansion of electric power facilities and the growing use of electrical refrigeration equipment, there is a tendency for demand for dry ice to fall off, and a careful estimate should be made not only of current demand but also of future prospects. However, there are still many areas where refrigeration facilities are few, and in such areas there may be good prospects for a dry ice plant for some years to come.

### C. MARKET ASPECTS

1. USERS. Food industries, eating places, households.
2. SALES CHANNELS AND METHODS. Sales to industries and distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. Long distance shipping requires insulated trucks and railroad cars, and normally the shipping limit is about 300 miles. This product is not exported.
4. COMPETITION. The spread of electrical refrigeration equipment increasingly challenges the dry ice business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend on climate, income level, industrial development, the extent to which electrical refrigeration equipment is available, etc. The wide variation in these respects prevents any useful generalization on the market size in terms of total population.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 2,500 Tons

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 1 acre.	\$ --
Building. One story, 60'x60'.	21,600
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$322,000
Other tools & equipmt.	2,000
Furniture & fixtures	800
Transportation equipmt.	2,500
Total (excl. Land)	<u>327,300</u>
	<u>\$358,900</u>

Principal Items. Oil storage tank, furnace, boiler, feed water heater, scrubbers, absorbers, 5 blowers, fan, monoethanolamine system including reboiler & bubble column, gas holder, compressor, separator, dryer, cleaner, liquid CO<sub>2</sub> tank, expansion tank, solid CO<sub>2</sub> pressing equipment, solid CO<sub>2</sub> cutting & wrapping equipment, pumps, pipes, valves, traps & fittings.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 11,100
Admin. Costs(b), Contingencies, Sales Costs (c)		4,000
Training Costs		1,000
Total Working Capital		<u>\$ 16,100</u>

#### c. TOTAL CAPITAL (EXCL. LAND) \$375,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Fuel oil	325,000 gals.	\$ 16,250
Monoethanolamine	1,000 gals.	250
Kraft paper bags, tape	87,500	1,800
Total		<u>\$ 18,300</u>

#### b. Supplies

Lubricants & hand tools	2,500
Maintenance & spare parts	3,600
Acid & cleaning chemicals	2,700
Office supplies	250
Total	<u>\$ 5,300</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Produced in the plant.	
b. Fuel. Heat is available as a by-product.	
c. Water. Make-up.	<u>\$ 1,000</u>

### 4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Small truck for local delivery.	<u>\$ 1,000</u>
b. External Transport Facilities. For shipping any appreciable distance insulated trucks or railroad cars are necessary.	

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	\$ 5,000
Semi-skilled	1	4,000
Unskilled	2	6,000
Total	<u>4</u>	<u>\$ 15,000</u>
b. Indirect Labor		
Manager	1	\$ 10,000
Utility & maintenance	2	12,000
Truck driver	1	4,000
Total	<u>4</u>	<u>\$ 26,000</u>

c. Training Needs. The manager must be experienced as a chemical engineer & in the manufacture of dry ice. With 1 skilled worker he can train others & reach full production in 30 days.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

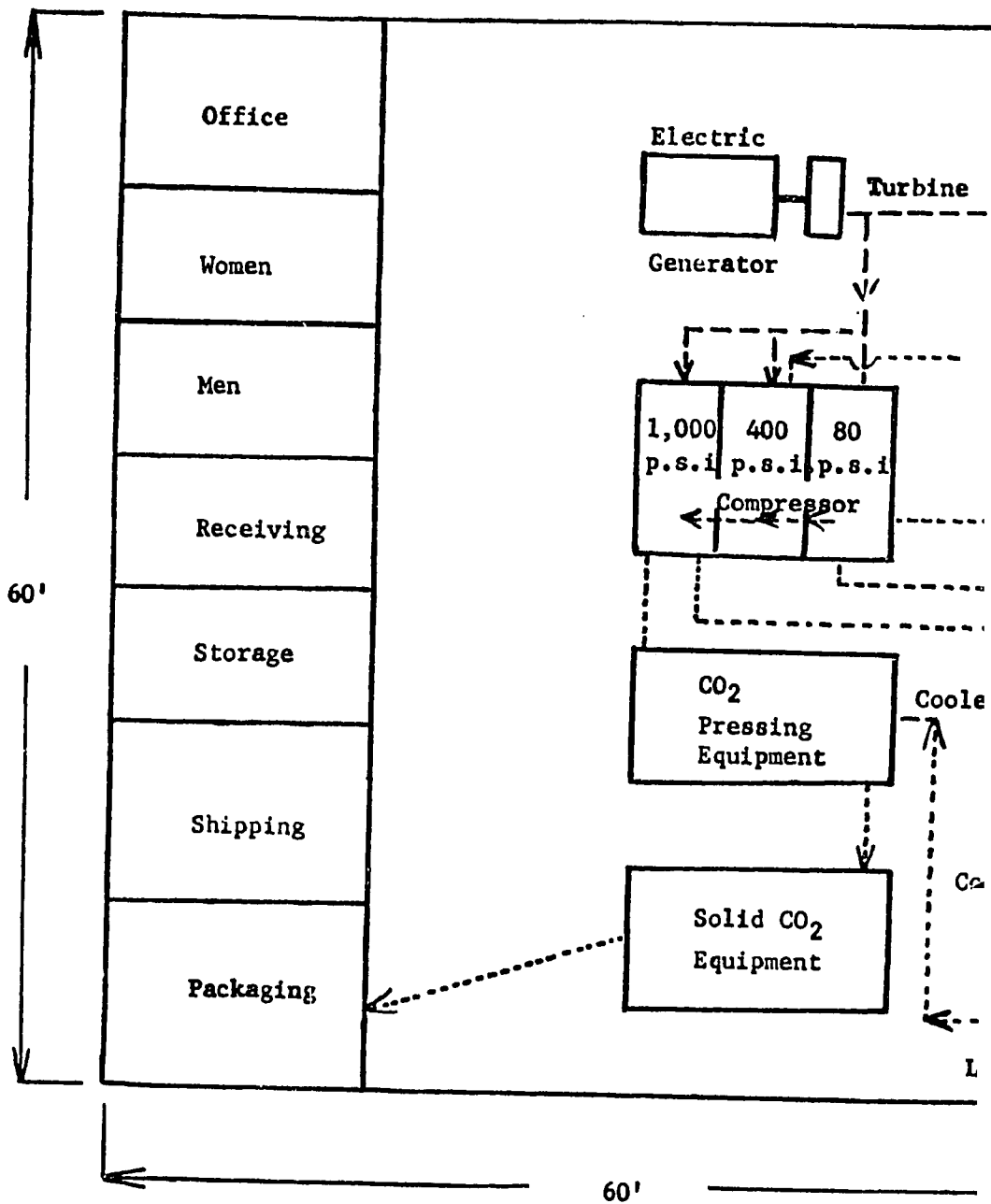
a. Annual Costs	
Direct Materials	\$ 18,300
Direct Labor	15,000
Manufacturing Overhead(a)	33,300
Admin. Costs(b), Contingencies	21,000
Sales Costs(c), Bad Debts	32,000
Depreciation on Fixed Capital	34,600
Total	<u>\$154,200</u>
b. Annual Sales Revenue	<u>\$200,000</u>

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

DRY ICE: S.I.C. 2813

DRY ICE: S.I.C. 2813

PLANT LAYOUT AND WORKFLOW



Fuel oil storage

Furnace and Boiler

Flue gasses Scrubber

Water

To sewer

Drying System

Cleaning System

Absorbers Gas vent

Scrubber

Potassium Permanganate

Monoethanolamine Recirculating System

Reboiler

Exchange

Cooler

Gas Storage Holder

Bubble tower

CO<sub>2</sub> and Steam Cooler

Liquid CO<sub>2</sub> Storage

Accumulator

Water and monoethanolamine back to system



DRY ICE: S.I.C. 2813

SELECTED REFERENCES

I. TEXTBOOKS

- A. **The Chemical Process Industries.** R. N. Shreve. 1956. 973 p. Illus. \$13.50.  
McGraw-Hill Book Company, Inc.  
300 West 42nd Street  
New York, N. Y. 10036  
Processes used in the various chemical and allied industries including that of chemical refrigeration.
- B. **Industrial Chemistry.** E. R. Riegel. 1958. 1015 p. Illus. \$13.50.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Describes sources and method used in production of dry ice.
- C. **Basic Refrigeration.** G. R. King. 1951. 526 p. Illus. \$6.00.  
Nickerson and Collins Company  
433-435 North Waller Avenue  
Chicago, Ill. 60644  
Design, operation, and servicing of systems in production and utilization of main refrigerants, including dry ice.
- D. **Refrigeration Engineering.** H. J. Macintire and F. W. Hutchinson. 1950. 610 p. Illus. \$7.95.  
John Wiley and Sons, Inc.  
605 Third Avenue  
New York, N. Y. 10016  
Refrigeration equipment and manufacture of dry ice.
- E. **How Ammonia Compressors Can Make Dry Ice.** February 1957. Vol. 62. No. 2, 89 p. \$1.00.  
Power Engineering  
Technical Publishing Company  
110 South Dearborn Street  
Chicago, Ill. 60603

II. U. S. GOVERNMENT PUBLICATIONS

- A. **Manufacture of Dry Ice.** IR-20744  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
This report provides basic information for the establishment and operation of a dry ice plant.

III. PERIODICALS

- A. **Industrial and Engineering Chemistry.** Monthly. \$5.00/year.  
American Chemical Society  
1155 16th Street, N. W.,  
Washington, D. C. 20036  
Frequent technical articles on the manufacture of dry ice.

## SELECTED REFERENCES (Continued)

### IV. U.S. PATENTS

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

- A. Patent No. 2,989,853. 1961. 3 p.  
Multistage gas compression process and apparatus.
- B. Patent No. 2,954,677. 1960. 7 p.  
Gas liquification process.
- C. Patent No. 2,944,969. 1960. 10 p.  
Process and apparatus for separating gaseous mixtures.

### V. TRADE ASSOCIATIONS

- A. Compressed Air and Gas Institute  
122 East 42nd Street  
New York, N. Y. 10017
- B. Refrigeration Service Engineers Society  
433 North Waller Avenue  
Chicago, Ill. 60644

### VI. ENGINEERING COMPANY

- A. Tampa Bay Engineering Company  
151 Treasure Island Causeway  
St. Petersburg, Florida 33706  
Design, equipment selection, construction management, plant start-up  
for industrial projects including refrigeration and various types of  
compressor systems.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## FARM HAND TOOLS

I. P. No. 66108

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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.

## FARM HAND TOOLS: Standard Industrial Classification 3423

### A. PRODUCT DESCRIPTION

Spades, long-handled shovels, mattocks, mattock hoes, picks, digging forks, hay forks, rakes, planters' hoes, machetes.

### B. GENERAL EVALUATION

This plant requires skilled management and a fair number of skilled operators. Provided these are obtainable and good quality tools can be produced, the industry is suited to conditions of many less developed areas. Products are in common use in agriculture, mining, construction work and some industries. Product mix can be readily adapted to requirements of particular markets.

### C. MARKET ASPECTS

1. USERS. Farmers, construction firms, mining and quarrying concerns, certain industries, armed forces.
2. SALES CHANNELS AND METHODS. Factories usually sell to wholesalers. Large users such as military may buy direct. Manufacturers often use brand name.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are easily handled and transport costs are fairly low in relation to value. In country of moderate size and with reasonably good transport facilities, potential market may be nation-wide. b. Export. Market is world-wide.
4. COMPETITION. a. Domestic Market. If manufacturing operations and distribution and sales organization are efficient products should be able to meet competition from small forges and from imports. b. Export Market. Several European countries, as well as U. S. and Japan, export substantial quantities of tools of kind described, and competition in export markets is keen. Plant of size described might be able to sell some tools in easily accessible areas of adjacent countries but would not normally be able to compete with large-scale producers in general international trade.
5. MARKET NEEDED FOR PLANT DESCRIBED. These products are durable goods. Demand will be for (1) replacements, (2) additions to existing stock of tools. In poor areas even simple tools are carefully preserved and replacement rate tends to be low. Volume of additions to stock depends on rate of expansion in agriculture, mining and construction work, which varies significantly in different areas. Prospective investor should seek aid in market investigation from government departments, cooperative societies, etc. Since product mix is variable, inquiry should be directed to ascertaining which of products are in general use in potential market area and relative demand for them. On conservative estimates of rate of replacement and of expansion in relevant economic sectors, in an area predominantly agricultural and with mainly arable farming, population of perhaps 4-5 million might provide outlet for plant's production.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: About 250,000 Tools

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	\$	Cost
Land.		--
Building. One story, about 80'x90', with a lean-to without sides, about 80'x40', fireproof.	45,000	
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$131,000	
Other tools & equipmt.	36,000	
Furniture & fixtures	2,000	169,000
Total (excl. Land)		<u>\$214,000</u>

Principal Items. Crane, bar shear, forge furnace, mechanical press, helve hammer, upright helve hammer, forging dies, tongs, platform hand lift truck, skid boxes on special racks, belt grinder, heat treat furnace, oil quench tank, brinnell tester, degreasing tank, degreasing basket, radial saw, table saw, gauge lathe, special lathe, end rounder, sanding machine, lumber wagons, lacquer dip tank, drill press, rivet spinner, jib crane & hoist, milling machine, lathe, pedestal grinder, surface grinder, welding equipment.

#### b. WORKING CAPITAL

	No. of Days	\$
Direct Materials	90	\$ 17,000
Direct Labor, Mfg. Overhead(a)	60	30,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	6,600
Training Costs		21,000
Total Working Capital		<u>\$ 75,000</u>

#### c. TOTAL CAPITAL (EXCL. LAND) \$289,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Steel	325 tons	\$ 39,000
Lumber		25,000
Lacquer		4,000
Total		<u>\$ 68,000</u>

#### b. Supplies

Dies	\$ 3,000
Maintenance materials	2,000
Sandpaper, tools & bits	500
Grease & oil	100
Office supplies	700
Total	<u>\$ 6,300</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> About 780 kw-hr daily.	<u>\$ 4,800</u>
b. <u>Fuel.</u> For production & for general purposes. If oil is used, about 17,000 gals. annually.	<u>\$ 2,000</u>
c. <u>Water.</u> About 1.2 mn. gals. annually for production & general purposes.	<u>\$ 300</u>

### 4. TRANSPORTATION

- a. Own Transport Equipment. None required.
- b. External Transport Facilities. Combined in & out shipments about 120 tons a month. No special requirements.

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	10	\$ 60,000
Semi-skilled	3	15,000
Unskilled	12	48,000
Total	<u>25</u>	<u>\$123,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 18,000
Office	2	8,000
Other	5	20,000
Total	<u>9</u>	<u>\$ 46,000</u>

- c. Training Needs. Forging & heat treating operations require skilled workers. Manager & forging engineer should be fully experienced & able to train workers. Three forging operators, 1 heat treat operator, 1 wood worker, all experienced, should assist in training. Plant should reach full production in about 3 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

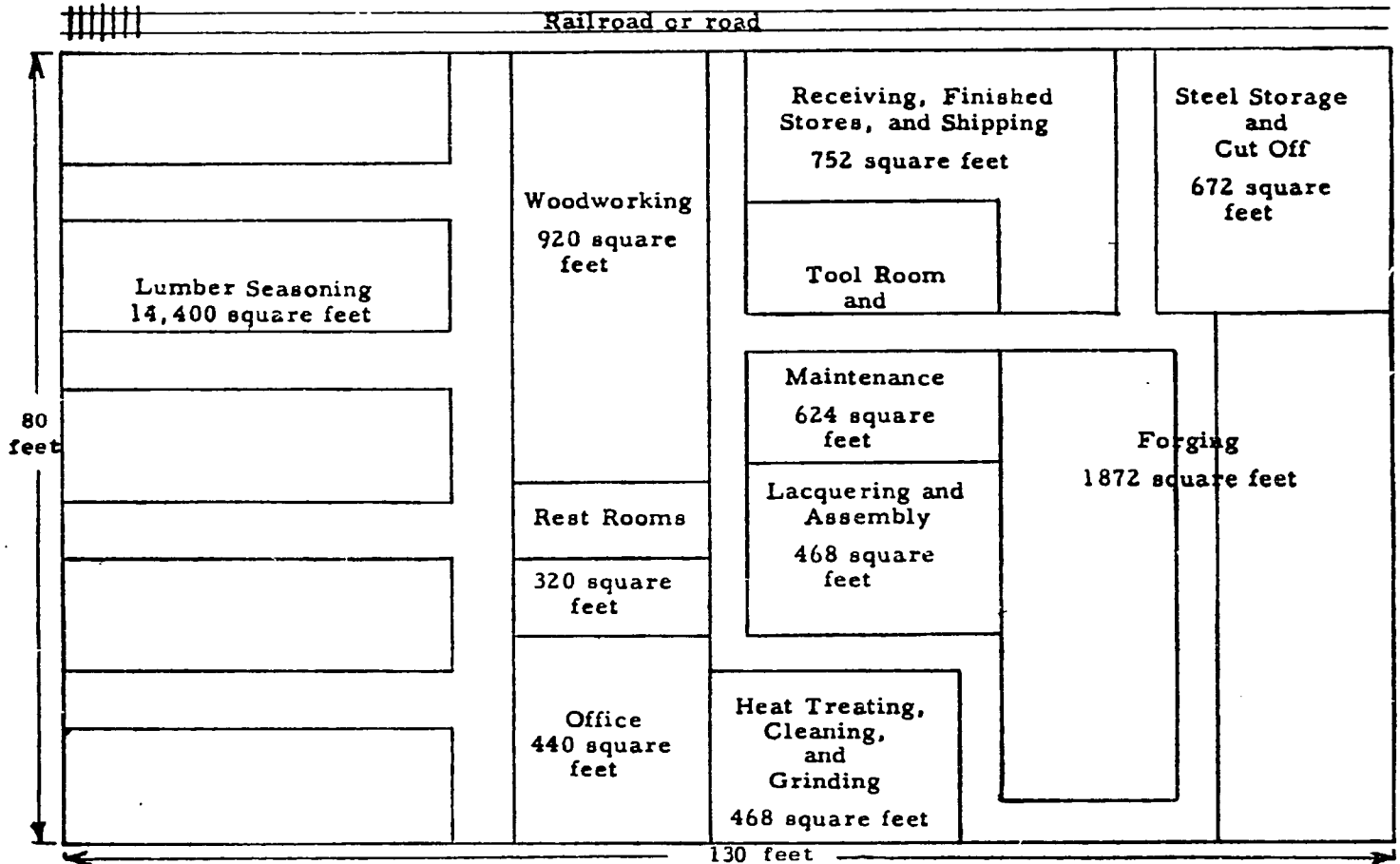
a. <u>Annual Costs</u>	
Direct Materials	\$ 68,000
Direct Labor	123,000
Manufacturing Overhead(a)	59,400
Admin. Costs(b), Contingencies	30,000
Sales Costs(c), Bad Debts	55,000
Depreciation on Fixed Capital	22,600
Total	<u>\$358,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$450,000</u>

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

FARM HAND TOOLS: S.I.C. 3423

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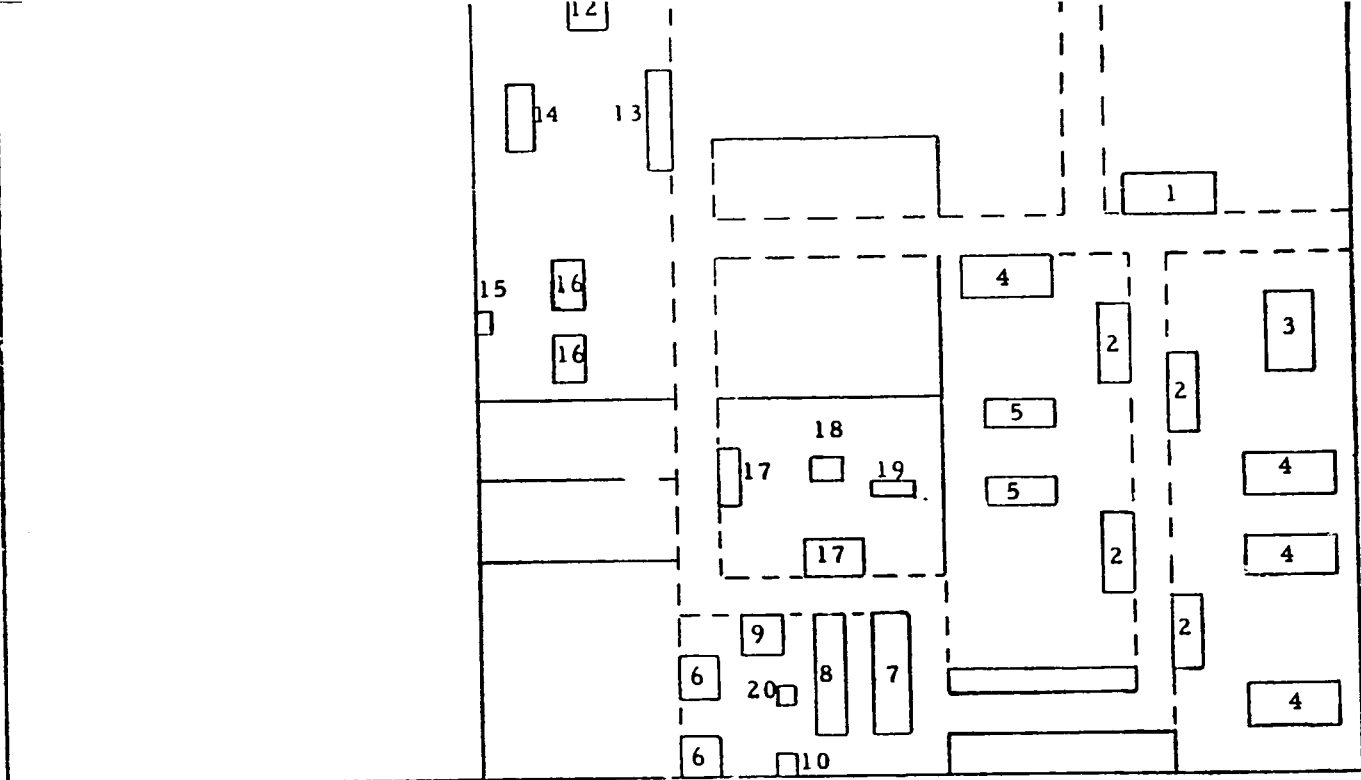
PLANT LAYOUT



FLOW-DIAGRAM

FARM HAND

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- |                              |                    |                          |
|------------------------------|--------------------|--------------------------|
| 1. Bar Shear                 | 8. Oil quench tank | 15. Special machine      |
| 2. Forge furnace             | 9. Degreaser       | 16. Sanding machine      |
| 3. 200-ton mechanical press  | 10. Brinell tester | 17. Lacquer tank         |
| 4. 200# helve hammer         | 11. Radial saw     | 18. Drill press          |
| 5. 100# upright helve hammer | 12. Table saw      | 19. Rivet spinner        |
| 6. Belt grinder              | 13. Gauge lathe    | 20. 500-pound jib crane. |
| 7. Heat treat furnace        | 14. Special lathe  |                          |

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## FARM HAND TOOLS: S. I. C. 3423

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Forging and Forming Metals. S. E. Rusinoff. 1952. Illus. \$5.50.  
American Technical Society  
848 East 58th Street  
Chicago, Ill. 60637  
Comprehensive treatise on producing forgings and on metal forming.
- B. General Woodworking. C. H. Groneman. 2nd edition. 1959. 956 p.  
Illus. \$7.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N.Y. 10036  
Deals with machine tool, portable tool and hand tool processes.
- C. Manufacturing Processes : Production. 560 p. \$7.25.  
American Technical Society  
848 East 58th Street  
Chicago, Ill. 60637  
A presentation of the industrial processes currently employed in the fabrication of metal parts.
- D. The Closed-Die Forging Process. P. E. Kyle. 138 p. \$1.50.  
Macmillan Company  
60 Fifth Avenue  
New York, N.Y. 10011  
Steps in the production of forgings.

#### II. U. S. GOVERNMENT PUBLICATION

- A. Shop Practices. \$.50.  
Office of Technical Services  
U. S. Department of Commerce  
Washington. D. C. 20230  
Covers manufacturing techniques.

#### III. PERIODICALS

- A. American Machinist. Weekly. \$25.00/year.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N.Y. 10036  
Markets, sources of materials and supplies, machinery and equipment, news and technical information.
- B. The Wood Worker. Monthly. \$2.00/year.  
S. H. Smith Company  
2232 North Meridian  
Indianapolis, Indiana 46208  
Provides subscribers with news on developments, processes, methods, markets, in the woodworking field.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,966,379. 1960. 3 p.  
Manufacturing of farm hand tools including shovels, rakes, hoes, and related implements.
- B. Patent No. 2,905,214. 1959. 3 p.  
Process for the manufacture of chopping and cutting tools including machetes.
- C. Patent No. 2,797,544. 1957. 3 p.  
Method for making self-cleaning, and other types of rakes.
- D. Patent No. 2,750,223. 1956. 5 p.  
Process for the manufacture of spades and shovels.
- E. Patent No. 2,410,784. 1946. 4 p.  
Method of making hoes, shovels, and other farm hand tools.

### V. TRADE ASSOCIATIONS

- A. American Society for Metals  
Metals Park, Ohio 44073
- B. American Iron and Steel Institute  
150 East 42nd Street  
New York, N.Y. 10017

### VI. ENGINEERING COMPANY

- A. Mathewson Machine Works, Inc.  
78 Hancock  
Quincy, Massachusetts 02169  
Design, development and manufacturing.

### VII. DIRECTORY

- A. Farm Equipment Manufacturers List. \$ .35.  
Farm and Power Equipment  
2340 Hampton  
St. Louis, Missouri 63110

FARM HAND TOOLS: S. I. C. 3423

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## 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

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.

## LADIES' DRESS SHOES

I. P. No. 66109

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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.

## LADIES' DRESS SHOES: Standard Industrial Classification 3141

### A. PRODUCT DESCRIPTION

Ladies' leather shoes, with leather soles, made in a variety of styles.

### B. GENERAL EVALUATION

The investment required to start a mechanized plant in this industry is fairly large, and the labor skills needed are of a moderately high order. These shoes comparatively are high-priced. In many low income areas the great majority of the women wear shoes of this kind only on special occasions. The potential investor in this industry needs to study carefully whether the market, which will almost certainly be entirely domestic, will be large enough to absorb the production of a mechanized plant such as the one described, in addition to the supplies that will continue to come from small shoemakers, making to customers' individual requirements, and possibly also from importation.

### C. MARKET ASPECTS

1. USERS. Women and girls.
2. SALES CHANNELS AND METHODS. The plant will sell mainly direct to retailers. In some countries large shoe manufacturers have their own retail outlets, but this would scarcely be feasible for a plant of this size. Brand names are common in this industry. Some advertising in appropriate journals may be useful.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are very easy to handle and normally can be relatively cheaply transported. In most countries the potential domestic market area will be nationwide. b. Export. Shoes of this kind are commonly exported by the countries of Western Europe, and the United States.
4. COMPETITION. a. Domestic Market. Economies of large scale production are fairly marked in this industry, and competition of imports from large-scale producers is likely to be keen. Other competition will probably come from small local shoemakers, who in low wage areas may be able to compete in price with factory products and who have the advantage of being able to make shoes according to customers' individual requirements. Cheaper types of shoes, such as rubber-soled fabric shoes, may compete to some degree. b. Export Market. This plant would not be able to compete in world markets.
5. MARKET NEEDED FOR PLANT DESCRIBED. Since this type of shoe will be something of a luxury item in many of the less developed areas, a rather large total population may be needed to support it, possibly of the order of two million people.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 50,000 Pairs

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 1 acre.	\$ --
Building. One story, 100'x200'.	120,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt.	\$42,000
Other tools & equipmt.	5,000
Furniture & fixtures	700
Total (excl. Land)	47,700
	<u>\$167,700</u>

Principal Items. Machines: 24 sewing, marking, 2 skiving, 2 clicking, heel cementing, edge setting, edge trimming, buffing, leather, splitting, 2 lasting, 2 sole sewing, 2 heeling; lasts, leather racks, last trucks, dies.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 46,700
Admin. Costs(b), Contingencies, Sales Costs(c)	30	2,500
Training Costs		16,100
Total Working Capital		<u>\$ 65,300</u>

c. TOTAL CAPITAL (EXCL. LAND) \$233,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Leather	50,000 sq. ft.	\$ 35,000
Linings	15,000 sq. ft.	3,000
Findings (eyes, heels, thread, etc.)		12,000
Cardboard boxes	50,000	5,600
Total		<u>\$ 55,600</u>

#### Supplies

Lubricants & hand tools	\$ 200
Cutting tools	200
Dies & adhesives	600
Maintenance & repair parts	1,300
Office supplies	200
Total	<u>\$ 2,500</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 100 hp.	\$ 3,000
b. Fuel. About 7,000 gals. oil, or equivalent, annually.	\$ 900
c. Water. About 800,000 gals. annually.	\$ 200

### 4. TRANSPORTATION

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

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	12	\$ 60,000
Semi-skilled	22	88,000
Unskilled	10	30,000
Total	44	<u>\$178,000</u>
a. Indirect Labor		
Manager & supervisors	4	\$ 28,000
Office	2	8,000
Other	1	4,000
Total	7	<u>\$ 40,000</u>

- b. Training Needs. Manager & supervisors should be fully experienced. With help of 3 skilled workers they should be able to do all necessary labor training. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

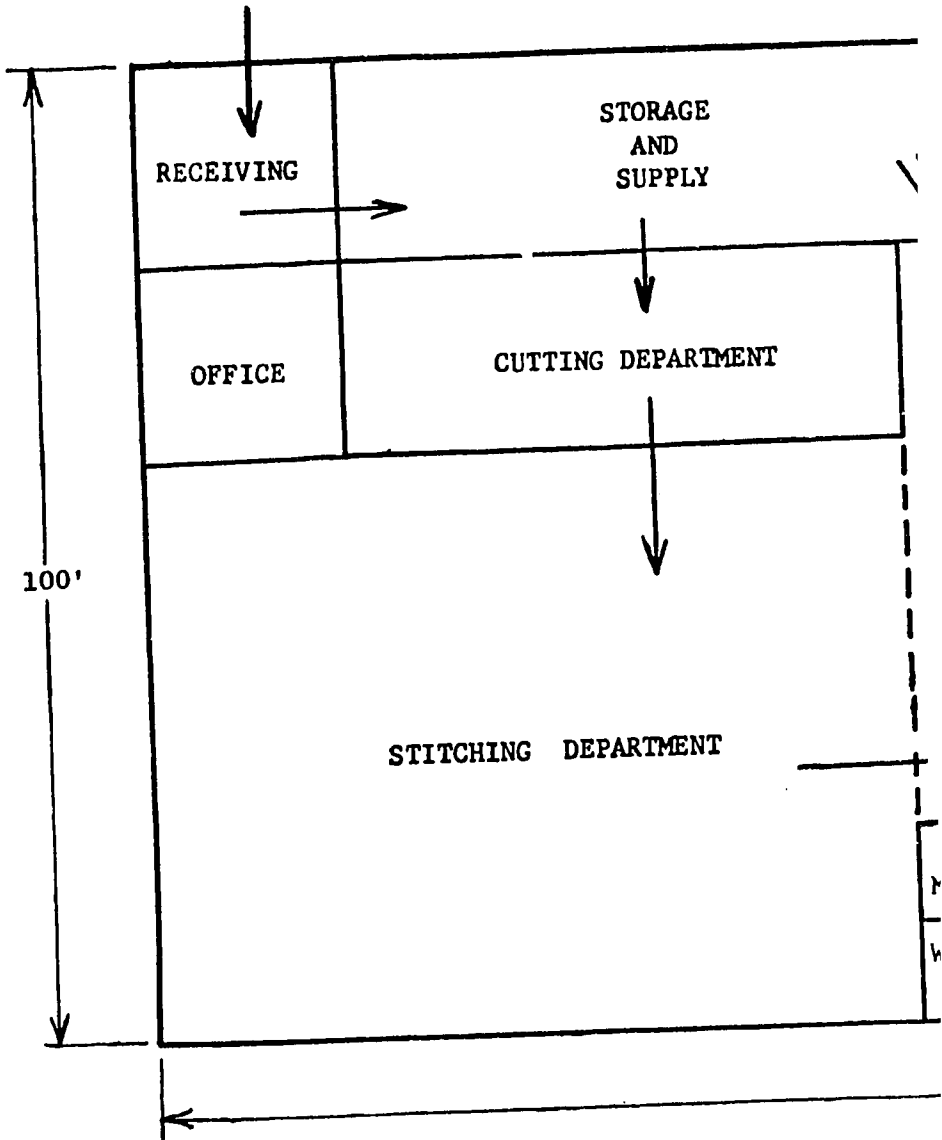
a. Annual Costs	
Direct Materials	\$ 55,600
Direct Labor	178,000
Manufacturing Overhead(a)	46,600
Admin. Costs(b), Contingencies	13,000
Sales Costs(c), Bad Debts	20,000
Depreciation on Fixed Capital	11,300
Total	<u>\$324,500</u>
b. Annual Sales Revenue	<u>\$400,000</u>

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

LADIES' DRESS SHOES S.I.C. 3141

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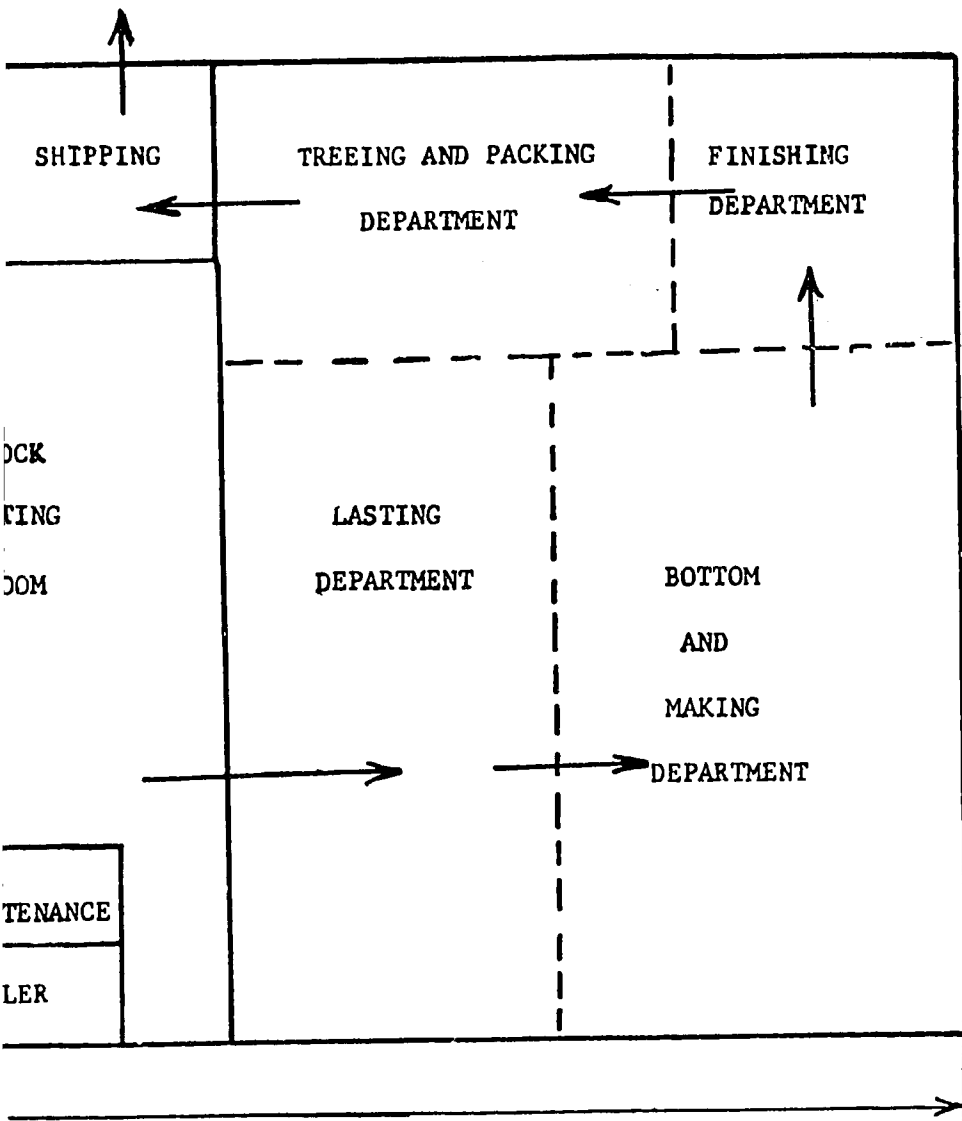
ARROWS I



S : S. I. C. 3141

OUT

WORK FLOW



DOCK  
ING  
DOM

TENANCE

LER



LADIES' DRESS SHOES: S.I.C. 3141

SELECTED REFERENCES

I. TEXTBOOKS

- A. Textbook of Footwear Manufacture. J. H. Thornton. 1954. 551 p. Illus. \$13.50.  
Transatlantic Arts, Inc.  
Hollywood-by-the-Sea, Florida 33020  
Machinery, equipment, materials and processes used in the manufacture of footwear.
- B. Boot and Shoe Production. J. Korn. 1953. 627 p. Illus. \$11.00.  
Pitman Publishing Corporation  
20 E. 46th Street  
New York, N. Y. 10017  
Facilities and operational techniques in shoe manufacture, and marketing.
- C. Mode in Footwear. R. T. Wilcox. 1958. 463 p. Illus. \$5.95.  
Charles Scribner's Sons  
597 Fifth Avenue  
New York, N. Y. 10017  
Describes trends in footwear, with illustrations.
- D. Consumption and Business Fluctuations: A Case Study of the Shoe, Leather, Hide Sequence. R. P. Mack. 1956. \$7.50.  
Princeton University Press  
Princeton, New Jersey 08540  
Study of operations and markets in the shoe and related industries.

II. U. S. GOVERNMENT PUBLICATION

- A. Women's Dress Shoes. FP-46. November 1951. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Describes the facilities and operational processes in a factory producing ladies' dress shoes.

III. PERIODICALS

- A. American Shoemaking. Weekly. \$3.00/year.  
Shoe Trades Publishing Company  
683 Atlantic Avenue  
Boston, Massachusetts 02111  
Materials, production methods, and markets of the shoe industry.
- B. Leather and Shoe. Weekly. \$6.00/year.  
Rumpf Publishing Company  
300 West Adams Street  
Chicago, Illinois 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. 2,574,485. 1951. 5 p.  
Process for making tackless ladies shoes.
- B. Patent No. 2,573,752. 1951. 3 p.  
Method of manufacturing women's welted shoes.
- C. Patent No. 2,569,184. 1951. 5 p.  
Method of making women's slip-lasted shoes.

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 COMPANIES

- A. Ward Machine Company, Inc.  
970 Main Street  
Brockton, Massachusetts 02401  
Design, engineering, manufacture.
- B. Industrial Engineering Service  
South Easton, 02375  
Design, production, research, and development.

VII. DIRECTORY

- A. Leather and Shoes Blue Book. Annual. \$5.00.  
Rumpf Publishing Company  
300 West Adams Street  
Chicago, Illinois 60606  
Manufacturers, market outlets, and material and equipment suppliers.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## LAUNDRY AND MILLED TOILET SOAP

I. P. No. 66110

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# LAUNDRY AND MILLED TOILET SOAP: Standard Industrial Classification 2841

## A. PRODUCT DESCRIPTION

Cleansing agents, manufactured by the combination of fats or oils with a water solution of either sodium or potassium hydroxide in the process of saponification. The method used in this plant is known as the full-boiled process.

## B. GENERAL EVALUATION

The manufacture of toilet soap is a lengthier and, because of the addition of the perfumes and the additional steps involved in its processing, more expensive process than that of laundry soap. However, the first steps in making toilet soap are the same as those in making laundry soap; only the raw materials are somewhat different. The plant here described manufactures both types and is geared to produce twice as much toilet soap as laundry soap. It is a small unit but can readily be expanded by the addition of further soap kettles. Other manufacturing equipment will not be fully utilized until production is expanded. If a greater output is attained, more automatic equipment can be installed, e.g. the foot operated press for toilet soap can be replaced by a fully automatic press. In less developed areas the consumption of soap will increase with a rise in the level of income and in hygienic standards. Toilet soap is likely to be more affected by such a rise, since it is more expensive and since the cheaper laundry soap can serve as a substitute. The required investment is not large and the degree of skill needed can easily be acquired. Major raw materials, such as the fats and oils, can be varied according to local availability. The major problem will be the competition of imported soaps, particularly if the local producer fails to maintain a high standard of quality.

## C. MARKET ASPECTS

1. USERS. Households, industry restrooms, hospitals, hotels, etc.
2. SALES CHANNELS AND METHODS. Sales generally to wholesalers. An attractive brand name and active sales promotion are necessary.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Transportation costs are unimportant. Distribution may be nation-wide. b. Export. Market is world-wide.
4. COMPETITION. a. Domestic Market. The most important competition would come from imports by large-scale well-established producers. Quality maintenance of the product would be particularly important in meeting such competition. b. Export Market. The plant is too small to compete in the world market. Some exports to adjacent foreign territory might be possible.
5. MARKET REQUIRED FOR PLANT DESCRIBED. Soap is already in general use in most areas of the world. However, in the less developed areas its total consumption depends greatly upon the level of income. This applies even more to toilet soap than to laundry soap, for the latter can be substituted for the former where price is of great importance. Climate is also important. In the warm and temperate zones a population of one million should support the output of this plant, even if the level of income is comparatively low.

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## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 100,000 Pounds of Laundry Soap ; 200,000 Pounds of Toilet Soap

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 1/2 acre.	\$ --
Building. One story, 40'x100'.	24,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$30,900
Other tools & equipmt.	3,500
Furniture & fixtures	1,000
Total (excl. Land)	<u>\$ 35,400</u>
Total	<u>\$ 59,400</u>

Principal Items. Foot presses (2), boiler, storage tanks (5), soap kettles (3), crutcher, frames & dollies (12), slabbing & cutting frame, pumps (3), chipper, amalgamator, mill, granite roll, plodder, cutting table.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 19,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,000
Training Costs		6,000
Total Working Capital		<u>\$ 26,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 85,400

### 2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Tallow (or palm oil)	71,500 lbs.	\$ 5,000
Soydean (or coconut oil)	23,700 lbs.	3,200
Caustic soda	16,650 lbs.	850
Rosin	4,500 lbs.	400
Salt	30,000 lbs.	300
Sodium carbonate (58%)	1,850 lbs.	30
Sodium silicate	41,100 lbs.	620
Perfume	1,000 lbs.	4,000
Cartons (2 doz. size)	45,000	2,300
Total		<u>\$ 16,700</u>

#### b. Supplies

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

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 50 hp.	\$ 1,500
b. Fuel. About 36,000 gals. oil annually for boiler.	\$ 4,300
c. Water. For production & heating	\$ 500

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments 50 tons a month. No special requirements.

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	4	\$ 20,000
Semi-skilled	4	16,000
Unskilled	6	18,000
Total	<u>14</u>	<u>\$ 54,000</u>
b. Indirect Labor		
Manager & supesviser	2	\$ 14,000
Office	2	8,000
Other	4	14,000
Total	<u>8</u>	<u>\$ 36,000</u>

- c. Training Needs. Manager & supervisor must be fully experienced. With aid of 2 skilled workers, they should be able to train all other workers. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

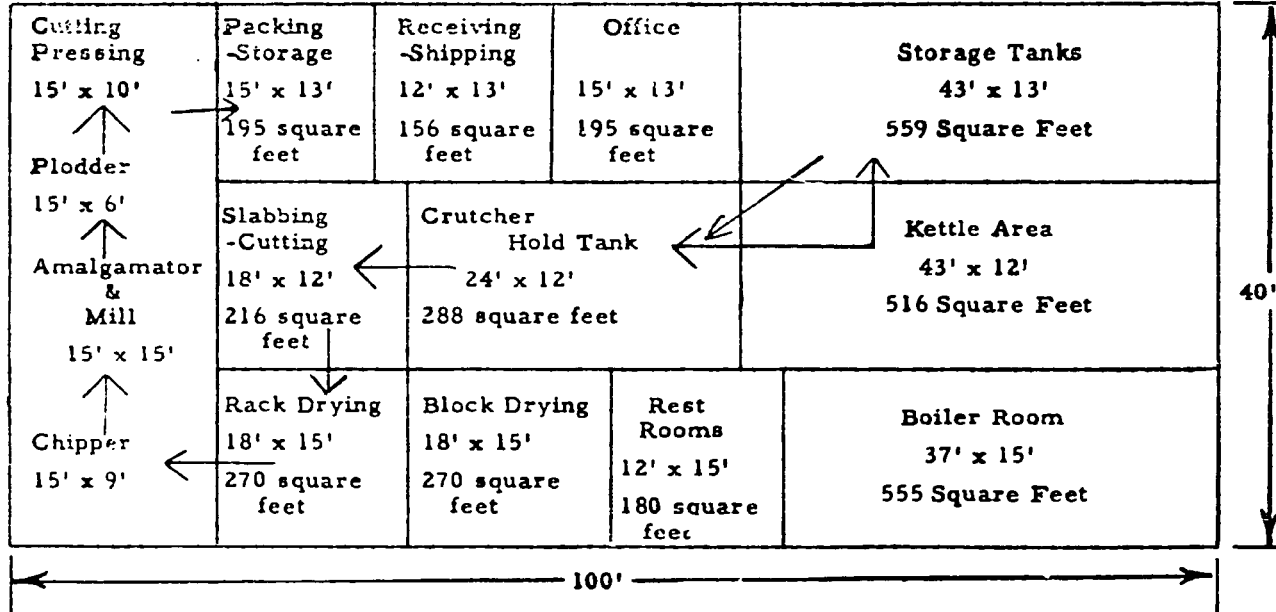
a. Annual Costs	
Direct Materials	\$ 16,700
Direct Labor	54,000
Manufacturing Overhead(a)	43,300
Admin. Costs(b), Contingencies	12,000
Sales Costs(c), Bad Debts	18,000
Depreciation on Fixed Capital	4,500
Total	<u>\$148,500</u>
b. Annual Sales Revenue	<u>\$180,000</u>

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

LAUNDRY AND MILLED TOILET SOAP: S.I.C. 2841

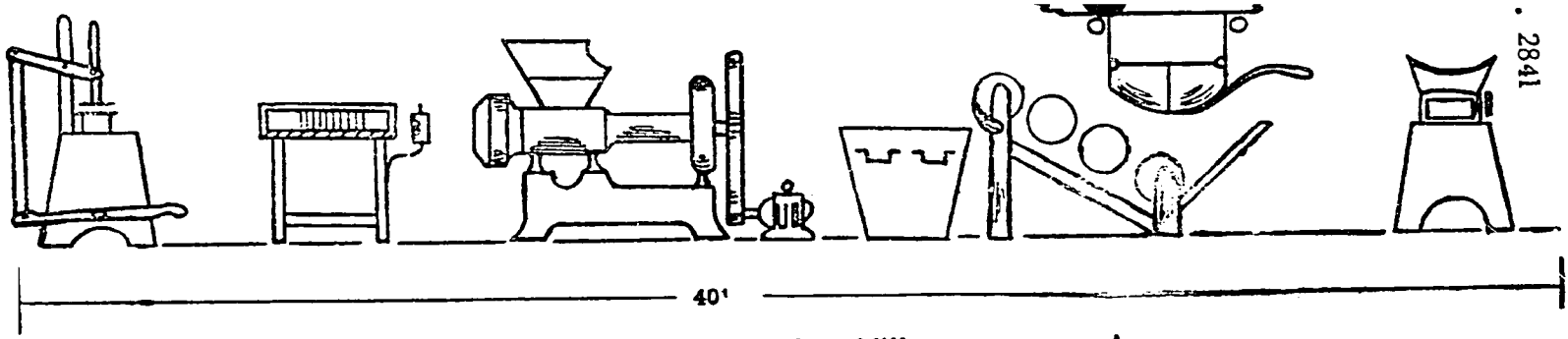
# PLANT LAYOUT

ARROWS INDICATE WORK FLOW



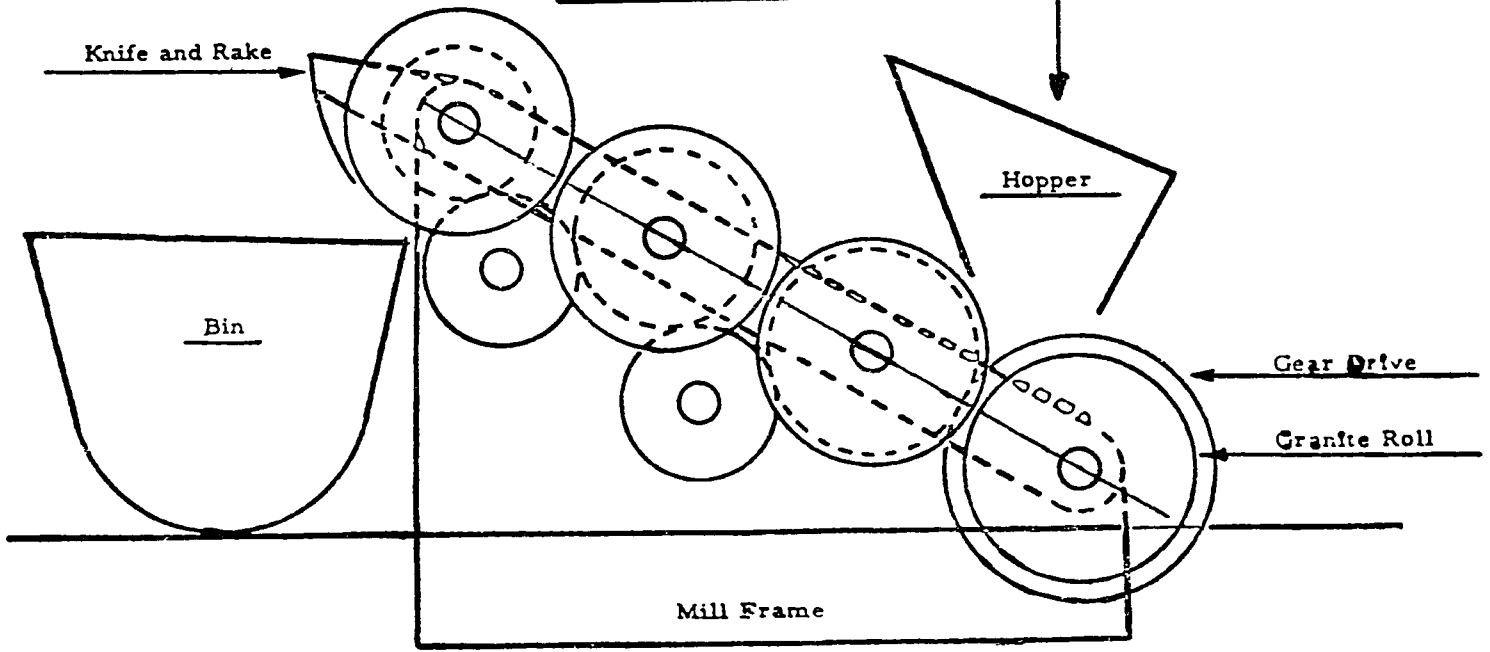
LAYOUT FOR MILLING OPERATIONS

LAUNDRY AND MILLED TOILET SG



2841

Granite Roll Soap Mill



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# LAUNDRY AND MILLED TOILET SOAP: S.I.C. 2841

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Sanitary Chemicals. L. Schwarcz. 1953. 576 p. Illus. \$8.00.  
McNair-Dorland Company, Inc.  
254 West 31st Street  
New York, N.Y. 10001  
Practical handbook dealing with manufacture, testing, packaging, labeling  
and most effective use of soaps and other cleaning specialties.
- B. Soap Manufacture. J. Davidsohn, and others. Vol. 1. 1953. 537 p.  
Illus. \$13.50.  
John Wiley & Sons, Inc.  
605 Third Avenue  
New York, N.Y. 10016  
Principles, raw materials, processes, the different kinds of soaps produced.
- C. Industrial Chemistry. E. R. Riegel. 1958. 1015 p. Illus. \$13.50.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Covers the manufacture of laundry and milled toilet soap.
- D. Standards on Soap and Other Detergents. 1958. 256 p. \$3.50.  
American Society for Testing Materials  
1916 Race Street  
Philadelphia, Pennsylvania 19105  
Cleaning materials, standards for their preparation, tests, and use.

### II. PERIODICALS

- A. Soap and Chemical Specialties. Monthly. \$4.00/year.  
McNair-Dorland Company, Inc.  
254 West 31st Street  
New York, N. Y. 10001  
Serves manufacturers, converters, marketers, and jobbers of soap and  
related products.
- B. Maintenance and Sanitary Suppliers. Weekly. \$2.00/year.  
McNair-Dorland Company, Inc.  
254 West 31st Street  
New York, N. Y. 10001  
Markets, processes, new products in the field of cleaning and sanitary  
supplies.

### III. U. S. PATENTS

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

- A. Patent No. 2,861,953. 1958 3 p.  
Method for making laundry soap.
- B. Patent No. 2,800,398. 1957. 4 p.  
Apparatus and process for making various kinds of soap.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATION

- A. Soap and Detergent Association  
295 Madison Avenue  
New York, N. Y. 10017

V. ENGINEERING COMPANY

- A. Wurster and Sanger, Inc.  
5201 Kenwood Avenue  
Chicago, Illinois 60615  
Contracting and consulting engineers to the soap industry.

VI. DIRECTORY

- A. Soap Blue Book. Annual. \$4.00.  
McNair-Dorland Company, Inc.  
254 West 31st Street  
New York, N. Y. 10001  
Cover sources of supply for raw materials, equipment, machinery,  
containers, and finished products for soap industry.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## MEN'S WORK SHOES

I. P. No. 66111

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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.

## MEN'S WORK SHOES: Standard Industrial Classification 3141

### A. PRODUCT DESCRIPTION

Leather work shoes for men and youths.

### B. GENERAL EVALUATION

The plant described is a small operation, by the general standards of the factory-made shoe industry, but for one of the economically less developed areas capital requirements must be considered rather large. Skilled labor requirements are also fairly high. The potential market would almost certainly be mainly domestic. Taking into account competition from imports and small makers, this plant would probably be profitable only in an area of considerable size and with well-organized public services, extensive transport, and some heavy industry development.

### C. MARKET ASPECTS

1. USERS. Working men and youths, police, military.
2. SALES CHANNELS AND METHODS. Sales will generally be made to retail stores and to police and military organisations.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are easily handled and transport costs are low in relation to unit price. In countries of moderate size and with a reasonably well developed transport system the potential domestic market area should be nation-wide. b. Export. These products are exported world-wide.
4. COMPETITION. a. Domestic Market. Economics of large-scale operation are marked in this industry, and large-scale foreign manufacturers may provide strong competition. In areas with very low labor earnings, the small shoemaker can often compete effectively with the mechanized factory. b. Export Market. A plant of the size described could not compete in the export trade with large-scale producers in advanced industrial areas.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend on development of public services, industry and transport. In the average conditions of economically less developed areas this plant might be able to supply the needs of a total population of the order of two million.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 50,000 Pairs

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	<u>Cost</u>
<u>Land.</u> About 1 acre.	\$ --
<u>Building.</u> One story, 100'x200'.	120,000
<u>Equipment, Furniture &amp; Fixtures.</u>	
Prod'n. tools & equipmt.	\$ 43,300
Other tools & equipmt.	5,000
Furniture & fixtures	700
<u>Total (excl. Land)</u>	<u>49,000</u>
	<u>\$169,000</u>

Principal Items. Machines: 26 sewing, marking, skiving, 2 clocking, 2 heel scouring, edge setting, edge trimming, buffing, leather splitting, perforating, inner sole, 2 lasting, 2 sole sewing, 2 nailing. Lasts, last trucks, leather racks, dies.

#### b. WORKING CAPITAL

	<u>No. of Days</u>	
<u>Direct Materials, Direct Labor, Mfg. Overhead(a)</u>	60	\$ 45,300
<u>Admin. Costs(b), Contingencies, Sales Costs(c)</u>	30	2,500
<u>Training Costs</u>		15,200
<u>Total Working Capital</u>		<u>\$ 63,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$232,000

### 2. MATERIALS AND SUPPLIES

	<u>Annual Requirements</u>	<u>Annual Cost</u>
a. <u>Direct Materials</u>		
Leather	90,000 sq. ft.	\$ 38,000
Linings		3,000
Findings		10,000
Packaging materials		4,000
<u>Total</u>		<u>\$ 55,000</u>

#### b. Supplies

Lubricants & hand tools	\$ 200
Cutting tools	200
Dies & adhesives	600
Maintenance & repair parts	1,300
Office supplies	200
<u>Total</u>	<u>\$ 2,500</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 100 hp.	\$ 3,000
b. <u>Fuel.</u> About 7,000 gals. oil, or equivalent in other fuel, annually.	\$ 900
c. <u>Water.</u> About 800,000 gals. annually for general purposes.	\$ 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	12	\$ 60,000
Semi-skilled	20	80,000
Unskilled	10	\$ 30,000
<u>Total</u>	<u>42</u>	<u>\$170,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisors	4	\$ 28,000
Office	2	8,000
Other	1	4,000
<u>Total</u>	<u>7</u>	<u>\$ 40,000</u>

- c. Training Needs. Manager & supervisors should 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.

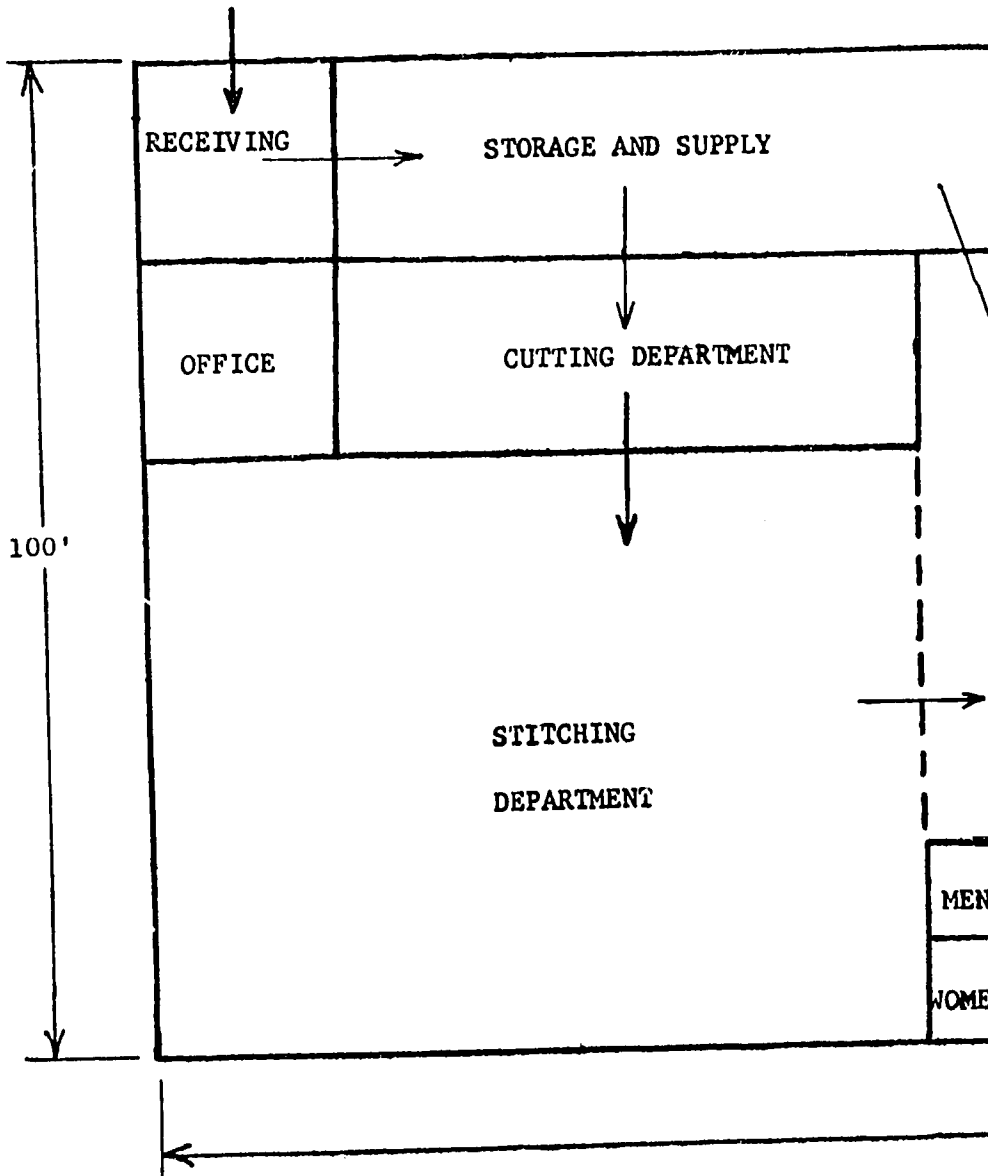
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 55,000
Direct Labor	170,000
Manufacturing Overhead(a)	46,600
Admin. Costs(b), Contingencies	13,000
Sales Costs(c), Bad Debts	20,000
Depreciation on Fixed Capital	11,400
<u>Total</u>	<u>\$316,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$390,000</u>

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

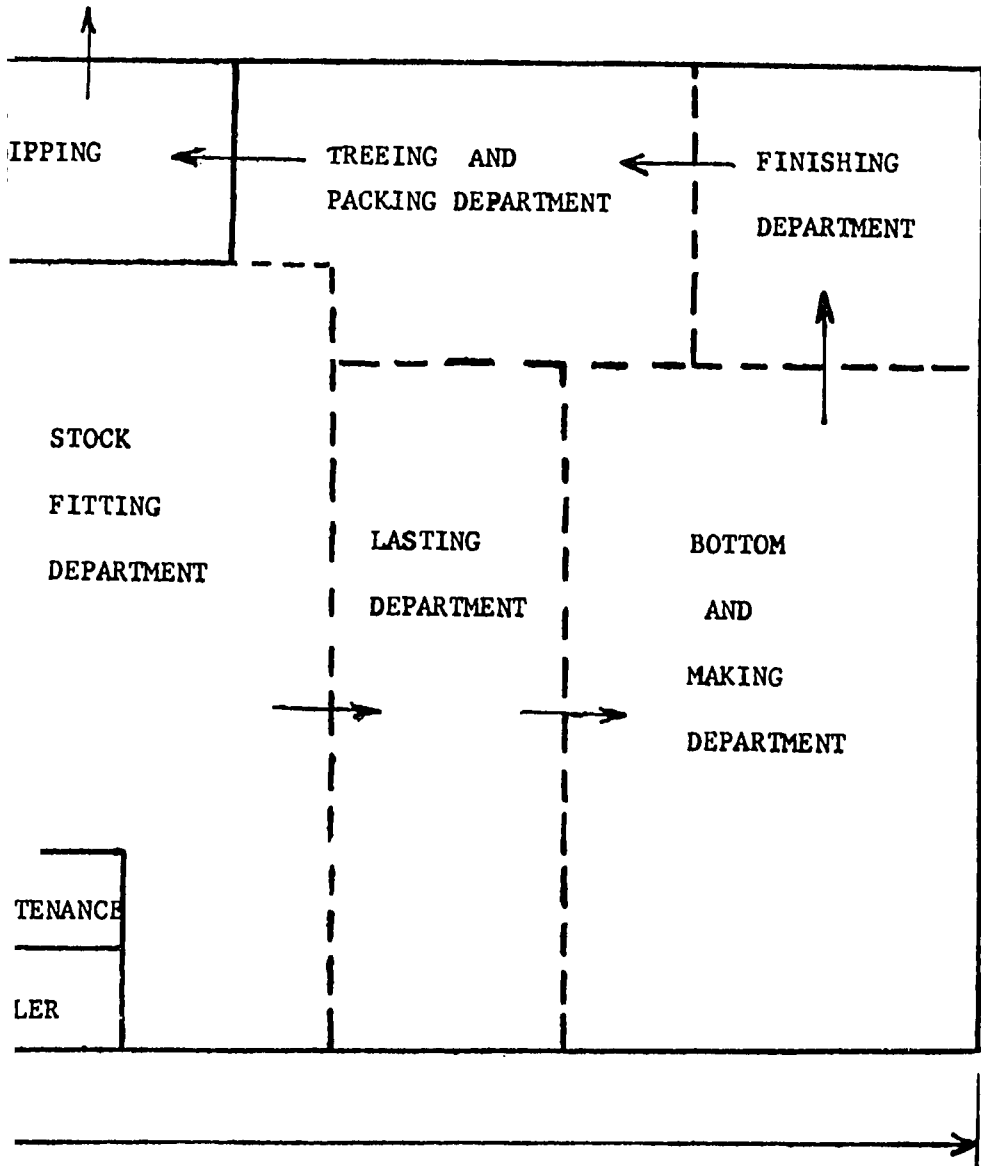
MEN'S WORK SHOES: S. I. C. 3141

MEN'S WORK  
PLAN  
ARROWS INDICATE



ES : S.I.C. 3141

OUT  
WORK FLOW





# MEN'S WORK SHOES: S. I. C. 3141

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Textbook of Footwear Manufacture. J. H. Thornton, editor. 1954. 611 p. Illus. \$13.50.  
Transatlantic Arts, Inc.  
Hollywood-by-the-Sea, Florida 33020  
Machinery, equipment, and processes in the manufacture of shoes.
- B. Shoe Machinery. R. N. Anthony. 1955. 91 p. Illus. \$3.50.  
National Shoe Manufacturers Association  
342 Madison Avenue  
New York, N.Y. 10017  
Describes shoe machinery and shoe manufacturing processes.
- C. Textbook of Footwear Materials. J. H. Thornton, editor. 1955. 441 p. Illus. \$10.00.  
Transatlantic Arts, Inc.  
Hollywood-by-the-Sea, Florida 33020  
Selection and preparation of leather and other materials for use in the manufacture of shoes.
- D. Boot and Shoe Production. J. Korn. 1953. 627 p. Illus. \$11.00.  
Pitman Publishing Corporation  
20 E. 46th Street  
New York, N.Y. 10017  
Information regarding the shoe industry, types of footwear produced, and markets.

### II. PERIODICALS

- A. American Shoemaking. Weekly. \$5.00/year.  
Shoe Trades Publishing Co.  
682 Atlantic Avenue  
Boston, Massachusetts 02111  
Weekly trade periodical for the shoe manufacturer.
- B. Leather and Shoes. Weekly. \$7.00/year.  
Rumpf Publishing Company  
300 West Adams Street  
Chicago, Illinois 60606  
Materials, machinery, products, and markets.

### III. U. S. GOVERNMENT PUBLICATIONS

- A. Men's Work Shoes. No. 13192. 1960. 15 p. Gratis.  
Department of Defense  
Washington, D. C. 20301  
Drawings and specifications for men's work shoes.
- B. Quality Control. March 1960. TB-66. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Manual for training personnel in quality control in industry.

as

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,973,530. 1961. 8 p.  
Method of manufacturing men's shoes.
- B. Patent No. 2,973,529. 1961. 6 p.  
Technique for making shoes.
- C. Patent No. 2,962,738. 1961. 5 p.  
Method of making shoes for men.

### V. TRADE ASSOCIATIONS

- A. National Shoe Manufacturers Association  
342 Madison Avenue  
New York, N.Y. 10017
- B. National Shoe Institute  
50 Rockefeller Plaza  
New York, N.Y. 10020.

### VI. ENGINEERING COMPANIES

- A. Sterling Leather Works  
329 Frelinghuysen Avenue  
Newark, New Jersey 07114  
Provides engineering service for plants to manufacture leather products,  
including shoes.
- B. United Shoe Machinery Corporation  
140 Federal Street  
Boston, Massachusetts 02107  
Provides engineering for shoe manufacturing plants.

### VII. DIRECTORY

- A. Shoe Factory Buyer's Guide. Annual. \$2.00.  
Shoe Trades Publishing Company  
683 Atlantic Avenue  
Boston, Massachusetts 02148  
Lists suppliers of leather, machinery, equipment, supplies, and the like  
for the shoe industry.

MEN'S WORK SHOES: S. I. C. 3141

## 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

## MIRROR MANUFACTURING AND RESILVERING

I. P. No. 66112

*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.

**MIRROR MANUFACTURING AND RESILVERING: Standard Industrial  
Classification 3231**

**A. PRODUCT DESCRIPTION**

Unframed mirrors, various sizes. Resilvering of old mirrors.

**B. GENERAL EVALUATION**

Capital requirements for this industry are small and little skilled labor is required. The use of mirrors for decorative as well as utilitarian purposes is widespread. Sales would probably be mainly local, and a substantial concentration of population in a fairly modern urban area would be needed to provide a market for the plant described.

**C. MARKET ASPECTS**

1. USERS. Households, hotels, restaurants, stores, etc.
2. SALES CHANNELS AND METHODS. Sales will generally be made to furniture stores and possibly direct when complete equipment of stores or hotels is taking place.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are fragile and somewhat costly to transport. However, where supply sources are far apart, they may be transported long distances. b. Export. These products are not common in international trade.
4. COMPETITION. a. Domestic Market. Unless costs are abnormally high, competition from imports should be unimportant. b. Export Market. The chance of significant export sales is slight.
5. MARKET NEEDED FOR PLANT DESCRIBED. An urban area containing a total population of the order of one million, and with a fair development of modern housing and public amenities, should be able in most cases to provide a market for this plant:

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 20,000 Sq. Ft. New Mirrors, 10,000 Sq. Ft. Resilvering

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<b>Cost</b>
Land. About 10,000 sq. ft.		\$ --
Building. One story, 50'x60', Equipment, Furniture & Fixtures.	18,000	
Prodn. tools & equipmt. \$ 6,000		
Other tools & equipmt.	500	
Furniture & fixtures	500	
Transportation equipmt.	2,500	
<b>Total (excl. Land)</b>	<b>\$ 27,500</b>	

Principal Items. Acid tank, cleaning rack, pouring rack, boiler, drying rack, pouring equipment, drill press, water demetalizer, water storage tank, glass cutting table, delivery truck.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 6,700
Admin. Costs(b), Contingencies, Sales Costs(c)	30	400
Training Costs		1,400
<b>Total Working Capital</b>		<b>\$ 8,500</b>

c. **TOTAL CAPITAL (EXCL. LAND)** \$ 36,000

### 2. MATERIALS AND SUPPLIES

<b>a. Direct Materials</b>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Glass	20,000 sq. ft.	\$ 10,000
Silvering solution		3,500
Shipping crates		500
<b>Total</b>		<b>\$ 14,000</b>

### b. Supplies

Lubricants & hand tools	\$ 50
Cutting tools	150
Maintenance & repairs	200
Office supplies	100
<b>Total</b>	<b>\$ 500</b>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
<b>a. Electric Power.</b> Connected load about 7 hp.	\$ 300
<b>b. Fuel.</b> About 2,500 gals. oil, or equivalent in other fuel, for heating, where necessary.	\$ 300
<b>c. Water.</b> About 400,000 gals. annually.	\$ 100

### 4. TRANSPORTATION

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

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
<b>a. Direct Labor</b>		
Skilled	1	\$ 5,000
Semi-skilled	1	4,000
Unskilled	2	7,000
<b>Total</b>	<b>4</b>	<b>\$ 16,000</b>

### b. Indirect Labor

Manager - buys, sells, keeps books & supervises 1 \$ 8,000

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

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

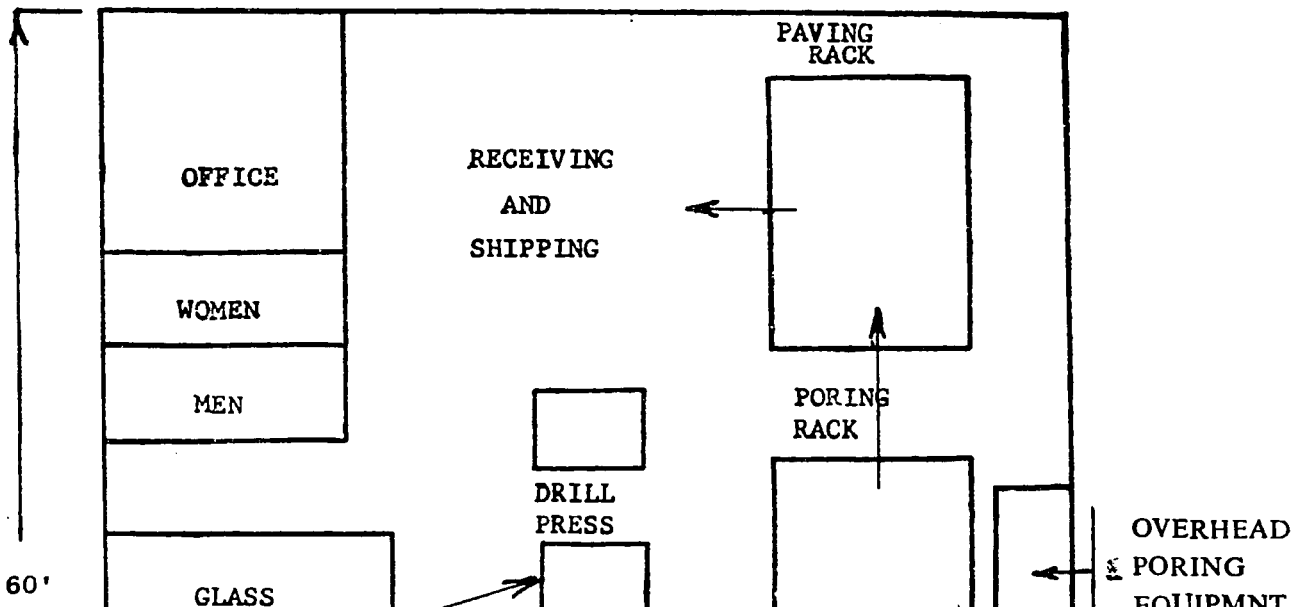
<b>a. Annual Costs</b>	
Direct Materials	\$ 14,000
Direct Labor	16,000
Manufacturing Overhead(a)	10,200
Admin. Costs(b), Contingencies	1,800
Sales Costs(c), Bad Debts	3,600
Depreciation on Fixed Capital	2,300
<b>Total</b>	<b>\$ 47,900</b>
<b>b. Annual Sales Revenue</b>	<b>\$ 60,000</b>

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

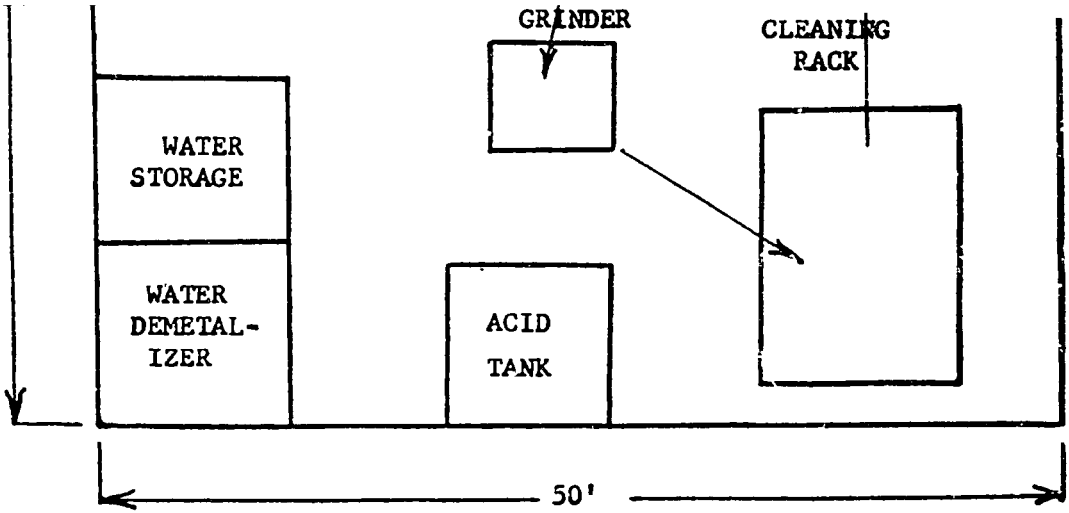
MIRROR MANUFACTURING AND RESILVERING: S.I.C. 3231

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PLANT LAYOUT  
ARROWS INDICATE WORK FLOW



MIRROR MANUFACTURING AND RE



ING: S.I.C. 3231

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# MIRROR MANUFACTURING AND RESILVERING: S.I.C. 3231

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Silver in Industry. A. Addicks. 1940. 636 p. Illus. \$10.00.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Includes extensive data on materials and processes employed in the  
manufacture of silver mirrors and related products.
- B. Complete Instructions on Silvering Plate Glass Mirrors. W. S. Wear.  
124 p. Illus. \$3.00.  
W. S. Wear  
Excelsior Springs, Missouri 64024  
Drawings and directions for the silvering of mirrors.
- C. Architectural Data Handbook. Pittsburgh Plate Glass Company. 1961.  
121 p. Gratis.  
Pittsburgh Plate Glass Company  
One Gateway Center  
Pittsburgh, Pa. 15222  
Includes section on components and processes in the production of mirrors.
- D. Mirrors, Prisms, and Lenses. J.P.C. Southall. 1933. 806 p.  
Illus. \$4.50.  
Macmillan Company  
60 Fifth Avenue  
New York, N. Y. 10011  
Describes manufacturing processes and finished products.

### II. U. S. GOVERNMENT PUBLICATION

- A. Plate Glass Mirrors. DD-M-411. 1961. 7 p. \$.05.  
General Services Administration  
Washington, D. C. 20405  
Specifications and drawing of plate glass mirrors.

### III. PERIODICALS

- A. National Glass Budget. Weekly. \$5.00/year.  
National Glass Budget  
916 Empire Building  
Pittsburgh, Pa. 15222  
Materials and markets for glass and glass products.
- B. Glass Digest. Monthly. \$3.00/year.  
Ashlee Publishing Company, Inc.  
130 West 57th Street  
New York, N. Y. 10029  
Information on developments in flat glass and allied trades.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,934,454. 1960. 4 p.  
Process for producing lead sulphide mirror or silver mirror.
- B. Patent No. 2,858,603. 1958. 4 p.  
Method of making mirrors, reflectors and the like.
- C. Patent No. 2,856,818. 1958. 3 p.  
Mirror and protective coating.

### VI. TRADE ASSOCIATION

- A. National Association of Mirror Manufacturers  
1028 Connecticut Avenue, N. W.  
Washington, D. C. 20006

### V. ENGINEERING COMPANIES

- A. Sommer and Maca Company  
5501 West Ogden Avenue  
Chicago, Illinois 60650  
Design, engineer and supervise construction of mirror manufacturing plants.
- B. Henry G. Lange Machine Works, Inc.  
177 North May Street  
Chicago, Illinois 60607  
Manufacture machinery and perform engineering services for the glass mirror and silvering industries.

### VII. DIRECTORY

- A. Glass Factory Directory. Annual. \$3.00.  
National Glass Budget  
916 Empire Building  
Pittsburgh, Pa. 15222  
Lists all glass manufacturing firms and mirror manufacturers.

## 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

## OIL OF CLOVES

I. P. No. 66113

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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

Essential oil made from cracked cloves.

## B. GENERAL EVALUATION

This plant is appropriate where cloves are locally produced and there are export possibilities, or where there is a domestic complex of user industries, in which case it would be feasible to use imported cloves. Little capital or technical skill is required. The plant's equipment can be used to make other kinds of essential oils.

## C. MARKET ASPECTS

1. USERS. Manufacturers of condiments, food flavorings, pharmaceuticals, soap, etc.
2. SALES CHANNELS AND METHODS. Sales usually to user industries and export houses.
3. GEOGRAPHICAL EXTENT OF MARKET. Shipping presents no difficulty either internally or internationally.
4. COMPETITION. This is a highly specialized commodity and competition will come only from other producers, both domestic and foreign. This is a fairly standard product of the type in which price competition may be keen.
5. MARKET NEEDED FOR PLANT DESCRIBED. This cannot be estimated in terms of total population or other quantitative criterion. Price and demand trends should be carefully studied in order to judge the prospects of profitable operation.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 26,000 Pounds

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	<u>Cost</u>
Land. About 1/2 acre.	\$ --
Building. One story, 30'x60'	10,800
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$ 15,500	
Other tools & equipmt. 500	
Furniture & fixtures 700	16,700
<u>Total (excl. Land)</u>	<u>\$ 27,500</u>

Principal Items. Two steam distillation units (including condenser and receiver), scales, 2 hand trucks.

#### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 8,700
Admin. Costs(b), Contingencies, Sales Costs(c)	30	800
Training Costs		500
<u>Total Working Capital</u>		<u>\$ 10,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 37,500

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	<u>Annual Requirements</u>	<u>Annual Cost</u>
Cracked cloves	150,000 lbs.	\$ 28,260
Jugs	3,200	620
Cartons	800	120
<u>Total</u>		<u>\$ 29,000</u>

#### b. Supplies

Lubricants & hand tools	\$ 100
Maintenance & spare parts	500
Office supplies	100
<u>Total</u>	<u>\$ 700</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Lighting only.	\$ 100
b. <u>Fuel.</u> Bunker C oil for low pressure boiler.	\$ 200
c. <u>Water.</u> For production, sanitation and fire production.	\$ 100

### 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>		
Semi-skilled	2	\$ 10,000
b. <u>Indirect Labor</u>		
Manager	1	\$ 12,000
c. <u>Training Needs.</u> Manager must be fully experienced. He should be able to train the workers and reach full production in 30 days.		

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

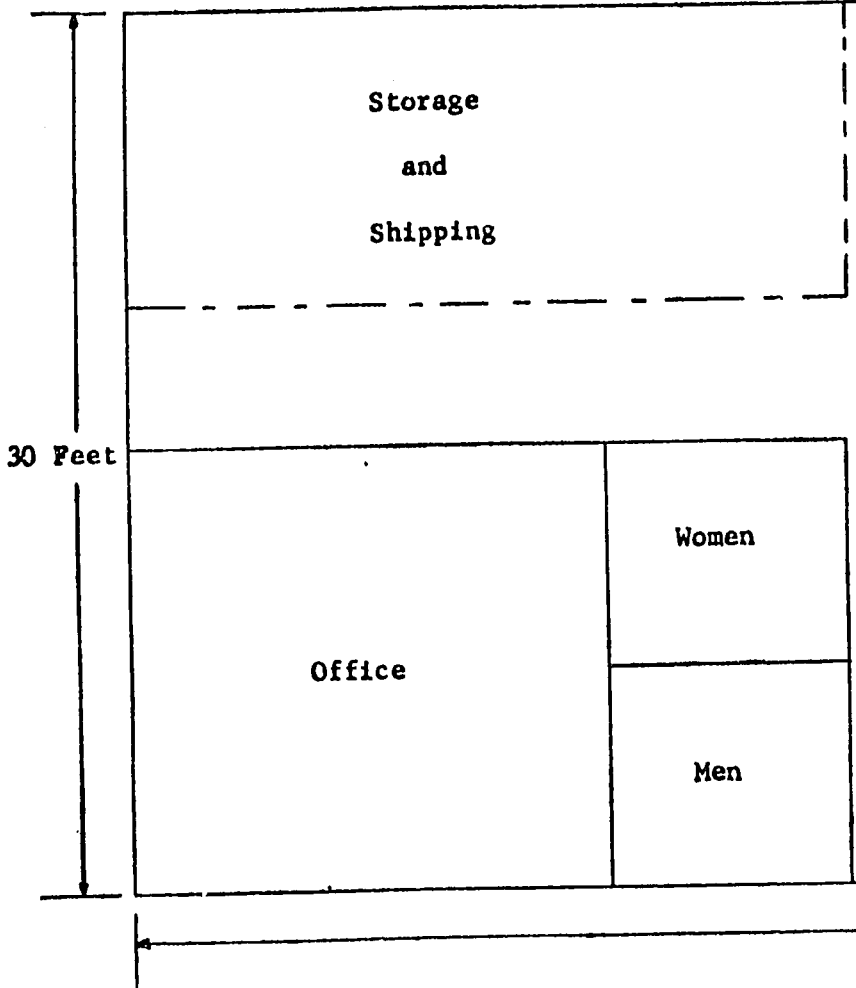
a. <u>Annual Costs</u>	
Direct Materials	\$ 29,000
Direct Labor	10,000
Manufacturing Overhead(a)	13,100
Admin. Costs(b), Contingencies	4,800
Sales Costs(c), Bad Debts	6,000
Depreciation on Fixed Capital	2,300
<u>Total</u>	<u>\$ 65,200</u>
b. <u>Annual Sales Revenue</u>	<u>\$ 78,000</u>

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

OIL OF CLOVES : S.I.C. 2899

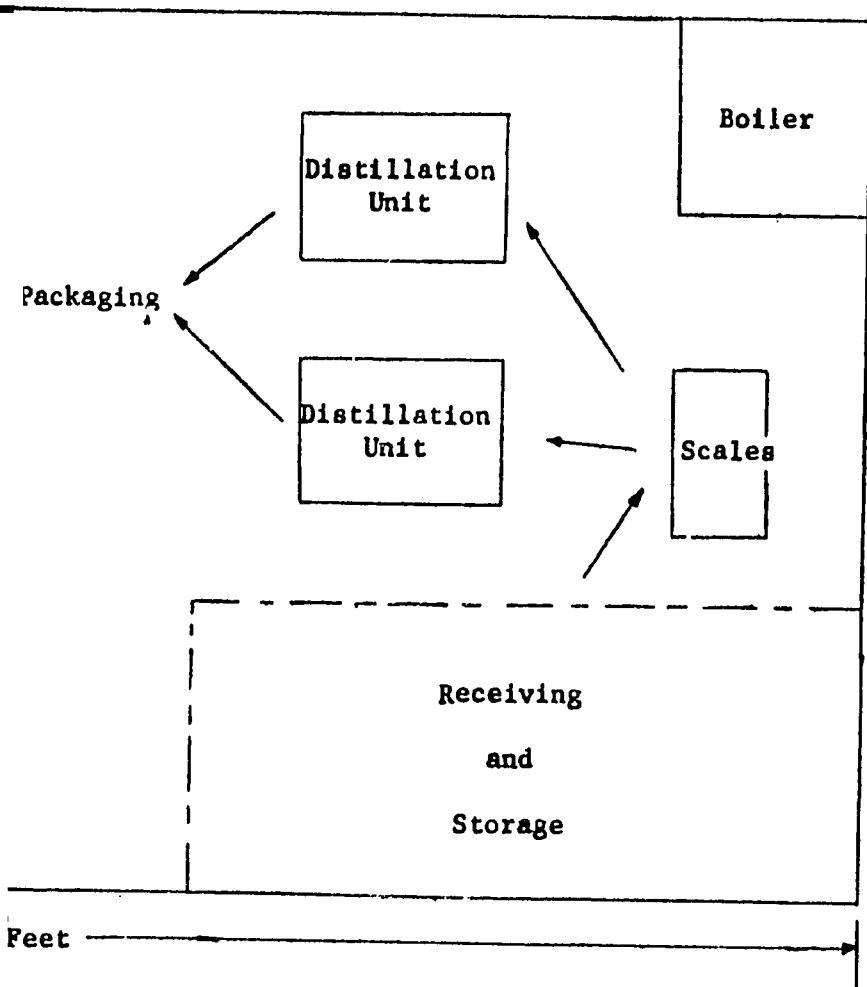
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D WORKFLOW





# OIL OF CLOVES: S I. C. 2899

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. The Essential Oils. E. Guenther. 1949. Vol. II. 868 p. Illus. \$16.50.  
D. Van Nostrand Company, Inc.  
120 Alexander Street  
Princeton, New Jersey 08540  
Has sections on spices and also on the essential oils, including oil of cloves.
- B. Chemical Analysis of Food and Food Products. M. B. Jacobs. 1958. 3rd edition. Illus. \$18.00.  
D. Van Nostrand Co., Inc.  
120 Alexander Street  
Princeton, New Jersey 08540  
Covers oil of cloves in section on the essential oils.
- C. The Use of Chemical Additives in Food Processing. Food Protection Committee of the Food and Nutrition Board. 1956. 91 p. \$2.00.  
National Research Council  
2101 Constitution Avenue, N.W.,  
Washington, D. C. 20037  
Has data on flavoring agents - aromatic chemicals, essential oils, and others.
- D. Essential Oils and Aromatic Chemicals. Council of Scientific and Industrial Research of New Delhi, India. 1958. 174 p. \$4.25.  
Sara Swaty Press Ltd.  
32 Upper Circular Road  
Calcutta 9, India  
Covers subject of the various essential oils.

### II. U. S. GOVERNMENT PUBLICATION

- A. Methods of Extracting Volatile Oils from Plant Materials. Technical Bulletin No. 16. March 1952. 28 p. \$10.  
United States Department of Agriculture  
Washington, D. C. 20250  
Equipment and processes for extracting essential oils.

### III. PERIODICALS

- A. Coffee and Tea Industries and the Flavor Field. Monthly. \$4.00/year.  
The Spice Mill Publishing Company  
106 Water Street  
New York, N.Y. 10006  
Current market situation with regard to essential oils.
- B. Perfumery Essential Oil Record. Monthly. \$5.60/year.  
G. M. Press, Ltd.  
Diana House, 33 Chiswell Street  
London E. C. 1, England  
Regular reports on the international market in essential oils.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,975,170. 1961. 5 p.  
Process for manufacturing terpeneless essential oils.
- B. Patent No. 2,729,564. 1956. 5 p.  
Method of recovering essential oils.
- C. Patent No. 2,712,008. 1955. 3 p.  
Production of terpeneless essential oils.

### V. TRADE ASSOCIATIONS

- A. Flavoring Extract Manufacturers Association of the United States  
1051 First National Bank Building  
Chicago 3, Illinois
- B. American Spice Trade Association  
76 Beaver Street  
New York, N.Y. 10005

### VI. ENGINEERING COMPANY

- A. The Pfaudler Company  
West Avenue and Clark  
Rochester, New York 14611

### VII. DIRECTORY

- A. Consulting Services. \$1.50.  
Association of Consulting Chemists and Chemical Engineers, Inc.  
50 East 41st Street  
New York, N.Y. 10017  
Lists approximately 120 members of the association with a classifier of the work performed.

## 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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Clearinghouse for Federal Scientific and  
Technical Information, 410.12  
Springfield, Virginia 22151

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

### GENERAL INFORMATION

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

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

# INDUSTRY PROFILES

## PAINT

I. P. No. 66114

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

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

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

## PAINT: Standard Industrial Classification 2851

### A. PRODUCT DESCRIPTION

Oil-based ready-mixed paint.

### B. GENERAL EVALUATION

This industry requires only a small amount of capital to start production on a reasonable scale. However, plant of size described will be able to make only a limited range of paints. If demand justifies it, addition of equipment in order to extend range of products presents no technical difficulty. Manufacturing operations do not demand much skill, except from the manager, who will have to assume responsibility for mixing the materials and conducting any necessary tests. It is highly important to produce an article of consistently good quality. This industry seems well adapted to the conditions of many industrially less developed areas.

### C. MARKET ASPECTS

1. USERS. Shipyards, ships, railroads, large variety of industries, military forces, professional decorators, home owners, other small users.
2. SALES CHANNELS AND METHODS. Sales chiefly to wholesalers, but also some direct to large buyers such as shipyards, railroads, military forces. Distinctive and attractive brand name is necessary. Good salesmanship important. Display advertising generally most appropriate, but some advertising in periodicals might also be useful.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Economies of large-scale production are not important in this industry. In the United States there are about 1500 plants, many of them quite small, scattered throughout the country, location being influenced primarily by advantages of proximity to markets. However, paint is easily handled and transport costs are not unduly burdensome, so that the market area may be fairly extensive. b. Export. Paint is a common export item and is shipped world-wide.
4. COMPETITION. a. Domestic Market. Competition from imports may be strong. To meet this competition domestic product must be comparable in quality and, since users are often accustomed to some well-known imported brand and are reluctant to change, generally somewhat lower in price. Management should follow technical developments in the industry and be prepared to adapt to manufacture of new types of paint, as necessary to meet demand. b. Export Market. There is a large export trade in paint. Much of it is in the hands of a comparatively few large manufacturers who are well experienced in export business. Plant described might possibly make some sales in nearby areas of neighboring countries but would not be able to compete in general export business.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for paint varies according to extent and character of industrial activity, extent of maritime activity, size of military establishment, type of buildings in general use, and, of course, the overall standard of living. Plant described is small and is designed to produce type of paint that is most commonly used. In any developed urban area with a population of, say, a million, and a fair measure of industrial and trading activity, it should be possible to find a market.

## D. PRODUCTION REQUIREMENTS

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

### 1. CAPITAL REQUIREMENTS

	Cost
a. <u>FIXED CAPITAL</u>	
Land. 1/2 acre.	\$ --
Building. One story, about 900 sq. ft. floor space, fireproof. Provision should be made for natural illumination of mixing area for shading operation.	6,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt. \$ 4,800	
Other tools & equipmt. 600	
Furniture & fixtures 700	6,100
Total (excl. Land)	<u>\$ 12,100</u>

Principal Items. Pebble mill & pebbles, portable mixer, scale, drums, scoops, ladles, hand trucks.

### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 13,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,400
Training Costs		600
Total Working Capital		<u>\$ 15,800</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 27,900

### 2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. <u>Direct Materials</u>		
Basic carb. white lead	116,500 lbs.	\$ 19,800
90% red iron oxide	2,080 lbs.	200
98% red lead	16,870 lbs.	2,850
Magnesium silicate	8,330 lbs.	1,250
Stand. aluminum paste	3,550 lbs.	1,700
Anatase titanium diox.	4,080 lbs.	950
Titanium calcium pigmt.	50,450 lbs.	4,550
Lead-free zinc oxide	11,550 lbs.	1,650
3x asbestine	3,330 lbs.	500
Precipitated calc. carb.	12,410 lbs.	2,500
Aluminum stearate	100 lbs.	50
Naphthanates	1,590 lbs.	400
Mineral spirits & solvents	4,000 gls.	750
Vehicle (oil)	14,230 gls.	24,350
Cans & cartons		5,000
Total		<u>\$ 66,500</u>

### b. Supplies

Maintenance materials	\$ 100
Lubricants & hand tools	50
Office supplies	250
Total	<u>\$ 400</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Consumption about 10 kw-hr an hour.	\$ 400
b. <u>Fuel.</u> For heating, if necessary.	\$ 300
c. <u>Water.</u> For general purposes, approximately 800,000 gals. annually.	\$ 200

### 4. TRANSPORTATION

- a. Own Transport Equipment. None needed.
- b. External Transport Facilities. Total in & out shipments about 40 tons a month. No special requirements.

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Semi-skilled	1	\$ 4,000
Unskilled	1	3,000
Total	<u>2</u>	<u>\$ 7,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 8,000

- c. Training Needs. Manager must be fully experienced in paint manufacture. He will be responsible for mixing materials to produce desired type and quality and will conduct all testing and analysis work in laboratory. He will also deal with purchases and sales and keep books and records. Plant should reach full production in 1 month.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 66,500
Direct Labor	7,000
Manufacturing Overhead(a)	9,300
Admin. Costs(b), Contingencies	6,000
Sales Cost(c), Bad Debts	10,000
Depreciation on Fixed Capital	1,000
Total	<u>\$ 99,800</u>

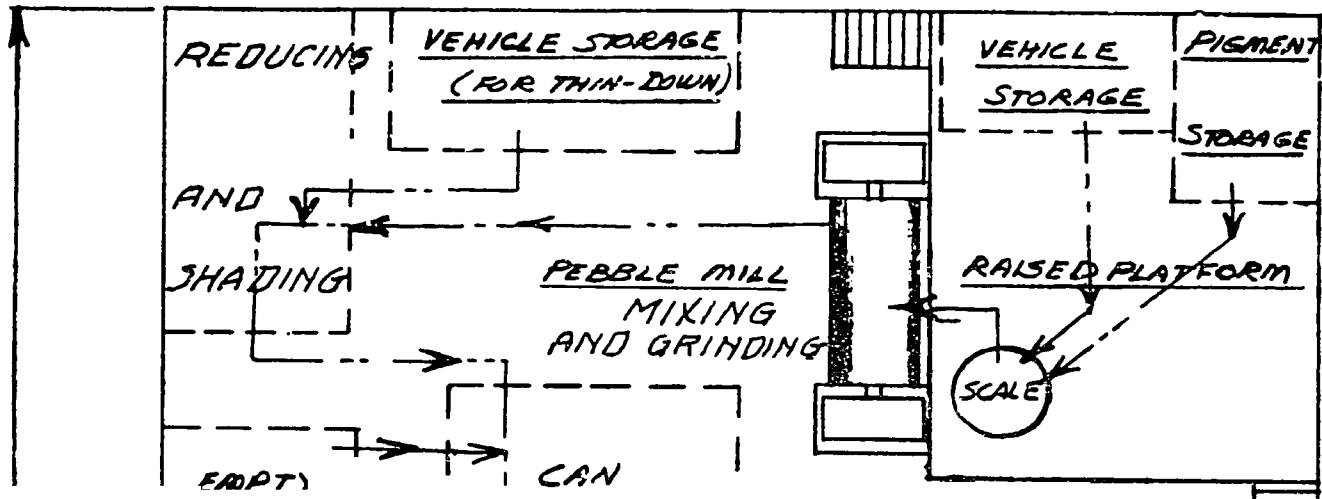
b. Annual Sales Revenue \$120,000

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

PAINT : S.I.C. 2851

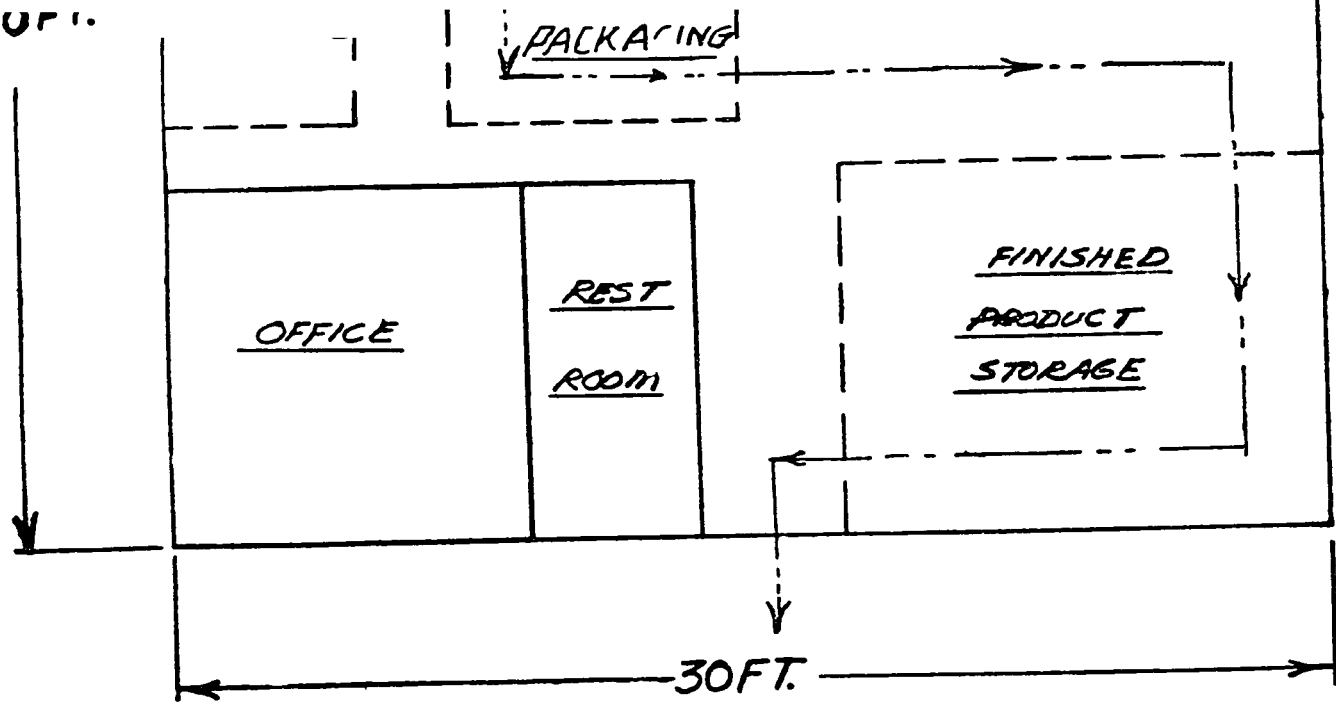
116

PLANT LAYOUT  
ARROWS INDICATE FLOW OF WORK



117.

30 FT.



30 FT.



SELECTED REFERENCES

I. TEXTBOOKS

- A. Paint Technology Manuals. Oil and Color. Chemists Association. 3 parts. Part I, 1961, \$7.50. Part 2, \$7.50. Part 3, 1963. \$7.50. Reinhold Publishing Corp. 430 Park Avenue New York, N. Y. 10022
- B. Paint and Varnish Products Manual. V. C. Bidlack and E. W. Fasig. 288 p. \$8.50. John Wiley and Sons, Inc. 605 Third Avenue New York, N. Y. 10016 Facilities, products and personnel.
- C. Paint and Varnish Manual. P. L. Gordon and R. Gordon. 1955. 192 p. \$4.00. John Wiley and Sons, Inc. 605 Third Avenue New York, N. Y. 10016 Control and development of laboratory experiments and test procedures.
- D. Painting and Decorating Encyclopedia. W. D. Jarvis. 288 p. \$5.45. Goodheart-Willcox Company, Inc. 18250 Harwood Homewood, Illinois 60430 A reference book of professional "know-how".

II. PERIODICALS

- A. Paint and Varnish Production. Monthly. \$3.00/year. Powell Magazines, Inc. 855 Avenue of the Americas New York, N. Y. 10001
- B. Paint, Oil and Chemical Review. Bi-monthly. \$3.00/year. Trade Review Company 332 Harrison Street Oak Park, Illinois 60304

III. U. S. PATENT

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

- A. Patent No. 2,885,298. May 5, 1959. 3 p.  
This invention relates to the manufacture of paint in a rapid economical manner.

SELECTED REFERENCES (Continued)

IV. TRADE ASSOCIATIONS

- A. National Paint, Varnish and Lacquer Association  
1500 Rhode Island Avenue, N. W.  
Washington, D. C. 20005
- B. Federation of Societies for Paint Technology  
121 South Broad Street  
Philadelphia, Pennsylvania 19107

V. ENGINEERING COMPANIES

- A. Eagle-Picker Company  
1956 American Building  
Cincinnati, Ohio 45202  
Basic carbonate, lead paint manufacturing.
- B. National Lead Company  
111 Broadway  
New York, N. Y. 10006  
Information on manufacture of white lead paint in oil.

VI. DIRECTORY

- A. MacRea's Blue Book. \$15.00.  
W. J. Brown  
118 East Huron Street  
Chicago, Ill. 60611  
Industries, equipment, products and materials.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## PHARMACEUTICAL GLASS (COMPLETE)

I. P. No. 66115

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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

Glass tubing, ampoules, and vials, for antibiotics. The plant makes neutral glass and processes it into the aforementioned products. The ampoules and vials have a capacity of five to eight cubic centimeters. Plant capacity is given in terms of production of ampoules and vials of average size, in the ratio of 40:60. Ratio can, however, be varied to meet demand. Also, other pharmaceutical products, such as syringes and glass for laboratory use, can be manufactured in this plant, if sufficient demand for them exists.

## B. GENERAL EVALUATION

This industry requires a rather large investment, especially in production equipment. Labor skills needed are mainly not of a high order. The economic feasibility of establishing this industry will depend very largely on whether a substantial part of the raw materials required can be obtained locally at low cost. The market for these products is growing rapidly in many parts of the world. But a plant of even this relatively small size, by the standards of the industry, would need a population of several million people, fairly well provided with modern medical facilities, to provide it with a market.

## C. MARKET ASPECTS

1. USERS. Pharmaceutical industry, hospitals, clinics.
2. SALES CHANNELS AND METHODS. Sales are usually made to large users and to wholesale distributors of pharmaceutical supplies.
3. GEOGRAPHICAL EXTENT OF MARKET. These products need to be carefully packed, and transport costs are fairly high. However, since these are more or less essential articles, for which there is generally no adequate substitute, transport costs alone are unlikely to limit the market area, if modern medical facilities exist and need these products for their operation. There is a fair volume of export trade in these products.
4. COMPETITION. a. Domestic Market. Assuming production at reasonable cost in relation to world prices, this plant should be able to meet competition from imports without difficulty. b. Export Market. Though this plant could normally not compete in general export trade, some exports to neighboring countries might well be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these products will depend entirely on the extent to which modern medical facilities and the manufacture and sale of antibiotics have developed in the potential market area. Since there are great variations in these respects, no useful generalization can be made about the size of the market needed for this plant in terms of total population.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 25 Million Ampoules and Vials

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<b>Cost</b>
Land. About 4 acres.		\$ --
Building. One story, fireproof, 80'x250'.		120,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$362,500	
Other tools & equipmt.	1,500	
Furniture & fixtures	1,200	
Transportation equipmt.	2,500	367,700
Total (excl. Land)		\$487,700
Principal Items. Tank furnace, furnace burners & heavy oil system, instrumentation, block cooling system, compressed air system, forebay & mandrel oven, mandrel machine, tube runway, tube drawing machine, clipper & glazing machine, tube size sorting machine, forming equipment, general equipment, stand-by power unit, 1-ton pickup truck.		
<b>b. WORKING CAPITAL</b>		
	<b>No. of Days</b>	
Direct Materials		
Direct Labor, Mfg. Overhead(a)	60	\$ 45,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	8,000
Training Costs		12,000
Total Working Capital		\$ 65,800
<b>c. TOTAL CAPITAL (EXCL. LAND)</b>		<b>\$553,500</b>

### 2. MATERIALS AND SUPPLIES

<b>a. Direct Materials</b>		<b>Annual Requirements</b>	<b>Annual Cost</b>
Sand	2,484,500 lbs.		\$12,400
Soda ash	867,500 lbs.		20,950
Limestone	433,700 lbs.		10,100
Feldspar	805,300 lbs.		19,650
Borax	250,300 lbs.		8,250
Zinc	152,700 lbs.		19,650
Fluorspar	29,000 lbs.		750
Cullet	752,000 lbs.		4,550
Total			\$ 96,300
<b>b. Supplies</b>			
Lubricants & hand tools		\$	325
Cutting tools			200
Welding rods			100
Maintenance & parts			3,675
Office supplies			200
Total			\$ 4,500

### 3. POWER, FUEL AND WATER Annual Cost

<b>a. Electric Power.</b> Connected load about 330 hp. Standby diesel power plant is included in equipment, to keep essential equipment in operation in case of power failure.	\$ 6,000
<b>b. Fuel.</b> About 186,000 gals. Bunker B oil annually. Gas, either natural or bottled, needed for processing equipment used in forming product. Annual cost about \$7,000.	\$ 15,000
<b>c. Water.</b> About 25 million gals. annually.	\$ 6,000

### 4. TRANSPORTATION Annual Oper. Cost

<b>a. Own Transport Equipment.</b>	
Pickup truck.	\$ 1,000
<b>b. External Transport Facilities.</b> Total in and out shipments about 500 tons a month. Good highway & proximity to railroad necessary.	

### 5. MANPOWER

<b>a. Direct Labor</b>	<b>Number</b>	<b>Annual Cost</b>
Skilled	2	\$ 12,000
Semi-skilled	12	60,000
Unskilled	8	32,000
Total	22	\$104,000
<b>b. Indirect Labor</b>		
Manager & superintendent	2	\$ 18,000
Office	2	8,000
Other	4	16,000
Total	8	\$ 42,000

**c. Shift Operation.** Manufacturing process is continuous. However, some types of labor need not be employed on all shifts, and the number of workers therefore varies from shift to shift.

**d. Training Needs.** Manager & superintendent should have long experience. Together with the master mechanic, chemist & 2 skilled workers, they should be able to do all necessary labor training. Full operation in 2 months.

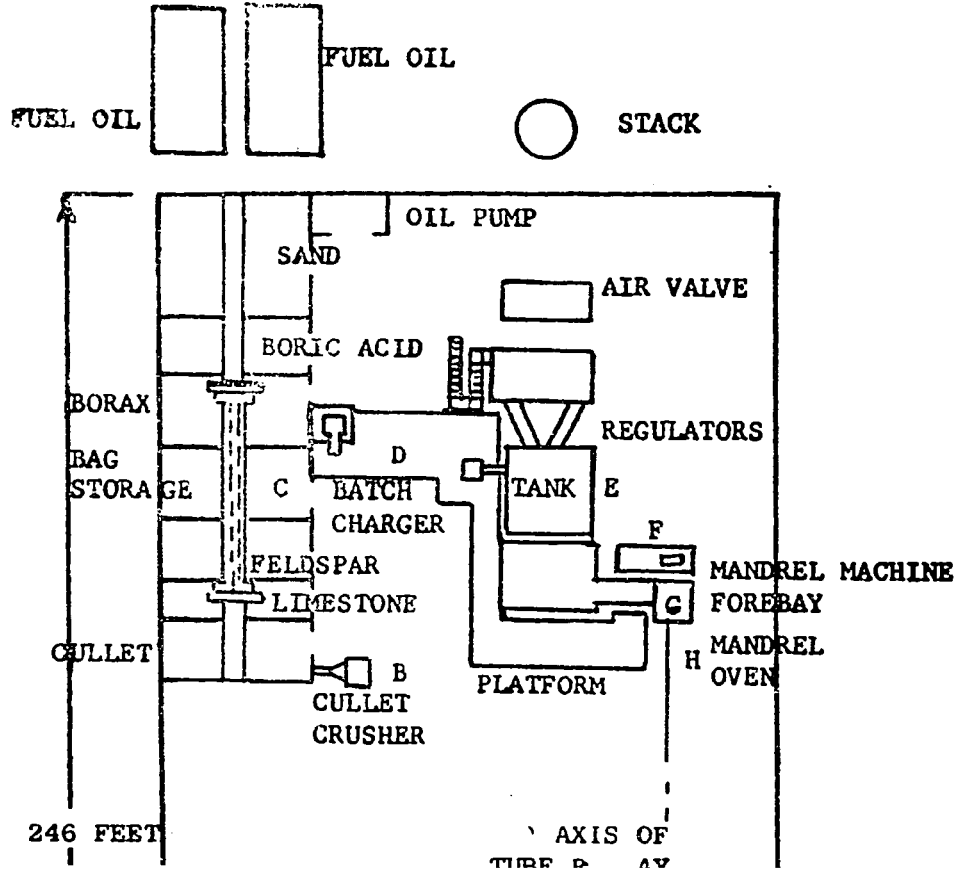
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

<b>a. Annual Costs</b>		
Direct Materials		\$ 96,300
Direct Labor		104,000
Manufacturing Overhead (a)		74,500
Admin. Costs(b), Contingencies		57,000
Sales Costs(c), Bad Debts		50,000
Depreciation on Fixed Capital		43,300
Total		\$425,100
<b>b. Annual Sales Revenue</b>		<b>\$600,000</b>

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

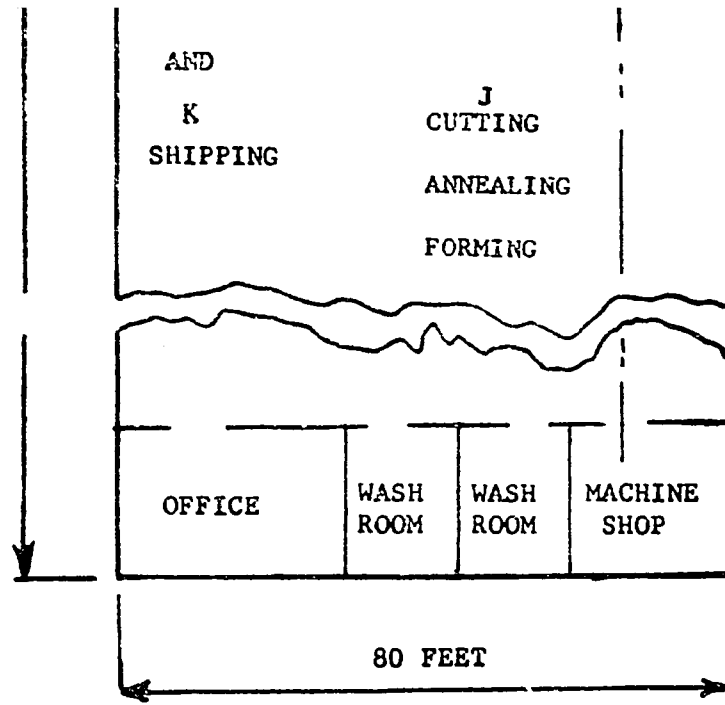
PHARMACEUTICAL GLASS (COMPLETE): S.I.C. 3229

PLANT LAYOUT AND WORK FLOW



PHARMACEUTICAL GLASS

125



PLETE) : S.I.C. 3229

- A. Raw material storage
- B. Cullet crusher
- C. Batch mixer
- D. Batch charger
- E. Melting furnace
- F. Mandrel machine
- G. Forebay
- H. Mandrel oven
- I. Tube runway
- J. Cutting, annealing and forming
- K. Storage and Shipping



# PHARMACEUTICAL GLASS (COMPLETE) S.I.C. 3229

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Glass: Industrial Applications. C. J. Phillips. 1960. \$6.95.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N.Y. 10022  
Glass working principles, glass working machinery, finishing, annealing, applications.
- B. Handbook of Glass Manufacture. F. V. Tooley, editor. 1959. 2 vols. \$25.00.  
Ogden Publishing Company  
530 E. 86th Street  
New York, N. Y. 10036  
Composition, properties, and manufacture of glass.
- C. Glass Engineering Handbook. E. B. Shand. 2nd edition. 1959. \$2.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N.Y. 10036  
Process of glass manufacture. Practical data on the use of glass and glass products in industry, engineering, research, and other fields.

### II. U. S. GOVERNMENT PUBLICATION

- A. Quality Control. TB-66. March 1960. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Manual for training personnel in the subject of quality control in industry.

### III. PERIODICALS

- A. American Glass Review. Monthly. \$10.00/year.  
Ebel-Doctrow Publications, Inc.  
9th and Linden Streets  
Miller Heights  
Easton, Pennsylvania 18042  
Uses of glass products, development of new glass products.
- B. Glass Industry. Monthly. \$5.00/year.  
Ogden Publishing Company  
New York, N.Y. 10036  
Articles relative to glass technology and manufacturing.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,896,807. 1959. 4 p.  
Tubular glass ampules formed with tapered ends.
- B. Patent No. 2,832,701. 1958. 4 p.  
Containers for liquids, which permit the liquid to drain free of the walls of the vessel.
- C. Patent No. 2,764,156. 1956. 4 p.  
Containers or ampules of the type commonly employed to fill hypodermic syringes.
- D. Patent No. 2,731,965. 1956. 4 p.  
Device for marketing and/or dispensing certain pharmaceutical preparations.

### V. TRADE ASSOCIATION

- A. Glass Container Manufacturers Institute  
99 Park Avenue  
New York, N.Y. 10001

### VI. ENGINEERING COMPANIES

- A. Frasier-Simplex, Inc.  
P.O. Box 493  
Washington, Pennsylvania 15301  
Engineers to the glass industry.
- B. Eisler Engineering Company  
758 South 13th Street  
Newark, New Jersey 07103  
Designers, engineers, manufacturers of equipment for the glass industry.

### VII. DIRECTORY

- A. Glass Factory Directory. Annual. \$3.00.  
National Glass Budget  
916 Empire Building  
Pittsburgh, Pennsylvania 15222  
Lists glass manufacturers. Buyers' guide of glass industry suppliers and equipment.

PHARMACEUTICAL GLASS (COMPLETE): S.I.C. 3229

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# INDUSTRY PROFILES

## PHARMACEUTICAL TABLETS AND PILLS

I. P. No. 66116

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PHARMACEUTICAL TABLETS AND PILLS: Standard Industrial Classification  
2834

A. PRODUCT DESCRIPTION

Various sizes and shapes of pharmaceutical tablets and pills, coated and uncoated, packaged in polyethylene strips, tins or bottles. The materials shown are for the production of aspirin, but the equipment will make any kind of tablets and pills.

B. GENERAL EVALUATION

In this business it is necessary to pay strict attention to maintaining product quality. Active sales promotion is necessary. Good management is essential, but only a modicum of skilled labor is needed. Capital requirements are modest. Plants of this kind have been started in many developing areas, and there should be opportunities for more.

C. MARKET ASPECTS

1. USERS. Individuals.
2. SALES CHANNELS AND METHODS. Sales to distributors of pharmaceutical products and sometimes direct to large retailers.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are very easy to ship both domestically and abroad.
4. COMPETITION. a. Domestic Market. To meet competition from imports it is essential to maintain good quality and generally to sell at a lower price than the internationally-known brands. b. Export Market. It would be difficult for this plant to compete successfully in international markets with the products of established large-scale makers of pharmaceutical products, with their large sales and publicity organizations.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will vary greatly with income levels, the extent of medical facilities, etc., but generally a population of about a million should provide a sufficient market for this plant.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 25 Million Tablets

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 1/2 acre.	\$ --
Building. One story, 40'x60'.	14,400
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipment.	\$29,000
Other tools & equipmt.	600
Furniture & fixtures	700
Total (excl. Land)	<u>\$ 44,700</u>

Principal Items. 3 tablet machines, 18 sets of punches & dies, mixer, drying oven, wet & dry granulator, water still, tablet harshness tester, coating & polishing machine (complete), strip packaging machine, manual counters, hand trucks, air conditioning unit.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 13,900
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,000
Training Costs		1,400
Total Working Capital		<u>\$ 16,300</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 61,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Acetylsalicylic acid	17,350 lbs.	\$ 9,750
Cornstarch	1,735 lbs.	150
4" polyethylene strip	2,000,000 ft.	16,000
Boxes	120,000	6,000
Cartons	3,560	700
Total		<u>\$ 32,600</u>

#### b. Supplies

Lubricants & hand tools	\$ 100
Maintenance & spare parts	900
Office supplies	200
Total	<u>\$ 1,200</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 15 hp. connected load.	<u>\$ 200</u>
b. Fuel. For heating, if necessary.	<u>\$ 200</u>
c. Water. For production & general purposes.	<u>\$ 100</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	1	\$ 6,000
Semi-skilled	2	10,000
Unskilled	5	15,000
Total	<u>8</u>	<u>\$ 31,000</u>
b. Indirect Labor		
Manager	1	\$ 10,000
Office	2	8,000
Total	<u>3</u>	<u>\$ 18,000</u>

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

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

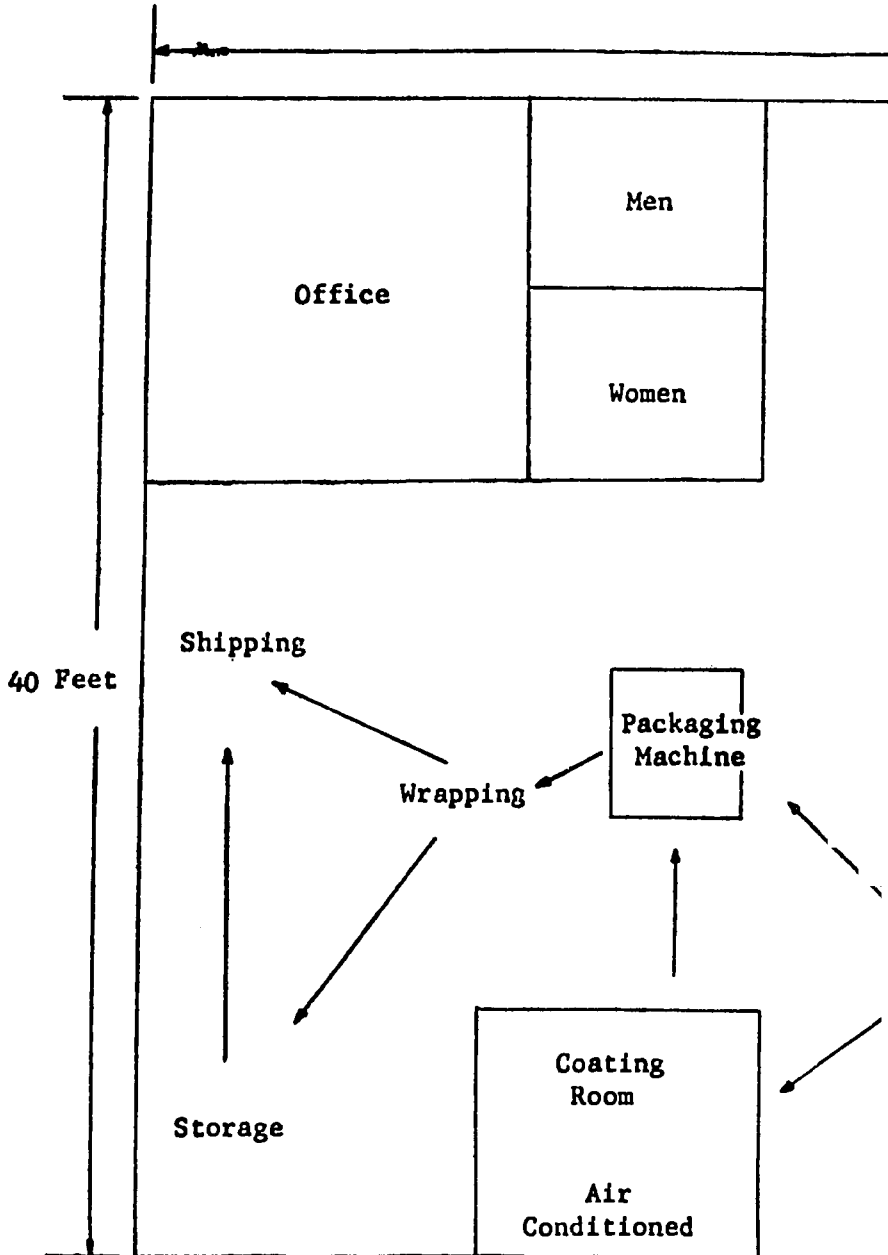
a. Annual Costs	
Direct Materials	\$ 32,600
Direct Labor	31,000
Manufacturing Overhead(a)	19,700
Admin. Costs(b), Contingencies	6,000
Sales Costs(c), Bad Debts	6,000
Depreciation on Fixed Capital	3,800
Total	<u>\$ 99,100</u>
b. Annual Sales Revenue	<u>\$125,000</u>

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

PHARMACEUTICAL TABLETS AND PILLS: S.I.C. 2834

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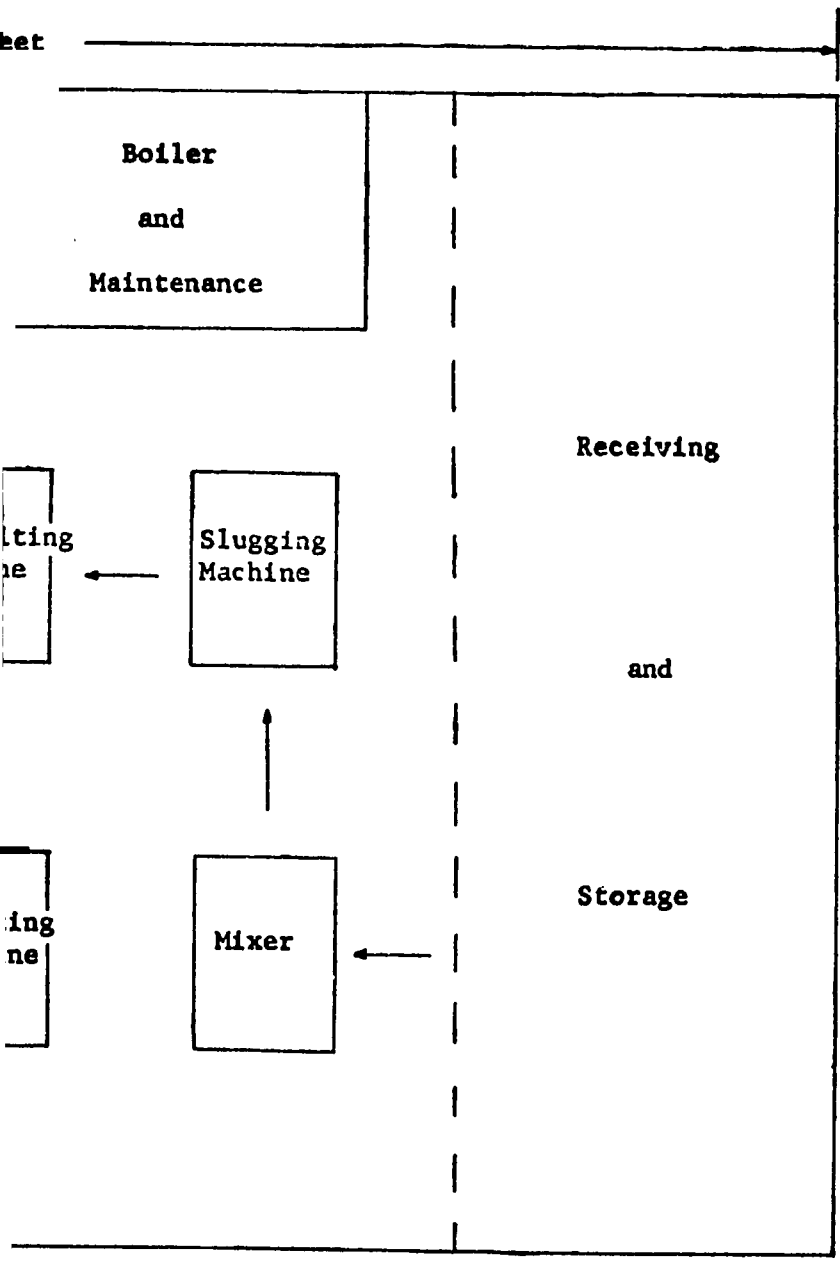
PHARMACEUTICAL TABLET  
PLANT LAYOUT



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AND PILLS : S.I.C. 2834

WORKFLOW





PHARMACEUTICAL TABLETS AND PILLS: S. I. C. 2834

SELECTED REFERENCES

I. TEXTBOOKS

- A. Remington's Practice Pharmacy, E. F. Cook and E. W. Martin, editors. 11th edition. 1956. 1,707 p. Illus. \$20.00.  
The Mack Publishing Company  
20th and Northampton Streets  
Easton, Pennsylvania 18042  
A treatise on the manufacturing, standardizing, and dispensing of pharmaceutical products.
- B. American Pharmacy. R. A. Lyman and J. B. Sprowls, Jr. 5th edition. 1960. Illus. \$10.75.  
J. B. Lippincott Company  
East Washington Square  
Philadelphia, Pennsylvania 19105  
Textbook of pharmaceutical principles, processes, and preparation.
- C. Textbook of Pharmaceutical Compounding and Dispensing. R. A. Lyman and J. B. Sprowls, Jr., 2nd edition. 1955. 477 p. Illus. \$9.75.  
J. B. Lippincott Company  
East Washington Square  
Philadelphia, Pennsylvania 19105  
Compounding of ingredients and manufacture of tablets.

II. TECHNICAL PAPER

- A. Laboratory Information Bulletin No. 1. January 31, 1959. 4 p. Gratis.  
F. J. Stokes Corporation  
5500 Tabor Road  
Philadelphia, Pennsylvania 19105  
Binders for tablet making, description, and mixers.

III. U. S. GOVERNMENT PUBLICATION

- A. Production of Pharmaceutical Products. IR-12928. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Data on basic investment capital, equipment, factory facilities, staffing, processes for producing pharmaceutical products.

IV. PERIODICALS

- A. American Journal of Pharmacy. Monthly. \$4.00/year.  
Philadelphia College of Pharmacy and Science  
43rd and Kingsessing Avenue  
Philadelphia, Pennsylvania 19104  
Journal serving the pharmaceutical field.
- B. Drug and Cosmetic Industry. Monthly. \$5.00/year.  
Drug Markets, Inc.  
101 West 31st Street  
New York, N.Y. 10001  
Pertains to the manufacture of drugs and cosmetics.

1  
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## SELECTED REFERENCES (Continued)

### V. U. S. PATENTS

Available U. S. Patent Office

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

- A. Patent No. 2,997,968. 1961. 4 p.  
Mixing device for combining dry powders and liquids.
- B. Patent No. 2,997,741. 1961. 7 p.  
Rotary compacting machine for making pharmaceutical products.
- C. Patent No. 2,995,096. 1961. 6 p.  
Pharmaceutical pelletizing machine.
- D. Patent No. 2,958,900. 1960. 7 p.  
Pharmaceutical pellet mill die assembly.
- E. Patent No. 2,931,292. 1960. 6 p.  
Marking machine for pharmaceutical capsules, pellets, and the like.

### VI. TRADE ASSOCIATION

- A. American Pharmaceutical Association  
2215 Constitution Avenue, N. W.  
Washington, D. C. 20007

### II. ENGINEERING COMPANIES

- A. F. J. Stokes Corporation  
5500 Tabor Road  
Philadelphia, Pennsylvania 19105  
Chemical research and equipment for pharmaceutical products.
- B. Technical Enterprises, Inc.  
29-31 South Street  
New York, N.Y. 10004  
Erects complete pharmaceutical plants.

### III. DIRECTORY

- A. Drug Topics Red Book. Annual. \$9.00.  
Topics Publishing Company, Inc.  
10 East 15th Street  
New York, N.Y. 10003  
Lists brand names of products sold in the United States. Also  
manufacturers, forms, sizes and prices.

## 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

## PRIMARY HARDWARE

I. P. No. 66117

*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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## PRIMARY HARDWARE : Standard Industrial Classification 3429

### A. PRODUCT DESCRIPTION

Hand tools, including picks, wrecking bars, digging bars, axes, hatchets, bush and grab hooks, trowels, hinges, knives, bolts, punches and nail sets, tackle blocks, shackles, clamps, hand screws, steel U-bolts, chisels, hammers, and screwdrivers. Machines for making other items may be added if demand for them is large enough.

### B. GENERAL EVALUATION

The capital needed to establish a plant of this kind is small. Skilled management and some skilled workers, including a forge hammer and heat-treating operator, are needed but the labor requirements should not be beyond the capacity of most developing areas. Articles produced are in wide demand and the product mix may be easily varied and extended, to meet the demands of particular markets. This industry is a promising one for many developing areas.

### C. MARKET ASPECTS

1. USERS. Industries, farmers, builders, workshops, homeowners, etc.
2. SALES CHANNELS AND METHODS. Sales are normally made to wholesale hard-ware distributors. Some might be made to large retailers.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are easily handled, and transport costs are not an important limiting factor on the market area. Such products are exported all over the world by industrially advanced countries.
4. COMPETITION. a. Domestic Market. Provided a high level of quality can be maintained, it should generally not be difficult to meet the competition of imports b. Export Market. Some exports to nearby areas in neighboring countries might be possible, but a plant of this size would not be able to compete in general export business with large-scale producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these products will depend on the volume of construction, the type of industrial and agricultural activity, and many other factors. The total capacity of the plant is not large, and a market for its output should be provided by almost any mainly urban area with a population of around a million.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 100,000 Pieces

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<u>Cost</u>
Land. About 6,000 sq. ft.	\$	--
Building. One story, 40'x60'.		14,400
Equipment, Furniture & Fixtures.		
Prodn. tools & equipment	\$37,000	
Other tools & equipmt.	2,000	
Furniture & fixtures	700	39,700
Total (excl. Land)		<u>\$ 54,100</u>

Principal Items. Punch presses (2), gas or oil furnace, forging hammer, dies & punches, hand forge, anvils (2), electric heat treat furnace, quench tank, pickling tank, hand shear, tumbling machine, hand grinder, drill press, buffing machine, bench shaper, small milling machine, lathe, hand screw machine, boiler.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 8,100
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,800
Training Costs		3,500
<u>Total Working Capital</u>		<u>\$ 13,400</u>

**c. TOTAL CAPITAL (EXCL. LAND)** \$ 67,500

### 2. MATERIALS AND SUPPLIES

<b>a. Direct Materials</b>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Steel	72 tons	\$ 10,000

### b. Supplies

Lubricants & hand tools	\$	100
Cutting tools		200
Dies		1,500
Maintenance & repair parts		1,000
Office supplies		200
<u>Total</u>		<u>\$ 3,000</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
<b>a. Electric Power.</b> Connected load about 50 hp.	\$ 1,500
<b>b. Fuel.</b> About 6,000 gals. oil annually for furnace & boiler.	\$ 800
<b>c. Water.</b> Needed for heat treatment, sanitation & fire protection.	\$ 100

### 4. TRANSPORTATION

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

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
<b>a. Direct Labor</b>		
Skilled	2	\$ 12,000
Semi-skilled	2	10,000
Unskilled	1	4,000
<u>Total</u>	<u>5</u>	<u>\$ 26,000</u>
<b>b. Indirect Labor</b>		
Manager, - buys, sells & supervises	1	\$ 9,000
Office	1	4,000
<u>Total</u>	<u>2</u>	<u>\$ 13,000</u>

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

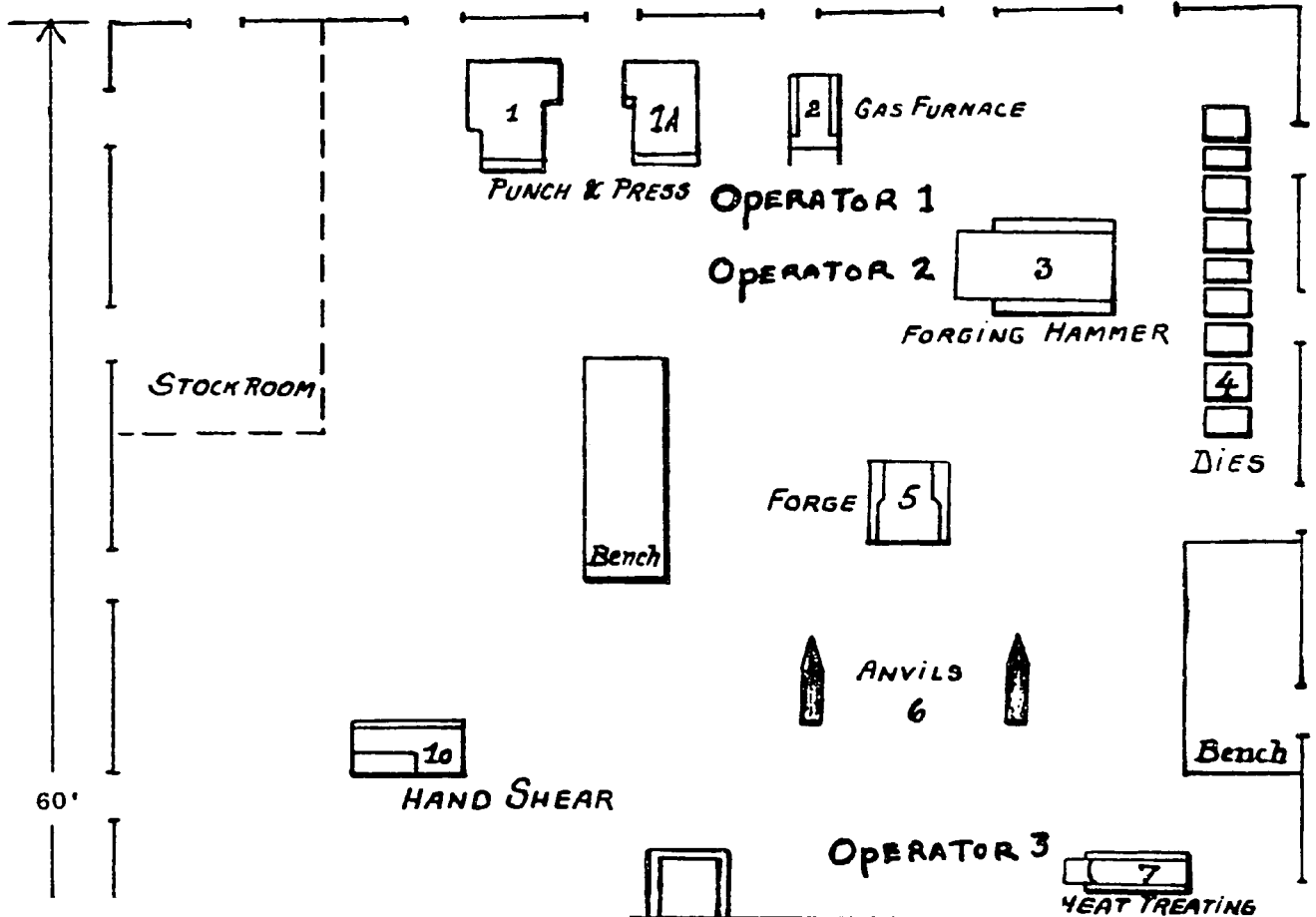
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

<b>a. Annual Costs</b>	
Direct Materials	\$ 10,000
Direct Labor	26,000
Manufacturing Overhead(a)	18,400
Admin. Costs(b), Contingencies	6,000
Sales Costs(c), Bad Debts	8,000
Depreciation on Fixed Capital	4,900
<u>Total</u>	<u>\$ 73,300</u>
<b>b. Annual Sales Revenue</b>	<u>\$106,000</u>

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

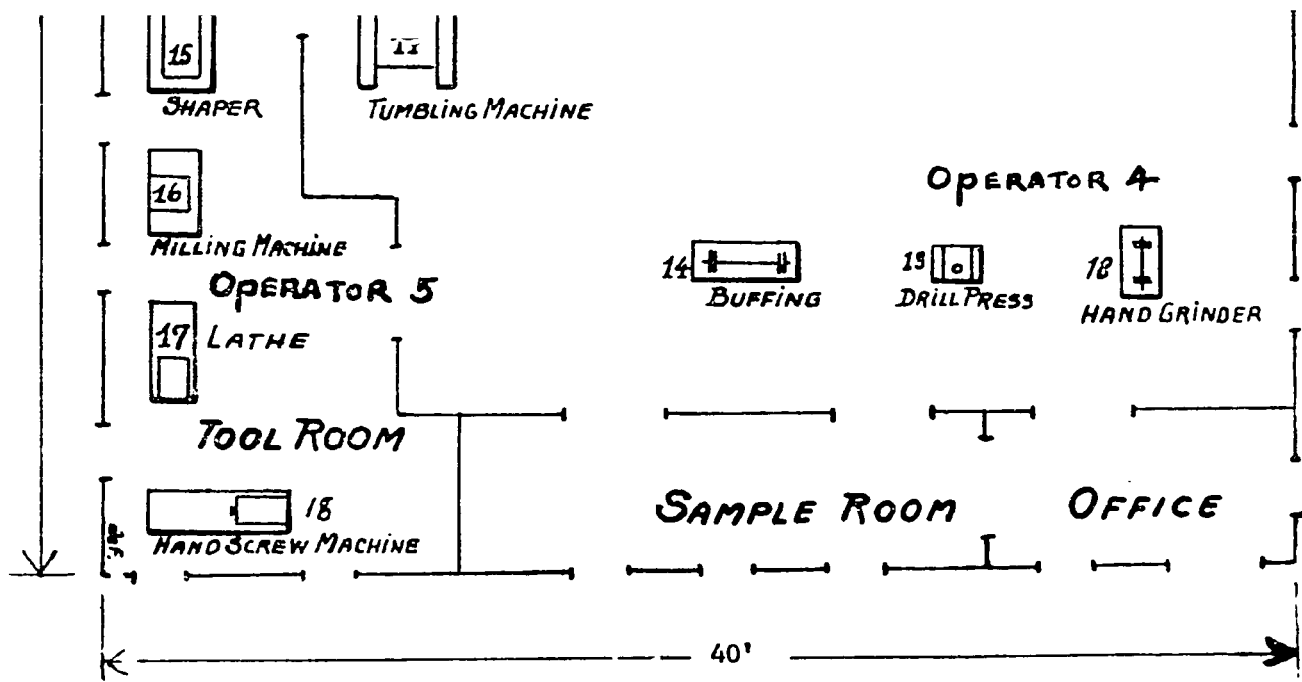
PRIMARY HARDWARE: S.I.C. 3429

PLANT LAYOUT



PRIMARY H

1411



Primary Hardware includes so many diversified items that a constant flow of work is impracticable. All punch press work will go to operator Number One. All forge work will go to operator Number Two. All heat treat and shear work will go to Operator Number Three. All drill press, grinding and buffing will go to Operator Number Four. All machinery work, except drilling, will go to Operator Number Five. Each operator should be capable of working at more than one station, since all stations will not always have work at the same time.

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## PRIMARY HARDWARE : S.I.C. 3429

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. **Fundamentals of the Working of Metals.** G. Sachs. 1954. 158 p.  
\$4.75.  
Macmillan Co.  
60 5th Avenue  
New York, N. Y. 10011  
Presents basic facts that determine the success or failure of a metal forming operation.
- B. **ASME Handbook—Metals Engineering, Processes.** R. W. Bolz, editor. 1958. 448 p. Illus. \$13.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Covers heat treatment of steel, hot and cold working, welding, casting, machining.
- C. **Pressworking of Metals.** 2nd edition. C. W. Hinman. 1950. 551 p. Illus. \$9.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Presents uses of metalworking press in forming and punching as well as tool designs, types of presses, attachments.

#### II. U. S. GOVERNMENT PUBLICATIONS

- A. **Primary Hardware.** TI-26. May 1958. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Discusses factors for consideration in establishing a plant to manufacture primary hardware.
- B. **Forging Machinery.** IR-8057. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Technical reply to inquiry on machinery and operations in metal forging.

#### III. PERIODICALS

- A. **Machinery.** Monthly. \$7.00/year.  
The Industrial Press  
93 Worth Street  
New York, N. Y. 10013  
Magazine of engineering and production in the manufacture of metal products.
- B. **Metal forming and Fabricating.** Monthly. \$10.00.  
Watson Publications, Inc.  
201 North Wells Street  
Chicago, Illinois 60606  
Production journal specializing in methods of metal working.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,998,618. 1961 4 p.  
Process for making spring hinges.
- B. Patent No. 2,905,214. 1959. 3 p.  
Method of manufacturing hatchets.
- C. Patent No. 2,888,734. 1959 16 p.  
Method of making hinge members.
- D. Patent No. 2,883,888. 1959. 5 p.  
Boring tool and method for making same.

V. TRADE ASSOCIATION

- A. American Hardware Manufacturers Association  
342 Madison Avenue  
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

- A. E. W. Bliss Company  
1382 Raff Road, S. W.  
Canton, Ohio 44710  
Makers of punches, shears, forging machines and tools.
- B. Buffalo Tank Corporation  
Dunellon, New Jersey 08812  
Pickling and quenching tanks.

VII. DIRECTORY

- A. Standard Metal Directory. Biennial. \$15.00.  
National Business Press, Inc.  
425 West 25th Street  
New York, N. Y. 10001  
Lists smelters, refineries, mills, foundries, and manufacturers of steel  
and metal products 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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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

## RUBBER CEMENT

I. P. No. 66118

*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.

A. PRODUCT DESCRIPTION

Rubber cement, made from natural rubber and petroleum distillates, for use primarily in the shoe industry. Plant includes can-making equipment.

B. GENERAL EVALUATION

This plant requires only a moderate amount of capital and little skilled labor. From the technical point of view the industry appears suitable for the conditions of many less developed areas. The main problem in most cases is likely to be to find a market, and this may not exist unless a fair degree of industrialization has already been achieved. Although the capacity of the plant is estimated at 75,000 gallons a year, actual operating capacity will vary with the degree of concentration of the solution used. Machinery listed would permit appreciable expansion of production at little or no expense for additional equipment.

C. MARKET ASPECTS

1. USERS. The shoe industry is a principal user, but rubber cement is increasingly used for a variety of industrial purposes.
2. SALES CHANNELS AND METHODS. Sales to user industries or wholesalers.
3. GEOGRAPHICAL EXTENT OF MARKET. This product is easy to handle, and transport costs are not an important factor in limiting the size of the market area. The product is exported widely.
4. COMPETITION. a. Domestic Market. Unless costs are unusually high, the local product should be able to compete effectively with imports. Use of this product has become to a considerable degree specialized, and for most uses there is little competition from substitutes. b. Export Market. A plant of this size would be too small to engage in the general export business, though some sales might be possible in neighboring countries.
5. MARKET NEEDED FOR PLANT DESCRIBED. Since demand for this product is likely to depend almost entirely on how far user industries have been established in the area concerned, no estimate can be given of the market needed in terms of population.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 75,000 Gallons

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 20,000 sq. ft.	\$ ---
Building. One story, 50'x60'.	18,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt. \$27,000	
Other tools & equipmt. 3,300	
Furniture & fixtures 700	31,000
Total (excl. Land)	<u>\$49,000</u>

Principal Items. Rubber mill, churn, viscometer, square shear, small notching machine, small bar folder, foot press, body forming machine, horn press with closing horn, flanger, double seamer, boiler.

#### b. WORKING CAPITAL

	No. of Days	Cost
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 7,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,200
Training Costs		2,300
Total Working Capital		<u>\$ 11,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$60,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Natural rubber (pale crepe)	7,500 lbs.	\$ 2,650
VM & P naptha	60,000 lbs.	1,900
Tetrachloroethylene	7,500 lbs.	1,000
Can material (flat cans)	75,000	8,250
Packaging material		500
Total		<u>\$ 14,300</u>

#### u. Supplies

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

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 30 hp.	<u>\$ 900</u>
b. Fuel. About 3,000 gals. oil annually. Alternative fuel may be used with appropriate boiler.	<u>\$ 400</u>
c. Water. About 800,000 gals. annually.	<u>\$ 200</u>

### 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	\$ 5,000
Semi-skilled	2	8,000
Unskilled	1	3,000
Total	<u>4</u>	<u>\$ 16,000</u>
b. <u>Indirect Labor</u>		
Manager - buys sells & supervises	1	\$ 8,000
Office	1	4,000
Total	<u>2</u>	<u>\$ 12,000</u>

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

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

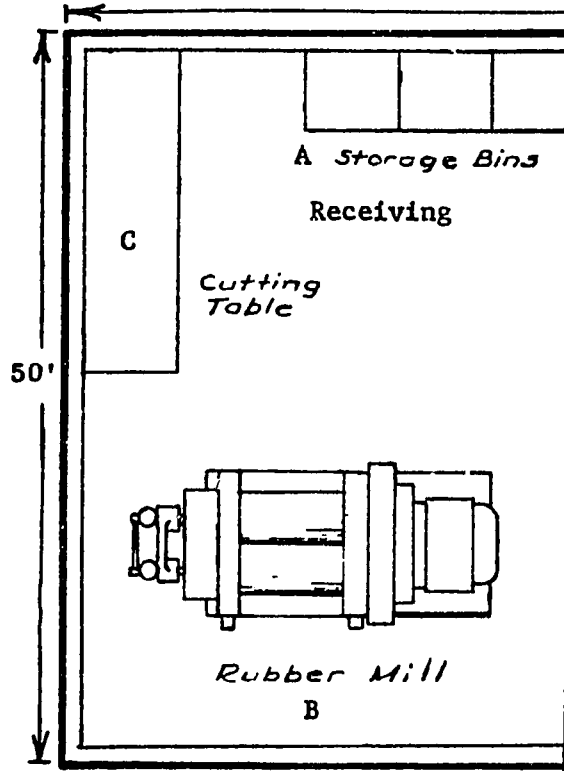
a. <u>Annual Costs</u>	
Direct Materials	\$ 14,300
Direct Labor	16,000
Manufacturing Overhead(a)	14,500
Admin. Costs(b), Contingencies	6,000
Sales Costs (c), Bad Debts	9,000
Depreciation on Fixed Capital	4,300
Total	<u>\$ 64,100</u>
b. <u>Annual Sales Revenue</u>	<u>\$ 80,000</u>

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

RUBBER CEMENT: S.I.C. 3069

145

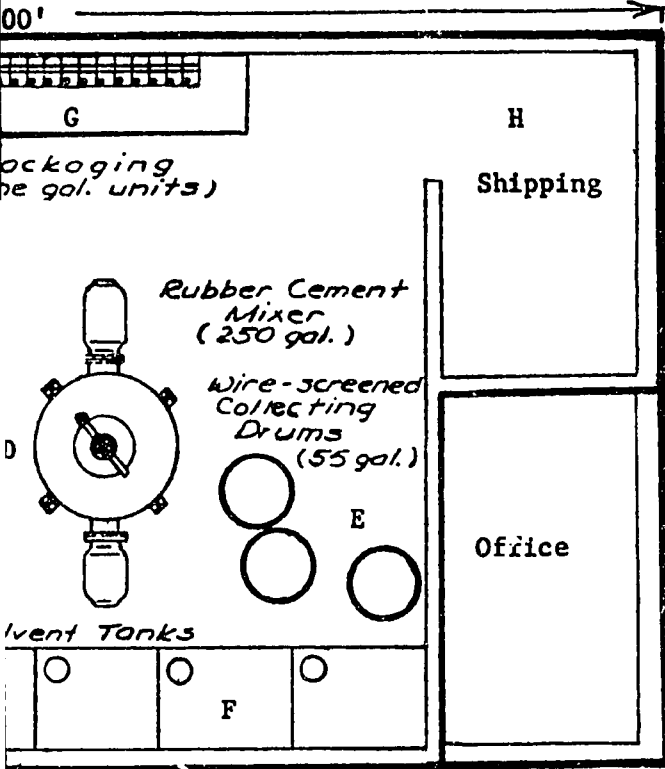
RUBBER  
PLANT LAY



- A.
- B. M
- C. C
- D. R
- E. Sc
- F. Sc
- G. Pa
- H. SH

NT : S. I. C. 3069

ND FLOW OF WORK



resins, and accelerators

pent, mixer

drums

tanks

251



## RUBBER CEMENT: S.I.C. 3069

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Latex in Industry. 2nd Edition. R. J. Noble. 1955. 920 p. \$16.00.  
Palmerton Publishing Company, Inc.  
101 West 31st Street  
New York, N. Y. 10001  
Devoted to the chemistry of rubber, including adhesives.
- B. Adhesion and Adhesives. N. A. De Bruyne and R. Houwink, editors.  
1951. 518 p. \$13.50.  
D. Van Nostrand Company, Inc.  
120 Alexander Street  
Princeton, New Jersey 08540  
Devoted to adhesion and adhesives, including inorganic cements, rubbery adhesives, testing of adhesion and adhesives.
- C. Rubber: Natural and Synthetic. J. H. Stern. 1954. 491 p. \$12.00.  
Palmerton Publishing Company, Inc.  
101 West 31st Street  
New York, N. Y. 10001  
Comprehensive coverage including discussions on solvents and solution.
- D. Method of Chemical Analysis of Rubber Products. No. D297. 1959. \$.30.  
American Society for Testing Materials  
1916 Race Street  
Philadelphia, Pennsylvania 19103  
Technical methods of determining the quality of rubber products.

#### II. U. S. GOVERNMENT PUBLICATION

- A. Rubber Cement. TI-30. June 1958. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Plant requirements for establishing and operating a factory to produce rubber cement.

#### III. PERIODICAL

- A. Rubber Chemistry and Technology. Five issues a year. \$8.00/year.  
American Chemical Society  
Division of Rubber Chemistry  
Prince and Lemon Streets  
Lancaster, Pennsylvania 17602  
Chemistry and technology of rubber.

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### IV. U.S. PATENTS

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

- A. Patent No. 2,637,751. 1953. 4 p.  
Adhesive compositions of rubber.
- B. Patent No. 2,522,137. 1950. 8 p.  
Rubber adhesives.
- C. Patent No. 2,386,696. 1945. 2 p.  
Adhesive compositions of natural or synthetic rubber.

### V. TRADE ASSOCIATIONS

- A. Rubber Manufacturers Association  
444 Madison Avenue  
New York, N. Y. 10022
- B. Rubber and Plastic Adhesives and Sealants Manufacturers Council  
159 North Dearborn Street  
Chicago, Illinois 60601

### VI. ENGINEERING COMPANIES

- A. Mixing Equipment Company, Inc.  
138 Mt. Read Boulevard  
Rochester, New York, 14611  
Special mixer manufacturers.
- B. Charles Ross and Son, Inc.  
83 Emmerson Place  
Brooklyn, New York 11205  
Rubber cement mixers and other machinery.

### VII. DIRECTORY

- A. Rubber Red Book. Annual. \$15.00.  
Rubber Age  
Palmerton Publishing Company, Inc.  
101 West 31st Street  
New York, N. Y. 10001  
Gives information on United States manufacturers of rubber, raw materials, products made, factories, machinery used, and personnel.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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

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

## ORDERING INSTRUCTIONS

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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

## SALICYLIC ACID

I. P. No. 66119

*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.

## SALICYLIC ACID: Standard Industrial Classification 2818

### A. PRODUCT DESCRIPTION

Technical grade salicylic acid, made from purchased phenol, sodium hydroxide, carbon dioxide, and sulfuric acid. Crystallized and sublime (USP) grades of salicylic acid are derived from the technical grade.

### B. GENERAL EVALUATION

The plant described though small by U. S. standards, requires substantial capital and a fair amount of managerial and technical supervisory skill. The product is of an intermediate type, being both derived from and a raw material for other chemical products. If the chemicals from which it is made are locally produced, it may be possible to sell in fairly distant markets. On the other hand, if the plant is located in the vicinity of a sizable complex of user industries, it may be able to bear the cost of getting its raw materials from distant sources.

### C. MARKET ASPECTS

1. USERS. Manufacturers of various pharmaceutical and chemical products, including aspirin, antiseptics, food preservatives, dyes.
2. SALES CHANNELS AND METHODS. Sales will generally be made direct to user industries.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Salicylic acid is a comparatively high value product and the potential market area may be nation-wide. b. Export. This product is commonly exported.
4. COMPETITION. a. Domestic Market. If the materials needed for making salicylic acid are locally produced, competition from imports is unlikely to be significant. If on the other hand the raw materials need to be imported, locally produced salicylic acid might be very little, if at all, cheaper than imported, and imports would therefore be strongly competitive. b. Export Market. This plant would probably have little chance in export markets in general competition with large-scale chemical producers. Some exports to neighboring countries might be possible if the plant has access to cheap raw materials and can keep its costs low.
5. MARKET NEEDED FOR PLANT DESCRIBED. Unless the materials for manufacturing salicylic acid are locally produced at low cost it is unlikely that this plant could develop any export business. If the industry is based largely or entirely on imported materials it will need a substantial development of user industries to supply it with the necessary market. The economic feasibility of this plant thus depends on the development of related supplier and user industries. No estimate of the market needed can be given in terms of total population or other simple yardstick.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION : 500 Tons

### 1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	<u>Cost</u>
Land. About 1 acre.	\$ --
Building. One story, 100'x150',	150,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt. \$160,000	
Other tools & equipmt. 18,000	
Furniture & fixtures 1,000	179,000
<u>Total (excl. Land)</u>	<u>\$329,000</u>

Principal Items. Phenol, sodium hydroxide, & sulfuric acid steel storage tanks; agitated evaporator for sodium phenate; agitated autoclave for carboxylation; vacuum system for autoclave; 2 CO<sub>2</sub> vaporizers; wood tank for sodium salicylate solution; wood plate & frame filter press; stainless steel precipitation tank; stainless steel centrifuge; stainless steel rotary drier; bagging & packing equipment; pumps and accessories.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 39,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,400
Training Costs		6,000
<u>Total Working Capital</u>		<u>\$ 48,600</u>

c. TOTAL CAPITAL (EXCL. LAND) \$377,600

### 2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
39° C Phenol	400 tons	\$ 88,000
76% Na <sub>2</sub> O Sodium Hydroxide	175 tons	17,100
Carbon Dioxide	250 tons	17,500
66° Be Sulfuric acid	225 tons	5,400
Fiber drums	2,500	10,000
<u>Total!</u>		<u>\$138,000</u>

### b. Supplies

Lubricants & hand tools	\$ 200
Maintenance & parts	5,000
Chemicals	1,300
Office supplies	500
<u>Total</u>	<u>\$ 7,000</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 50 hp.	\$ 4,000
b. <u>Fuel.</u> About 40,000 gals. oil. annually.	<u>4,800</u>
c. <u>Water.</u> About 2.4 mn. gals. annually for production & general purposes.	<u>\$ 600</u>

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary
- b. External Transport Facilities. Total in & out shipments about 170 tons a month. Good highway necessary.

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	3	\$ 19,500
Semi-skilled	3	16,500
Unskilled	6	18,000
<u>Total</u>	<u>12</u>	<u>\$ 54,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 11,000
Chemist	1	8,000
Office	2	8,000
<u>Total</u>	<u>4</u>	<u>\$ 27,000</u>

- d. Training Needs. Manager & chemist must be fully experienced. With aid of 3 skilled workers, they should be able to do all necessary labor training. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

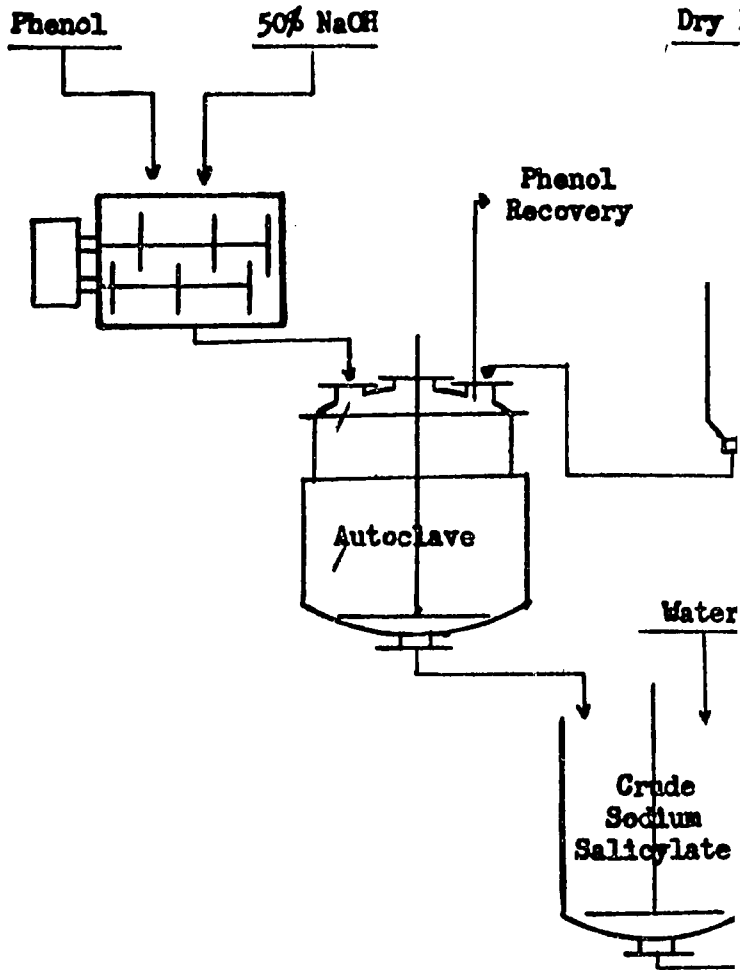
a. <u>Annual Costs</u>	
Direct Materials	\$138,000
Direct Labor	54,000
Manufacturing Overhead(a)	43,400
Admin. Costs (b), Contingencies	20,000
Sales Costs (c), Bad Debts	20,000
Depreciation on Fixed Capital	21,000
<u>Total</u>	<u>\$296,400</u>
b. <u>Annual Sales Revenue</u>	<u>\$400,000</u>

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

SALICYLIC ACID: S.I.C. 2818

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SALICYL

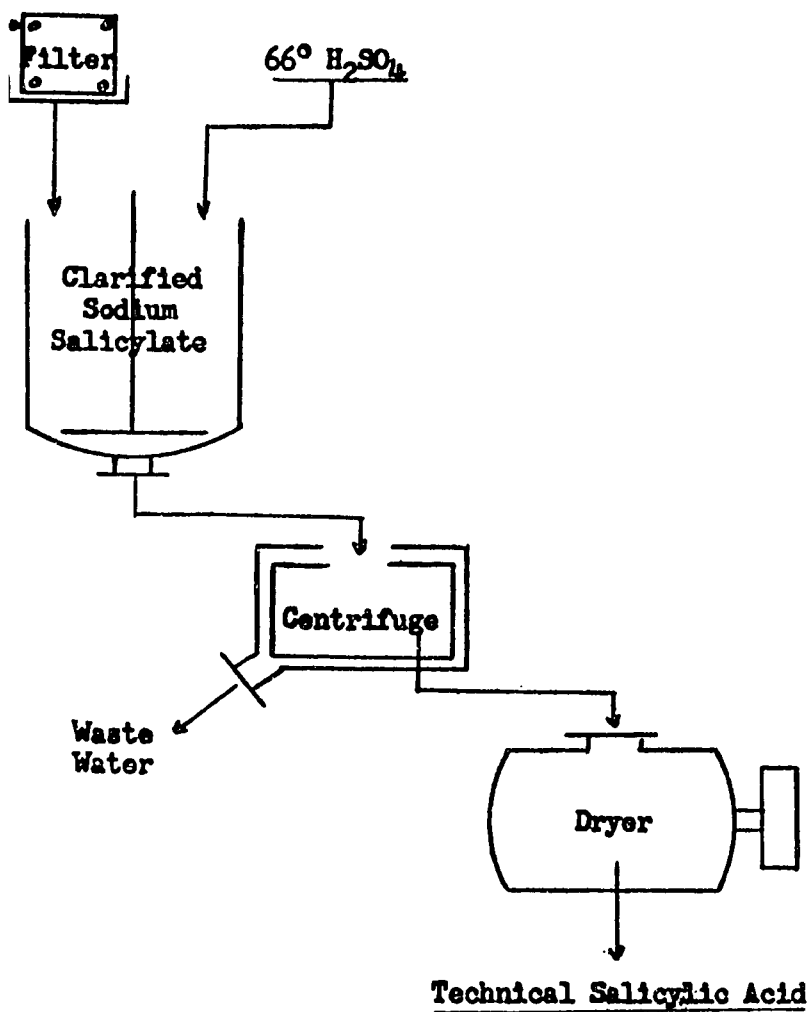


Building requirements in

One story 100' x 150' c

157

ID : S. I. C. 2818



page.

000 square feet.



## SALICYLIC ACID: S.I.C. 2818

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Organic Chemistry. L. J. Desha. 1952. 565 p. Illus. \$8.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Study of specific compounds and their identification, with illustrative material chosen primarily from among substances of industrial importance and general interest.
- B. Industrial Chemistry. 5th edition. E. R. Riegel. 1949. 1020 p.  
Illus. \$10.00.  
Reinhold Publishing Company  
430 Park Avenue  
New York, N. Y. 10022  
Covers 50 major chemical and process industries.
- C. The Chemical Process Industries. R. N. Shreve. 1956. 973 p. \$12.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
A presentation of processes used in various chemical and allied industries.

#### II. TECHNICAL PAPER

- A. Salicylic Acid. J. J. Banewicz and others. Journal of American Chemical Society. January 5, 1957. 79. p. 2693-5. \$1.75 plus postage.  
American Chemical Society  
1155 16th Street, N. W.,  
Washington, D. C. 20036  
Experimental investigation of the distribution of salicylic acid between cyclohexane and water. Includes bibliography.

#### III. U. S. GOVERNMENT PUBLICATION

- A. Salicylic Acid Plant. IR 15569 PR. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Factors to be considered in setting up and operating a plant to manufacture salicylic acid.

#### IV. PERIODICAL

- A. Chemical Processing. Monthly. \$35.00/year.  
Putman Publishing Company  
111 East Delaware Place  
Chicago, Ill. 60611  
Basic chemical and chemical processing industries and allied fields, intended primarily for management level.

## SELECTED REFERENCES (Continued)

### V. U.S. PATENTS

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

- A. Patent No. 2,970,163. 1961. 3 p.  
Salicylic acid compositions and method of reacting same.
- B. Patent No. 2,918,491. 1959. 2 p.  
Salicylic acid and esters of same.
- C. Patent No. 2,894,984. 1959. 3 p.  
Four trifluoromethyl salicylic acids and their preparation.
- D. Patent No. 2,811,547. 1957. 4 p.  
Process for preparing five chlorosalicylic acids.

### VI. TRADE ASSOCIATIONS

- A. Chemical Specialities Manufacturers Association  
50 East 41st Street  
New York, N. Y. 10017
- B. Chemical Market Research Association  
100 Church Street  
New York, N. Y. 10007

### VII. ENGINEERING COMPANY

- A. Denver Equipment Company  
1661 Market Street  
Denver, Colorado 80202  
Complete line of equipment for process industries.

### VIII. DIRECTORY

- A. Chemical Materials Catalog and Directory of Producers. \$15.00.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Includes a listing of manufacturers of chemicals and of raw materials.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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Clearinghouse for Federal Scientific and  
Technical Information, 410 12  
Springfield, Virginia 22151

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## GENERAL INFORMATION

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# INDUSTRY PROFILES

## SEA SALT

I. P. No. 66120

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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.

## SEA SALT: Standard Industrial Classification 2899

### A. PRODUCT DESCRIPTION

Salt produced by pumping salt water into prepared earth vats where the water is evaporated from the salt. The salt is then gathered, washed, dried and grained for bulk shipment.

### B. GENERAL EVALUATION

A saltern will naturally be established only in areas where there is a long period of dry weather. The site of the plant must be near both to an assured source of salt water and also to adequate transport facilities, by road, rail or water. With a standard bulk commodity such as salt, the essential factor in marketing is delivered price and the market area for a particular saltern will extend to points beyond which supplies may be more cheaply obtained from other sources. Determination of the market area involves a careful study of production costs and freight rates to different points, followed by an investigation of demand within the market area to ascertain whether it is sufficient to absorb the plant's production.

### C. MARKET ASPECTS

1. USERS. Chemical industries, food industries, producers of refined salt, etc.
2. SALES CHANNELS AND METHODS. Most sales are made direct to user industries.
3. GEOGRAPHICAL EXTENT OF MARKET. This will be determined almost entirely by the delivered price at which salt can be obtained from different sources. Such sources may be distant, since salt from major producing areas is sometimes shipped very long distances, often at very low freight rates.
4. COMPETITION. Assuming the standard of quality is maintained, the essential factor in competition is delivered price, though in abnormal circumstances speed of delivery may be a factor.
5. MARKET NEEDED FOR PLANT DESCRIBED. No simple yardstick can be used. The essential requirement is to have a sufficiency of user industries within a radius where delivery can be effected at low cost, and this can only be determined through investigation of particular situations.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 50,000 Tons

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. 200 acres, near source of salt.	\$ --
Building. Preparation of the site. One story, 50'x50'.	15,000
Equipment. Furniture & Fixtures.	15,000
Prod'n. tools & equipmt.	\$97,000
Other tools & equipmt.	3,500
Furniture & fixtures	700
Transportation equipmt.	4,800
<u>Total (excl. Land)</u>	<u>106,000</u>
	<u>\$136,000</u>

Principal Items. 300 hp. boiler, wash tank, driers, 2 grainers, 2 portable elevators, bins, conveyors, harvesters, hand tools, trucks, pipes, track pumps, scales.

#### b. WORKING CAPITAL

	No. of Days	
Direct Labor, Mfg. Overhead(a).	60	\$ 41,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	6,000
Training Costs		5,000
<u>Total Working Capital</u>		<u>\$ 52,000</u>

#### c. TOTAL CAPITAL (EXCL. LAND) \$188,000

### 2. MATERIALS AND SUPPLIES

#### a. Direct Materials

Salt water is the only direct material. This is pumped from lakes, oceans or wells.

#### b. Supplies

	Annual Cost
Lubricants & hand tools	\$ 200
Cutting tools & abrasives	100
Maintenance & spare parts	2,500
Office supplies	200
<u>Total</u>	<u>\$ 3,000</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 20 hp. connected load.	\$ 400
b. Fuel. 480,000 gallons oil.	\$ 57,000
c. Water. For general purposes.	\$ 100

### 4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. Two small trucks for plant use, with occasional transportation outside.	\$ 1,500
b. External Transport Facilities. Must have easy access to railroad, highway, or dock facilities.	

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	8	\$ 40,000
Semi-skilled	6	24,000
Unskilled	20	60,000
<u>Total</u>	<u>34</u>	<u>\$124,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 18,000
Office	1	5,000
Maintenance, 2 drivers	3	15,000
<u>Total</u>	<u>6</u>	<u>\$ 38,000</u>

c. Training Needs. The manager must be fully experienced. He & the skilled workers can train the other personnel in 30 days.

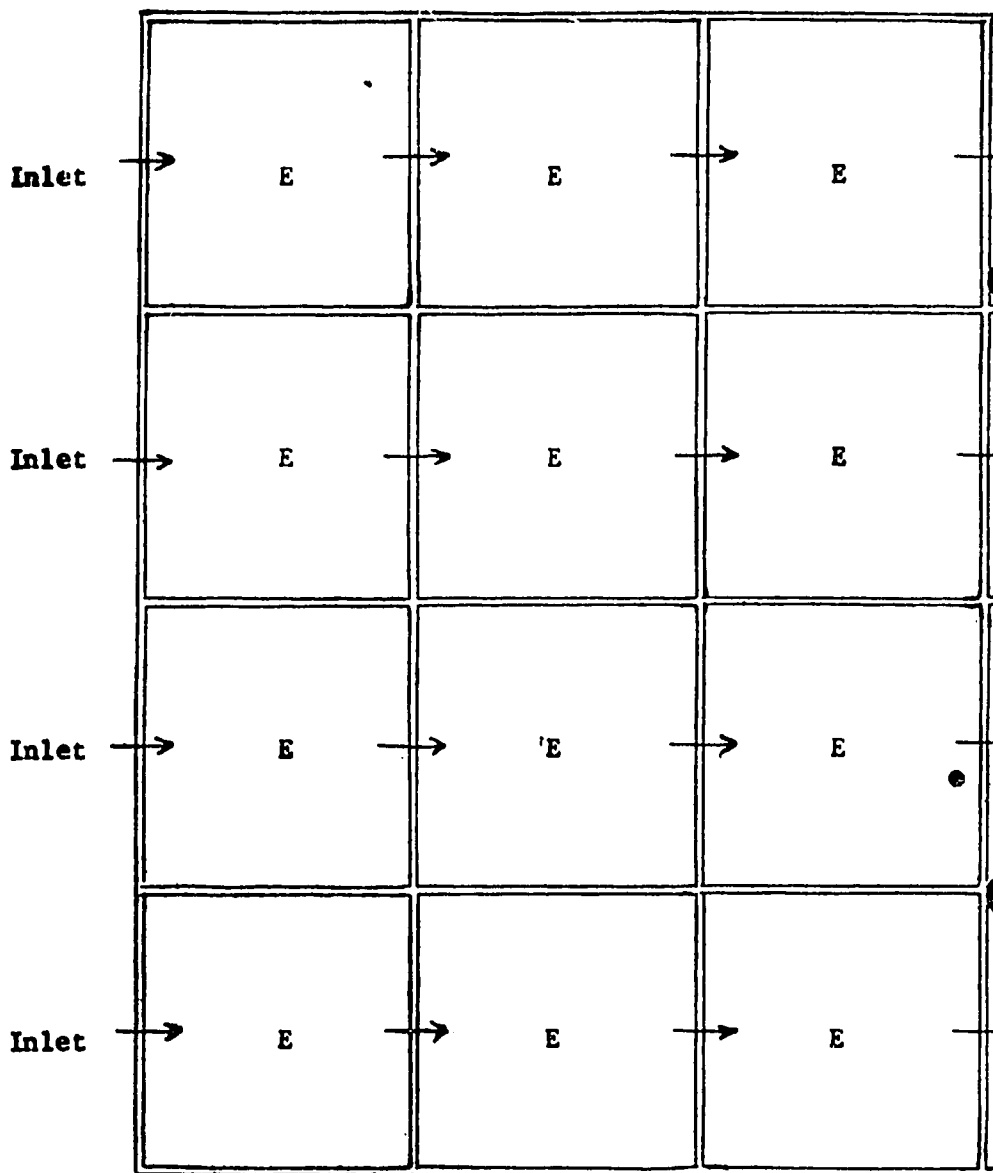
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Labor	\$124,000
Manufacturing Overhead(a)	100,000
Admin. Costs(b), Contingencies	18,000
Sales Costs(c), Bad Debts	54,000
Depreciation on Fixed Capital	13,200
<u>Total</u>	<u>\$309,200</u>
b. Annual Sales Revenue	<u>\$350,000</u>

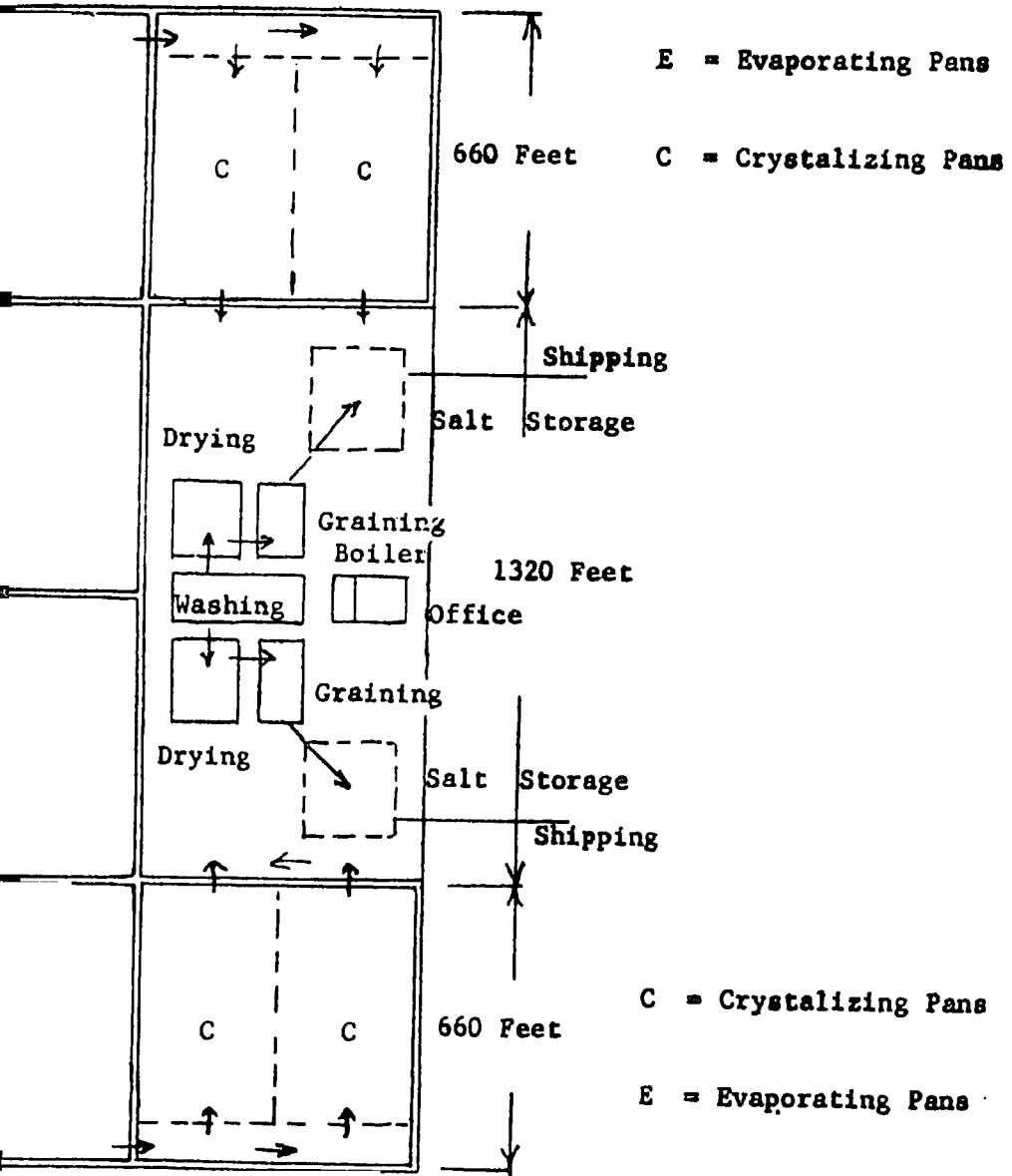
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions. Freight Out, Travel.

SEA SALT: S.I.C. 2899

12/4



3300 Feet



166



SEA SALT: S.I.C. 2899

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I. TEXTBOOKS

- A. Inorganic Process Industries. K. A. Kobe. 1948. 371 p. Illus. \$8.00.  
Macmillan Company  
60 Fifth Avenue  
New York, N. Y. 10011  
Theory of inorganic processes including natural sodium salts.
- B. Chemical Process Machinery. 2nd edition. E. R. Riegel. 1953. 743 p.  
\$13.50.  
Reinhold Publishing Company, Inc.  
430 Park Avenue  
New York, N. Y. 10022  
Discusses sites, material handling and propulsion of liquids, separation of  
solids from liquids.
- C. Materials Selection for Process Plants. R. E. Gackenbach. 1960.  
Reinhold Publishing Corporation  
430 Park Avenue  
The problems of materials selection as encountered by the engineering,  
maintenance, and production personnel of process plants.

II. U. S. GOVERNMENT PUBLICATION

- A. Salt. Minerals Yearbook Reprint. Catalog Number 128.37/a:Sa. 37/958.  
1958. \$.10  
Superintendent of Documents  
Government Printing Office  
Washington, D. C. 20402  
A general discussion of the subject of salt by the U. S. Bureau of Mines.

III. U. S. PATENTS

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

- A. Patent No. 2,954,282. 1960. 4 p.  
Method of crystalizing.
- B. Patent No. 2,606,838. 1952. 15 p.  
Non-caking sea-salt and method of producing same.

IV. TRADE ASSOCIATIONS

- A. Salt Producers Association and Salt Institute  
33 North LaSalle Street  
Chicago, Illinois 60602
- B. Salt Distributors Association of America  
1508 Fidelity Building  
Baltimore, Maryland 21201

SELECTED REFERENCES (Continued)

V. ENGINEERING COMPANIES

- A. Denver Equipment Company  
1661 Market Street  
Denver, Colorado 80202  
Complete equipment for process industries.
- B. Hardinge Company, Inc.  
240 Arch Street  
York, Pennsylvania 17403  
Washing and drying equipment.

IV. DIRECTORY

- A. Chemical Materials Catalog and Directory of Producers. Annual. \$15.00.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Listing of manufacturers of chemicals and raw materials.

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Address orders to: U.S. Department of Commerce  
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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

## SHEET GLASS

I. P. No. 66121

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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.

## SHEET GLASS: Standard Industrial Classification 3211

### A. PRODUCT DESCRIPTION

Two millimeter sheet glass, made by the Fourcault process, weight about 19 ounces a square foot.

### B. GENERAL EVALUATION

Production of sheet glass is economically feasible only on a large scale. The plant described is considered to be the smallest practicable modern sheet glass plant, but it nevertheless requires a capital investment which, from the viewpoint of most economically less developed areas, must be regarded as very substantial. The industry requires a heavy investment in fixed capital and buildings. Skilled labor requirements are also high. It is also necessary to have an ample and assured water supply. This plant will, therefore, be economically feasible only where economic activity has already reached a fairly high level and there is a large population within the area in which it is practicable to sell.

### C. MARKET ASPECTS

1. USERS. Building contractors, institutional and individual property owners.
2. SALES CHANNELS AND METHODS. Sales are usually made to building contractors, building supplies houses, large institutions, such as public works departments and military services, which do their own building maintenance.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Though glass is costly to transport the market economies of large scale operation in this industry result in production being concentrated in very few plants. In a country of moderate size and with a reasonably good transport network the potential market area may be nation-wide. b. Export. Sheet glass is manufactured in many countries and is a standardized product where quality differences are not important in deciding the choice of supplier. There is a moderate amount of export trade but freight charges are a very important element is cost of imports. Exports tend, therefore, to be limited to shipments to nearby countries.
4. COMPETITION. a. Domestic Market. If costs are reasonable, competition from imports would not be important. b. Export Market. Some regional exports might be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will vary with climate and types of building in common use, as well as with level of income. In the conditions of most less developed areas, this plant could meet the needs of at least 10 million people and possibly many more.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 10 Million Square Feet

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. about 5 acres.	\$ --
Building. 70'x485'. Fireproof.	
Cost includes mixing tower.	340,000
<u>Equipment, Furniture &amp; Fixtures.</u>	
Prodn. tools & equipmt.	\$759,000
Other tools & equipmt.	2,000
Furniture & fixtures	2,000
Transportation equipmt.	4,000
	<u>767,000</u>
Total (excl. Land)	<u>\$1,107,000</u>

Principal Items. Storage, track hopper, conveyor, weighing & mixing machines, batch charger, furnace, cooling system, stack, control instruments, debiteuse & floater kiln, fourcalt machine, cutting tables, boiler, standby power unit & utility services, delivery truck.

#### b. WORKING CAPITAL

	No. of Days	Cost
Direct Materials,	90	\$ 32,300
Direct Labor, Mfg. Overhead(a)	60	90,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	20,000
Training Costs		42,500
Total Working Capital		<u>\$185,000</u>

#### c. TOTAL CAPITAL (EXCL. LAND) \$1,292,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Sand	3,500 tons	\$ 28,000
Soda ash	1,190 tons	47,600
Limestone	980 tons	31,400
Feldspar	294 tons	11,800
Cullet	1,050 tons	10,500
Total		<u>\$129,300</u>

#### b. Supplies

Maintenance materials & parts	\$ 6,400
Lubricants	200
Hand tools	125
Cutting tools	250
Welding rods	125
Office supplies	300
Total	<u>\$ 7,400</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load about 1,000 hp. 425 kw. standby diesel power plant is included in equipment for keeping essential plant in operation in case of power failure.	<u>\$ 18,000</u>
b. <u>Fuel.</u> About 450,000 gals. Bunker B oil annually.	<u>\$ 18,000</u>
c. <u>Water.</u> About 550 gals. of water a minute. Much of this is drained into cooling ponds & re-used. About 16 mn. gals. annually needed for make-up water & for other purposes. Water supply is important in choosing plant site.	<u>\$ 4,000</u>

### 4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 5-ton truck for deliveries.	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> Total in & out shipments about 10,000 tons a month. Crated products are heavy & bulky, & require careful handling. Plant should be located on railroad siding & on good highway.	

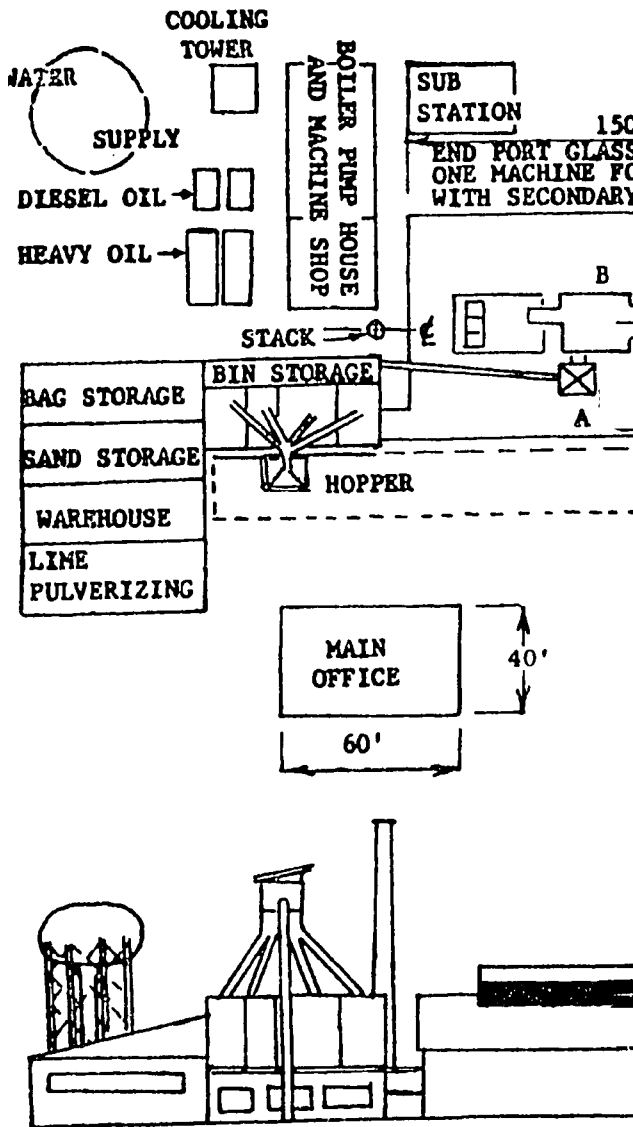
### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	30	\$180,000
Semi-skilled	30	150,000
Unskilled	24	96,000
Total	<u>84</u>	<u>\$426,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisors	4	\$ 39,000
Office staff	4	16,000
Other	3	12,000
Total	<u>11</u>	<u>\$ 67,000</u>

c. Training Needs. Manager, supervisors & chemist should be fully experienced in sheet glass industry. With assistance of 12 skilled workers, they should be able to carry out all necessary training of workers. Plant should reach full production in about 2 months.

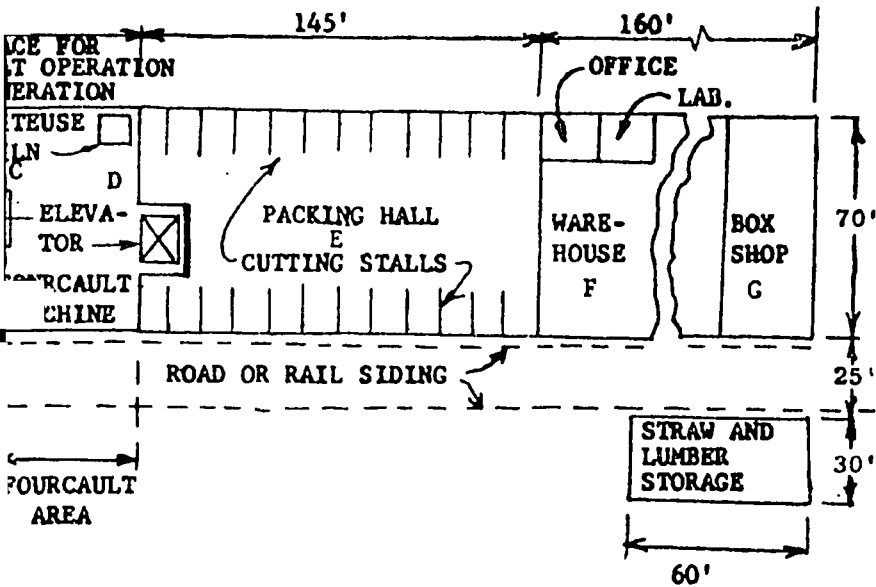
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$129,300
Direct Labor	426,000
Manufacturing Overhead(a)	115,400
Admin. Costs(b), Contingencies	148,000
Sales Costs(c), Bad Debts	116,000
Depreciation on Fixed Capital	94,500
Total	<u>\$1,029,200</u>
b. <u>Annual Sales Revenue</u>	<u>\$1,500,000</u>

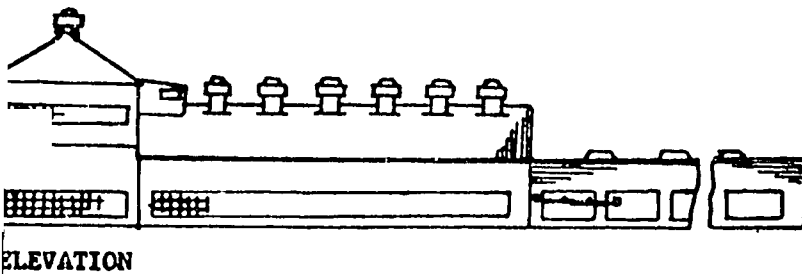


- A. Storage to hopper
- B. Hopper to furnace
- C. Furnace to fourcalt machine
- D. Fourcalt machine to elevator

GLASS: S.I.C. 3211  
 LAYOUT AND WORK FLOW



ONE MACHINE FOURCAULT SHEET GLASS PLANT



- E. Sheet glass goes to cutting stalls
- F. Cutting stalls to warehouse
- G. Box shop for making shipping boxes

1774



SHEET GLASS: S.I.C. 3211

SELECTED REFERENCES

I. TEXTBOOKS

- A. Glass Engineering Handbook. E. B. Shand. 2nd edition. 1959.  
Illus. \$12.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Describes the processes of glass manufacture; gives basic technical information on glass and its applications.
- B. 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  
A book of reference for the executive, technologist, or engineer.
- C. Glass : Its Industrial Applications. C. J. Phillips. 1960. \$6.95.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Equipment for glass making, glassworking machinery and principles, finishing, annealing, applications.

II. U. S. GOVERNMENT PUBLICATION

- A. Quality Control. TB-66. March 1960. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Manual for training of personnel in the subject of quality control in industry.

III. PERIODICALS

- A. Glass Industry. Monthly. \$5.00/year.  
Ogden Publishing Company  
55 West 42nd Street  
New York, N. Y. 10036  
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.

## SELECTED REFERENCES (Continued)

### IV. U.S. PATENTS

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

- A. Patent No. 2,957,275. 1960. 3 p.  
Method and apparatus for producing sheet glass.
- B. Patent No. 2,948,989. 1960. 5 p.  
Apparatus for producing sheet glass.

### V. TRADE ASSOCIATION

- A. Flat Glass Jobbers Association  
P. O. Box 677  
Topeka, Kansas 66601

### VI. ENGINEERING COMPANIES

- A. Frazier-Simplex, Inc.  
428 East Beau Street  
Washington, Pennsylvania 15301  
Builds complete glass factories.
- B. H. R. Dreshman and Sons, Inc.  
West 16th and Hays Streets  
Homestead, Pennsylvania 15120  
Manufacturers of glass making machinery.

### VII. DIRECTORY

- A. 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.

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# INDUSTRY PROFILES

## SMALL LEATHER TANNERY

I. P. No. 66122

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## **SMALL LEATHER TANNERY: Standard Industrial Classification 3111**

### **A. WORK DESCRIPTION**

Plant operated by manager and one skilled assistant, engaged in tanning hides furnished by customers. A rented building is suitable for such an enterprise.

### **B. GENERAL EVALUATION**

The capital required for this business is very small, consisting almost entirely of a modest investment in equipment. Operations are largely hand work. The work is skilled, and both manager and assistant must be well experienced. The plant is suited to conditions where hides are produced in small quantities mainly for local use.

### **C. MARKET ASPECTS**

Demand for services of a plant such as this will depend on how far the practice of using custom tanneries exists in a particular area. Where hides are produced on a large scale most hides are purchased by large tanneries, especially if there is a substantial export trade in leather. Often hides are exported to tanneries abroad. However, the small contract tannery may have a place in communities where hides are produced in limited quantities, principally for local use. Even in the United States, where the average-sized tannery employs about 80 people, the small tannery operated by two or three persons and catering to the needs of small communities, continues to hold its place in the industry.

## D. PRODUCTION REQUIREMENTS

ANNUAL PRODUCTION - ONE-SHIFT OPERATION: 95,000 Square Feet.

### 1. CAPITAL REQUIREMENTS

a. FIXED CAPITAL Cost  
Production Tools & Equipment. \$ 9,000  
 Principal Items. Half round 8" vat, tanning drum, hand tools.

### b. WORKING CAPITAL No. of Days

Direct Labor, Mfg. Overhead(a) 30 \$ 1,200

TOTAL CAPITAL \$ 10,200

### 2. RENT Annual Cost

One story building, 30'x80' \$ 1,000

### 3. SUPPLIES Annual Cost

Chemicals \$ 900  
 Hand tools 50  
 Office supplies 50  
Total \$ 1,000

### 4. POWER, FUEL AND WATER Annual Cost

a. Electric Power. Connected load 20 hp. \$ 200

b. Fuel. For heating, if necessary. \$ 100

c. Water. For production & general purposes. \$ 200

### 5. TRANSPORTATION

a. Own Transport Equipment. None needed.

b. External Transport Facilities. No special requirements.

### 6. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	1	\$ 5,000

b. <u>Indirect Labor</u>		
Working manager	1	\$ 7,000

c. Training Needs. Both manager and skilled operator should be experienced in leather tanning. No training period should be necessary.

### 7. TOTAL ANNUAL COSTS AND SALES REVENUE

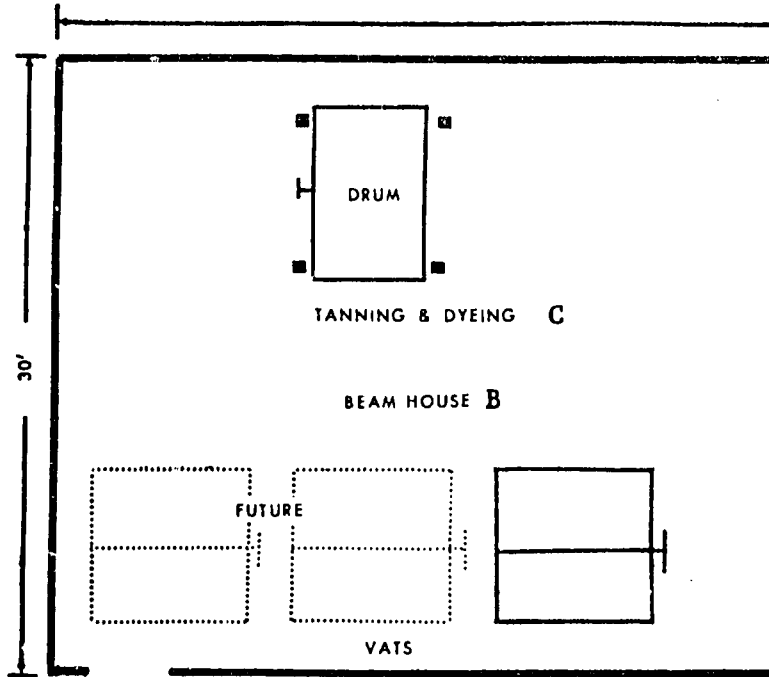
a. <u>Annual Costs</u>		
Rent		\$ 1,000
Direct Labor		5,000
Manufacturing Overhead(a)		8,500
Administrative & Sales Costs		300
Depreciation on Fixed Capital		900
<u>Total</u>		<u>\$ 15,700</u>

b. <u>Annual Sales Revenue</u>		<u>\$ 19,000</u>
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NOTE. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor.

SMALL LEATHER TANNERY: S.I.C. 3111

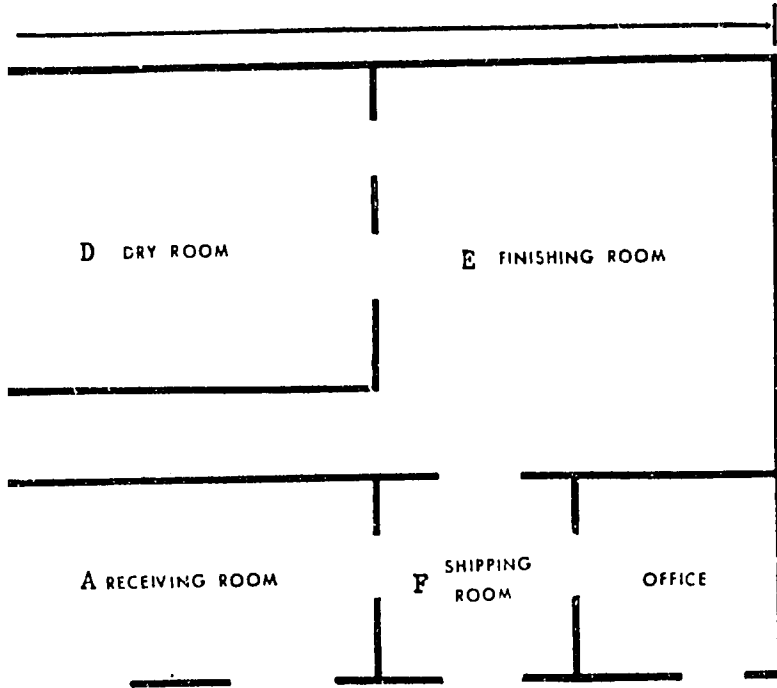
SMALL LEATHER  
PLANT LAYOUT



SUGGESTED SPACE REQUIREMENTS  
10 HIDES PER DAY 2400 SQUARE FEET  
WITH PROVISION TO INCREASE PRODUCTION  
TO 30 HIDES PER DAY

NERY : S. I. C. 3111

FLOW OF WORK



- A. Receive hides
- B. Trim, soak, flesh, lime, beet pickle
- C. Dye and fat liquor in drum, wring out
- D. Set out and dry
- E. Sammying, staking, tacking, buffing, ironing
- F. Measuring, storing and shipping



## SMALL LEATHER TANNERY: S.I.C. 3111

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Chemistry of Tanning Processes. K. H. Gustavson. 1956. 403 p. Illus. \$12.50.  
Academic Press, Inc.  
111 Fifth Avenue  
New York, N. Y. 10003  
Procedures and tests employed in the production of uniform quality leather.
- B. Tanning Processes. A. C. Orthwein. 1945. 414 p. Illus. \$12.50.  
Rumpf Publishing Company  
300 West Adams Street  
Chicago, Illinois 60606  
Comprehensive descriptions of tanning operations applicable to small plants.
- C. Chemistry and Technology of Leather. F. O'Flaherty and others. Vol. 1. 1956. 509 p. Illus. \$14.00.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Describes characteristics of hides and skins suitable for tanning and their processing.
- D. Case History of Statistical Quality Control in Chrome Tanning. F. L. Collins and G. M. Oliensis. American Leather Chemists Association Journal. February 1958. Vol. 53. p. 72-6. \$1.50.  
University of Cincinnati  
Cincinnati, Ohio 45221  
Method of operation to insure production of leather of uniform quality.

#### II. U. S. GOVERNMENT PUBLICATION

- A. Small Leather Tannery. OD-30. January 1958. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Materials, equipment, and manufacturing costs for a small leather tannery.

#### III. PERIODICALS

- A. The Leather Manufacturer. Monthly. \$1.00/year.  
Shoe Trades Publishing Company  
683 Atlantic Avenue  
Boston, Massachusetts 02111  
Process developments, sources of supply, and markets of interest to the leather manufacturer.
- B. Leather and Shoes. Weekly. \$5 00/year.  
Rumpf Publishing Company  
300 West Adams Street  
Chicago, Illinois 60606  
Current materials, processing, and marketing information for the leather and shoe industries.

## SELECTED REFERENCES (Continued)

### IV. U.S. PATENTS

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

- A. Patent No. 2,942,930. 1960. 4 p.  
Method of tanning leather.
- B. Patent No. 2,829,943. 1958. 3 p.  
Tanning agents and processes.
- C. Patent No. 2,826,477. 1958. 3 p.  
Process for tanning skins and hides.
- D. Patent No. 2,689,163. 1954. 6 p.  
Tanning agent and method of using same.

### V. TRADE ASSOCIATIONS

- A. Tanners Council of America  
411 Fifth Avenue, Suite 1002  
New York, N. Y. 10016
- B. National Industrial Leather Association  
P. O. Box 1485  
Pompano Beach, Florida 33061

### VI. ENGINEERING COMAPANIES

- A. Sterling Engineering Company  
46 West Peddic Street  
Newark, New Jersey 07112  
Consultants for manufacturers, with particular attention to the tanning industry.
- B. Industrial Process Engineering  
5 Linter Avenue  
Newark, New Jersey 07105  
Engineering consultants to tanners.

### VII. DIRECTORY

- A. Leather and Shoes Blue Book. Annual. \$3.00.  
Rumpf Publishing Company  
300 West Adams Street  
Chicago, Illinois 60606  
Information concerning tanners and tanneries, as well as supplies, materials, and equipment used in tanning.

SMALL LEATHER TANNERY: S.I.C. 3111

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# INDUSTRY PROFILES

## SUPERPHOSPHATE AND DIAMMONIUM

I. P. No. 66123

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## A. PRODUCT DESCRIPTION

The principal ingredients for triple phosphate fertilizer are phosphate rock, sulfur and ammonia. The diammonium is a by-product.

## B. GENERAL EVALUATION

Capital requirements for this plant are very large, and a substantial amount of skilled labor is needed. In a developing area a plant such as this will normally be established only if a large part of the raw materials is produced locally, and generally also only if there is a domestic market for at least the greater part of the production. For a project of this magnitude and type a full-scale feasibility study would be indispensable.

## C. MARKET ASPECTS

1. USERS. Farmers and horticulturalists.
2. SALES CHANNELS AND METHODS. Sales may be made direct to large users or to wholesale distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. These products are easy to transport and are often shipped long distances both internally and internationally.
4. COMPETITION. a. Domestic Market. Imports may present stiff competition, since international competition in the sale of all types of fertilizers is keen.  
b. Export Market. Some regional exports might be possible, but it would be very difficult to enter the general international market in competition with large-scale manufacturers with world-wide sales organizations.
5. MARKET NEEDED FOR PLANT DESCRIBED. This will depend on the type of agriculture, the nature of the soil, and the extent to which inorganic fertilizers are used. Where phosphatic fertilizers are in regular use it might be necessary to have some 2 million acres under cultivation to provide the required market.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - TWO-SHIFT OPERATION: 80,000 Tons Triple Phosphate; 70,000 Tons Diammonium

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land.	\$ --
Buildings.	900,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$4,100,000
Other tools & equipmt.	776,000
Furniture & fixtures	4,000
Transportation equipmt.	100,000
Total (excl. Land)	\$5,880,000

Principal Items. Sulfuric acid - 265 TPD  
 $H_2SO_4$ ; "Prayon" phos. acid 100 TPD  $P_2O_5$ ;  
 F.C. evaporator - 100 TPD  $P_2O_5$ ; run of  
 pile triple super - 130 TPD; diammonium  
 phos. and mixed goods - 110 TPD; shipping  
 mill - all products - 30 TPH; supporting  
 facilities - wells, laboratory, maintenance  
 shop.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$480,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	50,000
Training Costs		20,000
Total Working Capital		\$550,000

c. TOTAL CAPITAL (EXCL. LAND) \$6,430,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Sulfur	31,000 tons	\$730,000
Phosphate rock	120,000 tons	720,000
Ammonia	81,000 tons	729,000
Packaging		50,000
Total		\$2,229,000

#### b. Supplies

Lubricants & hand tools	\$ 1,000
Cutting tools & abrasives	2,000
Maintenance & spare parts	100,000
Office supplies	1,000
Total	\$104,000

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. About 1.2 mn. kw-hr.	\$ 24,000
b. Fuel. 375,000 gals. oil.	\$ 22,000
c. Water. 1,920 GPM make-up water.	\$ 4,000

### 4. TRANSPORTATION

Annual  
Operating Cost

- a. Own Transport Equipment.  
20 heavy duty trucks. \$ 20,000
- b. External Transport Facilities. In & out shipments average about 1,200 tons a day. Good highways & railroad facilities necessary.

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	36	\$180,000
Semi-skilled	30	120,000
Unskilled	20	60,000
Total	86	\$360,000
b. Indirect Labor		
Manager & supervisors	6	\$ 62,000
Office	5	25,000
Truck drivers	8	32,000
Total	19	\$119,000

- c. Training Needs. Manager & 5 supervisors should be fully experienced. With 30 skilled workers they should be able to train the other workers and reach full production in 30 days.

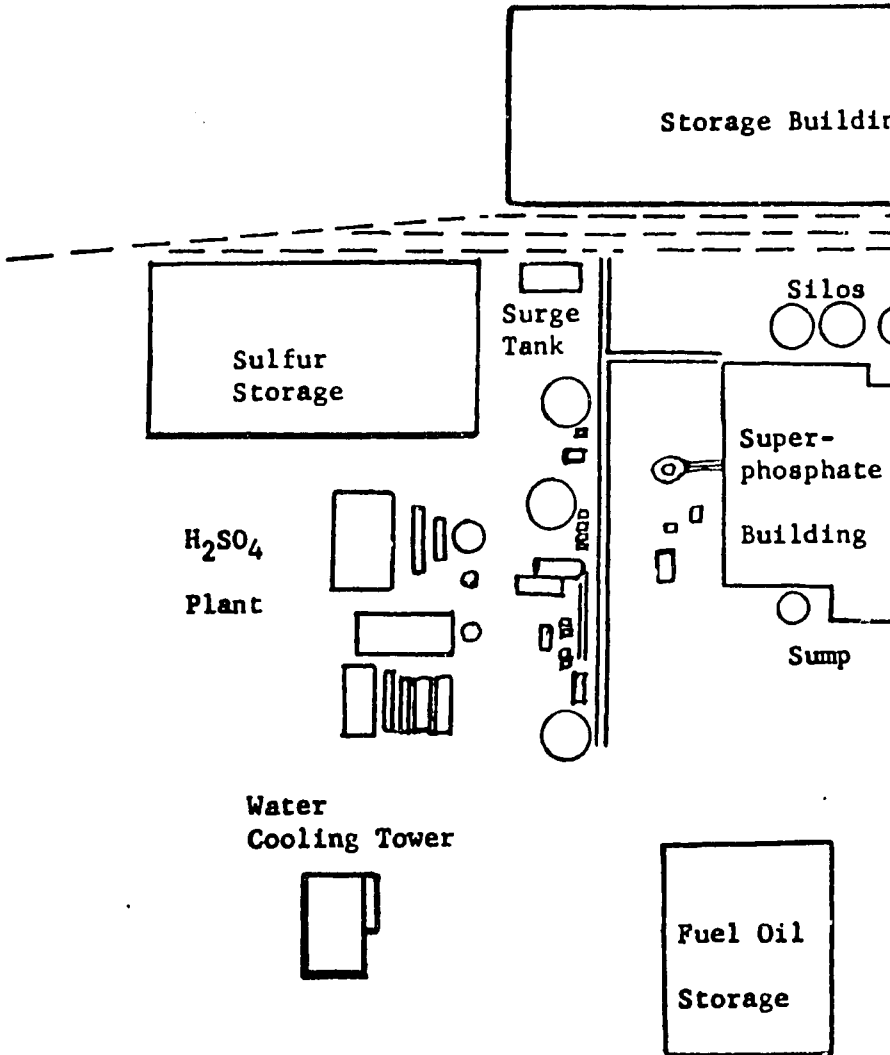
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$2,229,000
Direct Labor	360,000
Manufacturing Overhead (a)	293,000
Admin. Costs(b), Contingencies	360,000
Sales Costs(c), Bad Debts	270,000
Depreciation on Fixed Capital	635,000
Total	\$4,147,000
b. Annual Sales Revenue	\$5,400,000

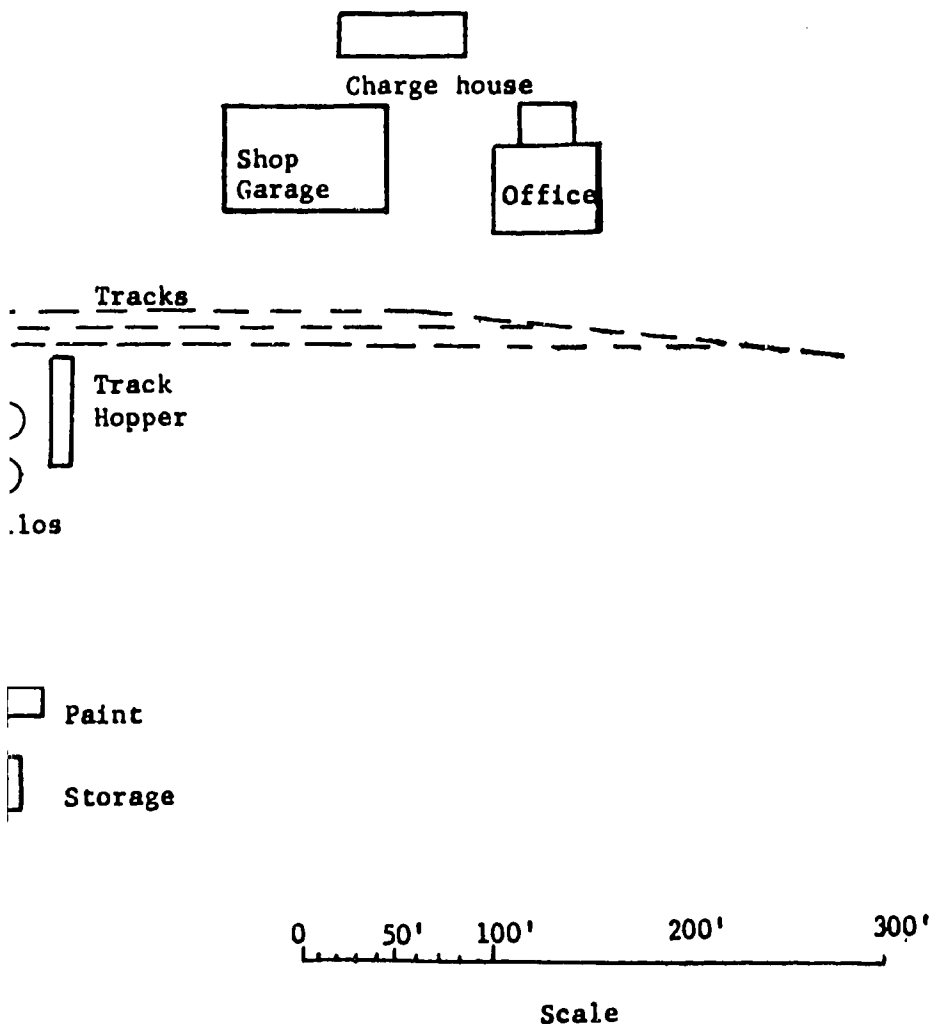
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

SUPERPHOSPHATE AND DIAMMONIUM: S.I.C. 2871

SUPERPHOSPHATE A



AMMONIUM: S. I. C. 2871





# SUPERPHOSPHATE AND DIAMMONIUM: S.I.C. 2871

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Phosphoric Acid, Phosphates and Phosphatic Fertilizers. W. H. Waggaman. 2nd Edition. 1952. 683 p. \$15.00.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Thorough treatise on the subjects of superphosphate and ammoniated superphosphate.
- B. Commercial Fertilizers. G. H. Collings. 5th Edition. 1955. 761 p. Illus. \$11.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Origin, development of use, and production of many fertilizers.

### II. U. S. GOVERNMENT PUBLICATION

- A. Effects of Phosphate Fertilization on Nutritive Value of Soybean Forage for Sheep and Rabbits. 1954. 95 p. Illus. Catalog No. A 1.36:1086. \$.35.  
Superintendent of Documents  
Government Printing Office  
Washington, D. C. 20402

### III. PERIODICALS

- A. Commercial Fertilizer. Monthly. \$3.00.  
Walter W. Brown Publishing Company, Inc.  
75 Third Street, N. W.  
Atlanta, Georgia 30308  
Gives information on fertilizer production and use.
- B. Farm Chemicals. Monthly. \$6.00.  
Ware Brothers Company  
317 North Broad Street  
Philadelphia, Pennsylvania 19107  
Presents comprehensive information on fertilizer manufacture and use.

### IV. U.S. PATENTS

- Available U. S. Patent Office  
Washington, D.C. 20231 \$\$.25 each.
- A. Patent No. 2,978,312. 1961. 3 p.  
Process for making various fertilizers and products thereof.
- B. Patent No. 2,976,118. 1961. 2 p.  
Method of preparing superphosphatic fertilizers.
- C. Patent No. 2,970,888. 1961. 7 p.  
Di-ammonium phosphatic fertilizer production.
- D. Patent No. 2,963,359. 1960. 10 p.  
Process of manufacturing di-ammonium fertilizers.
- E. Patent No. 2,946,655. 1960. 5 p.  
production of di-ammonium phosphate.

SELECTED REFERENCES (Continued)

V. TRADE ASSOCIATION

- A. National Plant Food Institute  
1700 K Street, N. W.  
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. Edw. Renneburg and Sons Company  
2637 Boston Avenue  
Baltimore, Maryland 21224  
Installers of complete fertilizer plants.
- B. Link-Belt Company, TR Division  
Prudential Plaza  
Chicago, Illinois 60601  
Equipment manufacturers for fertilizer plants.

VII. DIRECTORY

- A. Commercial Fertilizer Yearbook. Annual. \$10.00.  
Walter W. Brown Publishing Company, Inc.  
75 Third Street, N. W.  
Atlanta, Georgia 30308  
A list of manufacturing plants with types of fertilizers produced as well  
as a list of raw material 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.

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

# INDUSTRY PROFILES

## TANNING EXTRACTS

I. P. No. 66124

*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.

1974

## TANNING EXTRACTS: Standard Industrial Classification 2861

### A. PRODUCT DESCRIPTION

Tanning extracts made from dry bark.

### B. GENERAL EVALUATION

The amount of capital required for this industry is fairly substantial. Managerial and technical supervisory skill needed is of a high order and a fair amount of skilled labor is also necessary. This plant will be economically feasible only where the bark needed as raw material is readily and cheaply available from local supplies. In many cases an outlet for the plant's production will exist only if an export business can be developed.

### C. MARKET ASPECTS

1. USERS. Leather tanning industry.
2. SALES CHANNELS AND METHODS. Sales normally direct to tanneries and to export houses for overseas shipment.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The product is fairly easily transported and its value is moderately high in relation to transport costs. In a country of moderate size the potential market area may be nationwide. b. Export. The product is common in international trade.
4. COMPETITION. a. Domestic Market. Competition from imports is unlikely to be significant. b. Export Market. Assuming that bark is available from local sources and manufacturing costs are reasonable, this plant should be able to find export markets.
5. MARKET NEEDED FOR PLANT DESCRIBED. In many less developed areas the local tanning industry may not be large enough to provide a market for this plant. However, if local bark is available at low cost and processing costs are reasonable it should be possible to export any surplus above domestic needs.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 4,000 Tons

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 1 acre.	\$ ---
Building. One story, buildings--- unloading shed, drier shed, 3 storage sheds, leach house, boiler & powerhouse, office & laboratory. Total area 18,000 sq. ft.	\$108,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$200,000	
Other tools & equipmt. 5,000	
Furniture & fixtures 1,000	206,000
Total (excl. Land)	\$314,000

Principal Items. Bark drier, 3 conveyors,  
2 grinding units, 12 leach house tanks,  
leach house auxiliary equipment, evapor-  
ators, drum drier, laboratory equipment,  
2 350-hp. water tube boilers, power  
generator.

#### b. WORKING CAPITAL

	No. of Days	Annual Cost
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 54,700
Admin. Costs(b), Contin- gencies, Sales Costs(c)	30	3,000
Training Costs		13,300
Total Working Capital		\$ 71,000

#### c. TOTAL CAPITAL (EXCL. LAND) \$385,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Dry bark	20,000 tons	\$135,000
Bags		15,000
Total		\$150,000

#### Supplies

Lubricants & hand tools	\$ 100
Chemicals	4,000
Maintenance & repair parts	1,000
Office supplies	300
Total	\$ 5,400

### 3. POWER, FUEL AND WATER

Annual Cost

#### a. Electric Power. Produced in plant.

#### b. Fuel. Bark refuse may be used.

#### c. Water. Ample water supply essential. About 30 million gals. needed annually.

\$ 7,500

### 4. TRANSPORTATION

#### a. Own Transport Equipment. None necessary.

#### b. External Transport Facilities. Total in & out shipments about 2,200 tons a month. Good highway & easy access to railroad necessary.

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	7	\$ 35,000
Semi-skilled	7	28,000
Unskilled	20	60,000
Total	34	\$123,000
b. Indirect Labor		
Manager & supervisors	3	\$ 22,000
Office	2	8,000
Other	3	12,000
Total	8	\$ 42,000

#### c. Training Needs. Manager, 2 supervisors & 2 chemists should be fully experienced. With 2 skilled workers, they should be able to do all labor training. Plant should reach full production in 2 months.

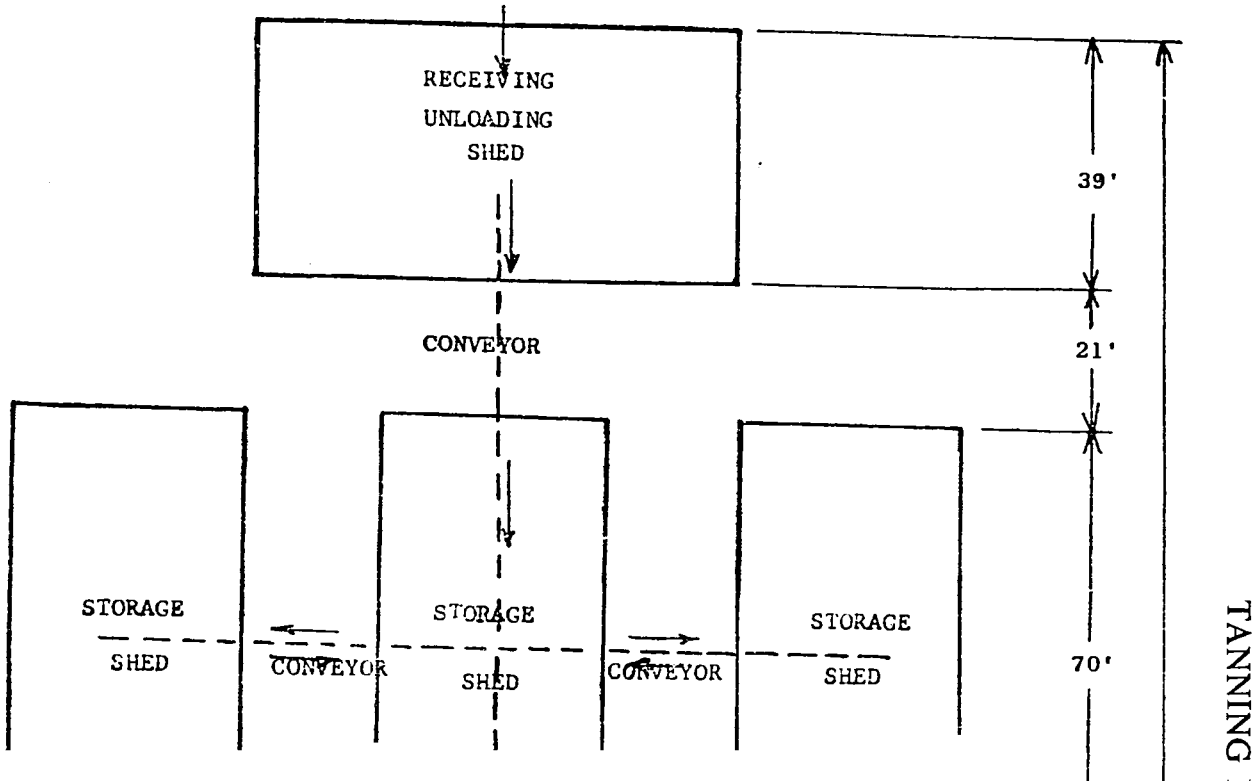
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$150,000
Direct Labor	123,000
Manufacturing Overhead(a)	54,900
Admin. Costs(b), Contingencies	16,000
Sales Costs(c), Bad Debts	24,000
Depreciation on Fixed Capital	26,500
Total	\$394,400
b. Annual Sales Revenue	\$450,000

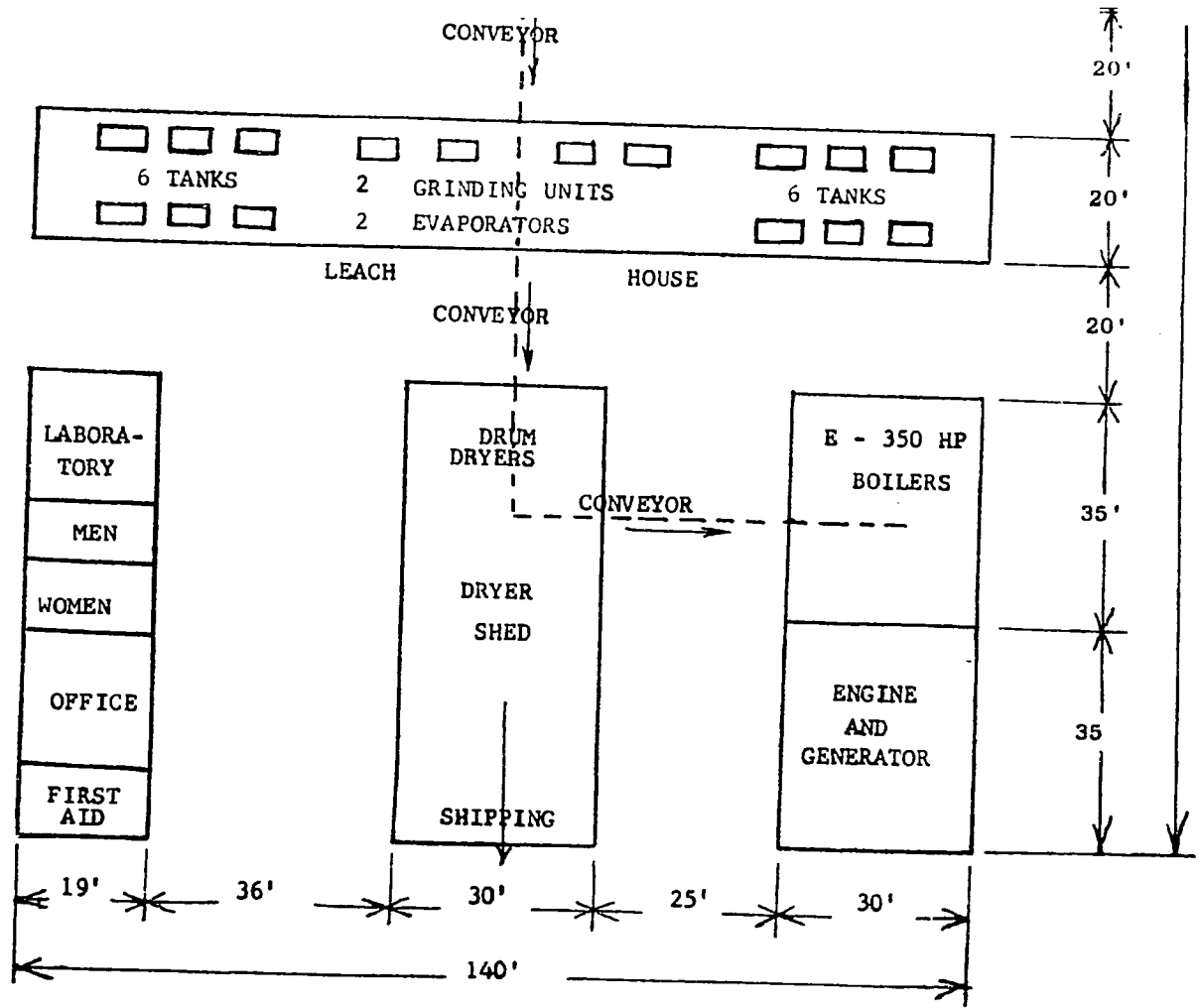
NOTES. (a) Includes Supplies, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

TANNING EXTRACTS: S.I.C. 2861

PLANT LAYOUT  
ARROWS INDICATE WORK FLOW



19.1





# TANNING EXTRACTS: S.I.C. 2861

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Tanning Materials With Notes on Tanning Extract Manufacture. A. Harvey. 1921. 147 p. Illus. \$8.00.  
Tudor Publishing Company, Inc.  
221 Park Avenue South  
New York, N. Y. 10003  
Deals with tanning materials and manufacture of tanning extracts.
- B. Unit Operations of Chemical Engineering. W. L. McCabe and J. C. Smith. 1956. 956 p. Illus. \$13.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Covers many of the operations used in a tanning extract plant including grinding, fluid mechanics, flow of heat, evaporation, distillation, leaching, extraction, and drying.

### II. PERIODICAL

- A. Industrial Engineering Chemistry. Monthly. \$5.00/year.  
American Chemical Society  
1155 16th Street, N. W.  
Washington, D. C. 20036  
The above periodical publishes technical information on the subject of tanning extracts from time to time.

### III. U. S. PATENTS

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

- A. Patent No. 2,795,478. 1957. 3 p.  
Tanning agent and process.
- B. Patent No. 2,789,974. 1957. 3 p.  
Relates to producing tanning agents obtained in the alkaline method of digesting wood.
- C. Patent No. 2,653,967. 1953. 3 p.  
Tanning materials and processes for preparing same.
- D. Patent No. 2,640,052. 1953. 6 p.  
Tanning composition derived from the alkaline digestion of wood.
- E. Patent No. 2,505,818. 1950. 2 p.  
Tanning extracts from bark of trees.

## SELECTED REFERENCES (Continued)

### V. TRADE ASSOCIATIONS

- A. American Leather Chemists Association  
University of Cincinnati  
Cincinnati, Ohio 45231
- B. Tanners Council of America  
411 Fifth Avenue  
New York, N. Y. 10016

### IV. ENGINEERING COMPANIES

- A. Goslin-Birmingham Manufacturing Company, Inc.  
3523 10th Avenue  
Birmingham, Alabama 35201  
Chemical plant processing machinery.
- B. Brill Equipment Company  
35 Izbez Street  
Newark, New Jersey 07105  
Single items or complete chemical plants.

### VI. DIRECTORY

- A. Chemical Materials Catalog and Directory of Producers. Annual. \$15.00.  
Reinhold Publishing Corporation  
430 Park Avenue  
New York, N. Y. 10022  
Lists manufacturers of chemicals and raw materials.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## WALLBOARD FROM BAGASSE

I. P. No. 66125

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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.

## WALLBOARD FROM BAGASSE: Standard Industrial Classification 2661

### A. PRODUCT DESCRIPTION

Wallboard sheets, standard size 8 feet by 4 feet by 1/2 inch thick, made from sugar cane residue.

### B. GENERAL EVALUATION

The first requirement for this plant is a nearby source of bagasse, and normally the plant will be located near a cane sugar mill, which in its turn will probably be located close to sugar cane fields. The production equipment is costly, even for a relatively small plant such as the one described, and the total capital investment needed is substantial. The industry also requires skilled management and a considerable number of skilled workers. The product, however, is highly useful and comparatively cheap, and there is a generally expanding market for it. Where manufacturing conditions are favorable, this industry has much to recommend it.

### C. MARKET ASPECTS

1. USERS. Building contractors; some industries, e.g. manufacture of vehicles, radios and television sets, suitcases, etc.; householders.
2. SALES CHANNELS AND METHODS. Sales are made to building contractors, user industries, and building supplies houses for sales to small users. Since this product is still not a very familiar one in some areas, and new uses for it can be found, active sales promotion is called for.
3. GEOGRAPHICAL EXTENT OF MARKET. This product is easily handled, and though fairly heavy and bulky, it is nevertheless often transported considerable distances. It is also found quite commonly in foreign trade, and is shipped world-wide.
4. COMPETITION. Wallboard is made from a variety of materials (e.g. rice straw, sawmill waste products), and competition may arise from wallboard made of materials other than bagasse. In competition with other materials for use in construction, particularly wood, relative cost will be the most important factor. Generally, wallboard should be strongly competitive in price. If manufacturing conditions are reasonably favorable, the domestic product should be able to compete effectively with imports. It should also in some cases be possible to sell to nearby areas in neighboring countries, though the plant's capacity is not large enough to permit export trade on an extensive scale.
5. MARKET NEEDED FOR PLANT DESCRIBED. The market for this product will depend largely on the extent to which its use has been adopted in low-cost housing and other building. Where substantial use is made of the product for these purposes, a total population of about 5 million people, with an average growth rate, should support the output of this plant.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 23 Million Board Feet

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land, About 2 acres.	\$ ---
Building, One story, 60'x300', with basement for pulping equipment.	108,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$761,000
Other tools & equipmt.	2,000
Furniture & fixtures	1,000
Transportation equipmt.	4,000
<u>Total (excl. Land)</u>	<u>\$876,000</u>

Principal Items. Hammermill & screen, pulper, 3 centrifugal pumps, screw press, digester pulp refiner, pulp screen, pulp washer, thickener, consistency regulator, storage tank, cylinder board machine, agitator, presses, wet saw, trimming saw, boiler, 5-ton truck.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 84,000
Admin. Costs(b), Contingencies, Sales Cost(c)	30	19,000
Training Costs		15,000
<u>Total Working Capital</u>		<u>\$118,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$994,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Bagasse	7,000 tons	\$112,000
Chemicals & adhesives		175,000
<u>Total</u>		<u>\$287,000</u>

#### b. Supplies

Maintenance materials	\$ 5,800
Spare parts	1,200
Welding rods & gas	400
Lubricants & hand tools	400
Office supplies	200
<u>Total</u>	<u>\$ 8,000</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load about 500 hp.	<u>\$ 15,000</u>
b. <u>Fuel.</u> About 170,000 gals. oil annually	<u>\$ 18,000</u>
c. <u>Water.</u> About 1,600 gals. a minute. Water is returned & re-used. Annual cost of make-up & other water needs	<u>\$ 4,000</u>

### 4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 5-ton truck for deliveries.	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> Total in & out shipments about 1,500 tons a month, Plant should be located on good highway and, if possible, on railroad siding.	

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	15	\$ 75,000
Unskilled	12	36,000
<u>Total</u>	<u>27</u>	<u>\$111,000</u>

#### b. Indirect Labor

Manager & supervisors	4	\$ 30,000
Office	1	5,000
Other	6	24,000
<u>Total</u>	<u>11</u>	<u>\$ 59,000</u>

c. Training Needs. Manager & supervisors should be fully experienced. With assistance of 6 skilled workers, they should be able to do all necessary labor training. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES

#### REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$287,000
Direct Labor	111,000
Manufacturing Overhead(a)	105,000
Admin. Costs(b), Contingencies	100,000
Sales Costs(c), Bad Debts	140,000
Depreciation on Fixed Capital	83,000
<u>Total</u>	<u>\$826,000</u>
b. <u>Annual Sales Revenue</u>	<u>\$1,115,000</u>

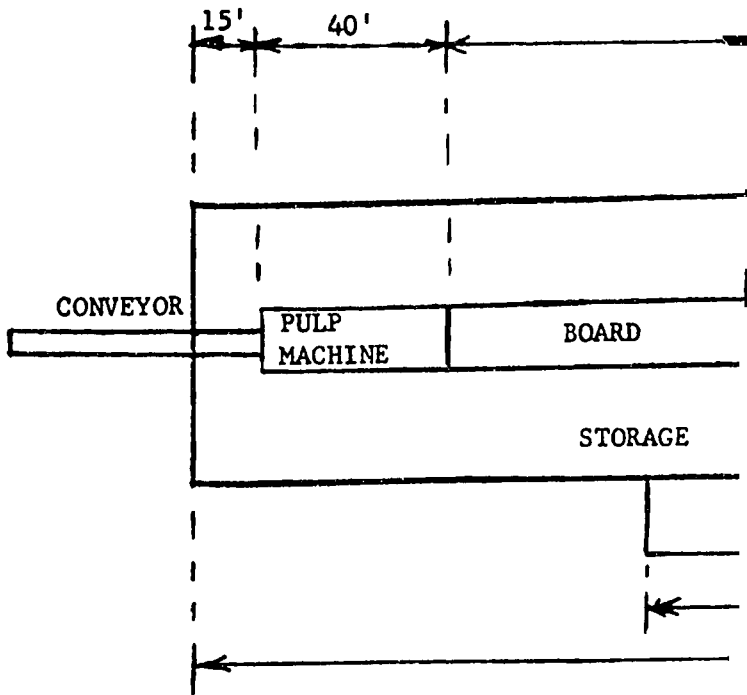
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

WALLBOARD FROM BAGASSE: S.I.C. 2661

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# WALLBOARD FR

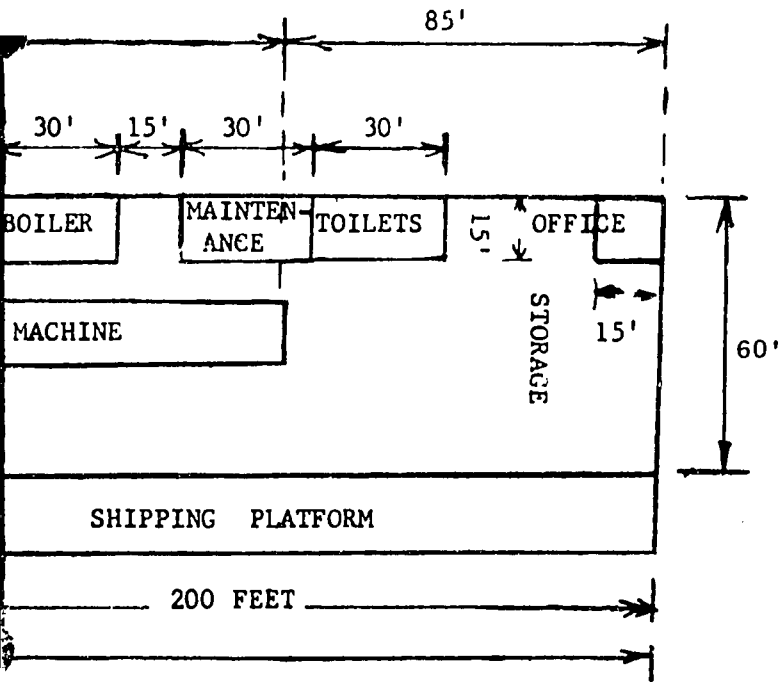
## P L A N



Flow  
from  
to the

GASSE : S. I. C. 2661

LAYOUT



continuous  
conveyor  
duct.

206



# WALLBOARD FROM BAGASSE: S. I. C. 2661

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Paper and Paperboard. American Society for Testing Materials. 1951. 140 p. \$2.50.  
American Society for Testing Materials  
1916 Race Street  
Philadelphia, Pennsylvania 19103  
Discussion of various types of paper and paperboard.
- B. Pulp and Paper Manufacture Series. J. N. Stephenson, editor. 1950-55. 4 volumes. \$34.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Covers the pulping of various fibers and the manufacture of paper and board products.

### II. U. S. GOVERNMENT PUBLICATIONS

- A. Wallboard Manufacture from Bagasse. IR-19567.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- B. Paper, Paperboard, and Pulp Production. IR-25942. May 1960. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Information on paper, paperboard, and pulp.

### III. PERIODICALS

- A. Fiber Containers and Paperboard Mills. Monthly. \$9.00/year.  
Board Products Publishing Company  
228 North LaSalle Street  
Chicago, Illinois 60601
- B. Official Board Markets. Weekly. \$38.00/year.  
Board Products Publishing Company  
228 North LaSalle Street  
Chicago, Illinois 60601

### IV. U. S. PATENTS

- Available U. S. Patent Office  
Washington, D. C. 20231 \$.25 each.
- A. Patent No. 2,825,674. 1958. 5 p.  
Pressed composition boards.
- B. Patent No. 2,710,276. 1955. 5 p.  
Hardboard.
- C. Patent No. 2,551,796. 1951. 4 p.  
Fiber board.

SELECTED REFERENCES (Continued)

V. TRADE ASSOCIATIONS

- A. Technical Association of the Pulp and Paper Industry  
360 Lexington Avenue  
New York, N. Y. 10017
- B. American Pulp and Paper Association  
112 East 42nd Street  
New York, N. Y. 10017

VI. ENGINEERING COMPANIES

- A. A. H. Johnson and Company, Inc.  
415 Lexington Avenue  
New York, N. Y. 10017  
Consulting and designing engineers for the pulp and paper industry.
- B. Apmew, Inc.  
P. O. Box 1  
Glens Falls, N. Y. 12800  
Complete line of pulping machinery.

VII. DIRECTORY

- A. World Market Pulp Directory. Annual. \$2.00.  
Pulp and Paper  
1791 Howard Street  
Chicago, Illinois 60626  
Lists producers of pulp for paper products.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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## 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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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

## ABRASIVE WHEELS

I. P. No. 66126

*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.

## ABRASIVE WHEELS: Standard Industrial Classification 3291

### A. PRODUCT DESCRIPTION

General purpose grinding wheels, sizes 2" diameter by 1/4" thick to 8" diameter by 1" thick, using aluminum oxide as abrasive and resinoid type of bond.

### B. GENERAL EVALUATION

This plant requires a moderate investment. Managerial and technical skills needed are of a fairly high order. Grinding wheels are almost all sold to industrial users, and a considerable amount of prior industrial development is necessary if establishment of this plant is to be economically feasible. In general, this industry will be appropriate only where considerable progress in industrialization has already been made.

### C. MARKET ASPECTS

1. USERS. Large variety of industries. Some industries use them only for sharpening tools. Foundries and forges use them for grinding castings and forgings. Industries using steel and other metals use abrasive wheels for grinding. Other users are machine shops, automobile repair shops and garages, and quarries. A few abrasive wheels are sold to individuals for use in home workshops.
2. SALES CHANNELS AND METHODS. Sales are usually made direct to user industries. A few are sold to retailers for resale to small users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are easily handled and transport costs are not normally very important in limiting the market area, which will often be nation-wide. b. Export. Market is world-wide.
4. COMPETITION. a. Domestic Market. Competition from imports may be strong. b. Export Market. A plant of size described, could not normally compete successfully in general export trade with large-scale producers.
5. MARKET REQUIRED FOR PLANT DESCRIBED. Users of abrasive wheels are very varied and size of market required for this plant cannot be expressed in simple terms. The types of industries using abrasive wheels in significant quantities are indicated in paragraph 1 above. It is necessary to have a market area containing a well-developed industrial complex in which such industries play an important part.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 106,000 Pounds

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		
Land. About 10,000 sq. ft.	\$	---
Building. One story, 2,000 sq. ft. area.		18,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$58,000	
Other tools & equipmt.	2,000	
Furniture & fixtures.	1,000	
<u>Total (excl. Land)</u>		<u>\$ 79,000</u>
Principal Items. Scales (2), air conditioner unit, mixer, molds, pallets, facing lathe, cabinet oven.		

### b. WORKING CAPITAL

	No. of Days	
Direct Materials	90	\$ 4,300
Direct Labor, Mfg. Overhead(a)	60	12,700
Admin. Costs(b), Contingencies, Sales Costs (c)	30	2,000
Training Costs		11,000
<u>Total Working Capital</u>		<u>\$ 30,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$109,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Aluminum oxide 30 grit	38,675 lbs.	\$ 5,000
Aluminum oxide 36 grit	38,675 lbs.	5,000
Aluminum oxide 46 grit	19,335 lbs.	2,500
Liquid resin	2,340 lbs.	1,000
Dry resin	7,225 lbs.	2,800
Packing materials		1,000
<u>Total</u>		<u>\$ 17,300</u>

### b. Supplies

Lubricants	\$	100
Maintenance & repairs		500
Hand tools		200
Office		200
<u>Total</u>		<u>\$ 1,000</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power</u> , About 192 kw-hr a day.	<u>\$ 1,200</u>
b. <u>Fuel</u> . For production & general purposes.	<u>\$ 1,000</u>
c. <u>Water</u> . Heating, sanitation & fire protection.	<u>\$ 300</u>

### 4. TRANSPORTATION

- a. Own Transport Equipment. None required.
- b. External Transport Facilities. In & out shipments about 2 tons a day. No special requirements.

### 5. MANPOWER

a. Direct Labor	Number	Annual Cost
Skilled	7	\$ 42,000
Semi-skilled	1	5,000
<u>Total</u>	<u>8</u>	<u>\$ 47,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 9,000
Office	2	9,000
Other	2	8,000
<u>Total</u>	<u>5</u>	<u>\$ 26,000</u>

- c. Training Needs. Mixing of materials for abrasive wheels must be accurate. Manager should be fully experienced & should be able, with aid of skilled workers, to do all necessary labor training. Plant should reach full production in 3 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 17,300
Direct Labor	47,000
Manufacturing Overhead(a)	29,500
Admin. Costs(b), Contingencies	11,500
Sales Costs(c), Bad Debts	14,000
Depreciation on Fixed Capital	6,700
<u>Total</u>	<u>\$126,000</u>
b. <u>Annual Sales Revenue</u>	
	<u>\$160,000</u>

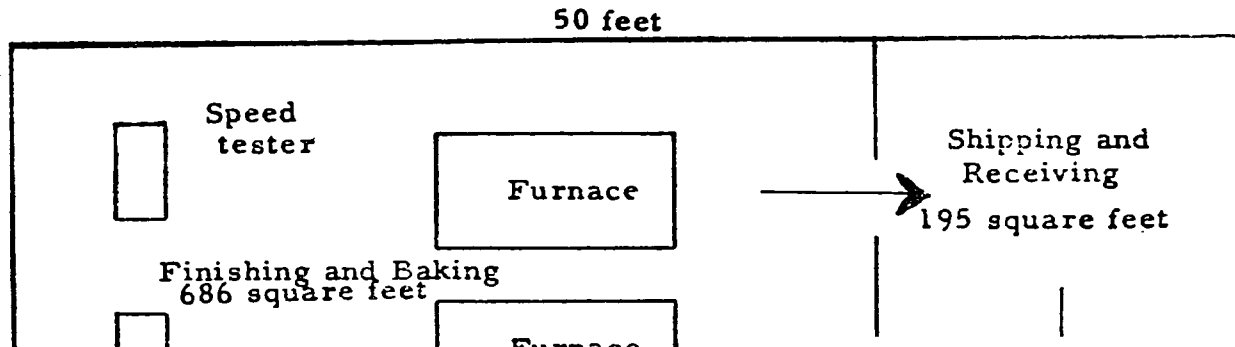
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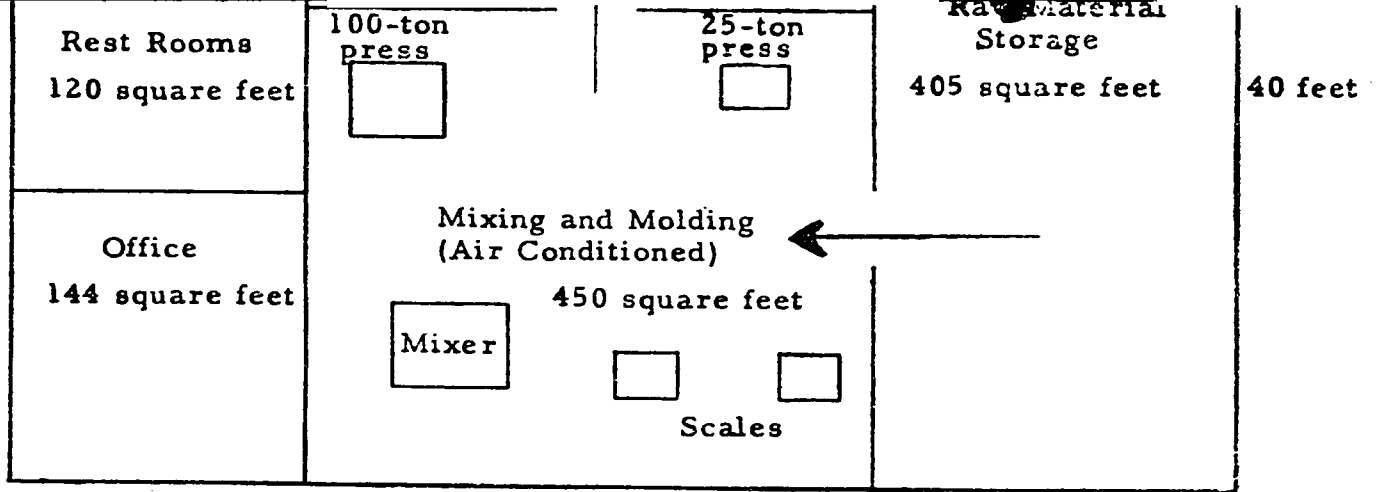
ABRASIVE WHEELS: S.I.C. 3291

2/2

# PLANT LAYOUT

ARROWS INDICATE FLOW OF WORK





SELS : S I. C. 3291

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# ABRASIVE WHEELS: S. I. C. 3291

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Quality Control for Management. Paul Peach. 1964. \$15.00.  
Prentice-Hall, Inc.  
Englewood Cliffs, New Jersey 07632
- B. Quality Control. Bertrand Hansen. 1963. \$16.65.  
Prentice-Hall, Inc.  
Englewood Cliffs, New Jersey 07632
- C. Total Quality Control. A. V. Feigenbaum. 1961. 443 p. Illus. \$12.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
The principles of quality control methods. Applying quality control methods in the plant.
- D. Shop Tools : Care and Repair. Dewitt Hunt. 1958. 252 p. \$5.20.  
D. Van Nostrand Company, Inc.  
120 Alexander Street  
Princeton, New Jersey 08540  
Use and maintenance of abrasive equipment.

### II. U. S. GOVERNMENT PUBLICATIONS

- A. Chapter on Abrasive Materials. Mineral Year Book.  
Bureau of Mines  
Department of Interior  
Washington, D. C. 20240
- B. Abrasives Used on Wood Finishing Operations. DK-126.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- C. Grinding and Polishing with Abrasive Belts. DK-128.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- D. Care and Maintenance of Diamond Abrasive Wheels. DK-130.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

### III. PERIODICALS

- A. Grinding and Finishing. Monthly. \$6.00/year.  
Hitchcock Publishing Company  
Geneva Road  
Wheaton, Ill. 60187  
Supplies subscribers with information on developments, products, manufacturing, marketing and related subjects.
- B. Mechanical Engineering. Monthly. \$7.00/year.  
The American Society of Mechanical Engineers  
29 West 39th Street  
New York, N. Y. 10018  
Reports, studies, articles on all phases of mechanical engineering, including abrasives and abrasive wheels and their relation to other phases of mechanical engineering.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,910,810. 1959. 2 p.  
Two portion grinding wheel with different grains, for use as a small wheel after outer portion has been worn away.
- B. Patent No. 2,907,148. 1959. 4 p.  
Vitreous binder abrading wheels affixed to a steel mandrel.
- C. Patent No. 2,772,524. 1956. 3 p.  
Small diameter abrasive grinders for interiors of recesses and passages.
- D. Patent No. 2,694,886. 1954. 7 p.  
Abrasive cutoff wheel of low stress structure.
- E. Patent No. 2,656,654. 1953. 6 p.  
Thin, rugged abrasive wheel, not subject to normal breakage nor to flying apart.

### V. TRADE ASSOCIATION

- A. Grinding Wheel Institute  
2130 Keith Building  
Cleveland, Ohio 44115  
Keeps members informed on latest developments, manufacturing processes, market opportunities.

### VI. ENGINEERING COMPANIES

- A. Sterling Engineering Company  
46 West Peddie  
Newark, New Jersey 07112  
Consulting for manufacturers.
- B. Rust Engineering Company  
930 Fort Duquesne Boulevard  
Pittsburgh, Penn. 15222  
Design, engineer, construct, provide initial operation of manufacturing plants.

### VII. DIRECTORY

- A. Hitchcock's Machine and Tool Directory. Annual. \$10.00.  
Hitchcock Publishing Company  
Geneva Road  
Wheaton, Ill. 60187  
Concerned with design, production, economy, and techniques in the industrial metalworking field.

ABRASIVE WHEELS: S. I. C. 3291

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## AGRICULTURAL IMPLEMENTS

I. P. No. 66127

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## AGRICULTURAL IMPLEMENTS: Standard Industrial Classification 3522

### A. PRODUCT DESCRIPTION

Metal plows, spike tooth drag harrows, spring tooth harrows, disc harrows (wheel), and cultivators. Capacity is calculated in terms of equal division between these five items, but product mix can be varied in accordance with demand.

### B. GENERAL EVALUATION

Capital requirements for this plant are substantial, and labor skills needed are of a fairly high order. The potential market will almost certainly be domestic only, or at best limited to a small region. Within that market a large number of fair-sized farms or cooperative farming organizations will be necessary to absorb the production of the plant. If production and market conditions are generally favorable, it will still be necessary to examine carefully the relative costs of domestic products and competing imports. This is an industry in which economies of large-scale production are fairly marked, and in the major producing countries there are large producers competing actively for business. However, a plant of the type described is basically equipped to make types of agricultural equipment other than those mentioned, as well as various kinds of construction equipment, such as terracers and graders, dump scrapers, trailer kits, and it may be possible to find a large enough market by diversifying production.

### C. MARKET ASPECTS

1. USERS. Farmers, farmers' cooperatives.
2. SALES CHANNELS AND METHODS. Sales are generally made through wholesale distributors, though direct sales are not uncommon. Active salesmanship is usually required in selling to the rural population, and sometimes it is necessary to extend comparatively long credit to purchasers.
3. GEOGRAPHICAL EXTENT OF MARKET. Though these products are somewhat clumsy to handle, their unit value is high enough to support transport costs over a wide area. With a reasonably good transport network, the potential market may be nation-wide. Agricultural implements of the type described are exported all over the world, chiefly by European countries, the United States and Japan.
4. COMPETITION. a. Domestic Market. Competition from imports may be keen. The domestic producer will probably be under constant pressure to maintain quality and keep down costs. b. Export Market. Some sales to nearby foreign areas might be feasible, but this plant could not compete effectively in general international trade with large-scale producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these products will depend on the type of agriculture that predominates in the market area concerned, as well as the prosperity of the agricultural community, and the extent to which new land is being taken into cultivation. Where farming is prosperous and the type of farming encourages use of implements of this kind, an arable area of about 400,000 acres might absorb this plant's output.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 1,800 Units

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<u>Cost</u>
<u>Land.</u> About 5 acres.		\$ ---
<u>Building.</u> Plant 48'x120', office 1,000 sq. ft., shed 2,000 sq. ft.	53,000	
<u>Equipment, Furniture &amp; Fixtures.</u>		
Prod'n. tools & equipmt.	\$192,500	
Other tools & equipmt.	4,000	
Furniture & fixtures	1,000	
Transportation equipmt.	2,500	200,000
<u>Total (excl. Land)</u>		<u>\$253,000</u>

Principal Items. Power hack saw, metal band saw, plate shears, hydraulic bender, brake, bending rolls, punch press, drill press, radial drill and punch press, acetylene unit, electric welder, 2 engine lathes, milling machines, slotter, oil furnace, electric furnace, grinders, paint spray equipment, arbor press, riveter, crane, jib hoist, 12 flat bed trucks, 1-ton pickup truck.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
<u>Direct Materials, Direct Labor, Mfg. Overhead(a)</u>	60	\$ 45,300
<u>Admin. Costs(b), Contingencies, Sales Costs(c)</u>	30	3,700
<u>Training Costs</u>		15,000
<u>Total Working Capital</u>		<u>\$ 64,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$317,000

### 2. MATERIALS AND SUPPLIES

	<u>Annual Requirements</u>	<u>Annual Cost</u>
<b>a. Direct Materials</b>		
Steel : tubing, shafting, sheet, plate, spring stock, strip & castings	252 tons	\$ 51,000
Grey iron castings	125 tons	30,000
Bearing metal		500
Ball bearings		800
Paint & other finishes		200
<u>Total</u>		<u>\$ 82,500</u>

### b. Supplies

Lubricants & hand tools	\$ 300
Cutting tools & abrasives	600
Maintenance & repair parts	2,600
Office supplies	300
<u>Total</u>	<u>\$ 3,800</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
<b>a. Electric Power.</b> Connected load about 100 hp.	
	<u>\$ 3,000</u>
<b>b. Fuel.</b> About 6,000 gals. oil annually.	
	<u>\$ 700</u>
<b>c. Water.</b> Small amount for production, sanitation & fire protection.	
	<u>\$ 100</u>

### 4. TRANSPORTATION

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

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
<b>a. Direct Labor</b>		
Skilled	6	\$ 36,000
Semi-skilled	16	80,000
Unskilled	9	36,000
<u>Total</u>	<u>31</u>	<u>\$152,000</u>
<b>b. Indirect Labor</b>		
Manager	1	\$ 10,000
Office	2	9,000
Other	2	8,000
<u>Total</u>	<u>5</u>	<u>\$ 27,000</u>

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

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

<b>a. Annual Costs</b>	
Direct Materials	\$ 82,500
Direct Labor	152,000
Manufacturing Overhead(a)	35,600
Admin. Costs(b), Contingencies	24,000
Sales Costs(c), Bad Debts	22,000
Depreciation on Fixed Capital	23,400
<u>Total</u>	<u>\$339,500</u>
<b>b. Annual Sales Revenue</b>	
	<u>\$400,000</u>

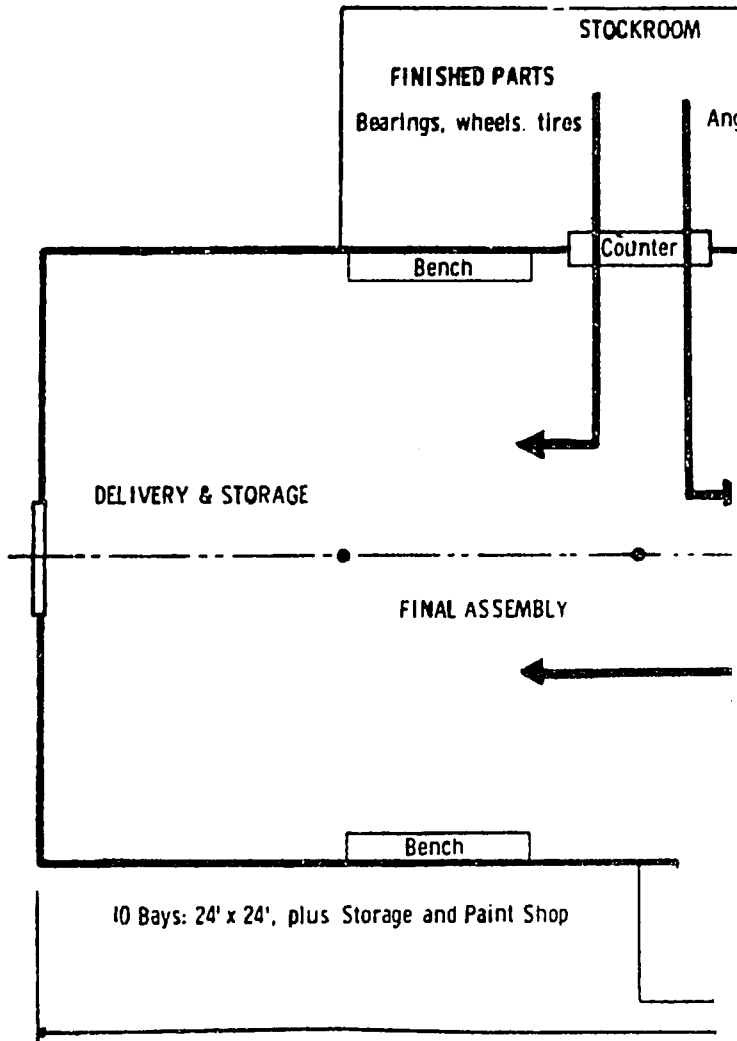
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

AGRICULTURAL IMPLEMENTS: S.I.C. 3522

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# AGRICULTURE

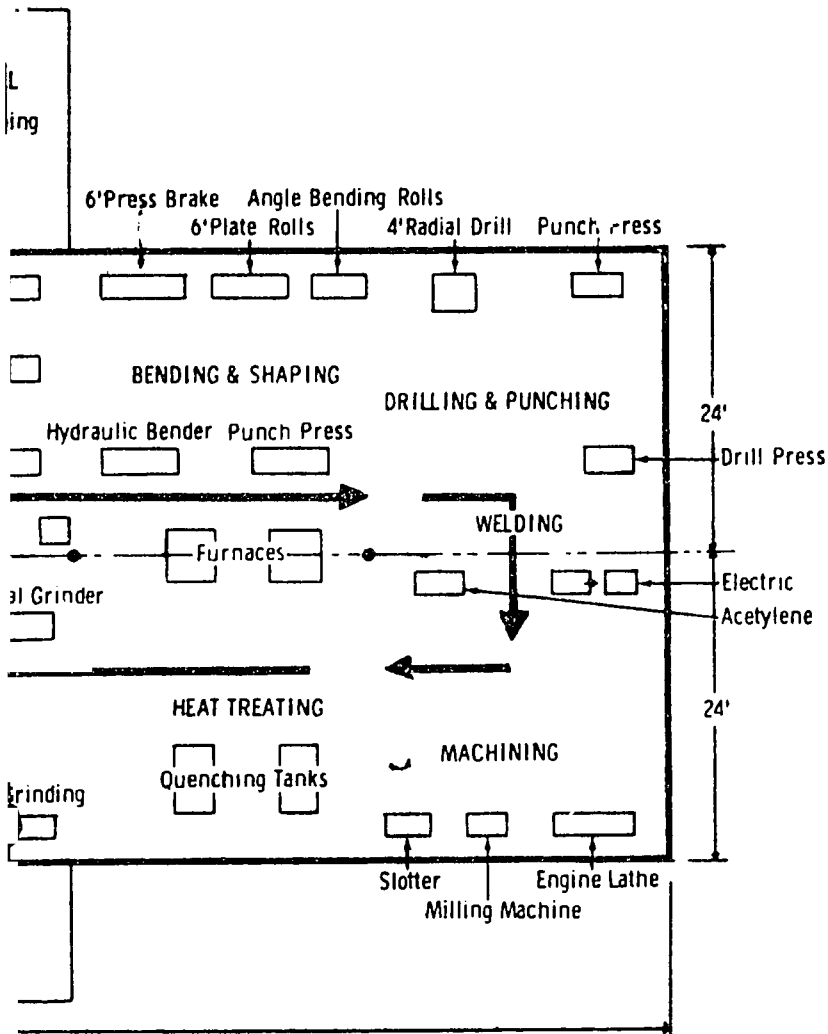
ARROWS I



ELEMENTS : S. I. C. 3522

LAYOUT

FLOW OF WORK





# AGRICULTURAL IMPLEMENTS: S.I.C. 3522

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Farm Machinery. A. G. Harris and others. 1965. Pap. \$4.00.  
Oxford University Press, Inc.  
417 Fifth Avenue, New York, N. Y. 10016
- B. Farm Machinery and Equipment. Harris P. Smith. 5th Edition. Illus. 1964.  
\$10.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street, New York, N. Y. 10036
- C. Quality Control. Bertrand Hansen. 1963. \$16.65.  
Prentice-Hall, Inc.  
Englewood Cliffs, N. J. 07632

### II. U. S. GOVERNMENT PUBLICATIONS

- A. Agricultural Implements. TI-48. 41 p. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- B. Agricultural Implements. IR-23599.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

### III. PERIODICALS

- A. Farm Implement News. Bi-weekly. \$3.00/year.  
Farm Implement News Company  
608 South Dearborn Street, Chicago, Ill. 60605  
News of developments, manufacture, marketing.
- B. Northwest Farm Equipment Journal. Monthly. \$1.00/year.  
Farm Implements Publishing Company  
Lumber Exchange Building  
Minneapolis, Minn. 55401  
Farm equipment news, statistics, developments.

### IV. U. S. PATENTS

- Available U. S. Patent Office  
Washington, D. C. 20231 \$25 each.
- A. Patent No. 2,818,008. Dec. 31, 1957. 6 p.  
Auxiliary support and disc for disc harrow gangs, to fill in the undesirable  
trough left by the lateral outer end discs.
  - B. Patent No. 2,614,375. Oct. 21, 1952. 7 p.  
Revolving spring tooth harrow.
  - C. Patent No. 2,502,094. March 28, 1950. 2 p.  
Improved type of tine for use on soil tilling devices.

## SELECTED REFERENCES (Continued)

### V. TRADE ASSOCIATIONS

- A. Farm Equipment Institute  
608 South Dearborn Street  
Chicago, Ill. 60605
- B. Farm Equipment Manufacturers Association  
34 North Brentwood  
St. Louis, Missouri 63105
- C. Farm Equipment Wholesalers Association  
1015 Upper Midwest Building  
Minneapolis, Minnesota 55401

### VI. ENGINEERING COMPANIES

- A. National Engineering Company  
610 Machinery Hall Building  
Chicago, Ill. 60606  
Consulting and foundry work.
- B. The Jeffery Manufacturing Company  
7 Wynnewood Road  
Wynnewood, Penn. 19096  
The manufacture of sand handling and preparation equipment, mold, casting and other conveyors, and similar equipment for the foundry.
- C. Dodge Steel Company  
6501 State Road  
Philadelphia, Penn. 19135  
Designers of complete plants for manufacture of agricultural implements and equipment.

### VII. DIRECTORY

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

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## ALUMINUM ARCHITECTURAL SPECIALTIES

I. P. No. 66128

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ALUMINUM ARCHITECTURAL SPECIALITIES: Standard Industrial  
Classification 3449

A. PRODUCT DESCRIPTION

Sliding doors, louver type windows, windows of various types, aluminum frames for picture glass doors, store show cases, shower doors, gutters and down spouts, made principally of aluminum. Some related articles could be added to the product mix, if demand exists, with the addition of little or no equipment.

B. GENERAL EVALUATION

The capital needed to start this industry is quite modest. Skilled labor needs are not of a high order, though intelligent management is required, since the manager needs to be able to advise potential clients and suggest designs. The great bulk of the sales would have to be made locally. A large enough market will exist only where there is an extensive and comparatively modern and progressive urban area, with a high rate of new construction. Given a sufficiently large and steady local market, this industry has much to recommend it.

C. MARKET ASPECTS

1. USERS. Building contractors engaged in construction and renovation of stores, offices, public buildings, dwellings, etc ; individual users.
2. SALES CHANNELS AND METHODS. Sales are made direct to users. Some publicity in appropriate journals would often be useful.
3. GEOGRAPHICAL EXTENT OF MARKET. Transport charges on items of this kind are likely to be fairly onerous. Moreover, such items are often made to special requirements, and local suppliers are preferred. The bulk of sales would be local and generally within the radius of truck deliveries. For the reasons that limit the area of the domestic market, exports of such items are uncommon.
4. COMPETITION. a. Domestic Market. Competition from imports, given the normal preference for local suppliers in the case of such products, is unlikely to be important, if the plant is run with reasonable efficiency. The main competition will come from products made from alternative materials. Aluminum products of this type attract by their durability and appearance, but they are comparatively expensive, and in some areas other materials may be much less costly than aluminum. b. Export Market. A plant of this type and size would almost certainly be unable to sell abroad.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these products will depend on the level of income, the rate of growth of the community, the type of building favored in the area, climate, and other factors. Some developing areas have cities large and progressive enough to provide a potential market for the capacity production of this plant, if the management seeks actively to develop business.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 2,500 Units

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		<u>Cost</u>
Land. About 6,000 sq. ft.	\$	--
Building. One story, 40'x60'.		15,000
Equipment, Furniture & Fixtures.		
Prod'n. tools & equipment	\$	11,000
Furniture & fixtures		500
Transportation equipmt.	2,500	<u>14,000</u>
Total (excl. Land)		<u>\$ 29,000</u>

Principal Items. Squaring shear, foot powered, w/precision back gage; press brake; dies for press brake; hand brake, w/molding forms; slip rolls; drill presses (2); radial saw; notcher, hand operated; bender-cutter, hand operated, rod & strip; welder, inert gas; bench machines & hand tools.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 12,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	<u>900</u>
Total Working Capital		<u>\$ 13,400</u>

c. **TOTAL CAPITAL (EXCL. LAND)** \$ 42,400

### 2. MATERIALS AND SUPPLIES

<b>a. Direct Materials</b>		<u>Annual Requirements</u>	<u>Annual Cost</u>
Aluminium sheets	60,000 lbs	\$	30,000
Copper sheets	2,000 lbs.		13,300
Door knobs	1,400 pieces		700
Hinges	2,000 pieces		800
Medallions			500
Rivets			100
Bolts, nuts, & washers			100
Total			<u>\$ 45,500</u>

### b. Supplies

Welding gas	\$	100
Welding rods		100
Hand tools		100
Office supplies		200
Total		<u>\$ 500</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. Electric Power. Connected load about 20 hp.	\$ 400
b. Fuel. For heating, if necessary.	\$ 300
c. Water. For sanitation & fire protection.	<u>\$ 100</u>

### 4. TRANSPORTATION

	<u>Annual Operating Cost</u>
a. Own Transport Equipment. 1-ton truck for pickup & deliveries.	<u>\$ 1,000</u>
b. External Transport Facilities. No special requirements.	

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
<b>a. Direct Labor</b>		
Skilled	1	\$ 6,000
Semi-skilled	1	5,000
Unskilled	2	8,000
Total	<u>4</u>	<u>\$ 19,000</u>
<b>b. Indirect Labor</b>		
Manager - buys, sells, keeps books, supervises & works in shop.	1	<u>\$ 8,000</u>

c. **Training Needs.** Manager must be well experienced. With 1 skilled operator, he should be able to maintain full production while training the other 3 operators.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

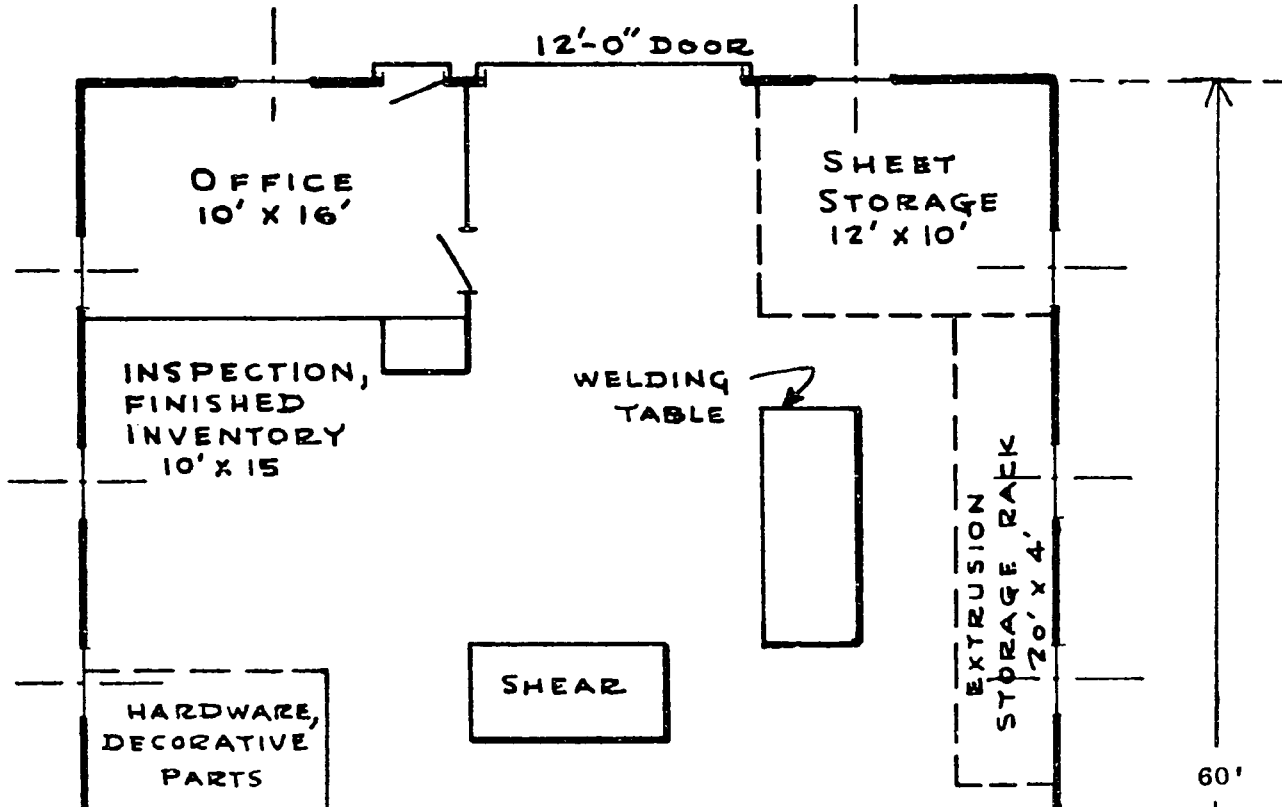
<b>a. Annual Costs</b>		
Direct Materials		\$ 45,500
Direct Labor		19,000
Manufacturing Overhead(a)		10,300
Admin. Costs(b), Contingencies		4,500
Sales Costs(c), Bad Debts		6,000
Depreciation on Fixed Capital		2,500
Total		<u>\$ 87,800</u>
<b>b. Annual Sales Revenue</b>		<u>\$110,000</u>

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

ALUMINIUM ARCHITECTURAL SPECIALTIES: S.I.C. 3449

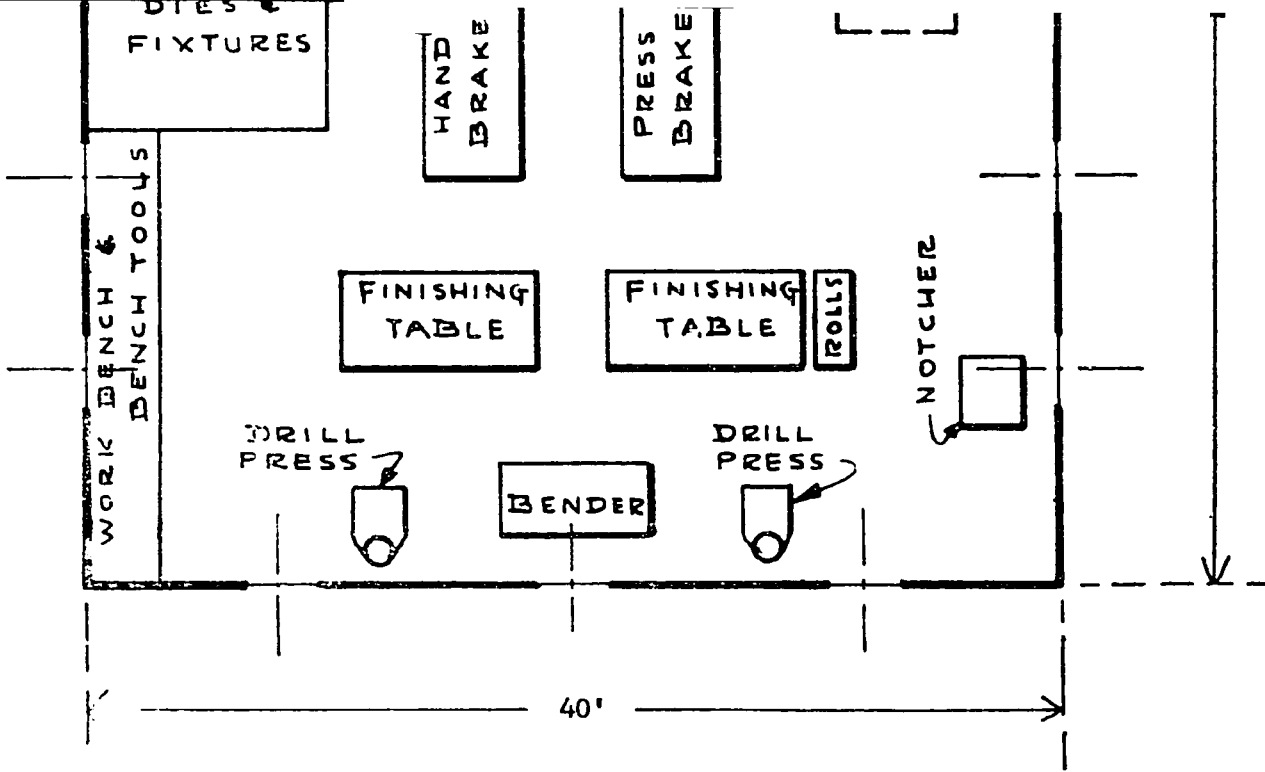
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PLANT LAYOUT



ALUMINUM ARCHITECTURE

12/2/67



The products made in this type of plant are so diversified in shapes and sizes, that a standard work flow is not practicable.



ALUMINUM ARCHITECTURAL SPECIALTIES: S.I.C. 3449

SELECTED REFERENCES

I. TEXTBOOKS

- A. Modern Machine Tools. Frank H. Habicht. 1963. \$6.50.  
D. Van Nostrand Co., Inc.  
120 Alexander Street, Princeton, N. J. 08540
- B. Machine Shop Training. S. F. Krar and J. E. St. Armand. Illus. 1963.  
\$3.95.  
McGraw-Hill Book Co., Inc.  
330 West 42nd Street, New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

- A. Aluminum Door and Window Sash. TI-58. 42 p. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Information for establishing plant to produce aluminum doors and window sashes.
- B. Aluminum Door and Window Factory. IR-23089.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- C. Aluminum Alloy Suitable for the Manufacture of Decorative Items.  
I-24744.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICAL

- A. Mechanical Engineering. Monthly. \$5.60/year to ASME members.  
\$7.00 year to non-members.  
The American Society of Mechanical Engineers  
20th and Northampton Streets, Easton, Penn. 18042  
Reports, studies, articles on all phases of mechanical engineering, including metal forming, metal cutting, mechanisms, design.

IV. U. S. PATENTS

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

- A. Patent No. D-175,271. August 2, 1955. 1 p.  
Design for ornamental window shutter.
- B. Patent No. D-172,647. July 13, 1954. 3 p.  
Design for folding door.
- C. Patent No. D-169,234. March 31, 1953. 2 p.  
Design for shower door frame.
- D. Patent No. D-181,519. Nov. 26, 1951. 1 p.  
Design for louvered shutter.

## SELECTED REFERENCES (Continued)

### V. TRADE ASSOCIATION

- A. National Association of Architectural Metal Manufacturers  
228 North LaSalle Street  
Chicago, Ill. 60601  
Keeps members informed of latest developments, processes and other progress in architectural metal manufacturing.

### VI. ENGINEERING COMPANIES

- A. Henry Keck Associates  
660 South Fair Oaks Avenue  
Pasadena, California 91105  
The design of machines and products for appearance and utility.
- B. Wells Alluminum Corporation  
151 Wells  
North Liberty, Indiana 46554  
Contract designers, engineers, and manufacturers of metal stampings, assemblies, and new products of metal or wood.

### VII. DIRECTORY

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

## 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

## ALUMINUM COOKING UTENSILS

I. P. No. 66129

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

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

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

## ALUMINUM COOKING UTENSILS: Standard Industrial Classification 3461

### A. PRODUCT DESCRIPTION

Aluminum cooking utensils, including combination cookers, frying pans with covers, frying pans open, saucepan sets, covered saucepans, drip coffee makers, teakettles, covered pots, and egg poachers of various sizes.

### B. GENERAL EVALUATION

This plant requires a fair amount of capital and skilled labor. Good management is also needed, in order to maintain quality, keep abreast of innovations, and develop sales. With the cheapening of aluminum since World War II, the use of aluminum cooking utensils has greatly increased, and the industry should have reasonably good prospects in many developing areas.

### C. MARKET ASPECTS

1. USERS. Households, eating establishments of various kinds.
2. SALES CHANNELS AND METHODS. Sales to wholesalers and large retailers. A brand name is common.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. The products are fairly easy to handle and transport cost is low in relation to product value. The domestic market may be nationwide. b. Export. These products are widely exported.
4. COMPETITION. a. Domestic Market. Cooking utensils of other materials will generally provide competition, depending on relative prices and income levels. b. Export Market. This plant is too small to develop a general export business but might make some sales in neighboring countries.
5. MARKET NEEDED FOR PLANT DESCRIBED. This will vary greatly with the level of income, but an area with a population of about a million people would generally provide a large enough market.

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## D. PRODUCTION REQUIREMENTS

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

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 1/2 acre.	\$ --
Building. One story, 60'x100'.	36,000
Equipment, Furniture & Fixtures.	
Prod'n. tools & equipmt.	\$ 75,000
Other tools & equipmt.	5,000
Furniture & fixtures	1,000
Total (excl. Land)	<u>\$117,000</u>

Principal Items. Square shears, 2 punch presses, 3 spinning lathes, 4 buffing machines, 2 drill presses, annealing oven, 2 riveting machines, compressor, dies & forms, fork lift truck, skids.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead (a)	60	\$ 34,900
Admin. Costs (b), Contingencies, Sales Costs(c)	30	1,200
Training Costs		4,500
Total Working Capital		<u>\$ 40,600</u>

c. TOTAL CAPITAL (EXCL. LAND) \$157,600

### 2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Aluminum sheets	90 tons	\$ 50,000
Handles	80,000	5,000
Wrapping & cartons		10,000
Total		<u>\$ 65,000</u>

#### b. Supplies

Lubricants & hand tools	\$ 200
Cutting tools & abrasives	400
Maintenance & spare parts	2,000
Office supplies	400
Total	<u>\$ 3,000</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric power. Connected load about 50 hp.	\$ 800
b. Fuel. Heat & annealing oven.	<u>\$ 400</u>
c. Water. Sanitation & fire protection.	<u>\$ 100</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	6	\$ 36,000
Semi-skilled	8	40,000
Unskilled	8	32,000
Total	<u>22</u>	<u>\$108,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 17,000
Office	2	9,000
Maintenance	1	6,000
Total	<u>5</u>	<u>\$ 32,000</u>

- c. Training Needs. Manager & supervisor must be fully experienced. With 6 skilled workers they should be able to train others & reach full production in 30 days.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$ 65,000
Direct Labor	108,000
Manufacturing Overhead(a)	36,300
Admin. Costs (b), Contingencies	12,700
Sales Costs(c), Bad Debts	15,600
Depreciation on Fixed Capital	10,400
Total	<u>\$ 248,000</u>
b. Annual Sales Revenue	<u>\$ 300,000</u>

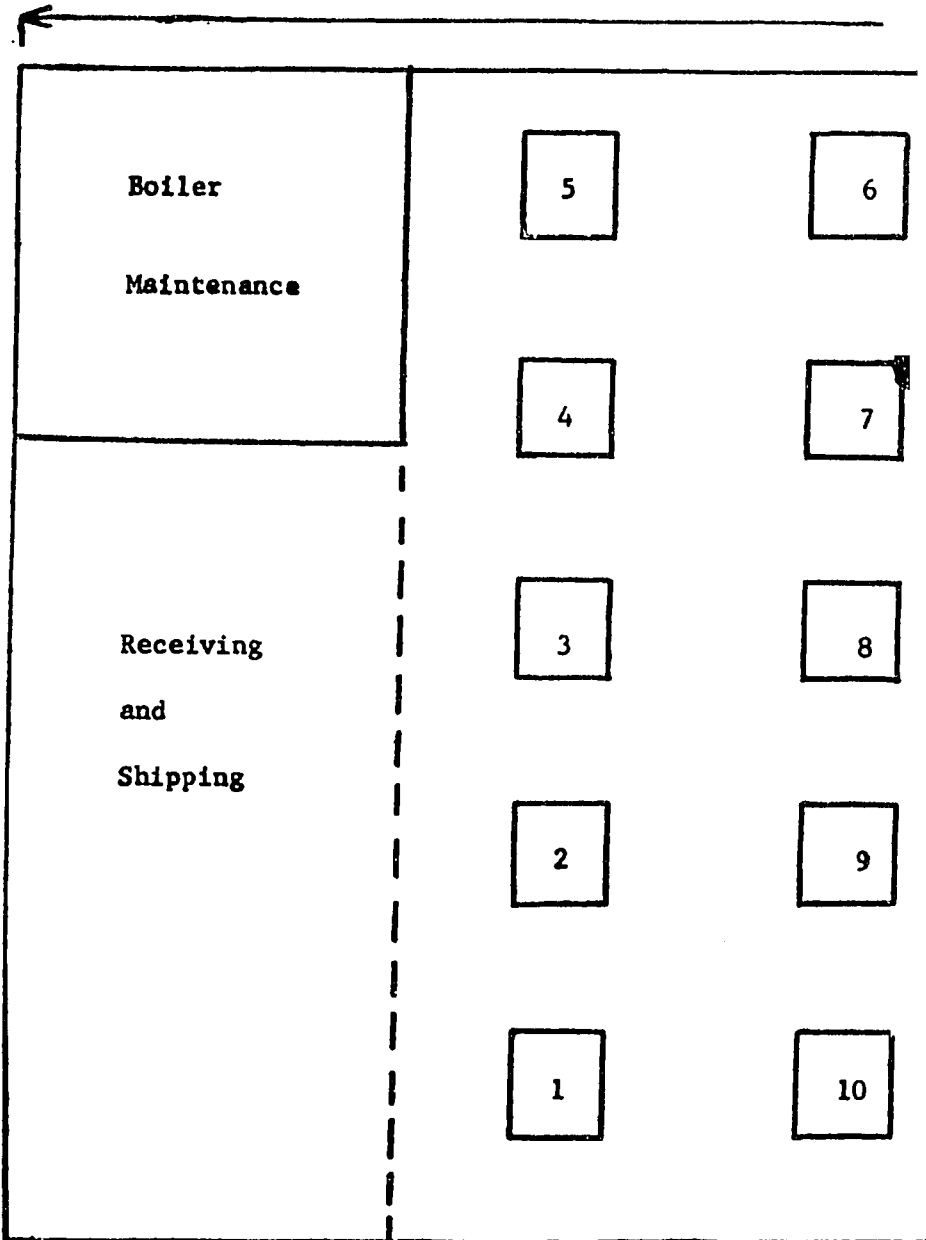
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

ALUMINUM COOKING UTENSILS: S.I.C. 3461

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# ALUMINUM COOK

## PLANT LAY

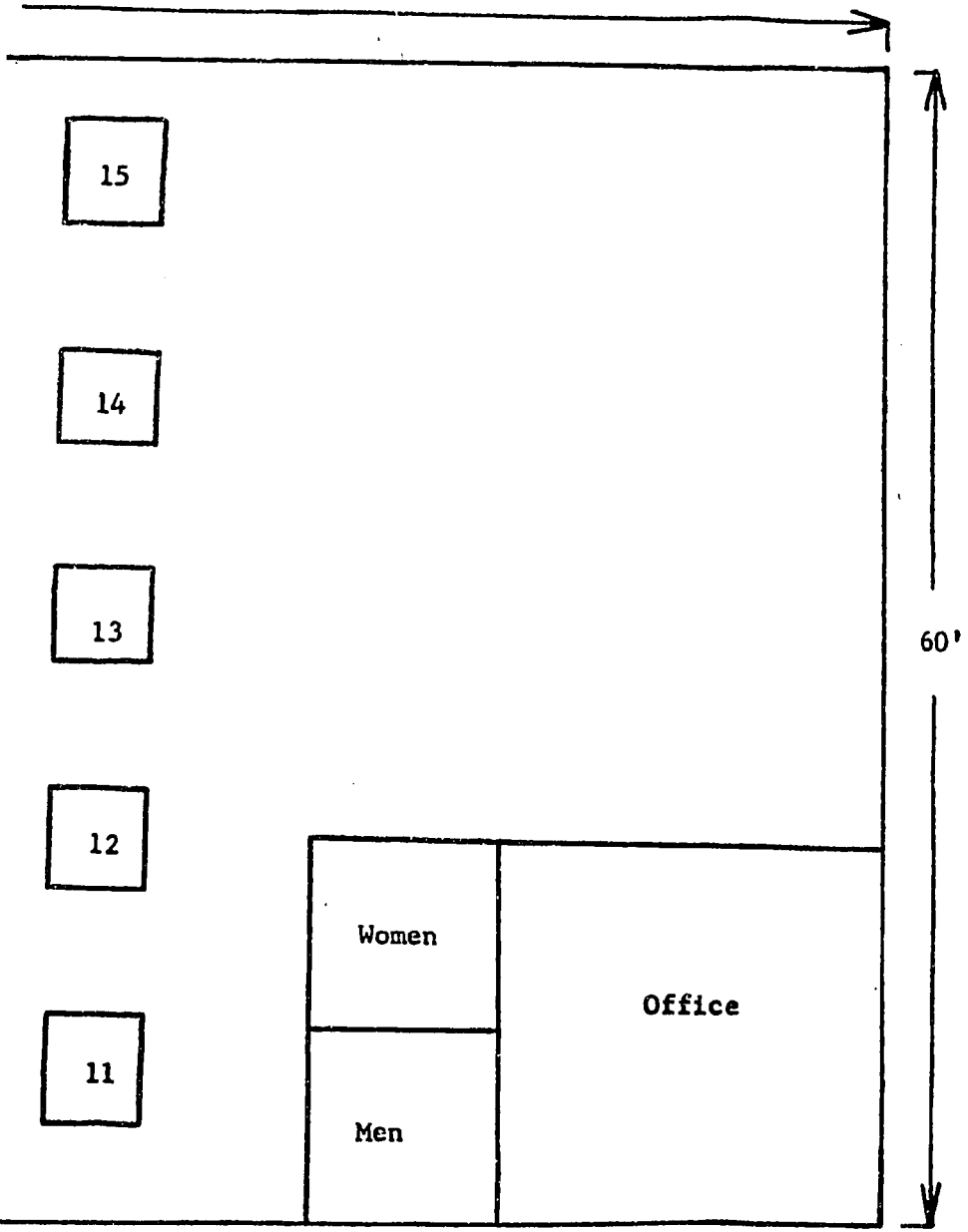


- 1. Square shear
- 2. Punch press
- 3. Punch press
- 4. Spinning lathe
- 5. Spinning lathe

- 6. Spin
- 7. Ann
- 8. Drill
- 9. Drill
- 10. Buffi

TENSILS : S. I. C. 3461

D WORKFLOW



- the 11. Buffing machine
- oven 12. Buffing machine
- 13. Buffing machine
- 14. Riveting machine
- hine 15. Riveting machine

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# ALUMINUM COOKING UTENSILS : S.I.C. 3461

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. American Society of Mechanical Engineers. ASME Handbook of Metals Engineering: Design. 2nd Edition by Oscar J. Horger. Illus. 1965. \$22.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street, New York, N. Y. 10036
- B. Machinery's Handbook. 17th Edition. Erik Oberg and Franklin D. Jones. Illus. 1964. \$14.00.  
The Industrial Press  
93 Worth Street, New York, N. Y. 10013
- C. Use of Handbook Tables and Formulas. John M. Amiss and Franklin D. Jones. Edited by Henry H. Ryffel. Illus. 1959. \$2.00.  
The Industrial Press  
93 Worth Street, New York, N. Y. 10013
- D. Metal Engineering - Processes. American Society of Mechanical Engineers Handbook. Editor, Roger W. Bolz. 1958. 448 p. \$13.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street, New York, N. Y. 10036  
Basic processes such as casting, forging, stamping, metallizing, milling, turning, spinning, welding; their scope, advantages, and limitations.

### II. U. S. GOVERNMENT PUBLICATIONS

- A. Metal Spinning. IR-16617. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Presents information on establishing metal spinning plant.
- B. Spinner, IV. 4-94. 201. 1944. 6 p. \$.05. Catalog No. PR-32. 5228:Sp4.  
Superintendent of Documents  
Government Printing Office  
Washington, D. C. 20402  
Job description of spinner who spins sheet metal into circular shapes such as cups, cones, and cylinders.

### III. PERIODICAL

- A. Metalworking. Monthly. \$5.00/year.  
Metalworking Publishing Co., Inc.  
795 Boylston Street, Boston, Mass. 02116  
News and information on all phases of metalworking.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

Available U. S. Patent Office

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

- A. Patent No. D-182,433. April 1, 1958. 2 p.  
Design for aluminum cooking pan or similar article.
- B. Patent No. D-174,504. April 19, 1955. 2 p.  
Design for covered deep fry pan.
- C. Patent No. D-157,803. March 21, 1950. 2 p.  
Design for egg poacher.
- D. Patent No. 2,577,200. Dec. 4, 1951. 5 p.  
Drip coffee maker and improvements in the basket for such devices.

### V. TRADE ASSOCIATIONS

- A. National Metal Spinners Association  
130 Clinton Street, Brooklyn, N. Y. 11201  
Supplies members with latest information and developments on metal spinning, stamping and other forming methods.
- B. Metal Cookware Manufacturers Association  
P. O. Box 1136, La Grange Park, Ill. 60528

### VI. ENGINEERING COMPANY

- A. Wells Aluminum Corporation  
151 Wells, North Liberty, Indiana 46554  
Contract designers, engineers and manufacturers of stampings, assemblies and new products.

### VII. DIRECTORY

- A. Hardware Age Merchandise Directory  
Chilton Company  
Chestnut and 56th Streets, Philadelphia, Penn. 19139  
Information on hardware stores, store managers' guide, product information, merchandise listings, wholesalers' brands listings.

## 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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# INDUSTRY PROFILES

## ASBESTOS-CEMENT SIDING

I. P. No. 66130

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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.

## ASBESTOS-CEMENT SIDING: Standard Industrial Classification 3292

### A. PRODUCT DESCRIPTION

Sheets made of asbestos fiber and Portland cement, from each of which 57 shingles, size 12" by 24" can be made.

### B. GENERAL EVALUATION

This product is excellent in construction of small houses and other small building, and no special skill is required to use it. Managerial, technical and skilled labor needs are comparatively high in this industry and the manufacturing process is moderately complicated. For technical and economic reasons the product must be made on a relatively large scale, and the market required, in terms of population, is therefore often considerable (see C5 below). Though market for asbestos-cement products in the US is very large and still expanding, they are still unfamiliar material in many areas.

### C. MARKET ASPECTS

1. USERS. Building contractors.
2. SALES CHANNELS AND METHODS. Sales mostly direct to building supplies stores. Since product is unfamiliar in many areas, salesmen should be well informed on its advantages and method of using it.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Product is fairly heavy and bulky in relation to value, and transport costs may limit market area. Where extensive system of inland waterways exists this factor may not be important. b. Export. Since freight and packaging costs are high in relation to value of product and local substitutes for it in construction work are usually available, product is not common in international trade.
4. COMPETITION. a. Domestic Market. Competition mainly from locally-produced alternative construction materials. Freight costs on imports usually high enough to give local industry considerable degree of natural protection. b. Export Market. Some sales may be possible to easily accessible areas of neighboring countries where product is not locally made, but no substantial volume of exports will normally be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for product will largely depend on availability and relative prices of alternative construction materials, particularly lumber. Also to some extent on type of building customary in area concerned. In average conditions of developing areas, assuming that construction is at least keeping pace with population growth and that one-third of new houses and some small public buildings use this material, population of the order of 5 million would be needed to absorb capacity output of this plant.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 123,600 Sheets

### 1. CAPITAL REQUIREMENTS

a. <b>FIXED CAPITAL</b>		<u>Cost</u>
Land. About 1 acre.	\$	--
Building. 23,000 sq. ft.		138,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt. \$ 245,000		
Other tools & equipmt. 12,000		
Furniture & fixtures 1,000		258,000
<u>Total (excl. Land)</u>		<u>\$396,000</u>

Principal Items. Mixers, clarifier, cutter, crusher, platform scale, hydraulic oil press, steel press plates, power dry-trimmer, conveyors, factory trucks & wooden pallets.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials,	90	\$115,000
Direct Labor, Mfg. Over-		
head(a)	60	76,000
Admin. & Sales Costs (b),		
Contingencies	30	11,000
Training Costs		55,000
<u>Total Working Capital</u>		<u>\$257,000</u>

c. **TOTAL CAPITAL (EXCL. LAND)** \$653,000

### 2. MATERIALS AND SUPPLIES

a. <b>Direct Materials</b>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Asbestos	1,440 tons	\$ 202,000
Portland cement	8,200 tons	197,000
Coloring matter	130 tons	60,000
Crushed scrap	515 tons	--
Packing materials		2,000
<u>Total</u>		<u>\$ 461,000</u>

### b. Supplies

Cylinder screens	\$	200
Felt belts		1,200
Strapping tools		400
Lubricants & spare parts		2,200
Maintenance materials		1,600
Office supplies		400
<u>Total</u>		<u>\$ 6,000</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 112 hp.	\$ 11,000
b. <u>Fuel.</u> For boiler. Local fuel may be used.	\$ 2,000
c. <u>Water.</u> Production, heating, sanitation & fire protection.	\$ 1,000

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. In & out shipments about 85 tons a day. Good all-weather highways to raw material sources and markets are indispensable. Plant should be located, if possible, on railroad.

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	27	\$162,000
Semi-skilled	12	60,000
Unskilled	27	108,000
<u>Total</u>	<u>66</u>	<u>\$330,000</u>

### b. Indirect Labor

Manager, lab. technician, supervisors	9	\$ 68,000
Office	3	14,000
Other	6	24,000
<u>Total</u>	<u>18</u>	<u>\$106,000</u>

- c. Training Needs. Manager, laboratory technician & 7 supervisors should be fully experienced. With help of 5 skilled workers they should be able to train all workers. Plant should reach full production in 3 months.

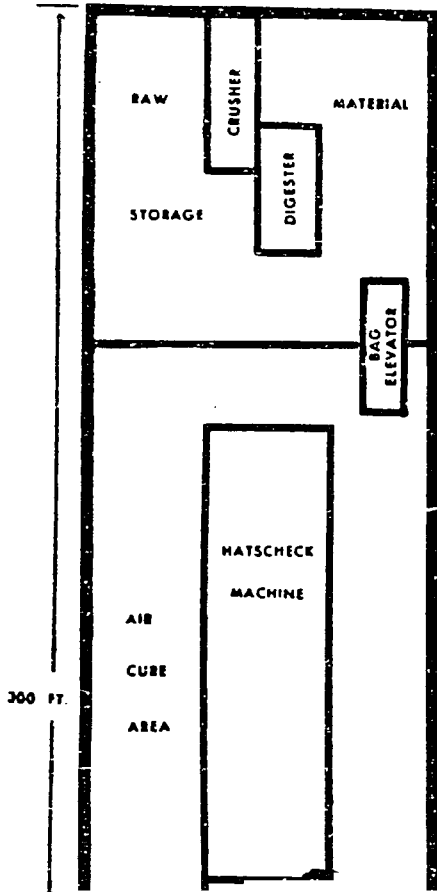
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$461,000
Direct Labor	330,000
Manufacturing Overhead (a)	126,000
Admin. & Sales Costs (b), Bad Debts, Contingencies	135,000
Depreciation on Fixed Capital	34,000
<u>Total</u>	<u>\$1,086,000</u>

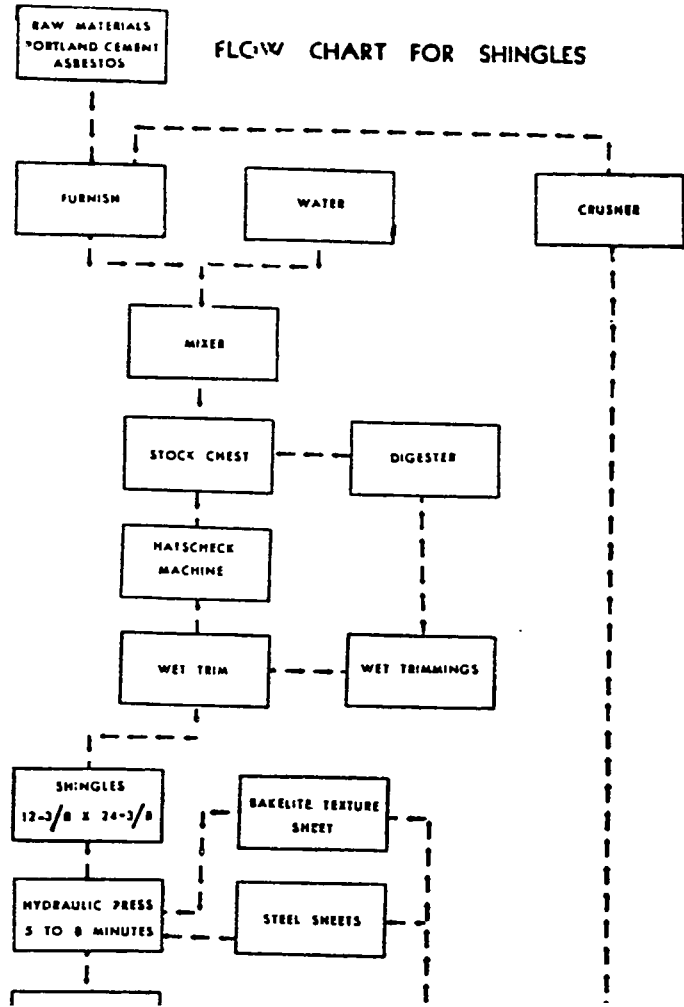
b. Annual Sales Revenue \$1,300,000

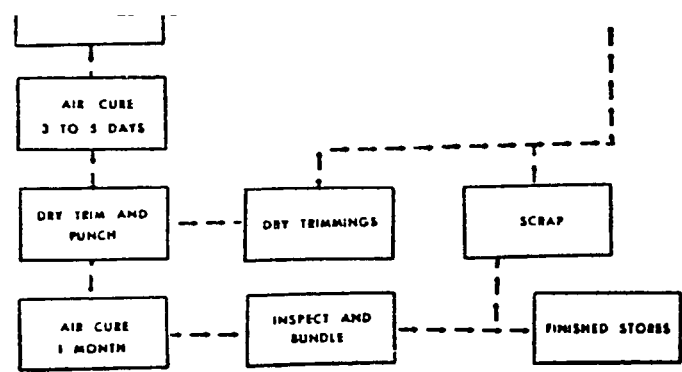
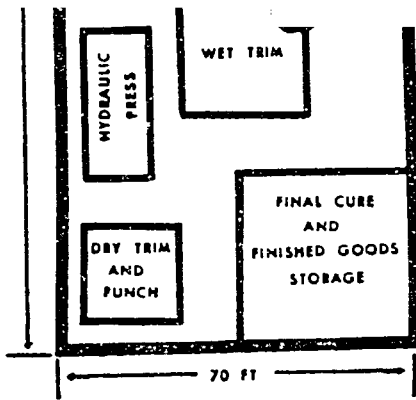
NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges, Sales Commissions, Travel, Freight Out.

PLANT LAYOUT AND WORK FLOW



FLOW CHART FOR SHINGLES

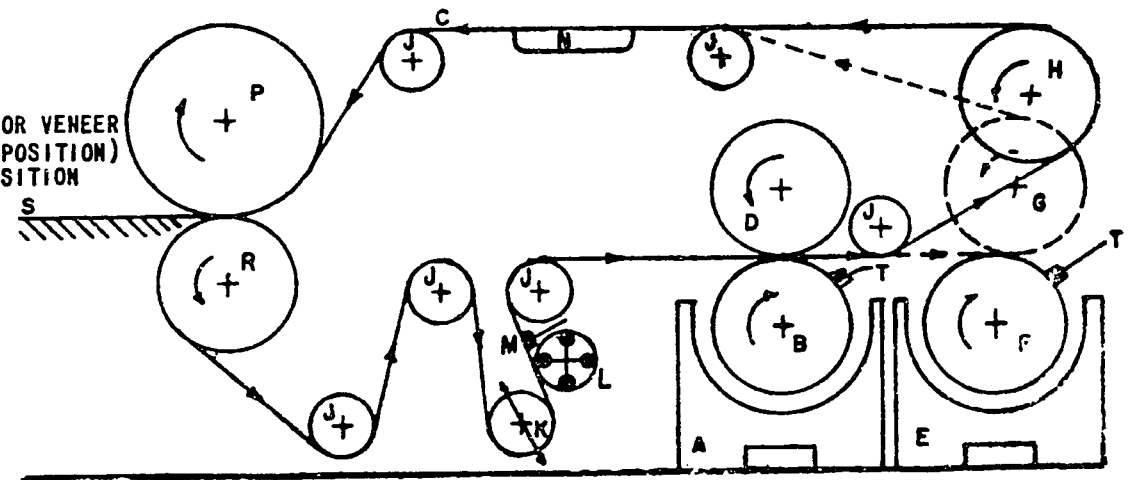




JING: S.I.C. 3292

## HATSCHECK FORMING MACHINE FOR SHINGLES

- VAT A - FOR BASE SLURRY
- B - BRONZE PERFORATED CYLINDER
- C - WOOLEN FELT BELT
- D - RUBBER COUCH ROLL
- VAT E - VENEER (COLORED) SLURRY
- F - BRONZE PERFORATED CYLINDER FOR VENEER
- G - RUBBER COUCH ROLL (IN LOWER POSITION)
- H - RUBBER COUCH G IN HIGHEST POSITION
- J - IDLER WHEELS
- K - BELT ADJUSTER
- L - WHIPPER WHEEL
- M - BELT SHOWER
- N - SUCTION BOX
- P - ACCUMULATOR ROLL-BRONZE
- R - DRIVE CYLINDER
- S - TABLE
- T - CYLINDER SHOWER



9776



ASBESTOS-CEMENT SIDING: S.I.C. 3292

SELECTED REFERENCES

I. TEXTBOOKS

- A. Asbestos Fundamentals: Origin, Properties, Mining, Processing, Utilization  
Hans Berger. Tr. by Ralph E. Oesper. Illus. 1963. \$6.00.  
Tudor Publishing Company  
221 Park Avenue South, New York, N. Y. 10003
- B. Asbestos: Its Industrial Applications. D. V. Rosato. 1959. 220 p. \$5.75.  
Reinhold Publishing Corp.  
430 Park Avenue, New York, N. Y. 10022  
Properties of asbestos, asbestos in asbestos-cement products, tile and other products.
- C. Weathering Tests on Asbestos-Cement Roofing and Siding. 1947. Technical Paper No. 20.  
Department of Scientific and Industrial Research  
H. M. Stationery Office  
London, England.

II. U. S. GOVERNMENT PUBLICATIONS

- A. Manufacture of Asbestos Cement. IR-15637.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- B. Asbestos-Cement Sheets. IR-15840  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- C. Asbestos and Asbestos-Cement Products - Bibliography. IR-25807.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICALS

- A. Modern Concrete. Monthly. \$2.00 a year.  
Pit and Quarry Publications, Inc.  
431 S. Dearborn Street, Chicago, Ill. 60605  
Information on all areas of cement and concrete uses and markets.
- B. American Roofer and Siding Contractor. Monthly. \$3.00 a year USA., \$4.00 a year foreign.  
American Roofer and Siding Contractor  
429 Fourth Avenue, New York, N. Y. 10016

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,487,593. Nov. 8, 1949. 4 p.  
Asbestos-cement shingle on siding to be laid in overlapping courses.
- B. Patent No. 2,421,721. June 3, 1947. 9 p.  
Rigid molded composition products of hardened material containing cement and a fibrous material.
- C. Patent No. 2,323,835. July 6, 1943. 2 p.  
The manufacture of asbestos-cement shingles and the incorporating of certain improvements therein.

### V. TRADE ASSOCIATION

- A. Asbestos-Cement Products Association  
509 Madison Avenue, New York, N. Y. 10022  
Provides members with latest information on roofing, siding, building materials made of, or related to, asbestos-cement compound.

### VI. ENGINEERING COMPANIES

- A. Industrial Service Company  
51 Paterson Avenue, East Rutherford, N. J. 07073  
Specialists in the design, engineering, procurement and construction of bulk materials handling systems for conveying, screening, storing, blending, mixing.

### VII. DIRECTORY

- A. Directory of Cement, Gypsum, Lime, Sand, Gravel, and Crushed Stone Plants.  
Annual \$20.00.  
Pit and Quarry Publications  
431 S. Dearborn Street, Chicago, Ill. 60605

## 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.

## 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.

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# INDUSTRY PROFILES

## AUTOMOBILE AND TRUCK LEAF SPRINGS

I. P. No. 66131

*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 AND TRUCK LEAF SPRINGS: Standard Industrial  
Classification 3493**

**A. PRODUCT DESCRIPTION**

Leaf springs for passenger automobiles and for trucks, various sizes. Plant capacity is given in terms of production ratio of 1 automobile to 3 truck springs, but this ratio can be varied in accordance with demand in the market concerned.

**B. GENERAL EVALUATION**

This plant requires a substantial amount of capital and a considerable number of skilled workers. The market for such a plant located in an economically less developed area will almost certainly be only domestic, or at best confined to a small region. It will also be a market for replacements only, except in the rare cases where there is any automobile assembly. Though, on the one hand, many of the less developed areas have rough roads and, in relation to the number of automobiles, a comparatively large demand for replacement of springs, the total number of automobiles is sometimes small.

**C. MARKET ASPECTS**

1. USERS. Automobile assembly plants, automotive repair establishments, trucking and bus companies doing their own repairs.
2. SALES CHANNELS AND METHODS. Sales are made to automobile parts distributors, and direct to large users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. This product is fairly easily handled. The unit value is comparatively high, and the potential market area may be nation-wide. b. Export. This product is exported all over the world by the major automobile producing countries.
4. COMPETITION. a. Domestic Market. Competition from imports may be keen. Distributors of particular makes of imported cars often prefer to obtain replacement parts from the automobile manufacturers. b. Export Market. A plant of this character could not compete in general world trade, though it might make some sales in nearby foreign areas.
5. MARKET NEEDED FOR PLANT DESCRIBED. A market area containing at least 100,000 automobiles in use and perhaps considerably more, would be necessary to provide a market for this plant.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY : ONE-SHIFT OPERATION: 18,000 Automobile and 54,000 Truck Leaf Springs

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 50,000 sq. ft.	\$ --
Building. One story, 160'x180'.	170,000
Equipment, Furniture & Fixtures.	\$212,000
Prodn. tools & equipmt.	28,000
Other tools & equipmt.	2,000
Furniture & fixtures	8,000
Transportation equipmt.	250,000
<b>Total (excl. Land)</b>	<b>\$420,000</b>

Principal Items. 2 alligator shears, power shear vertical, 9 furnaces, 2 eye roll machines, 4 drill presses, 3 punch presses, power hack saw, threader, 5 rolls, 5 form bending presses, 5 quenching tanks, hydraulic press, annealing furnace, double wheel grinder, assembling presses, air compressor, scale, 2 five-ton trucks.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$143,200
Admin. Costs(b), Contingencies, Sales Costs(c)	30	16,000
Training Costs		30,800
<b>Total Working Capital</b>		<b>\$190,000</b>

c. **TOTAL CAPITAL (EXCL. LAND)** \$610,000

### 2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. <b>Direct Materials</b>		
Spring steel, bolts, nuts	2,484 tons	\$498,000
Rivets & inserts		27,000
Bushings	144,000	51,000
Paint		6,000
<b>Total</b>		<b>\$582,000</b>

#### b. Supplies

Lubricants & hand tools	\$ 400
Cutting tools & dies	7,300
Maintenance materials & spare parts	3,000
Office supplies	300
<b>Total</b>	<b>\$ 11,000</b>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <b>Electric Power.</b> Connected load about 200 hp.	\$ 5,400
b. <b>Fuel.</b> About 180,000 gals. oil annually.	\$ 20,000
c. <b>Water.</b> About 800,000 gals. annually for general purposes.	\$ 200

### 4. TRANSPORTATION

	Annual Operating Cost
a. <b>Own Transport Equipment,</b> 2 5-ton trucks for deliveries.	\$ 2,400
b. <b>External Transport Facilities.</b> In & out shipments about 500 tons a month. Good highways needed, and proximity to railroad desirable.	

### 5. MANPOWER

	Number	Annual Cost
a. <b>Direct Labor</b>		
Skilled	13	\$ 78,000
Semi-skilled	15	75,000
Unskilled	7	28,000
<b>Total</b>	<b>35</b>	<b>\$181,000</b>
b. <b>Indirect Labor</b>		
Manager & supervisors	3	\$ 28,000
Office staff	4	18,000
Other	3	11,000
<b>Total</b>	<b>10</b>	<b>\$ 57,000</b>

c. **Training Needs.** Manager, supervisors & 6 skilled workers should be fully experienced. They should be able to do all necessary labor training. Plant should reach full production in 3 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

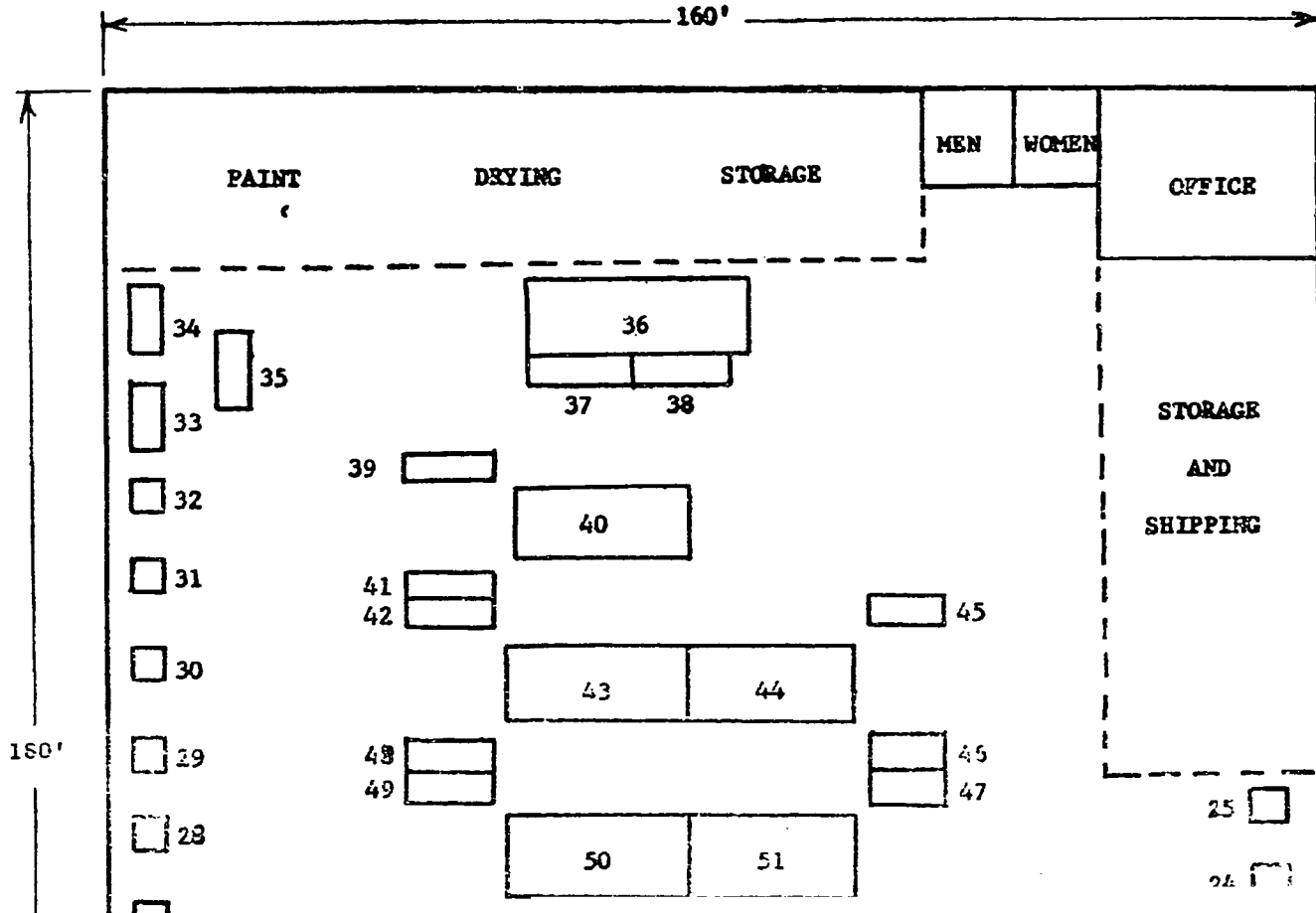
a. <b>Annual Costs</b>	
Direct Materials	\$582,000
Direct Labor	181,000
Manufacturing Overhead(a)	96,000
Admin. Costs(b), Contingencies	75,000
Sales Costs(c), Bad Debts	130,000
Depreciation on Fixed Capital	37,500
<b>Total</b>	<b>\$1,101,500</b>
b. <b>Annual Sales Revenue</b>	<b>\$1,300,000</b>

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 AND TRUCK LEAF SPRINGS: S.I.C. 3493

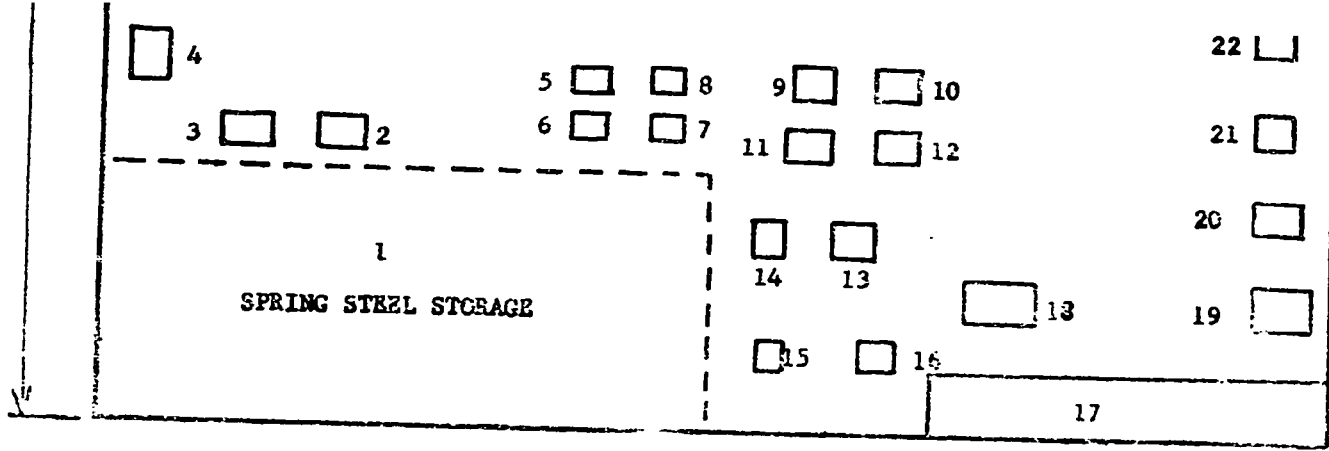
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# PLANT LAYOUT



AUTOMOBILE AND T.

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- |               |                                |    |                          |    |                |
|---------------|--------------------------------|----|--------------------------|----|----------------|
| 1             | Spring steel storage           | 24 | Roll ends machine        | 39 | Quench Tank    |
| 2-3           | Alligator shears               | 25 | Furnace                  | 40 | Furnace        |
| 4             | Vertical power shears          | 26 | Hand roll eye            | 41 | Bending press  |
| 5-6-7-8-12-13 | Small punch presses            | 27 | Furnace                  | 42 | Quenching tank |
| 9-10          | Drill presses                  | 28 | Hand roll eye            | 43 | Furnace        |
| 11            | Furnace                        | 29 | Bushing press            | 44 | Furnace        |
| 14            | Bench grinder                  | 30 | Double wheel end grinder | 45 | Quenching tank |
| 15            | Bench grinder                  | 31 | Ream bushing             | 46 | Bending press  |
| 16            | Power hack saw                 | 32 | Rivet spring clip        | 47 | Bending press  |
| 17            | Bolt stock rack                | 33 | Assemble                 | 48 | Bending press  |
| 18            | Bolt threader                  | 34 | Assemble                 | 49 | Bending press  |
| 19            | Bolt bender                    | 35 | Assemble                 | 50 | Furnace        |
| 20            | Punch press spring clips       | 36 | Annealing                | 51 | Furnace        |
| 21            | Punch press f. rm spring clips | 37 | Shape leaves             | 52 | Quenching tank |
| 22            | Form and roll ends             | 38 | Shape leaves             | 53 | Quenching tank |
| 23            | Furnace                        |    |                          |    |                |

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AUTOMOBILE AND TRUCK LEAF SPRINGS : S.I.C. 3493

SELECTED REFERENCES

I. TEXTBOOKS

- A. Fundamentals of Manufacturing Processes and Materials. C. Edgar. 1965. \$10.50.  
Addison-Wesley Publishing Co., Inc.  
Reading, Mass. 01867
- B. Advances in Machine Tool Design and Research. S. A. Tobias. 1965. \$30.00.  
Pergamon Press  
44-01 21st Street, Long Island City, N. Y. 11101
- C. Fabricated Materials and Processes. T. C. DuMond. 338 p. 1953. \$6.50.  
The Industrial Press  
93 Worth Street, New York, N. Y. 10013  
The problem of selecting methods for small parts. Cost as a factor in selecting fabricated materials and parts. Design and production factors.
- D. Manufacturing Processes : Production. S. E. Rusinoff. 560 p. \$7.25.  
American Technical Society  
848 East 58th Street, Chicago, Ill. 60637  
A presentation of the industrial processes currently employed in the fabrication of metal parts.

II. U.S. GOVERNMENT PUBLICATION

- A. Automobile and Truck Leaf Springs and Mufflers. TI-70. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Presents general picture for establishing plant for producing automobile and truck leaf springs and mufflers.

III. PERIODICALS

- A. Automotive Service Digest. Monthly. \$4.00/year.  
National Market Reports, Inc.  
900 South Wabash Avenue, Chicago, Ill. 60605  
Covers volume market of the automotive service and repair field.
- B. Auto-Truck Parts Digest. Bi-monthly. \$5.00/year.  
Auto-Truck Parts Digest  
24 South Sixth Street, Minneapolis, Minn. 55402  
Official publication of National Auto and Truck Wreckers Association.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,711,314. June 21, 1955. 3 p.  
Vehicle spring suspension of the type in which the effective length of the spring is automatically shortened as the result of an increase in weight on the vehicle frame.
- B. Patent No. 2,690,334. Sept. 28, 1954. 3 p.  
Leaf springs for vehicles, both road and rail, the axles of which are subject to torque due to braking and acceleration.
- C. Patent No. 2,635,870. April 21, 1953. 3 p.  
The construction of vehicle springs, particularly overload springs which enable a vehicle having more or less conventional leaf springs to carry heavier than ordinarily intended loads.

### V. TRADE ASSOCIATION

- A. Spring Research Institute  
1008 Standard Building, Cleveland, Ohio 44113  
Provides members with most recent developments in production and markets in leaf spring industry.

### VI. ENGINEERING COMPANIES

- A. Rust Engineering Company  
930 Fort Duquesne Boulevard, Pittsburgh, Penn. 15222  
Consulting service plus design, engineering, procurement, and construction.
- B. Master Machine and Tool Company  
921 West North Avenue, Chicago, Ill. 60622  
Industrial design.

### VII. DIRECTORY

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

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## BUILDING BRICKS

I. P. No. 66132

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## BUILDING BRICKS: Standard Industrial Classification 3251

### A. PRODUCT DESCRIPTION

Building bricks, 8" long by 3-3/4" wide by 2-1/4" deep, dry weight 5 pounds each, color clay red, made by soft mud method.

### B. GENERAL EVALUATION

Local sources of brick-making materials, situated not far from potential markets, are essential for this industry. Such conditions are not uncommon, and brick-making is an art that has long been practiced in many places. Where brick is commonly used as building material, local manufacturers will certainly already exist. A new plant will, therefore, be required only to meet increased demand and/or replace existing brick kilns, which may be small and technically backward. Where market for new mechanized plant can only be obtained, at least in part, at expense of existing plants, economic justification for its establishment may be found in its ability to produce at lower unit cost. Where capital is scarce and labor relatively abundant, however, costs in modern mechanized plant may not be appreciably lower than in small plants with little modern equipment. Where new building materials are needed, e. g., because wood is becoming scarce or because of rapid urbanization, necessitating use of building materials more appropriate to modern cities than traditional materials used, brick is likely to meet competition from other and newer materials, demand for which is generally growing more rapidly than that for brick. Conditions appropriate to establishing plant of type under consideration are (1) common use of brick in construction; (2) large urban concentration within easy reach of plant, which will normally have to locate near source of raw materials; (3) ability to compete in price with newer materials that are becoming increasingly popular. Especially in view of growing competition from other materials, market situation needs to be studied with special care before making the fairly large investment in fixed capital needed for mechanized production in this industry.

### C. MARKET ASPECTS

1. USERS. Building and public works contractors, individuals for minor jobs.
2. SALES CHANNELS AND METHODS. Sales to building contractors and building materials supply houses.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Transport costs on bricks are too high to make it economically feasible to sell them far from plant. Bulk of production will generally have to be sold within radius of 20 miles or so from plant. Market area may be larger if good system of inland waterways provides cheap transport for heavy goods. b. Export. Bricks are very seldom exported, because of high freight costs. Other construction materials are almost always locally available that are cheaper than exported brick.
4. COMPETITION. a. Domestic Market. In countries where brick is commonly used existing kilns will provide competition. Modern plant would probably be able to compete effectively with small producers where there is substantial market concentrated in small area. In markets outside usual delivery radius small producers could probably hold their own. Within plant's natural market area, concrete and other newer types of materials, which tend to gain in popularity over brick, will be likely to provide major competition. In some areas brick may find market as replacement for wood, as latter becomes scarcer. b. Export Market. For reason given in 3 b., export market is insignificant.
5. MARKET NEEDED FOR PLANT DESCRIBED. In view of variety of materials available for construction and great variations between countries in importance of brick among them, useful generalizations on market required for plant described, in terms of total population, are scarcely possible. By housing standards of many developing areas, this plant could provide materials for adequate dwellings for 5,000 persons or more annually. Where brick is a commonly used building material, taking into consideration competition from existing kilns and from other materials, on the one hand, and, on the other hand, allowing for demand for commercial and public buildings, in addition to housing, plant would probably need to have within normal delivery radius, total population of at least a million people, with fairly high growth rate and building construction keeping pace with general growth.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 6.5 Million

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. 10 acres, including clay & sand deposits, if possible.	\$ --
Building. One story, 7,000 sq. ft. floor space, & office, 500 sq. ft. Equipment, Furniture & Fixtures.	45,000
Prodn. tools & equipmt. \$170,000	
Other tools & equipmt. 3,000	
Furniture & fixtures 1,000	
Transportation equipmt. 4,000	178,000
<b>Total (excl. Land)</b>	<b>\$223,000</b>

Principal Items. Power shovel, dump truck, granulator, disintegrator & crusher, pug mill, automatic brick machine, molds for brick machine, tunnel dryers, cars for drying tunnel, pallets, kilns, conveyors, delivery truck.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 31,800
Admin. & Sales Costs(b), Contingencies	30	2,300
Training Costs		11,400
<b>Total Working Capital</b>		<b>\$ 45,500</b>

**a. TOTAL CAPITAL (EXCL. LAND) \$268,500**

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Clay	20,000 tons	\$ 900
Parting sand	350 tons	1,700
<b>Total</b>		<b>\$ 2,600</b>

#### b. Supplies

Maintenance & repair parts	1,000
Hand tools	200
Lubricants	100
Office supplies	200
<b>Total</b>	<b>\$ 1,500</b>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load 200 hp.	\$ 6,000
b. <u>Fuel.</u> 4,500 tons of coal annually.	\$ 22,500
c. <u>Water.</u> About 900,000 gals. annually.	\$ 250

### 4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 5-ton truck for deliveries.	\$ 1,200
b. <u>External Transport Facilities.</u> Total in & out shipments about 4,000 tons a month. Shipments close to plant will be made by truck. Some buyers will pick up bricks at plant. Plant should be located on good highway and as near to railroad as possible.	

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	2	\$ 12,000
Semi-skilled	17	85,000
Unskilled	8	32,000
<b>Total</b>	<b>27</b>	<b>\$129,000</b>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 16,000
Office staff	1	4,500
Other	2	7,500
<b>Total</b>	<b>5</b>	<b>\$ 28,000</b>

c. Training Needs. Manager & supervisor should be fully experienced and, with assistance of 2 skilled workers, should be able to do all labor training. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

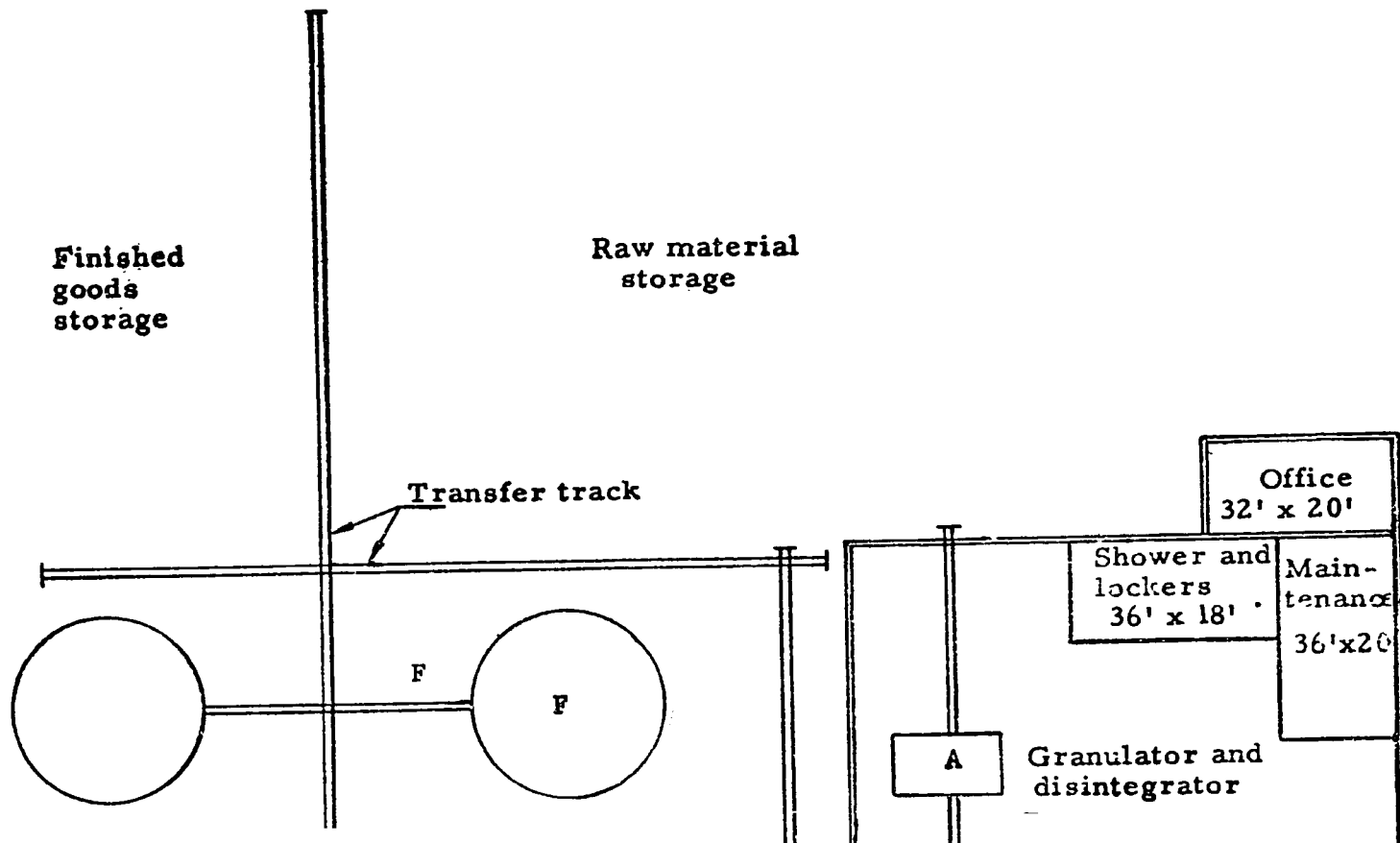
a. <u>Annual Costs</u>	
Direct Materials	\$ 2,600
Direct Labor	129,000
Manufacturing Overhead(a)	59,450
Admin. & Sales Costs(b), Bad Debts, Contingencies	30,000
Depreciation on Fixed Capital	20,950
<b>Total</b>	<b>\$242,000</b>
b. <u>Annual Sales Revenue</u>	<b>\$300,000</b>

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

BUILDING BRICKS: S.I.C. 3251

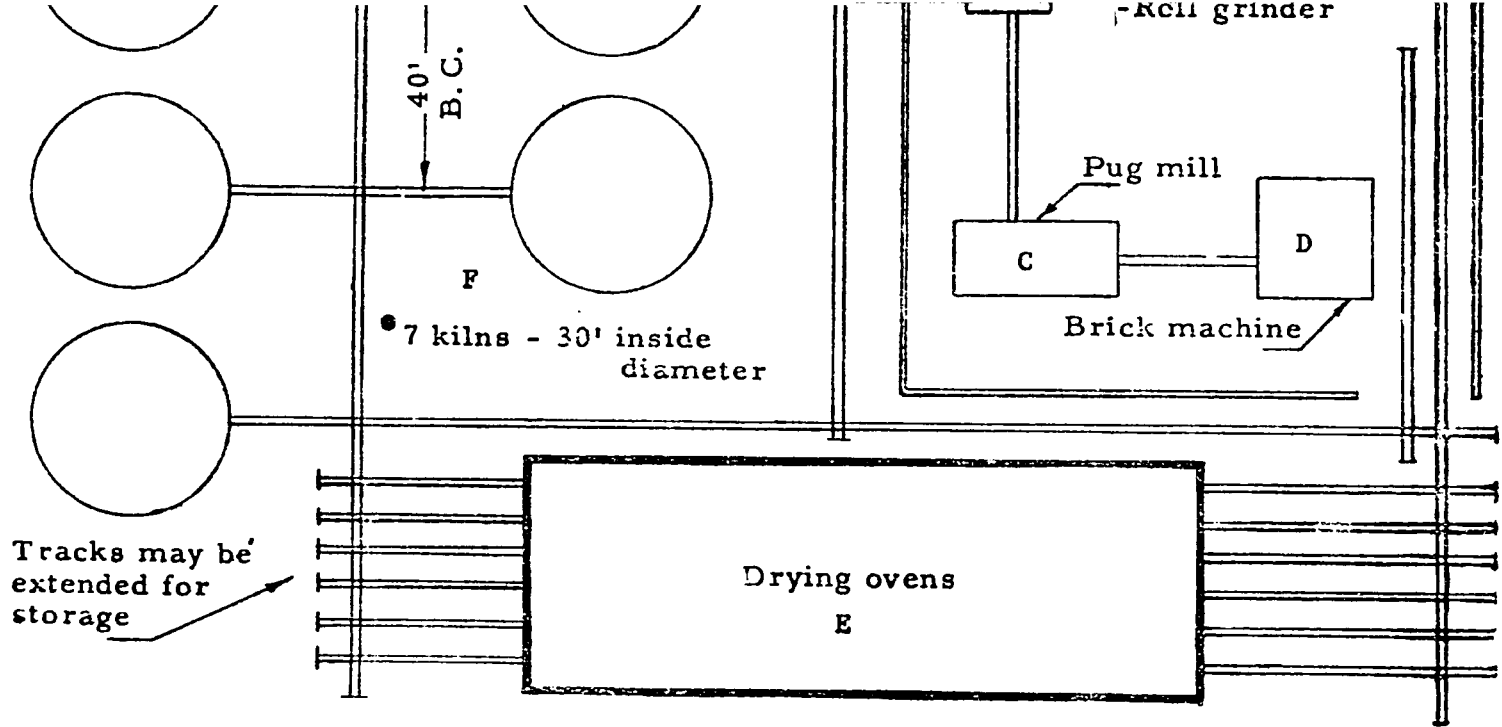
260

# PLANT LAYOUT AND WORK FLOW



BUILDING

261



Building height - 20 feet

- A. Granulator and disintegrator
- B. 2-roll grinder
- C. Pug mill
- D. Brick machine
- E. Drying ovens
- F. 7-kilns

10/27



## BUILDING BRICKS: S.I.C. 3251

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Applied Clay Mineralogy. Ralph E. E. Grim. 1962. Illus. \$13.75.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street, New York, N. Y. 10036  
Deals with the composition of clay materials.
- B. Clays and Clay Minerals. W. F. Bradley, ed. \$5.00.  
Pergamon Press  
44-01 21st Street, Long Island City, N. Y. 11101
- C. Reinforced Brick Masonry. Harry C. Plummer and John A. Blume. 271 p.  
\$4.95.  
Structural Clay Products Institute  
1520 18th Street, N. W., Washington, D. C. 20036  
Thoroughly covers its subject and includes a bibliography.

#### II. U. S. GOVERNMENT PUBLICATION

- A. Heat Transfer Through Building Walls. EP 291. Gratis.  
National Bureau of Standards  
Washington, D. C. 20234

#### III. PERIODICALS

- A. The Brick and Clay Record. Monthly. \$5.00/year.  
Industrial Publications, Inc.  
5 South Wabash Street, Chicago, Ill. 60603  
New trends and developments for manufacturers of burned clay products.
- B. Ceramic Age. Monthly. \$4.00/year.  
Ceramic Publications, Inc.  
Ninth-Chester Building, Cleveland, Ohio 44114  
News on progress in the industry including materials, supplies, engineering machinery, and management.

#### IV. U. S. PATENTS

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

- A. Patent No. 2,710,696. June 14, 1955. 62 p.  
Materials handling devices for handling bricks after they have been shaped.
- B. Patent No. 2,787,040. April 2, 1957. 9 p.  
Mobile brick making unit for entire process except curing.

## SELECTED REFERENCES (Continued)

### V. TRADE ASSOCIATIONS

- A. National Building Material Distributors Association  
22 West Monroe Street, Chicago, Ill. 60603
- B. Structural Clay Products Institute  
1520 18th Street, N. W., Washington, D. C. 20006  
Research, technical information, marketing, promotion in the structural  
clay products industry.
- C. National Association of Home Builders of the United States  
1625 L Street, N. W., Washington, D. C. 20006

### VI. ENGINEERING COMPANIES

- A. Hewitt-Robbins, Inc.  
664 Glenbrook Road, Stamford, Conn. 06906  
Specialists in design, construction of bulk handling systems for conveying,  
stacking, blending and reclaiming materials.
- B. Ferro Corporation  
Harvard and East 56th Streets, Cleveland, Ohio 44105  
Ceramic engineers.

### VII. DIRECTORY

- A. MacRea's Blue Book. \$15.00.  
W. J. Brown  
118 East Huron Street, Chicago, Ill. 60611  
Industries, equipment, products and materials.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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

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

### ORDERING INSTRUCTIONS

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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

## CEMENT

I. P. No. 66133

*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.

## CEMENT : Standard Industrial Classification 3241

### A. PRODUCT DESCRIPTION

Portland cement, manufactured in a rotary kiln. Various alternative combinations of raw materials may be used. Choice of them will depend on local availability. Other types of cement, e.g. masonry cement, may be made with the equipment described.

### B. GENERAL EVALUATION

The growing use of cement as a construction material, the widespread presence of raw materials that can be used to make it, and the advantage of local production of a bulk commodity of this kind from the point of view of keeping down transport costs recommend the cement industry as suitable for many developing areas. Against the advantages enumerated must be placed the fact that any cement plant, even the relatively very small one described, which is about the minimum practicable size, necessitates a very substantial capital investment, and also demands a fair amount of skilled labour. In spite of this drawback, developing areas usually give high priority to the establishment of cement plants, and often they have proved to be profitable ventures.

### C. MARKET ASPECTS

1. USERS. Construction and public works contractors, railroads, various industries.
2. SALES CHANNELS AND METHODS. Sales are commonly made direct to large users, as well as to distributors for re-sale in small lots.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Generally cement is not shipped very far from the point of manufacture, owing to heavy transport costs. In the United States cement plants are scattered all over the country, and the market radius on the average probably does not exceed 100 miles. In some countries, however, cheap transport by barge over inland waterways, or by coastal ships, may permit sales at much greater distances. b. Export. Where cement plants are located at ports and can load directly into ocean vessels, sales to distant countries are possible.
4. COMPETITION. a. Domestic Market. Competition from imports is likely to fluctuate in intensity. Surplus capacity sometimes develops rather suddenly and unexpectedly in this industry, and producers are sometimes prepared to sell abroad at low prices in order to maintain operations. Competition from alternative materials will depend largely on comparative costs, and this will vary greatly from area to area. b. Export Market. This plant would be too small to compete in general export business. Some regional sales might occasionally be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for cement will depend on the extent of new construction of various kinds that is under way, types of buildings in common use, cost of alternative materials, etc. A fairly modern and progressive urban area with a population of the order of a million people should generally develop sufficient demand for cement to support a plant of this size.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 35,000 Tons

### 1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	<u>Cost</u>
<u>Land.</u> Including deposits of clay & limestone - 80 acres.	\$ --
<u>Building.</u> Total floor space area 50,000 sq. ft., including production, storage, power & office.	300,000
<u>Equipment, Furniture &amp; Fixtures.</u>	
Prodn. tools & equipmt. \$1,200,000	
Other tools & equipmt. 50,000	
Furniture & fixtures 2,000	1,252,000
<u>Total (excl. Land)</u>	<u>\$1,552,000</u>

Principal Items. Air drills & compressor, diesel shovels & dump cars, diesel locomotive & railroad siding, crusher, hammer mill, conveyor & elevator, rough mill & slurry tanks, air compressor, kiln & feed tank, rotary clinker cooler, clinker conveyor & silos, finish mill elevator & conveyor, packaging equipment, laboratory equipment, pumping equipment, water storage, maintenance equipment, power plant.

### b. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 71,300
Admin. Costs(b), Contingencies, Sales Costs(c)	30	6,300
Training Costs		25,400
<u>Total Working Capital</u>		<u>\$103,000</u>

c. TOTAL CAPITAL (EXCL. LAND) \$1,655,000

### 2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Limestone	52,000 tons)	Cost in land
Clay	11,500 tons)	depletion
Gypsum	1,600 tons	11,000
Bags		18,000
<u>Total</u>		<u>\$ 29,000</u>
b. <u>Supplies</u>		
Lubricants & hand tools	\$ 700	
Refractories, brick, clay & cement	18,000	
Maintenance & repair parts	6,000	
Office supplies	300	
<u>Total</u>		<u>\$ 25,000</u>

### 3. POWER, FUEL AND WATER

a. <u>Electric Power.</u> Connected load about 900 hp. Plant produces own power.	<u>Annual Cost</u>
b. <u>Fuel.</u> About 36,000 barrels of Bunker C oil annually.	\$ 72,000
c. <u>Water.</u> About 10.8 mn. gals. annually.	\$ 2,500

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 4,000 tons a month. Railroad siding & good highway necessary.

### 5. MANPOWER

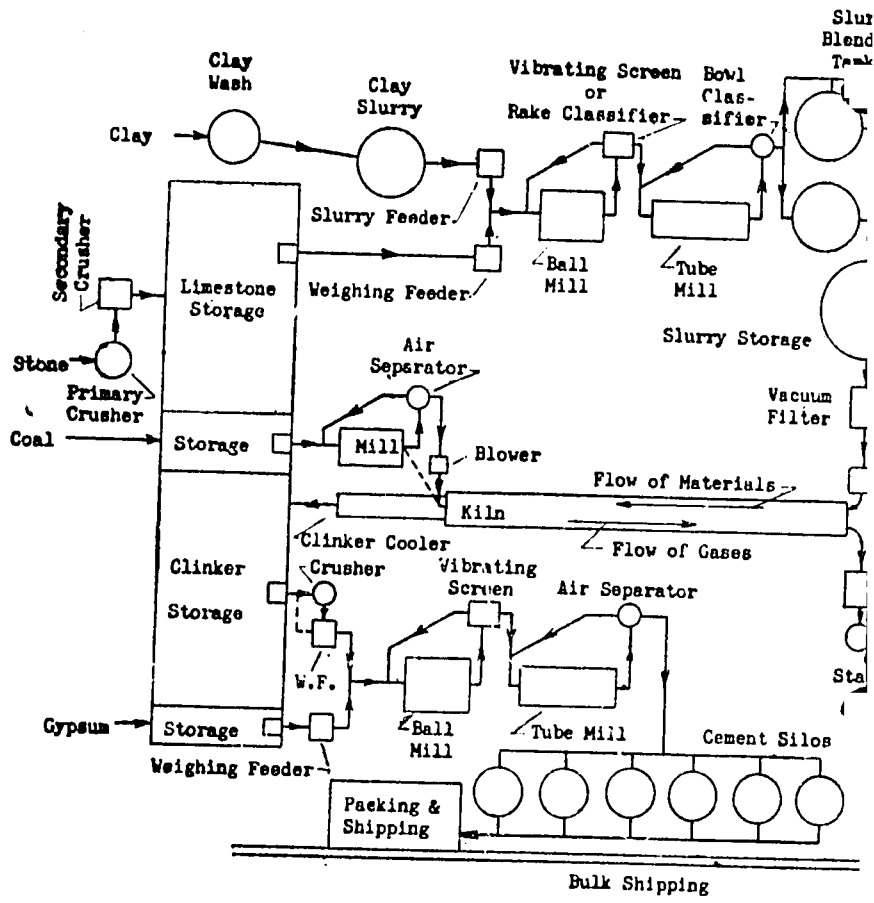
a. <u>Direct Labor</u>	<u>Number</u>	<u>Annual Cost</u>
Skilled	10	\$ 60,000
Semi-skilled	20	100,000
Unskilled	20	80,000
<u>Total</u>	<u>50</u>	<u>\$240,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisors	3	\$ 26,000
Chemist	1	9,000
Office	2	9,000
Other	3	15,000
<u>Total</u>	<u>9</u>	<u>\$ 59,000</u>

- c. Training Needs. Manager & supervisors should be fully experienced. With aid of 6 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	\$ 29,000
Direct Labor	240,000
Manufacturing Overhead(a)	158,500
Admin. Costs(b), Contingencies	50,000
Sales Costs(c), Bad Debts	30,000
Depreciation on Fixed Capital & Land Depletion	145,200
<u>Total</u>	<u>\$652,700</u>
b. <u>Annual Sales Revenue</u>	<u>\$875,000</u>

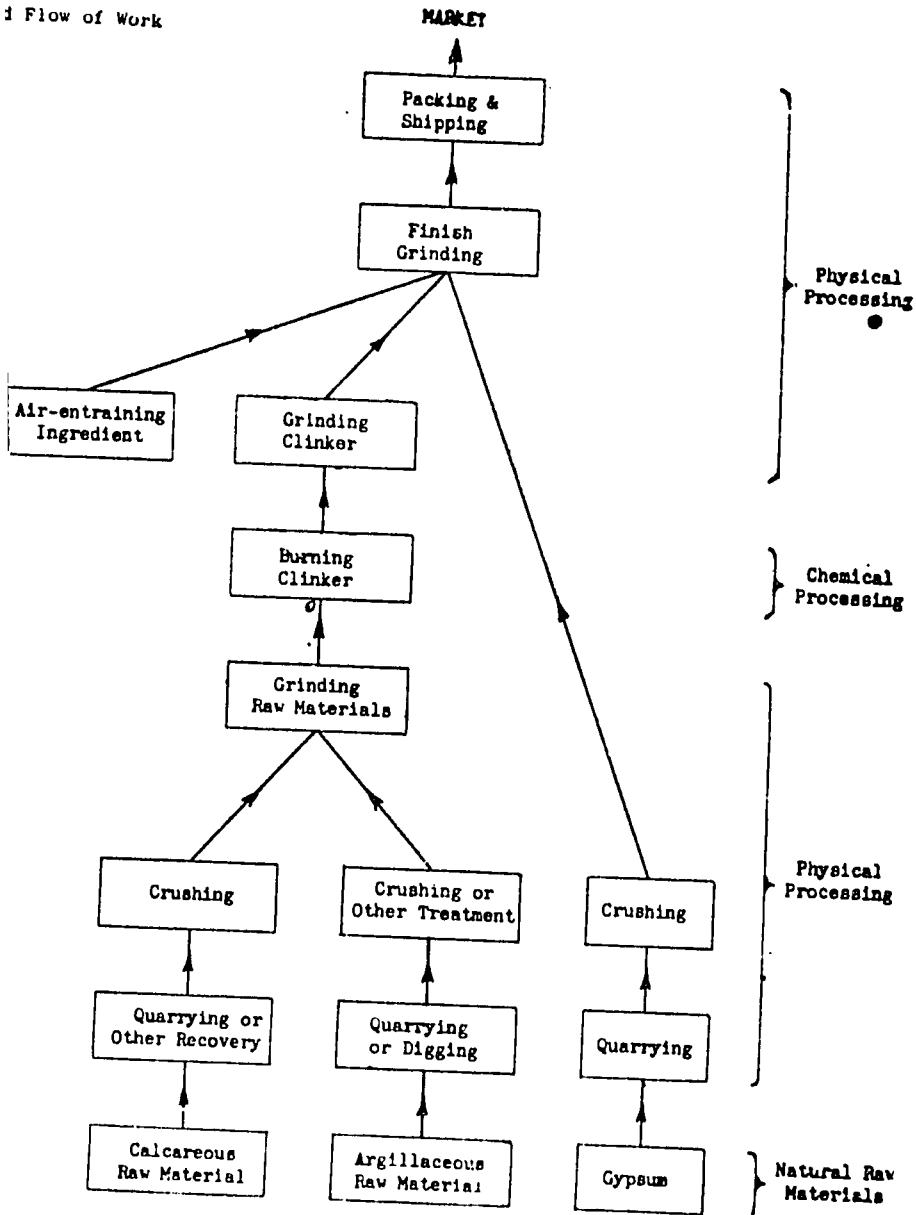
NOTES. (a) Includes Supplies, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.



2657

.I.C. 324i

Flow of Work



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CEMENT: S.I.C. 3241

SELECTED REFERENCES

I. TEXTBOOKS

- A. Chemistry of Cements. H.F.W. Taylor, ed. 2 Vols. 1964. Vol. 1, \$16.50; Vol. 2, \$15.00.  
Academic Press, Inc.  
111 Fifth Avenue, New York, N. Y. 10003
- B. Portland Cement and Asphalt Concretes. Illus. 1963. \$6.95.  
McGraw-Hill Book Co., Inc.  
330 West 42nd Street, New York, N. Y. 10036
- C. Technology of Cement and Concrete. R.F. Blanks and H.L. Kennedy. 1955  
2 Vols. Illus. \$22.00.  
John Wiley and Sons, Inc.  
605 Third Avenue, New York, N. Y. 10016
- D. Chemistry of Cement and Concrete. F. M. Lea and C. H. Desch. 1956.  
1100 p. Illus. \$15.00.  
St. Martin's Press, Inc.  
175 Fifth Avenue, New York, N. Y. 10010

II. U. S. GOVERNMENT PUBLICATIONS

- A. Cement. IR 17940. 20 p. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Plant requirements, method of production, and operating costs for a  
cement plant having a capacity of 100 metric tons a day.
- B. Portland and Other Hydraulic Cements. Gratis.  
United States Bureau of Mines  
U. S. Department of the Interior  
Washington, D. C. 20240

III. PERIODICALS

- A. Rock Products. Monthly. \$3.50/year.  
Maclean-Hunter Publishing Corporation  
59 West Monroe Street, Chicago, Ill. 60603  
Articles on equipment and manufacturing processes relating to rock  
products, including various cements.
- B. Pit and Quarry. Monthly. \$3.00/year.  
Complete Service Publishing Company  
431 South Dearborn Street, Chicago, Ill. 60605  
Technical and trade articles on main phases of limestone and related pit  
and quarry products.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

Available U. S. Patent Office

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

- A. Patent No. 2,987,164. 1961. 5 p.  
Handling apparatus for cement and other bulk materials.
- B. Patent No. 2,907,606. 1959. 4 p.  
Means for controlling the operation of material conveying device.
- C. Patent No. 2,899,601. 1959. 6 p.  
Vibrating screen for components of cement.
- D. Patent No. 2,888,324. 1959. 4 p.  
Method and apparatus for hydrating calcitic and dolomite quicklimes.
- E. Patent No. 2,857,148. 1958. 3 p.  
Method of firing rotary kilns and gas burner thereof.

### V. TRADE ASSOCIATIONS

- A. Portland Cement Association  
33 West Grand Avenue, Chicago, Ill. 60610
- B. American Concrete Institute  
P. O. Box 4754, Redford Station, Detroit, Mich. 48219

### VI. ENGINEERING COMPANY

- A. Kennedy-Van Sann Manufacturing & Engineering Corporation  
2 Park Avenue, New York, N. Y. 10016  
Cement plant design, construction, initial operation, and training of personnel.

### VII. DIRECTORY

- A. Pit and Quarry Handbook. \$3.00.  
Pit and Quarry Publications  
370 Lexington Avenue, New York, N. Y. 10017

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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

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# INDUSTRY PROFILES

## CERAMIC DINNERWARE

I. P. No. 66134

*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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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.

## CERAMIC DINNERWARE: Standard Industrial Classification 3262

### A. PRODUCT DESCRIPTION

Relatively heavy, serviceable semivitreous dinnerware, including cups, saucers, 6-inch and 10-inch plates, salad bowls, large serving bowls. Other items can be added if demand exists.

### B. GENERAL EVALUATION

This plant requires experienced management and a fair number of skilled workers. Since, however, ceramics making is ancient and widespread art, it will often be possible to find workers familiar with the craft who can be trained without great difficulty in mechanized operations. Good design is highly important if the plant is to compete successfully with imports and products of small kilns, still more so if it is hoped to find some overseas customers. Cost of materials is a small part of total costs and it would generally be economically feasible to base production on imported materials.

### C. MARKET ASPECTS

1. USERS. Households, restaurants, communal eating places.
2. SALES CHANNELS AND METHODS. Sales generally to wholesalers, sometimes direct to large stores and institutions. Brand name is customary.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Product needs careful handling and transport costs may to some extent limit domestic market area. However, in country of moderate size and with reasonably efficient transport system potential market may be nation-wide. b. Export. Products are widely exported.
4. COMPETITION. a. Domestic Market. Competition in domestic market may come from three sources. That from imports is generally the most important. Lowpriced ceramic dinnerware is exported in large quantities. Second possible source of competition is plastics industry, which now makes reasonably good substitutes for cheap ceramic ware, though plastics perhaps compete more directly with still cheaper tableware (see Industry Profile on Kitchen Earthenware: S.I.C. 3269.) Third possible source of competition in some areas is production from small kilns. Latter can often produce at low cost articles that are preferred by some people to standardized factory products on account of their variety and superior artistic qualities. b. Export Market. Competition is very keen. In Japan some plants manufacture primarily for export, and in some European countries exports are very important part of business of some makers. These manufacturers are highly experienced in selling overseas, and plant of size under consideration would stand little chance in competition with them. However, if plant is able to produce articles of original and distinctive design and obtain protection against imitation, there may be possibility of some overseas sales.
5. MARKET NEEDED FOR PLANT DESCRIBED. Where per capita income is very low, even comparatively low-priced products such as these may be saleable only to a relatively small class with above-average incomes. Eating habits are also important and are to some degree independent of income. Only where dinnerware of this type is in general use will there commonly be economic justification for establishing plant such as that described. In such situations plant could probably supply needs for additions and replacements of a growing community of at least two million people.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 75,000 Dozen Pieces

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 20,000 sq. ft.	\$ --
Building. One story, 9,000 sq. ft.	54,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$90,000
Other tools & equipmt.	1,500
Furniture & fixtures	2,000
Transportation equipmt.	2,500
<u>Total (excl. Land)</u>	<u>\$150,000</u>

Principal Items. Elevator conveyor, batch car & hoist, blunger, agitator, filter press, pug mill, batter-out machines, jiggers, driers, ball mill, spray booth, oil-fired kiln, pickup truck.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 33,800
Admin. & Sales Costs(b), Contingencies,	30	4,200
Training Costs		21,000
<u>Total Working Capital</u>		<u>\$ 59,000</u>

2. TOTAL CAPITAL (EXCL. LAND) \$209,000

### 2. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
a. Direct Materials		
Flint	188 tons	\$ 2,200
Feldspar	63 tons	1,450
Kaolin	125 tons	1,900
Ball clay	147 tons	3,000
Glaze	38 tons	18,750
Packaging		1,400
<u>Total</u>		<u>\$ 28,700</u>

#### Supplies

Lubricants & tools	\$ 1,400
Maintenance & repair parts	800
Office supplies	300
<u>Total</u>	<u>\$ 2,500</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load about 100 hp.	<u>\$ 2,500</u>
b. <u>Fuel.</u> To assure uniform firing oil is generally used. Annual consumption about 40,000 gals.	<u>\$ 5,000</u>
c. <u>Water.</u> Good quality essential. Water supply & disposal facilities of prime importance in choosing plant site	<u>\$ 1,000</u>

### 4. TRANSPORTATION

	Annual Operating Cost
a. <u>Own Transport Equipment.</u> 1-ton pickup & delivery truck.	<u>\$ 1,000</u>
b. <u>External Transport Facilities.</u> In & out shipments about 120 tons a month. Good all-weather highway needed.	

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	11	\$ 66,000
Semi-skilled	3	15,000
Unskilled	11	44,000
<u>Total</u>	<u>25</u>	<u>\$125,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 10,000
Chemist-foreman	1	9,000
Office staff	2	10,000
Other	2	8,000
<u>Total</u>	<u>6</u>	<u>\$ 37,000</u>

c. Training Needs. Manager & chemist-foreman should be fully experienced in ceramics manufacture and be able to train workers in all operations. Initially, 3 experienced operators should assist with training. Plant should reach full production in about 3 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

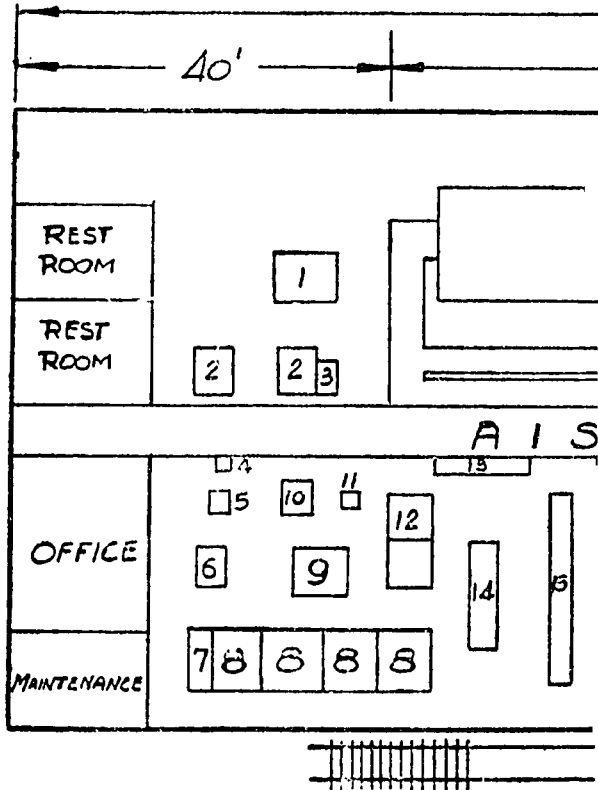
a. <u>Annual Costs</u>	
Direct Materials	\$ 28,700
Direct Labor	125,000
Manufacturing Overhead(a)	49,000
Admin. & Sales Costs(b), Bad Debts, Contingencies	54,000
Depreciation on Fixed Capital	12,800
<u>Total</u>	<u>\$269,500</u>
b. <u>Annual Sales Revenue</u>	<u>\$315,000</u>

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

CERAMIC DINNERWARE: S.I.C. 3262

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# CERAMIC

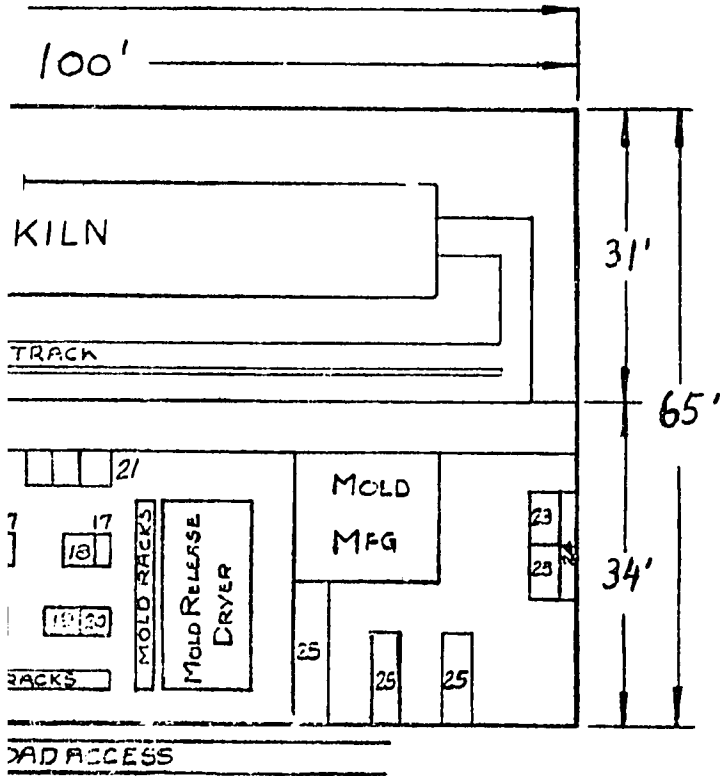


## Key

- |                               |            |
|-------------------------------|------------|
| 1. Glaze oven                 | 9. Blun    |
| 2. Glaze spray booths         | 10. Slip   |
| 3. Glaze tubs                 | 11. Slip   |
| 4. Glaze magnetic filter      | 12. Slip   |
| 5. Glaze liquid screen filter | 13. Slip   |
| 6. Glaze ball mill            | 14. Filter |
| 7. Glaze storage bin          | 15. De-a   |
| 8. Storage bins for clays     | 16. Cup    |
|                               | 17. Clay   |

WARE : S.I.C. 3262

LAYOUT



- 18. Batter-out machines
- 19. Jiggers
- 20. Pottery whirler
- 21. Finishing Wheels
- 22. Finishing lathe
- 23. Packing tables
- 24. Packing materials bins
- 25. Storage racks



## CERAMIC DINNERWARE: S.I.C 3262

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Practical Pottery and Ceramics. K. I. Clark. Illus. 1964. \$6.50.  
Viking Press  
625 Madison Avenue, New York, N. Y. 10022
- B. Ceramics. Krevolin, Lewis and Elizabeth Constantine. 1965. \$1.00.  
Pitman Publishing Co.  
20 East 46th Street, New York, N. Y. 10017
- C. Industrial Ceramics. F. and S. Singer. Ill. 1965. \$40.00.  
Tudor Publishing Co.  
221 Park Avenue South, New York, N. Y. 10003
- D. Introduction to Ceramics. W. D. Kingery. 1960. Illus. \$15.00.  
John Wiley and Sons, Inc.  
605 3rd Avenue, New York, N. Y. 10016
- E. Ceramics. Vincent A. Roy. McGraw-Hill Publications in Industrial Arts. 1959. \$7.75.  
McGraw-Hill Book Co., Inc.  
330 W 42nd Street, New York, N. Y. 10036  
Constructing, designing, decorating, glazing, firing. Suggested bibliography.

#### II. U.S. GOVERNMENT PUBLICATIONS

- A. Bibliography on Ceramic Products IR-i6930
- B. Bibliography on Ceramics IR-18836
- C. A complete directory of Ceramic Materials 0-9  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

#### III. PERIODICALS

- A. American Ceramic Society Bulletin.  
Monthly. \$8.00/year.  
American Ceramic Society  
4055 N. High Street, Columbus, Ohio 43214  
Research papers on ceramic materials, their manufacture, testing and applications, with reports on ceramics and allied sciences abroad.
- B. Ceramic Industry. Monthly. \$8.00/year.  
Industrial Publications, Inc.  
5 S. Wabash Ave., Chicago, Ill. 60607  
Management, engineering, and production of porcelain enamel, electronic and other new ceramics.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent N 2,920,740. Sept. 8, 1959. 11 p.  
This patent relates to completely automatic apparatus that receives bulk clay and turns out dinnerware.
- B. Patent No. 2,587,271. Feb. 26, 1952. 18 p.  
Method and apparatus for use in manufacturing dinnerware and the like from plastic material such as clay.

V. TRADE ASSOCIATIONS

- A. American Ceramic Society  
4055 North High Street  
Columbus, Ohio 43214
- B. National Institute of Ceramic Engineers  
4055 North High Street  
Columbus, Ohio 43214

I. ENGINEERING COMPANY

- A. Harrop Ceramic Service Co.  
Pearl and Gay Streets  
Columbus, Ohio 43215  
Ceramic design, plant construction, equipment, tests, analyses.

## 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

## COIL SPRINGS

I. P. No. 66135

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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.

## COIL SPRINGS: Standard Industrial Classification 3481

### A. PRODUCT DESCRIPTION

For stock springs, up to 3/4" by 2", tension and compression springs, 1/2" to 2" diameter, hot method; tension and compression springs, No. 33 to No. 3 American Steel and Wire Gauge, cold method; torsion springs; rings, closed-opens, cold method; Bowden cable; special shapes. Many other varieties of springs can be made in this plant.

### B. GENERAL EVALUATION

This industry requires a fairly substantial capital investment, and moderately high labor skills. Since the plant described will normally have to depend mainly on domestic sales, its establishment will only be economically feasible where a sizable industrial complex, including numerous industries using springs, has already developed.

### C. MARKET ASPECTS

1. USERS. A large variety of industries.
2. SALES CHANNELS AND METHODS. The great bulk of sales is normally made direct to user industries. In many cases springs will be made to the particular specifications of customers.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products have a high enough unit value to bear transport costs over an extensive market area that may be nationwide. b. Export. Springs are shipped all over the world from the major metal manufacturing countries.
4. COMPETITION. a. Domestic Market. An efficiently run plant, even if it is using imported materials, should be able to meet the competition of imports. b. Export Market. Some sales in neighboring countries might be possible, but this plant could not compete in general export business with large-scale producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for the products of this plant will exist only where local user industries have already been developed on an appreciable scale.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 100 Tons

### 1. CAPITAL REQUIREMENTS

<b>a. FIXED CAPITAL</b>		
Land. About 1 acre.		\$ --
Building. One story, 106'x115',	72,000	
Equipment. Furniture & Fixtures.		
Prodn. tools & equipmt.	\$393,000	
Other tools & equipmt.	55,000	
Furniture & fixtures	2,000	450,000
Total (excl. Land.)		\$522,000

Principal Items. Alligator shears 2", clutch type spring coiler (4), torsion type spring winder (3), ring coiling machine, flexible casing coiler, tunnel type bar heating furnace (2), taper rolling machine (2), open end heating forge, ring coiling machine-cold method, spring setting machine-light duty, hydraulic coiling machine-hot method, hydraulic bulldozing machine for spring setting, tool room & heat treat equipment.

### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 40,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	4,600
Training Costs		20,000
Total Working Capital		\$ 65,000

c. TOTAL CAPITAL (EXCL. LAND) \$587,000

### 2. MATERIALS AND SUPPLIES

<b>a. Direct Materials</b>		Annual Requirements	Annual Cost
Steel	120 tons	\$	24,000
Packaging material			3,000
Total		\$	27,000

### b. Supplies

Lubricants & hand tools	\$	200
Cutting tools		1,000
Welding rods & gas		1,000
Maintenance & repair parts		3,000
Office supplies		300
Total	\$	5,500

### 3. POWER, FUEL AND WATER

		Annual Cost
<b>a. Electric Power. Connected load about 120 hp.</b>		
		\$ 3,600
<b>b. Fuel. For production &amp; heating.</b>		
Production 10,000 gals. oil	1,200	
Heating-any local fuel.	300	\$ 1,500
<b>c. Water. About 800,000 gals. annually.</b>		
		\$ 200

### 4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. No special requirement.

### 5. MANPOWER

	Number	Annual Cost
<b>a. Direct Labor</b>		
Skilled	6	\$ 36,000
Semi-skilled	9	45,000
Unskilled	6	23,000
Total	21	\$105,000
<b>b. Indirect Labor</b>		
Manager & Supervisors	4	\$ 38,000
Office	5	22,000
Other	10	40,000
Total	19	\$100,000

c. Training Needs. Manager & supervisors should be experienced. Together with 6 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

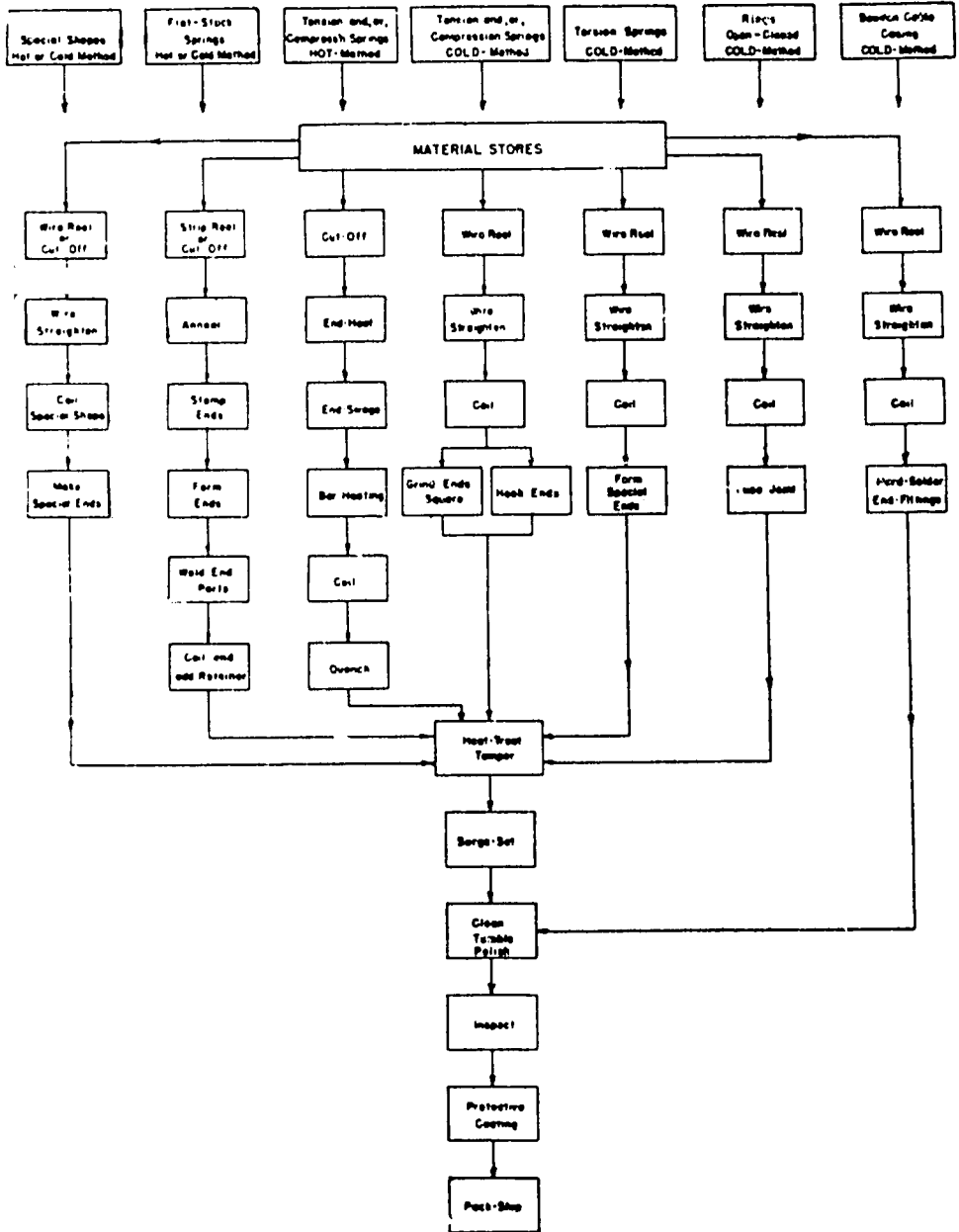
<b>a. Annual Costs</b>		
Direct Materials	\$	27,000
Direct Labor		105,000
Manufacturing Overhead(a)		110,800
Admin. Costs(b), Contingencies		28,600
Sales Costs(c), Bad Debts		30,000
Depreciation on Fixed Capital		54,100
Total	\$	355,500
<b>b. Annual Sales Revenue</b>		\$ 480,000

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



S. I. C. 3481

WORK FLOW





COIL SPRINGS: S.I.C. 3481

SELECTED REFERENCES

I. TEXTBOOKS

- A. Mechanical Springs. A. M. Wahl. 2nd edn. 1963. \$12.75.  
McGraw-Hill Book Co., Inc.  
330 West 42nd Street, New York, N. Y. 10036
- B. Design of Machine Element. V. M. Faires. 4th edn. 1965. 550 p.  
Illus. \$11.00  
Macmillan Company  
60 Fifth Avenue, New York, N. Y. 10011  
Engineering, design, computations, and production of machine elements  
including springs.
- C. Helical Spring Tables. J. D. Gayer and P. H. Stone, Jr. 1955. 165 p.  
\$6.50.  
The Industrial Press  
93 Worth Street, New York, N. Y. 10013  
Simplifying helical spring design, life, stress and material conversion  
factors, arranged by coil diameters.
- D. Mechanical Engineering Design. J. E. Shigley. 1963. Illus. \$10.95.  
Mc-Graw-Hill Book Co., Inc.  
330 West 42nd Street, New York, N. Y. 10036  
Selection and design of such machine elements as springs, and relevant  
methods of manufacture.

II. U. S. GOVERNMENT PUBLICATION

- A. Coil Springs. OD-7. May 1957. 19 p. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICALS

- A. Wire and Wire Products. Monthly. \$8.00/year.  
Quinn-Brown Publishing Company  
453 Main Street, Stamford, Conn. 06901  
Materials, equipment, and new processes relating to wire and wire  
products.
- B. Materials in Design Engineering. Monthly. \$3.00/year.  
Reinhold Publishing Corporation  
430 Park Avenue, New York, N. Y. 10022  
Most recent industrial applications of metals, non-metallics, forms, and  
finishes.

SELECTED REFERENCES (Continued)

IV. U.S. PATENTS

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

- A. Patent No. 2,946,536. 1960. 4 p.  
Pay off reel for wire in the manufacture of wire products.
- B. Patent No. 2,925,115. 1960. 4 p.  
Spring coiling machine with means of permitting removal of terminal portion of wire.
- C. Patent No. 2,923,343. 1960. 20 p.  
Length measure and cutting means for spring coiling machines.
- D. Patent No. 2,902,079. 1959. 9 p.  
Spring coil machine with means for separating feed rolls during a cutting cycle.
- E. Patent No. 2,820,505. 1958. 11 p.  
Spring coil mechanism having a coiling abatement holder.

V. TRADE ASSOCIATIONS

- A. Spring Manufacturers Institute  
81 Main Street, Bristol, Conn. 06010
- B. Spring Research Institute  
1008 Standard Building, Cleveland, Ohio 44113

VI. ENGINEERING COMPANY

- A. Morris and Van Wormer, Engineers  
25 Broad Street, New York, N. Y. 10004  
Design and build spring plants.

VII. DIRECTORY

- A. Directory of Iron and Steel Plants. \$16.00.  
Steel Publications, Inc.  
624 Grant Building, Pittsburgh, Penn. 15230

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## KITCHEN EARTHENWARE

I. P. No. 66136

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## KITCHEN EARTHENWARE : Standard Industrial Classification 3269

### A. PRODUCT DESCRIPTION

White, undecorated pottery for table and kitchen use, including plates, cups, saucers, dishes, of simple design.

### B. GENERAL EVALUATION

This industry has the advantage that manufacturing operations are comparatively simple. Moreover, since pottery making is an ancient and widespread art, there is often a supply of workers familiar with more primitive forms of pottery making who can be trained without great difficulty in the processes of a mechanized plant. Obtaining a good manager, chemist-foreman and machinery maintenance men may present greater problems. This industry is appropriate where the bulk of the raw materials are locally produced.

### C. MARKET ASPECTS

1. USERS. Households, restaurants, communal eating places, military forces.
2. SALES CHANNELS AND METHODS. Sales to wholesalers, large stores, any bulk users, such as military. Brand names are common.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. In relation to unit value of pottery of this quality, transport costs are high. Product also requires careful handling if breakages are to be kept within reasonable limits. Market area may therefore be fairly restricted, especially if small kilns catering to local market for simple pottery ware are distributed through the country. However, where a good system of inland waterways provides cheap transport for heavy and bulky goods, factory products of this type may move considerable distances from plant to consumers. b. Export. Simple but serviceable pottery is made in many areas, often by primitive but nevertheless low cost methods. Because of freight costs imports often cannot compete in this range of price and quality. Most export pottery is of higher value.
4. COMPETITION. a. Domestic Market. Some direct competition from imports may exist where exporters are located advantageously. Imported ware of higher quality and price, if price is relatively low, may also compete, e. g. some Japanese ware of superior quality and fairly good design is sold at prices low enough to attract buyers who might otherwise buy cheaper ware. Small kilns may provide strong competition in some countries, especially where esthetic preference for handmade ware over standardized factory products lingers. b. Export Market. Export market for these products will normally be firmly in the hands of large-scale ceramic manufacturers with large variety of products of different qualities and designs and with experienced export departments. Plant described might make some sales in easily accessible areas of neighboring countries.
5. MARKET NEEDED FOR PLANT DESCRIBED. In the conditions of developing areas the plant could probably meet needs of about 2 million people for additions to total stocks of these products and for replacements. As pointed out above, local market for cheap table and kitchenware may be currently supplied in large part by products of small kilns and only where population within the area that can be served is dense or there is unusually rapid population growth would it be possible to obtain a market without making inroads on business of small kilns. In so far as plant's production replaces imports, this effect will, of course, be reduced.

## 9. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 4 Million Pieces

### CAPITAL REQUIREMENTS

<u>FIXED CAPITAL</u>	Cost
Land.	\$ --
Building. One story, fireproof, with floor space of 12,000 sq. ft. & ceiling clearance of 16 ft.	72,000
Equipment, Furniture & Fixtures.	
Prod'n. equipmt.	\$175,000
Other tools & equipmt.	13,000
Furniture & fixtures	1,500
Transportation equipmt.	2,500
Total (excl. Land)	192,000
	<u>\$264,000</u>

Principal Items. Portable bucket conveyors, chain hoist, scales, blunger, magnetic screen & tank, filter press, eistern, scoop shovel lift truck, power conveyor, pug mill, extruder, 8 molding machines, dipping machine, pickup truck.

### WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 49,500
Admin. & Sales Costs(b), Contingencies	30	6,000
Training Costs		15,500
Total Working Capital		<u>\$ 71,000</u>

TOTAL CAPITAL (EXCL. LAND) \$335,000

### MATERIALS AND SUPPLIES

<u>Direct Materials</u>	Annual Requirements	Annual Cost
Kaolin	685 tons	\$ 6,850
Flint	851 tons	7,650
Feldspar	575 tons	11,500
Ball clay	177 tons	2,650
Glaze	170 tons	68,000
Other		1,150
Packing materials		6,000
Total		<u>\$103,800</u>
Supplies		
Maintenance		\$ 2,000
Grinding & other tools		1,500
Office supplies		500
Total		<u>\$ 4,000</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 100 hp.	<u>\$ 2,400</u>
b. Fuel. To secure uniformity in firing the ware, bunker C oil generally used. If other fuel used, firing equipment for the kiln must be suitably adapted. About 60,000 gals. of oil needed annually.	<u>\$ 7,200</u>
c. Water. About 7.2 million gals. annually for production and general purposes.	<u>\$ 1,800</u>

### 4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton pickup trucks, for general purposes.	<u>\$ 1,000</u>
b. External Transport Facilities. Combined in & out shipments about 500 tons a month. Plant should be located where there are good all-weather highways and, if possible, near railroad.	

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	7	\$ 42,000
Semi-skilled	7	35,000
Unskilled	15	60,000
Total	<u>29</u>	<u>\$137,000</u>
b. Indirect Labor		
Manager	1	\$ 10,000
Chemist-foreman	1	9,000
Office staff	2	10,000
Other	3	11,000
Total	<u>7</u>	<u>\$ 40,000</u>

c. Training Needs. Manufacturing operations relatively simple & do not require long training. Manager & chemist-foreman should be fully experienced & able to train operators. Three experienced operators should be used to assist in training. Plant should reach full production in about 2 months.

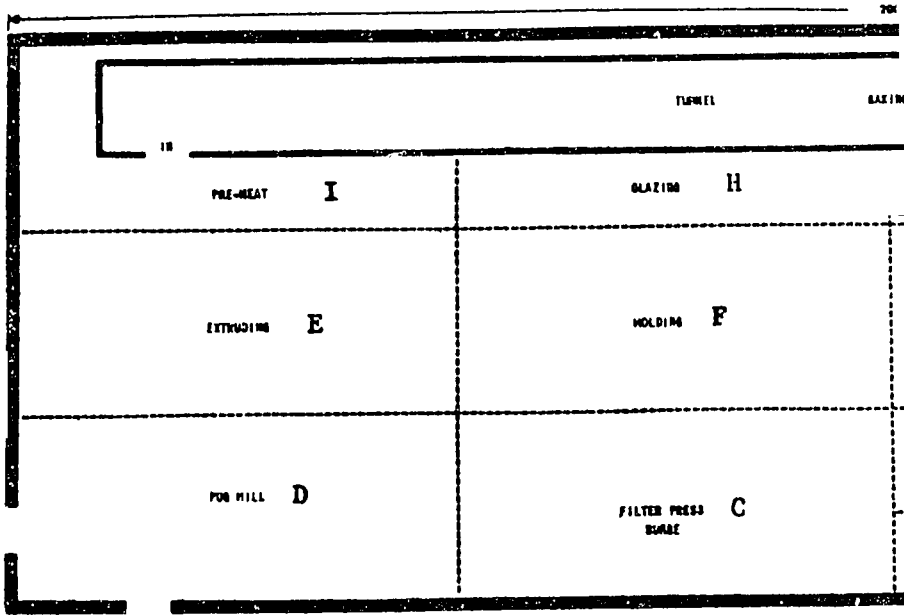
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$103,800
Direct Labor	137,000
Manufacturing Overhead (a)	56,400
Admin. & Sales Costs (b), Bad Debts, Contingencies	75,000
Depreciation on Fixed Capital	24,500
Total	<u>\$396,700</u> ✓
b. Annual Sales Revenue	<u>\$475,000</u>

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

# KITCHEN EARTHE

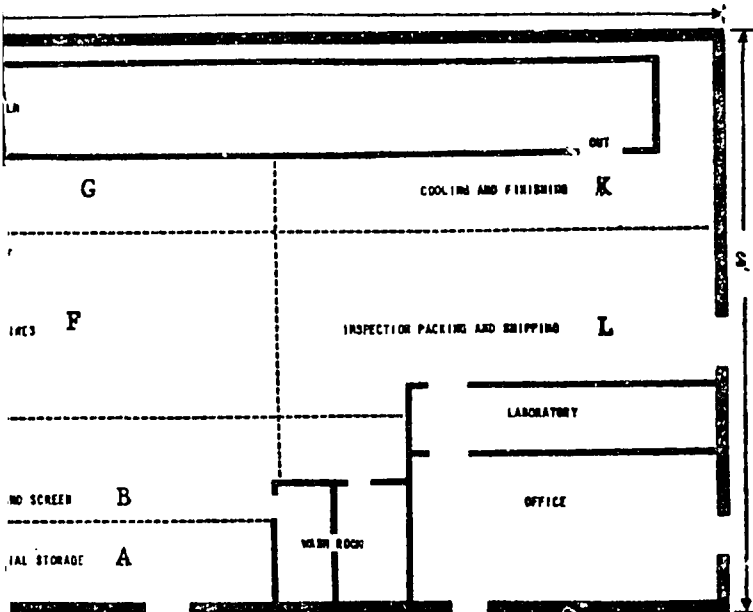
## PLANT LAYOUT



- A. Raw material storage
- B. Blunge and screen
- C. Filter - Press - Surge
- D. Pug Mill
- E. Extruding
- F. Molding

S.I.C. 3269

FLOW



and finishing  
n packing and shipping

294



## KITCHEN EARTHENWARE : S. I. C. 3269

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Practical Pottery and Ceramics. K. I. Clark. Illus. 1964. \$6.50.  
Viking Press  
625 Madison Avenue, New York, N. Y. 10022
- B. Ceramics. Krevolin, Lewis, and Elizabeth Constantine. 1965. \$1.00.  
Pitman Publishing Corporation  
20 East 46th Street, New York, N. Y. 10017
- C. Industrial Ceramics. F. and S. Singer. Illus. 1964. \$12.50.  
Addison-Wesley Publishing Co., Inc.  
Reading, Mass. 01867
- D. Ceramic Fabrication Processes. W. D. Kingery, ed. 1958. 235 p.  
Illus. \$9.50.  
John Wiley and Sons, Inc.  
605 Third Avenue, New York, N. Y. 10016

#### II. U. S. GOVERNMENTS PUBLICATIONS

- A. Bibliography on Ceramic Products. IR-16930.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- B. Bibliography on Ceramics. IR-18836.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- C. Ceramics - Manufacture. IR-21947.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- D. A Complete Directory of Ceramic Materials. O-9.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

#### III. PERIODICALS

- A. Ceramic Age. Monthly. \$8.00/year.  
Ceramic Publications, Inc.  
Ninth-Chester Building, Cleveland, Ohio 44114  
Current materials and market information for the ceramic industry.
- B. Ceramic Industry. Monthly. \$8.00/year.  
Industrial Publications, Inc.  
5 South Wabash Avenue, Chicago, Ill. 60603  
Serves operating executives and engineers in the ceramics field.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

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

- A. Patent No. 2,995,796. 1961. 15 p.  
Apparatus for shaping ceramic articles.
- B. Patent No. 2,964,822. 1960. 6 p.  
Process for the manufacture of ceramic objects, including tableware
- C. Patent No. 2,902,740. 1959. 7 p.  
Apparatus for making tableware.

### V. TRADE ASSOCIATIONS

- A. American Ceramic Society  
4055 North High Street, Columbus, Ohio 43214
- B. National Institute of Ceramic Engineers  
4055 North High Street, Columbus, Ohio 43214

### VI. ENGINEERING COMPANIES

- A. Harrop Ceramic Service Company  
Pearl and Gay Streets, Columbus, Ohio 43215  
Ceramic design, plant construction, equipment, tests and analyses of  
material and products.
- B. Ferro Corporation  
Harvard and East 56th Streets, Cleveland, Ohio 44105  
Kiln and oven engineers and designers.

### VII. DIRECTORY

- A. Ceramic Data Book Buyers Directory. \$2.50.  
Industrial Publications, Inc.  
5 South Wabash Avenue, Chicago, Ill. 60603  
Lists manufacturers and suppliers of raw materials and equipment to the  
ceramic industry.

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# INDUSTRY PROFILES

## METAL SPINNING

I. P. No. 66137

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## METAL SPINNING: Standard Industrial Classification 3461

### A. PRODUCT DESCRIPTION

Kitchen utensils (saucepans, bowls, kettles, etc.) made by cold spinning small aluminum sheets. Equipment can be employed to make other articles and to use other metals.

### B. GENERAL EVALUATION

Capital requirements for this industry are modest. Labor skills need time to acquire, and it is essential to have a well experienced manager, who himself works as a spinner, and one fully experienced spinner, at the start of operations. Possibilities of varying output of plant to meet market needs are considerable. A plant of this type appears to be well adapted to the conditions of many less developed areas, provided a good standard of quality can be maintained.

### C. MARKET ASPECTS

1. USERS. Restaurants and communal eating places of various kinds, households.
2. SALES CHANNELS AND METHODS. Sales to wholesale distributors, large retailers, large users, e.g. military.
3. GEOGRAPHICAL EXTENT OF MARKET. Products are fairly easy to handle and transport costs are moderate in relation to value. Market area, however, tends to be limited by the fact that numerous substitutes are available and cheap local products made in small workshops can often compete with products of distant factory. For similar reasons the volume of exports of such products is small.
4. COMPETITION. It should not normally be difficult to compete with imports in price and quality. The main competition will come from utensils made of other materials. The strength of this competition will depend on relative costs of substitutes, and these will vary from area to area. In general, aluminum ware is increasing in popularity and its competitive position is usually fairly strong. A plant of this size would normally be unable to compete in export business with large producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these products will depend on the general level of income and the living habits of the people. In a moderately low-income area where these products have come into common use a developing urban community of about half a million might provide this plant with a sufficient market.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 30,000 Aluminum Kitchen Utensils

### 1. CAPITAL REQUIREMENTS

<u>FIXED CAPITAL</u>	<u>Cost</u>
Land. About 5,000 sq. ft.	\$ --
Building. One story, 50'x50'.	14,400
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$ 7,200	
Other tools & equipmt. 300	
Furniture & fixtures 500	8,000
Total (excl. Land)	<u>\$ 22,400</u>

Principal Items. Light spinning lathe 12", light spinning lathe 24", heavy-duty spinning lathe, tool grinder, spinning tools, metal band saw.

### 2. WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 4,900
Admin. Costs(b), Contingencies, Sales Costs(c)	30	300
Training Costs		2,000
Total Working Capital		<u>\$ 7,200</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 29,600

### 2. MATERIALS AND SUPPLIES

<u>a. Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Aluminum	10,000 sheets	<u>\$ 5,000</u>

<u>b. Supplies</u>		
Lubricants & hand tools	\$ 100	
Cutting tools	300	
Caustic soda	200	
Office supplies	100	
Total		<u>\$ 700</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 10 hp.	<u>\$ 300</u>
b. <u>Fuel.</u> Hot water needed for cleaning & heating.	<u>\$ 100</u>
c. <u>Water.</u> For cleaning tank, sanitation & fire protection.	<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	1	\$ 6,000
Semi-skilled	1	5,000
Unskilled	1	4,000
Total	<u>3</u>	<u>\$ 15,000</u>

### b. Indirect Labor

Manager does production work, bags, sells, & keeps books	1	<u>\$ 8,000</u>
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- c. Training Needs. Manager must have long experience. He should be able to do all necessary labor training. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

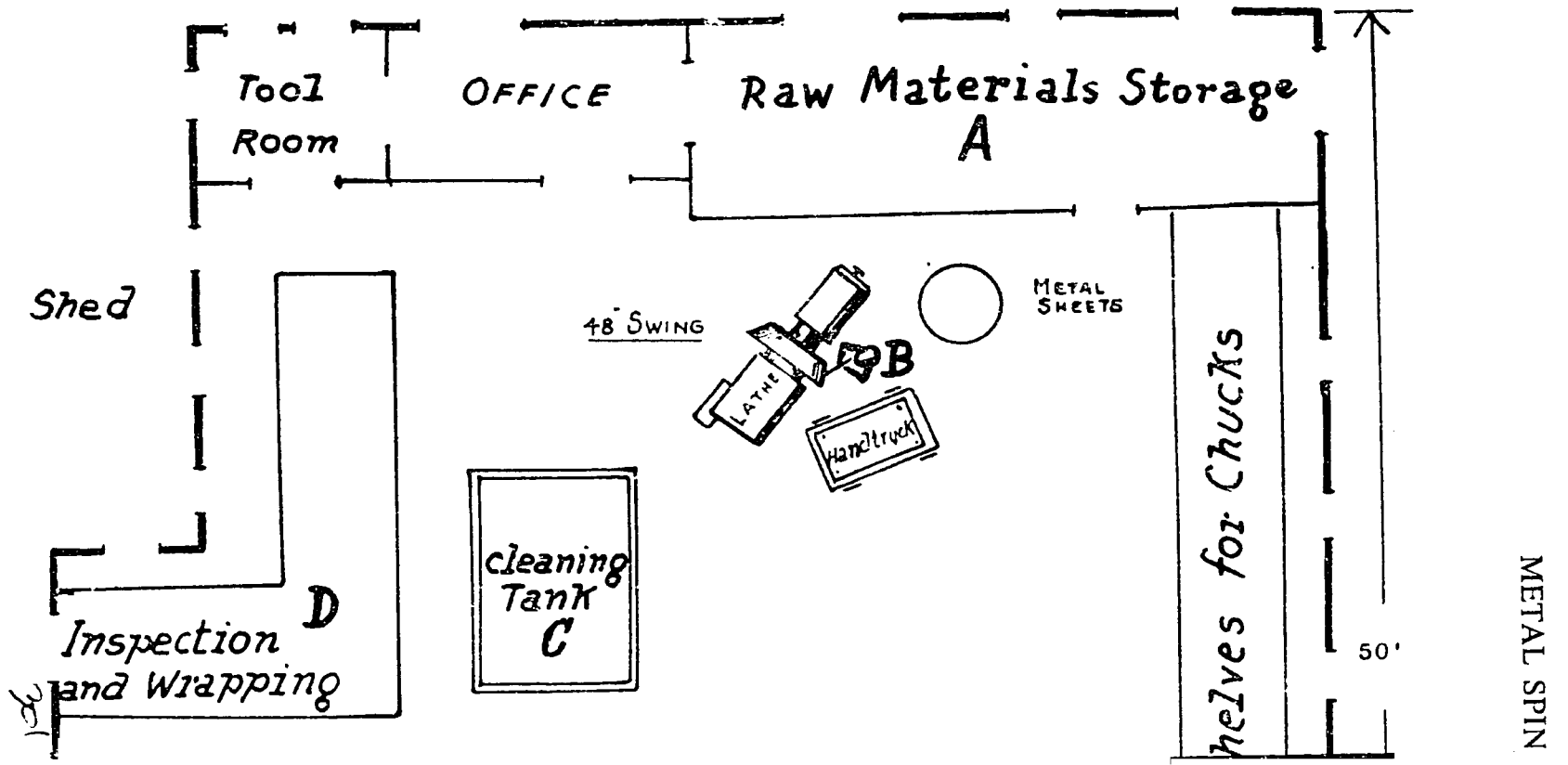
a. <u>Annual Costs</u>		
Direct Materials		\$ 5,000
Direct Labor		15,000
Manufacturing Overhead(a)		9,200
Admin. Costs(b), Contingencies		1,900
Sales Costs(c), Bad Debts		2,400
Depreciation on Fixed Capital		1,500
Total		<u>\$ 35,000</u>
b. <u>Annual Sales Revenue</u>		<u>\$ 45,000</u>

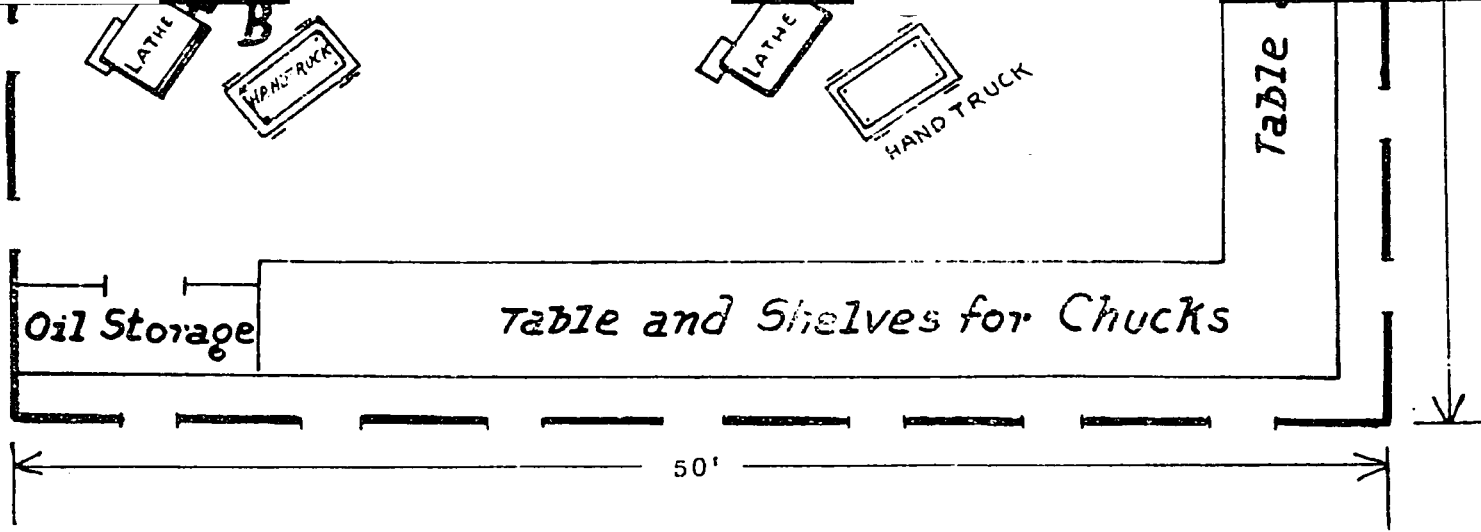
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

METAL SPINNING: S.I.C. 3461

3500

PLANT LAYOUT AND FLOW OF WORK





- A. Sheet metal is purchased and stored in sizes required.
- B. Sheets are delivered on hand trucks to lathes, depending on size of product, kind and thickness of metal
- C. Finished product cleaned in cleaning tank.
- D. Finished product wrapped and shipped or placed in shipping storage.

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## METAL SPINNING: S.I.C. 3461

### SELECTED REFERENCES

#### I. TEXTBOOKS

- A. Metal Spinning Techniques and Projects. H. V. Johnson. 1960. 130 p.  
Illus. \$3.50.  
Bruce Publishing Company  
400 North Broadway  
Milwaukee, Wisconsin 53201  
Describes and illustrates various metal spinning techniques and products.
- B. Fabricated Materials and Parts. T. C. Du Mond. 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 fabrication of spun metal articles.
- C. Etching, Spinning, Raising, Tooling Metals. R. E. Smith. 1951. 88 p.  
Illus. \$1.25.  
McKnight and McKnight Publishing Company  
Towanda Avenue & Route 66, Bloomington, Illinois 61701  
Materials, equipment, and directions for metal spinning.
- D. Machine Shop Theory and Practice. Illus. 1961. \$1.75. Fred H. Hallett.  
St. Martins Press, Inc.  
175 5th Avenue, New York, N. Y. 10010

#### II. U. S. GOVERNMENT PUBLICATION

- A. Metal Spinning. IR-16617  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Plant layout, materials, manpower requirements, process, and products of a metal spinning plant.

#### III. PERIODICALS

- A. Machinery. Monthly. \$4.00/year.  
Industrial Press  
93 Worth Street, New York, N. Y. 10013  
Articles and information on metal spinning.
- B. Machine and Tool Bluebook. Monthly. \$5.00/year.  
Hitchcock Publishing Company  
222 East Willow Avenue, Wheaton, Ill. 60187  
Covers all phases U. S. metalworking field, including metal spinning.

## SELECTED REFERENCES (Continued)

### IV. U.S. PATENTS

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

- A. Patent No. 2,995,170. 1961. 7 p.  
Metal spinning machine.
- B. Patent No. 2,965,059. 1960. 6 p.  
Metal spinning tool and application.
- C. Patent No. 2,960,951. 1960. 15 p.  
Metal spinning machine.

### V. TRADE ASSOCIATION

- A. National Metal Spinners Association  
130 Clinton Street, Brooklyn, N. Y. 11201

### VI. ENGINEERING COMPANIES

- A. Lyon Machinery Builders, Inc.  
904 Hotop Street, Kalamazoo, Michigan 49001  
Machinery and engineering service for metalworking industry.
- B. Engineering Tool Company  
Berkley Street at Wayne Avenue  
Philadelphia, Penn. 19144  
Development, engineering, and product designing.

### VII. DIRECTORY

- A. Tool Engineers Suppliers Directory Issue. Annual. \$4.50.  
American Society of Tool and Manufacturing Engineers  
10700 Puritan Avenue  
Detroit, Michigan 48238  
Lists products, their manufacturers, and sales offices.

## 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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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.

## MINERAL WOOL

I. P. No. 66138

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## MINERAL WOOL: Standard Industrial Classification 3296

### A. PRODUCT DESCRIPTION

Mineral wool consists of a fluffy light-weight mass of fine intermingled mineral fibers composed of complex silicates, made from rock, slag or glass sands. Information that follows applies to plant using slag from an open hearth steel operation. However, slag from iron, copper or lead operations can be used. The mineral wool may be finally processed into either loose wool or granulated wool. It is used mainly for thermal insulation, but also to some extent for sound absorption, in the manufacture of certain kinds of tiles, and as a filter medium.

### B. GENERAL EVALUATION

Capital requirements for this industry are quite large. Skilled labor requirements are also rather high. Unless slag and coke are produced locally, this industry would not normally be economically feasible. If production conditions are favourable and costs are low, some export business might be developed.

### C. MARKET ASPECTS

1. USERS. Building contractors, also individuals, for thermal insulation and sound-proofing. Industries use this product for tile manufacture and filtering.
2. SALES CHANNELS AND METHODS. Sales will be made to building contractors, building supplies houses, user industries.
3. GEOGRAPHICAL. EXTENT OF MARKET. This product is easily handled, but transport costs are rather high in relation to value and usually impose fairly narrow limits on the potential market area. This area may be quite extensive, however, if the plant is located close to inland waterways and coastal and ocean shipping facilities. This product is not common in international trade, since it is mainly used in economically advanced countries that are capable of making the product for themselves.
4. COMPETITION. a. Domestic Market. Competition from imports is unlikely to be important, since freight costs will normally give a sufficient amount of natural protection. Alternative materials are not significantly competitive.  
b. Export. As indicated above, this product is not important in international trade. In favorable conditions, some regional exports might be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for this product will depend on income levels, climate, type of buildings used, and volume of new construction taking place, as well as the extent to which user industries exist. The product is not one for which the market needed can be indicated in terms of total population.

# PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 10,000 Tons

## CAPITAL REQUIREMENTS

<u>FIXED CAPITAL</u>	<u>Cost</u>
Land. About 3 acres.	\$ --
Building. One story, steel construction, sheet siding. H columns & monitor roof. Total area 80,000 sq. ft.	480,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$123,000
Other tools & equipmt.	4,000
Furniture, fixtures & laboratory	5,000
Total (excl. Land)	<u>\$612,000</u>

Principal Items. Truck hopper conveyors (3), slag bin, coke bin, proportion feeders (4), cupolas (2), cupola blowers (2), preheaters (2), boilers (2), oil sprayer, blow chambers (2), granulator, power wiring, laboratory equipment, lagging machine, cyclone air lift, trommel screen, fork truck.

## WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 57,400
Admin. Costs(b), Contingencies, Sales Costs (c)	30	5,000
Training Costs		16,600
<u>Total Working Capital</u>		<u>\$ 79,000</u>

TOTAL CAPITAL (EXCL. LAND) \$691,000

## MATERIALS AND SUPPLIES

<u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Slag	14,500 tons	\$ 58,000
Coke	2,420 tons	50,800
Paraffin oil		3,100
Limestone		1,800
2-ply sacks		20,300
<u>Total</u>		<u>\$134,000</u>

<u>Supplies</u>		
Lubricants & hand tools	\$ 1,000	
Maintenance & spare parts	5,000	
Office supplies	500	
<u>Total</u>	<u>\$ 6,500</u>	

## 3. POWER, FUEL AND WATER

Annual Cost

- a. Electric Power. Connected load about 1,350 hp. \$ 12,000
- b. Fuel. Included under Direct Materials.
- c. Water. Annual consumption about 18.4 mn. gals. for production & general purposes. \$ 4,600

## 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 2,800 tons a month. Plant should be located within 100 miles of both slag & coke, and should be rail-road, and also on waterway, if possible.

## 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
a. <u>Direct Labor</u>		
Skilled	9	\$ 54,000
Semi-skilled	12	60,000
Unskilled	9	36,000
<u>Total</u>	<u>30</u>	<u>\$150,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 10,000
Office	1	5,000
Chemist & other	4	22,000
<u>Total</u>	<u>6</u>	<u>\$ 37,000</u>

- c. Training Needs. Manager & chemist should be fully experienced. With aid of 4 skilled workers, they should be able to do all necessary labor training. Plant should reach full production in 2 months.

## 6. TOTAL ANNUAL COSTS AND SALES REVENUE

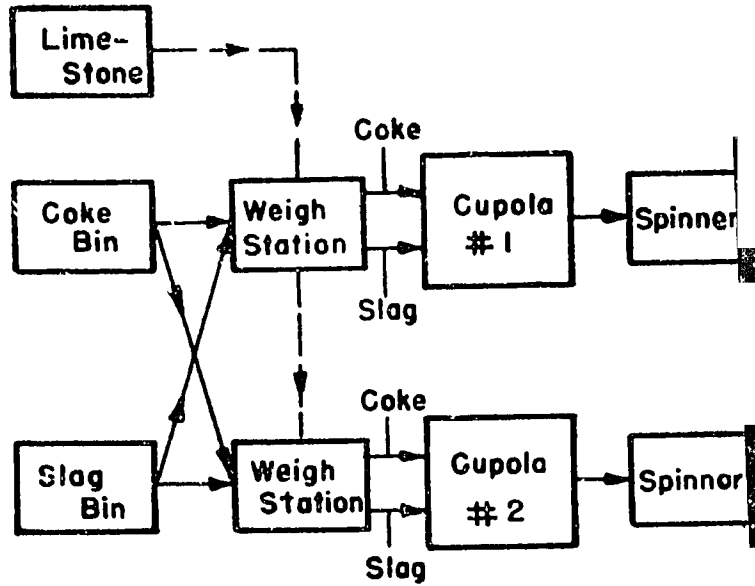
a. <u>Annual Costs</u>	
Direct Materials	\$134,000
Direct Labor	150,000
Manufacturing Overhead(a)	60,100
Admin. Costs(b), Contingencies	32,000
Sales Costs(c), Bad Debts	32,000
Depreciation on Fixed Capital	37,600
<u>Total</u>	<u>\$445,700</u>
b. <u>Annual Sales Revenue</u>	<u>\$600,000</u>

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

MINERAL WOOL: S.I.C. 3296

MINERAL W

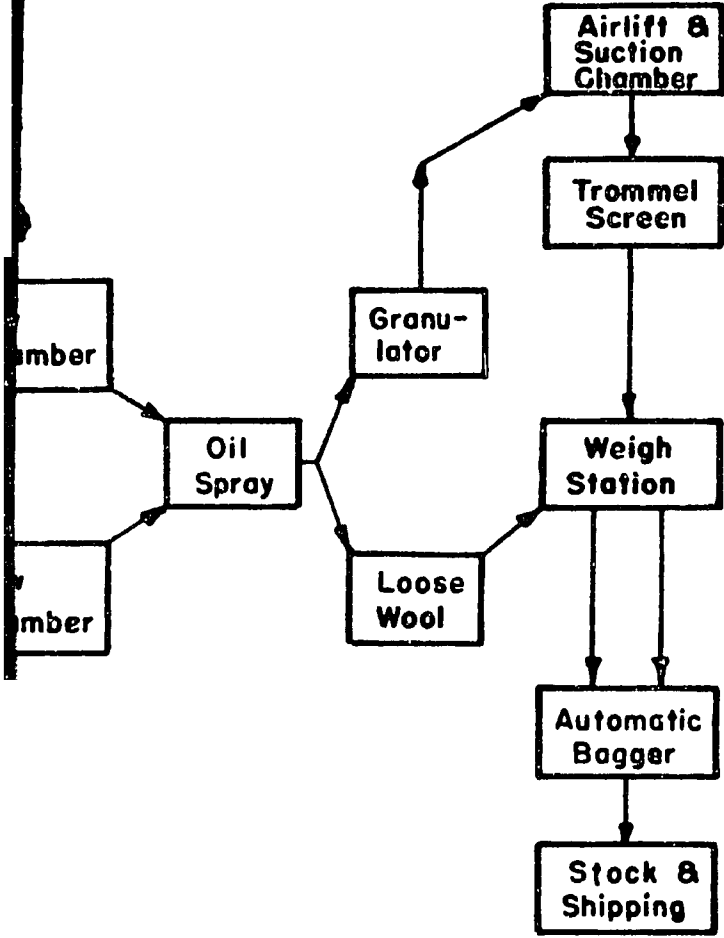
ARROWS INDICA



DIMENSIONS

3296

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NG 200' x 400'



MINERAL WOOL: S.I.C. 3296

SELECTED REFERENCES

I. TEXTBOOKS

- A. Nonmetallic Minerals. 2nd edition. R. B. Ladoo and W. M. Myers. 1951. 605 p. Illus. \$12.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036  
Production, uses, and prices of components of mineral wool.
- B. Heat Insulation. G. B. Wilkes. 1950. 224 p. Illus. \$6.00.  
John Wiley and Sons, Inc.  
605 3rd Avenue  
New York, N. Y. 10016  
Describes production and uses of various insulating material, including mineral wool.
- C. The Development of Mineral Wool from Florida Minerals. A. F. Greaves-Walker and A. P. Welch. 1953. 28 p. Gratis.  
Florida Geological Survey  
Tallahassee, Florida 32301  
Describes materials, equipment and method of producing mineral wool.
- D. Building Insulation. P. D. Close. 1951. 402 p. Illus. \$5.25.  
American Technical Society  
848 East 58th Street  
Chicago, Ill. 60637  
Describes utilization of heat and sound insulating materials including mineral or rock wool.

II. U. S. GOVERNMENT PUBLICATION

- A. Manufacturing and Uses of Mineral Wool. IR-20580.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICALS

- A. Rock Products. Monthly. \$3.00/year.  
Maclean-Hunter Publishing Corporation  
79 West Monroe Street  
Chicago, Ill. 60603  
Processes, new machinery, uses, and markets for rock products.
- B. Pit and Quarry. Monthly. \$3.00/year.  
Pit and Quarry Publications, Inc.  
431 South Dearborn Street  
Chicago, Ill. 60605  
Information on mining, processing, and industrial utilization of mineral products including silicates.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,994,915. 1961. 13 p.  
Apparatus for producing mineral wool.
- B. Patent No. 2,992,453. 1961. 8 p.  
Apparatus for producing such fibers as rock or mineral wool from molten material.
- C. Patent No. 2,987,762. 1961. 6 p.  
Apparatus for manufacturing mineral wool.

V. TRADE ASSOCIATIONS

- A. National Mineral Wool Insulation Association  
1270 Sixth Avenue  
New York, N. Y. 10020
- B. National Insulation Manufacturers Association  
441 Lexington Avenue  
New York, N. Y. 10017

VI. ENGINEERING COMPANY

- A. Morris and Van Wormer  
25 Broad Street  
New York, N. Y. 10004  
Design, engineer, construct mineral wool plants.

VII. DIRECTORY

- A. Annual Buyers' Guide and Product Directory. Annual. \$2.00.  
Edwin A. Scott Publishing Corporation  
92 Martling Avenue  
Tarrytown, New York 10591  
Lists products and manufacturers serving the heating, air conditioning, ventilation, and roofing industries.

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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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# INDUSTRY PROFILES

## ORNAMENTAL IRONWORK

I. P. No. 66139

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## ORNAMENTAL IRONWORK: Standard Industrial Classification 3449

### A. PRODUCT DESCRIPTION

Ornamental iron products, such as garden and patio furniture, forged iron hardware, tree guards, park benches, lightning rods, lighting fixtures, lanterns, floor lamps, ornamental curtain and drapery fittings, cemetery fences, protective window guards, reproductions of antique hardware, grills, gratings, railings, balconies, doors, gates, fences, window fronts.

### B. GENERAL EVALUATION

Capital requirements in this industry are modest. The labor skills needed, however, are of a fairly high order, and the workers should have some degree of artistic inclination. Product are largely of a luxury or semi-luxury character, and market will only exist where there is an appreciable amount of construction of public buildings, modern commercial buildings, luxury residences, and the like.

### C. MARKET ASPECTS

1. USERS. Building and public works contractors, homeowners.
2. SALES CHANNELS AND METHODS. Sales are made direct to clients. Manager should be able to advise clients. Some samples of work pieces may be exhibited in the workshop, but more commonly photographs of finished jobs are used to show clients what the firm can do.
3. GEOGRAPHICAL EXTENT OF MARKET. Market will almost certainly be mainly local.
4. COMPETITION. Competition in some uses may come from alternative types of materials. The range of articles that can be produced is too wide to permit useful generalizations on this subject.
5. MARKET NEEDED FOR PLANT DESCRIBED. The market for a plant of this kind cannot be estimated in terms of population. It can only be stated that, in general, the plant would need to be located in an urban area of considerable size in which a substantial volume of building of a luxury or semi-luxury character takes place.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: About 160 Jobs

### CAPITAL REQUIREMENTS

<u>FIXED CAPITAL</u>	<u>Cost</u>
Land. About 4,000 sq. ft.	\$ --
Building. One story, 40'x50'	\$ 12,000
<u>Equipment, Furniture &amp; Fixtures.</u>	
Prodn. tools & equipmt.	\$ 6,500
Other tools & equipmt.	1,500
Furniture & fixtures	500
Transportation equipmt.	2,500
	11,000
<u>Total (excl. Land)</u>	<u>\$ 23,000</u>

Principal Items. Arc welder, oxyacetylene welding unit; punch & shear, power blower, forge - hand operated, post drill, electric hand tool, bending machine, bench grinder, hand shear, 1-ton truck.

### WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 6,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	400
Training Costs		600
<u>Total Working Capital</u>		<u>\$ 7,600</u>

TOTAL CAPITAL (EXCL. LAND) \$ 30,600

### MATERIALS AND SUPPLIES

<u>Direct Materials</u>	<u>Annual Cost</u>
Iron rods & flats	\$ 8,000
Hinges & hasps & ornaments	1,000
<u>Total</u>	<u>\$ 9,000</u>

<u>Supplies</u>	
Lubricants & tools	\$ 100
Welding rods & gas	300
Maintenance & repairs	300
Office supplies	200
<u>Total</u>	<u>\$ 900</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 10 hp.	\$ 300
b. <u>Fuel.</u> For forges & heating.	\$ 300
c. <u>Water.</u> For sanitation & fire protection.	\$ 100

### 4. TRANSPORTATION

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

### 5. MANPOWER

	<u>Number</u>	<u>Annual Cost</u>
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 does buying, selling, office work & supervision	1	\$ 8,000
Other	1	4,000
<u>Total</u>	<u>2</u>	<u>\$ 12,000</u>

c. Training Needs. Manager must be fully experienced. With 1 skilled operator, he should be able to do all necessary labor training. Plant should be fully operative in 2 weeks.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

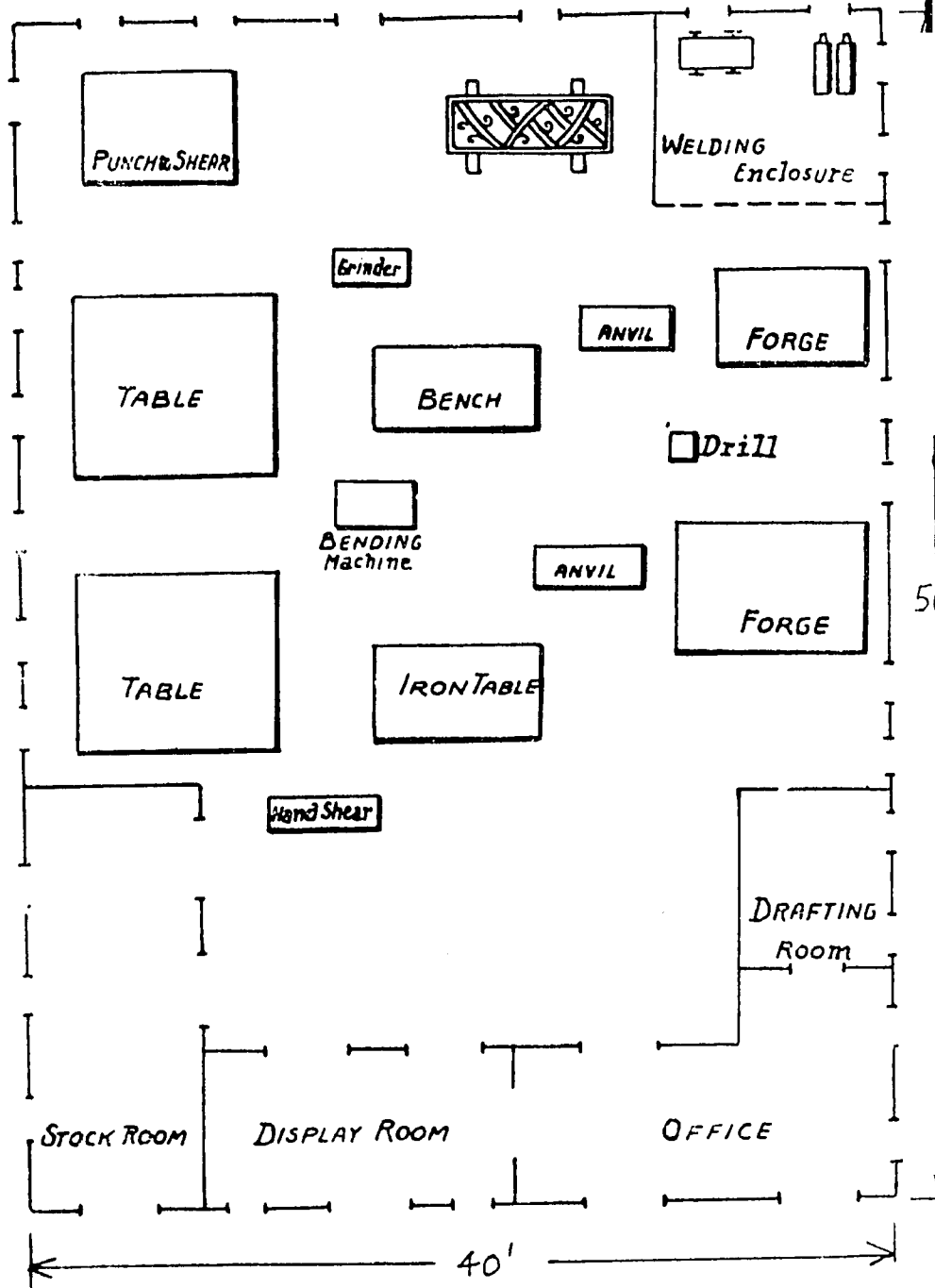
a. <u>Annual Costs</u>	
Direct Materials	\$ 9,000
Direct Labor	16,000
Manufacturing Overhead(a)	14,600
Admin. Costs(b), Contingencies	2,500
Sales Costs(c), Bad Debts	2,600
Depreciation on Fixed Capital	2,300
<u>Total</u>	<u>\$ 47,000</u>
b. <u>Annual Sales Revenue</u>	\$ 60,000

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

ORNAMENTAL IRONWORK: S.I.C. 3449

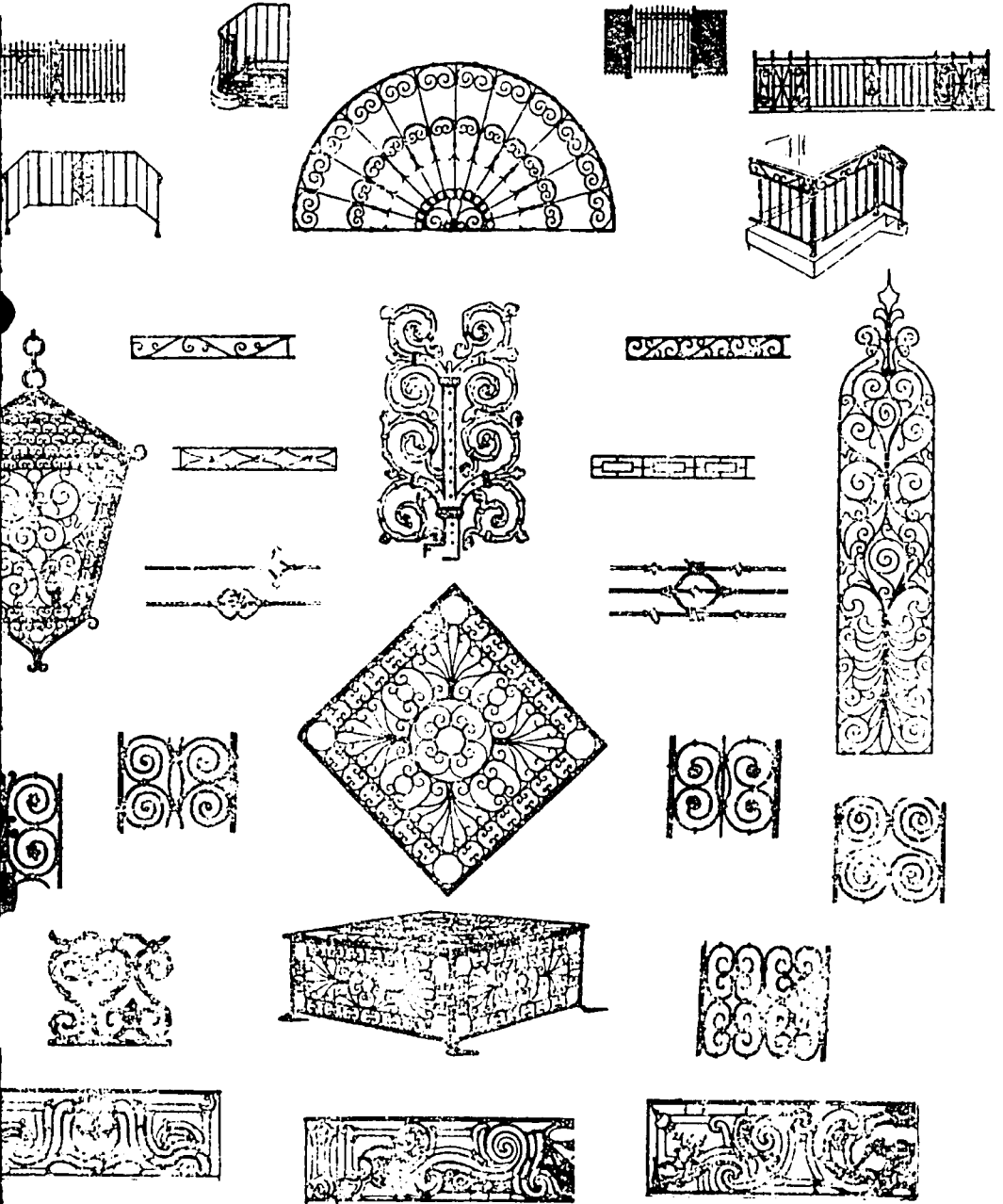
3/16

Plant Layout



As indicated by the samples shown  
 are so diversified that a standard w

SAMPLES OF IRONWORK PIECES



on operations  
practicable.



ORNAMENTAL IRONWORK: S. I. C. 3449

SELECTED REFERENCES

I. TEXTBOOKS

- A. Decorative Ironwork. H. R. D'Allemagne. 1966. 2 vols. \$6.00.  
Dover Publications Inc.  
180 Varick Street, New York, N. Y. 10014
- B. Metalsmithing. R. C. Thomas. 1960. 173 p. Illus. \$7.50.  
Chilton Company  
Chestnut and 56th Streets, Philadelphia, Penn. 19139  
Instruction in welding, forging and machining iron and other metals.
- C. Creative Metalworking. E. B. Mattson. 1960. 122 p. Illus. \$3.25.  
Bruce Publishing Company  
400 North Broadway  
Milwaukee, Wisconsin 53201  
Instructions and designs for the production of iron and other metal ornaments.
- D. Decorative Wrought Ironwork in Great Britain. R. Lister. 1957. 272 p.  
\$7.00.  
Irwin, Inc.  
1818 Ridge Road, Homewood, Ill. 60430  
Materials, equipment, tools and processes used for the production of ornamental ironwork.
- E. Metals and How to Weld Them. T. B. Jefferson and G. Woods. 1954.  
322 p. Illus. \$2.00.  
James F. Lincoln Arc Welding Foundation  
12818 Colt Road, Cleveland, Ohio 44101  
Basic metallurgical knowledge related to welding and welding techniques.  
Latter are described in detail.

II. U. S. GOVERNMENT PUBLICATION

- A. Ornamental Ironwork. TI-22. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Materials, equipment, plant and labor requirements for making ornamental iron products.

III. PERIODICAL

- A. Materials and Methods. Monthly. \$3.00/year.  
Reinhold Publishing Corporation  
430 Park Avenue, New York, N. Y. 10022  
Information on materials, processes and products in the metalworking field.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,944,782. 1960. 3 p.  
Supports for curtains, draperies, and the like.
- B. Patent No. 2,918, 995. 1959. 4 p.  
Method of making iron grating for lighting fixtures.
- C. Patent No. 2,866,238. 1958. 6 p.  
Adjustable iron window guard.

V. TRADE ASSOCIATION

- A. Metal Etching and Fabricating Association  
1625 K Street, N. W.,  
Washington, D. C. 20006

VI. ENGINEERING COMPANIES

- A. Bergen Iron and Engineering Company  
100 Route No. 17  
Carlstadt, New Jersey 07072  
Engineers, fabricators and erectors of architectural and ornamental  
ironwork plants.
- B. Haven-Busch Company  
Chicago Drive S. W. at 28th Street  
Grandville, Michigan 49418  
Designers, fabricators and erectors of ornamental iron equipment.

VII. DIRECTORY

- A. American Machinist/Metal working Manufacturing Buyer's Guide and  
Production Preview. Annual, \$1.50.  
McGraw-Hill Publishing Company  
330 West 42nd Street  
New York, N. Y. 10036  
Lists manufacturers of machinery, equipment, materials, and supplies,  
as well as equipment and materials distributors.

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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

## PHARMACEUTICAL GLASS FROM PURCHASED TUBING

I. P. No. 66140

*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.

## PHARMACEUTICAL GLASS FROM PURCHASED TUBING: S. I. C. 3231

### A. PRODUCT DESCRIPTION

Glass tubing, ampoules, and vials, for antibiotics. The ampoules and vials have a capacity of five to eight cubic centimeters. Plant capacity is given in terms of production of ampoules and vials of average size, in the ratio of 40: 60. Ratio can, however, be varied to meet demand. Also, other pharmaceutical products, such as syringes and glass for laboratory use, can be manufactured in this plant, if sufficient demand for them exists.

### B. GENERAL EVALUATION

Making pharmaceutical glass from purchased tubing requires an investment only about two-fifths as large as making it from glass produced in the same plant--see Industry Profile on Pharmaceutical Glass Complete: S. I. C. 3229. Manufacture from purchased tubing may be preferable where raw materials for glass making are not readily and cheaply obtainable, or where capital is very scarce.

### C. MARKET ASPECTS

1. USERS. Pharmaceutical industry, hospitals, clinics.
2. SALES CHANNELS AND METHODS. Sales usually to large industrial users and to wholesale distributors of pharmaceutical supplies.
3. GEOGRAPHICAL EXTENT OF MARKET. These products need to be carefully packed, and transport costs are fairly high. However, since these are more or less essential articles, for which there is generally no adequate substitute, transport costs alone are unlikely to limit the market area, if modern medical facilities exist and need these products for their operation. There is a fair volume of export trade in these products.
4. COMPETITION. a. Domestic Market. Assuming production at reasonable cost in relation to world prices, this plant should be able to meet competition from imports without difficulty. b. Export Market. Though this plant could normally not compete in general export trade, some exports to neighboring countries might be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand for these products will depend entirely on the extent to which modern medical facilities and the manufacture and sale of antibiotics have developed in the potential market area. Since there are great variations in these respects, no useful generalization can be made about the size of the market needed for this plant in terms of population.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION: 25 Million Ampoules and Vials

### 1. CAPITAL REQUIREMENTS

#### FIXED CAPITAL

	Cost
Land. About 2 acres.	\$ --
Building. One story 80'x100', fireproof.	48,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$100,000
Other tools & equipmt.	1,500
Furniture & fixtures	1,200
Transportation equipmt.	2,500
Total (excl. Land)	<u>\$153,200</u>

Principal Items. Ampoule & vial forming machine, clipper & glazing machine, tube size sorting machine, vial bottom closing machine, gas booster, air pressure blower, fuel oil tank, fuel oil pump, delivery truck.

### 2. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 71,500
Admin. Costs (b), Contingencies, Sales Costs(c)	30	9,200
Training Costs		10,100
Total Working Capital		<u>\$ 90,800</u>

**3. TOTAL CAPITAL (EXCL. LAND) \$244,000**

### 3. MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
Direct Materials		
Glass tubing	1,250 tons	<u>\$290,000</u>

#### Supplies

Lubricants & hand tools	\$ 200
Cutting tools	200
Maintenance & repair parts	2,800
Office supplies	300
Total	<u>\$ 3,500</u>

### 4. POWER, FUEL AND WATER

	Annual Cost
Electric Power. Connected load about 40 hp.	\$ 3,000
Fuel. About 100,000 gals. diesel oil annually.	<u>\$ 10,000</u>
Water. About 2 mn. gals. annually for production, sanitation & fire protection.	<u>\$ 500</u>

### 4. TRANSPORTATION

	Annual Operating Cost
a. Own Transport Equipment. 1-ton truck for pickup & delivery	<u>\$ 1,000</u>
b. External Transport Facilities. Total in & out shipments about 350 tons a month. Good highway necessary.	

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	2	\$ 13,000
Semi-skilled	8	\$ 42,000
Unskilled	4	17,000
Total	<u>14</u>	<u>\$ 72,000</u>
b. Indirect Labor		
Manager & supervisor	2	\$ 18,000
Office staff	2	9,000
Other	4	22,000
Total	<u>8</u>	<u>\$ 49,000</u>

c. Shift Operation. Some of night-shift operation can be prepared by operators on earlier shift, so that fewer men are employed on night shift.

d. Training Needs. Manager & supervisor should be fully experienced. Together with the master mechanic, chemist & 2 skilled workers, they should be able to do all necessary labor training. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$290,000
Direct Labor	72,000
Manufacturing Overhead (a)	67,000
Admin. Costs (b), Contingencies	55,000
Sales Costs (c), Bad Debts	55,000
Depreciation on Fixed Capital	13,500
Total	<u>\$552,500</u>
b. Annual Sales Revenue	<u>\$625,000</u>

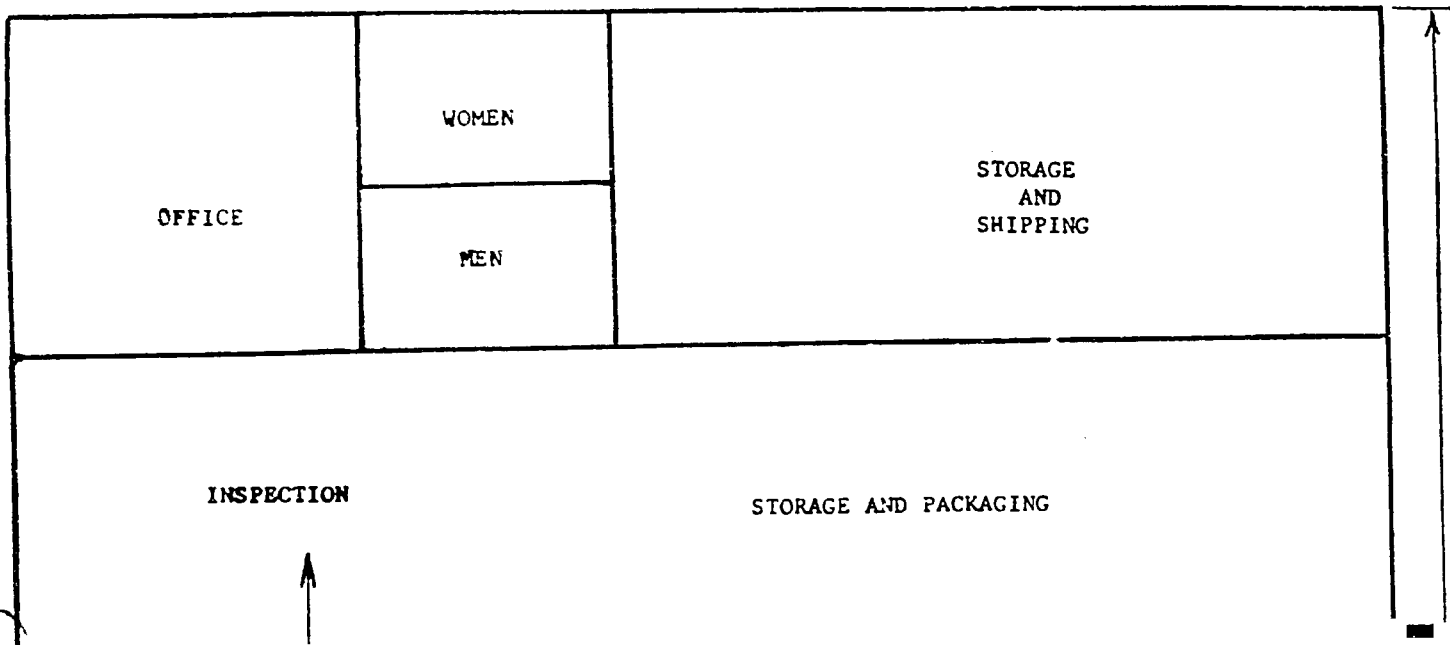
NOTES. (a) Includes Supplies, Power, Fuel, Water, Transportation, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

PHARMACEUTICAL GLASS FROM PURCHASED TUBING: S.I.C. 3231

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PLANT LAYOUT

ARROWS INDICATE WORK FLOW



TUBING PURCHASED TUBING : S.I.C. 3231

100

TUBE SORTING

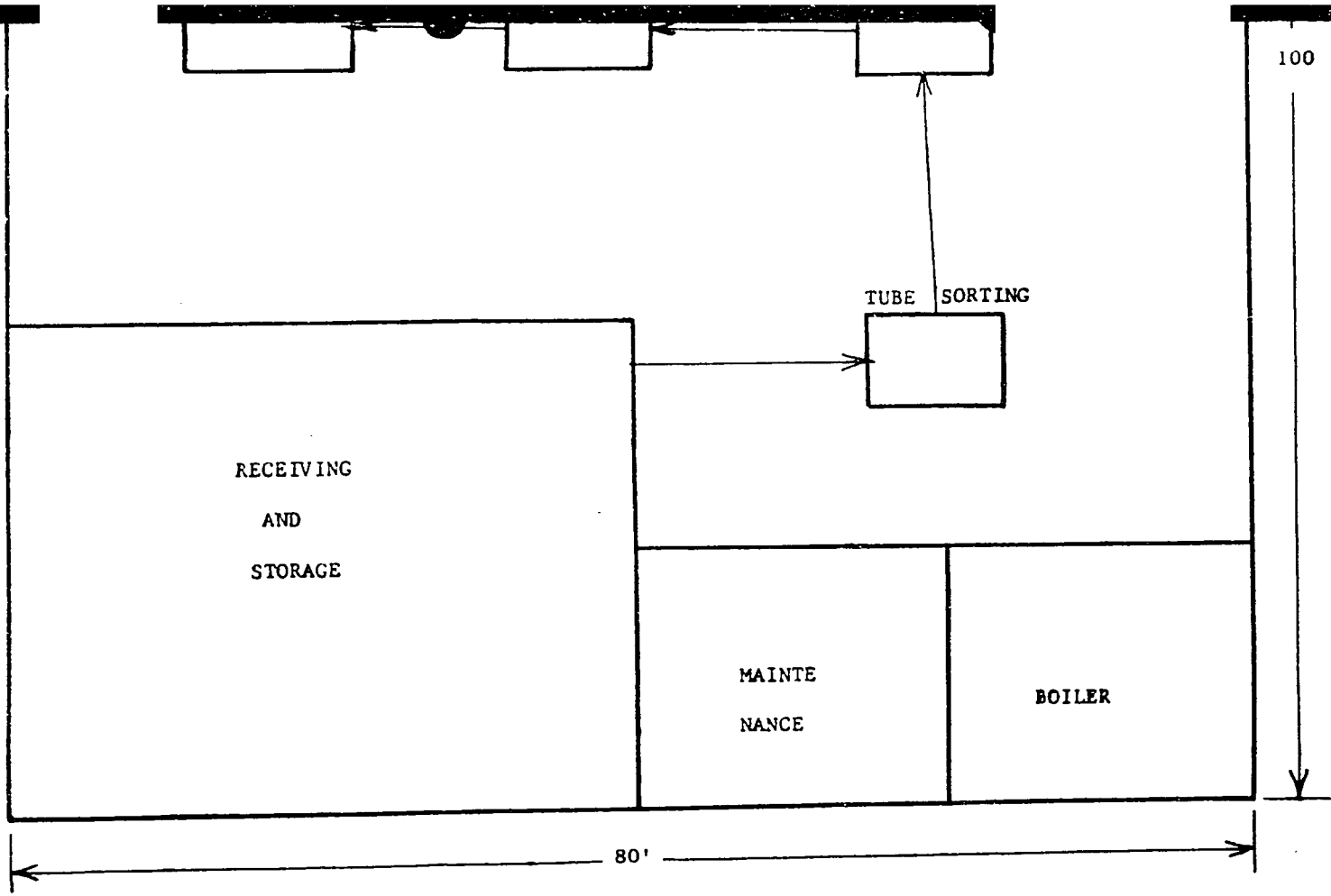
RECEIVING  
AND  
STORAGE

MAINTENANCE

BOILER

80'

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# PHARMACEUTICAL GLASS FROM PURCHASED TUBING: S. I. C. 3231

## SELECTED REFERENCES

### I. TEXTBOOKS

- A. Glass: Its Industrial Applications. Charles J. Phillips. 1960. Illus. \$6.95.  
Reinhold Publishing Corporation  
430 Park Avenue, New York, N. Y. 10022
- B. Scientific Glassblowing. E. L. Wheeler. 1958. 500 p. Illus. \$12.00.  
John Wiley & Sons, Inc.  
605 3rd Avenue  
New York, N. Y. 10016  
Glass blowing characteristics, glass blowing equipment, basic operations and glass grinding.
- C. Glass Engineering Handbook. E. B. Shand. 1958. 471 p. Illus. \$12.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036
- D. Glass, The Miracle Maker. 2nd edition. C. J. Phillips. 1948. 429 p. Illus. \$8.50.  
Pitman Publishing Corp.  
20 E. 46th Street, New York, N. Y. 10017  
Glass working principles, glassworking machinery, finishing, annealing, applications.

### II. U. S. GOVERNMENT PUBLICATIONS

- A. Glass Manufacture. IR 21980. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- B. Glass Manufacturing - Bibliography. IR 24385. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

### III. PERIODICALS

- A. The Glass Industry. Monthly. \$5.00/year  
Ogden Publishing Company  
55 West 42nd Street  
New York, N. Y. 10036  
Devoted to glass technology.
- 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.

## SELECTED REFERENCES (Continued)

### IV. U.S. PATENTS

Available U. S. Patent Office

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

- A. Patent No. 2,896,807. 1959. 4 p.  
Tubular glass ampules formed with a tapered end.
- B. Patent No. 2,832,701. 1958. 4 p.  
Containers for liquids, which permit the contained liquid to drain free of the walls of the vessel.
- C. Patent No. 2,764,156. 1956. 4 p.  
Containers or ampules of the type commonly employed to fill hypodermic syringes.

### V. TRADE ASSOCIATIONS

- A. Glass Container Manufacturers Institute  
99 Park Avenue, New York, N. Y. 10001
- B. National Association of Glass Container Distributors  
27 - 49 Haynes Avenue  
Newark, N. J. 07114

### VI. ENGINEERING COMPANIES

- A. Frasier-Simplex, Inc.  
P. O. Box 493  
Washington, Penn. 15301  
Engineers to the glass industry.
- B. Eisler Engineering Company  
758 South 13th Street  
Newark, New Jersey 07103  
Designers, engineers, manufacturers of equipment for the glass industry.

### VII. DIRECTORY

- A. Glass Factory Directory. Annual. \$3.00.  
National Glass Budget  
916 Empire Building  
Pittsburgh, Penn. 15222  
Lists glass manufacturers. Buyers guide of glass industry suppliers and equipment.

PHARMACEUTICAL GLASS FROM PURCHASED TUBING: S. I. C. 3231

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## 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.

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# INDUSTRY PROFILES

## PLATING

I. P. No. 66141

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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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## PLATING: Standard Industrial Classification 3471

### A. PRODUCT DESCRIPTION

Metal plating to customers' specifications.

### B. GENERAL EVALUATION

This is a very small enterprise, requiring a very modest capital investment. A trained and experienced manager is required. This is a versatile service industry, readily expandable if business warrants it and serving a variety of other industries, ranging from factories in need of plated machinery to metal jewelry manufacturers who need their products silver-plated. With the development of industry and the increased use of machines of various types, many developing areas should be able to support such a plant.

### C. MARKET ASPECTS

1. USERS. A variety of industries and machinery repair establishments, as well as individuals for non-industrial items.
2. SALES CHANNELS AND METHODS. Sales are mainly 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 rival establishments, if any, located in the same market area. Large industrial plants, where plating is required, frequently have their own plating departments.
5. MARKET NEEDED FOR PLANT DESCRIBED. In the conditions of economically less developed areas, a major urban area with a variety of machine and other metal using industries would be needed to provide a market for this plant.

# PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: \$35,000 of Job Work

## CAPITAL REQUIREMENTS

### FIXED CAPITAL

Land. About 2,000 sq. ft.	\$	--
Building. One story, 30'x40'.		7,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt. \$ 3,000		
Other tools & equipmt. 500		
Furniture & fixtures 500		4,000
Total (excl. Land)	\$	<u>11,000</u>
Principal Items. Bench grinder, pickling tank, 3 plating tanks, electric control panel, 2 buffing machines, rinsing tank, work benches.		

### WORKING CAPITAL

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

TOTAL CAPITAL (EXCL. LAND) \$ 13,300

## MATERIALS AND SUPPLIES

	Annual Cost
Direct Materials	
Plating materials	\$ 1,000
Chemicals	500
Total	<u>\$ 1,500</u>
Supplies	
Grinding & buffing wheels	\$ 100
Maintenance & repair parts	300
Office supplies	100
Total	<u>\$ 500</u>

## 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> For plating & general purposes.	\$ 400
b. <u>Fuel.</u> About 3,000 gals. oil, or equivalent in other fuel, for heating, if necessary.	\$ 400
c. <u>Water.</u> For tanks, sanitation & fire protection.	\$ 200

## 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
Total	<u>2</u>	<u>\$ 11,000</u>
b. <u>Indirect Labor</u>		
Manager - buys, sells, keeps books, supervises & does production work	1	\$ 8,000
c. <u>Training Needs.</u> Since manager would be experienced and 1 helper skilled, no training would be required.		

## 6. TOTAL ANNUAL COSTS AND SALES REVENUE

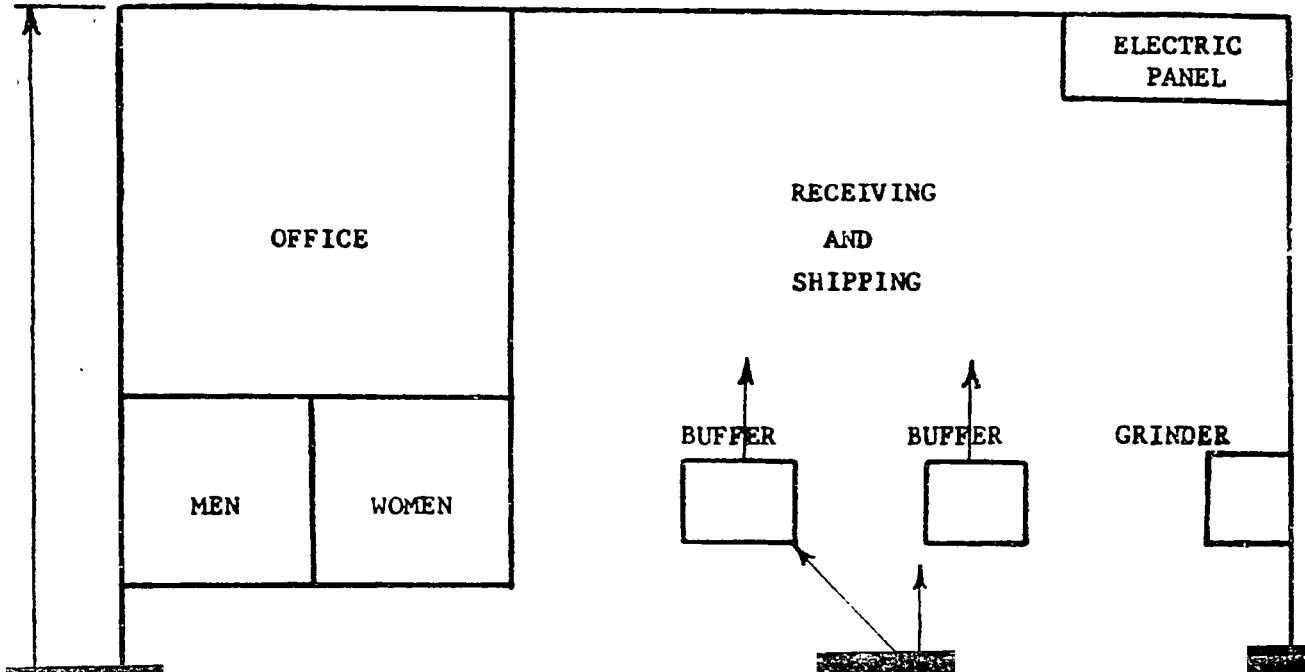
a. <u>Annual Costs</u>	
Direct Materials	\$ 1,500
Direct Labor	11,000
Manufacturing overhead(a)	9,500
Admin. Costs(b), Contingencies	1,000
Sales Costs(c), Bad Debts	2,000
Depreciation on Fixed Capital	800
Total	<u>\$ 25,800</u>
b. <u>Annual Sales Revenue</u>	<u>\$ 35,000</u>

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

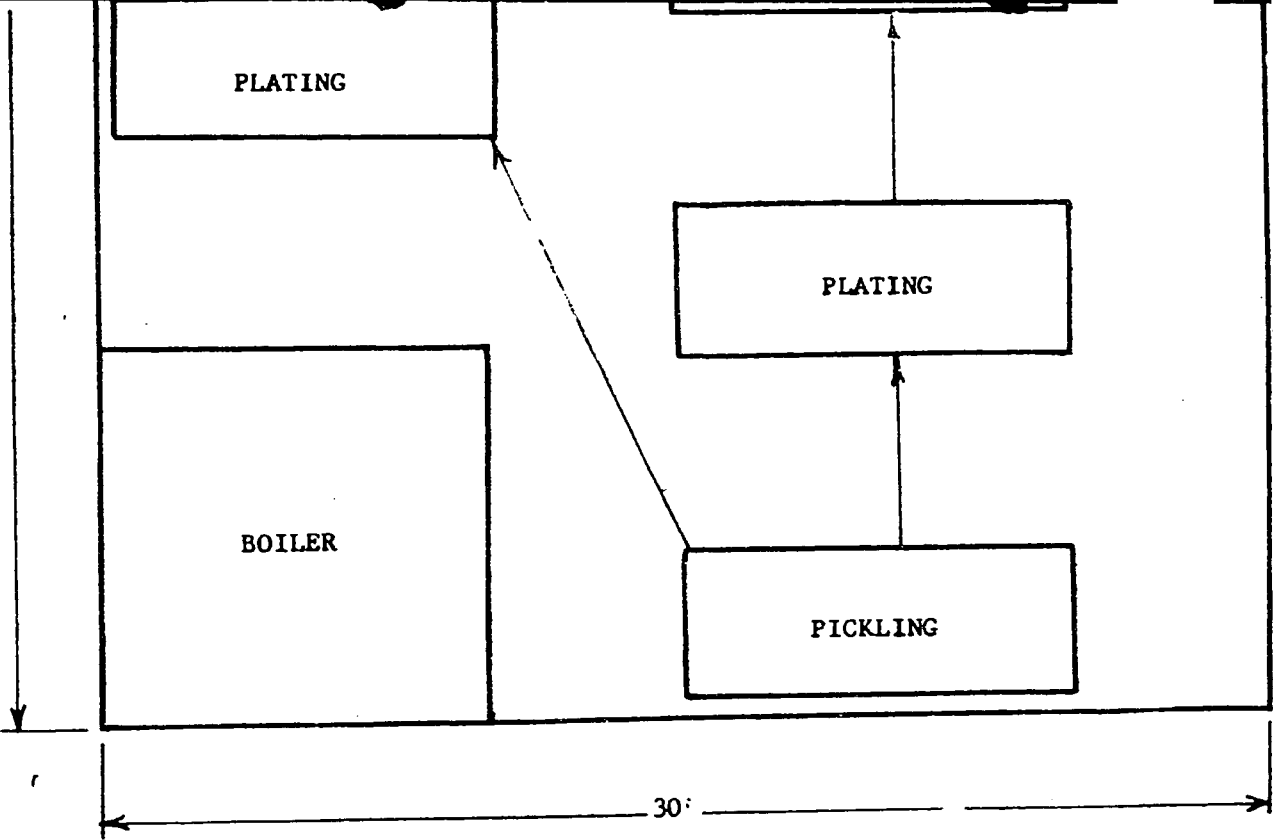
PLATING: S.I.C. 3471

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PLANT LAYOUT  
ARROWS INDICATE WORK FLOW



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PLATING: S.I.C. 3471

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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. 2,941,929. 1960. 10 p.  
Electrolytes for forming films on metal.
- B. Patent No. 2,899,367. 1959. 5 p.  
Method of preparing surfaces for electroplating.
- C. Patent No. 2,888,387. 1959. 2 p.  
Process for electroplating.
- D. Patent No. 2,873,233. 1959. 4 p.  
Method of electrodepositing metals.
- E. Patent No. 2,868,795. 1959. 7 p.  
Art of electrolytically treating metal to clean, level, smooth, polish  
and/or protect the surface thereof.

### 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.

### 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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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

## PLOWS

I. P. No. 66142

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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.

## PLOWS: Standard Industrial Classification 3522

### A. PRODUCT DESCRIPTION

Walking plows. Plant is equipped to make steel castings from pig iron and scrap, and to manufacture wooden beams and handles from lumber. Tractor plows, walking cultivators, harrows and other farm tools, can be produced without additional equipment other than foundry patterns, and steel beam equipment for the tractor plows.

### B. GENERAL EVALUATION

This plant requires a moderately large capital and a fair amount of skilled labor. Generally it would not be economical to establish the industry unless at least the scrap metal is available from local sources. Given this production advantage and an adequate local market, this industry has fairly good prospects in some developing areas.

### C. MARKET ASPECTS

1. USERS. Farmers.

2. SALES CHANNELS AND METHODS. Sales are made mostly to agricultural machinery and equipment distributors.

3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. Since this product is somewhat cumbersome and costly to move, market area will depend to considerable degree on transport costs and extent to which transport network is developed in farming areas. In the United States similar types of farm equipment are commonly made in rather small plants located so as to provide as easy access as possible to markets. b. Export. There is a fair volume of export trade in agricultural equipment of this kind.

4. COMPETITION. a. Domestic Market. Given favorable conditions in raw materials supply this industry should be able to compete with imports. b. Export Market. Though the plant described would be too small to attempt general export business, some sales to nearby areas in neighboring countries might be possible.

5. MARKET NEEDED FOR PLANT DESCRIBED. Though the product of this plant is a comparatively simple implement, in many less developed areas farmers' incomes are so low that purchase of one of these plows would constitute a significant investment. Total demand for this particular implement may in some cases be insufficient to keep the plant in operation. The solution to this may sometimes be product diversification. As indicated above, under Product Description, the plant could, with little additional expense, make tractor plows, walking cultivators, harrows etc.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 12,500 Units

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land.	\$ --
Building. One story, 110'x80', fireproof.	53,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$ 50,000	
Other tools & equipmt. 2,500	
Furniture & fixtures 1,000	
Transportation equipmt. 2,500	56,000
Total (excl. Land)	<u>\$109,000</u>

Principal Items. #3 cupola, spark arrester, roof board, blower & motor, charging hoist & floor, cupola lining, balanced type car, platform scale, core oven, sand conditioning equipment, 2 molding machines, 2 air jolt hand rollovers, 3 trolley ladles 250 lbs., 1 ladle 1-ton, 6 shanks & ladles 50 lbs., tram rail, crane system with 3-ton hoist, flasks, jackets, bottom boards, cover plates, air hoses, shovels, riddles & screens, double grinder, tumbler, 2 air grinders, chipping hammers, cut-off saw, roller sander, drill press, paint tank, hand trucks, assembling benches, exhaust fans, air compressor, crane scrap breaker, pickup truck.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 43,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,300
Training Costs		12,600
Total Working Capital		<u>\$ 59,400</u>

#### c. TOTAL CAPITAL (EXCL. LAND) \$168,400

### 2. MATERIALS AND SUPPLIES

Direct Materials	Annual Requirements	Annual Cost
Pig iron, scrap, coke for castings	625 tons	\$ 62,500
Lumber		37,500
Paint		5,500
Steel braces		2,500
Bolts, nuts, washers		1,000
Total		<u>\$109,000</u>

#### b. Supplies

Molding sand, fire brick, fire clay, flux, core sand, core oils, wires, rods, chaplets	\$ 2,600
Patterns & flasks	700
Maintenance materials & repair parts	800
Lubricants & tools	200
Office supplies	200
Total	<u>\$ 4,500</u>

### 3. POWER, FUEL AND WATER

Annual Cost

a. Electric Power. Connected load about 50 hp.	\$ 900
b. Fuel. Cost of coke for cupola is included in cost of castings under Direct Materials. Oil is used for core oven. About 10,000 gals. annually.	<u>\$ 1,200</u>
c. Water. Used for conditioning the sand. Also needed for fire protection & sanitation. About 1.6 mn. gals. annually.	<u>\$ 400</u>

### 4. TRANSPORTATION

Annual Operating Cost

a. Own Transport Equipment. Pickup truck.	<u>\$ 1,000</u>
b. External Transport Facilities. Total in & out shipments about 400 tons a month. Plant should be located on good all-weather highway & if possible, on rail siding.	

### 5. MANPOWER

Number      Annual Cost

a. Direct Labor		
Skilled	6	\$ 36,000
Semi-skilled	5	25,000
Unskilled	12	48,000
Total	<u>23</u>	<u>\$109,000</u>
b. Indirect Labor		
Manager & foreman	2	\$ 18,000
Office	2	9,000
Other	2	8,000
Total	<u>6</u>	<u>\$ 35,000</u>

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

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

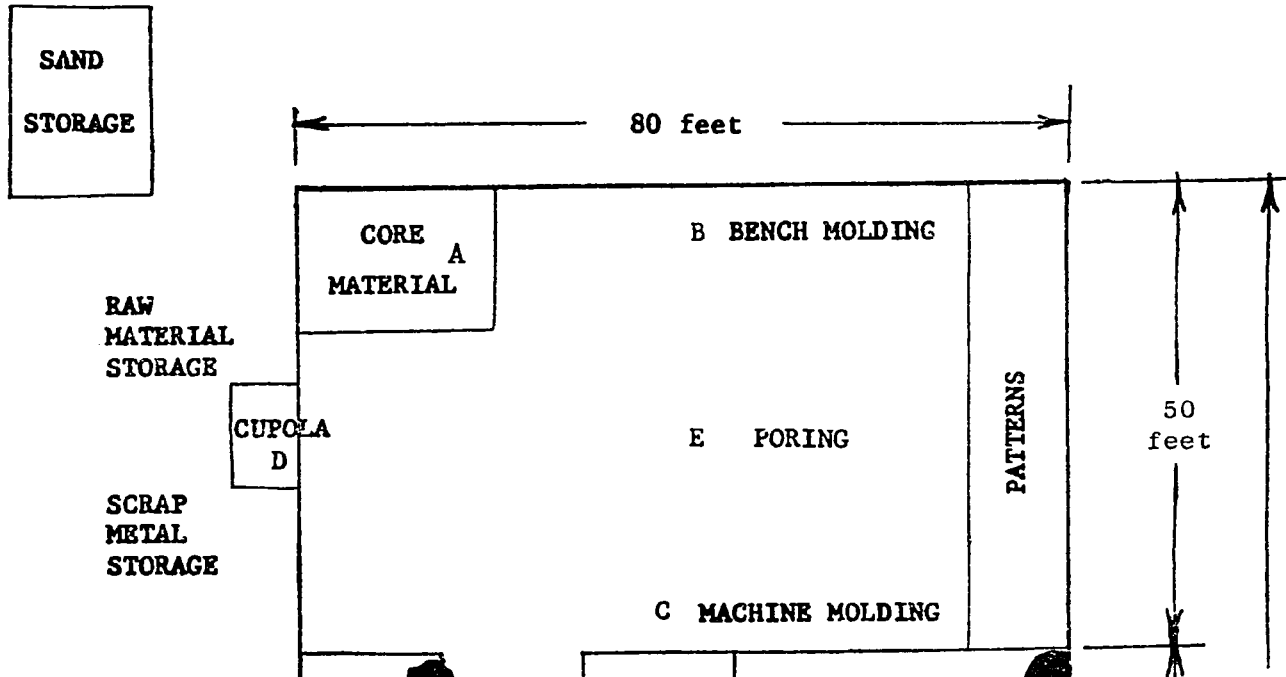
a. Annual Costs	
Direct Materials	\$109,000
Direct Labor	109,000
Manufacturing Overhead(a)	43,000
Admin. Costs(b), Contingencies	16,100
Sales Costs(c), Bad Debts.	26,000
Depreciation on Fixed Capital	8,900
Total	<u>\$312,000</u>
b. Annual Sales Revenue	<u>\$375,000</u>

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

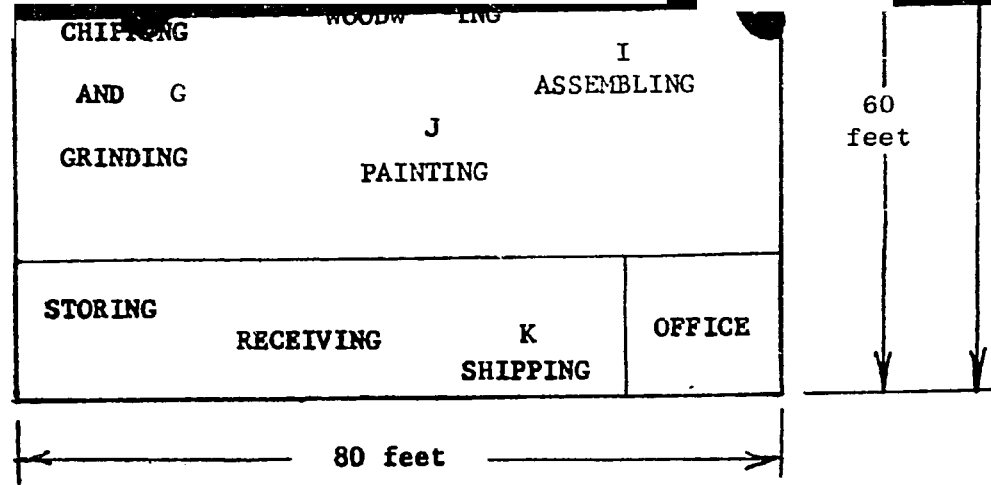
PLOWS: S.I.C. 3522

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# PLANT LAYOUT AND WORK FLOW



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- A. Core oven
- B. Bench molding
- C. Machine molding
- D. Cupola
- E. Poring
- F. Chill
- G. Chipping and grinding
- H. Woodworking
- I. Assembling
- J. Painting
- K. Shipping

2/10



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I. TEXTBOOKS

- A. Foseco Foundryman's Handbook. Foseco. 1965. \$3.50.  
Pergamon Press  
44-01, 21st Street, Long Island City, N. Y. 11101
- B. Patternmaking and Founding. Robert E. Smith. 1959. \$1.60.  
Taplinger Publishing Co., Inc.  
119 West 57th Street, New York, N. Y. 10019
- C. Exploring Patternmaking and Foundry. Harvey D. Miner and John G. Miller. 1959. \$4.85.  
D. Van Nostrand Co., Inc.  
Princeton, N. J. 08540
- D. Metallurgical Principles of Founding. V. Kondic. 1965.  
American Elsevier Publishing Co. Inc.  
52 Vanderbilt Avenue  
New York, N. Y. 10017

II. U. S. GOVERNMENT PUBLICATION

- A. Manufacture of Plow Shares. IR-12448  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICALS

- A. Foundry. Monthly. \$20.00/year.  
Penton Publishing Company  
1213 West 3rd Street  
Cleveland, Ohio 44113  
Covers all phases of foundry practice, both technical and non-technical.
- B. Woodworker. Monthly. \$2.00/year.  
S. H. Smith Company  
2232 North Meridian  
Indianapolis, Indiana 46208  
Provides subscribers with news and developments, processes, methods, markets, in the woodworking field.

SELECTED REFERENCES (Continued)

**IV. TRADE ASSOCIATIONS**

- A. Farm Equipment Institute  
608 South Dearborn Street  
Chicago, Ill. 60605
- B. National Farm and Power Equipment Dealer Association  
2340 Hampton Avenue, St. Louis, Missouri 63139
- C. Farm Equipment Manufacturers Association  
34 North Brentwood, St. Louis, Missouri 63105
- D. Farm Equipment Wholesalers Association  
1015 Upper Midwest Building  
Minneapolis, Minn. 55401

**V. ENGINEERING COMPANIES**

- A. Rust Engineering Company,  
930 Fort Duquesne Boulevard  
Pittsburgh, Penn. 15222  
Complete plant design and layout.
- B. Erd Co., Inc.  
235 Ringgold Street  
Waynesboro, Penn. 17268  
Design equipment, prepare plant layouts, set up production programs.

**VI. DIRECTORY**

- A. Penton's Foundry List. \$150.00.  
Penton Publishing Company  
1213 West 3rd Street  
Cleveland, Ohio 44113  
Comprehensive information on metal casting plants in U. S. and  
Canada.

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## RICE PADDY CULTIVATORS

I. P. No. 66143

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## RICE PADDY CULTIVATORS: Standard Industrial Classification 3522

### A. PRODUCT DESCRIPTION

Simply designed, hand-operated rice cultivators (weed eradicators), with iron teeth, designed to use wood (teak or other suitable kind) to maximum extent.

### B. GENERAL EVALUATION

Use of these cultivators necessitates laying out of fields in a geometric pattern, with plant rows straight and equidistant from each other. Weeds are eradicated from wet rice paddies not by cutting but by forcing them deep enough into the mud to hold them there. Teak is a suitable wood for this implement, being heavy enough to force weeds into the mud but not so heavy as to make the cultivators unwieldy. A market for the output of this plant is only likely to exist where improved rice cultivation is receiving active encouragement.

### C. MARKET ASPECTS

1. USERS. Wet rice farmers.
2. SALES CHANNELS AND METHODS. Sales will be made to distributors of farm equipment, and to farm co-operatives. Plant may need to cooperate with distributors in spreading information about use of cultivators among the farmers.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. With a reasonably good transport network, the potential market area may be nationwide.  
b. Export. There is a moderate volume of international trade in implements of this type.
4. COMPETITION. a. Domestic Market. Competition from imports is unlikely to be important. Competition from small-scale producers, e. g. local blacksmiths, might in some cases be significant. b. Export Market. No general export trade would be possible, but some sales to easily accessible areas of neighboring countries might in some cases be possible.
5. MARKET NEEDED FOR PLANT DESCRIBED. In many rice-producing countries these cultivators will be an innovation, and sales will mainly be to new users rather than for replacements. An active sales campaign will be needed over a wide area to dispose of the annual production of this plant. At the stage where the market becomes saturated, and replacement demand is insufficient to absorb the total capacity of the plant, it would probably be possible for the plant to diversify by entering on production of other types of agricultural implements to the manufacture of which the equipment could be readily adapted.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION : 7,500 Cultivators

### 1. CAPITAL REQUIREMENTS

<u>FIXED CAPITAL</u>	<u>Cost</u>
Land. About 7,000 sq. ft.	\$ --
Building. One story, 40'x75'.	18,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt. \$ 1,000	
Furniture & fixtures 200	1,200
<u>Total (excl. Land)</u>	<u>\$ 19,200</u>

Principal Items. Cut-off saw, jointer-planer, bench saw, 3 drill presses, sander, forge, metal shearer, grinder & burnisher.

### WORKING CAPITAL

	<u>No. of Days</u>	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 20,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	800
Training Costs		3,200
<u>Total Working Capital</u>		<u>\$ 24,400</u>
<u>TOTAL CAPITAL (EXCL. LAND)</u>		<u>\$ 43,600</u>

### MATERIALS AND SUPPLIES

<u>Direct Materials</u>	<u>Annual Requirements</u>	<u>Annual Cost</u>
Wood	185,000 sq ft.	\$ 18,500
Iron	10 tons	19,000
Wood screws		4,300
Bolts		2,300
Creosote		100
<u>Total</u>		<u>\$ 44,200</u>

### Supplies

Lubricants & hand tools	\$ 200
Repair parts & maintenance	200
Office supplies	100
<u>Total</u>	<u>\$ 500</u>

### 3. POWER, FUEL AND WATER

	<u>Annual Cost</u>
a. <u>Electric Power.</u> Connected load about 10 hp.	\$ 200
b. <u>Fuel.</u> For production, and heating, if needed. About 2,000 gals. oil, or equivalent in other fuel.	\$ 300
c. <u>Water.</u> About 400,000 gals. for production & general purposes.	\$ 100

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Plant should be located on good highway.

### 5. MANPOWER

<u>Direct Labor</u>	<u>Number</u>	<u>Annual Cost</u>
Skilled	1	\$ 6,000
Semi-skilled	11	55,000
Unskilled	2	8,000
<u>Total</u>	<u>14</u>	<u>\$ 69,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 8,000

- c. Training Needs. Manager will act as buyer, salesman, bookkeeper & general supervisor. With help of 1 skilled & 2 semi-skilled workers, he should be able to train all other workers. Plant should reach full production in 1 month.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$ 44,200
Direct Labor	69,000
Manufacturing Overhead(a)	9,100
Admin. Costs(b), Contingencies	4,000
Sales Costs(c), Bad Debts	6,000
Depreciation on Fixed Capital	1,000
<u>Total</u>	<u>\$133,300</u>
b. <u>Annual Sales Revenue</u>	<u>\$160,000</u>

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

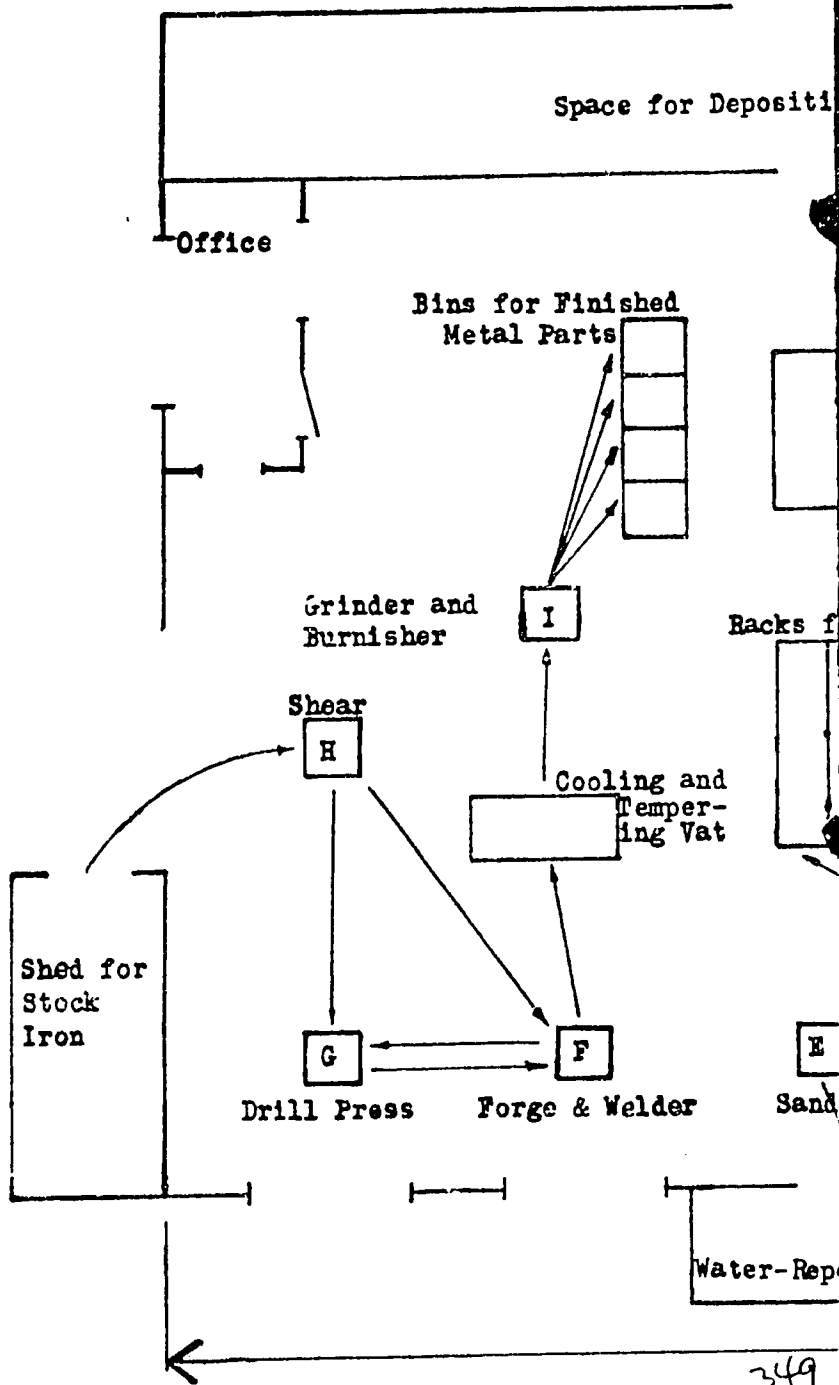
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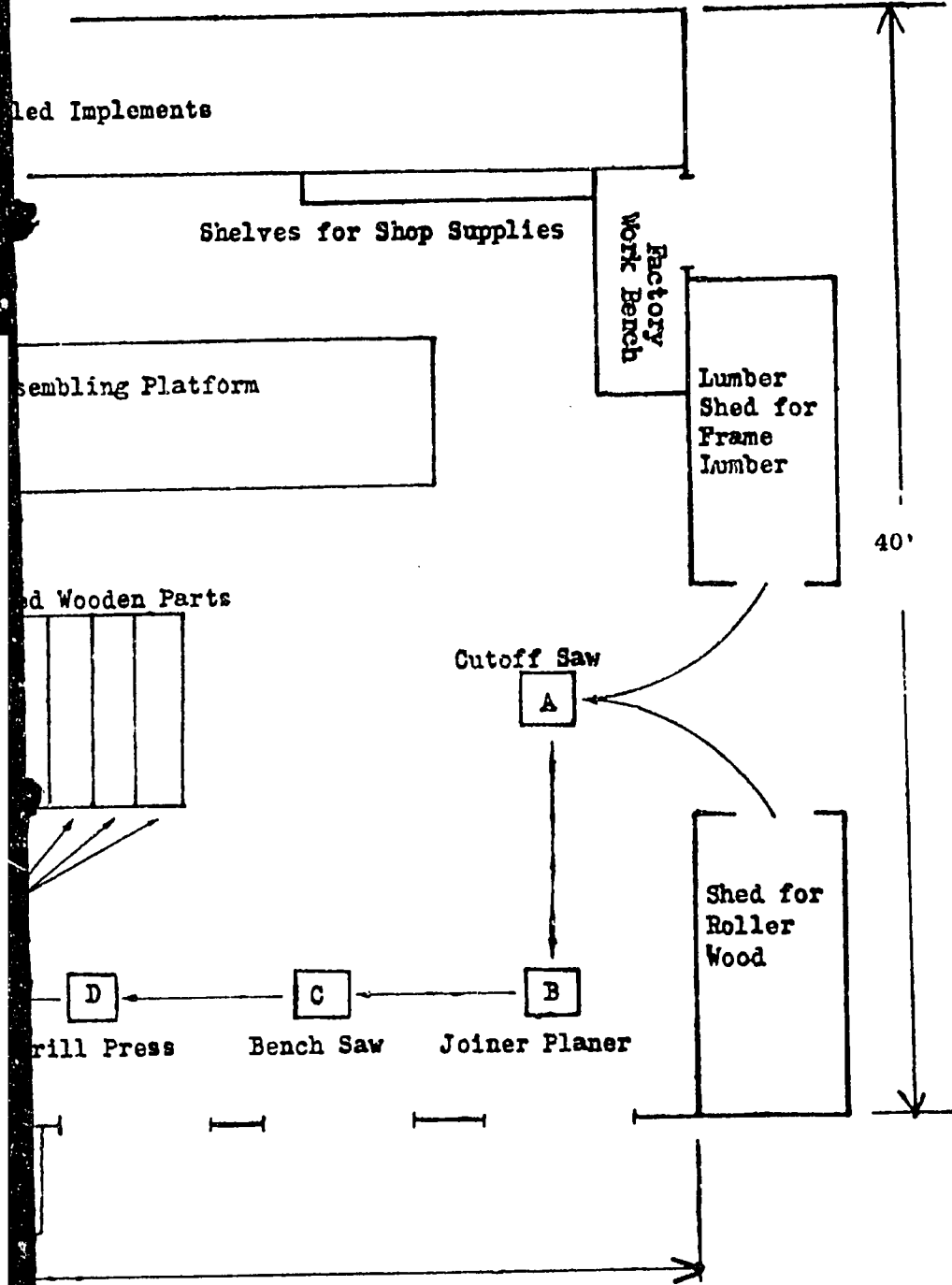
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RICE PADDY CULTIVATORS: S. I. C. 3522

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417 5th Avenue, New York, N. Y. 10016
- B. Farm Machinery and Equipment. Harris P. Smith. 5th edition. Illus.  
1964. \$10.50.  
McGraw-Hill Book Co. Inc.  
330 West 42nd Street  
New York, N. Y. 10036
- C. Principles of Farm Machinery. R. Bainer, R. Kepner and E. L. Barger.  
1955. 571 p. \$8.75.  
John Wiley and Sons, Inc.  
605 3rd Avenue  
New York, N. Y. 10016
- D. Manufacturing Processes : Production. S. E. Rusinoff. 1958. 560 p.  
\$7.25.  
American Technical Society  
848 East 58th Street  
Chicago, Ill. 60637  
Deals with processes in the fabrication of metal parts.

II. U. S. GOVERNMENT PUBLICATION

- A. Implements for Irrigated Agriculture - Bibliography IR-25286.  
Office of Technical Research and Cooperation  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICALS

- A. Farm Implement News. Bi-weekly. \$3.00/year.  
Farm Implement News Company  
608 South Dearborn Street  
Chicago, Ill. 60605  
News of development, manufacture, and marketing of farm implements.
- B. The Wood-Worker. Monthly. \$2.00/year.  
S. H. Smith Company  
2232 North Meridian Street, Indianapolis, Indiana 46207

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,677,926. 1954. 6 p.  
Device for cutting plants under water.
- B. Patent No. 2,571,502. 1951. 6 p.  
Foliage remover bucket.

V. TRADE ASSOCIATIONS

- A. Farm Equipment Institute  
608 South Dearborn Street  
Chicago, Ill. 60605
- B. Farm Equipment Manufacturers Association  
34 North Brentwood Boulevard  
St. Louis, Missouri 63105
- C. National Farm and Power Equipment Dealers Association  
2340 Hampton Avenue  
St. Louis, Missouri 63139
- D. Farm Equipment Wholesalers Association  
1015 Upper Midwest Building  
Minneapolis, Minn. 55401

VI. ENGINEERING COMPANIES

- A. National Engineering Company  
610 Machinery Hall Building  
Chicago, Ill. 60606  
Consulting and foundry work.
- B. Mathewson Machine Works, Inc.  
78 Hancock  
Quincy, Mass. 02169  
Design, development, and manufacturing.

VII. DIRECTORY

- A. Agriculture Teachers' Directory and Handbook. Annual. \$5.00.  
Lans Baron  
200 South 7th Street  
Columbia, Missouri 65201  
Covers farm implements and equipment.

RICE PADDY CULTIVATORS: S. I. C. 3522

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# INDUSTRY PROFILES

## SANITARY WARE

I. P. No. 66144

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## SANITARY WARE : Standard Industrial Classification 3431

### A. PRODUCT DESCRIPTION

Enameled cast iron wash sinks, urinals and toilets, of simple design, suited primarily for use in factories and institutions. With minor changes in production set-up, product line can be extended to include sanitary ware for home use, such as lavatories and kitchen sinks. Heavier products such as bath tubs and laundry tubs, could be made if equipment for handling them, such as a heavier crane, were added. Plant capacity shown, namely 44,250 pieces, is based on assumption that 10,000 wash sinks, 14,250 urinals, and 20,000 toilets will be made. This product mix can, however, be varied to meet actual demand situations in different markets.

### B. GENERAL EVALUATION

The plant described is rather highly mechanized, which reduces demand for skilled labor but necessitates a moderately large capital investment. A market for the output of such a plant will exist only where this particular kind of sanitary ware is in common use, where modern sanitation has made substantial progress, at least in urban areas, and where a large amount of new construction, especially of factories, public institutions, etc., is taking place.

### C. MARKET ASPECTS

1. USERS. Factories, schools, hospitals, barracks, private dwellings, etc.
2. SALES CHANNELS AND METHODS. Sales are made to building contractors and to building supply houses.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are somewhat heavy and bulky and require rather elaborate packing. Transport costs may keep the market area within fairly narrow limits. b. Export. Freight and packing costs are high and the volume of exports is small.
4. COMPETITION. a. Domestic Market. In most countries freight costs on imports should provide sufficient natural protection to the domestic producer. Other types of sanitary ware may provide some competition, although the durability and relative cheapness of the type under consideration are strong points in its favor. b. Export Market. Plant described might, in favorable circumstances, make some regional sales, but this type of sanitary ware is not usually exported far or in large quantity.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend on income levels, sanitary habits of the people, and rate of building construction, especially construction of industrial and institutional buildings. Assuming that modern sanitary systems exists in the urban areas, and that this type of sanitary ware is in common use, plant under consideration might meet the requirements of a developing urban area with a total population of the order of five million.

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## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION, EXCEPT ENAMELING, THREE-SHIFTS : 44,250 Pieces

### CAPITAL REQUIREMENTS

#### FIXED CAPITAL

Land.	\$	---	
Building. One story, 70'x170', with sidewall height about 16'. Equipment, Furniture & Fixtures.		72,000	
Prod'n. tools & equipmt.	\$151,000		
Other tools & equipmt.	1,000		
Furniture & fixtures	1,000	153,000	
Total (excl. Land)		\$225,000	

Principal Items. #4 cupola, spark arrester, roof board, blower with motor & controls, cupola lining, balance type car, platform scale, heavy duty shakeout, sand handling & mixing equipment, jolt stripper machine, 1,500 lb. capacity bull ladle, 600 lb. capacity ladle, 3-ton hoist, patterns, flasks, 1-ton hoist with monorail, metal abrasive throwing equipment, portable electric grinder, 8'x6'x4' furnace, air operated table, mechanical sieve, spraying booth & equipment, conveyors, exhaust fans, hand trucks.

#### WORKING CAPITAL

	No. of Days	
Direct Materials		
Labor, Mfg. Overhead(a)	60	\$106,500
Admin. Costs(b), Contingencies, Sales Costs(c)	30	10,500
Training Costs		21,000
Total Working Capital		\$138,000

TOTAL CAPITAL (EXCL. LAND) \$363,000

#### MATERIALS AND SUPPLIES

	Annual Requirements	Annual Cost
Direct Materials		
Pig iron	1,460 tons	\$102,500
Purchased scrap	1,280 tons	51,200
Home scrap	960 tons	38,300
Wet base enamel	38 tons	10,500
Frit - dry ground	250 tons	50,000
Crating lumber	630 M bd. ft.	53,600
Steel strapping	15,800 lin. ft.	1,900
Total		\$308,000

#### Supplies

Molding sand	\$ 34,000
Coke by-product	15,000
Metal abrasives	10,000
Alloy briquettes, parting sand, fire clay	5,000
Maintenance materials	1,800
Hand tools	400
Office supplies	300
Total	\$ 66,500

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load about 60 hp.	\$ 1,000
b. <u>Fuel.</u> Coke is used in cupola. Annual cost \$15,000. Oil is used for enameling furnace. Annual cost, \$3,000.	\$ 18,000
c. <u>Water.</u> For preparing molding sand, for sanitation & fire protection. About 1.2 mn. gals annually.	\$ 300

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 900 tons a month. Both raw materials & finished products are bulky & heavy. Plant should be located in area of good all-weather highways and, if possible, on railroad siding.

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	4	\$ 24,000
Semi-skilled	6	30,000
Unskilled	36	144,000
Total	46	\$198,000
b. <u>Indirect Labor</u>		
Manager	1	\$ 10,000
Foreman	2	16,000
Office	2	9,000
Other	3	12,000
Total	8	\$ 47,000

- c. Training Needs. Manager, 2 foremen & 4 skilled operators should be fully experienced. Plant should reach full production in 2 months.

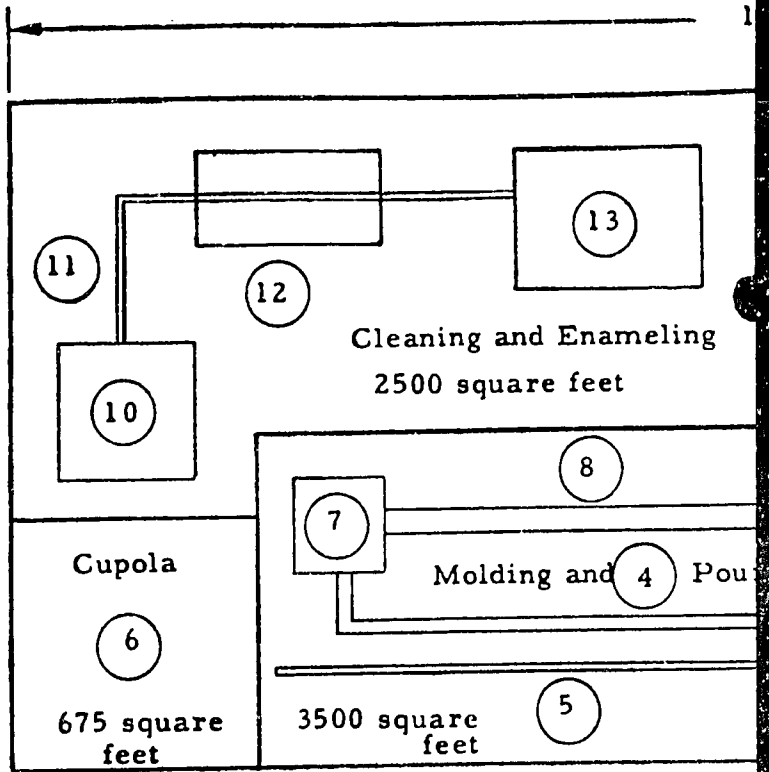
### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$308,000
Direct Labor	198,000
Manufacturing Overhead (a)	132,800
Admin. Costs(b), Contingencies	68,000
Sales Costs(c), Bad Debts	64,000
Depreciation on Fixed Capital	19,000
Total	\$789,800
b. <u>Annual Sales Revenue</u>	\$925,000

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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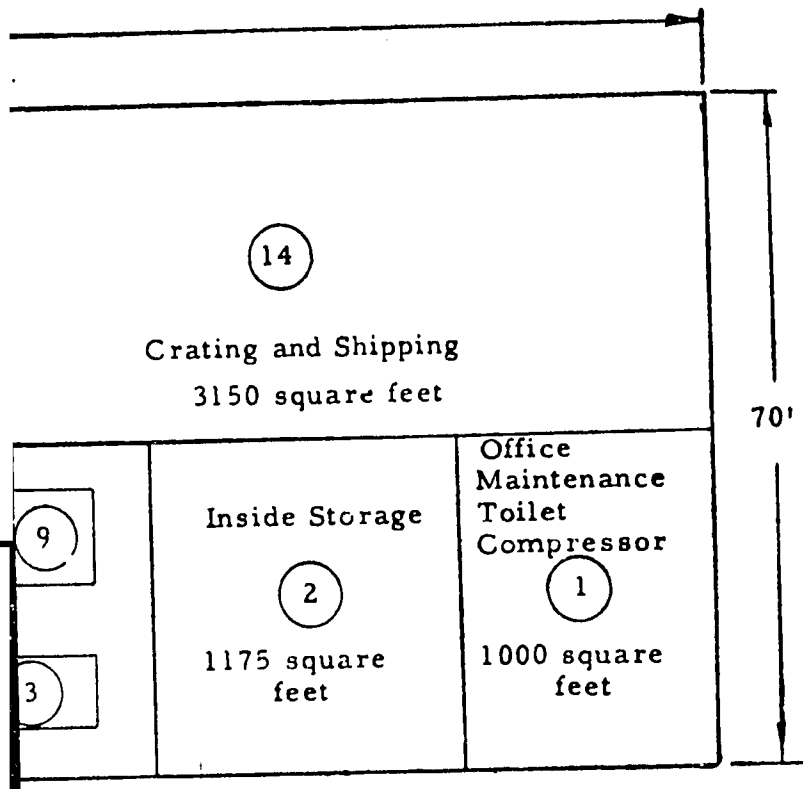
SANITARY  
PLANT LAY



1. Office, maintenance, rest rooms, & compressor
2. Inside storage
3. Molding machine
4. Gravity conveyor
5. Ladle hoist
6. Cupola
7. Shakeout machine

: S.I.C. 3431

WORK FLOW



- 8. Used sand conveyor
- 9. Sand reconditioner
- 10. Cleaning
- 11. Ground coat spray area
- 12. Tilt table and frit applicator
- 13. Enameling furnace
- 14. Crating and shipping

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SANITARY WARE: S. I. C. 3431

SELECTED REFERENCES

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- A. Foseco Foundryman's Handbook. Foseco. 1965. \$3.50.  
Pergamon Press  
44-01 21st Street, Long Island City, N. Y. 11101
- B. Patternmaking and Founding. Robert E. Smith. 1959. \$1.60.  
Taplinger Publishing Co, Inc.  
119 West 57th Street  
New York, N. Y. 10019
- C. Exploring Patternmaking and Founding. Harvey D. Miner and John G. Miller. 1959. \$4.85.  
D. Van Nostrand Co. Inc.  
Princeton, N. J. 08540
- D. Introduction to Foundry Technology. D. C. Ekey and W. P. Winter. 1958. 296 p. Illus. \$7.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036

II. U.S. GOVERNMENT PUBLICATION

- A. Foundry Practices. IR-18454. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523

III. PERIODICAL

- A. Foundry. Monthly. \$20.00/year.  
Penton Publishing Company  
Penton Building  
Cleveland, Ohio 44113

IV. U.S. PATENTS

- Available U. S. Patent Office  
Washington, D. C. 20231 \$ .25 each.
- A. Patent No. 2,836,831. 1958. 5 p.  
Wash basin.
  - B. Patent No. 2,810,916. 1957. 4 p  
Lavoratory.
  - C. Patent No. 2,767,407. 1956. 5 p.  
Sink construction.

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V. TRADE ASSOCIATIONS

- A. Gray Iron Founders Society  
National City E—6th Building  
Cleveland, Ohio 44114
- B. Malleable Founders' Society  
781 Union Commerce Building  
Cleveland, Ohio 44114
- C. Steel Founders' Society of America  
606 Terminal Tower  
Cleveland, Ohio 44113
- D. Foundry Equipment Manufacturers Association  
5225 Manning Place, N. W.,  
Washington, D. C. 20016

VI. ENGINEERING COMPANIES

- A. National Engineering Company  
610 Machinery Hall Building  
Chicago, Ill. 60606  
Consulting and foundry work.
- B. Jeffery Manufacturing Company  
956 North 4th Street  
Columbus, Ohio 43201  
Build complete foundries

VII. DIRECTORY

- A. Standard Metal Directory. Biennial. \$15.00.  
National Business Press, Inc.  
425 West 25th Street  
New York, N. Y. 10001  
Lists United States metal plants, including foundries.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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

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

## ORDERING INSTRUCTIONS

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

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

Address orders to: U.S. Department of Commerce  
Clearinghouse for Federal Scientific and  
Technical Information, 410 12  
Springfield, Virginia 22151

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

## GENERAL INFORMATION

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

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

# INDUSTRY PROFILES

## SMALL CERAMICS SHOP

I. P. No. 66145

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

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

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

## SMALL CERAMICS SHOP: Standard Industrial Classification 3269

### A. PRODUCT DESCRIPTION

Small ceramic wares, such as ashtrays, rings, plates, cigarette boxes, etc.

### B. GENERAL EVALUATION

The investment required for this plant is very small, as also is the labor force. The objects will be decorated with purchased decalcomanias. The problem in determining the market for factory-produced articles of this kind is the same as in the case of gold jewelry, although the items are less expensive. (See Industry Profile on Gold Jewelry: S. I. C. 3911). The local market in less developed areas will be limited because of the low average income of the people. The market among tourists will depend, at least in part, upon the degree to which the product has preserved its native characteristics in the process of factory production. If a distinctive style has been preserved and an export market can be established through direct shipments abroad and not only through tourist trade, factory production may be economically feasible.

### C. MARKET ASPECTS

1. USERS. Individuals, households, restaurants, etc.
2. SALES CHANNELS AND METHODS. Plant would sell to jewelry stores, gift shops, department stores, and also to exporters for shipment abroad.
3. GEOGRAPHICAL EXTENT OF MARKET. The products are light. However, care needs to be taken in packaging them for shipping. Distribution will depend on transportation facilities.
4. COMPETITION. a. Domestic Market. Imported mass-produced products will often be competitive. Inexpensive locally-made handicraft items may also compete. b. Export Market. The success of articles of this type in the export market, particularly when not bought by tourists but exported directly, depends largely upon the extent to which their local character has been maintained.
5. MARKET NEEDED FOR PLANT DESCRIBED. No population figure necessary to support this plant can be given. Level of income would be the major limitation on domestic consumption. The plant would depend partly upon exports, both direct and indirect. Volume of tourist traffic, extent to which these items have preserved a local character, and their relative price level will determine export demand.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 16,000 Pieces

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

	Cost
Land. About 1,000 sq. ft.	\$ --
Building. One story, 20'x30'.	4,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$1,200
Other tools & equipmt.	500
Furniture & fixtures	300
Total (excl. Land)	\$ 2,000
Total	\$ 6,000

Principal Items. 2 small fire brick kilns, small metal kiln, molds, brushes, knives & spatulas, scrapers, sieves, sgraffito knives, stilts for kilns, 2 spray guns for glazing.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 4,300
Admin. Costs(b), Contingencies, Sales Costs(c)	30	500
Training Costs		1,200
Total Working Capital		\$ 6,000

#### c. TOTAL CAPITAL (EXCL. LAND) \$ 12,000

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Slip-casting clay	2 tons	\$ 200
Glazes, various type & colors		300
Decalcomanias	2,000	400
Glaze stain & under-glaze strains		200
Overglaze		300
Plaster		30
Glue & quick drying cement		20
Cones & carrying clasps		150
Benches & bins		400
Total		\$ 2,000
Supplies		
Hand tools		\$ 100
Maintenance & repair parts		200
Office supplies		100
Total		\$ 400

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. 16,000 kw-hr annually.	\$ 400
b. Fuel. For heating, if necessary.	\$ 100
c. Water. Small quantity for production, sanitation & fire protection.	\$ 100

### 4. TRANSPORTATION

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

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	\$ 6,000
Semi-skilled	2	9,000
Total	3	\$ 15,000
b. Indirect Labor		
Manager - buys, sells, keeps books & supervises	1	\$ 8,000

- c. Training Needs. Manager must be fully experienced. He should be able to do all labor training. Plant should reach full production in 1 month.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$ 2,000
Direct Labor	15,000
Manufacturing Overhead(a)	9,000
Admin. Costs(b), Contingencies	1,500
Sales Costs(c), Bad Debts	4,500
Depreciation on Fixed Capital	500
Total	\$ 32,500
b. Annual Sales Revenue	\$ 40,000

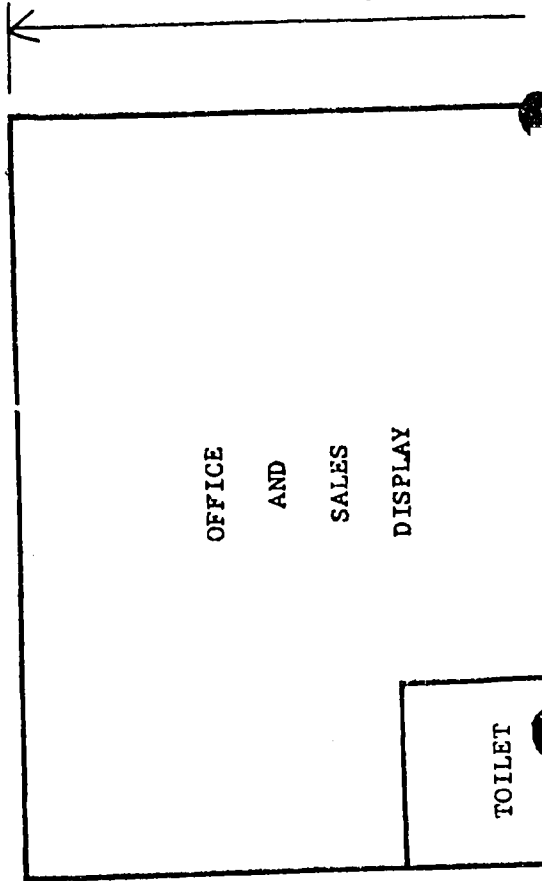
NOTES: (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal and Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

SMALL CERAMICS SHOP: S.I.C. 3269

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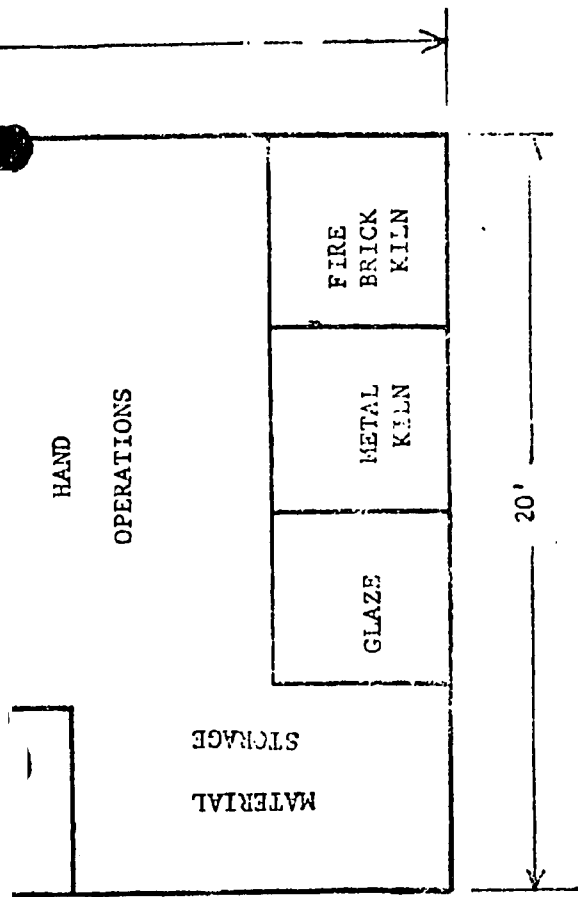
PLANT LAYOUT

SMALL CERAMICS S



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I.C. 3269



3269



## SMALL CERAMICS SHOP: S. I. C. 3269

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- B. Practical Pottery and Ceramics. K. i. Clark, Illus. 1964. \$6.50.  
Viking Press  
625 Madison Avenue, New York, N. Y. 10022
- C. Ceramics: Stone Age to Space Age. Lane Mitchell. Illus. 1963. \$2.50  
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New York, N. Y. 10036
- D. Ceramics. Glen C. Nelson, revised edition. Illus. 1960. \$6.75.  
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383 Madison Ave.  
New York, N. Y. 10017
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Tudor Publishing Co.  
221 Park Ave. So. New York, N. Y. 10003

#### II. U. S. GOVERNMENT PUBLICATIONS

- A. A Complete Directory of Ceramic Materials. 0-9. Gratis.  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- B. Bibliography on Ceramic Products. IR-16930. Bibliography on Ceramics  
IR-18836. Gratis.  
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- C. Ceramics. August 1962. SB-503. Gratis.  
United States Department of Commerce  
Washington, D. C. 20230

#### III. PERIODICALS

- A. Ceramic Age. Monthly. \$8.00/year.  
Ceramic Publications, Inc.  
Ninth-Chester Building, Cleveland, Ohio 44114  
Deals with industrial and electronic ceramics, pottery, whiteware, abrasives,  
refractories, porcelain enamel, glass, structural clay products, raw  
materials, and equipment.
- B. Ceramic Industry. Monthly. \$8.00/year.  
Industrial Publications, Inc.  
5 South Wabash Avenue, Chicago, Ill. 60603  
Management, engineering, and production of porcelain enamel, glass,  
whiteware, electronic and other new ceramics.

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VI. U. S. PATENTS

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

- A. Patent No. 2,864,711. 1958. 2 p.  
Glazed ceramic bodies and methods for producing them.
- B. Patent No. 2,839,209. 1958. 6 p.  
Method for making ceramic ware gift items.
- C. Patent No. 2,741,008. 1956. 2 p.  
Methods of producing glazed ceramic objects.
- D. Patent No. 2,662,826. 1953. 2 p.  
Self-glazing ceramic compositions.

V. TRADE ASSOCIATIONS

- A. American Ceramic Society  
4055 North High Street  
Columbus, Ohio 43214
- B. National Institute of Ceramic Engineers  
4055 North High Street  
Columbus, Ohio 43214

VI. ENGINEERING COMPANIES

- A. Ferro Corporation  
Harvard and East 56th Street  
Cleveland Ohio 44105  
Kiln and oven engineers and designers.
- B. Harrop Ceramic Service Company  
Pearl and Gay  
Columbus, Ohio 43215  
Ceramic design, plant construction, equipment, tests, analyses.

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## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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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

## SPLIT GIB-HEAD KEYS, AND TAPER PINS

I. P. No. 66146

*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.

## A. PRODUCT DESCRIPTION

Metal fasteners as follows: Split gib-head keys of all shapes in stock ranging from 1/8" to 1/2"; split taper pins, diameter 3/32" to 9/16" and length 3/4" to 7-1/2"; solid taper pins, diameter from 1/16" to 3/4" and length 1/2" to 9". Made from purchased cold rolled steel flat and bar stock.

## B. GENERAL EVALUATION

This plant requires a fairly heavy capital investment. Skilled labor requirements are small. The products are in common use in industry, but a substantial industrial complex would be needed to support the plant described. Some sales to nearby countries might be possible in some cases, but the great bulk of the market would almost certainly have to be domestic.

## C. MARKET ASPECTS

1. USERS. A large variety of metal using industries. Small quantities may be purchased by individuals.
2. SALES CHANNELS AND METHODS. Sales are made to industry and also to hardware distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are very easy to transport and potential domestic market will generally be nationwide. b. Export. These products are exported world-wide by the major industrial nations.
4. COMPETITION. a. Domestic Market. Competition from imports may be keen. b. Export Market. This plant would not normally be able to compete in world markets, though some regional sales might be possible in some cases.
5. MARKET NEEDED FOR PLANT DESCRIBED. There is no simple yardstick for measuring the size of the market needed for this plant. It can only be said that a complex of metal-using industries on a considerable scale would be needed to provide an outlet for its production.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - ONE-SHIFT OPERATION: 250 Tons

### 1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>	Cost
Land. About 10,000 sq. ft.	\$ --
Building. One story, 65'x75', Equipment, Furniture & Fixtures	30,000
Prodn. tools & equipmt.	\$262,800
Other tools & equipmt.	21,200
Furniture & fixtures	1,000
<u>Total (excl. Land)</u>	<u>\$315,000</u>

Principal Items. Cutter grinder, surface grinder, toolpost grinder, shaper, cut-off saw, vertical tool room miller, horizontal tool room miller, bench lathe, tool room engine lathe, air compressor, power punch press, 2 band saws, power cutt-off shear degreaser-vapor type, spot welder, wet grinder, fork truck, 3 hand pallet trucks, 2 tumbling barrels, punch press, horizontal milling machine, hand milling machine, automatic screw machine, centerless grinder, turret lathe, cutting tools, pallets.

### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 34,000
Admin. Costs(b), Contingencies, Sales Costs(c)	30	3,500
Training Costs		10,000
<u>Total Working Capital</u>		<u>\$ 47,500</u>

c. TOTAL CAPITAL (EXCL. LAND) \$362,500

### 2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Steel (cold rolled)	480 tons	\$ 77,000
Packaging		3,000
		<u>\$ 80,000</u>
Less scrap steel sales (220 tons)		7,000
<u>Total</u>		<u>\$ 73,000</u>

### b. Supplies

Lubricants & hand tools	\$ 200
Cutting oil & welding rods	500
Cutting tools	2,500
Maintenance & repair parts	3,000
Office supplies	300
<u>Total</u>	<u>\$ 6,500</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power.</u> Connected load about 70 hp.	\$ 2,100
b. <u>Fuel.</u> About 4,300 gals. oil for heating, if necessary.	\$ 500
c. <u>Water.</u> About 400,000 gals. annually for general purposes.	\$ 100

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 80 tons a month. Good highway & easy access to railroad desirable.

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	2	\$ 12,000
Semi-skilled	6	30,000
Unskilled	4	16,000
<u>Total</u>	<u>12</u>	<u>\$ 58,000</u>
b. <u>Indirect Labor</u>		
Manager & supervisor	2	\$ 18,000
Maintenance, toolroom inspectors	4	25,000
Office	3	13,000
Other	2	8,000
<u>Total</u>	<u>11</u>	<u>\$ 64,000</u>

- c. Training Needs. Manager & supervisor should be fully experienced. With 2 skilled operators, 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	\$ 73,000
Direct Labor	58,000
Manufacturing Overhead (a)	73,200
Admin. Costs (b), Contingencies	20,000
Sales Costs (c), Bad Debts	24,000
Depreciation on Fixed Capital	32,100
	<u>\$280,300</u>
b. <u>Annual Sales Revenue</u>	\$360,000

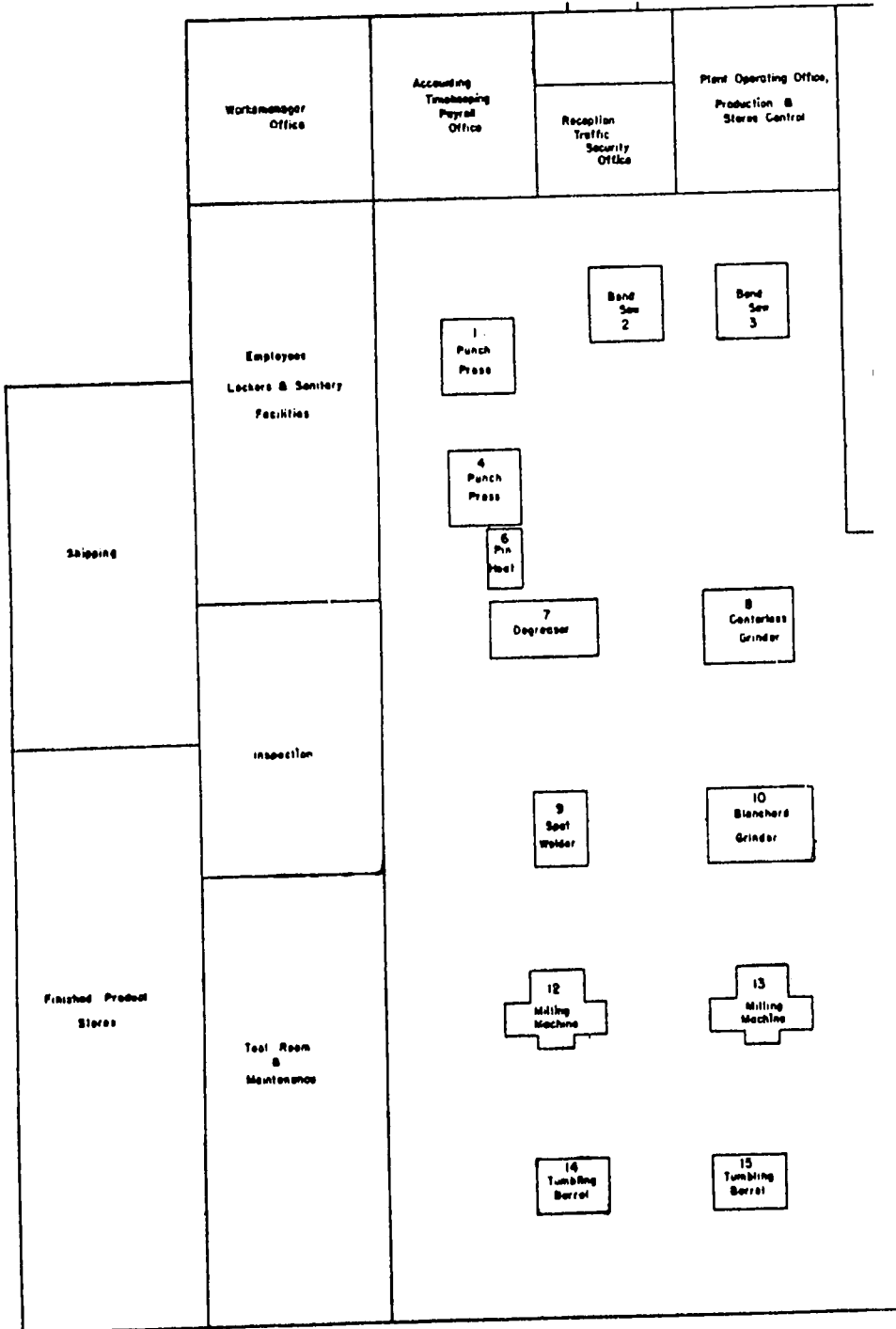
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

SPLIT GIB-HEAD KEYS, AND TAPER PINS: S.I.C. 3429

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SPLIT GIB-HEAD KE

Plant 1

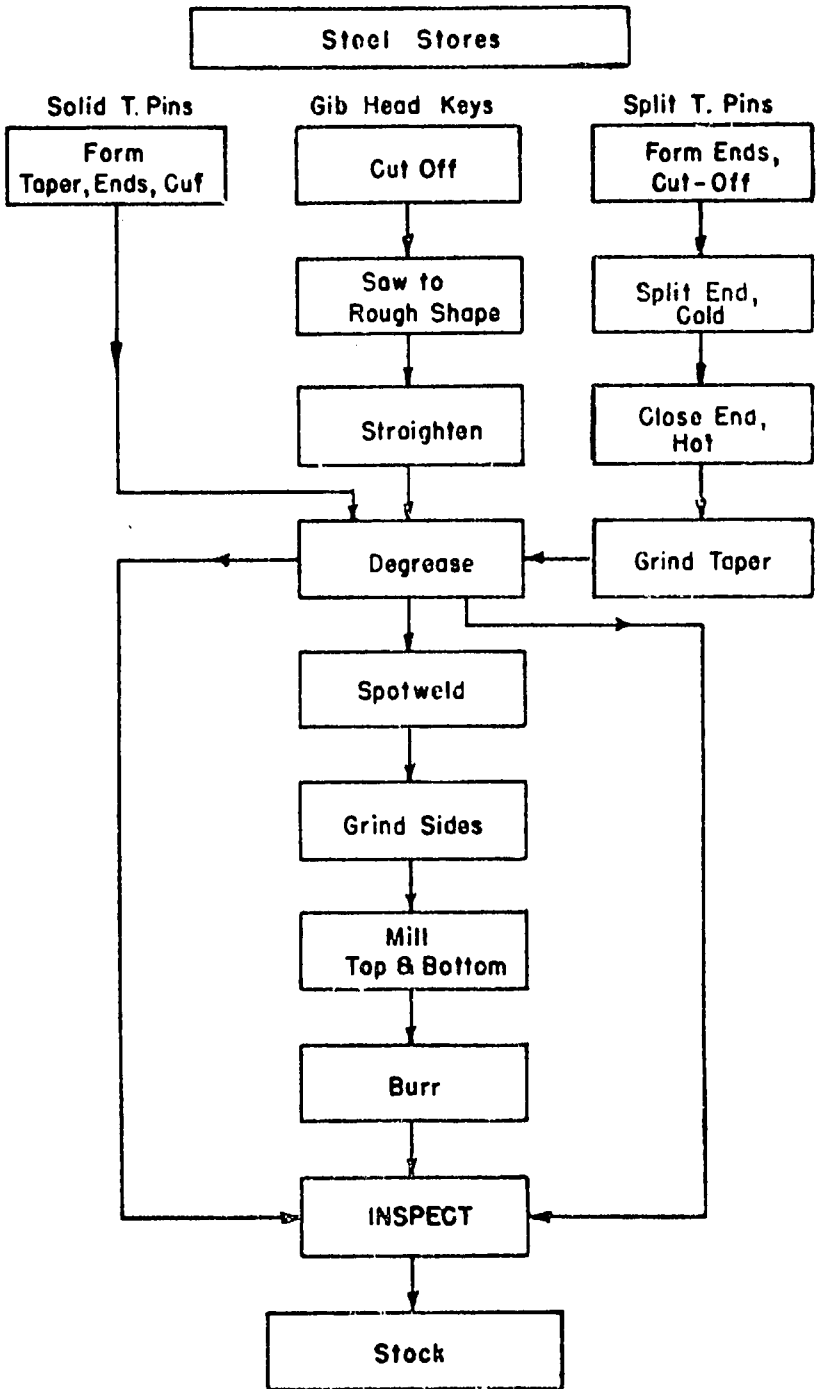


← 65' →

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# TAPER PINS: S.I.C. 3429

## Work Flow



75'

5 Shear

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- B. Machinery's Handbook. Erik Oberg and Franklin D. Jones. 17th edition.  
Illus. 1964. \$14.00.  
Industrial Press, 93 Worth Street, New York N. Y. 10013
- C. Modern Machine Tools. Frank H. Habicht. Illus. 1963. \$6.50.  
D. Van Nostrand Company, Inc.  
120 Alexander Street  
Princeton, New Jersey 08540
- D. Engineering Design. Robert Matcusek. ed. by D. C. Johnson, tr. by  
A. H. Burton. 1963. \$8.50.  
John Wiley & Sons, Inc.  
605 Third Ave.,  
New York, N. Y., 10016

II U.S. GOVERNMENT PUBLICATIONS

- A. Split-Gib Head Keys and Solid Taper Pins. OD-33. May 1957. Gratis  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523  
Requirements for establishing and operating a plant to produce split-gib  
keys and solid taper pins.
- B. Directory of Metalworking Machinery. Published irregularly. \$6.95.  
United States Government Printing Office  
Division of Public Documents  
Washington, D. C. 20402  
Lists manufacturers of metalworking machinery.

III. PERIODICALS

- A. American Machinist. Bi-weekly. \$25.00/year.  
McGraw-Hill Publishing Company, Inc.  
330 West 42nd Street, New York, N. Y. 10036  
Covers metalworking machinery and tools, engineering, and management  
problems.
- B. Mechanical Engineering. Monthly. \$7.00/year.  
The American Society of Mechanical Engineers  
29 West 39th Street, New York, N. Y. 10018  
Devoted to mechanical engineering and industrial problems.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,335,418. 1943. 3 p.  
Taper pin manufacture.
- B. Patent No. 2,223, 871. 1940. 3 p.  
Taper pin.

V. TRADE ASSOCIATIONS

- A. American Supply and Machinery Manufacturers Association  
2130 Keith Building  
Cleveland, Ohio 44115
- B. National Machine Tool Builders Association  
2139 Wisconsin Avenue, N. W.,  
Washington, D. C. 20007
- C. Machinery and Allied Products Institute  
1200 18th Street, N. W.,  
Washington, D. C. 20006

VI. ENGINEERING COMPANY

- A. Daystrom, Inc.  
753 Main Street  
Poughkeepsie, New York 12603  
Development, design, engineering, and manufacturing of complete  
facilities in the metalworking field.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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

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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.

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# INDUSTRY PROFILES

## STAINLESS STEEL UTENSILS

I. P. No. 66147

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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 the profile must make suitable adjustments to conditions prevailing in his country. This profile should help in reaching correct assumptions.

## STAINLESS STEEL UTENSILS: Standard Industrial Classification 3461

### A. PRODUCT DESCRIPTION

Utensils made from purchased stainless steel sheets. Utensils up to 5 inches in diameter are made by small (15-ton) hydraulic press with small dies; larger utensils by heavy, automatic-feed spinning lathe.

### B. GENERAL EVALUATION

This is a small scale operation requiring only a modest amount of capital. Labor skills needed are fairly high but any country possessing metal working skills should be able to supply them. Stainless steel utensils are rather high priced, but demand for them is increasing. In low income areas this type of small equipment might not be used so much in the home because of the price, but should find a market in hospitals, restaurants, military institutions, etc. As these services expand in developing areas, demand for these items will also increase and as income rises, more utensils might be used in the home. The plant here described manufactures a variety of shapes, mostly rather small. For some household uses, such as saucepans, further processing would be necessary, such as adding handles made of heat-resistant materials.

### C. MARKET ASPECTS

1. USERS. Industries, restaurants, medical and other institutions, households, etc.
2. SALES CHANNELS AND METHODS. Sales will normally be made to wholesale and retail distributors, but a few might be made direct to large users.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. This product is easily transported and transport costs are low in relation to value of product. In many countries the potential domestic market will be nationwide. b. Export. These products are exported worldwide by major industrial countries.
4. COMPETITION. a. Domestic Market. Competition from imports may be important. Competition from other metals, e. g. aluminum and enamelware, may be strong, and for many uses the market position of stainless steel utensils will depend on relative cost in relation to such alternatives. b. Export Market. This plant would not be able to compete in international markets.
5. MARKET NEEDED FOR PLANT DESCRIBED. In the conditions of most economically less developed areas, stainless steel utensils are luxury or semi-luxury items, for which cheaper substitutes are commonly available for most uses. Demand for stainless steel ware is growing, but in most cases this plant could probably meet the demand of several million people in such areas.

## D. PRODUCTION REQUIREMENTS

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

### 1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		Cost
Land. About 6,000 sq. ft.		\$ --
Building. One story, 40'x60',		14,400
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$ 26,000	
Furniture & fixtures	500	26,500
<u>Total (excl. Land)</u>		<u>\$ 40,900</u>

Principal Items. Circular shear, 15-ton drawing press, dies, spinning lathe with 4 chucks, tools, annealing gas furnace, polisher.

### WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 9,800
Admin. Costs(b), Contingencies, Sales Costs(c)	30	900
<u>Total Working Capital</u>		<u>\$ 10,700</u>

TOTAL CAPITAL (EXCL. LAND) \$ 51,600

### MATERIALS AND SUPPLIES

Direct Materials	Annual Requirements	Annual Cost
Stainless steel sheets	21 tons	\$ 28,000
Wire		1,000
<u>Total</u>		<u>\$ 29,000</u>

### Supplies

Maintenance & parts	\$ 500
Lubricants & tools	200
Office supplies	100
<u>Total</u>	<u>\$ 800</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power</u> . Connected load 15 hp.	\$ 400
b. <u>Fuel</u> . About 4,000 gals. oil, or equivalent, for heating, if necessary.	\$ 500
c. <u>Water</u> . For sanitation & fire protection.	\$ 100

### 4. TRANSPORTATION

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

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	2	\$ 12,000
Unskilled	2	8,000
<u>Total</u>	<u>4</u>	<u>\$ 20,000</u>
b. <u>Indirect Labor</u>		
Manager	1	\$ 8,000
c. <u>Training Needs</u> . Manager looks after purchases & sales, keeps books & supervises. Plant should reach full production without preliminary training period.		

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

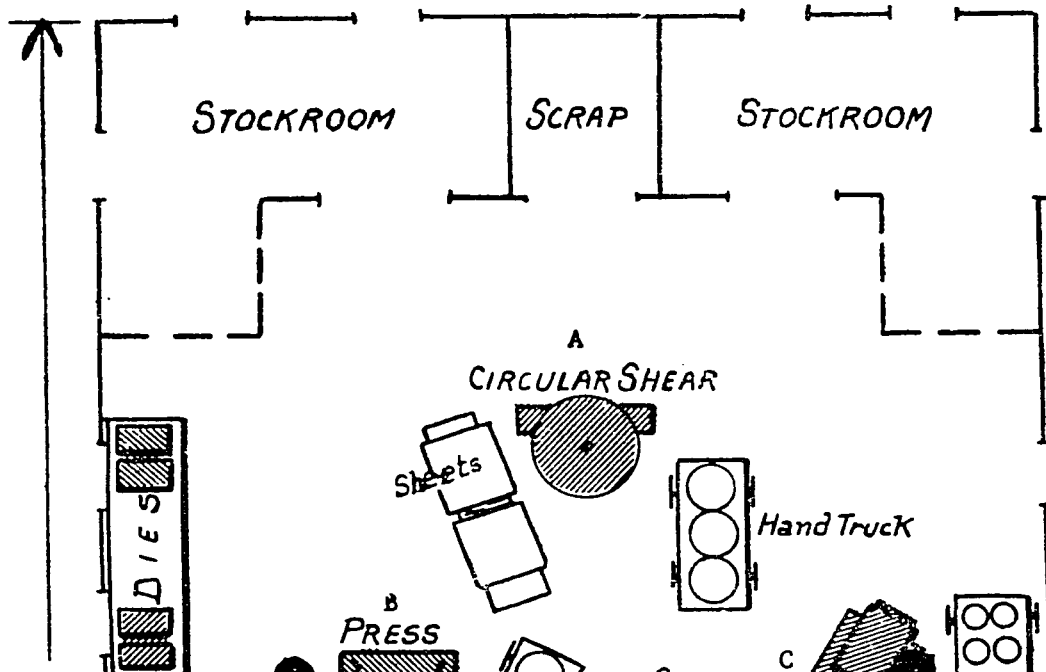
a. <u>Annual Costs</u>	
Direct Materials	\$ 29,000
Direct Labor	20,000
Manufacturing Overhead(a)	9,800
Admin. Costs(b), Contingencies	4,500
Sales Costs(c), Bad Debts	6,500
Depreciation on Fixed Capital	3,400
<u>Total</u>	<u>\$ 73,200</u>
b. <u>Annual Sales Revenue</u>	\$ 84,000

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

STAINLESS STEEL UTENSILS: S.I.C. 3461

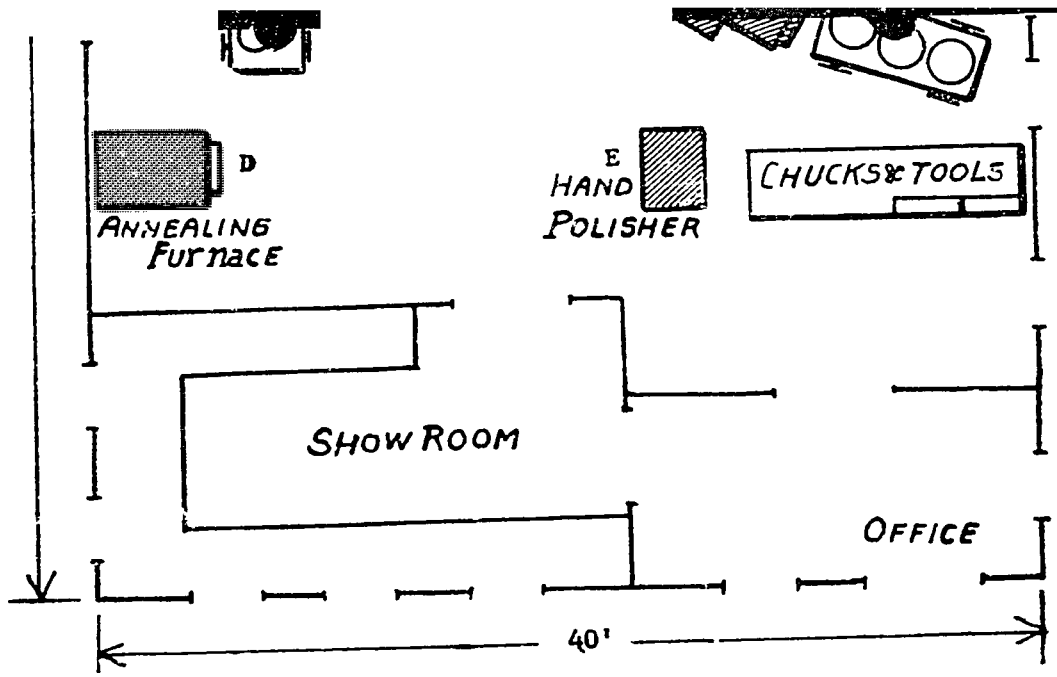
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# PLANT LAYOUT AND WORK FLOW



STAINLESS STEEL

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- A. Cut to size on circular shear.
- B. Form on press
- C. Form in spinning lathes
- D. Anneal
- E. Head polish

AS



STAINLESS STEEL UTENSILS: S. I. C. 3461

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I. TEXTBOOKS

- A. Sheet Metal Shop Practice. Leroy F. Bruce and Leo Meyer. \$5.50.  
American Technical Society, 848 E. 58th Street  
Chicago, Ill, 60637
- B. Basic Sheet Metal Work. Wray Youmans, 1964.  
St. Martins Press, Inc.  
175 Fifth Avenue, New York, N. Y. 10010
- C. Sheet Metal Practice. W. Neundor and C. Stevens. 1963. \$2.95.  
McGraw-Hill Book Company, Inc.  
330 W. 42nd Street, New York, N. Y. 10036
- D. Shaping America's Products. D. Wallance. 1956. 200 p. \$10.00.  
Reinhold Publishing Corporation  
430 Park Avenue, New York, N. Y. 10022
- E. 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
- F. Pressworking of Metals. C. W. Hinman. 1950. 551 p. Illus. \$9.00.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street, New York, N. Y. 10036
- G. Fabrication of U. S. Stainless. Catalog ADV-15595. Gratis.  
U. S. Steel Corporation  
Pittsburgh, Penn. 15230

II. U. S. GOVERNMENT PUBLICATION

- A. Directory of Metalworking Machinery. Published irregularly. \$6.95.  
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Division of Public Documents  
Washington, D. C. 20402  
Lists manufacturers of metalworking machinery.

III. PERIODICALS

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McGraw-Hill Publishing Company, Inc.  
330 West 42nd Street, New York, N. Y. 10036  
Devoted to machine shop practice.
- B. Machine and Tool Blue Book. Monthly. \$5.00/year.  
Hitchcock Publishing Company  
222 East Willow Avenue, Wheaton, Ill. 60187  
Devoted to the metalworking field.

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VI. U. S. PATENTS

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

- A. Patent No. 2,975,743. 1961. 16 p.  
Metal forming machine.
- B. Patent No. 2,966,872. 1961. 23 p.  
Form shaped hollow metal articles.
- C. Patent No. 2,952, 294, 1960. 6 p.  
Forming of sheet metal.

V. TRADE ASSOCIATIONS

- A. American Iron and Steel Institute  
150 East 42nd Street  
New York, N. Y. 10017
- B. American Machine Tool Distributors Association  
1500 Mass. Avenue, N. W.,  
Washington, D. C. 20005

VI. ENGINEERING COMPANIES

- A. Dorr-Oliver, Inc.  
99 Havermeyer Lane  
Stamford, Connecticut 06903  
Consulting, metallurgical, and industrial.
- B. Continental Industrial Engineers, Inc.  
2321 West Hubbard  
Chicago, Ill. 60612  
Production lines and complete plants.

## PRE-INVESTMENT FEASIBILITY STUDY SUGGESTED

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# INDUSTRY PROFILES

## STORAGE BINS

I. P. No. 66148

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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.

## STORAGE BINS: Standard Industrial Classification 3444

### A. PRODUCT DESCRIPTION

Bins made from purchased hot-rolled sheet metal and heavy gauge steel wire, for storage of commodities, spare parts, etc., in factories, warehouses, stores, homes, etc. A wide variety of bins can be made including tilting bins, rotary bins, stackable box-type and bin-type pallets, removable bin boxes, collapsible crates, tote boxes, and others.

### B. GENERAL EVALUATION

The plant described has about the minimum requirements of machinery and tools needed to start manufacture of a reasonably comprehensive range of these products. The capital needed is modest and labor skills required are not very high. A wide variety of products can be made and production can be readily adapted to the demands of the particular market. Many developing areas should be able to support a plant of this kind.

### C. MARKET ASPECTS

1. USERS. Industries, wholesale and retail stores, hospitals, schools, households, etc.
2. SALES CHANNELS AND METHODS. Sales may be made direct or to wholesale and retail distributors.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic. These products are fairly easy to handle and may be transported comparatively long distances. However, substitutes can be made by small workshops or of other materials, and this competition may restrict the natural domestic market area. b. Export. Since these products, or some substitute, can be fairly easily produced in most countries, and freight costs are somewhat high in relation to value, these products are not common in international trade.
4. COMPETITION. a. Domestic Market. Competition from imports is unlikely to be significant. Competition from small makers and from substitutes made of other materials may be important, especially on the fringes of the plant's natural market area. b. Export Market. It is unlikely that a plant like this would be able to make any export sales.
5. MARKET NEEDED FOR PLANT DESCRIBED. In the average conditions of economically less developed areas, an urban area containing a fair proportion of modern stores and institutions and some factory industry, with a population of the order of a million people, should be able to absorb the output of this plant.

# D. PRODUCTION REQUIREMENTS

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

## 1. CAPITAL REQUIREMENTS

**a. FIXED CAPITAL**

	Cost
Land. About 5,000 sq. ft.	\$ --
Building. One story, 40'x60'.	12,000
Equipment, Furniture & Fixtures.	
Prodn. tools & equipmt.	\$7,000
Other tools & equipmt.	1,000
Furniture & fixtures	500
Total (excl. Land)	<u>\$ 20,500</u>

Principal Items. Power square shear, 2 hand punches, combination bending brake, bench type punch, angle-iron shear, electric welder, boiler, oxyacetylene welder, electric hand grinder, bench grinder, drill press, spray booth complete, cleaning tank & cleaner.

## b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	60	\$ 5,400
Admin. Costs(b), Contingencies, Sales Costs(c)	30	600
Training Costs		1,200
Total Working Capital		<u>\$ 7,200</u>

**c. TOTAL CAPITAL (EXCL. LAND) \$ 27,700**

## 2. MATERIALS AND SUPPLIES

**a. Direct Materials**

	Annual Requirements	Annual Cost
Sheet metal	20,000 lbs.	\$ 1,600
Metal mesh	1,450 lbs.	100
Rivets, bolts, nuts & washers		200
Paint		200
Total		<u>\$ 2,100</u>

**b. Supplies**

Lubricants & hand tools	\$ 100
Welding rods & gas	200
Cutting tools	300
Maintenance & repair parts	800
Office supplies	200
Total	<u>\$ 1,600</u>

## 3. POWER, FUEL AND WATER

	Annual Cost
<b>a. Electric Power.</b> Connected load about 10 hp.	<u>\$ 400</u>
<b>b. Fuel.</b> For heating, if necessary.	<u>\$ 100</u>
<b>c. Water.</b> For sanitation & fire protection only.	<u>\$ 100</u>

## 4. TRANSPORTATION

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

## 5. MANPOWER

	Number	Annual Cost
<b>a. Direct Labor</b>		
Skilled	1	\$ 6,000
Semi-skilled	2	10,000
Unskilled	1	4,000
Total	<u>4</u>	<u>20,000</u>
<b>b. Indirect Labor</b>		
Manager - buys, sells, keep books & supervises	1	<u>\$ 8,000</u>

**c. Training Needs.** Manager must be experienced. With 1 skilled worker, he should be able to do all labor training. Plant should reach full production in 1 month.

## 6. TOTAL ANNUAL COSTS AND SALES REVENUE

**a. Annual Costs**

Direct Materials	\$ 2,100
Direct Labor	20,000
Manufacturing Overhead(a)	10,200
Admin. Costs(b), Contingencies	2,600
Sales Costs(c), Bad Debts	5,500
Depreciation on Fixed Capital	1,600
Total	<u>\$ 42,000</u>

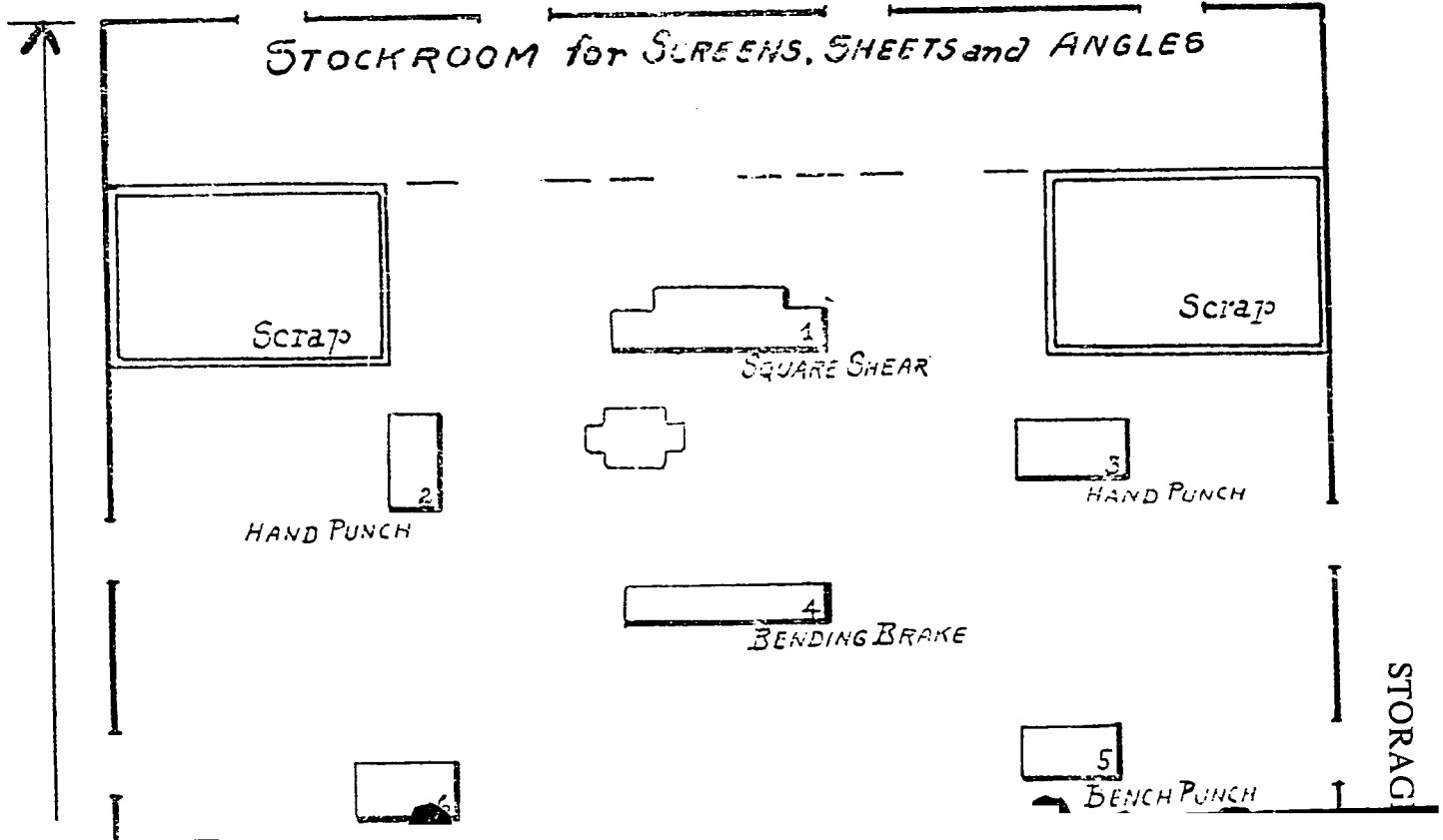
**b. Annual Sales Revenue** \$ 50,000

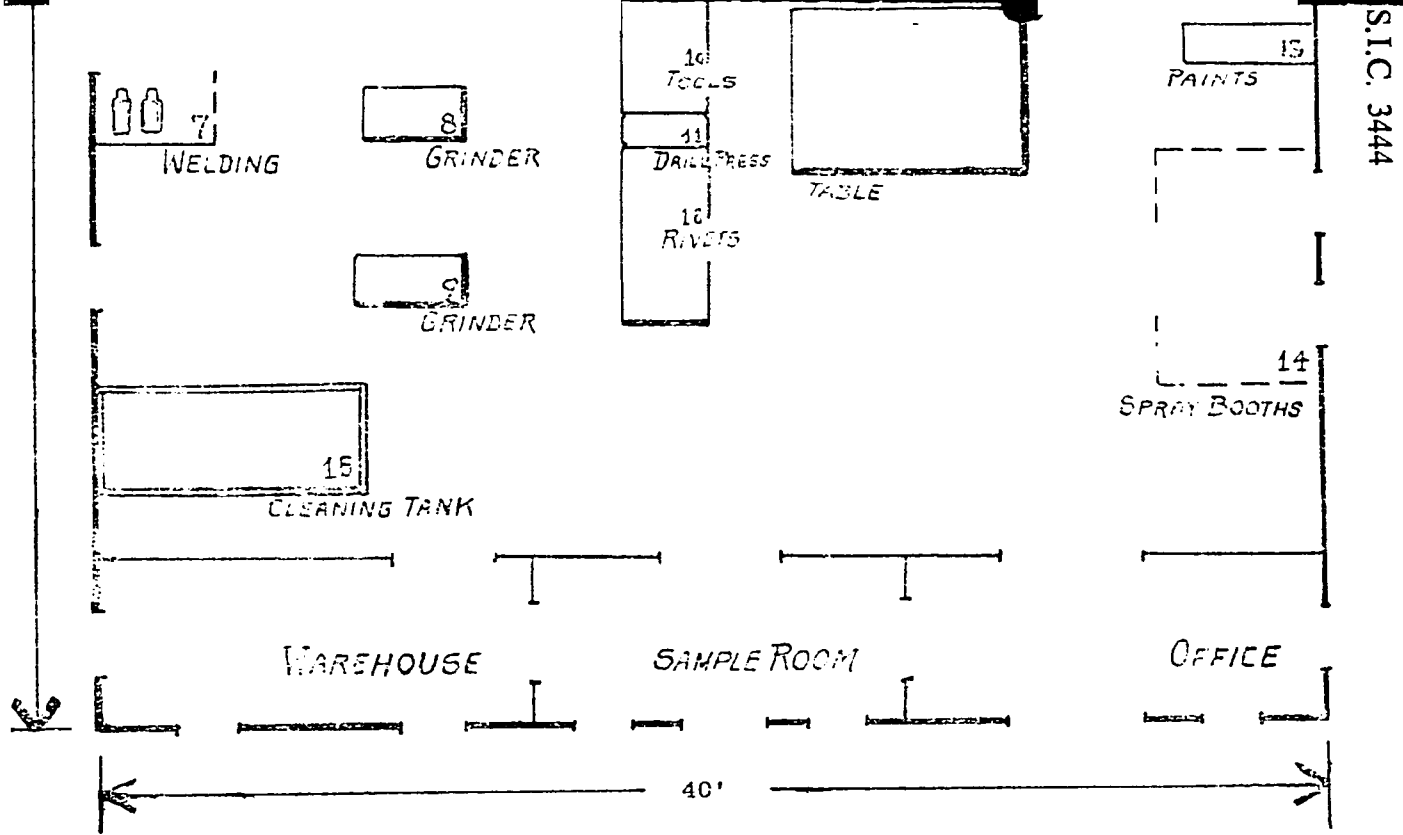
**NOTES.** (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b), Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

STORAGE BINS: S.I.C. 3444

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PLANT LAYOUT





The operations are diversified depending on the design and the size of the products. Therefore, it is not practicable to indicate the exact flow of work.

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STORAGE BINS: S. I. C. 3444

SELECTED REFERENCES

I. TEXTBOOKS

- A. Sheet Metal Shop Practice. Leroy F. Bruce, and Leo Meyer 3rd edition. \$5.50.  
American Technical Society,  
848 E. 58th Street  
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- B. Basic Sheet Metal Work. Wray Youmans. 1964.  
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175 Fifth Avenue, New York, N. Y. 10010
- C. Sheet Metal Practice. W. Neundorf and C. Stevens. 1963. \$2.95.  
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\$7.64.  
Prentice-Hall, Incorporated  
Englewood Cliffs, New Jersey 07632
- E. 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. U.S. GOVERNMENT PUBLICATIONS

- A. Directory of Metalworking Machinery. Published irregularly. \$6.95.  
U. S. Government Printing Office  
Division of Public Documents, Washington, D. C. 20402  
Lists manufacturers of metalworking machinery.
- B. Storage, Containers, Packaging, Materials Handling. Nov. 1961. SB-476.  
Gratis.  
United States Department of Commerce  
Washington, D. C. 20230

III. PERIODICALS

- A. Metal Forming and Fabricating. Monthly. \$10.00/year.  
Watson Publications, Incorporated  
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. 60127  
Serves the fabricated metal products industry. Includes design, engineering,  
market and statistical information.

SELECTED REFERENCES (Continued)

IV. U. S. PATENTS

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

- A. Patent No. 2,943,752. 1960. 4 p.  
Bulk feed bin.
- B. Patent No. 2,934,233. 1960. 10 p.  
Bin for powdered or granular foodstuffs.
- C. Patent No. 2,863,575. 1958. 8 p.  
Storage hoppers.
- D. Patent No. 2,828,025. 1958. 6 p.  
Flour storage bin.

V. TRADE ASSOCIATIONS

- A. National Metal Trades Association  
222 West Adams Street  
Chicago, Ill. 60606
- B. American Society for Metals  
Metals Park  
Ohio 44073

VI. ENGINEERING COMPANIES

- A. Consolidated Welding and Engineering Co.  
2452 South Ashland Avenue  
Chicago, Ill. 60606  
Complete engineering and contracting service in welding, fabricating and machining.
- B. Whitney Metal Tool Company  
726 Forbes Street  
Rockford, Ill. 61108  
Makers of all kinds of metal forming equipment.

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# INDUSTRY PROFILES

## SUPERPHOSPHATES

I. P. No. 66149

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## SUPERPHOSPHATES: Standard Industrial Classification 2871

### A. PRODUCT DESCRIPTION

Superphosphates, manufactured from phosphate rock.

### B. GENERAL EVALUATION

This industry is one in which economies of large-scale production are marked. A small plant, such as that described, would generally be appropriate only where raw materials are obtainable locally at low cost. If this advantage is present, the plant might be able to compete with large-scale producers. Manufacturing operations are relatively simple and not much skilled labor is needed, and in those respects the project is suitable for many developing areas.

### C. MARKET ASPECTS

1. USERS. Farmers, where soil conditions and type of farming are appropriate to use of phosphate fertilizers.
2. SALES CHANNELS AND METHODS. Sales usually to distributors. Some sales might be made direct to large users, including experimental farms, where they exist. Plant of size described would have insufficient resources for any extensive promotional activities but could distribute explanatory literature and might organize educational visits to farm areas by salesmen on limited scale. Management should keep in close touch with any governmental activities in field of inorganic fertilizer promotion.
3. GEOGRAPHICAL EXTENT OF MARKET. a. Domestic Market. The extent of the potential market area will depend largely on transport facilities. Where there is a good railroad network and/or a good system of inland waterways the market area may be very extensive. b. Export Market. There is a fair volume of exports of phosphatic fertilizers.
4. COMPETITION. a. Domestic Market. If an area produces the necessary raw materials, or a substantial part of them, it should be able to compete effectively with imports. b. Export Market. Competition between major producing countries is fairly strong. Plant of size described could not compete in general export trade, though it might possibly make some sales in easily accessible areas of neighboring countries.
5. MARKET NEEDED FOR PLANT DESCRIBED. There are great variations in soil conditions in different places and in fertilizer requirements for different crops, so that it is very difficult to make any useful generalization regarding the acreage needed to provide a market. Assuming that it has been established by appropriate scientific tests that superphosphates are the cheapest suitable inorganic fertilizer for the crops grown and for the soil conditions of the area, and assuming also that maximum use is made of available organic fertilizers, regular use of superphosphates on upwards of 400,000 acres of land might be necessary to provide a market. In many developing areas such a market will exist only if there has been a large-scale educational effort by the government to encourage use of inorganic fertilizers. Assistance of agricultural departments should be sought in study of economic feasibility of establishing this plant.

## D. PRODUCTION REQUIREMENTS

ANNUAL CAPACITY - THREE-SHIFT OPERATION : 34,000 Tons

### 1. CAPITAL REQUIREMENTS

a. <u>FIXED CAPITAL</u>		Cost
Land. About 3 acres.	\$	--
Building. One story, 70'x250', with 30' side walls for overhead crane. Steel frame and galvanized steel sheets. Price includes boiler.		175,000
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$227,000	
Other tools & equipmt.	3,000	
Furniture & fixtures	1,000	231,000
Total (excl. Land)		\$306,000

Principal Items. Mobile crane & bucket, rock grinder, fine pulverizer, bridge crane, scale hoppers with acid spray equipment, rasper with feed hopper, hoppers & mixer, weighing & bagging machine with sewing machine head, conveyors.

### b. WORKING CAPITAL

	No. of Days	
Direct Materials, Direct Labor, Mfg. Overhead(a)	90	\$168,900
Admin. Costs(b), Contingencies, Sales Costs(c)	30	10,000
Training Costs		12,500
Total Working Capital		\$191,400

c. TOTAL CAPITAL (EXCL. LAND) \$597,400

### 2. MATERIALS AND SUPPLIES

a. <u>Direct Materials</u>	Annual Requirements	Annual Cost
Phosphate rock	21,000 tons	\$ 63,000
Sulphuric acid	17,500 tons	367,500
Bags	525,000	94,500
Total		\$525,000

### b. Supplies

Maintenance materials & machine parts	\$ 3,500
Lubricants	100
Hand & cutting tools	500
Office supplies	500
Total	\$ 4,600

### 3. POWER, FUEL AND WATER

	Annual Cost
a. <u>Electric Power</u> Connected load about 100 hp.	\$ 9,000
b. <u>Fuel.</u> About 20,000 gals. oil annually.	\$ 2,400
c. <u>Water.</u> About 2.4 mn. gals annually for production, sanitation & fire protection.	\$ 600

### 4. TRANSPORTATION

- a. Own Transport Equipment. None necessary.
- b. External Transport Facilities. Total in & out shipments about 8,000 tons a month. Plant should be on good highway and, if possible, on railroad siding.

### 5. MANPOWER

	Number	Annual Cost
a. <u>Direct Labor</u>		
Skilled	3	\$ 18,000
Unskilled	13	\$ 52,000
Total	16	\$ 70,000
b. <u>Indirect Labor</u>		
Manager & supervisors	6	\$ 50,000
Office	2	10,000
Other	1	4,000
Total	9	\$ 64,000

- c. Shifts. Skilled workers consist of working foreman & 2 shift bosses. Each of these takes charge of a shift. Day shift has 5 unskilled men, including 1 for cleaning up purposes. Other shifts have 4 unskilled men each.

- d. Training Needs. The manager & supervisors should be fully experienced. They should be able to train all workers. Plant should reach full production in 2 months.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. <u>Annual Costs</u>	
Direct Materials	\$525,000
Direct Labor	70,000
Manufacturing Overhead(a)	80,600
Admin. Costs(b), Contingencies	60,000
Sales Costs(c), Bad Debts	60,000
Depreciation on Fixed Capital	32,200
Total	\$827,800
b. <u>Annual Sales Revenue</u>	\$1,020,000

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

SUPERPHOSPHATES. S. I. C. 2871

2,416

# SUPERPHOSPHATES: S.I.C. 2871

## Plant Layout and Flow of Work

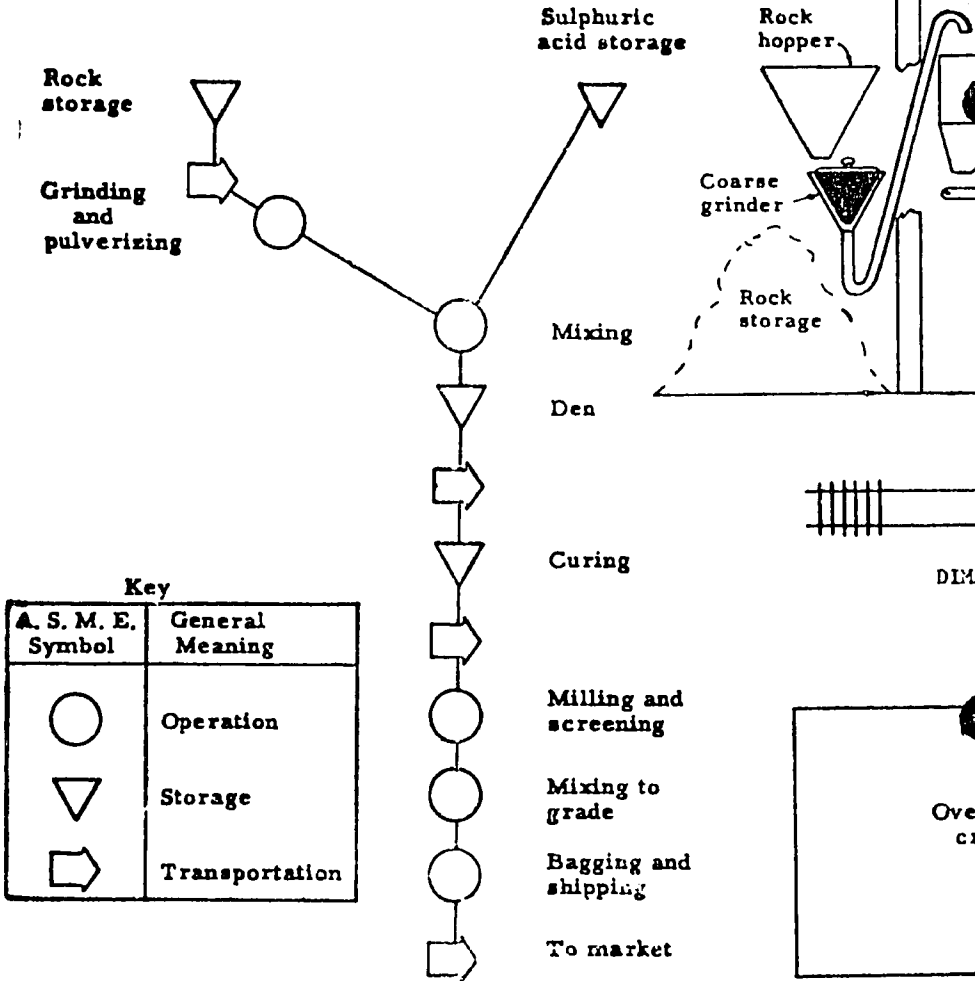
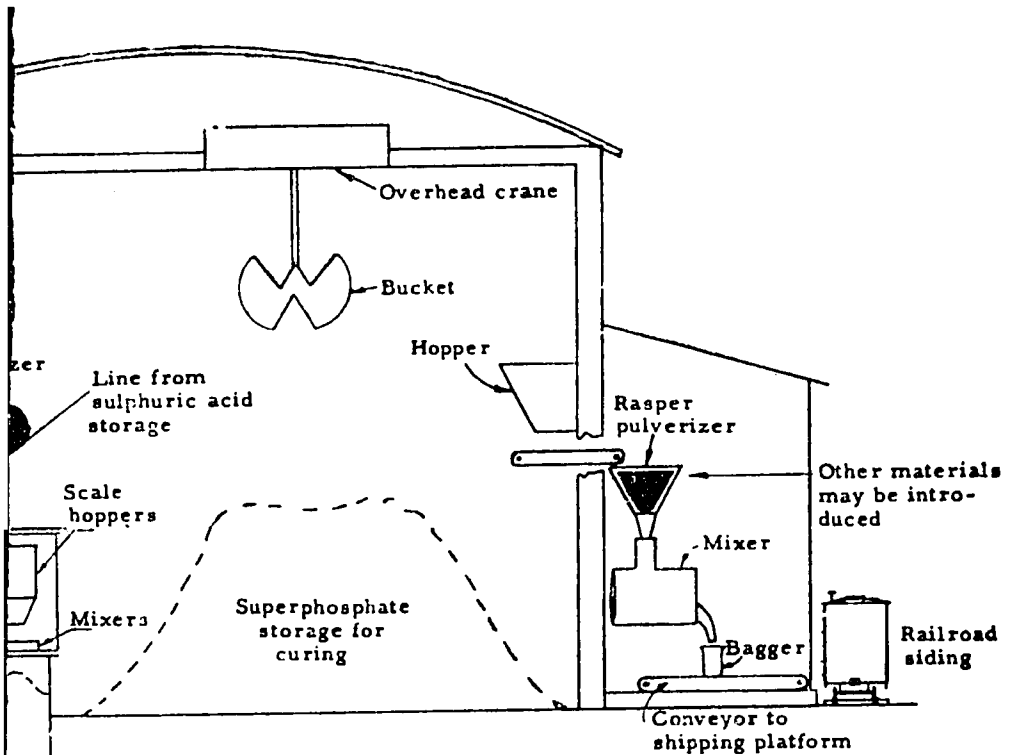


Diagram showing how phosphate rock is processed to superphosphate



Railroad siding

BUILDING 70' x 250' x 30' SIDE WALLS

ROCK STORAGE

Grinding

den den den

STORAGE FOR CURING

bag storage

Milling, screening, bagging

Shipper's office

Loading and shipping platform

Railroad siding



SUPERPHOSPHATES: S. I. C. 2871

SELECTED REFERENCES

I. TEXTBOOKS

- A. Fertilizer Application. Andre Voisin. 1964.  
Charles C. Thomas  
301-327 East Laurence Avenue  
Springfield, Ill. 62703
- B. Chemistry and Technology of Fertilizers. Vincent Sanchelli. 1960. \$18.00.  
Reinhold Publishing Co.  
430 Park Avenue, New York. N. Y. 10022
- C. Economic and Technical Analysis of Fertilizer  
Innovations and Resource Use. E. L. Baum. 1957. \$4.50.  
Iowa State University Press  
Press Building, Ames, Iowa 50010
- D. Commercial Fertilizers. G. H. Collings. 5th edition. 1955. 617 p.  
Illus. \$11.50.  
McGraw-Hill Book Company, Inc.  
330 West 42nd Street  
New York, N. Y. 10036

II. U. S. GOVERNMENT PUBLICATIONS

- A. Fertilizers - Bibliography IR-30631  
Office of Technical Cooperation and Research  
Agency for International Development  
Washington, D. C. 20523
- B. Fertilizers. Sept. 1963. SB-522.  
United States Department of Commerce  
Washington, D. C. 20230

III. PERIODICALS

- A. Commercial Fertilizer. Monthly. \$3.00/year.  
Walter W. Brown Publishing Company  
75 Third Street, N. W., Atlanta, Georgia 30308
- B. Croplife. Weekly. \$5.00/year.  
Miller Company  
2501 Wayzata Boulevard  
Minneapolis, Minn. 55405  
Contains information on materials, supplies, processes.

## SELECTED REFERENCES (Continued)

### IV. U. S. PATENTS

Available U. S. Patent Office

Washington, D. C. 20231 \$0.25 each.

- A. Patent No. 2,978,312. 1961. 3 p.  
Process for manufacture of superphosphate fertilizers from phosphate rock.
- B. Patent No. 2,980,526. 1961. 5 p.  
Method for continuous processing of phosphate into dry, granular, superphosphate fertilizer.
- C. Patent No. 2,924,509. 1960. 7 p.  
Processing of phosphate substances into commercial product including fertilizers.
- D. Patent No. 2,908,561. 1959. 3 p.  
Improved method for producing enriched superphosphates from phosphatic rock.
- E. Patent No. 2,829,031. 1958. 5 p.  
Method of producing superphosphates by processing phosphate bearing minerals.

### V. TRADE ASSOCIATIONS

- A. American Institute of Chemists  
60 East 42nd Street  
New York, N. Y. 10017
- B. Manufacturing Chemists Association  
1825 Connecticut Avenue, N. W.,  
Washington, D. C. 20009
- C. National Agricultural Chemicals Association  
1145-19th Street, N. W., Washington, D. C. 20006
- D. American Chemical Society  
1155 16th Street, N. W., Washington, D. C.

### VI. ENGINEERING COMPAINES

- A. DeKalb Metal Fabrications Company  
Young Road, Stone Mountain, Georgia 30083  
Materials handling equipment.
- B. Hewitt-Robins  
664 Glenbrock Road, Stamford, Conn. 06906  
Bulk materials handling system for conveying, stacking, screening, blending, mixing materials, including chemicals.

### VII. DIRECTORY

- A. Commercial Fertilizer Yearbook. \$10.00.  
Walter W. Brown Publishing Company  
75 Third Street, N. W., Atlanta, Georgia 30308

## 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

## TWO-BURNER GAS PLATES

I. P. No. 66150

*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.

402

## TWO-BURNER GAS PLATES: Standard Industrial Classification 3433

### A. PRODUCT DESCRIPTION

Two-burner gas plates, made from purchased gray-iron castings and components. Shipped unassembled.

### B. GENERAL EVALUATION

Capital needed for this industry is modest. Careful workmanship is needed, but the labor skills required will be available in most areas. If suitable castings are not easily procurable at a reasonable price, it may be advisable for the gas-plate manufacturer to make his own. Where this situation exists, reference may be made to Industry Profile, entitled Gray Iron Jobbing Foundry: S. I. C. 3321. In less developed areas finding a large enough market may be more difficult than overcoming the technical problems.

### C. MARKET ASPECTS

1. USERS. Households, possibly also small eating establishments.
2. SALES CHANNELS AND METHODS. Sales are made to wholesale and retail hardware dealers. A distinctive brand name is desirable.
3. GEOGRAPHICAL EXTENT OF MARKET. Shipped unassembled, this product is easy to handle and transport costs are low in relation to product value. The domestic market will often be nation-wide. This product is also commonly exported by countries producing metal goods on a large scale.
4. COMPETITION. a. Domestic Market. Competition from imports may be keen. Competition may also come from electrical equipment of a similar type, depending on the relative costs of gas and electric power. b. Export Market. This plant might make some sales in nearby foreign areas, but could not compete in general export business with large-scale producers.
5. MARKET NEEDED FOR PLANT DESCRIBED. Demand will depend on the availability and price of gas, and its relative cost compared with electricity and various fuels. In many less developed areas gas, either piped or from tanks or bottles, is expensive and used only by a small proportion of the population. Where there is a good supply of gas at low rates this plant could probably meet the needs of a population of about a million people.

## D. PRODUCTION REQUIREMENTS

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

### 1. CAPITAL REQUIREMENTS

#### a. FIXED CAPITAL

Land. About 8,000 sq. ft.	\$	--
Building. One story, 25'x50'.		7,500
Equipment, Furniture & Fixtures.		
Prodn. tools & equipmt.	\$5,000	
Furniture & fixtures	500	5,500
Total (excl. Land)		<u>\$ 13,000</u>

Principal Items. Match plater, core patterns, 2 drill presses, band saw, dip tank, drying rack, stocks & dies.

#### b. WORKING CAPITAL

	No. of Days	
Direct Materials	90	\$ 22,000
Direct Labor, Overhead(a)	60	4,600
Admin. Costs(b), Contingencies, Sales Costs(c)	30	1,800
Training Costs		1,100
Total Working Capital		<u>\$ 29,500</u>

c. TOTAL CAPITAL (EXCL. LAND) \$ 42,500

### 2. MATERIALS AND SUPPLIES

a. Direct Materials	Annual Requirements	Annual Cost
Casting (13.5 lbs.)	170 tons	\$ 62,000
Valves	50,000	15,000
Air adjustment plate	50,000	1,000
Pipe & cap		3,000
Paint		2,500
Bolts & nuts		1,500
Packing materials		3,000
Total		<u>\$ 88,000</u>

Supplies	
Spare parts & maintenance	\$ 200
Lubricants	100
Office supplies	100
Total	<u>\$ 400</u>

### 3. POWER, FUEL AND WATER

	Annual Cost
a. Electric Power. Connected load about 15 hp.	\$ 400
b. Fuel. For sanitation & heating, if necessary.	\$ 500
c. Water. For general purposes.	\$ 100

### 4. TRANSPORTATION

a. Own Transport Equipment. None necessary.

b. External Transport Facilities. Combined in & out shipments about 50 tons a month. No special requirements.

### 5. MANPOWER

	Number	Annual Cost
a. Direct Labor		
Skilled	1	\$ 6,000
Semi-skilled	3	15,000
Total	<u>4</u>	<u>\$ 21,000</u>
b. Indirect Labor		
Office	1	\$ 5,000

c. Training Needs. Manager in addition to supervising all operations, will work as skilled operator. He should be experienced in similar industry. Operators will need little training. Plant should reach full capacity in 1 month.

### 6. TOTAL ANNUAL COSTS AND SALES REVENUE

a. Annual Costs	
Direct Materials	\$ 88,000
Direct Labor	21,000
Manufacturing Overhead(a)	6,400
Admin. Costs(b), Contingencies	6,500
Sales Costs(c), Bad Debts	15,000
Depreciation on Fixed Capital	1,100
Total	<u>\$138,000</u>
b. Annual Sales Revenue	<u>\$160,000</u>

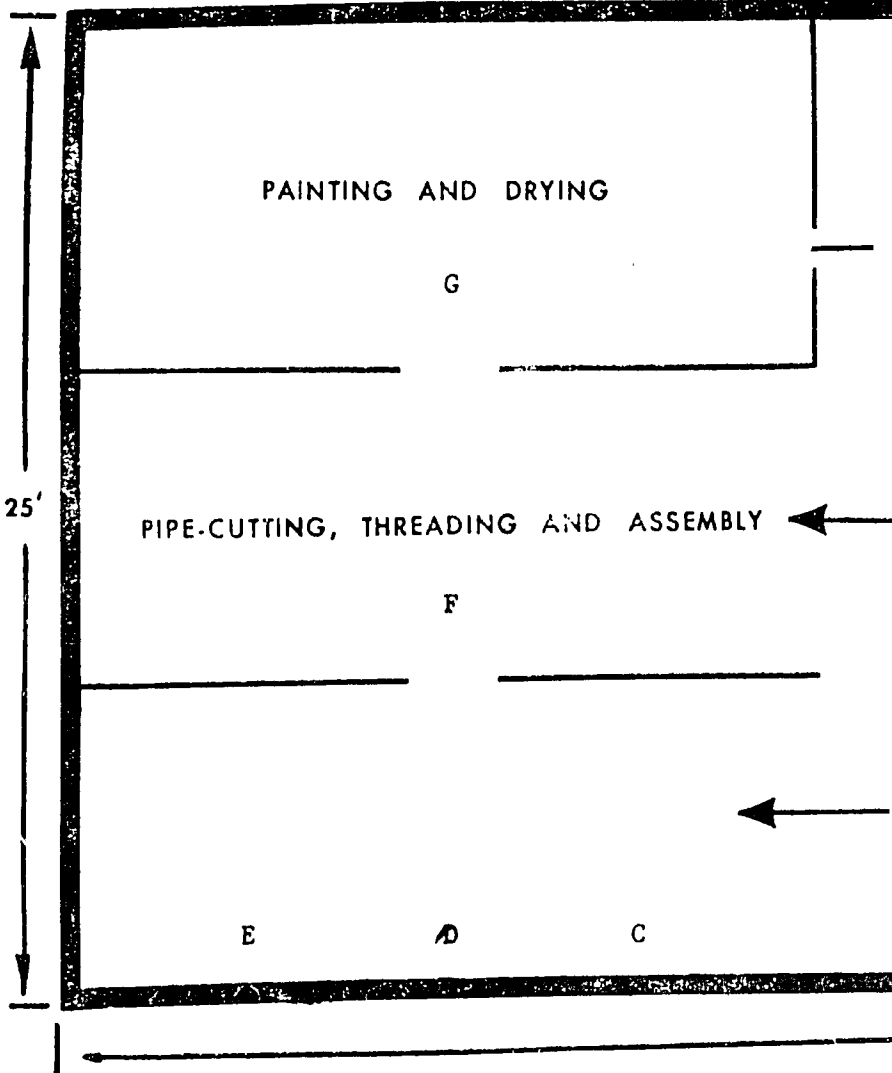
NOTES. (a) Includes Supplies, Power, Fuel, Water, Indirect Labor. (b) Includes Interest, Insurance, Legal & Audit Charges. (c) Includes Sales Commissions, Freight Out, Travel.

TWO-BURNER GAS PLATES: S.I.C. 3433

1104

# TWO-BURNER

ARROWS INDICATE

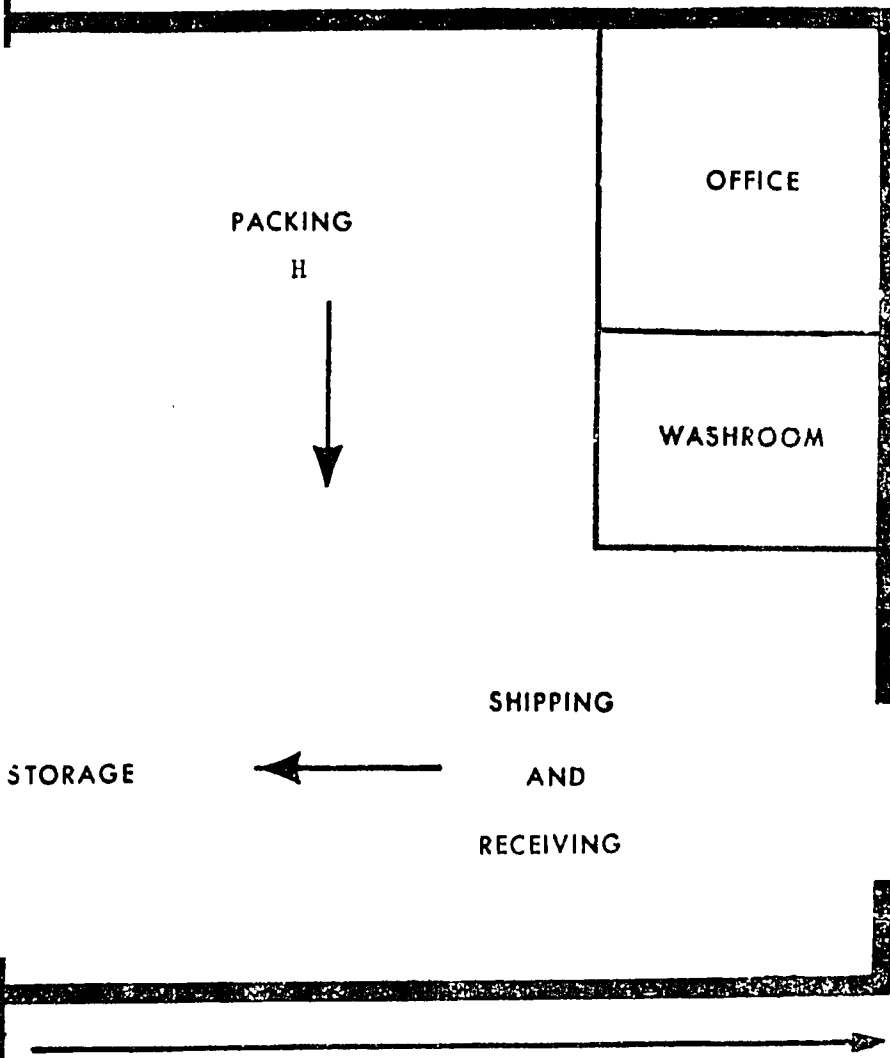


- A. Receiving and shipping
- B. Storage
- C. Drill press
- D. Drill press

105

TES : S.I.C. 3433

OW OF WORK



nd saw  
be cutting, threading and assembly  
inting and drying  
ckaging

406



TWO-BURNER GAS PLATES : S. I. C. 3433

SELECTED REFERENCES

I. TEXTBOOKS

- A. **General Engineering Workshop Practice.** 1963. \$7.00.  
Transatlantic Arts, Inc.  
Hollywood-by-the-Sea, Fla. 33020
- B. **Aids to Workshop Practice.** C. T. Bower. 1958. 192 p. \$3.75.  
Macmillan Company  
60 Fifth Avenue  
New York, N. Y. 10011

II. U. S. GOVERNMENT PUBLICATION

- A. **Directory of Metalworking Machinery.** Published irregularly. \$6.95.  
Government Printing Office  
Division of Public Documents  
Washington, D. C. 20402  
Lists manufacturers of metalworking machinery.

III. PERIODICALS

- A. **Journal of Applied Mechanics.** Quarterly. \$5.00/year.  
American Society of Mechanical Engineers  
29 West 34th Street  
New York, N. Y. 10018  
Devoted to mechanical and fabrication problems.
- B. **Metal Products Manufacturing.** Monthly. \$10.00.  
Dana Chase Publications  
York Street at Park Avenue  
Elmhurst, Ill. 60126  
Serves the fabricated metal products industry.

VI. U. S. PATENTS

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

- A. Patent No. 2,669,985. 1954. 5 p.  
Combination gas and oil stove.
- B. Patent No. 2,552, 683. 1951. 3 p.  
Portable camp stove.
- C. Patent No. 2,409,129. 1946. 5 p.  
Gas burner.

SELECTED REFERENCES (Continued)

V. ENGINEERING COMPANIES

- A. Boice-Crane Company  
941 West Central Avenue  
Toledo, Ohio 43610  
Drill presses and tapers and other metal working machinery.
- B. Heller Tool Company  
Heller Drive  
Newcomerstown, Ohio 43832  
Produces metal bandsaws.

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