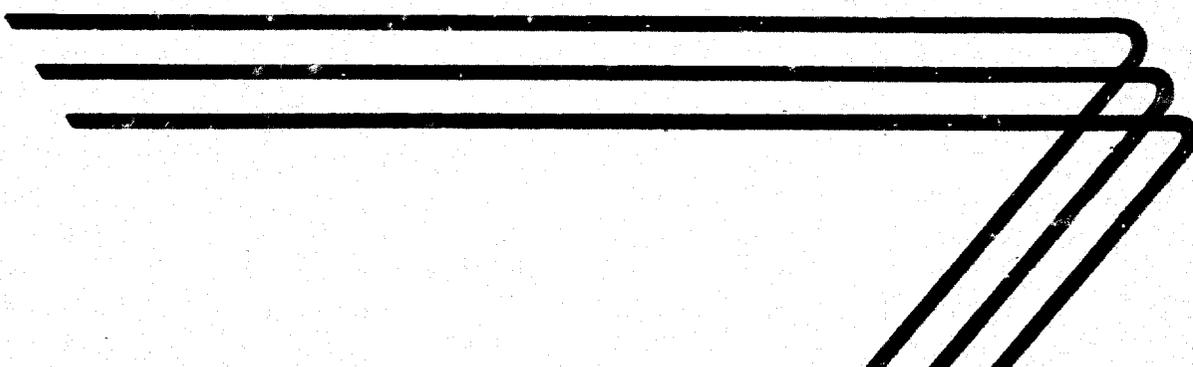


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PLANT REQUIREMENTS FOR MANUFACTURE OF PAPER BAGS



**DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
COMMUNICATIONS RESOURCES DIVISION**

Washington 25, D. C.



FOREWORD

This brochure is one of a series of reports resulting from overseas technical inquiries on factory or commercial establishments, operation, management, and engineering. The report is designed to provide only a general picture of the factors that must be considered in establishing and operating a factory of this type. In most cases, plans for actual installations will require expert engineering and financial advice in order to meet specific local conditions.

Mention of the name of any firm, product, or process in this report is not to be considered a recommendation or an endorsement by the Agency for International Development, but merely a citation that is typical in its field.

This report was prepared by Morris and Van Wormer, New York, N. Y., in August 1958 through the facilities of the Office of Technical Services, U. S. Department of Commerce, for the technical aids program.

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For further information and assistance, contact should be made with the local Productivity Center, Industrial Institute, Servicio, or United States AID Mission.

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PAPER BAGS
(Commercial kraft paper type)

Kraft paper bags are manufactured from rolls of medium length fibre kraft paper which are of standard specifications regarding tear strength, burst strength and gauge tolerance. The plant herein described is set up for the manufacture of self opening square kraft paper bags of the sizes 1/4 to 35 pounds, which are commonly known as grocers' bags.

The manufacturing facilities described are the minimum required for the production of the necessary size ranges and represent the minimum capital investment.

The rated capacity, of the required set of four bag-making machines, operating an eight hour day five days per week and fifty weeks per year, producing the complete series of bag sizes possible, within the machines' respective ranges, would be approximately 100,000,000 bags.

These bag making machines can be adapted for the manufacture of flat and other types of square paper bags, but cannot be used for the production of multiwall bags.

General Assumptions:

All costs and statistics are those current in the United States.

Readily available fuel, water and electricity at the plant site.

Available transportation facilities at the plant site.

Omissions:

The costs of in-freight and out-freight
Taxes
Insurance
Interest
Land Value

Building Requirements:

A suitable structure would be of one story, concrete block and steel construction with a truss roof to avoid columns. For raw material storage (30 calendar days supply), production areas, finished goods and shipping, office, toilets and boiler room the requirement is approximately 5,000 sq.ft. Current cost of building approximately \$60,000.00.

Manufacturing Operations:

Kraft paper, in rolls, is brought to the plant by rail or motor truck. The paper is unloaded by a fork truck and stored in the warehouse area where conditions are regulated to prevent excess heat and humidity. The rolls are taken, by the fork truck, to the machine area where they are hand loaded onto the take-off spindles of the bag making machines. Each of these machines is limited to definite size ranges and the production rate varies with the size of the bag to be made.

The paper, from the take-off spindle, is threaded into the machine and goes through the following sequence of operations: seam pasting, tube folding, tube cut-off, bottom folding, bottom pasting, bottom sealing. The completed bags coming from the sealing rolls, are automatically counted and conveyed to the collecting rack. While the machine is in operation the operator frequently takes completed bags from the collecting rack and inspects them for paste adherence and squareness of cut. When indicated, the operator makes suitable adjustments to the machine.

From the collecting rack, the bags are loaded on a truck and pushed to a bundling press. Here they are compressed into bundles of 500s, tied with string, labeled and returned to the truck. From the bundling press, the bales are taken to the baling table where eight bundles are wrapped in kraft paper, tied with cord and labeled on the outer wrapping. These baled bags are placed on skids and moved to the stock and shipping area.

TABLE I.MACHINERY & TOOLS REQUIRED

<u>Description</u>	<u>No. needed</u>	<u>Price</u>
Bag Machine range 1/4-2	1	\$15,210.00
Bag Machine " 3-6	1	15,890.00
Bag Machine " 8-20	1	17,375.00
Bag Machine " 25-35	1	17,200.00
Gas Powered Fork Lift	1	6,766.00
Paste cooking & Mixing Machine	1	1,680.00
Factory Platform Trucks	8	625.00
Bundling Press	1	1,650.00
Skids	36	333.00
Paper Cutter (41")	1	9,400.00
Waste Paper Baler	1	1,050.00
Machine Shop:		
12 1/2" Lathe	1	9,600.00
Roll Grinder	1	100.00
Drill Press	1	200.00
Misc. Hand Tools	1	500.00

TABLE II.DEPRECIATION

<u>Item</u>	<u>Cost</u>	<u>Years of life</u>	<u>Depreciation per year</u>
Land	-	-	-
Building	\$50,000	20	\$ 3,000
Production Tools and equipment	84,221	10	8,422
Machinery and equipment skids, platform trucks	958	10	95
Lathe, Grinder, Drill Press	9,900	10	990
Hand tools	500	1	500
Furniture and Fixtures	3,000	10	<u>300</u>
		TOTAL	\$13,307

TABLE III.

Direct Labor:

<u>Occupation</u>	<u>Personnel Required</u>	<u>Average Weekly Salary</u>
Foreman	1	\$ 100.00
Machine Tender	2	128.00
Machine Operator	2	108.00
Bundler	1	54.00
Baler	1	54.00
Fork Truck Operator	1	64.00
Maintenance Mechanic	1	80.00
Glue Maker	1	<u>60.00</u>
	TOTAL	\$ 648.00

Indirect Labor:

<u>Occupation</u>	<u>Personnel Required</u>	<u>Average Yearly Salary</u>
Plant Superintendent	1	\$ 7,500.00
Maintenance and Janitor	1	3,120.00
Clerk (acc't & Purch.)	1	3,500.00
Clerk (shipping & stock)	1	<u>3,480.00</u>
	TOTAL	\$ 17,600.00

TABLE IV.OVERHEAD

	Year	Week
<u>Depreciation</u>	\$ 13,307	\$ 266.10
<u>Indirect Labor:</u>		
Plant Superintendent	7,500	150.00
Maintenance & Janitor	3,120	62.40
Clerk (acc't & purch.)	3,500	70.00
Clerk (shipping & stock)	3,480	69.60
Utilities: Power, light, fuel	4,000	80.00
General Maintenance, materials	3,500	<u>70.00</u>
	TOTAL	\$ 768.10

Cost Data Explanation

The calculations, which follow, are based on producing the entire grocers' bag size range, 1/4 to 35 lbs.

The manufacturing operations are such that each set up of four machines will run a full day on one size, within the size range of the machine. Each machine is operated for six hours and two hours are allotted for maintenance and set up time. The four machines are run, at approximately 100% of rated hourly capacity, five days per week and fifty weeks per year.

TABLE V. - PRODUCTION COST TABULATION

<u>Machine No.</u>	<u>Size of Bags</u>	<u>No. of Bags per day</u>	<u>Cost of Paper & Glue per day</u>	<u>Direct Labor cost per day</u>	<u>Overhead cost per day</u>	<u>Mfg. cost per M</u>	<u>Selling price per M</u>
1	1/4	180,000	108.71	32.40	41.90	1.02	1.12
2	3	165,000	167.42	"	"	1.46	1.98
3	8	130,000	185.15	"	"	1.92	3.52
4	20	95,000	400.50	"	"	5.00	6.16
1	1/2	180,000	123.56	32.40	41.90	1.06	1.32
2	4	160,000	183.16	"	"	1.61	2.20
3	10	128,000	191.09	"	"	2.08	3.96
4	25	95,000	451.98	"	"	5.53	6.60
1	1	175,000	135.44	32.40	41.90	1.19	1.54
2	5	158,000	194.15	"	"	1.70	2.86
3	12	120,000	184.16	"	"	2.15	4.84
4	30	88,000	440.10	"	"	5.84	14.80
1	2	166,000	151.28	32.40	41.90	1.36	1.76
2	6	150,000	187.22	"	"	1.74	3.08
3	14	118,000	447.50	"	"	4.42	5.28
4	35	84,000	697.50	"	"	9.17	17.00
3	16	116,000	461.36	32.40	41.90	4.71	5.72

TABLE V is based on the production of four machines; each machine having the following size range and rated capacity:

<u>Machine</u>	<u>Size Range</u>	<u>Rated Bag Capacity per day</u>
#1	1/4 to 2 lbs.	180,000 to 165,000
#2	3 to 6 lbs.	165,000 to 150,000
#3	8 to 16 lbs.	130,000 to 116,000
#4	20 to 35 lbs.	95,000 to 84,000

TABLE V shows the machine operating on a 4 1/4 day cycle wherein the four machines cover the manufacture of the entire bag range size (17 bag sizes). A 30 lb. basis weight paper was used for the sizes 1/2 through 12 lbs., and a 40 lb. basis weight paper for sizes 14 through 35 lbs. Average weight of a roll was 1200 lbs. and an average price of \$8.25 per hundred weight. The glue costs were averaged and include the prices for seam paste and bottom paste. The selling price was based on the current whole-sale prices in the New York area.

Calculations in TABLE V, are based on running each machine, on each bag size, 58.8 days per year. The factor 58.8 is derived in the following manner:

4 1/4 days required for 4 machines to make the complete range of 17 bag sizes -

$$\frac{250 \text{ working days per year}}{4 \frac{1}{4}} = 58.8 \text{ days per machine on each bag size in its range.}$$

Working Capital

Estimated

Raw material inventory (30 calendar days supply)	\$ 21,087.00
Manufacturing cost for 1 day	
Set up #1	1,149.10
Set up #2	1,239.99
Set up #3	1,248.77
Set up #4	1,778.60
16 lb. bags	546.36
Accounts Receivable (45 days production)	41,739.74
Expenses for 60 calendar days	
wages	8,117.32
utilities	666.66
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TOTAL	\$ 77,573.54

Total Capital Requirements

Estimated

Land	No estimate
Building	\$ 60,000.00
Production Tools & Equipment	84,221.00
Machinery & Equipment	10,858.00
Furniture & Fixtures	3,000.00
Working Capital	77,573.54
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TOTAL	\$ 235,652.54

Projected Profit and Loss Statement (1 Year Normal Operation)

Gross Sales	\$ 543,745.90
Less Returns & Allowances	<u>5,437.45</u>
Net Sales	\$ 538,307.45
Less Cost of Goods Sold	350,613.80
Gross Manufacturing Profit on Sales	187,694.65

Estimates pertaining to sales and administrative expenses depend on local customs and conditions.

Plant Expansion

This report is based on a 1 shift, 8 hour operation with approximately 6 hours of machine operating time.

If the plant warranted a 2 or 3 shift operation an expansion of 200% or 300% could be realized.

CONCLUSIONS:

The profit potential of the operation, as outlined, is sufficiently attractive to stimulate further study of the requirements of any particular area with consideration being given to the following:

1. Existing demand for kraft grocers' type bags or the possibility of developing such a demand at reasonable expense.
2. Availability of raw materials at reasonable prices.
3. Availability of labor, with sufficient mechanical aptitude, to maintain and operate high speed production equipment.

Selected References

Grocers Paper Bags - U. S. Dept. of Commerce Publication
No. 42-53, 1954. Washington 25, D. C.

Paper Bag Institute - 379 Lexington Avenue, New York, N. Y.

St. Regis Paper Sales Corp. - 150 E. 42nd St., New York, N.Y.

Engineering firms who design and construct paper bag plants:

Morris and Van Wormer - 25 Broad Street, New York 4, N.Y.

Ebasco Services, Inc. - 2 Rector Street, New York 5, N.Y.

Stone & Webster - 90 Broad Street, New York 4, N. Y.

**FLOW DIAGRAM OF THE MANUFACTURE
OF
KRAFT PAPER BAGS**

