Glass Mirror

PRODUCT CODE	:	94162 and 94180
QUALITY AND STANDARDS	:	IS 3438:1979 IS 6184:1979
MONTH AND YEAR OF PREPARATION	:	January, 2003
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Introduction

Glass Mirrors are made of good quality plate/sheet glass of different thickness varying from 2 mm to 7 mm. It is coated chemically on one side to give the desired reflection. The need of these mirrors is increasing with the increase of population, hotels, restaurants, Hair dressing saloons, railways, vehicles and other household decorations etc. It is popularly used for looking purpose by one and all.

Market Potential

In view of the utility of mirrors, it is considered an important and essential item without which one cannot imagine modern life. It is roughly estimated that there are around 325 registered units producing mirrors by hand pouring simple machines. These types of units are artisans in nature which are mostly engaged in decoration of glass. The production capacity of all these SSI units put together is estimated approximately at 7.2 million sq. meters per annum.

The demand of these mirrors is increasing day by day due to its use in building construction decoration and export to the neighboring countries. The mirrors are largely consumed by Fancy shops, Jewellary shops, Hotels, Bars, Saloons, Furniture manufacturers, tailoring shops, theatres, show-rooms, household, Railways, Automobiles industry etc. The gap between demand and supply is estimated approximately at 10% in the country. It is an essential item in each and every house. Being fragile it enjoys good replacement market also. There is good demand of the product for export market in the neighbouring countries and far-east countries.

There is a good scope for ancillarisation of the mirror industry to support large industries like Railways,

Automobile, Defence. Automobiles can buy semi-finished items from the small-scale sector. Hence there is a good scope to set up glass mirror industry in SSI sector.

BASIS AND PRESUMPTIONS

1) The unit will work on a single shift basis for 300 working days in a year.
2) The unit can achieve its full production in the first year itself.
3) Labour and wages are taken as per the prescribed minimum wages of the Govt. rates.
4) Interest calculation is taken @ 14% for both fixed and working capital of total investment.
5) Margin Money is considered @ 10-25% depending upon the locations and scheme adopted by the entrepreneurs.
6) The operative period of the project is around 10 years.
7) The costs of land, construction charges, machinery and equipments, raw materials and consumables, other contingent expenses are taken as per the prices prevailing in the market at the time of project preparation.

IMPLEMENTATION SCHEDULE

Sl. No.	*Activity*	*Period*		
		Starting		*Completion*
1.	Market Survey of data collection in respect of demand, raw material, power, fuel, Machinery and Technology etc.	0	to	1st Month
2.	Preparation of Project document and registration	1st	to	2nd Month
3.	Arrangement for margin money financial assistance	3rd	to	5th Month
4.	Selection of site and land development, construction of make shift office etc.	4th	to	5th Month
5.	Selection of machines, electricity, fuel and water and clearance for pollution	5th	to	6th Month
6.	Placement of order for machine, transportation and installation of machine and equipment etc.	6th	to	8th Month
7.	Selection of raw material and placement of orders	7th Month		
8.	Receipt of raw material	8th	to	9th Month
9.	Trial Production			10th Month

Technical Aspects

Process of Manufacture

Selection of Glass Sheet/Plate

The best quality of mirror is obtained by silvering plate glass which produces true and undisturbed image due to its high polish, flatness and uniform thickness. If sheet glass is used instead, true reflection is not possible because of characteristic surface waviness of the glass even though it is of the highest grade. It is generally used for making small mirrors only. While selecting sheet glass for mirroring, it is particularly important to see that the central portion which would be directly in the line of sight, should be free from defects as far as possible. Depending on the quality of plate or sheet glass used, where defects are accentuated by silvering, various grade of mirrors are produced.

Cleaning of Glass

If the surface of glass has been left exposed to the atmosphere for a long time, it gets hydrolyzed and also coated with film of dust, oil grease and metal salts. In each cases an adherent and uniform layer of silver is formed only after proper cleaning of the glass surface. For this purpose, the surface is treated with an organic solvent like, alcohol, ether and Carbon tetrachloride or with an alkaline solutions such as sodium hydroxide and sodium phosphate, sulphuric acid and nitric acid etc. which make the surface suitable for adherence of silvering.

This cleaning is done by using absorbent cotton of sufficient thickness rapped on a glass spatula or rod soaked with pure HNO_3 and distilled water. The entire surface is properly cleaned and rinsed off by using ordinary water followed by distilled water.

Sensitizing the Glass

Sensitizing makes the surface active for attracting the silver metal to form a quick adhering and uniform film. It is done by treating the surface of the glass sheet with stannous chloride solution after properly cleaning the glass.

Stannous chloride performs two functions in the manufacturing of the silver mirrors

(a) It speeds up the precipitation of metallic silver from a silver solution, and

(b) It increases the adherence of silver to glass surface.

Application of sensitizing solution to the glass surfaces can be done by: (i) Pouring, (ii) Spraying with spray gun, (iii) Immersing the surface into sensitizing solution. One minute is sufficient for sensitizing the glass surface.

Protective Coating on Silvered Surface of the Mirror

The durability and life of silver coating is backed by protective backing paint. The finished mirror is fit to withstand, atmospheric corrosion of the silver film due to diffusion of moisture or glass through the lacquer. Shellac type paints followed by relatively low oxidizing top coats are normally used by spray gun. Due to its excellent adhesion, it is still in use by some mirror makers. It is applied directly on the silver film or on the copper coated silver. However, due to the bottleneck of shellac, it is applied on this film and a white lead paint covers it for further protection.

Silvering Solution

Several compositions for the preparation of silvering solutions are known, each having its own speciality. Besides the composition of silvering

solution, other factors like temperature, time, light, amount of silver per unit area, and surface chemistry of glass influences the formation of the silvered mirror. A typical formulation of silver solution is given below:

(a) Solution C: Sugar Solution

Dissolve 2.5 gm of sugar in 25 ml of distilled water and add 1 ml drop of conc. HNO_3 (Conc. Rs. Nitric acid S.gr. 1.42) and the solution is heated for 5 minutes and then cooled slowly.

(b) Solution B : Silver Nitrate Solution

i) 1 gm of KOH is dissolved in 25 ml of distilled water glass in a bottle.

ii) 1 gm of $AgNO_3$ to 25 ml of distilled water in a separate glass bottle.

Then the solution (i) and (ii) are mixed and Ammonium Hydroxide Solution is added drop wise to form clear solution.

(c) Solution A

0.25 gms of $Sncl_2$ is dissolved in 25 ml distilled water.

Sensitization of glass surface is carried out by pouring/spraying of $Sncl_3$ solution on the surface of cleaned glass.

The silver nitrate solution mixed with sugar solution in the ratio of 2:1 is poured on the horizontal surface of glass in a dim light room. Excess water is removed after drying lead oxide protection coating is applied.

Quality Control and Standards

The following specifications have been formulated and published by the Bureau of Indian Standards, for guidance in maintenance of the quality of the product:

IS 3438:1977	Silvered Glass Mirror for general purpose (First revision)
IS 6184:1971	Specification for furniture Mirror. (re-affirmed - 1987)

Production Capacity (per annum)

Quantity : 12, 000 sq. metres

Value : Rs. 37, 74, 000.

Motive Power 20 HP.

Pollution Control

There is not much pollution in this industry. However, there should be proper arrangement for exhaust in spray booth, drainage for used water from the unit. It is advisable for the operator to use goggles to protect his eyes while handling the silver solution. The used water should be collected in a cement tank with proper arrangements for removal of such water at regular intervals.

Energy Conservation

This industry uses only electric power. Simple precautions and knowledge of effective utilisation of electric power could save energy.

FINANCIAL ASPECTS

A. Fixed Capital

(i) Land and Building	Rate (Rs.)	Value (Rs.)
Land 300 sq. mtr.	@ Rs.900 per sq.mtr	2,70,000
Building Workshop 100 sq.mtr.	@ Rs. 1700 per sq.mtr.	1,70,000
Office 35 sq. mtr.	@ Rs. 2000 per sq. mtr.	70,000
	Total	5,10,000

(ii) Machinery and Equipments

Particular items	Qty.	Rate (Rs.)	Value (Rs.)
Automatic levelling machine	1 No.	8,50,000	8,50,000
Surface Polishing machine	-do-	80,000	80,000
Bevel polishing machine	-do-	9,000	9,000
Spray gun with air Compressor (3 HP motor)	-do-	18,000	18,000
Drilling machine	1 set	10,000	10,000
Cost of tools and equipment			
Accessories:			
a) Diamond drill bits	6 Nos.	L.S.	25,000
b) High Carbon drill bits	12 Nos.		
c) Diamond Cutters	5 Nos.		
d) Circular Cutters	1 No.		
Furniture and fixtures		L.S.	25,000
Execution Electrification and Installation charges @ 10% of Machinery and Equipments		L.S.	1,02,000
		Total	11,19,000
(iii) Preliminary and Pre-operative expenses like deposits, project cost (non-refundable) and other unforeseen expenditure)		L.S.	50,000
		Total	11,69,000
Total Fixed Capital (i+ii+iii)			Rs. 16,79,000

B. Working Capital (Per Month)

(i) Salary and Wages (per month)

Designation	No.	Salary	Value (Rs.)
Manager	1	5,000	5,000
Accountant	1	3,000	3,000
Clerk-cum-typist	1	2000	2,000
Peon-cum-watchman	1	1,600	1,600
Skilled workers	2	2,500	5,000
Semi-skilled workers	4	1,800	7,200
Un-skilled workers	2	1,600	3,200
	Total		27,000
Add perquisites @ 15% of salary and wages			4,050
	Total		31,050
	or Say		31,000

(ii) Raw Material (per month)

Particulars	Qty. (Sq. metre)	Rate (Rs.)	Value (Rs.)
Glass sheet/plate 2 mm	300	100	30,000
Glass sheet/plate 3 mm	300	120	36,000
Glass sheet/plate 4 mm	200	160	32,000
Glass sheet/plate 5.0 mm	200	200	40,000
Chemical, paints and various items etc.		L.S.	50,000
	Total		1,88,000

(iii) Utilities (per month)

Particulars	Qty.	Rate (Rs.)	Value (Rs.)
Power	3000 kWH	@ Rs.3.00/ mt.	9,000
Water		L.S.	600
	Total		9,600

(iv) Other Contingent Expenses (per month)

Particulars	Value (Rs.)
Postage and Stationery	500
Telephone	500
Consumable Store	1,000
Repair and Maintenance	2,000
Advertisement	1,000

Particulars	Value (Rs.)
Insurance	500
Misc. Expenditure	1,000
Total	6,500
Total Working Capital (i + ii + iii + iv) (2,35,100 x 3) (on 3 months basis)	7,05,300

C. Total Capital Investment (Rs.)

i) Fixed capital	16,79,000
ii) Working Capital	7,05,300
Total	23,84,300

FINANCIAL ANALYSIS

(1) Cost of production (per year)	Value (Rs.)
Total recurring cost	28,21,200
Depreciation on building @ 5%	12,000
Depreciation on Machinery and Equipments @ 10%	99,200
Furniture and Fixtures @ 20%	5000
Interest on Total capital investment @ 14%	3,33,802
Total	32,71,202

(2) Turnover (per year)

Particular items	Qty. (Mtrs)	Rate (sq.mtrs.)	Value in (Rs.)
2 mm Silvered glass Mirror	3,600	235	8,46,000
3 mm Silvered glass Mirror	3,600	300	10,80,000
4 mm Silvered glass Mirror	2,400	360	8,64,000
5 mm Silvered glass Mirror	2,400	410	9,84,000
Total			37,74,000

(3) Net profit per year

= Total Sales receipt – Cost of production

= Rs. 37,74,000 – 32,71,202

= Rs. 5,02,798

(4) Profit on Sale Ratio

$$= \frac{\text{Net profit x 100}}{\text{Turn over per year}}$$

$$= \frac{5,02,798 \times 100}{37,74,000}$$

= 13.32%

(5) Rate of Return Ratio

$$= \frac{\text{Net Profit per year x 100}}{\text{Total Capital investment}}$$

$$= \frac{5,02,798 \times 100}{23,84,300}$$

= 21%

(6) Break-even Point

Fixed Cost	(Rs.)
Depreciation on Building	12,000
Depreciation on machinery and equipment	99,200
Interest on total capital investment	3,33,802
Depreciation on furniture and fixture	5000
40% of salary and wages	1,48,000
Insurance	6000
40% of contingent expenses	28,800
Total	6,32,802

$$\text{B.E.P.} = \frac{\text{Fixed cost x 100}}{\text{Fixed cost + Net Profit}}$$

$$= \frac{6,32,802 \times 100}{6,32,802 + 5,02,798}$$

= 55.7%

Addresses of Machinery and Equipment Suppliers

1. M/s. Bando Trading Co. Ltd.
   Tokashime, 770,
   Jaipur
   (For automatic bevelling machine Model - B-10)
2. M/s. Narang Glass and Frame Industries
   2-1-77, Ridge Hyderabad - 2
   (For mirror bevelling and edge cutting machine small type)

3. M/s. General Glass Machinery (P) Ltd.
F-13, Shanti Kunj,
Sadhu Vishwani Road,
Punjab

Raw Material Suppliers

1. M/s. Carborandum Universal Ltd.
52/53, Jahangir Street,
Chennai - 600 001.
(For grinding media and wheels)
2. M/s. Kilburn and Co.
Mount Road,
Chennai - 600 002
3. M/s. Indo-Ashali Glass Co. Ltd.
Bhuru Kunda,
P.O. Bhadani Nagar,
Distt. Hazaribagh,
Jharkhand
(For Sheet/plate glass)
4. M/s. Triveni Sheet Glass Ltd.
Naini,
Allahabad (UP)
5. M/s. Hindustan Pilkington Glass Industries
Asansol,
(West Bengal)
6. M/s. Seraikells glass works (P) Ltd.
41, Hazra Road,
Kolkata - 700 010.
7. M/s. Haryana Sheet Glass Ltd.
F-24, Desh Bandhu Gupta Market,
Surindra Mansion,
Karol Bagh,
New Delhi - 110 005.