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Auto Pistons

PRODUCT CODE	:	374743002
QUALITY AND STANDARDS	:	IS 7793 : 1975
PRODUCTION CAPACITY	:	Qty. : 60,000 Nos. (per annum) Value : Rs. 36 Lakh
MONTH AND YEAR OF PREPARATION	:	October, 2002
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Introduction

Gravity casting in Aluminium alloy is used for casting of Piston. Rapid production of engineering piston is used in automobile industries. The technique has obvious advantage when a component is required in large quantities. However in automotive applications, properties and durability are of primary importance. It is, therefore, essential that the best feature of design should be used and optimum casting techniques with minimum cost should be adopted. Gravity Die Casting products are used in domestic as well as international automobile industries.

Market Potential

The technique of gravity die cast aluminium alloy components has the following advantages compared to other methods of castings :

1. High Productivity.
2. Good cast surface finish and appearance.
3. Can be cast within close dimensional tolerance.
4. Do not require further machining.
5. Very thin section can be cast with ease.
6. Metal wastage in the casting process is less.

Auto piston is a part of automobile which reciprocates in the engine cylinder to transmit power to the wheels. It is generally made of Aluminium.

Pistons are used in automobile industries and auto vehicles manufacturers are its main customers. The primary market is expected to continue as the leading market with the trend of demand growth in order to cater to the requirement of more and more new auto industries. The demand is expected to expand at an average growth rate of 15% to 20%. The replacement market is also likely to expand.

BASIS AND PRESUMPTIONS

1. For capacity utilisation, it is considered 60% efficiency and 6 working hours per day are required.
2. Four years are required for achieving full capacity utilisation.
3. Labour and wages have been taken as per the present circumstances.
4. Interest rates for Fixed and Working Capital are taken @ 16% per annum.
5. Margin Money from the proprietor is 25% and 75% will be raised from financial institutions.
6. Land and Building has been considered on rent.
7. Cost of Machinery and Equipments is based on a particular make.

IMPLEMENTATION SCHEDULE

Sl.No.	*Activity*	*Period*
1.	Preparation of the project report:	
	a. Calling quotations	1 month
	b. Preparation of Report	2 weeks
2.	Provisional registration as SSI Unit	1 week
3.	Clearance from Pollution Control Board	3 months
4.	Financial Arrangements	3 months
5.	Purchase and Procurement of Machinery and Equipment	1 month
6.	Installation of Machines and Equipment	1 month
7.	Electrification etc.	1 month
8.	Recruitment of staff	1 month
9.	Commencement of production	9 month's onwards

TECHNICAL ASPECTS

Process of Manufacture

Aluminium alloys suitable for gravity die casting for piston is to be chosen for casting of the piston. Aluminium alloys like Hyper, LM are suitable for casting of piston. These alloys have excellent fluidity, good corrosion resistance and good mechanical properties. The cast component should be free from holes, pinholes, shrinkage, coldshut etc.

Ingot shall be reasonably free from slag or dross. Microscopical examination in hypereutectic alloys shall show uniform distribution of primary silicon cuboids in the eutectic matrix. Size of silicon cuboids as measured in the field of 75 mm dia. and 100 magnification shall be on an average of 40 to 70 microns and individual silicon cuboid size shall be not more than 100 microns.

Quality Control and Standards

As per IS 7793 : 1975, Al. Alloys for I.C. Engine Pistons, basically four grades of the alloys have been specified namely 2285, 4658, 4928 - A and 4928 - B with various alloying compositions like Cu, Mg, Si, Fe, Mn, Ni, Zinc etc. Hardness has been specified between 90 to 140 HB with tensile strength ranging from 165 to 275 N/mm^2 for various grades.

Production Capacity

This scheme has been prepared with estimated production capacity of 12 tonnes per annum on single shift basis assuming minimum weight of piston to be 200 grams. 5000 No. of pistons of different sizes for auto engineering are estimated per month.

Pollution Control

This industry does not come under the category of pollutant industry. However, consent of the State Pollution Control Board is required which will remain valid till a unit modifies or changes its process.

Energy Conservation

There is a little scope for energy conservation in this industry except in the melting process where the furnace should be properly insulated to reduce radiation losses and should be fitted with automatic pyrometer control to maintain the proper temperature in the furnace.

FINANCIAL ASPECTS

A. Fixed Capital

(i) Land and Building	(Rs.)
Rented Land with covered area, 2500 Sq. Ft.	8000
Total	8000

(ii) Machinery and Equipment

Sl. No.	Particulars	Qty.	Amount (In Rs.)
1.	Crucible furnace 200 Kg. with motor and accessories	4	2,40,000
2.	Lathe machine 4½ size and electricals	4	1,20,000
3.	Precision Lathe	2	1,80,000
4.	Pillar type Drilling Machine with 1 HP motor	1	25,000
5.	Bench Grinder double ended with 1 HP motor	1	8,000
6.	Vice, table, fixtures, measuring instruments, gauges etc.	L.S.	50,000
7.	Laboratory comprising chemical and physical testing with heat treatment furnace	L.S.	1,00,000
8.	Generator and other electrical accessories	L.S.	100000
	Total		8,23,000
	Office/Lab. Furniture/ equipments	L.S.	50,000
(iii)	Pre-operative Expenses		50,000
	Electrical and mechanical installation @ 10% of Plant and Machinery equipments		82300
	Total		9,55,300
	Total Fixed Capital (i+ii+iii)		10,05,300

B. Working Capital (per month)

(i) Salary and Wages

Sl. No.	Designation	Nos.	Salary (Rs.)	Amount (In Rs.)
1.	Works Manager	1	5000	5000
2.	Sales Executive	2	4000	8000
3.	Supervisor	2	4000	8000
4.	Store Keeper	1	3000	3000
5.	Office Assistant	1	2500	2500
6.	Skilled Workers	4	3000	12000
7.	Semi–skilled Workers	3	2300	6900
8.	Un–skilled Workers	4	1850	7400
9.	Watchman/Peon	2	1750	3500
10.	Maintenance Fitter	2	2500	5000
		Total		61300
	Perquisites @ 15%			9195
		Total		70495

(ii) Raw Materials	Qty.	(In Rs.)
1. Aluminium Alloy @ Rs.90 Kg	1000 Kg	90,000
2. Packing material	L.S.	5000
Total		95,000

(iii) Utilities		(In Rs.)
1. Power and Electricity @ Rs.3 per unit	2000	6000
2. Fuel charges @ Rs. 22/litre	300	6600
3. Water @ Rs. 10 KL	100	1000
Total		13600

(iv) Other Contingent Expenses	(In Rs.)
1. Rent	8000
2. Insurance	4000
3. Office stationery and postage	5000
4. Publicity and advertisement	5000
5. Travelling and conveyance	1000
6. Packing charges	3000
7. Legal and other expenses	2000
8. Repair and maintenance	5000
9. Consumable stores	5000
10. Miscellaneous expenses	5000
Total	43000

(v) Total Recurring Expenditure (per month)	(In Rs.)
1. Salary and wages	70495
2. Raw materials	95000
3. Utilities	13600
4. Other contingent expenses	43000
Total	2,22,095

(vi) Working Capital for 3 Months= Rs. 666285

C. Total Capital Investment

(1) Fixed Capital	Rs. 1005300
(2) Working Capital for 3 Months	Rs. 666285
Total	Rs. 1671585

FINANCIAL ANALYSIS

(1) Cost of Production (per year)	(In Rs.)
1. Total Recurring Cost	26,65,140
2. Depreciation on Machinery and Equipment @ 10%	82,300
3. Depreciation on Furnaces @ 20%	48,000
4. Depreciation on Office Equipments @ 25%	12,500
5. Interest on Total Capital Investment @ 16%	2,67,450
Total	30,75,390

(2) Turn-over (per year)	(In Rs.)
By Sale of 60,000 Auto Piston of different sizes @ Rs. 60/ Piston (average basis)	36,00,000

(3) Profit (per year)	(In Rs.)
Total Turnover - Total Cost of Production	5,24,610

(4) Rate of Return on Investment 31.3%

(5) Rate of Return of Sales 14.6%

(6) Break-even Point

(i) Fixed Cost (per annum)	(In Rs.)
1. Interest on Total Investment	2,67,450
2. Depreciation on Furnaces	48,000
3. Depreciation on Machinery and Equipments	82,300
4. Insurance	48,000
5. 40% of Salary and wages	3,38,376
6. 40% of Other contingent expenses (excluding Rent and Insurance)	1,48,800
Total	9,32,926

(ii) Net Profit (per year) Rs. 524610

$$B.E.P = \frac{\text{Fixed Cost} \times 100}{\text{Fixed Cost} + \text{Profit}}$$

$$= 64\%$$

Addresses of Machinery, Equipment and Raw Material Suppliers

1. M/s. Engineering and Industrial Foundry Company
   Ramnagar,
   Coimbatore – 641009.
2. M/s. Krystal Elmec
   Ichalkaranji Industrial Co-op. Estate Ltd.
   Common Hall No.5,
   Block No. 8/9,
   Ichalkaranji – 416115.
3. M/s. Instrumentation and Controls
   P.B. 2726,
   Kalbadevi,
   Mumbai - 1
4. M/s. Plus-one Machine Fabrik
   St. No. 323, Pl. No. 25-26,
   Udyambag,
   Belgaum - 8

5. M/s. Aluminium Alloy Manufacturing Co.
   126, V.V. Chandan Street,
   Mumbai - 3
6. M/s. Bassein Metals Pvt. Ltd.
   B-61, Dattani Apts. No.4,
   Parekh Nagar, S.V. Road,
   Kandivalli (W),
   Mumbai - 67.
7. M/s. Radiant Metals and Alloys Pvt. Ltd.
   A-6, Girikunj Indl. Estate,
   off Mahakali Caves Road,
   Andheri (E),
   Mumbai -3
8. M/s. Fuel Instruments and Engineers Pvt. Ltd.
   68–69, Parvati Co-operative
   Indl. Estate, Yadrav,
   Tah. Shirol,
   Kolhapur - 416 145
9. M/s. Electroil Super Thermal Engineers,
   151, Small Factory Area,
   Lakadganj,
   Nagpur - 440 008.
10. M/s. Mechachem Industries
    D-55, M.I.D.C,
    Nagpur - 440 028