

PROJECT PROFILE ON PISTON RING

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PREPARED BY



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INTRODUCTION.

Piston ring is one of the most important part of the Deisel/Petrol engines.It is an open-ended ring that fits into a groove on the outer diameter of a piston in a reciprocating engine such as an internal combustion engine or steam engine. The principal function of the piston rings is to form a seal between the combustion chamber and the crankcase of the engine. The goal is to prevent combustion gases from passing into the crankcase and oil from passing into the combustion chamber

The three main functions of piston rings in reciprocating engines are:

1. Sealing the combustion/expansion chamber.
2. Supporting heat transfer from the piston to the cylinder wall.
3. Regulating engine oil consumption.

During the compression and power strokes, the compression ring seals the combustion gases and prevents blow-by. Although blow-by is not completely eliminated it is kept to an acceptable limit. During the compression and exhaust strokes the cylinder walls are lubricated with oil by throw off from the connecting rod bearings. Excess oil is wiped off by the piston rings. Not only does the oil ring have the responsibility of wiping the excess oil off the cylinder walls, but the job is also shared by all of the rings, leaving a fine layer of oil on the wall to provide lubrication for the following ring. As rings wear, the ability to perform these functions is decreased resulting in oil consumption and blow-by. When this happens it is time for a new set of rings.

MARKET POTENTIAL

Piston ring is the one of the most replaceble part of the diesel/petrol engines.It has great demand in the replaceble market as well as in new engines market.For the last few years there is noticeable increase in the automobile industry, which is the vast market for it. Piston rings are not only used in the automobile industry but also used in :

- Railway Engines
- Compressors
- Steam Hammers
- Cars
- Retaining Rings

- Pumps
- Industrial Applications
- Cranes
- Gearboxes

So, by maintaining quality and using proper marketing techniques there is always a great market of this product.

BASIS AND PRESUMPTIONS

- The information supplied is based on a standard type of manufacturing activity utilizing conventional techniques of production and optimum level of performance.
- 75% of the envisaged capacity is taken as efficiency on single working shift.
- Labour and wages are required as per present circumstances.
- The cost in respect of land & building, machine & equipment, raw material & selling price of finished product etc are those generally obtained at the time of preparation of project profile and may vary depending upon the location, make and for variety of reasons.
- The interest on total capital has been assumed @ 14% p.a

IMPLEMENTATION SCHEDULE

- | | |
|---|--|
| • Selection of site & Preparation of bankable project report | 3 months |
| • Filing of EM part-I with GM, DIC | 3 days |
| • Submission of project report & sanction of finance from financial institution/ Bank | 4 months |
| • Procurement of Plant, machinery & equipment | 1 month |
| • Commissioning and erection of Plant & machinery and trial run | 3 months |
| • Purchase of raw material & recruitment of labour & staff | 1 month |
| • Start of commercial production | Immediately as soon as above activities completed |
| • Filing of EM Part-II with GM, DTIC | Immediately after the Enterprises has gone into regular production |

TECHNICAL ASPECTS

MATERIAL

The materials used to make Piston Rings are one of the most critical factors in its performance.

Listed below are some of today's common material used in manufacturing of piston rings and metallic seals:

- Cast iron
- Cast iron alloyed for piston rings
- Nodular cast iron alloyed for piston rings
- Bronze
- Aluminum Bronze
- Phosphor Bronze
- Steel
- Stainless Steels for use in high temperature

MANUFACTURING PROCESS

Piston rings are generally made up of cast iron. The blanks of cast rings of required size and desired properties are procured from the local foundries. After that blanks are cleaned and get ground. Then the blanks are undergone through various processes like facing, rough diameter, rough bore, finish diameter & finish bore. The rings are generally machined to the required shape by means of turning, a process in which the ring blank, already axially ground, is copy turned on the inside and outside diameters. After a segment equivalent to the free gap is cut from the ring it assumes the free shape that will give it the required radial pressure distribution when fitted into the cylinder..

Piston Ring Coatings

After the completion of machining process the following surface treatments for piston rings are principally designed to provide corrosion protection for storage, enhance appearance and improve running.

- Bronze Coating
- Ceramic Chrome Plating
- Chrome Plating
- Copper Plating
- Molybdenum

- Phosphate Coating
- Plasma Sprayed Coating
- Tin Coating

PRODUCTION CAPACITY

Approximately 45,000 set of different sizes per year.

QUALITY CONTROL

The procured blanks castings should be checked very carefully as per given requirement (size, grade etc). This is the very first step in quality control. The product should be monitored after completion of each stage so that chance of rejection at the end is eliminated. Piston rings should be manufactured as per IS : 5791-1971 & IS: 8422 for IC engines. The entire operation of surface treatment/ coating should be closely controlled. For the inspection process proper calibrated gauges should be used.

POLLUTION CONTROL

As this unit does not come under heavy polluted industry, although No Objection Certificate from pollution control board should be taken.

POWER CONSUMPTION

As this is a small unit it has less power consumption, which is approx. 30H.P

FINANCIAL ASPECTS

FIXED CAPITAL

1. Land & building	Rs.
400 sq. mtrs. With covered area of 300 sq. mtrs	5,000(approx.)
on monthly rent basis	

2. Machinery & Equipments

Sr. No.	Description	Qty	Price (Rs.)
1	Lathe machine,1800 mm bed with 3 H.P motor	2	3,40,000
2	Lathe machine,900 mm bed with 2 H.P motor	1	2,60,000
3	Face grinder with special attachment, 4 H.P motor	1	60,000
4	Bench drill machine.12mm capacity	1	15,000
5	Bench grinder,250mm wheel dia,1H.P motor	1	15,000
6	Gauges,tools & other equipments	L.S	40,000

Total= 7,30,000

Installation & electrification charge @ 10% of cost of machine = 73,000

13	Furniture & office equipment		20000
		TOTAL	823000

WORKING CAPITAL (per month)

1. Personnel

Sr. no.	Designation	No.	Salary (per month)	Total
1	Manager	1	7000	7000
2	Supervisor	1	5000	5000
4	Skilled worker	2	4000	8000
5	Unskilled worker	2	3000	6000
7	Store-keeper	1	4000	4000
8	Clerk-cum-Typist	1	4000	4000
9	Peon	1	3000	3000
10	Watchman	1	3000	3000

Total 40,000/-

2. Raw material (per month)

Sr. no.	Description	Qty.	Rs.
1	Piston ring castings @ Rs.48/kg	1300kg	62,400

3. Utilities (per month)

Electricity & Water Rs 20,000

4. Other expenses (per month)

Sr. no.	Description	Rs.
1	Stationary	4000
2	Transport charges	5000
3	Telephone	2000
4	Maintenance	4000
5	Insurance	3000
6	Miscellaneous	5000
7	Rent	5000
	TOTAL	28000

Total recurring expenditure (per month)

$$1+2+3+4 = 1,50,400/-$$

Total working capital (for 3 months)

$$1,50,400 \times 3 = 4,51,200 \text{ or say } 4,51,000/-$$

- **TOTAL CAPITAL INVESTMENT**

1. Fixed capital	Rs. 8,23,000/-
2. working capital	Rs. 4,51,000/-
Total =	Rs. 12,74,000/-

FINANCIAL ANALYSIS

- **Cost of production (per year)**

Total recurring cost per year	Rs. 18,04,800
Depreciation on machinery & equipment @ 10%	Rs. 73,000
Depreciation on office furniture @ 20%	Rs. 4,000
Interest on total investment @ 14%	Rs. 1,78,360
Total cost of production	Rs. 20,60,160

- **Turnover (per year)**

Qty.	Rate /set	Value(Rs.)
45000 sets of piston Ring	@ Rs. 58/-	26,10,000/-

- **Net profit (per year)**

$$= 26,10,000 - 20,60,160$$

$$= 5,49,840 \text{ or say } 5,50,000/-$$

- **Net profit ratio**

$$= \frac{\text{Net profit per annum} \times 100}{\text{Turnover per annum}}$$

$$\begin{aligned}
 &= \frac{550000 \times 100}{2610000} \\
 &= 21.07 \% \\
 &= 21\%
 \end{aligned}$$

- **Rate of return**

$$\begin{aligned}
 &= \frac{\text{Net profit per annum} \times 100}{\text{Total investment}} \\
 &= \frac{550000 \times 100}{1274000} \\
 &= 43.17\%
 \end{aligned}$$

- **Break even point**

1. Fixed cost per annum	Rs.
a. Depreciation on machinery & equipments @10%	73000
b. 40% of other expenses (excluding rent & insurance)	96,000
c. Depreciation on office furniture @20%	4,000
d. 40% of salary & wages	1,92,000
e. Interest on capital investment @14%	1,78,360
f. Rent	60,000
g. Insurance	36,000

Total= 6,39,360 Or say 6, 39,000

2. Breakeven point

$$\begin{aligned}
 &= \frac{\text{Fixed cost} \times 100}{\text{Fixed cost} + \text{profit}} \\
 &= \frac{6,39,000 \times 100}{6,39,000 + 5,50,000} = 53.74\%
 \end{aligned}$$

1. Addresses of Machinery Suppliers –

1.Emtex Machinery Private Limited: No. 4-E, Vandhana Building, No. 11, Tolstoy Marg, Connaught Place, Delhi - 110 001,

2.R. K. Foundry And Engineering Works: G.. T. Road, Batala - 143 505, India

3.Accurate Auto Lathes Private Limited: Dugri Road, Near Canal Bridge, Ludhiana - 141 002, India

4.Atul Machine Tools: Metoda GIDC, Plot No. P-103, Opp. Makrana Marble, Kalawad Road, Metoda, Rajkot - 360 003,

5.Memco Machinery Mart , No. 4094, 1st Floor, Kuch Dilwali Singh, Ajmeri Gate, Delhi - 110 006, India