

## **AUTO CYLINDER LINERS**



### **1. INTRODUCTION:**

Cylinder Liner is one of the critical components of I. C. (internal combustion) Engines and reciprocating air/gas compressors for industrial and refrigeration plants. In engines, Cylinder walls can get worn or damaged from use. The cylinder liners are filleted in to engine block to restore cylinder bore clearances. The cylinder liners are mostly made of cast iron and for smaller engines and aeroengines, suitable strong aluminum alloys are used. Liners plays an important role in the working of the heavy duty petrol and diesel Engine and maintains efficiency of the engine.

### **2. PRODUCT & ITS APPLICATION:**

If the engine is not equipped with replaceable sleeves there is a limit to how far the cylinder walls can be bored or worn before the block must be replaced. In such cases, the use of a sleeve or liner is made to ensure / restore proper clearances to an engine. Sleeves or liners are made out of iron alloys and are very reliable. A sleeve is installed by a machinist at a machine shop. The engine block is mounted on a precision boring machine where the cylinder is then bored to a size much larger than normal and a new cast-iron sleeve can be inserted with an interference fit. The sleeves can be pressed into place, or they can be held in by a shrink fit.

### **3. DESIRED QUALIFICATIONS FOR PROMOTER:**

The promoter with experience of foundry metal casting and auto component trading with mechanical / metallurgical engineering background will be suitable for the project.

### **4. INDUSTRY OUTLOOK/TREND**

Cylinder liners are essential component for 4 wheeler automobiles and other large capacity stationary and mobile engines viz Power generation engines, earth moving machine engines as well as marine engines. Being part of the auto component industry, the outlook for this product relates with the Indian auto-components industry that has experienced healthy growth over the last two decades. The auto-component industry of India has expanded by 14.3 per cent because of strong growth in the spares or after-market sales to reach at a level of Rs 2.92 lakh crore (US\$ 44.90 billion) in the year 2017. The auto-components industry accounts for almost seven per cent of India's Gross Domestic Product (GDP) and employs as many as 25 million people, both directly and indirectly. A stable government framework, increased purchasing power, large domestic market, and an ever increasing development in infrastructure have made India a favorable destination for investment.

The Indian automotive aftermarket is expected to grow at a CAGR of 10.5 per cent and reach Rs 75,705 crore (US\$ 13 billion) by the year 2019-20, according to the Automotive Component Manufacturers Association of India (ACMA). These estimates are in sync with the targets of the Automotive Mission Plan (AMP) 2016-26. In view of the strong growth of domestic spares market as well as export market of the components, there is scope for Indian units to grow in coming decades.

### **5. MARKET POTENTIAL AND MARKETING ISSUES. IF ANY:**

India is the leading auto manufacturer in the world with first and second largest position in terms of production volumes. Indian automobiles and its ancillary component industry are now emerging as leading exporter in the world. India's auto industry is with production capacity of around 29 million during 2015 is expected to grow to more than 48 million vehicles by 2020.

With the increasing automobile demand, the country is also proportionately expected to witness a surge in auto components used for these vehicles.

With the huge growth of industry, both automotive and stationary type, being used in industrial activities and agricultural mechanized implements. There is good scope for cylinder liners in domestic markets. The cylinder liner is replaceable items. After a certain use, the liner is to be replaced. Hence the item is having good demand for new engine and as well as for replacement purpose in domestic and export markets.

## **6. RAW MATERIAL REQUIREMENTS:**

Pig iron and cast iron scrap are the main input materials along with alloying additives, fluxes etc. in casting of Liners. Aluminum alloys are also used in certain small capacity engines of two wheeler.

## **7. MANUFACTURING PROCESS:**

Most of the cylinder liners are cast by centrifugal casting process as per required specification of bore diameters and lengths. Molten metal of specific grade of cast iron is poured into rotating molds and allowed to solidify and cool. To achieve bore surface property, additives/fluxes are poured in mold.

Different bore and length liners are produced and suitable metal molds are used. The liners are cleaned, fettled and then operations like rough machining, facing, rough outer diameter, rough boring is done. Then final machining operation is carried out like finish boring, and Honing etc. After last operation every liner is checked & grouped as per category and packed for dispatch.

## **8. MANPOWER REQUIREMENT:**

The unit shall require highly skilled service persons. The unit can start from 8 employees initially and increase to 23 or more depending on business volume.

Sr. No	Type of Employees	Monthly Salary	No of Employees				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Skilled Operators	15000	2	2	3	4	4
2	Semi-Skilled/ Helpers	8000	6	8	12	14	16
3	Supervisor/ Manager	25000	0	0	1	1	1
4	Accounts/ Marketing	15000	0	0	1	1	1
5	Other Staff	7000	0	0	1	1	1
	TOTAL		8	10	18	21	23

## 9. IMPLEMENTATION SCHEDULE:

The unit can be implemented within 3 months from the serious initiation of project work.

Sr. No	Activities	Time Required in Months
1	Acquisition of Premises	-
2	Construction (if Applicable)	-
3	Procurement and Installation of Plant and Machinery	2
4	Arrangement of Finance	2
5	Manpower Recruitment and start up	1
	Total Time Required (Some Activities run concurrently)	3

## 10. COST OF PROJECT:

The unit will require total project cost of Rs 28.02 lakhs as shown below:

Sr No	Particulars	In Lakhs
1	Land	0.00
2	Building	0.00
3	Plant and Machinery	16.95
4	Fixtures and Electrical Installation	2.75
5	Other Assets/ Preliminary and Preoperative Expenses	1.50
6	Margin for working Capital	6.82
	<b>TOTAL PROJECT COST</b>	<b>28.02</b>

## 11. MEANS OF FINANCE:

The project will require promoter to invest about Rs 12.12 lakhs and seek bank loans of Rs 15.90 lakhs based on 70% loan on fixed assets.

Sr No	Particulars	In Lakhs
1	Promoters Contribution	12.12
2	Loan Finance	15.90
	TOTAL :	28.02

## 12. WORKING CAPITAL REQUIREMENTS:

Working capital requirements are calculated as below:

Sr. No	Particulars	Gross Amount	Margin %	Margin Amount	Bank Finance
1	Inventories	3.71	40	1.49	2.23
2	Receivables	4.99	50	2.50	2.50
3	Overheads	1.36	100	1.36	0.00
4	Creditors	3.71	40	1.49	2.23
	TOTAL	13.77		6.82	6.95

## 13. LIST OF MACHINERY REQUIRED:

The layout of unit suitable for different activities are planned to ensure smooth material and product flow.

(Rs.)

Sr. No	Particulars	UOM	Quantity	Rate	Total Value
	Main Machines/ Equipment				
1	Induction Melting Furnace for cast iron alloys	Nos	1	500000	500000
2	Centrifugal Casting machines	Nos	4	60000	240000
3	Cylindrical / Internal grinding attachments		2	60000	120000

Sr. No	Particulars	UOM	Quantity	Rate	Total Value
4	Honing Machine	Nos	1	80000	80000
5	Shot blasting machine		1	80000	80000
6	Lathe Machine with Boring attachments		3	100000	300000
7	Drilling Machine		1	65000	65000
8	Bench/ Flexible shaft grinders		2	30000	60000
	subtotal :				1445000
	Tools and Ancillaries				
1	Molds tools and gauges	LS	1	150000	150000
2	Misc. tools etc.	LS	1	100000	100000
	subtotal :				250000
	Fixtures and Elect Installation				
	Storage racks and trolleys	LS	1	15000	15000
	Other Furniture	LS	1	20000	20000
	Telephones/ Computer	LS	1	40000	40000
	Electrical Installation	LS	1	200000	200000
	subtotal :				275000
	Other Assets/ Preliminary and Preoperative Expenses	LS	1	150000	150000
	<b>TOTAL PLANT MACHINERY COST</b>				<b>2120000</b>

All the machines and equipment are available from local manufacturers. The entrepreneur needs to ensure proper selection of product mix and proper type of machines and tooling to have modern and flexible designs. It may be worthwhile to look at reconditioned imported machines, dies and tooling. Some of the machinery and dies and tooling suppliers are listed here below:

1. Balaji Engineers  
No. 122, Vishala Industrial Estate, Near Odhav Ring Road Chokdi Near Kathwada G. I. D. C., Odhav, Odhav Industrial Estate, Ahmedabad -382415, Gujarat, India
2. Eddy Melt  
C 70, M. I. D. C., Hingna Industrial Estate, Nagpur - 440025  
Maharashtra, India

3. Electrotherm India Ltd.,  
Survey No. 72, Village Palodia, Taluka Kalol Via Thaltej  
Ahmedabad- 382115, Gujarat, India
  
4. Micro Engineering Works;  
No. 6/140, Gandhi Nagar, Nallampalayam Road Nanjai Gounden, Pudur, G. N. Mills  
Post, Coimbatore - 641029, Tamil Nadu, India
  
5. Gautam Industries  
Plot No. 267, Near Upvan Lake, Upvan  
Thane - 400606  
Maharashtra, India

Other well known machine manufacturers can be searched from directories/ internet. Some are listed here below:

- ACME TOOLINGS, D-67, Phase 1, IDA Jeedimetla, Hyderabad – 500055,
- Ace Manufacturing Systems Ltd.,
- Batliboi Ltd. Mumbai,
- Bharat Fritz Werner Ltd.,
- HMT Machine Tools Ltd.,
- Advani Oerlikon Ltd, Bombay,
- Lakshmi Machine Works Ltd.,
- Lokesh Machines Ltd.,
- Praga Tools Ltd.,
- Toolcraft Systems Pvt. Ltd.

#### **14. PROFITABILITY CALCULATIONS:**

(Rs. Lakh)

Sr No	Particulars	UOM	Year Wise estimates				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Capacity Utilization	%	35	45	60	70	80
2	Sales	Rs Lakhs	59.89	77.00	102.67	119.78	136.89
3	Raw Materials & Other Direct Inputs	Rs Lakhs	44.55	57.28	76.37	89.10	101.83
4	Gross Margin	Rs Lakhs	15.34	19.72	26.30	30.68	35.06
5	Overheads Except Interest	Rs Lakhs	14.07	14.07	14.07	14.07	14.07
6	Interest	Rs Lakhs	2.23	2.23	2.23	2.23	2.23
7	Depreciation	Rs Lakhs	2.12	2.12	2.12	2.12	2.12
8	Net Profit Before Tax	Rs Lakhs	-3.08	1.31	7.88	12.26	16.64

The basis of profitability calculation:

The Unit will have capacity of 300 MT of Cast Liners per year of assorted types/ designs. The sales prices of Liners of various types range from Rs 40 to Rs 200 per Kg or more depending on type, metal composition, and volumes. The raw material cost of CI scrap is ranges from 25 to 35 per Kg depending on grades. The material requirements are considered with wastage/ scrap/burnouts etc. of 6 % of finished products as most of generated scrap is reused. The unusable scrap is sold at @ Rs 15 ~ 18 per Kg. and the income of same is added. Energy Costs are considered at Rs 7 per Kwh and fuel cost is considered at Rs. 65 per liter. The depreciation of plant is taken at 10 % and Interest costs are taken at 14 -15 % depending on type of industry.

## 15. BREAK EVEN ANALYSIS

The project is can reach break-even capacity at 42.02 % of the installed capacity as depicted here below:

Sr No	Particulars	UOM	Value
1	Sales at Full Capacity	Rs Lakhs	171.12
2	Variable Costs	Rs Lakhs	127.29
3	Fixed Cost incl. Interest	Rs Lakhs	18.42
4	Break Even Capacity	% of Inst Capacity	42.02



## **16. STATUTORY/ GOVERNMENT APPROVALS**

The unit will require state industry unit registration with District Industry center. No other procedures are involved. For export, IEC Code and local authority clearances. The industry registration and approval for factory plan, safeties etc. are required as per factory inspectorate and labor laws. Other registration are as per Labor laws are ESI, PF etc. Before starting the unit will also need GST registration for procurement of materials as also for sale of goods. As such there is no pollution control registration requirement, however the unit will have to ensure safe environment through installation of chimney etc as per rules. Solid waste disposal shall have to meet the required norms.

## **17. BACKWARD AND FORWARD INTEGRATION**

The machines and equipment offer scope for diversification in to producing other consumer and industrial parts/ components viz hydraulic and pneumatic cylinders, parts for heavy machinery of construction, earth moving, mining structural tubes etc. However the unit can add few machines to produce normal sand castings, etc. by using the spare capacities of furnace and machining capabilities. As such there is not much scope for organic backward or forward integration.

## **18. TRAINING CENTERS/COURSES**

There are no specific training centers for production technology. However foundry technology can be obtained by joining as apprentice in foundry units. The Prototype Development Centers can provide some assistance and for dies and Tools development, courses run by centers of excellence viz Indo German Tool Room at Ahmedabad, Rajkot, Chennai, etc. shall be helpful.

The most important scope of learning is in new product design and development by study of the new product designs, product range, features and specifications of leading Brands / competitors across the world by scanning the Internet and downloading data from websites of Viz. North American, Europe, China etc. markets.

Udyamimitra portal (link: [www.udyamimitra.in](http://www.udyamimitra.in)) can also be accessed for hand-holding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates all over India.

**Disclaimer:**

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.