

# **PLASTIC PARTS FOR ENG. EQUIPMENT**

## **1. INTRODUCTION:**

Plastics parts in engineering industry are replacing metal parts since last few years. It is proved to improve their products, reduce costs and streamline the manufacturing process by converting metal components and assemblies to plastic. Metal to plastic conversions focus on improving the product or component integrity while reducing overall weight and cost.

A key to success is the continual introduction and improvement of engineered plastic resins that have the strength and durability to compete with metal. In addition, these plastic materials can provide better wear surfaces and have lower friction. For example, metal bearings can be eliminated by designing bearing features directly into the plastic part.

Plastic components are often superior when it comes to high-impact strength, fatigue life or recoverable deformation, and plastic parts can be molded into complex shapes at a much lower cost than machining metal components.

In addition to part weight reduction, consistent dimensions and lower cost, metal to plastic conversions often result in enhanced performance and product value.

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

The basic products manufactured from plastic for engineering equipment have advantages as under.

### **Improve Products:**

- Designs consolidate parts and create additional performance features
- Ability for more complex shapes and geometries

- Opportunity to combine materials for enhanced features using multi-shot molding, over molding or insert molding
- Increased strength and durability
- Enhanced decoration or labeling with in-mold decorating and labeling
- Improved aesthetics
- Ability to maintain close tolerances
- Plastic materials and construction absorb impact and reduce noise
- Lighter weight components for improved product performance

#### **Reduce Costs:**

- Reduced secondary operations, such as painting, machining or assembly
- Improved production consistency
- Reduced part/product weight – reduced shipping and operating costs
- Product improvements resulting in increased customer satisfaction and decreased warranty issues
- Streamlined manufacturing cost savings
- Reduced scrap and waste
- Part consolidation

#### **Streamline Manufacturing:**

- Reduced labour and time, eliminating secondary operations and assembly
- Plastic injection molding is a faster and more consistent manufacturing process than metal fabrication
- Tools for testing materials and performance in the design phase predict performance

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

Graduate in any discipline.

### **4. INDUSTRY LOOK OUT AND TRENDS**

Plastic Injection molding is a manufacturing process for producing parts from both thermoplastic and thermosetting plastic materials. Material is fed into a heated barrel,

mixed, and forced into a mold cavity where it cools and hardens to the configuration of the mold cavity. After an industrial designer or an engineer designs a product, usually, molds are made by a mold maker (or toolmaker) from metal, usually either steel or aluminum, and precision-machined to form the features of the desired part. Injection molding is widely used for manufacturing a variety of parts, from the smallest component to entire body panels of cars. It is also used to create many things such as wire spools, packaging, bottle caps, automotive dashboards, pocket combs, and most other plastic products available today. Injection molding is the most common method of part manufacturing. It is ideal for producing high volumes of the same object. Some advantages of injection molding are high production rates, repeatable high tolerances, and the ability to use a wide range of materials, low labour cost, minimal scrap losses, and little need to finish parts after molding.

India automotive industry is expected to grow in another ten years. The Indian automotive industry is growing at a very high rate with sales of more than one million passenger vehicles per annum. The overall growth rate is 10-15 per cent annually. The entire car market was likely to witness a fair amount of churning in the coming years. This will definitely be a driving force for a high demand of auto components. India is the world's second largest manufacturer of two-wheelers, fifth largest manufacturers of commercial vehicles as well as largest manufacturer of tractors. It is the fourth largest passenger car market in Asia and home to the largest motorcycle manufacturer. Coming to the Auto-component sector, the total market size of the auto-components industry is estimated at over Rs 700 billion. The industry estimates that the Indian components industry will grow to over Rs 950 billion by 2010. The overall investment in the components industry is estimated at Rs 288 billion. Indigenous firms like Bharat Forge, Sundaram Fasteners, Minda Industries and Gabriel India Ltd. are in the limelight. There is a boom in the auto components segment because of strong demand and robust economy. Also, the industry has strong forward and backward linkages with almost every other engineering segment. The component production range includes engine parts 31%, drive transmission and steering parts 19%, suspension and braking parts 12%, electrical parts 10%, equipments 12%, body and chassis 9% and others 7%. The auto component suppliers are emerging as systems suppliers with capacity to design and develop critical parts. The Indian automobile components industry has, no doubt, significant cost advantages, primarily due to lower labour cost. There is a very wide scope and good market potential of products manufactured in this sector. Few Indian Major Players are as under: Hanil Lear India Pvt. Ltd. Hi-Tech Elastomers Ltd. Machino Plastics Ltd. Tata Auto Plastic Systems Ltd. Varroc Engineering Pvt. Ltd.

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

Industrial insight and engineering expertise in evaluating conversion of an existing product or part from metal to plastic, including Construction equipment, Industrial pumps. Fluid power applications, Agricultural equipment, Power sport vehicles, Trucking equipment, Off-road vehicles, Consumer products, Appliances are available in the market. However basic knowledge is required for shifting from metal to plastic.

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

The major raw materials required for the project are different type of plastics- mainly PP, I.e. Polypropylene. Other raw materials required will be plasticizer, color additives, binding chemicals, and packing materials. Most of the raw materials are available easily in the Indian market.

## **7. MANUFACTURING PROCESS:**

In injection molding process, the cold, hard plastic material is loaded into the machine via hopper, plasticized by heating and then injected under pressure into a cold mold, where it sets and is then ejected as the finished products. The three successive main stages that are followed in the procedure of manufacturing are Feeding of Glass filled PP + colorant raw material into the hopper, Injection molding process. Finishing of the molded product. Glass filled PP + colorant Fixing of mold in machine, Injection Molten PP material in mold, Cooling and Opening of mold, Ejection of component and Packing.

### **Screw Profile**

The standard metering screw has three zones with a ring plunger assembly. The feed zone, where the plastic first enters the screw and is conveyed along a constant root diameter, the transition zone, where the plastic is conveyed, compressed and melted along a root diameter that increases with a constant taper, and the metering zone, where the melting of the plastic is completed and the melt is conveyed forward along a constant root diameter reaching a temperature and viscosity to form parts.

## **8. MANPOWER REQUIREMENT:**

The enterprise requires 9 employees as detailed below:

| Sr. No. | Designation of Employees | Salary per Person | Number of employees required |        |        |        |        |
|---------|--------------------------|-------------------|------------------------------|--------|--------|--------|--------|
|         |                          |                   | Year-1                       | Year-2 | Year-3 | Year-4 | Year-5 |
| 1       | Machine Operators        | 12,000            | 3                            | 1      | 1      | 1      | 1      |
| 2       | Helpers                  | 8,000             | 6                            | 3      | 4      | 4      | 5      |
| 3       | Production supervisor    | 15,000            | 2                            | 1      | 1      | 1      | 1      |
| 4       | Accounts/Stores Asst     | 12,500            | 2                            | 1      | 1      | 1      | 1      |
| 5       | Office Boy               | 9,000             | 3                            | 1      | 1      | 1      | 1      |
|         | Total                    |                   | 16                           | 7      | 8      | 8      | 9      |

## 9. IMPLEMENTATION SCHEDULE:

The project can be implemented in 4 months' time as detailed below:

| Sr. No. | Activity  | Time Required (in months) |
|---------|---|---------------------------|
| 1       | Acquisition of premises   | 1.00                      |
| 2       | Construction (if applicable)  | 1.00                      |
| 3       | Procurement & installation of Plant & Machinery                       | 2.00                      |
| 4       | Arrangement of Finance  | 2.00                      |
| 5       | Recruitment of required manpower                                      | 1.00                      |
|         | Total time required ( <i>some activities shall run concurrently</i> ) | 4.00                      |

## 10. COST OF PROJECT:

The project shall cost ₹157.85 lacs as detailed below:

| Sr. No. | Particulars              | ₹ in Lacs |
|---------|--------------------------|-----------|
| 1       | Land 2000 sq. mtrs@ 1000 | 20.00     |
| 2       | Building                 | 12.00     |
| 3       | Plant & Machinery        | 65.35     |

|   |   |               |
|---|---|---------------|
| 4 | Furniture, Electrical Installations                         | 6.54          |
| 5 | Other Assets including Preliminary / Pre-operative expenses | 7.84          |
| 6 | Working Capital   | 46.13         |
|   | Total   | <b>157.85</b> |

## 11. MEANS OF FINANCE:

Bank term loans are assumed @ 85 % of fixed assets. The proposed funding pattern is as under:

| Sr. No. | Particulars             | ₹ in Lacs     |
|---------|-------------------------|---------------|
| 1       | Promoter's contribution | 39.46         |
| 2       | Bank Finance            | 118.39        |
|         | Total                   | <b>157.85</b> |

## 12. WORKING CAPITAL REQUIREMENT:

| Sr. No. | Particulars | Gross Amt | Margin % | Margin Amt | Bank Finance |
|---------|-------------|-----------|----------|------------|--------------|
| 1       | Inventories | 15.38     | 0.25     | 3.84       | 11.53        |
| 2       | Receivables | 15.38     | 0.25     | 3.84       | 11.53        |
| 3       | Overheads   | 15.38     | 1.00     | 15.38      | 0.00         |
| 4       | Creditors   | 0.00      |          | 0.00       | 0.00         |
|         | Total       | 46.13     |          | 23.06      | 23.06        |

## 13. LIST OF MACHINERY REQUIRED:

A detail of important machinery is given below: Power Requirement: 125 HP

| Sr. No. | Particulars                   | UOM | Qty. | Rate (₹) | Value<br>(₹ in Lacs) |
|---------|-------------------------------|-----|------|----------|----------------------|
|         | Plant & Machinery / equipment |     |      |          |                      |
| a)      | Main Machinery                |     |      |          |                      |

|      |                                      |      |       |          |              |
|------|--------------------------------------|------|-------|----------|--------------|
| i.   | Injection Molding & Molds            | Nos. | 1     | 45.00    | 45.00        |
| ii.  | Dry color Mixer                      | Nos. | 1     | 2.50     | 2.50         |
| iii. | Scrap Grinding Machine               | Nos. | 1     | 5.00     | 5.00         |
| b)   | Ancillary machinery                  |      |       |          |              |
| i.   | Air Compressor                       | Nos. | 1     | 7.00     | 7.50         |
| ii.  | Chilling Plant/Cooling               | LS   | 1     | 5.35     | 5.35         |
|      | sub-total Plant & Machinery          |      |       |          | 65.35        |
|      | Furniture / Electrical installations |      |       |          |              |
| a)   | Office furniture                     | LS   | 1     | 20000.00 | 0.20         |
| b)   | Stores Almirah                       | LS   | 1     | 30000.00 | 0.30         |
| c)   | Computer & Printer                   |      | L. S. | 0.00     | 6.04         |
|      | sub total                            |      |       |          | <b>6.54</b>  |
|      | Other Assets                         |      |       |          |              |
| a)   | preliminary and preoperative         |      |       |          | 7.84         |
|      | sub-total Other Assets               |      |       |          | 7.84         |
|      | Total                                |      |       |          | <b>79.73</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. KabraExtrusiontechnik

402, Lalita Complex, Jain Mainder Road,  
OppositeHdfc Bank, Navrangpura,  
Ahmedabad, Gujarat 380009. Phone:079 2656 4828

2. S. A. Engineering Works

No. 17/2, Periyasamy Street, SunambuKalavai,  
Kuniyamuthur, Coimbatore-641008, Tamil Nadu, India  
Phone: +91-9362233362; +91-9047476299, +91-422-2233362

3. Electrons cooling systems Pvt. Ltd.

S-27, SIDCO Industrial Estate  
 Kakkalur Industrial Estate  
 Tiruvallur – 602003, Tamil Nadu, India

4. Springboard Enterprises India Ltd.

1st, 2nd & 3rd Floor, Plot No. 7, 8 & 9, Garg Shopping Mall,  
 Service Centre, Rohini Sector 2  
 New Delhi – 110085, Delhi, India

5. Sagar Engineering Works

A-129, Road No. 9 D,  
 V. K. I. Area, Jaipur - 302013,  
 Rajasthan, India  
 Phone: +91-9829024358, +91-141-4064876

6. Uday Enterprises

Khasra No. 1108, Village Makanpur, Behind Indian Child School  
 Opposite Janta Flat No. 433, Nyay Khand 1,  
 Indirapuram, Ghaziabad - 201010,  
 Uttar Pradesh, India  
 Phone: +91-9212320224.

## 14. PROFITABILITY CALCULATIONS:

| Sr. No. | Particulars                         | UOM        | Year-1 | Year-2 | Year-3 | Year-4 | Year-5 |
|---------|-------------------------------------|------------|--------|--------|--------|--------|--------|
| 1.      | Sales                               | ₹. In Lacs | 110.70 | 129.15 | 147.60 | 166.05 | 184.50 |
| 2.      | Raw Materials & Other direct inputs | ₹. In Lacs | 53.84  | 62.81  | 71.78  | 80.76  | 89.73  |
| 3.      | Gross Margin                        | ₹. In Lacs | 56.86  | 66.34  | 75.82  | 85.29  | 94.77  |
| 4.      | Overheads except interest           | ₹. In Lacs | 8.31   | 8.83   | 9.87   | 10.18  | 10.39  |
| 5.      | Interest                            | ₹. In Lacs | 11.84  | 11.84  | 7.89   | 5.92   | 4.74   |
| 6.      | Depreciation                        | ₹. In Lacs | 45.75  | 32.68  | 22.87  | 16.34  | 14.70  |
| 7.      | Net Profit before tax               | ₹. In Lacs | -9.03  | 12.99  | 35.18  | 52.85  | 64.94  |



The basis of profitability calculation:

The growth of selling capacity will be increased 10% per year. (This is assumed by various analysis and study; it can be increased according to the selling strategy.)

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 10-12 % and Interest costs are taken at 14 -15 % depending on type of industry.

## **15. BREAK EVEN ANALYSIS:**

The project shall reach cash break-even at 64.33 % of projected capacity as detailed below:

| Sr. No. | Particulars                     | UOM           | Value  |
|---------|---------------------------------|---------------|--------|
| 1       | Sales at full capacity          | ₹. In Lacs    | 184.50 |
| 2       | Variable costs                  | ₹. In Lacs    | 89.73  |
| 3       | Fixed costs incl. Interest      | ₹. In Lacs    | 15.13  |
| 4       | $BEP = FC/(SR-VC) \times 100 =$ | % of capacity | 15.96% |

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

As per the allocation of business rules under the Constitution, labour is in the concurrent list of subjects. It is dealt with by the MOLE at the Central and Departments of Labour under State Governments in respective States / UTs. The MOLE has enacted workplace safety and health statutes concerning workers in the manufacturing sector, mines, ports and docks and in construction sectors.

Further, other Ministries of the Government of India have also enacted certain statutes relating to safety aspects of substances, equipment, operations etc. Some of the statutes applicable in the manufacturing sector are discussed below:

**The Manufacture, Storage and Import of Hazardous Electronic Rules (MSIHC), 1989**

These MSIHC Rules are notified under the Environment (Protection) Act, 1986. These rules are aimed at regulating and handling of certain specified hazardous chemicals. The rules stipulate requirements regarding notification of site, identification of major hazards, taking necessary steps to control major accident, notification of major accident, preparation of safety report and on-site emergency plan; prevention and control of major accident, dissemination of information etc. These rules are notified by the Ministry of Environment and Forests (MOEF) but enforced by the Inspectorates of Factories of respective States / UTs in the manufacturing sector. Entrepreneur may contact State Pollution Control Board where ever it is applicable.

## **17. BACKWARD AND FORWARD INTEGRATIONS**

Both forward and backward integration for any Electrical Industry are strategies to gain better control over the supply chain, reduce dependency on the suppliers and increase their competitiveness. The two strategies can help companies reduce their dependency on suppliers and increase their influence over the customers. The benefits of these strategies can be big. Both impact the bottom line directly. Integration happens if a company moves upward or downward in its supply chain. Starting from the suppliers from whom the raw materials are obtained, the chain moves downstream towards the distributors and the retailers. If the suppliers' power is very high, it can create financial burdens for the company. Suppose the number of suppliers of a company is low, then the control in their hands would be low. The burden in that case will fall upon company's shoulders. Its expenditure on raw materials will be high.

## **18. TRAINING CENTERS AND COURSES**

There is no such training required to start this business but, basic Electrical or IC bachelor's degree is plus point for enterpriser. Promoter may train their employees in such specialized institutions to grow up the business. There are few specialized Institutes provide degree certification in chemical Technology, few most famous and authenticate Institutions are as follows:

1. Department of Electrical LD College of engineering  
No.120, Circular Road, University Area, Navrangpura,

Opposite Gujarat University, Ahmedabad, Gujarat 380015

2. MIT College of Engineering, Pune

Gate.No.140, Raj Baugh Educational Complex,  
Pune Solapur Highway,  
LoniKalbhor, Pune – 412201  
Maharashtra, India

Udyamimitra portal ( link : [www.udyamimitra.in](http://www.udyamimitra.in) ) can also be accessed for handholding 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.