**Profile No.: 231 NIC Code: 24319**

**STEEL CASTINGS**

**1. INTRODUCTION:**

Steel is an alloy of Iron and carbon. Carbon content below 2% is termed as steel while that above the limit is termed as cast iron. Steel castings are used when cast irons cannot deliver enough strength or shock resistance.

Carbons steels are graded in to low, medium and high carbon steel. Depending on the carbon content steel achieves different microstructure. This can be further enhanced by controlling cooling rates of molten metal and heat treatment.

This project is focused on value addition in steel castings with consistency in mechanical properties, superior microstructure and precision casting. This is to be achieved by monitoring and adopting best practices for process control of moulding, melt preparation and alloy addition as per requirement.

**2. PRODUCT & ITS APPLICATION:**

Steel melt with good composition can be cast by melting in medium frequency induction durance. In addition to controlling carbon impurities content, several alloy elements are added. Steel castings quality is ensured with proper process controls. For steel castings addition of alloys is very important to get the desired properties needed for end application, viz manganese, silicon, chromium, nickel, vanadium, molybdenum etc. are added to get different properties. Viz heat, corrosion, wears etc. resistance. Also Stainless and Tool Steels for very high end application are used in most machines.

Steel casting is widely used in all types of industries for critical components. Steel castings applications are common for critical machines such as hydroelectric turbine wheels, forging presses, gears, railroad truck frames, valve bodies, pump casings, mining machinery, marine equipment, turbocharger turbines and engine cylinder blocks.

**3. DESIRED QUALIFICATIONS FOR PROMOTER:**

Preferably mechanical or metallurgical graduate with experience in this technology.

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

India is the world’s third-largest casting producer after China and the U.S. India produces castings of about 11 and 12 million tonnes per year. The steel foundries in India comprises of various large, medium and small companies that manufacture carbon steel alloys stainless steel and super alloy cast products.

Large players produce bulk of the domestic and export requirements for auto, mining, Power, capital goods, Railways and defense sectors. Few names are Electro steel Castings Ltd, Lanco Industries, Rail Wheel Factory, Hinduja Foundries, Nelcast Ltd., Tata Motors, Brakes India, Dcm Engineering Products, Sakthi Auto Component Ltd., Cooper Foundry, Mahindra- Hinoday, Mahindra Auto, Jayaswals Neco Ltd., NECO Castings, Ashok Iron Works, Kirloskar Ferrous Industries Ltd., Welcast Steels Ltd. etc. compete with various medium and small companies numbering around 1500 units located all around industrial and urban centers in India to provide services to end-user industries.

Large companies dominate the bulk of auto, power, railways and defense market in India with more than 70% share. Small and medium industry are competing in industrial valves pumps, machine tools, mining, mineral processing, cement, chemical, pharma, dairy, food processing etc. industry. The steel foundries in unorganized sector with proper standard specification and approval process are doing quite well in niche markets.

Though Indian steel foundries are dominated by low technology, slow shift can be witnessed with energy efficient furnaces, molding machines and metal quality control systems.

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

The growth of Indian economy is at 7%, sue to huge population demanding massive industrial and infrastructure investment in automobiles, Railway, cement, power generation and fertilizer Industries etc. core sectors and all associated industries viz Chemical, Pharmaceutical, Dairy, food processing Equipment etc. is the main driver for steel castings.

The global steel casting market is dominated by Asian countries China, Japan, India. India is likely to be leader competing with China in near future with a large number of players. India is emerging in steel casting industry and global demand will augment the growth opportunities for steel foundries in the coming years. Most of the global steel castings demand is with better metallurgy with austenitic, ferritin and martensitic grade steel alloys suitable for Heat Treatment.

Steel Castings units producing their castings with standards and specifications with respect to chemical composition of steel and close tolerances have immense scope. There is good scope for setting up such units in the Small to medium Scale Sector with induction melting and good metallurgical quality control facilities.

**6. RAW MATERIAL REQUIREMENTS:**

The raw materials – are Steels viz. Stainless Steel, Heat Resistant, Corrosion Resistant, Tool Steel & even High-Speed Steel. The basic raw material is assorted steel scrap or ingots for melting. Other materials are fluxes micro alloying additives and Ferro alloy elements. Other consumables are molding sand and pattern making materials. Certain additives for molding, viz. refractory powder, graphite etc. And melt additives for cleaning, metal composition control is used to get desired quality and finish of castings.

**7. MANUFACTURING PROCESS:**

Steel Castings with controlled chemical composition can be made by induction melting process. Depending on furnace capacity large castings can be manufactured in variety of Materials - viz. Stainless Steel, Heat Resistant, Corrosion Resistant, Tool Steel & even High-Speed Steel. The main stages Process are as below:

* Precision pattern Development as per Customer drawing & Foundry practice. Manufacture of Pattern and cores is critical as ensure close tolerances.
* Preparation of mold for casting.
* Assembling of patterns may be required for complex shapes and sizes.
* Covering of mold with the various materials viz refractory or graphite, silicon or other additive mixed sand.
* Baking of mold and core inserts
* Melting of metal with desired composition in furnace and chemical/ physical testing of melt samples prior to casting.
* Pouring the required Metal in molds.
* Removal of moulds and allowing casting to cool at required rate to achieve microstructure.
* The gates risers are cut-off and grinding is done with flexible shaft grinders. The casting is then sand or shot blasted to maintain metal skin properties and finish.
* Casting may be machined as per customer drawing and heat treated before or after machining. Surface treatments may be carried out.
* Final Inspection, Packing & Dispatch

**8. MANPOWER REQUIREMENT:**

The unit shall require highly skilled service persons. The unit can start from 20 employees initially and increase to 42 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 | 18000 | 4 | 6 | 8 | 10 | 12 |
| 2 | Semi-Skilled/ Helpers | 8000 | 12 | 18 | 24 | 24 | 24 |
| 3 | Supervisor/ Manager | 30000 | 1 | 2 | 2 | 2 | 2 |
| 4 | Accounts/ Marketing | 16000 | 1 | 2 | 2 | 2 | 2 |
| 5 | Other Staff | 8000 | 2 | 2 | 2 | 2 | 2 |
|  | TOTAL |  | 20 | 30 | 38 | 40 | 42 |

 **9. IMPLEMENTATION SCHEDULE:**

The unit can be implemented within 8 months from the serious initiation of project work.

|  |  |  |
| --- | --- | --- |
| **Sr No** | **Activities** | **Time Required in Months** |
| 1 | Acquisition of Premises | 2 |
| 2 | Construction (if Applicable) | 2 |
| 3 | Procurement and Installation of Plant and Machinery | 3 |
| 4 | Arrangement of Finance | 2 |
| 5 | Manpower Recruitment and start up | 2 |
|  | Total Time Required (Some Activities run concurrently) | 8 |

**10. COST OF PROJECT:**

The unit will require total project cost of Rs 210.33 lakhs as shown below:

|  |  |  |
| --- | --- | --- |
| **Sr. No** | **Particulars** | **In Lakhs** |
| 1 | Land | 30.00 |
| 2 | Building | 45.00 |
| 3 | Plant and Machinery | 72.33 |
| 4 | Fixtures and Electrical Installation | 12.20 |
| 5 | Other Assets/ Preliminary and Preoperative Expenses | 4.00 |
| 6 | Margin for working Capital | 46.80 |
|  | TOTAL PROJECT COST | 210.33 |

**11. MEANS OF FINANCE:**

The project will require promoter to invest about Rs 87.68 lakhs and seek bank loans of Rs 122.65 lakhs based on 70% loan on fixed assets.

|  |  |  |
| --- | --- | --- |
| **Sr. No** | **Particulars** | **In Lakhs** |
| 1 | Promoters Contribution | 87.68 |
| 2 | Loan Finance | 122.65 |
|  | TOTAL : | 210.33 |

**12. WORKING CAPITAL REQUIREMENTS:**

Working capital requirements are calculated as below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No** | **Particulars** | **Gross Amount** | **Margin %** | **Margin Amount** | **Bank Finance** |
| 1 | Inventories | 29.63 | 40 | 11.85 | 17.78 |
| 2 | Receivables | 26.56 | 50 | 13.28 | 13.28 |
| 3 | Overheads  | 9.82 | 100 | 9.82 | 0.00 |
| 4 | Creditors | 29.63 | 40 | 11.85 | 17.78 |
|  | TOTAL | 95.63 |  | 46.80 | 48.83 |

**13. LIST OF MACHINERY REQUIRED:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No** | **Particulars** | **UOM** | **Quantity** | **Rate** | **Total Value** |
|  | **Main Machines/ Equipment** |  |  |  |  |
| 1 | Medium Frequency Induction Furnace 1500 kg  | Nos | 1 | 3500000 | 3500000 |
| 2 | Cooling tower, Water softening plant, heat exchanger auxiliaries | Nos | 1 | 850000 | 850000 |
| 3 | Molding Machines | Nos | 3 | 250000 | 750000 |
| 4 | Sand mixer, sieves etc. | Nos | 1 | 150000 | 150000 |
| 5 | Core molding Machine | Nos | 2 | 25000 | 50000 |
| 6 | Sand reclamation System | Nos | 1 | 200000 | 200000 |
| **Sr. No** | **Particulars** | **UOM** | **Quantity** | **Rate** | **Total Value** |
| 7 | Core Baking oven with accessories | Nos | 1 | 70000 | 70000 |
| 8 | Mold/core coating material mixer / spray gun  | Nos | 1 | 35000 | 35000 |
| 9 | Ladle with heating system | Nos | 2 | 30000 | 60000 |
| 10 | EOT Crane  | Nos | 1 | 350000 | 350000 |
| 11 | Shot blasting machine | Nos | 1 | 200000 | 200000 |
| 12 | Lathe Machine | Nos | 2 | 75000 | 150000 |
| 13 | Drilling Machine | Nos | 1 | 50000 | 50000 |
| 14 | Milling Machine | Nos | 1 | 300000 | 300000 |
| 15 | Mold Boxes and tools  | LS | 1 | 250000 | 250000 |
| 16 | Bench/ Flexible shaft grinders | Nos | 4 | 12000 | 48000 |
| 17 | Metallurgical Microscope | Nos | 1 | 80000 | 80000 |
| 18 | Sample grinding / polishing M/c | Nos | 1 | 200000 | 200000 |
| 19 | Physical testing Lab | LS | 1 | 350000 | 350000 |
| 20 | Chemical Test Lab | LS | 1 | 150000 | 150000 |
|  | subtotal : |  |  |  | 7013000 |
|  | **Tools and Ancillaries** |  |  |  |  |
| 1 | Patterns tools and gauges | LS | 1 | 150000 | 150000 |
| 2 | Misc. tools etc. | LS | 1 | 70000 | 70000 |
|  | subtotal : |  |  |  | 220000 |
|  | **Fixtures and Elect Installation** |  |  |  |  |
|  | Storage racks and trolleys  | LS | 1 | 30000 | 30000 |
|  | Other Furniture | LS | 1 | 40000 | 40000 |
|  | Telephones/ Computer | LS | 1 | 150000 | 150000 |
|  | Electrical Installation | LS | 1 | 1000000 | 1000000 |
|  | subtotal : |  |  |  | 1220000 |
|  | Other Assets/ Preliminary and Preoperative Expenses | LS | 1 | 400000 | 400000 |
|  | TOTAL PLANT MACHINERY COST |  |  |  | 8853000 |

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

1. Techno Machines

Chikkanahalli Road,

Opp. Shahi Exports (Unit No 6),
Near Annapoorneshwari Temple,

Bommanahalli,
BENGALURU-560 068, INDIA

2. S. S. Engineering Works
 Ajit Khanna(Proprietor)
 Plot No. 100, Sector 6 IMT Manesar,

Gurgaon - 122050, Haryana, India

3. Taurus Private Ltd Co

No. 24, D 2 / E 3, Kiab Industrial,

Area At Pivele
Kiab Industrial Area,

Bengaluru – 560100 Karnataka, 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. Electrotherm India Ltd.,

 Survey No. 72, Village Palodia,

Taluka Kalol Via Thaltej
Ahmedabad- 382115, Gujarat

Other well-known machine are Acme Tooling’s, Ace manufacturing systems, Batliboi Ltd., Bharat Fritz Werner, HMT Machine Tools Ltd., Advani Oerlikon Ltd, Lakshmi Machine Works Ltd., Lokesh Machines Ltd., Praga Tools Ltd., Toolcraft Systems Pvt. Ltd. Etc. The above list of machine supplier is illustrative.

**14. PROFITABILITY CALCULATIONS:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No** | **Particulars** | **UOM** | **Year Wise estimates** |
|  |  |  | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** |
| 1 | Capacity Utilization | % | 35 | 45 | 55 | 65 | 75 |
| 2 | Sales | Rs Lakhs | 318.70 | 409.75 | 500.81 | 591.87 | 682.92 |
| 3 | Raw Materials & Other Direct Inputs | Rs Lakhs | 237.01 | 304.72 | 372.44 | 440.15 | 507.87 |
| 4 | Gross Margin | Rs Lakhs | 81.69 | 105.03 | 128.37 | 151.71 | 175.05 |
| 5 | Overheads Except Interest | Rs Lakhs | 61.38 | 61.38 | 61.38 | 61.38 | 61.38 |
| 6 | Interest | Rs Lakhs | 17.17 | 17.17 | 17.17 | 17.17 | 17.17 |
| 7 | Depreciation | Rs Lakhs | 13.35 | 13.35 | 13.35 | 13.35 | 13.35 |
| 8 | Net Profit Before Tax | Rs Lakhs | -10.21 | 13.13 | 36.47 | 59.81 | 83.15 |

The Unit will have capacity of 1000 MT per year of Steel Castings of different grades/ types. The bulk sale/ distribution sales prices of steel castings ranges from Rs 50 per Kg to Rs 300 per kg for super alloy, intricate and high end metal products depending on type, size, ratings/ specifications and testing requirements and volumes/ order.

The raw material cost ranges from 45 to 70 per kg for steel scrap. The melt additives costs range from Rs 30 to 460 per Kg. The material requirements are considered with wastage/ scrap etc. of 6 % of finished products. The unusable scrap is sold at @ Rs 18 ~ 50 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 | 910.56 |
| 2 | Variable Costs | Rs Lakhs | 677.16 |
| 3 | Fixed Cost incl. Interest | Rs Lakhs | 91.90 |
| 4 | Break Even Capacity | % of Inst Capacity | 39.38 |

 **16. STATUTORY/ GOVERNMENT APPROVALS**

The unit shall have to get state industrial unit registration from DIC, IEC Code for Export and local authority clearance. Depending on structure of finance the company shall need to register company with registrar of companies. The registration and approval for factory plan, safety for Fire etc. requirement, registration as per Labour laws ESI, PF etc. shall be required as per rules and applicability. 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 requirements, except installation of chimney/ blowers for heat treatment furnace / pickling line and ensure safe environment as per rules of factory safety. Solid waste disposal shall have to meet the required norms. Entrepreneur may contact State Pollution Control Board where ever it is applicable.

 **17. BACKWARD AND FORWARD INTEGRATION**

The machines and equipment offer scope for diversification in to producing the continuous flux cored and coated electrode range of products and also take up import substitution for welding electrodes by ensuring metal and flux compositions. The unit can also of other consumer and industrial wire products / components etc. by using the spare capacities and machine 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 wire drawing technology. There are training for dies and tools development run by several centers of excellence viz Indo German Tool Room at Ahmedabad, Rajkot, Chennai, and CTTC Bhubaneswar etc. shall be helpful.

The most important scope of learning is in new product design and development by associating with institutes like NID etc. Entrepreneur may also study the new product designs, product range, features and specifications of leading Brands / competitors across the world by scanning the Internet and downloading data. 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.