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. Vizheat, corrosion, wearsetc. 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. MARKET POTENTIAL AND MARKETING ISSUES. IF ANY:

Railway, cement, power generation and fertilizer Industries etc.require certain special mechanical properties close machining allowance and timely supply. Other industries viz Chemical, Pharmaceutical, Aircraft and aerospace Industries, Dairy Equipment etc. require a number of special castings such with other special alloy steels. Most of it conforms to austenitic, ferritic and martensitic grade steel alloys that are also suitable for Heat Treatment. In addition, the requirement of tool steel components has also increased with the pace of industrial development in country and exports market.

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.

5. 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 required are moulding sand and pattern making materials. Certain mould additives and refractory powder are used to get desired finish of castings..

6. 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 mould for casting.
Assembling of patterns may be required for complex shapes and sizes.
Covering of mould with the various materials viz refractory or graphite, silicon or other additive mixed sand.
Baking of mould and core inerts
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 surface grinding is done with flexible shaft grinders. The casting is then sand or shot blasted to maintain metal skin properties and finish.
Casting may machine as per customer drawing and heat treated before or after machining.
Surface treatments like pickling, passivating, mechanical &electro polishing, hot dip galvanizing may be carried out.
Final Inspection, Packing &Dispatch

7. 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

8. 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

9. 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

10. 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

11. 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

12. LIST OF MACHINERY REQUIRED:

Sr. No	Particulars	UOM	Quantity	Rate	Total Value
	Main Machines/ Equipment				
1	Medium Frequency Induction Melting Furnace 750 kg	Nos	1	3500000	3500000
2	Cooling tower, Water softening plant, heat exchanger	Nos	1	850000	850000
3	Molding Machines	Nos	3	250000	750000
4	Sand mixer, sieves etc.	Nos	1	150000	150000

Sr. No	Particulars	UOM	Quantity	Rate	Total Value
5	Core molding Machine	Nos	2	25000	50000
6	Sand reclamation System	Nos	1	200000	200000
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

13. 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

14. BREAKEVEN ANALYSIS

The project is can reach break-even capacity at 42.02 % of the installed capacity asdepicted herebelow:

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