Profile No.: 8 **NIC Code: 24319**

GREY IRON CASTINGS

1. INTRODUCTION:

The Grey Iron Casting is a type of cast iron that has a graphitic micro structure. It is named after the gray color of the micro structure with free graphite flakes it forms. Gray iron is a common engineering alloy because of its relatively low cost and good machinability, which results from the graphite lubricating the cut and breaking up the chips. It also has good galling and wear resistance because the graphite flakes self-lubricate. The graphite also gives gray iron an excellent damping capacity because it absorbs the energy and converts it into heat. It is the most common cast iron and the most widely used cast material.

2. PRODUCT & ITS APPLICATION:

Cast iron's properties are changed by adding various alloying elements. Silicon is the most important alloy element because it helps in forming free graphite. A low percentage of silicon allows carbon to remain in solution forming iron carbide and the production of white cast iron. A high percentage of silicon forces carbon out of solution forming graphite and the production of Grey cast iron. Other alloying agents are manganese, chromium, molybdenum, titanium and vanadium etc. that counteracts silicon, promotes the retention of carbon, and the formation of carbides in micro structure, thereby improving tensile strength, impact strength, wear and heat resistance, corrosion resistance etc. Nickel and copper increase strength, and machinability, but do not change the amount of graphite formed.

It has a number of desirable characteristics not possessed by any other metal and yet is among the cheapest of ferrous materials available to the engineer. Gray iron castings are readily available in nearly all industrial areas and can be produced in foundries representing comparatively modest investments.

It is used for machinery body and rotating machine housings where the stiffness of the component is more important than its tensile strength. Alloy gray iron is very popular for internal combustion engine cylinder blocks, pump housings, valve bodies, machine tools, heavy earth movers and stationary machinery. In addition it is suitable for electrical boxes and decorative castings due to its properties/ Grey cast iron's high thermal conductivity and specific heat capacity are often exploited to make cast iron cookware and disc brake rotors.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

Preferably metallurgical or mechanical engineer.

4. MARKET POTENTIAL AND MARKETING ISSUES. IF ANY:

Premium quality "Grey Iron Castings" are used widely for engineering products and components such as Industrial machines, castings for motor body, pulley casting, coupling casting, trolley casting, valves, valve actuators, pulleys, pumps, turbines, oil machinery, textile machinery, plastic machinery, mining and minerals crushers, agri machinery, motor covers, hubs and many others.

Some of the alloy added Grey iron castings are very widely used in automotive and heavy machines. In view of the wide application in industry, a good unit will have very good scope of developing products for existing and new applications for the consumers of these castings.

5. RAW MATERIAL REQUIREMENTS:

Main raw materials are pig iron, cast iron scarp and metallurgical coke. Other materials are alloying additives and molding adhesives like molasses graphite and silicon, manganese etc.

6. MANUFACTURING PROCESS:

Grey cast Iron castings are produced by melting pig iron and C.I. scrap in melting furnace. The molten metal is poured in dry sand molds. Castings are taken out of the mold after getting

cooled. After breaking the runner and risers castings are fettled properly. Pattern design and mold preparation is a very critical operation for gray iron casting and may have big impact on profitability of the project.

Sand casting, uses sand clay and binder mix to prepare mold for casting, various types of processes are available for sand mold preparation depending on the design and shape of casting, intricacy of shape and volume of production of the parts to be produced.

Green Sand casting and shell casting technology are two most popular sand casting processes. Green sand molding is the most economical method of producing castings and large castings of up to 500 kg per piece can be made in green sand. For the larger castings, the mold surfaces are sometimes sprayed with a graphite mix and skin is dried to produce a cleaner surface on the casting. This procedure is often used on engine blocks. To withstand the higher electrostatic pressures developed in pouring larger castings; dry sand molds are often used.

The shell molding process is also used for it has ability to get hard mold or core, improving the accuracy and finish of the casting. Centrifugal casting of gray iron in water-cooled metal molds is widely used by the cast iron pipe industry as well as for some other applications.

Raw castings undergo the process of cutting, grinding, shaving or sanding away these unwanted bits is called "fettling". Fettling can add significantly to the cost of the resulting product, and designers of molds seek to minimize it through the shape of the mold, the material being cast, and sometimes by including decorative elements. Theses castings may be machined for semi-finished component for supply to customer.

7. MANPOWER REQUIREMENT:

The unit shall require highly skilled service persons. The unit can start from 19 employees initially and increase to 49 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	7000	12	16	20	24	30
3	Supervisor/ Manager	30000	1	1	1	2	2
4	Accounts/ Marketing	16000	1	2	2	3	3
5	Other Staff	7000	1	1	2	2	2
	TOTAL		19	26	33	41	49

8. IMPLEMENTATION SCHEDULE:

The unit can be implemented within 6 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	2
4	Arrangement of Finance	2
5	Manpower Recruitment and start up	2
	Total Time Required (Activities run concurrently)	6

9. COST OF PROJECT:

The unit will require total project cost of Rs 148.69 lakhs as shown below:

Sr No	Particulars	In Lakhs
1	Land	15.00
2	Building	25.00
3	Plant and Machinery	36.59
4	Fixtures and Electrical Installation	4.80
5	Other Assets/ Preliminary and Preoperative Expenses	2.00
6	Margin for working Capital	65.30
	TOTAL PROJECT COST	148.69

10. MEANS OF FINANCE:

The project will require promoter to invest about Rs 86.14 lakhs and seek bank loans of Rs 62.54 lakhs based on 70% loan on fixed assets.

Sr No	Particulars	In Lakhs
1	Promoters Contribution	86.14
2	Loan Finance	62.54
	TOTAL:	148.69

11. WORKING CAPITAL REQUIREMENTS:

Working capital requirements are calculated as below:

Sr No	Particulars	Gross Amount	Margin %	Margin Amount	Bank Finance
1	Inventories	46.42	40	18.57	27.85
2	Receivables	50.49	50	25.25	25.25
3	Overheads	2.92	100	2.92	0.00
4	Creditors	46.42	40	18.57	27.85
	TOTAL	146.24		65.30	80.95

12. LIST OF MACHINERY REQUIRED:

Sr. No	Particulars	UOM	Quantity	Rate	Total Value
	Main Machines/ Equipment				
1	Metal Melting Furnace 1000 kg and 500 kg	Nos	2	750000	1500000
2	Molding Machines	Nos	6	100000	600000
3	Sand mixer, sieves etc.	Nos	1	80000	80000
4	Core molding Machine	Nos	2	40000	80000
5	Sand reclamation System	Nos	1	130000	130000

Sr. No	Particulars	UOM	Quantity	Rate	Total Value
6	Core Baking oven with burner/ temp control fan/ blower etc.	Nos	1	75000	75000
7	Ladle with heating system	Nos	2	30000	60000
8	Jib Crane	Nos	1	130000	130000
9	Shot blasting machine	Nos	1	175000	175000
10	Lathe Machine	Nos	3	75000	225000
11	Drilling Machine	Nos	1	50000	50000
12	Milling Machine	Nos	1	200000	200000
13	Mold Boxes and tools	LS	1	100000	100000
14	Bench/ Flexible shaft grinders	Nos	3	8000	24000
15	Metallurgical Microscope	Nos	1	80000	80000
16	Physical testing Lab	LS	1	150000	150000
17	Chemical Test Lab	LS	1	80000	80000
	Subtotal:				3429000
	Tools and Ancillaries				
1	Patterns tools and gauges	LS	1	150000	150000
2	Misc. tools etc.	LS	1	80000	80000
	Subtotal:				230000
	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	260000	260000
	Subtotal:				480000
	Other Assets/ Preliminary and Preoperative Expenses	LS	1	200000	200000
	TOTAL PLANT MACHINERY COST				4339000

13. PROFITABILITY CALCULATIONS:

Sr. No	Particulars	UOM	Year Wise estimates				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Capacity Utilization	%	40	50	60	70	80
2	Sales	Rs Lakhs	605.94	757.42	908.90	1060.39	1211.87
3	Raw Materials & Other Direct Inputs	Rs Lakhs	557.01	696.26	835.51	974.77	1114.02
4	Gross Margin	Rs Lakhs	48.93	61.16	73.39	85.62	97.85
5	Overheads Except Interest	Rs Lakhs	26.23	26.23	26.23	26.23	26.23
6	Interest	Rs Lakhs	8.76	8.76	8.76	8.76	8.76
7	Depreciation	Rs Lakhs	6.84	6.84	6.84	6.84	6.84
8	Net Profit Before Tax	Rs Lakhs	7.11	19.34	31.57	43.80	56.03

14. 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	1514.84
2	Variable Costs	Rs Lakhs	1392.52
3	Fixed Cost incl. Interest	Rs Lakhs	41.82
4	Break Even Capacity	% of Inst Capacity	34.19