Manufacturing of S.G. Iron Castings

<table>
<thead>
<tr>
<th>PRODUCT CODE</th>
<th>: 33115000</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALITY AND STANDARDS</td>
<td>: 1. BIS 1865:1974</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. BIS 5789:1970 S.G. Iron Castings for low temperature applications</td>
</tr>
<tr>
<td></td>
<td>3. BIS 5788:1970 S.G. Iron Castings for use at elevated temperature applications</td>
</tr>
<tr>
<td>PRODUCTION CAPACITY</td>
<td>: Quantity : 300 MT (per annum)</td>
</tr>
<tr>
<td></td>
<td>Value : Rs. 2,10,50,000</td>
</tr>
<tr>
<td>MONTH AND YEAR</td>
<td>: September, 2002</td>
</tr>
<tr>
<td>OF PREPARATION</td>
<td>: Branch Small Industries Service Institute</td>
</tr>
<tr>
<td>PREPARED BY</td>
<td>Industrial Estate, Jammu–180 010.</td>
</tr>
<tr>
<td>UPDATED ON</td>
<td>: March 2011</td>
</tr>
<tr>
<td>UPDATED BY</td>
<td>: MSME-DI, Thrissur.</td>
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</tbody>
</table>

**INTRODUCTION**

The present project profile envisages the production of S.G. Iron Castings of various shapes and sizes having weight between 50 gm. to 12 kg. in Medium frequency induction furnace. S.G. Iron Castings are extensively used because of their high strength, ductility, shock as well as wear resistance properties and easy machinability.

**MARKET POTENTIAL**

S.G. Iron possesses greater tensile strength, machinability than ordinary cast iron and also has a considerable measure of ductility, resistance to impact comparable to that of steel and low cost involved that justifies it as the metal of future. Due to economic reforms based upon principle of liberalization, globalization, privatization and changes at international economy including the emergence of WTO global and domestic challenges, the demand for components of S.G. Iron particularly in automobile sector is likely to increase manifold not only for domestic consumption but also for export purpose. Since small-scale sector accounts for 40% of gross value of output in the manufacturing sector and 35% of total exports from the country, this industry has great scope.

**BASIS AND PRESUMPTIONS**

1. All machinery and equipments are indigenously available.
2. Prices of machinery and equipment as included in the profile are of particular make and will change with the make and model of actual machine procured.
3. Prices of Raw Material, and others are those ruling at the time of preparation of this project profile.
4. Break-even Point has been calculated on full capacity utilization basis.
5. 5% irrecoverable melting loss has been considered. Rejection of runners and risers will be recycled.
6. Pay back period of 3 years had been considered after 1½ years of moratorium period.
7. The scheme is based on single shift of 8 hours at 75% efficiency assuming 300 working days in a year.
8. It is presumed that capacity utilization will be 60% in the 1st year, 70% in the second year and 80% in the subsequent years.
9. The rate taken in respect of salaries and wages for skilled workers and others are the prevailing rates in the State.
10. The interest rate for fixed and working capital has been assumed @18% on an Average whether financed by Bankers or by Financial Institutions.
11. Margin money required is minimum 30% of the projected investment.
12. The rental value of the work shed and other built up/covered area has been taken on the basis of that prevailing in the area.

**IMPLEMENTATION SCHEDULE**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Activity</th>
<th>Period (in Weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Selection of Site</td>
<td>01–02 weeks</td>
</tr>
<tr>
<td>ii.</td>
<td>Preparation of Project Report</td>
<td>06–08 weeks</td>
</tr>
<tr>
<td>iii.</td>
<td>Provisional Registration</td>
<td>00–01 week</td>
</tr>
<tr>
<td>iv.</td>
<td>Financial Arrangements</td>
<td>12–16 weeks</td>
</tr>
<tr>
<td>v.</td>
<td>Procurement of Machinery Electrification</td>
<td>12–16 weeks</td>
</tr>
<tr>
<td>vi.</td>
<td>Installation and Electrification</td>
<td>08–12 weeks</td>
</tr>
</tbody>
</table>

The above-mentioned schedule maybe considered as guideline only. It can best be implemented in a period of 12 to 15 months by performing some common activities simultaneously with proper and systematic planning.

**TECHNICAL ASPECTS**

**Process of Manufacture**

S.G Iron is a high carbon ferrous material with graphite in the spheroidal form achieved with a small amount of magnesium and therefore the name derived. To make S.G. Iron, mild steel scrap, Fe-Si, Coke etc. is melted in induction furnace. Once the melt is ready, it is inoculated with small addition of Magnesium or Chromium available in Ferro blends. The metal is then poured into moulds, cooled and fettled. The total carbon remains as spheroid in as-cast condition but if required, it may further be annealed to achieve the desired properties.

**Quality Control and Standards**

a. As per BIS: 1865-1974.
Production Capacity
300 MT (as cast) per annum

Motive Power
350 KW.

Pollution Control

Foundry industry produces heat, gases, dust, noise and a large quantity of wastes such as irreclaimable sands, ashes and slags. These individual elements have considerable effect on environmental degradation and cause conditions unsuitable for human health. So it requires getting NOC from the State Pollution Control Board.

In order to minimize the level of above pollution, the Government provides information on related acts from time to time. The pollution can also be reduced by installing number of low cost equipments meant for foundry.

Energy Conservation

It can effectively be achieved by:
(a) Energy audit
(b) Better combustion system
(c) Use of lubricant and proper maintenance of the machines.

Financial Aspects

A. Fixed Capital

(i) Land and Building (Rs.)
   i. Land 1500 sq. mtrs. 4,50,000
      @ Rs. 300/ Sq. mtr.
   ii. Building
       Office / Laboratory 300 sq. mtr. 3,60,000
          @ Rs.1200/ sq. mtr.
       Factory shop floor 1000 sq. mtrs. 7,50,000
          @ Rs. 750/ sq. mtr.
       Total 15,60,000
### (ii) Machinery and Equipment

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Amount (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>200 KG medium frequency Induction melting Furnace with interchangeable crucibles, with Input voltage adjust transformer and solid state Inverter power pack output 325-375 KW and two way change over switch with hydraulic power pack arrangement for lifting of crucible</td>
<td>1</td>
<td>25,00,000</td>
</tr>
<tr>
<td>2.</td>
<td>One overhead tank, one underground Water tank pipelines with cooling towers</td>
<td>1</td>
<td>3,00,000</td>
</tr>
<tr>
<td>3.</td>
<td>Water Softening Plant</td>
<td>1</td>
<td>1,50,000</td>
</tr>
<tr>
<td>4.</td>
<td>Plate Type Heat Exchanger</td>
<td>1</td>
<td>1,50,000</td>
</tr>
<tr>
<td>5.</td>
<td>Immersion Pyrometer</td>
<td>1</td>
<td>40,000</td>
</tr>
<tr>
<td>6.</td>
<td>Air Compressor (7.5 HP)</td>
<td>1</td>
<td>1,50,000</td>
</tr>
<tr>
<td>7.</td>
<td>EOT Crane (1.5 Ton Capacity)</td>
<td>1</td>
<td>2,00,000</td>
</tr>
<tr>
<td>8.</td>
<td>Grinders (flexible shaft)</td>
<td>2</td>
<td>1,50,000</td>
</tr>
<tr>
<td>9.</td>
<td>Grinders (swing frame type)</td>
<td>2</td>
<td>1,50,000</td>
</tr>
<tr>
<td>10.</td>
<td>Platform Weighing Scale</td>
<td>1</td>
<td>1,00,000</td>
</tr>
<tr>
<td>11.</td>
<td>Transformer, cables and cost of Power connection</td>
<td>1</td>
<td>5,00,000</td>
</tr>
<tr>
<td>12.</td>
<td>D.G. set (60 KVA)</td>
<td>1</td>
<td>1,00,000</td>
</tr>
<tr>
<td>13.</td>
<td>Hand operated Moulding machine</td>
<td>1</td>
<td>1,00,000</td>
</tr>
<tr>
<td>14.</td>
<td>Sand Mixer, 250 kg batch with 7.5 HP motor and accessories</td>
<td>1</td>
<td>1,00,000</td>
</tr>
<tr>
<td>15.</td>
<td>Heat Treatment Furnace (2.5 mtr.×1.5 mtr.×1.5 mtr.)</td>
<td>1</td>
<td>1,50,000</td>
</tr>
<tr>
<td>16.</td>
<td>Core and mould drying oven, Oil fired provided with Blower, Burner etc.</td>
<td>1</td>
<td>75,000</td>
</tr>
<tr>
<td>17.</td>
<td>Fettling and Cutting Tools (Mechanised)</td>
<td>LS</td>
<td>50,000</td>
</tr>
<tr>
<td>18.</td>
<td>Chemical laboratory equipment for routine testing [UTM, C-S apparatus, Ultrasonic Magnetic Detector etc.]</td>
<td>LS</td>
<td>4,50,000</td>
</tr>
<tr>
<td>19.</td>
<td>Sieving Machine with sieves and 15 HP motor</td>
<td>1</td>
<td>60,000</td>
</tr>
<tr>
<td>20.</td>
<td>Material Handling Equipment</td>
<td>LS</td>
<td>20,000</td>
</tr>
</tbody>
</table>

**Total 54,95,000**

21 Electrification and installation charge @ 10% of the cost of machinery and equipment: 5,49,500

22. Cost of Moulds and Foundry Tools: LS 1,00,000

23. Patterns: LS 50,000

24. Cost of Office Equipment: LS 2,50,000

25. Pre-operative Expenses: LS 75,000
Grand Total 65,69,500

B. Working Capital (per month)

(i) Personnel

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Designation</th>
<th>Qty.</th>
<th>Salary (In Rs.)</th>
<th>Amount (In Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Metallurgist</td>
<td>01</td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>2</td>
<td>Melter</td>
<td>01</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>3</td>
<td>Foreman</td>
<td>01</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>4</td>
<td>Chemist</td>
<td>01</td>
<td>8,000</td>
<td>8,000</td>
</tr>
<tr>
<td>5</td>
<td>Clerk/Typist</td>
<td>01</td>
<td>7,000</td>
<td>7,000</td>
</tr>
<tr>
<td>6</td>
<td>Store-Keeper</td>
<td>01</td>
<td>6,000</td>
<td>6,000</td>
</tr>
<tr>
<td>7</td>
<td>Furnace Operator</td>
<td>01</td>
<td>10,000</td>
<td>10,000</td>
</tr>
<tr>
<td>8</td>
<td>Skilled Workers</td>
<td>04</td>
<td>8,000</td>
<td>32,000</td>
</tr>
<tr>
<td>9</td>
<td>Unskilled Workers</td>
<td>02</td>
<td>5,000</td>
<td>10,000</td>
</tr>
<tr>
<td>10</td>
<td>Peon</td>
<td>01</td>
<td>4,500</td>
<td>4,500</td>
</tr>
<tr>
<td>11</td>
<td>Chowkidar</td>
<td>01</td>
<td>4,000</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Total 1,21,000

Perquisites @ 15% 18,150

G. Total 1,39,150

Say 140,000

(ii) Raw Materials (Indigenous) (Rs.)

1. Mild Steel scrap 5 MT @ Rate Rs. 23,000 per MT 1,15,000
2. Pig Iron 15 MT @ Rate Rs. 34000 per MT 5,10,000
3. Ferro Alloys [Fe-Si, Fe-Mg etc.] 40,000
   0.5MT @ Rs. 80,000 per MT
4. Refractory such as hot top and crucible linings and Ramming Mass (Mgo) etc. LS 25,000
5. Moulding sand, binder and other materials LS 15,000
6. Packaging materials LS 5,000

Total 7,10,000

(iii) Utilities (Rs.)

1. Power 25,000 Unit @ Rs. 6.5 per unit, 1,62,500
2. Water Charges (Lump sum) 10,000
3. Furnace Oil [1000 litres @ Rs. 30/Litre] 30,000
4. Diesel [500 litres @ Rs. 40/Litre] 20,000

Total 2,22,500
(iv) Other Contingent Expenses (Rs.)
1. Postage 2,000
2. Telephone 10,000
3. Consumable stores like chemicals, oil for hydraulic power pack grinding wheel etc. 15,000
4. Repair and maintenance 7,000
5. Advertisement and publicity 15,000
6. Insurance 10,000
7. Miscellaneous 10,000
Total 69,000

(v) Total Recurring Expenses (Rs.)

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary and Wages</td>
<td>140,000</td>
</tr>
<tr>
<td>Raw Materials</td>
<td>7,10,000</td>
</tr>
<tr>
<td>Utilities</td>
<td>2,22,500</td>
</tr>
<tr>
<td>Other Contingent Expenses</td>
<td>69,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,41,500</strong></td>
</tr>
</tbody>
</table>

(vi) Total Working Capital (for 3 months)

11,41,500 × 3 = Rs. 34,24,500

C. Total Capital Investment
(i) Land and Building Rs. 15,60,000
(ii) Machinery and Equipment Rs. 65,69,500
(iii) Working Capital (for 3 months) Rs. 34,24,500
Total Rs. 1,15,54,000

FINANCIAL ANALYSIS

1. Cost of Production (per annum) (Rs.)
   a. Total recurring expenditure 1,36,98,000
   b. Depreciation on Building @ 5% 585,900
   c. Depreciation on machinery and equipment @ 10% 2,77,000
   d. Depreciation on Furnaces @ 30% 8,17,500
   e. Depreciation on Moulds and Tools, Patterns @ 30% 45,000
   f. Depreciation on office equipment @ 20% 50,000
   g. Interest on total investment @ 18% 19,90,620
   Total 1,74,63,520

(2) Total Sales (per annum)
   by sale of S.G. Iron Castings 300 MT @ Rs. 70,000 per MT Rs. 2,10,50,000

(3) Profitability (per annum)
   Annual Sales – Cost of Production = Net Profit [Before Tax]
   Rs. 2,10,50,000 – 1,74,63,520 = Rs. 35,86,480

(4) Net Profit Ratio
Net Profit \times 100 &= 35,86,480 \times 100 \\
\text{Turnover per year} &\quad = 2,10,50,000 \\
&\quad = 17.03\% \\

(5) \textbf{Rate of Return} \\
Net Profit \times 100 &= 35,86,480 \times 100 \\
Total Investment &\quad = 1,15,54,000 \\
&\quad = 31.04\% \\

(6) \textbf{Break-even Point} \\
\textbf{Fixed Cost (per annum) (Rs.)} \\
i. Total Depreciation 17,74,000 \\
ii. Interest on total investment @ 18% 19,90,620 \\
iii. Insurance 120,000 \\
v. 40 \% of Contingent and utility expenses (Excluding Insurance) 13,51,200 \\
iv. 40 \% of salary and wages 6,72,000 \\
\text{Total} 57,87,820 \\

\textbf{B.E.P.} \\
= \frac{\text{Fixed Cost \times 100}}{\text{Fixed Cost + Profit}} \\
= \frac{57,87,820 \times 100}{57,87,820 + 35,86,480} \\
= 61.74\%
Addresses of Machinery Suppliers

1. M/s. Inductotherm (India) Ltd.
   Shri Kishorebhai D. Vyas Building,
   Bopal, Ahmedabad 380 058
   Gujarat, India  Phone : 91-2717-231961 (8 lines)
   Fax: 91-2717-231266
   E-mail : iil@inductothermindia.com
   Web-Site : www.inductothermindia.com
   Ahmedabad.

2. M/s. Electrotherm (India) Ltd.
   Survey No. 72,
   Village : Palodia, Taluka : Kalol,
   Dist. : Gandhinagar - 382 115
   Gujarat, India.
   Phone : +91-2717-234554, 660550
   Fax : +91-2717-237612, 234616
   Email : ho@electrotherm.com

   Bharat House, 5th Floor,
   104, Bombay Samachar Marg,
   Fort, Mumbai - 400 001
   Phone: +91 (22) 6637 8200
   Fax: +91 (22) 2267 5601
   Email : info@batliboi.com
   Website : www.batliboi.com

Addresses of Raw Material Suppliers

Locally available.

Ferro-Alloys and Other Consumable Stores

Locally available.