Heat Treatment Servicing Unit

QUALITY AND STANDARDS : IS EN and I.S. (as per the metal Specification)

MONTH AND YEAR OF PREPARATION : December, 2002

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INTRODUCTION

Heat Treatment is a term used for hardening and tempering of Metal components/Mechanical products of Ferrous and Non-Ferrous origin to increase the life or mechanical properties. Steel in general, supplied in annealed conditions having hardness between 140 to 280 BHN depending on the percentage of alloying elements which facilitate further mechanical operations. 15%–20% of the steel produced is tool steel which will be the raw material for manufacturing of gears, fixtures, shafts, cutting tools, blades and many more products. If these products are used in soft conditions, it will be worn out in a short period. Hence such products are to be hardened and tempered. Heat Treatment is a general term which consists of processes like Hardening, Tempering, Annealing and Case Hardening etc.

MARKET POTENTIAL

Demand in the market mainly arises from:
1. Defence
2. Railways
3. Automobile
4. Ball & Roller Bearings
5. General Engineering
6. Fasteners and Hardware
7. Machine Tools.

The demand in the above areas again depends upon the primary market, i.e., replacement market and substitution market. Most of the general engineering units in SSI Sector offload the Heat Treatment jobs to servicing units because they may not have enough capital for an independent Heat Treatment section.

BASIS AND PRESUMPTIONS

The profile is worked out on the basis of following presumptions:

1. Working hours/shift 8 hrs/day
2. No. of shift/day Single

3. No. of working days/annum 300 days
4. Efficiency of the plant 75%
5. Time for achieving max. two years from capacity the date of Commencement of production
6. Labour charges as per the Minimum Wages Act of the State Govt.
7. Margin Money 25%
8. Rate of Interest 14% per annum
9. Pay back period 5 years
10. Land and Building On Rent
11. The cost of machinery and equipment is on the basis of prevailing market rates
12. The selling rates are calculated 1% lower than the present market rates to facilitate competition and credit period.

IMPLEMENTATION SCHEDULE

The major activities and their implementation schedule are furnished below. The assessment of the time required for implementation of the project has been considered and counted from the date of sanction of the loan.

Activity Period in Days

1. Preparation of scheme and SSI Provisional Registration	15 days
2. Financial arrangements	60 days
3. Procurement of M/c & Installation	60 days
4. Power and water connection	30 days
5. Infrastructure and communication	30 days

All these activities are to be carried out simultaneously. The commencement of production should be within 3 months.

TECHNICAL ASPECTS

Process of Manufacture

The Heat Treatment processes involve a series of operations, mainly:

1. Hardening (which follows Tempering)
2. Annealing/Normalizing/Stress relieving
3. Carburising/Case Hardening All Direct hardening materials are heated in the muffle furnace. The material is heated to the pre-determined temperature and the required soaking time is given. Then it is rapidly cooled in water, oil or air. Then it should be tempered at low temperature to remove the stresses developed inside. Direct hardening and case hardening process can be carried out in salt bath furnace also which is more productive and with 100% prevention of oxidation. In this process, jobs are to be preheated compulsorily, as the jobs are put into the furnace at higher temperature. The hardening and tempering procedures are the same as mentioned earlier. The salt bath should have cynide salt of 18% to 20% concentration.

Quality Control and Standards

1. NDT Test for crack/flaw defects.
2. Microscopic test for structure.
3. Hardness Testing in RA, RB, RC and BHN which are faster and sure for Metal

condition. Quality Standards conform to IS and EN Standards.

Production Capacity (per annum)
Quantity : 65 M.T.
Value : Rs.26,00,000

Motive Power 30 H.P. 22.5 kW

Pollution Control
The work shed should be well ventilated with exhaust fans. Disposable waste salt, acids etc. should be treated before disposed off. Smoke from the chimney can be controlled effectively by monitoring furnace oil flow by using LDO.

Energy Conservation
Waste gases from the salt bath can be routed to pre-heating chamber which is an option.

FINANCIAL ASPECTS

A. Fixed Capital

(i) Land and Building Rent	**(Rs. per month)**
Covered Area (for office, 400sq.ft. store, work place)@ Rs.25/sq.ft.	20,000
	Total 20,000

(ii) Machinery and Equipments

Sl. No.	**Description**	**Indigenous/ Imported**	**Qty**	**Rate (In Rs.)**	**Amount (In Rs.)**
1.	Electrical muffle furnace, 600×300× 300 mm with automatic Temp. Control, panel board, max. temp. 1000O 24 KW	Indigenous	1 No.	1, 52,000	1, 52,000
2.	Air circulating Tempering furnace with temp control, panel board, Max.power.18 KW	-do-	1 No.	2,10,000	2,10,000
3.	Oil fired salt bath furnace 2 HP Motorised, blower 2800 RPM, Pot size 450 × 600 mm, LAP-1 Burner Temp. indicator, Max temp. 1000ºC	- do -	1 No.	4,18,000	4,18,000
4.	Hardness testing m/c 150 kg. Load, reading of RA, RB and RC with 120O iron ball and 2 & 5 mm dia steel ball indentors	- do -	1 No.	61,000	61,000
5.	Pre-heating chamber for salt bath furnace	-do-	1No.	1,10,000	110,000
6.	Quenching tanks 1Mx0.75 Mx1 M	- do -	4 Nos.	10,000	40,000
7.	1 MT capacity chain pulley block with tripoy	- do -	1 No.	20,000	20,000
8.	Platform type trolleys	- do -	2 Nos.	3,000	6,000
9.	Hand tools	- do -	L.S.		10,000
10.	Power tools	- do -	L.S. -		20,000
11.	Handling tools	- do -	LS. -		10,000
12.	Weighing M/c platform type 200 kg	- do -	1 No.	20,000	20,000
13.	Fire fighting equipment	- do -	LS -		15,000
				Total 10,92,000	
14.	Office and workshop furniture and equipment				40,000
15.	Erection and Electrification				80,000

16. Pre-operative cost, deposits, statutory formalities 50,000

Grand Total 12,62,000

HEAT TREATMENT SERVICING UNIT

B. Working Capital (per month)

(i) Raw Materials (per month)

One time raw materials such as Neutral salt, cyanide and quenching oils are required for initial filling.

Sl. No.	**Description of stores**	**Indigenous**	**Qty.**	**Rate (In Rs.)**	**Amount (In Rs.)**
1.	Natural Salt	Indigenous	100 kg	15/kg	1,500
2.	Cyanide Salt	-do-	150 kg	110/kg	16,500
3.	Barium carbonate	-do-	50 kg	26/kg	1300
4.	Quenching oil	-do-	4 Barrel	24000	72,000
			(one time investment)		**91,300**

(ii) Personnel

Administrative and Workshop

Sl. No.	**Designation**	**Nos.**	**Salary (In Rs.)**	**Amount (In Rs.)**
1.	Manager	1	15,000	15,000
2.	Supervisor	1	10,000	10,000
3.	Clerk	2	6,000	6,000
4.	Skilled Workers	2	7,000	14000
5.	Unskilled Workers	6	4,000	24,000
6.	Watch & Ward	2	4000	8,000
				Total 77,000

Perquisites @ 15% 11,550

Total 88,550

(iii) Other Contingent Expenses (per month)	**(In Rs.)**
1. Rent	20,000
2. Stationery, Postage, Telephone	3,000
3. Electricity and Water	8,500
4. Transport and Conveyance	3,000
5. Maintenance and Repairs	2500
6. Consumable Stores	4,000
7. Tax	750
8. Miscellaneous	4,000
Total	**45,750**

(iv) Working Capital (per month)	**(Rs.)**
1. Raw materials (one time investment)	91,300
2. Salaries and Wages	77,000
3. Other Contingent Expenditure	45,750
Total	**2,14,050**

(v) Working Capital (for 3 months) **(Rs.)**

Working Capital

for 3 months = (2,14,050–91,300)×3+91,300 = **4,59,550**

C. Total Capital Investment

a.Fixed Capital Rs. **12,62,000**

b.Working Capital for 3 months Rs. **4,59,550**

Total Rs.17,21,550

FINANCIAL ANALYSIS

(1) Cost of Production (per annum)	**(Rs.)**
a) Recurring Expenses (2,14,050–91,300)×12+91,300	15,64,300
b) Depreciation on Machinery @ 10%	109200
c) Depreciation on Office Equipment @20%	8,000
b) Interest on Capital @ 14%	2,41,017
	Total 19,22,517
	Say 19,25,000

(2) Turnover (per annum)

Sl. No.	**Activity Job**	**Qty./ Kg.**	**Rate (In Rs.)**	**Amount (In Rs.)**
1	By executing direct hardening	15 MT	35	5,25,000
2	Case Hardening jobs	30 MT	45	13,50,000
3	Annealing/ Normalising	5 MT	25	1,25,000
4	Special Steels	15 MT	40	6,00,000
				Total 26,00,000

(3) Profitability (per annum)

Rs. **26,00,000**– **19,25,000** = **Rs. 6,75,000**

(4) Net Profit Ratio = $\frac{\text{Net Profit per year}\times 100}{\text{Sales per annum}} = \frac{6,75,000\times 100}{26,00,000}$

= **25.96%**

(5) Rate of Return = $\frac{\text{Net Profit per year} \times 100}{\text{Total Capital Investment}} = \frac{6,75,000\times 100}{17,21,550}$

= **39.20%**

(6) Break-even Point

Fixed Cost (per annum)	**(Rs.)**
1. Rent	2,40,000
2. Interest on Investment	2,41,017
3. Depreciation on machinery and Office Equipment	117,200
4. 40% of Salaries/Wages	4,25,040
5. 40% of other expenses excluding rent	1,23,600
	Total 11,46,857
	Say 11,47,000

B.E.P. = $\frac{\text{Fixed cost} \times 100}{\text{Fixed cost + Net Profit}} = \frac{11,47,000\times 100}{11,47,000 +. 6,75,000}$

= **62.9%**

Addresses of Machinery Suppliers

1. M/s. Hindustan Furnaces Pvt. Ltd.
   Viyur, Thrissur-680 010
   Kerala.
2. M/s. Amur Instrumentation
   Amala Nagar P.O.,
   Thrissur-680 550
   Kerala.
3. M/s. High Temp. Furnaces Pvt. Ltd.
   1-C II Phase, Peenya I.A.,
   P. B. No. 5809
   Bangalore-560 058
4. M/s. Metatherm Furnaces Pvt. Ltd.
   W-91, MIDC, I.A., Belapur Road,
   Thana-400 701.

For Testing M/C

5. M/s. Inspection Instruments Corpn.
   7, Sherif Douj Street,
   Zakaria Bldg.,
   Mumbai-400 003
6. M/s. Fuel Instrument and
   Engineers Pvt. Ltd.
   Ichalkaranchi,
   (Maharashtra)
7. M/s. Blue Steel Engineers Pvt. Ltd.
   Blue Steel House, D-12 MIDC,
   Marol Ambhri (East),
   Mumbai-400 073

For Quenching Oil, LDO and Furnace Oil

8. M/s. Indian Oil Corporation

For Sodium Cyanide Salt

9. Local Chemical Dealers