12

Heat Treatment Servicing Unit

PRODUCT CODE	:	344020002
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. capacity	Two years from 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.12,30,000

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, store, work place) @ Rs.25/sq.ft.	400sq.ft.	10,000
	Total	**10,000**

(ii) Machinery and Equipments

Sl. No.	Description	Indigenous/ Imported	Quantity	Rate (In Rs.)	Amount (In Rs.)
1.	Electrical muffle furnace, 600×300×300 mm with automatic Temp. Control, panel board, max. temp. 1000° 24 KW	Indigenous	1 No.	56,500	56,500
2.	Air circulating Tempering furnace with temp control, panel board, Max.temp. 18 KW	- do -	1 No.	1,11,000	1,11,000
3.	Oil fired salt bath furnace 2 HP Motorised blower, 2800 RPM, Pot size 450 × 600 mm LAP-1 Burner, Temp. indicator, Max. temp. 1000°C	- do -	1 No.	2,08,000	2,08,000
4.	Hardness testing m/c 150 kg. Load, reading of RA, RB and RC with 120° iron ball and 2 & 5 mm dia steel ball indentors	- do -	1 No.	21,000	21,000
5.	Pre-heating chamber for salt bath furnace	-do-	1 No.	65,000	65,000
6.	Quenching tanks 1Mx0.75 Mx1 M	- do -	4 Nos.	6,000	24,000
7.	1 MT capacity chain pulley block with tripoy	- do -	1 No.	8,000	8,000
8.	Platform type trolleys	- do -	2 Nos.	1,500	3,000
9.	Hand tools	- do -	L.S.	-	5,000
10.	Power tools	- do -	L.S.	-	10,000
11.	Handling tools	- do -	LS.	-	5,000
12.	Weighing M/c platform type 200 kg	- do -	1 No.	8,000	8,000
13.	Fire fighting equipment	- do -	LS	-	6,000
			Total		**5,30,500**
14.	Office and workshop furniture and equipment				18,000
15.	Erection and Electrification				30,000
16.	Pre-operative cost, deposits, statutory formalities				25,000
			Grand Total		**6,03,500**

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	65/kg	9,750
3.	Barium carbonate	-do-	50 kg	12/kg	600
4.	Quenching oil	-do-	4 Barrel	8000	32,000
				(one time investment)	43,850

(ii) Personnel

Administrative and Workshop

Sl. No.	Designation	Nos.	Salary (In Rs.)	Amount (In Rs.)
1.	Manager	1	5,000	5,000
2.	Supervisor	1	4,000	4,000
3.	Clerk	2	2,000	4,000
4.	Skilled Workers	2	2,500	5,000
5.	Unskilled Workers	6	1,000	6,000
6.	Watch & Ward	2	800	1,600
		Total		**25,600**
	Perquisites @ 15%			3,840
		Total		**29,440**

(iii) Other Contingent Expenses (per month)	(In Rs.)
1. Rent	10,000
2. Stationery, Postage, Telephone	1,000
3. Electricity and Water	3,500
4. Transport and Conveyance	1,000
5. Maintenance and Repairs	500
6. Consumable Stores	1,000
7. Tax	250
8. Miscellaneous	1,000
Total	**18,250**

(iv) Working Capital (per month)	(Rs.)
1. Raw materials (one time investment)	43,850
2. Salaries and Wages	29,440
3. Other Contingent Expenditure	18,250
Total	**91,540**

(v) Working Capital (for 3 months)	(Rs.)
Working Capital for 3 months	= (91,540–43,850)×3+43,850
	= **1,86,920**

C. Total Capital Investment

a. Fixed Capital	Rs. 6,03,500
b. Working Capital for 3 months	Rs. 1,86,920
Total	**Rs. 7,90,420**
Say	**Rs. 8,00,000**

FINANCIAL ANALYSIS

(1) Cost of Production (per annum)	(Rs.)
a) Recurring Expenses (91,540–43,850)×12+43,850	6,16,130
b) Depreciation on Machinery @ 10%	53,050
c) Depreciation on Office Equipment @20%	3,600
b) Interest on Capital @ 14%	1,12,000
Total	**7,84,780**
Say	**7,85,000**

(2) Turnover (per annum)

Sl. No.	Activity Job	Qty./ Kg.	Rate (In Rs.)	Amount (In Rs.)
1	By executing direct hardening	15 MT	15	2,25,000
2	Case Hardening jobs	30 MT	22	6,60,000
3	Annealing/ Normalising	5 MT	15	75,000
4	Special Steels	15 MT	18	2,70,000
		Total		**12,30,000**

(3) Profitability (per annum)

Rs. 12,30,000 – 7,85,000 = **Rs. 4,45,000**

(4) Net Profit Ratio = $\frac{\text{Net Profit per year} \times 100}{\text{Sales per annum}}$

= $\frac{4,45,000 \times 100}{12,30,000}$

= **36.18%**

(5) Rate of Return = $\frac{\text{Net Profit per year} \times 100}{\text{Total Capital Investment}}$

= $\frac{4,45,000 \times 100}{7,90,420}$

= **56%**

(6) Break-even Point

Fixed Cost (per annum)		**(Rs.)**
1. Rent		1,20,000
2. Interest on Investment		1,12,000
3. Depreciation on machinery and Office Equipment		53,050
4. 40% of Salaries/Wages		1,41,312
5. 40% of other expenses excluding rent		39,600
	Total	**4,65,962**
	Say	**4,66,000**

B.E.P. = $\frac{\text{Fixed cost} \times 100}{\text{Fixed cost + Net Profit}}$

= $\frac{4,66,000 \times 100}{4,66,000+4,45,000}$

= **51%**

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
8. M/s. Indian Oil Corporation
   For Quenching Oil, LDO and Furnace Oil
9. Local Chemical Dealers
   For Sodium Cyanide Salt