PROJECT PROFILE
ON
HEAT TREATMENT OF REAR AXLE SHAFT

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Name of the Project	:	Heat Treatment of Rear Axle Shaft
Annual Production Capacity	:	180 MT per Annum
Quality specification	:	As per Market Demand
Year of Preparation	:	2012-13
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1. INTRODUCTION :

Rear Axle shaft is one of the typical component for automobile industries and special heat treatment process are employed for this item. Applying special heat treatment process required mechanical properties are imparted in the component to increase utility & work life of the shaft.

2. MARKET :

There are good number of Automobile Industry as well as auto workshop units in the country which require heat treatment services of their products and components keeping the point in view there is a wide scope of establishing heat treatment unit specially for auto shafts to be used in any kind of subassemblies for auto industries , which requires to be heat treated in order to increase quality and work life of the product.

3. BASIC AND PRESUMPTION :

This project has been prepared on the basis of the following presumptions :

1. Working hour per day : 8 Hrs. per shift and 300 working days per year.
2. Time period for achieving full capacity utilization : 3 Yrs.
3. Labour wages : As per local market value or otherwise as per minimum wages act.
4. Margin money : 20% of the total investment.
5. Land cost & construction of sheds : Leased from IADA or on rent.
6. Cost of machines & equipments : Based on indigenous market price.
7. Grant from Central Governments : Based on govt. policy.

4. IMPLEMENTATION SHEDULE :

1. Preparation of detailed project report	- 1 Month
2. Provisional registration	- ½ Month
3. Sanction of Term Loan	- 1 Month
4. Acquisition of Land	- ½ Month
5. Civil Construction	- 1 Month
6. Procurement of machine and equipment	- 1 ½ Month

7. Arrangement of utilizes	- ½ Month
8. Procurement of raw materials	- ½ Month
9. Erection, installment and electrification	- 1.5 Month
10. Recruitment of staff	- ¼ Month
11. Commission of train run	- ¼ Month
12. Commercial production	- ¼ Month

5. TECHNICAL ASPECTS :

Heat treatment process involve a series of operation such as Normalizing Annealing, Hardening, Tempering, Case-hardening etc. depending upon metal composition and requirement of mechanical properties to be imparted in the component. The jobs are tested before heat treatment processes in order to select right heat treatment cycle. At the same time it is tested after heat treatment operations in order to control mechanical properties of the components required to impart in it.

In case of rear axle shaft the forging blanks are taken in normalized form the normalized blanks are machined with closed grinding tolerances. The machined shafts are then taken for heat treatment. The shaft is primarily case hardened and then oil quenched in quenching tank from Ac3 Temperature. Quenched shafts are tempered, washed, straightened and finally grinded for final uses.

6. QUALITY SPECIFICATIONS :

Heat treatment servicing units normally undertake jobbing work. As per the requirement of the customer and standard provided by the customer, a heat treatment cycles processing charts i.e. prepared, jobs are allowed to go through the process After completion of the process final inspection as per the standard given are made. Necessary rectification in cycle is made if required in order to maintain the standard.

So far as heat treatment tastings are concerned in case of shafts; case depth, hardness tensile strength, toughness & straightness are main points to consider.

7. PRODUCTION CAPACITY :

Heat treatment of Auto Shaft : 300 MT per annum at 100 % capacity utilization &
: 180 MT per annum at 60 % capacity utilization

8. POLLUTION CONTROL :

Heat treatment industry has a share in the present environmental degradation. So it requires NOC from Pollution Control Board of the State. Heat treatment Industry depending on the character of the production is a great source of heat, toxic gases, dust and noise. It also produces a large quantity of wastes such as irreclaimable ashes and scales. These all elements have individual contributory affect on the environmental degradation and causes unhealthy and unsafe conditions within the unit or surroundings. The important consideration to prevent pollution is the right choice of appropriate technologies to be adopted and correct installation of instruments and machinery.

There are mainly two methods for control of pollution in a small Industrial units :

1. By Exploiting Metrological and Topographical Conditions :

For small unit, the exploitation of natural draughts and climate conditions are best cheapest methods for dispersion of chimney emissions. Use of equipment like gas scrubbers, ventilation fans, washers etc require considerable capital investment and also in value running expenses.

2. By using various equipments for cleaning and dispersion of heat treatment emissions :

Use of high stack chimney and operating the unit at a time of favorable natural draught through chimney, helps to successfully disperse the dust and gases emitted from the unit at zero or negligible cost. Proper treatment and handling of the raw material also reduces the emission contents, particularly dust. Use of simple measures like removal of dust from the furnace charge, use of oil of proper strength with appropriate air blast will also help to a great extent.

10. ENERGY CONSERVATION :

It has become essential these days that the energy conservation efforts are needed to be strengthened substantially. The energy audit is an integral part of an energy conservation project and is the key to a systematic approach for decision. Various factors which affect fuel economy in industrial furnaces may be stated as :

1. Complete combustion with minimum excess air;
2. Proper heat distribution;
3. Operating at the desired temperature;
4. Reducing heat losses from openings,
5. Minimizing wall losses;
6. Waste heat recovery from flue gases;

The principles of good combustion for the proper selection and maintenance of fuel oil burner is very important and it has the main role. So, standard and good quality burner should be used for better conservation of oil fuel.

10. FINANCIAL ASPECTS : (RA Shaft)

1. Fixed Capital :

i) Land and building :

Total Covered area : 500 sqm. Rent Rs. 15000 p.m.
Build up area : 375 sqm.

ii) Machinery & Equipments (Indigenous) :

Sl. No.	Description	No.	rate	Amount(Rs.)
1	Pit type furnace-electrically heated (60-KW) size – 24" dia. & 60" depth	2	190000	380000
2	Quenching tank with water cooling system ; Size : 3'x3.5'x6'	1	135000	135000
3	Tempering F/s pit type, electrically heated (18-KW) size 24" dia. & 60" depth working temperature – 250^{0C} to 450^{0C}	2	145000	290000
4	Step down transformer ;440w	1	275000	275000
5	Over head crane; one ton cap.	1	285000	285000
6	Weighing balance, platform type capacity 200 KG	1	10000	10000
7	Rockwell hardness tester	1	85000	85000
8	Double ended pedestal grinder with 2 HP motor	1	35000	35000
9	charging carrier etc.	4	15000	60000
9	Fire fighting equipments	1	7500	7500
10.	Hand tools & material handling equipments	LS	25000	25000
	Total :		--	1587500
	Electrification & Installation charges @ 10% of the machinery & equipment		--	158750
	Furniture & office equipment		--	115000
	Total :			1861250
	Pre operative expenses		--	75000
	Total :		**--**	**3797500**

1. Personnel :

Sl.No.	Designation	No.	Salary (pm)	Total (Rs.)
I	Supervisor/Engineer	1	14500	14500
Ii	Skilled workers	1	12500	12500
Iii	Semi-Skilled Workers	1	10500	10500
Iv	Maintenance worker	1	11500	11500
V	Store-keeper-cum-clerk	1	11000	11000
Vi	Watchman-peon	2	5000	10000
			Total :	**70000**
	Staff welfare@ 15%			3300
			Total :	**73300**

2. Raw Material (Per Month) :

Sl. No.	Particulars	Qty.	Rate	Value
1.	Consumption of quenching oil	100 Ltr.	Rs. 55/- per ltr.	5500
2.	Carburizing fluid	200 Kg	Rs. 35/- per kg	7000
			Total:	**12500**

3. Utilities (Per month) :

1.	Electrical power 100 KWH x250 Hrs.@ 6/- per KWH	30000
2.	Water	1500
	Total:	**31500**

4. Other Contingent expenses (Per Month) :

1.	Rent	:	15000
2.	Postage & Stationary	:	1500
3	Consumable	:	1000
4	Repair & maintenance	:	3500
5.	Transport & Conveyance	:	2500
6	Unforeseen expenses	:	4500
	Total (Rs.)	**:**	**28000**

5. Working Capital (Per Month) :

1.	Raw Material	:	12500
2.	Personnel	:	73300
3	Utilities	:	31500
4	Other contingent exp.	:	28000
	Total (Rs.)	:	**145300**
	Total Working Capital for three months =145300 X 3	:	**435900**

COST OF PROJECT :

1.	Fixed capital	3797500
2.	Working capital	435900
	Total (Rs.):	**4233400**

11. MACHINERY UTILIZATION :

The scheme, on the basis of 60% efficiency on single shift, is considering 25 working days in a month. This project is based on operations like material heating to its carburizing temperature, soaking at quenching temperature, tempering & inspection etc. The break-even-point has come to 40% which will be achieved on giving care at different operational stage and full capacity utilization is needed for full achievement. The payback period of the project has been calculated on the basis of five years.

12. FINANCIAL ANALYSIS :

1. Cost of Production (per year)

1.	Recurring cost (145300 x 12)	1743600
2.	Depreciation on f/cs (20% x 805000)	161000
3.	Depreciation on charge carrier/transformers (15% x 335000)=	50250
4.	Depreciation on other M/cs (10% x 721250)	**72125**
5.	Interest on investment @ Rs.14% x 4233400 =	592676
	Total:	**2619651**
	or say	**2619650**

2. Turn Over per year (based on 60% capacity utilization)

1.	Carbonizing Hardening & Tempering @ 25000 per MT x 180 MT	4500000
	Total:	**4500000**

3. Profit (per year) :

Or Annual Sales – Cost of Production = profit
= 4500000-2619651= 1880349

4. Net Profit (per year):

Net Profit x 100 / Total Sale
= 1880349 x 100 / 4500000 = 41%

5. Rate of Return :

Net Profit x 100 / Total Investment
= 1880349 x 100 / 4233400 = 44%

6. Break Even Point :

Fixed Cost :

1.	40% of salary & wages	351840
2.	40% utilities & other expenses	23800
3.	Depreciation furnace, Dies & Tools	283375
4.	Interest on total capital investment @ 14% x 4233400	592676
	Total:	**1251691**
	or say	**1251700**

BEP :

Fixed Cost x 100 / Fixed Cost + Profit

= 1251700 x 100 / 1251700 + 1880349 = 40 %

$$\text{DSCR} = \frac{\text{Profit+Depriciation+Int on term Loan}}{\text{Int. on TL +Installment of TL}} \text{ or } \frac{1880349+283375+592676}{592676+846680} = \frac{2756400}{1439356} = 1.92{:}1$$

13. NAME & ADDRESS OF PLANT & MACHINERY:

1. M/s Westman Engg. (P) Ltd. Dumdum Road, Kolkata

2. M/s Macro Furnaces (P) Ltd, Faridabad (Haryana)

3. M/s Wellmake Engg. Corpn. Ltd., Mayapuri Phase – IB-104, New Delhi

4. M/s Patel Furnace & Forging (P) Ltd, A2/510, GIDC Estate Makarpura, Vadodra.
5. M/s Metatherm Furnace Pvt. Ltd.

6. M/s High-Temp. Furnace Pvt. Ltd. 1-C, II-Phase, Peenya Industrial Area, Post Box No. 5809, Bangalore – 560058.

7. M/s. Inspection Instruments Corpn.

8 Sherif Douj Street, Zakaria Bldg.,
Mumbai-400 003

9 . M/s. Fuel Instrument and Engineers Pvt. Ltd.
Ichalkaranchi, (Maharashtra)

14. For Quenching Oil, LDO and Furnace Oil

8. M/s. Indian Oil Corporation

9. M/s Hindustan petroleum Corp. Ltd.