# Steel Forgings

| | | |
|---|---|---|
| PRODUCT CODE | : | 331199009 |
| QUALITY AND STANDARDS | : | As per Customers' Specifications |
| MONTH AND YEAR OF PREPARATION | : | March, 2003 |
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## Introduction

Forging is a cost-effective way to produce net shape components. Iron forging is the process of heating iron block in the form of rod, round, (small ingot/billets) and then hammering or pressing them into the desired shapes.

## Market Potential

Forged parts vary in size, shape and sophistication. There are many small forged steel components of close tolerance and precision used in commercial airplanes, space shuttle, automotives and automotive machines. The Industries that tend to be the largest buyers of forgings include: aerospace, defence and automotive. Throughout the 1980s and 1990s, the forging industry underwent a declining trend due to over capacity and competition from world markets. Between 1995 and 2000, this industry had a fairly good time, some units showing increasing trends in production and sales.

The forging components and parts are superior than those manufactured by any other metal process. That is why forgings are used when reliability, light weight, high strength and human safety are prime considering factors. The steel forgings become indispensable in many applications. Therefore, there is a good scope for steel forging units.

## Basis and Presumptions

1. The scheme has been prepared on the basis of 75% efficiency on single shift considering 25 working days in a month.
2. The rate of interest in the scheme has been worked out on the basis of 14% on an average, However this figure is likely to vary depending on the financial outlay of the project as well as location of the unit.
3. The cost of machinery and equipment as indicated is approximate ruling locally at the time of preparation of the scheme.
4. The rates quoted in respect of salaries and wages for workers

and others are the minimum rates in the state/neighbouring states.

5. Margin money required is minimum 25% of the projected investment.

## IMPLEMENTATION SCHEDULE

Project implementation will take a period of 5 ½ months from the date of approval of the scheme. Break-up of time required in each activity is shown below:

| Sl.No. | Activity | Period |
|---|---|---|
| 1. | Preparation of the Project Report: | |
| | (a) Calling quotations | 1 month |
| | (b) Preparation of report | 2 weeks |
| 2. | Provisional registration as SSI Unit | 2 weeks |
| 3. | Financial arrangement | 3 months |
| 4. | Purchase and Procurement of machinery and equipment | 3 months |
| 5. | Installation of machines and equipments | 3 months |
| 6. | Electrification | 1 month |
| 7. | Recruitment of Staff and workers | 1 month |
| 8. | N.O.C. from Pollution Control Board | 2 months |

## TECHNICAL ASPECTS

### Process of Manufacture

As per the customers specifications, steel rods of different sizes are cut to the required length for forging in power shearing machine/hacksaw machine. The cut pieces are heated in the heating furnace to forging temperature. The hot pieces removed from the furnaces are forged in the power hammers/presses using forging dies. The forged components are then trimmed in the trimming press/ trimming hammer to get the exact size of the component. After inspection, the components are shotblasted and cleaned/fettled in the fettling shop. The good components without any defects are despatched as per customers requirements.

### Quality Control and Standards

It has become essential these days that the energy conservation efforts are strengthened substantially to reduce the cost of production. The potential for conservation however, is much large in the forging industry and hence all efforts need to be made to realise it to the extent possible.

The energy efficiency can be achieved by considering the following:

1) Reduction in heating cycles.
2) Energy efficient gas fueled burners for furnaces.
3) Fuel/combustion system optimization.
4) Advanced cogeneration/waste heat utilization system.
5) Induction heating system with reshapable coil.

The energy audit is an integral part of energy conservation project and is the key to a systematic approach for achieving greater conservation of energy.

Various factors which affect fuel economy in industrial furnaces in the forging industry are explained below:

Complete combustion with minimum leakage and proper distribution of the flame. Further operating at the desired temperature, reducing heat losses from openings, minimising wall losses and

waste heat recovery from fuel gases will increase furnace efficiency.

So the efficiency of a furnace will depend on how efficient the combustion system is and secondly, how best the generated heat is utilised. Burner is very important and it has a main role. So standard and good quality burners should be used for better conservation of oil fuel.

### Pollution Control

Forging industry has a share in the present environmental degradation. So it requires NOC from Pollution Control Board of the State. The pollution control machinery and equipment costs are too exorbitant for the small units. Forging industry depending on the character of the production, is a great source of heat, noxious gases, dust and noise. It also produces a large quantity of wastes such as irreclaimable ashes and scales. All these elements have individual contributory effect on the environment degradation and causes unhealthy and unsafe conditions within the unit. These aspects play a significant role in reducing the proportions of pollutants and thereby reduce the magnitude of environmental degradation.

In order to control pollution, various legislation and acts have been passed but as per information available, no minimum national standards have been devised for the Forging Units.

There are mainly two methods for control of pollution in a small industrial unit:

1. By exploiting the meteorological and topographical conditions.
2. By using various equipments for cleaning and dispersion of forging emissions.

For a small unit, the exploitation of natural draughts and climatic conditions are the best and cheapest methods for dispersion of chimney emissions. Use of equipments like gas scrubbers, ventilation fans, washers, etc. require considerable capital investment and also running expenses. On the other hand, use of high stack chimney and operating the unit at a time of favourable 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.

Again use of simple devices like increased chimney height for the furnace, allowing proper space beyond the furnace stack, the pollution of the neighbourhood can be reduced by providing a fall-out area for the dust, ash etc. within the factory premises itself.

Use of sophisticated pollution control measures are neither feasible nor viable for small units.

## FINANCIAL ASPECTS

### A. Fixed Capital

**(i) Land and Building**

| Sl.No. | Description | Amount (In Rs.) |
|---|---|---|
| 1. | Building 240 sq. ft. @ Rs. 400 per sq. ft. | 96,000 |
| | Land 2 acres @ Rs. 10,00,000 / acres | 20,00,000 |
| | **Total** | **20,96,000** |

**(ii) Machinery and Equipments**

| Sl. No. | Description | Qty. | Rate (In Rs.) | Amount (In Rs.) |
|---|---|---|---|---|
| 1. | Centre lathe heavy duty with 3 HP motor and accessories 12" centre height and 6 feet length | 1 | 110,000 | 1,10,000 |
| 2. | Double ended pedestal Grinder 2 HP motor capacity 8" dia | 1 | 11,600 | 11,600 |
| 3. | High speed shaping machine stock 630 mm 3 HP motor | 1 | 115,000 | 1,15,000 |
| 4. | Normalising furnace electrically operated 1500 mm×600mm | 1 | 1,70,000 | 1,70,000 |
| 5. | Oil fired pre-heating furnace with oil burners and matching capacity blowers, oil preheaters, oil service tank valves, strainers and pipe lines alongwith other accessories etc. | 1 | 1,75,000 | 1,75,000 |
| 6. | Pillar type drill machine 1" cap, 1 HP motor | 1 | 12,000 | 12,000 |
| 7. | Platform type weighing machine 500 kg cap. | 1 | 12,000 | 12,000 |
| 8. | Pneumatic power hammer capacity 500 kg with 33 HP motor and accessories | 1 | 5,40,000 | 5,40,000 |
| 9. | Power hacksaw, 1 HP motor | 1 | 30,000 | 30,000 |
| 10. | Rockwell hardness tester | 1 | 40,000 | 40,000 |
| 11. | Self-contained friction drop hammer cap. 500 kgs with 25 HP motor and accessories | 1 | 4,00,000 | 4,00,000 |
| 12. | Shot blasting chambers with 7.5 HP motor | 1 | 3,60,000 | 3,60,000 |
| 13. | Tools, Dies and Equipments | | | 1,50,000 |
| 14. | Trimming power press 60 ton cap with 5 HP motor and accessories | 1 | 1,75,000 | 1,75,000 |
| 15. | Office furniture and equipments | | LS | 29,000 |
| 16. | Pre-operative expenses | | | 25,000 |
| 17. | Installation and Electrification | | | 1,79,000 |
| | | **Total** | | **25,33,600** |

## B. Working Capital (per month)

**(i) Raw Material (per month)**

| Sl. No. | Description | Qty. | Rate (In Rs.) | Amount (In Rs.) |
|---|---|---|---|---|
| 1. | Forging quality steel ingots/ rod conforming to customers specifications | 60 | 19,000 | 11,40,000 |
| 2. | Lubricating oil, cotton waste, packing material | | LS | 9,000 |
| | | | **Total** | **11,49,000** |

**(ii) Salaries and Wages (per month)**

| Sl. No. | Designation | No. | Salary (In Rs.) | Amount (In Rs.) |
|---|---|---|---|---|
| 1. | Accountant/Stores Incharge | 1 | 4,000 | 4,000 |
| 2. | Clerk–cum–Typist | 2 | 3,500 | 7,000 |
| 3. | Helper/Watchmen | 3 | 2,000 | 6,000 |
| 4. | Lab Technician | 2 | 4,500 | 9,000 |
| 5. | Skilled Workers | 10 | 2,500 | 25,000 |
| 6. | Supervisor | 1 | 3,000 | 3,000 |
| 7. | Unskilled Workers | 10 | 2,000 | 20,000 |
| 8. | Works Manager/ Metallurgist | 1 | 12,500 | 12,500 |
| | | **Total** | | **86,500** |
| | *Perquisites @ 15%* | | | 12,975 |
| | | **Total** | | **99,475** |

**(iii) Utilities (per month)**

| Sl. No. | Description | Amount (In Rs.) |
|---|---|---|
| 1. | Electricity | 92,500 |
| 2. | Water | 1,600 |
| | **Total** | **94,100** |

**(iv) Other Contingent Expenses (per month)**

| Sl. No. | Description | Amount (In Rs.) |
|---|---|---|
| 1. | Cartage/Freight | 5,800 |
| 2. | Die steels, MS plates, etc. | 58,000 |
| 3. | Other consumables | 5,800 |
| 4. | Publicity/advertisement | 11,000 |
| 5. | Repair and Maintenance | 9,000 |
| 6. | Telephone | 2,300 |
| | **Total** | **91,900** |

**(v) Working Capital (per month)**
Rs. 11,49,000 + 99,475 + 94,100 + 91,900
**= Rs. 14,34,475**

**(vi) Working Capital for 3 Months** =Rs. 14,34,475× 3
**= Rs. 43,03,425**

## C. Total Capital Investment

| | |
|---|---|
| Fixed Capital | Rs. 46,19,600 |
| Working capital for 3 months | Rs. 43,03,425 |
| **Total** | **Rs. 89,23,025** |

# FINANCIAL ANALYSIS

**(1) Cost of Production (per annum)**

| Sl. No. | Description | Amount (In Rs.) |
|---|---|---|
| 1. | Recurring Expenditure | 1,72,13,700 |
| 2. | Depreciation on Furnace | 43,750 |
| 3. | Depreciation on Machinery and Equipment | 1,99,060 |
| 4. | Depreciation on Office furniture | 2,900 |
| 5. | Depreciation on Tools | 37,500 |
| 6. | Interest on capital investment @ 14% | 12,49,224 |
| | **Total** | **1,87,46,134** |

| (2) Sales (per annum) | (Rs.) |
|---|---|
| By sale of steel forgings 684 MT per annum @ Rs. 30,000/MT | 2,05,20,000 |
| By sale of scrap 10 tonnes @ Rs. 10,000/ tonne | 1,00,000 |
| **Total** | **2,06,20,000** |

| (3) Profit (per annum) | (Rs.) |
|---|---|
| Sales | 2,06,20,000 |
| Cost of Production | 1,87,46,134 |
| **Total** | **18,73,866** |

**(4) % of Profit on Sales**

$$= \frac{\text{Profit/annum} \times 100}{\text{Sales/annum}}$$

$$= \frac{18,73,866 \times 100}{2,06,20,000}$$

$$= \mathbf{9.09\%}$$

**(5) % of profit on investment**

$$= \frac{\text{Profit/annum} \times 100}{\text{Total Capital investment}}$$

$$= \frac{18,73,866 \times 100}{89,23,025}$$

$$= \mathbf{21\%}$$

**(6) Break-even Point**

| (i) Fixed Cost (per annum) | (Rs.) |
|---|---|
| Depreciation | 2,83,210 |
| Interest on investment | 12,49,224 |
| 40% of salary and wages | 4,77,480 |
| 40% of other expenses and Utilities | 8,92,800 |
| **Total** | **29,02,714** |

**(ii) Profit (per annum)** **= Rs. 18,73,866**

**B.E.P.**

$$= \frac{\text{Fixed Cost per annum} \times 100}{\text{Fixed cost/annum + profit/annum}}$$

$$= \frac{29,02,714 \times 100}{29,02,714 + 18,73,866}$$

$$= \mathbf{60.77\%}$$

**Addresses of Machinery and Equipment Suppliers**

*Forging and H.T. Furnaces*

(i) M/s. Wesman Engg. Co. P. Ltd.
7 - Ganesh Chandra Avenue,
Kolkata - 700 013.

(ii) M/s. Wester Works Engg. Ltd.
5-D, Valcan Insurance Building,
Veer Nariman Point,
Mumbai - 400 020.

*Testing Machinery and Equipments*

(i) M/s. Fuel Instrument and Engg. P. Ltd.
Ichalkaranji, Maharashtra.

(ii) M/s. Inspection Instruments Corporation
7 - Sheriff Dovji Street,
Zakaria Building,
Mumbai - 400 003.

*Name of Oil Supplier*

(i) M/s. Indian Oil Corporation
Indian Oil Bhawan,
New Delhi - 110 001.

(ii) M/s. Hindustan Petroleum Ltd.
UCO Bank Building,
Parliament Street,
New Delhi - 110 001.