HIGH TENSILE NUTS AND BOLTS

1. INTRODUCTION

Industrial fasteners have a vital contribution for the growth of almost all sectors of industry. It is a wonderful manifestation which joins & secures materials together for any productive uses. A fastener is a connective mechanism that mechanically joins or affixes two or more objects together. A bolt is an externally threaded fastener designed for insertion through holes in assembled parts, and is normally intended to be tightened or released by torquing a nut. A nut is a type of hardware fastener with a threaded hole. Nuts are almost always used opposite a mating bolt to fasten a stack of parts together. The two partners are kept together by a combination of the friction of their threads, a slight stretch of the bolt, and compression of the parts. High tensile nuts and bolts find wide application in joining part where continuous rotation and wear and tear of the nuts and bolts occurs. As the nuts and bolts are subjected to variable stress in a dynamic condition, there is every likelihood that these fasteners can be failed at any instant causing situations like catastrophe. For the above purpose, nuts and bolts are manufactured from alloy steels having high tensile strength and resistant to continuous wear and tear.
2. MARKET POTENTIAL

As we have a vibrant economy with high growth rate, it is assured that all user industries are performing well. Fasteners industry is evolving from commodities to customized market since most auto manufacturers have different design specifications for their assemblies. Fasteners, commonly known as Nuts, Bolts & Screws find wide application in Automobile, Agriculture and Engineering Industries. Thus Heavy and Medium Commercial Vehicles, Light Commercial Vehicles, Utility Vehicles, Cars, Three Wheelers, Tractors, Heavy Earth Moving Equipments, Machine Tools, Textile Machinery, Railways, Defence, Power, Telecommunication, Aircrafts, Spacecrafts, Air-Conditioning and Refrigeration etc. need fasteners for sub or main assembly. In fact there is no assembly complete without fasteners. The automotive industry is the largest end-user of fasteners with the remaining demand coming from sectors like textile machinery, railway locomotives, construction, computer hardware and general engineering. Industrial fasteners, accounting for 40% of the total demand, are more oriented towards the retail markets. Original Equipment Manufacture (OEM) segment is mainly dominated by organized players due to high intensity of capital and technology.

As the sectors mentioned above use fasteners extensively and there is a vast replacement market spread across the country, hence the scope of venturing to this sector is highly promising.

3. BASIS AND PRESUMPTION
i) The project profile is prepared on the basis of single shift per day of 8 hours /per shift and 300 schedule working days per year.
ii) Labour wages has been taken as per prevailing wage practices in the state.
iii) The rate of interest both for fixed & working capital has been taken as 14 % simple.
iv) The capacity utilization of the project is considered as 75% in first 4 years and 100% onwards
v) Calculation of all elements of cost are made at 100% capacity utilization.
vi) Cost of raw materials and other inputs have been taken as per the rate prevailing at the time of preparation of Project Report.
vii) Cost of machinery and equipments have been taken as per the price prevailing at the time of preparation of the project. The entrepreneurs may update the exact price for a specific make and model of the machine selected.
viii) The break-even point has been worked out on the basis of 100% capacity utilization.
4. IMPLEMENTATION SCHEDULE

i) Preparation of Project Report:
   (a) Calling quotations …………….             ……….      4 weeks
   (b) Preparation             …………….             ……….     2 weeks
ii) Filing of Entrepreneur’s Memorandum at D.I.C.          ………..    1 week
iii) Financial arrangement  from Financial Institution and others  8 weeks
iv) Registration of land and site development       ………..  4 weeks
v) Construction of workshop and office building         ………..  8 weeks
vi) Purchase and procurement of machinery and equipment   8 weeks
vii) Erection of machinery and Electrification          …………   3 weeks
viii) Recruitment of personnel                         …………   4 weeks
ix) Trial run                                           …………   1 week

Some activities shown above can be undertaken simultaneously in order to minimize the period of completion of the project.

5. TECHNICAL ASPECTS

Process of manufacturing:

The raw material best suited for manufacture of bolt is M.S. rounds manufactured by using TMT technology and alloy steels having micro alloying elements suitable for withstanding high tensile stress and resistant to corrosion. As the TMT Bar has a refined grain structure and higher yield strength, the rounds can be used for better performance of the fasteners. The rounds are pickled in the acid tanks, washed and drawn in a drawing machine. The cleaned rod is than fed into the cold heading machine for formation of bolt head on one end and cutting to a desired length on the other end simultaneously. For the HT bolts forging are done on hot forging press. Threading is done in the thread rolling machines.

While manufacturing nuts, the hexagonal rod of desired size and appropriate material is procured and the nuts are cut on the automatic nut-cutting machine. Nuts blanks are drilled and tapped on the nut-tapping machine. Finally, these are deburred in the polishing barrel.

*Process Flow Chart for Manufacturing of Steel Bolt

M.S / Alloy steel rod
↓ Pickling in Acid
↓ Wire Drawing
↓ Bolt Cutting
↓ Head Forging
↓ Head Trimming
↓ Thread Rolling
↓ Heat Treatment (800 °C - 900 °C)
↓ Tempering (400 °C - 500 °C)
↓ Plating / Galvanizing
↓ Polishing
↓ Inspection / Store / Despatch

*Process Flow Chart for Manufacturing of H.T Nut

Hexagonal Steel Bar
↓ Nut Cutting
↓ Drilling / Tapping
↓ Deburring
↓ Heat Treatment (800 °C - 900 °C)
↓ Tempering (400 °C - 500 °C)
6. **Quality Control and Standards**

The Bureau of Indian Standards has laid down the following quality standards for M.S. and High tensile fasteners such as Bolts and Nuts:

- **IS 1363 : 1992**
- **IS 1367 : 1994**
- **IS 4206 : 1987**

7. **Production Capacity**

- **Quantity**: Nuts & Bolts of various sizes - **360 MT./ annum**
- **Turnover**: Rs. **2,88,00,000/-**

8. **Motive Power requirement**: **85 H.P**

9. **Pollution Control**

No pollution control measure is required for the unit as occurrence of pollution is quite minimal. However, State Pollution Control Board should be contacted in order to comply pollution control norms, if any.

10. **Energy Conservation**:

A capacitive circuit should be incorporated in the electricity supply network for improvement of power factor which maximizes energy input. All motor drives should be thyristor controlled in order to minimize loss of energy.

11. **FINANCIAL ASPECTS**:

A. **FIXED CAPITAL** :

a) **Land & Building** :

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High Tensile Nuts & Bolts
(i) Land 1.0 Acres - @ Rs.20.0 lacs per Acre
Including land development, approach & internal roads, Drain, boundary wall etc. : Rs. 20,00,000/-

(ii) Building –Workshop, office & Store-2000 Sq.mtr
Average cost of construction @ Rs.8,000/-per sq.mtr : Rs. 1,60,00,000/-
Total - Rs. 1,80,00,000/-

b) Machinery and Equipments:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Quantity</th>
<th>Price (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Double stroke solid die cold head forging machine suitable for bolt dia 6 mm to 18 mm and length 20 mm to 150 mm with 15 HP electric motor</td>
<td>1 No.</td>
<td>8,50,000/-</td>
</tr>
<tr>
<td>2.</td>
<td>Head trimming machine up to 18 mm dia bolt x 150 mm length with 10 HP electric motor</td>
<td>1 No.</td>
<td>5,50,000/-</td>
</tr>
<tr>
<td>3.</td>
<td>Thread rolling machine suitable for upto 18 mm dia bolt x length 150 mm with 15 HP electric motor</td>
<td>1 No.</td>
<td>5,00,000/-</td>
</tr>
<tr>
<td>4.</td>
<td>Bull block wire drawing machine</td>
<td>1 No.</td>
<td>1,20,000/-</td>
</tr>
<tr>
<td>5.</td>
<td>Wire pointing machine with 1 HP motor</td>
<td>1 No.</td>
<td>20,000/-</td>
</tr>
<tr>
<td>6.</td>
<td>Steel polishing barrel with electric motor</td>
<td>1 No.</td>
<td>60,000/-</td>
</tr>
<tr>
<td>7.</td>
<td>Automatic nut forming plant, five station capacity 18 mm dia with 25 HP motor, lubricant &amp; coolant pump</td>
<td>4 Nos.</td>
<td>15,00,000/-</td>
</tr>
<tr>
<td>8.</td>
<td>Nut tapping machine with 3 HP motor and starter</td>
<td>4 Nos.</td>
<td>3,00,000/-</td>
</tr>
<tr>
<td>9.</td>
<td>Semi muffle oil fired furnace</td>
<td>1 No.</td>
<td>2,00,000/-</td>
</tr>
<tr>
<td>10.</td>
<td>Tempering furnace H.T. air circulated type electrically heated temp. upto 500ºC 3 KW rating</td>
<td>1 No.</td>
<td>1,00,000/-</td>
</tr>
<tr>
<td>11.</td>
<td>Die, tools gauges and measuring instruments</td>
<td>L.S</td>
<td>2,50,000/-</td>
</tr>
<tr>
<td>12.</td>
<td>Electrification and installation @ 10% of cost of the machinery</td>
<td></td>
<td>4,20,000/-</td>
</tr>
<tr>
<td></td>
<td>Office equipment and furniture</td>
<td></td>
<td>1,00,000/-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>49,70,000/-</td>
</tr>
</tbody>
</table>
B. PRE OPERATIVE EXPENSES : Rs. 1,00,000/-

C. WORKING CAPITAL

a. Personnel (Per month):

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Designation</th>
<th>Nos.</th>
<th>Salary / P.M (Rs.)</th>
<th>Total (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manager</td>
<td>1</td>
<td>25,000/-</td>
<td>25,000/-</td>
</tr>
<tr>
<td>2</td>
<td>Office Assistant/clerk</td>
<td>1</td>
<td>10,000/-</td>
<td>10,000/-</td>
</tr>
<tr>
<td>3</td>
<td>Skilled worker</td>
<td>6</td>
<td>8,000/-</td>
<td>48,000/-</td>
</tr>
<tr>
<td>4</td>
<td>Semi-skilled worker</td>
<td>2</td>
<td>6,000/-</td>
<td>12,000/-</td>
</tr>
<tr>
<td>5</td>
<td>Un-Skilled worker</td>
<td>3</td>
<td>5,000/-</td>
<td>15,000/-</td>
</tr>
<tr>
<td>6</td>
<td>Watchman-cum-Peon</td>
<td>1</td>
<td>4,000/-</td>
<td>4,000/-</td>
</tr>
</tbody>
</table>

Perquisites @ 20% 22,800/-

Total : 1,36,800/-

b. Raw Material (Indigenous) (Per month):

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars and rate</th>
<th>Quantity</th>
<th>Amount (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.S./H.T Wire/rod 6mm–18 mm dia @ Rs. 40,000/- per MT</td>
<td>19.5 MT</td>
<td>7,80,000/-</td>
</tr>
<tr>
<td>2</td>
<td>Hexagonal M.S. rod 6 mm – 18 mm dia @ Rs. 40,000/- per MT</td>
<td>11.00 MT</td>
<td>4,40,000/-</td>
</tr>
<tr>
<td>3</td>
<td>Packing/Polishing materials and consumables</td>
<td>L.S</td>
<td>10,000/-</td>
</tr>
</tbody>
</table>

Total: 12,30,000/-

c. Utilities (Per month):

| i) Electricity, 13000 units/month @ 4.80 per unit | 62,400/- |
| ii) Water L.S                                          | 3,000/-  |
| iii) Furnace oil, 6,000 ltrs. @ Rs.22.00 per ltr.    | 1,32,000/-|
| iv) Lubricant oil etc.                                | 5,000/-  |

Total- 2,02,400/-

d. Other Contingent Expenses (Per month):

1) Postage & Stationery : 8,000/-
2) Telephone : 2,000/-
3) Repair & Maintenance : 50,000/-
4) Miscellaneous factory expenses : 50,000/-
5) Sales promotion & advertising : 10,000/-
6) Insurance : 20,000/-
7) Miscellaneous expenses : 10,000/-

TOTAL 1,50,000/-

d. Total Recurring Expenditure (P.M) =
(a + b + c + d) = Rs 17,19,200/-
Say, Rs. 17,19,000/-

Considering a working capital cycle of 2 (Two) months for the project,

The required, Working Capital will be,
= Rs 17,19,000/- x 2
= Rs. 34,38,000/-

12. TOTAL CAPITAL INVESTMENT:

a. Fixed Capital (A+B) 1,81,00,000/-
b. Working Capital 34,38,000/-

Total : 2,15,38,000/-

13. FINANCIAL ANALYSIS:

a. Cost of production (Per Annum)

1. Total Recurring Expenses 2,06,30,400/-
2. Depreciation on machine & equipment @ 10% 4,45,000/-
3. Depreciation on Office equipment @ 20% 20,000/-
4. Interest on total Capital Investment @ 14% 30,15,320/-

Total: 2,41,10,720/-

b. Total Sales Turnover (Per Annum):

1. By sale of HT bolts @ Rs. 80/- per kg. 300 MT 2,40,00,000/-
2. By sale of HT nuts @ Rs. 80/- per kg. 60 MT 48,00,000/-

Total: Rs.2,88,00,000/-
14. Profit per year: \((2,88,00,000 - 2,41,10,720)\) = Rs. 46,89,280/-

15. Net profit ratio on sale = \(\frac{\text{Net profit} \times 100}{\text{Turn over}}\)

   \(= \frac{46,89,280 \times 100}{2,88,00,000} \quad \% = \text{16.3 \%} \)

16. Rate of return = \(\frac{\text{Net profit} \times 100}{\text{Total Investment}}\)

   \(= \frac{46,89,280 \times 100}{2,15,38,000} \quad \% = \text{21.8 \%} \)

17. BREAK EVEN POINT:
   a. Fixed Cost:

   1. Depreciation on Building @ 5\% 8,00,000/-
   2. Depreciation on machinery & equipment @ 10\% 4,45,000/-
   3. Depreciation on office equipments @ 20\% 20,000/-
   4. Interest on total investment @ 14\% 30,15,320/-
   5. 40\% of salary & wages 6,56,640/-
   6. 40\% of other expenses excluding Insurance 6,24,000/-

   Total Rs. 55,60,960/-

   Hence, Fixed Cost is Rs. 55,60,960/-

   Say, Rs. 55,61,000/--/

   B.E.P = \(\frac{\text{Fixed cost} \times 100 \%}{\text{Fixed cost} + \text{Net profit}}\)

   \(= \frac{55,61,000 \times 100 \%}{55,61,000 + 46,89,280} \quad 54.25 \% \)

18. ADDRESS OF MACHINERIES AND EQUIPMENTS SUPPLIERS:

1. M/s ABM Fasteners (India), 79A, Pocket GG-1, Vikas Puri, Delhi, - 110018, India
2. M/s S. B. Machine tools, 23/4, Lane No-11, Anand Parbat Industrial Area, New Rohtak Road, New Delhi - 110005, India
3. M/s Royal Forging & Engineering, 51/K Dockyard Road, Mazagaon, Lohar Khata, Shop No. 5, Mazagaon, Mumbai - 400010, Maharashtra, India
5. M/s. Manek Lal & Sons., 23, Ganesh Chandra Avenue, Kolkata – 700 013
7. M/s Devindra Industries, 3857, New Janta Nagar, Opposite. ITI ,Gill Road, Ludhiana - 141003, Punjab
8. Polo Machinery Pvt. Limited, 12, Amar Park, Zakhira , New Rohtak, New Delhi-110035, India

19. **ADDRESS OF RAW MATERIAL SUPPLIERS:**

1. M/s. Usha Martin Industries, Tatisilwai, Ranchi
3. Local Market