

**117. PROFILE ON PRODUCTION OF BOLTS
AND NUTS**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of bolts and nuts with a capacity of 2,400 tonnes per annum.

The present demand for the proposed product is estimated at 1,488 tonnes per annum. The demand is expected to reach at 3,469 tonnes by the year 2025.

The plant will create employment opportunities for 56 persons.

The total investment requirement is estimated at about Birr 9.05 million, out of which Birr 1.60 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 26 % and a net present value (NPV) of Birr 8.45 million discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Bolt is cylindrical piece of metal that fasten objects together. It is a piece of steel forged at one end to make hexagonal, square or round head and the shank fully or partially threaded at the other end. Nut is hexagonal or square piece with a threaded hole at the center. Bolts and nuts can be zinc or cadmium plating to resist corrosion. Bolt and nut are used to fasten together loose parts mainly in industries and workshops.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past supply and present demand

Although bolts and nuts are manufactured by few of the existing metal industries the bulk of it is supplied from import. Import of bolts and nuts in the past seven years is analyzed to arrive at the current effective demand (see Table 3.1)

Table 3.1
IMPORT OF BOLTS AND NUTS OF IRON & STEEL

Year	Quantity (Ton)
2000	1270.0
2001	1011.6
2002	776.2
2003	1098.8
2004	1275.9
2005	1165.2
2006	2021.9

Source: Customs Authority

Import of bolts and nuts between the period 2000-2006 ranges from the lowest 776 tons (year 2002) to the high 2021.9 tons (year 2006) with annual average of about 1231 tons.

Since the figure for the year 2006 is much higher compared to the previous six years the average of the recent three years (2004-2006) is taken to fairly reflect the current unsatisfied demand. Accordingly current unsatisfied demand is set at 1488 tons.

2. Demand Projection

Bolts and nuts are items which are used extensively in all industries either during manufacturing or maintenance of engineering products . They are universal industrial fasteners and their demand is expected to increase with the development of the manufacturing, maintenance and construction sector. The manufacturing and the construction sector has been growing by more than 7% in the past few years while the service sector by more than 12% . Considering these factors demand for bolts and nuts is forecasted by applying an 8% annual growth rate (See Table 3.2)

Table 3.2

PROJECT DEMAND FOR BOBBINS, SPOOLS & CONES OF PAPER (TON)

Year	Quantity (Ton)
2008	1,607
2009	1,736
2010	1,874
2011	2,024
2012	2,186
2013	2,361
2014	2,550
2015	2,754
2016	2,975
2017	3,469

3. Pricing and distribution

A factory gate price of Birr 11,350 per tonne is taken for sales revenue projection. The product will find its market outlet through the existing construction materials and spare parts distribution enterprises.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME**1. Plant Capacity**

According to the market study above, the envisaged plant will have a capacity of 2,400 tones of bolts and nuts. The plant will operate single shift of eight hours a day and 300 days per annum.

2. Production Programme

The plant is intended starting production at 70% of installed capacity in the first year. It will then raise its capacity to 85% in the second year, and finally to 100% in year three and thereafter.

IV. MATERIALS AND INPUT**A. RAW AND AUXILIARY MATERIALS**

The raw material required by the plant for the manufacture of bolt is mild steel dawn wire from Ø6 up to 12mm and for manufacturing of hexagonal mild steel bars of from M6-M10 are used. Saw dust and sand are used as auxiliary inputs.

Annual requirement of raw and auxiliary materials is shown in Table 4.1.

Table 4.1**RAW MATERIALS REQUIREMENT AT FULL CAPACITY OPERATIONS**

Sr. No.	Description	Qty. (tones)	Unit cost ('000 Birr)	Total cost ('000 Birr)		
				FC	LC	Total
1	Mild Steel Rod	3,000	5.152	15,456.00	3,864.00	19,320.00
2	Hexagonal Mild Steel Bars	600	6.164	3,698.40	924.60	4,623.00
3	Saw dust/Sand	3	1.75	-	5.25	5.25
	TOTAL			19,154.40	4,793.85	23,948.25

B. UTILITIES

Inputs required by the plant consist of electricity, and water. Electricity is required for supplying power to all production equipment, and also to power sockets, lighting system and other auxiliary equipment of the plant.

For the plant operating single shift of eight hours a day, and 300 days a year, the total annual electrical energy requirement will be 45,000 Kwhs. The annual electricity bill will then be Birr 21,312.-.

Water is required for cleaning, drinking and general purpose. The annual water requirement is estimated at 1,500m³, and the corresponding expenditure is Birr 15,000.-.

Thus, the total annual cost of utilities is estimated at about Birr 36,312.00.-.

V. TECHNOLOGY AND ENGINEERING**A. TECHNOLOGY****1. Process Description**

The manufacturing of bolt process will be started by removing the rust formation using mechanical scraper. Then the wire coil is pickled in pickling tanks. The mild steel rods

are fed in the header machine. Trimming of formed head and shank reduction take place on trimming machine. Then the blanks are loaded to the automatic thread rolling machine for threading to the required length and size. The bolts are further put into barrel and get polished. If required, they are plated for corrosion.

Nuts are also manufactured in a similar fashion like bolts. Rust removing and pickling process will be took place. Then drilling and cutting of blanks from hexagonal bars is performed on nut cutting machine. The blanks are put on the tapping machine and threaded through polishes and plated if required.

Finally after inspection, it will be weighed and packed.

2. Source of Technology

The machinery and equipment required can be obtained from the following companies.

SHANDONG WEICHAO IMP.& EXP.CORP.

NO.6A,SIPING Rd.,KUIWEN DISTRICT,

WEIFANG, SHANDONG, P.R. OF CHINA

Tel +8269988

Fax: +86-536-8232079/8262666

B. ENGINEERING

1. Machinery and Equipment

Plant machinery and equipment required for bolts and nuts plant is presented in table 5.1. The total investment cost of plant machinery and equipment is estimated at Birr 1.68 million. Out of which about Birr 1.34 million will be required in foreign currency.

Table 5.1**LIST OF MACHINERY AND EQUIPMENT FOR BOLTS AND NUTS PLANT**

Sr. No.	Description	Qty.
1	Automatic double stroke solid die cold heading machine capacity Ø 8-12mm	1
2	Automatic double stroke solid die cold heading machine capacity Ø 6-8mm	1
3	Automatic bolt head trimming & shank reducing machine capacity Ø 6-8mm.	3
4	Automatic bolt head trimming & shank reducing machine capacity Ø 8-12mm.	4
5	Automatic thread rolling machine capacity Ø 6-8mm.	1
6	Automatic thread rolling machine capacity Ø8-12mm.	1
7	Automatic nut cutting machine capacity Ø 6-8mm.	1
8	Automatic nut cutting machine capacity Ø 8-12mm.	1
9	Automatic nut tapping machine capacity Ø 6-8mm	1
10	Automatic nut tapping machine capacity Ø 8-12mm	1
11	Polishing Barrel	3
12	Inspection Gauges	1 Set
13	Standard working tools& handling equipment	1 Set
14	Center lathe between center distance 1000mm	1
15	Pillar type drilling machine capacity Ø 20mm	1
16	Surface grinder	1
17	Mechanical scraper	1
18	Pickling tanks	1 Set
19	Zinc plating plant	1 Set

2. Land, Building and Civil Works

The envisaged plant will require a total land area of 1,500m². The total land lease value for 80 years at the rate of Birr 0.40 per m² is therefore Birr 48,000. The floor space required for the building of and other facilities will be about 800m². The total estimated cost of building and civil works at the rate of Birr 2,000 per m² is about Birr 1.60 million.

Therefore, the total cost of land, building and civil works is estimated at Birr 1,648,000.

3. Proposed Location

Location of an industrial plant is determined on the basis of the proximity to the market for final products. The majority of the raw materials for the envisaged products have to be imported although few auxiliary materials can be procured from local markets. The envisage plant is proposed to locate at Bonga zuria in Bonga town.

VI. MANPOWER & TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The manpower list and the corresponding monthly and annual salaries are given in Table 6.1 below.

Table 6.1**LIST OF MANPOWER REQUIREMENT AND ANNUAL SALARY**

Sr. No.	Description	No.	Salary (Birr)	
			Monthly	Annual
A. ADMINISTRATION				
1	Plant Manager	1	2,000	24,000
2	Head, Finance & Administration Department	1	1,600	19,200
3	Head, Production and Technical Department	1	1,600	19,200
4	Secretary	1	850	10,200
5	Accountant	1	1,000	12,000
6	Salesman	1	800	9,600
7	Clerk	1	600	7,200
8	Cashier	1	650	7,800
9	General Service	3	250	9,000
SUB TOTAL		11		118,200
B. PRODUCTION				
13	Forman	1	1,200	14,400
14	Machinery Operators	22	650	171,600
15	Assistant Operators	15	450	81,000
15	Mechanics	2	800	19,200
16	Quality controller	1	600	14,400
17	Laborers	4	200	9,600
SUB TOTAL		45	-	309,600
EMPLOYEE'S BENEFIT (25% OF BASIC SALARY)		-	-	106,950
TOTAL		56	-	534,750

B. TRAINING REQUIREMENT

The supervisor, skilled workers and quality control worker need at least two weeks training on the technology, maintenance and quality control. For the rest, on-the-job training will be sufficient on the start up period by the specialists. Total training cost is estimated at about 50,000 Birr.

VII. FINANCIAL ANALYSIS

The financial analysis of the bolts and nuts project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity
	70 % loan
Tax holidays	3 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Raw material, import	90 days
Work in progress	2 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 9.05 million, of which 43 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1
INITIAL INVESTMENT COST

Sr. No.	Cost Items	Total Cost (‘000 Birr)
1	Land lease value	48.0
2	Building and Civil Work	1,600.0
3	Plant Machinery and Equipment	1,681.3
4	Office Furniture and Equipment	100.0
5	Vehicle	250.0
6	Pre-production Expenditure*	312.5
7	Working Capital	5,068.1
	Total Investment cost	9,059.9
	Foreign Share	43

* *N.B Pre-production expenditure includes interest during construction (Birr 162.52 thousand) training (Birr 50 thousand) and Birr 100 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 25.16 million (see Table 7.2). The material and utility cost accounts for 95.30 per cent, while repair and maintenance take 0.45 per cent of the production cost.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	23,948.25	95.15
Utilities	36.31	0.14
Maintenance and repair	113.65	0.45
Labour direct	185.76	0.74
Factory overheads	61.92	0.25
Administration Costs	123.84	0.49
Total Operating Costs	24,469.73	97.22
Depreciation	340.52	1.35
Cost of Finance	358.13	1.42
Total Production Cost	25,168.38	100

C. FINANCIAL EVALUATION**1. Profitability**

According to the projected income statement, the project will start generating profit in the first year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable.

2. Break-even Analysis

The break-even point of the project including cost of finance when it starts to operate at full capacity (year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 22 \%$$

3. Pay Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 5 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 26 % and the net present value at 8.5% discount rate is Birr 8.45 million.

D. ECONOMIC BENEFITS

The project can create employment for 56 persons. In addition to supply of the domestic needs, the project will generate Birr 4.64 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.