PROFILE ON RIVETS

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I. SUMMARY

This profile envisages the establishment of a plant for the production of rivet with a capacity of   80 tonnes   per annum. Rivets are short rods with a head formed on one end. A rivet is inserted through aligned holes in two or more parts to be joined; then by pressing the protruding end, a second head is formed to hold the parts together permanently. The product is extensively used in all industries either during manufacturing or maintenance of engineering products.

Raw materials required to manufacture rivets are mild steel and aluminum, which have to be imported.

The present demand for the proposed product is estimated at 58 tonnes per annum. The demand is expected to reach at 104 tonnes by the year 2020.

The total investment requirement is estimated at Birr 8.49 million, out of which Birr 1.56 million is required for plant and machinery. The plant will create employment opportunities for 27 persons.

The project is financially viable with an internal rate of return (IRR) of 24.04% and a net present value (NPV) of Birr 6.93 million, discounted at 8.5%.

The project will have a forward linkage with the manufacturing sector. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.

II. PRODUCT DESCRIPTION AND APPLICATION

A rivet is a mechanical fastener. It consists of a smooth cylindrical shaft with a head on one end. On installation the rivet is placed in a pre-drilled hole. Then the tail is "Upset" (i.e. deformed) so that it expands to about 1.5 times the original shaft diameter and holds the rivet in place. To distinguish between the two ends of the rivet, the original head is called the factory head and the deformed end is called the shop head or buck tail.

There are a number of rivets, designed to meet different cost, accessibility, and strength requirements. These include: solid rivets, blind rivets, multi-grip rivets, grooved rivets, peel type blind rivets, self-pierce rivets, plastic rivets, tubular rivet, etc.

Rivet has wide application in the structural parts of aircraft, in static structures such as bridges, cranes and building frames. It is also used in manufacture or repair of truck bodies.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Rivets have wide application in the manufacturing sector as well as during maintenance of various products. As there is no local production of rivets, the country's requirement is entirely met through import. Normal rivets and tabular or bifurcated type of rivets are imported in a substantial quantity annually. Imported quantity of rivets for the past nine years is shown in Table 3.1.

Table 3.1

IMPORT OF RIVETS (TONNES)

Year	Import
1998	18.2
1999	72.2
2000	49..5
2001	26.2
2002	52.7
2003	68.0
2004	62.6
2005	51.7
2006	48.8

Source: - Customs Authority.

Import of rivets during the past nine years was fluctuating from year to year although there is a general increasing trend. During the first three years, 1998-2000, the annual average stood at 46.6 tonnes. In the second three years, i.e. 2001-2003, the annual average level of import increased to 49 tonnes. During the recent last three years the yearly average was 54.4 tonnes. The total growth rate between year 2001-2003 and year 2004-2006 is found to be about 10.2%. This gives an annual average growth of about 3.4%.

To determine the current effective demand, the recent three years average, which is 54.4 tonnes is taken as abase. Then, the growth rate registered within the periods 2001-2003 and 2004-2006 is applied to arrive at the current demand. Accordingly, their current demand for rivets is estimated at 58 tonnes.

2. Projected Demand

The demand for rivets is directly related with the manufacturing sector, especially with the engineering industries. Although the manufacturing sector is planned to grow by 11.5% per annum the engineering industry requires some time to develop as it requires

relatively high knowledge and technology. Hence, annual growth of 5% is taken to forecast the future demand (see Table 3.2.).

Table 3.2

FORECASTED DEMAND FOR RIVETS (TONNES)

Year	Projected Demand
2009	60.9
2010	63.9
2011	67.1
2012	70.5
2013	74.5
2014	77.7
2015	81.6
2016	85.7
2017	90.0
2018	94.5
2019	99.2
2020	104.2

Demand for rivets will grow from 60.9 tonnes in the year 2010 to 74 tonnes and 90 tonnes by the year 2012 and 2017, respectively. By the year 2020, the demand will reach at 104.2 tonnes.

3. Pricing and Distribution

The average CIF price per tonne of rivets is found to be Birr 43,456. Allowing 40% for taxes, inland transport and other charges Birr 60,838 per tonnes is taken for sales revenue projection.

The product will find its market out let through the existing spare parts and building materials whole sale enterprises.

B.   PLANT CAPACITY AND PRODUCTION PROGRAMME

1.   Plant Capacity

The envisaged plant will have a production capacity of 80 tonnes of rivets per annum based on a single shift of 8 hours a day for 300 days a year.

2.   Production Programme

The proposed plant will commence production at 70% in the first year and grows to 85% and 100% capacity in the second and third year and then after, respectively. The production programme is shown in Table 3.3 below.

Table 3.3
PRODUCTION PROGRAMME

Year	1	2	3
Capacity Utilization (%)	70	85	100
Production (tonnes)	56	68	80

IV.   MATERIALS AND INPUTS

A.   RAW MATERIALS

The raw materials used for the production of rivets are mainly mild steel and alloyed or non-ferrous metals (Aluminum) depending upon the applications. The raw materials

have to be imported. Mild steel and aluminum are available in Ukraine, Turkey & India and packing materials are found locally. The annual requirement and its cost are indicated in Table 4.1 below.

Table 4.1

RAW MATERIALS REQUIREMENT AND COST

Sr. No.	Description	Qty (No.)	Total Cost ('000 Birr)		
			FC	LC	TC
1	Mild steel	59	708.00	177.00	885.00
2	Aluminum	31	803.52	200.88	1,004.40
3	Packing & others	LS	-	75.00	75.00
	Total		**1,511.52**	**452.88**	**1,964.40**

B.   UTILITIES

The major utilities required for the envisaged plant are electric power and water. The annual consumption is shown in Table 4.2.

Table 4.2

ANNUAL CONSUMPTION OF UTILITIES AND COST

Sr. No.	Description	Qty.	Cost (Birr)
1	Electricity kWh	25,000	11,840
2	Water (m^3)	500	1,625
	Total		**13,465**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The raw material is fed into the shearing machine to form rivet by shearing length of the rod and extruding. An aluminum rivet blank approximately the same diameter as the head of the finished rivet is used. This rivet blank is forced into a die to extrude the tapered region and the shank of the finished rivet. The fabrication process provides more uniform cold working at the junction of the shank and the tapered region. This process also can provide a superior surface finish, and is suitable for use in wet wing fabrication without further processing for improved surface finish.

After the final product is manufactured will be transferred to the quality inspection and packing department. Then ready for dispatch. The technological process has no any adverse environmental impact.

2. Source of Technology

The machinery and equipment required can be obtained form the following company:

YUSHUNG METALPRODUCTS, CO, LTD

http//yushung.en.ecplaza.net

Tel: +86-0757-8181-3165

Fax: +86-0757-8128-5289

Address: Sanshan industrial zone, Foshan, Guang dong,

China 528251

B. ENGINEERING

1. Machinery and Equipment

The machinery and equipment required along with estimated cost are listed in Table 5.1. The total cost of the machinery and equipment is estimated at Birr 1,563,750.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT AND COST

Sr. No.	Description	Qty	Cost '000 Birr		
			FC	LC	TC
1	Shearing machine	1	215.00	53.75	268.75
2	Cutting machine	1	145.00	36.25	181.25
3	Grinding machine	2	28.00	7.00	35.00
4	Foot press machine	2	75.00	18.75	93.75
5	Hand press machine	1	28.00	7.00	35.00
6	Sheet rolling machine	2	370.00	92.50	462.50
7	Extrusion machine	2	390.00	97.50	487.50
	Total		**1,251.00**	**312.75**	**1,563.75**

2. Land, Building and Civil Works

The overall land required by the envisaged project is about 1,500 m^2, of which 1,000 m^2 is for building and production spaces. The balance, i.e., 500 m^2 is earmarked for production hall including 300 m^2 set for inspection and packing, raw material and finished product store and the remaining 200 m^2 for office building. The total construction cost at a unit cost of Birr 2,300/m^2 is estimated to Birr 2,300,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 272/2002) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is blow 5000 m^2 the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority.

However, if the land request is above 5,000 m^2 the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

The land lease price in the industrial zones varies from one place to the other. For example, a land was allocated with a lease price of Birr 284 /m^2 in Akakai-Kalti and Birr 341/ m^2 in Lebu and recently the city's Investment Agency has proposed a lease price of Birr 346 per m^2 for all industrial zones.

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all manufacturing projects will be located in the industrial zones. Therefore, for the this profile since it is a manufacturing project a land lease rate of Birr 346 per m^2 is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criterions are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.2 shows incentives for lease payment.

Table 5.2
INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS

Scored Point	Grace Period	Payment Completion Period	Down Payment
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The period of lease for industry is 60 years.

Accordingly, the total lease cost, for a period of 60 years with cost of Birr 346 per m^2, is estimated at Birr 31.14 million of which 10% or Birr 3,114,000 will be paid in advance. The remaining Birr 28.03 million will be paid in equal installments within 28 years i.e., Birr 1,000,929 annually.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The plant requires a total number of 27 workers. The list of man power required and corresponding labor cost is shown in Table 6.1.

Table 6.1
MANPOWER REQUIREMENT AND ANNUAL LABOUR COST

Sr. No.	Description	Req. No.	Monthly Salary	Annual Salary (Birr)
1	General manager	1	3,500	42,000
2	Secretary	1	1,000	12,000
3	Production and technical head	1	2,800	33,600
4	Accountant	1	1,200	14,400
5	Accountant clerk	1	650	7,800
6	Finance & Administration head	1	2,800	33,600
7	Supervisor	1	1,200	14,400
8	Machine operator	6	4,500	54,000
9	Electrician/ mechanic	1	800	9,600
10	Laborers	6	2,400	28,800
11	Store keeper	1	650	7,800
12	Guard	2	700	8,400
	Sub-Total	**23**		**266,400**
	Employee's Benefit (25% Basic Salary)			66,600
	Total	**27**		**333,000**

B.   TRAINING REQUIREMENT

The training shall be given to the production and technical head, operators and mechanic in the time of erection for a period of one month by the machinery supplier. The training cost is estimated at Birr 50,000.

VII.   FINANCIAL ANALYSIS

The financial analysis of the rivet 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	2 years
Bank interest	8.5%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Raw material import	90 days
Work in progress	1 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

A.   TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 8.49 million, of which 15 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 ('000 Birr)

Sr. No.	Cost Items	Local Cost	Foreign Cost	Total Cost
1	Land lease value	3,114.00	-	3,114.00
2	Building and Civil Work	2,300.00	-	2,300.00
3	Plant Machinery and Equipment	312.75	1,251.00	1,563.75
4	Office Furniture and Equipment	100.00	-	100.00
5	Vehicle	450.00	-	450.00
6	Pre-production Expenditure*	538.64	-	538.64
7	Working Capital	423.93	-	423.93
	Total Investment Cost	**7,239.32**	**1,251.00**	**8,490.32**

* *N.B Pre-production expenditure includes interest during construction (Birr 499.24 thousand) training (Birr 50 thousand)   and Birr 150 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 3.28 million (see Table 7.2). The raw material and utility cost accounts for 59.79 per cent of the production cost. The other major components of the production cost are depreciation, financial cost and direct labour which account for   16.96%, 10.33% and 4.86% respectively. The remaining 8.06% is the share of utility, repair and maintenance, labour overhead and other administration cost.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	1,964.40	59.79
Utilities	13.47	0.41
Maintenance and repair	78.19	2.38
Labour direct	159.84	4.86
Labour overheads	66.60	2.03
Administration Costs	106.56	3.24
Land lease cost	-	-
Total Operating Costs	**2,389.06**	72.71
Depreciation	557.08	16.96
Cost of Finance	339.46	10.33
Total Production Cost	**3,285.60**	**100**

C.   FINANCIAL EVALUATION

1.   Profitability

Based on the projected profit and loss statement, the project will generate a profit through out its operation life. Annual net profit after tax will grow from Birr 986.21 thousand to Birr 1.55 million during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 14.70 million.

2.   Ratios

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by

dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, 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.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 25\%$$

4. Payback Period

The pay back period, also called pay – off period is defined as the period required to recover the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 4 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money

in a bank account. Accordingly, the IRR of this porject is computed to be 24.04 % indicating the vaiability of the project.

6.   Net Present Value

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project in to a common measuring unit i.e. present value.   It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principal a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 8.5% discount rate is found to be Birr 6.93 million which is acceptable.

D.   ECONOMIC BENEFITS

The project can create employment for 27 persons.   In addition to supply of the domestic needs, the project will generate Birr 3.66 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. The project will have a forward linkage with the manufacturing sector