119. PROFILE ON PRODUCTION OF ALUMINUM FRAMES AND PROFILES

TABLE OF CONTENTS

I. SUMMARY

This profile envisages the establishment of a plant for the production of aluminum frames and profiles with a capacity of 140 tonnes per annum.

The present demand for the proposed product is estimated at 1,110 tonnes per annum. The demand is expected to reach at 4,640 tonnes by the year 2022.

The plant will create employment opportunities for 31 persons.

The total investment requirement is estimated at about Birr 12.85 million, out of which Birr 8.74 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 14 % and a net present value (NPV) of Birr 3.53 million discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Aluminium frames (profiles) are extruded sections used for the fabrication of door and window frames. The main advantage an aluminium frame is its strength, which meant that people could use very slim frames made of the material. When compared to wood, aluminium is more resistance to warping and certainly more durable, as aluminium frames do not rot. There is also a higher level of security with Aluminium frames and much harder for the would be burglar to negotiate. Aluminium frames are also pretty much maintenance-free and can be easily cleaned with a damp cloth.

III. MARKET AND PLANT CAPACITY

A. MARKET STUDY

1. Present Demand and Supply

Aluminum frame and profile is a structure that is used for fabrication of window frames. The product is commonly used for modern commercial buildings. Accordingly, the building construction sector constitutes the major end user of the product. Although various types of profiles and frames are manufactured locally the country's requirement for aluminum frames and profiles is essentially met through imports. The quantity of imports of the product during the period 1997 - 2006 is shown in Table 3.1. During the period under reference, imports exhibited substantial fluctuations and averaged at 1009.9 tons.

Table 3.1

IMPORTS OF ALUMINUM FRAMES AND PROFILES

Year	Import (tons)
1997	107.6
1998	973.6
1999	588.9
2000	801.3
2001	3175.1
2002	550.7
2003	663.1
2004	762.6
2005	814.5
2006	1661.2
Average	**1009.9**

Source: *Customs Authority, External Trade Statistics, 1997-2004*

Given, the substantially considerable fluctuations in the supply of the product, which comprises of only imports, the average annual supply for the period under reference is considered as the effective demand for the product for the year 2006. The demand for the product is directly related to the growth of the construction sector. Hence, given the substantial growth in the construction sector, the demand for aluminum frame and profile is estimated to grow at the rate of 10%. Thus the present demand for the product (i.e., for 2007) is estimated at 1110.9 tones.

2. Demand Projection

As stated above, a rate of growth of 10% is used in projecting the demand for aluminum frame and profile. Table 3.2 depicts the projected demand for the product.

Table 3.2

Projected Demand for Aluminum Frame and Profile

(IN TONS)

Year	Projected Demand
2007	1110.9
2008	1222.0
2009	1344.2
2010	1478.6
2011	1626.5
2012	1789.1
2013	1968.0
2014	2164.8
2015	2381.3
2016	2619.4
2017	2881.4
2018	3169.5
2019	3486.5
2020	3835.1
2021	4218.6
2022	4640.5

3. Pricing and Distributions

According to the external trade statistics for 2006 the unit CIF price of aluminum frame and profile was Birr 36.75 per kg. Allowing 40% for import duty and other clearing expenses, the factory-gate price for the envisaged plant is estimated at Birr 51.45 per kg.

The products of the envisaged plant can be marketed through the existing wholesale and retail network. The plant can also appoint agents at selected locations.

The products of the envisaged plant can be marketed through the existing wholesale and retail network. The plant can also appoint agents at selected locations.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

Demand projection for aluminium frames and profile indicate that in the year 2008 & 2009 the demand is 101.40 tones and 106.44 tones, respectively. These figures will grow to 182.06 tones by the year 2020. The envisaged plant will have a capacity of 140.00 tones of aluminium frames and profiles. 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 75% 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

Raw and auxiliary material required by the plant is aluminium ingot. Anodizing chemicals 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	**LM pressure die casting Aluminium Ingot**	154	23.711	2,556	1,095.45	3,651.49
2	Anodizing Chemicals	L.S	-	125	31.25	156.25
	TOTAL			**2,681.05**	**1,126.70**	**3,807.74**

B. UTILITIES

Inputs required by the plant consist of electricity, fuel oil 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 125,000 Kwhs. The annual electricity bill will then be Birr 59,200.-.

Water is required for cleaning, drinking and general purpose. The annual water requirement is estimated at 1,500m^3, and the corresponding expenditure is Birr 15,000.-. Fuel oil is required for the extrusion press and the anodizing unit is estimated to be 15.00m^3 and the annual estimated cost will be Birr 81,150.

Thus, the total annual cost of utilities is estimated at about Birr 155,350.-.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The manufacturing of aluminium frame and profile comprises aluminium ingots are melted in the melting furnace, the mother ingot is cast into billets, a feeding and oven preheating system for the initial billets, a means of loading the pre-heated billets into an extrusion press and, at the exit of this press, a line for the reception of the extruded profiles followed by a bench for cooling, straightening (stretching) and cutting the profile to size.

Then, once cut, the profiles are grouped together side by side on support tables or in baskets and conveyed to an ageing chamber or tunnel where they stay at a present temperature and for a preset time for a heat treatment so their molecular structure can stabilize and the extruded metal can reach mechanical characteristics.

After this treatment, the profiles are recovered and conveyed to other process such as anodizing and other mechanical conditions. Then finally the finished products passed to the assembly section and the other products can be arranged for transport.

2. Source of Technology

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

a) VAP GLOBAL INDUSTRIES
INC. VANCOUVER, BC
Tel 604-685-8274
Fax 604-685-8292

B. ENGINEERING

1. Machinery and Equipment

Plant machinery and equipment required for aluminum frame and profile plant is presented in table 5.1. The total investment cost of plant machinery and equipment is estimated at Birr 8.74 million.

Table 5.1.

LIST OF MACHINERY AND EQUIPMENT FOR ALUMINIUM FRAME & PROFILE PLANT

Sr. No.	Description	Qty.	Cost (Birr)'000		
			LC	FC	Total
1	Extrusion Plant				
	Extrusion Press	2		3,500.00	3,500.00
	Melting Furnace, Preheating Furnace & Ageing Furnace	3			
	Billet Casting Machine	1			
	Power Hack saw	3			
	Material Handling System	L.S			
2	Anodizing Plant				
	Coloring Equipment	2 Set		1,875.00	1,875.00
	Cooling Equipment	1Set			
	Tank lining & accessories	1Set			
	D.C. Power Supply system, steam generation equipment, gas exhausting & scrubber equipment etc.	Set			
3	Door & Window Fabrication Shop				
	Assembly Equipment	1 Set		75.00	75.00
	Power Hack saw	1			
	Tools	Set			
4	Extrusion Die Manufacturing & Maintenance Equipment				
	Vertical Milling Machine	1		1,544.00	1,544.00
	Lathe Machine	1			
	Surface grinding Machine	1			
	Measuring & Hand tools	Set			
TOTAL			**-**	**6,994.00**	**6,994.00**
INSURANCE, CUSTOMS DUTY, INLAND TRANSPORT, BANK CHARGE, ETC.			1,748.50	-	1,748.50
GRAND TOTAL			**1,748.50**	**6,994.00**	**8,742.50**

2. Land, Building and Civil Works

Land is required to accommodate plant building, management offices, social building for workers, stores, internal roads, adequate space for expansions and other industry related activities. The total land area for the envisaged plant is estimated to be 2,500m^2. Of this size of land, about 850m^2 will be covered by different types of buildings indicated above. Estimated land lease value for 80 years at a rate of 1.01 is Birr 202,000, and the cost of building at a rate of birr 2,300 will be estimated at birr 1,955,000. Thus, the total estimated cost of land and building will be Birr 2,157,000.

3. Proposed Location

Location of an industrial plant is determined on the basis of the proximity to sources of raw materials and access to the market for final products. In terms of basic location mode, the optimal location is one where the aggregate costs of raw materials transportation, production and distribution of the products is minimized. The majority of the raw materials for the envisaged products have to be imported although few auxiliary materials can be procured from local markets. End user of the products is available in big town and cities. Therefore, it would be advisable to locate the plant at Awassa. This is advantageous since infrastructures like electricity, water; transportation and communication are well developed. But other zonal towns like Dilla or Yirgalem could also be considered as potential locations for the envisaged project.

VI. MANPOWER & TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The plant requires both direct and indirect manpower. The direct manpower consists of designers, operators of workshop equipment, mechanics, welders, painters, and laborers are engaged in manufacturing of the products executed by production & technical departments and the administrative activities are executed by indirect works that include

plant manager, executive secretary, heads of finance and administrations, and personnel officer, accountant and other support giving personnel.

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	3,000	36,000
2	Head, Finance & Administration Department	1	2,200	26,400
3	Head, Production and Technical Department	1	2,500	30,000
4	Secretary	1	1,000	12,000
5	Accountant	1	1,200	14,400
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**		**152,400**
B. PRODUCTION				
13	Designer	1	2,000	24,000
14	Machinery Operators	8	800	76,800
15	Assistant Operators	6	450	32,400
15	Mechanics	4	800	38,400
16	Welders	2	600	14,400
17	Painters	2	400	9,600
18	Laborers	6	200	14,400
SUB TOTAL		**29**	**-**	**210,000**
EMPLOYEE'S BENEFIT (25% OF BASIC SALARY)		-	-	90,600
TOTAL		**31**	**-**	**453,000**

B. TRAINING REQUIREMENT

The Designer, machine operator and skilled workers need at least three weeks training on the technology, maintenance and operation of the machines. 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 55,000 Birr.

VII. FINANCIAL ANALYSIS

The financial analysis of the aluminum frames and profile 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	5 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 12.85 million, of which 52 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	202.0
2	Building and Civil Work	1,955.0
3	Plant Machinery and Equipment	8,742.5
4	Office Furniture and Equipment	100.0
5	Vehicle	250.0
6	Pre-production Expenditure*	773.4
7	Working Capital	828.9
	Total Investment cost	**12,851.7**
	Foreign Share	52

** N.B Pre-production expenditure includes interest during construction (Birr 623.35 thousand) training (Birr 55 thousand) and Birr 95 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 6.27 million (see Table 7.2). The material and utility cost accounts for 63.17 per cent, while repair and maintenance take 2.39 per cent of the production cost.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	3,807.34	60.70
Utilities	155.35	2.48
Maintenance and repair	150	2.39
Labour direct	271.8	4.33
Factory overheads	90.6	1.44
Administration Costs	181.2	2.89
Total Operating Costs	4,656.29	74.23
Depreciation	1072.1	17.09
Cost of Finance	544.46	8.68
Total Production Cost	**6,272.85**	**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.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 28\ \%$$

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 6 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 14 % and the net present value at 8.5% discount rate is Birr 3.53 million.

D. ECONOMIC BENEFITS

The project can create employment for 31 persons. In addition to supply of the domestic needs, the project will generate Birr 2.33 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.