100. PROFILE ON THE PRODUCTION OF COATED ABRASIVE

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I. SUMMARY

This profile envisages the establishment of a plant for the production of coated abrasive with a capacity of 300 tons per annum. Abrasive cloth is generally used in shoe industry, painting workshops, furniture and leather industry, metal, wood, glass and automotive industries. Abrasive cloth (Emery cloth) is originally restricted to finishing applications such as polishing or preparing surfaces for painting or plating. Through improvements in the strength of backings and the properties of abrasive minerals, coated abrasives now can be used for heavy –duty applications.

The demand for coated abrasive is entirely met through import. The present (2012) demand for coated abrasive is estimated at 238 tons. The demand for coated abrasive is projected to reach 383 tons and 616 tons by the year 2017 and 2022, respectively.

The principal raw materials required by the envisaged plant are Aluminum Oxide, Silicon Carbide, Treated Cloth and Phenol Formaldehyde Resin which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 10.50 million. From the total investment cost, the highest share (Birr 7.30 million or 72.66%) is accounted by fixed investment cost followed by initial working capital (Birr 1.71 million or 17.03%) and Pre operating cost (Birr 1.03 million or 10.31%). From the total investment cost, Birr 3.26 million or 32.44% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 31.93% and a net present value (NPV) of Birr 11.59 million, discounted at 10%.

The project can create employment for 51 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will create backward linkage with mining subsector and forward linkage with manufacturing sub sector and also income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Abrasive is a mixture of granular corundum or dark color, having impurities of magnetite and hematite. It is a very strong and hard material, therefore, used as an abrasive for varying purposes. The paper or cloth coated with emery is known as emery paper or cloth. Emery is natural mineral, corundum having certain impurities.

The emery cloth generally used in shoe industry, painting workshops, furniture and leather industry and automotive industries. The abrasive used in the cloth is normally available in the colors of bluish black, dull black or deep grey depending upon the source of mineral. The emery cloth is inspected at various stages to ensure quality control of the product. Good quality products after drying are separated and defected pieces are discarded. After separation of good quality product final touch is given and the cloth is now packed and marketed.

Abrasive cloth (emery cloth) consist of some type of abrasive mineral, which can be organic or synthetic; flexible backing; and adhesives. Due to their extreme hardness, natural minerals such as garnet or emery (corundum with iron impurities) find limited use in products for wood-related applications, while crocus mineral (natural iron oxide) is limited to use as a polishing agent because of its softness.

Abrasive cloth (Emery cloth) is originally restricted to finishing applications such as polishing or preparing surfaces for painting or plating. Through improvements in the strength of backings and the properties of abrasive minerals, coated abrasives now can be used for heavy –duty applications.

Although the most familiar types of coated abrasives are probably the individual sheets of emery cloth with which home wood workers prepare furniture or crafts for painting, the trade term “coated abrasives” actually encompasses a much wider array of products for both individual and industrial use. While these products assume many forms, all are essentially a single layer of abrasive grit attached to a flexible backing. In recent years, development work has been done in

many countries, and vast improvements have been introduced until coated abrasives have become known as the "Modern Tool of Industry".

In the manufacture of commercial abrasive products, seven distinctly different abrasive materials are employed. In order of their respective hardness (soft to hard) these are: crocus, flint, garnet, emery, zirconia alumina, ceramic, aluminum oxide, silicon carbide and diamonds. The majority of modern coated abrasives have working surfaces of man-made abrasive minerals which are harder, tougher, and sharper than anything nature has to offer except for the diamond.

The bonding materials holding the minerals to the flexible backings, and the backings themselves, have been specifically developed to meet the rigorous demands on these modern tools. The manufacturing controls of coated abrasives are now so great that the consistency of any one product is almost invariably better than that of the material on which it is being used.

Coated abrasive products are employed in the manufacture of almost every product used, whether in the factory, the office, the home or on the farm. They are used on products on the land, in the air and on the sea. Even in the rare cases when coated abrasive products were not used directly to make a product. The machines that made the product were themselves usually brought to accurate and polished perfection with the aid of coated abrasives in one form or another.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Abrasive cloth /emery cloth as a polishing, cleaning, shaping, smoothing and finishing material is mainly used in the metal, wood, glass and the like. The demand for the product is currently met through import. The major suppliers of abrasive/emery cloth to the Ethiopian market are China, Germany, United Arab Emirates, and Britain among others. Import of abrasive/emery cloth during the period 2002-2011 is presented in Table 3.1.

Table 3.1

IMPORT OF ABRASIVE/EMERY CLOTHE (TONS)

Year	Quantity
2002	92
2003	68
2004	112
2005	119
2006	137
2007	188
2008	119
2009	309
2010	179
2011	225

Source: *- Ethiopian Revenue and Customs Authority*

Table 3.1 reveals that import of coated abrasive shows a general increasing trend, with minor fluctuations in some years, in the past 10 years. During the years 2002 and 2003, the average import was about 80 tons. But between years 2004 – 2008, the yearly average import has increased to about 135 tons. On the other hand yearly average level of import during the recent three years (2009 – 2011) has reached about 238 tons. Accordingly, the recent three years average, which is 238 tons, is considered to fairly approximate the current effective demand for the product.

2. Demand Projection

Demand for abrasive cloth/emery cloth will increase with the development of the manufacturing sector mainly the wood and metal sub sectors. These sub sectors are also the main suppliers of various goods to the construction sector. Since the construction sector is growing fast due to various development activities the growth of the metal and wood-manufacturing sector is

inevitable. Considering this situation, demand for abrasive/ emery cloth is forecasted to grow by 10% per annum. The projected demand is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR ABRASIVE/ EMERY CLOTH (TONS)

Year	Quantity
2013	261
2014	288
2015	316
2016	348
2017	383
2018	421
2019	463
2020	509
2021	560
2022	616
2023	678
2024	746
2025	821

3. Pricing and Distribution

The prices of coated abrasive vary according to the quality of the raw material used. The average CIF price of the product in the recent two years (2010 and 2011) is Birr 33,298 per ton. Allowing 25% for import duty and other clearing expenses, the factory- gate price of the envisaged plant is estimate at Birr 41,623 per ton.

Currently the product is distributed mainly through building materials shops. The envisage plant can also use the existing building materials shops or establish own distribution centers in major urban areas.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The envisaged plant would have a capacity of 300 tons of abrasive cloth per year. The plant operates single shift of 8 hours per day and 300 working days per annum.

2. Production Program

The plant is expected to start at 75% of its capacity during the first year of operation and at 85% during the second years and then to full capacity during the 3rd year and then after.

IV. MATERIALS AND INPTUS

A. MATERIALS

Aluminum Oxide, Silicon Carbide, Treated Cloth and Phenol Formaldehyde Resin are the main raw materials required by the project. Most of the raw materials have to be imported till they are produced locally. The required raw material and annual requirement for the manufacturing of abrasive cloth are listed in the Table 4.1 below.

Table 4.1

ANNUAL REQUIREMENT OF RAW & AUXILIARY MATEIRALS AND COST

Sr. No	Description	Qty. Tons	Cost (000 Birr)		
			F.C	L.C	Total
1	Aluminum Oxide	63	1006	-	1006
2	Silicon Carbide	47	739	-	739
3	Treated Cloth	19	1026	-	1026
4	Phenol formaldehyde resin	79	1995	-	1995
5	Other inputs (Glue, ink, etc)	LS	431	-	431
	Sub-total	-	**5,197**		**5,197**
	Insurance, Customs Duty, Inland Transport, Bank Charge, Etc.			1299	1299
	Grand Total		**5,197**	**1,299**	**6,496**

B. UTILITIES

Utilities required are electricity and water. Water is mainly needed for human consumption and general purpose. The annual quantities and cost of utilities are estimated as shown in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIREMENT &COST

Sr. No.	Description	Qty	Total (in Birr)
1	Electric Power (kWh)	75,000	43,500
2	Water (m3)	5,250	52,500
	Total		**96,000**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Production starts when the make coat is applied to one side of the backing material. The abrasive grains are then applied using an electrostatic deposition process, in which the grains are given an electric charge. Finally, another layer of adhesive-the size coat-is applied.

The next step, applying the abrasive mineral, is the most important in the manufacturing process because it determines the orientation and density of the mineral. The backing is passed, adhesive side down, over a pan of abrasives that have been electro-statically charged-given an electric charge opposite to the backing. The opposite charge causes the abrasive to adhere evenly to the backing, resulting in a very sharp, fast cutting coated abrasive tool with the maximum life possible.

Once the grain has been imbedded in the make coat, the roll is dried and moved on for application of the size coat. Following application of the size coat, the roll is dried again and cured under carefully controlled temperature and humidity conditions.

Before the coated abrasive roll is converted into a belt or other products, it is systematically flexed or bent to break the continuous layer of adhesive bond. Converting roll material into abrasive belts with cutting strips of coated abrasives to the desired width. Each strip is then cut to the proper length and the ends are joined together.

2. Environmental Impact Assessment

The production of coated abrasive involves mainly a coating and application of abrasive on the coated material and then roll and dry. The unit operations can be performed in a controlled manner. Hence, the plant does not have any adverse impact on environment.

B. ENGINEERING

1. Machinery and Equipment

Total cost of machinery and equipment is estimated at Birr 4,075,280 of which Birr 3,260,220 is required in foreign currency. Table 5.1 below provides list and costs of machinery and equipment required for the envisaged plant.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT AND CORRESPONDING COST

Sr. No.	Description	Qty.	Cost ('000 Birr)		
			LC	FC	Total
1	**Main Machinery**				
	Electrostatic coating equipment	1	--	1648.20	1648.20
	Abrasive application	1	--	201.00	201.00
	Adhesive mixer	1	--	87.10	87.10
	Mark printer	1	--	298.82	298.82
	Adhesive coating machine	1	--	194.30	194.30
	Dryer	1	--	201.00	201.00
2	**Auxiliary Machinery**		--		
	Re-winding Machine	1	--	160.80	160.80
	Slitting machine	1	--	46.90	46.90
	Cutting machine	1	--	60.30	60.30
	Flat press	1	--	361.80	361.80
Sub-total			--	**3260.22**	**3260.22**
Insurance, duty, inland transport, bank charge, etc			815.06	-	815.06
Grand Total			**815.06**	**3,260.22**	**4,075.28**

2. Land, Buildings & Civil Works

Taking into consideration space for easy movement and possible future expansion, the total area required by the project is 1,000 square meters. The production building will be one-storied steel frame building will be suitable. The floor space required 550 m^2. The walls will be plastered, reinforced concrete floor and RHS truss and EGGA sheet roof. The total building and construction cost at a unit cost of Birr 5,000 is estimated at about Birr 2.50 million.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No. 721/2004) 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 below 5,000 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.

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to be auctioned by the city government or transferred under the new "Urban Lands Lease Holding Proclamation."

The new regulation classified the city into three zones. The first Zone is Central Market District Zone, which is classified in five levels and the floor land lease price ranges from Birr 1,686 to Birr 894 per m^2. The rate for Central Market District Zone will be applicable in most areas of the city that are considered to be main business areas that entertain high level of business activities.
The second zone, Transitional Zone, will also have five levels and the floor land lease price ranges from Birr 1,035 to Birr 555 per m^2 .This zone includes places that are surrounding the city and are occupied by mainly residential units and industries.

The last and the third zone, Expansion Zone, is classified into four levels and covers areas that are considered to be in the outskirts of the city, where the city is expected to expand in the future. The floor land lease price in the Expansion Zone ranges from Birr 355 to Birr 191 per m^2 (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor Price/m^2
Central Market District	1st	1686
	2nd	1535
	3rd	1323
	4th	1085
	5th	894
Transitional zone	1st	1035
	2nd	935
	3rd	809
	4th	685
	5th	555
Expansion zone	1st	355
	2nd	299
	3rd	217
	4th	191

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones. Therefore, for the profile a land lease rate of Birr 266 per m^2 which is equivalent to the average floor price of plots located in expansion zone 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 5.3 shows incentives for lease payment.

Table 5.3

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 land lease period for industry is 60 years.

Accordingly, the total land lease cost at a rate of Birr 266 per m^2 is estimated at Birr 266,000 of which 10% or Birr 26,600 will be paid in advance. The remaining Birr 239,400 will be paid in equal installments with in 28 years i.e. Birr 8,550 annually.

VI HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

Total human resource required is 55 persons. Annual cost of labor is estimated at Birr 288,000. The detail of the human resource requirement and the estimated monthly and annual labor cost, including employees' benefit, is given in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND LABOR COST

Sr. No	Job Title	No. of Persons	Salary (Birr)	
			Monthly	Annual
1	General Manager	1	4,500	54,000
2	Secretary	1	1400	16,800
3	Production & Technical Head	1	3,800	45,600
4	Commercial Head	1	3,800	45,600
5	Finance & Administration Head	1	3,800	45,600
6	Personnel	1	3,000	36,000
7	Accountant	1	1,800	21,600
8	Accounts Clerk	1	1,400	16,800
9	Cashier	1	1,200	14,400
10	Sales person	1	2,000	24,000
11	Purchaser	1	1,800	21,600
12	Store Keeper	1	1,800	21,600
13	Quality Controller	1	2,000	24,000
14	Forman	1	1,800	21,600
15	Machine Operator	15	24,000	288,000
16	Assistant Operator	10	10,000	120,000
17	Laborer	6	2,400	28,800
18	Mechanic	1	1,500	18,000
19	Electrician	1	1,500	18,000
20	Driver	2	2,200	26,400
21	Guard	2	1,600	19,200
	Sub – total	**51**		**927,600.00**
Employee's Benefit 15% basic salary				139,140.00
	Total			**1,066,740.00**

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 during commissioning and start up period by the machinery suppliers and experts. Total training cost is estimated at about 100,000 Birr.

VII. FINANCIAL ANALYSIS

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

Construction period	1 year
Source of finance	30 % equity & 79% loan
Tax holidays	5 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material local	30 days
Raw material imported	120 days
Work in progress	1 day
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 10.50 million (see Table 7.1). From the total investment cost, the highest share (Birr 7.30 million or 72.66%) is accounted by fixed investment cost followed by initial working capital (Birr 1.71 million or 17.03%) and Pre operating cost (Birr 1.03 million or 10.31%). From the total investment cost, Birr 3.26 million or 32.44% is required in foreign currency.

Table 7.1

INITIAL INVESTMENT COST ('000 Birr)

Sr. No	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	**Fixed investment**				
1.1	Land Lease	26.60		26.60	0.26
1.2	Building and civil work	2,500.00		2,500.00	24.88
1.3	Machinery and equipment	815.06	3,260.22	4,075.28	40.55
1.4	Vehicles	450.00		450.00	4.48
1.5	Office furniture and equipment	250.00		250.00	2.49
	Sub total	**4,041.66**	**3,260.22**	**7,301.88**	**72.66**
2	**Pre operating cost ***				
2.1	Pre operating cost	378.76		378.76	3.77
2.2	Interest during construction	657.47		657.47	6.54
	Sub total	**1,036.23**		**1,036.23**	**10.31**
3	**Working capital ****	**1,711.83**		**1,711.83**	**17.03**
	Grand Total	**6,789.72**	**3,260.22**	**10,049.94**	**100**

* *N.B Pre operating cost include project implementation cost such as installation, startup, commissioning, project engineering, project management etc and capitalized interest during construction.*

** *The total working capital required at full capacity operation is Birr 2.31 million. However, only the initial working capital of Birr 1.71 thousand during the first year of production is assumed to be funded through external sources. During the remaining years the working capital requirement will be financed by funds to be generated internally (for detail working capital requirement see Appendix 7.A.1).*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 10.35 million (see Table 7.2). The cost of raw material account for 62.76% of the production cost. The other major components of the production cost are depreciation, labor and financial cost, which account for 10.68%, 8.96% and 6.11%, respectively. The remaining 11.49% is the share of utility, repair and maintenance, labor overhead, marketing and distribution and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (YEAR THREE)

Items	Cost (000 Birr)	%
Raw Material and Inputs	6,496.00	62.76
Utilities	96.00	0.93
Maintenance and repair	203.76	1.97
Labour direct	927.60	8.96
Labour overheads	139.14	1.34
Administration Costs	250.00	2.42
Land lease cost	-	-
Cost of marketing and distribution	500.00	4.83
Total Operating Costs	**8,612.50**	**83.20**
Depreciation	1,105.81	10.68
Cost of Finance	632.82	6.11
Total Production Cost	**10,351.13**	**100**

C. FINANCIAL EVALUATION

1. Profitability

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax ranges from Birr 2.36 million to Birr 2.62 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 25.01 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4, respectively.

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 for capacity utilization and sales value estimated by using income statement projection are computed as followed.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 5{,}244{,}540$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 36.71\%$$

4. Payback Period

The pay -back period, also called pay- off period is defined as the period required for recovering 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 3 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 project is computed to be 31.93% indicating the viability 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 principle, a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 10% discount rate is found to be Birr 11.59 million which is acceptable. For detail discounted cash flow see Appendix 7.A.5.

D. ECONOMIC AND SOCIAL BENEFITS

The project can create employment for 51 persons. The project will generate Birr 5.34 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 also create backward linkage with mining subsector and forward linkage with manufacturing sub sector and also generate income for the Government in terms of payroll tax.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.1
NET WORKING CAPITAL (in 000 Birr)

Items	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Total inventory	1,218.00	1,380.40	1,624.00	1,624.00	1,624.00	1,624.00	1,624.00	1,624.00	1,624.00	1,624.00
Accounts receivable	548.70	616.30	717.71	717.71	718.42	718.42	718.42	718.42	718.42	718.42
Cash-in-hand	15.84	17.95	21.12	21.12	21.24	21.24	21.24	21.24	21.24	21.24
CURRENT ASSETS	**1,782.54**	**2,014.65**	**2,362.83**	**2,362.83**	**2,363.66**	**2,363.66**	**2,363.66**	**2,363.66**	**2,363.66**	**2,363.66**
Accounts payable	70.71	80.14	94.28	94.28	94.28	94.28	94.28	94.28	94.28	94.28
CURRENT LIABILITIES	**70.71**	**80.14**	**94.28**	**94.28**	**94.28**	**94.28**	**94.28**	**94.28**	**94.28**	**94.28**
TOTAL WORKING CAPITAL	**1,711.83**	**1,934.51**	**2,268.55**	**2,268.55**	**2,269.38**	**2,269.38**	**2,269.38**	**2,269.38**	**2,269.38**	**2,269.38**

Appendix 7.A.2
PRODUCTION COST (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	4,872	5,522	6,496	6,496	6,496	6,496	6,496	6,496	6,496	6,496
Utilities	72	82	96	96	96	96	96	96	96	96
Maintenance and repair	153	173	204	204	204	204	204	204	204	204
Labour direct	696	788	928	928	928	928	928	928	928	928
Labour overheads	104	118	139	139	139	139	139	139	139	139
Administration Costs	188	213	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**6,584**	**7,396**	**8,613**	**8,613**	**8,621**	**8,621**	**8,621**	**8,621**	**8,621**	**8,621**
Depreciation	1,106	1,106	1,106	1,106	1,106	125	125	125	125	125
Cost of Finance	0	723	633	542	452	362	271	181	90	0
Total Production Cost	**7,690**	**9,225**	**10,351**	**10,261**	**10,179**	**9,108**	**9,017**	**8,927**	**8,836**	**8,746**

Appendix 7.A.3
INCOME STATEMENT (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales revenue	9,365	10,614	12,487	12,487	12,487	12,487	12,487	12,487	12,487	12,487
Less variable costs	6,084	6,896	8,113	8,113	8,113	8,113	8,113	8,113	8,113	8,113
VARIABLE MARGIN	**3,281**	**3,718**	**4,375**	**4,375**	**4,375**	**4,375**	**4,375**	**4,375**	**4,375**	**4,375**
in % of sales revenue	35.03	35.03	35.03	35.03	35.03	35.03	35.03	35.03	35.03	35.03
Less fixed costs	1,606	1,606	1,606	1,606	1,614	634	634	634	634	634
OPERATIONAL MARGIN	**1,675**	**2,113**	**2,769**	**2,769**	**2,760**	**3,741**	**3,741**	**3,741**	**3,741**	**3,741**
in % of sales revenue	17.88	19.90	22.17	22.17	22.10	29.96	29.96	29.96	29.96	29.96
Financial costs		723	633	542	452	362	271	181	90	0
GROSS PROFIT	**1,675**	**1,389**	**2,136**	**2,226**	**2,308**	**3,379**	**3,470**	**3,560**	**3,651**	**3,741**
in % of sales revenue	17.88	13.09	17.10	17.83	18.48	27.06	27.79	28.51	29.23	29.96
Income (corporate) tax	0	0	0	0	0	1,014	1,041	1,068	1,095	1,122
NET PROFIT	**1,675**	**1,389**	**2,136**	**2,226**	**2,308**	**2,366**	**2,429**	**2,492**	**2,555**	**2,619**
in % of sales revenue	17.88	13.09	17.10	17.83	18.48	18.94	19.45	19.96	20.46	20.97

Appendix 7.A.4
CASH FLOW FOR FINANCIAL MANAGEMENT (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	**7,681**	**11,805**	**10,623**	**12,501**	**12,487**	**12,487**	**12,487**	**12,487**	**12,487**	**12,487**	**12,487**	**4,453**
Inflow funds	7,681	2,440	9	14	0	0	0	0	0	0	0	0
Inflow operation	0	9,365	10,614	12,487	12,487	12,487	12,487	12,487	12,487	12,487	12,487	0
Other income	0	0	0	0	0	0	0	0	0	0	0	4,453
TOTAL CASH OUTFLOW	**7,681**	**9,024**	**9,255**	**10,498**	**10,059**	**9,978**	**10,900**	**10,837**	**10,774**	**10,711**	**9,743**	**0**
Increase in fixed assets	7,681	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	1,783	232	348	0	1	0	0	0	0	0	0
Operating costs	0	6,084	6,896	8,113	8,113	8,121	8,121	8,121	8,121	8,121	8,121	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	0	0	1,014	1,041	1,068	1,095	1,122	0
Financial costs	0	657	723	633	542	452	362	271	181	90	0	0
Loan repayment	0	0	904	904	904	904	904	904	904	904	0	0
SURPLUS (DEFICIT)	**0**	**2,781**	**1,368**	**2,004**	**2,428**	**2,509**	**1,587**	**1,650**	**1,713**	**1,776**	**2,744**	**4,453**
CUMULATIVE CASH BALANCE	**0**	**2,781**	**4,149**	**6,153**	**8,581**	**11,090**	**12,676**	**14,326**	**16,039**	**17,816**	**20,559**	**25,013**

Appendix 7.A.5
DISCOUNTED CASH FLOW (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	**0**	**9,365**	**10,614**	**12,487**	**12,487**	**12,487**	**12,487**	**12,487**	**12,487**	**12,487**	**12,487**	**4,453**
Inflow operation	0	9,365	10,614	12,487	12,487	12,487	12,487	12,487	12,487	12,487	12,487	0
Other income	0	0	0	0	0	0	0	0	0	0	0	4,453
TOTAL CASH OUTFLOW	**9,392**	**6,807**	**7,730**	**8,613**	**8,613**	**8,621**	**9,635**	**9,662**	**9,689**	**9,716**	**9,743**	**0**
Increase in fixed assets	7,681	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	1,712	223	334	0	1	0	0	0	0	0	0	0
Operating costs	0	6,084	6,896	8,113	8,113	8,121	8,121	8,121	8,121	8,121	8,121	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	0	0	1,014	1,041	1,068	1,095	1,122	0
NET CASH FLOW	**-9,392**	**2,558**	**2,884**	**3,875**	**3,874**	**3,866**	**2,852**	**2,825**	**2,798**	**2,771**	**2,744**	**4,453**
CUMULATIVE NET CASH FLOW	**-9,392**	**-6,835**	**-3,950**	**-76**	**3,798**	**7,664**	**10,516**	**13,341**	**16,139**	**18,910**	**21,653**	**26,107**
Net present value	-9,392	2,325	2,384	2,911	2,646	2,400	1,610	1,450	1,305	1,175	1,058	1,717
Cumulative net present value	-9,392	-7,067	-4,683	-1,772	873	3,274	4,884	6,334	7,639	8,814	9,872	11,589

NET PRESENT VALUE	11,589
INTERNAL RATE OF RETURN	31.93%
NORMAL PAYBACK	3 years