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Feasibility Study of

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The Rehabilitation and Expansion

Of The

MISR SPINNING AND WEAVING COMPANY

Mehalla El Kubra, Egypt

For

Agency for International Development
Department of State
Washington, D.C.

By

KURT SALMON ASSOCIATES, INC.
Management Consultants
Atlanta, Georgia

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KSA

Kurt Salmon Associates, Inc. Management Consultants
400 Colony Square, Atlanta, Georgia 30361 (404) 892-0521 Cable: KURSALAS

Agency for International Development
Department of State
Washington, D.C. 20523

Gentlemen:

We are pleased to present this report on a study of the technical and economic feasibility of the rehabilitation and expansion of the Misr Spinning and Weaving Company of Mehalla El Kubra, Egypt.

The study basically concludes that an investment program of $95,600,000 (U.S. dollars) and $38,200,000 in local Egyptian currency over the next three years is technically and economically feasible. This report contains the findings, observations and analyses supporting this conclusion.

The study team wishes to express its sincere gratitude and appreciation for the superb assistance and cooperation of Dr. Ghoroury, the chairman of the company, and his staff during the on-site portion of the study. Without the long hours and diligent effort on the part of the company's management during the team's work in Egypt, this study could not have been completed within the time limits imposed and in the depth required.

The conduct of this study for the Agency for International Development was both professionally rewarding and personally satisfying. We appreciate the opportunity afforded us to provide this assistance.

Respectfully submitted,

Kurt Salmon Associates, Inc.

KURT SALMON ASSOCIATES, INC.

RHHinck
JDJohnson
GLTurbyfill
GAVercaemert
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FOREWORD

This report on the study of the rehabilitation and expansion of the Misr Spinning and Weaving Company of Mehalla El Kubra, Egypt, is divided into the following four parts:

Part One	—	Executive Summary
Part Two	—	Detailed Analyses of Proposed Investments
Part Three	—	Recommended Technical Assistance
Part Four	—	Financial Analysis

For those wishing only an overview of the study, Part One is recommended. For those wishing an overview plus the financial analysis, Parts One and Four are recommended. Part Two contains the technical evaluations and individual project estimates. Part Three outlines suggested technical assistance programs and some general observations for management.

Throughout the report, the terms Misr Spinning and Weaving Company and Mehalla are used interchangeably to identify the company.

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PART ONE

EXECUTIVE SUMMARY

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SECTION I: STUDY OBJECTIVES, SCOPE AND PROCEDURE

A. OBJECTIVE OF THE STUDY

The basic objective of this study was to determine the resource requirements in equipment, materials and manpower to rehabilitate and expand the Misr Spinning and Weaving Company located in Mehalla El Kubra, Egypt (A.R.E.).

Within this overall objective, the following specific items were to be accomplished:

1. Determination of the technical feasibility of a rehabilitation plan prepared by the Misr Spinning and Weaving Company.

2. Determination as to whether the equipment proposed in the rehabilitation plan was suitable for the planned products, sufficient for the projected volumes and balanced adequately for the planned product mixes.

3. Determination as to whether projections for supervision, labor complements and skill requirements were realistic and adequate.

4. Determination as to whether utilization of current and proposed space was efficient and adequate.

5. Determination of the adequacy of auxiliary facilities and equipment including boilers, power generating plant, fire fighting and fire protection equipment, workshops, and materials handling.

6. Development of recommendations for alternative equipment, quantities, and plant layouts where these were believed to be advantageous.

7. Development of recommendations for technical assistance where such assistance was deemed necessary to ensure optimum results from the proposed expenditures.

8. Development of cost estimates for proposed equipment and technical assistance.

9. Development of an economic analysis of the proposed rehabilitation program.

10. Preparation of this report covering the findings, recommendations and conclusions.

B. SCOPE OF THE STUDY

The scope of the study included the following:

1. Cotton system yarn spinning for cotton and cotton/synthetic fiber blend yarns.

2. Weaving of cotton and cotton/synthetic fiber blend fabrics.

3. Dyeing, printing and finishing of cotton and cotton/synthetic fiber blend fabrics.

4. Woolen system yarn spinning.

5. Worsted system yarn spinning.

6. Wool weaving.

7. Woolen and worsted yarn and fabric dyeing and finishing.

8. Garment manufacturing.

9. Power station and boilers.

10. Workshops.

11. Materials handling.

12. Fire protection.

The scope of the study did not include an analysis or evaluation of current or projected markets or market potentials, and it was assumed that the market plans supplied by Misr Spinning and Weaving Company were valid.

C. STUDY PROCEDURE

The procedure used in conducting the study was generally as follows:

1. A team of five consultants visited Misr Spinning and Weaving Company in Mehalla El Kubra during the first three weeks in March.

2. During the visit, the team did the following:

a. Interviewed key management and supervisory personnel.

b. Visited the individual manufacturing units to observe current operating conditions.

c. Obtained historical and current data on operating performances and costs.

d. Obtained sales, product and market data and projections.

e. Reviewed the "Study on Prospective Extensions and Renewals" of Misr Spinning and Weaving Company presented to A.I.D. dated January 1976.

f. Discussed the rationale of the proposed rehabilitation plan in detail with management of Misr Spinning and Weaving Company.

g. Developed logical alternatives to the proposed plans with management of Misr Spinning and Weaving Company.

h. Reviewed tentative conclusions with management of Misr Spinning and Weaving Company.

3. Upon returning to the United States, the team did the following:

a. Analyzed production requirements, capacities and balance of the manufacturing units involved in the proposed rehabilitation project.

b. Developed equipment requirements.

c. Obtained estimated equipment prices.

d. Performed an economic analysis of the proposed project.

e. Prepared this report on the findings, conclusions and recommendations.

SECTION II: GENERAL DESCRIPTION OF THE COMPANY

A. BRIEF HISTORY

Misr Spinning and Weaving Company is one of the world's largest textile complexes concentrated in one location. The company's foundation was authorized in 1927 with an initial capitalization of £E 300,000. Today the capitalization is £E 4,000,000. Production started in 1931 with cotton spinning and weaving. Subsequently, woolen spinning and weaving production was started in 1939 and ready-made garment production in 1957.

During the early period of the company's history, concentration was devoted to introduction and acceptance of the company's products in the domestic market. During World War II, the company benefited from the reduction of imported textiles to further expand and solidify its position in the domestic market. About 1950, the company began to export its products and exports today are an important contributor to the company's sales and profits.

The nationalization of the company was started in 1961 and completed in 1963.

B. PRODUCTS

Today, the Misr Spinning and Weaving Company is a vertically integrated textile company, from fiber to finished products. The primary products currently produced are as follows:

1. Cotton Yarns

Coarse, medium and fine counts. Greige, mercerized, bleached and dyed. Singles, doubled and cabled. Used for weaving, knitting, sewing thread and fish nets.

2. Cotton Fabrics

Fabrics of various widths, constructions and weights for apparel, industrial uses and home furnishings. Greige, piece dyed, yarn dyed and printed.

3. Woolen, Worsted and Wool Blend Yarns

Yarns for weaving and knitting.

4. **Woolen, Worsted and Woolen Blend Fabrics**

   Yarn dyed and piece dyed for use in apparel.

5. **Ready-made Garments**

   Including shirts, pajamas, trousers, work suits, military uniforms, aprons, shop coats and other miscellaneous apparel products.

6. **Home Furnishings**

   Towels, blankets, tablecloths, napkins, sheets and pillowcases.

   Cotton/wool, gauze bandages and surgical dressings.

In 1975, the company produced approximately 34,800 tons of cotton yarn, 141 million meters of cotton fabric. Approximately 41 million meters of the fabric were dyed and 57 million meters were printed. Approximately 1,880 tons of woolen and worsted yarns and 2,880,000 meters of woolen and worsted fabrics were produced. Blanket production was approximately 70,000 units and approximately 6 million units of apparel and textile consumer products were fabricated.

C. PHYSICAL SIZE AND STRUCTURE

The company covers an area of approximately 640 acres. Within this complex are located the following manufacturing facilities:

Cotton System Spinning Plants	—	6
Yarn Twisting Unit	—	1
Central Slashing Department	—	1
Waste Plant	—	1
Cotton Weaving Sheds	—	13
Integrated Cotton Bleaching, Dyeing, Printing and Finishing Plant	—	1
Woolen Plant Comprising Woolen and Worsted Spinning, Weaving, Dyeing and Finishing	—	1
Cotton Wool Plant	—	1
Apparel Plant	—	1

In addition to the manufacturing units, the company is virtually self-sufficient as to its auxiliary needs. Within the complex are located the following service facilities:

1. A water plant with a capacity of 48,000 cubic meters per day.

2. A power station capable of producing 50,000 kilowatts with boilers capable of producing 400 tons of steam per hour.

3. Mechanical, electrical and carpentry workshops for equipment maintenance and manufacture of spare parts.

4. Two fire stations.

5. A training center.

In addition, the company maintains or supports numerous facilities for its employees. Among these are the following:

1. 1,800 dwellings.

2. Restaurant.

3. Athletic facilities for sports such as soccer, tennis, basketball, volleyball, swimming and diving, gymnastics.

4. Playgrounds.

5. Three cinemas.

6. Theatre.

7. Library.

8. Social club.

9. Two primary schools.

10. Secondary school.

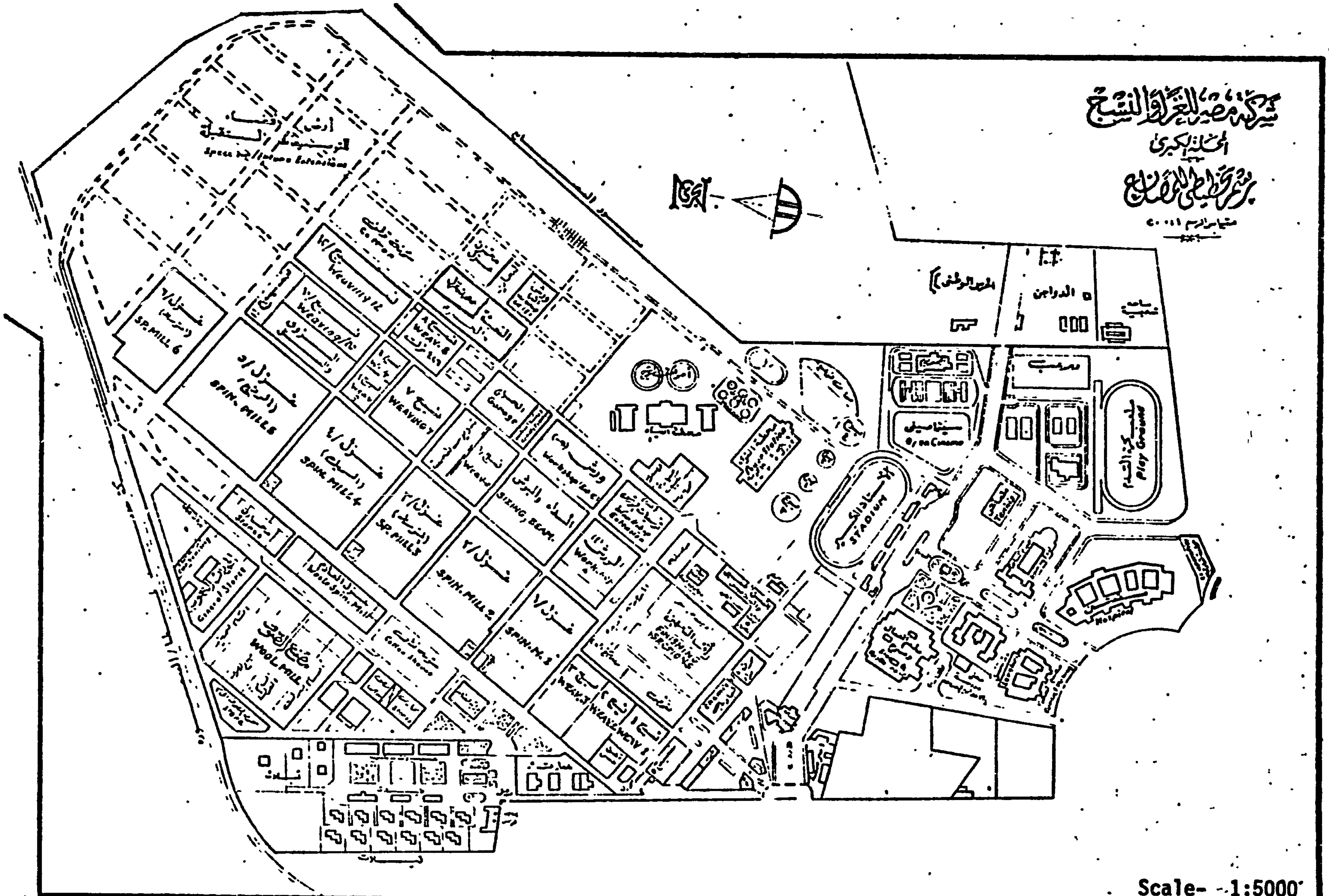
11. A 257-bed hospital.

12. Cooperative societies for food, household appliances, cottage industries and poultry raising.

A plan of the complex follows as Exhibit I.

EXHIBIT I

MISR SPINNING AND WEAVING COMPANY, MEHALLA EL KUBRA, EGYPT



D. POSITION WITHIN THE TEXTILE INDUSTRY

In 1975, the company's position within the Egyptian public textile sector was as follows:

1. Produced 15% of the sector's production value.
2. Accounted for 17.8% of the sector's exports.
3. Accounted for 12.1% of the sector's domestic sales.
4. Accounted for 13.4% of the sector's total sales.
5. Employed 12.4% of the sector's total employees.
6. Paid 15% of the sector's total wages.
7. 1975 sales volume of the company was £E 54,881,000.

In 1974, textiles accounted for 47% of all of Egypt's manufactured exports.

E. FINANCIAL POSITION

The company has a very strong financial position as exemplified by the following:

Current Assets at End of 1975	—	£E 41,995,000
Cash at End of 1975	—	3,350,000
Total Current Liabilities at End of 1975	—	14,147,000
Total Equity at End of 1975	—	56,033,000
Long-Term Loans at End of 1975	—	3,329,000
Range of Pre-tax Profit as % of Sales for 1971-1975	—	13.7% to 24.8%

F. PERSONNEL AND MANAGEMENT

The company employs approximately 35,400 persons. In 1975, 925 persons were hired and 1,067 persons left the company for all reasons; thus, the annual labor turnover was only about 3%. Over the next five years, 2,992 employees are expected to retire; approximately 8% of the current employment. In 1975 absenteeism averaged about 4% when military training and service and annual leave are excluded; the figure was about 25% when these items were included.

The company's training center provides prevocational training for approximately 600 persons each year, vocational training for about 1,000 persons and various managerial, supervisory, productivity and cultural programs for another 2,400. Additional training is given to employees of other companies; amounting to about 1,200 persons.

Labor productivity improvement is one of the pressing needs of Misr Spinning and Weaving Company. With current laws making it difficult to reduce the work force, and with only about 8% of the employees expected to retire within the next five years, the improvement of labor productivity is one of management's most difficult and challenging tasks.

The 42 managers of the company range in age from 40 to 59 and in experience from 18 to 41 years. All of the managers have college degrees or vocational diplomas. Five of the managers have received additional education in the United Kingdom and one in the United States. Women hold several key management positions.

The managerial staff, for the most part, appear to be capable and dedicated. The esprit de corp among the managerial group appears to be very high. The top management leadership is outstanding.

To aid management in planning and control, the company has a 32 K, ICL 1903 S computer. Currently, the computer performs the functions of payroll, invoicing, inventory accounting (other than raw materials), quality control, cost analysis and job costing for the workshops. Future planned applications are for production planning, color matching and pattern grading.

G. EQUIPMENT

The company has a wide range of equipment — from old and obsolete to modern. The equipment has been purchased from many countries — the United States, the United Kingdom, Eastern Bloc Countries, Western Europe and Japan. Because of the variety of equipment and the country of origin, availability of the required foreign exchange for spare parts has, at times, necessitated the manufacture of spare parts by the company. In some cases, particularly with the more modern equipment, this has resulted in less than optimum quality of spare parts, leading to excessive downtime and relatively low efficiencies.

H. ENVIRONMENT

For a manufacturing complex as large as the Misr Spinning and Weaving Company, the grounds and facilities are exceptionally well maintained. The environment is considered by management in its investment and expansion programs and the overall environment of the complex is relatively clean.

I. RATIONALE FOR REHABILITATION AND EXPANSION

The basic rationale for rehabilitation and expansion is the attainment of a good financial return in order to ensure the future viability and profitability of the company. The following are the keys to the attainment of a good return on the proposed investments:

1. Increased labor productivity.

2. Increased machine efficiencies.

3. Increased capacity for producing quality yarns for export.

4. Increased ability to produce blended yarns and fabrics.

5. Improved ability to apply new fabric finishes in order to achieve better grades of fabrics.

6. Increased ability to produce quality ready-made garments suitable for export.

7. Increased efficiency of the woolen and worsted operations.

8. Increased capacity for weaving wider fabrics.

9. Upgrading of the power plant to ensure sustained and continuous low cost power.

SECTION III: SUMMARY OF PROPOSED INVESTMENTS

A. INTRODUCTION

In Part Three of this report is a detailed description of the proposed investments. Where these differ significantly from those originally proposed by Misr Spinning and Weaving Company in their "Study on Prospective Extensions and Renewals," presented to A.I.D. in January, 1976, the rationales for the new proposals are described. In most instances, the proposals in this report were discussed in general terms with Mehalla management while the study team was in Egypt.

In Exhibit II, which follows, is a table summarizing the original Mehalla investment proposals and those recommended as a result of this study.

EXHIBIT II

SUMMARY OF PROPOSED AND SUGGESTED INVESTMENT PLAN

Item No.	Investment Plan	Investments As Projected By Mehalla: Foreign Exchange in US $	Local Currency in US $	Total US $	Investments As Suggested By KSA: Foreign Exchange in US $	Local Currency in US $	Total US $	Original A.I.D. Request Ref. Annex 13
1.	Cotton Yarn Mill 7	13,560,300	3,633,000	17,193,300	20,423,000	7,891,500	28,314,500	Table 1
2.	Cotton Weaving	18,099,200	1,538,400	19,637,600	12,253,740	2,546,800	14,800,540	Table 2
3.	Rehabilitation Cotton Equipment	Not Requested			1,386,750	180,500	1,567,250	None
4.	Twisting and Sewing Thread	Not Requested			875,250	119,000	994,250	None
5.	Cotton Finishing	9,082,880	–	9,082,880	9,156,210	7,942,869	17,099,079	Table 3
6.	Woolen and Worsted	17,258,000	384,600	17,642,600	12,106,716	3,762,486	15,869,202	Tables 6 – 12
7.	Apparel	2,564,000	–	2,564,000	3,310,526	351,942	3,662,468	Table 13
8.	Power Station	6,758,000	2,564,000	9,322,000	10,763,000	6,829,500	17,592,500	Table 4
9.	Foundry and Shops	880,000	–	880,000	878,000	169,800	1,047,800	Table 5
10.	Materials Handling	1,000,000	–	1,000,000	2,440,000	330,400	2,770,400	Table 14
11.	Fire Protection	1,000,000	–	1,000,000	344,000	44,700	388,700	Table 14
	Subtotal	70,202,380	8,120,000	78,322,380	73,937,192	30,169,497	104,106,689	
	Freight + Insurance	7,020,000	–	7,020,000		Included in Individual Plans		
	Import Duties	–	9,346,000	9,346,000		Included in Individual Plans		
	Clearing + Local Transport.	–	1,756,000	1,756,000		Included in Individual Plans		
	Erection	377,000	690,000	1,067,000		Included in Individual Plans		
	Grand Total Before Contingencies	77,599,380	19,912,000	97,511,380	73,937,192	30,169,497	104,106,689	
	Contingencies (15.5% Mehalla/ 10% KSA)	12,038,000	3,028,000	15,066,000	7,393,719	3,016,950	10,410,669	
	Inflation (15% After Contingencies)	–	–	–	12,199,637	4,977,967	17,177,604	
	Total With Contingencies and Inflation	89,637,380	22,940,000	112,577,380	93,530,548	38,164,414	131,694,962	
	Proposed Technical Assistance				2,105,000	–	2,105,000	
	Total				95,635,548	38,164,414	133,799,962	

From this exhibit, it may be seen that the total U.S. dollar requirements, before contingencies, were $77,600,000 in Mehalla's original proposal and $74,000,000 as recommended in this report. Mehalla added 15.5% for contingencies and, in this report, 10% was added for contingencies and then 15% was provided for inflation. The resulting U.S. dollar requirements become $89,600,000 and $93,500,000 respectively. To the basic investment requirements, $2,105,000 of technical assistance has been recommended in this report; making the U.S. dollar requirements $89,600,000 as proposed by Mehalla and $95,600,000 proposed in this report.

Local currency requirements as originally proposed by Mehalla were $22,900,000 and, as proposed in this report, are $38,200,000. The difference in these figures is attributable primarily to an attempt in this study to quantify all expected local currency expenditures, to significantly higher construction costs than projected by Mehalla and to a higher contingency plus inflation factor.

The total estimated project costs, U.S. dollars and local currency expenditures expressed in U.S. dollars, are $112,500,000 for the original Mehalla proposal and $133,800,000 proposed in this study.

B. BRIEF DESCRIPTION OF PROPOSED INVESTMENTS

In Appendices I through XIII at the back of this section are summaries of the proposed investments. A very brief summary of these proposed investments, more fully described in Part Two of this report, follows.

1. New Cotton Yarn Spinning Mill

A new yarn mill for producing medium counts including polyester/cotton blends is proposed. The proposed mill would have 54,078 ring spinning spindles. The plant is proposed in order to create additional capacity for producing medium count yarns, to provide ability to spin polyester/cotton blends, to promote yarn exports and to balance future increase of weaving capacity. It is recommended that no existing yarn spinning be closed at this time. A new, airconditioned plant will be required.

2. **Cotton Weaving**

The scrapping of 456 old looms and the addition of 670 new looms is recommended. In addition, two new warpers and three new slashers are recommended. Auxiliary equipment such as Unifils, knotting machines, shearing machines and plaiting machines are recommended.

The proposed investments will meet 1980 production requirements, will expand capacity of the most profitable products and will avoid new building construction.

3. **Rehabilitation of Existing Cotton Equipment**

It is recommended that investment be made in U.S. supplier produced original spare parts in order to overhaul certain looms, manual winders and combers, the objective to be improved productivity and quality on a more economical basis than replacing the equipment.

4. **Twisting and Sewing Thread**

New twisting and mercerizing equipment is recommended in order to replace some older twisting equipment, expand capacity and permit manufacture of sewing thread for the garment plant and for possible external sales.

5. **Cotton Dyeing, Printing and Finishing**

A variety of equipment is recommended for the cotton dyeing, printing and finishing plant. The basic objectives of the recommended equipment are to add capacity for projected increase in volume; to permit dyeing and finishing of a higher volume of cotton/polyester fabrics; permit mercerizing a greater portion of the production; allow for printing of wide sheeting; and improve overall quality levels.

The major items of equipment recommended include a rope bleaching range; one open width bleach range; two chain mercerizing units; one caustic recovery unit; one Thermosol range; two roller screen print machines; one steamer; one washing range; two batching tenters; three stenters; four calenders and two calender presses; one curing oven and one curing range.

6. Wool Mill

Recommended investments in the wool mill include new woolen spinning equipment, new worsted spinning equipment, three new warpers, new weft winding equipment, 151 new looms and new fabric finishing and inspection equipment.

The objectives of the wool mill investments are to expand capacity, replace obsolete equipment, improve quality and provide newer finishing technology to permit special finishes to be imparted to the fabrics.

7. Apparel

The recommended investment for apparel manufacture consists of a new apparel unit of 435 sewing and finishing machines plus auxiliary equipment and the replacement of 430 sewing and finishing machines. In addition, a technical assistance program is recommended to ensure the proper start-up and development of the new sewing unit. The new unit will be housed in an existing building.

The apparel investment program has as its objectives the expansion of capacity, the improvement of quality and the increase of labor productivity.

8. Power Plant

The recommended investment for the power plant is for one 20 Megawatt turbine generator and one 150 tons per hour boiler; plus controls, water treatment plant, cooling tower and accessories.

The objectives of this investment are to provide additional power and steam capacity for expanded spinning, weaving, dyeing, finishing and increased airconditioning; to update existing equipment; to ensure continuity of power and steam supply.

9. Foundry and Shops

Investments recommended here include a new foundry, new heat treatment equipment, new forging equipment and modern measurement equipment.

The basic objectives of this investment are to improve the quality of the cast iron used to make replacement parts.

10. Materials Handling

A study of the overall materials handling system is recommended in order to determine the feasibility and economic justification of a mechanized materials handling system. Contingent upon the results of such a study, estimates have been included for a mechanized system of handling yarn, warp beams, loom beams and cloth rolls.

The objectives of the investment are to reduce labor requirements and costs, improve flow of materials to reduce bottlenecks and downtime and reduce incidence of product damage due to handling.

11. Fire Fighting and Fire Protection

Two new fire trucks, one with a 75-foot extension platform and smoke detection equipment is recommended.

The objective of this investment is to improve fire detection and fire fighting capability.

SECTION IV: SUMMARY OF PROPOSED TECHNICAL ASSISTANCE

To aid in ensuring the proper selection of equipment and the attainment of the forecast return on the proposed investments, several technical assistance programs have been recommended. These are described more fully in Part Three of this report. Following is a list of these recommended programs and the estimated cost of each:

Technical Assistance Program		Estimated Cost
Master Development Plan (CPM and PERT)	—	$ 70,000
Materials Handling Study	—	165,000
Development of Equipment Specifications	—	60,000
Bid Evaluations	—	120,000
Survey of Cotton Spinning and Weaving	—	50,000
Waste Reduction and Control Programs		
— Cotton Spinning	—	160,000
— Cotton Weaving	—	200,000
Production Control Programs		
— Cotton Spinning	—	120,000
— Cotton Weaving	—	140,000
Cost Reduction Programs		
— Cotton Spinning	—	400,000
— Cotton Weaving	—	400,000
Engineering of Warping and Sizing	—	60,000
Start-up Assistance in New Yarn Mill	—	160,000
Total Estimated Cost	—	$2,105,000

These assistance programs would be spread out over a period of about three years. While some are directly connected to the proposed project expenditures (Master Development Plan, Equipment Specifications, Bid Evaluations, New Plant Start-up Assistance, Materials Handling Study), others concern existing operations and their effect on the overall project. The implementation of these programs should more than pay for their costs through cost reductions over and above the cost reductions of the proposed investment program. More importantly, perhaps, they would provide Mehalla staff with training in modern textile management techniques and the application of these techniques to attain results which can be extended to other areas of the company and applied to expanded operations in the future.

Industrial engineering and analytical operator training are emphasized in these proposed technical assistance programs. These are functions in which Mehalla is relatively weak and which are fundamental to the attainment of high levels of productivity; one of the key challenges facing Mehalla's management.

SECTION V: SUMMARY OF FINANCIAL ANALYSIS OF RECOMMENDED INVESTMENTS

A. INTRODUCTION

In Part Four of this report is a financial analysis of the proposed investment program. This analysis contains:

1. A review of the recent financial performance of the company.
2. Profitability by major product group.
3. Review of proposed investments.
4. Projected sales volume increases.
5. Projected future profits.
6. A cash flow analysis to determine Mehalla's ability to repay the proposed loan.
7. Comments on contingencies, inflation and subsidies.

Following is a brief summary of the financial analysis.

B. GENERAL BACKGROUND

Based on original purchase price, 54.2% of present equipment is 12 or more years old. The original cost of Mehalla's equipment was $68,492,000.

Assuming a 10% inflation rate, the current replacement cost of equipment over 12 years old is estimated to be $116,000,000. Pre-tax profits for the five years, 1971 through 1975, ranged from 13.7% to 24.9% of net sales and averaged 18.1%. Without subsidies, the operating profits for this period averaged 12.8% of net sales. This is substantially better than most U.S. textile firms.

An analysis of the operating profits of the major product groups indicate that all are profitable; with cotton yarns showing the greatest profitability, followed by wool fabrics and garments.

As noted earlier in this section, the proposed investments amount to $95,600,000 (U.S. dollars) and $38,200,000 in local currency; or a total of $133,800,000. Assuming that these investment programs are fully implemented by 1980, they should increase sales volume (based on current prices) from an estimated $147,500,000 in 1976 to $199,700,000 in 1980; an increase of $52,200,000, or 35.4%.

C. ECONOMIC JUSTIFICATION

Based upon the proposed investment program, an increase in annual operating profits (before taxes, interest and subsidies, but including depreciation) of $17,761,000 are projected. Based upon an estimated project cost of $104,100,000 (U.S. dollar requirements and local currency requirements, before contingencies and inflation), this would result in a 17.06% return on the project cost. Using an "average" investment figure of $52,000,000 over the straight line depreciated life of the equipment, the economic return on the investment would be 34.12%.

A cash flow analysis indicates that sufficient cash flow will be generated during the period 1976 through 1979 to cover the estimated $30,300,000 of local costs of the project; that sufficient cash flow will be generated to cover both interest payments and the loan repayments; and that additional cash flow of $250,000,000 will be generated over the loan repayment period to provide for further equipment replacement, expansion and increased inventories to properly service increased sales.

The above analysis is based upon the estimated project costs without a contingency factor and ignoring possible inflation. Allowing 10% for contingencies would reduce the economic return on the "average" investment from 34.1% to 29.8%. It has been assumed that increased costs caused by inflation will be passed on to customers, therefore maintaining projected profit margins. Additionally, the rapid escalation of equipment costs is an additional factor supporting the proposed investments.

The above analyses assume that Mehalla management will be able to staff the expanded operations with the existing work force. However, if present labor productivity levels are not improved and, assuming that one-half of the manufacturing wages vary with volume, labor costs would increase by 17.7% (one-half of the projected sales increase of 35.4%). Based upon the 10% contingency factor and an inability to increase labor productivity, the economic return on the "average" investment would be 19.1%.

A reasonable assumption is that the return on the "average" investment will be between 19.1% and 34.1%; the midpoint figure of 26.6% may be the most reasonable projection.

Currently, Mehalla pays about 40% of the world's prices for its cotton. Should the Egyptian government require that they pay \$.30 to \$.45 per pound more for this cotton, this would reduce the projected cash flow over the 16-year period, 1976 to 1991, from \$250,000,000 to about \$100,000,000 to \$150,000,000 after debt repayment. This assumes no export subsidies. This analysis indicates that the project would be viable even if cotton prices were increased.

SECTION VI: CONCLUSION

The proposed investment program for the Misr Spinning and Weaving Company appears to be economically sound. The company's past and projected financial performance indicates that the proposed loan and interest can be repaid from funds generated by the company. The proposed investment program will help ensure the future viability and profitability of the company; enabling the company to protect the employment of thousands of persons, to supply the local market with competitively priced textile products, and to increase exports and bring foreign exchange currency into the economy.

There are several key factors which bear on the company's ability to achieve optimum results from the proposed investment program. Among these are the following:

- The attainment of improved labor productivity in order to staff the expanded operations with the current work force.
- The ability to improve product quality, particularly for exports.
- The continuation of the strong, effective leadership presently being given to the company.

APPENDIX 1

SUMMARY OF INVESTMENT PLAN – YARN MILL NO. 7

NEW YARN COUNTS – MEDIUM COUNTS – 54,000 SPINDLES

Item No.	Description	Estimated Costs: Foreign Exchange in US $	Local Currency in US $	Total US $
1.	Processing Equipment CIF Value	$15,137,000		$15,137,000
2.	Import Duty on 1. (12%)		$1,816,500	1,816,500
3.	Clearing Local Transportation + Erection	152,000	152,000	304,000
4.	Auxiliary Equipment + Accessories CIF Value	1,742,000		1,742,000
5.	Import Duty on 4.		209,000	209,000
6.	Clearing + Local Transportation for 4.		9,000	9,000
7.	Spares (5%), Including Duty (12%)	757,000	91,000	848,000
8.	Electrical Substation, CIF + Distribution + Installation + Duty	785,000	200,000	985,000
9.	Airconditioning Equipment, CIF + Installation + Duty	1,850,000	380,000	2,230,000
	Subtotal Equipment Installed	$20,423,000	$2,857,500	$23,280,500
10.	Construction 22,880 Sq. Meters at 220		5,034,000	5,034,000
	Total Investment (Excluding Working Capital)	$20,423,000	$7,891,500	$28,314,500

APPENDIX 2

SUMMARY OF INVESTMENT PLAN – COTTON WEAVING

Item	Description	Estimated Cost in US $ Estimated Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Processing Equipment and Accessories CIF Value	$10,446,800		$10,446,800
2.	Import Duty on 1.(12%)	–	$1,254,000	1,254,000
3.	Clearing and Local Transportation and Erection	105,000	123,000	228,000
4.	Auxiliary Equipment and Accessories		Included in Item 1.	
5.	Import Duty on 4.		Included in Item 2.	
6.	Clearing and Local Transportation for 4.		Included in Item 3.	
7.	Spares (10%) Including Duty (12%)	1,044,500	125,300	1,169,800
8.	Electrical (Renovation and Connection Only) Estimated		134,000	134,000
9.	Airconditioning (Updating Only) Estimated		50,000	50,000
	Subtotal Equipment Installed	$11,596,300	$1,686,300	$13,282,600
10.	Construction (Updating Only) 10,050 at $65 Estimated		655,000	655,000
	Total Investment (Excluding Working Capital)	$11,596,300	$2,341,300	$13,937,600

APPENDIX 2A

SUMMARY OF INVESTMENT PLAN – WARPING AND SLASHING

		Estimated Cost in US $		
Item	Description	Estimated Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Processing Equipment – CIF Value	$606,440		$606,440
2.	Import Duty on 1. (12%)		$ 72,800	72,800
3.	Clearing and Local Transportation and Erection	20,500	112,000	132,500
4.	Auxiliary Equipment and Accessories		Included in Item 1.	
5.	Import Duty on 4.		Included in Item 2.	
6.	Clearing and Local Transportation for 4.		Included in Item 3.	
7.	Spares (5%) Including Duty (12%)	30,500	3,700	34,200
8.	Electrical (Renovation and Connection Only)		5,000	5,000
9.	Airconditioning		None	
	Subtotal Equipment Installed	$657,440	$193,500	$850,940
10.	Construction (Updating Only) Estimated		12,000	12,000
	Total Investment (Excluding Working Capital)	$657,440	$205,500	$862,940

APPENDIX 3

SUMMARY OF INVESTMENT PLAN

EQUIPMENT REHABILITATION (COTTON MILLS)

		Estimated Cost		
Item No.	Description	Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Equipment + Accessories CIF Value(1)	1,386,750		1,386,750
2.	Import Duty on 1. (12%)		166,500	166,500
3.	Clearing + Local Transportation + Erection		14,000	14,000
4.	Auxiliary Equipment + Accessories		Not Applicable	
5.	Import Duty on 4.		Not Applicable	
6.	Clearing + Local Transportation for 4.		Not Applicable	
7.	Spares Including Duty		Not Applicable	
8.	Electrical		Not Applicable	
9.	Airconditioning		Not Applicable	
	Subtotal Equipment Installed	1,386,750	180,500	1,567,250
10.	Construction		Not Applicable	
	Total Investment (Excluding Working Capital)	1,386,750	180,500	1,567,250

(1) Essentially no equipment but original spares.

APPENDIX 4

SUMMARY OF INVESTMENT PLAN

TWISTING AND SEWING YARN MANUFACTURING

Item No.	Description	Estimated Cost Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Equipment CIF Value	825,000		825,000
2.	Import Duty on 1. (12%)		99,000	99,000
3.	Clearing + Local Transportation + Erection	9,000	9,000	18,000
4.	Auxiliary Equipment + Accessories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing + Local Transportation for 4.		Included in 3.	
7.	Spares (5%) Including Duty (12%)	41,250	5,000	46,250
8.	Electrical (Connection Only)		6,000	6,000
9.	Airconditioning		None	
	Subtotal Equipment Installed	875,250	119,000	994,250
10.	Construction		None	
	Total Investment (Excluding Working Capital)	875,250	119,000	994,250

APPENDIX 5

SUMMARY OF INVESTMENT

COTTON DYEING AND FINISHING

Item No.	Description	Estimated Cost Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Processing Equipment + Accessories – CIF Value	8,557,206		8,557,206
2.	Import Duty on 1. (12%)		1,026,865	1,026,865
3.	Clearing + Local Transportation + Erection	85,572	85,572	171,144
4.	Auxiliary Equipment and Accesories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing and Local Transportation on 4.		Included in 3.	
7.	Spares (6%) Including Duty (12%)	513,432	61,612	575,044
8.	Electrical (Renovation & Connection) Estimate		171,144	171,144
9.	Airconditioning (Updating Only) Estimate		Not Applicable	
	Subtotal Equipment Installed	9,156,210	1,345,193	10,501,403
10.	Construction			
	(33,100 Sq. Mtrs. Avg $154/Sq. Mtr.)(1)		5,097,400	5,097,400
	(6,882 Sq. Mtrs. at $218/Sq. Mtr.)(2)		1,500,276	1,500,276
	Total Investment (Excluding Working Capital)	9,156,210	7,942,869	17,099,079

(1) Building to be started early 1978, completed mid 1979.
(2) Building presently under construction.

APPENDIX 6

SUMMARY OF INVESTMENT – WOOL MILL – YARN

		Estimated Cost in US $		
		Foreign Exchange	Local	Total
1.	Processing Equipment and Accessories – CIF Value			
	– Raw Wool Scouring	232,950		
	– Worsted Spinning	1,597,550		
	– Woolen Spinning	4,101,600		
	– Bulking, Reeling, Winding	183,800		
	Subtotal	6,115,900		
2.	Import Duty on 1. (12%)		733,908	
3.	Clearing and Local Transportation and Erection	122,320	61,160	
4.	Auxiliary Equipment and Accessories	Included in 1.		
5.	Import Duty on 4.	Included in 2.		
6.	Clearing and Local Transportation on 4.	Included in 3.		
7.	Spares (8%) Including Duty	489,272	58,713	
8.	Electrical (Renovation and Connection) Estimate		30,580	
9.	Airconditioning (Updating Only) Estimate	Not Applicable		
	Subtotal Equipment Installed	6,727,492	884,361	7,611,853
10.	Construction (6,000 Sq. Meters at $167)(1)		1,002,000	1,002,000
	Total Investment (Excluding Working Capital)	6,727,492	1,886,361	8,613,853

(1) 50% of total 12,000 square meters to be built for wool mill to be completed mid-1978.

APPENDIX 7

SUMMARY OF INVESTMENT – WOOL MILL – WEAVE AND FINISH

		Estimated Cost in US $		
		Foreign Exchange	Local	Total
1.	Processing Equipment and Accessories – CIF Value			
	– Weaving and Preparation	2,996,370		
	– Wool Dyeing and Finishing	1,591,510		
	– Inspection and Finishing	215,000		
	Subtotal of 1.	4,802,880		
2.	Import Duty on 1. (12%)		576,346	
3.	Clearing and Local Transportation and Erection	96,056	48,028	
4.	Auxiliary Equipment and Accessories	Included in 1.		
5.	Import Duty on 4.	Included in 2.		
6.	Clearing and Local Transportation on 4.	Included in 3.		
7.	Spares (10%) Including Duty (12%)	480,288	57,635	
8.	Electrical (Renovation and Connection) Estimate		192,116	
9.	Airconditioning (Updating Only) Estimate	Not Applicable		
	Subtotal Equipment Installed	5,379,224	874,125	6,253,349
10.	Construction (6,000 Sq. Meters at $167)(1)		1,002,000	1,002,000
	Total Investment (Excluding Working Capital)	5,379,224	1,876,125	7,255,349

(1) 50% of total 12,000 square meters to be built for wool mill to be completed mid-1978.

APPENDIX 8

SUMMARY OF INVESTMENT PLAN – APPAREL

NEW APPAREL UNIT PLUS EQUIPMENT REPLACEMENT

Description	Estimated Cost in US$ Foreign Exchange in US$	Local Currency in US$	Total US$
New Sewing Factory Plus Equipment Replacement (CIF Value)			
[$913,750 + $21,500 x 1.10 (Freight)]	$1,028,775		
[$924,304 + $21,750 x 1.10 (Freight)]	1,040,659		
	$2,069,434		$2,069,434
Auxiliary Equipment plus Accessories	405,682		405,682
Spare Parts	192,596		192,596
Erection	18,814		18,814
Technical Assistance	624,000		624,000
Clearing, Local Transport Plus Local Installation	–	$351,942	351,942
Total	$3,310,526	$351,942	$3,662,468

APPENDIX 9

SUMMARY OF INVESTMENT PLAN – POWER PLANT

Item No.	Description	Est. Cost in US $ Foreign Exchange in US $	Local Currency in US $	Total US $
1.	Equipment CIF Value	10,153,000		10,153,000
2.	Import Duty on 1. (12%)		1,218,500	1,218,500
3.	Clearing + Local Transportation + Erection	102,000	1,950,000(1)	2,052,000
4.	Auxiliary Equipment + Accessories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing + Local Transportation for 4.		Included in 3.	
7.	Spares (5%) Including Duty (12%)	508,000	61,000	569,000
8.	Electrical		Included in 3.	
9.	Airconditioning		None	
	Subtotal Equipment Installed	10,763,000	3,229,500	13,992,500
10.	Construction 3,000 Sq. Mtrs at 1,200 (Estimated)		3,600,000	3,600,000
	Total Investment (Excluding Working Capital)	10,763,000	6,829,500	17,592,500

(1) Includes $500,000 for turbine foundation.

APPENDIX 10

SUMMARY OF INVESTMENT PLAN – FOUNDRY AND SHOPS

Item No.	Description	Est. Cost in US $ Foreign Exchange in US $	Local Currency in US $	Total US $
1.	Equipment + Accessories CIF Value	793,000		793,000
2.	Import Duty on 1. (12%)		96,000	96,000
3.	Clearing + Local Transportation + Erection	45,000	64,000	109,000
4.	Auxiliary Equipment + Accessories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing + Local Transportation for 4.		Included in 3.	
7.	Spares (5%) Including Duty (12%)	40,000	4,800	44,800
8.	Electrical (Connection Only)		5,000	5,000
9.	Airconditioning		None	
	Subtotal Equipment Installed	878,000	169,800	1,047,800
10.	Construction		None(1)	
	Total Investment (Excluding Working Capital)	878,000	169,800	1,047,800

(1) Machinery foundations included in item 3.

APPENDIX 11

SUMMARY OF INVESTMENT PLAN – MATERIALS HANDLING

MATERIALS HANDLING SYSTEM

	Est. Cost in US $		
Description	Foreign Exchange in US $	Local Currency in US $	Total US $
Materials Handling System (Includes $220,000 Spare Parts)	2,420,000		2,420,000
Import Duty		290,400	290,400
Clearing + Local Transportation + Erection	20,000	40,000	60,000
Total Investment	2,440,000	330,400	2,770,400

APPENDIX 12

SUMMARY OF INVESTMENT PLAN – FIRE PROTECTION

NEW FIRE TRUCKS AND FIRE DETECTION EQUIPMENT

	Estimated Cost in US $		
	Foreign Exchange	Local	Total
Two Fire Trucks Plus Fire Detection Equipment (Including Spare Parts at $28,000)	344,000	–	344,000
Import Duty	–	44,700	44,700
Total Investment	344,000	44,700	388,700

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PART TWO

DETAILED ANALYSES OF PROPOSED INVESTMENTS

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SECTION I

COTTON SPINNING

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SECTION I: COTTON SPINNING

A. PRESENT CONDITIONS AND MARKET POTENTIAL

The six existing cotton spinning units total close to 280,000 spindles. This represents one of the world's largest concentrations of cotton spinning capacity, in a single location. A summary of the equipment complement is listed in the appendices.

Basically, over 70% of the yarns produced are used in the Mehalla weaving mills while the remaining 30% are sold in the domestic and primarily in the export markets.

At an overall average yarn count of approximately Ne 21, the daily production slightly tops the 100,000 kilograms. Actual yarn counts range from Ne 8 to Ne 160.

Most of the yarns are manufactured from Egyptian cotton. Blends of polyester and cotton are being processed on a small scale and with only relative success.

The major asset of Mehalla's cotton spinning operation is the use of Egyptian cotton, which has outstanding spinning characteristics and which is presently available at very low prices.

Three of the six existing spinning mills are processing coarser count yarns up to Ne 20 and averaging Ne 15. In volume, these three mills account for over 72% of the production and they contribute to approximately 42% of Mehalla's cotton yarn exports.

The export yarns, in the coarse counts, range from Ne 8 to Ne 20. Two-thirds of these yarns are plied and Ne 12/2 seems to be the most popular count, representing one-third of the coarse count export volume. Apparently these export yarns are used mainly for industrial purposes, Western Europe being an important customer.

Coarser cotton yarns are the easiest to produce and countries such as India and Pakistan market these yarns at extremely competitive prices. However, Mehalla's coarser yarns apparently command a better price than average, particularly for industrial uses, because of their excellent strength characteristics.

These coarse carded cotton yarns are manufactured from Dandara or Giza 72 or Giza 66 fibers, whose Pressley index typically exceeds 93,000 pounds per square inch. In comparison, similar yarns in the United States would be manufactured from U.S. cotton averaging a Pressley index of 80,000 to 85,000. As a result, Mehalla is marketing coarse cotton yarns with a break factor of 2,600 to 2,800, whereas comparable good quality coarse carded yarns in the United States would not exceed 2,000 to 2,300. The ability to produce premium yarns made from local raw materials represents a valuable asset for the Egyptian cotton industry in general and for Mehalla in particular.

Two of the six yarn mills produce medium counts, ranging from Ne 20 to Ne 50 and averaging Ne 31. One mill produces fine counts up to Ne 160, averaging Ne 65. The medium counts represent approximately 20%, while fine counts take only some 5% of the total production volume.

Although almost 45% of the production of fine counts is exported, mainly as plied yarns and apparently at very good prices, the future for these exports seems less promising than for medium and heavy count yarns. In 1975 fine yarns, Ne 50's and up, accounted for 14% of Mehalla's cotton yarn export volume in weight and over 30% in value.

The following factors may limit the future export potential of fine cotton yarns:

1. A considerable portion of fine cotton yarns has traditionally been shipped to the eastern communist bloc. Developments in political relationships between Egypt and these countries may adversely affect future trade relations, including Egyptian yarn exports.

2. Finer cotton yarns are practically all combed, high quality yarns, used in the manufacturing of high quality fabrics. The quality as well as the manufacturing cost of these end products depends largely on the quality of the yarns used. For this reason the manufacturers of fine quality goods prefer to have better control over the quality of their end products and they generally produce their own yarns. Usually they resort to imports only for limited quantities or to relieve temporary bottlenecks.

However, the Egyptian cotton spinning industry is uniquely privileged to produce such fine yarns in that some of the locally grown varieties of cotton have the appropriate physical characteristics to produce fine and very fine yarns of high quality. As a matter of fact, most producers of fine cotton yarns all over the world use Egyptian cotton and for some varieties, such as the Giza 45, Egypt is practically the sole supplier. With only a few exceptions, cotton fibers produced in most countries average approximately 1" to 1-1/4" in staple length, 3.8 to 4.8 in micronaire and 70,000 to 85,000 in Pressley index. As a comparison, the Giza 45 variety yields a fiber of 3.2 to 3.3 micronaire, 1-19/32" staple length and an average Pressley index of 109,000. Yarns produced from Giza 45 fiber typically attain a break factor in excess of 2,800. Another Egyptian cotton variety, frequently used in fine combed yarns, is the Menoufi with an average micronaire value of 3.6 to 3.8, staple length of 1-1/2" approximately and 100,000 Pressley index. Yarn counts up to 100's can be spun from Menoufi fiber, although in that case the average number of fibers in the yarn section is not more than 45 and this would be considered the practical limit.

Whether or not it would be more advantageous for Egypt to market this precious fiber either as a raw material to foreign spinners or converted into high quality fine yarns depends on a number of factors which generally exceed the scope of the present study.

Based on historic data and considering the available low cost labor in Egypt, it would appear, taking into account possible future limitations, that the existing export potential for fine yarn offers an economically desirable opportunity for Egypt. As a result, it is considered worthwhile to endeavor preserving or expanding if possible the exports of fine yarns at least as long as present economic and social conditions prevail.

Recognizing the smaller contribution in the overall cotton yarn export volume by the finer yarns, 14% in weight compared to 44% for medium counts and 42% for heavy counts, and possible future limitations of the export potential toward certain areas and marketing problems in other areas, it would appear more desirable to focus on sales yarns in the medium and heavy count ranges. Medium and heavy yarns combined take 86% of the volume of cotton export yarns in weight and approximately 70% in value.

In recent years Mehalla's cotton yarn exports have steadily declined from 10,000 tons in 1968/1971 to slightly over 5,000 tons in 1975.

Gradual increase in weaving capacity and apparently deteriorating conditions of the spinning capacity are quoted as the main reasons for the decline of cotton yarn exports.

In some instances we were able to ascertain evidence of growing difficulty to comply with average standards of either machine productivity or quality. Typical examples are the poor mechanical condition of the pickers in Mill 1 and of the Leesona rotoconer winders in Mills 1, 2 and 4. In other instances, excessive waste levels appear to contribute to higher yarn consumption. This is particularly apparent in warping, slashing, pirn winding and in some weave sheds.

Whatever reason explains the general down trend in export sales of yarns, it represents a serious loss in earnings potential for Mehalla and every possible effort should be directed toward correcting any factor which tends to limit yarn production. Beside generating valuable foreign exchange for Egypt, export of cotton yarns yields a substantial profit. Financial analyses indicate that total manufacturing cost in 1974/1975 of these yarns was less than 55% of the net sales price. This highly favorable situation is to a large extent the result of the low prices paid for the raw cotton. Under the present set of conditions, cotton yarn spinning is the most profitable of all Mehalla's activities and export of cotton yarns contributes significantly to the overall financial performance.

Based upon the 1974 figures, cotton yarn exports, in spite of some decline in volume (8,300 tons), still represent approximately 50% of the value of all exports or actually £E 10,254,000 on a total of £E 21,304,000 export value. In 1975 cotton yarn exports declined further to 5,200 tons and the value of export yarns £E 6,776,000 represents only 41% of a total export value of £E 16,548,000. The considerable reduction in the total volume of exports from 1974 to 1975 is due primarily to the decrease in yarn sales.

In 1974 cotton spinning contributed £E 6,193,590 to an overall gross profit of £E 14,182,352, which represents 43.6% of the total.

B. PRESENT EQUIPMENT

The conventional spinning capacity is distributed over six plants and consists of 275,040 ring spinning spindles. In addition, a separate condenser plant produces waste yarns and consists of eight cards and 3,520 spindles.

A summary of the equipment complement in each of one of the six plants is listed in Appendices 1 through 6. Plants 1, 2 and 4, with a total of 130,572 spindles, are designed as coarse mills and produce carded yarns up to Ne 20's averaging approximately Ne 15. Mills 1 and 2 were built in 1948 and Mill 4 in 1958. The equipment in all three mills is characterized by slow speeds, particularly in carding, drawing and spinning and by small package sizes. As a result, the existing equipment is less productive and more labor intensive compared to more recent conventional yarn manufacturing equipment.

The productivity of the cards has been improved through the use of hard wire card clothing, but the conversion has not been completed yet and some cards still use the flexible wire type clothing. The performance of the spinning has also been improved through modernization of the drawing systems in 1962.

Considering the age of the machines and the problems or sometimes the impossibility of securing original spare parts, the equipment is generally in fair mechanical condition.

Over the years Mehalla has visibly given much attention to maintenance, but the unavailability of original spares appears to have been a serious handicap in the past. The two areas most affected in that respect are the pickers and the cone winders. The quality of locally manufactured spares is not always appropriate and one of the main problems seems to be the weakness of the castings. At the time of our visit, only two of the eight pickers in Mill 1 had the automatic doffing system in operative condition. As a result of this situation, it is difficult to control the weight of the initial yard of each picker lap, which in turn causes more rejects and consequently more waste.

The situation in winding is somewhat different. The parts required for these machines are more sophisticated and more difficult to produce locally, because of narrower tolerances and higher quality raw materials required. As a result of the unavailability of these parts, the rotoconers operate with excessively worn old parts which in turn affects production and quality. Excessive horizontal play of the spindle combined with worn winding drums does not allow proper construction of the cone, which ultimately results in slower machine speeds or causes waste at the next process because of difficulties in unwinding the improperly constructed package. Lack of pressure or irregular pressure on the cone makes it impossible to reach the full size and the proper density of the cone. This is a serious problem and adds to the risk of cones being damaged or collapsing during handling, transportation or subsequent unwinding.

Unequal sizes of cones cause problems in warping and increase the volume of creel ends which requires more rewinding and adds to the overall waste.

Most of these detrimental effects (with regard to production, quality and waste in the blow room in winding and in some other areas such as roving) could be substantially reduced and in some cases totally eliminated by using original spares. The investment in these spares is likely to be paid off in very short periods, at least in such areas as the blow room and the winding department through higher production, better quality and less waste.

In spite of these problems and consequently lower performance, the heavy yarn mills contribute considerably to the company's profits. For that reason (although these units are practically depreciated completely) we feel that it would be difficult to economically justify discarding one of the plants and replacing the lost capacity by a new mill. On the contrary, if additional yarn capacity is really needed (which would already seem desirable at least to promote exports), we would prefer at this point in time and for as long as current conditions and cost structures prevail to add the necessary spinning capacity for exports and eventually for weaving without scrapping any of the existing spinning capacity.

Mills 3 and 6 produce medium counts carded and combed cotton and cotton polyester yarns (Mill 6 only). Mill 5 produces fine counts of combed cotton, mostly plied yarns.

Mill 3 was started in 1951 and modernized in 1961. Mill 5 started operations in 1958 and Mill 6 is the most recent and went on stream in 1970.

Polyester/cotton blends are spun in Mill 6 in limited quantities. Airconditioning is available but without refrigeration. As a result it is difficult to maintain optimum conditions, particularly with regard to relative humidity, for efficient spinning of synthetic/cotton blends.

As for the heavy yarn mills, the equipment in the medium count and fine count mills is relatively well maintained except in a few areas where original parts have become a critical issue. This seems to be the case for the Whitin combers in Mill 5.

Basic speeds and machine productivity in Mills 3 and 5 are not significantly higher than in the older heavy yarn mill. In Mill 6, the most recent, basic productivity levels are much lower than those of comparable equipment, available at the time of purchase in 1969. Delivery speeds of the Textima drawing frames in Mill 6 are quoted 125 meters per minute while similar machines from different suppliers in 1969 would achieve 200 to 220 meters per minute. Equally, spinning spindles are operating at 9,000 RPM while we would expect 11,000 to 12,000 RPM maximum practical speeds on equipment of that vintage.

C. CAPACITY PRODUCTION BALANCE AND EFFICIENCY

The following table indicates the theoretical capacity of each mill and the theoretical yarn count for which its equipment is balanced:

Mill No.	Capacity Kg./Hour	Theoretical Average Ne	Remarks
1	1,080	15.76	Coarse
2	1,091	15.72	Coarse
3	333	30.60	Medium
4	945	15.47	Coarse
5	214	64.98	Fine
6	502	31.00	Medium
Total	4,165	21.24	

KSA

Based upon 325 working days, annual capacity would be 32,487 tons.

The condenser plant has a practical capacity of approximately 150 kilograms per hour, at an average count of Ne 7.8.

Including the condenser mill capacity, the overall spinning capacity attains 4,315 kilograms per hour or, on a three-shift basis and for 325 days annually, the rated capacity would be 33,657 tons per year.

In 1975 the yarn mills operated 354 days to produce enough yarns for sales and for the weaving, which operated on a 324-day schedule. Total production of cotton yarns during 1975 equalled 34,805.2 tons or 4,096.6 kilograms average production per hour. This reflects an apparent utilization factor of the available capacity equal to 96.86% adjusted to take into account differences of actual yarn counts compared to theoretical.

Exhibit I indicates individual mill performances.

EXHIBIT I

COTTON YARN PRODUCTION AND CONSUMPTION – 1975

Mill No.	1975 Prod. Kg./Year	1975 Avg. Prod. Kg./Hour	Avg. Actual Count Ne	Theoretical Balance: For Avg. Count Ne	Theoretical Balance: At Capacity Kg./Hour	Apparent Utilization Factor Adj. To Theoretical Avg. Ne
Production						
1	8,703,893	1,024.5	15.90	15.76	1,080	.957
2	9,097,873	1,070.8	16.10	15.72	1,091	1.005
3	2,546,153	299.7	31.80	30.60	333	.935
4	7,813,349	919.7	15.40	15.47	945	.969
5	1,792,275	211.0	63.40	64.98	214	.962
6	4,189,804	493.2	31.70	31.00	502	1.005
Subtotal	34,143,347	4,018.9	21.46	21.24	4,165	.975
Condenser	661,829	77.9	7.80	7.80	150	.519
Grand Total	34,805,176	4,096.8	21.19(3)	20.77	4,315	.9686

Uses	Tons per Year	Average Count Ne
Consumption		
Weaving Warp	12,548	19.77(1)
Weaving Weft	12,287	15.32(1)
Total Weaving	24,835	17.57(1)
Other Internal	300	28.00(2)
Export	5,453	28.84(1)
Domestic	4,214	28.00(2)
Total	34,802	20.69(3)

(1) Single spun count based on 1976 projected mix.
(2) Estimated.
(3) Difference from average produced count may reflect different counts in carryover inventories and also the fact that weaving averages are based on 76 projected mix.

Although no specific research was done in the scope of this study to determine precise reasons for the losses, it would appear from observations and discussions with management, that a significant part of the 3.14% apparent activity loss is due primarily to excessive waste and poor mechanical condition of some equipment. As indicated in Exhibit I, the low performance of the condenser mill (by the utilization factor of 51.9%) is due to a large degree to voluntary stoppages of the machines at shift changes. The reasons for this practice have not been analyzed but it seems that this situation developed many years ago and it may have been the result of overcapacity. The extent of the activity loss due to this phenomenon could not be determined, but based on observations and discussions with management it may account for 15% to 25% of the unutilized capacity.

Exhibit I also indicates that Mills 2 and 6 showed the best performance in 1975. The latter is relatively new, while the former is one of the oldest with equipment in relatively poor condition and without adequate climatic controls. The overall utilization factor for the regular spinning mills, without the condenser mill, is 97.5%.

To some degree occasional unbalance may also have contributed to lower utilization. Eventual unbalances may occur for several reasons, mainly because of occasional changes in the product mix, differences in yields or qualities of the fibers processed, but also because of poor mechanical condition, resulting in lower speeds. This may have been the case in Mill 3 (which in 1975 showed the lowest performance) before the installation of the last autoconers.

In general, the spinning mills seem in fair balance for the presently processed product mixes and average yarn counts. The use of rigid card wire allows slightly higher doffer speeds, increasing the card capacity proportionally without affecting the quality of the carding process. As a result there is no danger for bottlenecks in carding at present and a substantial margin is available. The condition of the rotoconer winders is seriously deteriorated and affects their efficiency. However, the addition of autoconers in recent years has relieved the potential bottleneck in winding caused by the eroding mechanical condition of the original manual winders. The processes of drawing and roving generally do not present any real bottlenecks at the moment. However, the condition of the drawing and roving equipment in the coarse yarn mills is poor and speeds are slow. It is doubtful that the production of the existing machines in drawing and roving could be increased without creating quality problems and generating additional waste. We believe that the only danger for unbalanced conditions in the cotton yarn spinning is in the coarse yarn drawing and roving processes. If, in the future, any major shift towards heavier yarn counts occurs, drawing and roving may not be able to absorb the additional volume which would be required to fully operate the available spinning capacity.

Any project for additional spinning capacity should take into account this weakness and sufficient flexibility should be built in to eventually cope with or at least minimize the effects of such a situation.

D. QUALITY AND WASTE

As mentioned elsewhere, the main asset of the cotton spinning operation is the availability of high quality raw materials. Staple length, strength and fineness of the Egyptian cotton represent for the local spinners a distinct advantage over almost any other cotton spinner in the world. This applies particularly to export yarns but it also means an opportunity to produce above average yarns for the local weaving mills.

Nep counts in carding range from 8 to 30 on the average per 100 square inches. Over 25 is considered high. Typically, the slower operating and older Platt cards achieve much better nep counts than the faster Textimas. For the longer and finer Menoufi fibers, the Textima cards typically produce twice as many neps as the Platt cards. For coarser and shorter fibers the difference is somewhat less.

Typical break factors are as follows:

60's Combed Weave Yarns from Giza 68 and Menoufi	—	2,850
30's Combed Weave Yarns from Ashmouni	—	2,350
24's Combed Knit Yarns from Ashmouni	—	2,225
14's Carded Weave Yarns from Dandara	—	2,050

Uster variation (U%) is approximately average except in Mill 5 where average standards seem difficult to reach, probably because of the poor mechanical condition of the combers.

Quality control is done on a daily basis by a special laboratory within the spinning department and includes all conventional tests such as picker lap weight, sliver weights, nep counts, Uster variation of sliver and yarn, yarn strength and variation as well as machine settings and yields. In addition, a central quality control office monitors the activities of the departmental quality control laboratories, sets the standards, controls qualities of incoming materials and outgoing products. The central department keeps records and develops statistics.

Usually standards for quality and waste are based on accumulated past averages.

The effectiveness of the central quality control office on the day-to-day operation seems more theoretical than practical. However, the departmental quality control laboratory appears to be in control of the situation although a considerable amount of time is devoted to generating records and statistics which may not always achieve full effectiveness or sometimes duplicate other reports.

Based on the records of the quality control laboratory and on observations in the plants, the quality of the yarns produced is generally satisfactory in spite of some older equipment. Generally strength is very good, variation coefficients are good and appearance is above average. It is likely that lower grade raw materials could yield similar results if some of the equipment were updated or replaced with more modern technology.

Waste levels, as reported by the central quality control office, average as indicated in the following table:

Item	Average Maximum %	Average Minimum %	Average Standard %
Card Sliver	1.20	.40	1.00
Drawing Sliver	.65	.30	.45
Roving Sliver	2.60	1.21	1.43
Subtotal Reworkable			2.88
Mill Sweepings	2.35	1.09	1.47
Flat Card Strips	4.00	3.00	3.50
Card Undercasing	2.00	1.50	1.75
Subtotal Soft Reworkable(1)			6.72
Spinning	.77	.55	.67
Winding	2.33	.83	1.10
Subtotal Hard Nonreworkable			1.77
Total Nonreworkable Average			8.49
Total Reworkable Average			2.88
Grand Total Average			11.37

(1) Not including noils from combing: 15% to 20%.

Substantial variations occur from one mill to the other and from one period to the next. The general averages of strips and card undercasing are relatively low and reflect the overall cleanliness of the stock processed.

Practical averages seem to be higher and the recorded figures do not include rejected picker laps, which are returned to the blending operation immediately. On the other hand, waste at winding averages 1.1% which is substantially higher than expected reflecting probably the poor mechanical condition of the old manual winders.

The waste figures computed in the spinning department for December 1975, including noils from combing, indicate the following total percentages:

	Actual	Standard
Reworkable	4.08%	3.44%
Nonreworkable	14.99%	12.89%

The excess waste above standard levels in late 1975 is ascribed by spinning management, at least partially, to the use of lower grades of cotton. It may partly also be explained by the continuous pressure to increase spinning production in order to meet weaving and export needs and by the poor mechanical condition of some equipment.

The reworkable waste is put into bags per category and sent to the condenser mill where it is blended with raw stock and noils to be converted into coarse yarns, Ne 7 — 10.

A part of the nonreworkable waste is used to produce hydrophylic material (surgical cotton wool) and the remaining portion is sold.

In summary, it would appear that substantial savings are possible through waste reduction. The key element to achieve lower waste levels seems to be the maintenance of some equipment with original spares, particularly winders. Better quality, particularly of combed yarns in Mill 5, would also appear possible through improving the mechanical condition of the Whitin combers by using original spares.

Waste handling and control procedures are elaborate and labor intensive. Their effectiveness may be improved and for that purpose we would suggest baling all waste per category by press instead of packing manually in bags.

E. LABOR AND PRODUCTIVITY

The payroll in the spinning department included an average of 7,265 employees (up from 6,794 in 1971), although production was slightly down in volume but approximately equal when adjusted for the actual yarn counts produced.

Average overall labor productivity from opening through winding equals 1.69 kilograms per man-hour (down from 1.89 in 1971). These figures compare rather unfavorably with almost any country in the world. To illustrate this point, the following table indicates the averages in selected typical areas all over the world:

Country		Average Kilograms/ Man-hour
Turkey	—	4.0
European Common Market	—	10.0
Hong Kong	—	4.5
Pakistan	—	2.5
United States	—	18.0
Tunisia	—	4.5

Although older machinery is responsible to some degree, the very low productivity achieved by Mehalla, in comparison with most other countries, is mainly the result of excess staffing. The effects of overstaffing at present are partly offset by equally very low wage rates. However, wage increases are bound to occur in the future and the intensity of the increases will probably be in proportion with the degree of economic expansion. The latter seems to be very rapid, if present tendencies prevail. As a result it would appear doubtful that Mehalla can maintain much longer the present profitable cost structure in cotton spinning on the basis of new technology alone.

In 1974 profits on yarn sales totaled in excess of £E 6 million, while labor cost equalled close to £E 2.7 million. If wages were doubled, much of the present profits would be wiped out and the profitability of the cotton spinning (which is now the company's main asset) would be seriously in trouble. If we consider that cotton prices are kept at artificially low levels, it is easy to understand that labor productivity may well be the most significant factor in years to come.

The average wage rate increase for the last four years equals approximately 9% per year. The accelerated pace of development of the Egyptian economy, as well as the worldwide inflationary trend since 1974, beside the fact that Egyptian wage rates are very low compared to most other countries, may be the most determining factors in dramatically lifting wage rates during the next few years. A 20% per annum average increase would result in doubling the present payroll in less than four more years. This means that even before the benefits of new equipment would be in full effect increased labor cost could dramatically reduce the profitability of the company if no action is undertaken to improve labor productivity. Under the present circumstances, it would appear difficult to dismiss any workers, but hiring could be significantly reduced or even completely stopped. In case no more hiring would be considered and the present rate of turnover, although low and apparently less than 2%, would continue, increased wages could be offset to a large extent by increased productivity.

In summary, labor utilization, productivity and wage rates will be determining factors in the company's overall profitability.

New equipment in itself will improve profit potential but without better labor productivity, it is doubtful that the company could remain profitable in the long run.

Comparative labor productivity will be discussed further in connection with the cost structure in subsection F.

The present labor force in cotton spinning, including 7,265 employees, represents 20.5% of total labor employment of the complex.

F. CURRENT COST

Based upon 1974 actual figures, the cost structure of the cotton spinning is broken down in Exhibit II.

The average total manufacturing cost of all yarns spun in 1974 equals £E .516 per kilogram of which £E .365 or 70.7% is represented by raw materials and £E .077 or 14.9% by labor.

Further analysis indicates (as illustrated in Exhibit II) that the cost structure is quite different depending on the yarn count and also on other factors, some of which may increasingly affect the company's profitability in the future.

Fiber cost obviously differs greatly depending on the yarn count and the finer the yarn count, the more expensive becomes the fiber component. The average fiber cost per kilogram for coarse yarns equals £E .351, for medium counts £E .385, and for fine counts £E .487 per kilogram of yarn.

EXHIBIT II

SUMMARY OF COST STRUCTURE – COTTON YARN MANUFACTURING

COST/KILOGRAM IN MILLIEMES

	Coarse Counts		Medium Counts Mill No. 3		Medium Counts Mill No. 6		Fine Counts Mill No. 5		Avg. All Mills	
	Mill./Kg. of Yarn	% of Total	Mill./Kg. of Yarn	% of Total	Mill./Kg. of Yarn	% of Total	Mill./Kg. of Yarn	% of Total	Mill./Kg. of Yarn	% of Total
Raw Material Fiber	351	76.6%	383	59.2%	386	66.3%	487	47.8%	365	70.7%
Other Materials	004	.9%	006	.9%	004	.7%	015	1.5%	005	1.0%
Labor and Fringes	061	13.3%	137	21.2%	072	12.4%	255	25.0%	077	14.9%
Total Direct	416	90.8%	526	81.3%	462	79.4%	757	74.3%	447	86.6%
Spare Parts	003	.7%	005	.7%	003	.5%	015	1.5%	003	.6%
Maintenance	011	2.4%	031	4.8%	021	3.6%	063	6.2%	016	3.1%
Power	011	2.4%	027	4.2%	034	5.8%	079	7.8%	019	3.7%
Other	001	.2%	001	.2%	001	.2%	001	.1%	001	.2%
Total Variable Indirect	026	5.7%	064	9.9%	059	10.1%	158	15.6%	039	7.6%
Depreciation	006	1.3%	031	4.8%	045	7.7%	055	5.4%	016	3.1%
Other Overhead	010	2.2%	026	4.0%	016	2.8%	048	4.7%	014	2.7%
Total Fixed Indirect	016	3.5%	057	8.8%	061	10.5%	103	10.1%	030	5.8%
Total Manufacturing	458	100.0%	647	100.0%	582	100.0%	1,018	100.0%	516	100.0%
Interest Charges	013	2.8%	041	6.3%	033	5.7%	078	7.7%	021	4.1%
S, G & A	020	4.4%	054	8.4%	037	6.3%	097	9.5%	028	5.4%
Total Cost of Sales	491	107.2%	742	114.7%	652	112.0%	1,193	117.2%	565	109.5%
Average Count Ne	15.7		31.8		31.7		63.4		21.4	

Although labor rates are low, the labor component is not negligible and its impact on total manufacturing cost is considerably higher for medium and especially for fine counts.

The average labor cost for all mills equals £E .077 per kilogram of yarn which represents 14.9% of the total manufacturing cost. However, for fine counts the labor cost per kilogram is more than three times higher and represents 25.0% of total manufacturing cost.

For medium count yarns two distinctly different situations occur in the two mills which produce these counts. Mill 3, except for winding, is equipped with older, more labor intensive machinery, while Mill 6 is more modern and the basic technology in this mill (although perhaps not the best available) is far less labor intensive mainly because of higher speeds and larger packages. Labor cost in Mill 3, the older operation, is almost twice as high per kilogram yarn produced as in the more modern Mill 6; £E .137 per kilogram in Mill 3, compared to £E .072 per kilogram in Mill 6. In the older mill, labor cost represents 21.2% of total manufacturing cost while in the more modern mill it only represents 12.4%

With regard to the profitability of the medium count mills, increasing labor rates will have a more detrimental effect in the older mill than in the more modern one. It also appears from Exhibit II that the future profit potential, in the perspective of growing labor cost, is much more vulnerable in the case of the older medium yarn count mill than in the coarse count mills, in which labor cost is less than half and only 13.3% of total manufacturing cost.

To illustrate this point, let us assume for the purpose of comparison, that labor rates double. In the coarse mills and the modern medium count mill, the total manufacturing cost would increase 12% to 13%. In the older medium count mill, the additional labor cost would represent 21.2% of the present total manufacturing cost which is now already 11% higher than in the more modern mill.

As a result, we would recommend that these cost aspects and the higher vulnerability of Mill 3 be given serious consideration in planning of future modernization or expansion.

Other cost factors (such as spare parts and maintenance) also contribute to higher cost in the older mill. Only two areas achieve more advantageous cost figures in the case of the older medium count mill — depreciation and power consumption. The higher investment in more modern equipment logically requires proportionally higher depreciation. In this case, the depreciation in the more modern mill is approximately 50% higher and equals £E .045 compared to £E .031 per kilogram. Power consumption is slightly higher, £E .007 per kilogram of yarn produced, which is the effect of faster, more energy consuming machinery.

However the additional depreciation and power cost does not offset the lower labor cost in the more modern mill and the net gain in total manufacturing cost (compared to the older mill) is approximately 11%.

For the same yarns in the United States, total present labor cost, including fringes for yarn manufacturing from opening through winding in a conventional, modern ring spinning operation, would typically amount to $.22 per kilogram, based on an average yarn count of Ne 21. This compares with £E .077 or .20 per kilogram at Mehalla in 1974. Labor cost in 1975 increased approximately 9.2%. Present labor cost in Mehalla would average $21.84, or would be approximately equal to present U.S. labor cost. Basically, in Mehalla labor rates are ten times lower than in the U.S., but labor productivity is equally ten times lower than the U.S. average. However, to make a meaningful and fair comparison of labor productivity, it should be based on similar equipment in both cases. This is rather hypothetical since some of the older equipment used at Mehalla is not used any more in the United States. Because of a very competitive market and high wages in the U.S., the equipment must produce at an average high level of labor productivity, otherwise manufacturing cost would be excessive. As a result, nonconverted cards, small packages and low speeds, as in drawing at Mehalla, could not be maintained in operation in a profitable mill under U.S. conditions.

In any case, under the present set of circumstances Mehalla's labor cost on a per kilogram basis is approximately equal to the U.S. average. As we demonstrated (in medium count spinning), one of the two mills is much more labor intensive and does not achieve average labor cost standards. As wages are expected to rise at an accelerated pace, the contribution to overhead and profits of that particular mill (Mill 3) will decline much faster than in the case of the other mills, including the coarse count mills (1, 2 and 4).

G. FUTURE REQUIREMENTS AND DEVELOPMENT

The present situation with regard to cotton spinning is characterized by the following main features and constraints:

1. Available spinning capacity was utilized in 1975 at approximately 97%. More yarns are needed for exports and for future increasing weaving requirements.

2. The spinning mills are in reasonable balance for the present product mix. Even if some minor changes of this product mix occur, the effect on the overall balance is likely to be neutralized, because of the great variety of styles and the size of the operation. However, any major shift towards heavier yarns would result in bottlenecks in the drawing and roving processes but not in carding. This is not likely to occur for domestic needs of yarn, either sales or weaving yarns. A shift to coarser yarns may happen due to changing export requirements.

3. Although theoretically Mill 6 has capacity to produce the increasingly popular polyester/cotton blends, it would appear that the real capability to produce these yarns at the desired quality levels is limited mainly by the following factors:

   a. Insufficient control of relative humidity — no refrigeration.

   b. Inexperience in the marketing and processing of quality blends.

   c. Lower quality performance of the equipment in certain areas such as carding and drawing.

The real strength of Mehalla's spinning operation is the ability to produce high quality cotton yarns from the local raw materials. However, we recognize the need to be prepared for spinning of quality blends with polyester. In addition, the economics of spinning polyester/cotton blends at Mehalla do not appear as attractive as spinning of cotton yarns. However, that condition may evolve when Egypt produces the polyester fiber locally which is planned for the near future.

1. Labor productivity is extremely low and wages continue to rise. Both these elements represent a serious threat to the future profitability of the cotton spinning operation, which at present makes significant contributions to Mehalla's profits.

2. For the time being, all six spinning mills are profitable and contribute to the overall performance. However, in the perspective of increasing labor cost, some equipment will become obsolete in the future. A master plan should be prepared outlining objectives, timing and cost for future modernization and for expansion.

In summary, the equipment (relatively modern in some plants) is generally of older concept and of less productive technology. Under the present configuration of raw material cost, labor cost and depreciation schedules, the spinning mills are very profitable. However, the present favorable situation is likely to erode in the future, primarily because of increased labor cost and possibly because of increased fiber cost.

On the other hand, the present demand for yarn is strong and likely to continue along the same lines in the foreseeable future. Raw material consumption is expanding into the synthetic fiber area and prospects are real for further growth. It is difficult to estimate the future polyester consumption in a given time frame, but gradual increase is expected over the next few years and particularly when local production of polyester comes on stream.

Based on projections of future needs in weaving as well as for domestic and export sales, Exhibit III summarizes the future yarn requirements.

EXHIBIT III

SUMMARY OF ACTUAL AND PROJECTED YARN REQUIREMENTS(1)

Year	Actual or Exp. Million Meters/Year Cotton Fabrics	Yarn Requirements – Tons/Year				
		Cotton Weaving(4)	Other Internal Uses(2)	Export Sales	Domestic Sales	Total
1975	140.5	24,835	300	5,453	4,214	34,802
1976	148.5	26,249	300	7,000	1,650	35,199
1980(3)	163.0	28,812	350	12,000	1,000	42,162

Projected figures are:

(1) Based upon unchanged product mixes and same yields as 1975.
(2) Mainly blanket weaving Ne 20/2.
(3) After completion of project.
(4) Based upon apparent overall yield of 95.36% for weaving yarns in 1975.

As mentioned earlier, yarn requirements are calculated on the assumption of constant product mix. Based on past performance and considering the wide variety of styles as well as the size of the operation, it does not seem likely that major shifts would occur in the near future, except perhaps in the use of polyester fiber. If adequate spinning capacity is made available, an increasing proportion of polyester would not materially affect the weaving operation, nor the balance between weaving and spinning. Therefore, we feel confident that the production projections are realistic and can be used as a basis for projections and estimates of equipment requirements with a reasonably small chance of error.

Exhibit IV summarizes the yarn requirements for weaving as per Mehalla's weaving plan for 1976 which is based on the same product mix as 1975, but the volume is somewhat larger. The yarn quantities in the summary of Exhibit IV have been converted into yarn requirements at winding by applying a factor of .9536, which is the overall yield factor from yarn to fabric in 1975. These converted figures are used in Exhibit III. The summary of Exhibit IV is extracted from the detailed spread sheets attached in Appendices 7 through 11.

EXHIBIT IV
SUMMARY MEHALLA YARN REQUIREMENTS FOR WEAVING PLAN – 1976

Sec.	Designation	Lin. Meters Required per Day	Weight of Yarns in Fabric Required per Day		
			Kg. Warp	Kg. Weft	Kg. Total
I.	Fabrics Sold in Greige	61,950	4,981	5,899	10,880
II.	Fabrics for Bleaching	94,860	7,150	6,283	13,433
III.	Fabrics for Printing	184,080	13,176	15,205	28,381
IV.	Fabrics for Dyeing	103,920	11,714	9,361	21,075
Va.	Miscellaneous Fabrics	12,030(1)	1,080	1,085	2,165
	Subtotal	456,840	38,101	37,833	75,934
Vb.	Towels and Napkins		816	272	1,088
	Total	456,840	38,917	38,105	77,022

(1) 1,860 meters of the 12,030 meter/day have wool warp yarns. These fabrics may be considered for weaving in the wool mill in future projections; present projections in cotton mill used only for calculation of constant product mix.

Mehalla's projections for weaving have been established at 148.5 million linear meters in 1976 and 163.0 million meters in 1980. As indicated in Exhibit III, we have further anticipated 12,000 tons per year of yarns for export in 1980, which is the objective Mehalla considers equivalent to the maximum potential.

Projections of domestic sales yarns have been scaled down to 1,000 tons per year by 1980, on the basis that yarns appear more profitable to be sold as fabric rather than as yarn, at least in the free domestic market where the demand for fabrics is estimated to remain strong and prices attractive.

As a result, the yarn requirements for 1976 are set at 35,199 tons, slightly higher than the 34,802 actually used in 1975. For 1980, the requirements would reach 42,162 tons per year which is approximately 3,500 tons more than Mehalla's projections based upon the original expansion plan. In the next paragraph, we will analyze the expansion plan and examine how to implement these objectives in the most economical way.

H. DEVELOPMENT PLAN ANALYSIS

Effective management of a large textile complex (as Mehalla) is a very complicated equation. Optimum utilization and proper upkeep of the available capacity and production facilities is one of the key functions to maximize profits. On one hand, management has to constantly scrutinize the markets, domestic and foreign and anticipate shifts and changes in product mixes and styles. On the other hand, the production facilities have to remain adequate for the desired styles and qualities, while maintaining potential to generate reasonable profit margins.

In order to achieve these goals, we believe that it is indispensable to establish a master plan of investments based upon realistic projections of volume, cash flow, profit margins, social objectives and harmonious development of the company for at least 10 years ahead.

If the presently considered investments are not or cannot be integrated in a realistic long-range development plan, they will fail to achieve their optimum potential, whatever the present outlook for immediate benefits may be. We therefore have studied in as much detail as possible, considering the limited time frame of this evaluation, the basic strategy of each one of the requested investments and also of some additional ones, as commented upon in other parts of this report. When the final decisions are made, we suggest that Mehalla examine these strategies and adopt a master plan for investments, based upon these strategies or revised ones, recognizing that investment decisions are long-range bearing and must be compatible with the best long-range interests of the company, of the employees and of the country.

With regard to the cotton spinning, Mehalla's original plan consists of building new capacity for approximately 13,000 tons of coarse yarns per year and discarding Mill 2 which produced approximately 9,100 tons of coarse yarns at full capacity in 1975. The net result would be a gain of 3,900 tons of annual capacity, based on the present annual working schedule of 354 days. The product mix in cotton yarn production would shift slightly to the coarser yarns and the average count would decrease to approximately 19.21 down from 21.2.

1. It is not clear that the shift to a coarser average would balance the actual yarn requirements, even considering doubling last year's export sales from 5,000 to 10,000 tons and assuming that the 5,000 tons additional export yarns would all be 12's counts. In the latter extreme case, the average count required for weaving and export sales combined would still be slightly finer and be equal to Ne 19.7 approximately.

2. The estimated investment required in equipment would amount to $13,560,300 according to the projections in Table 1 of the original A.I.D. request. The incremental capacity would only be 3,900 tons per year. As a result, the investment required per ton incremental capacity would equal $3,477. Considering that Mill 2 is still profitable, discarding at this point in time would seem premature and could not be justified economically.

   If the capacity of Mill 2 is further used and the new mill is built in addition, the cost in equipment per ton incremental capacity would decrease from $3,477 to $1,045. For a coarse yarn mill, the latter would be a much more economical proposition.

3. Keeping Mill 2 operative and building additional capacity, as suggested in the preceding point, for more coarse yarns would shift the average yarn count further to the coarse side. The total capacity would equal 35,000 + 13,000 = 48,000 tons per year and the average count would also be in the order of Ne 19.70. In an extreme favorable case, assuming the need for 7,000 tons additional export yarns of mainly 12's average, the actually produced average yarn count of Ne 19.70 would be acceptable. According to Mehalla's estimates, the maximum export potential is 12,000 tons per year and this limit would be reached by adding 7,000 tons to the present 5,000 tons of exports.

   Exhibit III indicates that by 1980, beside 12,000 tons for export, another 28,812 tons per year of yarns would be required for weaving; and total yarn requirements would then equal 42,162 tons per year. To absorb another 5,900 tons, if spinning capacity is allowed to increase to 48,000 tons per year and yarn sales potential does not exceed 12,000 tons, weaving capacity would have to be raised from 163 million to 196 million linear meters per year approximately, or 33 million meters per year extra weaving capacity would have to be added. This extra incremental capacity would require approximately 1,000 new looms in addition to the 996 presently planned new looms necessary to meet the production objectives of 163 million meters per year by 1980 (assuming also discarding of an equal number, 996, old looms).

We do not believe that it would be wise to increase weaving capacity in such a large proportion within a rather short time frame. Adding looms would require new construction, while the existing buildings are generally in good condition and sooner or later more than 40% of the present weaving equipment (which is over 20 years of age) will have to be replaced.

When the replacement occurs, the available construction (eventually with some minor adjustments and updating of airconditioning installations) would be perfectly convenient for new weaving equipment. However, the same existing floor space would be suitable for more weaving capacity, up from 60% to 100% more than the presently installed capacity, depending on which technology would be selected. To be logical, weaving expansion should be balanced with proportionally increased finishing capacity as well as with spinning capacity. Also, the market should be able to absorb the additional production.

For all these reasons, the target of 193 million meters to balance 48,000 of yarns seems excessive at this time and would require additional investment in new construction. This would be less desirable, considering that most of the existing buildings may be used at very low additional cost to install 60% to 100% more weaving capacity than presently in operation in a not too distant future.

In summary, the alternative approach to keep Mill 2 in operation and add 50,000 new spindles for 13,000 tons per year additional coarse yarns does not seem desirable because excessive investments would be required in weaving and finishing initially, while an opportunity exists to create additional weaving capacity at lower cost in existing buildings, whenever the present equipment has reached the limit of its profitable lifetime. Considering approximately 40% of the existing equipment is over 20 years old and wages are increasing rapidly, some equipment could reach that limit in a foreseeable future.

In this case, a master plan for future development would be desirable to warrant harmonious growth compatible with market demands, availability of capital as well as with social and other objectives of the company.

In conclusion, we would not recommend the construction of a new coarse yarn mill at this time and we would equally not consider discarding an existing profitable mill.

In order to provide the 42,162 tons of yarns required for the overall projections as indicated in Exhibit III, we would recommend the construction of a medium count mill, approximately 6,000 tons per year capacity, capable of producing carded and combed yarns, cotton and polyester blends. If the average yarn count of the new mill equals Ne 30, the overall average count would shift slightly from Ne 21.2 to Ne 22.70; the shift towards finer yarns would be more desirable than towards coarser yarns.

If some volume of polyester/cotton blends is to be considered, finer yarns will obviously prevail in that portion. On the other hand, a shift of export yarns toward coarser counts is still a strong possibility. For that reason, we believe the new mill should have enough flexibility to quickly shift to coarser yarns if the need arises.

To build in the necessary flexibility for that purpose, it would be sufficient to overequip slightly the carding, drawing and roving sections, bearing in mind that the cards could run at higher speeds when shorter, coarser fibers are processed for coarser average yarn counts.

In the next subsection, we will develop the idea of a new medium count yarn mill and examine the implications of such a decision on the overall spinning operation.

I. SUGGESTED REVISED DEVELOPMENT PLAN IN COTTON SPINNING

1. Scope

As a result of the analysis in previous paragraphs, we have concluded that a new medium count yarn mill is the most economically viable proposition for present expansion, while all other yarn mills are kept in operation as long as they are profitable.

The previous analysis also indicates that priorities in future rehabilitation or modernization of the equipment of cotton spinning may have to be shifted to the older medium count Mill 3, rather than to one of the coarse count mills because the profit potential of the older medium count yarn mill appears considerably more vulnerable to future increased labor cost than any other mill in the complex.

Exhibit V summarizes a typical revised product mix for a medium count yarn mill including, at the lower end of the spectrum, some 24's carded yarns which are popular exports for knitting and at the other end, some 40's, 50's and 60's, poly/cotton blends, to be plied and converted into sewing threads.

The product mix of the new spinning project, as outlined in Exhibit V, is based on projections of practical requirements, including polyester/cotton yarns. The volume of the new spinning plant approximately balances future needs and is adequate to accommodate the available floor space of approximately 22,800 square meters which corresponds to two adjacent blocks right behind spinning Mill 6. The new project is called Mill 7.

Approximately one-third of the 707 kilograms per hour scheduled production is composed of polyester/cotton blended yarns, while 300 kilograms per hour or 42% are carded cotton yarns and 180 kilograms per hour or 25% are combed cotton yarns.

EXHIBIT V

COTTON SPINNING – PRODUCT MIX – REVISED DEVELOPMENT PLAN

Ne	End Use	Kg./Hour Required	Materials	Twist Factor	Estimated Spindle RPM	M/Min	Expected Efficien. %	Expected Gr. per Sp. Hour(1)	Spindles Required
24	Weaving/Knitt.	150	Carded Cotton	3.9	11,000	14.61	90	18.66	8,039
24	Weaving/Knitt.	100	Poly/Cotton	3.9	10,500	13.95	90	17.82	5,612
30	Weaving/Knitt.	150	Carded Cotton	3.9	12,000	14.26	90	14.57	10,295
30	Weaving/Knitt.	50	Poly/Cotton	3.9	11,500	13.66	90	13.95	3,584
30	Weaving/Knitt.	30	Combed Cotton	3.8	12,000	14.63	91	15.11	1,985
40	Weaving/Knitt.	150	Combed Cotton	3.8	12,500	13.20	92	10.34	14,507
50	Weaving/Knitt.	35	Poly/Cotton	3.8	12,000	11.33	93	7.18	4,875
40	Sewing Thread	14	Poly/Cotton	3.4	12,000	14.16	92	11.10	1,261
50	Sewing Thread	14	Poly/Cotton	3.4	12,000	12.67	93	8.03	1,743
60	Sewing Thread	14	Poly/Cotton	3.4	12,500	12.05	94	6.43	2,177
		707							54,078

(1) Including average estimated contraction of 3.5%.

The overall average yarn count of the suggested new Mill 7 is Ne 32.18, while the overall average yarn count of the produced yarns, without the sewing yarns, equals Ne 31.05 (as indicated in Exhibit VI).

Exhibit VI summarizes the yarn requirements for the program of Mill 7.

One additional feature of the projected new spinning capacity is the flexibility to produce a wide range of yarns, eventually different from the scheduled average count. It is indeed possible to design the necessary equipment complement to accommodate the available space and to allow sufficient flexibility for considerable deviation from the projected average count, in case the need for such deviation arises.

As indicated in Exhibit V, a total of 54,078 spindles would be required to produce 707 kilograms of the given product mix per hour. If, for any reason, the yarn requirements would shift towards heavier counts, more production would be necessary in the preparation. The suggested equipment complement, as indicated in Exhibit VII, provides the necessary flexibility to eventually allow a significant shift of the average yarn count without seriously affecting the balance.

EXHIBIT VI

SUMMARY OF YARN REQUIREMENTS – MILL NO. 7

Type of Yarn	Kg./Hour Required Ne 24	Ne 30	Ne 40	Ne 50	Ne 60	Total	Weaving & Knitting Total Kg.	Sewing Thread Total Kg.
Weaving/Knitting								
– Carded Cotton	150	150				300	300	
– Combed Cotton		30	150			180	180	
– Poly/Cotton	100	50		35		185	185	
Sewing Thread								
– Poly/Cotton			14	14	14	42		42
Totals	250	230	164	49	14	707	665	42

Average Yarn Count = Ne 32.18 Overall

250	x	24	=	6,000
230	x	30	=	6,900
164	x	40	=	6,560
49	x	50	=	2,450
14	x	60	=	840
707	x	32.18	=	22,750

(Ne 31.05 Without Sewing Thread)

(250	x	24	=	6,000)
(230	x	30	=	6,900)
(150	x	40	=	6,000)
(35	x	50	=	1,750)
(665	x	31.05	=	20,650)

EXHIBIT VII
NEW YARN MILL PROCESSING EQUIPMENT
AND ESTIMATED COST

Process	Estimated Kg./Hour Req'd.	Est. Number Required			FOB Cost/ Machine $	Total FOB Cost $
		Machines	Deliveries/ Machine	Total Deliveries		
Opening	750 170	2 (1) 1 (2)			$473,000 140,000	$ 946,000 140,000
Carding	845	48	1	48	46,000	2,208,000
Predrawing	350	3	2	6	29,500	88,500
Lap Forming		3	1	3	36,600	109,800
Combing		16	2	32	32,500	520,000
Blending	245	3	2	6	22,500	67,500
First Drawing	735	7	2	14	29,500	206,500
Second Drawing		7	2	14	22,500	157,500
Roving		12	96	1,152	49,000	588,000
Spinning	707	123	440	54,120	48,400	5,953,200
Winding		23	50	1,150	110,000	2,530,000
Total Yarn Mfg. — FOB $						$13,515,000
Seaworthy Packing and Freight and Insurance						1,622,000
Total CIF						$15,137,000

(1) Lines cotton.
(2) Line polyester.

Assuming, as an example, that for some reason all yarns to be spun are 24's, in that case the spinning capacity would rise to approximately one ton per hour. It would still be possible to produce the required open stock with the three available opening lines and if all stock were cotton, the two cotton lines will eventually suffice, assuming relatively clean stock is processed.

In the total number of 48 cards is included a portion which is based on lower speeds to accommodate finer micronaires and longer staple. In addition, an overall allowance in capacity of 10% has been added. Sliver weights at the drawing and roving processes could be increased to accommodate higher production of coarser yarns, if the need arises.

In summary, the suggested equipment complement is designed and is suitable to balance future projections in yarn requirements to accommodate eventual fluctuations in average yarn counts and also to produce polyester/cotton yarns.

2. Cost

Exhibit VIII summarizes suggested auxiliary equipment and accessories. The estimated CIF cost of processing equipment, auxiliary equipment and accessories is listed in Exhibits VII and VIII, and totals $16,879,000. A summary of the investment plan is listed in Exhibit IX. The total investment required, including construction, is estimated at $28,314,500; $20,423,000 of this total is foreign exchange including all equipment, freight, erection and spares.

Based upon the foreign exchange portion, which is basically the installed cost of all equipment, the investment per annual ton incremental capacity in cotton spinning equipment amounts to $3,403. The investment per annual ton incremental capacity for a heavy yarn mill would be substantially less and in the order of $1,200 (freight erection included). However, the medium yarn count mill has a potential and flexibility to satisfy Mehalla's yarn requirements much more effectively than a coarse yarn mill.

EXHIBIT VIII
DETAIL AND COST OF RECOMMENDED AUXILIARY EQUIPMENT AND ACCESSORIES – NEW YARN MILL

		Estimated FOB Cost
Auxiliary Equipment (Including Spares)		
1.	Waste Collecting for Blow Room and Card Room	$ 56,000
2.	Baling Press for Waste	26,000
3.	Scales	4,500
4.	Card Maintenance Shop and Tooling	18,000
5.	Spinning Frame Maintenance Shop and Tooling	16,000
6.	Two Lift Trucks	36,000
7.	Laboratory Equipment and Instruments	62,000
8.	Handling and Transportation Equipment	14,000
9.	Compressors and Cleaning Equipment	32,500
10.	Traveling Overhead Cleaners for Spinning	148,000
11.	Thermosetting for Blended Yarns	220,000
	Subtotal FOB $	$ 633,000
Accessories		
12.	Cans for Carding, Drawing, Roving	$ 210,000
13.	Bobbins for Spinning, Roving, Combing and Winding	460,000
14.	Tools and Initial Supplies of Card Wire, Cots, Aprons, Travelers, Tape, Small Mechanical and Electrical Spares	252,000
	Subtotal FOB $	$1,555,000
Seaworthy Packing and Freight and Insurance		$ 187,000
15.	Grand Total CIF	$1,742,000

EXHIBIT IX

SUMMARY OF INVESTMENT PLAN – YARN MILL NO. 7

NEW YARN COUNTS – MEDIUM COUNTS – 54,000 SPINDLES

		Estimated Costs		
Item No.	Description	Foreign Exchange in US $	Local Currency in US $	Total US $
1.	Processing Equipment CIF Value	$15,137,000		$15,137,000
2.	Import Duty on 1. (12%)		$1,816,500	1,816,500
3.	Clearing + Local Transportation + Erection	152,000	152,000	304,000
4.	Auxiliary Equipment + Accessories CIF Value	1,742,000		1,742,000
5.	Import Duty on 4.		209,000	209,000
6.	Clearing + Local Transportation for 4.		9,000	9,000
7.	Spares (5%), Including Duty (12%)	757,000	91,000	848,000
8.	Electrical Substation, CIF + Distribution + Installation + Duty	785,000	200,000	985,000
9.	Airconditioning Equipment, CIF + Installation + Duty	1,850,000	380,000	2,230,000
	Subtotal Equipment Installed	$20,423,000	$2,857,500	$23,280,500
10.	Construction 22,880 Sq. Meters at 220		5,034,000	5,034,000
	Total Investment (Excluding Working Capital)	$20,423,000	$7,891,500	$28,314,500

3. Expected Performance

A new modern mill would have potential to achieve better productivity and higher quality than either one of the existing medium count mills. Larger packages and chute fed cards would also account for lower waste levels.

A most significant savings potential exists in labor cost. In order to illustrate this point, we have developed in Exhibit X the labor complement required to operate the new mill. Three different levels of productivity have been considered:

a. No improvement in comparison with the existing situation. In that case, it is assumed that the workers' activity is equal to the present average in Mills 3 and 6. As indicated in the first column of Exhibit X, 846 workers would be necessary. Overall labor productivity would be improved in comparison with Mills 3 and 6 because of faster more automated machinery and less handling required.

b. Target level. The level of productivity Mehalla should strive to achieve and which we feel is attainable through sound engineering without putting unnecessary strain on the system. In that case, 499 workers would be required.

c. Ideal level. Productivity level achievable through sound engineering and substantial improvement in motivation and reduction of present absenteeism rates. At this level, which compares to somewhat less than half the U.S. productivity, 403 workers would be required.

EXHIBIT X
LABOR COMPLEMENT
NEW YARN MILL PROJECT
(MEDIUM COUNTS – 54,000 SPINDLES)

Process	Staffing Required for Three Shifts At Levels of Labor Productivity		
	Present	Target	Ideal
Direct and Indirect Variable Labor			
Opening	32	15	20
Carding	17	10	
Combing	59	36	20
Drawing	64	36	15
Roving	66	28	16
Spinning	262	181	163
Winding	159	107	100
Subtotal	659	413	334
Indirect Fixed Labor			
Opening	20	8	15
Carding	27	13	
Combing	21	10	7
Drawing	16	6	4
Roving	12	8	6
Spinning	30	14	12
Winding	35	12	10
Clerks	3	3	3
Utility Workers	6	2	2
General	17	10	10
Subtotal	187	86	69
Grand Total	846	499	403
Overall Labor Productivity Kg./Man-Hour	2.51	4.25	5.26

Exhibit II indicates that actual labor cost per kilogram in the two comparable existing Mills 3 and 6, producing similar yarns of the same average count, is as follows:

Mill No. 3	—	137 Mill./Kg.
Mill No. 6	—	072 Mill./Kg.

The figures in Exhibit II are based on 1974 cost and performance. To make the comparison meaningful, we will use the same basic average labor cost, including fringes, of £E 379 per year and per worker.

At the different productivity levels, labor cost in the new plant would be as follows:

At Present Level of Labor Activity	—	053 Mill./Kg.
At Target Productivity	—	031 Mill./Kg.
At Ideal Productivity Level	—	025 Mill./Kg.

Assuming the target level of productivity would be achieved, the net gain in labor cost (compared with the best of the existing mills) would be 041 milliemes per kilogram, which is a saving of more than 58% of the present labor cost.

Spare parts and maintenance cost would also be less and could be as low as 011 milliemes per kilogram of yarn produced, as compared to 024 in Mill 6.

Power consumption is estimated somewhat higher than for Mill 6, including refrigeration. Depending on actual consumption of the airconditioning installation, the power cost is estimated at 038 to 040 milliemes per kilogram as compared to 034 in Mill 6.

Depreciation at the present rates of 6% for equipment and 2.5% for construction would increase from 045 milliemes per kilogram to 096 milliemes per kilogram, or a net loss of 051 milliemes per kilogram, compared to Mill 6. This increase in depreciation charges would be totally offset by lower labor cost and less maintenance expenses.

The actual overall manufacturing cost in the new mill is expected to be somewhat lower than in Mill 6, considering all cost factors, including lower waste levels. However, the new mill would offer other intangible benefits, such as better quality yarns, particularly polyester/cotton blends. The differential in manufacturing cost between the new mill and the existing mills would gradually increase as labor cost rises.

4. Additional Opportunities

The creation of the new mill presents to Mehalla an excellent opportunity to improve overall productivity in cotton yarn manufacturing.

The following action plan is submitted for consideration by Mehalla management. If implemented, the benefits would be in addition to the expected performance, as described in a previous paragraph. These additional benefits are not reflected in the financial statements and would mean extra contribution and higher levels of profit than those expected in the financial analysis (summarized in Part Two of this report).

a. The labor required for the new mill may be drawn from the existing excess in the other six mills. A thorough reorganization of all six mills would be necessary and considerable effort and tact may be required to convince the workers and to implement the plan without any disruption. It would be a first step in improving the present overall labor productivity of the complex and it would avoid hiring new employees. The potential savings are estimated in excess of $500,000 per year at present labor cost.

b. The actual output of the existing cotton spinning operations could be improved to some degree, waste levels could be decreased and in some cases better quality could be achieved through the use of original spare parts. The poor mechanical condition of some machines, such as Leesona cone winders and Whitin combers, contributes seriously to lower production, bad quality and excess waste. In Section III dealing with machinery rehabilitation, we demonstrate that the payoff by overhauling such equipment with original parts may be less than one year, in some cases, based upon saving of only one percent of the processed materials. We believe, however, that a complete evaluation of all areas contributing to lower performance, would yield substantial opportunity to improve production and quality, by updating equipment with original parts. In some instances, the cost of this program may even be lower than when locally manufactured parts are used.

Conservative estimates indicate that 1% to 2% higher production could be expected in the existing plant, through a combination of factors including waste reduction (in some cases better quality and higher output of some machines) by an adequate updating program using original parts

If only 1% could be added to the present production, it would mean some 350 additional tons of yarn available per year, worth approximately $1,000,000 at current prices.

c. Other substantial savings are possible through implementation of improved procedures and controls. As commented elsewhere, other areas which offer considerable potential for cost reduction are the handling of materials in-plant and particularly between plants and also the handling and control of waste. Material handling problems have been dealt with in Section X of this report. In order to permit better waste control and handling procedures, a waste press has been included in the auxiliary equipment of the new yarn mill.

An evaluation of the cost reduction potential is recommended followed by adequate implementation procedures.

5. **Summary of the Project Evaluation**

Exhibit XI briefly summarizes the project evaluation and indicates the requested compared to the recommended, investment in equipment at FOB prices, as well as the justification for the expenditures.

EXHIBIT XI

SUMMARY OF INVESTMENT EVALUATION – COTTON SPINNING

Mill: Cotton Yarn Mill No. 7
Department: Cotton Spinning
A.I.D. Request Reference: Annex 13, Table 1

Item	Quantity	A.I.D. Request Value FOB £E	A.I.D. Request Value FOB US $
Cotton Yarn Spinning Mill	1	5,297,000	13,560,300

(As described in Annex 13, Table 1 of A.I.D. request equipment and accessories and spares.)

U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost FOB – US $			17,627,000

Recommend:

For creation of additional cotton spinning capacity in the medium yarn count range:

1. To promote yarn exports which traditionally have been one of the company's most profitable activities. Target for exports – 12,000 tons per year. Exports 1975 = 5,300 tons.

2. To balance future increase of weaving capacity.

3. To improve flexibility and to add appropriate facilities for spinning of polyester/cotton blends. For the same reason we have included airconditioning with refrigeration.

J. BALANCE AFTER IMPLEMENTATION

As outlined in Exhibit III, projected yarn requirements by 1980 (after the implementation of the present investment programs), would equal 42,162 tons per year, including 12,000 tons for export. The available capacity would include the existing six mills and the new Mill 7 and would approximately equal:

		Tons/ Year
Existing Mills	–	35,000
New Mill 7	–	6,000
Total	–	41,000

The deficit of approximately 1,100 tons could be compensated in several ways:

1. Less exports: 10,900 tons instead of the projected 12,000 tons.
2. Purchase of yarn: 1,100 tons per year.
3. Improved performance of the existing plants resulting in a conservatively estimated net gain of 350 tons of yarn per year and reducing the deficit proportionally.
4. Improved yield in weaving from the present 95.36% to a conservatively estimated level of 97% and resulting in savings of some 500 tons of yarn per year.

In conclusion, the deficit of 1,100 tons per year in yarn manufacturing capacity could be compensated to a large extent, if appropriate action is timely initiated. A minimum of 850 tons is expected to be saved eventually and we believe that this conservative estimate could be exceeded to make up the total deficit. As a result, we would consider the projected balance reasonable and plausible. It should be pointed out that this balance is based on the same working schedule of the past years, including 354 working days per year, while the weaving projections are based on the normal weaving schedules including only 325 days per year. On the other hand, all computations are based on the 1975 performance and the overall utilization factor during that period was down to .9686 as indicated in Exhibit I. If the plants can be fully utilized in the future, the utilization factor would be equal to 1.0 and about 1,000 tons per year additional yarns would be available, or the work schedule could be reduced by 10 or 11 days in the year, to produce the required quantity of yarns.

K. TECHNICAL ASSISTANCE

Unlike the garment operation, Kurt Salmon Associates believes Mehalla has the fundamental capabilities and experience to implement the new cotton spinning project.

However, to capitalize on existing opportunities in the new as well as in the older operations, KSA feels that some technical assistance may be required on one hand to speed up and properly structure the new project and on the other hand to improve the performance of existing operations.

The following is a broad outline of estimated investment requirements for technical assistance in the scope of new and existing operations over the next three to five years:

Specification Write-up (All New Projects Combined)	—	$ 60,000
Bid Evaluations (All Projects Combined)	—	120,000
Survey of Existing Spinning Operations	—	50,000
Waste Control Program	—	160,000
Production Control Program	—	120,000
Cost Reduction Program (3 Years)	—	800,000
Monitoring and Start-up New Yarn Mill	—	160,000
Total	—	$1,470,000

As indicated in subsection I, potential savings in labor cost in the new mill, if all necessary workers are transferred from other units, would exceed $500,000 per year and savings of 1% in waste in all mills would yield approximately $1,000,000 additional contribution to overhead and profits. These benefits are estimated conservatively and if full scale action is undertaken as it is assumed in the overall scope of the seven-point assistance program, as listed above, substantial higher benefits may be expected. The actual scope of some of the programs listed can be determined only after an appropriate survey has been conducted and therefore the quoted figures should be used as guidelines only.

APPENDIX 1

EQUIPMENT SUMMARY

PLANT — YARN MANUFACTURING

DEPARTMENT — MILL NO. 1 (AVERAGE NE 15)

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect Average Eff. %	Remarks
Opening 4 Lines, 8 Pickers Ne .0013 (455 Gr./M)	Platt	49	8	1	3	200	200	70	Automatic Fleece Cutting Out of Order
Carding (12" Cans) Ne .12	Platt	49	245	1	245	5.9-8.2	5.9-8.2	80	5.9 = Flexible Wire 8.2 = Rigid Wire
Drawing — First Ne .12	Platt	48	28	4	112	54	54	75	3 Over 4
Drawing Fin. Ne .12	Platt	48	28	4	112	54	54	75	3 Over 4
Roving Ne 1.00 TPI = 1.00 Ne 1.25 TPI = 1.13	Platt	48	28	120	3,360	510	510	80	
Spinning	Platt (Zinser Drawing)	48	103	380	39,140	4,500-8,500	8,500	86-88	Ne 10-24 — 50.8 MM
	Saco Lowell	51	20	240	4,800	4,000-5,000	4,500	89	Ne 7-10 — 63.5 MM
	Textima	69	6	416	2,496	4,500-8,500	8,500	89	Ne 24 — 50 MM
	Tantra		1	360	360				Not Operative
Total					46,796				
Cone Winding	Leesona	48	13	120	1,560	400-600	550	70	Actual Eff. 60%

APPENDIX 2

EQUIPMENT SUMMARY

PLANT – YARN MANUFACTURING

DEPARTMENT – MILL NO. 2 (AVERAGE NE 15)

rocess	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect Average Eff. %	Remarks
pening Lines, 8 Pickers le .0013 (455 Gr./M)	Platt	49	8	1	8	200	200	70	
arding le .12 (12" Cans)	Platt	49	210	1	210	7.5	7.5	80	All Rigid Wire
rawing – First le .12	Platt	48	28	4	112	54	54	75	3/4 Zinser Converted
rawing Fin. le .12	Platt	48	28	4	112	54	54	75	3/4 Zinser Converted
oving e 1.00 TPI = 1.00 e 1.25 TPI = 1.13	Platt	48	28	120	3,360	510	510	80	4/4
inning	Platt	48	116	380	44,080	5,000-8,000	8,000	86-88	Ne 12-22 – 50.8 MM
	Textima	69	6	416	2,496	4,500-8,500	8,500	90	Ne30 – 50 MM
					46,576				
Winding	Leesona	48	13	120	1,560	400-600	550	60-67	Actual Eff. 60%
	Schlafhorst	48	1	96	96	400-600	550	75	Rewind Dye Packages
Total					1,656				

APPENDIX 3

EQUIPMENT SUMMARY

PLANT – YARN MANUFACTURING

DEPARTMENT – MILL NO. 3 (AVERAGE NE 30)

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect Average Eff. %	Remarks
Opening									
3 Lines, 6 Pickers	Saco Lowell	51/58	4	1	4	188	188	75	Non-Automatic Doff
Ne .0013	Platt	51	2	1	2	200	200	70	For Mill No. 2
Carding									
Ne .15	Platt	48/58	120	1	120	4.1-4.8	4.1-4.8	84	Rigid 4.8; Flexible 4.1
Predrawing	Hartford	63	6	4	24	117	117	80	3 Passes
Ne .15; Ne .17	Textima	71	2	2	4	260	200	80	2 Passes
	Textima	71	6	2	12	260	200	80	1 Pass; Cans 40 CM
Lap Forming	Hartford	63	3	1	3	46	46	75	
Ne .0098	Textima	71	3	1	3	43	43	75	
Comber									
(Typical 30% of Production Combed)	Hartford	63	9	2	18	120 Nips/Min.	120	85	Ne .15 – 20 Kg./Machine Hour Ne .17 – 15 Kg./Machine Hour
	Textima	71	12	2	24	180	180	85	Ne .15 – 25 Kg./Machine Hour
Drawing – First									
Ne .15	Ingolstadt	51	16	5	80	43	43	80	3/4
Drawing – Fin.	Ingolstadt	51	16	5	80	43	43	80	3/4
Slubbing									
Ne 1.25	Platt	61	16	120	1,920	510	510	81	Zinser Converted
Roving									
Ne 3.00	Platt	61	20	168	3,360	890	890	72	Zinser Converted
Spinning	Platt	51	26	416	10,816	7,000-9,000	9,000	89	Ne 30-40; 44/45 MM
	Platt	48	62	380	23,560	6,000-9,000	8,000	89	Ne 24-40; 50.8 MM
	Platt		1	60	60				
	Polish	71	1	384	384		8,000	90	Ne 30
					34,820				
Winding	Schlafhorst	70	12	50	600	400-1,200	800	65-70	Autoconer

APPENDIX 4

EQUIPMENT SUMMARY

PLANT – YARN MANUFACTURING

DEPARTMENT – MILL NO. 4 (AVERAGE NE 15)

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect Average Eff. %	Remarks
Opening Lines, 8 Pickers Ne .0013	Rieter	58	8	1	8	217	217	80	Auto Doff
Carding Ne .13	Platt	58	260	1	260	6.0	6.0	80	Rigid and Flexible
Drawing – First Ne .125	Ingolstadt	57	25	6	150	43	43	80	3/4
Drawing – Fin. Ne .125	Ingolstadt	57	25	6	150	43	43	80	3/4
Roving Ne .8	Ingolstadt	58	20	96	1,920	600	550	80	4/4
Spinning	Ingolstadt	58	100	372	37,200	4,500-8,000	8,000	89	Ne 8-20, 55 MM
Winding	Schlafhorst	70	9	50	450	400-1,200	800	50-67	Autoconer
	Leesona	48	5	120	600	400-600	550	65	

APPENDIX 5

EQUIPMENT SUMMARY

PLANT – YARN MANUFACTURING

DEPARTMENT – MILL NO. 5 (AVERAGE NE 60-65)

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect Average Eff. %	Remarks
Opening One Line, Two Pickers Ne .0014	Rieter	58	2	1	2	190	190	80	Auto Doff
Carding Ne .15	Platt	58	120	1	120	4.1-4.9	4.1-4.9	80-85	Rigid 4.9; Flexible 4.1
Sliver Lap Forming Ne .0111	Whitin	58	6	1	6	37	37	75	
Ribbon Lap Forming Ne .0098	Whitin	58	6	1	6	44	44	70	
Comber Ne .17	Whitin	58	18	2	36	150 Nips/Min.	150	85	Actual Eff. 60%
Drawing – First Ne .17	Ingolstadt	58	12	4	48	46	46	80	3/4
Drawing – Second Ne .17	Ingolstadt	58	12	4	48	46	46	80	3/4
Drawing – Fin. 2 x Ne .35 Kruse	Ingolstadt	58	12	4	48	46	46	80	4/5
Roving – First Ne 2.6-3.0-4.0	Rieter	58	18	126	2,268	810	810	86	
Roving – Second Ne 6.0	Rieter	58	6	168	1,008		1,170	86	
Spinning	Rieter	58	120	480	57,600	8,000-9,500	9,000	90	Ring 38 MM
Winding (Single)	Schlafhorst Schweiter	72 58	10 24	50 48	500 1,152	400-1,200 300-500	800 400	65-74 65-81	

APPENDIX 5 (CONTINUED)

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect Average Eff. %	Remarks
Doubling	Schweiter	58	12	64	768	300-500	400	75	
Twisting	Allma	58-60	54	416	22,464	7,000-8,500	8,000	85	Ring 50.8 MM
Rewinding	Schweiter	58	12	48	576	400-600	500	65	
Hankwinding	Schweiter	58	6	48	288	200-600			For Mercerizing Dyeing

APPENDIX 6
EQUIPMENT SUMMARY
PLANT – YARN MANUFACTURING
DEPARTMENT – MILL NO. 6 (AVERAGE NE 30)

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect Average Eff. %	Remarks
Opening 2 Lines, 4 Pickers Ne .0014-.00185	Herpeth	69	4	1	4	252 190	252 190	85 85	Cotton Polyester
Carding Ne .13-.15	Textima Platt	69 48	48 8	1 1	48 8		19.5 13.5	85 85	Cotton Carded Polyester
Predrawing Ne .15	Textima	69	6	2	12	140	140	80	Combed Cotton + Portion Cotton in Blends
Lap Forming	Textima	71	3	1	3	46	46	75	
Combing	Textima	71	12	2	24	180 Nips/Min.	180	85	
Sliver Blending	Toyota	73	1	2	2	190	190	80	
Drawing – First Ne .15-.17	Textima	69	14	2	28	125	125	80	
Drawing – Fin. Ne .15-.18	Textima	69	14	2	28	125	125	80	
Drawing	Textima	71	4	2	8	100-370			Out of Order
Roving Ne 1.0-1.25-1.50	Textima	69	14	120	1,680		800	77	
Spinning	Textima	69 - 73	116 8	420 416	48,720 3,328 52,048	8,000-9,000 8,000-9,000	9,000 9,000	88 88	Ring 50 MM
Winding	Schlafhorst	69	16	50	800	400-1,200	800	60-75	Autoconer

APPENDIX 7

MEHALLA WEAVING PRODUCTION PLAN – 1978

FABRICS SOLD IN GREIGE

Item	Style	Greige Width (CM)	Proj. Meters per Day	Grams per Linear Meter Warp	Grams per Linear Meter Weft	Kg./Day Warp Required in Fabric – Ne 14	20	18	24	30	10	12	16	4	8	7/5	12/3	Total Kg./Day Warp in Fabric
1.	91/54	102	1,800	89.5	86.5	162												162
2.	2290	87	10,050	49.2	101.9		406											406
3.	834	102	2,310	69.7	61.3			161										161
4.	928	140	1,800	65.3	142.7				118									118
5.	Twill 1666	91	2,950	49.5	86.1					142								142
6.	107/58	103	5,370	46.8	92.8				246									246
7.	49/53	127	3,600	96.7	92.6		348											348
8.	Duck 1677	119	1,530	70.6	80.9			108										108
9.	1287	94	3,510	82.6	116.1	290												290
10.	1288	102	2,310	64.6	61.7				160									160
11.	2277	102	3,720	108.9	104.0						405							405
12.	2232	99	2,010	60.3	70.0		121											121
13.	49/53	150	5,190	114.1	100.9		582											582
14.	49/53	160	720	121.6	116.1		88											88
15.	443	137	1,050	125.6	116.4							132						132
16.	49/53	96	7,830	73.3	70.9		574											574
17.	107/58	132	1,050	58.8	118.9				62									62
18.	2068	96	1,560	51.3	57.2		90											90
19.	20/58	160	660	152.1	145.1								100					100
20.	738	142	270	234.3	208.3									63				63
21.	97/55	142	330	148.3	104.2										40			40
22.	84/53	138	420	126.5	115.1							63						63
23.	Duck 117/57	104	360	624.9	257.0											225		225
24.	Duck 104/53	105	330	308.1	287.5												102	102
25.	Mouftakher	83	1,320	97.3	68.4							115						115
			61,960			452	2,298	269	576	142	405	300	100	63	40	225	102	4,981

Item	Style	Kg./Day Weft Required in Fabric – Ne 14	8	18	10	16	12	20	24	4	7/5	12/5	Total Kg./Day Weft in Fabric
1.	91/54	184											184
2.	2290		1,024										1,024
3.	834			142									142
4.	928				257								257
5.	Twill 1666					248							248
6.	107/58						400						400
7.	49/53							334					334
8.	Duck 1677				123								123
9.	1287		406										406
10.	1288								143				143
11.	2277				387								387
12.	2232					141							141
13.	49/53							565					565
14.	49/53							84					84
15.	443						122						122
16.	49/53							546					546
17.	107/58						125						125
18.	2068	88											88
19.	20/58					58							58
20.	738									57			57
21.	97/55		35										35
22.	84/53				40								40
23.	Duck 117/57										93		93
24.	Duck 104/53											88	88
25.	Mouftakher						90						90
		243	1,467	142	816	482	838	1,531	143	57	93	88	5,880

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MEHALLA WEAVING PRODUCTION PLAN – 1976

FABRICS FOR BLEACHING

Item	Style	Greige Width (CM)	Proj. Meters per Day	Grams per Linear Meter Warp	Grams per Linear Meter Weft	Kg./Day Warp Required in Fabric – Ne 14	20	30	24	16	50	40	Total Kg./Day Warp in Fabric	Kg./Day Weft in Fabric 14	20	30	18	16	40	50	10	Total Kg./Day Weft in Fabric
1.	91/54	102	1,860	89.6	85.5	167							167	159								159
2.	91/54	87	4,170	76.4	72.9	319							319	304								304
3.	91/54	140	2,220	122.9	117.4	273							273	261								261
4.	2290	87	18,450	76.4	63.4	1,410							1,410	1,170								1,170
5.	49/53	150	4,320	114.1	108.9		493						493		470							470
6.	49/53	168	900	121.6	116.1		109						109		105							105
7.	49/53	142	2,400	108.4	103.5		260						260		248							248
8.	49/53	127	4,740	96.7	92.6		458						458		439							439
9.	49/53	96	9,810	73.3	70.0		719						719		687							687
10.	Sabaa Sh	203	840	197.0	174.6	165							165	147								147
11.	Sabaa Sh	153	2,790	150.6	133.0	420							420	420								420
12.	Sabaa Sh	245	1,800	237.8	210.8	428							428	380								380
13.	Gauze 1068	98	5,040	24.3	19.2			123					123			97						97
14.	Gauze 1884	97	19,290	36.7	31.6				708				708				610					610
15.	Dabalanz 22	[illegible]	1,500	76.5	73.0					115			115					110				110
16.	Gauze 76/60	106	3,480	9.6	8.1						34		34						28			28
17.	Voile 366	145	2,100	48.8	36.7						103		103							77		77
18.	Voile 366	99	1,620	32.7	25.1						53		53							41		41
19.	Tab. Cloth	192	120	213.0	233.6	26							26								28	28
20.	Tab. Cloth	168	180	18[illegible].4	204.4	34							34								37	37
21.	Ter. Towel	72	890	140.0	41.7	145							145					41				41
22.	2215	128	1,470	59.9	41.4			88					88			61						61
23.	433	98	2,550	37.3	29.5							95	95						75			75
24.	Ter. Towel	161	330	333.9	93.2	110							110					31				31
25.	Ter. Towel	55	330	114.0	31.9	38							38					11				11
26.	Sabaa Sh	183	1,560	164.9	157.5	257							257	246								246
			94,860			3,792	2,039	211	708	115	190	95	7,150	3,087	1,949	158	610	193	103	118	65	6,283

APPENDIX 9

MEHALLA WEAVING PRODUCTION PLAN – 1976

FABRICS FOR PRINTING

Item	Style	Greige Width (CM)	Proj. Meters per Day	Grams per Linear Meter Warp	Grams per Linear Meter Weft	Kg./Day Warp Required in Fabric – Ne 14	20	18	30	24	24/2	30/2	12	40	Total Kg./Day Warp in Fabric
1.	91/54	102	1,740	89.6	86.5	156									156
2.	Cr. 1333	96	9,300	95.4	102.3		867								867
3.	2290	87	32,840	76.4	63.4	2,494									2,494
4.	FL 1383	80	4,410	49.2	105.0		217								217
5.	934	102	5,310	69.7	61.3			370							370
6.	Sh 1213	88	6,510	49.8	66.0		324								324
7.	Sat 1873	137	1,980	156.5	133.5				310						310
8.	107/58	103	20,010	45.8	92.8					917					917
9.	928	140	1,440	65.3	142.7					94					94
10.	48/53	150	4,290	114.1	108.9		480								480
11.	48/53	160	4,830	121.6	116.1		587								587
12.	48/53	127	4,740	96.7	92.6		458								458
13.	49/53	96	10,680	73.3	70.0		783								783
14.	Sat 1484	75	3,380	151.7	90.3						510				510
15.	Fl 1276	80	10,580	65.6	101.9							665			665
16.	Pop. Nasim	96	1,680	71.1	60.5			120							120
17.	Fl 1286	90	4,650	58.2	96.4		271								271
18.	Fl 1212	79	22,800	49.2	101.9		1,122								1,122
19.	Ter. Towel	72	990	146.0	41.7	145									145
20.	DOB 1568	97	3,990	92.4	67.6			369							369
21.	Helka 1636	96	5,940	62.1	59.3				369						369
22.	107/58	132	1,890	58.8	118.9					111					111
23.	Dobby 412	96	1,530	68.6	52.0				105						105
24.	DOB 2085	97	7,200	69.0	46.0				497						497
25.	76/60	96	2,220	66.3	62.3				147						147
26.	443	137	2,610	125.6	118.4								328		328
27.	Bat. Zah	96	6,750	44.4	40.3									300	300
			184,080			2,795	5,130	859	1,428	1,122	510	665	328	300	13,176

Item	Kg./Day Weft Required in Fabric – Ne 14	8	18	12	10	20	16	30	24	40	Total Kg./Day Weft in Fabric
1.	140										140
2.		952									952
3.	2,080										2,080
4.		463									463
5.			326								326
6.	430										430
7.			264								264
8.				1,867							1,867
9.					206						206
10.						467					467
11.						561					561
12.						430					430
13.						740					740
14.					303						303
15.		1,079									1,079
16.			102								102
17.					448						448
18.		2,323									2,323
19.							41				41
20.				290							290
21.								352			352
22.				225							225
23.									90		90
24.								331			331
25.								138			138
26.				308							308
27.										274	274
Total	2,640	4,817	692	2,690	957	2,218	41	821	90	274	15,205

APPENDIX 10

MEHALLA WEAVING PRODUCTION PLAN – 1970

FABRICS FOR DYEING

Item	Style	Greige Width (CM)	Proj. Meters per Day	Grams per Linear Meter Warp	Grams per Linear Meter Weft	Kg./Day Warp Required in Fabric – Ne 14	24	40	20	40/2	12/2	30	30/2	50	16/3	12/3	60	Total Kg./Day Warp in Fabric
1.	Saban Sh.	203	810	197.0	174.6	160												160
2.	Saban Sh.	183	1,590	177.6	157.6	282												282
3.	Saban Sh.	153	2,790	150.6	133.0	420												420
4.	Saban Sh.	245	1,800	237.8	210.8	428												428
5.	Tab. Cloth	168	180	186.4	204.4	34												34
6.	1458	110	150	122.1	122.6		19											19
7.	Popl 2257	98	10,110	68.2	42.8			690										690
8.	Drill 2212	78	3,210	85.8	82.3				275									275
9.	Dr. Meh.	162	5,460	262.4	205.1	1,433												1,433
10.	Dr. 2236	181	1,230	218.1	114.3					268								268
11.	Dr. Meh.	76	36,350	122.6	96.2	4,460												4,460
12.	Duck 712	106	660	179.5	155.0						119							119
13.	Popl 1822	100	3,120	69.6	43.7			217										217
14.	107/58	132	660	58.8	118.9		39											39
15.	1270	97	5,130	62.8	64.9							322						322
16.	114/58	160	630	82.0	234.7		52											52
17.	1216	73	8,220	57.4	48.3	472												472
18.	Bat. RAB	57	8,640	44.1	42.1							381						381
19.	Dr. 825	154	2,730	275.6	166.5								752					752
20.	1823	103	2,910	46.7	40.1									136				136
21.	Duck 71/80	82	2,040	226.2	158.8										462			462
22.	Duck 104/83	106	330	309.1	267.5											102		102
23.	Leno 875	97	5,160	35.6	32.2												184	184
			103,920			7,689	110	907	275	268	119	703	752	136	462	102	184	11,714

Item	Kg./Day Weft Required in Fabric – Ne 14	16	24	40	12	40/2	12/2	8	30	24/2	50	16/3	12/6	60	Total Kg./Day Weft in Fabric
1.	141														141
2.	250														250
3.	371														371
4.	380														380
5.		37													37
6.			18												18
7.				433											433
8.					264										264
9.		1,120													1,120
10.						141									141
11.		3,502													3,502
12.							102								102
13.				136											136
14.					78										78
15.			333												333
16.								148							148
17.	397														397
18.									364						364
19.										455					455
20.											117				117
21.												329			329
22.													88		88
23.														166	166
	1,539	4,659	351	569	342	141	102	148	364	455	117	329	88	166	9,361

APPENDIX 11

WEAVING PRODUCTION PLAN — 1976

MISCELLANEOUS FABRICS

Item	Style	Greige Width (CM)	Proj. Meters per Day	Grams per Linear Meter Warp	Grams per Linear Meter Weft	Kg./Day Warp Required — Ne 18	30	20/2	20	Total Kg./Day Warp	Kg./Day Weft Required — Ne 18	30	10	14	28/2	Total Kg./Day Weft
1.	Tick 720	140	1,650	182.2	94.6	301				301	156					156
2.	Tick 720	160	660	208.2	108.2	137				137	72					72
3.	Check 555	96	3,810	52.2	54.4		199			199		207				207
4.	Denim 1488	101	1,260	179.7	118.5			226		226			149			149
5.	Fl 1392	97	2,430	80.0	126.3				194	194				307		307
6.	Popl 2209	97	360	63.4	51.9		23			23		19				19
7.	Wool Army	140	1,860	—											175	175
			12,030			438	222	226	194	1,080	228	226	149	307	175	1,085

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SECTION II

COTTON WEAVING

KSA

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SECTION II: COTTON WEAVING

A. PRESENT CONDITIONS AND MARKET POTENTIAL

The cotton weaving department produced, in 1975, a total of 140,500,000 linear meters.

Basically, the cotton weaving products are distributed into five different channels. The next table summarizes a typical breakdown of the distribution per channel based on 1975 figures.

Channel	1975 Quantity Lin. Meters	% of Total	Number of Greige Styles (Approx.)
Exports	40,000,000	28.5	(Mostly Greige)
Military Fabrics	15,000,000	10.7	2
Ration Fabrics	35,000,000	24.9	7
Internal Garments	20,000,000	14.2	20
Free Domestic Sales	30,500,000	21.7	60
Total	140,500,000	100.0	

The production objectives for 1980 are set at 163 million with the following approximate distribution breakdown:

Channel	1980 Quantity Lin. Meters	% of Total
Exports	55,000,000	33.7
Military Fabrics	15,000,000	9.2
Ration Fabrics	40,000,000	24.6
Internal Garments	23,000,000	14.1
Free Domestic Market	30,000,000	18.4
Total	163,000,000	100.0

Of, the five distribution channels, the third one is the only nonprofitable. Ration fabrics are those fabrics which have to be sold in the local market at controlled, artificially low prices. The Egyptian government imposes quotas for production and marketing of ration fabrics to each producer each year. Annually, the quotas assigned to each mill are revised; and they are distributed according to capacity remaining after deduction of exports and military fabrics.

In 1975, the government had determined that the total volume of rationed fabrics to be marketed by all the local producers was 280 million meters. After deduction of exports and military fabrics totalling 55 million meters, the quota assigned to Mehalla for 1975 was 41% of remaining capacity or 85.5 million meters x .41 = 35 million meters, which represents 12.5% of the country's overall requirements of ration fabrics.

The production of 15 million linear meters per year of military fabrics in 1975 represents some 80% of the country's requirements; and consequently Mehalla is the most important supplier of fabrics to the military establishment.

According to Mehalla's projections, military fabrics and sales to the free domestic market are assumed to remain fairly constant from 1975 to 1980. The percentage of ration fabrics is also expected to vary slightly, and increasing consumption may require a small upward adjustment from 41% to 43% of remaining capacity after deduction of exports and military fabrics.

The main thrust is aimed toward exports with an expected increase from 40 to 55 million meters per year from 1975 to 1980. This may be an optimistic projection; but, on the other hand, the expected increase in consumption of fabrics for local manufacturing of garments from 20 to 23 million would appear conservative. As indicated in Section VII, which deals with the garment project, production of garments and internal consumption of fabrics could be considerably increased if proper implementation procedures and training methods are used to operate the planned new production facilities. It further appears that the local free market is not likely to be saturated in the near future because of continuously growing demand. In addition, that particular segment of the market is also very profitable.

Mehalla probably focusses as much as possible on exports because of the subsidies and hard currency contribution and because export quantities reduce the unprofitable ration fabric quota. Even if Mehalla's export projections would appear somewhat optimistic, we feel confident that other profitable market segments, in particular local garment manufacturing and the free domestic market, would take over any excess unsold on the export market. We therefore believe Mehalla's production estimates for 1980 are realistic and can be used as a sound basis for equipment requirements.

B. PRESENT EQUIPMENT

Cotton weaving preparation is centralized in one single department, while the 4,854 looms presently in operation are distributed over 13 sheds. Pirn winding is centralized also, but weaving Mill 5 has its own pirn winding (non-automatic looms).

The equipment complement in warping, slashing, pirn winding and weaving is summarized in Appendices 1 through 4.

1. Cotton Weaving Preparation

Fourteen warpers are installed, of which one is sectional. One warper is over 20 years old but still in relatively satisfactory condition if operated at lower speed (300 meters per minute).

Four narrow warpers, 18 years old, are also in satisfactory condition and operating at 400 meters per minute. The remaining eight warpers are less than five years old. Two of these eight, of Polish construction, apparently do not meet modern quality requirements, mainly because the brakes and warp stop motions are not reliable. They also operate at lower speed (300 meters per minute). The more modern warpers operate at 500 meters per minute and could theoretically be sped up. Higher speeds may not be recommendable at present because of poor yarn packages delivered by some of the manual winders in the spinning operations.

Twenty-two slashers are installed, of which 15 are 26 years old. All except the two most recent ones are designed with air drying facilities which are less economical than the more modern can drying equipment.

1,820 pirn winding spindles are installed and 480 additional spindles are on order. Some machines, representing 852 spindles, are 20 years of age and have apparently not been maintained with original parts, resulting in very poor mechanical condition.

2. Weaving

Of the 4,854 looms presently in operation, 1,906 or approximately 40% are 20 years old or older. Some 700 looms are equipped with Unifil winders and 240 are manual looms. The remaining looms have rotary batteries (or magazines for four box looms).

The width distribution of the existing looms, broken down in three categories, is as follows:

Category	Reed Space Centimeters	100% Available Picks per Hour (x 1,000)	% of Total Picks
1	Up to 120 CM	26,298	53.3
2	120 – 200 CM	21,207	43.0
3	Over 200 CM	1,832	3.7
	Total	49,337	100.0

A detailed breakdown of the available pick capacity and width distribution is summarized in Exhibit I.

As noted in yarn manufacturing, some of the older equipment is seriously deteriorated and in poor mechanical condition because of lack of original spares. Some looms can be updated again if original parts are available; but others, particularly the narrow Northrop dobby looms, could apparently not be reconditioned at any economical cost.

EXHIBIT I

PRESENT COTTON LOOM CAPACITY

Shed No.	Number of Looms	PPM	Reed Width (CM)	100% Loom Picks per Hour (x 1,000) Available: Up to 120 CM Narrow	120 – 200 CM Medium	Over 200 CM Wide
1	448	180	102	4,838		
2	96	182	102	1,048		
	300	180	176		3,240	
3	600	182	82	6,552		
4	48	110	270			317
	54	120	220			389
5	168	180	107	1,815		
	72	180	114	778		
6a	52	142	162		443	
	2	110	216			13
	24	112	177		161	
	40	115	177		276	
	32	164	116	315		
	72	135	127		583	
	18	115	183-193		124	
	24	150	72	225		
	24	125	177		180	
	24	105	112	151		
	12	120	260			87
	12	105	112	76		
	12	126	117	91		
	6	130	132		47	
	12	140	102	101		
	36	93	305			201
	120	168	107	1,210		
7	432	176	102-107	4,562		
8	336	173	112	3,488		
	48	150	152		432	
	42	143	177		361	
9	72	191	330			825
10	480	177	130		5,098	
11	240	156	180		2,246	
12	800	167	140		8,016	
13	96	182	102	1,048		
Total	4,854			26,298	21,207	1,832
Total Loom Picks per Hour Available (x 1,000)					49,337	
Total Loom Picks per Hour Available %				53.3%	43.0%	3.7%

C. CAPACITY PRODUCTION BALANCE AND EFFICIENCY

1. Weaving

In 1975, the cotton weaving department produced 140,326,000 linear meters of fabric at an overall efficiency of 71.94%. Actual efficiencies varied greatly from one shed to another as indicated in Exhibit II.

The best performance was achieved in Mill 9 by the Sulzer looms with 89.73% average efficiency; and the worst performance, 59.06%, was registered in Mill 7, equipped with narrow Northrop cam looms, built in 1951. Incidentally, the third best performance was achieved by the old 1936 manual Butterworth looms in shed 5, topping an average of 85% efficiency for the year, 1975. On the other hand, the recent Textima looms in sheds 11 and 12 barely reached the overall average.

In comparing the present loom complement, as summarized in Appendix 4, with the average number of looms in operation in 1975, as indicated in Exhibit II, it appears that some fundamental changes have taken place, although the overall capacity has practically remained at the same level. In summary, 300 new Picanol medium width looms have been added in shed 2, while some 315 narrow Northrop looms have been taken out of shed 7. The total loom complement has decreased from an average of 4,875 in 1975 to 4,854 at present; but, considering that 300 new Picanols would achieve better efficiency and are wider than the discarded looms, the overall capacity may have increased only slightly, compared to the average of 1975.

EXHIBIT II

PRODUCTION SUMMARY

COTTON WEAVING MILLS – 1975

Mill	Days Worked	Average Number of Looms	Million Picks Produced	Total Meters Produced (Thousands)	Average Efficiency Percent
1	324	448	21,744	12,525	60.29
2	324	148	7,520	4,315	80.63
3	324	600	40,345	19,726	80.72
4	324	102	4,732	2,344	87.43
5	324	240	17,154	13,035	85.25
6	324	518	22,973	12,268	71.80
7	324	747	34,117	17,259	59.06
8	324	426	22,640	10,384	69.66
9	324	73	16,957	7,170	89.73
10	324	480	30,222	13,268	75.11
11	324	325	15,459	7,401	72.06
12	324	672	35,674	16,428	72.03
13	324	96	6,283	4,107	81.06
Weaving Experimental Section			219	96	
	324	4,875	276,039	140,326	71.94

2. Product Mix

A wide variety of styles are processed in the cotton weaving department; but, apparently, the product mix remains fairly constant. Appendices 7 through 11 of Section I summarize the complete product mix and the yarn requirements based upon the 1976 production program. It has been stated by Mehalla management that this product mix is fundamentally the same as in 1975 and that only minor changes have occurred in the past few years.

As a result, we have taken the 1976 projected mix as a base, and all future projections are developed on the assumption that the product mix will not significantly change in the foreseeable future. Considering the fairly stable market position as commented upon in subsection A and the large variety of styles in the product mix, we believe that the assumption of a constant product mix is reasonable and that possible error is within acceptable limits.

Greige widths vary from 72 centimeters to 245 centimeters (for sheets). The major portion of the fabrics are woven in widths from 72 to 106 centimeters, and the average greige fabric is 101.84 centimeters wide.

Other characteristics of the product mix are as follows:

- Average Yarn Count Warp, Single Ne 19.77, Actual Ne 18.62
- Average Yarn Count Weft, Single Ne 15.32, Actual Ne 14.88
- Average Picks per Centimeter = 19.60
- Average Yarn Weight per Linear Meter:

— Warp	83.74 Grams
— Weft	82.81 Grams
Total Grams per Linear Meter	166.55

As indicated by Exhibit III, the total available capacity in loom picks does not correspond with the projected production in terms of width. The product mix contains 81.1% of the fabrics in greige widths below 109 centimeters. The looms adequate to weave these fabrics with reed widths up to 120 centimeters only represent 53.3% of the available capacity. This means that a substantial portion of the narrower fabrics are woven on looms with excessive reed space or in multiple widths on the wide loom. Although it is unlikely to occur, as previously stated, *this situation could become critical if a major shift would occur toward wider fabrics.*

EXHIBIT III

WEAVING PRODUCTION PLAN – 1976

PROJECTED DISTRIBUTION OF GREIGE WIDTH VERSUS ACTUAL LOOM CAPACITY

AVERAGE FABRIC WIDTH(1) = 101.84 CM GREIGE

Greige Fabric Width (Centimeters)	Projected Production of Fabrics(1) Meters per Day of 24 Hours	% of Total	Reed Width (CM)	Loom Capacity Available 100% Loom Picks per Day of 24 Hours	% of Total Picks
Less Than 80	76,260	16.7			
80 – 89	101,490	22.2			
90 – 99	135,840	29.7	72 – 102	392,304,000	33.1
100 – 109(2)	56,880	12.5	103 – 120(3)	238,848,000	20.2
Total Up To 109(2)	370,470	81.1	Up to 120(3)	631,152,000	53.3
110 – 168	77,850(6)	17.0	120 – 200(4)	508,968,000	43.0
168 – 245	8,520	1.9	Over 200	43,968,000(5)	3.7
Totals	456,840	100.0		1,184,088,000	100.0

(1) Exclusive of towels but including toweling fabrics (for apparel).
(2) Maximum actual 106 CM.
(3) Maximum actual 117 CM.
(4) Maximum actual 193 CM.
(5) Approximately half of wide loom capacity is used for multiple width narrow fabrics.
(6) Approximately equally divided in fabric widths 110 – 149 and 150 – 168 CM.

In case the average greige width increases, even without changes in fabric construction, the available loom capacity may be able to accommodate while spinning would not be able to produce the necessary yarns. An increase of 10 centimeters in the average greige width would result in an additional yarn consumption of some 2,500 tons per year. Mehalla should be aware of this situation and be prepared to adjust spinning capacity if the average width ever becomes wider.

The basic data and yarn requirements in connection with the present and future weaving projections are summarized in Exhibit IV.

It should be pointed out that the yarn quantities listed are those in the fabric and that the listed linear meters do not include towels and napkins, to avoid confusion. In this way, we conform with Mehalla's method of reporting towels per kilogram and napkins in units separately from the regular fabrics. As a result, our overall figures are consistent and comparable with Mehalla's projections.

The balance with spinning has been discussed in Section I, which deals with cotton spinning. We concluded that there would be no significant imbalance to meet the projected volume of 163 million meters per year in 1980, provided the product mix remains unchanged.

To meet production requirements of 148,500,000 meters in 1976, the available loom capacity should operate at an average efficiency of 74.27%. This target efficiency is up 2.3% compared to the 1975 performance, but we believe it is a reasonable goal and it can be achieved easily. The key to improved loom efficiency is essentially maintenance and specially original spare parts as well as good quality shuttles and pirns.

EXHIBIT IV

ACTUAL AND PROJECTED WEAVING PROGRAM – BASIC DATA

Year	Days of Operation	Actual or Projected(1) Lin. Meters	Greige Average Grams per Meter	Avg. Daily Production Linear Meters	Avg. Daily Production Picks in Fabric (000)	Average Eff. Percent	Yarn Requirements per Day Kilograms of Yarn in Fabric Warp	Weft	Total
1975	324	140,500,000	166.55	433,642	849,938	71.94	36,157(4)	35,915	72,072
1976	325	148,500,000	166.55	456,840	895,569	74.27(3)	38,101(4)	37,833	75,934
1980(2)	325	163,000,000	166.55	501,538	983,015	75.00	41,835(4)	41,535	83,370

(1) Based upon same product mix of 1975 and same average yield and pickage.

(2) After project.

(3) Calculated – based upon available daily picks in single fabric = 1,205,760 per day taking into account multiple width weaving on the Sulzer looms.

(4) Excluding wool warps for 1,860 meters per day in 1975 and 1976; 1,966 meters in 1980.

3. Weaving Preparation

The 13 available direct warpers operate at a combined speed of 5,500 meters per minute as indicated in the equipment summary in Appendix 1.

At 100% efficiency and for an actual yarn count of Ne 18.62 and an average of 470 ends per warp, the combined production of the warping department equals:

(470 x 5,500 x 60)/(18.62 x 1.7 x 1,000) = 4,900 Kilograms per Hour

Total warping requirements equal 1,700 kilograms per hour at present and will increase to approximately 1,870 kilograms per hour by 1980.

The operative time required to warp the 1980 requirements equals:

(1,870)/(4,900) = .38 Hour per Hour

Otherwise stated, the necessary average efficiency to warp the 1980 required volume is 38%.

We would expect under typical conditions an average of 40%. We doubt, however, that under the present circumstances Mehalla would achieve that goal. The main reasons are the poor mechanical condition of the two Polish warpers and the fact that winding bobbins are very uneven, resulting in excessive creeling and recreeling. If the winders in spinning are updated, this condition may substantially improve; and the danger of developing bottlenecks in warping may be eliminated. If the need arises, the average number of ends may also be increased to 500.

The 2,300 available pirn winding spindles, (including those on order) as listed in Appendix 3, operate at a combined speed of 1,172,400 meters per minute.

For an average actual yarn count of Ne 14.88, the total production of the pirn winders at 100% efficiency equals:

(1,172,400 x 60)/(14.88 x 1.7 x 1,000) = 2,780 Kilograms per Hour

Total present weft requirements equal approximately 1,665 kilograms per hour, including some 375 kilograms per hour for the Sulzer looms and the looms equipped with Unifils. Actual pirn winding requirements equal:

1,665 – 375 = 1,290 Kilograms per Hour

If the new looms are equipped with Unifils, no additional pirn winding would be required by 1980. The operative time required to wind on pirns 1,290 kilograms of weft equals:

1,290/2,780 = .465 Hour per Hour

Otherwise stated, the necessary average efficiency of the pirn winding to process the required volume is 46.5%.

Under normal conditions, we would expect an average efficiency of 75%. Taking into account the poor mechanical condition of some older pirn winders, the average efficiency achieved by Mehalla may be somewhat lower, but we do not believe that under the present circumstances any bottleneck should develop.

In slashing the 22 slashers total a theoretical drying capacity of 3,860 kilograms per hour, which approximately corresponds to the weight of yarn that can be dried from a saturation of 110% to a dry state of 7% remaining moisture.

The total yarn requirements at the slashing process by 1980 equal 1,850 kilograms per hour. The operative time required to process these quantities equals:

1,850/3,860 = .479 Hour per Hour

Otherwise stated, the necessary average efficiency of the slashing department to meet all requirements by 1980 equals 47.9%.

We would expect under normal conditions an average efficiency of approximately 50%, but we believe that the poor mechanical condition of the older machinery and equally of the more recent Polish slashers would not permit the attainment of an average efficiency of 50%. As a result, bottlenecks may occur in the slashing department.

D. QUALITY AND WASTE

1. Waste and Quality Performance

Based upon the data collected for 1975, the overall yield factor in cotton weaving averaged .9536 for the entire year from yarn to greige fabric. No reliable breakdown was reported for weft and warp yarns.

Overall waste figures computed by the central quality control department indicate the following waste averages per process:

Warping	.5%
Sizing	.8%
Weaving	1.5%
Subtotal	2.8%
Cloth Room	.2%
Overall Total	3.0% from Yarn to Greige

Typically, we would expect an overall total waste percentage from yarn to greige fabric of 2.0% to 3.0%, but the overall yield factor of .9536 would indicate that the real waste levels are higher and average 4.64% or 1.5 times the recorded quantities.

According to the official statistics computed by the central quality control department and based upon actual weight of waste materials in each weaving shed, percentages vary widely from one shed to the other. The best performance is reported by the Sulzer looms in shed 9, attaining an average low waste level of .5%. Among the worst performers are older sheds, such as 1 and 7, but also shed 11 which is equipped with recent Textima looms. We believe one of the reasons for the excessive waste levels in shed 11 is the poor design of the warp beam. The barrel diameter is only four inches (usually 5 to 6-1/2 inches), and the flanges are sheet metal made. As a result, it is difficult to unwind on the loom the last 20 to 50 meters of the warp yarns; and sheet metal flanges are subject to warping, resulting in uneven building of the selvages at the slashing process. These factors may also be instrumental in lower machine efficiency.

Another critical area for potential high waste levels is the warping. As mentioned elsewhere, excessive recreeling of the warpers is necessary because of uneven packages from winding.

Reportedly, approximately 8% creel ends have to be rewound. Under normal circumstances, we would expect 3% to 4% and a maximum 5% of the yarns introduced into warping being recreeled. This situation is still more critical because the creel ends are returned to one of the spinning mills for rewinding purposes. The additional handling and transportation to and from the spinning mill make controls less effective and are a potential source of errors and possible mixing of yarn counts as well as yarn wastage. We would recommend that these procedures be reviewed to improve effectiveness and to reduce waste. As an immediate measure, we suggest the purchase of a 120-spindle manual winder, which we have included in the package for new equipment. This winder would be used in the warping department for creel ends.

The brakes on the Polish warpers are inoperative. As a result, the warp beam does not stop timely upon an end down; and the tail of the broken end usually disappears in the beam.

The braking systems of these warpers are of an older design; and, based upon our experience, they are inefficient and difficult to maintain. However, we believe that the building of quality warp beams is essential for the efficiency and quality of all further processes.

Conservatively estimating that the lack of proper brakes causes .5% additional waste and reduces weaving efficiency by 3%, a slow warper producing an average of 125 kilograms per hour, beside causing lower quality fabrics, adversely affects the profit potential in the following manner (based upon average yarn prices of $2.50 per kilogram and fabric contribution to overhead and profit of $.05 per meter):

Loss of Materials (.5%)	125 x .005 x 2.5	= $1.56 per Hour
Loss of Efficiency (3%)	$\frac{125}{.088}$ x .03 x .05	= 2.13 per Hour
Total		= $3.69 per Hour

The total annual potential loss represents at least:

3.69 x 7,800 = $28,782

The cost of a new warper of 50% higher capacity than the Polish warper is estimated at $68,000. Taking into account shipping and installation cost, the new warper would be paid off in approximately 2.5 years. Considering the very reasonable payoff and the many intangible benefits, including lower operating cost and better quality production, we would recommend replacement of the two Polish warpers by two new ones. As a result, two new warpers have been included in the suggested equipment package.

2. Waste and Quality Control

Procedures and controls relative to waste and fabric quality are very elaborate. Except for exports, we question their real effectiveness.

Quality standards are relatively high for export fabrics but very low for domestic products. Many of the older looms would not be in a position to produce fabrics meeting export quality standards, but they generally meet domestic standards. We would not recommend, at this point in time, discarding any looms on the basis of not meeting domestic quality standards; but the quality criterion may become essential if exports are to continue expanding.

E. LABOR AND PRODUCTIVITY

The average labor complement in cotton weaving during 1975 includes 7,794 employees, up from 6,859 in 1971, while production was down from 145 million meters in 1971 to 140.5 million in 1975.

The labor productivity in 1975 of the cotton weaving operation averaged 13,700 picks per man-hour, compared to 16,000 picks per man-hour in 1971. The significant downward trend of the labor productivity in this short time span can hardly be explained completely by the deterioration of the loom condition through lack of original spares, since two new mills, 11 and 12, have come on stream in the meantime, while some older looms have been discarded. We assume that overstaffing is the main cause of the low productivity performance.

Compared to other countries, the overall productivity of the Mehalla cotton weaving operation is relatively low but not in the same proportion as in spinning, the technology of the equipment used in weaving being generally less outdated than in spinning.

The following table summarizes average labor productivity figures in a few selected countries:

Country	Average Picks per Man-Hour
Turkey	22,000
European Common Market	60,000
Hong Kong	26,500
Pakistan	15,400
U.S.A.	100,000

We did not analyze actual loom stops; but, from data collected at the responsible department, it would appear that the number of warp stops varies widely, depending on yarn count, fabric construction and operative conditions. Typically, the better performing styles may attain two warp stops per loom hour, while others may be as high as six warp stops per loom hour. From our observations, we suspect that the overall level of warp stops could be somewhat reduced by improving the quality of warping and slashing.

In 1974, the cotton weaving operation contributed £E 4.8 million to a total of £E 14.1 million gross profit. Total manufacturing cost was approximately 80% of sales. As for the cotton spinning operation, rising labor cost may significantly erode the profit potential of the cotton weaving operation in the foreseeable future if no action is taken to improve labor productivity.

F. CURRENT COST

Based upon 1974 actual figures, manufacturing cost in cotton weaving for the average fabric is typically structured as follows:

Cost Element	Milliemes per Lin. Meter	% of Total Conversion Cost
Auxiliary Materials	004	8.7
Labor and Fringes	023	50.0
Spare Parts	005	10.9
Maintenance	005	10.9
Power	002	4.3
Depreciation	002	4.3
Other Overhead	005	10.9
Total	046	100.0

Total conversion cost (excluding raw materials) in cotton weaving would average £E .046 or \$.118 per linear meter of fabric produced. Taking into account 9.2% increase in wages in 1975, the total actual cost would equal approximately £E .048 or \$.123 per linear meter. Typically in the U.S.A. present conversion cost may be closer to \$.14 per linear meter, but the average greige width would be around 120 centimeters instead of 101 centimeters as at Mehalla.

Interest charges, sales and administrative charges account for another £E .013 per meter, which represents approximately 22.5% of conversion cost.

Spare parts and maintenance cost account for £E .010 or \$.026 per meter. In the U.S., spares and maintenance would be in the order of \$.010 to \$.015 per meter (£E .004 — .006). Mehalla's excess maintenance cost may reflect to some degree the lack of effectiveness of local spare parts manufacturing.

Assuming straight replacement of an old loom by a new loom, we would expect labor cost and maintenance to decrease while depreciation on a per meter basis would increase. If no changes in staffing are made, the average increase in output through higher speeds and better efficiency is estimated at 25% on a per loom basis. As a result, new looms, producing identical products, would achieve labor savings of £E .00575 per meter; and the average labor cost would decrease from £E .023 to .017 per linear meter.

On the other hand, for the new loom, the expected depreciation charges would be higher and are estimated as follows:

1. For the loom:

   15,000 x .06 ÷ 30,000 = \$.03 per Meter or £E .0117 per Meter

2. For new construction, if any:

   200 x 15 x .025 ÷ 30,000 = \$.0025 per Meter or £E .001 per Meter

   Equipment and Building = \$.0325 per Meter or £E .0127 per Meter

Without new construction at conservatively estimated installed cost of new looms and using the same depreciation rates as for the old equipment, depreciation charges would increase from £E .002 to £E .0117, representing an increase of approximately £E .010 in total depreciation charges per linear meter produced. If new construction has to be considered, the excess depreciation would equal £E .011 per linear meter produced.

In summary, the increase in depreciation charges is approximately double the gain in labor cost. As a result, replacement of older profitable weaving equipment on the basis of cost reduction could not be justified under the present cost structure.

Maintenance of production equipment varies widely from shed to shed. The average cost per loom equals £E 223 per year, including maintenance wages, oil and lubricant, spares and local workshop orders. Shed 9, Sulzer equipped, averages £E 394 per loom year; shed 1 remains slightly below the average with £E 207 per loom year; shed 13 is at £E 257 per loom year and sheds 11 and 12 (Textimas) are at £E 190 per loom and per year; shed 5, equipped with the oldest looms (1936) has an excellent maintenance performance on a per loom basis with £E 170 per year.

G. FUTURE REQUIREMENTS AND DEVELOPMENT

Mehalla's projections for growth in cotton weaving capacity, from the present 141 million meters per year to 163 million meters in 1980, seem reasonable. Although Mehalla counts primarily on increased export sales, the domestic demand is likely to remain strong in the foreseeable future; and local consumption of fabrics for garment manufacturing may also exceed the preliminary estimates.

The same basic principles would apply as we outlined in the discussion of cotton yarn spinning development. Most important is the design of a long-range master plan which would take into account the overall development of the integrated operation from spinning through garment manufacturing for the best interest of the company, the employees and the national economy.

Any new acquisition or expansion should be part of this plan and should be compatible with those interests.

As a first step in elaborating the master plan, we would like to summarize an operating strategy for cotton weaving development, as we perceive it at present, in the best interest of all concerned.

1. Cotton weaving should not lead spinning and should not develop at a faster pace than spinning in order to avoid unnecessary strain on yarn production, which could result in cancelling profitable export yarn sales.

2. Replacement of older profitable looms on the basis of reduced manufacturing cost does not seem justifiable under the present operating conditions. Only those looms, whose efficiency is much lower than average, may eventually be replaced if the cost to recondition them would be excessive.

3. The payoff on new weaving equipment, including new construction, is still less attractive and should be avoided because of higher depreciation and also because existing buildings may be used to install 60% to 100% more capacity when older equipment is discarded in the future.

4. New investments in weaving should be taking into account possible shifts in the product mix toward more profitable fabrics such as finer poplins, dobby patterns, ducks, more mattress ticking and bedspreads.

As a result, the future production objectives of 163 million meters per year should be reached by discarding a minimum number of existing looms, by concentrating on the more profitable styles and by avoiding new construction.

H. PROPOSED DEVELOPMENT PLAN

1. Weaving

Present Mehalla's plans call for replacement of 996 looms as listed in Exhibit V.

Most of these looms are indeed relatively old and in poor mechanical condition. Particularly, the looms in positions 1, 3, 4, 5, 6, and 8 are performing at low levels of efficiency; and reconditioning them would either be impossible or extremely expensive and is estimated to cost over 60% of the replacement cost. As a result, the investment in reconditioning would be difficult to justify economically; and we agree that these looms should be discarded.

EXHIBIT V

MEHALLA'S ORIGINAL LOOM REPLACEMENT PLAN

Shed No.	Make	Number of Looms	Reed Width	Remarks	Position
7	Northrop	240	102/107	Cam	1
7	Northrop	192	102/107	Cam (Poplin)	2
6	Northrop	32	117	Dobby	3
6	Northrop	24	72	Terry Plain	4
6	Northrop	34	178	Dobby and Plain	5
6	Northrop	32	107	Dobby	6
6	Northrop	12	117	Heavy Duck	7
6	Northrop	6	132	Plain	8
6	Northrop	88	107	Dobby	9
13	Draper	96	102	Plain	10
5	Butterworth	240	102/115	Plain	
	Total	996			

However, we would doubt that discarding the looms in the other positions could be economically justified for the following reasons:

— Position 2 — 192 Poplin Looms in Shed 7

  These looms have been maintained as much as possible with original parts, and they are in satisfactory mechanical condition.

— Position 7 — 12 Heavy Duck, Hand Change Looms

  They are the only heavy duck looms in the company. They produce profitable fabrics at high levels of efficiency, and replacement would seem premature at this point in time. .

— Position 9 — 96 Draper Looms in Shed 13

  These looms are now operating at approximately 80% efficiency. Maintaining them with original spares should allow continuation of the present profitable condition in the foreseeable future.

— Position 10 — The Old 1936 Butterworth Looms in Shed 5

  These machines are classic examples of depreciated, efficient and low cost operating equipment, whose replacement could not be justified on an economical basis. The quality performance may not be very impressive; but, if the same fabrics, mostly ration fabrics with no profit potential, had to be woven on new equipment, the company would have to sustain serious additional losses for which any new investment would be unjustified.

In summary, the suggested loom replacement plan consists of 456 machines as listed in Exhibit VI.

EXHIBIT VI

SUGGESTED REPLACEMENTS OF EXISTING LOOMS

Shed No.	Number of Looms	PPM	Reed Width (CM)	Capacity in Number of Picks per Hour (x 1,000): Up to 90 CM Reed Width Plain	90 CM to 120 CM Reed Width Plain	90 CM to 120 CM Reed Width Dobby	120 CM to 200 CM Reed Width Plain	120 CM to 200 CM Reed Width Dobby	Remarks
7	240	176	102/107		2,534				
6	32	170	117			326			
6	24	156	72	225					Terry Towels
6	120	168	107			1,210			
6	6	130	132				47		Duck
6	24	112	178					161	
6	10	115	178				69		
				225	2,534	1,536	116	161	
Total	456 Looms				4,295		277		4,572
					Narrow Up to 120 CM		From 120 – 200 CM		Total Picks/Hour (x 000)
	9.4% of Existing Looms				16.3% of Narrow Width Capacity		1.3% of Medium Width Capacity		9.2% of Total Pick Capacity

After considering discarding these 456 looms, projections for new capacity have been developed on the basis of 163 million meters per year output of an unchanged product mix by 1980. Assuming 325 working days in the year, the 1980 projected volume would correspond to a daily production of 501,538 linear meters.

It is further assumed that the 456 discarded looms were operating at an average efficiency of 60% while the new looms will be operating at an average of 80%.

After discarding 456 looms, which were operating at lower than the average estimated efficiency of 75%, it is logical to assume that the remaining looms will operate at a higher average performance level. The weighted average efficiency, based on 75% overall performance before discarding the 456 looms would equal 76.52% after discarding. As a result, we will assume that the remaining looms are operating at an average of 76.52% after discarding the 456 worst ones, while the average operating efficiency of any new weaving capacity is estimated at 80%. Exhibit VII summarizes these computations:

EXHIBIT VII

ACTUAL WEAVING CAPACITY AND PROJECTED FUTURE REQUIREMENTS

Year	Days of Operation	Actual or Projected Lin. Mtrs. per Day	Total Picks in Fabric per Day (000)	Avg. Eff. %	Capacity Required to Produce Actual or Projected Lin. Mtrs. Picks (000) per Day	Capacity Available Picks (000) per Day Before Project	Incremental Capacity Required Picks (000) per Day
1975	324	433,642	849,938	71.94	1,181,454	1,181,454	None
1976	325	456,840	895,569	74.27	1,205,760	1,205,760	None
1980	325	501,538	983,015	76.52	1,284,651	1,096,032(1)	188,619(2)

(1) After taking out 456 looms representing 4,572,000 x 24 = 109,728,000 picks per day.

(2) 188,619,000 picks per day would be required as incremental capacity at the average projected efficiency of 76.52%. However, new looms are expected to reach at least 80%, while the scrapped looms contributed only at an estimated 60%. As a result, scrapping 9.2% of the total pick capacity is reflected by an efficiency increase of the remaining looms from 75.00 to 76.52. It is further assumed that 75% was reached before 1980 due to improved maintenance mainly through original spare parts. At 80%, the incremental capacity required would be 180,414,000 picks per day.

The next step is to determine how many looms are required to provide the incremental capacity and to break down the new capacity in narrow and wide, cam, dobby and jacquard, single shuttle and box looms.

In order to increase the flexibility of the existing cotton weaving operation, we have suggested a diversified set of 670 looms, totalling a capacity of 7,620,000 picks per hour or 182,880,000 picks per day, or two million picks per day in excess of the calculated requirements at 80% efficiency.

Bearing in mind increasing capacity in the more profitable fields, we have suggested 368 dobby looms and 32 wide jacquard looms as well as 34 new duck looms. Although the suggested loom complement is subject to minor adaptations, we believe that it achieves three important objectives:

— Increase Mehalla's capacity to 163 million meters per year.

— Diversify Mehalla's product mix into the more profitable styles.

— No additional new construction is required.

The detailed breakdown of the suggested new cotton weaving equipment plan is summarized in Exhibit VIII.

The estimated cost of this equipment complement and its accessories is listed in Exhibit IX.

EXHIBIT VIII

SUGGESTED NEW COTTON WEAVING EQUIPMENT PLAN

Item	Number of Looms	Expected PPM	Usable Reed Width (CM)	Capacity in Number of Picks (x 1,000) per Hour: Up to 200 CM, Plain	Up to 200 CM, Dobby	Over 200 CM, Jacquard	Total Capacity 1,000 Picks per Hour	Number of Looms: 1 x 1	4 x 1	4 x 3	Remarks: Typical Uses of Fabric(1)
1.	292	200	132	3,504			3,504	292			Poplins
2.	220	190	132		2,508		2,508	220			Light and Medium Twills
3.	12	200	112	144			144	12			Duck Looms
4.	16	190	132	182			182	16			Duck Looms
5.	6	190	152	69			69	6			Duck Looms
6.	16	170	178	163			163	16			Bottom Weights
7.	72	165	178		713		713	72			Fancy Twills
8.	4	160	178		38		38		4		Tablecloths
9.	12	160	220			115	115	12			Ticking
10.	8	155	220			74	74		6	2	Tablecloths
11.	8	155	245			74	74	8			Bedspreads
12.	4	150	245			36	36		2	2	Upholstery
Total	670			4,062	3,259	299		654	12	4	
Total Picks per Hour x 1,000				7,321		299	7,620				

(1) Provided only as a guideline.

EXHIBIT IX
SUGGESTED INVESTMENT – NEW COTTON WEAVING EQUIPMENT
LIST OF EQUIPMENT AND ESTIMATED COST

Item	Number of Looms	Description of Looms	Usable Reed Space (CM)	Plain	Dobby	Jacquard	1 Shuttle	4 x 1	4 x 3	Unifil	Estimated FOB Cost per Unit $	Total Estimated Cost FOB $
1.	292	Single Shuttle Cam Loom	132	x			x			x	$ 7,200	$ 2,102,400
2.	220	Single Shuttle Dobby Loom	132		x		x			x	9,000	1,980,000(1)
3.	12	Duck Loom	112	x			x			x	8,200	98,400
4.	16	Duck Loom	132	x			x			x	8,400	134,400
5.	6	Duck Loom	152	x			x			x	8,800	52,800
6.	16	Single Shuttle Cam Loom	178	x			x			x	8,100	129,600
7.	72	Single Shuttle Dobby Loom	178		x		x			x	9,800	705,600(1)
8.	4	Dobby Box Loom	178		x			x		x	11,500	46,000(1)
9.	12	Single Shuttle Jacquard Loom	220			x	x				10,700	128,400
10.	8	Jacquard Box Loom	220			x		x	x		12,750	102,000
11.	8	Single Shuttle Jacquard Loom	245			x	x				10,900	87,200
12.	4	Jacquard Box Loom	245			x		x	x		13,000	52,000
	670	Total Looms										$ 5,618,800
13.	634	Unifils									2,200	1,394,800
14.	32	Jacquard Heads – 1,248 Hooks									5,100	163,200
15.	634	Sets of Accessories for Cam and Dobby Looms										1,574,800
16.	32	Sets of Accessories for Jacquard Looms										131,200
		Subtotal Looms F.O.B.										$ 8,882,800
17.	18	Knotting Machines with Accessories									19,000	342,000
18.	2	Shearing Machines with Accessories									88,000	176,000
19.	2	Plaiting Machines with Accessories									27,000	54,000
20.	3	Inspection Machines with Accessories									14,000	42,000
		Subtotal F.O.B.										$ 9,496,800
21.		Seaworthy Packing, Freight and Insurance										950,000
22.		Grand Total CIF Value										$10,446,800

(1) Including dobby.

The summary of investments in Exhibit X indicates that the total estimated CIF cost equals $10,446,800; and the total investment, excluding working capital, is estimated at $13,937,600.

This is substantially lower than the original estimates which were over $17,000,000 for equipment only. In addition, the original plan would have required construction of approximately 10,000 square meters at an estimated cost of $2,000,000.

Including freight, erection, duty, spares and accessories, the original plan would have required a total investment in excess of $23,000,000 while the actual potential would not have been greater than with the suggested plan.

EXHIBIT X

SUMMARY OF INVESTMENT PLAN – COTTON WEAVING

Item	Description	Estimated Cost in US $ Estimated Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Processing Equipment and Accessories CIF Value	$10,446,800		$10,446,800
2.	Import Duty on 1.(12%)		$1,254,000	1,254,000
3.	Clearing and Local Transportation and Erection	105,000	123,000	228,000
4.	Auxiliary Equipment and Accessories		Included in Item 1.	
5.	Import Duty on 4.		Included in Item 2.	
6.	Clearing and Local Transportation for 4.		Included in Item 3.	
7.	Spares (10%) Including Duty (12%)	1,044,500	125,300	1,169,800
8.	Electrical (Renovation and Connection Only) Estimated		134,000	134,000
9.	Airconditioning (Updating Only) Estimated		50,000	50,000
	Subtotal Equipment Installed	$11,596,300	$1,686,300	$13,282,600
10.	Construction (Updating Only) 10,050 at $65 Estimated		655,000	655,000
	Total Investment (Excluding Working Capital)	$11,596,300	$2,341,300	$13,937,600

2. Weaving Preparation

As we stressed earlier, the weaving preparation is very critical with regard to quality and performance of the subsequent processes and particularly weaving.

In the original request, only two new slashers were included. We believe at least one is needed to relieve potential bottlenecks and the other one to replace inadequate equipment. A new modern can slasher would replace the present capacity of 2.5 of the three Polish slashers. It would save at least five operators and consume only 60% of the steam now required by the Polish slashers. We may further assume that the quality of the warps would be increased and waste would be reduced. The cost of a new slasher is slightly under $100,000, but the payoff would be less than three years, considering only these elements at conservative estimates:

	Per Year
— Labor Savings	$ 5,000
— Steam Savings	5,800
— .5% Less Waste	24,500
Total	$35,300

In order to build in more flexibility, we suggested one of the slashers be equipped with warp dyeing equipment.

In warping, no new equipment was requested, and apparently no potential bottlenecks exist. However, as we discussed in subsection D, we would recommend replacement of the two existing Polish warpers, mainly for quality reasons. The payoff would be less than 2.5 years as demonstrated in the same subsection. Further improvements in warping are possible, and we also suggested a 120 spindle manual winder to rewind creel ends.

Exhibit XI summarizes the suggested investment plan in warping and slashing, while Exhibit XII is a recap of the capital required and estimated at $862,940, of which $657,440 is foreign exchange.

EXHIBIT XI

SUGGESTED INVESTMENT – ADDITIONAL WARPING AND SLASHING

Process	Number of Machines	Description	Estimated F.O.B. Cost in US $ Per(1) Machine	Total $
Warping	1	54" Wide Beam 40" Diameter Including Creel 544 Ends	$ 68,000	$ 68,000
	1	72" Wide Beam 40" Diameter Including Creel 544 Ends	76,000	76,000
	64	Beams for Warpers	660	42,240
Rewinding	1	Manual Cone Winder 120 Sp.	31,200	31,200
Slashing	2	12 Can Slasher – 16 Stands in Creel, 2 Size Boxes – 60"	96,000	192,000
	1	18 Can Slasher – 16 Stands in Creel and Dye Box	132,000	132,000
		Subtotal		$541,440
		Seaworthy Packing, Freight and Insurance		65,000
		Grand Total CIF Value		$606,440

(1) Complete including normal accessories but no spares.

EXHIBIT XII

SUMMARY OF INVESTMENT PLAN – WARPING AND SLASHING

Item	Description	Estimated Cost in US $ Estimated Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Processing Equipment – CIF Value	$606,440		$606,440
2.	Import Duty on 1. (12%)		$ 72,800	72,800
3.	Clearing and Local Transportation and Erection	20,500	112,000	132,500
4.	Auxiliary Equipment and Accessories		Included in Item 1.	
5.	Import Duty on 4.		Included in Item 2.	
6.	Clearing and Local Transportation for 4.		Included in Item 3.	
7.	Spares (5%) Including Duty (12%)	30,500	3,700	34,200
8.	Electrical (Renovation and Connection Only)		5,000	5,000
9.	Airconditioning		None	
	Subtotal Equipment Installed	$657,440	$193,500	$850,940
10.	Construction (Updating Only) Estimated		12,000	12,000
	Total Investment (Excluding Working Capital)	$657,440	$205,500	$862,940

3. Additional Opportunities

In Section III, we discuss the upgrading of certain machinery including existing Draper and Crompton looms with original spares. We refer to that section for more details. In the scope of the cotton weaving plan however, we consider updating these looms at an estimated cost per loom from $900 to $2,800 as a very productive investment. As a result of this investment, representing on the average less than 10% of the replacement value of the loom, we expect to gain efficiency increases at least from 65% to 75% and more. Such increases represent an additional 15% output above the present performance.

4. Expected Performance

The suggested investment in 670 new looms, in updating some existing looms and in new warping and slashing equipment would not require any additional labor nor any additional construction. It would further include the following benefits:

- Average expected loom efficiency would rise from 72% in 1975 to over 76.5% in 1980.
- Annual production is expected to be increased from 148 million meters in 1976 to 163 million meters in 1980.
- Overall yield from yarn to fabric is expected to improve slightly over the 1975 level of .9536 because of reduction in waste, particularly in the warping and the slashing processes.
- Greige goods quality should improve through better slashing.
- Although the product mix remains basically unchanged, additional flexibility has been added in the areas where the profit potential seems to be the greatest, such as:
    - Slasher dyeing.
    - Weaving of jacquard patterns in bedspreads and ticking material.
    - Weaving of ducks and dobby fabrics.

The incremental weaving capacity created through the implementation of this project equals 163 — 148.5 = 14.5 million meters per year for a total investment of approximately $14 million. On a marginal basis, the depreciation per incremental meter produced would be:

(14,000,000 x .06)/14,500,000 = $.0579 or £E .23 per Meter

The marginal depreciation of £E .023 per meter is substantially higher than the present average of £E .002 per meter; but, for the incremental production, no additional labor is required which represents a saving of £E .023 per meter practically equivalent to the increase in marginal depreciation. On balance the new equipment, beside considerable intangible benefits, improves the profit potential of the company even before taking into account the effects of better quality and reduced waste levels. As for the cotton spinning, further potential exists to reduce the labor cost if proper reorganization is implemented.

5. **Summary of the Project Evaluation**

Exhibits XIII through XVII summarize the project evaluation relative to the cotton weaving and accessory equipment. They indicate the requested compared to the recommended investment in equipment at F.O.B. prices, as well as the justification for the expenditure.

EXHIBIT XIII

SUMMARY OF INVESTMENT EVALUATIONS – LOOMS

Mill – Cotton Weaving
Department – Weaving
A.I.D. Request Reference – Annex 13, Table 2

Quantity	Item	A.I.D. Request Value F.O.B. £E	US $
996	Looms with Unifil	5,313,000	13,601,280
	Spares	796,950	2,040,190
	Total	6,109,950	15,641,470

U.S. Manufacturer of Desirable Equipment	Yes
Estimated Cost F.O.B. – US $	9,771,080

Recommended:

Installation of 670 looms only based upon the following strategy:

1. Investment in weaving should not result in unbalance with spinning nor in reduction of yarn exports.

2. Instead of discarding 996 looms, we would recommend at this time considering only 456 looms. The others can be updated at moderate cost and with excellent payoff. (See updating program.)

3. Meet production targets of 163 million meters per year in total, based on present product mix.

4. Expand capacity primarily in the most profitable areas such as dobby weaving, mattress ticking, bedspreads, and ducks.

5. Avoid additional new construction as much as possible. On the basis of the suggested program, no new construction is required to meet the production targets.

EXHIBIT XIV

SUMMARY OF INVESTMENT EVALUATION – LOOM ACCESSORIES

Mill – Cotton Weaving
Department – Weaving
A.I.D. Request Reference – Annex 13, Table 2

Quantity	Item	A.I.D. Request Value F.O.B. £E	US $
18	Knotting Machines	90,000	230,400
	Spares	13,500	34,560
	Total	103,500	264,960

U.S. Manufacturer of Desirable Equipment	Yes
Estimated Cost F.O.B. – US $	376,200

Recommended:

For replacement and additional capacity. Actual prices appear higher than originally estimated by Mehalla.

EXHIBIT XV

SUMMARY OF INVESTMENT EVALUATION – WEAVING PREPARATION

Mill – Cotton Weaving

Department – Weaving Preparation

A.I.D. Request Reference – Annex 13, Table 2

Quantity	Item	A.I.D. Request Value F.O.B. £E	US $
2	Sizing Machines	200,000	512,000
	Spares	30,000	76,800
	Total	230,000	586,800

U.S. Manufacturer of Desirable Equipment — Yes

Estimated Cost F.O.B. – US $ — 568,500

Recommended:

To install 2 regular sizing machines and one sizing machine with separate dye box for warp dyeing. In addition to the requested program, we recommend two new warpers and a 120-spindle cone winder for rewinding creel ends. We would consider discarding the present Textima warpers and slashers on the basis of low quality performance, high cost to operate and maintain, as well as excessive wastage of yarn. Individual machine prices appear lower than originally estimated by Mehalla. The proposed investment would permit Mehalla to substantially improve the quality of weaving preparation, which is a prerequisite to efficiency and quality of weaving. In addition, controls would be more effective and waste levels, which now appear excessive, could be substantially reduced.

EXHIBIT XVI

SUMMARY OF INVESTMENT EVALUATION – COMPLEMENTARY EQUIPMENT

Mill – Cotton Weaving
Department – Weaving
A.I.D. Request Reference – Annex 13, Table 2

Quantity	Item	A.I.D. Request Value F.O.B. £E	US $
	Complementary Equipment (Airconditioning Substations, Etc.)	500,000	1,280,000

U.S. Manufacturer of Desirable Equipment — **Yes**

Estimated Cost F.O.B. – US $ — **0**

Recommend:

The newly suggested cotton weaving investment plan does not require new construction although it is designed to meet the 1980 production objectives of 163 million meters per year. As a result, we have recommended updating only existing buildings, electrical installations and existing airconditioning equipment. For these investments, only local currency would be required.

EXHIBIT XVII

SUMMARY OF INVESTMENT EVALUATION – CLOTH ROOM EQUIPMENT

Mill – Cotton Weaving
Department – Cloth Room
A.I.D. Request Reference – Annex 13, Table 2

Quantity	Item	A.I.D. Request Value F.O.B. £E	US $
2	Shearing Machines	30,000	76,800
2	Plaiting Machines	12,000	30,720
3	Inspection Machines	3,000	7,680
	Total	45,000	115,200

U.S. Manufacturer of Desirable Equipment — Yes

Estimated Cost F. O. B. – US $ — 299,200

Recommended:

For additional capacity and improved quality of these operations. Individual prices of machines appear higher than originally estimated by Mehalla.

I. TECHNICAL ASSISTANCE

We believe Mehalla has the fundamental expertise and experience to implement the new cotton weaving investment plan with some help from the suppliers. However, to fully capitalize on existing opportunities, it would appear desirable to include some form of technical assistance for the main purpose of reducing cost through better controls, quality improvements and reduced waste levels. It would also be advisable to design a master plan for future development of the company, including the establishment of criteria, objectives, cash flow projections and budgeting. Cotton spinning, weaving and finishing being a major activity of Mehalla, this would be a good place to start. The plan should also be managed on a continuous basis, and the necessary organization to assure continuity should also be examined and laid down.

The following is a broad outline of estimated investment requirements for technical assistance in the scope of the new and continuing operations:

Design and Initial Implementation of the Company's Master Plan for Future Development	$ 70,000
Engineering of Warping and Sizing Processes	60,000
Waste Control Program	200,000
Production Control Program	140,000
Cost Reduction Program (3 Years)	400,000
Total	$870,000

Basically, the engineering of warp and sizing processes would be aimed at improving quality of the sized beams introduced into weaving. Improving the quality of sized warps would have a beneficial effect on weaving efficiency. For each percent additional weaving efficiency, the estimated annual savings, based on average contribution to depreciation and profits of $.05 per meter of fabric woven, would amount to:

1,630,000 x .05 = $81,500 per year (£E 31,786)

The waste control program would aim at reducing and controlling waste in all processes, but the specific objective would be to increase the overall weaving yield from yarn to fabric from the present level of .9536 to .9700, which is a conservative objective. This would save some 500 tons of yarn per year, worth well over $1,000,000 (£E 390,014).

The actual scope and potential savings of some of the proposed technical assistance programs can be determined only on the basis of an appropriate survey; therefore, the quoted figures should be used as guidelines only.

APPENDIX 1

EQUIPMENT SUMMARY

PLANT – CENTRAL DEPARTMENT

DEPARTMENT – WARPING

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect. Average Eff. %	Remarks
Warping (Direct)	Reiner	46	1	1	1	300-600	300		560 Ends
	Schlafhorst	71	1	1	1	300-600	500		Double Creel 608 Ends
	Schlafhorst	72	1	1	1	300-600	500		560 Ends
	Schlafhorst	74	4	1	4	300-600	500		560 Ends
	Polish	70	2	1	2	300-400	300		600 Ends
	Barber	58	4	1	4	300-800	400		540 Ends
Warping (Sectional)	Polish	72	1	1	1	80-600			576 Ends

APPENDIX 2

EQUIPMENT SUMMARY

PLANT — CENTRAL DEPARTMENT

DEPARTMENT — SLASHING

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Rated Drying Capac. Kg./Hr.	Remarks
Slashing	Hibbert	62	2	1	2	8-30		120	Head Stock 180 CM
	Hibbert	49	14	1	14	8-30		120	12 x 110 CM 2 x 180 CM
	Poland	70	3	1	3	10-30		140	180 CM
	Sucker	72/73	2	1	2	20-125		700	200 CM
(Reconditioned)	Hibbert	49	1	1	1	8-30		120	110 CM
			22		22				

APPENDIX 3
EQUIPMENT SUMMARY
PLANT — CENTRAL DEPARTMENT
DEPARTMENT — PIRN WINDING

Process	Make	Year	No. of Machines	Del. per Machine	Total Deliveries	100% Kg./Hour, RPM, PPM & Mtr. per Min. Range	Typical	Expect. Average Eff. %	Remarks
Pirn Winding	Schlafhorst	55	13	36	468	400-550	500		
	Schlafhorst	55	16	24	384	400-550	500		
	Schlafhorst	71	4	36	144	500-600	550		
	Hacoba	49	5	40	200		300		
	Schweiter	71	5	48	240	500-600	550		
	Schweiter	73	3	48	144	500-600	550		
	Schweiter	75	5	48	240	500-600	550		
	Total Installed				1,820				
	Schweiter	76	10	48	480	500-600	550		On Order
					2,300				

APPENDIX 4
EQUIPMENT SUMMARY
PLANT – COTTON WEAVING
DEPARTMENT – WEAVING

Mill No.	Make	Year	Number of Looms	Reed Width (CM)	PPM	Change	Motion	Exp. Avg. Eff. %	Remarks
1	Northrop S	1949	448	102	180	B	C	75	Change
2	Draper X-2	1948	96	102	182	B	C	80	M = Manual
	Picanol	1975	300	176	180	U	C	80	B = Battery
3	Draper X-2	1950	600	82	182	B	C	80	U = Unifil
4	Saurer	1970	48	270	110	B	C	75	M = Magazine
	Saurer	1972	54	220	120	B	C	75	
5	Butterworth	1936	168	107	180	M	C	80	Motion
	Butterworth	1936	72	114	180	M	C	80	C = Cam
6	Northrop	1956	120	107	168	B	D	75	D = Dobby
	Northrop	1961	32	116	164	B	D	75	J = Jacquard
	Northrop	1958	40	177	115	B	C	75	
	Northrop	1957	24	177	112	B	C	75	
	Northrop	1956	24	177	125	B	J	75	
	Northrop	1956	2	216	110	B	D	75	
	Northrop	1948	36	305	93	B	C	75	
	Northrop	1948	12	117	126	B	C	75	
	Northrop	1964	24	112	105	B	J(1)	75	
	Northrop	1964	6	132	130	B	C	75	
	Draper X-2	1948	24	72	156	B	C(1)	75	
	Draper XP	1948	12	102	140	B	C	75	
	Picanol	1962	52	162	142	U	C	80	
	Crompton	1959	4	183	115	B	J	75	
	Crompton	1959	6	188	115	B	J	75	
	Crompton	1958	2	188	115	B	D	75	
	Crompton	1953	6	193	115	B	J	75	
	Crompton	1959	12	112	105	B	J(1)	75	
	Crompton	1958	72	127	135	M	D	75	
	Investa	1974	12	265	120	B	D(1)	75	
7	Northrop	1951	240	102	176	B	C	75	
	Northrop	1951	192	107	176	B	C	75	
8	Northrop	1962	336	112	173	U	D	75	
	Northrop	1963	48	152	150	U	C	75	
	Northrop	1960	42	177	143	U	C	75	
9	Sulzer	1963	72	330	191	–	C	90	
10	Saurer	1970	480	130	177	B	C	80	
11	Textima	1972	240	180	156	B	C	80	
12	Textima	1974	740	140	167	B	C	80	
	Textima	1974	60	140	167	B	D	80	
13	Draper X-2	1948	96	102	182	B	C	80	
Total All Looms			4,854						

1,906 of these looms are 20 years of age or older.

(1) Terry.

APPENDIX 5
COTTON WEAVING PROGRAM
LIST OF FABRIC CONSTRUCTIONS

Style Number	Greige (CM)	Warp x Weft Ne	Construction Ends x Picks (CM)	Exclusive of Sizing Gr. Weight per Linear Meter Warp	Weft	Total
91/54	87	14 x 14	19.0 x 19.0	76.4	72.9	149.3
1212	80	20 x 8	19.0 x 16.5	49.2	101.9	151.1
2290	87	14 x 14	19.0 x 16.5	76.4	63.4	139.8
934	102	18 x 18	19.0 x 17.5	69.7	61.3	131.0
1393	80	20 x 8	19.0 x 17.0	49.2	105.0	154.2
1873	137	30 x 18	53.0 x 28.4	156.6	133.5	290.1
Drill Meh.	162	14 x 10	35.0 x 20.5	262.4	205.1	467.5
928	140	24 x 10	17.3 x 16.5	65.3	142.7	208.0
49/53	150	20 x 20	23.5 x 23.5	114.1	108.9	223.0
49/53	160	20 x 20	23.5 x 23.5	121.6	116.1	237.7
Drill 825	154	30/2 x 24/2	41.5 x 21.0	275.6	166.5	442.1
Drill 2236	161	40/2 x 40/2	41.5 x 23.0	216.1	114.3	330.4
Drill 2239	150	30/2 x 30/2	41.5 x 23.0	268.5	142.0	410.5
Drill Meh.	76	14 x 10	35.0 x 20.5	122.9	96.3	219.2
Sat 1484	75	24/2 x 10	37.5 x 19.5	151.7	90.3	242.0
Drill 2212	78	20 x 12	34.0 x 20.5	85.8	82.3	168.1
Fl 1286	80	20 x 10	22.5 x 19.5	58.2	96.4	154.6
Sabaa Sheet	203	14 x 14	21.0 x 19.5	197.0	174.6	371.6
Sabaa Sheet	245	14 x 14	21.0 x 19.5	237.8	210.8	448.6
Sabaa Sheet	183	14 x 14	21.0 x 19.5	177.6	157.5	335.1
Sabaa Sheet	168	20 x 20	23.5 x 23.5	127.8	122.0	249.8
Flan. 1219	73	14 x 14	17.0 x 15.0	57.4	48.3	105.7
Gauze 1884	97	24 x 18	14.0 x 9.5	36.7	31.6	68.3
Bat. Rabeh	87	30 x 30	23.5 x 23.5	44.1	42.1	86.2
Popl. Nassem	86	18 x 18	23.0 x 20.5	71.1	60.5	131.6
Dabalan 22	88	16 x 16	21.5 x 21.5	76.5	73.0	149.5
Gauze 1068	98	30 x 30	11.5 x 9.5	24.3	19.2	43.5
Gauze 76/60	106	50 x 40	7.0 x 5.0	9.6	8.1	17.7
Batista Rabih	87	30 x 30	23.5 x 23.5	44.1	42.1	86.2
Voile 366	145	50 x 50	26.0 x 20.5	48.8	36.7	85.5
Tablecloth	192	14 x 10	24.0 x 19.7	213.0	233.6	446.6
Tablecloth	168	14 x 10	24.0 x 19.7	186.4	204.4	390.8
Dobby 1434	140	30/2 x 14	35.0 x 20.5	211.4	126.6	338.0
84/53	138	12 x 10	17.0 x 13.5	126.5	115.1	241.6
1823	154	50 x 50	35.0 x 31.5	69.8	60.0	129.8
Flan. Misr	80	30/2 x 8	19.0 x 16.5	65.6	101.9	167.5
Flan. Dobb.	80	20 x 10 (Soft)	22.5 x 19.5	58.2	96.4	154.6
Tube 1459	110	24 x 24	41.5 x 43.3	123.1	122.6	245.7

APPENDIX 5 (CONTINUED)

Style Number	Greige (CM)	Warp x Weft Ne	Construction Ends x Picks (CM)	Exclusive of Sizing Gr. Weight per Linear Meter		
				Warp	Weft	Total
Terry Towel	72	14 x 16	23.5 x 15.0	146.0	41.7	187.7
Terry Towel	59	14 x 16	23.5 x 15.0	122.4	34.2	156.6
Ticking Cloth	140	18 x 18	36.2 x 19.7	182.2	94.6	276.8
Ticking Cloth	160	18 x 18	36.2 x 19.7	208.2	108.2	316.4
Tablecloth	173	30/2 x 30/2	33.0 x 33.0	246.3	235.1	481.4
Bashkir	125	20 x 16	25.5 x 13.0	103.1	62.7	165.8
Jacq. Towel	60	24/2 x 10	23.0 x 15.5	114.9	57.4	172.5
Jacq. Towel	55	24/2 x 14	23.0 x 15.5	130.2	37.6	167.8
Jacq. Towel	83	20/2 x 10	19.0 x 15.0	194.8	76.9	271.7
Jacq. Napkin	50	40/2 x 40/2	31.0 x 33.0	50.1	51.0	101.1
Terry Towel	161(+55)	14 x 16	23.5 x 15.0	447.9	125.1	573.0
Terry Towel	60	24/2 x 14	23.0 x 15.7	142.1	41.6	183.7
555 Check	96	30 x 30	25.2 x 27.5	52.2	54.4	106.6
Sabaa Sheet	245	14 x 14	17.7 x 19.7	200.4	212.9	413.3
Dobby 1568	97	18 x 12 (Soft)	26.5 x 13.5	92.4	67.4	159.8
Flan.	79	30/2 x 10 (Soft)	19.0 x 16.5	64.7	80.5	145.2
Duck 712	106	12/2 x 12/2	15.7 x 14.2	179.5	155.0	334.5
Duck 117/57	104	7/5 x 7/5	13.0 x 5.6	624.9	257.0	881.9
Duck 71/60	92	15/3 x 15/3	19.0 x 13.8	226.2	156.8	38[illegible].0
Duck 104/53	105	12/3 x 12/5	18.2 x 9.9	309.1	267.5	576.6
Flan.	80	30/2 x 8	19.0 x 20.5	65.6	126.6	192.2
Poplin 2257	98	40 x 40	43.0 x 28.3	68.2	42.8	111.0
Poplin 1822 (Mix)	100	40 x 40	43.0 x 28.3	69.6	43.7	113.3
Leno 1823 (Mix)	103	50 x 50	35.0 x 31.5	46.7	40.1	86.8
Heika 1636	96	30 x 30	30.0 x 30.0	62.1	59.3	121.4
Denim 1488	101	20/2 x 10	27.5 x 19.0	179.7	118.5	298.2
Flan.	97	20 x 14	25.5 x 29.5	80.0	126.3	206.3
Voile 366	99	50 x 50	25.5 x 20.5	32.7	25.1	57.8
Twill 1668	91	30 x 16	25.2 x 24.5	49.5	86.1	135.6
Dobby 413	86	30 x 24	37.0 x 23.5	68.6	52.0	120.6
Poplin 2209	97	30 x 30	30.3 x 26.0	63.4	51.9	115.3
Wool 525	98	30/2 x 8	19.0 x 15.8	80.3	119.6	199.9
Leno 875	97	60 x 60	34.0 x 32.2	35.6	32.2	67.8
Duck 1677	119	18 x 10	16.5 x 11.0	70.6	80.9	151.5
107/59-	128	24 x 12	16.5 x 17.5	57.0	115.3	172.3
Grey 1287	94	14 x 8	19.0 x 16.0	82.6	116.1	198.7
738 Grey	142	4 x 4	10.2 x 9.5	234.3	208.3	442.6
97/55	142	8 x 8	13.0 x 9.5	149.3	104.2	243.5
49/53	142	20 x 20	23.6 x 23.6	108.4	103.5	211.9
49/53	96	20 x 20	23.6 x 23.6	73.3	70.0	14[illegible]3

APPENDIX 5 (CONTINUED)

Style Number	Greige (CM)	Warp x Weft Ne	Construction Ends x Picks (CM)	Exclusive of Sizing Gr. Weight per Linear Meter		
				Warp	Weft	Total
2232	98	20 x 16	19.0 x 18.5	60.3	70.0	130.3
Wool 7500	140	20/2 x 28/2		140.0	160.0	300.0
2068	96	20 x 14	16.5 x 13.5	51.3	57.2	108.5
1270	97	30 x 24	30.0 x 26.0	62.8	64.9	127.7
75/60	96	30 x 30	32.0 x 31.5	66.3	62.3	128.6
107/59	103	24 x 12	16.5 x 17.5	45.8	92.8	138.6
91/54	102	14 x 14	19.0 x 19.0	89.6	85.5	175.1
Sabaa Sheet	153	14 x 14	21.3 x 19.7	150.6	133.0	283.6
20/58	160	16 x 16	23.5 x 23.5	152.1	145.1	297.2
Reps 1333	96	20 x 8	30.7 x 13.8	95.4	102.3	197.7
Batist Zehour	98	40 x 40	28.0 x 26.8	44.4	40.6	85.0
1268	102	24 x 24	23.5 x 23.5	64.6	61.7	126.3
49/53	127	20 x 20	23.6 x 23.6	96.7	92.6	189.3
2215	128	30 x 30	21.7 x 15.7	59.9	41.4	101.3
Dobby 2085	97	30 x 30	33.0 x 23.0	69.0	46.0	115.0
433	98	40 x 40	23.5 x 19.5	37.3	29.5	66.8
2277	102	10 x 10	16.5 x 16.5	108.9	104.0	212.9
Mouftakher	83	12 x 12	19.5 x 16.0	87.3	68.4	155.7
Sheet 1213	88	20 x 14	17.5 x 17.0	49.8	66.0	115.8
443	137	12 x 12	17.0 x 16.5	125.6	116.4	242.0
114/59	160	24 x 8	19.0 x 19.0	82.0	234.7	316.7
91/94	140	14 x 14	19.0 x 19.0	122.9	117.4	240.3

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SECTION III

REHABILITATION OF EXISTING COTTON EQUIPMENT

SECTION III: REHABILITATION OF EXISTING COTTON EQUIPMENT

As discussed in various instances in Sections I and II, we believe that some older equipment can be rehabilitated and can continue to perform properly and economically in the foreseeable future.

A. SCOPE

The possibility of updating, rather than discarding, certain machines has been examined from an economical as well as from a technical viewpoint in the cotton yarn and weaving mills.

The list of parts recommended is not exhaustive and is mainly centered around U.S. made equipment. In other areas partial or complete rehabilitation may be a feasible and economical proposition and should be considered whenever the question is raised whether or not the equipment is to be discarded.

Exhibit I indicates the machines in the cotton mills for which rehabilitation is recommended within the scope of the present project and also the estimated cost per machine.

The program basically involves 894 looms, 3,570 manual winding spindles and 144 combing heads.

EXHIBIT I

RECOMMENDED SPARES FOR REHABILITATION OF EQUIPMENT

Mill No.	Machine	Make	Year	Unit	No. Units Considered	Rec. Amount of Spares $ Per Unit	Rec. Amount of Spares $ Total
Weaving 2	Loom 40"	Draper x 2	1948	Machine	96	$ 900	$ 86,400
Weaving 3	Loom 32"	Draper x 2	1948	Machine	600	400	240,000(1)
Weaving 6	Loom 72"/74"	Crompton	1959	Machine	12	1,800	21,600
Weaving 6	Loom 76"	Crompton	1953	Machine	6	2,800	16,800
Weaving 6	Loom 44"/50"	Crompton	1959	Machine	84	1,750	147,000
Weaving 13	Loom 40"	Draper x 2	1948	Machine	96	900	86,400
Spinning 1	Winding	Leesona	1948	Spindle	1,560	115	179,400
Spinning 2	Winding	Leesona	1948	Spindle	1,560	115	179,400
Spinning 4	Winding	Leesona	1948	Spindle	450	115	51,750
Spinning 5	Combing	Whitin	1958	Head	144	1,750	252,000
Subtotal							$1,260,750
Packing + Freight + Insurance							126,000
Total Cost CIF							$1,386,750

(1) Looms have been updated partially in 1975 for an approximate average cost of $500 per loom.

B. RATIONALE AND EXPECTED BENEFITS

1. The looms in weaving shed 3 were partially rebuilt last year. As a result of an investment of approximately $500 in original spares per loom, efficiency was improved from 65% to 80%. New looms of the same size would cost approximately $10,000 to $12,000 installed, with accessories and spares, but they would not produce significantly more. The investment to recuperate 15% of the possible production, or to gain 23% over past performance, costs 5% of the investment that would be required in new equipment. It is true, however, that new equipment may achieve better quality but in the case of Mehalla, except perhaps for exports, better quality would not yield additional income. We recommend increasing the investment in parts to $900 for this type loom and from $1,800 to $2,800 for the wider Dobby and Jacquard looms as listed in Exhibit I.

2. Rehabilitation of the Leesona winders is a different perspective. In this case, the expected benefits are waste reduction and improved quality.

   As commented on in Section I, the poor mechanical condition of these winders contributes to uneven sizes and badly constructed bobbins as well as low performance of the winder and higher maintenance cost. However the condition of the bobbin is very critical for the performance at subsequent processes. We estimate that the 8% creel ends in warping could be reduced to 5% and that at best 1% yarn would be saved from being wasted, if an estimated amount of $115 were invested in original parts per spindle.

   Taking into account only the potential savings of 1% in less yarn waste at $2.5 per kilogram average and assuming an average spindle production of one kilogram per hour, it would take 4,600 hours or less than eight months, three-shift operation, to pay off the investment in original parts.

3. The Whitin winders would have to be replaced on the basis that the produced slivers do not meet the quality specifications. A new machine, composed of eight heads, would cost (installed) approximately $40,000 or $5,000 per head. We believe that the existing machines can be rehabilitated to meet quality specifications for $1,750 or one-third of the cost for new equipment.

C. SUGGESTED INVESTMENT

Exhibit I indicates the breakdown of recommended spares and cost. The total CIF value is estimated at $1,386,750.

Exhibit II summarizes the investment plan. Including duties and the cost of overhauling, the total investment would amount to $1,567,250.

Exhibit III is the summary of the investment plan evaluation.

EXHIBIT II

SUMMARY OF INVESTMENT PLAN

EQUIPMENT REHABILITATION (COTTON MILLS)

Item No.	Description	Estimated Cost: Foreign Exchange in US $	Estimated Cost: Local Currency in US $	Estimated Cost: Total in US $
1.	Equipment + Accessories CIF Value(1)	1,386,750		1,386,750
2.	Import Duty on 1. (12%)		166,500	166,500
3.	Clearing + Local Transportation + Erection		14,000	14,000
4.	Auxiliary Equipment + Accessories		Not Applicable	
5.	Import Duty on 4.		Not Applicable	
6.	Clearing + Local Transportation for 4.		Not Applicable	
7.	Spares Including Duty		Not Applicable	
8.	Electrical		Not Applicable	
9.	Airconditioning		Not Applicable	
	Subtotal Equipment Installed	1,386,750	180,500	1,567,250
10.	Construction		Not Applicable	
	Total Investment (Excluding Working Capital)	1,386,750	180,500	1,567,250

(1) Essentially no equipment but original spares as per Exhibit III.

EXHIBIT III

SUMMARY OF INVESTMENT PLAN EVALUATION

Mill: Cotton Spinning and Weaving

Department: Winding, Combing, Weaving

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Equipment not included in original A.I.D. request.			
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			1,260,750

Recommend:

To rehabilitate certain looms, the rotoconer winders and the Whitin combers with original spares. The objective is to improve production and quality. The investment required has a good payoff and is moderate considering the alternative of replacing the equipment.

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SECTION IV

TWISTING AND SEWING THREAD

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SECTION IV: TWISTING AND SEWING THREAD

A. PRESENT CONDITIONS

In the production program of the new yarn Mill 7, as described in Section I, a small volume of 42 kilograms per hour of yarns is included for the purpose of manufacturing sewing threads, in view of the expansion of the garment factory and eventually for sales.

Capacity for twisting these yarns would theoretically be available in the twisting department and no request was submitted by Mehalla in the original A.I.D. write-up for additional twisting or further processing equipment of sewing threads.

Although we do not anticipate any serious bottlenecks in the twisting department, we realize that some of the equipment is in very poor mechanical condition. We therefore suggest consideration be given to adding some twisting equipment in order to update the present operation and eventually to replace some of the existing machines which are in very poor mechanical condition.

B. SUGGESTED INVESTMENT

It would probably be appropriate to consider two for one twisters. To our knowledge, this type of machine is not manufactured in the United States and we have based our estimates on conventional ring twisters. Not all of the suggested twisting equipment should necessarily be installed in the twisting department. As a matter of fact, we believe it would be more adequate to install a part of the new twisters in Mill 7 to process the required volume of yarns for sewing threads. In this manner controls may be easier and more effective.

Yarn mercerizing equipment is equally not manufactured in the United States and our cost estimates are based on prices quoted in the U.S. by European suppliers.

Exhibit I describes the suggested investment and lists the estimated cost.

Exhibit II summarizes the investment plan. The total investment, excluding working capital, is estimated at $994,250 of which the foreign exchange portion equals $875,250.

Exhibit III is a summary of the investment plan evaluations and compares the originally estimated FOB cost with the suggested. In this case, no equipment had been included in the original request and the reasons why we believe it should be included are summarized again at the bottom of the exhibit.

EXHIBIT I

SUGGESTED INVESTMENT

TWISTING AND SEWING YARN MANUFACTURING

Item No.	Description	Estimated FOB Cost in US Dollars Per Unit	Total $
1.	12 Twisters 4" Ring, 200 Sp. Each(1)	36,000	432,000
2.	10 Reeling Machines Cone to Hank	6,000	60,000
3.	Yarn Mercerizing Equipment(2)	88,000	88,000
4.	8 Winders Hank to Cone, 12 Spindles Each	9,000	72,000
	Subtotal Machines		652,000
5.	Accessories for 1. to 4.		98,000
	Subtotal Equipment + Accessories		750,000
6.	Seaworthy Packing + Freight + Insurance		75,000
7.	Grand Total CIF Value		825,000

(1) Based on three creel packages/spindle — creel included.
(2) Apparently not available from U.S. sources.

EXHIBIT II

SUMMARY OF INVESTMENT PLAN

TWISTING AND SEWING YARN MANUFACTURING

		Estimated Cost		
Item No.	Description	Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Equipment CIF Value	825,000	-	825,000
2.	Import Duty on 1. (12%)		99,000	99,000
3.	Clearing + Local Transportation + Erection	9,000	9,000	18,000
4.	Auxiliary Equipment + Accessories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing + Local Transportation for 4.		Included in 3.	
7.	Spares (5%) Including Duty (12%)	41,250	5,000	46,250
8.	Electrical (Connection Only)		6,000	6,000
9.	Airconditioning		None	
	Subtotal Equipment Installed	875,250	119,000	994,250
10.	Construction		None	
	Total Investment (Excluding Working Capital)	875,250	119,000	994,250

EXHIBIT III

SUMMARY OF INVESTMENT PLAN EVALUATION

Mill: Yarn Manufacturing

Department: Twisting

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Equipment not included in original A.I.D. request.			
U.S. Manufacturer of Desirable Equipment	Yes — Twisters No — Yarn Mercerizing		
Estimated Cost US $ — FOB			787,500

Recommend:

To install new twisting equipment partially; to add capacity and partially to replace some older frames which are inadequate for quality reasons and uneconomical because of excess maintenance and/or low speeds and small packages. Sewing thread manufacturing is suggested as additional capacity to supply yarns for the garment manufacturing expansion and eventually for sales.

Yarn mercerizing equipment is included although it does not seem to be manufactured in the United States.

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SECTION V

COTTON DYEING, PRINTING, FINISHING

SECTION V: COTTON DYEING, PRINTING, FINISHING

A. PRESENT CONDITIONS

The current volume of the cotton dyeing, printing and finishing plant is approximately 128,000,000 meters per year. The plant, including making up (inspection and packing), has 2,302 employees. As in many departments at Mehalla, the labor productivity is below that which is possible considering the overall conditions. Machine productivity seems reasonable except for excessive stoppage at shift changes. This seems to be a tradition that has been established and needs to be corrected; particularly in view of the relatively low labor costs compared to the high equipment investment in the dyeing and finishing operations. The plant now runs seven days per week on many operations — vacation weeks excluded.

The primary strength of the plant appears to be the enthusiasm and technical competence of the current management. They are aware of many areas of potential improvement; including the major areas of labor productivity, machinery productivity and improved quality.

An obvious weakness of the plant has been in maintenance of equipment. This probably has been due to conditions outside the control of plant management; largely due to a lack of spare parts. Because of inadequate maintenance over the years, some of the equipment has reached such a condition that replacement is more economical than repairing.

Due to the difference in fabric construction, types of chemicals and dyestuff used, etc., a meaningful comparison of costs was not possible.

Compared to textile industries in other countries, this department probably rates as favorably as any in Mehalla.

The plant is equipped to produce a wide variety of cotton textile fabrics. It is anticipated that the small volume of cotton/polyester fabrics now produced will increase significantly; mostly for local consumption. All of the current production is for local consumption. Current production quality is not suitable for export to the Western world due to both greige and finished quality levels.

B. PLANNED EXPANSION

1. General Plan

The planned expansion is based on an increase in the total volume of production as well as a shift in products.

The following table details the current production levels of the plant and the projected production after completion of the investment programs. This table is detailed into certain categories which are most important to the specifications of the equipment required. These categories are by width ranges, whether cotton or cotton/polyester, and the manner in which the color is imparted to the fabric.

From this table it can be seen that the significant changes in this overall program include the following:

a. Increase in total finished goods from 127,716,000 meters to 142,000,000 meters annually.

b. A general shift to wider fabrics.

c. A significant increase in polyester/cotton production, from a mix of mostly all cotton.

d. A significant decrease in printed fabrics with yarn dyed and fabric dyed production absorbing this decrease as well as the total increase in overall volume.

COTTON FINISHING
CURRENT AND PROJECTED PRODUCTION
M METERS/YEAR

Fiber	Polyester/Cotton				Cotton				Total			
Width Range in CM	To 100	101-160	Over 160	Total	To 100	101-160	Over 160	Total	To 100	101-160	Over 160	Total
Current												
Full White	5	50	–	55	24,000	6,610	1,470	32,080	24,005	6,660	1,470	32,135
Print on White	520	–	–	520	50,590	9,030	–	59,620	51,110	9,030	–	60,140
Print on Dye	–	–	–	–	6,800	–	–	6,800	6,800	–	–	6,800
Yarn Dyed	–	–	–	–	3,000	750	–	3,750	3,000	750	–	3,750
Fabric Dyed	455	550	–	1,005	20,306	1,810	1,770	23,886	20,761	2,320	1,810	24,891
Total Finished	980	600	0	1,580	104,696	18,200	3,240	126,136	105,676	18,800	3,240	127,716
Sold in Greige												21,000
Total												148,716
Projected												
Full White	1,000	–	–	1,000	19,000	7,000	2,000	28,000	20,000	7,000	2,000	29,000
Print on White	1,000	1,000	–	2,000	37,000	4,000	2,000	43,000	38,000	5,000	2,000	45,000
Print on Dye	3,000	–	–	3,000	10,000	2,000	–	12,000	13,000	2,000	–	15,000
Yarn Dyed	–	–	–	–	8,000	3,000	–	11,000	8,000	3,000	–	11,000
Fabric Dyed	3,000	11,000(1)	–	14,000	19,000	6,000(1)	3,000	28,000	22,000	17,000	3,000	42,000
Total Finished	8,000	12,000	–	20,000	93,000	22,000	7,000	122,000	101,000	34,000	7,000	142,000
Sold in Greige												21,000
Total												163,000
Weight per Linear Mtr. Finished												
Average	103	400		282	130	265	450	172	128		450	188
Drill Only		440				440						
Exc. Drill		200				200						

(1) Drill = 10,000 of 11,000 P/C, 6,000 of 6,000 cotton.

In order to indicate the required volume of production from certain major processes, the following table has been constructed. The basis on which certain recommendations are made was dependent on the information in this table.

For bleaching and dyeing, this table includes the desirable method of bleaching but, as pointed out later, all methods may not be practical for all bleaching and dyeing exactly as listed in this table.

In addition to certain equipment replacements due to the condition of equipment and availability of spare parts, the equipment requested in dyeing and finishing will provide the following:

a. Allow dyeing and finishing of the significantly higher level of cotton/polyester fabrics.

b. Allow for mercerizing a greater portion of the production for higher quality fabrics.

c. Improve overall quality levels.

d. Allow the higher levels of production projected.

e. Allow printing of wide sheeting.

COTTON FINISHING

MAJOR PROCESSES AND PROJECTED ANNUAL PRODUCTION FOR 1980

ANNUAL PRODUCTION IN M METERS BY WIDTH IN CENTIMETERS

Fiber	Polyester/Cotton				Cotton				Total			
Width Range in CM	To 100	101-160	Over 160	Total	To 100	101-160	Over 160	Total	To 100	101-160	Over 160	Total
Rope Bleach	—	—	—	—	85,000	13,000	2,000	100,000	85,000	13,000	2,000	100,000
Open Bleach	8,000	12,000	—	20,000	—	6,000	5,000	11,000	8,000	18,000	5,000	31,000
Current 2-Box Bleach -	—	—	—	—	8,000	3,000	—	11,000	8,000	3,000	—	11,000
Chain Mercerize	8,000	12,000	—	20,000	32,000	11,200	—	43,200	40,000	23,200	—	63,200
Chainless Mercerize	—	—	—	—	33,000	4,200	—	37,200	33,000	4,200	—	37,200
Pad Roll Dye System	—	—	—	—	—	—	3,000	3,000	—	—	3,000	3,000
Thermosol Dye	7,000	11,000	—	18,000	—	—	—	—	7,000	11,000	—	18,000
Continuous Dye Range	—	—	—	—	14,000	6,000	—	20,000	14,000	6,000	—	20,000
Pad — Dry on Cans	—	—	—	—	5,000	—	—	5,000	5,000	—	—	5,000
Jigger Dye	—	—	—	—	10,000	2,000	—	12,000	10,000	2,000	—	12,000
Brush, Equalize, Batch	4,000	1,000	—	5,000	47,000	6,000	See Tenter	53,000	51,000	7,000	—	58,000
Roller Print	4,000	—	—	4,000	40,000	—	—	40,000	44,000	—	—	44,000
Screen Print	—	1,000	—	1,000	7,000	6,000	2,000	15,000	7,000	7,000	2,000	16,000
Steam	4,000	1,000	—	5,000	30,000	4,500	2,000	36,500	34,000	5,500	2,000	41,500
Wash	4,000	1,000	—	5,000	30,000	4,500	20,000	36,500	34,000	5,500	—	41,500
Flash Age	—	—	—	—	5,000	—	—	5,000	5,000	—	—	5,000
Bake (Pigment Prints)	—	—	—	—	12,000	1,500	—	13,500	12,000	1,500	—	13,500
Finish on Tenter	8,000	12,000	—	20,000	93,000	22,000	7,000	122,000	101,000	34,000	7,000	142,000
Heat-Set on Tenter	8,000	12,000	—	20,000	—	—	—	—	8,000	12,000	—	20,000
Optical on Tenter	1,000	—	—	1,000	—	—	—	—	1,000	—	—	1,000
Pre. for Print (Sheeting)	—	—	—	—	—	—	2,000	2,000	—	—	2,000	2,000
Baking (	8,000	12,000	—	20,000	9,000	6,000	—	15,000	17,000	18,000	—	35,000
Schreiner Cal.	—	—	—	—	20,000	4,000	—	24,000	20,000	4,000	—	24,000
Regular Calender	—	—	—	—	53,000	18,000	7,000	78,000	53,000	18,000	7,000	78,000

2. Recommended Equipment and Costs

In addition to the notes regarding reasons for recommendation on the individual equipment requested elsewhere in the report, certain explanations for some major processes are necessary.

a. *Bleaching*

It appears that the requests for bleaching equipment have not been evaluated carefully enough to make final investment decisions. The request for bleaching equipment included:

(1) A rope bleach range.

(2) A two-stage addition to the current open width range.

(3) Some capacity for bleaching in a pad roll system requested in the dyehouse.

Points to be considered regarding these requests include:

(1) Such a significant portion of the production is shifted to polyester/cotton and is anticipated by Mehalla to require open width bleaching.

- Little, if any, additional rope bleaching capacity would be required.

- The open width range as proposed might not be able to handle all of the projected polyester/cotton heavy cottons and yarn dyes anticipated for the range.

(2) There is a possibility that much of the polyester/cotton goods could be rope bleached if heat-set in the greige.

(3) A final decision in favor of a pad roll system, depending on the number of units purchased, could eliminate the need for either the rope bleach range or the open width range.

(4) The technique used in the United States to rope bleach wide sheetings for dyeing should be studied further.

After much consideration and believing that this need must be studied further before final decions are made, for budgeting purposes, the following assumptions were made:

(1) A rope bleach range has been included in the equipment costs.

(2) A complete, rather than a partial, open width range has been included in the equipment costs.

(3) The pad roll system for dyeing and bleaching has not been included. This system is not available from U.S. equipment manufacturers.

With this budget for equipment, a number of options are open. Examples, but not all inclusive, are:

(1) Full rope bleach range and partial open width as requested. This anticipates heat-setting a significant portion of the polyester/cotton in the greige. The reduced cost of the partial open width range and the lower cost of heat-setting on special equipment compared to that of the stenter method could be applied to a pad roll system for dyeing and additional open width bleaching.

(2) Do not add a rope bleach range (anticipating a significant portion of the polyester/cotton could not be heat-set in the greige); but add a full (four-stage) open width range and possibly the partial range open width range. The difference in cost could be applied to the pad roll system for dyeing and additional bleaching.

In summary, the complete rope range and complete (four-stage) open width range included in the equipment costs cover more capacity and a greater cost than necessary for these machines alone. The exact manner in which the best overall decision can be made must be studied further.

b. Mercerizing

A chainless mercerizer was requested for mercerizing wider sheeting or two widths of narrow fabric. The chainless mercerizer is not made in the United States and the necessity of mercerizing wide sheeting is certainly questionable as it is seldom done in the United States. Also, quality problems can arise when running a large percentage of two narrow widths and a smaller percentage of a wide fabric subject to creating streaks due to wear on the roller.

For these reasons, the projection is based on two chain mercerizers, which are made in the United States, rather than the one requested. This will allow sufficient capacity at higher quality but does not provide for the wide sheeting.

c. Other Equipment, Not Requested

During the analysis, several pieces of equipment were requested by Mehalla in addition to those in the original A.I.D. request. Those recommended and included as additions to the original are:

(1) A wide roller screen print machine.

(2) Mangles for the present drying ranges.

(3) A curing oven for pinpoint prints.

(4) Dry cans to replace those on the washer in printing which are in poor condition.

(5) Singers to replace those currently inoperative in the bleach lines.

Notes are included on the individual sheets for each piece of equipment which indicates, if recommended, the basis on which the recommendation was made.

It is anticipated that after expansion the labor force will be increased from 2,302 employees to 2,346 employees through better utilization of labor during and following the expansion.

The total investment for this department is estimated as follows:

	Avail. in US $
Rope Bleach	1,366,666
Open Width Bleach	818,550
Mercerizing	909,500
Caustic Recovery	700,000
Thermosol Range	631,300
Yarn Dyeing	42,000
Color Preparation	52,340
Rotary Screen Printing	687,886
Roll Back Greige	13,000
Grinding Machines	16,800
Steamer	251,450
Washing Range	301,740
Brushing, Equalizing, Batching	299,600
Stenters	824,000
Calender Press	148,000
Calenders	438,000
Baking Oven for Resin Finish	145,000
Engraving	260,000
Making Up	
— Piece Wrapping	38,000
— Inspection and Plaiting	156,874
— Heat Stamping	26,500
Mangles(1)	54,000
Curing Range for Pigments(1)	96,000
Dry Cans(1)	214,000
Singers(1)	66,000
Basic Equipment Costs (Exclude Spares) CIF	8,557,206

The original request had estimated a cost of $8,650,240 for dyeing, finishing and making up. A small part may not be readily available in the United States.

(1) These were not included in the original A.I.D. request.

SUMMARY OF INVESTMENT

COTTON DYEING AND FINISHING

Item No.	Description	Estimated Cost: Foreign Exchange in US $	Local Currency in US $	Total in US $
1.	Processing Equipment + Accessories – CIF Value	8,557,206		8,557,206
2.	Import Duty on 1. (12%)		1,026,865	1,026,865
3.	Clearing + Local Transportation + Erection	85,572	85,572	171,144
4.	Auxiliary Equipment and Accesories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing and Local Transportation on 4.		Included in 3.	
7.	Spares (6%) Including Duty (12%)	513,432	61,612	575,044
8.	Electrical (Renovation & Connection) Estimate		171,144	171,144
9.	Airconditioning (Updating Only) Estimate		Not Applicable	
	Subtotal Equipment Installed	9,156,210	1,345,193	10,501,403
10.	Construction			
	(33,100 Sq. Mtrs. Avg $154/Sq. Mtr.)(1)		5,097,400	5,097,400
	(6,882 Sq. Mtrs. at $218/Sq. Mtr.)(2)		1,500,276	1,500,276
	Total Investment (Excluding Working Capital)	9,156,210	7,942,869	17,099,079

(1) Building to be started early 1978, completed mid 1979.
(2) Building presently under construction.

SUMMARY OF INVESTMENT PLAN EVALUATION

Mill: Cotton Dyeing and Finishing

Department: Bleaching

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Rope Bleaching Range	1	350,000	897,436
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			1,366,666

Recommend:

See notes in finishing discussion.

Complete Rope Bleach Range Including Singe, Desize, 4-Stage Bleach, Scutchers and Dry Cans – Full Instrumentation	1	1,301,587
Seaworthy Packing, Inland Freight		65,079
Total		1,366,666

Bleaching Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Samdo Perble Open Width Bleach Range	2	300,000	769,231

(Mehalla personnel stated this was intended as two boxes to add to present open width bleach range.)

U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			818,550

Recommend:

See notes in finishing discussion.

Complete 4-Storage Open Width Bleach Range, Including Singe, Desize, Scutchers and Dry Cans	1		765,000
Seaworthy Packing, Inland Freight			53,550
Total			818,550

Bleaching Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Chain Mercerizing Machine	1	150	
Chainless Mercerizing Machine	1	250	
Total		400	1,025,641
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			909,500

Recommend :

Replacing one chainless mercerizer in poor condition and allowing increased mercerizing capacity.

Complete Chain Mercerizing Units to 160 CM Cloth at $425,000	2	850,000
Seaworthy Packing, Inland Freight		59,500
Total		909,500

Bleaching Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Complete Unit of Caustic Recovery	1	500,000	1,282,050
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			700,000

Recommend:

To save in cost of caustic used. Estimate 1-1/2 to 2 years' return on investment.

Complete Unit, Including Structural Steel	1		665,000
Seaworthy Packing, Inland Freight			35,000
Total			700,000

Mill: Dyeing and Finishing

Department: Dyeing

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Complete Pad Steam Range (This Was Requested From Mehalla as Being a Continuous Thermosol Dyeing Range)	1	80	205,128
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			613,300

Recommend:

To allow dyeing of polyester/cotton fabrics for the projected volume.

Complete Thermosol Range	1		590,000
Seaworthy Packing, Inland Freight			41,300
Total			631,300

Dyeing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Complete Broad Pad Roll Range	1	80,000	
U.S. Manufacturer of Desirable Equipment	No		
Estimated Cost			

Recommend:

See finishing discussion – not recommended for budget purposes.

Dyeing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Yarn Dyeing Machine	1	20,000	51,282
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			42,000

Recommend:

To allow dyeing of polyester/cotton in small quantities for sewing thread.

Dye Machine for Yarn — Capacity 125 Pounds	1	40,000
Seaworthy Packing, Inland Freight		2,000
Total		42,000

Dyeing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Yarn Mercerizing Machines	2	50,000	
Continuous Yarn Drying Machine	1	50,000	
Total		100,000	256,410

U.S. Manufacturer of Desirable Equipment

Estimated Cost US $ – FOB

Recommend:

Request cancelled by Mehalla. Letter of credit already opened.

Mill: Dyeing and Finishing

Department: Color Preparation

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Double Jacquard Color Prep., 800 Lit.	4	12,000	
Double Jacquard Color Prep., 500 Lit.	2	4,000	
Color Container Washing Machines	2	5,000	
High Speed Stirrers	2	10,000	
Total		31,000	79,487
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			52,340

Recommend:

First item cancelled, requested by Mehalla. Loc. opened others for replacement and addition.

Double Jacquard, 500 Lit. at $2,170	2	4,340
Color Container Washing Machines at $10,000	2	20,000
High Speed Stirrers at $12,000	2	24,000
Subtotal		48,340
Seaworthy Packing, Inland Freight		4,000
Total		52,340

Mill: Dyeing and Finishing

Department: Printing

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Rotary Screen Printing Machine	1	100,000	256,410

(This was changed to two roller screen machines – one of 160 centimeters and one of 280 centimeters to print either wide or narrow goods.)

U.S. Manufacturer of Desirable Equipment	No		
Estimated Cost US $ – FOB			687,886

Recommend:

To increase the volume of roller screen print fabrics and to allow printing of sheeting.

Roller Screen Print, 160 CM Complete Range	1	260,218
Roller Screen Print, 280 CM, Complete Range	1	390,506
Subtotal		650,724
Seaworthy Packing, Inland Freight		37,162
Total		687,886

Printing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Roll Back Greige Machine	1	10,000	25,641
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			13,000

Recommend:

For use in rolling back greige for light fabrics.

Rolling Unit	1		12,000
Seaworthy Packing, Inland Freight			1,000
Total			13,000

Printing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Grinding Machines	2	5,000	12,821
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			16,800

Recommend:

To replace manual sharpening of blades in roller printing.

Grinding Machines (at $8,000)	2	16,000
Seaworthy Packing, Inland Freight		800
Total		16,800

Printing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
High Temperature Steamer Machines	2	150,000	384,615
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			251,450

Recommend:

One machine only needed with projected decrease in printing.

Steamer to 260 CM	1	235,000
Seaworthy Packing, Inland Freight		16,450
Total		251,450

Printing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Complete Washing Range	1	100,000	256,410
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			301,740

Recommend:

For replacement of machine in poor condition and support capacity projected.

Complete Washing Range to 260 CM	1	282,000
Seaworthy Packing, Inland Freight		19,740
Total		301,740

Printing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Brushing, Equalizing, Batching	2	100,000	256,410
U.S. Manufacturer of Desirable Equipment			
Estimated Cost US $ – FOB			299,600

Recommend:

For replacement of equipment in poor condition.

Batching Tenters, Complete (at $140,000)	2		280,000
Seaworthy Packing, Inland Freight			19,600
Total			299,600

Mill: Dyeing and Finishing

Department: Finishing

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Stenter Machines, Width 300 CM	2	350,000	
Stenter Machines, Width 130 CM	2	250,000	
Total		600,000	1,538,461

The request was changed from the 300-centimer machines to 180 centimeters.

U.S. Manufacturer of Desirable Equipment	Yes	
Estimated Cost US $ – FOB		824,000

Recommend:

Only 180-centimeter machines be installed to replace one machine and add capacity; two machines for finishing, one for heat-setting sufficient.

Stenters for Finishing, 180 CM at $240,000	2	480,000
Stenter for Finishing or Heat-Set, 180 CM	1	290,000
Subtotal		770,000
Seaworthy Packing, Inland Freight		54,000
Total		824,000

Finishing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Calender Press	2	50,000	128,205
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			148,000

Recommend:

For replacement of equipment in poor condition.

Calender Press at $70,000	2		140,000
Seaworthy Packing, Inland Freight			8,000
Total			148,000

Finishing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Calender With 7 Bowls, 300 CM	2	100,000	
Shreiner Calender, 250 CM	1	50,000	
Calender With 7 Bowls, 130 CM	2	50,000	
Total		200,000	512,820
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			438,000

Recommend:

Five-bowl calender available in U.S. For same purpose as seven-bowl calenders. Recommend all wide calenders to run one or two strands.

Five-Bowl Calender, 260 CM at $115,000	3	345,000
Schreiner Calender, 260 CM	1	70,000
Subtotal		415,000
Seaworthy Packing, Inland Freight		23,000
Total		438,000

Finishing Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Baking Oven for Resin Finish	1	50,000	128,205
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			145,000

Recommend:

To allow finishing of polyester/cotton.

Curing Oven	1	135,000
Seaworthy Packing, Inland Freight		10,000
Total		145,000

Mill: Dyeing and Finishing

Department: Engraving

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Horizontal Copper Depositing Unit	3	10,000	
Barrel Chrome Depositing Unit	1	2,000	
Step and Repeat for Film, 180 CM	1	15,000	
Schreiner Roller Engraving – 250 CM	1	5,000	
High-Speed Printing Cabinet	1	1,000	
Total		33,000	84,615
Added During Visit To Mehalla: Camera for Photo Engraving Reproduction	1		
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			260,000

Recommend:

To allow preparation of rollers in Mehalla.

As a Group as Listed	250,000
Seaworthy Packing, Inland Freight	10,000
Total	260,000

Mill: Dyeing and Finishing

Department: All

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Sewing Machines	30	15,000	38,462

U.S. Manufacturer of Desirable Equipment

Estimated Cost

Recommend:

Mehalla dropped request as letter of credit already opened.

Mill: Dyeing and Finishing

Department: Making Up

A.I.D. Request Reference: Annex 13, Table 3

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Piece Wrapping Machine	1	12,000	30,769
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			38,000

Recommend:

To replace manual wrapping.

Automatic Wrapping Machine	1		35,000
Seaworthy Packing, Inland Freight			3,000
Total			38,000

Making Up Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Slitting for Circular Knitting	1	9,000	
Inspection for Knitted Fabrics	1	7,000	

U.S. Manufacturer of Desirable Equipment

Estimated Cost

Recommend:

No. Mehalla dropped request as need not now anticipated.

Making Up Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Inspection and Plating, 260 CM	1	7,000	
Inspection and Plating, 130 CM	5	21,000	
Total		28,000	72,795
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			156,874

Recommend:

For increased production levels.

Inspection and Folding Group for Double/Double	1	35,374
Inspection and Folding for Narrow Fabrics at $22,700	5	113,500
Subtotal		148,874
Seaworthy Packing, Inland Freight		8,000
Total		156,874

Making Up Department (Continued)

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Heat Stamping Machine on Fabrics	1	9,000	23,077
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			26,500

Recommend:

For automatic labeling.

Heat Stamping Machine	1	25,000
Seaworthy Packing, Inland Freight		1,500
Total		26,500

Mill: Dyeing and Finishing

Department: Bleaching

A.I.D. Request Reference: Not Applicable

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			54,000

Recommend:

As requested in addition to the original request. Mangler for current dry can ranges in bleaching.

Sets of Manglers to 260 CM at $25,000	2		50,000
Seaworthy Packing, Inland Freight			4,000
Total			54,000

Mill: Dyeing and Finishing

Department: Printing

A.I.D. Request Reference: Not Applicable

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			96,000

Recommend:

Curing oven for pigment prints.

Curing Range	1		90,000
Seaworthy Packing, Inland Freight			6,000
Total			96,000

Mill: Dyeing and Finishing

Department: Printing

A.I.D. Request Reference: Not Applicable

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			214,000

Recommend:

Dry cans to replace can sets on current washers which are in poor condition.

Set of Dry Cans, 228 CM Face	1		40,000
Sets of Dry Cans, 135 CM Face at $32,000	5		160,000
Subtotal			200,000
Seaworthy Packing, Inland Freight			14,000
Total			214,000

Mill: Dyeing and Finishing

Department: Printing

A.I.D. Request Reference: Not Applicable

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			66,000

Recommend:

Singers to replace unoperable equipment on two bleach ranges.

Singes at $30,000	2		60,000
Seaworthy Packing, Inland Freight			6,000
Total			66,000

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SECTION VI
WOOL MILL

SECTION VI: WOOL MILL

A. INTRODUCTION

The wool mill is a rather complex operation. It includes processes logically found in textile operations engaged in manufacturing a broad range of products normally produced on these manufacturing systems. These processes include:

- Scouring of wool.
- Carbonizing of wool.
- Combing of wool (and recombing).
- Worsted yarn — drawing, spinning and twisting.
- Woolen yarn — carding, spinning and twisting.
- Weaving of fabrics — including preparation.
- Finishing — including fabrics as well as dyeing tops, fiber and yarn.
- Sales yarn finishing — bulking, reeling, balling.
- Fabricating of blankets.

The major departments excluded from the request for equipment included:

- Carbonizing of wool — where equipment and capacity are still considered adequate.

- Combing and recombing of wool — where a significant portion of the production is purchased in dyed tops and an increase in capacity is not projected in relation to an increase in production.

The present conditions and expansion plans are covered in two sections following:

- Yarn — including scouring, worsted yarn, woolen yarn, and sales yarn finishing.

- Weaving and finishing — including weaving, finishing and inspection.

B. YARN

1. Present Conditions

The present equipment covers a range from new equipment (worsted spinning and rewinding) to very old and outdated equipment (woolen carding and spinning). Between these extremes, there are varying degrees of adequacy for other types of equipment. In some instances, the equipment has not been adequately maintained; and the overall condition has reached a stage that it is more feasible to replace than attempt to repair.

The yarn operations included here currently have a total of about 1,467 employees. The plant now runs about 340 days per year, but certain operations do not run three shifts.

The strength in the organization appears to be in overall technical knowledge and the ability to keep an operation of such complexity and diverse levels of equipment conditions functioning at a reasonable level of efficiency.

With the exception of the newer machines, the condition of the equipment is poor. This, of course, has an important bearing on product quality, machine efficiencies and labor productivity.

The yarn finishing department, although a small part of the total, appeared to have an extremely low level of labor productivity.

The total cost figures available indicate that the cost of yarn manufacturing is very high, and the products probably would not be competitive in a free market. Both raw material and manufacturing costs appeared high.

2. Planned Expansion

The planned expansion of this area includes significant increases in the production of yarns for weaving as well as some increase in sales yarns from both the woolen and worsted systems.

As can be noted in the report, certain equipment is recommended for replacement while a considerable portion of the equipment is for expansion. Most of the production is planned for the local market.

It is anticipated by Mehalla management that the expanded yarn operation would require 1,704 employees compared to 1,467 at present.

A summary of the equipment and costs recommended for yarn is listed below, followed by a discussion of each of these areas.

Raw Wool Opening, Scouring, Drying	$ 232,950
Woolen Mill	4,101,600
Worsted Mill	1,597,550
Yarn Finishing (Bulking, Reeling, Unwinding)	183,800
Basic Equipment Costs — CIF (Excludes Spares)	$6,115,900

a. Raw Wool Scouring

The current equipment is very old and in poor condition. Current production rate is now about 50 kilograms per hour. The anticipated requirements for the projected sales are about 100 kilograms per hour. The equipment recommended here is based on a capacity considerably in excess of the requirements; however, it is the typical standard unit for which the cost would be no more than that which would be incurred in designing a custom unit for less capacity.

The estimated cost for this equipment is $232,950 compared to the estimate of the original request of $307,692.

b. Worsted Spinning

This investment relates primarily to an increase in projected sales in both worsted yarns and worsted fabrics. The exception to this will be noted in assembly winding where equipment is also included for the woolen mill plied yarns and for replacement of assembly winders in the present worsted mill.

The expansion to 550 tons was compared to present and projected sales, and the equipment recommended covers such an expansion. The following briefly summarizes the comparison of current and projected sales:

	Current Tons per Year	Projected Tons per Year	Difference
Sales Yarn	485	570	85
Weave Yarns	995	1,328	333
	1,480	1,898	418

For the overall capacity, an indicated excess of 7% from the recommended equipment will exist against projected increases in sales:

$$(550-418)/1{,}898 = 7\%$$

However, for several reasons, the mill as requested for the 550 ton capacity is recommended:

(1) Even as a unit of this size is relatively small and, being reasonably balanced, to reduce the size further would result in a poorer balance and a less economical unit.

(2) There is an overall shift to a slightly finer yarn count, from 1/26.8 Nm to 1/28.2 Nm, which would offset a portion of the indicated 7% excess capacity.

In total, the equipment for this unit was estimated in the suggested investment at $1,923,000, while the closer evaluation indicates an investment for the 550 ton unit as summarized below. All equipment included is available in the United States.

	CIF Costs
Mixing Gills	$ 44,100
Drawing Gill Boxes	107,100
Roving Frames	106,450
Spinning Frames	844,200
Assembly Winding	144,000
Ring Twisting	298,200
Cone Winding	53,500
	$1,597,550

3. Woolen

The woolen equipment is for replacement and expansion of the current operation. The proposed size of the unit was to produce 950 tons per year compared to the present 350 tons per year. Current sales figures indicate current production at nearer 450 tons per year, and the forecast production indicates sales yarn and woven fabrics at nearly 1,100 tons per year. The investment has been based on the higher figure.

The replacement of the major equipment in this department is for updating the carding and spinning equipment which is old, in poor condition and generally outdated. The total volume of the proposed plant was based on the following yarns and fabric requirements:

	Tons per Year	Meters
Sales Yarns		
— Carpets	100	3.5
— Caps	50	10.0
Blankets	406	2.5
Woven Fabrics	530	6, 6.5, 2/10, 2/13.5
	1,086	

Considering waste between spinning and sales, the mill requirements were based on producing over 1,200 tons per year at spinning.

Replacement equipment has been included in the waste and blending areas to support the requirements. In addition to twisting requirements for the plied woolen yarns (2 frames), a third large ring frame was included for twisting the coarse hand knitting, worsted yarns. Assembly winding equipment for the woolen plied yarns was included in the worsted mill.

A summary of the recommended equipment costs for this department is:

	Available in U.S.
Hard Waste Opener	$ 95,000
Rag Cutting	33,000
Wool Blending and Oiling	160,000
Card Clothing Mounting	15,500
Woolen Carding	1,905,000
Woolen Spinning	1,582,400
Woolen Twisting	274,700
Cone Winding	36,000
	$4,101,600

The original suggested investment for this department was $4,820,000.

4. Yarn Finishing

The volume of production through this unit will not increase as significantly as the production of fabrics in the wool mill. With the introduction of the Hacoba yarn relaxing system, which is not available from a U.S. manufacturer, the requirements of reeling will be reduced significantly. The basis of equipment requirements are noted on the tables for each individual piece of equipment. In all instances, the equipment has a capacity somewhat in excess of the average requirements; but this will allow flexibility due to the seasonal nature of this sales yarn business.

The projected volume of sales yarns used in this equipment justification is as follows:

Type and Nm.	Fiber	Tons/ Year	Final Put-up	Processes in This Department (1)
Hand Knit				
3/14	Blend	50	Balls	2, 3, 4
3/14	Wool/Acrylic	50	Balls	2, 3, 4
3/14	High Bulk Acrylic	50	Hanks	1
2/10	Wool/Nylon/Rayon	30	Hanks	2
Coarse Machine Knit				
2/14	Wool/Nylon/Rayon	40	Cones	None
2/20	Wool/Nylon/Rayon	60	Cones	None
Fine Machine Knit				
1/40	Wool	110	Cones	None
2/36	High Bulk Acrylic	150	Cones	1
2/44	Normal Acrylic	30	Cones	None
Carpet				
3.5	Wool	100	Hanks	2, 3
Caps				
10		50		None

(1) Processes

	Summary of Tons per Year			
	1	2	3	4
	Hacoba	Skein	Rewind Skeins	Ball
	50	50	50	50
	150	50	50	50
		30	100	
		100		
Total Tons/Year	200	230	200	100

Note:

All coarse machine knit is top dyed or undyed. All fine machine knit is undyed. Cap yarn is undyed.

A summary of cost of recommended equipment for bulking, reeling, and unwinding is as follows:

	CIF Cost Not Available in U.S.	CIF Cost Available in U.S.
Continuous Yarn High Bulking	$106,000	
Hank Reels		$13,400
Hank Unwinding Machines		19,400
Hand Knitting Balling Machines	45,000	
	$151,000	$32,800
	$183,800	

The original suggested investment for this depatment totalled £E 165,000 or US $423,000.

C. WEAVING AND FINISHING

1. Present Conditions

The woolen weaving operation produces at a very low level of efficiency and results in low labor productivity. The quality from weaving is very poor, and only through a disproportionate level of mending labor does a relatively satisfactory quality fabric result.

The low weaving efficiency results from poor to marginal yarn quality, poor warp and filling preparation and extremely poor condition of the looms. While the looms are from 15 to 30 years old, it is not unusual for such looms properly maintained to produce at reasonable levels of productivity. The current condition of the looms probably resulted from a period of time during which foreign exchange for replacement parts was unavailable. A general lack of proper maintenance is also considered a contributing cause of the present conditions.

The warp and filling preparation equipment also is in bad condition, probably for reasons similar to those for looms. This contributes to the low efficiency and quality of production from the looms.

The finishing plant has a wide variety of equipment for finishing the woven fabrics. This plant also has facilities for dyeing yarns, loose fiber and tops (including backwashing). The dye plant typically operates only one shift. Generally speaking, the operation has very low labor productivity. Management attributes their inability to significantly improve productivity to the lack of planning of an even flow of goods through the processes.

Fabrication of blankets is also a part of this operation; and, again, labor productivity is very low.

The plant has the technical knowledge to handle the wide variety of products now produced and planned for the future.

The indicated cost of the products appears quite high compared to world prices; and, based on present operations, the plant could not be competitive in world markets.

The departments included in weaving and finishing have 1,855 employees.

2. Planned Expansion

The planned expansion is to increase the fabric production by 36% in terms of total linear meters and over 40% in square meters due to wider average cloth widths. Blanket production is projected to more than double with an increase of 113%.

Management projects a labor complement increase from 1,855 to 2,111 — or 14% — under the proposed equipment replacements.

The current and projected sales of woven fabrics from the wool mill are as follows:

	Typical Construction		Finished Meters (Annual Sales)	
	Ends	Picks	Projected	Current
WORSTED				
Serge	48	60	600,000	360,000
Shirt(1)	33	34	725,000	600,000
Army Fabric	120	60	100,000	51,480
Men's Wear				
– Heavy Wool	100	60	550,000	247,200
– Blended	45	64	435,000	351,000
– Light Wool	100	44	100,000	24,000
– Light Blended	43	43	550,000	351,000
Ladies' Wear – Wool	40	36	220,000	99,840
Men's Wear – Coating	93	50	2,000	15,480
		48 Avg.	3,300,000	2,100,000
Worsted Pajamas	54	42	0	500,000
				2,600,000
WOOLEN				
Men's Wear				
– Blended	22	20	150,000	31,200
– Overcoat Blended	34	30	50,000	14,400
– Serge	26	28	360,000	180,000
Ladies' Wear – Blended	26	24	200,000	30,000
Roller Cover	20	18	50,000	14,400
		28 Avg.	810,000	420,000
Woolen Hair Fabrics	38	26	0	150,000
			810,000	570,000
Total Worsted and Woolen			4,110,000	3,170,000
BLANKETS				
Blends(1)	23	35	320,000 or 150,000 Blk.	150,000 or 70,000 Blk.

(1) Cotton warps.

a. *Weaving and Preparation*

(1) Preparation

Warping is performed on sectional warpers. There are currently two modern machines which handle a majority of the production. Three older machines should be replaced. It is recommended that three machines be acquired to replace the older machines and provide for the increase in capacity (machines not available in the United States).

The condition of the weft winding equipment is such that it must be replaced, and this replacement is recommended.

Provisions have also been made for warp trucks to improve beam handling and knotting machines to improve the handling and cost in the department.

(2) Weaving

Some finalization of exact equipment may be required, particularly if shuttleless looms could be better justified for certain fabrics. (Consideration of shuttleless looms will require finishing differences and customer acceptance must be determined.)

For purposes of determing the costs of the recommended looms, the following assumptions were made:

- That 40 of the present 166 looms, for fabric, be retained and overhauled. For calculation purposes, assumed 5% lower operating efficiency than the new looms. An estimated cost for spare parts of $3,000 per loom CIF is included.

- That 30% of the fabric looms be included as capable of weaving pick and pick fabrics. These were assumed to be W-3 PAPA looms operating at 125 picks per minute.

- The remaining cost of looms for fabric would be based on C & K Model C-10 looms at a speed of 150 picks per minute.

- The 9 current blanket looms would be retained.

- The new blanket looms assumed to be C & K Model C-10 at 130 picks per minute.

Calculations to determine number of looms required using formulas:

$$\frac{\text{Picks/Min.} \times 60\ \text{Min./Hr.} \times 24\ \text{Hrs./Day} \times 325\ \text{Days/Year} \times \%\ \text{Eff.}}{\text{Picks/Inch} \times 39.37\ \text{Inches/Meter}} = \text{Meters/Loom/Year}$$

And

(Meters Required per Year)/(Meters/Loom/Year) = Looms Required

For Woolen and Worsted:

Assume the 40 looms to be retained are operated on worsted fabrics at 125 picks per minute and 65% efficiency.

For Looms Retained

$$\frac{125 \times 60 \times 24 \times 325 \times .65}{48 \times 39.37} = 20{,}122\ \text{Meters/Loom/Year}$$

For New Looms

	Total Meters	30% for PAPA	Remain. for Other Than P & P
Woolen	810,000	243,000	567,000
Worsted	3,300,000	990,000	2,310,000

Worsted – Other Than Pick and Pick

2,310,000 Meters Less (20,122 x 40 Looms) = 1,505,120 Meters

$$\frac{150 \times 60 \times 24 \times 325 \times .70}{48 \times 39.37} = 26{,}003 \text{ Meters/Year/Loom}$$

(1,505,120)/(26,003) = 57.88 Looms Required

Woolen – Other Than Pick and Pick

$$\frac{150 \times 60 \times 24 \times 325 \times .55}{28 \times 39.37} = 35{,}025 \text{ Meters/Year/Loom}$$

(567,000)/(35,025) = 16.19 Looms Required

Total

Total Looms Other Than Pick and Pick = 74.07 Looms. Use 78.

Worsted PAPA

$$\frac{125 \times 60 \times 24 \times 325 \times .70}{48 \times 39.37} = 21{,}669 \text{ Meters/Year/Loom}$$

(990,000)/(21,669) = 45.69 Looms Required

Woolen

$$\frac{125 \times 60 \times 24 \times 325 \times .55}{28 \times 39.37} = 29{,}187 \text{ Meters/Year/Loom}$$

(243,000)/(29,187) = 8.33 Looms Required

Total

Looms PAPA = 54.02 (Use 58)

For Blankets

Production from current 9 looms to be retained is 150,000 meters per year.

320,000 − 150,000 = 170,000 Meters for New Looms

$$\frac{130 \times 60 \times 24 \times 325 \times .60}{35 \times 39.37} = 26{,}491 \text{ Meters/Year/Loom}$$

(170,000)/(26,491) = 6.41 Looms Required (Use 7)

A summary of new looms recommended is as follows:

For Fabrics:

C-10	78	All Dobby
PAPA	56	

For Blankets:

C-10	7	4 Jaquards, 3 Dobbies

Provisions have also been included to equip 60 additional looms for selvage name weaving.

A summary of the costs as detailed on the individual equipment sheets is as follows:

	CIF Not Available in U.S.	CIF Available in U.S.
Blanket Looms (Including Accessories)		$ 132,336
Wide Looms (Including Accessories, Overhaul Parts, Name Weave)		2,432,214
Weft Winding		148,720
Warp Knotting		42,000
Drawing-in		36,000
Sectional Warping	$205,100	
	$205,100	$2,791,270

The original suggested investment for this department was $7,820,000.

b. *Wool Finishing*

The equipment requested in this department is to round out the capability of the new capacity and, in some instances, replace current equipment which is in poor condition, improve quality, and allow newer finishing technology and special finishes. The basis on which the equipment is recommended is noted on the individual sheets for each type of equipment.

A summary of the recommended equipment costs for this department is:

	Not Available in U.S.	Available in U.S.
Singeing		$ 86,250
Padding Mangle/Thermoset		278,500
Open Width Scour	$ 60,000	
Jet Dyeing		86,000
Backwashing		93,200
Combined Scouring and Milling	70,000	
Large Size Milling		168,000
Centrifuge		22,860
Ultraviolet Inspection		6,500
Potting Machine		55,000
Shearing Machine		52,000
Garnett Wire Raising		39,000
Relaxing Machine		72,000
Loose Wool Dyeing		100,000
High Pressure Dyeing		118,000
Hank Drying		35,000
Permanent Setting		78,200
Continuous Crab		171,000
	$130,000	$1,461,510

$1,591,510

The original suggested investment for this department was $1,708,000.

c. *Inspection*

This portion of the request covers various types of equipment as detailed and recommended on the individual equipment request sheets:

	Not Available in U.S.	Available in U.S.
Inspection Machines		$ 37,100
Rolling Machine		47,000
Sewing Machines/Scissors		9,900
Measuring and Cutting		15,000
Testing Apparatus	$53,000	53,000
	$53,000	$162,000
	$215,000	

The original suggested investment for this department was $256,000.

SUMMARY OF INVESTMENT – WOOL MILL – YARN

		Estimated Cost in US $		
		Foreign Exchange	Local	Total
1.	Processing Equipment and Accessories – CIF Value			
	– Raw Wool Scouring	232,950		
	– Worsted Spinning	1,597,550		
	– Woolen Spinning	4,101,600		
	– Bulking, Reeling, Winding	183,800		
	Subtotal	6,115,900		
2.	Import Duty on 1. (12%)		733,908	
3.	Clearing and Local Transportation and Erection	122,320	61,160	
4.	Auxiliary Equipment and Accessories	Included in 1.		
5.	Import Duty on 4.	Included in 2.		
6.	Clearing and Local Transportation on 4.	Included in 3.		
7.	Spares (8%) Including Duty	489,272	58,713	
8.	Electrical (Renovation and Connection) Estimate		30,580	
9.	Airconditioning (Updating Only) Estimate	Not Applicable		
	Subtotal Equipment Installed	6,727,492	884,361	7,611,853
10.	Construction (6,000 Sq. Meters at $167)(1)		1,002,000	1,002,000
	Total Investment (Excluding Working Capital)	6,727,492	1,886,361	8,613,853

(1) 50% of total 12,000 square meters to be built for wool mill to be completed mid-1978.

SUMMARY OF INVESTMENT – WOOL MILL – WEAVE AND FINISH

		Estimated Cost in US $		
		Foreign Exchange	Local	Total
1.	Processing Equipment and Accessories – CIF Value			
	– Weaving and Preparation	2,996,370		
	– Wool Dyeing and Finishing	1,591,510		
	– Inspection and Finishing	215,000		
	Subtotal of 1.	4,802,880		
2.	Import Duty on 1. (12%)		576,346	
3.	Clearing and Local Transportation and Erection	96,056	48,028	
4.	Auxiliary Equipment and Accessories	Included in 1.		
5.	Import Duty on 4.	Included in 2.		
6.	Clearing and Local Transportation on 4.	Included in 3.		
7.	Spares (10%) Including Duty (12%)	480,288	57,635	
8.	Electrical (Renovation and Connection) Estimate		192,116	
9.	Airconditioning (Updating Only) Estimate	Not Applicable		
	Subtotal Equipment Installed	5,379,224	874,125	6,253,349
10.	Construction (6,000 Sq. Meters at $167)(1)		1,002,000	1,002,000
	Total Investment (Excluding Working Capital)	5,379,224	1,876,125	7,255,349

(1) 50% of total 12,000 square meters to be built for wool mill to be completed mid-1978.

SUMMARY OF INVESTMENT PLAN EVALUATION

Mill: Wool

Department: Preparation

A.I.D. Request Reference: Annex 13, Table 12

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Warping Machines	5	75,000	192,308
U.S. Manufacturer of Desirable Equipment	No		
Estimated Cost US $ — FOB			205,100
Recommend:			
3 Machines To Replace Very Old Equipment Producing Poor Quality; 2 Machines To Be Retained			
Sectional Warpers	3	39,000	117,000
Creels	6	6,600	39,600
			156,600
Auxiliaries			32,000
			188,600
Seaworthy Packing, Inland Freight			16,500
			205,100

Mill: Wool

Department: Preparation

A.I.D. Request Reference: Annex 13, Table 14

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Weft Winding Machines	5	115,000	294,872
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			148,720
Recommend:			
For Replacement of Equipment in Very Poor Condition			
Machines of 12 Spindles Each	16	7,920	126,720
Auxiliaries			7,000
			133,720
Seaworthy Packing, Inland Freight			15,000
			148,720

Mill: Wool

Depr-tment: Weave

A.I.D. Request Reference: Annex 13, Table 12

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Drawing-in Machines	2	12,000	30,769
(This reques· was for handling trucks rather than for drawing- machines as such. Trucks to be designed to exact nee)			
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			36,000
Recommend:			
To Allow Improved Handling of Warps			
Trucks	12	2,500	30,000
Seaworthy Packing, Inland Freight			6,000
			36,000

Mill: Wool

Department: Weave

A.I.D. Request Reference: Annex 13, Table 12

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Warp Knotting Machines	2	13,000	33,333
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			42,000

Recommend:

To Allow Tying of Warps Not Now Possible

Machines with Framǝs	2	19,000	38,000
Seaworthy Packing, Inland Freight			4,000
			42,000

Mill: Wool

Department: Weave

A.I.D. Request Reference: Annex 13, Table 12

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Blanket Looms	9	135,000	346,154
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			132,336
Recommend:			
For Additional Capacity — 110" Looms			
Dobbies (i.e., C & K C-10)	3	12,024	36,072
Jacquards (i.e., C & K C-10)	4	15,566	62,264
			98,336
Auxiliaries			25,200
			123,536
Seaworthy Packing, Inland Freight			8,800
			132,336

Mill: Wool

Department: Weave

A.I.D. Request Reference: Annex 13, Table 12

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Wide Looms	225	2,700,000	6,923,077
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			2,432,214
Recommend:			
To Replace Current Looms in Very Poor Condition and Add Capacity — 82"			
Dobbies — C-10	78	11,603	905,034
Dobbies — PAPA	56	12,780	715,680
			1,620,714
Auxiliaries			453,400
			2,074,114
Seaworthy Packing, Inland Freight			154,100
			2,228,214
Allowance for Selvage Name Weave	60	1,400	84,000
Allowance for Parts To Overhaul	40	3,000	120,000
			2,432,214

Mill: Wool

Department: Wool Scouring

A.I.D. Request Reference: Annex 13, Table 7

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Raw Wool Opening	1	10,000	25,641
Raw Wool Scouring and Drying	1	110,000	282,051
			307,692
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			232,950

Recommend:

For Replacement of Old Equipment and Increased Capacity

Unit Consisting of Primary Feeder, Single Cylinder Opener, Duster, Secondary Feeder, 4 Bowl Scouring, Dryer Mangle and Feed and Dryer	204,500
Seaworthy Packing, Inland Freight	28,450
	232,950

Mill: Wool

Department: Worsted

A.I.D. Request Reference: Annex 13, Table 8

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Mixing Intersecting Gills	2	40,000	102,564
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			44,100
Recommend:			
For Increased Worsted Capacity			
Two Gills for Blending and Preparation of Top			
– Ball Creel	1		20,000
– Can Creel	1		19,000
			39,000
Cans and Auxiliary Equipment			3,000
			42,000
Seaworthy Packing, Inland Freight	2		2,100
			44,100

Mill: Wool

Department: Worsted

A.I.D. Request Reference: Annex 13, Table 8

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Drawing Gill Boxes	4	50,000	128,205
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			107,100
Recommend:			
For Increased Worsted Capacity			
Breaker Gill (Pin Drafter with Leveller (1 Delivery)	1		32,000
Intermediate (2 Delivery)	1		28,000
Finisher (4 Delivery)	1		27,000
			87,000
Cans and Auxiliary			15,000
			102,000
Seaworthy Packing, Inland Freight			5,100
			107,100

Only 3 machines are required with the number of deliveries as proposed.

Mill: Wool

Department: Worsted

A.I.D. Request Reference: Annex 13, Table 8

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Roving Frames	2	55,000	141,026
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			106,450
Recommend:			
For Increased Worsted Capacity			
Machines – 48 Spindles	2	45,000	90,000
Bobbins and Auxiliary			9,000
			99,000
Seaworthy Packing, Inland Freight			7,450
			106,450

Mill: Wool

Department: Worsted

A.I.D. Request Reference: Annex 13, Table 8

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Ring Spinning Frames	10	450,000	1,153,846
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			844,200
Recommend:			
For Increased Worsted Capacity			
Ring Spinning Frames at 360 Spindles Each Based on 3-1/4" Gauge	11	64,800	712,800
Auxiliary – Bobbins, Cleaners, Etc.			72,000
			784,800
Seaworthy Packing, Inland Freight			59,400
			844,200

Mill: Wool

Department: Worsted

A.I.D. Request Reference: Annex 13, Table 8

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Assembly Winding	4	40,000	102,564
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			144,000
Recommend:			
Increased Worsted Capacity, Woolen Plied Yarns, Replacement of Current Assembly			
60-Spindle for Increase in Worsted	2	27,600	55,200
60-Spindle for Replacement of Current Worsted	2	27,600	55,200
30-Spindle for Woolen Spinning	1	15,000	15,000
			125,400
Auxiliary – Trucks			12,000
			137,400
Seaworthy Packing, Inland Freight			6,600
			144,000

Mill: Wool

Department: Worsted

A.I.D. Request Reference: Annex 13, Table 8

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Ring Twisting Frames	4	75,000	192,308
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			298,200
Recommend:			
For Increased Worsted Capacity			
Ring Twisting Frames at 360 Spds. Based on 4" Gauge	5	50,400	252,000
Auxiliary – Trucks, Cleaners, Bobbins			25,200
			277,200
Seaworthy Packing, Inland Freight			21,000
			298,200

Used 5 frames rather than 4 because of overall increase in percentage of plied yarns in projected program compared to current.

Mill: Wool

Department: Worsted

A.I.D. Request Reference: Annex 13, Table 8

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Cone Winding Machines	3	40,000	102,564
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			53,500
Recommend:			
For Increased Worsted Capacity. These Machines for Winding of Both Single and Plied.			
Winding Machines of 80 Spindles Each	3	15,000	45,000
Auxiliary, Trucks, Etc.			4,500
			49,500
Seaworthy Packing, Inland Freight			4,000
			53,500

Mill: Wool

Department: Woolen Mill

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Opening and Blending Machines	2	20,000	
Milling and Knop Machines	2	6,000	
		26,000	66,667

Not recommended. Mehalla deleted after reconsideration.

Mill: Wool

Department: Woolen Mill

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Hard Waste Opener	2	74,000	189,744
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			95,000

Recommend:

For Replacement of Older Equipment in Poor Condition. 1 Machine Sufficient for Requirements.

Waste Card/Garnett Machine	1		91,000
Seaworthy Packing, Inland Freight			4,000
			95,000

Mill: Wool

Department: Woolen Mill

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Rag Cutting	2	20,000	51,282
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			33,000

Recommend:

Only One Machine Needed for Requirements			
Waste Cutting Machine	1		30,000
Seaworthy Packing, Inland Freight			3,000
			33,000

Mill: Wool

Department: Woolen

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Wool Blending and Oiling	1	80,000	205,128
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			160,000

Recommend:

To Replace the Non-continuous System Now in Use and in Poor Condition

Blending Line	1	153,000
Seaworthy Packing, Inland Freight		7,000
		160,000

Mill: Wool

Department: Woolen

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Card Clothing Mounting	2	5,000	12,821
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			15,500

Recommend:

For Use with New Cards

Card Clothing Mounting Equipment	1 Set		14,000
Seaworthy Packing, Inland Freight			1,500
			15.500

Mill: Wool

Department: Woolen Mill

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Woolen Carding Engines	5	800	2,051,280
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			1,905,000

Recommend:

To Replace Current Cards in Poor Condition and Increase Capacity

Cards	5	360,000	1,800,000
Accessories			20,000
			1,820,000
Seaworthy Packing, Inland Freight			85,000
			1,905,000

Mill: Wool

Department: Woolen Mill

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Woolen Ring Spinning Frames	6	545,000	1,397,436
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			1,582,400

Recommend:

To Replace Mule Spinning — Coarse at 5" Ring, 6-1/2" Gauge; Fine and Medium at 4-1/2" Ring, 6" Gauge

Frames at 120 Spindles for Coarse Counts	2	115,000	230,000
Frames at 160 Spindles for Fine & Medium	8	145,000	1,144,000
			1,374,000
Accessories			137,400
			1,512,400
Seaworthy Packing, Inland Freight			70,000
			1,582,400

Mill: Wool

Department: Woolen Mill

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Woolen Twisting Frames	6	300,000	769,231

(Request was said to include capacity for twisting 3/14 from worsted mill also one of the recommended machines is for this purpose.)

U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			274,700

Recommend:

Machines at 144 Spindles Each	3	79,200	237,600
Accessories			24,000
			261,600
Seaworthy Packing, Inland Freight			13,100
			274,700

Mill: Wool

Department: Woolen Mill

A.I.D. Request Reference: Annex 13, Table 9

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Cone Winders	3	30,000	76,923
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			36,000
Recommend:			
Machines of 80 Spindles Each	2	15,000	30,000
Auxiliaries			3,000
			33,000
Seaworthy Packing, Inland Freight			3,000
			36,000

Mill: Wool

Department: Bulking, Reeling, Unwinding, Etc.

A.I.D. Request Reference: Annex 13, Table 10

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Continuous Yarn High Bulking Machine	1	50,000	128,205
U.S. Manufacturer of Desirable Equipment	No		
Estimated Cost US $ – FOB			106,000

Recommend:

To Allow Mehalla To Market High Bulk Yarns Under the Hacoba Trademark			
32 Deliveries Hacoba High Bulk with Compatible Winding Spindles – Including Auxiliaries, Seaworthy Packing and Freight			106,000

Average Requirements = 200 Tons per Year at 7,800 Hours = 26 Kilograms per Hour
Depending on yarn counts, capacity is typically over 50% more than requirements projected.

Mill: Wool

Department: Bulking, Reeling, Winding, Etc.

A.I.D. Request Reference: Annex 13, Table 10

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Hank Reels	6	60,000	153,846
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			13,400

Recommend:

To Replace Older Equipment in Poor Condition

Machines of 18 Deliveries with Creel	2	6,000	12,000
Seaworthy Packing, Inland Freight			1,400
			13,400

Average Requirements = 230 Tons per Year at 7,800 Hours = 30 Kilograms per Hour

Actual Capacity for 36 deliveries is more than twice requirements for typical yarns averaging 4.5 equivalent meters.

Mill: Wool

Department: Bulking, Reeling, Unwinding, Etc.

A.I.D. Request Reference: Annex 13, Table 10

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Hank Unwinding Machines	3	15,000	38,462
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			19,400

Recommend:

To Replace Older Equipment in Poor Condition

Machines at 12 Spindles Each	2	9,000	18,000
Seaworthy Packing, Inland Freight			1,400
			19,400

Average Requirements = 100 Tons at 7,800 Hours = 13 Kilograms per Hour

Actual capacity for 24 spindles is more than twice requirements for typical yarns of 3/14 Nm.

Mill: Wool

Department: Bulking, Reeling, Unwinding

A.I.D. Request Reference: Annex 13, Table 10

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Hand Knitting Balling Machines	3	30,000	76,923
U.S. Manufacturer of Desirable Equipment	No		
Estimated Cost US $ – FOB			45,000

Recommend:

To Replace Older Equipment in Poor Condition

Winding Units Including Auxiliaries, Packing and Freight	20		45,000

Average Requirements = 100 Tons at 7,800 Hours = 13 Kilograms per Hour

Actual capacity for 20 units is significantly higher than requirements for the typical yarn of 3/14 Nm.

Mill: Wool

Department: Bulking, Reeling, Unwinding

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Bundle Press	2	10,000	25,641

Not Recommended for Volume Involved and Recommendation

Mill: Wool

Department: Inspect

A.I.D. Request Reference: Annex 13, Table 11

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Raw Inspection Machines, 180 CM	4	10,000	25,641
Raw Inspection Machines, 250 CM	1	4,000	10,256
Inspecting Machine	1	4,000	10,256
		18,000	46,154
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			37,100

Recommend:

For Replacement of Current Manual Machines and for Increased Production

Machines – 180 CM (Greige)	4	5,500	22,000
Machines – 250 CM (Greige)	1	6,600	6,600
Machines (After Dry)	1	5,500	5,500
			34,100
Seaworthy Packing, Inland Freight			3,000
			37,100

Mill: Wool

Department: Inspect and Finish

A.I.D. Request Reference: Annex 13, Table 11

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Detensioning Machine	1	5,000	12,820

Not recommended. Request deleted by Mehalla.

Mill: Wool

Department: Inspect and Finish

A.I.D. Request Reference: Annex 13, Table 11

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Rolling Machines	2	10,000	25,641
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			47,000

Recommend:

To Double Cloth Before Inspection

Machines for Doubling	2	22,000	44,000
Seaworthy Packing, Inland Freight			3,000
			47,000

Mill: Wool

Department: Inspect and Finish

A.I.D. Request Reference: Annex 13, Table 11

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Sewing Machines	3	5,000	12,821
Scissors	6	2,000	5,128
			17,949
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			9,900

Recommend:

For Increased Production of Blankets (Sewing Machines)
For Increased Production (and Replacement) Blankets (Round Knives)

Zigzag Sewing Machines	3	2,000	6,000
Round Knives	6	400	2,400
			8,400
Seaworthy Packing, Inland Freight			1,500
			9,900

Mill: Wool

Department: Inspect and Finish

A.I.D. Request Reference: Annex 13, Table 11

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Measuring and Cutting	2	25,000	64,103
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			15,000

Recommend:

Only One Machine (Mehalla Agreed) for Rolling Cloth for Garment Factory

Rolling Machine	14,000
Seaworthy Packing, Inland Freight	1,000
	15,000

Mill: Wool

Department: Inspect

A.I.D. Request Reference: Annex 13, Table 11

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Testing Apparatus	1	35,000	89,744
U.S. Manufacturer of Desirable Equipment	Yes No		
Estimated Cost US $ — FOB (Estimate 50% Available in U.S.)			106,000

Recommend:

For Improved Measurement and Control of Quality

Details of each piece of equipment not possible to evaluate and all will not be available in U.S.

Various Equipment for Testing	100,000
Seaworthy Packing, Inland Freight	6,000
	106,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Jigger	1	15,000	
Centrifuge	1	5,000	
Sewing Machines	2	3,000	
Calender Dryer	1	10,000	
Hank Dyeing	1	15,000	
		48,000	123,077

Recommend:

Not recommended. The above listed items were deleted for the following reasons with Mehalla's agreement.

Jigger – To be secured from group of jiggers already ordered for cotton finishing.

Centrifuge – Letter of Credit already opened.

Sewing Machines – Letter of Credit already opened.

Hank Dyeing – Not needed with inclusion of Hacoba continuous relax machines for which hank dyeing machines were used for bulking.

Calender Dryer – Had been requested based on inaccurate technical information.

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Singeing Machine	1	50,000	128,205
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			86,250

Recommend:

For Special Finish Characteristics to Polyester/Wool Fabrics with Significantly Increasing Volume

Combination Plate and Flame Singer	1	80,000
Seaworthy Packing, Inland Freight		6,250
		86,250

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Padding Mangle	1	15,000	
Thermosetting Machine	1	100,000	
		115,000	294,872
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			278,500

Recommend:

For Increased Drying Capacity and Thermoset Polyester

Padding Mangle	1	40,000
Drying Stenter with Thermoset Unit	1	215,000
		255,000
Seaworthy Packing, Inland Freight		23,500
		278,500

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Open Width Scouring	1	6,000	15,385
U.S. Manufacturer of Desirable Equipment	No		
Estimated Cost US $ – FOB			60,000

Recommend:

For Improved Quality on Fabrics Needing Open Scouring

Open Width Scour	1		60,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Jet Dyeing Machines	2	40,000	102,564
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			86,000

Recommend:

Only One Machine Required for Knitted 100% Synthetic Fabrics and Increased Capacity of Woven Blends (Mehalla concurred with only one machine, two tubes.)

Jet Dyeing — Two Tube	1	80,000
Seaworthy Packing, Inland Freight		6,000
		86,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Backwashing Machine	1	30,000	76,923
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			93,200

Recommend:

For Replacement of Old Equipment in Poor Condition and for Increased Volume

Backwasher with Dryer	1	55,000
Allowance for Gilling	1	25,000
		80,000
Auxiliary Allowance		5,000
		85,000
Seaworthy Packing, Inland Freight		
– Backwasher		7,000
– Gill		1,200
		93,200

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Combined Scouring and Milling	1	8,000	20,513
U.S. Manufacturer of Desirable Equipment	No		
Estimated Cost US $ – FOB			70,000

Recommend:

Combined Scour and Mill	1		70,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Large Size Milling	2	20,000	51,282
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			168,000

Recommend:

For Increased Production of Fabrics Requiring Milling

Large Size Milling	2	79,000	158,000
Seaworthy Packing, Inland Freight			10,000
			168,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Centrifuge	2	3,000	7,692
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			22,860

Recommend:

For Increased Volume

Centrifuge – 48" Diameter	2	10,880	21,760
Seaworthy Packing, Inland Freight			1,100
			22,860

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Ultraviolet Inspection	1	2,000	5,128
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			6,500

Recommend:

For Pre-inspect before Final Finish to Improve Overall Quality

Ultraviolet Inspection Machine	1	6,000
Seaworthy Packing, Inland Freight		500
		6,500

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Potting Machine	1	4,000	10,256
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			55,000

Recommend:

For Special Finish. Price Based on Rotary Crab in U.S.

Rotary Crab with Tenter	1	50,000
Seaworthy Packing, Inland Freight		5,000
		55,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Shearing Machine	2	40,000	102,564
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			52,000

Recommend:

Only One Machine Required for More Precise Shearing on Certain Fabrics
(Mehalla concurred)

1 Blade Machine – 90″	1	48,000
Seaworthy Packing, Inland Freight		4,000
		52,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Garnett Wire Raising	1	10,000	25,641
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			39,000

Recommend:

More Stable Machine for Napping of Synthetics			
24-Roll Napper – 108"	1		35,000
Seaworthy Packing, Inland Freight			4,000
			39,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Relaxing Machine	1	5,000	12,821
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			72,000

Recommend:

For Continuous Relaxing of Fabrics. To Handle Increased Volume.

Machine for 72" Fabrics	1	67,000
Seaworthy Packing, Inland Freight		5,000
		72,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Loose Wool Dyeing Machine	1	30,000	76,923
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			100,000

Recommend:

For Replacement of Atmospheric Loose Stock Machine for Quality Dyeing of Synthetics

High Temperature Dyeing Machine 1,000 Pound Capacity	1		85,000
Auxiliary			10,000
			95,000
Seaworthy Packing, Inland Freight			5,000
			100,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
High Pressure Dyeing Machine	1	45,000	115,385
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US$ — FOB			118,000

Recommend:

Combination Dyeing Machine for Loose Wool or Tops for Quality Dyeing of Synthetics

High Temperature Dyeing Machine 600 Pound Capacity	1		85,000
Loose Stock Carriers	3 Cans	3,000	9,000
Top Carriers	3	6,000	18,000
			112,000
Seaworthy Packing, Inland Freight			6,000
			118,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Hank Drying Machine	1	60,000	153,846
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			35,000

Recommend:

Continuous machine not recommended but two chambers for hanks and loose wool in addition to present capacity.

Drying Chambers	2	15,000	30,000
Seaworthy Packing, Inland Freight			5,000
			35,000

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Permanent Setting Machine	1	100,000	256,410
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ – FOB			78,200

Recommend:

Full Decater To Replace Current Machine of Small Capacity and Poor Condition

Full Decater – Complete	1		66,000
Aprons – 400 Yards Each	2	3,600	7,200
			73,200
Seaworthy Packing, Inland Freight			5,000
			78,200

Mill: Wool

Department: Dyeing and Finishing

A.I.D. Request Reference: Annex 13, Table 6

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Continuous Crabbing	1	50,000	128,205
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			171,000

Recommend:

For Higher Production Projected

Continuous Crab	1	160,000
Seaworthy Packing, Inland Freight		11,000
		171,000

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SECTION VII

APPAREL

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SECTION VII: APPAREL

A. PURPOSE AND SCOPE

The purpose of this section is to evaluate management's plans regarding:

- The updating of equipment used in the present operation.
- Formation of a new factory to produce additional workers' suits plus denim and summer leisure suits.

The scope is limited basically to apparel (confection) cutting, sewing and finishing although there will be some comments regarding cloth received by the factory.

B. PROCEDURE

1. Initial plans for expansion and machinery replacement previously prepared by Mehalla personnel were received and reviewed.
2. A tour of the present facilities and new building which is under construction was made.
3. Meetings were held with Mehalla personnel to further discuss the current situation as well as replacement and expansion plans.
4. Mehalla personnel were requested to gather certain historical data on items such as equipment, standard costs, labor turnover and absenteeism, quality, volume, productivity, layouts, etc. Upon receipt, these were studied and evaluated.
5. Each garment factory (floor) was visited to form conclusions concerning equipment, operating conditions, personnel and control procedures.
6. Further discussions were held with company, factory and sales management personnel to develop a broader understanding of the operation and plans for the future.
7. Preliminary conclusions were discussed with management, and a basic strategy for modernization and expansion was outlined, recommended and agreed upon by management.

8. Samples of garments to be made in the new factory were obtained and later analyzed in order to determine equipment requirements.

9. All data was reviewed and analyzed; suppliers were contacted for equipment prices; conclusions were reached; and, finally, this section of the report was prepared.

C. HISTORY

Briefly, this factory was started in late 1955 in another part of Egypt with 24 machines. It grew to about a 300-machine operation by 1961 and was relocated to Mehalla in 1968. Since that time, it has grown to about 1,400 machines and produces more than six million garments annually.

D. CURRENT IMPORTANCE

Currently, the apparel operation is a vital part of the company as indicated by the following:

— Apparel manufacturing employs 2,542 people or 7% of the total company personnel.

— In 1975 the factory used 22 million meters of cloth made by the company or over 15% of the total fabric production.

— Sales in 1974 were 6,590,000 Egyptian pounds or 13.5% of total sales, and for the first six months of 1975 apparel sales amounted to 14.9% of the total.

— Apparel gross margin for 1974 was 1,466,000 pounds or 10.5% of the total, and in the first half of 1975 this figure increased to 16% of total gross margin.

— Operating profit was 954,000 pounds (8.3% of total) in 1974, and this increased to 15.6% of total company profits for the first half of 1975.

These statistics take on a special significance when it is recognized that the operation is located in one building, that the capital investment for a garment factory is very low relative to a textile operation, and that the value added to the raw material is increased by fabricating the cloth produced into garments.

E. CURRENT EQUIPMENT

Exhibit I is the present sewing machine inventory list. Recapping this in Exhibit II, we see:

- Only 18% are less than five years old.
- 35% are 20 years old or more.
- 47% are 10 years old or more.
- 82% are 5 years old or more.

During the last five years, both the spare parts and maintenance costs have increased disproportionately to the number of machines as shown in Exhibit III. While inflation probably accounts for the increase in spare parts cost, machinery age and condition have probably caused the major portion of the 60% increase in maintenance personnel.

Exhibit IV is a summation of random machine speed checks made on some of the more prevalent types of equipment. This shows that *no* machines were running at the speed at which a modern piece of equipment would be operated. While machine speed is of little importance on many jobs, it is critical on others. The newer equipment should be operated at or near its rated RPM; however, age of machines prohibits this in many instances.

More important than machine speeds is the fact that on many operations the proper type machine is not available. Examples are:

1. Sleeve joining and topstitching being done with a single needle lockstitch versus safety stitch or felling.
2. Pocket hemming and banding with lockstitch versus chain stitch.
3. Side seam, inseam and seat seam operations performed with lockstitch versus chain stitch, safety stitch or felled seams.
4. Crotch pieces attached with lockstitch versus safety stitch.
5. Patch pockets creased by hand versus with a macbine.
6. Belt loops stitched down with lockstitch versus bartack machine.

Using the correct machine in these examples would mean *automatic* productivity increases ranging from 2-1/2% to 7-1/2% based on normal machine delay allowances only. For instance, the delay allowance normally added to operating time for a single needle lockstitch machine is 12-1/2% and for a single needle chain stitch the allowance is 7-1/2%. The 5% point difference should be translated into 5% more production.

Aside from incorrect machine types and slow machines, there is an almost complete lack of modern labor saving attachments such as.

1. Undertrimmers for automatically cutting top and bottom threads.

2. Other thread chain cutters such as impact cutters, automatic chain cutting feet and air operated side cutters.

3. Automatic needle positioners.

4. Air operated stackers for small parts and certain assembly operations.

5. Folders for jobs like hemming pockets, hemming shirts, attaching sleeve facings and attaching center plaits.

6. Automatic button feeders.

Use of the correct machine would also result in better quality on jobs like these:

1. Better appearance at seat seam, inseam and side seams where these are now stitched and restitched. The same for shirt seams which could be safety stitched or felled.

2. Use of bartack machines would add strength to belt loops and pockets.

3. Chain stitch seam for seat seaming would give elasticity which the present lockstitch cannot provide.

4. Guides, folders, etc. would give more uniformity and better appearance of patch pockets, center plaits, pocket facings, etc.

To put this in perspective, we observed 1,425 of the 1,447 machines and asked ourselves the question: "Considering age, condition, speed, attachments, type machine for the job, etc. is (1) this machine now right or can it be made right with little trouble or cost; or, (2) should it be replaced; or, (3) is some major attachment, effort or cost needed to make the machine right?" The results are shown in Exhibit V. What this says, in effect, is that a factory set up today to produce the same mix of quality products at a competitive price would not use 610 (42%) of the present machines and another 650 (45%) would require varying degrees of cost to make "right."

Obviously, this particular analysis is somewhat subjective as time did not permit a thorough study and payout analysis for new equipment on all jobs in each of the factories — which should be done prior to ordering equipment. However, in order to approach overall replacement costs realistically, one can look at several points on the scale:

1. At the high end, assume replacement costs for the 610 machines and for one-half the 650; or, replace 935 machines (65%).

2. Discount any costs associated with the 650 machines and replace 610 (42%).

3. Assume that, in the final analysis, the cost equivalent would be for 50% of each category; or, 610 + 650 x 50% = 630 machines (44%).

4. Assume replacement of 75% of the 610 and cost equivalent for 25% of 650; or, 620 machines (43%).

5. And, finally, at the lowest conceivable point on the scale, assume cost justification for 50% of 610 and 25% of 650; or, replace 468 machines (32%).

At this juncture, we should emphasize one major point. New equipment will help increase productivity and earnings, lower costs and improve quality on individual jobs. This, however, does *not* mean that there will be corresponding improvements in plant-wide productivity, costs, earnings and quality. In fact, really worthwhile improvements within an individual production line may not be realized by the replacement or addition of individual pieces of equipment. As will be discussed later, very little equipment can be justified unless accompanied by a plan of total reorganization.

EXHIBIT I
SEWING MACHINE INVENTORY

Type and Make	Number of Machines by Age (Years) 1	2	3	4	5	10	15	20
Single Needle Lockstitch								
Textima 8332/6								118
Téxtima 8332/003					94			
Textima 8332/005	182				313			
Textima 8332/035					16			
Textima 8332/605					21			
Nauman 8331/6								14
Pfaff 463-6						76		
Pfaff 463-431						4		
Vertas 8352/2								4
Brother DB2-B751						22		
Durkopp 207-5								2
Singer 195-K1								24
Singer 421-12								95
Singer 451-K1								3
Singer 451-K105								161
2-Needle Lockstitch								
Pannonia V1201			3					
Pannonia V1213			3					
2-Needle Chain Stitch (Off-Arm)								
Brother DT6-925						19		
Singer 231-4								26
2-Needle Chain Stitch (Flatbed)								
Brother DT2-962						17		
Singer 147-100								1
Singer 147-101								9
Overedge								
Textima 8514/0	9							
Juki MO-352		2						
Juki MO-804		2						
Singer 460/21								11

EXHIBIT I (CONTINUED)

Type and Make	Number of Machines by Age (Years) 1	2	3	4	5	10	15	20
Safety Stitch								
Textima 8514/153	16							
Textima 8514/154					55			
Pfaff 1422						11		
Button Sew								
Singer 175-60								15
Durkopp 566								1
Pfaff 3300-1						3		
Pfaff 3300-958	4							
Brother BQ1-911						11		
Lewis 200-1				11				
Juki MB-372		1						
Buttonhole								
Singer 71-101								11
Pfaff 3114-1						2		
Pfaff 3114-958	5							
Juki LBH-761		1						
Reece 101				4				
Minerva						2		
Brother DL1-812						12		
Durkopp 551-2W							3	2
Reece S-2				12				
Miscellaneous								
Singer 300W205								1
Pannonia (2-Needle Belt Loop)			3					
Singer (Blindstitch)								1
Pannonia CS652	3		4					
Singer (Bartack)								2
Total	219	6	13	27	499	179	3	501
Grand Total								1,447

EXHIBIT II

RECAP OF SEWING MACHINE AGE

Number of Years Old	Number of Machines		Percent	
1	219	15.1%		
2	6	.4%	18.3%	
3	13	.9%		
4	27	1.9%		
5	499	34.5%	34.5%	
10	179	12.4%		81.7%
15	3	.2%	47.2%	
20	501	34.6%		
	1,447			

EXHIBIT III

SEWING MACHINES/SPARE PARTS COST/MAINTENANCE PEOPLE

Year	Number of Productive Sewing Machines	Cost of(1) Spare Parts	Number of Shop and Maintenance Personnel
1971	1,206	34,009	46
1972	1,206	33,773	45
1973	1,221	36,672	63
1974	1,221	42,757	63
1975	1,321	39,234	74

Comparison — 1971 to 1975

Number of Machines	– Up 9.5%
Cost of Spare Parts	– Up 15.4%
Number of Maintenance People	– Up 60.9%

(1) Cost in Egyptian pounds.

EXHIBIT IV

MACHINE SPEEDS

Type of Machine	Present Machine Speeds (RPM)	Possible Machine Speeds with Modern Equipment (RPM)
Single Needle Lockstitch	2,000 – 5,000	5,200(1)
Feed Off the Arm	3,000 – 4,100	4,500
Flatbed Fell	4,400 – 4,600	5,500
Safety Stitch	2,500 – 4,800	5,500

(1) When equipped with thread trimming device.

EXHIBIT V

MACHINE SUITABILITY

Factory	1-Needle Lockstitch	Feed-Off Arm Fell	2-Needle Chain Stitch	Overlock	Safety Stitch	Tacker	Buttonhole	Button Sew	Other	Total
O.K. As Is										
1	15			2		5	11	15		
2	21		9	9	1		8	8		
3			5	2	2		18	15		
4 and 5	1		1			3	8	6		
	37		15	13	3	8	45	44		165
Replace										
1	384	19	5	8		2	6		3	
2	45	15	9	5	15					
3	19	4	2	2	53					
4 and 5		9	2	1			2			
	448	47	18	16	68	2	8		3	610
Major Cost										
1	19									
2	204									
3	222									
4 and 5	205									
	650									650
Total										1,425

F. CURRENT PRODUCTS — PROJECTED PRODUCTS

The multi-story factory consists essentially of four production floors plus one floor for miscellaneous functions. Products made or services performed on these floors are:

Floor	
1	Military Suits and Uniforms
2	Pajamas, Bed Sheets and Towels
3	Shirts
4	Uniforms
5	Administrative, Training, Patternmaking, Marking, Main Shop, Trim and Parts Storage

Other products include jeans; drill trousers, jackets and lab coats; wool trousers, suits and lab coats; aprons; head covers; and undershorts.

Mehalla management expects to continue manufacturing these products in the present facility and, in the adjoining facility nearing completion, to produce additional workers' suits; additional jeans and/or a denim leisure type suit; and a new summer leisure suit.

The desirable construction and quality features of each were thoroughly reviewed with management; but, without going into all the details, the garments are to be made basically as follows:

1. Workers' Suit

Very much like the current model including a button fly; although a zipper fly may be added at a later date. The major difference is that safety stitch seams are to be used wherever feasible on both tops and pants.

2. Denim Suit

Tops to have cuffed long sleeves, three patch pockets, two-piece vented back, felled seams and no lining.

The pant is to be a basic western type jean but with a button fly. There are to be patch back pockets, either patch or swing front pockets, major seams (yoke, seat seam, side seam and inseam) are to be felled, and the band is to be two-needle chain stitched with belt loops.

Most machinery for the tops unit is versatile enough to be easily converted to make jeans should the jacket prove not to be marketable for some reason.

3. Summer or Leisure Suit

To be made of lighter weight, more expensive fabrics in either short sleeve or cuffed long sleeve. It is to be unlined with many of the same features as the denim suit; the major difference is that seams will be safety stitch type rather than felled.

Pants are to be the so-called casual type with a lined right fly; zipper, hook and eye closure; set-in back pockets; pressed open seams; chain stitched seams; taped crotch and overlocked fabric edges.

Here a comment concerning the new products — denim suits and summer suits — is in order. Both of these are commonly called leisure suits; and this has recently been one of the fastest growing segments of the clothing industry. On the one hand, the trend seems to be toward more casual or informal dress, especially as inflation continues to increase the price of tailored clothing. On the other hand as workers become more affluent, they tend to dress up; and the price of leisure suits such as those planned may well be within the reach of many.

It appears, therefore, that management's plan to enter this market is sound; and the greatest words of caution would concern themselves with the manufacturing aspects — low costs, high productivity and good quality.

G. CURRENT VOLUME — PROJECTED VOLUME

1. Current

Production figures for 1975 as summarized in Exhibit VI show:

—	Total Units	6,522,206
—	Export Units	35% of Total
—	Shirts and Pajamas	59% of Total
—	Shirts, Pajamas and Drill Suits	74% of Total

Total units produced have increased by 20% since 1972; but the product mix has remained relatively stable with shirts, pajamas and drill suits consistently accounting for 70% to 75% of the total volume.

EXHIBIT VI

GARMENT PRODUCTION – 1975

Article	Units Produced: Local Market	Export	Total
Shirts	895,651	1,470,944	2,366,595
Pajamas	808,059	660,996	1,469,055
Drill (Workers) Suits	993,011	7,970	1,000,981
Jeans and Drill Trousers	79,982	114,640	194,622
Drill Jackets	4,577	–	4,577
Drill Lab Coats	15,493	–	15,493
Aprons	170,180	–	170,180
Head Covers	1,006	–	1,006
Wool Suits	63,001	–	63,001
Wool Trousers	135,411	–	135,411
Wool Lab Coats	593	–	593
Other	1,100,692	–	1,100,692
Totals	4,267,656	2,254,550	6,522,206 (1)(2)

(1) Actual figure – 6,000,000 units used in Mehalla study dated January, 1976 – was based on projected volume.

(2) Compares to production of 5.4, 6.0 and 5.5 million units in 1972 – 1974.

2. Projected

Management has estimated that *without* the project there will be a 1% drop in volume every other year beginning in 1978. Using actual versus projected 1975 volume as the base and using one-half of one percent (.005) per year rather than the 1%, we have shown in Exhibit VII the results of this loss. On this basis the volume would drop to 6.2 million units by 1985, and the cumulative loss would be 1,448,103 units.

With the present product mix, each machine currently produces about 4,500 units per year. This projection means, therefore, the loss of production from seven to eight machines per year either through scrapping the machines or through additional downtime of only 2.4 minutes per day per machine. Considering the fact that 501 machines (35%) are at least 20 years old, this loss does not seem unreasonable. If anything, the projection may be optimistic.

EXHIBIT VII

PROJECTED VOLUME – WITHOUT PROJECT

Year	Projected Volume From Estimated Base Year Volume (Units)	Projected Volume From Actual Base Year Volume (Units)	Lost Units from Actual Base Year	Cumulative Lost Units
1975 (Base)	6,000,000	6,522,206	– Base	Year –
1976	6,000,000	6,522,206	–	–
1977	6,000,000	6,489,595	32,611	32,611
1978	5,940,000	6,457,147	65,059	97,670
1979	5,940,000	6,424,861	97,345	195,015
1980	5,880,000	6,392,737	129,469	324,484
1981	5,880,000	6,360,773	161,433	485,917
1982	5,820,000	6,328,969	193,237	679,154
1983	5,820,000	6,297,324	224,882	904,036
1984	5,760,000	6,265,837	256,369	1,160,405
1985	5,760,000	6,234,508	287,698	1,448,103
Lost Units			1,448,103	

With the project, management anticipates a 1% loss in 1978 then expects to regain this plus 750,000 new units by 1979. The volume of the new units (as described previously) is planned to be:

	Units per Year
Workers' Suits	350,000
Summer Suits	200,000
Denim Suits	200,000
	750,000

With a 15% allowance for spare machines and 325 working days, the units would be set up for 1,237, 707 and 707 units (tops and bottoms) per day, respectively.

Except for the new units in the new factory, management made no projection for a volume increase. In other words replacement equipment alone was not expected to yield any increased volume over the base year (1975). This is probably realistic since, as was mentioned earlier, new equipment may help on an individual job but will not necessarily improve overall production.

If total plant reorganization accompanies the introduction of replacement equipment, however, it is just as realistic to say that the base volume level can be maintained with fewer operating personnel and less cost; or, there can be a sizable increase in volume with the same number of people.

Assuming sales could support this additional volume, the estimated buildup and total increase might appear like that shown along with other projections in Exhibit VIII. From this we see that plant reorganization with replacement equipment could add over nine million units in the 10-year projection period.

EXHIBIT VIII

PROJECTED VOLUME – WITH PROJECT

Year	Projected Volume Equipment Alone From Estimated Base Year Volume (Units)	 From Actual Base Year Volume (Units)	Projected Volume Possible with Reorganization and Equipment (Units)	Possible Gain over Actual Base Year Projection (Units)
1975 (Base)	6,000,000	6,522,206	– Base Year	–
1976	6,000,000	6,522,206	6,522,206	–
1977	6,000,000	6,522,206	6,897,206	375,000
1978	5,940,000	6,456,984	7,272,206	815,222
1979	6,750,000	7,272,206	7,551,729	279,523
1980	6,750,000	7,272,206	7,831,252	559,046
1981	6,750,000	7,272,206	8,110,775	838,569
1982	6,750,000	7,272,206	8,390,298	1,118,092
1983	6,750,000	7,272,206	8,669,821	1,397,615
1984	6,750,000	7,272,206	8,949,344	1,677,138
1985	6,750,000	7,272,206	9,228,868	1,956,662
		70,406,838	79,423,705	
Possible Units To Be Gained				9,016,867

In looking at the feasibility of volume projections, the space requirements must also be considered. Each floor of the present building contains approximately 44,562 square feet — 178,248 for the four production floors. Cutting, elevators, rest rooms, etc. would reduce this to 115,980 square feet or 61.1 square feet for each of the 1,897 production operators requiring a workplace.

The adjoining building now under construction has 24,354 square feet per floor or 97,416 square feet on four floors. Current plans, however, do not provide for total usage of this space for cutting, sewing and finishing; and this should not be necessary.

Plans for the new factory do call for using 58,081 square feet, which is one existing floor plus just over one-half of one of the new floors. Deducting requirements for cutting, rest rooms, etc., 42,514 square feet would remain. At a desirable 80 square feet per workplace, this would mean there is space for 531 workplaces. Requirements for the new factory call for only 435 machines plus about 25 additional workplaces.

As can be seen in Exhibit IX, even if the 460 workplaces were added (as opposed to reorganization for higher productivity), this expansion will provide a higher, yet potentially more productive, square footage area per workplace. It must be concluded, therefore, that manufacturing space will be adequate.

It also appeared that "outside" storage areas for both piece goods and finished products were adequate to handle the increased volume. By better utilization of floor space and air rights — tighter aisles and adding bins to the top of existing ones — it was estimated that one-third more piece goods and up to one-half more finished products could be stored in the existing space.

EXHIBIT IX

AVAILABLE SQUARE FOOTAGE

	Present	Planned: Using Only 1/2 of Each New Floor	Planned: Using 3-1/2 + Full Floors
Present Square Feet/Floor	44,562		
	x4		
	178,248		
Less Cutting, Etc.	62,268		
Available Space	115,980	115,980	115,980
New Space – Part Floor	–	13,519	13,519
New Space – 3 Full Floors	–	–	73,062
New Space – 50% of 3 Floors	–	36,531	–
Total Available Space	115,980	166,030	202,561
No. of Workplaces Required	1,897	1,897 to 2,357 Max.	1,897 to 2,357 Max.
Square Feet/Workplace	61.1	70.4 – 87.5	85.9 – 106.7

H. CURRENT EMPLOYEES

The apparel factory personnel are shown in Exhibit X which follows. From this we see a total of 2,542 people. It is significant to note that there are 147 people listed in the supervisory category; or, one supervisor for every 17 to 18 people. In reviewing the working papers from which this data was extracted, it was also significant to note that in sewing and finishing the number of workers per supervisor ranged from under 12 up to 19 and averaged 14.9. This is about half the number that could be expected in a more productive and efficient operation. A ratio of 1:30 in a staple shop is not at all unusual.

It should also be noted that the number of assistants is extremely high. While they do perform productive functions, one of two things would happen to most of them in an updated or newly built factory — either the need for them would be eliminated through the use of modern equipment and techniques; or, hopefully, they would be transferred to machines so that their efforts would be more productive. Through total reorganization this number could probably be reduced to about one-third the present requirement.

EXHIBIT X

GARMENT FACTORY PERSONNEL

	Factories	Patterns Samples	Technical and Maintenance	Admin.	Total
Cutting					
Supervision	10				
Workers	46				
Assistants	100				
					156
Preparation, Assembly and Finishing					
Supervision	95	6			
Workers	1,412	9			
Assistants	335	30			
					1,887
Pressing					
Supervision	9				
Workers	143				
Assistants	7				
					159
Quality Control					
Supervision	9				
Workers	100				
Assistants	33				
					142
Packing					
Supervision	5				
Workers	68				
					73
Maintenance					
Supervision	5		5		
Workers	41		18		
					69
Services					
Administration				3	
Clerks	9	1		6	
Services	29	3		5	
					56
Totals	2,456	49	23	14	2,542

Exhibit XI shows absenteeism for the garment workers for two months in 1975 and 1976. This indicates that absenteeism is high at 10% to 14%; but, when annual holidays are considered, the rate is not unduly high.

No new operators have been hired since 28 June 1975, and 87 people have resigned or have been terminated between that date and 9 March 1976. This indicates that about 10 people per month (120 per year) are leaving; and, based on the current total employment of 2,542, the rate would be just under 5%. While this is unusually low, there are many reasons for it, and we are in accord with the policy of no new hires since even this attrition will gradually help ease the current problem of being overstaffed for the volume produced.

EXHIBIT XI

GARMENT FACTORY ABSENTEEISM

	No. of Workers	Days	Man-Days Available	Number of Days Absent	Percent Absent
1975					
January	2,542	27	68,634	8,991	13.1%
February	2,542	25	63,550	6,828	10.7%

	January 1976		February 1976	
Days Available	63,250		63,200	
Cause	Days Lost	Percent	Days Lost	Percent
Without Permission	548	.87%	399	.63%
Sick Leave	2,828	4.47%	2,312	3.66%
Emergency	180	.28%	163	.26%
Work Accident	38	.06%	81	.13%
Annual Holiday	5,109	8.08%	3,719	5.88%
National Guard	289	.46%	285	.45%
	8,991	14.22%	6,959	11.01%

I. CURRENT COSTS

Exhibit XII shows the breakdown of costs for three garments plus the average for eight of the more popular styles currently made. From this we see that labor costs as a percentage of total cost range from 10.5% to 15.6% and average 12.7%. This checks with the profit analysis (exhibited elsewhere in the report) which indicates that 1974 labor cost was 13.0% and for the first half of 1975 it was 14.7% of total garment production cost. If calculated on the same basis as shown in Exhibit XII, these would drop to 12.0% and 13.6%, respectively.

Preliminary cost sheets for the new garments have also been prepared using the same format. This is shown as Fxhibit XIII, and here we see that the labor cost percentages have dropped due mainly to the much higher priced fabric planned for the summer leisure suits.

In the development of these costs, three points become obvious:

1. Even though a small part of the total, labor costs for future new garments could be developed in a more accurate and systematic manner.

2. Since labor costs are relatively small, the need to closely examine expenditures for replacement equipment becomes critical. Labor saving equipment must be justified by an acceptable payback before equipment is ordered.

3. Increased fabric costs for the new garments seem to make it mandatory that strict quality control measures be instituted.

EXHIBIT XII

BREAKDOWN OF CURRENT COSTS

	Shirt	Pajama	Suit	Average of 8 Popular Garments
Salaries and Wages	$ .469	$ .472	$ .682	$ .513
Maintenance	.082	.080	.123	.087
Depreciation	.028	.026	.041	.028
Interest	.039	.039	.059	.041
	$ .618	$ .617	$ .905	$ .669
Storage	$ .010	$ .010	$ .015	$ .010
General Expense	.023	.023	.033	.021
Welfare	.031	.028	.046	.031
	$ .064	$ .061	$ .094	$ .062
Administration	$ .077	$ .074	$ .115	$ .080
Sales	.033	.036	.044	.036
	$ .110	$ .110	$ .159	$ .116
Manufacturing Cost	$ .792	$ .788	$1.158	$ .847
Fabric	1.746	3.361	4.277	2.856
Auxiliaries (Trim)	.474	.362	.382	.341
Total Cost	$3.012	$4.511	$5.817	$4.044
Wages and Salaries % of Total Cost	15.6%	10.5%	11.7%	12.7%

EXHIBIT XIII

PRELIMINARY COST ESTIMATES(1) – NEW GARMENTS

	1/2 Sleeve Leisure Suit Top	Denim Jeans	Denim Top	Leisure Suit Pants	Long Sleeve Leisure Suit Top
Salaries and Wages	$ .682	$ .418	$ .810	$ 1.251	$ .741
Maintenance	.102	.059	.131	.187	.110
Depreciation	.033	.021	.044	.062	.039
Interest	.049	.028	.062	.090	.054
	$ .866	$ .526	$1.047	$ 1.590	$ .944
Storage	$ .013	$ .008	$ .015	$ .023	$ .015
General Expense	.028	.015	.036	.051	.031
Welfare	.039	.021	.046	.067	.041
	$ .080	$ .044	$ .097	$ .141	$ .087
Administration	$ .095	$ .054	$ .121	$ .172	$ .103
Sales	.041	.028	.044	.077	.044
	$ .136	$ .082	$ .165	$ .249	$ .147
Manufacturing Cost	$ 1.082	$ .652	$1.309	$ 1.980	$ 1.177
Fabric	9.423	2.667	5.941	7.692	10.897
Auxiliaries (Trim)	.703	.490	.164	1.477	.487
Total Cost	$11.208	$3.809	$7.414	$11.149	$12.561
Wages and Salaries % of Total Cost	6.1%	11.0%	10.9%	11.2%	5.9%

(1) Cost estimates by Mehalla management.

J. PRIMARY PROBLEMS

1. Piece Goods Availability and Quality

A summary of the stoppage reports for the sewing sections during December, 1975 is shown as Exhibit XIV; and this indicates lost time of 2.5% due to material not being available. At an average rate of 1.73 garments per hour per machine, the loss was 12,073 equivalent units during December alone — 144,876 lost units if extended for 12 months at this rate.

We, of course, do not know all the reasons for this but suspect there is a breakdown in the production planning system or in the communications between mill and garment plant personnel. Obviously, the problem needs attention.

During our plant visits, we observed the following:

a. Weaving defects.

b. Fabric shading in both the length and width of individual bolts.

c. Plaids off — up to 3/4" difference from middle of piece to selvage edge.

d. Width variations within the bolt.

As a measure of these, data was gathered concerning returned material; and this is presented in Exhibit XV where we see that only 88% of the amount requested was received. Of this, 5.3% was returned as defective cloth or short ends.

In an effort to separate defective cloth from short ends, another check was run, this one covering 531,000 meters (about 8-1/2 days of work). Here we found the following:

	Meters	
Short Ends Returned	25,992	4.9%
Defective Fabric Returned	12,318	2.3%
		7.2%

Obviously, there is no such thing as 100% perfect fabric from any mill; but an awareness of the extent of the problem should lead to some improvement.

EXHIBIT XIV

STOPPAGE IN SEWING DUE TO NO FABRIC

(DECEMBER 1975)

Department	Machine Hours Available During Month	Stoppage Due to No Fabric	
		Hours	Percent
Sewing 1	99,144	1,380	1.39%
Sewing 2	58,968	1,703	2.89%
Sewing 3	67,392	1,916	2.84%
Sewing 4	27,648	542	1.96%
Subtotal Sewing	253,152	5,541	2.19%
Finishing 1	7,344	233	3.17%
Finishing 2	3,888	165	4.24%
Finishing 3	7,344	813	11.07%
Finishing 4	1,296	227	17.52%
Subtotal Finishing	19,872	1,438	7.24%
Total	273,024	6,979	2.56%

EXHIBIT XV

GARMENT FACTORY MATERIAL RETURNS

Factory Number	Order Number	Quantity of Material Ordered (Meters)	Quantity of Material Received (Meters)	Quantity Returned Rejects and Short Ends (Meters)	Percent Returned
1	1097	2,418	2,405	155	6.4%
	1094	5,110	5,110	660	12.9%
	1155	476,400	476,400	14,990	3.1%
	1147	13,450	13,571	862	6.4%
2	2120	19,771	19,702	894	4.5%
	2121	12,900	12,840	623	4.9%
3	3219	678,500	531,000	38,220	7.2%
		1,208,549	1,061,028	56,314	5.3%
			(88%)		

2. Garment Quality

As shown in a previous exhibit, there are 142 quality control supervisors, workers and assistants for the 1,897 sewing, finishing and pressing personnel — or one quality control person per 13 operators. Unfortunately, the finished products are not reflective of this amount of effort; and management is not pleased with the overall quality level.

In examining quality control records as summarized in Exhibit XVI, several things stand out rather clearly. First, the number of seconds produced annually has been reduced drastically if the assumption is made that the quality standards have remained constant. Obviously, if the standards have been lowered, the number should drop; but, if the standards have been raised, then this improvement is noteworthy. Since the 1974 and 1975 December comparison go in the opposite direction, however, it is impossible to interpret the numbers accurately. Thus, when taken in total, an inconsistency would be indicated.

Perhaps of greater significance are the statistics relating to the three major products. Here we see a high number of rejects (5.6% to 9.5%) which must be repaired in order to make them first quality goods. More importantly, we see second quality goods ranging from 1.5% to 8.6% for these products; and these numbers — 1.5%, 2.3% and 8.6% — must be compared to the .6% seconds for *all* products.

This clearly indicates there is more than one quality level or standard existent in the factory — a condition that should be changed. While the construction quality can vary dependent on the garment, workmanship quality must be consistent. To attempt something other than this usually invites the lowering of quality for better grade garments and may increase the quality (and costs) on the less expensive garments.

Some of the specific quality problems noted in the garment factory include:

a. Parts that should have been numbered were not.

b. Cloth being dragged across the floor while spreading (laying up).

c. Uneven selvage edge on front side of lay.

d. Patch pocket placement being determined by "eyeballing" only.

e. Pocket corners not turned out.

f. Collar points not even.

g. Poor corners on topstitched flaps.

h. Center plait being folded without benefit of notch.

i. Garments on the floor; being walked on.

j. Skipped stitches and open seams being passed by supervisor.

k. Right fly lining being stitched from underneath side leaving crooked seam on outside.

l. Too many thread ends left on garments.

m. Etc.

As the company enters into the making of new garments of better construction and much higher priced fabrics; as they work to increase exports; and as the local market demands better quality, it becomes imperative that the above and other quality problems be dealt with effectively. The first step in this will be to change the mood and attitude of supervision, quality control personnel and operators to accept the fact that quality must improve and that within one building there can be only one level of workmanship quality. Once this is accomplished, an effective system to control and correct quality — as well as police — can be installed.

EXHIBIT XVI

GARMENT QUALITY

	Percent Seconds
SECOND QUALITY	
All Products	
– 1974 (Full Year)	1.6%
– 1974 (December Only)	.2%
– 1975 (Full Year)	.6%
– 1975 (December Only)	1.0%

Major Product	Production	Rejects No.	Rejects %	2nd Quality No.	2nd Quality %
REPAIRS AND SECOND QUALITY(1)					
Pajamas	74,297	4,139	5.6%	1,081	1.5%
Shirts	109,233	10,405	9.5%	9,482	8.6%
Suits	50,635	3,972	7.8%	1,150	2.3%

(1) Two-week period.

3. Productivity

Meaningful productivity records were difficult to obtain because of the manufacturing system and type records maintained. Actually, the records that are kept are fine, but there is a lack of emphasis on items such as standard dollars earned, makeup pay and other excesses, cost per unit produced, piecework efficiency and earnings, average hourly pay, etc. To briefly discuss the manufacturing system:

a. *Piece Goods*

As a general rule, cutting orders of substantial quantities are available; and piece goods for each floor are ordered one to two days in advance. There is sufficient space in the cutting departments for these quantities.

b. *Cutting*

Generally, there are ample production orders in the departments since most goods are cut to order. Each factory or floor has its own cutting department, including a full complement of equipment, operating personnel and supervision. While some goods come on rolls, most cloth is flat folded and generally spread face to face by hand by two people. There are a few pieces of spreading equipment in the factory; but, because of their condition, none were observed in operation.

Following spreading of the cloth, markers are laid out and dusted. Generally, the dust marks are then filled in by hand marking, and individual garment components are cut out using a straight knife. Many parts are then removed to another table where templates are placed on them, and the parts are then cut with a band knife. Individual plies of most parts are then hand numbered for cloth shading reasons.

In reviewing this procedure from a reorganization and updating point of view, the method of spreading should be changed so that one-man laying-up equipment is utilized; duplicated markers with solid lines should be considered for most products; and straight knife cutting (versus band cutting) should be used for all but the most critical parts — critical from a size or fit standpoint.

The amount of cut goods waiting for sewing ranges from 0 — 7 days with the norm about 3 days.

c. *Sewing/Finishing*

Some sewing lines or units are complete within themselves, but most floors have separate parts or preparation sections feeding the individual lines which in turn have varying numbers of operators dependent on the product being made. Finishing — bartacking, buttonhole, button sew, pressing and folding — is generally not considered to be a part of the line.

Line quotas have been established using time studied values; and, as is the inherent weakness in a line system, quotas must be based on the job requiring the most time. *Actual* production will also be dependent on this slow job or, in some cases, on the slowest operator in the line.

There are some advantages to this type system — the major ones being quick throughput time, a low amount of work in process and ease of supervision. The present system has some other major disadvantages, for example:

- Lines by their very nature preclude much that can be done to increase productivity through individual workplace "engineering" and through the use of individual incentives.

- Lines make it easy to hide or forget improvements that can be made. For instance on one style pajama, the present line production is set at 46 pajamas per hour based on the longest operational cycle time of .88 minute. The next longest cycle time is .72 minute. Should another machine be added to the first job making it in effect .44 + .44 minute, the line quota could then be calculated on the .72 minute. Using the Mehalla formula for allowances, this would change the quota to 58 pajamas per hour — an increase in volume of 26% and a sizable productivity gain even with the additional operator.

- Absenteeism unduly affects line quotas as the system has a built-in quota reduction factor. For example, a line with ten operators and three assistants has a quota of 480 units per day.

> If an assistant is out, the quota is automatically lowered by 1/13th to 443 units; and an operator's absence causes the quota to be reduced by 1/10th to 432 units. While there will always be absentees, there are ways to balance up rather than down.

Operators do work on incentive — group incentives for the lines and individual incentives for preparation. The assistants, supervisors, cutting personnel and other indirect labor have their pay tied to this incentive. Most operators appeared to be skilled, with good speed and good finger and hand dexterity; but the present incentive system imposes a ceiling of 125% on production and earnings. The reasons given for this ceiling are that it helps prevent cheating (over-reporting the amount of work produced) and to help control quality. It may help the former, but ceilings often have little or no effect on quality. Unless quality is controlled with a certain discipline by supervision, an operator may simply hurry through her work, reach the 125% level and then spend the remainder of her time visiting with other employees. This does happen to some degree at Mehalla, and the extent of it can be judged on any day by going into the factory about 30 minutes to one hour before quitting time.

Obviously any system can be abused, but we believe there is a better production and incentive system for this type operation, and this will be discussed more fully when considering the new factory and updated equipment.

As a result of equipment problems discussed earlier, piece goods availability problems, overstaffing and the above problems, the productivity level is low. The best measure of this was found in comparing projections for the new factory if (1) it was set up using the line system and current procedures or if (2) it were set up as a modern progressive bundle system with engineered workplaces and methods and with the proper procedures and controls. In this comparison the potential productivity increase ranged from 34% to 79% and averaged 53%.

K. PROPOSED INVESTMENT

It has been shown that there are many valid reasons for equipment replacement and modernization including:

- 35% of the machines are 20 or more years old.

- In the last five years, the number of machines has increased by 10% yet maintenance personnel have increased by 60%.

- Machine speeds are slow throughout the plant.

- There are very few labor saving devices on the machines.

- The correct type machine — from both a productivity and quality viewpoint — is not available for many jobs in the factory.

- At the very least, 32% of the machines would not be used in a reasonably modern factory.

- Additional downtime loss of only 2.4 minutes per day per machine or the annual loss of seven to eight machines would result in the loss of about 1.5 million units during the next ten years.

Although current labor costs average only 12% — 15% of the total garment costs, apparel manufacturing is considered a labor intense and skill oriented industry as opposed to being machine oriented. Labor costs will undoubtedly become more important at the Misr Spinning and Weaving Company as wage rates increase. On the other hand, it is unlikely that machine running times will increase over the 15% — 20% presently experienced on the company's products.

It therefore bears repeating that machines alone may do very little or nothing to improve overall productivity, costs or quality. These benefits are to be gained when the introduction of new equipment is accompanied by improvements in the production system, work handling techniques, operator training, proper incentives and sound operating procedures and controls. With this as a contingent factor, recommendations can be made concerning the investment.

As Phase I the new factory should be established, and this should be as modern and productive as possible. By so doing, it will be the training ground for management, industrial engineers and supervisors and will serve as a model or showplace for other operators in the plant.

The complete equipment requirements and costs for this factory are shown in Exhibit XVII and are summarized as follows:

435 Sewing and Finishing Machines	$ 924,304
Spare Parts (10%)	92,430
Export Crating	21,750
	$1,038,484
Required Auxiliary Equipment	$ 194,712
Spare Parts	8,791
Export Crating	5,000
	$ 208,503
Total	$1,246,987

While specific needs will change due to changing style requirements, most of the listed equipment is versatile and should not become obsolete in the near term.

The required investment for Phase II (replacement equipment) is more difficult to calculate for these reasons:

- Some modern equipment with labor saving devices costs about twice as much as plain machines, yet we do not know how well they can be maintained by Misr Spinning and Weaving Company personnel. This, of course, can be judged in Phase I.

- At this juncture, the exact operations for which the machines are scheduled cannot be determined.

- Therefore, it is impossible to calculate an expected return on investment to determine if a particular machine is justified.

In their initial proposal, however, management requested 430 replacement machines; and from our direct observation we concluded that the equivalent of at least 468 machines should be replaced. Since this was somewhat subjective, we believe the purchase of 430 machines plus auxiliary equipment for reorganization is justified.

The investment for this is estimated to be:

430 Sewing and Finishing Machines	$ 913,750
Spare Parts (10%)	91,375
Export Crating	21,500
Required Auxiliary Equipment, Parts and Crating	205,970
Total	$1,232,595

Technical assistance costs for helping plan, set up, train the personnel and start the new factory plus helping reorganize the existing factories are estimated to be $468,000 — $780,000 or $624,000 at midpoint. This is an integral part of both Phase I and II and is expected to be required over approximately a five-year period. Details of this technical assistance are outlined in a following section.

In total, then, the proposed investment for garment or confection manufacturing is:

New Factory	$1,246,987
Existing Factories	1,232,595
Technical Assistance	624,000 (Midpoint)
Total	$3,103,582

EXHIBIT XVII

SUGGESTED EQUIPMENT FOR NEW FACTORY

	Number Required	Price Each	Total Price
SEWING/FINISHING MACHINES			
Single Needle Lockstitch			
– With Chain Cutting Feet	6	$ 1,049	$ 6,294
– With Edge Trim Knife	2	1,165	2,330
– With Undertrimmer	172	1,657	285,004
– Special for Hem Pants Bottoms	5	2,513	12,565
Two-Needle Lockstitch			
– With Undertrimmer and Reverse Feed	17	2,974	50,558
Single Needle Chain Stitch			
– Plain Machine	3	1,639	4,917
– Plain with Pedestal	4	1,560	6,240
– With Special Curtain Folder	1	1,699	1,699
– With Undertrimmer	7	2,099	14,693
Two-Needle Chain Stitch			
– For Zipper to Fly	1	1,820	1,820
– For Belt Loops, with Cutters	1	3,900	3,900
– For Hemming	2	1,820	3,640
Four-Needle Chain Stitch			
– For Banding	3	2,697	8,091
Blindstitch			
– For Loops w/Cutter and Folder	1	2,740	2,740
– With Needle Positioner and Trimmer (Hemming)	2	1,990	3,980
– For Curtain Band	2	1,656	3,312
Tackers			
– Loops and Pockets w/Air Lift and Air Start	35	1,945	68,075
– For Tickets	2	1,765	3,530
– For Darts	3	2,505	7,515
– For Leather Label	1	2,605	2,605
– "U" Tack	1	2,505	2,505
– Reece S-2	1	2,745	2,745

EXHIBIT XVII (CONTINUED)

	Number Required	Price Each	Total Price
Overedgers			
– Pedestal, with Cutter	18	1,630	29,340
– Pedestal, with Cutter and Special Foot	5	1,662	8,310
– Overedge with Safety Stitch	32	1,811	57,952
Felling			
– Flatbed	1	1,820	1,820
– Feed-Off-the-Arm	13	2,439	31,707
Button Sew			
– X Tack Lockstitch with Button Robot	12	2,900	34,800
Buttonhole			
– Reece 101 or Singer 271K	17	3,740	63,580
Special Machines			
– U.S. 2800E-362 (Left Fly)	1	5,680	5,680
– Pocket Welt, with Loader	2	10,000	20,000
– Conveyor Fuse Press	2	12,175	24,350
– Pocket Creaser	5	4,500	22,500
– Trimmasters, Stationary	16	1,050	16,800
– Collar Turn, Trim and Press	3	3,068	9,204
- Fold and Press	5	840	4,200
Presses			
– Seam Presses	5	1,750	8,750
– 19" Mushroom Buck	1	2,450	2,450
– Toppers	6	2,725	16,350
– Utility	8	3,050	24,400
– Leggers	7	3,679	25,753
– Collar and Shoulder	4	4,400	17,600
Subtotal	435		$ 924,304
10% Spare Parts			92,430
Export Crating	435	50	21,750
Subtotal			$1,038,484

EXHIBIT XVII (CONTINUED)

OTHER EQUIPMENT	Total Price
Cutting Tables – 6 at 120′ x 6′ at $2.93/Sq. Ft.	$ 12,657
Cutting Table Track – 720 Lin. Ft. at $2.65/Ft.	1,908
Cutting Knives – 12 at $675 Each	8,100*
Drills – 6 at $400 Each	2,400
Spreading Machines – 6 at $7,240 + $160 Crating	44,400*
End Catchers – 6 at $1,270 Each	7,620
50 HP Compressor – 2 at $8,900 Each	17,800*
250 CFM Dryer – 2 at $2,405 Each	4,810*
40 HP Lamson THD Model Vacuum – 2 at $6,400 Each	12,800*
Cutting Room Feed Rail – 720 Lin. Ft. at $6.50/Ft.	4,680
Feed Rail Plugs – 12 at $10 Each	120
Flexipower – 3,820 Lin. Ft. at $5.60/Ft.	21,392
Flexipower Plugs – 435 at $20 Each	8,700
Band Slitter and Winder (One)	4,020
Chairs – 460 at $20 Each	9,200
Job Clocks – 6 at $250 Each	1,500
Master Time Clock (One)	500
Work Aids (Bundle Trucks, Clamps, Etc.) – 435 at $50 Each	21,750
Water Fountains – 2 at $350 Each	700
"Z" Nesting Trucks – 50 at $60 Each	3,000
Hand Notchers – 6 at $37 Each	222
Marker Duplicator (One)	4,195
Buttonhole Marker (One)	765
Long Arm Staplers – 6 at $37.50 Each	225
Bates Type Numbering Machines – 12 at $60 Each	720
Cleaning Guns – 2 at $70 Each	140
Skids and Lift Jacks – 2 at $150 Each	300
Tachometer (One)	88
Subtotal	$ 194,712
*10% Spare Parts	8,791
Estimated Export Crating	5,000
Subtotal	$ 208,503
Total	$1,246,987

L. ANTICIPATED RESULTS

1. Cost Reduction

In analyzing and estimating labor costs for garments to be made in the new factory, the labor costs were compared to those estimated by management (as shown earlier). This comparison is presented in Exhibit XVIII, and it will be seen that savings estimates range from 25% to 44% for the new garments. Using the 25% as a minimum potential through the introduction of equipment and reorganization, there is a potential reduction of $.295 per unit (weighted) for the new garments and $.128 per unit based on eight existing garments.

In Exhibit XIX these cost reductions are extended to show potential savings of over $3 million in six years. This projection is based on taking two years to get the new factory up to expected volume and a gradual coverage of existing products over the following four years. For the existing factories, the projection is based on current volume.

It should also be noted that some portion of these savings would have to be passed on to the operators in the form of increased earnings.

EXHIBIT XVIII

ESTIMATED COST REDUCTION

	Labor Costs			
	Mehalla Estimate	Estimated in Modern Factory	Potential Reduction	Percent Reduction
NEW FACTORY				
Workers' Suits	$ .687	$.513	$.174	25%
Denim Jeans	.418	.287	.131	31%
Denim Tops	.810	.520	.290	36%
Leisure Pants	1.251	.695	.556	44%
Leisure Tops	.741	.531	.210	28%
3 Suits (Weighted)	$1.180	$.885	$.295	25%
EXISTING FACTORIES				
Average of 8 Garments	$ .513	$.385	$.128	25%

EXHIBIT XIX

ESTIMATED SAVINGS POTENTIAL

	New Factory			Existing Factories (Present Volume)			
Year	Estimated Volume	Estimated Savings at $.295 per Unit	Estimated Cumulative Savings	Estimated Volume Affected	Estimated Savings at $.128 per Unit	Estimated Cumulative Savings	Estimated Cumulative Savings All Factories
1	375,000	$110,625	$ 110,625	–	–	–	$ 110,625
2	750,000	221,250	331,875	–	–	–	331,875
3	750,000	221,250	553,125	1,630,551	$208,710	$ 208,710	761,835
4	750,000	221,250	774,375	3,261,102	417,421	626,131	1,400,506
5	750,000	221,250	995,625	4,891,653	626,131	1,252,262	2,247,887
6	750,000	221,250	1,216,875	6,522,206	834,842	2,087,104	3,303,979

2. Productivity Increase

Since the potential savings estimates shown in the foregoing range from 25% to 44%, the estimates of potential productivity increases must also be in a range — in this case from 34% to 79% and averaging 53%. In order to be conservative, however, and because there may be unforeseen difficulties in achieving this, it can safely be assumed that a productivity increase on the order of 30% to 35% can be achieved throughout the plant.

3. Production Increase

The new factory will be able to produce the 750,000 garments previously discussed. The only question is, "How long will it take to reach and maintain this level?" The answer depends on the technical assistance provided and the amount of time required to call in, build and train the operating work force to a desired level of efficiency. We have estimated this will require two years.

Once accomplished and based only on the 1974 — 1975 profits of $.52 per unit, this factory should make an annual profit contribution of at least $390,000. We stress "only" and "at least" because the $.52 is before taking the potential savings into consideration.

If sales can support increased volume that would be provided by the potential productivity increase, we have seen (Exhibit VIII) that an additional 9,016,867 units could be produced during the next ten years.

At the $.52 average unit profit experienced during the last year and a half, this would result in a total contribution to profit of $4,688,770 during the ten years. Wage and other cost increases not offset by price increases would have to be deducted; but, when coupled with the savings potential, a sizable amount should remain.

4. Other Benefits

To keep the potential for cost reduction, savings, productivity increases, volume gains and additional profits in perspective, it should be remembered that without the project there will be a loss of production. As discussed earlier, this loss was conservatively estimated to be 1,448,103 units during the next ten years. Again using only the $.52 per unit and without accounting for decreased overhead absorption, the loss of profits on this many units would be $753,013.

This loss compares, once the project is completed, to additional *annual* profits of at least $1,224,842 — $390,000 from the new factory plus $834,842 from the existing factories with no additional production.

Aside from the above benefits which should accrue to the company, the envisioned project will also provide:

— Better earnings for the employees.

— Better quality.

— Better competitive position in the export market in terms of costs and quality.

M. TECHNICAL ASSISTANCE — NEW FACTORY AND REORGANIZATION

We believe the foregoing shows that, while the proposed investment is feasible, an investment in equipment alone would be difficult to justify. The new factory should be set up in the best manner known, and the existing factories should then be reorganized or converted to emulate this model. The basic objective should be a reduction in the total unit labor cost by improving productivity while increasing operator take-home pay and quality of the finished product.

These goals can be achieved, but a good deal of technical assistance will be required before the following changes and improvements are accomplished.

At the heart of the reorganization is a change from the present line system to what is called a mobile bundle unit (MBU). Essentially, a MBU is a production system based on a bundle as the unit of work and operations are divided for maximum efficiency. The job content of each operation is set for this efficiency without regard for the balancing required in a straight line. Work tables are designed for each operation, and specific handling methods are determined. Thus, each operator's earnings are dependent only on her own skill and the effort she puts forth.

Bundle storage is provided for on small (2' x 2') bundle trucks with casters, and these trucks serve as the pickup and disposal rack for each garment. On many front and back pants panels, the trucks are equipped with clamps to further facilitate the handling. Each machine is powered by an individual motor, and each work table is located to permit minimum travel time to get and dispose bundles. The main advantages of this system are:

1. The unit production is no longer limited to the slowest operation.

2. The rigidity of the line system is eliminated, making possible maximum utilization of motion economy principles through table designing.

3. Work in process can be accumulated between each operation, permitting greater production flexibility.

4. Each operator can work as rapidly as he is able to without dependence on his co-workers.

5. It is possible to balance part-time jobs by transferring operators during the day.

6. It is possible to counteract the effect of absenteeism and turnover by transferring operators and by overtime to a greater extent than is possible in the straight-line system.

7. It is easier to expand or contract the unit size for changes in demand or in styles.

8. It allows individual incentives which are superior to group incentives.

The main disadvantages are:

1. It requires better supervision — better judgment and application of time.

2. Bundle handling is necessary.

3. It requires more work in process.

4. It requires a longer production cycle than a straight-line system.

For those garments planned and now made, we believe the advantages far outweigh the disadvantages.

As the first step in the proposed conversion, an action plan should be developed, probably as a part of a detailed factory planning report. This action plan should be a joint effort between management and the technicians; it should assign responsibilities and priorities; and it should include a timetable for completion of the various steps.

Although by no means complete and not necessarily in order, such a plan might include the following:

1. Develop complete action plan.

2. Start detailed factory planning report:

   a. New factory —
      - Garment specifications.
      - Machinery specifications.
      - Layout.
      - Cost, volume and efficiency projections.

   b. Existing factories.

3. Select management and engineers for foreign training and plant visits.

4. Trial patterns and samples.

5. Visit foreign factories and equipment suppliers.

6. Schedule new equipment trials.

7. Correct and finalize patterns; run final sample cuts.

8. Complete equipment trials and evaluation. Specify, order and schedule equipment delivery and setup dates.

9. Complete planning report.

10. Complete layout plans for new and existing factories.

11. Complete building construction.

12. Relocate existing factories.

13. Explanations to employees — short-range actions and long-term plans.

14. Review personnel procedures and finalize changes.

15. Design payroll system; initial training of management and clerks.

16. Select people for initial training.

17. Start supervisory training.

18. Begin training center.

19. X% of equipment and operators in new factory.

20. 100% of equipment and operators.

21. Review and update planning report and action plan for existing factories.

22. Specify, order, etc. equipment for existing factories.

23. New factory to X% efficiency.

24. Start conversion of first existing factory.

25. Etc.

Although the above is important, the greatest value from technical assistance will come during the plant start-up and comprehensive cost reduction and quality improvement program. Some of the major elements of this include:

1. Organize or reorganize the factories into desirable units; consider combining the cutting rooms, parts sections, etc. Prepare layouts of these.

2. Specification of machinery, attachments and storage facilities if not accomplished in the planning report. Follow up on deliveries, setups and carpentry work.

3. Design and have printed bundle production tickets. These should be serially numbered to help prevent cheating and should provide spaces for each operator's clock number or initials to assist in quality control efforts.

4. Complete design or revision of payroll system and train clerks. System to provide:

    a. Gummed sheets for attendance, production and off-standard times as well as space for production tickets.

    b. Simple yet effective and timely cost, production, efficiency and operating reports for management's use.

5. Revise materials handling and cutting procedures to support new system and layout.

6. Design improved workplaces to reduce handling times.

7. Introduce selected equipment, attachments and work aids such as thread trimmers and stackers meant to reduce labor content, job complexity and training times. Make certain these provide more consistent quality.

8. Standardize the method of handling at each operation and establish training curves for the jobs.

9. Train operators to use the new equipment, attachments and methods and motivate them to perform well.

10. Implement scientific training program. As discussed elsewhere, this is a formalized training approach designed to effectively fill vacancies, to upgrade capabilities, to retrain existing employees to improve their productivity and quality, and to assure that new operators are properly trained in the shortest possible time. This type training is especially useful on the more difficult jobs having longer learning times, and these should probably be started early in the project.

11. Continuously try to simplify the make of the garment where this can be done without lowering the intrinsic value or appearance of the finished product.

12. Work measurement to develop standards for all operations and to equalize earnings opportunities. Individual incentives should be used throughout the factories, hopefully without a ceiling or maximum. Additionally, the quotas should be established using proper allowances for the job and machine — not just one allowance figure across the board.

13. Rate or quota installation and follow-up to prove the standards for each operation as installed. Of all the elements, this is the most time consuming; it is also the most important and is the key to success.

14. Design and install quality control procedures and train personnel.

15. Select and train utility operators and install utility and transfer incentive plans.

16. Since the operation is currently overstaffed, continuously work toward restructuring the organization to reduce indirect labor.

17. Formal training and development of management, staff engineers and supervision both in the factory and in classroom sessions. This is the second key to success, and topics should cover both the technical and human relations aspects of their jobs. A short list of some of the items that should be covered includes:

    a. Cost Controls:

        — Payroll procedures.
        — Cost reports.

    b. Quality Control

        — General considerations.
        — Specific in-plant procedures.
        — Quality specifications.

    c. Engineering Techniques

        — Capacity studies.
        — Follow-up.
        — Methods improvement.
        — Quotas and piece rates.
        — Slide rule use.
        — Sewing equipment.
        — Incentive plans.

    d. Production Flow

        — Balancing.
        — Production systems.
        — Work in process.

    e. Personnel

        — Operator orientation.
        — Operator training.
        — Turnover and absenteeism.
        — Handling grievances.
        — Company policy.
        — Safety.
        — Maintaining morale.

18. Manualization of all procedures, operation bulletins, quality specifications, methods, time values and rates, workplace sketches, etc.

With these things in place and operating as they should, we are confident that the garment plant will continue to maintain or improve its vital position in the company.

EXHIBIT XX

SUMMARY OF INVESTMENT PLAN – APPAREL

NEW APPAREL UNIT PLUS EQUIPMENT REPLACEMENT

Description	Estimated Cost in US$ Foreign Exchange in US$	Local Currency in US$	Total US$
New Sewing Factory Plus Equipment Replacement (CIF Value)			
[$913,750 + $21,500 x 1.10 (Freight)]	$1,028,775		
[$924,304 + $21,750 x 1.10 (Freight)]	1,040,659		
	$2,069,434		$2,069,434
Auxiliary Equipment plus Accessories	405,682		405,682
Spare Parts	192,596		192,596
Erection	18,814		18,814
Technical Assistance	624,000		624,000
Clearing, Local Transport Plus Local Installation	–	$351,942	351,942
Total	$3,310,526	$351,942	$3,662,468

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SECTION VIII

POWER PLANT

SECTION VIII: POWER PLANT

The Mehalla complex includes a power generating plant which theoretically at least is capable of supplying all the power needs for the entire complex. Power from the grid (public supply) is also available through an inter-connection including switch-gear and a transformer substation 63,000/6,300 volts of 25 MVA capacity.

A. PRESENT EQUIPMENT AND CAPACITY

The power plant was erected in two stages and was started in 1948. Initially installed capacity was 20,000 KW, delivered by two turbogenerators of 10,000 KW each, built by Metropolitan Vickers. Two standby units of 2.5 Megawatts each completed the initial generating section. In 1948 three oil-fired boilers, John Tompson, were erected followed in 1956 by a fourth one, oil-fired, John Tompson also, but convertible to coal. Each one of these four boilers, part of the initial stage, has a rated capacity of 45 tons per hour. The initial power plant was built on a 3,000-square meter area, not including smoke stacks and cooling towers. Another 2,400 square meters were added for the second stage in 1959 to install two Skoda turbogenerators of 12,000 KW each, raising the total generating capacity to 44,000 KW. The second stage included two boilers BRNO, both oil-fired and each one of 110 tons per hour capacity. The connection to the grid was completed in 1965. Two diesel generators of 650 KW each are also installed as standby units.

In summary, the total installed operating capacity equals 44,000 KW and 400 tons of steam per hour broken down as follows:

No. Units Installed	Make	Capacity/ Unit	Total Capacity
Power			
2	Vickers	10,000 KW	20,000 KW
2	Skoda	12,000 KW	24,000 KW
	Total Operating Capacity		44,000 KW
	Standby Capacity		
	— Steam		5,000 KW
	— Diesel		1,300 KW
Steam			
4	John Tompson	45 Tons/Hr.	180 Tons/Hr.
2	BRNO	110 Tons/Hr.	220 Tons/Hr.
	Total Rated Capacity		400 Tons/Hr.

The turbines operate at a pressure of 36 kilograms per square centimeter (512 pounds per square inch) and the super-heated steam enters the turbines at a temperature of 426°C (800°F). Each turbine consists of a high pressure stage, a speed wheel, a medium and a low pressure stage. The first extraction after the high pressure stage, at 9.0 kilograms per square centimeter (128 pounds per square inch and 260°C — 500°F), is discharged into the steam distribution ring and is used as processing steam in different parts of the complex, mainly in the finishing plants.

At the time of our visit, one of the two BRNO boilers was inoperative and under repair for leaks. The other BRNO boiler was reported to operate at less than 60% capacity because of potential mechanical problems at higher loads. One of the Vickers turbines was reported to develop mechanical problems with fixed blades, while one Skoda turbine was out of order and being repaired.

Many maintenance problems seem to have accumulated in the plant, seriously deteriorating the ability of the plant to deliver the desired capacity. The reasons for this development are not evident but we suspect that adequate maintenance has been difficult at some times in the past because of limited availability of hard currency to purchase original parts. On the other hand, it is possible that the BRNO boilers and the Skoda turbines are built with less expensive materials and therefore could be less durable.

Maintenance problems are further evidenced by the fact that four serious power failures occurred in the last two years resulting in complete black-outs for durations from 20 minutes to three hours.

The power generated by the alternators is delivered to the distribution switchboard at 3,600 volts and further delivered at that tension to the individual transformers of each production unit and in addition to one transformer of the municipality (230 and 550 volts).

B. PRESENT AND PROJECTED POWER REQUIREMENTS

The present average power consumption is estimated at 26,000 KWH per hour and peak consumption at 29,500. Since the complex includes very many individual consumption points, mostly operating in three shifts, the peak consumption is not significantly different from the average and approximately 15% higher. Under the present circumstances, the power plant does not seem to be in a position to generate enough steam to cover the peak requirements and a portion of the daily consumption is supplied by the grid.

The present power balance can be summarized as follows, for average and peak conditions:

	KWH/ Hour
AVERAGE	
Production	
— 3 Turbogenerators	25,000
Consumption	
— Power Station Internal	1,500
— Plant	24,500
Total	26,000
Production	
— Generators	25,000
— Grid	1,000
PEAK	
Consumption	
— Power Station Internal	1,500
— Plant	28,000
Total	29,500
Production	
— Generators	25,000
— Grid	4,500
Total	29,500

For the day of March 8, 1976, which was considered a typical working day, the production records indicated the following figures:

Total Power Consumed in 24 Hours	624,100(1)
Total From Grid	79,500
Total From Generators	544,600
Average Hourly Consumption	26,004

Hourly Average Supply:

Generators	22,692
Grid	3,312
Total	26,004

(1) Includes 32,000 to the municipality.

Only three generators were in operation on March 8, 1976:

Two Vickers x 10,000	20,000
One Skoda x 12,000	12,000
Total Capacity in Operation	32,000

Average Load Factor = 22,692: 32,000 = 71%

The limiting factor to produce more power seems to be the steam production. One BRNO boiler being under repair and the other one operating at limited capacity, the available quantity of steam would not exceed:

	Tons/Hour
Tompson Boilers, 4 x 45	180
BRNO, 1 x 60	60
Total	240

Assuming the average quantity of steam required for processing 60 to 75 tons per hour and 6.0 kilograms are used to generate 1 KWH, the steam balance would be typically as follows:

	Tons/Hour
Consumption Plant	75
Consumption Power Generations, 25 x 6.0	150
Total	225

These total steam requirements of 225.0 tons per hour are practically equivalent to the present capacity of 240 tons per hour. one BRNO boiler being out of order and the other one operating at limited load.

The estimated steam consumption of 6.0 kilograms per generated KWH could not be verified and seems rather high. This figure may be indicative of the present poor condition of the entire installation.

Future developments of the Mehalla plant are likely to require more power capacity. The new spinning plant (No. 7), including refrigeration, is estimated to consume 4,000 KWH per hour. The presently considered expansions in wool and garment manufacturing may account for another 1,500 KWH per hour.

In addition, when the present spinning and weaving equipment will be replaced by more modern equipment, it is reasonable to assume that labor cost will be cut dramatically, but also that power consumption will increase. In the absence of a master development plan, it is difficult to put forth any meaningful projections. However, if Mehalla's older spinning and weaving equipment is gradually replaced by more productive, less labor intensive, but more energy consuming, new equipment, it is reasonable to assume that the present consumption may increase by 50% in the next 10 to 15 years. This figure may even be exceeded in case more effective control of relative humidity and temperature is considered through refrigeration and heating of some plants in the future.

In summary, after implementation of the total project, presently under consideration, power requirements are likely to increase from an average of 26,000 KWH per hour to 31,500. The future development in the next 10 to 15 years may add an additional 12,000 to 15,000 KWH per hour to these figures.

Peak requirements seem to be approximately 15% over average. To cover peak loads and to average an economic load of the power generating facilities in the order of 70% of average requirements, the overall capacity of the power plants in 10 to 15 years ahead would have to be:

$$(31{,}500 + 15{,}000) \div .70 = 66{,}428 \text{ KW}$$

A capacity of 67,500 KW would cover all needs if the present yarn and weaving plants were completely rehabilitated and power consumption increased close to 60% over present levels. In terms of development, this would mean an extremely fast evolution and would require such a large amount of capital that it is unlikely to happen. We believe that projections for active power generating capacity between 50,000 and 60,000 KW would be realistic.

In the short term, we do not foresee the necessity of replacing any of the existing turbogenerators. However, to maintain the existing potential in fully operative condition, maintenance may have to be stepped up and as a result, significantly higher maintenance cost is to be expected in the next few years.

Remark: All boilers are presently oil-fired but plans call for future possible dual heating systems either oil or natural gas.

C. INVESTMENTS

Exhibit I summarizes a list of current investments, at cost, in the existing power plant. The figures are taken from Mehalla records.

The original investment, construction and equipment, per KW installed capacity, equals at cost:

$$13{,}119{,}988 \div 44{,}000 \quad = \quad \$298.2/\text{KW } (£\text{E } 116.3)$$

EXHIBIT I

POWER PLANT CURRENT INVESTMENTS

(AT COST)

Item No.	Description	Original Value At Cost £E	US $(1)
1.	Construction (Including Cooling Tower)	1,690,000	
2.	Water Plant	600,000	
	Substation Grid	11,000	
	Subtotal	2,301,000	5,899,764
4.	Two Vickers Turbines + Generators	668,000	
5.	Two Standby Vickers + Generators	166,000	
6.	Two Skoda Turbines + Generators	402,000	
7.	Two Sulzer Diesels + Generators	49,000	
8.	Four Tompson Boilers	673,000	
9.	Two BRNO Boilers	528,000	
10.	Water Pumping Equipment	330,000	
	Subtotal	2,816,000	7,220,224
	Total Investment at Cost	5,117,000	13,119,988

(1) £E = $2.654.

D. CURRENT COST

Based on 1975 figures, the breakdown of the present operating cost is as follows:

	£E per Year
Fuel (113,378 Tons x £E 7.5/Ton)	860,000
Labor	285,440
Maintenance	67,000
Subtotal	1,212,440
Depreciation — Building, 57,525 — Equipment, 168,960	226,485
Subtotal	1,438,925
General & Adm. (Estimated 10%)	143,893
Total Operating Cost/Year (at 2.564)	1,582,818 ($4,058,345)

1. Fuel cost to the Mehalla plant is extremely low. The current price per ton of fuel No. 2 is £E 7.5 ($19.23). On a caloric basis this would mean:

   £E.694 ($1.78) per Million Calories, or

   £E.176 ($.45) per Million B.T.U.

   For comparison the current cost of fuel No. 2 in the U.S. for industrial purposes is in the order of $2.00 per million B.T.U. or more than four times the cost to Mehalla.

2. The labor complement to operate the power plant consists of 455 operators including maintenance crews and 16 supervisors. Approximately half the workers are assigned to the water plant and the boilers.

3. According to available records, maintenance costs have evolved in the last six years as follows:

Year	Total Cost of Maintenance £E per Year	% Increase Over Previous Year
1970	12,000	
1971	15,000	25
1972	29,000	94
1973	45,000	55
1974	57,000	27
1975	66,000	16
Average	37,330	45

Maintenance cost is expected to increase dramatically in the near future. An extraordinary budget has already been earmarked for 1976 in the approximate amount of £E 136,000 including £E 76,000 for new stationary blades on one of the Vickers turbines (blades made by G.E.) and £E 50,000 for new wood structure in one of the cooling towers.

In 1975 the total production of steam was 1,522,709 tons and fuel consumption was 113,378 tons.(1) Fuel cost in 1975 at £E 7.5 per ton equals £E 850,335.

The complex used 203,868,601 KWH during 1975, broken down as follows:

	KWH
Power From Generators	190,494,601
Power From Grid	13,374,000
Total Power Available	203,863,601
Consumption Generator Auxiliaries	13,182,430
Plant Consumption.	190,686,171
Total Consumption	203,868,601

Based upon 1975 figures, the cost per KWH generated by the power station and available at the main terminals for distribution is as follows:

(1) At a caloric value of 10,800 KWH per kilogram of fuel, the actual overall efficiency of the boilers would only be 77.5%.

	Milliemes per KWH	Cents/ KWH
Fuel	3.34	.8575
Water	.17	.0436
Wages	1.35	.3454
Maintenance	.32	.0811
Depreciation	1.07	.2741
General & Adm.	.68	.1741
Total	6.93	1.7758

The cost to Mehalla of their own power is approximately 7 milliemes per KWH or less than $.018 per KWH.

If fuel cost were at U.S. prices, the cost per available KWH to Mehalla would increase with approximately 11 milliemes. It would then be 18 milliemes per KWH or $.046 per KWH.

Power supplied by the grid is available to Mehalla at a decreasing rate according to quantities consumed. In addition, an annual flat fee of £E 5.620 per contracted KW of capacity. The decreasing rate scale starts at 10.103 milliemes for the first 1,000 hours x contracted KW. The next rate is 9.503 milliemes for 500 hours followed by 8.203 milliemes for the next 1,000 hours. All consumption in excess of 5,000 hours x contracted KW is charged at 4.603 per KWH.

Mehalla has requested a revision of this rate scale and apparently has been offered a flat rate of 7 milliemes per KWH. The matter seems to be under litigation.

E. PROPOSED DEVELOPMENT PLAN

Recognizing on one hand the increase in future power and steam requirements and on the other hand the urgent need to rehabilitate the existing installation, Mehalla had originally requested additional capacity for 20,000 KW power generation and for 300 tons per hour steam production.

As indicated in subsection B. of this section, the average power consumption is likely to increase from the present 26,000 KW to 31,500 KW after completion of the present investment plans. In the next 10 to 15 years, if normal development continues, another increase in power requirements may be expected, estimated at 12,000 to 15,000 KW. As a result, the present planned addition of 20,000 KW would appear reasonable.

As for steam consumption, it is difficult to predict future growth. Under the assumption that developments in steam requirements may be parallel to those for power, some 50% more than the present consumption would be needed in 10 to 15 years in addition to the 75 to 90 tons per day after completion of the present projects.

Total estimated maximum needs may be in the order of 120 tons per hour, 10 to 15 years after the present project. Finishing equipment is becoming more sophisticated, particularly with the increasing consumption of polyester. For certain applications, where higher temperatures are required, and where accurate temperature control is more critical, steam is gradually replaced by hot oil or gas. The evolution towards these more modern concepts of finishing may dampen somewhat the future steam requirements. On the other hand increasing need for controlled atmospheric conditions in spinning may tend to increase steam consumption for heating purposes in winter.

Assuming in the future similar operating conditions as presently experienced and full capacity utilization of the new turbogenerator at 20,000 KW, the maximum steam consumption of the turbine would be 120 tons per hour. As a result, 30 tons per hour would be available, at the very least, for processing purposes. It is more likely though that the turbine will not operate constantly at its full capacity and that the efficiency will be better than in the case of the existing installation, resulting in lower steam consumption per KWH. It is therefore reasonable to assume that on the average 40 to 45 tons per hour of steam will be available from the new boiler for use in the plant, to cover anticipated increase in consumption.

It would therefore not appear justifiable to add a second 150-ton boiler at this time and we would recommend in the scope of the present project, only 150 tons additional steam generating capacity. In our opinion the addition of more capacity should depend on whether or not existing capacity has to be discarded. If the answer to that question is positive, the discarded capacity should be replaced and any new boiler should be installed in the same location as the discarded one. This would seem a logical approach, since the present steam requirements are met, for power generating and for processing with one BRNO boiler completely shut down and the other one operating at less than 60% of capacity. Before deciding to discard an existing boiler, every effort should be undertaken to assure that further repair is impossible or uneconomical.

Exhibit II summarizes the suggested equipment for the power plant expansion.

EXHIBIT II

SUGGESTED INVESTMENT – POWER PLANT EQUIPMENT

Item No.	Description	Estimated FOB Cost in US $ Per Machine	Total $
1.	Turbine + Generator 20 M Watt	3,900,000	3,900,000
2.	Turbine Control Room	200,000	200,000
3.	Condenser + Deaerator + Pumps	250,000	250,000
4.	Water Treatment Plant (Additional)	250,000	250,000
5.	Cooling Tower	180,000	180,000
6.	Boiler 150 Tons/Hour Oil Fired Including Pre-heater + Controls, 60 Kilograms per Sq. Centimeter	3,600,000(1)	3,600,000
7.	Piping, Valves and Accessories	850,000	850,000
	Subtotal	9,230,000	9,230,000
8.	Seaworthy Packing + Freight + Insurance		923,000
9.	Grand Total CIF Value $		10,153,000

(1) Gas fired would be $1,000,000 less, approximately.

The price of the boiler is based upon classical tubular water pipe boilers, oil fired. The price would be substantially less for a gas fired unit. Although conversion to gas firing is being planned by Mehalla at some time in the future, we believe that the boiler has to be equipped to be able to use oil for added security in case gas supply is not available in time or is not continuous in the future.

Prices of boilers and turbines are based on an operating pressure of 60 kilograms per square centimeter which is significantly higher than the present 36 kilograms per square centimeter working pressure. It has been recognized that modern equipment is now available at higher pressures and up to 100 to 120 kilograms per square centimeter. At these high levels of pressure, efficiencies are somewhat better than at 60 kilograms per square centimeter and much better than at 36 kilograms per square centimeter. However, maintenance becomes increasingly critical at higher pressures and based on past experience, we would emphasize (in the case of Mehalla) easy maintenance rather than the latest refinement in fuel saving.

For the same reason we based boiler prices on conventional tubular boilers rather than on the so-called compact "package" boilers. A distinct advantage of the package boilers, beside lower cost, is the easy installation. We still feel that easy maintenance should be considered as a predominant criterion.

Exhibit III summarizes the investment plan.

The total estimated investment, excluding working capital, is in excess of $17,500,000 or $880 per incremental KW capacity. This is approximately three times higher than the investment per KW of the present installation. As a result, the cost per incremental KWH will rise by 2.14 milliemes for additional depreciation, but it will be somewhat lower in fuel consumption and maintenance. Also, we do not think that additional labor is required.

On balance, the high investment required to create additional power generating capacity appears economically justified. Power supplied by the grid at presently applicable rates would not be less expensive. The existing power facilities at Mehalla, if properly maintained, are a valuable asset and provide better protection against fluctuations or disruptions in power supply.

Exhibit IV summarizes the investment evaluation and indicates requested versus recommended investment in equipment at FOB prices.

EXHIBIT III

SUMMARY OF INVESTMENT PLAN — POWER PLANT

Item No.	Description	Foreign Exchange in US $	Local Currency in US $	Total US $
			Est. Cost in US $	
1.	Equipment CIF Value	10,153,000		10,153,000
2.	Import Duty on 1. (12%)		1,218,500	1,218,500
3.	Clearing + Local Transportation + Erection	102,000	1,950,000(1)	2,052,000
4.	Auxiliary Equipment + Accessories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing + Local Transportation for 4.		Included in 3.	
7.	Spares (5%) Including Duty (12%)	508,000	61,000	569,000
8.	Electrical		Included in 3.	
9.	Airconditioning		None	
	Subtotal Equipment Installed	10,763,000	3,229,500	13,992,500
10.	Construction 3,000 Sq. Mtrs at 1,200 (Estimated)		3,600,000	3,600,000
	Total Investment (Excluding Working Capital)	10,763,000	6,829,500	17,592,500

(1) Includes $500,000 for turbine foundation.

EXHIBIT IV

SUMMARY OF INVESTMENT PLAN EVALUATION

Mill: Power Plant
Department:
A.I.D. Request Reference: Annex 13, Table 4

Item	Quantity	A.I.D. Request Value FOB £E	A.I.D. Request Value FOB US $
Turbogenerator, 20 M Watt	1	1,200,000	3,072,000
Steam Boilers	2	1,200,000	3,072,000
Spares		240,000	614,000
Total		2,640,000	6,758,000
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost – FOB US $			9,691,800

Recommend:

Install additional 20 M watt to provide additional capacity for future new spinning, weaving and possibly more airconditioning and more finishing. The new capacity would also permit updating of existing equipment. One large generator is recommended rather than two small ones because of more economical operation if at least 70% of its capacity can be used. This appears to be the case already under the present circumstances with 24 to 26 M watt average consumption.

However, two additional boilers, in our opinion, cannot be justified since one additional boiler of 150 tons would suffice, even with the BRNO boilers completely stopped, to provide all steam required for present and immediate future needs, including process steam. As a result, one 150-ton boiler would permit updating or replacing of BRNO boilers.

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SECTION IX

FOUNDRY AND WORKSHOPS

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SECTION IX: FOUNDRY AND WORKSHOPS

Mehalla has developed, in the past, an impressive central maintenance department including foundry, sheet metal, steel and wood workshops, as well as electrical repair facilities.

A. BACKGROUND AND PRESENT CONDITIONS

During past years, foreign exchange (and particularly hard currency) has been available in only limited amounts. In order to maintain the production equipment operative, Mehalla was forced, not always with the appropriate means, to manufacture a significant portion of the spares required.

Many efforts were devoted to becoming self-sufficient and in some areas relative success was attained. On balance, it appears that the spare parts manufacturing venture is not always desirable and in some cases it may add substantially to overall manufacturing costs. In Part Four, some thoughts on spare parts strategy are developed and we refer to this part of the report for further details.

At the present time, part of the tooling in the maintenance department is outdated, worn, or has become inadequate to fulfill its function and Mehalla is seeking to rehabilitate its potential to produce spare parts and to improve their quality.

Based upon recent figures, the annual output of the general maintenance department can be summarized as follows:

	Tons/Year
Cast Iron	500
Casting of Copper Base Alloys	75
Castings of Aluminium Alloys	75
Steel Profiles and Parts	360
	Sq. Mtrs./Year
Wood Consumption for Pirns	500
Other Wood for Parts	325
Other Wood for Export Cases	525

The mechanical shop produces some 1,400,000 parts per year from the local castings and from other steel bases. This represents some 90% of all metallic spares required by the entire complex. In some areas where more sophisticated machines are involved, such as Sulzer looms, no attempts have been made to produce the spare parts locally and whatever foreign currency was available has been used to cover the spare parts needs for these particular purposes.

Beside 175,000 various wooden parts per year for spinning and weaving, the wood workshop produces an average of 1,500,000 pirns per year and 17,000 cases for yarn exports. The latter may be discontinued if the use of cardboard for export packing is extended.

The central maintenance department employs 1,093 people including 64 supervisors, 712 skilled, 262 unskilled workers and 55 clerical staff.

One of the major weaknesses in the system is the quality of the castings. The parts fabricated from the local foundry appear to be much weaker than the original parts and in some cases the parts made of these local castings break as fast as they can be produced. One typical example seems to be the gears of the automatic picker doffing systems in yarn mills 1 and 2. The quality of the castings is substandard apparently for a number of reasons:

1. Poor condition of the cupolas and absence of controls.

2. Inadequacy of the sand preparation unit.

3. Difficulties in obtaining the right types of pig iron, coke and sand.

In addition, there are no facilities available to convert greige cast iron into malleable cast iron.

Another fundamental weakness is the lack of adequate equipment for hardening and annealing. Additional strength, or desired wear characteristics, cannot be obtained for some steel parts without these processes.

Forging equipment is very old and appears limited in performance potential.

Appropriate tooling to calibrate measuring instruments seems to be lacking also.

B. REQUESTED INVESTMENT

As listed in Annex 13, Table 5 of the original request, Mehalla has proposed the following plan to rehabilitate the central maintenance department:

1. Replace foundry equipment and add capacity to convert greige cast iron into malleable cast iron.

2. Add heat treatment equipment.

3. Review equipment of wood workshop and add machinery to manufacture shuttles.

4. Install a laboratory for calibrating measuring instruments.

The FOB value of the equipment included in this original request was estimated by Mehalla at $880,000.

In discussions with management during our investigation, additional requests were submitted for replacement of machine tools and existing forging equipment.

C. PROPOSED STRATEGY

As discussed in Part Four and in other parts of this report, we do not believe that Mehalla should attempt to be completely self-sufficient in the manufacturing of parts. The primary objective of the company is supposed to be the production of textile products at the lowest cost and of the highest possible quality.

On the average, Mehalla consumes some 30,000 shuttles per year on less than 5,000 looms. This means shuttle consumption is in excess of six units per year and per loom, or shuttle life is two months approximately. Most of these shuttles are locally made in an allegedly specialized shop near Cairo and cost in the order of $10 per unit.

The quality of the shuttles used in any weave room is a critical parameter and has significant bearing on loom efficiency and fabric quality. From our brief observations, the shuttles used at Mehalla are the less expensive, low quality type which is generally acceptable for low speed looms but would be unsatisfactory for today's modern loom speeds. A high quality shuttle in the United States would cost $16 to $20, or twice the price paid by Mehalla; however, its lifetime under Mehalla's operating conditions is expected to be two to three times longer and its performance with regard to loom efficiency and fabric quality would at least be equivalent or better. If Mehalla wanted to manufacture shuttles, it is doubtful they would be able to guarantee the same excellence in quality. Moreover, the wood would have to be imported as well as most of the accessories. In addition, many of the refinements which make a $20 shuttle better than a $10 one are patented and known only to the specialized manufacturers.

The successful producers of shuttles practically all have a research team and they are able to constantly improve the quality of their product or to adapt it to new developments in machine design. Mehalla would not be in a position to duplicate these conditions and if they were, it would take years to acquire a comparable level of experience.

The same is true for pirns, of which the Mehalla complex uses 1,500,000 per year, mostly made in Mehalla's wood shop. The wood and the rings have to be imported which substantially reduces the savings in foreign exchange and the benefits of fabricating pirns themselves. Reported average cost per pirn is £E .12 or $.31 per unit. The average cost of a high quality pirn in the United States would be in the order of $.50, but its lifetime would probably be more than twice that of the pirns manufactured at Mehalla.

Both previous examples illustrate some of the common fallacies with regard to manufacturing of spare parts. Generally, the more sophisticated or the more precise a given part, the more difficult it is to duplicate and the more expensive and less effective local replicas become.

Considering the size and the vulnerability of the Mehalla operation and based on past history, it would seem logical and highly desirable to maintain a certain degree of self-reliance with regard to spare parts. Under the circumstances and considering the practicalities, we would recommend the following strategy relative to manufacturing of parts:

1. Spare parts should be acquired, whenever possible, from the original suppliers to the extent that foreign currency is available.

2. Government instances should be alerted if necessary, when spare parts shortages threaten to occur and should be made aware of the detrimental consequences in case no original parts can be secured timely. Budgets for foreign exchange requirements should be submitted to the proper authorities as early as possible.

3. Parts which are complicated or whose quality and tolerances have a significant bearing on machine performance or product quality, should not be included in local spare parts manufacturing programs.

4. Mehalla should be self-reliant and equipped to adequately produce simple and current parts and accessories, based on quality castings and machining, including forging and heat treatments, when required or applicable.

D. PROPOSED INVESTMENT AND EXPECTED RESULTS

Based upon the strategy outlined in previous paragraphs, we would recommend the following investments be considered:

1. New cupola furnace of slightly higher capacity, completely equipped.
2. Induction furnace for conversion of greige cast iron to malleable cast iron.
3. Adequate equipment for heat treatment.
4. Replacement of the existing forging equipment.
5. Measuring and calibration equipment.

On the other hand, we would recommend against acquisition of any equipment to promote pirn and shuttle manufacturing or to expand the present machining facilities.

However, we would suggest maintenance of an appropriate capacity of machining facilities. The latter could be financed by regular budgets based on normal depreciation schedules and we would not recommend that these be included in the present project.

Exhibit I describes the suggested investment and cost. We included only one cupola furnace but of increased capacity and with complete controls, rather than two smaller units. For annual requirements in the order of 500 to 1,000 tons, a single unit, capable of producing over 100 tons a day should be amply sufficient.

The price of the furnace for conversion of greige to malleable cast iron includes automatic handling and complete atmospheric control, which should permit maximum quality.

Exhibit II summarizes the suggested investment plan and Exhibit III recaps the investment evaluation comparing FOB values of requested and recommended equipment as well as a brief summary of the justifications on which our recommendations are based. The total investment, excluding working capital, is estimated at $1,047,800 of which $878,000 is foreign exchange.

EXHIBIT I

SUGGESTED INVESTMENT – FOUNDRY AND SHOPS

Item No.	Description	Estimated FOB Cost in US $ Per Unit	Total $
Foundry			
1.	Cupola Furnace 5.5 – 7.0 Tons/Hr.	28,000	28,000
2.	Charger for 1. Complete	32,000	32,000
3.	Blower for 1.	8,000	8,000
4.	Accessories + Instrumentation for 1.	18,000	18,000
5.	Sand Preparation Station With Controls	50,000	50,000
6.	Shot Blast Cleaning Chamber Complete	22,000	22,000
7.	Induction Furnace for Malleable Steel(1)	58,000	58,000
8.	Analysis Lab Equipment + Testing Equipment	18,000	18,000
Heat Treatment			
9.	Box Furnace, Electrical, for Annealing	35,000	35,000
10.	Electric Furnace for High-Speed Hardening	55,000	55,000
11.	Electric Furnace for Case Hardening(2)	169,000	169,000
12.	Controls + Accessories	32,000	32,000
Forging			
12.	Drop Hammer Mechanical	12,000	12,000
13.	Pneumatic Hammer	36,000	36,000
14.	Drop Forging Hammer + Furnace	17,500	17,500
15.	Hot Circular Saw	4,500	4,500
16.	Controls + Accessories	4,000	4,000
Measuring			
17.	Calibration Lab for Instruments	68,000	68,000
18.	Various Instruments	22,000	22,000
	Subtotal		689,000
19.	Seaworthy Packing + Freight + Insurance		104,000
20.	Grand Total CIF Value		793,000

(1) Including controlled cooling.

(2) Elevator type, including protective gas generator.

EXHIBIT II

SUMMARY OF INVESTMENT PLAN – FOUNDRY AND SHOPS

Item No.	Description	Est. Cost in US $ Foreign Exchange in US $	Local Currency in US $	Total US $
1.	Equipment + Accessories CIF Value	793,000		793,000
2.	Import Duty on 1. (12%)		96,000	96,000
3.	Clearing + Local Transportation + Erection	45,000	64,000	109,000
4.	Auxiliary Equipment + Accessories		Included in 1.	
5.	Import Duty on 4.		Included in 2.	
6.	Clearing + Local Transportation for 4.		Included in 3.	
7.	Spares (5%) Including Duty (12%)	40,000	4,800	44,800
8.	Electrical (Connection Only)		5,000	5,000
9.	Airconditioning		None	
	Subtotal Equipment Installed	878,000	169,800	1,047,800
10.	Construction		None(1)	
	Total Investment (Excluding Working Capital)	878,000	169,800	1,047,800

(1) Machinery foundations included in item 3.

EXHIBIT III

SUMMARY OF INVESTMENT PLAN EVALUATION

Mill: Foundry and Shops
Department: Maintenance
A.I.D. Request Reference: Annex 13, Table 5

Item	Quantity	A.I.D. Request Value FOB £E	A.I.D. Request Value FOB US $
Equipment for Foundry Heat Treatment and Carpentry		343,000	880,000
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost – US $ FOB			725,000

Recommended:

We would recommend the use of original spare parts to the maximum extent possible. However, based on past history and considering the size of the Mehalla operation, we recognize the necessity of self-reliance to some degree. We therefore suggest replacing the cupolas, sand preparation station and forging shop on the basis of inadequacy to produce quality parts at present. For the same quality reasons, we also suggest adding equipment for hardening, annealing, and transformation of greige cast iron to malleable cast iron as well as calibration, and measuring instruments. On the other hand, we do not recommend investing in pirn or shuttle manufacturing on the basis of higher cost of these accessories when produced locally and lower quality than similar items acquired from specialized manufacturers.

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SECTION X

MATERIALS HANDLING

SECTION X: MATERIALS HANDLING

A. GENERAL BACKGROUND

The size and complexity of the Misr Spinning and Weaving Company requires that yarn and cloth be moved among various facilities continuously. Particularly in the cotton operations where six spinning mills feed 13 weaving locations is the magnitude and complexity of the materials handling requirements a major area of cost and source of potential scheduling disruptions and product damage and soilage.

Currently, most of the yarn movement is performed manually — individuals pushing and pulling yarn trucks among the various locations, often outside. About 1,500 persons are engaged in the movement of goods within the complex, with a total annual payroll in excess of £E 400,000. About one-half of these are engaged in the movement of cotton yarn.

Currently, an analysis of the overall materials handling probiem at Misr Spinning and Weaving Company is being performed by company management; this function having been identified as one of high priority from the standpoint of improvement need and potential. Our opinion is that this function should receive priority due to the current cost of handling, the effect on production scheduling and the potential for product damage.

It is our recommendation that an overall study of the materials handling function be conducted. This study should include not only the physical movement of goods, but also the in-process inventory levels and physical storage and the coordination with production scheduling. The study should be conducted in three phases — an analysis and conceptual design phase, a detailed design phase, and an implementation phase.

In the remainder of this section, we review a cursory analysis of the current activities, outline the type study which we believe should be conducted, and estimate the time and cost of the study and the order of magnitude cost of an improved materials handling system.

B. PRESENT CONDITIONS

From information furnished by the production general manager, a cursory analysis of the current materials handling work load and conditions was made. Concentration was given to spinning where the magnitude of the problem and opportunity for improvement are the greatest.

The following is a brief synopsis of the materials handling situation in spinning.

1. Spinning

A total of six spinning sheds and a condenser unit are supplying nine alternative locations with yarn (Appendix 1 presents a complex layout). There is a wide variation in the intensity of activity between locations, the greatest being between spinning and the warp shed, closely followed by export. Appendices 2 and 3 show an analysis of the movement and the ton meters moved per 24 hours are summarized below:

Move To	Ton Meters per 24 Hours	Tons per 24 Hours
Warp Shed	9,115	44.35
Central Spooling	5,487	20.95
Spooling No. 5	1,532	2.50
New Spooling	4,390	6.20
Export	8,506	20.50
Twisting	2,347	9.25
Weaving No. 2	180	1.00
Weaving No. 8	452	2.50
Weaving No. 9	663	3.50
Total	32,672	110.75

Three of the destinations — warp shed, central spooling and export — account for 77% of the tonnage moved but only 71% of the ton meters.

The total number of trips made in 24 hours is 1,130 during which period nearly 440,000 meters are covered for an average 393 meters per trip.

2. Materials Handling Equipment

Yarn is moved from spinning to weaving, export, etc., on one of two types of manually moved trucks. There are 1,309 of these trucks and, as only 1,130 trips are made in 24 hours, this indicates a lag in process time. Appendices 3a through 3h are descriptions of the current materials handling carts and trucks.

3. Weaving

The magnitude of the weaving activity is shown in Appendices 4 and 5. It may be seen that movement of warp beams from the sizing department to the weaving sections ranges from a distance of 30 meters up to 190 meters. Movement of greige cloth to inspection varies from a distance of 8 meters up to 690 meters.

Thus, while the magnitude of yarn movement is great, the movement of warp beams and cloth rolls covers considerable distances and the weights are substantial.

4. Personnel

The numbers of people engaged in material handling, by department, are shown in Appendix 6.

C. MATERIALS HANDLING STUDY

1. Analysis and Conceptual Design Phase

The analysis and conceptual design phase of the study should include the following:

a. Detailed flow chart of current material movement and in-process storage, including quantities and frequencies.

b. Detailed analysis of current materials handling costs, including labor, material, maintenance, equipment depreciation, inventory carrying costs, production disruptions, product damage.

c. Define the most efficient practical alternatives to improve the overall materials handling system.

d. Simulate the cost/benefits of the alternative systems.

e. Determine the most cost efficient and practical alternative.

2. **Detailed Design Phase**

The detailed design phase should include the following:

a. Development of detailed plans for the selected new systems, inclusive of equipment specifications, layouts, operation description, staffing and labor requirements.

b. Preparation of an implementation plan to ensure timely completion.

3. **Implementation Phase**

The implementation phase should include the following:

a. Solicitation of bids for new equipment.

b. Review of bids, selection of suppliers, ordering of equipment.

c. Development of supporting systems and controls.

d. Installation of new equipment, systems and controls.

e. Training of management, supervisors and workers in the use of the new equipment and supporting systems and controls.

D. ESTIMATED COST OF MATERIALS HANDLING STUDY

The estimated cost of a materials handling study, as outlined above, is as follows:

	US $
Analysis and Conceptual Design Phase	50,000
Detailed Design Phase	40,000
Implementation Phase	75,000
Total Estimated Cost	165,000

Phases two and three of the study should be undertaken only if the first phase clearly reveals that the cost/benefit relationship of an improved system is justified.

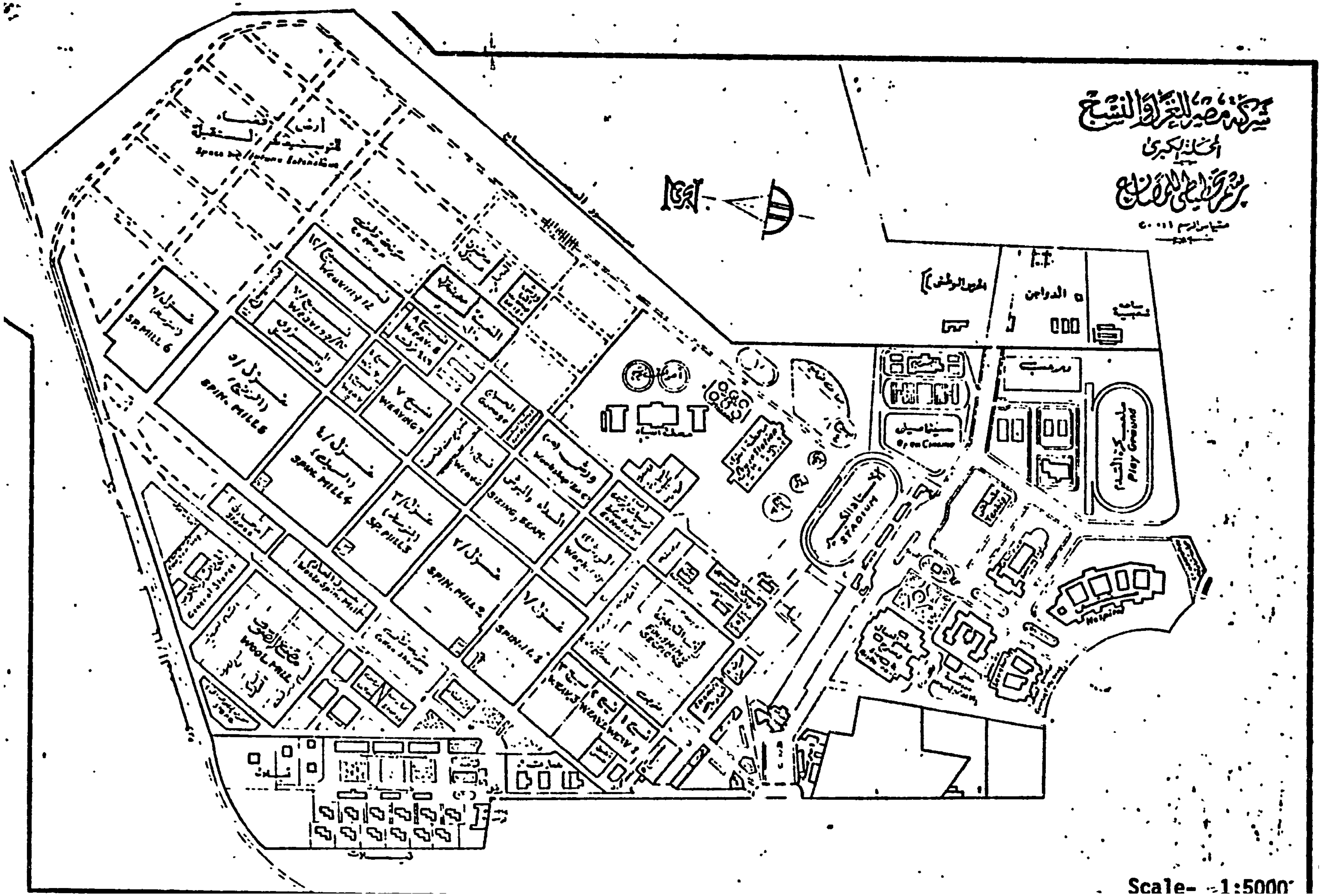
E. ORDER OF MAGNITUDE COST OF IMPROVED MATERIALS HANDLING SYSTEM

The type of systems which should be evaluated include in-ground tow conveyor, overhead conveyor and "driverless" tractor systems.

Assuming the cost/benefit relationship justifies such a system, the cost will likely be in the order of US $1,500,000 to US $2,000,000.

APPENDIX 1

MISR SPINNING AND WEAVING COMPANY COMFLEX



APPENDIX 2

ANALYSIS OF YARN MOVEMENT

Move to	Spinning Shed Number No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Condenser	Total
Warp Shed								
Tons/24 Hours	15.00	10.85	1.00	11.00	0.50	6.0	–	44.35
Trips/24 Hours	100	73	7	74	4	40	–	298
Avg. Weight/Trip (Kgs.)	150	150	143	149	125	150	–	149
No. Mtrs./Trip	80	60	180	294	500	600	–	–
Ton-Mtrs./Day	1,200	651	180	3,234	250	3,600	–	9,115
Central Spooling								
Tons/24 Hours	5.00	12.25	0.50	1.00	–	1.00	1.20	20.95
Trips/24 Hours	34	82	4	7	–	7	8	142
Avg. Weight/Trip (Kgs.)	151	149	125	143	–	143	150	148
No. Mtrs./Trip	270	240	114	110	–	430	500	–
Ton-Mtrs./Day	1,350	2,940	57	110	–	430	600	5,487
Spooling No. 5								
Tons/24 Hours	0.50	–	–	2.00	–	–	–	2.50
Trips/24 Hours	4	–	–	14	–	–	–	18
Avg. Weight/Trip (Kgs.)	125	–	–	143	–	–	–	139
No. Mtrs./Trip	320	–	–	686	–	–	–	–
Ton-Mtrs./Day	160	–	–	1,372	–	–	–	1,532
New Spooling								
Tons/24 Hours	1.00	–	–	4.00	–	–	1.20	6.20
Trips/24 Hours	7	–	–	27	–	–	8	42
Avg. Weight/Trip (Kgs.)	143	–	–	148	–	–	150	148
No. Mtrs./Trip	450	–	–	760	–	–	750	–
Ton-Mtrs./Day	450	–	–	3,040	–	–	900	4,390
Export Section								
Tons/24 Hours	2.0	1.0	6.0	3.0	4.5	4.0	–	20.5
Trips/24 Hours	14	7	40	20	50	27	–	158
Avg. Weight/Trip (Kgs.)	143	143	150	150	90	148	–	130
No. Mtrs./Trip	686	550	424	235	350	440	–	–
Ton-Mtrs./Day	1,372	550	2,544	705	1,575	1,760	–	8,506
Twisting								
Tons/24 Hours	2.0	3.25	–	–	–	4.0	–	9.25
Trips/24 Hours	14	22	–	–	–	27	–	63
Avg. Weight/Trip (Kgs.)	143	148	–	–	–	148	–	147
No. Mtrs./Trip	516	380	–	–	–	20	–	–
Ton-Mtrs./Day	1,032	1,235	–	–	–	80	–	2,347

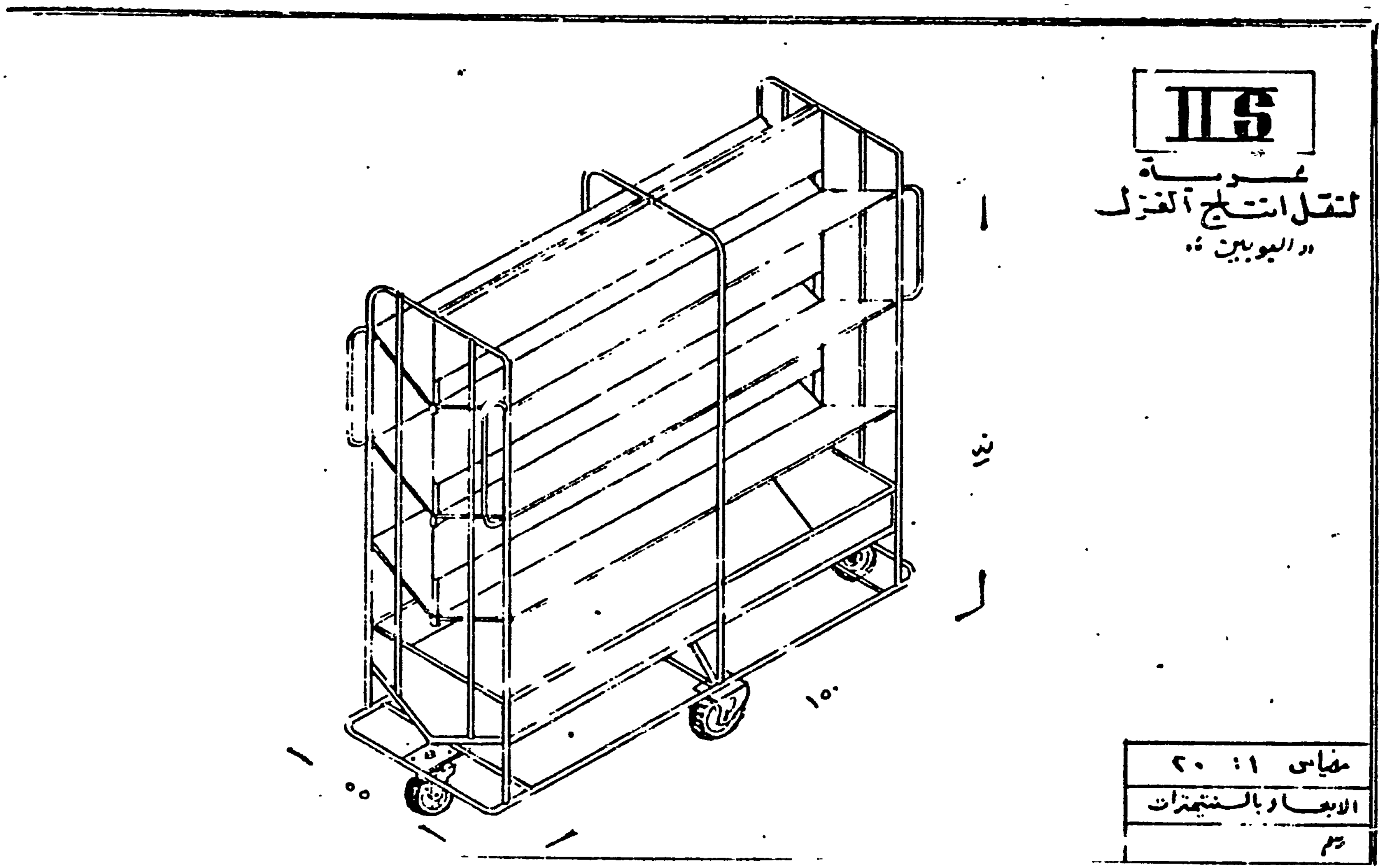
APPENDIX 2 (CONTINUED)

Move to	Spinning Shed Number No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Condenser	Total
Weaving No. 2								
Tons/24 Hours	1.0	–	–	–	–	–	–	1.0
Trips/24 Hours	7	–	–	–	–	–	–	7
Avg. Weight/Trip (Kgs.)	143	–	–	–	–	–	–	143
No. Mtrs./Trip	180	–	–	–	–	–	–	180
Ton-Mtrs./Day	180	–	–	–	–	–	–	180
Weaving No. 8								
Tons/24 Hours	0.5	0.5	–	1.5	–	–	–	2.5
Trips/24 Hours	4	4	–	10	–	–	–	18
Avg. Weight/Trip (Kgs.)	125	125	–	150	–	–	–	139
No. Mtrs./Trip	490	360	–	18	–	–	–	–
Ton-Mtrs./Day	245	180	–	27	–	–	–	452
Weaving No. 9								
Tons/24 Hours	0.5	–	–	1.5	–	1.5	–	3.5
Trips/24 Hours	4	–	–	10	–	10	–	24
Avg. Weight/Trip (Kgs.)	125	–	–	150	–	150	–	146
No. Mtrs./Trip	426	–	–	60	–	240	–	–
Ton-Mtrs./Day	213	–	–	90	–	360	–	663

APPENDIX 3a

MATERIALS HANDLING EQUIPMENT

SPINNING



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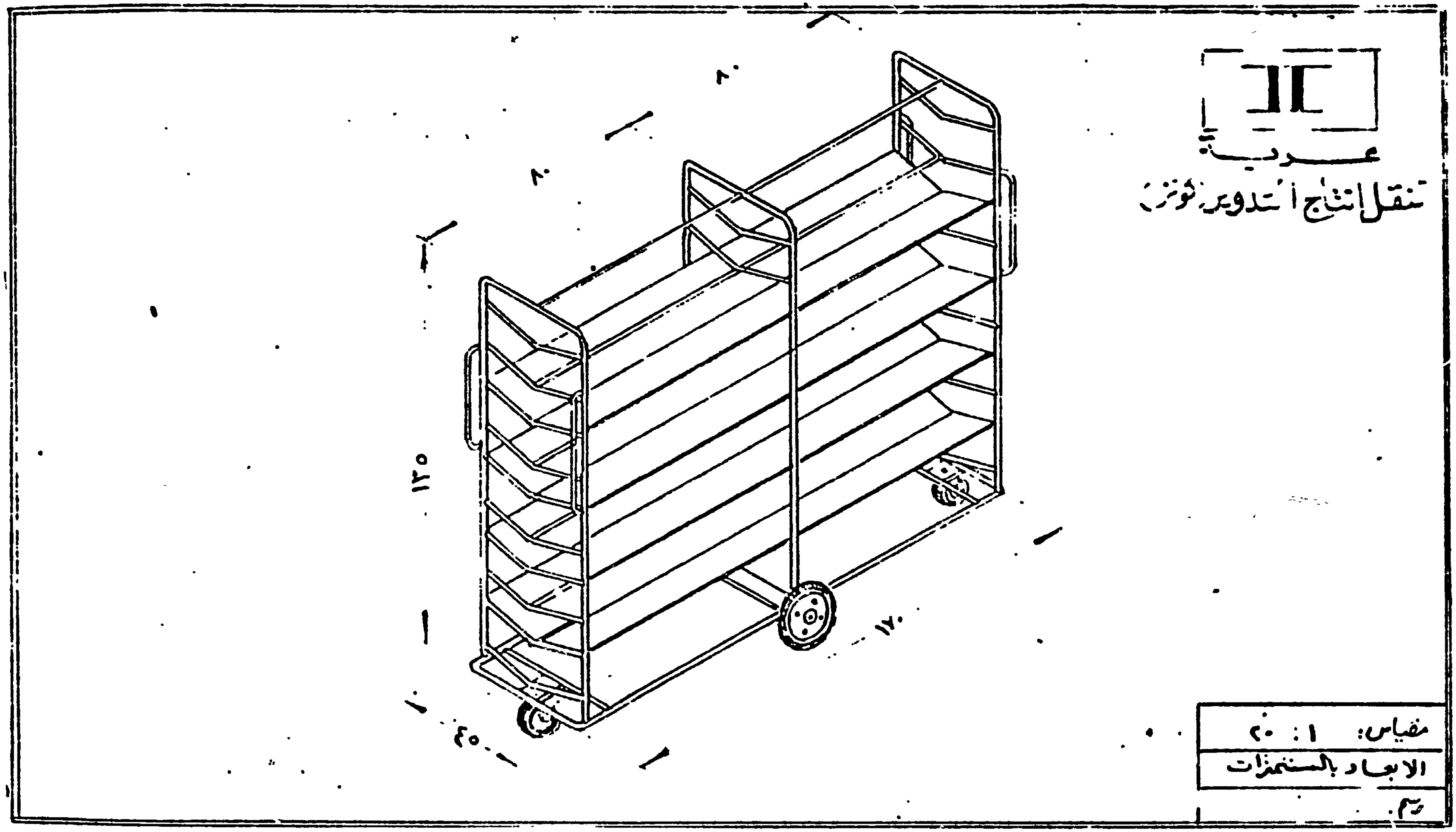
APPENDIX 3b

MATERIALS HANDLING EQUIPMENT

SPINNING



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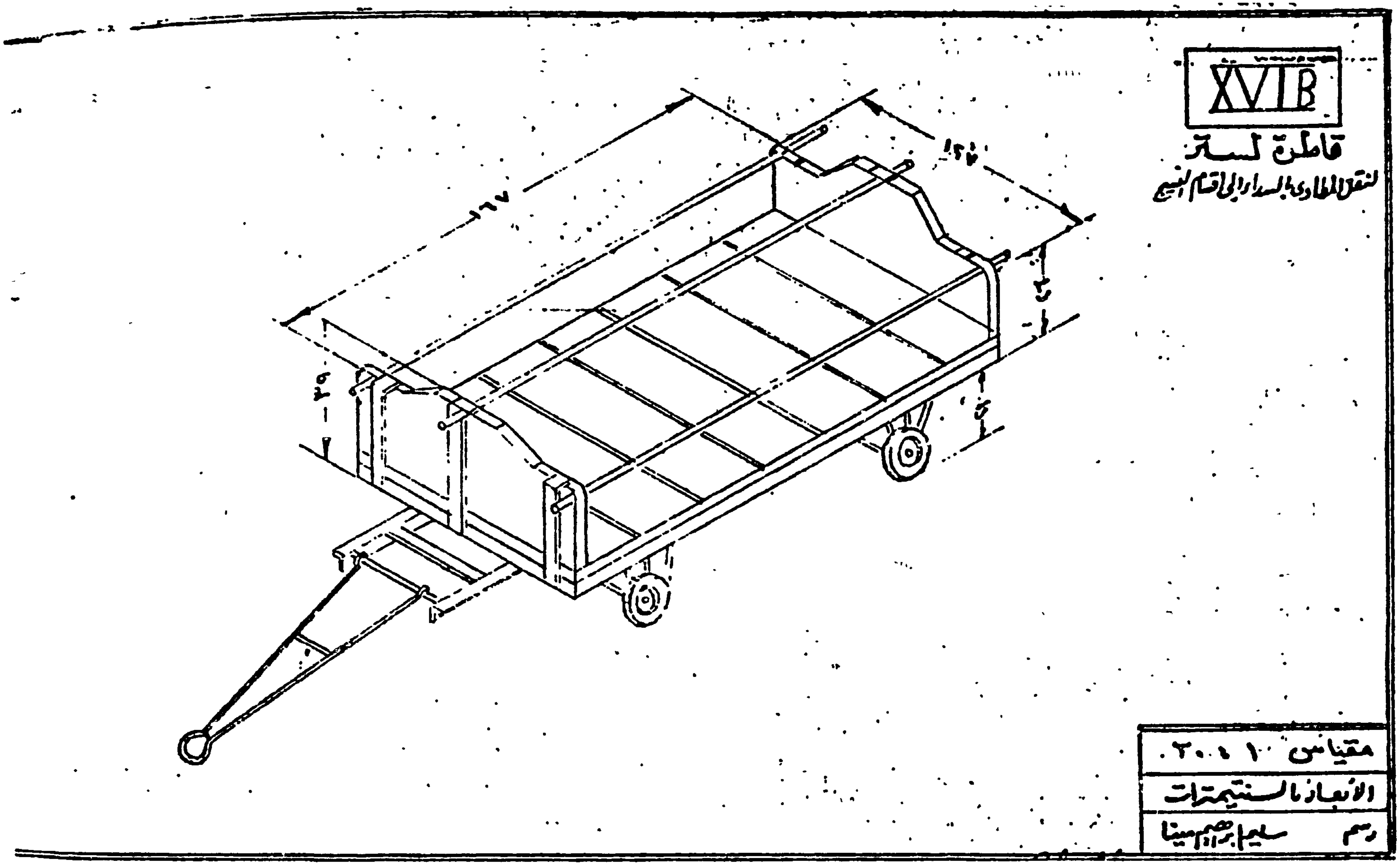
APPENDIX 3c

MATERIALS HANDLING EQUIPMENT

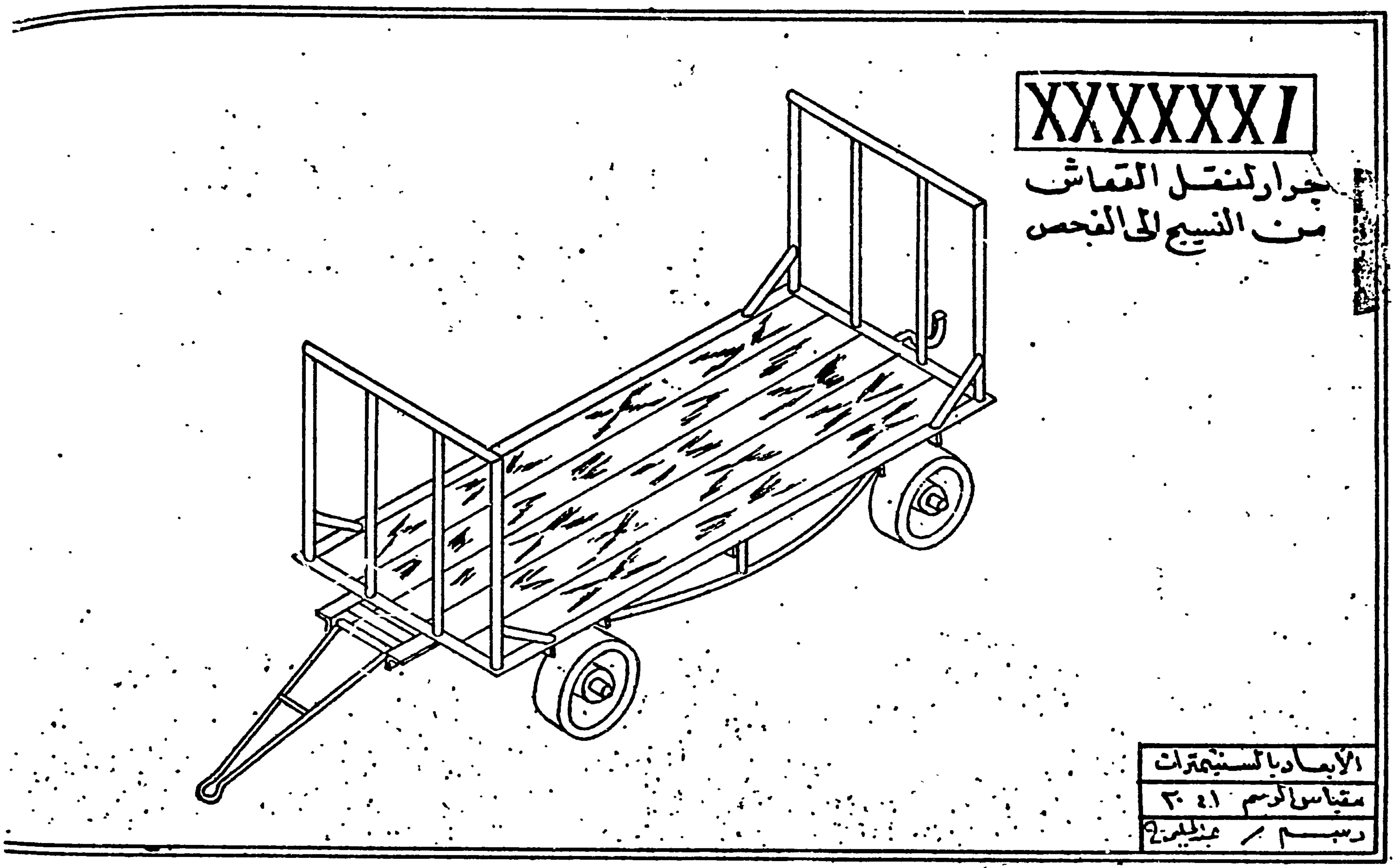
CLOTH TO INSPECTION DEPARTMENT



APPENDIX 3d

MATERIALS HANDLING EQUIPMENT

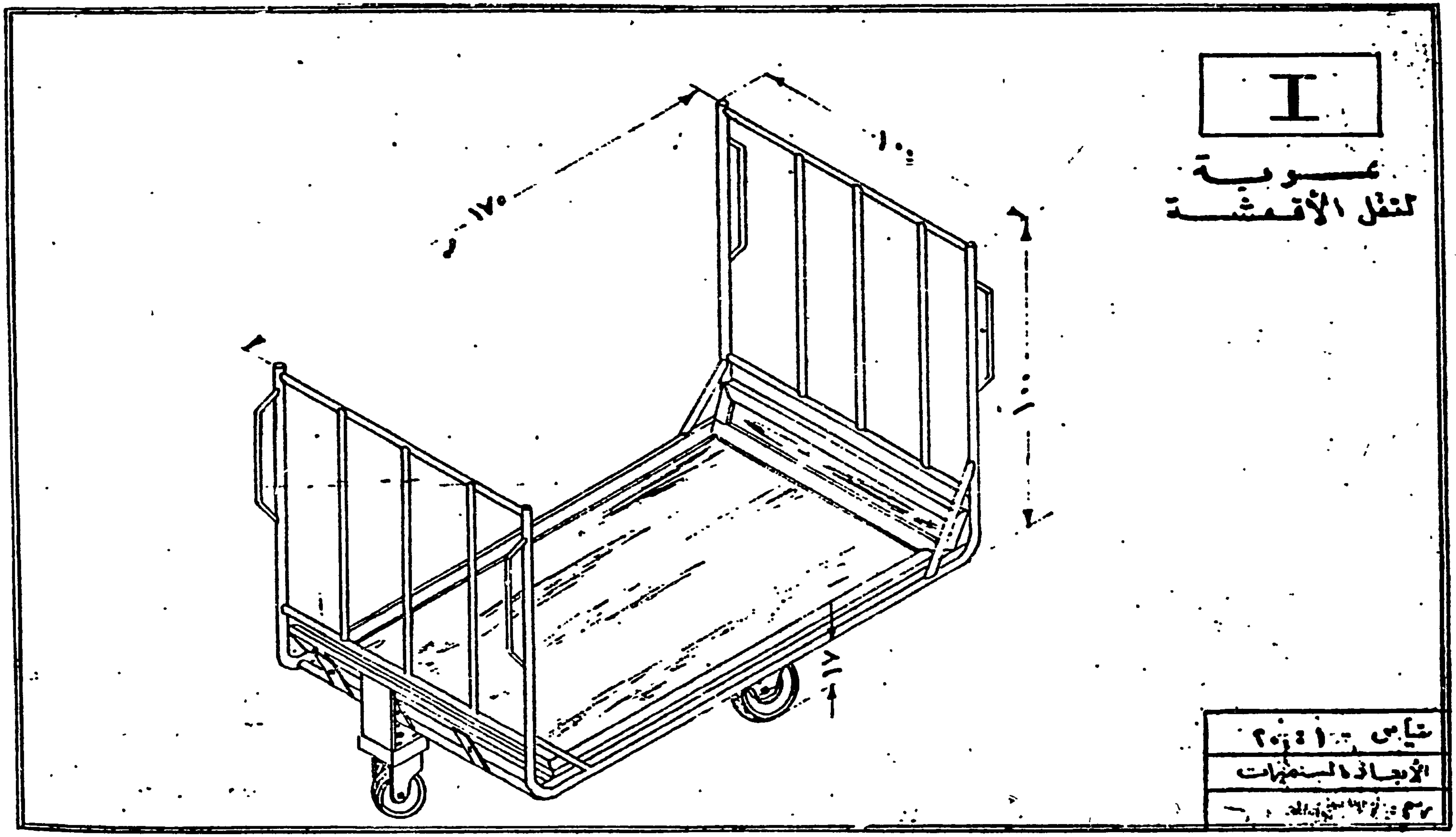
CLOTH TO INSPECTION DEPARTMENT



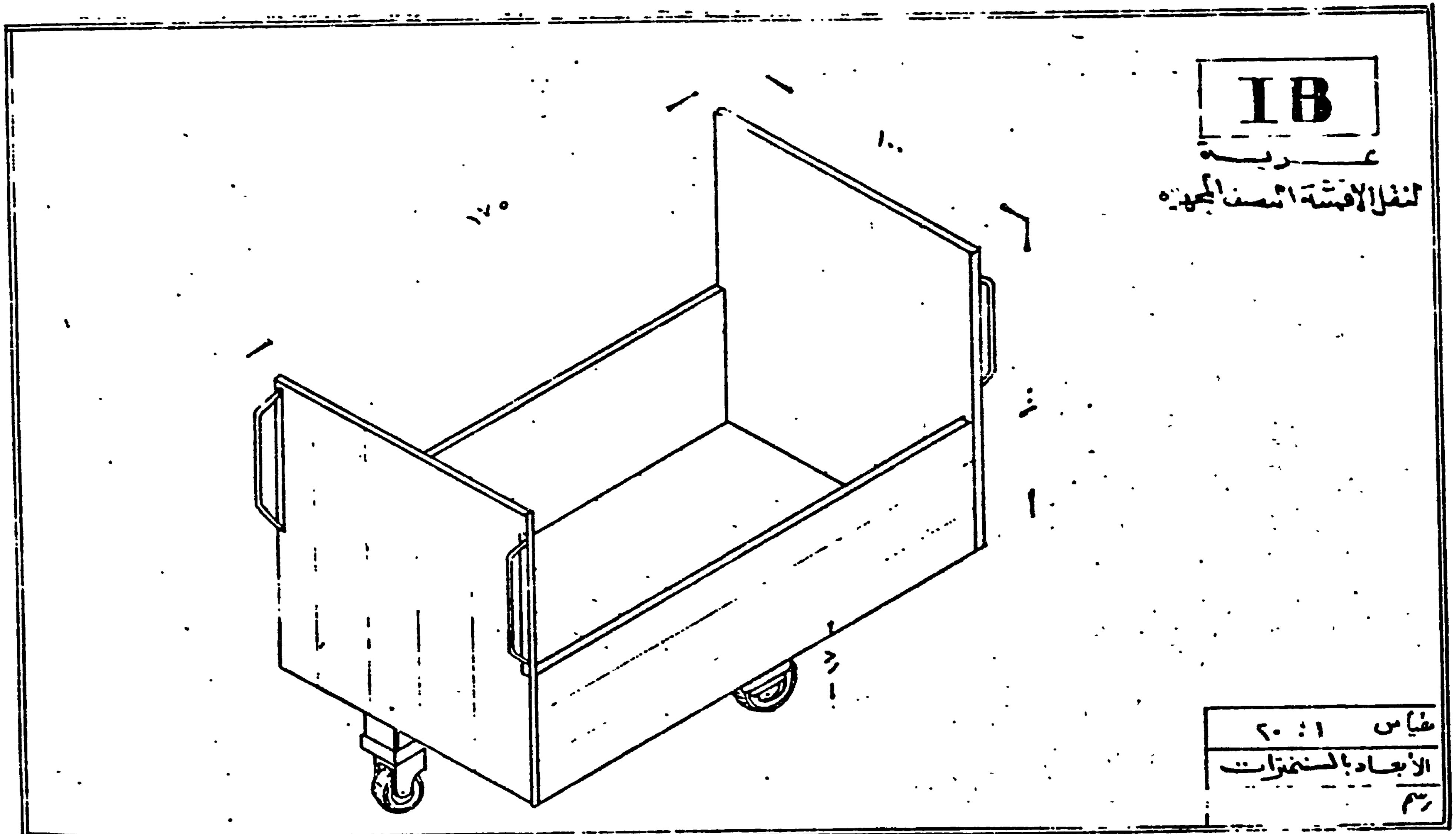
APPENDIX 3e

MATERIALS HANDLING EQUIPMENT

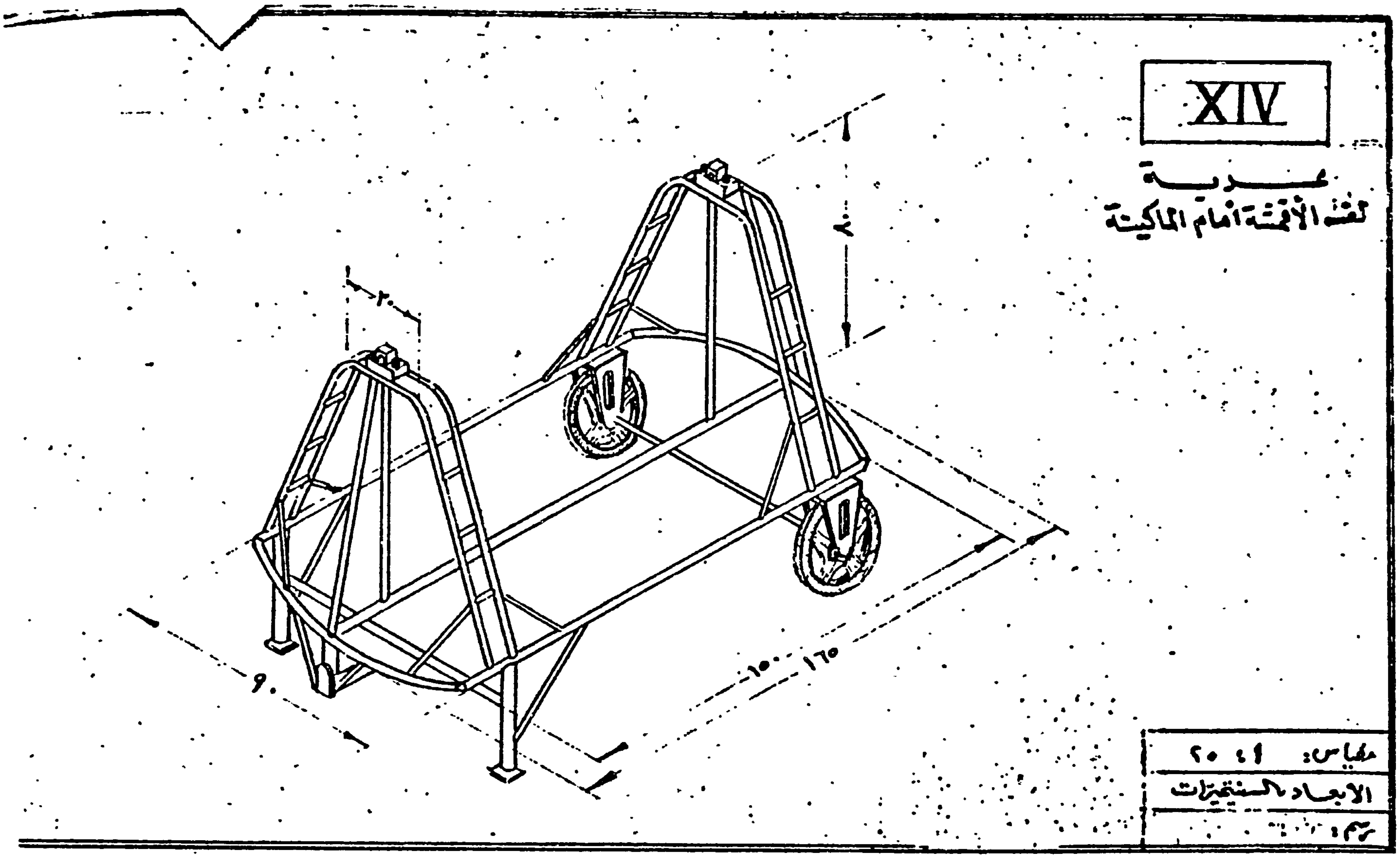
GREIGE CLOTH TO FINISHING



APPENDIX 3f
MATERIALS HANDLING EQUIPMENT
CLOTH WITHIN FINISHING



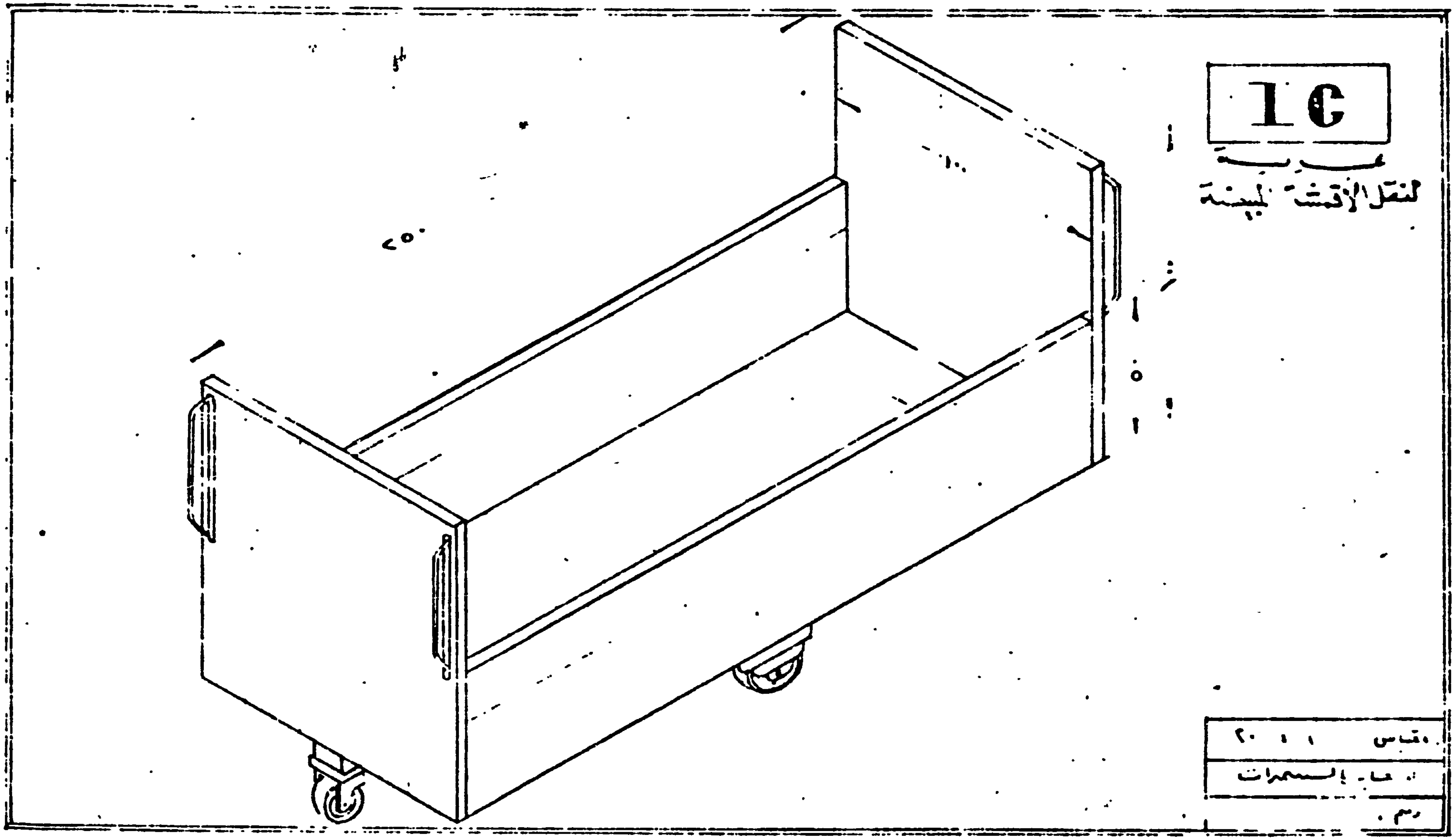
APPENDIX 3g
MATERIALS HANDLING EQUIPMENT
BEAMS IN FINISHING



APPENDIX 3h

MATERIALS HANDLING EQUIPMENT

WHITE CLOTH IN FINISHING



APPENDIX 4

WEAVING MILLS

	Mills															
						Col. Wild	6									
	1	2	3	4	5	L	Duck S	Dob. S	Shut. S	7	8	9	10	11	12	13
Working Shifts	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Incoming Yarn in Kgs. Daily	2,875	6,500	5,854	1,390	1,762	2,960	1,240	870	540	2,500	3,742	2,060	2,712	2,355	4,300	950
Incoming Beams Daily																
– Beams Drawing	6	3	6	1	3	5	1	1	1	10	9	1	3	1	4	3
– Beams Knotted	20	22	44	14	18	26	6	6	7	39	16	9	18	12	20	4
Incoming Spooled Weft Kgs. Daily	3,210	5,800	4,860	1,200	1,540	1,740	970	850	460	2,400	4,065	1,750	2,817	2,770	4,700	1,000
Cloth Length in Cloth Beam/Mtrs.																
– Minimum	139	139	139	124	128	30	74	139	124	128	100	112	106	139	100	80
– Maximum	167	180	167	139	280	260	139	167	139	167	186	139	139	260	180	120
Produced Cloth in Mtrs. Daily	41,550	40,650	50,670	6,750	32,310	32,000	5,600	9,990	2,100	34,100	39,240	21,450	40,410	23,490	57,480	11,550
Avg. Weight of Cloth (For One Meter) Gm.	135	450	223	379	92	196	333	165	467	139	190	168	134	223	200	170
Working Widths of Cloth – CM																
– Minimum	76	73	75	183	86	80	80	83	225	80	86	96	96	132	96	96
– Maximum	98	162	83	245	106	173	108	97	245	100	162	150	112	161	127	96

APPENDIX 5

DISTANCE BETWEEN WEAVING MILLS AND SIZING AND INSPECTION SECTIONS

Weaving Mills	Sizing Sec. Meters	Insp. Sec. Meters
1	160	8
2	120	20
3	120	20
4	140	300
5	180	30
6	30	180
7	80	240
8	100	280
9	110	280
10	150	300
11	190	690
12	160	300
13	120	190

APPENDIX 6

NUMBER OF WORKERS ENGAGED IN TRANSPORT

	Number of Workers
SPINNING MILLS (COTTON)	
Mill 1	198
Mill 2	192
Mill 3	96
Mill 4	141
Mill 5	99
Mill 6	126
Condenser	93
Export	20
Subtotal	965
WEAVING MILLS (COTTON)	
Mill 1	10
Mill 2	12
Mill 3	15
Mill 4	9
Mill 5	9
Mill 6	27
Mill 7	9
Mill 8	18
Mill 9	6
Mill 10	18
Mill 11	18
Mill 12	27
Mill 13	6
Warp Preparation Shed	15
Sizing	18
Spooling Shed	9
Inspection	57
Subtotal	283

APPENDIX 6 (CONTINUED)

	Number of Workers
FINISHING MILLS (COTTON)	
Bleaching	18
Dyeing	23
Printing	18
Finishing	27
Engraving	1
Subtotal	87
WOOL MILLS	
Spinning	131
Weaving	24
Finishing	28
Subtotal	183
GARMENT MILLS	
Mill 1	12
Mill 2	6
Mill 3	8
Mill 4	4
Mill 5	8
Subtotal	38
Grand Total	1,556

APPENDIX 7

SUMMARY OF INVESTMENT PLAN — MATERIALS HANDLING

MATERIALS HANDLING SYSTEM

Description	Foreign Exchange in US $	Est. Cost in US $ Local Currency in US $	Total US $
Materials Handling System (Includes $220,000 Spare Parts)	2,420,000		2,420,000
Import Duty		290,400	290,400
Clearing + Local Transportation + Erection	20,000	40,000	60,000
Total Investment	2,440,000	330,400	2,770,400

APPENDIX 8

Mill: Materials Handling (Conveyors)

A.I.D. Request Reference: Annex 13, Table 14

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Conveyors		390,000	1,000,000
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost US $ — FOB			2,000,000

Recommend:

Feasibility, design and implementation, technical assistance for overall materials handling.

Original request did not specify type or quantity of equipment or system. Therefore, a detailed feasibility study of the overall materials handling within the complex is required in order to:

1. Determine the economic justification.

2. Specify the required equipment if an improved system is found to be justified.

Technical assistance for materials handling study = $165,000.

Estimated cost of new system (3,000 meters at $66.7/meter) = $2,000,000.

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SECTION XI

FIRE PROTECTION AND FIRE FIGHTING

SECTION XI: FIRE PROTECTION AND FIRE FIGHTING

A. CURRENT FIRE PROTECTION AND FIRE FIGHTING EQUIPMENT AND PERSONNEL

Currently, the fire protection and fire fighting system at Misr Spinning and Weaving Company consists of the following items:

1. Two water sources — an artesian well and an underground storage tank.

2. Two stationary pumping stations.

3. Three fire trucks:

   a. One (1972) equipped with a four cubic meter water tank, four hoses, foam, CO_2.

   b. One (1971) equipped with a six cubic meter water tank, eight hoses, foam, CO_2.

   c. One (1958) equipped with four hoses and pump only.

4. Two fire stations.

5. 62 sprinkler system installations in manufacturing plants and enclosed warehouses.

6. One (1963) truck without pump.

7. Four (1972) tractors equipped with pumps.

8. Two (1946) four-wheel trailers.

9. Five (1973) portable gasoline engine pumps.

10. Two (1973) trailers for attachment to trucks.

The original cost of the current equipment listed above was approximately £E 861,000.

The current personnel complement for fire fighting and fire protection is as follows:

	Number of Persons
Fire Brigade of 36 Persons per Shift	108
Five Drivers per Shift	15
One Mechanic	1
One Chief	1
Maintenance	30
Engineer	1
Inspection	5
Pumping Stations — Two per Shift	6
Total Persons	167

B. INCIDENCE OF FIRES AND FIRE TRUCK CALLS

During 1975, the following were the incidences of fire truck calls:

January	17
February	25
March	16
April	14
May	24
June	32
July	25
August	30
September	17
October	15
November	21
December	16
Total	252
Average per Month	21

It was also reported that an average of 40 to 60 local small fires occur each month. These are primarily caused by overheated motors, faulty connections, electrical sparks, etc.

The last major fire occurred in an open cotton storage area in 1971. The damage was estimated at £E 3,000,000.

C. RECOMMENDATION

Because of the physical area and size of the Misr Spinning and Weaving Company; the number of persons employed and residing in the complex; the large investment in plant, equipment, raw material, work-in-process and finished goods; the age of some of the current fire fighting equipment; and the absence of fire and smoke detection equipment; it is recommended that additional fire fighting equipment and fire detection equipment be purchased.

Because of the number of multi-story buildings on the complex (garment plant, offices, residences), it is recommended that a fire truck equipped with an aerial platform be purchased. In addition, one pumping truck is recommended in view of the age and inadequacy of one of the current trucks. Smoke detection equipment is recommended for the open cotton warehouses and the top floor of the garment plant because of their vulnerability to fires not easily detected.

Below is a general description of the items recommended, together with approximate costs:

1.	One 75-foot aerial platform, mounted on suitable chassis. Equipped with a 200-gallon water tank, a 1,000-gallon per minute pump, a portable foam unit and dry chemical unit. Fully equipped with coats, boots, helmets, breathing equipment, ladders, etc.	
	Approximate Cost	US $165,000
2.	One pumper truck equipped with a 1,000-gallon water tank, a 1,000-gallon per minute pump, a portable foam unit, a dry chemical system. Fully equipped with hoses, boots, coats, helmets, breathing equipment, etc.	
	Approximate Cost	US $ 95,000
3.	Initial spare parts for the above equipment.	
	Approximate Cost	US $ 26,000
4.	Smoke detector units for the fourth floor of the garment plant and for the open cotton warehouses.	
	Approximate Cost	US $ 30,000
	Total Estimated Cost	US $296,000

Mill: Fire Fighting and Fire Detection

A.I.D. Request Reference: Annex 13, Table 14

Item	Quantity	A.I.D. Request Value £E	A.I.D. Request Value US $
Fire Protection		390,000	1,000,000
U.S. Manufacturer of Desirable Equipment	Yes		
Estimated Cost Country of Origin Port – FOB			296,000

Recommend:

Additional fire fighting and fire detection equipment, two fire trucks and smoke detection units. To provide additional fire fighting capability, including capability for fire fighting of multi-story structures. To upgrade fire fighting capability. To add fire detection units in open cotton warehouses and top floor of garment plant.

SUMMARY OF INVESTMENT PLAN – FIRE PROTECTION

NEW FIRE TRUCKS AND FIRE DETECTION EQUIPMENT

	Estimated Cost in US $		
	Foreign Exchange	Local	Total
Two Fire Trucks Plus Fire Detection Equipment (Including Spare Parts at $28,000)	344,000	–	344,000
Import Duty	–	44,700	44,700
Total Investment	344,000	44,700	388,700

PART THREE

RECOMMENDED TECHNICAL ASSISTANCE PROGRAMS

AND GENERAL OBSERVATIONS

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PART THREE

RECOMMENDED TECHNICAL ASSISTANCE PROGRAMS AND GENERAL OBSERVATIONS

KSA

SECTION I: RECOMMENDED TECHNICAL ASSISTANCE

A. GENERAL BACKGROUND

The proposed technical assistance programs have the following general objectives:

1. To aid in ensuring the proper selection of equipment.

2. To aid in ensuring timely, effective implementation of the rehabilitation and expansion program.

3. To aid in ensuring that the capital investments result in optimum returns.

4. To aid in achieving productivity and quality improvements and cost reductions over and above those attributable to the proposed capital investments.

5. To aid in establishing improved planning and control procedures to ensure continuing results from the rehabilitation and expansion programs.

6. To train personnel in modern techniques of textile management.

While all of the recommended technical assistance programs are deemed to be important to both the ensurance of the optimum results of the proposed capital expenditures and to the attainment of additional improvements, one particularly is connected intimately with the proposed investment programs and deserves special mention. This is the apparel technical assistance program.

B. APPAREL TECHNICAL ASSISTANCE

The apparel technical assistance program is described in detail in Section VII of Part Two. Apparel manufacturing is highly labor intensive; where machine productivity depends primarily upon the individual operators. Therefore, the production system, the work-in-process controls, individual workplace design, operator methods, operator and supervisory training and attention to individual motivation and activity level are more critical to overall productivity than equipment. The purchase of new equipment without the proper attention to these other aspects will not result in the desired levels of productivity and quality. For this reason, the apparel technical assistance program has been included as part of the capital investment proposals.

C. SUMMARY OF PROPOSED TECHNICAL ASSISTANCE PROJECTS

Below is a summary of the proposed technical assistance projects, excluding the apparel technical assistance which has been included in the overall apparel investment.

Program	Estimated Cost
Master Development Plan	$ 70,000
Materials Handling Study	165,000
Equipment Specifications	60,000
Bid Evaluations	120,000
Survey of Cotton Spinning and Weaving	50,000
Waste Control Program in Cotton Spinning	160,000
Production Control Program in Cotton Spinning	120,000
Cost Reduction Program in Cotton Spinning	400,000
Start-up Assistance in New Yarn Mill	160,000
Engineering of Warping and Sizing	60,000
Waste Control Program in Cotton Weaving	200,000
Production Control Program in Cotton Weaving	140,000
Cost Reduction Program in Cotton Weaving	400,000
Total Estimated Cost	$2,105,000

Following is a brief description of the scope of work envisioned in each of the proposed technical assistance programs.

D. MASTER DEVELOPMENT PLAN

The implementation of the proposed rehabilitation and expansion plan must be planned carefully and monitored effectively in order to ensure optimum results. Because of the complexity of the project and the interrelationship among manufacturing units, the sequence and timing of each element of the project bear on the overall results. For example, increased weaving capacity prior to the development of increased yarn supply could result in idle equipment; equipment procurement prior to completion of physical facilities could result in unnecessary capital being tied up; and equipment erection prior to personnel training could result in low equipment productivity.

It is recommended that a master plan be developed, using the Critical Path Method (CPM) and that the plan be monitored frequently, ideally through the use of the Program Evaluation Review Technique (PERT).

The general scope of work envisioned in this program is as follows:

— Development of a thorough understanding of each aspect of the program and the interrelationships of the individual projects.

— Development of a project "network," a graphical representation of the project plan, showing the interrelationships of the various activities.

— In conjunction with Mehalla management, determination of realistic time estimates for each element of the program.

— Review of the "network" for each individual project with the responsible Mehalla manager for that project.

— Obtainment of agreement of the elemental "network" and the overall project "network."

— Development of input requirements, frequencies and responsibilities for project status review and evaluation.

— Development of review and status evaluation procedures, including consideration of the use of Mehalla's computer.

— Training of several Mehalla personnel in the CPM and PERT techniques.

— Training of someone in Mehalla to act as overall project coordinator.

— Periodically monitoring the program and reporting of findings and recommended actions to Mehalla's senior management.

This assistance ideally should be provided by an individual or firm skilled in CPM and PERT techniques and with intimate knowledge of the textile and apparel industries. The assistance will require several months of on-site work at Mehalla at the very beginning of the project, followed by periodic visits to monitor the project throughout the duration of the project implementation.

The estimated cost of this assistance is $70,000.

E. MATERIALS HANDLING

In Section X, Part Two, a study of the overall materials handling systems has been recommended in order to determine the economic justification for improved materials handling and, if justified, to specify the type of system which should be installed.

Because capital expenditures for improved materials handling should not be made until after a feasibility/conceptual design study has been undertaken, this study should be conducted as soon as possible. Different from the other recommended technical assistance programs, this study must be conducted prior to a final capital investment decision and development of specifications of equipment.

The general scope of work for this assistance is described in Section X, Part Two of this report. The assistance is suggested in three phases as follows:

	Estimated Cost
Analysis and Conceptual Design Phase	$ 50,000
Detailed Design Phase	40,000
Implementation Phase	75,000
Total Estimated Cost	$165,000

F. EQUIPMENT SPECIFICATIONS

The development of equipment specifications is among the first steps in implementing the proposed project. The proper development of these specifications is vital to the success of the project. Mehalla management has considerable experience in developing equipment specifications; and, among the Mehalla management, there is a great deal of technical expertise.

However, there are several factors which suggest that assistance in the development of the equipment specifications is desirable:

1. The magnitude of the proposed investment will require not only the development of specifications for each individual major piece of equipment but also an overall review of the specifications, requiring knowledge of cotton, woolen and worsted systems of manufacture.

2. Since the specifications should be developed as soon as possible, outside assistance, unencumbered with daily managerial responsibilities, could serve to expedite the process.

3. Since U.S. equipment is involved, it would be highly desirable to have someone intimately familiar with U.S. equipment and U.S. equipment suppliers involved in the development of the specifications.

The general scope of work involved in this assistance is outlined below:

- Development of a thorough understanding of each project.

- Development of a thorough understanding of the end product specifications from each project.

- Development of desired capabilities, capacities, performance characteristics, flexibility and technical criteria for each major item of equipment.

- Preparation of written specifications for submission to potential suppliers.

All of this work should be done in conjunction with Mehalla management, working intimately with each key manager in the development of the specifications.

The estimated cost for this assistance is $60,000.

G. BID EVALUATIONS

The objective evaluation of the bids and proper selection of equipment are fundamental to the success of the project. As with the development of specifications, outside assistance in the evaluation of bids by persons intimately familiar with the projects involved and with U.S. equipment could aid in ensuring proper selection as well as reducing the time of Mehalla management for this detailed work.

The general scope of work involved in this assistance is as follows:

- Determination of bid evaluation criteria such as cost, guarantees, conformance to specifications, technical assistance, similar equipment in place, etc.

- Determination of value to be assigned to the various criteria.

— Detailed review of the bids in order to evaluate each according to the evaluation criteria.

— Discussion of bid review analysis with appropriate Mehalla manager.

— Preparation of written report on the evaluation of each major item of equipment.

— Review of final evaluation with senior Mehalla management.

— Determination of supplier or request for additional information or revised bids if required for final determination.

Ideally, this assistance should be provided by the same source which provided assistance in the preparation of equipment specifications.

The estimated cost for this assistance is $120,000.

H. SURVEY OF COTTON SPINNING AND WEAVING

As pointed out in Sections I and II of Part Two of this report, cursory analyses permitted during the course of this study indicated that considerable potential exists for cost reduction in the existing cotton spinning and weaving operations through improved labor productivity, improved machine efficiencies, reduced waste levels and improved production planning and control. These cost reductions could amount to several million dollars annually. Since the existing operations are intimately involved in the proposed project, their efficiency and costs are fundamental to overall project success. In order to identify and quantify the cost reduction potential and develop plans for improvement programs to achieve this potential, a survey of the existing cotton system spinning and weaving operations is recommended.

The general scope of work envisioned for this program is as follows:

1. Collection of data and information from each cotton system spinning and weaving unit on items such as the following:

   - Product mix.
   - Lot size.
   - Machine speeds.
   - Job assignments.
   - Indirect labor complement.
   - Supervisory complement.
   - Package sizes.
   - Waste levels.
   - Quality levels.
   - Running conditions (stop levels, ends down, etc.).
   - Work-in-process levels.
   - Productivity (machine and labor).
   - Unit balance.
   - Machine downtime.
   - Elemental costs (raw materials, labor, overhead).

2. Interviews with manufacturing management.

3. On-the-floor observations and studies of major operations.

4. Development of cost, productivity, waste and quality performance for each unit.

5. Comparison of current performance with achievable performance levels.

6. Development of cost reduction potential in each unit by cost element.

7. Development of a cost reduction program plan detailing the following, by unit:

   - Cost reduction goals.
   - Programs required to effect the improvements.
   - Techniques to be used.
   - Mehalla staff required to implement the programs.
   - Training required to prepare the Mehalla staff.
   - Priorities and sequence of implementation.
   - Estimated calendar time for each program.
   - Outside assistance required.
   - Estimated cost of each program.
   - Estimated cost/benefit relationship from each program.

8. Preparation of a written report covering the findings, conclusions and recommendations.

The resulting report should form the basis for the decision to embark on the improvement programs in the cotton spinning and weaving units described below. The survey would determine the feasibility and economic justification of these programs. While our cursory analysis indicates that the programs could result in substantial benefits, the proposed survey should be undertaken to verify this and to provide Mehalla management with a study of the economic justification and a plan of implementation.

The survey should be conducted by a firm or persons with in-depth textile experience and skilled in management techniques such as industrial engineering, production planning and control, waste and quality control.

The estimated cost of this study is $50,000.

I. WASTE CONTROL PROGRAMS

Assuming the economic justification for a program of waste reduction and control in the cotton spinning and weaving units is confirmed by the survey, the following general scope of work is envisioned. The scope of work, of course, would be defined in greater detail in the survey report.

1. Identification of current waste levels by process, type and cause.

2. Development of waste control reports by process, type and supervisory and managerial unit.

3. Development of corrective action to reduce waste created by improper machine settings, poor maintenance, improper handling, and operator created.

4. Conduct of supervisory and management training sessions on effect of waste on cost and profits and on theory and practical application of waste control.

5. Establishment of standard levels of waste by process, type and supervisory and managerial unit.

6. Follow-up with managers, supervisors, maintenance personnel and operators to ensure desired performance.

7. Examination of final product specifications and raw material input to determine potential for raw material savings through improved lay-down and blending techniques, blending by micronaire, etc.

8. Development of overall, coordinated waste control reporting system including supervision, unit management, department management and summary and exception reports for top management.

9. Training of several key Mehalla personnel in waste control procedures and in monitoring the program to ensure continuing results.

10. Documentation of all techniques, procedures and controls and conduct of management seminars to ensure understanding and acceptance.

These programs should be conducted by a firm or persons with in-depth textile and waste control experience.

The estimated costs of the technical assistance for these programs are $160,000 for spinning and $200,000 for weaving.

J. PRODUCTION CONTROL PROGRAM

Production scheduling and control at Mehalla are extremely complex, particularly in the cotton spinning and weaving area with its six spinning units and 13 weaving sheds. The development of an effective production planning and scheduling system can aid in ensuring no idle equipment time due to unavailability of stock, in reducing work-in-process and capital tied up in inventories, and in improving customer service. From observations made during this study, there were indications that a modern production control system is needed at Mehalla. With the modernization and expansion program, the need for such a system will become more acute.

The general scope of work envisioned for this assistance follows:

1. Review of current production planning, scheduling and control procedures.

2. Collection of information on production levels, product mix, work-in-process levels, raw materials inventories, finished goods inventories, throughput times, etc.

3. Identification of current responsibilities for production planning, scheduling and control and conduct of interviews with key personnel involved.

4. Description of current system, including inputs, outputs, frequencies, reports, controls and responsibilities.

5. Identification and quantification of improvement potential in terms of reduced downtime, reduced work-in-process and improved service.

6. Conceptual design of improved system including general input-output requirements, responsibilities, portions to be computerized, etc.

7. Review of conceptual design with Mehalla management.

8. Detailed design of the improved system, including programming specification.

9. Monitoring of Mehalla's programming staff and program testing.

10. Training of key users of the system.

11. Monitoring to ensure forecast results.

This assistance is estimated to cost $260,000.

K. COST REDUCTION PROGRAM IN COTTON SPINNING AND WEAVING

Cost reduction programs in the cotton spinning and weaving plants should be considered if the proposed survey of these operations indicates a desirable cost/benefit relationship. We are of the opinion that these programs can easily be justified. The programs would be especially timely in achieving increased labor productivity in order to ensure the ability to staff the expanded operations from the existing work force.

The general scope of work envisioned in the cost reduction programs is as follows:

1. Selection and training of 15 to 20 capable Mehalla employees in time and motion study, frequency checking techniques, work sampling procedures and basic principles of industrial engineering.

2. Taking one operation at a time, supervise and direct the engineering team to accomplish the following:

   — Analyze methods and procedures.

   — Improve methods and procedures.

   — Determine proper job loads for direct labor through work measurement.

   — Determine expected machine efficiencies.

   — Determine proper indirect labor complements.

   — Establish standards for machine speeds, package sizes, labor complements, machine efficiencies, productivity levels, and running conditions.

   — Establish control reports for comparing actual performance to standard.

   — Establish procedures for frequency checking running conditions.

3. Train two training coordinators, one for spinning and one for weaving, and 20 to 30 instructors in analytical training methods.

4. Supervise the implementation of analytical training programs for retraining employees in the improved methods.

5. Conduct management seminars on industrial engineering, analytical training and cost reduction.

6. Conduct supervisory development seminars to expose line supervisors to the basics of industrial engineering and analytical training and to develop involvement of the supervisors in the cost reduction programs.

7. Supervise follow-up, control and monitoring programs to ensure achievement of results and continuation of the improved performance.

In addition to the cost reductions which would result from these programs, they would provide the company with a trained group of work study and operator training personnel and industrial engineering and analytical training programs which could be extended into other areas of the company.

These programs would require several calendar years for completion, and the estimated cost is $400,000 for spinning and $400,000 for weaving.

L. ENGINEERING OF WARPING AND SIZING

The warping and sizing operations are centralized, and the quality of the sized beams has a significant effect on weaving efficiency. As pointed out in Section II, Part Two, one percent increase in weaving efficiency could result in additional contribution of about $80,000 per year. Therefore, it is recommended that an engineering program be conducted in this department, concentrating on improving the quality of the sized beams but also including methods improvement and development of standards for equipment productivity and labor.

The estimated cost of this program is $60,000.

M. START-UP ASSISTANCE IN THE NEW YARN MILL

To ensure an effective start-up of the new yarn plant, a program of technical assistance is recommended. The program should include the following:

1. Development of standards for productivity, machine efficiencies, labor, waste and quality.

2. Development of control and reporting systems for productivity, machine efficiencies, labor, waste and quality.

3. Training of first-line supervision.

4. Implementation of an analytical training program for operating personnel.

5. Development of a schedule for machine erection, machine commissioning, personnel intake and training, and production buildup.

6. Overall coordination of plant start-up.

The estimated cost of this assistance is $160,000.

SECTION II: GENERAL OBSERVATIONS

A. LONG-RANGE PLANNING

1. Introduction

During the course of this study, the desirability of the preparation of a formal long-range plan was noted. In view of the size, product diversity and complexity of the company, coupled with the dynamic nature of world textile markets and textile production and the rapid development and increasing cost of textile technology, the need for a formal long-range plan for Misr Spinning and Weaving Company is particularly acute.

2. Philosophy and Objectives

As the first step in the development of a long-range plan, it is suggested that management develop a clearly stated corporate philosophy. This should state the basic beliefs of management and what the company "stands for." It should place emphasis on those aspects of the company which management wishes to stress, for example, its people, product quality, product development, technological leadership, efficiency, customer service, etc. The philosophy should articulate the underlying mental attitude against which corporate objectives can be developed and within which management actions and activities will be taken.

Following the statement of corporate philosophy, a brief set of overall corporate objectives should be developed. These should include the following:

- Financial objectives.
- Market objectives.
- Growth objectives.

3. Market Plan

The marketing plan should form the basis of the overall long-range plan. This plan should look out into the future in a fairly definitive way for three years and in a general way for at least five years. The market plan should include at least the following:

a. Analysis of domestic market by major product group.

b. Analysis of export markets by major product group.

c. Analysis of major competitors domestically and in the export markets.

d. Analysis of the company's strengths and weaknesses in such areas as product design, product quality, product costs, and customer service.

e. Determination of percent of sales desired for domestic and export by major product group.

f. Three-year projection, by year, of sales volume, by major product group, and by country.

g. A more general projection for at least five years of sales volume by major product group for domestic and export sales.

h. Identification of areas of weakness and plans for improvement, for example, product development, sales force, product quality, etc.

4. Manufacturing Plan

The manufacturing plan should be developed from the marketing plan. Current manufacturing capabilities and capacities should be compared with the marketing projections. Requirements for additional capabilities or capacities should then be developed. Cost estimates for equipment replacement or additions should be prepared, together with a timetable for developing the required capabilities and capacities to meet the market projections. The manufacturing plan should include items such as the following:

- Projected product capabilities.
- Projected capacities by major product group.
- Projected space and equipment requirements.
- Plans for effecting productivity and quality improvements.
- Projected expenditures for plant and equipment.
- Projected labor requirements.
- Projected manufacturing costs.

5. **Personnel and Management**

Based upon the manufacturing plan, a management and personnel plan should be developed. This should include an analysis of personnel, supervisory and management requirements, taking into account anticipated turnover and retirements. Key management requirements should be noted and candidates for filling the requirements identified. Plans should then be developed for preparing the candidates to fill the identified positions.

Anticipated reductions in direct and indirect labor through technological improvements and productivity improvement programs should be developed and compared with anticipated requirements in new or expanded production units. Plans should then be developed for transferring and retraining these personnel.

6. **Support Functions**

To support the market and manufacturing plans, the support functions should develop plans for their areas of responsibility. These should include planning and control systems, quality control, maintenance and engineering, power and water, etc.

7. **Financial Plan**

Based upon the market, manufacturing, personnel and support function plans, a financial plan should be developed. This plan should include at least the following:

- Investment requirements.
- Projected changes in costs and expenditures.
- Cash flow projections.
- Pro forma profit and loss statements.
- Projected balance sheets.

8. Long-Range Planning Responsibility

Long-range planning should be the responsibility of the Chairman. It might be desirable to form a Long-Range Planning Committee consisting of the Chairman, Financial Director, Marketing Director and a senior manufacturing manager. This committee should develop a format for the plan elements, establish timetables for completion of each element and review and approve the elements and the final plan. Each year, the plan should be updated.

The first year the plan is developed will be the most difficult. However, in view of the magnitude of the proposed expenditures and the work which has already gone into the analysis and development of these, it is suggested that serious consideration be given to the development of a long-range plan by the end of 1976.

B. ANALYTICAL OPERATOR TRAINING

1. Background

Textile and apparel manufacturers are faced with a severe shortage of skilled workers in most parts of the world. Due to the increased skill requirements in these industries, employee selection, training and retraining procedures demand intensive appraisal by manufacturers. These functions have assumed a new importance; and, in the majority of companies, the need to upgrade them has become critical. The traditional training procedures followed by most manufacturers have been unsystematic, increasingly expensive and generally ineffective.

A basic analytical approach to training has been used successfully in many industries since its development in Great Britain during World War II. Since the early 1960's, analytical training has given the textile and apparel industries a scientific, specialized and systematic approach to the task of training textile and sewing machine operators. As practiced, it combines basic industrial engineering with concentrated training techniques to provide manufacturers with a highly effective means for both training new employees and retraining experienced operators whose performance is lagging or whose job content is substantially changed.

From our observations at the Misr Spinning and Weaving Company, it is our opinion that the application of analytical training to the training of employees in the proposed new manufacturing units and to the retraining of current employees could lead to significant improvements in productivity.

2. Objectives of Analytical Training

The underlying purpose of analytical training is to provide a company with the means to develop and improve human skills and performance rapidly and effectively. Providing good training and retraining for a company's employees is a humane and worthwhile project. To be successful in this development of operator skills, analytical training must be carefully planned, guided and controlled in order to achieve the following specific objectives:

a. *Increased Productivity*

Increased productivity is realized by:

- Training new operators faster.
- Raising the performance of experienced operators by retraining.
- Raising the performance of transferred operators (experienced operators who have been changed to a different job or product).
- Reducing labor turnover or failure rates, particularly among new employees.

b. *Reduced Labor Turnover or Failure Rate*

The turnover rate, or failure rate, in most companies tends to be highest during the learning period. Once a new operator achieves the performance level of the experienced operators, he or she tends to stay with the job except for mainly unavoidable causes and particularly upsetting circumstances.

Analytical training has its main effect on the inexperienced operator turnover, or failure, by helping new operators to gain job satisfaction and high performance and earnings in a much shorter time.

Control and reduction of unwanted turnover, or failure, during plant start-up or expansion is also of particular importance, since during expansion it is usually necessary to dip lower into the labor pool for new recruits or transfers; and the lower down the list of qualified prospects a company goes; the greater the need for intensified training.

c. *Improved Quality*

Another aim of analytical training is the improvement of the quality of operators' work by the development of correct job methods and skills. This is true not only with completely unskilled operators but also with experienced operators who may be highly productive but whose quality performance is poor.

In addition to the above, analytical training helps provide:

- Improved recruiting.
- Improved job methods.
- Improved supervision.
- Fixed overhead recovery.
- Increased plant flexibility.

3. Elements of Analytical Training

Much of the success achieved with analytical training can be traced to two key elements:

- Complicated production operations are broken down to their smallest component skills through detailed scientific analysis so that they can be taught effectively through repetitive practice and a "rebuilding" of the components into the complete operation.

- The specialized analytical training technique is applied from an engineering perspective. Training specialists who are also experienced production engineers must design and install analytical programs to fit the particular conditions and requirements of the labor force, the individual plant and the particular product or products to be manufactured.

4. Method of Accomplishing Objectives

Some salient characteristics of the analytical training approach include:

a. Separate training centers in which trainees and retrainees can concentrate upon learning without the distractions of the production floor. These centers should be located within, or contiguous to, each major production unit.

b. Analysis of the operation to be trained isolates its various skill elements, which provide the basis for designing a series of training exercises. As the analytical training program develops, a resident training director begins to do this important work on his own, having developed the necessary skills for doing so during the initial start-up phase.

c. Basic skill exercises are practiced by the operator in short, repetitive exercises but at full production speed. As the trainess reaches a predetermined level of proficiency in each skill, he or she goes on to more difficult exercises. Gradually, skills are combined until the operator is practicing the entire operation.

d. Stamina buildup is achieved as the trainee progresses from short practice runs to longer and longer cycles, until he or she develops the stamina to perform the operation properly over a full day.

e. Training instructors work closely with the new operators, as well as with experienced operators undergoing retraining. Under the supervision of the training director, they provide constant instruction and follow-up to ensure that the training will last.

f. Selection and testing procedures must be modernized to give analytical training programs the best opportunity to succeed. In particular, proper testing of new recruits and retrainees makes it possible to match the abilities of an employee, such as finger dexterity or eye-hand coordination — with the physical requirements of a particular operation.

Obviously, one of the most important phases of the analytical training program begins with the search for and selection of the training director and instructors. The success of the training program depends upon these people since they are the ones who have the day-to-day contact with and responsibility for those being trained.

Their training is equally important and must be under the initial guidance of a graduate engineer specializing in textile/apparel training and with experience in the specific or closely allied product.

5. Results in Plants Using Analytical Training

Typical results achieved in plants using analytical training have been:

Reduction in Training Times	
— Successful Trainees	69%
— Unsuccessful Trainees	59%
Reduction of Unearned Pay (or, Losses Sustained Due to Guaranteed Wage)	
— Successful Trainees	67%
— Unsuccessful Trainees	54%
Reduction of Replacement Costs	65%
Productivity Increases Retrainees	32%

An understanding of these numbers can only lead one to the conclusion that other improvements must follow and that everyone involved must benefit. As mentioned earlier, some of the additional improvements take the form of such things as:

- Increased earnings.
- Overhead recovery.
- Reduced turnover.
- Improved quality
- Increased flexibility.
- Improved morale.
- Improved supervision.

C. INDUSTRIAL ENGINEERING

The industrial engineering function at Mehalla is weak relative to the potential for cost reduction and overall manufacturing improvement. As pointed out several times in this report, one of the primary challenges to Mehalla management is to improve labor productivity. Industrial engineering can be the primary function for the development of productivity improvement.

It is recommended that additional emphasis be given to industrial engineering; that an effective industrial engineering staff be developed; that specific programs with quantified goals be planned and that the industrial engineering effort be measured against these goals.

As labor costs increase, the competitiveness of Mehalla may diminish unless considerable effort and attention is devoted to the improvement of productivity.

PART FOUR

FINANCIAL ANALYSIS

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PART FOUR

FINANCIAL ANALYSIS

A. CURRENCY EXCHANGE RATE

The financial data for the Misr Spinning and Weaving Company used in this section of the report are based on the company's records which are stated in terms of Egyptian pounds. Conversion of these amounts has been made to U.S. dollars at a rate of US $2.564 per one Egyptian pound.

B. AGE OF INVESTMENT IN MACHINERY

According to the records of the company, acquisitions of present machinery and equipment were made as follows:

Year	Current Age	Acquisition Cost (in 1,000's) £E	US $	Annual %	Cum. %
1975	1	2,732	7,005	10.2	10.2
1974	2	1,089	2,792	4.1	14.3
1973	3	1,889	4,843	7.1	21.4
1972	4	1,141	2,926	4.3	25.7
1971	5	1,184	3,036	4.4	31.1
1970	6	3,211	8,233	12.0	43.1
1969	7	258	661	1.0	44.1
1968	8	206	528	.8	44.9
1967	9	193	495	.7	45.6
1966	10	51	131	.2	45.8
1965	11	269	690	1.0	46.8
Before(1)	12+	14,490	37,152	54.2	100.0
Total		26,713	68,492	100.0	

The above table indicates that, based on equipment purchase prices, 54.2% of present machinery is 12 or more years old. The original cost of the pre-1965 equipment was US $37,152,000.

(1) Based on an adjustment in acquisition costs made after the nationalization of the company on June 30, 1965.

Assuming an annual inflation rate of 10% in the 12 years between 1964 and 1976, the current replacement cost of present equipment over 12 years in age would be 313% of original cost of US $116,000,000 ($37,152,000 x 3.13).

Based on the above, an expenditure in the range of $100,000,000 for new equipment over the next three years would appear to be reasonable.

C. COMPANY'S OVERALL PROFITS: 1971 – 1975

To provide a base for evaluating the return on investment and cash flow that will be generated by new facilities acquisitions, the profit history of the company was analyzed for the five-year period (1971 to 1975).

Exhibit I (Cost of Sales, 1971 – 1975) details production costs for this five-year period. In summary, it shows the following distribution of major manufacturing cost categories over this period:

Cost Category	In 1,000 £E Production Departments	Production Service Depts.	Total	1,000 US Dollars	% Of Total
Cotton	66,757	–	66,757	171,165	37.7
Wool and Synthetics	15,787	–	15,787	40,478	8.9
Chemicals	8,179	518	8,697	22,299	4.9
Fuel	450	4,747	5,197	13,325	2.9
Spare Parts	7,307	4,741	12,048	30,891	6.8
Packing	2,651	298	2,949	7,561	1.7
Total Material	101,131	10,304	111,435	285,719	62.9
Wages	39,088	10,689	49,777	127,628	28.1
Depreciation	7,661	3,210	10,871	27,873	6.1
Indirect Taxes	9,797	384	10,181	26,104	5.7
Other Expenses	793	1,408	2,201	5,643	1.2
Less Sales Credits(1)	(3,495)	(3,667)	(7,162)	(18,363)	(4.0)
Total	154,975	22,328	177,303	454,605	100.0

Exhibit II (Profit and Loss Before Taxes, 1971 – 1975) develops the before tax profits for this period.

In summary, these profits for the five-year period were:

(1) Sales of waste and services.

	1971	1972	1973	1974	1975	5-Year Total
			IN 1,000 £E			
Net Sales	37,317	39,335	40,983	48,749	54,881	221,265
Cost of Sales	32,010	33,074	33,933	34,852	42,241	176,110
Gross Margin	5,307	6,261	7,050	13,897	12,640	45,155
Marketing Expense	869	984	1,004	984	953	4,794
Administrative Expense	1,802	2,334	2,403	2,823	2,710	12,072
Operating Profit	2,636	2,943	3,643	10,090	8,977	28,289
Subsidies	3,107	1,907	1,183	1,269	775	8,241
Other Income	503	528	1,187	766	506	3,490
Net Before Tax Profit	6,246	5,378	6,013	12,125	10,258	40,020
			IN 1,000 US $			
Net Sales	95,681	100,855	105,080	124,992	140,715	567,323
Cost of Sales	82,074	84,802	87,004	89,360	108,306	451,546
Gross Margin	13,607	16,053	18,076	35,632	32,409	115,777
Marketing Expense	2,228	2,523	2,574	2,523	2,444	12,292
Administrative Expense	4,620	5,984	6,162	7,238	6,948	30,952
Operating Profit	6,759	7,546	9,340	25,871	23,017	72,533
Subsidies	7 966	4,889	3,034	3,254	1,987	21,130
Other Income	1,290	1,354	3,043	1,964	1,297	8,948
Net Before Tax Profit	16,015	13,789	15,417	31,089	26,301	102,611

As a percent of net sales, the above represent the following:

Gross Margin	14.2	15.9	17.2	28.5	23.0	20.4
Marketing Expense	2.3	2.5	2.4	2.0	1.7	2.2
Administrative Expense	4.8	5.9	5.9	5.8	4.9	5.4
Operating Profit (Without Subsidies)	7.1	7.5	8.9	20.7	16.4	12.8
Subsidies	8.3	4.8	2.9	2.6	1.4	3.7
Operating Profit (With Subsidies)	15.4	12.3	11.8	23.3	17.8	16.5
Net Before Tax Profit	16.7	13.7	14.7	24.9	18.7	18.1

The above five years' average operating profit of 12.8% (or 16.5% after export subsidies) is substantially greater than experienced by the typical American textile firm. For reference, following are the percent of operating profits in 1974 for some large North American firms:

Burlington Industries	—	9.29
J.P. Stevens	—	7.29
WestPoint Pepperell	—	8.31
Springs Mills	—	9.02
M. Lowenstein	—	5.46
Dan River	—	5.09
Cone Mills	—	7.83
Cannon Mills	—	5.80
Collins & Aikman	—	8.62
Dominion Textiles	—	12.07
Fieldcrest	—	6.93
Riegel Textiles	—	7.50

The relatively high operating profits of Mehalla reflect a basic ability to generate profits and cash flow needed to pay back borrowings required for a large capital improvement program. Mehalla's profits were attributable in part to the ability to purchase cotton at prices substantially below world market prices. Should this change in the future, the effect on the company's profitability would be quite significant. This is covered in more detail later in this part of the report.

EXHIBIT I

COST OF SALES 1971 – 1975 (IN £E 1,000)

Cost Items	1971 Amount	1971 %	1972 Amount	1972 %	1973 Amount	1973 %	1974 Amount	1974 %	1975 Amount	1975 %	5-Year Total Amount	5-Year Total %
Production Department Costs												
1. Cotton	13,326	42.7	13,615	39.9	13,406	39.2	13,255	35.6	13,156	32.4	66,757	37.7
2. Wool and Synthetics	2,347	7.5	3,046	8.9	2,822	8.3	3,670	9.9	3,903	9.6	15,787	8.9
3. Chemicals	1,317	4.2	1,451	4.2	1,409	4.1	1,578	4.2	2,424	6.0	8,179	4.6
4. Fuel	72	.2	81	.2	81	.2	95	.2	121	.3	450	.2
5. Spare Parts	1,233	4.0	1,267	3.7	1,346	3.9	1,547	4.2	1,914	4.7	7,307	4.1
6. Packing	337	1.1	564	1.7	492	1.5	486	1.3	772	1.9	2,651	1.5
7. Total Material (1. – 6.)	18,631	59.7	20,023	58.6	19,556	57.2	20,631	55.4	22,290	54.9	101,131	57.0
8. Wages	5,933	19.0	7,024	20.6	7,633	22.4	8,320	22.4	10,178	25.1	39,088	22.1
9. Misc. Services	120	.4	169	.5	154	.5	206	.5	144	.4	793	.4
10. Depreciation – Building	240	.8	240	.7	241	.7	253	.7	257	.6	1,231	.7
11. Depreciation – Equipment	1,214	3.9	1,271	3.7	1,307	3.8	1,365	3.7	1,273	3.1	6,430	3.6
12. Indirect Taxes	1,660	5.3	1,868	5.5	1,782	5.2	2,051	5.5	2,436	6.0	9,797	5.5
13. Subtotal (8. – 12.)	9,167	29.4	10,572	31.0	11,117	32.6	12,195	32.8	14,288	35.2	57,339	32.3
14. Total Production Cost (7. + 13.)	27,798	89.1	30,595	89.6	30,673	89.8	32,626	88.2	36,578	90.1	158,470	89.3
15. Less: Waste Sales	(346)	(1.1)	(472)	(1.4)	(739)	(2.2)	(705)	(1.9)	(819)	(2.0)	(3,081)	(1.7)
16. Less: Service Sales	(61)	(.2)	(83)	(.2)	(83)	(.3)	(51)	(0.1)	(136)	(.3)	(414)	(.2)
17. Net Departmental Costs (14. – 15. – 16.)	27,391	87.8	30,040	88.0	29,851	87.3	32,070	86.2	35,623	87.7	154,975	87.4
Production Service Costs												
18. Chemicals	74	.2	88	.3	103	.3	110	.3	143	.3	518	.3
19. Fuel	857	2.8	924	2.7	961	2.8	965	2.6	1,040	2.6	4,747	2.7
20. Spare Parts	786	2.5	681	2.0	859	2.5	1,195	3.2	1,220	3.0	4,747	2.7
21. Packing	67	.2	37	.1	42	.1	70	.2	82	.2	298	.2
22. Total Material (18. Through 21.)	1,784	5.7	1,730	5.1	1,965	5.7	2,340	6.3	2,485	6.1	10,304	5.9
23. Wages	1,750	5.6	1,982	5.8	2,061	6.0	2,229	6.0	2,667	6.6	10,689	6.0
24. Misc. Services	268	.8	303	.9	263	.8	399	1.1	175	.4	1,408	.8
25. Depreciation – Building	239	.8	247	.7	255	.8	260	.7	265	.7	1,266	.7
26. Depreciation – Equipment	246	.8	240	.7	238	.7	240	.7	239	.6	1,203	.7
27. Depreciation – Transport Equip.	56	.2	125	.4	172	.5	196	.5	192	.5	741	.4
28. Indirect Taxes	67	.2	52	.1	81	.2	90	.2	94	.2	384	.2
29. Subtotal (23. Through 28.)	2,626	8.4	2,949	8.6	3,070	9.0	3,414	9.2	3,632	9.0	15,691	8.8

EXHIBIT I (CONTINUED)

Cost Items	1971 Amount	1971 %	1972 Amount	1972 %	1973 Amount	1973 %	1974 Amount	1974 %	1975 Amount	1975 %	5-Year Total Amount	5-Year Total %
30. Total Production Service Exp. (22. + 29.)	4,410	14.1	4,679	13.7	5,035	14.7	5,754	15.5	6,117	15.1	25,995	14.7
31. Less: Value of Internal Work Orders	(501)	(1.6)	(457)	(1.3)	(557)	1.6	(468)	(1.3)	(960)	(2.4)	(2,943)	(1.7)
32. Less: Service Sales	(100)	(.3)	(140)	(.4)	(165)	.5	(154)	(0.4)	(165)	(.4)	(724)	(.4)
33. Net Production Service Costs (30. – 31. – 32.)	3,809	12.2	4,082	12.0	4,313	12.6	5,132	13.8	4,992	12.3	22,328	12.6
34. Total Manufacturing Cost (17. + 33.)	31,200	100.0	34,122	100.0	34,164	100.0	37,207	100.0	40,615	100.0	177,303	100.0
35. Less: Inv. Increase (Decrease)	(810)	(2.6)	1,048	3.1	231	.7	2,350	6.3	(1,626)	(4.0)	1,193	.7
36. Cost of Sales (34. – 35)	32,010	102.6	33,074	96.9	33,933	99.3	34,852	93.7	42,241	104.0	176,110	99.3

EXHIBIT II

PROFIT AND LOSS BEFORE TAXES 1971 – 1975 (IN £E 1,000)

Cost Items	1971 Amount	1971 %	1972 Amount	1972 %	1973 Amount	1973 %	1974 Amount	1974 %	1975 Amount	1975 %	5-Year Total Amount	5-Year Total %
1. Gross Sales	37,824	101.4	40,018	101.7	41,541	101.4	49,338	101.2	55,534	101.2	224,255	101.4
2. Less Rejects	157	.4	230	.6	43	.1	124	.3	275	.5	829	.4
3. Less Discounts	40	.1	43	.1	39	.1	14	–	–	–	136	.1
4. Less Transportation Paid	300	.8	398	1.0	467	1.2	440	.9	375	.7	1,980	.9
5. Less Gifts and Samples	10	.1	12	–	9	–	11	–	3	–	45	–
6. Total Deductions (2. – 5.)	507	1.4	683	1.7	558	1.4	589	1.2	653	1.2	2,990	1.4
7. Net Sales (1. – 6.)	37,317	100.0	39,335	100.0	40,983	100.0	48,749	100.0	54,881	100.0	221,265	100.0
8. Cost of Sales	32,010	85.8	33,074	84.1	33,933	82.8	34,852	71.5	42,241	77.0	176,110	79.6
9. Gross Margin (7. – 8.)	5,307	14.2	6,261	15.9	7,050	17.2	13,897	28.5	12,640	23.0	45,155	20.4
10. Marketing – Salaries	211	.6	230	.6	241	.6	255	.5	310	.6	1,247	.6
11. Marketing Commissions	259	.7	329	.8	370	.9	320	.7	243	.4	1,521	.7
12. Marketing Other	399	1.0	425	1.1	393	.9	409	.8	400	.7	2,026	.9
13. Marketing Total (10. – 12.)	869	2.3	984	2.5	1,004	2.4	984	2.0	953	1.7	4,794	2.2
14. Administrative Salaries	1,409	3.8	1,885	4.8	1,908	4.7	2,087	4.3	2,025	3.7	9,314	4.2
15. Administrative Depreciation	55	.1	60	.1	63	.1	63	.1	66	.1	307	.1
16. Administrative Other	338	.9	389	1.0	432	1.1	673	1.4	619	1.1	2,451	1.1
17. Administrative Total (14. – 16.)	1,802	4.8	2,334	5.9	2,403	5.9	2,823	5.8	2,710	4.9	12,072	5.4
18. Operating Profit Before Subsidy (9.-13.-17.)	2,636	7.1	2,943	7.5	3,643	8.9	10,090	20.7	8,977	16.4	28,289	12.8
19. Subsidies Received	3,107	8.3	1,907	4.8	1,183	2.9	1,269	2.6	775	1.4	8,241	3.7
20. Operation Profit after Subsidy (18.+19.)	5,743	15.4	4,850	12.3	4,826	11.8	11,359	23.3	9,752	17.8	36,530	16.5
21. Interest Received	206	.6	205	.5	265	.6	280	.6	324	.6	1,280	.5
22. Interest Paid	16	.1	100	.2	123	.3	107	.2	183	.3	529	.2
23. Net Interest Received (21. – 22.)	190	.5	105	.3	142	.3	173	.4	141	.3	751	.3
24. Misc. Income (Net of Misc. Deductions)	313	.8	423	1.1	1,045	2.6	593	1.2	365	.7	2,739	1.3
25. Net Before Tax Profit (20.+23.+24.)	6,246	16.7	5,378	13.7	6,013	14.7	12,125	24.9	10,258	18.7	40,020	18.1

D. PROFIT BY MAJOR PRODUCT GROUPS

To provide a further basis for evaluating the feasibility of new equipment purchases, we also analyzed cost of sales and profits by major product groups for the year 1974 and the first six months of 1975 (detailed information by product groups for the full year 1975 was not available at the time of this study). These analyses are contained in Exhibit III (1974) and Exhibit IV (six months' 1975).

In summary, these show the following percentages (of net sales):

Product Group	1974 Cost of Sales	1974 Gross Margin	1974 Operating Profit	6 Months 1975 Cost of Sales	6 Months 1975 Gross Margin	6 Months 1975 Operating Profit
Cotton Yarn	54.3	45.7	37.8(1)	55.6	44.4	37.7(1)
Cotton Fabrics	79.2	20.8	13.0(1)	80.8	19.2	12.5(1)
Cotton/Wool	79.6	20.4	12.7	76.1	23.9	17.1
Garments	77.7	22.3	14.5	71.7	28.3	21.6
Carded Wool Yarn	83.0	17.0	9.4	93.3	6.7	.0
Worsted Wool Yarn	83.1	16.9	9.1	89.4	10.6	3.8
Wool Fabrics	62.6	37.4	29.6	71.0	29.0	22.2
Total	71.5	28.5	20.7	73.8	26.2	19.5

The ratios are provided for reference only. They are not used in subsequent evaluations because transfers between areas are based on costs. They do, however, indicate all product categories involved in the proposed investment plan are profitable.

(1) The percents for cotton yarn and fabrics exclude export subsidies. In 1974, the subsidies amounted to a 6.9% of net sales for cotton yarn and 1.8% for cotton fabric. In the first six months of 1975, these subsidies amounted to 3.9% for cotton yarn and 1.0% for cotton fabrics. Overall, these subsidies amounted to 2.6% of total net sales in 1974 and 1.2% in the first six months of 1975.

EXHIBIT III

PROFIT ANALYSIS BY PRODUCT GROUPS – 1974

(IN £E 1,000)

Item	Total		Cotton Spinning		Cotton Fabrics		Cotton/ Wool		Ready-made Garments		Carded Wool Yarn		Worsted Wool Yarn		Wool Fabrics	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1. Material Used (Incl. Spare Parts & Packing)	20,631	55.4	13,596	67.9	2,336	10.3	532	64.0	185	3.6	495	75.1	3,310	85.2	177	4.1
2. Transfers in Of Processed Material	–		–	-	13,133	57.8	–	–	4,002	78.8	–	–	–	–	3,182	74.3
3. Departmental Wages	8,320	22.4	2,797	14.0	3,685	16.2	130	15.6	677	13.0	114	17.3	363	9.4	554	12.9
4. Departmental Services	206	.5	12	–	137	.6	16	1.9	28	.5	1	.2	1	–	11	.3
5. Depreciation and Indirect Taxes	3,669	9.9	2,400	12.0	828	3.6	54	6.5	56	1.1	30	4.5	227	5.8	74	1.7
6. Allocated Production Service Expense	5,132	13.8	1,773	8.8	2,614	11.5	100	12.0	155	3.0	39	5.9	161	4.1	290	6.8
7. Subtotal (1.+2.+3.+4.+5.+6.)	37,958	102.0	20,578	102.7	22,733	100.0	832	100.0	5,193	100.0	679	103.0	4,062	104.5	4,288	100.1
8. Less Sales of Waste and Services	756	2.0	549	2.7	6	–	–	–	–	–	20	3.0	176	4.5	5	.1
9. Total Production Cost (7. – 8.)	37,202	100.0	20,029	100.0	22,727	100.0	832	100.0	5,193	100.0	659	100.0	3,886	100.0	4,283	100.0
10. Transfers to Other Departments	–	–	13,133	65.6	3,121	13.7	41	4.9	–	–	568	86.2	2,573	66.2	971	22.7
11. Inventory Build-up (Decrease)	2,350	6.3	266	1.3	1,087	4.8	88	10.6	69	1.3	3	.5	172	4.4	665	15.5
12. Net Sales	48,749	100.0	12,202	100.0	23,369	100.0	883	100.0	6,590	100.0	106	100.0	1,372	100.0	4,227	100.0
13. Cost of Sales (9.–10.–11.)	34,852	71.5	6,630	54.3	18,519	79.2	703	79.6	5,124	77.7	88	83.0	1,141	83.1	2,647	62.6
14. Gross Margin (12. – 13.)	13,897	28.5	5,572	45.7	4,850	20.8	180	20.4	1,466	22.3	18	17.0	231	16.9	1,580	37.4
15. Marketing Expenses	984	2.0	257	2.1	468	2.0	17	1.9	130	2.0	2	1.8	27	2.0	83	2.0
16. Administrative Expenses	2,823	5.8	707	5.8	1,353	5.8	51	5.8	382	5.8	6	5.8	79	5.8	245	5.8
17. Operating Profit (14.–15.–16.)	10,090	20.7	4,608	37.8	3,029	13.0	112	12.7	954	14.5	10	9.4	125	9.1	1,252	29.6
18. Subsidies	1,269	2.6	847	6.9	422	1.8	–	–	–	–	–	–	–	–	–	–
19. Operating Profit After Subsidies (17.+18.)	11,359	23.3	5,455	44.7	3,451	14.8	112	12.7	954	14.5	10	9.4	125	9.1	1,252	29.6

EXHIBIT IV

PROFIT ANALYSIS BY PRODUCT GROUPS – FIRST SIX MONTHS – 1975

(IN £E 1,000)

	Item	Total		Cotton Spinning		Cotton Fabrics		Cotton/ Wool		Ready-made Garments		Carded Wool Yarn		Worsted Wool Yarn		Wool Fabrics	
		Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
1.	Materials Used (Incl. Spare Parts & Packing)	10,734	54.5	6,763	65.1	1,316	10.8	292	65.9	159	5.5	256	73.4	1,825	85.2	123	5.6
2.	Transfers In of Processed Material	–	–	–	–	7,099	58.1	–	–	2,239	77.5	–	–	–	–	1,558	71.5
3.	Departmental Wages	4,798	24.4	1,605	15.5	2,077	17.0	75	16.9	427	14.7	71	20.3	217	10.1	327	15.0
4.	Departmental Services	125	.6	9	.1	81	.7	2	.5	29	1.0	–	–	1	–	3	.1
5.	Depreciation and Indirect Taxes	1,997	10.1	1,415	13.6	385	3.2	25	5.6	27	.9	6	1.7	109	5.1	29	1.3
6.	Allocated Production Service Expense	2,480	12.6	858	8.3	1,260	10.3	49	11.1	74	2.6	19	5.4	81	3.8	139	6.4
7.	Subtotal (1.+2.+3.+4.+5.+6.)	20,134	102.2	10,650	102.6	12,218	100.1	443	100.0	2,955	102.3	352	100.8	2,233	104.2	2,179	100.0
8.	Less Sales of Waste and Seconds	431	2.2	265	2.6	6	.1	–	–	67	2.3	3	.8	90	4.2	–	–
9.	Total Production Cost (7. – 8.)	19,703	100.0	10,385	100.0	12,212	100.0	443	100.0	2,888	100.0	349	100.0	2,143	100.0	2,179	100.0
10.	Transfers to Other Departments	–	–	7,099	68.4	1,866	15.3	18	.4	–	–	302	86.5	1,238	57.8	373	17.1
11.	Inventory Build-up (Decrease)	(72)	(.4)	396	3.8	(578)	(4.7)	(15)	(3.4)	18	.6	(9)	(2.6)	153	7.1	(37)	(1.7)
12.	Net Sales	26,798	100.0	5,195	100.0	13,525	100.0	578	100.0	4,005	100.0	60	100.0	841	100.0	2,594	100.0
13.	Cost of Sales (9.–10.–11.)	19,775	73.8	2,890	55.6	10,924	80.8	440	76.1	2,870	71.7	56	93.3	752	89.4	1,843	71.0
14.	Gross Margin (12. – 13.)	7,023	26.2	2,305	44.4	2,601	19.2	138	23.9	1,135	28.3	4	6.7	89	10.6	751	29.0
15.	Marketing Expenses	443	1.6	86	1.6	223	1.6	10	1.7	66	1.6	1	1.6	14	1.7	43	1.7
16.	Administrative Expenses(1)	1,355	5.1	263	5.1	684	5.1	29	5.1	202	5.1	3	5.1	43	5.1	131	5.1
17.	Operating Profit (14. – 15. – 16.)	5,225	19.5	1,956	37.7	1,694	12.5	99	17.1	867	21.6	–	–	32	3.8	577	22.2
18.	Subsidies	335	1.2	203	3.9	132	1.0										
19.	Operating Profit After Subsidies (17.+18.)	5,560	20.7	2,159	41.6	1,826	13.5	99	17.1	867	21.6	–	–	32	3.8	577	22.2

(1) Administrative expenses used above based on 1/2 of total 1975 administrative expenses.

E. RECOMMENDED CAPITAL EXPENDITURES

Exhibit V, Summary of Recommended Capital Expenditures, contains a summary of the various recommendations made in other sections of this report for equipment purchases and construction of new buildings. In brief, these are as follows by source (in US $):

Area	Foreign Exchange	Local Currency	Total
Cotton Yarn	$21,956,240	$ 8,096,150	$ 30,052,390
Cotton Fabrics	22,138,710	10,584,519	32,723,229
Wool and Worsted Yarns	6,727,492	1,886,361	8,613,853
Wool and Worsted Fabrics	5,379,224	1,876,125	7,255,349
Garments	3,310,526	351,942	3,662,468
Total Production Depts.	$59,512,192	$22,795,097	$ 82,307,289
Total Service Depts.	14,425,000	7,374,400	21,799,400
Total Basic Project Costs	$73,937,192	$30,169,497	$104,106,689

The costs represent our best estimates as to the current prices of the recommended equipment and building construction costs. To these we recommend that a 10% contingency factor and a 15% inflation factor be added. The inflation factor is based upon the assumption that contracts for the equipment will be placed in two years and 7.5% inflation rate per year is provided for.

Applying these two factors, the total equipment and building costs would be:

	Foreign Exchange	Local Currency	Total
Basic Estimated Cost	$73,937,192	$30,169,497	$104,106,689
10% Contingency Factor	7,393,719	3,016,950	10,410,669
Subtotal	$81,330,911	$33,186,447	$114,517,358
Plus 15% Inflation Factor	12,199,637	4,977,967	17,177,604
Total	$93,530,548	$38,164,414	$131,694,962

It is to be noted that Exhibit V includes an amount of $624,000 for technical assistance for the garment plant. This is because productivity achieved in the garment plant will be related more to the technical aspects of the manufacturing system and to the individual operators than to the equipment itself. It is not a machine-paced operation as is generally the case in the spinning and weaving mills. As explained in more detail in the section of the report covering garments, it is essential that such technical assistance be made available concurrently with the installation of the equipment if desired production and quality levels are to be achieved. Therefore, this has been included as part of the cost of equipment for the garment area.

In other sections of the report, we have also recommended that technical assistance be provided in the spinning, weaving and finishing areas. However, since these processes are basically machine-paced, this assistance will not greatly increase machine production — mainly increase labor productivity, reduce waste losses and improve quality. Some of this assistance can be provided at a date subsequent to the installation of the equipment. However, we do believe the assistance should be provided within the scope of A.I.D.'s overall assistance program. Benefits from these assistance programs are not included in subsequent analyses, and the costs of these programs are assumed to be offset by cost reductions effected through the programs.

Adding the recommended technical assistance for spinning, weaving and finishing would bring the total A.I.D. commitment to:

Basic Project After Contingency and Inflation Factor	$93,530,548
Technical Assistance	
— Master Development Plan	70,000
— Equipment Specifications	60,000
— Bid Evaluations	120,000
— Materials Handling Study	165,000
— Survey of Cotton Spinning and Weaving	50,000
— Waste Control Program Cotton Spinning	160,000
— Production Control Program Cotton Spinning	120,000
— Cost Reduction Program Cotton Spinning	400,000
— Start-up Assistance in New Yarn Mill	160,000
— Engineering Warping and Sizing	60,000
— Waste Control Program Cotton Weaving	200,000
— Production Control Program Cotton Weaving	140,000
— Cost Reduction Program Cotton Weaving	400,000
Total Estimated Technical Assistance Cost	$ 2,105,000
Total Estimated US Dollar Project Cost	$95,635,548

KSA

EXHIBIT V

SUMMARY OF RECOMMENDED CAPITAL EXPENDITURES

(IN U.S. DOLLARS)

(EXCLUDING CONTINGENCY ALLOWANCE AND INFLATION FACTOR)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
				Departmental Service Equip.		Other Costs Related to Equip.			Total Costs	
Area	New Imported Equipment	Auxiliary Equip. & Accessories	Spare Parts	Foreign	Local	Foreign	Local	Build. Constr. Costs	Foreign Exchange	Local Currency
Yarn Mill No. 7	15,137,000	1,742,000	757,000	2,635,000	580,000	152,000	2,277,500	5,034,000	20,423,000	7,891,500
Twisting and Sewing Yarn	825,000	(In B)	41,250	–	6,000	9,000	113,000	–	875,250	119,003
Update Winding and Combing	–	–	657,990	–	–	–	85,650	–	657,990	85,650
Total Cotton Yarn	15,962,000	1,742,000	1,456,240	2,635,000	586,000	161,000	2,476,150	5,034,000	21,956,240	8,096,150
Cotton Weaving	10,446,800	(In B)	1,044,500	–	184,000	105,000	1,502,300	655,000	11,596,300	2,341,300
Warping and Slashing	606,440	(In B)	30,500	–	5,000	20,500	188,500	12,000	657,440	205,500
Cotton Finishing	8,557,206	(In B)	513,432	–	171,144	85,572	1,174,049	6,597,676	9,156,210	7,942,869
Update Looms	–	–	728,760	–	–	–	94,850	–	728,760	94,850
Total Cotton Fabrics	19,610,446	–	2,317,192	–	360,144	211,072	2,959,699	7,264,676	22,138,710	10,584,519
Wool Yarn Mills	6,115,900	(In B)	489,272	–	30,580	122,320	853,781	1,002,000	6,727,492	1,886,361
Wool Weave and Finish	4,802,880	(In B)	480,288	–	192,116	96,056	682,009	1,002,000	5,379,224	1,876,125
Total Wool Mills	10,918,780	–	969,560	–	222,696	218,376	1,535,790	2,004,000	12,106,716	3,762,486
New Sewing Factory	1,040,659	199,712	101,221	–	–	9,461	181,910	–	1,351,053	181,910
Replace Sewing Equipment	1,028,775	205,970	91,375	–	–	9,353	170,032	–	1,335,473	170,032
Technical Assistance	–	–	–	–	–	624,000	–	–	624,000	–
Total Garments	2,069,434	405,682	192,596	–	–	642,814	351,942	–	3,310,526	351,942
Total Production Areas	48,560,660	2,147,682	4,935,588	2,635,000	1,168,840	1,233,262	7,323,581	14,302,676	59,512,192	22,795,097
Power Plant Equipment	10,153,000	–	508,000	–	–	102,000	3,229,500	3,600,000	10,763,000	6,829,500
Foundry and Shops	793,000	–	40,000	–	5,000	45,000	164,800	–	878,000	169,800
Materials Handling	2,200,000	–	220,000	–	–	20,000	330,400	–	2,440,000	330,400
Fire Fighting Equipment	316,000	–	28,000	–	–	–	44,700	–	344,000	44,700
Total Service Equipment	13,462,000	–	796,000	–	5,000	167,000	3,789,400	3,600,000	14,425,000	7,374,400
Total Project	62,022,660	2,147,682	5,731,588	2,635,000	1,173,840	1,400,262	11,092,981	17,902,676	73,937,192	30,169,497

F. SALES GENERATED BY PROJECT

Exhibit VI, Estimated Sales Increases Under Project, develops a comparison of estimated pre-project 1976 sales volume with that projected after the installation of the project has been completed in 1980. This exhibit shows:

	In 1,000 £E			In 1,000 US $		
Product Category	Estimated 1976	Projected 1980	Increase	Estimated 1976	Projected 1980	Increase
Cotton Yarn	10,838	16,780	5,942	27,789	43,024	15,235
Cotton Fabrics	30,267	37,235	6,968	77,605	95,470	17,865
Cotton/Wool	1,064	1,064	–	2,728	2,728	–
Wool and Worsted Yarns	2,332	3,110	778	5,979	7,974	1,995
Wool and Worsted Fabrics	4,823	5,964	1,141	12,366	15,292	2,926
Garments	8,197	13,727	5,530	21,017	35,196	14,179
Total	57,521	77,880	20,359	147,484	199,684	52,200

This indicates the project will increase sales by 35.4% or $52,200,000.

In developing the above projected increase, we have ignored the probability of increased inflation in order to provide a more realistic evaluation of the true impact the project has on sales. We have also ignored the possibility that production volumes may decline as machines become older as, theoretically, this may happen to all equipment. We believe ignoring these two factors provides a more realistic and conservative evaluation of the merits of the project.

In Exhibit VI, the unit sales estimates used are based on those provided by Mehalla management. In some cases, these vary from those contained in Mehalla's initial study. The variations are noted on the various pages of Exhibit VI.

The unit sales prices used in Exhibit VI are 1975 unit prices as provided by Mehalla. These 1975 prices are also used in the 1980 projection except, as noted, where a change in product mix is forecasted. Examples of the forecasted product mix changes are higher sales of suits and of cotton fabrics with more costly finishes.

EXHIBIT VI

ESTIMATED SALES INCREASES UNDER PROJECT

1976 VERSUS 1980 (IN £E)

PRODUCT CATEGORY – COTTON YARN

Transaction	Estimated Sales Value of 1976 Production (At 1975 Prices)				Projected Sales Value with Project (At 1975 Prices)				Increase (Decrease) in Sales Value	
	Units Sold (Metric Tons)	Price per Unit	Sales Value Total Sales Value in 1,000£E	% of Total	Units Sold (Metric Tons)	Price per Unit	Sales Value Total Sales Value in 1,000£E	% of Total	Amount	%
Export Sales	7,000	1,320	9,240	85.3	12,000	1,320	15,840	94.4	6,600	71.4
Domestic Sales	1,700	940	1,598	14.7	1,000	940	940	5.6	(658)	(41.2)
Total Sales	8,700	1,246	10,838	100.0	13,000	1,291	16,780	100.0	5,942	54.8
Estimated Internal Transfers	26,500				29,200					
Total Sales and Transfers	35,200				42,200					

Comments:

(1) 1976 production units represent present production levels and sales.

(2) Projected production levels based on revised demand estimates utilizing equipment that was originally to be scrapped (projection of 42,200 tons compares with previous 1980 projection of 38,760 tons of production).

EXHIBIT VI (CONTINUED)
PRODUCT CATEGORY – COTTON FABRICS

Transaction	Estimated Sales Value of 1976 Production (At 1975 Prices) Units Sold (1,000 Meters)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Projected Sales Value with Project (At 1975 Prices) Units Sold (1,000 Meters)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Increase (Decrease) in Sales Value Amount	%
Export Sales	45,000	218	9,810	32.4	55,000	248	13,640	36.6	3,830	39.0
Domestic Sales	83,500	245	20,457	67.6	85,800	275	23,595	63.4	3,138	15.3
Total Sales	128,500	236	30,267	100.0	140,800	264	37,235	100.0	6,968	23.0
Estimated Internal Transfers	20,000				22,800					
Total Sales and Transfers	148,500				163,600					

Comments:

(1) Production quantities used are same as used in original projection.

(2) Projected price increases on export and local sales represent shift to more costly finishes.

EXHIBIT VI (CONTINUED)

PRODUCT CATEGORY – COTTON/WOOL

Transaction	Estimated Sales Value of 1976 Production (At 1975 Prices) Units Sold (Metric Tons)	Sales Value (1,000's) Price per Unit	Total Sales Value in 1,000 £E	% of Total	Projected Sales Value with Project (At 1975 Prices) Units Sold (Metric Tons)	Sales Value (1,000's) Price per Unit	Total Sales Value in 1,000 £E	% of Total	Increase (Decrease) in Sales Value Amount	%
Export Sales	650	591	384	36.1	650	591	384	36.1	–	–
Domestic Sales	1,000	680	680	63.9	1,000	680	680	63.9	–	–
Total Sales	1,650	645	1,064	100.0	1,650	645	1,064	100.0	–	–
Estimated Internal Transfers										
Total Sales and Transfers										

Comments: No new equipment proposed for cotton/wool production.

EXHIBIT VI (CONTINUED)

PRODUCT CATEGORY – WOOL AND WORSTED YARNS

Transaction	Estimated Sales Value of 1976 Production (At 1975 Prices)				Projected Sales Value with Project (At 1975 Prices)				Increase (Decrease) in Sales Value	
	Units Sold (Metric Tons)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Units Sold (Metric Tons)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Amount	%
Domestic Sales	540	4,320	2,332	100.0	720	4,320	3,110	100.0	778	33.4
Total Sales	540	4,320	2,332	100.0	720	4,320	3,110	100.0	778	33.4
Estimated Internal Transfers	1,390				2,264					
Total Sales and Transfers	1,930				2,984					

Comments:

(1) Internal transfers include blanket yarns of 190 tons in 1976 and 200 tons in 1980.
(2) Increase in units produced (from 1,880 to 1,930) over original estimate . represents current production level.
(3) Increase in projected units sold (from 2,850 to 2,984) represents greater projected internal use for garment production.

EXHIBIT VI (CONTINUED)

PRODUCT CATEGORY – WOOL AND WORSTED FABRICS

Transaction	Estimated Sales Value of 1976 Production (At 1975 Prices) Units Sold (1,000 Meters)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Projected Sales Value with Project (At 1975 Prices) Units Sold (1,000 Meters)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Increase (Decrease) in Sales Value Amount	%
Domestic Sales – Fabric	2,410	1,850	4,458	92.4	2,335	2,220	5,184	86.9	726	16.3
Domestic Sales – Blankets	150	2,436	365	7.6	320	2,436	780	13.1	415	114.0
Total Sales	2,560	1,883	4,823	100.0	2,655	2,246	5,964	100.0	1,141	23.7
Estimated Internal Transfers	760				1,775					
Total Sales and Transfers	3,320				4,430					

Comments:

(1) Blankets represent 70,000 units at 5.221/unit in 1976 and a projection in 1980 of 150,000 units at 5.221/unit.
(2) Increase of 20% in projected price per meter of fabrics represents combination of wider goods and more costly goods.

EXHIBIT VI (CONTINUED)

PRODUCT CATEGORY — GARMENTS

Transaction	Estimated Sales Value of 1976 Production (At 1975 Prices) Units Sold (1,000 Units)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Projected Sales Value with Project (At 1975 Prices) Units Sold (1,000 Units)	Price per Unit	Sales Value Total Sales Value in 1,000 £E	% of Total	Increase (Decrease) in Sales Value Amount	%
Export Sales	2,283	1,076	2,457	30.0	3,000	1,345	4,035	29.4	1,578	64.2
Domestic Sales	4,239	1,354	5,740	70.0	4,772	2,031	9,692	70.6	3,952	68.9
Total Sales	6,522	1,257	8,197	100.0	7,772	1,766	13,727	100.0	5,530	67.5
Estimated Internal Transfers										
Total Sales and Transfers										

Comments:

(1) Estimated 1976 sales of 6,522,000 units represents actual current production levels (this compares with 6,000,000 used in original estimate).

(2) Projected 1980 sales represent 6,522,000 units plus planned 750,000 new suits plus estimated additional production of 450,000 units as a result of reorganization of present plant. These 450,000 additional units represent 1/2 of indicated additional potential production. The total projected 7,772,000 units compares with original projection of 6,750,000 units.

G. PROFITS GENERATED BY PROJECT

Exhibit VII, Three-Year Comparative Operations Profit — 1973 to 1975, indicates that the 1975 operating profits (before interest, taxes, export subsidy and other income) were 16.4% compared with the three-year average of 15.7% (8.9% in 1973 and 20.7% in 1974). In 1975, the "cost of sales" was 77.0% of net sales, slightly higher than the three-year average of 76.8%. This increase in cost of sales was offset by lower marketing and administrative costs which are mostly fixed and should be lower, percentagewise, as volume increases.

On the basis of the above, we have assumed that 1975 was a "normal" year and have used it as a basis for making projections as to the profits and cash flow that will be generated by the project.

Exhibit VIII shows that the annual cost of depreciating the new equipment and buildings will amount to $7,057,424 (or £E 2,752,505). The basic project costs, as detailed in Exhibit V, were used in calculating this amount.

EXHIBIT VII
THREE-YEAR COMPARATIVE OPERATING PROFIT – 1973 – 1975

		1973		1974		1975		Total 3 Years	
		Amount	%	Amount	%	Amount	%	Amount	%
					IN 1,000 £E				
1.	Gross Sales	41,541	101.4	49,338	101.2	55,534	101.2	146,413	101.2
2.	Sales Deductions	558	1.4	589	1.2	653	1.2	1,800	1.2
3.	Net Sales (1. – 2.)	40,983	100.0	48,749	100.0	54,881	100.0	144,613	100.0
4.	Cost of Sales	33,933	82.8	34,852	71.5	42,241	77.0	111,026	76.8
5.	Gross Margin (3. – 4.)	7,050	17.2	13,897	28.5	12,640	23.0	33,587	23.2
6.	Marketing Expense	1,004	2.4	984	2.0	953	1.7	2,941	2.0
7.	Administrative Expense	2,403	5.9	2,823	5.8	2,710	4.9	7,936	5.5
8.	Operating Profit (5.-6.-7.)(1)	3,643	8.9	10,090	20.7	8,977	16.4	22,710	15.7

		1973		1974		1975		Total 3 Years	
		Amount	%	Amount	%	Amount	%	Amount	%
					IN 1,000 US $				
1.	Gross Sales	106,511	101.4	126,503	101.2	142,389	101.2	375,403	101.2
2.	Sales Deductions	1,431	1.4	1,510	1.2	1,674	1.2	4,615	1.2
3.	Net Sales (1. – 2.)	105,080	100.0	124,993	100.0	140,715	100.0	370,788	100.0
4.	Cost of Sales	87,004	82.8	89,361	71.5	108,306	77.0	284,671	76.8
5.	Gross Margin (3. – 4.)	18,076	17.2	35,632	28.5	32,409	23.0	86,117	23.2
6.	Marketing Expense	2,574	2.4	2,523	2.0	2,444	1.7	7,541	2.0
7.	Administrative Expense	6,161	5.9	7,238	5.8	6,948	4.9	20,347	5.5
8.	Operating Profit (5.-6.-7.)	9,341	8.9	25,871	20.7	23,017	16.4	58,229	15.7

(1) Operating profit before interest, taxes and export subsidies.

EXHIBIT VIII
DEPRECIATION SCHEDULE FOR NEW FACILITIES
(IN US DOLLARS)

Area and Type of Facility	Capital Expenditure	Depreciation Percent	Annual Depreciation
Production Equipment			
– Cotton Yarn	$ 25,018,390	8	$2,001,471
– Cotton Fabric	25,458,553	8	2,036,684
– Wool Mill	13,865,202	8	1,109,216
– Garments	3,662,468	5	183,123
Total Production Equipment	$ 68,004,613		$5,330,494
Service Equipment			
– Power Plant	$ 13,992,500	6	$ 839,550
– Foundry and Shops	1,047,800	5	52,390
– Materials Handling	2,770,400	10	277,040
– Fire Fighting Equip.	388,700	10	38,870
Total Service Equipment	$ 18,199,400		$1,207,850
New Buildings			
– Cotton Yarn	$ 5,034,000	3	$ 151,020
– Cotton Fabric	7,264,676	3	217,940
– Wool Mill	2,004,000	3	60,120
– Power Plant	3,600,000	2.5	90,000
Total New Building	$ 17,902,676		$ 519,080
Grand Total – In US Dollars	$104,106,689		$7,057,424
Grand Total – In £E	40,603,232		2,752,505

Note: Depreciation percents are those presently used by Mehalla.

Using the data contained in Exhibit VII and Exhibit VIII, the projected increase in profits resulting under the project were calculated in Exhibit IX, Increase in Net Profit Between 1976 and 1980, using the following routine:

1. A "normal operating profit" for the 1976 estimated sales was developed using "normal" (that is, 1975) cost of sales, marketing expense and administrative expense percentages. This indicates an estimated operating profit (before taxes, interest and export subsidies) of $24,186,000.

2. Next, the "normal operating profit" for 1980 projected sales was developed by applying the same "normal" percentages. This profit amounted to $32,747,000.

3. It must be recognized that, as a result of the project, certain costs will not rise proportionally with sales during this period. These exceptions, as noted in Exhibit IX, are:

   a. *Depreciation*

      Will rise from £E 2,226,000 ($5,707,464) to £E 4,534,000 ($11,625,176); an increase of 103.7% compared with the sales increase of 35.4%.

   b. *Spare Parts Costs*

      We estimate will rise only 10% (as compared with the 35.4% sales increase) as a result of new equipment and spare parts purchases included in the recommended investment program.

   c. *Personnel*

      We have concluded that Mehalla's contention, as set forth in their proposal, that overall manpower levels will not increase with the project is a valid one. Current regulations of the Egyptian government do not easily permit terminations of personnel. This, coupled with an extremely low turnover rate, virtually makes the labor force "fixed" on the minimum side. Mehalla's management recognizes and acknowledges the fact that labor productivity is low and has instituted a "no-hire" policy. The acquisition of new equipment will provide an opportunity to make better use of this "fixed" labor force, using current personnel to staff the new and expanded manufacturing operations. We realize that this is not a valid conclusion under criteria used in the United States in making economic evaluations. Recognizing this, we have evaluated the impact that possible increases in personnel will have upon projected profits in subsection I., Contingencies for Increased Costs.

4. These "adjustments," amounting to a favorable profit adjustment of $9,200,000, were applied to the nonnal operating profit of $32,747,000. This application resulted in an "estimated profit" of $41,947,000 in 1980; an increase in operating profits of $17,761,000, or 54.2% over estimated 1976 profits. This amount has been used as our base for making the economic evaluations set forth below.

The following yardsticks are provided as an indication of the economic justification of the project:

1. The annual additional operating profit (before taxes, interest and subsidies, but including depreciation) of $17,761,000 generated by the project is 17.06% of the estimated base expenditures of $104,106,689. (Based on the inclusion of the $2,105,000 proposed technical assistance expenditures, this figure is 16.7%.)

2. However, since straight line depreciation is used, it must be recognized that the average investment over the depreciated life of the equipment will be only one-half of the initial purchase cost. On this basis, the economic return on the investment is 34.12% ($17,761,000 ÷ $52,053,345).

EXHIBIT IX

INCREASE IN NET PROFIT (BEFORE TAXES, INTEREST AND EXPORT SUBSIDY) BETWEEN 1976 AND 1980

	In 1,000 Egyptian Pounds				In 1,000 U.S. Dollars		
	1976 Estimate		1980 Projection				
	% of Net Sales	Total Amount	% Increase	Total Amount	1976 Estimate	1980 Projection	Increase in 1980
Net Sales	100.0	57,521	35.394	77,880	147,484	199,684	52,200
Normal Cost of Sales	77.0	44,291	35.394	59,967	113,562	153,755	40,193
Normal Gross Margin	23.0	13,230	35.394	17,913	33,922	45,929	12,007
Selling Expense	1.7	978	35.394	1,324	2,508	3,395	887
Administrative Expense	4.9	2,819	35.394	3,817	7,228	9,787	2,559
Normal Operating Profit	16.4	9,433	35.394	12,772	24,186	32,747	8,561
Adjustments in Mfg. Cost	.0	0		3,588	0	9,200	9,200
Estimated Profit*	16.4	9,433		16,360	24,186	41,947	17,761

* Estimated profit is before interest, taxes and export subsidies.

ADJUSTMENTS TO PROJECTED 1980 NORMAL OPERATING PROFIT TO REFLECT MANUFACTURING COSTS THAT WILL RISE MORE OR LESS THAN THE PROJECTED INCREASE IN SALES (IN 1,000 £E)

Cost Elements	1976 Estimate	Normal 1980 Amount % Change	Total Amount	Projected 1980 Amount % Change	Total Amount	Increases Over Normal	Decreases Over Normal
Depreciation – Present Facilities(1)	2,226	+ 35.394	3,014	– 20.0	1,781		1,233
Depreciation – New Facilities(2)	–	–	–	–	2,753	2,753	
Total Manufacturing Personnel(3)	13,500	+ 35.394	18,278	.0	13,500		4,778
Spare Parts(4)	1,300	+ 35.394	1,760	+ 10.0	1,430		330
Totals						2,753	6,341
Net Adjustment Applied in "Net Profit" Calculation Above (in £E)							3,588

(1) It is estimated that depreciation on existing equipment will be reduced by about 20% over next five years due to equipment being fully depreciated or replaced.

(2) The annual depreciation on new equipment and buildings is calculated in Exhibit VIII as $7,057,424 (or 2,752,505 £E).

(3) As discussed in text, the basic economic justification evaluation is based on the assumption that no personnel in addition to existing manpower will be added to produce additional volume. The £E 13,500,000 represent estimated 1976 labor costs for manufacturing wages including service departments.

(4) Spare parts are included with the recommended equipment purchases. For this reason and because newer equipment will require fewer parts replacement, it is estimated that spare parts cost will increase by only about 10% while sales are increasing 35%. The estimated £E 1,300,000 represent estimated 1976 costs for spare parts in process departments only (service departments excluded).

H. CASH FLOW ANALYSIS

A further evaluation of the economic justification of the project is provided by the cash flow analysis developed in Exhibit X, Exhibit XI, and Exhibit XII.

Exhibit X, Schedule of Long Term Debt and Interest Payment, shows the repayment schedule and annual interest charges during the years 1976 through 1991 in connection with the basic recommended A.I.D. loan of $73,937,000 for this project and an outstanding loan of $14,500,000 as of January 1, 1976.

Exhibit XI, Projected Profit After Taxes, shows the before and after tax profits that will be earned by Mehalla during the loan payback period (through 1991). In this calculation, the following items, which are estimated to be about 63% of pre-tax profits, represent the difference between the before and after tax profits:

1. The mandatory purchase of government bonds.

2. So-called "dividends" which cover:

   - Distribution to workers.
   - Distributions to national and local welfare funds.
   - Distribution to national textile organizations.

3. Actual income taxes.

Exhibit XII, Cash Flow, develops the cash flow that will be available to repay loans and make required capital improvements. Exhibit XII indicates the following:

1. During the years 1976 through 1979, the Mehalla operations, with the added profits resulting from this project, will generate sufficient cash flow to cover the $30,325,936 of estimated local expenses (building construction, import duties, local freight, and local erection costs) required to effect the recommended program.

2. Sufficient cash flow will be available to cover both interest payments and loan repayments.

3. In addition, on the basis of the estimated profits detailed in Exhibit XI, additional cash flow of $250,798,000 will be generated over the loan repayment period (through 1991) to provide for further equipment replacement, expansion programs, and increased inventories required to properly service increased sales.

EXHIBIT X

SCHEDULE OF LONG-TERM DEBT AND INTEREST PAYMENTS

(IN U.S. $1,000)

Year	Loans Required(1) Existing	Loans Required(1) New	Principal Repayment Schedule Existing Loan	Principal Repayment Schedule New Loan (2)	Balance on Loans Existing Loan	Balance on Loans New Loan	Interest Payments(3) Existing Loan	Interest Payments(3) New Loan	Interest Payments(3) Total
1976	14,500		3,479		11,021		1,276	0	1,276
1977		18,484	4,228		6,793	18,484	891	924	1,815
1978		48,059	3,787		3,006	66,654	490	4,257	4,747
1979		7,394	1,528		1,478	73,937	224	7,030	7,254
1980			487		991	73,937	123	7,394	7,517
1981			487		504	73,937	75	7,394	7,469
1982			439	4,640	65	69,297	28	7,162	7,190
1983			65	5,103	0	64,194	3	6,675	6,678
1984				5,613		58,581		6,139	6,139
1985				6,175		52,406		5,549	5,549
1986				6,792		45,614		4,901	4,901
1987				7,472		38,142		4,188	4,188
1988				8,218		29,924		3,403	3,403
1989				9,042		20,882		2,540	2,540
1990				9,945		10,937		1,591	1,591
1991				10,937		0		547	547
Total	14,500	73,937	14,500	73,937			3,110	69,694	72,804

(1) The existing loan of $14,500,000 is the balance due on a previous loan. The new loan of $73,937,000 to be made in connection with this project is assumed to be required as follows: 25% in 1977, 65% in 1978, and 10% in 1979.

(2) The new loan of $73,937,000 is scheduled for repayment on an amortizing basis over a 10-year period starting in 1982. Amounts in this column represent approximate annual repayment amounts on an amortizing basis.

(3) Interest is applied at 10% of the average of the previous year's and current year's loan balance.

EXHIBIT XI
PROJECTED PROFIT AFTER TAXES, INTEREST AND DIVIDEND
(IN 1,000 U.S. $)

Year	Estimated Sales(1)	Normal Operating Profit(2)	Adjust-ments(3)	Adjusted Operating Profit(4)	Interest Payment(5)	Other(6) Income	Net Before-Tax Profit(7)	Purchase of Gov't. Bonds(8)	Dividends and Taxes(9)	Net Profit After Taxes & Bond Purch.
1976	147,484	24,186	–	24,186	1,276	1,200	24,110	723	14,466	8,921
1977	147,484	24,186	790	24,976	1,815	1,229	24,390	732	14,634	9,024
1978	152,704	25,043	(641)	24,402	4,747	1,258	20,913	627	12,548	7,738
1979	173,584	28,468	1,861	30,329	7,254	1,283	24,358	731	14,615	9,012
1980	199,684	32,748	9,200	41,948	7,517	1,312	35,743	1,072	21,446	13,225
1981	199,684	32,748	9,400	42,148	7,469	1,355	36,034	1,081	21,620	13,333
1982	199,684	32,748	9,600	42,348	7,190	1,398	36,556	1,097	21,934	13,525
1983	199,684	32,748	9,800	42,548	6,678	1,442	37,312	1,119	22,387	13,806
1984	199,684	32,748	10,000	42,748	6,139	1,487	38,096	1,143	22,858	14,095
1985	199,684	32,748	10,200	42,948	5,549	1,533	38,932	1,168	23,359	14,405
1986	199,684	32,748	10,400	43,148	4,901	1,580	39,827	1,195	23,896	14,736
1987	199,684	32,748	10,600	43,348	4,188	1,628	40,788	1,224	24,473	15,091
1988	199,684	32,748	10,800	43,548	3,403	1,677	41,822	1,255	25,093	15,474
1989	199,684	32,748	11,000	43,748	2,540	1,727	42,935	1,288	25,761	15,886
1990	199,684	32,748	11,200	43,948	1,591	1,779	44,136	1,324	26,482	16,330
1991	199,684	32,748	11,400	44,148	547	1,832	45,433	1,363	27,260	16,810
Total	3,017,464	494,859	125,610	620,469	72,804	23,720	571,385	17,142	342,832	211,411

(1) "Estimated sales" are based on applying 10% of projected increase (of $52,200,000 as per Exhibit IX) in 1978, 50% in 1979, and 100% in 1980.

(2) "Normal operating profit" is the "normal operating profit" of 16.4% (based on 1975 results). This profit is before application of interest, taxes and export subsidies.

(3) "Adjustments" are based on data developed in Exhibit IX. These are applied as follows:

In 1,000 Egyptian Pounds

Year	Reduction in Present Depreciation	Depreciation on New Facilities	Personnel Savings	Spare Parts	Total	Total (1,000 US $)
1977	+ 308	–	–	–	+ 308	+ 790
1978	+ 616	– 1,377	+ 478	+ 33	– 250	– 641
1979	+ 925	– 2,753	+ 2,389	+ 165	+ 726	+ 1,861
1980	+ 1,233	– 2,753	+ 4,778	+ 330	+ 3,588	+ 9,200

After 1980 adjustment is increased $200,000 (78,000 £E) annually to reflect estimated further reductions in depreciation on existing equipment.

(4) "Adjusted operating profit" represents expected annual profits before interest, taxes and export subsidies. It is calculated as the "normal profit" plus "adjustments."

(5) Interest payments as developed in Exhibit X.

(6) Other income is primarily interest received on mandatory purchases of government bonds.

(7) "Net before tax profit" is "adjusted operating profit" plus "other income" less "interest payments."

(8) Mandatory purchases of governments estimated at about 3% of "net before tax profits."

(9) "Dividends and taxes" are income taxes and mandatory profit distribution, estimated as 60% of "net before tax profit."

EXHIBIT XII
CASH FLOW ANALYSIS
(IN 1,000 U.S. DOLLARS)

Year	Net After-Tax Profit(1)	Annual(2) Depreciation	Available Funds(3)	Capital(4) Purchases	Repayment of Debt(5)	Cash Available(6) for Other Purposes Annual	Cumulative
1976	8,921	5,707	14,628	3,017	3,479	8,132	8,132
1977	9,024	5,423	14,447	9,051	4,228	1,168	9,300
1978	7,738	8,654	16,392	12,068	3,787	537	9,837
1979	9,012	11,910	20,922	6,034	1,528	13,360	23,197
1980	13,225	11,625	24,850		487	24,363	47,560
1981	13,333	11,425	24,758		487	24,271	71,831
1982	13,525	11,225	24,750		5,079	19,671	91,502
1983	13,806	11,025	24,831		5,168	19,663	111,165
1984	14,095	10,825	24,920		5,613	19,307	130,472
1985	14,405	10,625	25,030		6,175	18,855	149,327
1986	14,736	10,425	25,161		6,792	18,369	167,696
1987	15,091	10,225	25,316		7,472	17,844	185,540
1988	15,474	10,025	25,499		8,218	17,281	202,821
1989	15,886	9,825	25,711		9,042	16,669	219,490
1990	16,330	9,625	25,955		9,945	16,010	235,500
1991	16,810	9,425	26,235		10,937	15,298	250,798
	211,411	157,994	369,405	30,170	88,437	250,798	

(1) "Net after tax profit" (from Exhibit XI) represents profit after interest payments, other income, income taxes, mandatory distribution of profits, and mandatory purchases of bonds.

(2) Depreciation, as shown in Exhibit IX, is applied as follows:

	1976	1977	1978	1979	1980
On Current Equipment (In 1,000 £E)	2,226	2,115	2,004	1,892	1,781
On New Facilities (In 1,000 £E)	—	—	1,371	2,753	2,753
Total (In 1,000 £E)	2,226	2,115	3,375	4,645	4,534
Total (In 1,000 US $)	5,707	5,423	8,654	11,910	11,625

In 1981 and after, depreciation is reduced $200,000 per year to reflect further reduction in depreciation on existing equipment.

(3) "Available funds" are funds available to make capital purchases and repay loans. "Available funds" represent the "after tax profit" plus "depreciation."

(4) "Capital purchases" are local expenditures of $30,169,497, paid in £E, recommended under project. They are applied as 10% in 1976, 30% in 1977, 40% in 1978, 20% in 1979.

(5) "Repayment of debt" is per Exhibit X.

(6) "Cash available for other projects" are the funds available after local capital purchases in connection with the project and repayment of debt.

I. CONTINGENCIES FOR INCREASED COSTS

The profit and cash flow analyses set forth in the preceding paragraphs of this chapter are based on relatively optimum conditions — no overruns on the estimated capital expenditures, no inflation, the ability to maintain personnel requirements at present levels, and no increase in the controlled price of raw cotton.

However, it is also to be noted that these projections do not include any provision for export subsidies which have been paid in the past years.

Deviations from the optimum conditions described above can have a detrimental effect on profits and cash flow as follows:

1. Contingency for Overrun on Capital Expenditures

We have recommended that the A.I.D. authorization for this project include a 10% allowance for contingencies. This would result in an increase in the estimated investment from $104,106,689 to $114,517,358 and an increase in annual depreciation of $705,752 (from $7,057,424 to $7,763,166).

This would increase the average investment over the depreciated life of the new facilities to $57,258,679 (one-half of original investment). Likewise, pre-tax profits generated by the project would be reduced by $705,742 (the increased depreciation) to $17,055,258. This would result in a decrease in the economic rate from 34.1% to 29.8% ($17,055,258 ÷ $57,258,679).

2. Inflation Contingency

In developing the economic evaluation, the effects of inflation on costs and profits have been ignored in order to provide a constant base of comparison. It is reasonable to assume that future increased costs caused by inflation will be passed on to customers, therefore maintaining projected profit margins.

In fact, the probability of continued inflation is an additional factor justifying the undertaking of the recommended project at this time because it is only reasonable to assume that equipment replacement costs will be substantially greater in future years than at present.

3. Personnel Costs

In the basic evaluation we have accepted Mehalla's contention that overall manpower levels will not be increased by the project. However, a contingency should be provided to cover additional costs of personnel in the event Mehalla is unable to hold manpower requirements at present levels.

The basic assumption is that manufacturing wages for 1976 will be $34,614,000 (£E13,500,000). A further assumption is made that approximately one-half of the wages are variable, subject to increase as volume rises. Therefore, it is assumed if present labor productivity levels are maintained, these wages will increase by 17.7%, which is one-half of the projected sales increase of 35.4%.

If this increase in manpower occurs, wages would be increased (and pre-tax profits decreased) by $6,126,678 (17.7% of $34,614,000).

Such an increase would result in the following changes in the so-called economic rate of return:

	Return Vs. Basic Investment			Return With 10% Cont. Allow.		
	Investment	Pre-Tax Profit Increase	%	Investment	Pre-Tax Profit Increase	%
No. Labor Increase	$52,053,345	$17,767,000	34.1	$57,258,679	$17,055,258	29.8
17.7% Labor Increase	52,053,345	11,634,322	22.4	57,258,679	10,928,580	19.1

Thus, it would appear that the economic rate of return on investment could vary between a basic 34.1% under optimum conditions, and 19.1% based on 10% overrun on project costs and continued low productivity of production workers. A reasonable assumption is that the actual return will be at the midpoint between these two extremes, or at about 26.6%.

4. Increase in the Controlled Price of Cotton

At present, Mehalla is paying an extremely low price for Egyptian cotton as a result of government established price controls. It must be recognized that these controls may be lifted in the future and the local price allowed to reach a price comparable with worldwide prices.

Insofar as the economic evaluation of the recommended project is concerned, this contingency has been ignored.

However, such an increase in cotton prices will have a definite effect on the cash flow generated. While it is assumed that prices on sales to the local Egyptian markets would be increased to recover these increased material costs, it is highly improbable that these increased costs could be passed along to foreign customers.

Therefore, it is necessary to evaluate what impact such a decrease in profit margins on exports of cotton yarns, fabrics, and garments would have on after-tax profits and cash flow.

Exhibit VI contains a breakdown of projected sales under the project. This shows the following projection of cotton exports:

a. Of the 42,200 tons of projected cotton yarn production, it is estimated that 12,000 tons will be exported as yarn.

b. Of the projected production of cotton fabric of 163,600,000 meters, it is estimated that 55,000,000 meters (or 33.6%) will be exported. Therefore, it is estimated that 9,811 tons (33.6% of the estimated 29,200 tons of yarn used in weaving) will be exported as fabric.

c. Of the cotton fabric produced, 22,800,000 meters (or 13.9% will be used internally for production of garments. This represents 4,059 tons (13.9% of the 29,200 tons used in weaving). Of the garment sales, it is estimated that 3,000,000 units or 38.6% of the total projected units of 7,772,000 will be exported. This represents 1,567 tons of cotton yarn (38.6% of 4,059 tons of yarn transferred to the garment operation from weaving).

d. The above would indicate that the projected exports of cotton by Mehalla will be:

	Metric Tons
As Yarn	12,000
As Fabric	9,811
As Garments	1,567
Total Exports	23,378

e. Adding a 10% waste factor (principally for loss in spinning operations), the projected annual requirements of raw cotton for exports would be 25,716 tons (23,378 x 1.10).

At the present time, Mehalla is paying a price for raw cotton that is approximately 40% of the world price. If the controlled price of cotton to Mehalla is increased by the Egyptian government, it is possible that Mehalla may have to pay an additional amount for its cotton of between $660 and $990 per metric ton ($.30 to $.45 per pound). This would amount to between $16,972,560 and $25,458,840 increased costs (and decreased before-tax profits) per year.

However, after-tax profits (and cash flow) would be reduced only between $6,279,847 and $9,419,770 annually after application of 63% for taxes, dividends and mandatory investments.

Over the 16-year period between 1976 and 1991, this would amount to a reduction in cash flow of between approximately $100,000,000 and $150,000,000. This is 40% and 60% of the projected cash flow of $250,000,000 that is indicated as available after debt repayment in Exhibit XII, Cash Flow Analysis.

It is to be pointed out that the above calculations do not provide for any government export subsidies such as are presently paid ($3,250,000 in 1974 and $1,987,000 in 1975). Undoubtedly, if the price for raw cotton paid by Mehalla were allowed to rise to worldwide prices, export subsidies of some sort would be continued. This would obviously improve the cash flow.

The above, however, does indicate that the project would still be viable even if cotton prices were allowed to rise to natural levels and no export subsidies were paid.