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Contract No : 177
Islamabad Textile Mill Ltd
Bangladesh

Feasibility Report of
a New Spinning Mill

tds
SINCE 1958 WE HAVE BEEN PROVIDING A SERVICE IN ISTANBUL

February 1991
Textile Consulting Services Inc

Contents

	<u>Page</u>
1. GENERAL INFORMATION	1
1.1 Name of the Project	2
1.2 Name of the Company	2
1.3 Location of the Mill	2
1.4 Scope of the Project	2
1.5 Information on the Project Promoter	2
1.6 Project Implementation Schedule	3
1.7 Fixed Investment of the Project	3
1.8 Working Capital Requirement	3
1.9 Total Investment of the Project	3
1.10 Production Programme	4
1.11 Sales Revenues	4
1.12 Project Financing	4
1.13 Economic Viability of the Project	4
1.14 Feasibility Study Prepared by	4
2. EVALUATION OF MARKET	5
2.1 Country Profile	6
2.2 Demand	11
2.3 Foreign Trade	15
3. MILL CAPACITY	18
3.1 Project Description	19
3.2 Production Programme	20
3.3 Working Time	31
3.4 Manufacturing Process	32
3.5 Production Machinery	43
3.6 Machinery Allocation	53
3.7 Implementation Scheduling	57
4. INVESTMENT COST	60
4.1 Fixed Investment	62
4.2 Working Capital	75
4.3 Project Financing	77
4.4 Financial Expenses	78

	<u>Page</u>
5. OPERATIONAL DATA	80
5.1 Raw Material	81
5.2 Consumables and Auxiliary	83
5.3 Fuel, Energy and Water	83
5.4 Maintenance and Repair Expenses	83
5.5 Wages and Salaries	83
5.6 Depreciation	84
5.7 General Overheads	84
5.8 Total Production Cost	84
5.9 VAT	84
5.10 Interest on Short Term Loan	84
5.11 Sales Cost	84
5.12 Miscellaneous	84
5.13 Total Annual Operating Cost	84
6. FINANCIAL EVALUATION	87
6.1 Sales Revenues	88
6.2 Projected Cash Flow	90
6.3 Flow of Proforma Revenues	90
6.4 Added Value by Project	90
6.5 Debt-Service Coverage	90
6.6 Break-Even Point	93
6.7 Economic Rate of Return	94
6.8 Employment Opportunity	94
6.9 Foreign Exchange Earning	94

1. GENERAL INFORMATION

1.1 Name of the Project

A feasibility study of the "Multi Textile Limited"

1.2 Name of the Company

"Islamabad Textile Mills Ltd"

1.3 Location of the Mill

The proposed site of the project falls by the side of Feni-Chowmuhani, 18 km from Feni and 130 km from Chittagong.

The site is also connected with Dhaka the capital city and Narayanganj where majority of the RMG industry is concentrated.

1.4 Scope of the Project

To substitute partly the import of different types of yarns into the country and to create appropriate production facilities for quality yarns for supplying the local and foreign market.

1.5 Information on the Project Promoter

The company will be constituted with the local and foreign sponsoring Directors/Promoters. The overall management during implementation and on completion of the project will be vested with the Board of Directors to be constituted by the representations of both local and foreign Sponsoring Directors.

1.5.1 Head Office of the Company

Batali Hills, P.O. Box, 223
Chittagong 4000
Bangladesh

Phones : 220 491-5
 225 596
 203 084

Telex : 41843 (M.T.)
Fax : 220 491-5

1.5.2 Capital

The company's capital will be approximately : \$ 7728'000.

1.5.3 Distribution of Shares

- Local Sponsors	: 28.6 %
- Islamic Development Bank or other Financial Institution	: 14.2 %
- Prospective Partner / Iran	: 28.6 %
- Prospective Partner / Pakistan	: 28.6 %

1.6 Project Implementation Schedule

The project implementation schedule was envisaged as follows :

Negotiation with Financial Institutions	: May 1991
Building Constructions and Other Works	: December 1991
Machine Delivery	: January 1992
Erection Accomplished	: March 1992
Trial Production	: June 1992
Production at Full Capacity	: July 1992

1.7 Fixed Investment of the Project

Total fixed investment of the project is : \$ 21'404'624

1.8 Working Capital Requirement

Total working capital requirement is : \$ 1'273'314

1.9 Total Investment of the Project

Total investment of the project is : \$ 22'677'939

1.10 Production Programme

The mill production programme can be outlined as follows :

Production Programme

Count (Ne)	Mix/Blend of Fibres	Yarn Production on Cones		
		(kg/h)	(kg/day)	(ton/yr)
80	Combed CO	7.3	164.2	49.3
60	" "	10.4	234.0	70.2
60	Polyester	14.1	317.2	95.2
45	PES & Comb.CO	55.0	1'237.5	371.2
40	Polyester	25.9	582.7	174.8
40	Carded CO	71.6	1'611.0	483.3
30	Polyester	39.9	897.7	269.3
28	Carded CO	43.0	967.5	290.2
Total		267.2	6'011.8	1'803.5

1.11 Sales Revenues

Annual sales revenues of the mill amounts up to a figure of S 9'129'753.

1.11.1 Main Products : S 8'985'388

1.11.2 By-Products : S 144'356

1.12 Project Financing

- Loan : S 14'950'000

- Equity : S 7'727'939

1.13 Economic Viability of the Project

The economic viability of the project is 15 years.

1.14 Feasibility Study Prepared by

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 Simit Apt. No. 6/2
 Kabatas - Istanbul - Turkey
 Phone: (1) 343 44 13 - 14
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2. EVALUATION OF MARKET

2.1 Country Profile

The People's Republic of Bangladesh lies in southern Asia, surrounded by India on the west, north and east and by Burma on the south eastern tip - its southern coastline faces the Bay of Bengal.

Bangladesh has a land area of 143,999 km² and, with a population officially estimated at about 110 mn. It is among the world's most densely populated countries with a density of 740 people per km².

Bangladesh is the Second Largest Muslim State. More than 85 % of the people are Muslims, Islam being the state religion, and there are small minorities of Hindus, Buddhists and Christians.

The land is mostly flat, although there are hills in the north east and south east. It is dominated by the rivers Ganges and Brahmaputra, known locally as the Padma and Jamuna, and much of the land is intersected by the numerous waterways of the massive Ganges-Brahmaputra delta, the annual flooding of which provides rich alluvial soils. The climate is monsoon type with average rainfall exceeding 2,540 mm and mainly falling between July and October.

The principal urban centre is Dhaka, the capital, with a 1987 population of 4.77 mn. followed by Chittagong, with a population of 1.84 mn. Bengali is the official language, but English is widely employed in government, commerce and industry.

The unit of currency issued since March 1972 is the taka, which is divided into 100 paisa. As of October 7, 1990, the exchange rate against the dollar was Tk 35.82 = \$1.

In terms of average income, in 1987, according to estimates by the World Bank, the gross national product (GNP), measured at average 1985-87 prices, was US \$ 17,408 m., equivalent to about \$ 160 per head.

Agriculture, which employs about 60 % of the working population, contributed about 40 % of GDP in 1986/87 and 1987/88. The land is fertile.

Jute and tea are the main cash crops. Bangladesh supplies about 90 % of world exports of raw jute. In 1986 the jute industry employed about 250,000 workers.

The Government planned to increase the area under cotton cultivation from 6,000 ha in 1980 to 129,000 ha by 1990.

Industry accounted for only about 14 % of GDP in 1986.

The Ready Made Garments (RMG) industry expanded rapidly during the 1980s and established itself as an important source of export earnings. Most of this expansion was achieved through private initiative, and in 1985/86 nearly 60 new companies (providing 150,000 new jobs) were formed. During 1984/85 the R.M.Garment Industry exported goods worth US \$ 100 m., a three-fold expansion over 1983/84. In 1986 the US Government fixed Bangladesh's annual quota of R.M.Garment exports to the USA at 4.2m. dozen pieces for at least the next two years. In 1987/88 R.M.Garments overtook jute as Bangladesh's most important source of foreign exchange, with exports of garments valued at US \$ 435 m., compared with jute exports of \$ 339. The value of garment exports in 1988/89 was expected to increase by 20 %, to \$ 525 m.

However, the net retention will be only 30 % i.e. \$ 160 million approx. as 95 % of the fabric used is imported. Therefore, the growth of the Textile Sector is of paramount importance to add value to the Garment Exports as nearly 600 million metres of fabric is imported by the Garment Sector for re-export. It is envisaged that the import figure will increase to 900 million metres by 1993. Therefore, under the New Textile Policy - it is Government desire that there should be growth of the Textile Sector with modern Mills producing international quality fabrics to feed the growing Garment Sector.

In the industrial sector, the plan envisaged a 16 % rise in output of jute textiles to 650,000 tons and a 58 % rise for cotton cloth to 1,215 mn m².

Selected major targets of third five year plan

	Actual 1984/85	1986/87	Target 1989/90
Agriculture			
Jute (mn bales)	4.6	2.5 ^a	6.0
Industry			
Jute textiles ('000 tons)	512	510 ^b	650
Cotton textiles			
yarn (mn kg)	48.2	46.6	95.0
cloth (mn m ²)	771	586	1,215
Population growth rate (%)	2.4	2.8 ^a	2.8

a. 1988/89 estimate.

b. 1987/88 actual.

Source: Planning Commission, Third Five Year Plan, 1983-88, p. 27.

Unemployment and underemployment (in both the towns and rural areas) are very high. A large proportion of the work force is engaged in subsistence agriculture and remains largely outside the money economy. The Bangladesh Economic Survey indicates that about 85 % of the population depend, directly or indirectly, on agriculture for their livelihood.

Agricultural crop production
(^{'000 tons})

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Fibres							
Jute	830	872	931	913	1,572	1,226	846
Cotton	10	10	8	6	5	7	7

Source : Bangladesh Bureau of Statistics, Monthly Statistical Bulletin of Bangladesh.

Bangladesh's manufacturing sector remains small and narrowly based. Much of it depends on the processing of domestically produced agricultural raw materials. Despite this, there has been a slow move towards broadening the industrial base and a number of non-traditional industries such as garment manufacture have emerged over the past decade, albeit with varying degrees of success.

Indices of Industrial production by sector
(1973/74 = 100)

	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89 ^a
Textiles	111	111	100	116	113	110
cotton	114	117	110	120	122	112
jute	109	105	91	109	106	100

^a Provisional to April 1989.

Source : Bangladesh Bureau of Statistics, Monthly Statistical Bulletin of Bangladesh.

The most important industrial activity is the processing of jute into a variety of jute manufactures. The industry is the largest industrial employer and exports of jute goods accounted for 28 % of export earnings in 1987/88.

Gross value of industrial production by sector
(Tk mn)

	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85
Textiles	11,759	11,744	12,502	15,168	16,950	18,801
Total	33,338	40,843	47,630	50,617	54,308	58,916
% of Total	35.3	25.8	26.2	30.0	31.2	31.9

Source : Bangladesh Bureau of Statistics, Statistical Yearbook of Bangladesh.

Within the textiles sector also falls the cotton spinning and fabric production industry. Much of this sector was also publicly owned until 1982/83, being operated by the Bangladesh Textile Mills Corporation (BTMC), but 22 of BTMC's 52 mills were divested in 1982/83. With domestic cotton production still limited despite ambitious plans, the industry relies heavily on imported raw materials.

Some synthetic fabrics are produced, but the bulk of output is of cotton products. In recent there has been a proliferation of garment manufacturing enterprises (typically small) over the last five years and output has risen dramatically. Clothing, a nontraditional export, has emerged as the most important export item, overtaking jute in 1987/88, with 36 % of exports to jute manufactures' 23 %. Bangladesh has been particularly successful in supplying cotton shirts to Europe and the USA and there are already protectionist measures in place in several importing countries to restrict the level of Bangladesh exports. The initial imposition of quotas by the USA - which accounts for 75 % of the market for Bangladesh clothing exports - in February 1986 was extended a year later to more garment categories. In 1988 utilisation of quotas improved and there were increases in some US quota allocations for Bangladesh. Nonetheless, growing protectionist sentiment towards garments from developing countries suggests that the industry cannot continue to expand as rapidly as it recently has, and there are already signs that surplus productive capacity exists. The main thrust will be to add value to existing garment exports by using locally produced fabrics.

Production of selected items
('000 tons unless otherwise indicated)

	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Textile manufactures	50	54	52	41	52	52
Cotton cloth (mm yarn)	66	66	66	67	67	67
Cotton yarn (mm Ply)	100	100	100	100	100	100

Major exports, 1987/88
(Tk mn)

	1987/88	% of total
Garments	14,839	36.1
Jute manufactures	9,311	22.6
Raw jute	2,485	6.0
Total of textiles	26,635	64.7
Total exports	41,161	100.0

Source : Bangladesh Bureau of Statistics, Monthly Statistical Bulletin of Bangladesh

The main export commodities of the country are textile articles.

The USA provides the main market for exports. The UK, Pakistan, Italy and Japan are also important buyers. The EC has become the principal source of imports, followed by Japan, the USA, Singapore and South Korea, which are also significant.

2.2 Demand

Yarn and fabric demand of the country is estimated by considering the domestic consumption and RMG exports, as follows :

2.2.1 Spinning Capacity

The installed spinning capacity in Bangladesh is approximately 1'384'664 spindles. While a capacity of 683'588 spindles belongs to private entrepreneurs, 701'076 spindles managed by the Bangladesh Textile Mills Corporation (BTMC) belongs to the State Economic Enterprises.

33 private textile mills having an installed capacity of 683'588 spindles were able to operate at 82 % of the existing capacity and have been producing 64'383'593 lbs of yarn at an average count of Ne 32 during the financial year 1988/89.

On the other hand Bangladesh Textile Mills Corporation (BTMC) has been operating at only 71.2 % of its installed 701'076 spindle capacity in the 37 textile mills in the same year.

An additional 86'016 spindle capacity is under construction and will be in operation soon.

The output of the each spindle unit during the financial year 1988/89 was approximately 52 kg/spindle-year (114.91 lbs/spindle-year) at an average count of Ne 32.

The country will reach to a capacity of 1'470'680 spindles with the present installed capacity of 1'384'664 spindles and additional spindlage of 86'016 under erection.

All the spindles under operation and erection in Bangladesh is capable of producing 76'475'360 kg yarn annually at a count of Ne 32.

Since the population of Bangladesh is expected to reach a figure of 120 mn by the year of 1990 (end of the third five year plan), the annual demand of cloth is estimated to be 1'320'000'000 m (or 1'440'000'000 yds) by assuming 11 m (12 yds) cloth consumption per capita.

The demand of yarn for weaving of 1'320 mn. metre fabric is approximately 118'800'000 kg, by assuming to have an average fabric weight of 90 g/m (5 yds of fabric per pound of yarn of Ne 32 count).

The balance yarn production requirement thus comes to 42'325'000 kg annually. Therefore, an additional 815'000 spindles to the present capacity needs to be added in order to produce sufficient yarn for the domestic requirement.

Keeping in view the further growth of demand, the government kept provision of 750'000 spindles in the third five year plan, out of which only 205'000 spindles has actually been implemented till the present time.

2.2.2 Weaving Capacity

In most of the countries of the modern world per-capita use of cloth is considered as the yard stick for measuring the level of standard of living.

The cloth consumption per-capita in any country do not depend on only the single factor of climate, rather several factors spell up the cumulative resultant factor that dictates the ultimate per-capita cloth consumption of the community concerned.

It is a fact that requirement of cloth basically depends on two factors :

- increase of population
- standard of living

Considering these two basic facts the government have taken the task of providing 11 metres cloth per-capita at the terminal of the current Five Year Plan.

Bangladesh at present obtains its cloth requirement both by domestic production and import of cloth based upon local yarn or imported yarn in the following manner :

2.2.2.1 Domestic Production

<u>Cloth with Local Yarn</u>	<u>(mn metre)</u>
- BTMC Mills	43.54
- Private sector mills	31.68
- Other sources (cotton)	382.00
- Other sources (synthetics)	42.00
<u>Total I</u>	<u>499.22</u>

<u>Cloth with Imported Yarn</u>	
- Cotton fabrics	76.40
- Synthetic fabrics	233.65
<u>Total II</u>	<u>310.05</u>

2.2.2.2 Import of Cloth

- Cotton fabrics	15
- Synthetic fabric	47.22
- Second hand clothes	1.56
<u>Total III</u>	<u>63.78</u>

Total current consumption of cloth (I + II + III) = 872.05 mn metres

It is clear from here that about 27.3 % of the local production of cloth is dependent on import of yarn, further about 25.5 % of the total cloth requirement is met by imported cloth which include second hand cloth to the extent of 17.1 % of the total consumption of cloth in Bangladesh. Thus for 52.7 % of the cloth requirement is still dependent on import either in form of yarn or cloth or second hand cloth. These facts reveals the need for installation of more capacities in the field of textile production.

Nationwide average cloth consumption per-capita is currently running at about 8.84 metres.

Information sources indicated that there are only 19746 power looms in Bangladesh either in working or under implementation stage.

The number of looms sponsored / sanctioned by several agencies and authorities are shown in the following statement :

<u>Name of sanctioning agencies</u>	<u>Number of Power Looms</u>
- Bangladesh Shilpa Rin Sangtha	1'026
- Bangladesh Shilpa Bank	860
- Department of Textile	2'452
- Janata Bank	1'076
- Agrani Bank	1'245
- Sonali Bank	3'180
- Department of Industries	220
- Islamic Bank	100
- Bangladesh Krishi Bank	885
- BTMC	111
- Disinvested looms (Private sector)	337
- Other private sector looms	1'974
Total	19'746

Assuming 65 % efficiency the total availability of cloth should be around 600'000'000 metre. As against these the total requirement of cloth on the basis of 11 metre per head for a total 120 mn people by the terminal of the present plan period turn over to 1'320'000'000 metre. To meet the afforesaid demand gap if we assume that 50 % of the requirement be made on power looms and 50 % on hand looms the requirement of enhancement of looms shall call for in the following manner.

- a normal power looms can produce 20 metre of cloth per shift. If it works for 2 shifts a day for 300 days in a year, shall be producing 12'000 metre of cloth per year.

Thus to produce 600'000'000 metres (50 %) or 1'320'000'000 metre of cloth it will have to have been needed to install 55'000 units of power looms.

- a normal handloom can produce 10 metre of cloth per day. It usually works for single shift and 250 days per year.

Thus to produce 660'000'000 metres (50 % of 1'320'000'000 metre) it is required to establish 110'000 units of handloom.

While summing up all the facts and figures it may be mentioned at the very out set that statistics of different authorities although give different readings as to the actual national requirement and vis-a-vis the actual production of cloth but none of the reports could claim the courage of refusing the acute shortage and crying demand of cloth.

As such, for generalised calculation it may be hold good that :

- population of Bangladesh at the terminal of the current Five Year Plan would be 120 million.
- cloth requirement is expected to be $(120 \times 11) : 1'320$ million metres per year
- present production capacity 600 million metres per year
- calculated shortage at the terminal of the current Five Year Plan is $(1'320 - 600) : 720$ million metres per year
- if 50 % is kept reserved for production on hand looms.
- balance remains for power looms 360 million metres.
- add 620 million metre fabric required for Ready Made Garments industry
- total cloth production demand gap comes to 980 million metres.

These figures indicate that country can absorb further investment on spinning and weaving capacities.

It is the only Industrial Sector which has a huge domestic demand, as indicated above, plus an existing indirect export potential of 620 million metres of fabric to the Garment Industry which is estimated to grow to 900 million metres by 1993.

Therefore, the Bangladesh Textile Sector offers a unique investment opportunity to the local entrepreneur and the potential foreign Investor. In short it can become the engine of industrialisation and has the potential to transform the Bangladesh Economy.

2.3 Foreign Trade

The statistics of import and export figures available for the 3 years from 1984 to 1987 reveals that, the country is becoming a significant textile exporter.

Net export figures change favourably from S 1141411 net export to S 2016749 net value. (export after deduction of import)

Import CIF by Commodities in Value

('000 S)

SITC	Commodity	1984	1985	1986	1987
26	Textile fibres and waste	117'460	92'089	57'143	61'455
263	Cotton	97'266	76'119	42'699	43'628
2631	Raw cotton, excl linters	97'229	76'095	42'683	43'628
266	Synthetic fibres to spin	11'594	4'886	3'842	7'807
2665	Discn synth fibre uncmbd	10'874	4'288	3'688	6'822
26659	Other	10'841	4'262	2'093	2'039
269	Waste of textile fabrics	7'915	10'940	10'178	9'122
26901	Bulk text wste, old clthg	7'915	10'940	10'178	9'122
65	Textile yarn, fabrics, etc.	127'513	142'543	128'200	256'098
651	Textile yarn	58'102	77'534	67'912	81'198
6513	Cotton yarn	23'657	29'315	22'988	29'466
65134	80 km per kg or more	17'437	19'979	20'254	26'510
6514	Syn fib yrn, bulk, monofil	21'697	24'800	38'069	35'510
65144	Textrd, cont polyester	10'408	8'140	25'924	19'555
65149	Synth fibre monofil etc	8'847	12'393	7'098	11'004
6517	Regen fibre yarn, monofil	11'967	21'799	6'160	15'505
652	Cotton fabrics, woven	17'609	14'917	14'425	59'443
6522	Woven cotton bleachd, etc	17'465	14'901	14'093	59'209
65224	Bleched cotton fabric nes	17'465	14'901	14'093	59'097
653	Wovn man-made fib fabric	45'996	41'979	41'342	91'306
6531	Cont synt weaves nonpile	859	1'119	7'228	22'590
65316	Cont syn blend fabre nes	225	-	6'309	20'112
6534	Disc syn blend fabre nes	34'951	25'549	27'607	67'474
65341	Disc syn fib-cotton fabre	24'867	22'722	25'301	62'779
65349	Oth disc syn blend fabre	10'069	2'799	2'207	4'553
6539	Man-made pile etc fabre	9'775	15'205	5'925	682
65397	Syn fibre pile etc fabre	9'772	15'123	5'893	682
655	Knitted, etc fabrics	431	406	851	15'047
6551	Other knlt etc fab nes	416	405	851	14'648
6559	Knit etc fab nes	121	114	528	12'698
	Total	840'743	786'262	655'762	1124'870

Export FOB by Commodities in Value

(000 S)

SITC	Commodity	1984	1985	1986	1987
26	Textile fibres and waste	138'963	123'090	97'117	35'019
264	Jute, Oth tex bast fibres	137'958	122'822	96'732	92'855
65	Textile yarn, fabrics, etc	431'063	366'677	266'385	302'229
651	Textile yarn	34'531	27'100	25'578	33'387
6519	Textile fibre yarnnes	34'458	27'100	25'578	33'248
65198	Yarn of fibres of 264.0	34'433	27'097	25'578	33'248
654	Oth woven textile fabric	207'379	165'667	117'553	137'672
6545	Weaves of fibres of 2640	207'367	165'662	117'550	137'672
657	Special txtl fabric. prods	2'223	3'051	2'477	3'488
6575	Cordage and manufactures	2'212	3'051	2'477	3'488
658	Textile articles nes	186'298	169'871	119'993	126'616
6581	Bags, sacks of textiles	185'781	169'666	117'973	125'396
8	Misc manufactured goods	78'012	169'273	238'143	424'299
84	Clothing and accessories	76'672	167'528	235'934	416'190
842	Mens outerwear not knit	15'206	25'850	36'916	110'937
8423	Trousers, breeches etc	1'330	5'023	7'618	18'143
84232	Of cotton	1'152	4'401	5'051	14'219
84233	Of man-made fibres	178	445	2'272	3'837
8424	Jackets, blazers etc.	7'886	8'285	5'855	13'647
84242	Of cotton	1'485	1'892	1'245	4'393
84249	Of other fibres	4'327	5'036	3'124	7'090
8429	Other outer garments	5'841	11'868	23'041	77'925
84293	Of cotton	3'973	8'167	7'758	14'701
84299	Of other fibres	1'522	3'186	14'518	62'314
843	Womens outerwear nonknit	12'296	32'250	65'804	101'223
8431	Coats and jackets	897	2'478	2'281	5'604
8434	Skirts	16	2'268	1'758	6'472
84342	Of cotton	-	-	687	4'389
8435	Blouses	8'372	20'728	23'725	25'121
84351	Of cotton	2'213	10'833	10'358	11'839
84359	Of other fibres	4'212	8'778	11'077	12'349
8439	Other outer garments	2'593	6'437	36'520	60'658
84391	Of cotton	1'033	2'247	8'091	24'443
84399	Of other fibres	329	4'111	27'839	38'568
844	Under Garments not knit	43'277	108'228	124'114	172'996
8441	Men's shirts	41'403	104'031	119'936	153'831
84411	Of cotton	12'334	24'387	14'232	40'001
84419	Of man-made fibres	695	1'212	2'043	4'438
8442	Men's undershirts	8'487	8'362	94'661	100'000
8443	Men's briefs	-	-	11'396	24'000
8444	Men's socks	-	-	1'000	5'000

84439	Of other fibres	-	25	10'373	12'928
845	Outerwear knit nonelaste	4'831	3'969	6'696	23'452
8451	Jerseys, pullovers etc.	453	3'969	6'291	13'547
84514	Of regenerth fibres	-	827	1'956	5'727
84519	Of other fibres	-	1'730	2'285	3'912
8459	Other, clthg accesrys	4'258	-	405	8'369
84592	Of cotton	3'849	-	15	1'281
84599	Of other fibres	167	-	320	6'470
846	Under garments knitted	301	-	1'192	7'032
Total		1'972'154	2'195'770	2'174'825	3'165'535

Source : The Europa World Year Book 1989

3. MILL CAPACITY

3.1 Project Description

The mill will be located at Dagonbhuiyan of Feni District. The Proposed site of the project falls by the side of Feni-Chownahani all weather metalled road which is only 18 km from Feni and about 130 km from Chittagong the port city. The site is also well connected with Dhaka the capital city and Narayanganj where majority of the export oriented RMG industry is concentrated. The project site also enjoys other utility facilities such as gas, electricity, skilled labour etc.

The domestic market of Bangladesh is very deficient in quality fabrics which are generally required for exportable clothing apparels. "The International Standard Quality Fabrics" which are now consumed by export oriented RMG industry of the country is being met out of imports under back to back letter of credit. The export earnings from RMG during the last decade shows a bright prospect for export of garments from Bangladesh. So, to minimise the import of different types of fabrics into the country and to create appropriate production facilities for quality fabrics for supply to the export-oriented RMG industry and also for direct export of fabrics, setting up of a necessary number of Composite Textile units having modern spinning, weaving, dyeing and finishing facilities is being felt highly essential without further loss of time. The proposed project has been planned to be set up with the objective to produce the export quality woven fabrics.

The project envisages establishment of an integrated textile unit comprising of :

- 25'000 spindled ring spinning unit for manufacturing medium and high counts of cotton and Poly-cotton blended yarns from Ne 28 to Ne 80.
- Complete Weaving unit of 100 Rapier Looms and 140 Air-Jet Looms with required preparatory machines, shedding motion devices, air compressors etc.
- Complete Cloth Processing facilities having Bleaching, Scouring, Dyeing, Printing and Finishing together with Yarn Dyeing, Computerised Colour Kitchen etc.
- Auxiliary departments such as boiler house, air-conditioning, compressed-air, transformer etc. for the above departments.

3.2 Production Programme

Table No : 3.2/1-9

Manufacturing programme of the spinning unit consists of 100 % cotton carded and combed yarn, blend of cotton and man-made fibres and 100 % man-made spun yarn ranging from Ne 80 to Ne 28. The part of manufactured yarn is to be consumed by the weaving department within the same mill, the remaining yarn will be put on sale.

However at the phase I stage all the yarn to be manufactured will be sold outside since weaving department will be installed in the phase II.

Yarn manufacturing programme has been designated to process 3 different types of fibres and to produce 6 different counts of yarns.

Production Programme

Count (Ne)	Mix/Blend of Fibres	Yarn Production on Cones		
		(kg/h)	(kg/day)	(ton/yr)
80	Combed CO	7.3	164.2	49.3
60	" "	10.4	234.0	70.2
60	Polyester	14.1	317.2	95.2
45	PES & Comb.CO	55.0	1237.5	371.2
40	Polyester	25.9	582.7	174.8
40	Carded CO	71.6	1611.0	483.3
30	Polyester	39.9	897.7	269.3
28	Carded CO	43.0	967.5	290.2
Total		267.2	6111.8	1803.5

The blend ratio of polyester and combed cotton fibres is expected to be 67 % and 33 % respectively.

Manufactured yarn for consumption of weaving department as well as yarn sales programme is given below.

Yarn Consumption and Sales Programme
(after phase II)

(ton/yr)

Count (Ne)	Mix/Blend of Fibres	Production	Yarn Requirement For	
			Weav.Dept.	Sale
80	Combed CO	49.3	-	49.3
60	" "	70.2	-	70.2
60	Polyester	95.2	-	95.2
45	PES & Comb.CO	371.2	345.6	25.6
40	Polyester	174.8	-	174.8
40	Carded CO	483.3	483.3	-
30	Polyester	269.3	-	269.3
28	Carded CO	290.2	-	290.2
Total		1803.5	828.9	974.6

Spinning plans of single yarns which include operating parameters such as speed, efficiency, draft, twist etc. are given for each count separately on table no : 3.1/1-8.

The folding and twisting plans of polyester and cotton sewing threads are shown on table no : 3.2/9.

Annual Working Hours : 6,750

Table No : 3.2/1

Sl. No.	Type of Spinning	Yarn	Spinning Data				Data of Production				Efficiency (%)	Effective Production (g/h)	Machinery			Remarks
			Spun (No)	Revolving	Infeed (No)	Draft	Coeff.	Twist/	Revolution (rpm)	Delivery (m/min)			Necessary Unit	Units/Machine	Total No. of Mach.	
			3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3	
1	Ring	10	80	1	2.00	40.00	3.60	32.20	14,500	11.44	95	4.81	1,536	768	2.0	Rieter G5/1
2	Ring	10	210	1	0.18	11.11	1.10	1.56	1,100	17.96	75	238.7	31.8	96	0.3	Rieter F1/1a
3	Ring	10	0.18	8	0.16	9.00	-	-	-	250	85	41,839	0.18	1	0.2	Ingolstat
4	Ring	10	0.16	8	60 g/m	-	-	-	275 nips	140	90	27,909	0.28	1	0.3	Rieter
5	Ring	10	60 g/m	32	0.14	-	-	-	-	70	70	176,400	0.06	1	0.1	Rieter E 5/3
6	Ring	10	0.14	9	0.14	8.00	-	-	-	300	80	60,754	0.16	1	0.2	Ingolstat
7	Ring	10	0.14	-	-	-	-	-	-	100	90	22,783	0.44	1	0.4	Rieter
8	Ring	10	0.15	-	-	-	-	-	-	-	95	450,000	0.02	1	0.0	Unifloc
9	Ring	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Ring	10	80	-	80	-	-	-	-	1,100	80	390	18.8	50	0.4	Murata

Annual Working Hours : 6,750

Table No : 3.2/2

Description	Planning Data						Data of Production				Efficiency (%)	Effective Production (g/h)	Machinery			Remarks
	Waste (%)	Spinning (No)	Doubling	Infeed (No)	Draft	Coeff.	Twist/"	Revolution (rpm)	Delivery (m/min)	Necessary Unit			Units/machine	Total No. of Mach.		
1	2	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3		
Ring Spinning	0.01	0.01	60	1	2.00	30.00	3.90	30.21	14,500	12.19	95	6.84	1,536	768	2.0	Rieter GS/1
Ring	0.04	0.01	2.00	1	0.18	11.11	1.10	1.56	1,100	17.96	75	238.7	45.2	96	0.5	Rieter FI/1a
Twisting 20 Per	0.04	0.06	0.18	8	0.16	9.00	-	-	-	250	85	41,839	0.26	1	0.3	Ingolstat
Twisting	0.01	0.02	0.13	8	60 g/m	-	-	-	275 nips	140	90	24,808	0.44	1	0.4	Rieter
Twist	0.01	0.01	60 g/m	32	0.14	-	-	-	-	70	70	176,400	0.08	1	0.1	Rieter E 5/3
Twisting 10 Per	0.04	0.06	0.14	8	0.14	8.00	-	-	-	300	80	60,754	0.23	1	0.2	Ingolstat
Twist	0.04	0.05	0.14	-	-	-	-	-	-	100	90	22,783	0.61	1	0.6	Rieter
Spinning	0.04	0.05	-	-	-	-	-	-	-	-	95	450,000	0.03	1	0.0	Unifloc
Raw Material	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spinning	0.04	0.02	60	-	60	-	-	-	-	1,100	80	520	20.0	50	0.4	Murata

Annual Working Hours : 6,750

Table No : 3.2/3

Sl. No.	Machine	Waste (%)	Spinning Data			Production Parameters				Per Unit		Machinery			Remarks	
			Produced (No)	Doubling	Infeed (No)	Draft	Twist Coeff.	Twist/Inch	Speed (rpm)	Delivery (m/min)	Efficiency (%)	Production (g/h)	Necessary Unit	Units/Machine		Total No. of Mach.
		3.0	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3	7.1
1	Rieter G 5/1	1.0	60	-	1.60	37.50	3.60	27.89	12,500	11.39	92	6.19	2,304	768	3.0	Rieter G 5/1
2	Rieter FI/1A	1.0	1,600	-	0.16	10.00	0.85	1.08	1,100	25.99	80	460.5	31.8	96	0.3	Rieter FI/1A
3	Ingols. PSE 51	1.0	1,200	6	0.14	6.96	-	-	-	350	85	65,896	0.22	1	0.2	Ingols. PSE 51
4	Ingols. SB 52	1.0	1,100	6	0.13	6.46	-	-	-	350	80	70,880	0.21	2	0.1	Ingols. SB 52
5	Rieter CW-PP	1.0	1,100	-	-	-	-	-	-	143	90	35,086	0.43	1	0.4	Rieter CW-PP
6	Mixing B/D	1.0	1,100	-	-	-	-	-	-	-	75	360,000	0.04	1	0.0	Mixing B/D
7		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
8		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
9		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
10		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
11		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
12		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
13		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
14		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
15		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
16		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
17		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
18		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
19		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
20		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
21		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
22		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
23		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
24		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
25		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
26		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
27		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
28		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
29		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
30		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
31		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
32		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
33		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
34		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
35		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
36		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
37		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
38		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
39		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
40		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
41		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
42		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
43		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
44		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
45		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
46		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
47		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
48		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
49		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
50		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
51		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
52		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
53		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
54		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
55		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
56		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
57		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
58		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
59		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
60		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
61		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
62		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
63		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
64		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
65		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
66		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
67		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
68		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
69		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
70		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
71		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
72		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
73		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
74		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
75		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
76		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
77		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
78		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
79		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
80		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
81		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
82		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
83		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
84		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
85		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
86		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
87		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
88		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
89		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
90		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
91		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
92		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
93		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
94		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
95		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
96		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
97		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
98		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
99		1.0	1,100	-	-	-	-	-	-	-	-	-	-	-	-	
100		1.0	1,10													

Annual Working Hours : 6,750

Table No : 3.2/4

Machine	Spinning Data			Production Parameters				Per Unit		Machinery		Remarks
	Spindles	Twist (NE)	Draft	Twist Coeff.	Twist/Inch	Speed (rpm)	Delivery (m/min)	Efficiency (%)	Production (g/h)	Necessary Unit	Units/Machine	
1	3.4	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3
2	35	1.30	34.62	3.60	24.15	11,500	12.10	95	9.05	6,144	768	2.0
3	1.00	0.14	0.99	0.96	1.09	1,200	37.85	80	607.3	94.1	120	0.3
4	0.14	0.10	0.12	-	-	-	10	15	35,310	0.77	1	0.8
5	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
6	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
7	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
8	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
9	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
10	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
11	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
12	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
13	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
14	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
15	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
16	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
17	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
18	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
19	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
20	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
21	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
22	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
23	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
24	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
25	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
26	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
27	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
28	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
29	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
30	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
31	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
32	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
33	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
34	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
35	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
36	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
37	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
38	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
39	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
40	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
41	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
42	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
43	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
44	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
45	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
46	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
47	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
48	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
49	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
50	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
51	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
52	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
53	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
54	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
55	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
56	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
57	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
58	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
59	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
60	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
61	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
62	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
63	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
64	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
65	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
66	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
67	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
68	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
69	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
70	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
71	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
72	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
73	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
74	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
75	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
76	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
77	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
78	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
79	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
80	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
81	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
82	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
83	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
84	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
85	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
86	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
87	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
88	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
89	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
90	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
91	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
92	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
93	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
94	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
95	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
96	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
97	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
98	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
99	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
100	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
101	1.00	0.10	0.99	-	-	-	30	90	16,332	0.76	1	0.8
102	1.00	0.10	0.99	-	-	-	30	90	16,332	0.77	1	0.8
103	1.00	0.10	0.99	-	-	-	30	90	16,332			

Yapılan İşler : 1. Yılın 1. Dönemi

Yapılan İşler : 2. Dönemi

Annual Working Hours : 6,750

Table No : 3.2/5

İşin Adı	Üretim	Spinning Data				Production Parameters				Per Unit		Machinery			Remarks	
		Waste (%)	Spun (kg)	Doubling	Infeed (kg)	Draft	Twist Coeff.	Twist/Inch	Speed (rpm)	Delivery (m/min)	Efficiency (%)	Production (g/h)	Necessary Unit	Units/Machine		Total No. of Mach.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Spinning	1000	10	100	3.2	3.2	3.4	4.1	4.2	4.5	4.4	5.1	5.2	6.1	6.2	6.3	7.1
Spinning	1000	10	100	-	1.60	20.00	3.60	22.77	12,500	13.94	90	11.37	2,304	760	3.0	Rieler G S/1
Spinning	1000	10	100	-	0.16	10.00	0.35	1.08	1,100	25.99	80	460.5	50.5	96	0.6	Rieler F1/1a
Spinning	1000	10	100	6	0.14	6.06	-	-	-	350	85	65,096	0.41	1	0.4	Ingols.RSB S1
Spinning	1000	10	100	6	0.13	6.46	-	-	-	350	80	70,000	0.39	2	0.2	Ingols.SB S2
Spinning	1000	10	100	-	-	-	-	-	-	143	90	35,086	0.78	1	0.8	Rieler C4W-RR
Spinning	1000	10	100	-	-	-	-	-	-	-	95	360,000	0.08	1	0.1	Mixing B/O
Spinning	1000	10	100	-	-	-	-	-	-	-	-	-	-	-	-	-
Done winding	25.7	1.0	40	-	40	-	-	-	-	1,100	80	780	33.3	50	0.7	Murata

SPIN PLAN No: 11 Dated: 201

Model: Akarter Paçlıpaç

Annual Working Hours : 6,750

Table No : 3.2/6

Machine Description Model	Production		Spinning Data				Production Parameters				Per Unit		Machinery			Remarks
	kg	%	Produced (Ne)	Doubling	Infeed (Ne)	Draft	Twist Coeff.	Twist/ Inch	Speed (rpm)	Delivery (m/min)	Efficiency (%)	Production (g/h)	Necessary Unit	Units/ Machine	Total No. of Mach.	
1.1	2.1	2.2	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3	7.1
Sing Spinning	72.7	2.7	40	1	1.20	33.33	3.90	24.67	14,000	14.42	92	11.75	6,152	768	8.0	Rieter GS/1
Speed Frame	74.3	1.0	1.20	-	0.14	8.57	1.22	1.34	1,100	20.91	75	463.1	160.5	108	1.5	Rieter FI/1a
Draw Frame 11	75.1	0.6	0.14	8	0.14	8.00	-	-	-	350	85	75,310	1.00	1	1.0	Ingols.RSB 51
Draw Frame 12	75.5	0.6	0.14	8	0.13	8.62	-	-	-	350	85	75,310	1.00	2	0.5	Ingols.SB 51
Dand	76.1	0.1	0.13	-	-	-	-	-	-	130	90	31,896	2.38	1	2.4	Rieter CAM-RR
Collarbox	78.4	4.0	-	-	-	-	-	-	-	9	95	450,000	0.17	1	0.2	Unifloc
Raw Material	81.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Working	71.6	1.0	40	-	40	-	-	-	-	1,100	80	780	91.8	50	1.8	Murata

Annual Working Hours : 6,750

Table No : 3.2/7

S	SPINNING P.A.L.A	PRODUCTION PARAMETERS				PART	UNIT	MACHINERY		REMARKS			
		Twist Coeff.	Twist/Inch	Speed (rpm)	Delivery (m/min)			Efficiency (%)	Production (g/h)		Necessary Unit	Units/Machine	Total No. of Mach.
3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3	7.1
30	-	1.60	18.75	3.60	19.72	12,500	16.10	92	17.50	2,304	768	3.0	Pieter G S/1
1.60	-	0.16	10.00	0.85	1.08	1,100	25.99	80	460.5	40.0	96	0.9	Pieter FI/1a
0.16	6	0.14	5.86	-	-	-	350	85	65,896	0.64	1	0.6	Ingols. 888 S1
0.14	6	0.13	6.46	-	-	-	350	70	70,880	0.59	2	0.3	Ingols. 58 S2
0.13	-	-	-	-	-	-	115	60	35,086	1.21	1	1.2	Pieter C4N-PP
-	-	-	-	-	-	-	-	95	360,000	0.12	1	0.1	Waring B/O
30	30	30	-	-	-	-	1,100	80	1,040	38.4	50	0.6	Murata

Form No: 10 (Revizyon: 01) (Sewing Thread)

Annual Working Hours : 6,750

Table No : 3.2/8

Sıra No	İplik Adı	İplik Kalınlığı (mm)	Spinning Data				Production Parameters				Per Unit			Machinery		Remarks
			Skein Length (No)	Doubling	Infeed (No)	Draft	Twist Coeff.	Twist/Inch	Speed (rpm)	Delivery (m/min)	Efficiency (%)	Production (g/h)	Necessary Unit	Units/Machine	Total No. of Mach.	
1	10/2	0.2	28	-	1.20	23.53	1.00	21.17	13,500	16.20	92	18.86	2,304	768	3.0	Rieler G'S/1
2	10/2	0.2	1.20	-	0.14	8.57	1.24	1.36	1,100	20.57	75	455.6	98.0	96	1.0	Rieler F1/1a
3	10/2	0.2	0.14	8	0.14	8.00	-	-	-	350	85	75,310	0.60	1	0.6	Ingols. 659 S1
4	10/2	0.2	0.14	8	0.13	8.62	-	-	-	350	85	75,310	0.60	2	0.3	Ingols. SB S2
5	10/2	0.2	0.13	-	-	-	-	-	-	130	90	31,896	1.43	1	1.4	Rieler C4W-RR
6	10/2	0.2	-	-	-	-	-	-	-	-	95	450,000	0.11	1	0.1	Unifloc
7	10/2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	10/2	0.2	28	-	28	-	-	-	-	1,100	80	1,114	38.6	50	0.8	Murala

SPINNING PLAN No. 2 (No. 2 and No. 30/2 Polyester Sewing Thread)

Model: A-1 (Khan - Bangladesh)

Annual Working Hours: 6,750

Table No : 3.2/9

Machine	Production		Spinning Data				Production Parameters				Per Unit		Machinery			Remarks
	2.1	2.2	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3	
Twisting	14.0	0.5	60/2	-	60/2	-	6.75	26.1	11,000	10.7	93	23.48	596	204	2.9	Volkmann
	25.6	0.5	40/2	-	40/2	-	7.35	23.2	11,000	12.0	92	39.19	653	204	3.2	-
Winding	22.5	0.5	30/2	-	30/2	-	6.59	18.0	11,000	15.5	92	67.30	587	204	2.9	-
	11.1	0.5	60/2	2	60	-	-	-	-	800	90	851	16.5	66	0.3	Mettler
Single yarn	25.7	0.5	40/2	2	40	-	-	-	-	800	90	1,276	20.2	66	0.3	-
	32.7	0.5	30/2	2	30	-	-	-	-	800	90	1,701	23.3	66	0.4	-
	14.1	-	-	-	60	-	-	-	-	-	-	-	-	-	-	-
	25.9	-	-	-	40	-	-	-	-	-	-	-	-	-	-	-
	32.9	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-

SPINNING PLAN No. 2 (2-plied Cotton Sewing Thread)

Model: A-1 (Khan - Bangladesh)

Annual Working Hours: 6,750

Machine	Production		Spinning Data				Production Parameters				Per Unit		Machinery			Remarks
	2.1	2.2	3.1	3.2	3.3	3.4	4.1	4.2	4.3	4.4	5.1	5.2	6.1	6.2	6.3	
Twisting	14.0	0.5	28/2	-	28/2	-	6.45	17.1	10,000	14.9	92	69.63	612	204	3.0	Volkmann
	22.5	0.5	28/2	2	28	-	-	-	-	800	90	1,823	23.5	32	0.7	Mettler
Winding	11.1	0.5	60/2	2	60	-	-	-	-	800	90	851	16.5	66	0.3	Mettler
	25.7	0.5	40/2	2	40	-	-	-	-	800	90	1,276	20.2	66	0.3	-
Single yarn	32.7	0.5	30/2	2	30	-	-	-	-	800	90	1,701	23.3	66	0.4	-
	14.1	-	-	-	60	-	-	-	-	-	-	-	-	-	-	-
	25.9	-	-	-	40	-	-	-	-	-	-	-	-	-	-	-
	32.9	-	-	-	30	-	-	-	-	-	-	-	-	-	-	-

3.3 Working Time

The production programme is based on :

- 7.5 hours per shift
- 3 shifts a day
- 300 working days a year

totalling 6'750 hours a year.

Working Time of Personnel

Working Days	Staff	Shifts				4.	
		Daily	1.	2.	3.		
Monday to Friday	Start	8.00	8.00	08.00	16.00	24.00	-
	Finish	18.00	16.00	16.00	24.00	08.00	-
Saturday	Start	-	08.00	08.00	16.00	24.00	-
	Finish	-	16.00	16.00	24.00	08.00	-
Meal and Rest Period	Start	12.00	11.00	12.00	20.00	03.00	-
	Finish	13.00	11.30	12.30	20.30	03.30	-
Working Hours/Week	45	45	45	45	45	45	-
Working Weeks/Year	50	50	50	50	50	50	-
Working Hours/Year	2'250	2'250	2'250	2'250	2'250	2'250	-

Working Time of Departments

Code No	Units	No. of Shifts	Working Hours per Week	Annual Working Week	Annual Working Hours
01	Blowroom	3	135	50	6'750
02	Carding	3	135	50	6'750
03	Combing	3	135	50	6'750
04	Drawing	3	135	50	6'750
05	Roving	3	135	50	6'750
06	Ring Spin	3	135	50	6'750
07	Cone Winding	3	135	50	6'750
08	Twisting	3	135	50	6'750

3.4 Manufacturing Processes

Chart No : 3.4/1-8

The manufacturing of yarns from cotton and man-made staple fibres involve a number of processing stages where the ultimate yarn is produced in the spinning frame. The detail of manufacturing process has been described as follows:

The flow of materials during manufacturing stages with hourly production and with waste percentages of each process is shown on chart no : 3.3/1-8

3.4.1 Opening and Cleaning Line (Blow Room.)

Cotton from its constituent bales are blended and mixed at the automatic bale opener and processed through a series of opening and cleaning machines installed in the "Blow Room". These machines can be used in various arrangements which will provide different levels of cleaning. The cleaning line also includes a metal extractor and a central dust filter unit. The cleaning line removes dirt, foreign impurities and opens the tufts of the fibres and thus provide excellent cleaning and fibre preparation for yarn production. Ultimately this opened and cleaned cotton is fed into cards through chute-feed system.

Depending on different grades of raw cotton, their trash content and degree of cleaning desired, 3 to 6 beating points will be used, while the man-made staple fibre will be processed in the "Blow Room" using only 2 beating points.

3.4.2 Carding

The objectives of carding are to individualise the fibres, remove dirt, neps and sort fibres and to form uniform sliver. The tuft of fibres from blow room through chute-feed is fed to the card through feed rollers and dish-plate where the fringe of fibres are taken away by the taker-in mounted with metallic wires. After a further cleaning and opening at taker-in region the fibres are transferred to the cylinder region where the main carding action takes place in between cylinder and flats. Fibres are then transferred to doffer by the stripping action and produce a thin web. The web is then formed into sliver of certain fixed weight per unit length and coiled into sliver cans to be transferred to the next process.

3.4.3 Drawing

The slivers in cans are then fed at the feed end of the draw frame. At draw frames by doubling and drafting, parallelisation of fibres take place. The end product is a regular sliver, which is again coiled into sliver cans. For processing carded cotton yarn one or two passages are required at draw frame. For combed cotton yarn one pre-comb passage and one more passage after combing is required at draw frame. For the processing

cotton-polyester blended yarn, the cotton portion is also processed in the same process as combed cotton yarn upto combing machine, while the polyester fibre require one pre-draw passage. There after these two materials are blended in the draw frame proportionately (according to the blending ratio desired). These blended sliver are then undergone another two passage at draw frame heads in order to produce uniform sliver for ultimate mixing of the blends.

3.4.4 Combing

Combing is a special process where the short fibres are removed for producing finer yarn of Ne 40 and above. The short fibres extracted is called noil which is eventually collected into a roll. The noil percentage varies from 10 % to 25 % depends on the fineness of the yarn to be spun and its end use. Before combing a number of drawn sliver say 32 slivers are fed at the creel of lap former to form a lap weighing 60 to 75 g/m which is ultimately fed to the combing machine. After combing the sliver containing more or less uniform and longer fibres are coiled into the cans for using in the post comber drawing.

3.4.5 Speed Frame

The slivers processed at draw frames are then fed to speed (fly) frame, where drafting takes place together with application of some amount of twist to reduce the bulk. The end product roving is then would be on the bobbins in package form.

3.4.6 Ring Spinning

The packaged roving bobbins are fed to ring spinning frames, where considerable drafting take place together with application of twist. The end product yarn is then wound on ring cops (bobbins). It is a conventional spinning system in which twist is inserted in a yarn by using a revolving traveller. The yarn is wound-on since the rotational speed of the package is greater than that of the traveller.

3.4.7 Cone Winding

The yarn on ring cops (bobbins) are fed to winding machine, where yarns are wound on to larger package (cones or cheese form) at high speed upto 1200 m/min. Imperfections like neps and slubs are also removed at the winding machine automatically. The yarns wound on packages for weaving or knitting processes.

3.4.8 Twisting

Polyester is spun by the ordinary ring spinning process into two and then twisted by two together to make a 2/2.

3.4.9 Reeling

The packaged yarn (cones/cheese) from the winding machine in case of single yarn and the cops from the twisting machine (in case of folded yarn) is fed to reeling machine to reel the yarn into hank form.

3.4.10 Bundling

The reeled hanks from the reeling machine are pressed into bundles of fixed weight.

3.4.11 Baling

The bundles are then arranged and pressed into bales of fixed weight at the baling press and is prepared for marketing.

COMBED YARN FLOW CHART

(kg/h)

Waste(%)

	Raw material (CO)	10.8
	W/	
3.5	Blowroom	10.4
	W/	
3.5	Card	10.1
	W/	
0.6	Drawing I Pas	10.0
	W/	
1.0	Unilap	9.9
	W/	
22.0	Combing	7.7
	W/	
0.6	Drawing II pas	7.7
	W/	
1.0	Reving	7.6
	W/	
2.7	Ring Spinning	7.4
	W/	
1.0	Line Winding	7.4

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COMBED YARN FLOW CHART

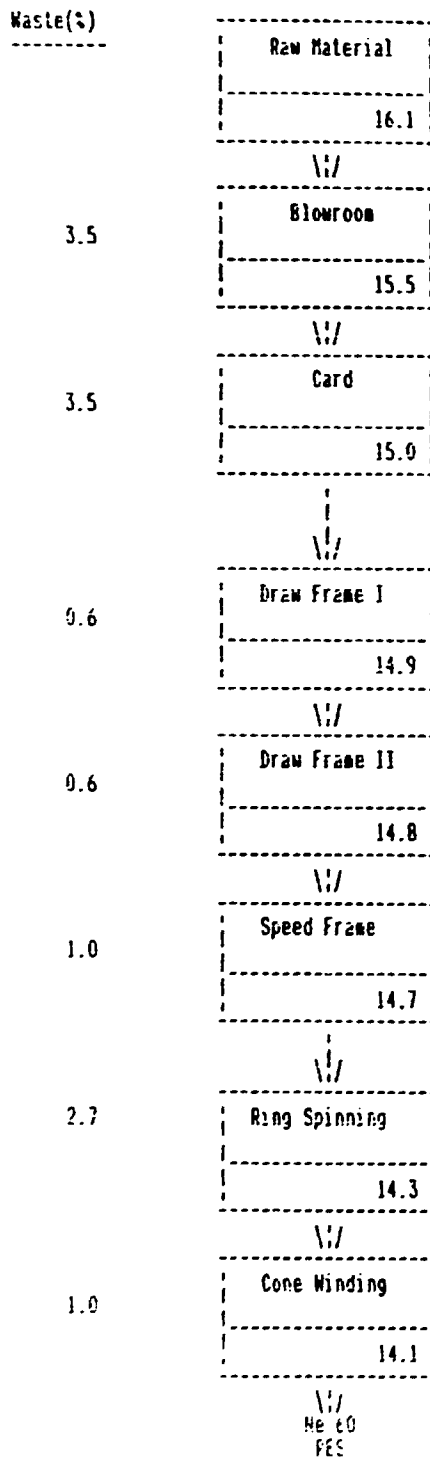
(kg/h)

Waste(%)

	Raw material	15.0
	\\	
3.5	Blowroom	14.4
	\\	
3.5	Cards	13.9
	\\	
0.6	Drawing I Pas	13.9
	\\	
1.0	unlap	13.7
	\\	
20.0	Combing	11.0
	\\	
0.6	Drawing II pas	10.9
	\\	
1.0	Roving	10.8
	\\	
2.7	Ring Spinning	10.5
	\\	
1.0	Cone Winding	10.4
	\\	
	W Waste Combed Cotton	

PES YARN MATERIAL FLOW CHART

(kg/h)



Ids
 100% COTTON / 100% PES

BLENDDED PES/Comb.CO YARN FLOW CHART

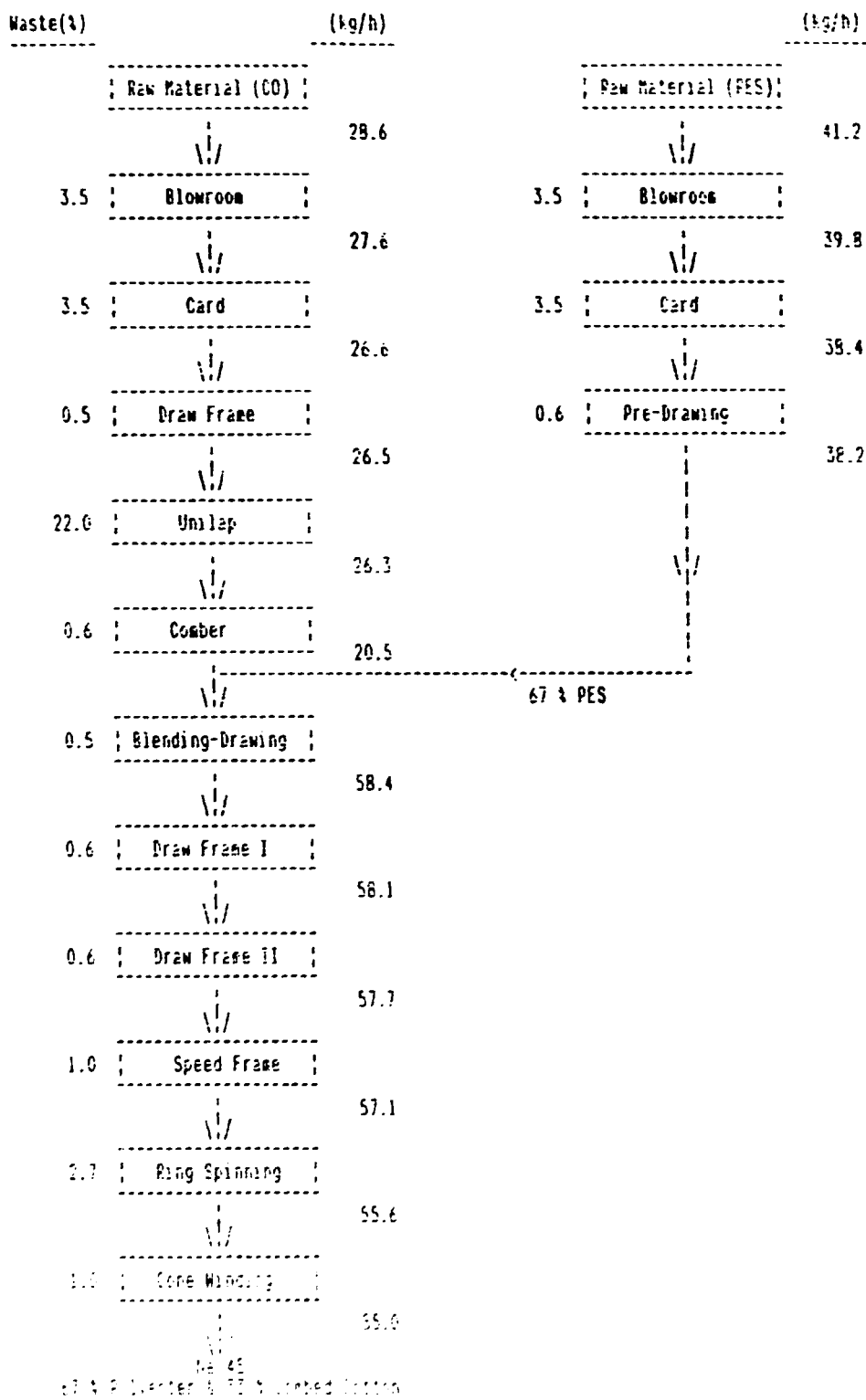


Chart No : 3.4/5

PES YARN MATERIAL FLOW CHART

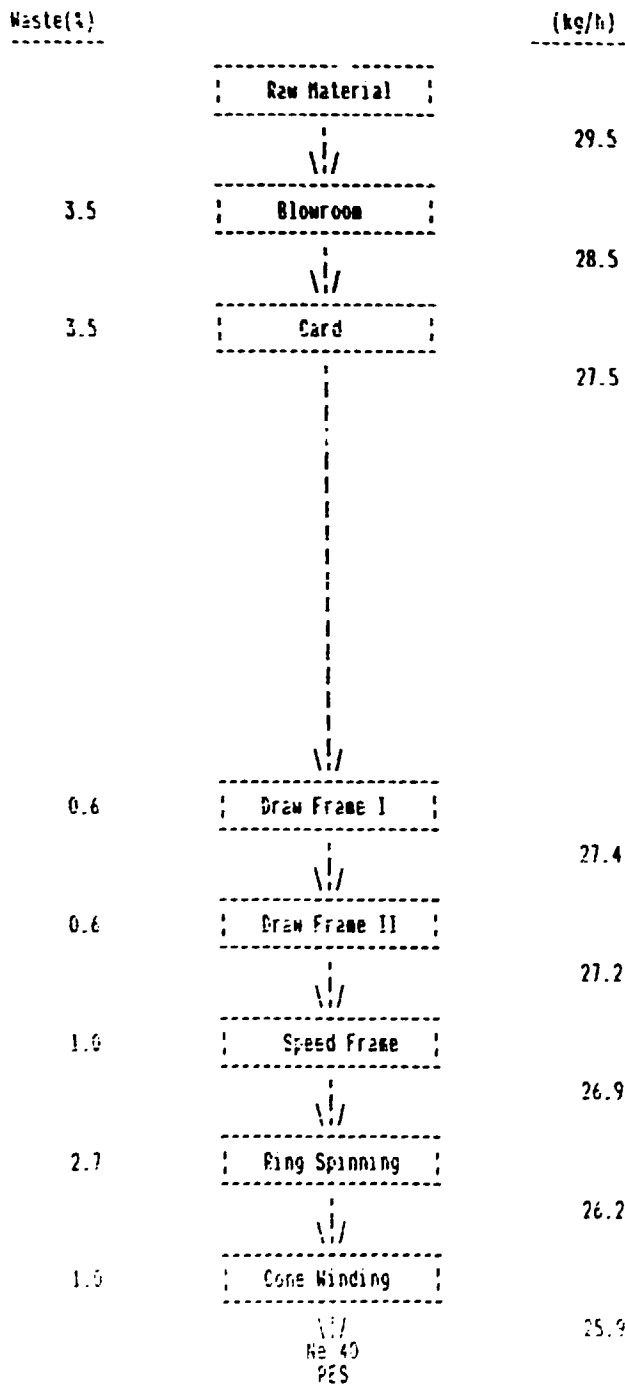


Chart No : 3.4/6

CARDED YARN MATERIAL FLOW CHART

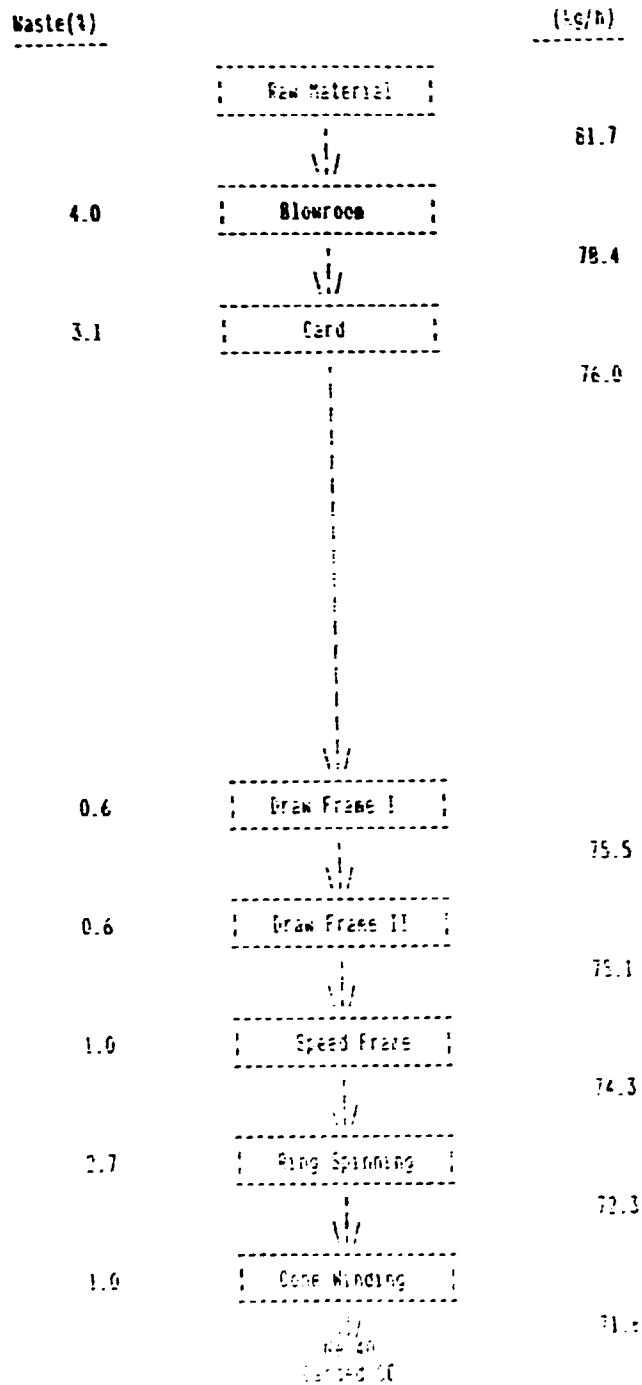


Chart No : 3.4/7

PES YARN MATERIAL FLOW CHART

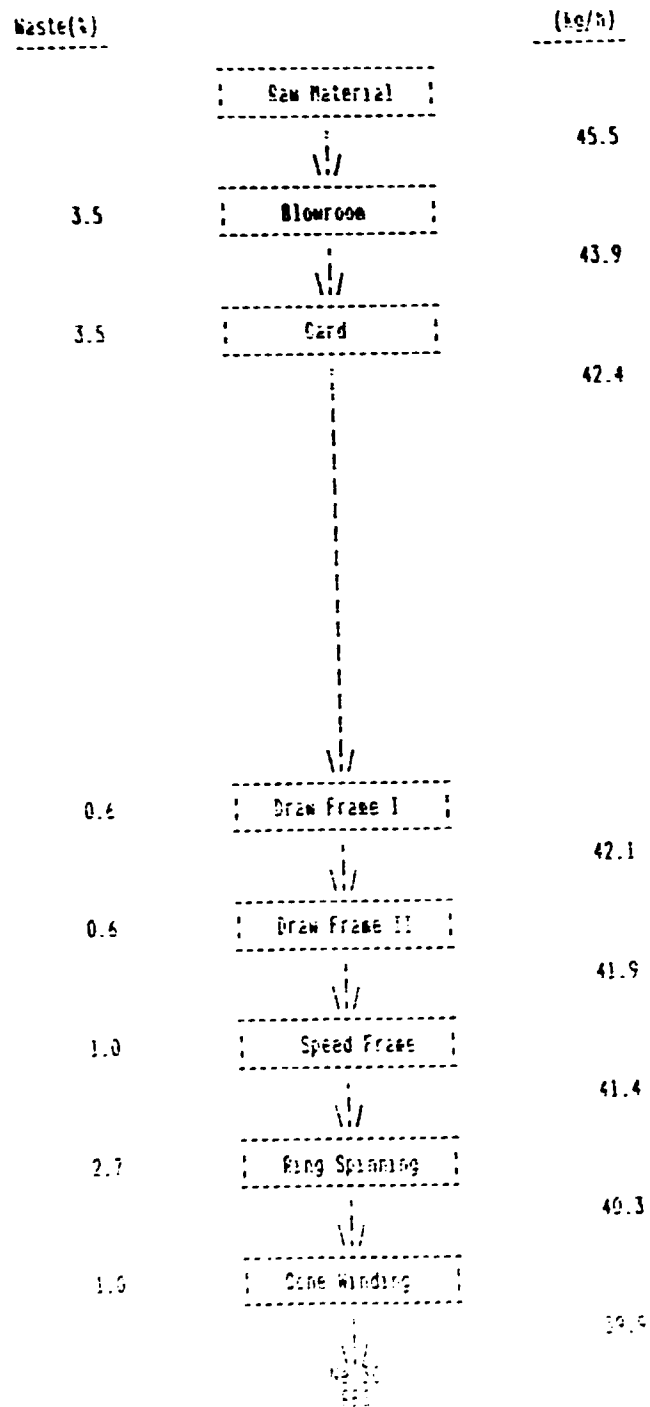
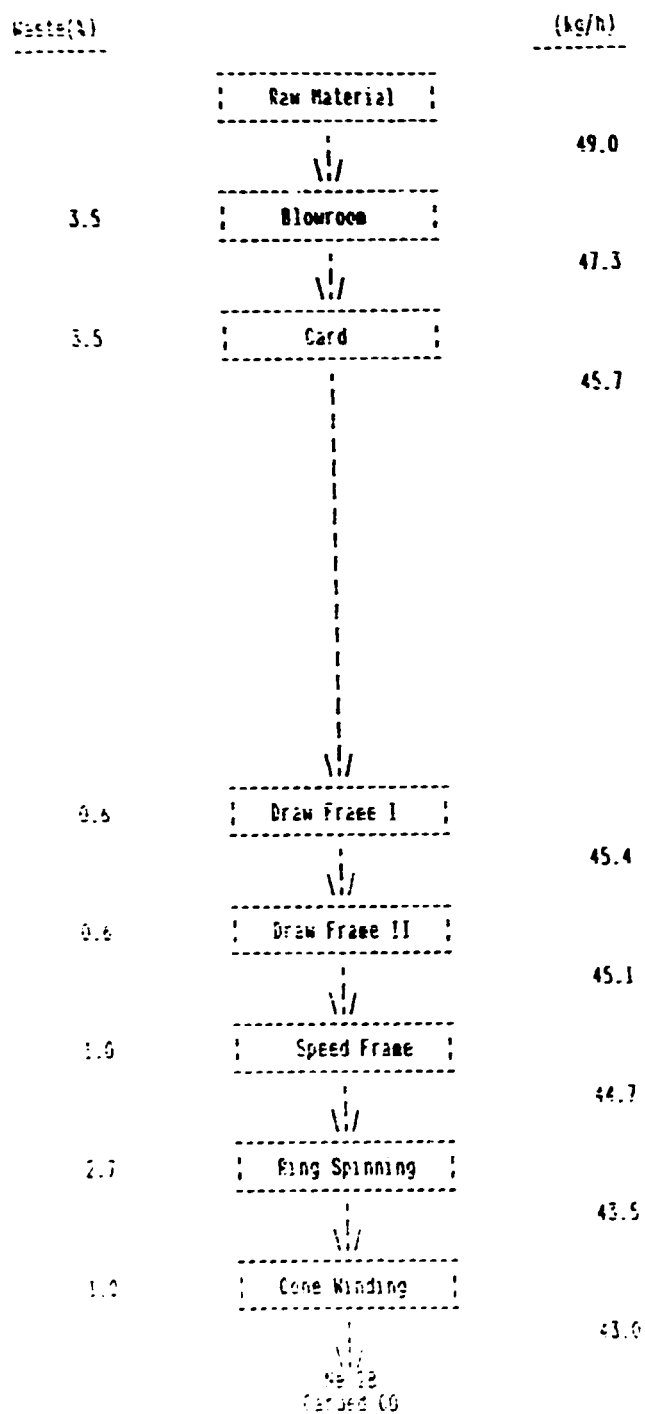


Chart No : 3.4/8

.....
CARDED YARN MATERIAL FLOW CHART



3.5 Production Machinery

Table No : 3.5/1-2

Basic technological principles of processing staple fibre into yarn have remained the same over the centuries. However, major development in machine technology have taken place over the last two decades. Noteworthy technological innovations took place through introduction of automation to increase efficiency, improve quality, save on labour costs and through designing high speed machines to increase productivity. Automation has thus been introduced in the blowroom in automatic bale opening and blending, in removing dust and waste pneumatically and in conveying raw materials (cotton and man made fibres) pneumatically. Autochute feed system has replaced the lap feeding system. Auto doffing in cards, draw frames and spinning frames, winding machines, autocleaning and auto-splicing/knotting of broken yarns have similarly been introduced.

3.5.1 Blowroom Machinery

Blowroom machinery consists of a set of opening and blending units.

3.5.1.1 Automatic Bale Opening

Uneven feeding of different raw material components to conventional bale openers affects the blend to a considerable degree. Yarn quality inevitably suffers as a result, so that poor use is made of the raw material.

The automatic bale opening system eliminates the subjective errors associated with manual feeding.

Moreover the gentle, continuous removal of very small tufts at constant rate lays the foundation for top yarn quality and impeccable performance in all downstream processes. In particular, opening the raw material into extremely small tufts by means of the whirldisc beater secures homogeneous blending, intensive yet gentle cleaning, and maximum dedusting - thereby laying the foundation for very high yarn evenness.

This is the first unit of the blowroom line. The machine is capable of processing short staple fibres such as cotton and man-made fibres up to 60 mm staple length.

Production rate of model A 1.2 of Uniloc with one assortment of raw material is 750 kg/h, when assortment is more than 20% the production rate falls to 600 kg/h. Tarp weight and moisture are 20-50 g/g.

Maximum material loss per ton of fibre is 8 mg per kg of fibre.

Installed power may vary.

3.5.1.2 Waste Opener

The machines which open and subsequently re-blend fibre waste. As with virgin fibres, here also applies that discontinuous processing or uncontrolled opening results in varying blend proportions and in different opening degrees of the material fed. These shortcomings show similar effects in the subsequent processing as varying fibre fineness, and can negatively influence the regularity of the final product.

The task is rendered more difficult for the waste openers as even smallest material flows must be continuously controlled.

Regular, continuous production of the machine is in the range of 3-60 kg/h at a constant, fine opening of the material fed.

Some of the reprocessed materials are :

- flat waste
- laps
- noils
- pre-opened roving
- etc.

The working width of the machine is 750 mm.

3.5.1.3 Mixing Bale Opener

This machine has a function of serving as a bale opening and cleaning machine in the blowroom line with lower production targets and with frequent changes of material mix.

The machine has a production capacity up to 400 kg/h cotton, man-made fibres and blends can be processed at this machine at a working width of 1200 mm

- installed power max : 7 kw

3.5.1.4 Blending and Cleaning Machine

Yarn strength, evenness and dyeability are the most important parameters whether the yarns are made from natural or synthetic fibres.

At the same time as there are tighter quality standards, the production should be run more economically and the raw material should be exploited to its limits. In order to achieve the highest spinning limits possible, homogeneous blend in as far as fibre length, maturity, fineness and colour are concerned, becomes extremely important. This results in a low number of ends down in spinning.

The automatic bale opening machine Unifloc takes off fibres from different stocks simultaneously and evenly and maintains a blending consistency over an extended period of time. The compact blending and cleaning machine Unimix follows this machine and carries out an efficient and homogeneous blending process followed by gentle opening and cleaning.

The machine processes cotton, man-made fibres and blends and has a production capacity up to 600 kg/h.

If the cleaning and opening device is incorporated with the machine the production rate is reduced and becomes up to 400 kg/h.

Working width of the machine is 1200 mm.

- capacity of the unit : active blending capacity 250 kg
- installed power max : 7.2 kw
- compressed air requirement max : 2.8 m³/s

3.5.1.5 Mono Cylinder Cleaner

Owing to the increasing use of mechanical picking and ginning methods in the harvesting of cotton and in the seed separation, many cotton grades now arrive with a considerably higher impurity content. For this reason an intensified cleaning action on the parts of the blowroom machinery is of prime necessity, in combination with extremely gentle handling of the fibres. This is all the more essential since according to spinning practice a further reduction in the number of operations in the blowing room is called for. The mono cylinder thoroughly cleans the tufts well opened by the Unifloc, mixing bale opener or waste opener by accelerating and decelerating them several times during their passage through the machine, at the same time turning them over and passing them three times across an adjustable grid. The raw material retains its natural fibre strength and elasticity due to gentle handling at high cleaning efficiency. The impurities are removed without being destroyed which has a very favourable effect on the subsequent operations in the mill.

The machine which has a production rate up to 500 kg/h, is capable of processing cotton fibres.

Material is conveyed pneumatically by separate fan. Waste can either be removed manually or extracted by connecting to an automatic suction system.

In view of the growing difficulties, carding is more than ever of crucial importance.

Good carding operation is the basis for a unique end-product yarn. The production rate varies in relation with fibre type, quality expectation, and consequently delivery speed and sliver count.

The materials processed are cotton and man-made fibres with staple length up to 600 mm. The production rate is up to 700 kg/h and sliver count range varies from 3.5 to 6.5 ktex.

Feed system used is called Aerofeed-U and feed weight is between 500-1'200 g/m.

The machine is capable of applying draft ranging from 80 to 300 and has a working width of 1'000 mm.

Waste removal system could either be intermittent or central suction. Sliver levelling apparatus is an integral part of the machine.

The machine has an automatic can changer mechanism with the 600 mm can diameter. The height of the cans can be selected between 1'000-1'300 mm.

- installed power max : 12 kw
- compressed air : 0.1 m³/h at 5 bar

3.5.3 Draw Frames

Cotton, man-made fibres and blends up to 80 mm fibre length are processed.

Some technological data can be summarised as below :

- feeding weight 20 to 50 ktex (g/h)
- delivery weight 2.5 to 7 ktex (g/m)
- 4 to 8 ends-up
- draft 3.5 to 10.1
- delivery speed up to 600 m/min.
- draft system 3-over-3 with pressure bar for fibre control
- integrated dust extraction system
- cans at feed and delivery from 225 mm (9") to 1000 mm (40") dia
- automatic can changer (optional)
- RSB 51 with electronic levelling system
- tension control at the delivery to ensure sliver evenness
- tension control at the entry
- sliver count
- sliver count can be operated only by Mh 51 and RSB 51
- power consumption max 18 kw

3.5.4 Combing Unit

3.5.4.1 Combing Preparation

An essential basis for optimum results in the combing process is a lap of highest quality. Combing preparation performs the function of aligning the fibres of the card slivers in parallel formation by doubling and drawing, and forming them into a lap having a high standard of evenness and appropriate width and thickness.

System is designated both for processing long and medium staple cotton producing a higher percentage noil, and for grades with shorter staple and a lower percentage noil, in other words upgrading.

"Combing Preparation System" is based largely on a new apportionment of drafting between the card and the combers.

Six to eight slivers are first doubled and drafted on the drawframe. Then on the Unilap itself, 2 x 16 drafted slivers are combined into a homogeneous lap.

The technological data of the combine preparation machine "Unilap" has been outlined below :

- actual production : up to 430 kg/h
- field of use : cotton of all origins 11/16"-2"
- count range : 3.3 - 5 ktex
- feed : max. 160 ktex
- cans in feed : 600 x 1200 mm 1000 x 1200 mm
- draft : 1.2 - 2.24
- delivery batt weight : up to 80 ktex

Technical data is as follows :

- lap weight net : up to 25 kg
- delivery lap width : 300 mm
- delivery speed : 80 - 120 m/min

Machine data is given below :

- dust extraction : connection to an external system or drum separator
- installed power max. : 14,6 kw
- compressed air consumption : 3,3 Nm³/h at 8 bar

3.5.4.2 Comber

Due to the ever increasing quality and economic demands made on the end product, the yarn, the quality of the combing process in cotton spinning becomes even more important than in the past. Combing, the traditional way of upgrading yarns of top quality, has to perform four main tasks :

- extraction of short fibres in order to improve the staple diagram
- extraction of the small impurities and neps left over from carding
- fibre parallelisation
- formation of an even combed sliver with the necessary cohesive forces required for successful downstream processing

Technological data of the comber is given below :

- production rate : up to 60 kg/h
- feed laps :
 - . lap weight : 60-75 (80) ktex
 - . max.diameter : 650 mm
 - . width : 300 (267) mm
 - . weight : up to 25 kg
- noil extraction : 5-25 %
- nipping rate : up to 300 nips min
- efficiency : 90-94 %
- combed silver : 1 per machine
- doublings per combed silver : 8-fold
- silver fineness at delivery : 3-6 ktex
- range of staple lengths : 1-2"
- intalled power max. : 8.2 kw
- compressed air requirement: 1.9 Nm³/h at 6

3.5.6 Roving Frame

Slivers delivered from draw frames are applied further draft and given slight twist in order to be processed at the subsequent yarn forming operation on ring frames.

Some of the technological data has been given as follows :

- spindle per frame : 60-120 variable in steps of 12 spindles.
- max. lift : 355 mm (14")
- max. package diameter: 178 mm (7")
- max. spindle speed : 1120 rpm
- range of roving hanks : 1180-200 tex
- break draft : 1.8
- main draft : 2-2.1

- delivery speed
 - . cotton : up to 30 m/min
 - . man-made : up to 40 m/min
- max. installed power : 14.6 kw
- compressed air requirement : 1.0 Nm³/h

3.5.7 Ring Spinning Machine

Roving is further drafted and given additional twist on ring spinning frames for manufacturing single yarn. The new high draft concept permits the spinning of quality yarns in the count range of 100-4.2 tex.

The ring spinning frames are integrated with the auto-doffing systems. The automatic tube sorting installation which is integrated into the tube feeder has made it possible to incorporate further steps for automation.

The ring spinning machines can also be prepared for connection with the cone winders.

Some technological features of the frame is given below :

- material to be processed : cotton, man-made fibres blends up to 60mm
- yarn counts : 100 - 4 tex
- range of twist : 140 - 2⁵⁵⁰ T/m
- draft : up to 60 (mechanically)
- spindle speed : up to 20'000 rpm (mechanically)
- number of spindles : 768
- spindle gauge : 70 / 75
- ring diameter : 40, 42, 45 48 mm
- tube length : 200 - 250 mm

3.5.8 Cone Winding

Automatic cone winders which join yarn ends together by "Splicer" mechanism enables knotless yarn manufacturing. The yarn packages at a size of approximately 2 kg will available for the subsequent processes i.e. weaving or knitting.

Standard machine is incorporated with 50 winding heads and with individual splicer for each head.

Power consumption per 50 spindle machine is roughly 16.7 kw. Compressed air requirement for Mach Splicer is 9 lt form.

3.6 Machinery Allocation

The details of machinery allocation regarding yarn types and counts is given below.

3.6.1 Cone Winder

Cone winders assumed to have 50 spindles per machine and each winding head equipped with automatic "Splicer" apparatus.

The speed and efficiency of winders have been taken 1'100 m/min and 80 % respectively for all types of yarns.

Allocation of cone winders have been made as follows :

Cone Winders

Count of yarn (Ne)	Blend or Mix. of Fibres	Req.Yarn on Cones (kg/h)	Machine Allocation		End-Use
			Unit	No.of Mach.	
80	Combed CO	7.3	18.8	0.4	Sale Yarn
60	-	10.4	20.0	0.4	-
60	Polyester	14.1	27.2	0.5	Sewing-thread
45	PES&Comb.CO	55.0	79.4	1.6	Weav.dept.
40	Polyester	25.9	33.3	0.7	Sewing-thread
40	Carded Cotton	71.6	91.8	1.8	Weav.dept.
30	Polyester	39.9	38.4	0.8	Sewing-thread
28	Carded CO	43.0	38.6	0.8	-
Total		267.2	347.5	7.0	-
				(8.0)	required

3.6.2 Ring Frames

Total 32 ring frames with 768 spindles each have been allocated according to the following yarn manufacturing programme :

- $\frac{1}{3}$ of the total spindle have been allocated for sewing thread
- $\frac{2}{3}$ of the total spindle allocation has been made for yarn to be used in weaving department and yarn for sale.

Ring Frame Allocation

Count of yarn (Ne)	Blend or Mix. of Fibres	Yarn Produced (kg/h)	Machine Allocation		End-Use
			No. of Mach.	No. of Spindle	
80	Combed cotton	7.4	2	1'536	Sale Yarn
60	" "	10.5	2	1'536	" "
60	Polyester spun	14.3	3	2'304	Sewing-thread
45	PES & Comb.CO	55.6	8	6'144	Weav.dept.
40	Polyester spun	26.2	3	2'304	Sewing-thread
40	Carded Cotton	72.3	8	6'144	Weav.dept.
30	Polyester spun	40.3	3	2'304	Sewing-thread
28	Carded cotton	43.5	3	2'304	" "
Total		270.1	32	24'576	

3.6.3 Roving Frames

Six Roving frame with 96 spindles and one frame with 120 spindles will be operating at 1'200 rpm at 80 % efficiency for manufacturing following roving production.

Roving

Roving Count (Ne)	Mix. or Blend of Fibres	Necessary		
		Unit	Unit/Mach.	Mach.
2.00	Combed CO	79.7	96	1
1.60	Polyester	178.7	96	2
1.30	Carded CO	258.4	96	3
1.30	PES&Comb.CO	94.7	120	1
Total		611.5		7

3.6.4 Drawing Frames II

Necessary number of machines has been calculated on the basis of following assumptions :

Draw frame II passage is incorporated with an auto-leveling system and has a single delivery unit.

3.6.7 Unilap

Unilap will be operating at a speed of 70 m/min with an efficiency of 70 %.
The machine has a single delivery unit.

Unilap

Sliver Count (g/m)	Mix. or Blend of Fibres	Necessary	
		Unit	Mach.
60	Combed I	0.14	1
60	PES & Comb.CO	0.17	-
Total		0.31	1

3.6.8 Cards

The Polyester fibre and two types of cotton are processed at an average efficiency of 90 %. Cards have one delivery unit each.

Cards

Sliver Count (Nc)	Mix. or Blend of Fibres	Sliver Delivery Speed (m/min)	Necessary	
			Unit	Mach.
0.14	Comb.CO	100.0	1.11	2
0.13	Polyester	143.0	2.41	3
0.13	Carded CO	130.0	3.82	4
0.13	PES of (PES&Comb)	135.0	1.79	2
0.13	Comb.CO of(PES&Comb.CO)	135.0	0.93	1
Total		643.0	10.06	12

3.6.9 Blowroom

There will be one Unifloc and 2 different blowroom lines. While the first line will be processing carding and combing quality cotton, the second line will be used in processing polyester fibre.

Blowroom Line

Type of Machine	Blending Opener	Unifloc	Waste Opener	Mono cylinder	Unimix	ERM I	ERM II
No. of Mach	1	1	1	1	2	1	1

3.7 Implementation Scheduling

3.7.1 Feasibility Study

The feasibility study is expected to be submitted to financial institutions and prospective equity participants in March 1991.

3.7.2 Approval of Investment

It is estimated that the decision for equity participation and approval of loans will be obtained by the June 1991.

3.7.3 Construction Works

The building constructions can be started in April or May 1991 and the production building can be completed by the end of the same year.

3.7.4 Selection of Machinery

Machinery and equipments can be chosen as soon as the finance is made available. The equity participation and investment loans are expected to be available by the July 1991.

The machinery suppliers generally demand a certain amount of down-payment with the orders and then they start to manufacture ordered machines.

3.7.5 Delivery of Machines

The manufacturing of machinery and equipments take about six months from the date of the down-payment.

Therefore delivery in this case should be in January 1992.

3.7.6 Erection

The machinery and equipments will be erected as they arrive to the mill site and erection operation probably will take place between February and March 1992.

The full erection operation will be accomplished by the end of March 1992.

3.7.7 Trial Production

First trial production may commence by the beginning of April 1992. Trial production period is expected to last for 3 months and within this period the total production is estimated to be 5000.

3.7.8 Full Capacity Utilisation

The machine operators will be trained, fine tunings of the machines will be accomplished and running-in period will be over by the end of the trial period.

Therefore full capacity production can start by the beginning of July 1992.

3.7.9 Capacity Utilisation

The capacity utilisation in the first year of the production is expected to be around 62.5 %.

4. INVESTMENT COST

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INVESTMENT COST

	(\$)		
TYPE OF EXPENDITURE	LOCAL CURRENCY	FOREIGN CURR.	TOTAL
1. PROJECT EXPENSES	0	5,000	5,000
2. LAND ACQUISITION	219,000	0	219,000
2.1 Land Owned	0	0	
2.2 Land To Be Purchased	219,000	0	
3. LAND DEVELOPMENT	82,000	0	82,000
4. CONSTRUCTION COSTS	1,547,500	0	1,547,500
4.1 Main Plant Construction	788,700	0	
4.2 Auxiliary Buildings	100,600	0	
4.3 Warehousing	33,600	0	
4.4 Administrative Buildings	184,000	0	
4.5 Social Buildings	60,000	0	
4.6 Residential Accomodation	283,000	0	
4.7 Other Construction Works	97,600	0	
5. TRANSPORTATION NETWORK	38,000	0	38,000
5.1 Internal Roads	35,000	0	
5.2 Connecting Roads	3,000	0	
5.3 Quay, Station	0	0	
6. MAIN PLANT MACHINERY AND EQUIPMENTS	4,065,532	13,726,772	17,792,304
6.1 Local Machinery and Equipments	199,753	0	
6.2 Import Machinery and Equipments (FOB)	0	13,726,772	
6.3 Import and Customs Expenses	2,951,256	0	
6.4 Local Transport and Insurance	3,184	0	
6.5 Overseas Freight and Insurance	685,339	0	
6.6 Erection	225,000	0	
7. MACHINERY AND EQUIPMENTS FOR UTILITIES	118,630	0	118,630
7.1 Water	9,132	0	
7.2 Electricity	81,167	0	
7.3 Steam	10,046	0	
7.4 Air Conditioning	0	0	
7.5 Compressed Air	0	0	
7.6 Others (Workshop & Effluent Water)	18,265	0	
8. TRANSPORTATION	77,000	0	77,000
9. START-UP EXPENSES	120,000	0	120,000
10. MISCELLANEOUS	96,387	0	96,387
11. CONTINGENCIES	411,803	0	411,803
12. INTEREST AT INVESTMENT STAGE	0	897,000	897,000
TOTAL FIXED INVESTMENT	6,775,852	14,623,772	21,404,624
13. WORKING CAPITAL	1,273,314	0	1,273,314
13.1 Raw Material Stocks	451,117	0	
13.2 Finished Goods Stocks	359,432	0	
13.3 Spare and Consumables	10,127	0	
13.4 Accounts Receivable	150,416	0	
13.5 Cash	92,222	0	
TOTAL INVESTMENT	8,049,166	14,623,772	22,672,938

4.1 Fixed Investment

The investment cost constitutes of two parts :

- fixed investment
- working capital

The fixed investment cost of the project will be appraised in this section together with infrastructural works and production units.

Working capital requirement for operating the mill at full capacity utilisation will be also calculated here.

4.1.1 Project Expenses

The project expenses of the intended investment project will be approximately \$ 5'000 including spinning, weaving and processing units.

4.1.2 Technical Assistance, Know-How

There will be no need for any outside technical assistance or know-how. Neither is there any patent issue related to the technology involved in this investment. Furthermore there will be no payments for royalties. A.K.Khan and Co. Limited has the necessary expertise with their similar textile mills to handle this operation with its qualified and skilled management and work force.

However a training programme should be provided by the machinery suppliers for the machine maintenance group of the mill so that they will be accustomed with the setting and tuning of the machines.

4.1.3 Land Acquisition

The project will be located at Dagonbhuiyan Upazilla of Feni District. The project site falls by the side of Feni-Chowmuhani all weather metalled road which is only 18 kilometres from Feni and about 130 kilometres from Chittagong the Port-City. On the otherhand the proposed site of the project is well connected with Narayangonj the largest textile marketing centre and Dhaka the capital city by the metalled road of the country. The proposed project will be located at Dagonbhuiyan a Government notified "Least Developed" area and will enjoy concessional rate of custom duty on the machinery and equipments @ 2.5% of the CIF value and the maximum tax holiday extended by the Government to industrial enterprises of 9 years as against 15 % duty and a 5 years tax holiday applicable to the developed area of the country. The proposed site is very near to 11 KV power line which passes by the side to the project. The water supply is also available to the proposed site of the project. The proposed site of the project is best suited for marketing its products to Satyagram and other marketing centres of the country and transportation of raw materials from Chittagong to project site. Last but

not the least, will be the socio-economic benefits of locating a labour intensive industrial undertaking in such an industrially backward part of the country. Dagonbhuiyan Upazilla is a densely populated area where employment is an acute problem. The majority of the surplus workers of this Upazilla are now engaged in various industrial units mainly textile industries situated all over the country. So there will not be and scarcity of skilled and un-skilled manpower for the project since there is high mobility of labour of the area.

The area of 80'000 sq-m or 20 acres of land is considered sufficient to accommodate all the physical facilities of the proposed composite textile mills. Total cost of 20 acres of land has been estimated at \$ 219'000.

4.1.4 Land Development

Land development cost for earth filling or earth removing etc. has been estimated \$ 82'000.

4.1.5 Construction Costs

The proposed spinning mill will require a total built-up area of 18'058 sq-m which will consist of production area, auxiliary buildings, warehousing etc.

The cost of buildings and other civil construction and utilities estimated \$ 1'547'500.

The cost of building and other utilities has been made on the basis of present prices of construction materials and actual cost of construction works.

4.1.5.1 Main Plant Construction

The building to be constructed on the production site at the first phase of the project is the spinning unit.

The spinning department will have a total floor area of 8'850 sq-m and with a construction cost of approximately \$ 89 per sq-m, totalling approximately \$ 788'700.

4.1.5.2 Auxiliary Buildings

The auxiliary departments, utilities and services will have a total built-up area of 2'235 sq-m with the details given below:

- water softener house
- transformer house
- boiler house
- air conditioning plant
- compressed air

The unit construction cost is estimated approximately \$ 45 per sq-m and the total cost of construction will be roughly \$ 100'600.

4.1.5.3 Warehousing

There will be 2 warehouses in the mill, which will be used for the following purposes ;

- warehousing for raw material 600 sq-m
- warehousing for yarn storage 450 sq-m

The estimated construction cost of the 1'050 sq-m warehousing buildings will be \$ 32 per sq-m which gives a total of \$ 33'600.

4.1.5.4 Administrative Buildings

The total covered area of the administrative buildings will be 2'068 sq-m with a construction cost of \$ 89 sq-m giving a total of \$ 184'000 building cost.

4.1.5.5 Social Buildings

The following social buildings will be available for utilisation by the mill personnel.

- dining hall attached to kitchen 300 sq-m
- change room and cloakroom 375 sq-m

The social buildings will have a total covered area of 675 sq-m with a construction cost per unit area of \$ 89 per sq-m giving an approximate total of \$ 60'000.

4.1.5.6 Residential Accomodation

There will be 4 different types of residences built for the mill personnel. Particularly residences for the top management will be used by them to be available on call 24 hours a day.

Total area of the buildings will be 3'180 sq-m and the cost of construction is estimated \$ 89 per sq-m which gives an approximate total cost of \$ 283'000.

The details of the accomodation will be as follows.

- residence of the general manager 200 sq-m
- bachelor officer's accomodation 300 sq-m
- staff quarter 1'080 sq-m
- workers quarter 1'600 sq-m

4.1.5.7 Other Construction Works

The investment on infrastructural works has been taken into account in this section. The total expenses for :

- barbed wire fencing around the land
- effluent water discharge canal
- sports and recreation fields
- garaging for staff cars

add up to a total of \$ 97'600.

4.1.6 Transportation Network

Transportation network consists of :

- internal roads
- connecting roads
- quay or station

The present project does not contain any quay or station works expenses.

The estimated transportation network expenses will be total \$ 38'000.

4.1.6.1 Internal Roads

The mill will have internal roads which will lead to all production and auxiliary buildings as well as administrative and social buildings.

The estimated cost will be roughly \$ 35'000.

4.1.6.2 Connecting Roads

The total cost of the connecting roads is estimated \$ 3'000.

4.1.7 Main Plant Machinery and Equipments

Main plant machinery and equipments will consist of local and import goods.

4.1.7.1 Local Machinery and Equipments

The proposed spinning mill will require a considerable number of local machinery and equipments; Namely, deep well, workshop equipments, weighing-scale, spinning mill accessories, material trucks, fire fighting equipments, local components of electric sub-station, fuel tank, ducting and installation of fan, filter for plant, electric cables and piping materials etc.

4.1.7.5 Overseas Freight and Insurance

The total expenses of the overseas freight and insurance is estimated to be 6 % of the value of import machinery and equipments.

However marine insurance cost (1 %) has already been taken into account at import and customs expenses and hence only 5 % value of the freight cost has been calculated.

This cost will be approximately \$ 686'300

4.1.7.6 Erection

The machinery of the project will be installed and put into operation under the technical assistance of machinery supplier. The sponsors will be required to spend an estimated amount of \$ 182'500 to the foreign erectors to be deputed by the machinery suppliers. In addition an amount of \$ 31'500 has been estimated to be spent for erection insurance. A team of local technicians, skilled and un-skilled workers will be provided by the sponsors to assist the foreign erectors for installation of machinery and an amount of \$ 11'000 million is estimated to be required for this purpose.

Cost of Erection

	Items of Installation	Cost (\$)
a)	Cost for foreign erectors	182'500
b)	Cost for local technician, skilled and un-skilled workers	11'000
c)	Erection Insurance	31'500
	Total	225'000

The erection expenses of the machinery and equipments will be roughly \$ 225'000

4.1.8 Machinery and Equipments for Utilities

The specification of import and local machinery and equipments for utilities and services are given in tables no . 3.5/1-2 and the values of the same machinery and equipments are shown in import and local machinery tables.

The total cost of machinery and equipments for utility department is estimated to be approximately \$ 118'630 for local machinery and \$ 484'000 for import machinery. Their specifications are detailed below.

4.1.8.1 Water

The project on completion will require approximately 110 tons of water per day for operation of machinery and human consumption. Necessary facilities required for supply of water such as overhead water tank, underground water reservoir and deep tube-well alongwith pump and motor will be provided for the project, the cost of which has been incorporated with investment cost of the project.

The water required for textile processes should be free from salinity, iron and other minerals. However, before commencement of implementation, water available at the site should be tested to see the suitability of water for the proposed project. Moreover, provision for a water treatment/softening plant has been proposed for installation.

The mill will be using its own water, which will be supplied by the wells in different locations of the mill's land.

There will be a water tower on the complex with a capacity of 150 tons.

The tower will be about 30 m to 50 m high and made of concrete of iron.

Underneath the tower, there will be a water tank with a surplus capacity of the tower's reservoir, from where the water will be pumped to the tower with all the necessary auxiliary equipments.

The wells will be incorporated with deep well pumps and piping and be able to supply sufficient water to the spinning department and other units.

A water purifying unit and a water filtration installation with sufficient capacities will have to be installed.

The cost of the water installation will be approximately \$ 132.

4.1.8.2 Electricity

The project on completion will require power for smooth operation of spinning machinery and humidification plant for spinning department. The estimated requirement of connected power load will be 1'800 kwh.

The project on completion will require connected power load for around 2'500 kVA. The required power will be available from the existing 33 KV line of Power Development Board which passes by the side of the proposed project. One unit of 11 KV/440 volt transformer having 1'000 kVA capacity, one unit of 11 KV/440 volt 1'500 kVA transformer with H.T. & L.T switchgear, DB/SDB and power factor improvement plant and power capacitors have been taken into consideration for the project. The cost of the substation as per current price has been shown with the list of machinery. In addition necessary provision in local currency for local supply of electrical equipments required for electric sub-station has been made.

The transformer unit is to be connected to the main high voltage cables approximately 11 kms away from the mill.

There will be a Diesel Generator, which will supply energy for illumination and for running some critical machinery during main power supply failures.

There will be also on installation for lighting the outside of the buildings and all the land area.

The cost of the power units and installation will be approximately S 81'187.

4.1.8.3 Steam

The project will require boiler having capacity of 6 tons for spinning department. The specification of steam requirement is given as follows :

- a) Rated capacity of boiler : 6 tons/hr
- b) Steam working pressure : 10-12 kg cm²
- c) Degree of superheat : 100⁰C

There will be 2 boilers in the boiler house with the capacity of 6 tons each, generating surface, each.

Each boiler will have an output of 6 tons of steam per hour at 10-12 kg/cm² superheat and at 100⁰C above atmospheric pressure.

All the necessary pumps and feeding pipes installations to the units will have to be completed.

The estimated cost of the boiler house and installations will be roughly \$ 10'046.

4.1.8.4 Air Conditioning

For effective and economic processing of basic textile raw materials such as cotton and synthetic fibres the relative humidity within an optimum range of 50-65 percent and temperature range $24^{\circ}\text{C} - 28^{\circ}\text{C}$ to be maintained inside the factory buildings of spinning unit. So, with a view to maintain humidity inside the factory building of spinning unit at a desired level, setting up of a humidification plant (air wash type) is highly essential which will help increase the level of production as well as improve quality of yarns. Keeping in view these objectives, provision for a humidification plant has been made for preparatory to finishing sections. The spinning department will be installed will require chillar type air conditioning plant, the cost of which has been incorporated in the investment cost of project.

The cost of the air-conditioning plant is estimated \$ 452'000 with chillar units. This cost has been taken into consideration in the Main Plant Machinery and Equipments section.

The ambient atmospheric conditions in Cithagong is very hot and humid and the only way to have control over temperature and humidity is to incorporate air-conditioning with chillar units.

4.1.8.5 Compressed Air

The compressed air is to be supplied in oil and water free condition for the effective running and proper maintenance of the machines. As such, a central air compressor with a special device has been recommended and included with the machinery list to ensure the constant supply of water and oil free compressed air for using in the spinning section of the proposed project.

The whole installation will have a value of \$ 32'000. This cost has been taken into consideration in the Main Plant Machinery and Equipments section.

4.1.8.6 Others (Workshop & Effluent Water)

This unit will consist of :

- universal lathe
- milling machine
- planing "
- drilling "
- grinding "
- welding "

The cost of the workshop and various other units will be approximately \$ 18'265

a) Safety Arrangements

Adequate safety arrangements to meet the fire hazards and first hand medical aid has been made for operative period of the project. For this purpose necessary provisions for fire fighting equipments and double fire proof doors has been incorporated in the list of local machinery.

b) Waste Disposal

Cotton and yarn waste of spinning mill is used for various purpose and will not pose any pollution and waste disposal problem.

4.1.9 Transportation

In order to provide transport facilities for administrative and key personnel, provision for the following vehicles has been included in the project cost.

<u>Vehicles</u>		
Type of. Transport	No. Req.	Estim.Cost (\$)
Car	1	27'400
Minibus	1	27'400
Station-Wagon	1	22'200
Total	3	77'000

4.1.10 Start-Up Expenses

Expenses accumulated during trial operation period of the mill constitute start-up expenses. A sum of \$ 120'000 has been taken into consideration for this type of expenses.

4.1.11 Miscellaneous

The cost of fixtures and furnitures for the offices composes the miscellaneous expenses.

A sum of \$ 96'387 has been allocated for the miscellaneous expenses.

4.1.12 Contingencies

The (FOB) value of importable machinery has been considered based on the present competitive offers of different manufacturers of machinery which is expected to remain valid until conclusion of contract for procurement of machinery. The estimated cost of buildings and other work estimated in such a way that further provision for price escalation will not be necessary. However, while provision for contingencies and price escalation for machinery and equipments have been made, no provision has been considered for buildings.

3 % of the import machinery and equipments' value has been taken as the contingency expenses which sums up to \$ 411'803.

4.1.13 Interest at Investment Stage

The mode of financing of the project has been considered at the debt-equity ratio of 65 % - 35 %. Interest during construction on borrowed capital has been calculated @ 12 % per annum as per present investment policy of the government. It has been assumed that from the date of retirement of shipping documents, approximately 6 months will be required to put the mill into operation. So, interest during construction of foreign and local currency loan has been calculated on the basis of 12 % per annum. Interest during construction will be capitalised with the project cost and to be repaid within 5 years of initial operation

Interest of the first six months will be capitalised as "Interest at Investment Stage" and will have an amount of \$ 897'000.

LOCAL MACHINERY AND EQUIPMENT

Mill : A.K.Khan / Bangladesh

Pos. No	Machinery And Equipment	Number	Unit Price (Taka)	Total Amount	
				(Taka)	(\$)
01	Electric Cables and Piping for Mach.	1	1,500,000	1,500,000	41,096
02	Material Handling and Trans.Implements	1	200,000	200,000	5,439
03	Weighting Scale (10 kg)	1	30,000	30,000	822
04	Weighting Scale (500 kg)	1	150,000	150,000	4,110
05	Sliver Can	3,500	700	2,450,000	67,123
06	Plastic Simplex Bobbin	48,000	20	960,000	26,301
07	Plastic Ring Tube	70,000	7	490,000	13,425
08	Plastic Cone	7,000	8	56,000	1,534
09	Fire Fighting Equipment	1	300,000	300,000	8,219
10	Double Fire Proof Doors	2	250,000	500,000	13,699
11	BD/SSd	1	500,000	500,000	13,699
12	Components for Elect. Sub-Station	1	530,000	530,000	14,521
13	Boiler Installation	1	333,333	333,333	9,132
14	Workshop Equipments	1	666,667	666,667	18,265
15	Deep Tube Wells	1	333,333	333,333	9,132
16	Fuel Tank	1	33,333	33,333	913
17	Cables for Generator Panel	1	333,333	333,333	9,132
18	Elec.Wiring for 1000 kVA stand by Gen.	1	233,333	233,333	6,393
19	Electric Cables for stand by Generator	1	166,667	166,667	4,566
20	Reeling Machine	1	1,237,000	1,237,000	33,890
21	Bunching Machine	1	618,000	618,000	16,932
22				0	0
Total				11,620,999	318,364

4.2 Working Capital

Estimated requirement of net working capital during first year of full production has been incorporated in the project cost.

The net working capital requirement during first year of full operation stands at \$ 1'273'314.

The criteria employed in calculating the working capital is as follows :

4.2.1 Raw Material Stocks

Two types of fibres are to be used :

- cotton
- polyester

Both raw cotton and polyester will be imported. A stock level of 6 weeks consumption is considered to be satisfactory.

Raw Material Requirement

Type of Fibre	Unit Price (\$/kg)	Stocks for 6 Weeks (kg)	Value (\$)
Polyester (38-40 mm)	1.68	107'184	180'069
Cotton (1 ^{1/4} mm)	1.80	113'088	203'558
Cotton (1 ^{3/32} mm)	1.70	39'696	67'484
Total/Average	1.74	259'968	451'111

A sum of \$ 451'111 constitutes the raw material stocks of the working capital.

4.2.2 Finished Goods Stocks

A certain amount of production will undoubtedly be stored for a period of time in the warehouse.

From past experience it is estimated that yarn stocks would amount to 2 weeks production at full mill capacity utilisation.

The amount of yarn in the warehouse was assumed therefore to be 30'524 kg with a value of \$ 53'111.

4.4 Financial Expenses

Financial expenses of the mill on implementation of the project for long term financing has been shown on the table below.

The rate of interest has been considered as 12 % per annum.

The total investment loan considered was \$ 14'950'000 with a grace period of 3 years and total pay-back period of 8 years.

Interest will be payable every six months including the grace period.

The principal payments will start after the first three years and will terminate at the end of the 8th year from the date of borrowing.

The following table shows the conditions of the interest and principal repayments.

REPAYMENT OF PRINCIPAL AND INTEREST OF LOANS

CUSTOMER : A.K.Khan - Bangladesh
 AMOUNT OF LOAN \$: 14,950,000
 ANNUAL INTEREST RATE (%): 12

GRACE PERIOD : 6
 REPATREMENT PERIOD : 10
 PERIOD: SIX MONTHS

Period	Principal Payment	Interest Payment	Total Payment
Jan. 1992	0	897,000	897,000
July. 1992	0	897,000	897,000
Jan. 1993	0	897,000	897,000
July. 1993	0	897,000	897,000
Jan. 1994	0	897,000	897,000
July. 1994	0	897,000	897,000
Jan. 1995	1,134,226	897,000	2,031,226
July. 1995	1,202,280	828,946	2,031,226
Jan. 1996	1,274,416	756,810	2,031,226
July. 1996	1,350,881	680,345	2,031,226
Jan. 1997	1,431,934	599,292	2,031,226
July. 1997	1,517,850	513,376	2,031,226
Jan. 1998	1,608,921	422,305	2,031,226
July. 1998	1,705,456	325,769	2,031,226
Jan. 1999	1,807,784	223,442	2,031,226
July. 1999	1,916,251	114,975	2,031,226
TOPLAM	14,950,000	10,744,260	25,694,260

5. OPERATIONAL DATA

5.1 Raw Material

The basic raw materials for the proposed spinning mill are raw cotton of 1/4" staple length and polyester fibre of 1.5 Denier and 38-40 mm cut length for spinning different counts of yarns. Both raw cotton and man-made fibres are ought to be imported from outside of the country. Since local raw cotton and man-made fibre productions do not meet the domestic consumption.

At present the requirement of raw cotton for spinning mills is generally met by importing from U.S.A., Sudan, Pakistan, Egypt, USSR etc. and the man-made fibre is imported from Japan, U.K. and U.S.A.

Raw Material Requirement

Yarn Count Ne	Mix. / Blend of Fibres			Demand of Raw Material				
	Type of Fibre	Staple Length	Ratio (%)	Polyester (kg/h)	(ton/yr)	Cotton (kg/h)	(ton/yr)	
80	US & Mexican Pima CO	1 1/4 "	100	-	-	10.8	72.9	
60	-	-	-	-	-	15.0	101.3	
60	Polyester	38-40 mm	-	16.1	108.7	-	-	
45	PES & Comb.CO	Blend	67/33	41.2	278.1	28.6	193.1	
40	Polyester	38-40 mm	100	29.5	199.2	-	-	
40	US & Mexican Pima	1 1/4 "	-	-	-	85.2	575.1	
30	Polyester	38-40 mm	-	45.5	307.2	-	-	
28	Memphis Cotton	1 3/32 "	-	-	-	49.0	330.8	
Total				-	132.2	893.2	188.6	1273.2

The C & F prices of raw cotton of different staple length and man-made fibre of different origins have been analysed to arrive at a rational price assumptions on the basis of average C & F prices prevailed during the financial years 1990-91. Staple cotton being an agri-product is subject to seasonal price fluctuation. Trade speculation often distorts price stability and crop failure in major producing countries pushes price upward. In this exercise examined monthly price quotation appearing in the journal "Cotton Outlook" - Industry's premier journal published from Liverpool, U.K. has been examined and arrived at the assumed price after careful analysis of fluctuation and stability.

Cost of Raw Material

Type of Fibre	Staple Length	Price (C&F) (\$/kg)	Consumption (ton/yr)	Annual Cost (\$)
US & Mexican Pima CO	1 1/4 "	1.80	942.4	1'696
Memphis Cotton	1 3/32 "	1.70	330.8	562
Polyester	38-40 mm	1.68	895.2	1'501
Total	-	1.74	2'166.4	3'759

5.2 Consumables and Auxiliary

The consumption of annual consumables and auxiliary materials is approximately \$ 22'000.

Annual packing material consumption is approximately \$ 105'000.
Total consumables and auxiliary materials amounts up to \$ 127'000.

5.3 Fuel, Energy and Water

The annual consumption of fuel, energy and water has been calculated on full scale production information and the following figures pertain :

- fuel : 300'000 liters and \$ 60'000
- electricity : 12'150'000 Kw and \$ 729'000

Water is directly obtained from the wells located within the mill complex, hence it was considered that there would be no expenditure on water.

The only cost incurred is that for the operation of the deep water pumps which consume electricity. This is accounted for in the electricity consumption figures.

5.4 Maintenance and Repair Expenses

The annual consumption of spare parts, maintenance and repair costs at full mill utilisation will amount to \$ 16'000.

5.5 Wages and Salaries

The considered project creates the following manpower at present :

List of Personnel

Job Title	No. of Personnel	Average Cost per Year to the Mill (\$)	Total Cost (\$)
Administration	2	4'932	9'900
Office Personnel	9	2'466	29'600
Technical Supervision	5	2'466	17'300
Foreman	17	904	18'300
Skilled Labour	106	878	97'500
Unskilled Labour	70	311	30'000
Total & Average	199	1'966	208'600

The annual expenditure of wages and salaries has been considered as \$ 208'600.

OPERATIONAL DATA
Annual Operating Expenses

EXPENDITURES	Annual Consumption at Full Capacity			
	Unit Cost (\$)	Quantity	Unit	Total (\$)
1. RAW MATERIAL	1.74	2,166,400	kg	3,759,256
1.1 Polyester (38-40 mm)	1.68	893,200	-	1,500,576
1.2 Cotton (1 1/4")	1.80	942,400	-	1,696,320
1.3 Cotton (1 3/32")	1.70	330,800	-	562,360
1.4	0	0	-	0
1.5	0	0	-	0
1.6	0	0	-	0
1.7	0	0	-	0
2. CONSUMABLES & AUXILIARY MATERIALS				127,000
2.1 Consumables & Operating Mat.				22,000
2.2 Packing Mat.				105,000
2.3				0
3. FUEL, ENERGY AND WATER				789,000
3.1 Water	0	33,000	tons	0
3.2 Electricity	0.06	12,150,000	kw	729,000
3.3 Fuel	0.2	300,000	lt	60,000
4. MAINTENANCE AND REPAIR EXPENSES				16,000
5. WAGES AND SALARIES		150	persons	205,200
5.1 Administration	4,932	2	-	9,864
5.2 Office Personnel	2,466	9	-	29,600
5.3 Technical Supervision	2,466	5	-	17,300
5.4 Foreman	904	17	-	18,100
5.5 Skilled Labour	575	106	-	99,500
5.6 Unskilled Labour	411	20	-	30,800
6. DEPRECIATION				1,461,846
6.1 Buildings				0
6.2 Machinery				0
6.3 Fixtures				0
6.4 Equipment				0
6.5 Know-how				0
6.6 Preliminary Expenses				0
7. GENERAL OVERHEADS				96,397
7.1 Rent				0
7.2 Insurance				0
7.3 Various Taxes				0
7.4 Administration Expenses				0
7.5 Other Operating Expenses				0
8. TOTAL PRODUCTION COSTS				6,454,689
9. V.A.T.				0
10. INTEREST ON SHORT TERM LOANS				0
11. SALES COST				136,946
12. MISCELLANEOUS				18,000
13. TOTAL ANNUAL OPERATING COST				6,609,635

VI. FINANCIAL EVALUATION
Cost of Depreciation

TYPE OF EXPENDITURE	AMOUNT INVESTMENT (\$)	RATE OF DEPRECIATION (%)	TOTAL DEPRECIATION (\$)
1. SURVEY AND PROJECT EXPENSES	5,000	0	0
2. COST OF LAND	219,000	0	0
3. ARRANGEMENT OF LAND	52,000	0	0
4. CONSTRUCTION TOTAL	1,547,500	4	61,900
5. INVESTMENT FOR TRANSPORTATION	38,000	4	1,520
6. MAIN PLANT MACHINERY AND EQUIPMENT	17,792,304	6.7	1,192,084
7. AUXILIARY MACHINES AND EQUIPMENT	118,630	6.7	7,948
8. TRANSPORT VEHICLES	77,000	20	15,400
9. START-UP EXPENSES	120,000	20	24,000
10. GENERAL EXPENSES	96,387	20	19,277
11. CONTINGENCIES	411,803	6.7	27,591
12. INTEREST AT INVESTMENT STAGE	897,000	12.5	112,125
<hr/>			
TOTAL FIXED INVESTMENT	21,464,624	6.83	1,461,846
<hr/>			
AVERAGE RATE OF DEPRECIATION (%) :	6.83		

YEARS	Depreciation Over The Years		TOTAL DEPRECIATION
	NEW INVESTMENT	EXISTING DEPRECIATION	
1991	1,461,846	0	1,461,846
1992	1,461,846	0	1,461,846
1993	1,461,846	0	1,461,846
1994	1,461,846	0	1,461,846
1995	1,461,846	0	1,461,846
1996	1,375,578	0	1,375,578
1997	1,375,578	0	1,375,578
1998	1,375,578	0	1,375,578
1999	1,263,453	0	1,263,453
2000	1,263,453	0	1,263,453
2001	63,420	0	63,420
2002	63,420	0	63,420
2003	63,420	0	63,420
2004	63,420	0	63,420
2005	63,420	0	63,420

6. FINANCIAL EVALUATION

6.1 Sales Revenues

The selling prices of yarns have been based on the international average FOB market prices.

The sewing thread prices have been obtained from Tootal Threads in İstanbul.

The prices of wastes have been estimated with the information compiled from the industry.

The company will have a potential of exporting its products either directly or through RMG by providing yarn for fabric or sewing thread.

However a modest figure of 5 % direct export has been foreseen.

The mill is capable of generating approximately \$ 2.5 million gross profit before tax and without any financial charges.

The detail of sales revenues is given on the following table.

OPERATIONAL DATA
Annual Sales Revenues

Pss. No	Products	Sales Revenues At Full Capacity			
		Production	Unit	Unit Price (\$/kg)	Sales Revenues (\$)
1	Main Products	758,025	kg	11.85	8,985,398
1.1	Combed Yarn (Ne 80)	49,275	-	12.60	620,865
1.2	Combed Yarn (Ne 60)	70,200	-	9.25	649,350
1.3	PES Yarn (Ne 60/2)	94,500	-	5.00	472,500
1.4	PES/CO Combed Yarn (Ne 45)	371,250	-	4.80	1,782,000
1.5	PES Yarn (Ne 40/2)	172,800	-	4.75	820,800
1.6	Carded Yarn (Ne 40)	483,300	-	4.50	2,174,850
1.7	PES Yarn (Ne 30/2)	266,625	-	4.50	1,199,813
1.2	Carded Yarn (Ne 28/2)	287,550	-	4.40	1,265,220
2	Wastes	341,550	kg	0.42	144,356
2.1	Cotton Waste	166,050	-	0.43	71,402
2.2	PES Waste	75,600	-	0.41	30,996
2.3	PES/CO Waste	99,900	-	0.42	41,958
	Total				9,129,753

PROFIT AND LOSS STATEMENT

Remarks	Profit & Loss	
	(\$)	
1. Annual Sales Revenues		9,129,753
1.1 Local Sales	8,522,910	
1.2 Exports (4.5)	456,488	
1.3 Sales of Wastes	144,356	
2. Annual Operating Expenses	6,609,635	6,609,635
3. Gross Profit or Loss		2,520,118

6.2 Projected Cash Flow

The project will enjoy tax holiday for 9 years, based on the projected earnings.

The mill shows a positive cash flow after deducting the interest on the long term loans.

6.3 Flow of Proforma Revenues

The annual retained fund following the deduction of the principal of loans from total of disposable profit and depreciation shows positive figures for the first three years and then becomes negative for the next five years until principal of loans is fully paid.

But in any case accumulated fund always shows a positive figure over the ten years of projection.

6.4 Added Value by Project

The accumulated added value of the mill to the Bangladesh economy over the next 10 years will be approximately \$ 40 million, provided full capacity is utilised at the shown costs and prices.

6.5 Debt-Service Coverage

From the debt-service coverage ratio, it reveals that the project under consideration will be able to meet debt obligation easily and the ratio is satisfactory.

VII- FINANCIAL EVALUATION
6.2 Projected Cash Flow Table

REMARKS	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. CAPACITY UTILISATION (%)	62.5	100	100	100	100	100	100	100	100	100
2. PROJECT REVENUES	5,795,096	9,129,753	9,129,753	9,129,753	9,129,753	9,129,753	9,129,753	9,129,753	9,129,753	9,129,753
3. PROJECT EXPENSES	4,131,022	6,609,635	6,609,635	6,609,635	6,609,635	6,609,635	6,609,635	6,609,635	6,609,635	6,609,635
4. NET INCOME FROM THE PROJECT (2-3)	1,575,074	2,520,118	2,520,118	2,520,118	2,520,118	2,520,118	2,520,118	2,520,118	2,520,118	2,520,118
5. INTEREST ON LONG TERM LOANS	897000	1,794,000	1,794,000	1,725,946	1,437,155	1,112,668	748,074	338,417	0	0
6. PRE-TAX PROFIT (4-5)	678,074	726,118	726,118	794,172	1,082,963	1,407,450	1,772,044	2,181,701	2,520,118	2,520,118
7. CORPORATE INCOME TAX	0	0	0	0	0	0	0	0	0	264,612
8. NET PROFIT (6-7)	678,074	726,118	726,118	794,172	1,082,963	1,407,450	1,772,044	2,181,701	2,520,118	2,255,506

6.3 Flow of Proforma Revenues and Funds (\$)

REMARKS	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. DISPOSABLE PROFIT	678,074	726,118	726,118	794,172	1,082,963	1,407,450	1,772,044	2,181,701	2,520,118	2,255,506
2. DEPRECIATION	1,461,846	1,461,846	1,461,846	1,461,846	1,461,846	1,375,578	1,375,578	1,375,578	1,263,453	1,263,453
3. TOTAL (1+2)	2,139,919	2,187,964	2,187,964	2,256,018	2,544,809	2,783,027	3,147,621	3,557,278	3,783,570	3,518,958
4. PRINCIPAL OF LOANS	0	0	0	2,336,506	2,625,297	2,949,784	3,314,377	3,724,035	0	0
5. ANNUAL RETAINED FUND (3-4)	2,139,919	2,187,964	2,187,964	(80,488)	(80,488)	(166,757)	(166,756)	(166,757)	3,783,570	3,518,958
6. ACCUMULATED FUND	2,139,919	4,327,883	6,515,847	6,435,359	6,354,870	6,188,114	6,021,358	5,854,602	9,638,172	13,157,130

VII- FINANCIAL EVALUATION
6.4 Value Added by the Project

(\$)

ITEMS	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. WAGE	205,200	205,200	205,200	205,200	205,200	205,200	205,200	205,200	205,200	205,200
2. DEPRECIATION	1,461,846	1,461,846	1,461,846	1,461,846	1,461,846	1,375,578	1,375,578	1,375,578	1,263,453	1,263,453
3. INTEREST	897,000	1,794,000	1,794,000	1,725,946	1,437,155	1,112,668	748,074	338,417	0	0
4. TAX	0	0	0	0	0	0	0	0	0	0
5. TAXES	0	0	0	0	0	0	0	0	0	264,612
6. PROFIT	678,074	726,118	726,118	794,172	1,082,963	1,407,450	1,772,044	2,181,701	2,520,118	2,255,506
7. OTHERS	0	0	0	0	0	0	0	0	0	0
8. TOTAL VALUE ADDED	3,242,119	4,187,164	4,187,164	4,187,164	4,187,164	4,100,895	4,100,895	4,100,895	3,988,770	3,988,770
9. UNRELATED VALUE ADDED	3,242,119	7,429,283	11,616,447	15,803,611	19,990,774	24,091,670	28,192,565	32,293,461	36,282,231	40,271,002

DEBPT-SERVICE COVERAGE
6.5 (Assuming Tax Holiday for 9 Years)

(\$)

REMARKS	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1. TOTAL VALUE ADDED	3,242,119	4,187,164	4,187,164	4,187,164	4,187,164	4,100,895	4,100,895	4,100,895	3,988,770	3,988,770
2. DEBT SERVICE OF LONG TERM LOAN	0	0	0	2,336,506	2,625,297	2,949,784	3,314,377	3,724,035	0	0
3. DEBT SERVICE OF SHORT TERM LOAN	897,000	1,794,000	1,794,000	1,725,946	1,437,155	1,112,668	748,074	338,417	0	0
4. DEBT SERVICE COVERAGE (TIMES)	0.3	0.4	0.4	1.0	1.0	1.0	1.0	1.0	0.0	0.0

6.6 Break-Even Point

Break-even point is the level of capacity utilisation at which sales revenues equal production costs.

Break-even point of this project has been calculated as 42.5 % on the following table.

OPERATIONAL DATA				
Fixed / Variable Annual Operating Expenses				
(\$)				
EXPENDITURES	FIXED/ VARIABLE	FIXED	VARIABLE	OPERATING EXPENSES
1. RAW MATERIAL	100 % V	0	3,759,256	3,759,256
2. CONSUMABLES & AUXILIARY MATERIALS	100 % V	0	127,000	127,000
3. FUEL, ENERGY AND WATER	70 % V	236,700	552,300	789,000
4. MAINTENANCE AND REPAIR EXPENSES	70 % V	4,200	11,200	16,000
5. WAGES AND SALARIES	70 % V	61,560	143,640	205,200
6. DEPRECIATION	100 % F	1,461,846	0	1,461,846
7. GENERAL OVERHEADS	100 % F	96,387	0	96,387
9. V.A.T.	100 % V	0	0	0
10. INTEREST ON SHORT TERM LOANS	100 % V	0	0	0
11. COSTS COST	100 % V	0	136,946	136,946
12. MISCELLANEOUS	100 % V	0	18,000	18,000
13. TOTAL ANNUAL OPERATING COST		1,861,293	4,748,342	6,609,635

$$\begin{aligned}
 \text{BREAK EVEN POINT} &= \frac{\text{FIXED COST}}{(\text{SALES REVENUES} - \text{VARIABLE COST})} \\
 &= \frac{1,861,293}{4,381,411} \times 100 \\
 &= 42.5
 \end{aligned}$$

6.7 Economic Rate of Return

The Economic Rate of Return of proposed project has been calculated on the basis of the methodology followed by the World Bank.

The Item-wise investment cost, i.e. land development, building construction and imported machinery and other assets have been valued at market prices.

The accounting values of foreign and local inputs, services and finished products have been arrived at by adjusting their market prices with relevant conversion factors. Adjustment of financial investment and operating cost for deriving economic cost has been shown at following tables respectively. The economic life of the project has been taken to be 15 years and the gestation period of the project has been taken at 2 years. Calculated on above mentioned basis, the EIRR comes to about 14.63 % and the FIRR becomes 19.36 %. The details of calculation of IFRR and FIRR are given at following tables.

6.8 Employment Opportunity

The project on completion will create employment opportunity for 159 persons of various categories. The cost per job created works out at S 1290.6 .

The project will also create indirect employment to many more people with the associated activities of the project.

6.9 Foreign Exchange Earning

This is an export-oriented industry and expected to earn considerable amount of foreign exchange every year. The project on implementation is expected to earn foreign exchange to the tune of approximately S 456488 per annum.

However: export potential of the mill is much more bigger than above figure.

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	0	63	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0
I. GELİRLER																	
II. REVENUES	0	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	0
Sales	0	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	0
Account Receivable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Account Received	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Income from liquidation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
NET INCOME	0	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	1
III. COST OF PRODUCTION																	
Raw and Aux Materials	0	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0
Administration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Labour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Expenses	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Patent Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sales Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL EXPENSES	0	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0
IV. WORKING CAPITAL																	
Cash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raw Material	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inventory	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trade Receivable	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Trade Payable	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
INCREASE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V. FIXED INVESTMENT																	
Land	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buildings	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leasing Machinery	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Machinery	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transporting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telephone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VI. NET FLOW	(21)	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-2,58889

FINANCED INTERNAL RATE OF RETURN 14.63%

	1991	1992	1993	...	2006	2007
I. C.U.R. &	0.0000	62.5000	100.0000	...	100.0000	0.0000
II. REVENUES						
Sales	0.0000	5.6141	8.9826	...	8.9826	0.0000
Account Receivable	0.0000	0.0000	0.0000	...	0.0000	0.0000
Account Received	0.0000	0.0000	0.0000	...	0.0000	0.0000
Income from Liquidation	0.0000	0.0000	0.0000	...	0.0000	1.1013
NET INCOME(+)	0.0000	5.6141	8.9826	...	8.9826	1.1013
III. COST OF PRODUCTION						
Raw and Aux. Materials	0.0000	2.1381	3.4209	...	3.4209	0.0000
Administration	0.0000	0.0672	0.0711	...	0.0711	0.0000
Labour	0.0000	0.1008	0.1367	...	0.1367	0.0000
Operating Expenses	0.0000	0.4945	0.6707	...	0.6707	0.0000
Packing Expenses	0.0000	0.0564	0.0902	...	0.0902	0.0000
General Expenses	0.0000	0.0887	0.0887	...	0.0887	0.0000
Sales Expenses	0.0000	0.0787	0.1260	...	0.1260	0.0000
TOTAL EXPENSES(-)	0.0000	3.0245	4.6242	...	4.6242	0.0000
IV. WORKING CAPITAL						
Cash	0.0738	0.1062	0.1002	...	0.0000	0.0000
Raw Material	0.2566	0.4195	0.4105	...	0.0000	0.0000
Other	0.1512	0.2312	0.2312	...	0.0000	0.0000
TOTAL	0.4816	0.7420	0.7420	...	0.0000	0.0000
INCREASE(-)	0.4816	0.2603	0.0000	...	0.0000	0.0000
V. FIXED INVESTMENT						
Land	0.0110	0.0000	0.0000	...	0.0000	0.0000
Construction	1.2547	0.0000	0.0000	...	0.0000	0.0000
Import Machinery	13.7268	0.0000	0.0000	...	0.0000	0.0000
Local Machinery	3.1492	0.0000	0.0000	...	0.0000	0.0000
Services	0.0925	0.0000	0.0000	...	0.0000	0.0000
Project-Eng.	0.0000	0.0000	0.0000	...	0.0000	0.0000
Erection	0.2070	0.0000	0.0000	...	0.0000	0.0000
Fixtures	0.0000	0.0000	0.0000	...	0.0000	0.0000
Vehicles	0.0501	0.0000	0.0000	...	0.0000	0.0000
Contingencies	0.2133	0.0000	0.0000	...	0.0000	0.0000
Start-up Expenses	0.1104	0.0000	0.0000	...	0.0000	0.0000
TOTAL (-)	18.8149	0.0000	0.0000	...	0.0000	0.0000
VI. NET FLOW	-19.2966	2.3293	4.3584	...	4.3584	1.1013
VII. FINANCIAL INTERNAL RATE OF RETURN			19.361			