

General Company for Carpets

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TECHNICAL DIAGNOSIS FOR GENERAL COMPANY FOR CARPETS

Date : 15 ~ 25 August, 1997

Person in Charge : Teruo Kimura

1. Present Situation of the Company

1.1 Location

The Damascus factory, the main factory of General Company for Carpet, is conveniently located within the city of Damascus. Second subsidiary Suwayda factory is located in a small city called Suwayda, 100 km from Damascus. Both companies are operated as a carpet weaving factories.

1.2 Outline of the Company

(1) General items

- ① Damascus and Suwayda factories are both wool carpet manufacturing units having design sections, jacquard weaving and finishing processes. Therefore, the production capacity of the General Company for Carpets needs to be calculated on the basis of the total production of both factories.
- ② Both factories jointly buy their raw material (wool carpet yarn) from the same source under the control of the same General Manager and the sale of the product is also managed by the Commercial Manager of the Damascus factory.

(2) Building site

- ① The total area of the Damascus factory site is about 8,800 m². The building have been expanded often, hence the present layout is not ideal.
- ② Suwayda factory is comfortably built on a sit of about 9,000 m² and provides many advantages to management to manage it.

(3) Raw material

- ① Both factories buy wool carpet yarn (3/15's) from the General Company for Wool (Hama) by 600 tons per year. The yarn is mixed yarn 80-85% New Zealand wool and 20-15% Syrian wool. They also buy wool carpet yarn (3/15's) by 250 tons per year from Al Khomasich Compny. This yarn is made of 100% New Zealand wool.
- ② Furthermore, they buy local cotton yarn and jute yarn imported from Bangladesh for base fabrics. The raw material of the base fabric consists of wool yarn 63%, cotton yarn 17 % and jute yarn 20 %.

(4) Product

- ① The carpet is rolled lengthwise and piled up in the warehouse before being cut into pieces according to the carpet type (shown in Appendix B-P-1).
- ② Wool carpet is cut into various sizes and becomes the final product after sewn by the over-lock machine and attaching fringes.
- ③ Size of the carpet is mostly $2.1\text{m} \times 1.68\text{m} = 3.528\text{m}^2$.
- ④ The product is a jacquard woven wool carpet. The patterns belong to the Oriental Carpet and include famous traditional patterns known as Damascus carpets. (Refer to Appendix B-R-1)
- ⑤ At present, the patterns are versatile due to a tendency towards diversification and individualization. However, the lead time for making a certain carpet is 5 months because of the manual design work and that now, they can only respond to 10% of the new patterns requested.
- ⑥ The total production of both factories is $430,000\text{m}^2/\text{year}$. Profit/loss situation of the company is shown in Appendix B-T-1.

(5) Sales and stocks

- ① Currently the demand for wool carpets is very good but only from domestic consumers. This is attributable to the traditional way of living. Wool carpets of special Middle East taste is under consideration to see if exports can be developed.
- ② The stock of both factories was about 8,000 pcs, as of end August, 1997. It is off season. Their stock will be sold within a few months. The company has considerable back orders.

- ③ The companies would like to export stocked carpets in summer because of working capital reason.

(6) Production plan and result

- ① Total production plan of both factories is 600,000 m²/year, but at present the output is 430,000 m².
- ② Both factories plan to produce 530,000 m²/year at total, considering various counterplans such as 3-shift operation.
- ③ Improvement of jacquard weaving loom efficiency is needed to increase the production, but there are many issues such as yarn quality and machine maintenance etc. to be addressed.

(7) Organization and manpower

Refer to Appendix B-T-2.

- ① The organization consists of 6 divisions under General Manager. The employees of the production and technical division account for about 90 percent of total employees.
- ② The Damascus factory has 317 employees. Working efficiency differs among each division. As one of the personnel management methods, the wage system consisting of the basic salary (70 %) and the efficiency/bonus wages (30%) has been adopted, but this system has not been well functioning. The Suwayda factory has 200 employees.

(8) Production equipment

Refer to Appendix B-T-3.

- ① Damascus factory has 16 Jacquard looms (including 3 rapier looms) and the Suwayda factory has 8 Jacquard looms. The Aleppo General Company for Silk Weaving has 5 Jacquard wool weaving looms. Syria has 29 Jacquard looms in total.
- ② The efficiency of the Suwayda factory is better because the production equipment is well maintained although it is old. The Suwayda factory is fully equipped with air conditioning equipment which affects very much the quality of the product, while Damascus factory has to rely on atomizers to add humidity. Also the blow cleaning equipment for the winders in the Suwayda factory work better than those in the Damascus factory.

2. Present Situation and Problems of Production Process (Carpet Weaving Process)

- ① The wool yarn used contains 15-20% of Syrian wool. In the process of weaving, the ratio of waste wool yarn of Syrian wool reaches 18 percent (3 times higher than New Zealand wool), by which the working efficiency of the looms decreases to 40% only.
- ② The air conditioning equipment for the weaving and preparatory process is not provided in Damascus factory and only the atomizers are used to adjust humidity. Generally wool carpet factory needs conditions 28°C temperature and 75% humidity but they are now 25°C and 60 % due to summer season conditions.
- ③ The blow cleaners for the winders do not work satisfactorily to remove short fibers, fly and waste. This affects very much the weaving process.
- ④ Because it is a manual system, designing and preparing punch-cards work is quite time consuming. In addition, with old weaving machinery weaving efficiency and weaving production is low. Also existing machinery and systems cannot meet present requirements of delicate and large pattern repeats (refer to Appendix B-F-3). Many a modern mills are using computers for this work.

3. Present Situation and Problems of Management in Carpet Weaving Process

3.1 Procurement Control

(1) Raw material

- ① There is no problem in raw material procurement control.

(2) Spare parts

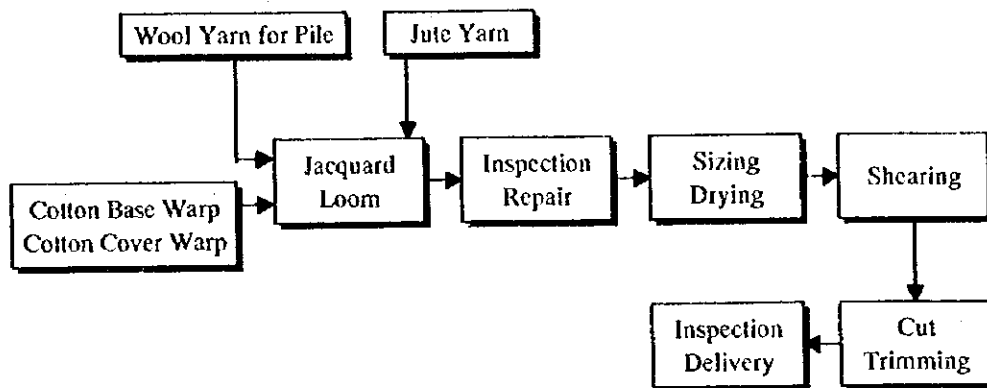
- ① Spare parts procurement for the looms has not been smooth because the parts are imported and the supplier, Textima, seems to be having problems.
- ② Local contents of spare parts has been increasing and now 40 % of the spare parts can be procured locally. However, bearings and electronics parts cannot be procured locally.

3.2 Inventory Control

- ① There is no problem of inventory control.

3.3 Process Control

- ① Process Flow Chart



- ② There are no indications or signs to show production targets and quality targets in the factory for the process control.
- ③ Because of location of factories, machinery and equipment has been separately installed. Therefore, it is difficult to control production processes and qualities together.
- ④ The design and the carpet punching work are performed in separate compartments. This makes it difficult to control the section as this work fluctuates depending on orders. The compartment has no windows which also makes it difficult to check the working situation from outside.
- ⑤ A carpet is a heavy fabric. And the transportation and handling is done manually. This causes low efficiency and difficult working condition.
- ⑥ The company has an excess of manpower with low efficiency.
- ⑦ The weaving technologies and maintenance techniques are got by experiences. Even seven years experience is not enough.
- ⑧ Looms and winders require periodical cleanings to eliminate wool fiber flies and wastes. Dusts are accumulated here and there (Refer to Appendix B-P-4/5).

3.4 Equipment Control

- ① Generally the excessive lubrication can be seen. Oily fly due to this affects the jacquard looms badly.(Refer to Appendix B-P-2/3)
- ② Because the air conditioning is not, the humidity control does not work well. This leads to low loom efficiency.
- ③ It is necessary for the room for looms and winders to maintain 28°C and 75-80%, temperature and humidity.
- ④ The cleaning of the jacquard machines is carried out twice a day and maintenance is well done. However due to the shortage of spare parts, 5 jacquard machines are now defunct. The maintenance technology for the machinery is difficult to develop in Damascus factory, since many engineers and technicians in the factory move frequently. Such management system as the preventive maintenance will be required.

3.5 Quality Control

- ① The wool yarn supplied has quality problem. Syrian wool content contained in the wool yarn loses 18 % in weight in the weaving process as short fibers waste. These short fibers stick on the carpet surface and are hard to remove.(Refer to Appendix B-P-5/6)
- ② The cotton yarns are mainly supplied by the Idleb factory, but the problematic quality (weak single yarn strength, yarn unevenness) brings about yarn breakage, thus degrading factory's operation efficiency.
- ③ The wool yarns used have 5 different colors, but there are color differences according to respective yarn dyeing baths. Although these differences are hidden by color patterns, quality issues remain to some extent. The top dyed yarn is comparatively good.
- ④ 5S-activity and other quality control methods have not been adopted. However, wage deduction system by producing defective goods are used.
- ⑤ The cotton yarn accounts for 17 % of total yarn used. The quality of the cotton yarn also affects the quality of the carpet and the loom efficiency.
- ⑥ The certificate of the wool mark, which would certify the quality of the carpet has not been granted to-date. The company applied for it 3 years ago but failed. The wool mark is absolutely indispensable to achieve exports (Refer to Appendix B-T-4).

- ⑦ The claim and feed-back systems for the quality of wool and cotton yarn do not work functionally.
- ⑧ According to data obtained, the percentage of B-grade carpet (out of the standard) was 3 % now against 5 % five years ago.

3.6 Education and Training

- ① Operational training and technical improvement training are carried out under the leadership of both the Production Manager and the Technical Manager.
- ② Technologies seem not to be properly succeeded.
- ③ The basic discipline to develop company employee is insufficient.

3.7 Environmental Preservation

- ① The factory is located in Damascus and the site area is tight and restricted. The access road is congested as well thus the company's environmental conditions are generally poor.
- ② The new investment in air condition equipment, including suction devices for yarn waste has been envisaged but it is now pending because of budget constraints.
- ③ Although polluted water is not discharged, the treatment of wool yarn wastes sucked from the duct of shearing machine is not adequate.

4. Modernization Plan

4.1 Modernization of Production Management

(1) Process control

- ① It is necessary to put the design room and punching room together and make an opening with transparent glass on the wall so that the inside operation can easily be checked from outside.
- ② It is suggested to put posters on the wall in the factory to indicate the production target and the quality control target and their attained ratio. This is to promote the awareness of employees.
- ③ It is also suggested to train employees to deal with more than two tasks. By this, it is meant that each employee will have more than two jobs, and the production process will be activated by fewer workers.

- ④ It is also suggested to install a monitoring TV. The production manager can always check each section through the TV display.
- ⑤ It is necessary to install or purchase carriers, and a lift roller conveyor for handling products.
- ⑥ Thorough practice of 5S activity.
- ⑦ Thorough practice of SOP and preventive maintenance.

(2) Equipment control

- ① Lubrication oil will be sufficient at half of the present volume. This will eliminate the stain and the trouble of oily fly sticking.
- ② The Atomizer is not working well. It should be repaired or replaced by a new one in order to get favorable humidity conditions. It is ultimately necessary to install a full air conditioning system in the future, as humidity control on its own is not sufficient.
- ③ The winders should be cleaned completely. The blow cleaner should be replaced by a new powerful cleaner, and the travelling rail for it should be converted to the circular type of rail.

(3) Quality control

- ① It is suggested that the outcome of periodical meeting held with spinning mills (Hama Wool : Khomasieh) to discuss yarn quality and uneven dyeing be fed back to the production site to solve problems.
- ② It is vital to upgrade the quality in order to obtain the Wool Mark.
- ③ Inspection standards need to be more strict in order to decrease the number of coming-off yarns and deformed patterns.
- ④ The following measures should be taken to improve the quality of cotton yarn:-
 - Requesting yarn suppliers to provide test results of their yarns;
 - Selecting the most suitable yarn suppliers;
 - Requesting yarn suppliers to use carton cases instead of bags when transporting yarns;
 (Necessary attention should be taken to keep yarn quality within the company's stated tolerances)
- ⑤ Yarn suppliers should be made aware that in future claims will be made against them if the quality of wool and/or cotton yarn provided is poor.

(4) Education and training

- ① Employee restart education and training from the beginning with 5S activity.
- ② Many of the management staff feel the issues of quality and the production will be settled if machinery and equipment is replaced by new ones. However, the effect of new machines will only be felt when considered along with technology, machinery maintenance and education and training required for the operation of such new machinery.
- ③ It is necessary to implant standard operation procedure (SOP) to all employees and the system of preventive maintenance.
- ④ There is no indication of production or quality targets on the wall. It is therefore necessary to put it as a part of educational training to employees.

(5) Environmental preservation

- ① It is suggested that all employees should participate in beautification campaign of the factory and its peripheral area during their idle time. Walls and floors of the factory could be repainted and trees or flowers could be planted around the factory. This will improve the image of the factory significantly.
- ② For the sake of health for employees, it is suggested that weaving and preparatory rooms should be cleaned twice a day by a new powerful cleaner in order to remove short wool fibers. This will affect very much the environmental preservation, quality and production.

4.2 Modernization of Production Process

(1) Improvement of technology and process in compliance with the market needs for carpet

- ① Current market needs for the carpet has been diversified, looking for designs more minute and of large repeat size. It is necessary to comply with such market needs, replacing the existing looms by new looms which enable to do so. Likewise, if the export is oriented, the loom which enables it to upgrade the overall quality
- ② Working time of General Company for Carpets from design making to weaving is fairly long, incurring much cost. At present, it takes 5 months to complete a new design carpet (drawing of design, card punching and machine setting) (Refer to Appendix B-P-6/7). It is suggested that the company employs

computer aided looms which enable it to make one new pattern within 4 hours only.

- (2) Suggestion to streamline the existing two factories, Damascus and Suwayda, making them specialized in sales for export or domestic market.
- (3) Renewal of defective air conditioning equipment of Damascus factory.

4.3 Modernization of Production Equipment

It is advised that computer aided jacquard looms should gradually be introduced in either the Damascus factory or the Suwayda factory. Products from the modernized factory should be targeted for export and the other one should be a conventional loom factory for local demand.

(1) Comparison of Punch-card Loom and Computer Loom.

	Punch-card Loom	Computerized New Loom
Picks(weft) /min	50 picks /min	95 picks /min
Weaving width	3 m	4m (2m x 2m double)
Efficiency	40 %	60 %
Production/hour	6 m/hour	25 m/hour
New pattern	6 month/pattern	4 month/pattern
Pattern ability	simple repeat pattern	complicated and long repeat pattern

(2) Capacity calculation

- ① The production of the new computerized loom per machine will be 3-4 times more than that of the conventional loom.
- ② The computer loom will expand the pattern possibilities far beyond traditional patterns. This will enable the factories to enable to respond to various essential requirements for export demand, such as diversified articles, small lot production, complex patterns and extra length patterns.
- ③ If 6 sets of computer loom are introduced, a third of total employees will not be needed.

(3) Layout plan

- ① Plan No. 1 : 6 computer jacquard looms for Damascus factory and 16 conventional looms for Suwayda factory
(Refer to Appendix B-F-1,2)
- ② Plan No .2 : 16 conventional looms for Damascus and 6 computer jacquard looms for Suwayda

(4) Auxillary and utility equipment

- ① In case of Plan 1, new air condition equipment and one winder should be in Damascus factory.
- ② 8 defective looms (5 in Damascus and 3 in Suwayda) should be scrapped and the rest to be gathered in Suwayda with better condition.

(5) Installation schedule for Plan 1

	Present	Year1	Year 2	Year 3	Year 4	Year 5	Year6
Damas	Old 11	9	7	5	3	1	0
	New 0	1	2	3	4	5	6
Suwayda	Old 5	7	9	11	13	15	16

(Note)

New : New computerized Loom

Old : Old conventional loom

(6) Manpower allocation

Manpower allocation and decrease of employees (35 % decrease)

-Weaving operation	104	→	55
-Weaving maintenance	41	→	10
-Jacquard room	17	→	3
-Others	155	→	137
Total	317	→	205

(7) Estimated investment cost

- Plan 1: US \$ 6.7 Million
- Plan 2: US \$ 5.6 Million

(8) Additional explanation for Modernization plan

Plan No.1:

6 computer looms for the Damascus factory and 16 conventional looms for the Suwayda factory

Plan No.2:

6 computer looms for Suwayda factory and 16 conventional looms for Damascus factory

- ① Modernization plan of Plan No.1 as a model (Plan No.2 is just contrary to this plan) : The modernization will be carried out by introducing computer jacquard looms into the Damascus factory, which will be grown into the wool carpet factory specializing in export demand. In addition, rehabilitation will be carried out in Suwayda factory to make it into the wool carpet factory specializing in local demand.
- ② Outline of Modernization Plan and Background
 - As wool carpet is supported by deep-rooted demand in Syria, the production will be active and successive. The export market is also firm. If quality and price can be adjusted, it is possible to respond satisfactorily to inquires, but the matters of pattern diversification and individualization will remain.
 - The Damascus factory is unstable from an employee viewpoint, because there is a high turnover. Therefore, it is difficult for the Damascus factory to operate a labor intensive factory. The Suwayda factory has a stable employee situation because it is located in local area. The Personnel management is easy because they are diligent and committed.
 - The Damascus factory should be modernized through a 6 year plan. Plant No.1 will have 3 computer looms and Plant No.2 also 3 computer looms, thus allowing both plans to have the new computer jacquard machines. The Damascus factory should scrap 5 old looms, and 11 conventional looms remaining should be transferred to the Suwayda factory. The Suwayda factory should scrap 3 old looms out of 8 looms and add the 11 conventional looms from the Damascus factory. These 11 looms will be installed comfortably in the Suwayda factory. The Suwayda factory will be the specialized factory for conventional looms only.
 - The essential reason for introducing computer jacquard looms is the quality of wool yarn. For the time being Hama Wool(old factory) is requested to spin wool yarn containing 100% New Zealand wool. With the computer

looms the Wool Mark from the IWS required for export demand will be obtainable. Hama Wool and Damascus Carpets will gradually raise the mixing ratio of Syrian wool to wool yarn together with clearing the technical points at issue.

- Air conditioning (temperature of 28°C and humidity of 75%) is also an essential condition for a modern computer jacquard loom factory. The improvement of air condition equipment should be carried out with as little cost as possible.

③ Merit of Computer Jacquard Loom

- The pattern creative capacity will expand significantly beyond the present traditional patterns. Diversified articles with small lot production, complex patterns and extra length patterns will enable the factory to respond to export requirements. Manual drawing of pattern and card punching work will be unnecessary.
- The production capacity per loom will rise to 3-4 times that of conventional looms, thus necessary manpower will decrease, from 317 workers to 205 workers.
- Non standard fabrics, defects and pattern mistakes will decrease.
- Company profit will increase to 2 or 3 times of the present profit. When the export business is set in the right direction, it will be even better.

④ Investment Cost for Modernization (Plan 1)

- Purchase of computer loom (1 set per year)
¥ 100,000,000 X 6 sets) = US\$ 5.0Million
- Air conditioning equipment conversion of Damascus factory and installation charge = US\$ 0.8Million
- Purchase of warper and winder for Damascus factory = US\$ 0.3Million
- Conversion charge and transfer charge of conventional looms to the Suwayda factory = US\$ 0.6Million

Total US\$6.7Million

APPENDIX B-T-1

TRANSITION OF PROFIT AND LOSS

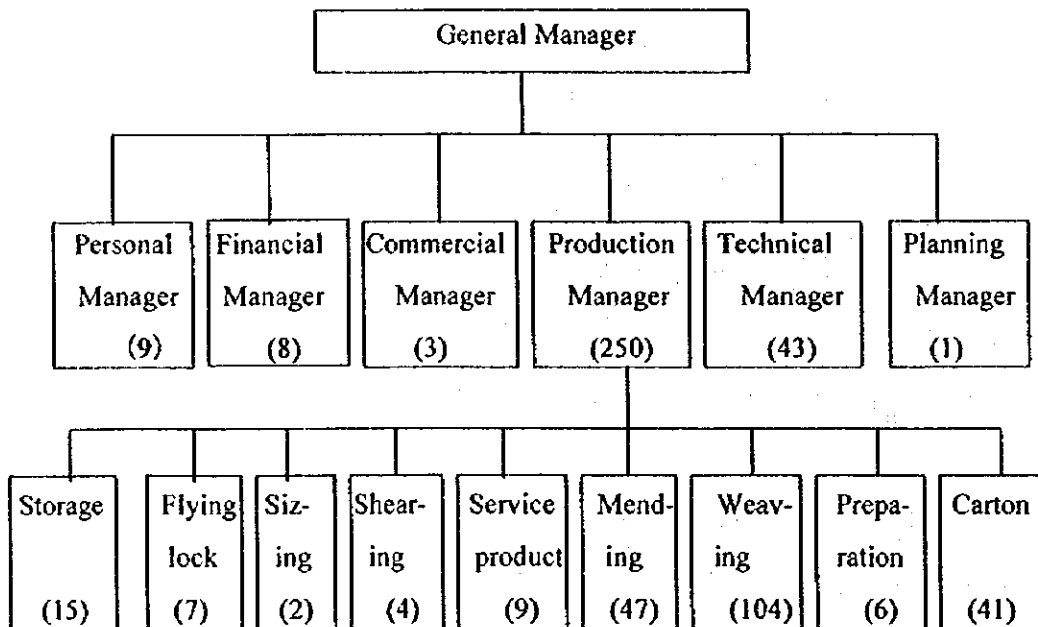
Unit: Million SP

Year	1991	1992	1993	1994	1995	1996
Profit	22,256	2,603	19,186	63,562	56,075	18,961

↑
Carpet price increased
↑
Increased wool, cotton yarn cost

APPENDIX B-T-2

MILL ORGANIZATION AND STAFF ALLOCATION



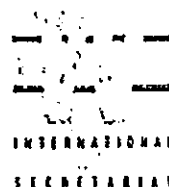
Appendix B-T-3

LIST OF MACHINERY

Process	Name of manu.	Model	Year of Manu	Remarks
Warping	Schlafhorst		1957	
Creel	Schlafhorst		1980	
	Projer		1995	
	Herch Berger		1985	Width
Jaquard Loom	Textima	shuttle	1958	2m
"	"	"	"	"
"	"	"	1972	"
"	"	"	"	"
"	"	"	"	"
"	"	"	"	2.5m
"	"	"	"	3m
"	"	"	"	"
"	"	"	1983	1.5m
"	"	"	"	3m
"	"	"	"	"
"	"	"	"	"
"	"	"	1990	2.5m
"	"	"	"	"
"	"	"	"	
shearing	Textima	"	1972	
sizing	"		1990	
Sewing M/C for hem.	Swidsh		"	
"	"		"	
Sewing M/C for fringe	"		"	
"	"		"	

APPENDIX B-T-4-(1)

INTERNATIONAL WOOL SECRETARIAT
 Carpet Test Unit — Ilkley Development Centre
 CARPET TEST RESULTS



BRANCH REF. No.	P 175	C.T.U. REF. No.	4955	Date	1 NOV 91
MANUFACTURER	IWS (CAIRO)	BRANCH	EGYPT		
QUALITY	CPT. MANUF. GEN CORP	WOOL CONTENT	100.0		
CONSTRUCTION					
CARPET TYPE	F/F.WILTON. CUT PILE. DESIGN PATTERN.				
TOTAL PILE WEIGHT		g/m ²	SHORN PILE WEIGHT, P	1183	g/m ²
TOTAL THICKNESS	13.9	mm	BACKING THICKNESS	3.3	mm
PILE HEIGHT	11.0	mm	PILE THICKNESS, I	10.6	mm
GAUGE	50.0	/dm	STITCHES	61.0	/dm
DURABILITY					
			EXTRA HEAVY	HEAVY	MEDIUM LIGHT
P ² /I	132	x1000			C
WIRA ABRASION	13.8	x1000 Rubs			
D FACTOR	447				C
VICAT		x1000 Rubs			
Tuft Withdrawal Force	3.0	N (.30 kgf)			
Bond Strength, Warp		N/50 mm	Bond Strength, Weft		N/50 mm
APPEARANCE RETENTION					
			No change (5)	4	3 2 1
Short term:- Thickness Loss	1.1	mm 11 %			
- Structure Change	4.0		X		
- Colour Change	3.5			X	
Long term:- Thickness Loss	3.3	mm 32 %	X		
- Structure Change	2.5				X
- Colour Change	2.0				X
Loop pile :- Fuzzing					
- Pilling					
OVERALL APPEARANCE CHANGE	3.5			X	
Dynamic Load:- 1000 Impacts		mm Loss			
- 2000 Impacts		mm Loss			
Static Load :- 2 Hour Recovery		mm Loss			
- 24 Hour Recovery		mm Loss			
Cold Water, Staining					
Hot Water, Texture					
Soiling					
DCM Extract	0.67	%			
COLOUR FASTNESS					
Light, First Fade	1.5		Dry Rubbing	4.0	
Light, Std. 5	3.0		Wet Rubbing	3.5	
Shampoo: Shade change	4.0		Wool Staining	4.0	Cotton Staining 4.5
I.W.S. CLASSIFICATION					
MEDIUM DUTY, CONTRACT					 Pure new wool
ISSUED SUBJECT TO CONDITIONS ON REVERSE SIDE OF THIS FORM					

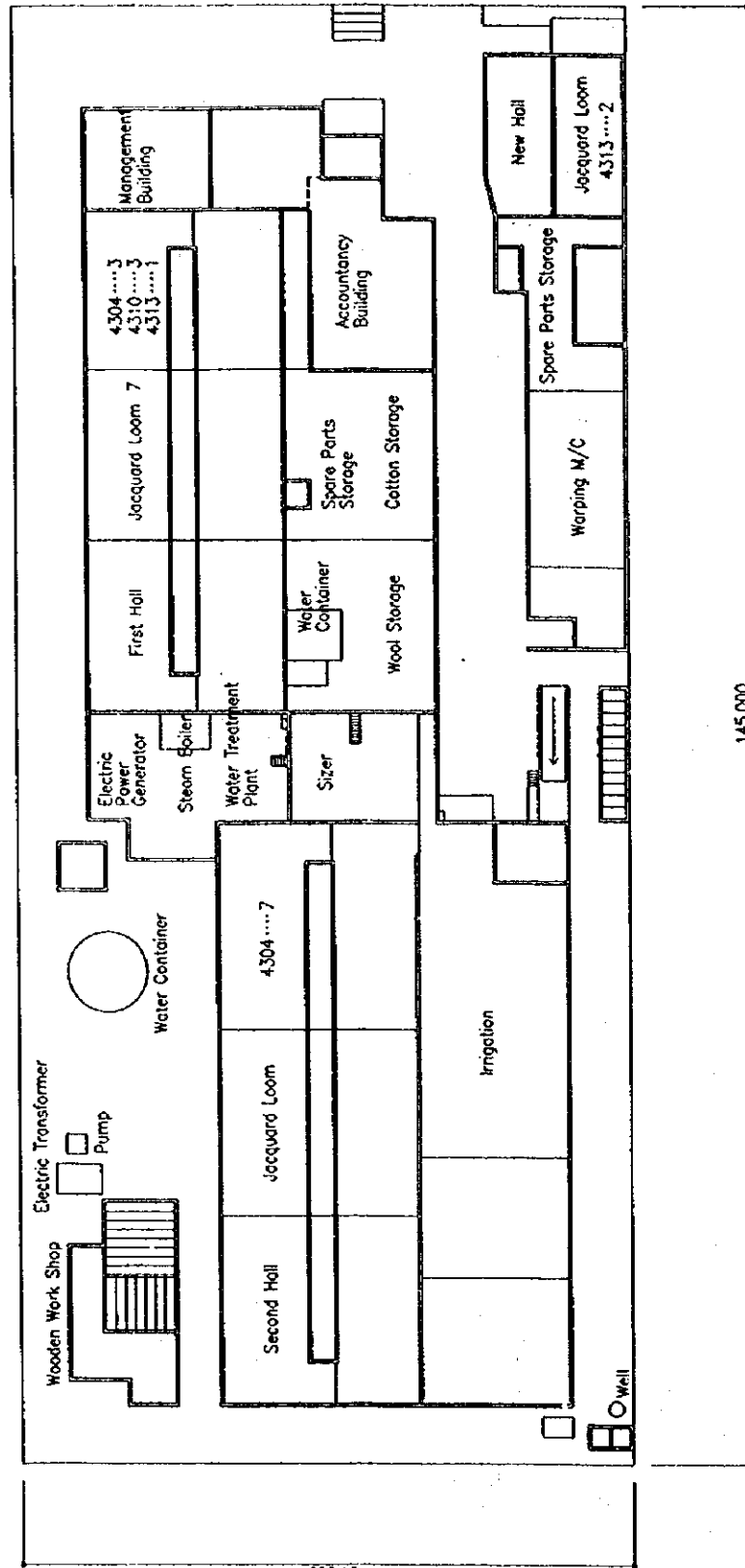
INTERNATIONAL WOOL SECRETARIAT
Carpet Test Unit — Ilkley Development Centre
CARPET TEST RESULTS



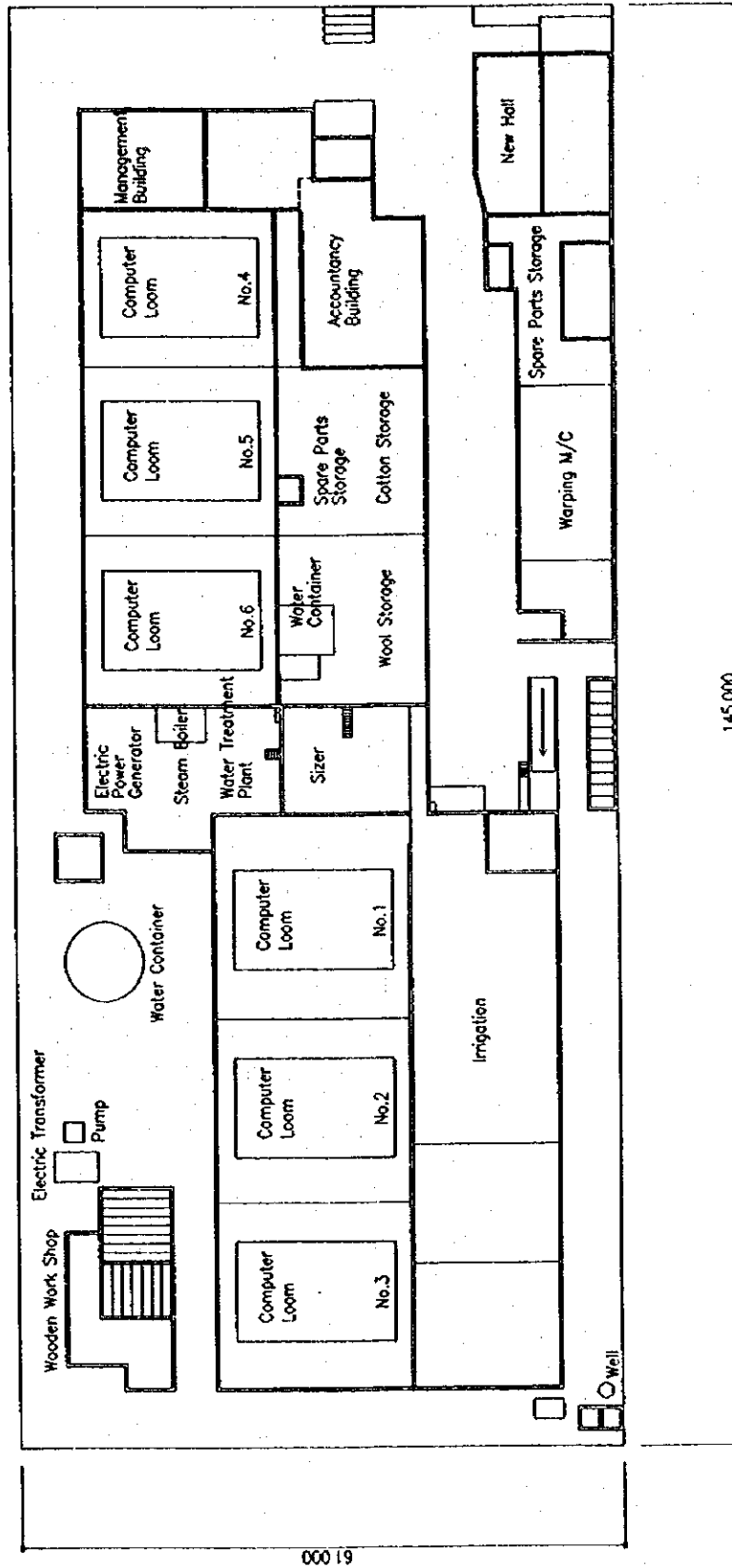
BRANCH REF. No.	P 175	C.T.U. REF. No.	4955	Date	1 NOV 91
MANUFACTURER QUALITY	IWS (CAIRO) CPT. MANUF. GRN CORP	BRANCH	EGYPT	WOOL CONTENT	100.0
CONSTRUCTION					
CARPET TYPE	F/F. WILTON. CUT PILE. DESIGN PATTERN.				
TOTAL PILE WEIGHT		g/m ²	SHORN PILE WEIGHT, P	1183	g/m ²
TOTAL THICKNESS	13.9	mm	BACKING THICKNESS	3.3	mm
PILE HEIGHT	11.0	mm	PILE THICKNESS, t	10.6	mm
GAUGE	50.0	/dm	STITCHES	51.0	/dm
DURABILITY					
P ² /t	132	x1000	EXTRA HEAVY	HEAVY	MEDIUM LIGHT
WIRA ABRASION	13.8	x1000 Rubs	R		
D FACTOR	447		R		
VICAT		x1000 Rubs			
Tuft Withdrawal Force	3.0	N (.30 kgf)			
Bond Strength, Warp		N/50 mm	Bond Strength, Weft		N/50 mm
APPEARANCE RETENTION					
Short term:- Thickness Loss	1.1	mm 11 %	No change (5)	4	3 2 1
- Structure Change	4.0		X		
- Colour Change	3.5			X	
Long term:- Thickness Loss	3.3	mm 32 %	X		
- Structure Change	2.6				X
- Colour Change	2.0				X
Loop pile :- Fuzzing					
- Pilling					
OVERALL APPEARANCE CHANGE	3.5			X	
Dynamic Load:- 1000 Impacts		mm Loss			
- 2000 Impacts		mm Loss			
Static Load :- 2 Hour Recovery		mm Loss			
- 24 Hour Recovery		mm Loss			
Cold Water, Staining					
Hot Water, Texture					
Soiling					
DCM Extract	0.67	%			
COLOUR FASTNESS					
Light, First Fade	1.5		Dry Rubbing	4.0	
Light, Std. 5	3.0		Wet Rubbing	3.5	
Shampoo: Shade change	4.0		Wool Staining	4.0	Cotton Staining 4.5
I.W.S. CLASSIFICATION					
EXTRA HEAVY DUTY, RESIDENTIAL					
ISSUED SUBJECT TO CONDITIONS ON REVERSE SIDE OF THIS FORM					



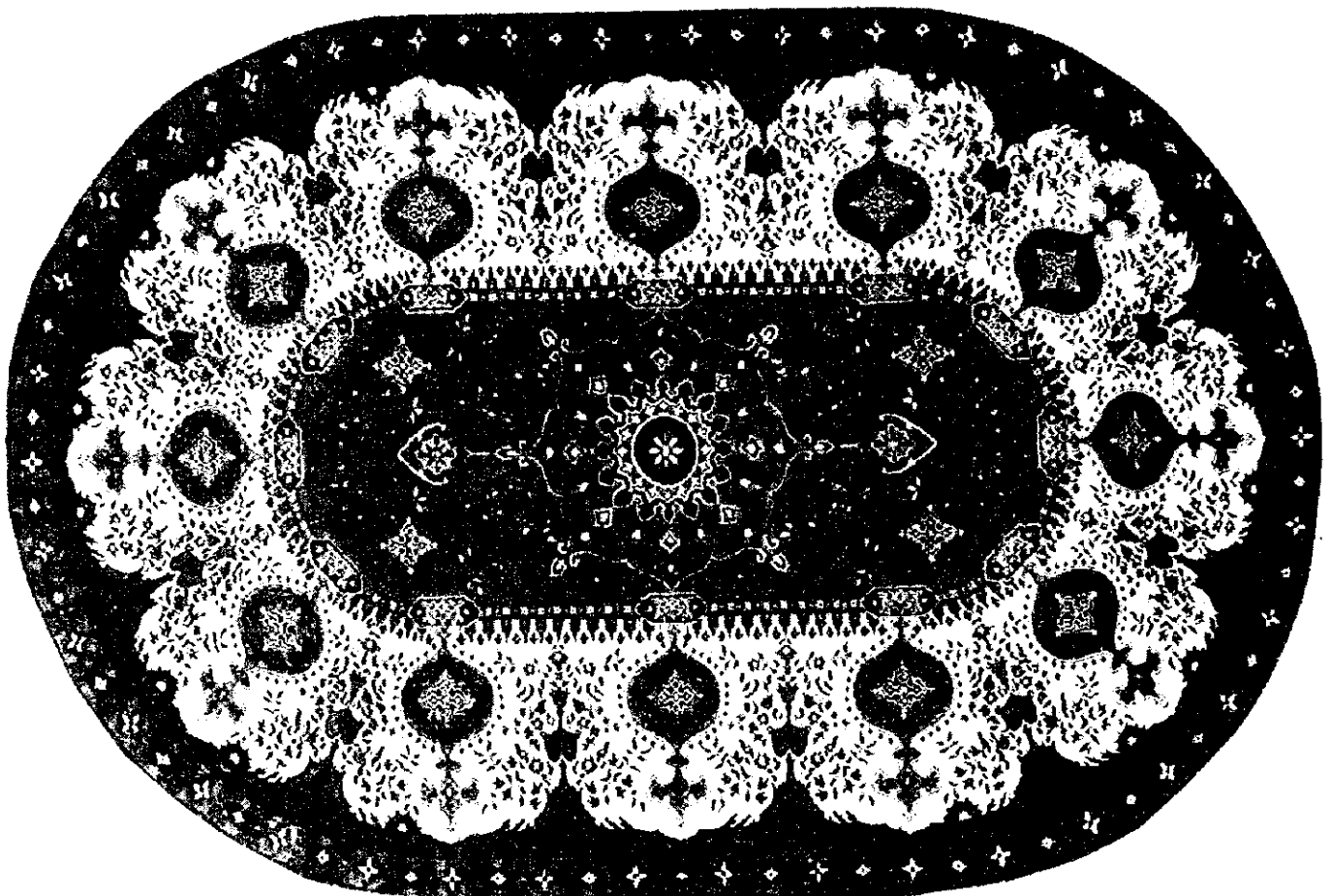
APPENDIX B-F-1
 General Company for Carpet Damas Factory Layout

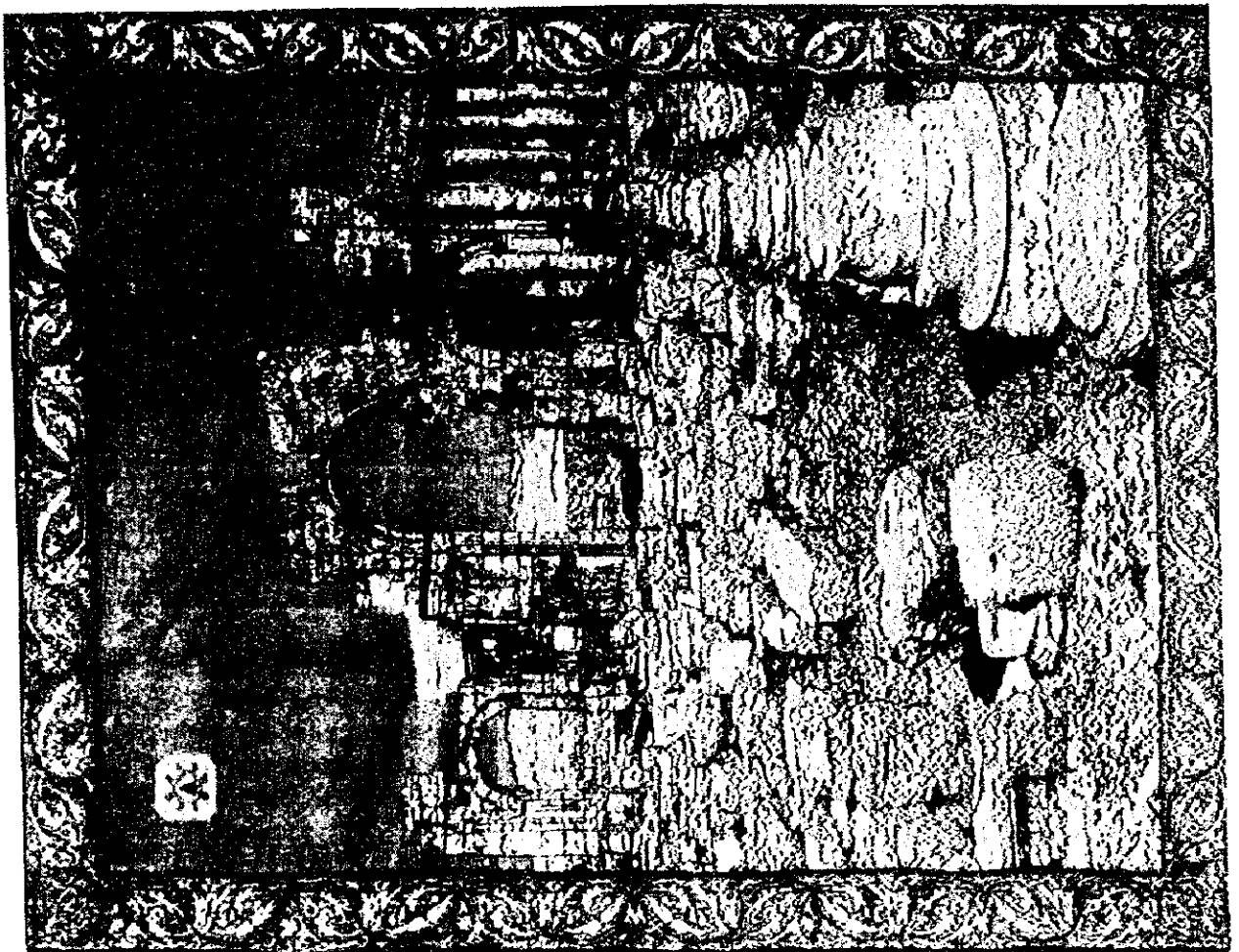
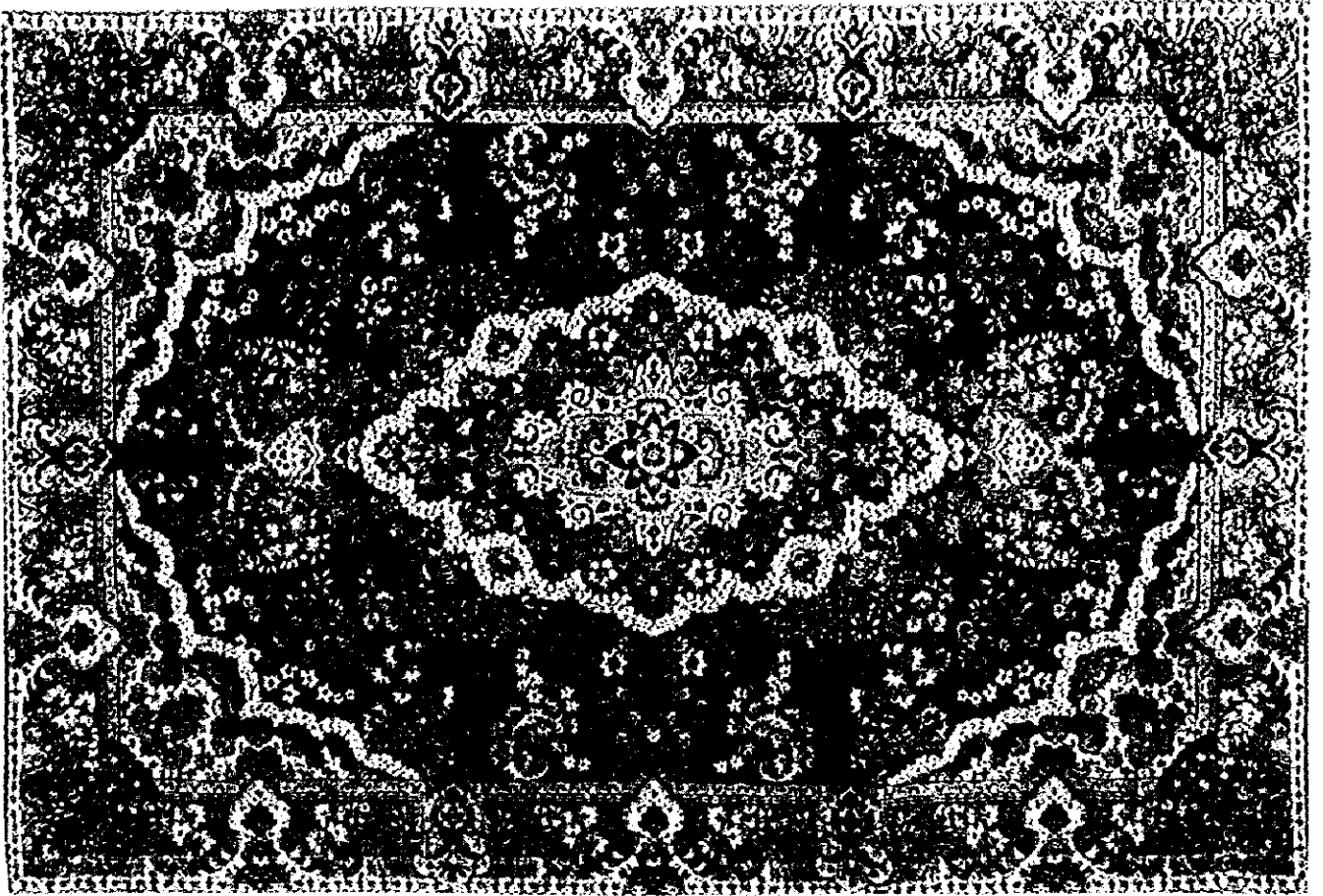


APPENDIX B-F-2
 General Company for Carpet Damas Factory Layout



APPENDIX B-F-3





A MAGIC CARPET

Syrian & Oriental Carpets. NAYDA ARSLANIAN.

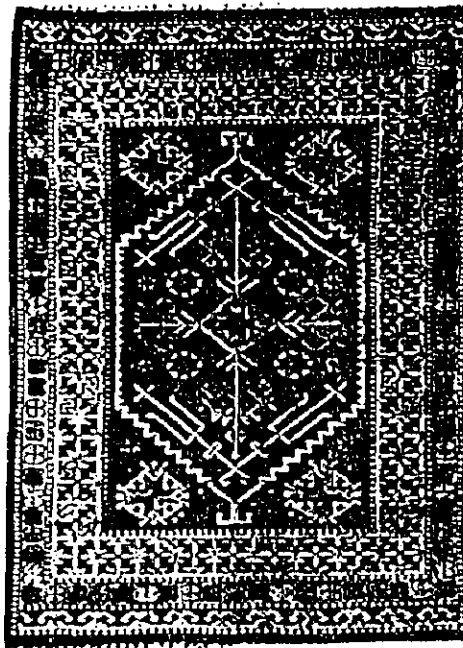
Oriental carpets, with their gorgeous, shimmering colours, the infinite variety of fascinating patterns and the soft textures of knotted woollen pile have delighted people from the East and the West for five centuries. They are unlike any other kind of work of art and combine the appeal of fine textile craftsmanship with the imaginative charm of abstract paintings. Above all, they are unique.

This art, invented by the simple peasants and nomads of Central Asia and the Middle East, is now quite extinct. The court manufactories of Persia and Turkey are no more and 20th century production methods have stifled the old village and tribal craft.

Where and when carpets were first knotted nobody can tell but nomad tribesmen in Central Asia may have been amongst the first rug weavers since they had the necessary material, wool, and incentive - a climate which was bitterly cold in winter.

Since carpet materials are perishable, there are natural limits to the age of existing specimens. In literature and art we find accounts and pictures which give us an idea of how early oriental carpets appeared in the history of civilisation.

The earliest large group of pile fabrics to survive came from the burial grounds of Egypt. In 1947-9, a most interesting find threw new light on the earliest days of rug-making. During excavations in a valley of the Altai range in South Siberia, the Russian archaeologist S.J. Ruchenko found a perfectly preserved deep-frozen rug in a grave mound belonging to a prince of Altai, who lived in the 5th century BC. The Altai rug is on exhibition in the Hermitage Museum in Leningrad.



The first examples of knotted pile carpets reached Europe by two routes; via the Levantine traders of Venice and Genoa and by overland trade through Muscovy to the northern ports. Late medieval and early Renaissance paintings in Italy and the low countries provide accurate information about specific types of carpets, which they depict lying at the feet of the Madonna and draped over tables, thrones and balconies. The designs of the contemporary Anatolian rugs that were then being imported into Europe helped establish the dating of the early styles as far back as the 14th century. Europe's ruling houses were soon competing for the best products and the sumptuous Persian carpets were the most esteemed. King Henry VIII and

Cardinal Wolsey were among the first in England to obtain large numbers of oriental rugs from Venice. Such carpets are shown in several portraits of Henry and his court.

Famous carpets

One of the most celebrated is the Ardabil carpet in the Victoria & Albert Museum. This carpet, considered to be the peak of Persian art, was made in the 1530s for the great mosque of Ardabil in northern Iran. In 1880, the carpet was sold by the mosque for approximately £2,400 to an English carpet dealer. Before its despatch to Europe it was repaired at Tabriz. The pair to this carpet is now in the Los Angeles County Museum of Art.

Oriental rugs of today

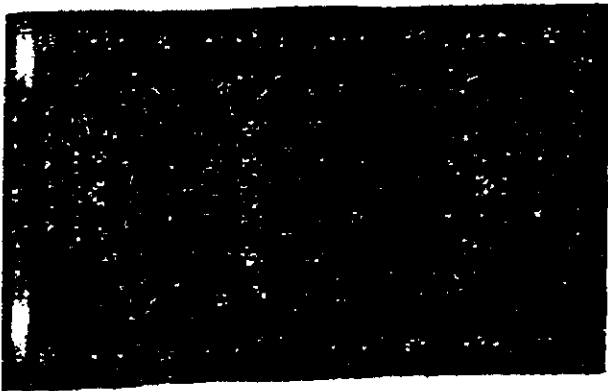
Oriental carpets can be classified in many ways: according to designs such as medallions, hunting themes, vase and flower rugs, geometric patterns and prayer rugs, or by producer, whether they

A MAGIC CARPET



inspiration from her surroundings than from the abstract world. However, many who have studied the symbolism of oriental rugs take a different view, and the symbols are explained as follows:

Flowers have always been a principal theme for the Iranians and the Persian garden has been likened to the Garden of Eden. Stylised flowers often appear: chrysanthemum and lotus flowers are said to bring happiness and fertility while the iris represents religious liberty in the finer Iranian and some nomadic rugs. The rose is a favourite pattern but is difficult to reproduce. The tree of life stands for divine power and a long or even everlasting life. The palm tree, to the Iranian, means the fulfilment of sacred wishes or a bless-



ing and a weeping willow represents sorrow and death.

A great variety of animal motifs is found, from the nomad rugs to the finest luxury carpets. The cock is the devil, woven into the rug to protect its owner from the evil eye. Beasts and birds of prey such as lions and falcons indicate courage, victory and glory. The heron symbolises long life and the hawk, victory. The comb means cleanliness while the sword stands for supreme power.

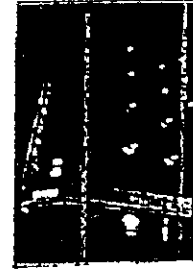
So, you want to buy a rug? The best buy is not necessarily the most expensive one. There are plenty of lovely 19th century carpets if you are shopping in Damascus and they are comparable to fine pieces from earlier periods, without costing the same astronomical amounts.

Generally, when you are investing in an oriental rug, go for the ones you like. The overall impression of design and colour should be harmonious and seductive. Beware of corrupted patterns and designs, sharp colours, crude tints and lifeless wool, which all diminish the worth of a carpet. A good carpet seems to speak to you. And when you have your good, hand-knotted oriental rug at home, realise that you possess a high-quality work of art. Treat it kindly, as it deserves!



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were made by nomads or by semi-nomads who were stationary in winter, or in workshops by craftsmen leading a settled life. But the usual method of classification is by place of origin, where they fall into five main categories:

- Iranian (Persian), the largest and most important group.
- Turkoman, the popular red carpets comprising the Turkoman, Afghan and Baluchistan rugs made in central Asia.
- Caucasian, with geometric figures for the main decoration, such as the Armenian rugs.
- Turkish (Anatolian), rare in Europe.
- The Indian, Pakistani and Chinese group.

There are natural and good reasons why handmade rugs should have found their home in the East. The Near East, meaning

Turkey and Iran, is a table-land broken and encircled by mountain ranges, the home of nomads with camels and large numbers of goats and sheep. Cotton is used too, for it is widely cultivated in Iran and India, as is silk from China.

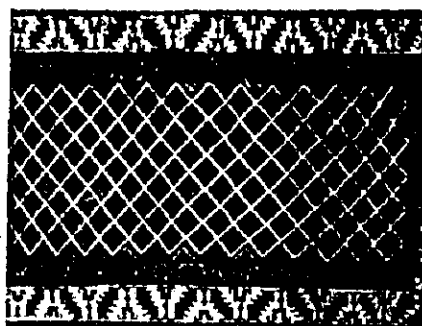
The Damascus carpet is also notable, as it dates back to 1600. The attribution of this carpet to Damascus in Syria is rather controversial but is based on deduction. Anatolian influence appears in the

border but no precedent has yet been discovered for the colour combination of red and green. The midway situation of Damascus between Egypt and Turkey makes it reasonable for this carpet of hybrid design to originate from Damascus.

Colours and their meanings

In the old days, the craftsmen had the great advantage that the material from which they would extract their dyes - plants, roots and insects - could be found on their doorstep. Skill in dyeing is a prerequisite for the creation of a really fine carpet, since the number of colours often increases with the density of the knotting. The dyer's craft is regarded as a science and the carpet-dyer as a sage to be consulted about many things. When he is at work, however, only other carpet-dyers may speak to him!

The red colours most frequently seen in oriental carpets are taken from the roots of the madder plant (*rubia tinctorum*), a wild perennial; cochineal, from the ground-up bodies of the female of the insect species *Coccus Cacti*, is used for carmine red and a third shade is derived from the insect *Chermes Abictis*. Oxblood was formerly used for reddish browns.



Yellow is obtained from the stalk, flowers and leaves of the resden plant, saffron yellow from the dried pistils of the rare and expensive saffron crocus and other shades from vine leaves and pomegranate skins.

Blue is made from the indigo plant which grows in the East Indies, while

shades of grey and brown may be natural wool or be dyed with extracts from nutshells and oak bark

Finally, black is obtained from oak apples. It is not much used because if the dye contains a lot of iron oxide the fibres may become brittle. That is why oriental rugs of some age are often threadbare in the black parts, giving an unintended relief effect.

To the Eastern mind, every colour has a meaning. Since the Prophet's coat was green, that colour is regarded as sacred and no true Moslem will use it as a principal colour. To the Chinese,

Iranians and Indians, white is the colour of grief where western people use black.

To the Iranians, blue is the colour of heaven. In Mongolia, blue stands for authority and power, red for wealth and joy. In China, yellow was the emperor's colour, in which he dressed. To the Moslem, orange represents devotion and piety.

Loom and knotting

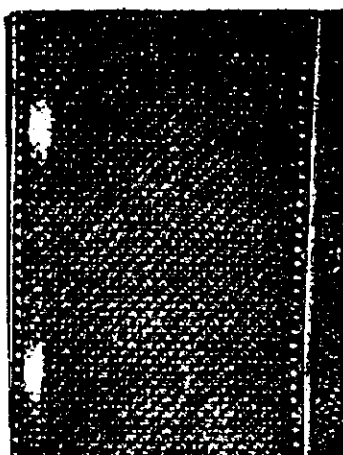
All rugs produced in the East are handmade and in all the great carpet regions the

technique is more or less the same; only the knots vary. In addition to kelim weaving, two kinds of knot are employed: the Ghiordes knot, which is more or less confined to the Near East, Turkey and the Caucasus, and the Senneh knot that predominates in Central Asia and the Far East, Afghanistan, India, Pakistan, Turkmenistan and China. In Iran both knots are used according to the origins of the producers.

Symbolism

The question of symbolism has always fascinated connoisseurs of the oriental rug. Many of the geometric patterns may have had meaning hundreds of years ago when they were first used but it is doubtful whether there was anything mysterious about them. In all probability they were meant simply to be animals, fruits, plants and flowers - innumerable repetitions throughout the centuries have changed their appearance until they have become stylised beyond recognition.

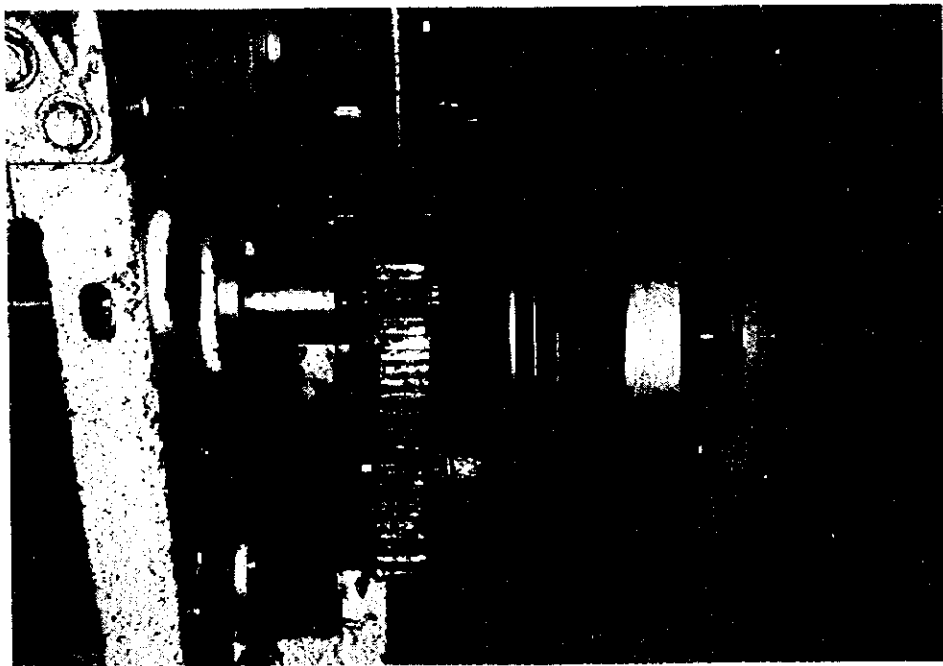
To bear this out, one of the greatest modern experts on oriental carpets, A. Cecil Edwards, suggests that the nomad woman crouching over her horizontal loom would be more likely to draw



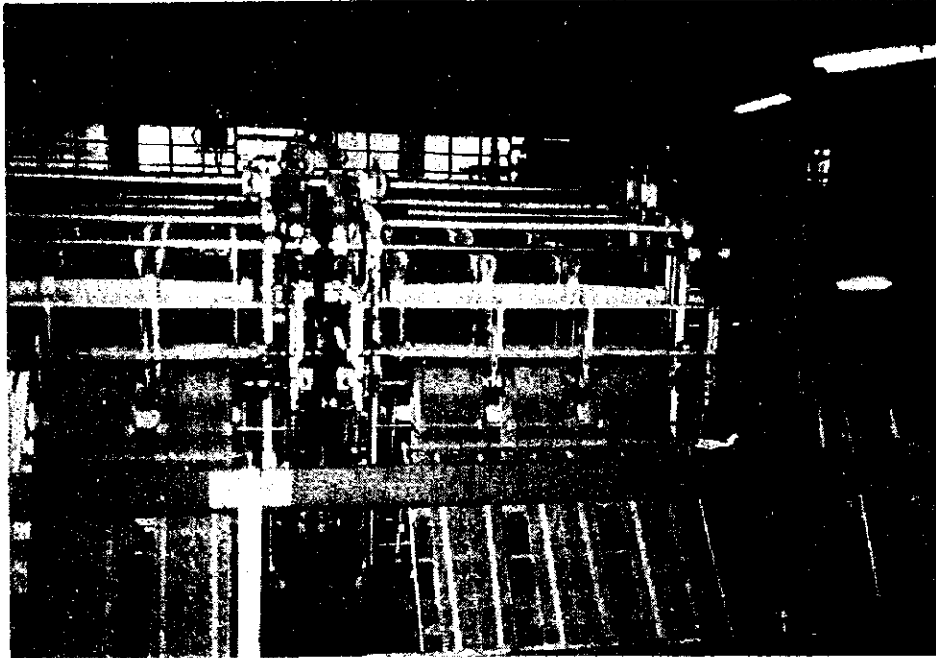
APPENDIX B-P-1 INVENTORY PROBLEM



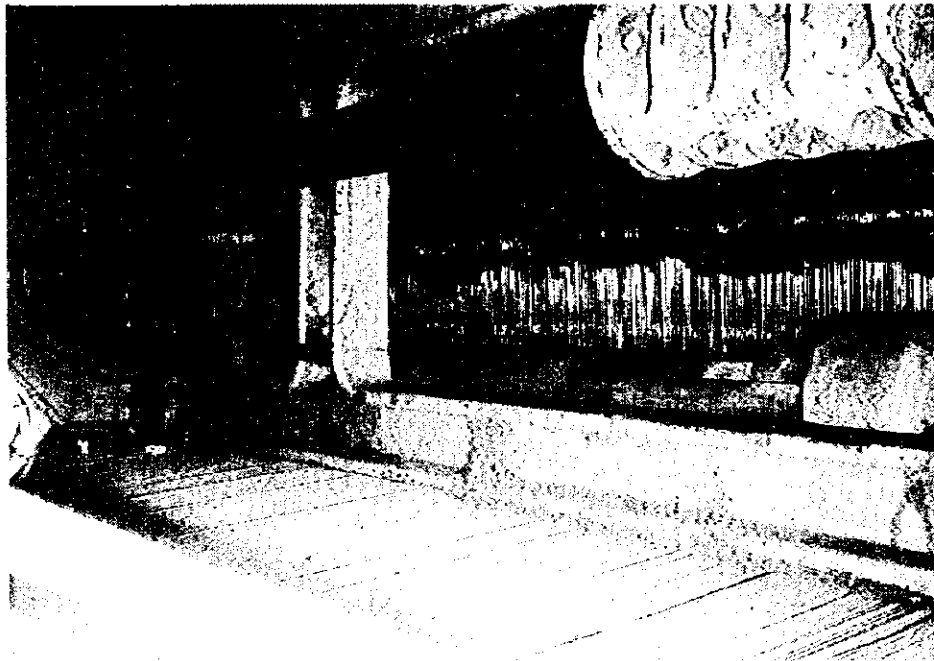
APPENDIX B-P-2 DIRTY LUBICATION



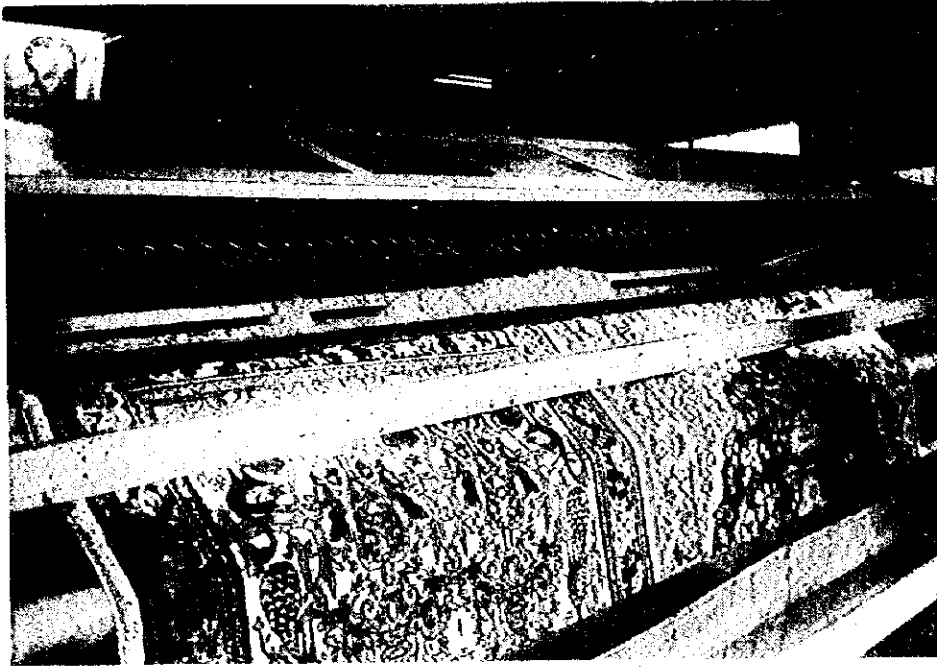
APPENDIX B-P-3 DIRTY LUBRICATION



APPENDIX B-P-4 SHORT WOOL FIBER WASTE



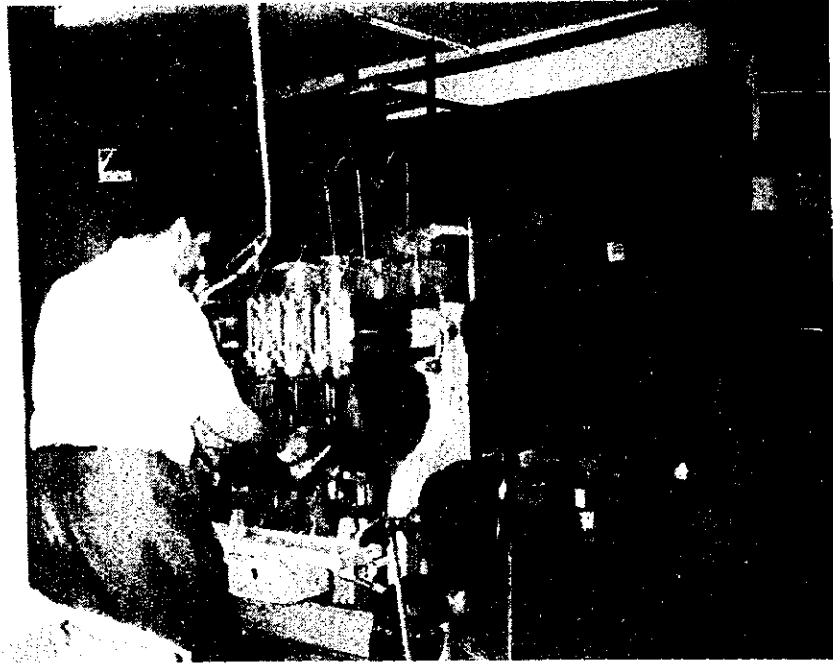
APPENDIX B-P-5 SHORT WOOL FIBER WASTE



APPENDIX B-P-6 MANUAL JACQUARD CARD PUNCHING



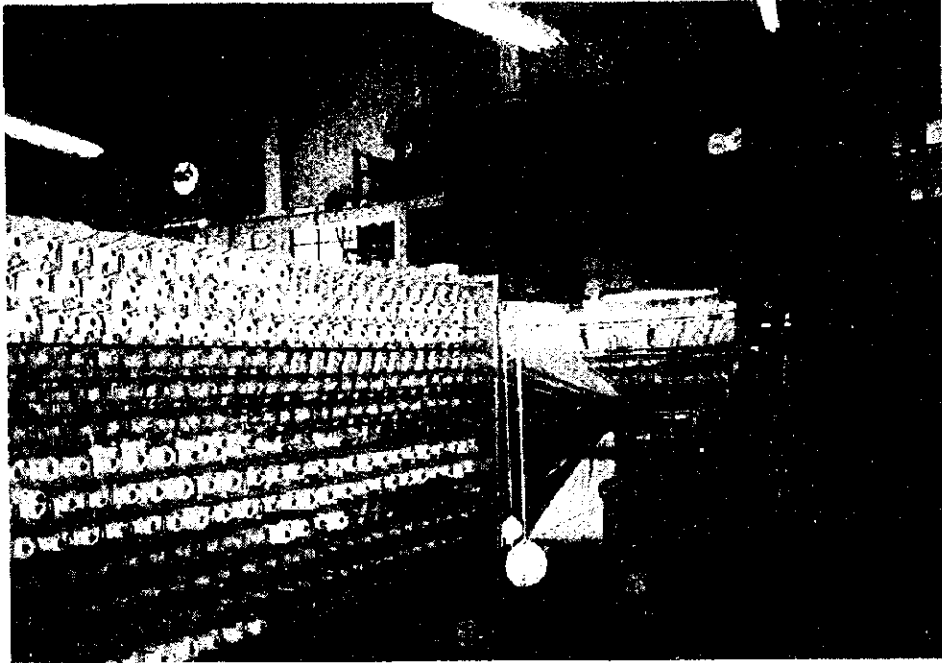
APPENDIX B-P-7 MANUAL JACQUARD CARD SEWING



APPENDIX B-P-8 WINDER AIR CLEANING PROBLEM



APPENDIX B-P-9 LOOM CLEANING PROBLEM



General Company for Wool

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TECHNICAL DIAGNOSIS FOR GENERAL COMPANY FOR WOOL

Date : 23~27 September,1997

Person in Charge: K.Ichikawa, T.Kimura

1. Present Situation of the Company

1.1 Location

The factory, located in the east-end of Hama city and adjacent to Hama Cotton Yarns Company, was built in 1978 and factory No.2 was added in 1995. Hama city is located in the central part of Syria, which enables the companies to gather various raw materials from every part of Syria. The population of the city, including the outskirts, is approximately 300,000 and there are not so many large-scale industries (5 state-owned and 3 private companies). Therefore, there is a sufficiently available labor pool.

1.2 Outline of the Company

(1) General items

The General Company for Wool produces spun yarn of Ne 3/15 for carpet weaving, and supplies it to the state-owned carpet weaving companies. The present production of wool yarn is 800 tons/year at total from the facility of 2,800 spindles in factory No.1 and 2,184 spindles in factory No.2.

(2) Building site

Site : 156,510 m²

Building : 19,430 m²

Please refer to Appendix C-F-1,2.

(3) Raw materials

① Wool for carpet use

Blending ratio : New Zealand wool : 80 ~85%

Syrian wool : 20 ~15%

- ② Wool for blanket use (Military use, commission-based scouring)
Colored wool and tannery wool (wool taken from tanned leather)
- ③ Syrian wool comes from AWARS breed specially improved for milk and meat. Wool appears to be considered a by-product.

(4) Products

- (1) Semi worsted yarn for carpets Nm 3/15 : 800 tons/year
- (2) Commission scouring of military blankets, etc. : 600 tons/year

(5) Sales and stocks

The products; semi worsted yarns for carpets are all produced to order. The yarns are purchased by the General Company for Wool and Aleppo Silk Weaving. In addition to the above, the scoured wool for military blankets is processed here.

(6) Production plan and result

- ① Production plan :800 tons/ year All production is made to order.
- ② Production result :800 tons/year Planned production is achieved and excess goes to stock.
- ③ Production Diagram and Sales Amount are shown in Appendix C-F-3.

(7) Organization and manpower

- ① Organization: Refer to Appendix C-F-4.
- ② Manpower : 517 persons, including 295 persons for production division
(three shifts for factory No.1 and one shift for No.2)

(8) Production equipment

Refer to C-T-1, 2 for detail.

- ① **Factory No.1** : Semi-Worsted Spinning Machines, 364 spindles x 6 frames = 2,184 spindles, and Top Dyeing Equipment for 600 kg/ 2 dyeing baths. The conditions of the machinery and equipment is very bad, because they have included second hand machines ever since the factory was constructed.
- ② **Factory No.2** : Semi Worsted Spinning Machines, 280 spindles x 10 frames = 2,800 spindles, and Yarn Dyeing Equipment for 8 kg/4 dyeing baths.

The production efficiency is low, although the factory was expanded only two years ago. At present, the factory is operated on one shift basis only.

2. Present Situation and Problems of Production Process

2.1 Carpet Yarn (Semi Worsted) Spinning Process

- ① Factory No.1 is for the spinning of semi worsted yarn for carpets, operated by a collection of machinery manufactured between 1955 and 1976. As the factory has the advantage of having top dyeing equipment, it is operated on 3-shifts. Factory No.2 was expanded in 1995 with Chinese machinery and equipment. The yarn dyeing machines are operated on only one shift because of many of problems in this process. The process control and manpower allocation are normally controlled at the factory No.2, while the equipment and manpower allocation of factory No.1 are considerably inferior to factory No.2.
- ② Factory No.2 is not operated well because of uneven dyeing in the yarn dyeing process.

3. Present Situation and Problems of Management in Production Process

3.1 Procurement Control

(1) Raw material

- ① Raw wool is supplied on the basis of 80~85% New Zealand wool and 15~20% Syrian wool. New Zealand wool is delivered by suppliers appointed through international tender. Syrian wool is supplied by local agents.
- ② In addition to the above, colored wool and tannery wool (taken from the tanned leather) for military blanket are used.
- ③ No problems are observed at this moment in respect of raw material procurement.

(2) Spare parts

- ① Factory No.1 finds difficulty in procuring spare parts, especially spare parts for Gill Reducer. Production of these machines was discontinued already.

The machine is running without a cover for the Calendar Roller at the coiler part. The rollers of the Cards, affecting the quality, do not rotate properly.

- ② The manufacturers of Cards and Gill no longer exist, therefore, spare parts procurement is very difficult. The question is how long the 3-shift operation could be continued from now on. (Refer to Appendix C-P-1,2)

3.2 Inventory Control

As the production is controlled according to the orders received, no stock is kept. Therefore, there is no point at issue.

3.3 Process Control

- ① The production equipment in No.1 factory is extremely deteriorated and process control is not implemented except for spinning and twisting department.
- ② Factory No.2 is faced with problems of mixing vegetable matters into the yarn. This is attributable to malfunctioning of the dust collectors for Opener and Cards, etc. (Refer to in Appendix C-P-3,4).
- ③ The scoured wool is packed into bags. This is not suitable for storage and transportation because it requires excessive physical labor and it damages the yarn quality. (Refer to Appendix C-P-5,6)

3.4 Equipment Control

- ① Electrical equipment, boiler, air conditioning equipment, water softening equipment and water volume received are well balanced between the capacity and consumption. All equipment is satisfactorily maintained.
- ② The fire fighting equipment does not work satisfactorily.

3.5 Quality Control

- ① The quality standard for carpet yarn is established. General laboratory tests are carried out as in any spinning mill. However, an evenness tester is not available.
- ② Mainly the physical tests are being carried out. However, the usual chemical tests are not being done in spite of having the scouring process in the factory.

Residual fat of scoured wool is an important control item, therefore, it should be regularly measured.

3.6 Education and Training

- ① New employees are given on-the-job training during the trial period for three months.
- ② The education and training are carried out not based on Standard Operation Procedure (SOP), but depending solely on the experience of trainers.

3.7 Environmental Preservation

Effluent from dyeing and scouring processes are discharged into the sewer system of the city without treating it in the factory.

4. Modernization Plan

4.1 Modernization of Production Management

(1) Process Control

- ① Necessary repairs to, or replacement of, the process equipment is required so that the Dust Collector works well at the factory No.2.
- ② Packing into bags of scoured wool after washing and drying should not be done at factory No.2. The dried wool should be transported by air through the air duct to the wool bin. Two more wool bins are required because of the capacity of the related equipment.
- ③ After washing and drying, carding oil should be supplied to coat on wool to acclimatize it to the atmosphere, namely seasoning for protecting the fibers from breaking.

(2) Equipment Control

- ① The fire fighting equipment should be checked and adjusted urgently to work satisfactory.

(3) Quality Control

- ① The present quality control measuring equipment will be insufficient, if the production will increase to 1,200 tons/year in the future instead of 800 tons/year at present. The following testing equipment and measuring devices etc. should be procured ; Measuring device for grease remaining in scoured wool, Yarn evenness tester, Physical and chemical tester for spinning yarn;
- ② It is also necessary to establish a quality control system in the process as required.

(4) Education and Training

A department engaged solely in the training should be provided and the training should be based on the standard operation procedure (SOP).

(5) Environmental Preservation

A plan to introduce effluent treatment system is under consideration. The planned location is near the main road to the city. The location should be restudied, taking into consideration the proper location as far as possible from the main road and any residential area in the neighborhood.

4.2 Modernization of Production Process

- ① Factory No.2 is equipped with new machinery, and operated on one shift only in order to balance production between spinning and yarn dyeing. The issue rests on inferior yarn dyeing equipment, namely the automatic control device is not working well and the technical level of color matching is insufficient. The replacement of the automatic control device and the improvement of the dyeing technology are, therefore, required.
- ② Factory No.1 is equipped with old machinery including top dyeing equipment. Top dyeing production is 2.2 tons/day only, while it has a capacity of 4 tons/day. Therefore, factory No.1 should utilize the top dyeing equipment to the maximum extent by using tops to be produced in factory No.2, which will help improve the quality.

4.3 Modernization of Production Equipment

4.3.1 First Plan

(1) Main machinery to be introduced

1) No.2 Factory (Yarn dyeing and Wool opening equipment)

- ① Solution of uneven yarn dyeing process
 - Replacement of control panels for yarn dyeing equipment
- ② Improvement of dust collecting function of greasy wool
 - Replacement of cylinder opener for greasy wool, one set
 - Replacement of cylinder opener for scoured wool, one set
 - Introduction of mixer for scoured wool
 - Replacement of sorting table
- ③ Improvement of transportation system for scoured wool and opening and dust collection effect for scoured wool.
 - The packing into bags should be discontinued. The scoured wool seasoned with carding oil after dryer should be transported through the mixer and dust collector newly introduced to the wool bins, according to which the raw wool is suitably conditioned for throwing into the process.
- ④ Carding machines should have metallic wire clothing with large size cans.

2) No.1 Factory (Top making equipment)

- Scoured Wool Opener 1
- Carding Engine 2
- 1st Gill 1
- 2nd Gill 1

(2) Capacity calculation

Production : 600 tons/year should increase to 800 tons /year

(Improvement of the production as well as the quality are planned by the replacement of the existing equipment).

Refer to the production plan into Appendix C-T-3.

Calculation : Refer to Appendix C-T-4,5

(3) Layout plan

Refer to Appendix C-F-5,6,7(Existing Layout) and Appendix C-F-8 (Modernization plan Layout).

(4) Auxiliary and utility equipment

The modernization plan includes mainly the replacement of machinery. There is no big change in power consumption ,etc..

(5) Erection plan

About 2 months are required

(6) Manpower allocation

Employees to be reduced : 15 persons from scoured wool packing section.

(7) Estimated investment cost

US \$ 1,650,000.-

4.3.2 Second Plan

(1) Renewal of No.1 Factory (Spinning and Laboratory Equipment)

• Mixing Gill	1
• 1 st Gill	1
• 2 nd Gill	1
• 3 rd Gill	1
• Bobbiner	1
• Ring Spinning Frame	6
• RT Winder	1
• Assembly Winder	1
• Double Twister	3
• Auxiliary Equipment	1 lot
• Laboratory Equipment	1 lot

(2) Estimated investment cost

US\$ 1,900,000.-

APPENDIX C-T-1
MACHINE LIST OF GENERAL CO. FOR WOOL (EXISTING)

Mill No.1

NO	Name of M/C	No. of M/C	Origin	Name of manufacturer	Model	Year of Manufa	Remarks
1	SCOURING M/C	1	Germany	Flisner			5 Baths, Dryer 5 cylinders
2	Blending m/c	1	"				
3	Carding E/G	2	"				not any document
4	1 st Gilling m/c	2	"	Krupp		1955	cans to cans
5	2 nd Gilling m/c	2	"	"		1955	cans to ball
6	Top Dying	2	"	Dobies		1976	6 spindles × 10 tops
7	Back Washer	1	"	Flisner		1977	3 baths 2 cylinder dryer
8	Mixing Gill	1	"	Krupp		1976	ball creel → cans to cans
9	1 st Gilling M/C	2	"	"		1955	
10	2 nd Gilling M/C	2	"	"		1955	
11	3 rd Gilling M/C	2	"	"		1955	2 cans by coil
12	Bobbiner	1 1	"	Bernhard			20 bobbins
13	Ring Spinning	6	"	spinbauu			364 sp. spinnidle G 75, Ring 60 Φ
14	Winder	1	"	schlafhorst			R, T, W 72D
15	Doubler	1	"	Mettler			
16	Double Twister	3		Barmag	DD39		128D
17	Steam Setter	1	"			1977	

APPENDIX C-T-2
MACHINE LIST OF GENERAL CO. FOR WOOL (EXISTING)

Mill No. 2

NO	Name of M/C	No. of M/C	Origine	Name of manufacture	Model	Year of Manufa.	Remarks
1	Opening M/C	1	China	上海第4紡績机機械	BO34-100	1991	3cylinder, 1 perforator R.1000W 850 ϕ
2	scouring m/c	1	"	"		"	5Bath, Dryer, 3cylinder
3	Opener	1	"	"	BL160	"	洗淨毛除染机 1 cylinder, 650 ϕ 1600W
4	Blender	2	"	"	BC262	"	pin type top 4 set
5	Carding Eng	4	"	"	B272A	"	2cylinder cans 600 ϕ \times 800H
6	1 st Gilling M/C	2	"	上海第1紡績机機械	B303	"	cans to cans
7	2 nd Gilling M/C	2	"	"	B306A	"	cans to ball
8	Mixing Gilt	1	"	"	B412	"	ball to ball (not used)
9	3 rd Gilling M/C	2	"	"	B423	1994	ball to cans
10	4 th Gilling M/C	2	"	"	H442	1991	cans to cans
11	Bobbiner	3	"	"	FB441	"	36sp
12	Ring Spinning	10	"	上海第2紡績机機械	FB551B	"	280sp Roller G, 280
13	Winder	1	"	天津紡績	GA012	"	RTW 60D soft winder
	Rewinder	1	"	"	HDZ	"	clearer slit type
14	Ring Twister	6	"	WD \times 1N02	B643A	"	120sp, ring ϕ 110
15	yarn Dying	4	"	仏山市天機曳八丁 郡阻第3紡績	SHAOERJ1 MF2414-100	"	紡績染色机曳脳控装置 XH-KB30
16	Dryer	2	"	郡阻第3紡績	MF431-110	"	132cones(22sp \times 6cones)

APPENDIX C-T-3

Production Plan for General Co., for Wool (Mill No.1)

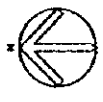
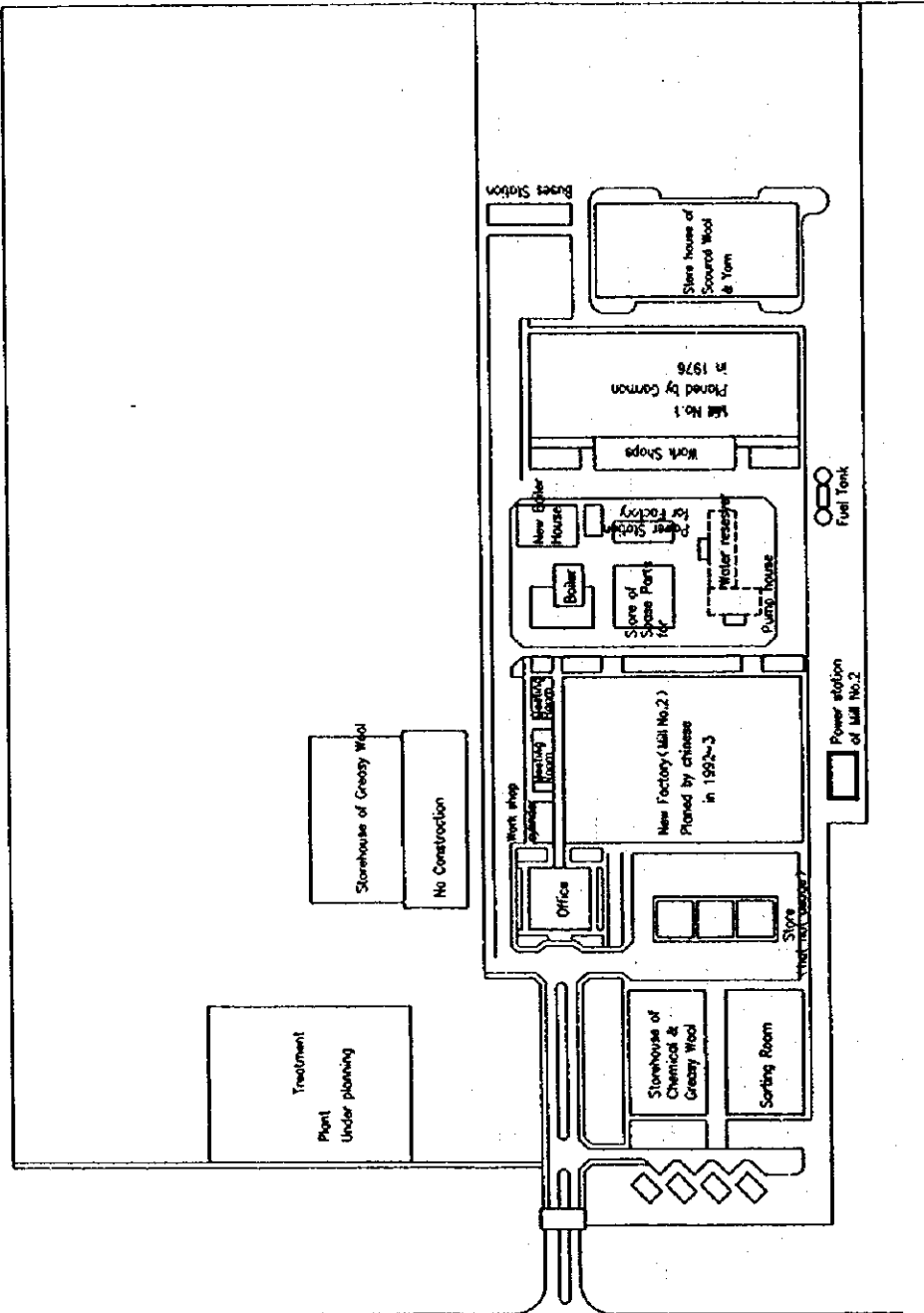
Process	Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
		Supply thickness (Grom/meter)	No. of doubling	Draft	Produced thickness (Grom/meter)	Twist multiplier (dm)	Twist per inch (TPM)	Waste percent (%)	Delivery speed or Revolution (per min)	Package	100% Production (kg) (per hour and unit)	Working hour	Working efficiency (%)	No. of spindle (per machine)	Actual Production (per machine) (kg)	Required Production (kg)	Calculated No. of machine	No. of machine	
(I) Top Making Process																			
1	Cording m/c				20					Rotary Gill Cons Chamber 1000φx1.20H	85.0	8	90	1	612	1,090	1.8	2	
2	1st Gill	20	8	6.4	25		120		Cans to Cons 1000φx1.016H	180	8	80	1	1,152	1,060	0.92	1		
3	2nd Gill	25	8	8	25		120		Cans to Ball Ball(20~25)	180	8	80	1	1,152	1,050	0.91	1		
(II) Spinning Process																			
1	Mixing Gill	25	10	10	25		120		2Hx1B Cons to Ball	180	8	80	1	1,152	1,050	0.91	1		
2	1st Gill	25	8	8	25		130		Ball to Cons 1000φx1.016H	195	8	75	1	1,170	1,035	0.89	1		
3	2nd Gill	25	4	9.1	11		140		1Hx20W 610φx1.016H	184.8	8	75	2x1	1,110	1,030	0.93	1		
4	3rd Gill	11	3	6.6	5		140		1Hx20W 406φx1.016H	201.6	8	75	4x2	1,210	1,020	0.84	1		
5	Bobbiner	5	1x3	10.9	1.1x2		80		10Hx20B	10.6	8	70	20	1,183	1,010	0.85	1		
6	Ring Spinning m/c	1.1	1	16.5	1/15		7,000 (17.07)			0.683	8	90	360	177	1,000	5.6	6		
7	Winder	1/15	1		1/15		500		R.T.W(96 D)	2.0	8	15	96	997.6	950	0.95	1		
8	Assemble Winder	1/15	1		3/15		400		R.T.W(48 D)	4.8	8	65	48	1,198	950	0.79	1		
9	Twister	3/15			3/15	200	5,000x2(47.6)		NO 373II S196	0.571	8	80	98	358	945	2.7	3		

Calculation Table for General Co. for Wool (Mill No.1)

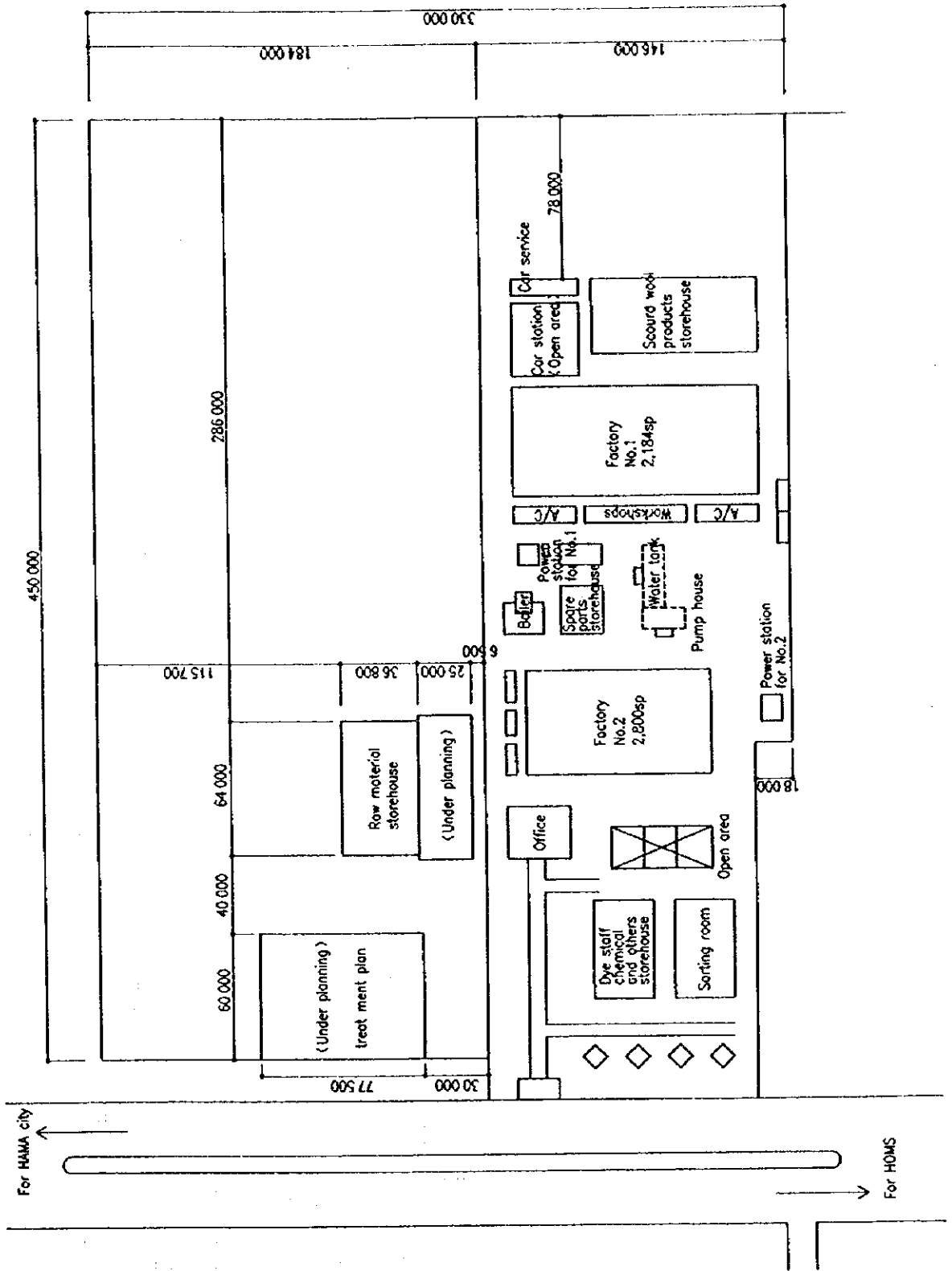
APPENDIX C-T-4

Process	Item	Supply thickness (Gram/meter)	No. of doubling	Draft	Produced thickness (Gram/meter)	Twist multiplier (dm)	Twist per inch (TPI)	Waste percent (%)	Delivery speed or Revolution (per min)	100% Production (kg) (per hour and unit)	Working hour	Working efficiency (%)	No. of spindle (per machine)	Actual Production (kg) (per machine)	Required Production (kg)	Calculated No. of machine	No. of machine (set)
1	Card				17			11.8	31 m/min	31.6	8	85	2	430.0	890	2.07	2/2
2	1st Gill	17	7	6.61	18			0.37	70 (60)	52.8 53.8	8	85	2	881.3 867.7	800	0.91 0.83	1/2
3	2nd Gill	18	10	7.5	24				80 (60)	86.3 115.2	8	85 90	2	1,104 1,658.9	800	0.73 0.48	1/2
4	Back Washer							0.3	6	8.6	8	85	32	1,880.0	796	0.42	1/2
5	Mixer																
6	4th Gill	24	7	7.63	22				80 (60)	79.2 105.6	8	80	2	1,013.8 1,351.8	793	0.78 0.58	1/2
7	5th Gill	22	5	7.85	14			2.9	85 (60)	50.4 71.4	8	85	2	681.6 971.6	793	0.72 0.82	1/2
8	6th Gill	14	4	10.18	5.5				80 (60)	19.8 26.4	8	85	4	505.5 726.5	793	0.48 1.09	2/2
9	Bobbiner	5.5	2	9.16	1.2				80 (35)	2.8 5.8	8	85 90	20x2	529.1 821.6	770	0.43 0.81	1/2
10	Ring	1.2	1	12.5	1/15		410	9.02	5,466 r/m	0.053	8	90	364	139.4	770	5.52	6/6
11	Winder	1/15	1						600	2.4	8	60	72	829.4	715	0.86	1/1
12	Doubler	1/15	3		3/15			6.02	400	4.8	8	60	36	829	707	0.85	1/1
13	Twister	3/15	1		3/15		200		12,200 r/m	0.732	8	70	128	390	667	1.71	2/3
	300 day/y. 600T/y								Recommended Speed								

APPENDIX C-F-1
 General Company for Wool (HAMA)
 Factory Outline Layout (Existing)

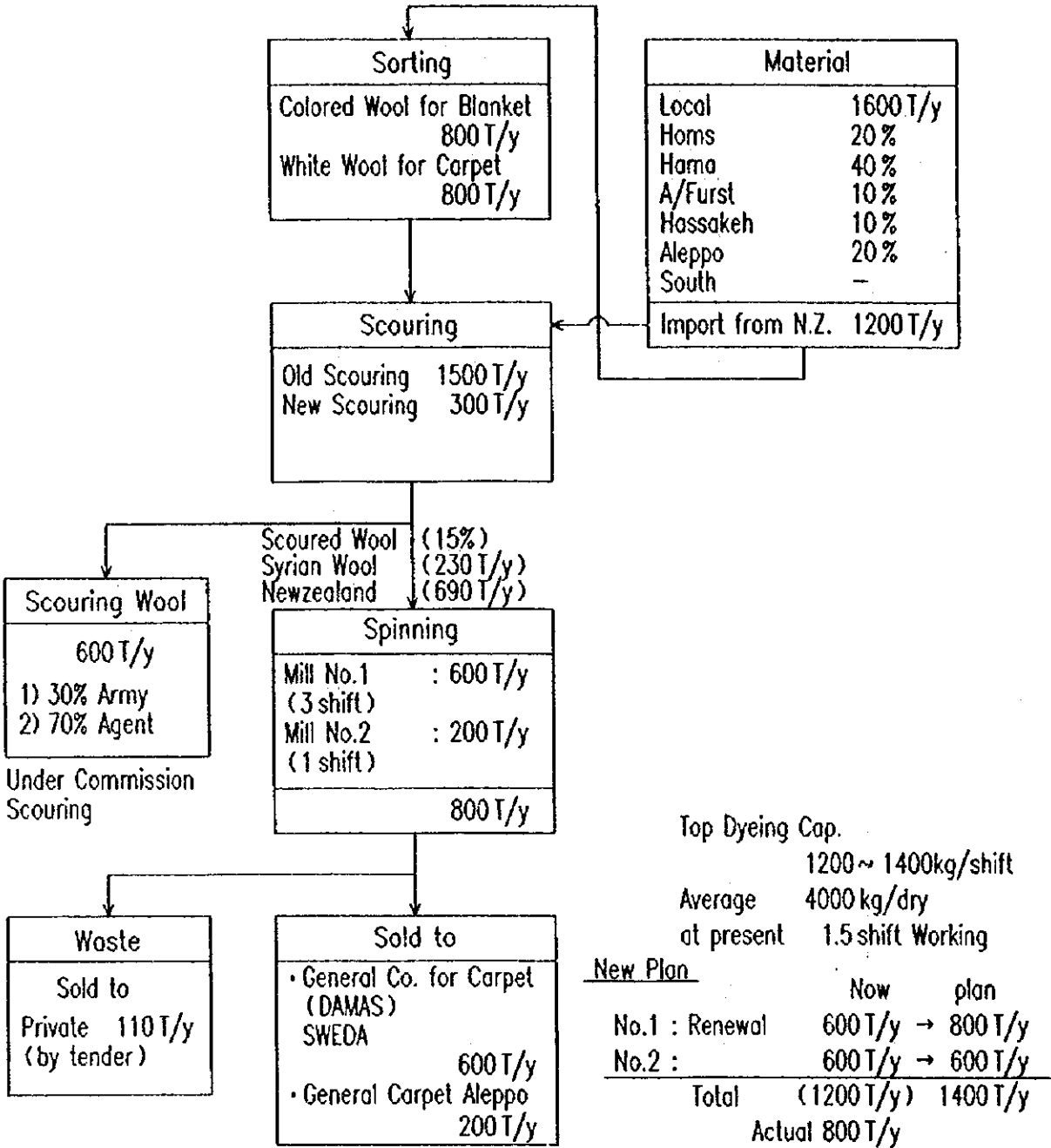


APPENDIX C-F-2
 General Company for Wool (HAMA)
 Factory Layout (Existing)



APPENDIX C-F-3

(I) PRODUCTION DIAGRAM SALE'S HAMA WOOL



(II) STOCK OF PRODUCTS

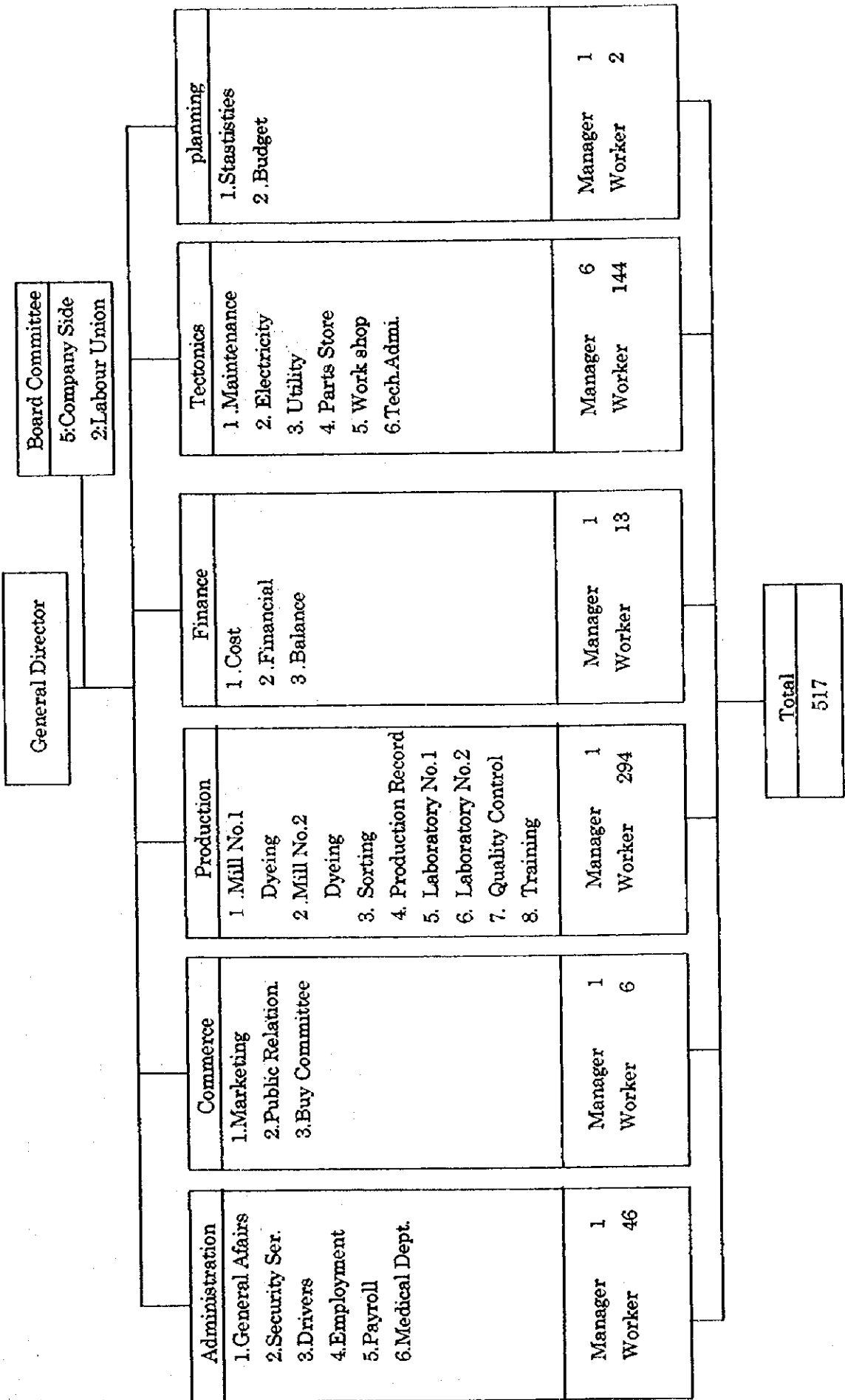
	Greasy Wool	Scoued Wool	Yarn	Waste
Quantity	Syrian 500T		100T	
Estiwate Value	30M sp (670k US\$)		31.6M sp	
Remarks			Due to Quality Probrem	

Shearing Term April ~ May
Greasy Wool 60 sp/kg

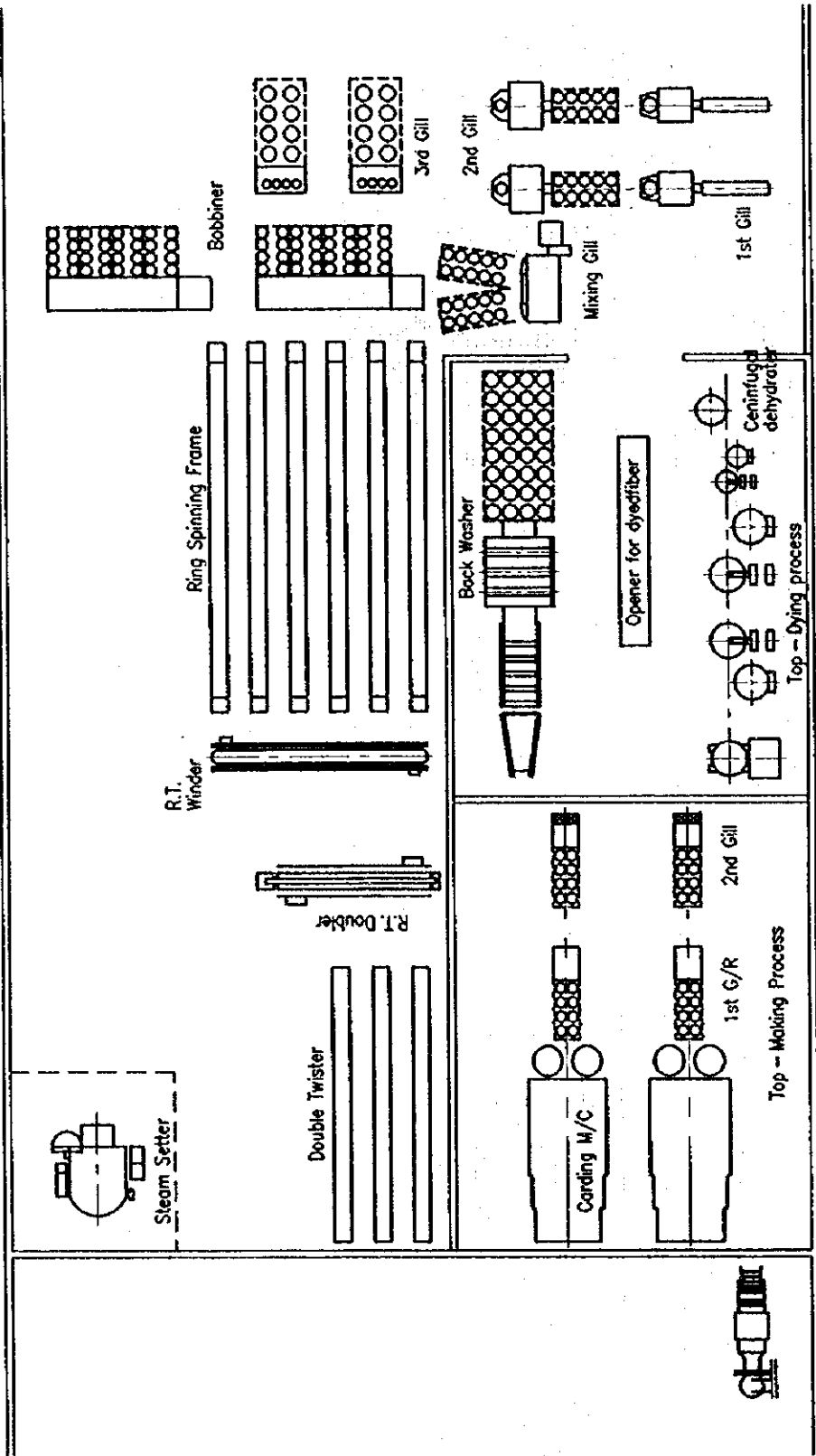
Dyed Yarn 325 sp/kg 80%
Raw Yarn 290 sp/kg 20%

Note : (Combed Yarn 367 sp)

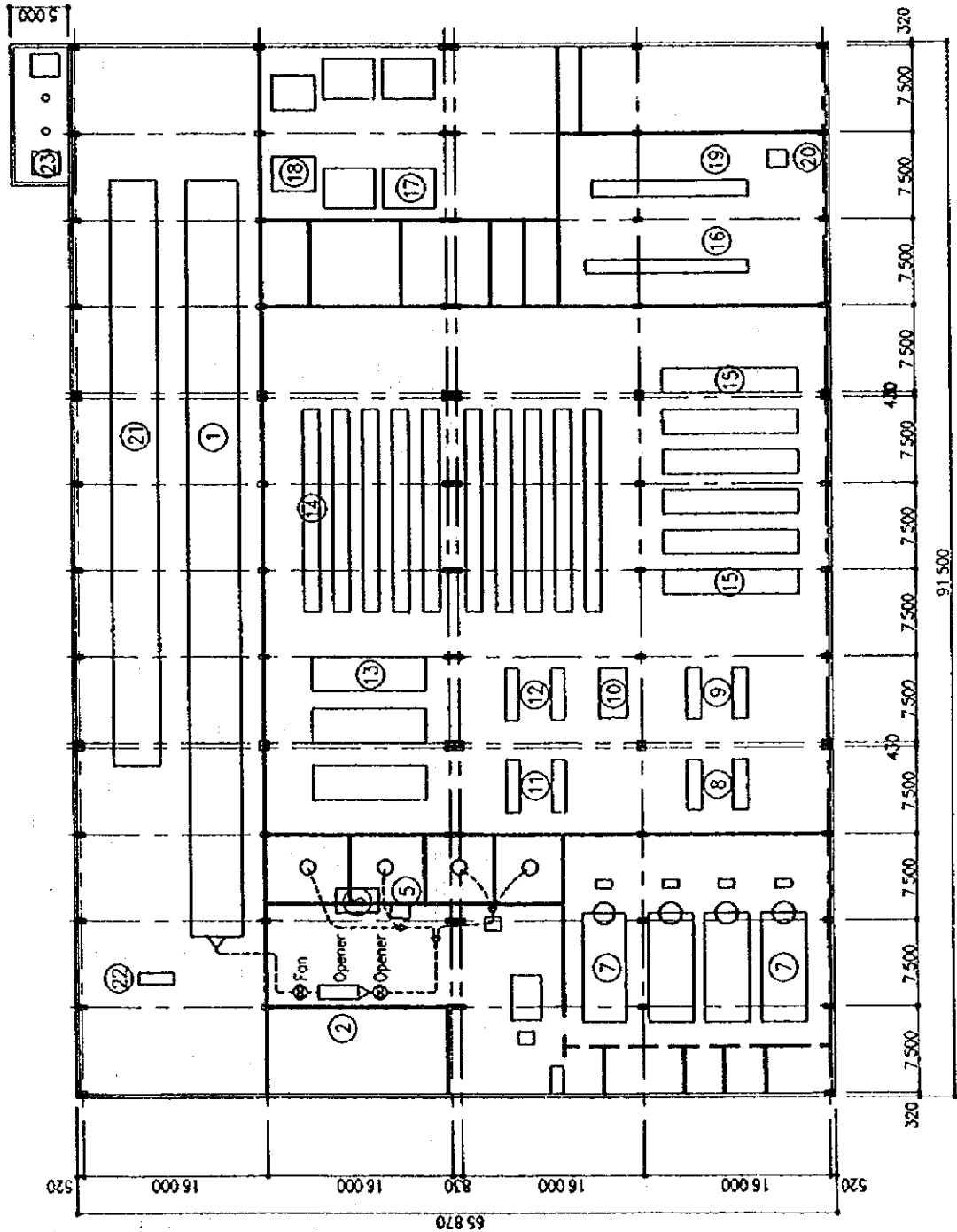
APPENDIX C-F-4 Organization of HAMA Wool



APPENDIX C-F-5
 General Company for Wool (HAMA)
 Factory No.1 Layout (Existing)

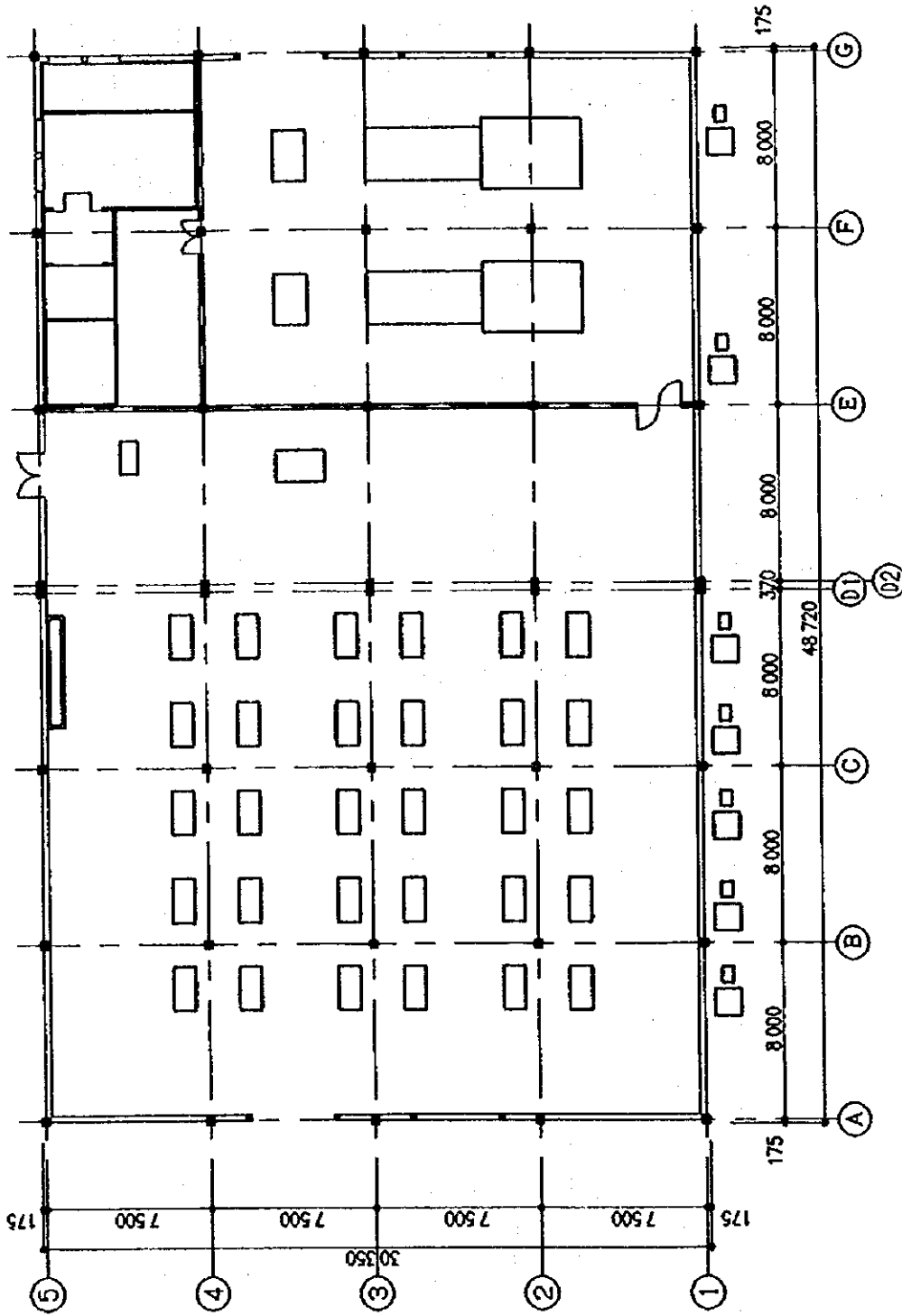


APPENDIX C-F-6
 General Company for Wool (HAMA)
 Factory No.2 Layout

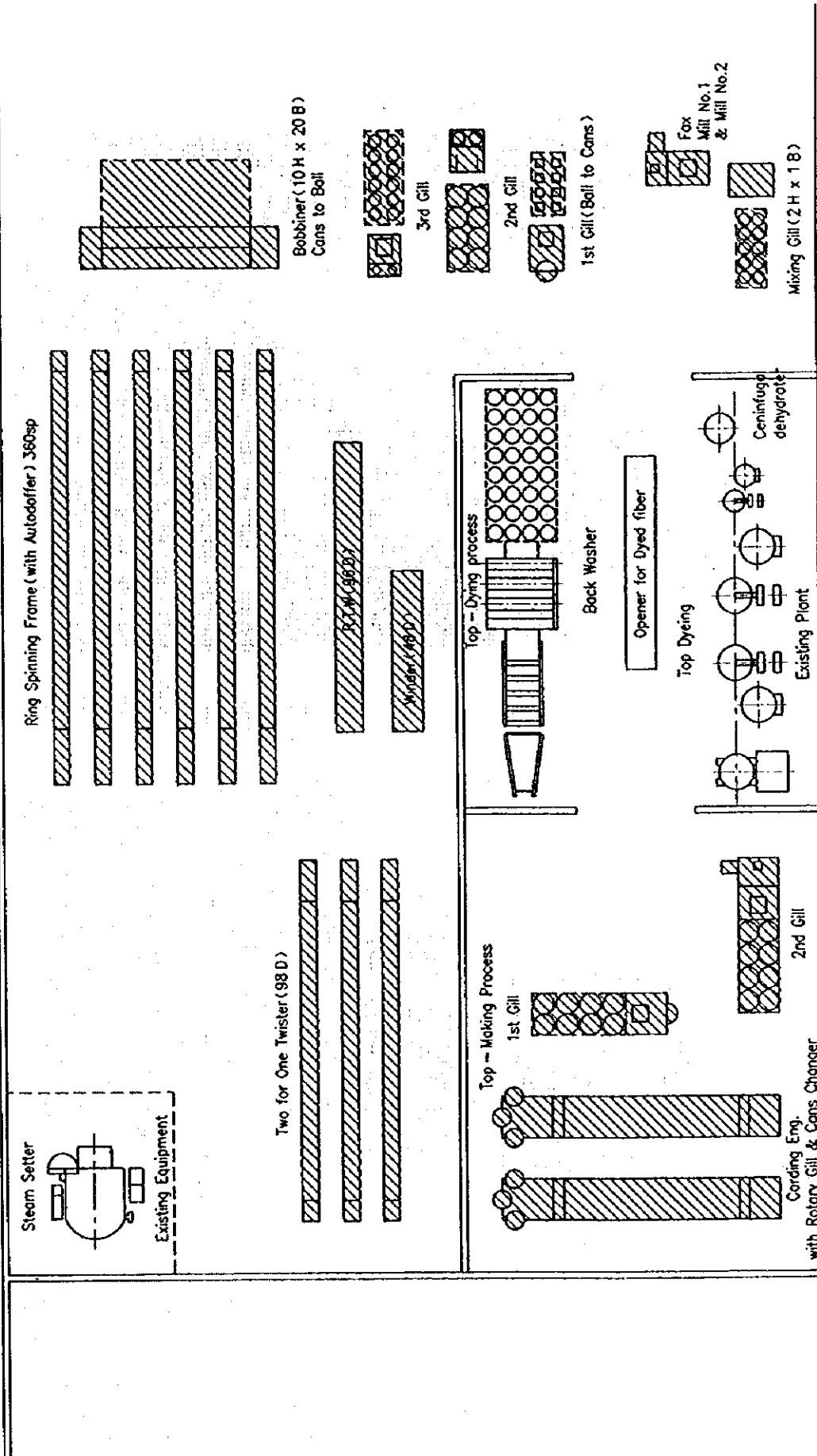


No.	Name of Machine	No. of M/C
①	Scouring M/C (M/C Naught Type)	1
②	Packing M/C	1
③	Opener	1
④	Blender	1
⑤		3
⑥	Oiling Device	1
⑦	Carding Engine	4
⑧	1st Gill (For Top)	2
⑨	2nd Gill (For Top)	2
⑩	Mixing Gill	1
⑪	3rd Gill (Mixer)	2
⑫	4th Gill	2
⑬	Bobbiner	3
⑭	Ring Spinning Frame (3ply on Creel)	10
⑮	Ring Twisting Frame (For Yarn Dye)	6
⑯	Winding M/C (R.T.W)	1
⑰	Yarn Dyeing Bath	4
⑱	Dyer	2
⑲	Ro-Winding M/C (R.T.W)	1
⑳	Pressing M/C	1
㉑	Scouring M/C	1
㉒	Packing M/C	1
㉓		2

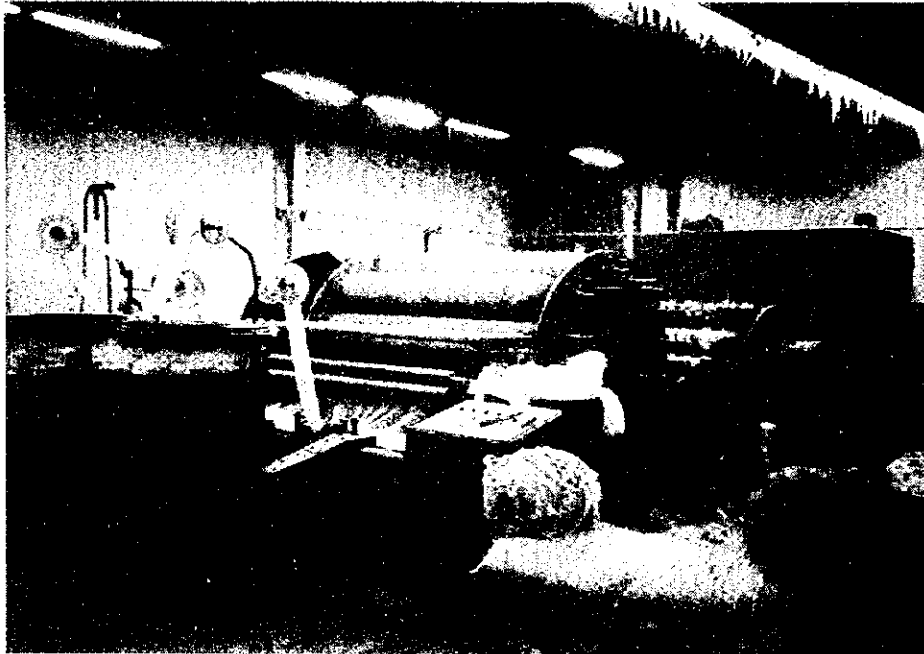
APPENDIX C-F-7
 General Company for Wool (HAMA)
 Sorting Room Layout (Existing)



APPENDIX C-F-8
 General Co. for Wool (HAMA) Mill No.1
 Factory Layout (modernization Plan)



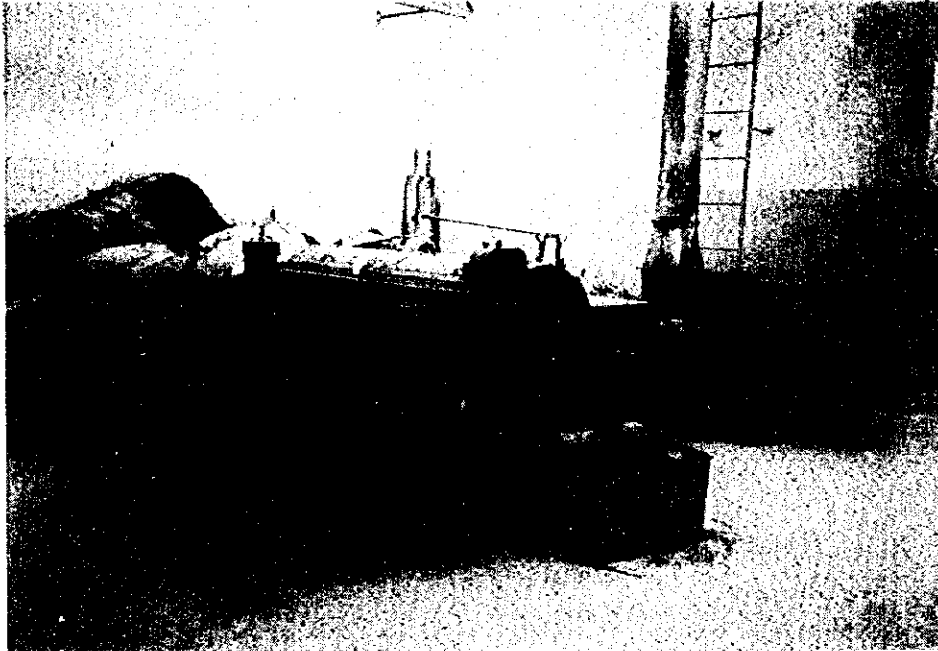
APPENDIX C-P-1 CARDING SHORTFALLING MANY COMPONENTS



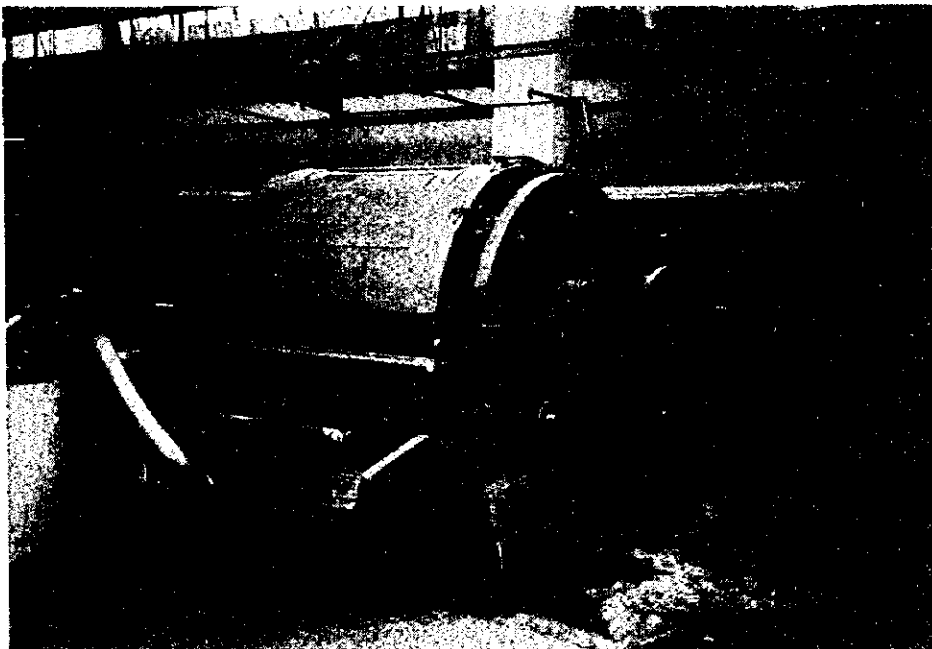
APPENDIX C-P-2 GILLING M/C SHORTFALLING MANY COMPONENTS



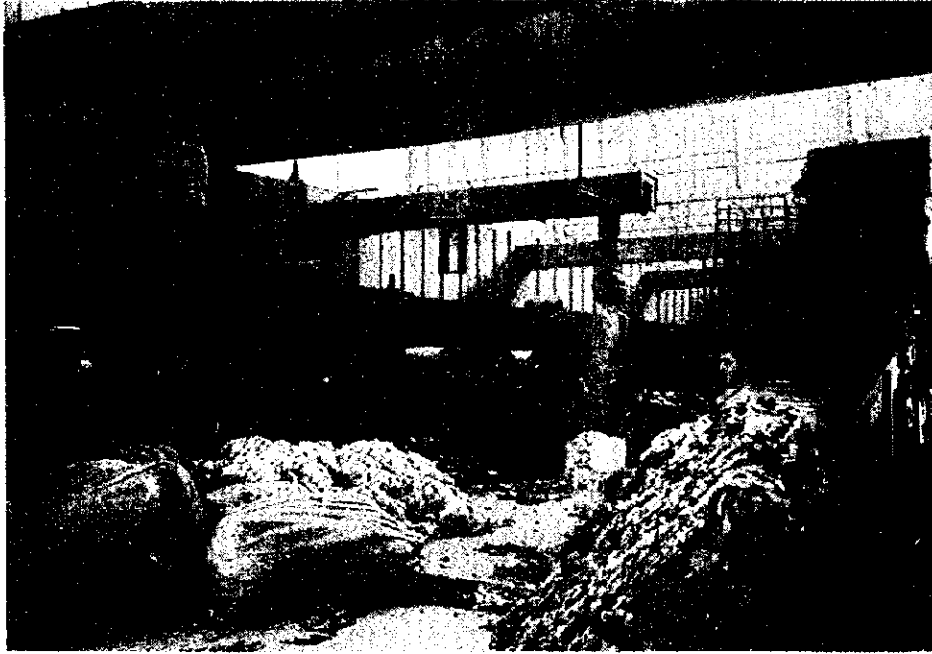
APPENDIX C-P-3 VERY POOR CONDITION OF SCOURED WOOL OPENER



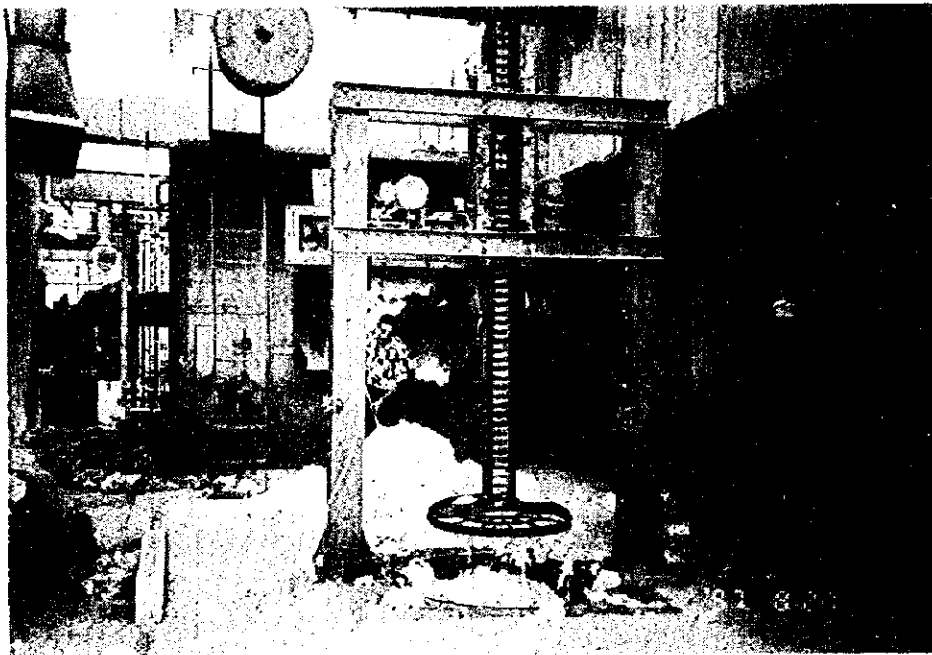
APPENDIX C-P-4 CARDING M/C, VERY POOR FUNCTION TO REMOVE DUST



APPENDIX C-P-5 SCOURED WOOL PACKED IN SACKS



APPENDIX C-P-6 PACKING M/C FOR SCOURED WOOL



Industrial Company for Ready Made Garment

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TECHNICAL DIAGNOSIS FOR INDUSTRIAL COMPANY FOR READY MADE GARMENT

Date : 27 Aug~4 Sep. 1997

Person in Charge : Arnold Haworth

1. Present Situation of the Company

1.1 Location

The Industrial Company for Ready-made Garment is located 15 km north of the center of Aleppo.

1.2 Outline of the Company

(1) General items

The company was built in order that the two factories would supply a limited range of standard type garments to Government Ministries and other Government Agencies. But, training of the work had barely reached a proficient level, when demand for the company's products started to fall away. Since the closure of the women's wear factory in 1996, demand for the company's products has further fallen away and low skill products such as sugar bags production added to the production program. It is now making flour bags alongside expensive wool/polyester suitings.

The factory throughout its existence has never achieved more than 60 per cent of its potential, sinking to 50 per cent in 1996 and now aimed at 39 per cent.

The factory is built to withstand earthquake in accordance with the plans drawn up by Nippon Iryo Co., Ltd., Japan, who was responsible for the layout, equipment and basic training.

(2) Building site

The site is comprised two garment making factories for men's wear and women's wear, putting up the administrative zone in the center. But, the garment factory for women was closed in January 1996 because it was loosing heavily.

(3) Raw material

The principal raw materials used are : polyester/wool, polyester/viscose and polyester/cotton fabrics bought from Syrian importers. Substantial quantities of locally woven cotton cloth ex. Lattakia Weaving is used on a CMT (cutting, making and trimming) basis.

(4) Product

The company mainly produces men's suits, jackets, trousers, safari suits, shirts, uniforms for school and other boys wears, driver's suits, etc.. Due to shortage of orders, a CMT program exists making sugar bags and flour bags from large quantities of badly woven cotton cloth. This program is for Lattakia Weaving. Some other CMT work is also undertaken making garments for private sector companies.

(5) Sales and stocks

The government is expected to place orders for its products. However, its quantity has been decreasing year by year. This fact suggests that the company needs a proper marketing strategy and plan. Opting for flour bag production is not a solution.

Stocks based on company costs currently amount to SP80 million. If based on the company's estimate of selling price, the value is SP85 million. If, based on a company assessment taking into account the need to revalue old stock, the value is SP72 million.

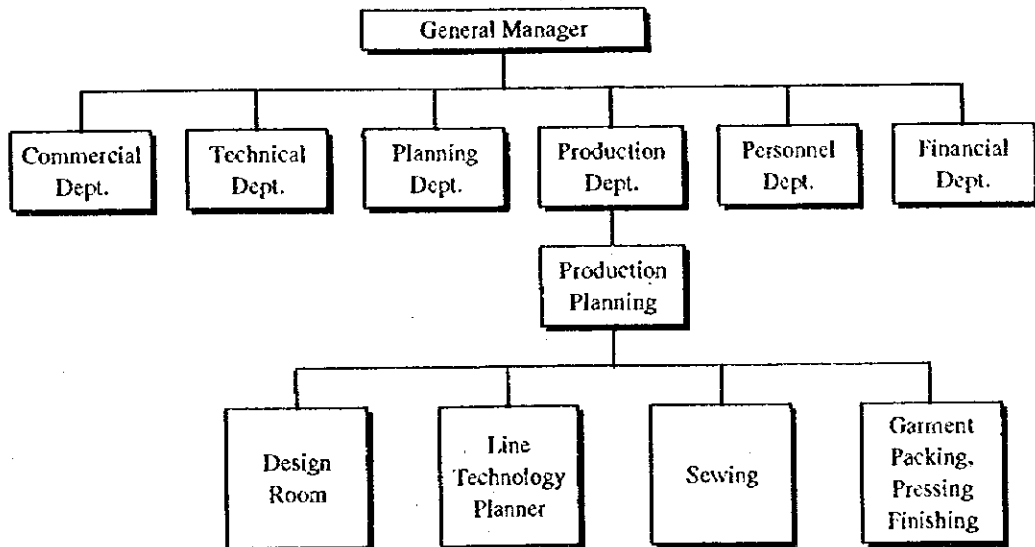
(6) Production plan and result

The most recent plan which has been submitted to GOTI is based on 39% of activity and listed as follows :

Items	Pcs	Raw Material
Jackets	17,845	polyester/wool, polyester/rayon
Trousers	71,594	polyester/wool, polyester/rayon
Safari jackets	35,786	polyester/cotton
Uniform jackets	52,486	cotton
Uniform trousers	62,983	cotton
Safari trousers	65,608	polyester/cotton
School uniforms	23,857	cotton, polyester/cotton
Shirts	32,804	polyester/cotton, polyester/rayon
School smocks	74,980	cotton, polyester 100%
Trousers - CMT	63,733	
Ladies dresses - CMT	59,484	
Bed covers	131,215	
Total	(692,375)	
Sugar bags	3,570,483	
Flour bags	3,570,483	
Other bags	3,570,483	

(7) Organization and manpower

The organization of the company is as follows :



Currently the company employs a total of 752 persons (438 male, 314 female). Included are 3 economists and 5 engineers and 67 secondary school qualifications.

Management staff	85	Guards	17
Drivers	14	Cleaners	5
Stores	8	Auxiliary workers	4
Nursery staff	6	Shop keepers	7
Gardeners	4	Mechanic's shop	35
Production workers	387	Indirect workers	180
Total		752	

(117 handicapped are included.)

Average age : <u>18~30</u>	<u>30~45</u>	<u>45~60</u> years
42%	40%	18%

(8) Production equipment

The machines for men's wear factory introduced in 1977 is listed in Appendix D-T-1. Though some machines were added thereafter (e.g.: Thermal bonding machine in 1997), the machines are generally old and help in making quality problems.

2. Present Situation and Problems of Production Management

2.1 Procurement Control

(1) Raw material

Raw materials (fabric) are procured by the tender system from the private sector suppliers. Fabric from the public sector does not require tenders but the cloth qualities are often unacceptable. There are restrictions on fabric procurement caused by the tendering system which has many adverse effects on garment quality, production and costs, because ;

- It takes long, long time from the preparation of tender to the acquisition of raw materials. Under such a situation, it is difficult to do "quick response", an essential action to respond to the requirement of garment markets.
- The delay of acquisition of raw materials is apt to lead to the loss of selling timing of products, which eventually go to the stock.

- Raw materials of higher prices or lower qualities are offered because bidders try to secure their profits.

The dispatch of products requires a lengthy time because of raw material procurement procedure linked to the tender and causes a serious disadvantage on sales of Industrial Company as follows. A customer's order when received is passed to the order room. All details are written down and submitted to the General Manager who passes the order to the Design Room where a one piece sample is made and submitted to the customer for his approval. In due course the sample is returned to the Design Room with the customer's approval. The Design Room analyze the model and specify - the fabric required - the trimmings required - the interlining required. The quantities are specified and the order submitted to the store. The stores indicate the availability of what they have and specify what they do not have. A request for the missing items is then prepared and a tender request prepared. Supplies of the required item may be offered. In the meantime the order is held up.

(2) Spare parts

There is no shortage of machinery spare parts and this is not an issue.

2.2 Inventory Control

There is not serious issue.

2.3 Process Control

- ① Technique to balance the production lines and ensure a smooth continuing flow of work was not trained nor transferred to the staff. The lines today are still as they were in 1978.
- ② There is no consensus between departments at what is a realistic time for an operation. So, the time allowed on the basis of the time taken to make a garment is excessively long, leading to much cost.
- ③ GOTI's system which has superseded Nippon Iryo's production system has more to do with the setting Bonus payment levels than with running an efficient production unit in a competitive market situation.

- ④ Space of sewing department narrower than finishing department makes difficult to arrange the deposit of midway products.
- ⑤ Illumination at hand for operators is not sufficient due to high position of lighting.

2.4 Equipment Control

- ① Equipment control is now in difficult situation due to worn out sewing machines introduced in the era of company foundation.
- ② But, sewing machines are in general well maintained
- ③ The existing machines are appropriate for the small batch production in these days.

2.5 Quality Control

- ① Quality control as understood in most garment making factories today does not exist.
- ② There is no real quality awareness in all levels of personnel.
- ③ Quality of men's wear is generally good. Label and shoulder pat are well finished and no puckering observed. But, tough and harsh handling of used fabric makes rigid the silhouette after sewn.
- ④ One hundred sheet of fabric is being cut at a time by the cutting machine. This may bring about slip of each sheet.
- ⑤ Current practice of pattern marking is producing much waste of fabric.
- ⑥ Handling of fabric after thermally bonded with linings is tough and harsh.
- ⑦ The company does not possess a testing laboratory in which to make tests on either cloth brought or garments made.
- ⑧ No shrinkage tests are undertaken.
- ⑨ Cloth is purchased without setting tight shrinkage specifications.

2.6 Education and Training

- ① Not only in this company but in all those under GOTT's jurisdiction, few employees are self-motivated in increasing productivity and reducing the associated cost and problems.
- ② Weakness of the skill base. It is said that in the Company less than 100 of the 752 employees are considered to have the basic skills needed.

3. Modernization Plan

3.1 Modernization of Production Management

The company is characterized as a low technology high labor intensive operation. It needs to be freed from some of its constraints in sourcing fabric and carrying excess labor. It needs to upgrade its technology and develop marketing strategies. It needs its design and technical staff to be exposed to modern systems and the outside world.

(1) Procurement Control

As stated in 2.1 1), the current procurement system by tender is causing many constraints to the Company at trying to get good quality raw material of reasonable price in quick delivery. Some countermeasures such as amendment of law, etc. are expected.

(2) Process control

- ① Lead time of the product in the company is said too long and that there is no consensus between different production departments at what is a realistic time for an operation. It is suggested to make again time study about each department (process) and re-establish a "lead time" for each item. The lead time is decided by summing each standard schedule of every process involved in the production of one item. To shorten the lead time of items is important for quick delivery of orders.
- ② Re-arrangement of areas of each department taking into account of spaces required for machine setting, workers' operating and deposit of raw materials and half-finished and finished products.
- ③ Appropriate illumination for comfortable working atmosphere should be considered.

(3) Quality control

- ① It is necessary to implant awareness of "quality first" to all levels of personnel. It is also important to make them understand that quality control aims to ensure conformity to specification with minimum cost.

- ② Main cause of rigid handling of men's suit after sewn is the quality of fabric domestically supplied. It is necessary to feedback the defective handling of fabric to the State-owned suppliers for improvement. Also, introduction of design creating technology capable of providing silhouette-led sewing design.
- ③ The number of sheet of fabric piled for cutting is appropriate to be about 50.
- ④ The present pattern marking is being carried out from the safety side, raising the wastage ratio. This practice should be revised and an efficient yield of cloth to be used should be always borne in mind. In the future, the introduction of a computer controlled pattern marking system should be considered.
- ⑤ The factory should be equipped with a testing laboratory.
- ⑥ To oblige the supplier of fabric to strictly abide by the specifications of shrinkage and other cloth properties indicated by the company.

(4) Education and training

- ① To reassess the content of the training at operative, supervisory and management levels and to create new curricula aiming at high level of self efficacy skills such as communication, problem solving and planning.
- ② To improve access to skills, qualifications and career progression within the company through the design and implementation of an integrated structure for continuing education and training.
- ③ To raise the skill level of employees throughout the company by introducing a training structure designed to encourage continuous learning. This should take place both through flexible college based routes and by making the work place itself into a site of learning.

3.2 Modernization of Production Process

- ① It is necessary to carry out testing and inspection of all incoming raw material and midway and finished products. The company does not possess a testing laboratory to make tests on either cloth brought or garments made. Lack of such laboratory is fatal, if the products are sold to the international market.
- ② Sewing machines supplied in 1977 by Nippon Iryo are already old and quality faults on the finished garments originated by machine troubles are observed. Some machines are shaky and vibrating at operating. Renewal is necessary.

For the time being, the renewal shall be set about from the machines for sewing the items of more demand.

- ③ Many of garment manufacturers have adopted CAD/CAM system to accelerate the speed of patter making and grading. It is recommended to install this system, as it is indispensable to respond to the requirement of quick delivery for garment transaction.

3.3 Modernization of Production Equipment

The following is suggested, in accordance with the 3.2.

3.3.1 Introduction of Laboratory Equipment

(1) Equipment introduced

- ① Cloth unfolding machine, Cloth opening machine, Cloth aging space, Cloth inspecting machine
- ② Sponging equipment (Steam setter, Steam dryer, Decatizer, etc.)
- ③ Physical testing equipment
Fastness tester (light, perspiration, rubbing, washing, bleaching, etc.), Steam & wet shrinkage tester, Strength and tearing tester

(2) Roughly estimated investment cost

250,000 dollars

3.3.2 Modernization of Sewing Machines

The company is now producing various items. Partial replacement of the existing sewing machines envisages the introduction of new equipment for working wear formation section.

(1) Design conditions

- ① Products : Working wear (Appendix D-F-1)
- ② Production quantity per year : 420,000 pcs
- ③ Production quantity per shift : 1,500 pcs
- ④ Working days : 284 days/year
- ⑤ Working shift : 1 shift/day
- ⑥ Production line : Sewing 1 line, Finishing 1 line

(2) Machinery and specifications

Machines 116, Auxiliary equipment 1 lot, Ironing equipment, Sewing testing equipment and defects repairing equipment (Mannequin, Mannequin with a built-in light, Metal detector, Repairing device with spray, aspirator and thinner, Dry cleaning apparatus, Liner coming off tester, etc.) 1 lot
Please see Appendix D-T-2.

(3) Useful information

1) Production flow chart

Please see Appendix D-F-2.

2) Manpower allocated

Sewing	116 persons/line
Finishing	12 persons/line
Total	128 persons/line

3) Standard time for formation by 1 operator

Sewing	37.21 minutes for 1 piece
Finishing	3.69 minutes for 1 piece
Total lead time	40.90 minutes for 1 piece

4) Capacity of 1 operator

12.93 pieces per day

5) Utility consumption

Consumption of power	125 KWH
Installed capacity of power	400~500KW
Consumption of compressed air	1 N · m ³ /min.

6) Required floor space

900 m²

(4) Layout

Please see Appendix D-F-3.

(5) Estimated investment cost

875,000 dollars

3.3.3 Introduction of CAD/CAM System

(1) Equipment to be introduced

- | | |
|-------------------------------|---|
| ① Pattern Digitizer | 1 |
| ② CAD System | 1 |
| ③ Plotter | 2 |
| ④ CAM System with Auto Cutter | 1 |

Refer to Appendix D-F-4.

(2) Estimated investment cost

300,000 dollars