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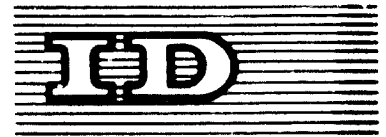
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STUDY AND COMPARISON OF
AUTOMATED VERSUS CONVENTIONAL
SYSTEMS OF MODERN SPINNING PLANT
WITH SPECIAL REFERENCE TO
OPEN-END SPINNING SYSTEM ^{1/}

by

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"Summary"

On April 30, 1970, an enquiry was sent to some of the leading manufacturers in Spinning machinery to quote for a Spinning Plant of about 30,000 spindles based on both :-

- (a) The Automated system
- (b) The Conventional system

with most up-to-date machine constructions to deal with middle staple cotton 26/34 mm. and to produce av. count No. 24's singles carded yarn with 3.4 twist factor. They were also requested to give power consumption for both systems together with the number of labour and overlookers necessary to run the Spinning Plant on both systems and based on their average skilled workers. Also a spin plan for each system with production based on 24 hours of 3 shifts daily.

The complete plant consisting of :-

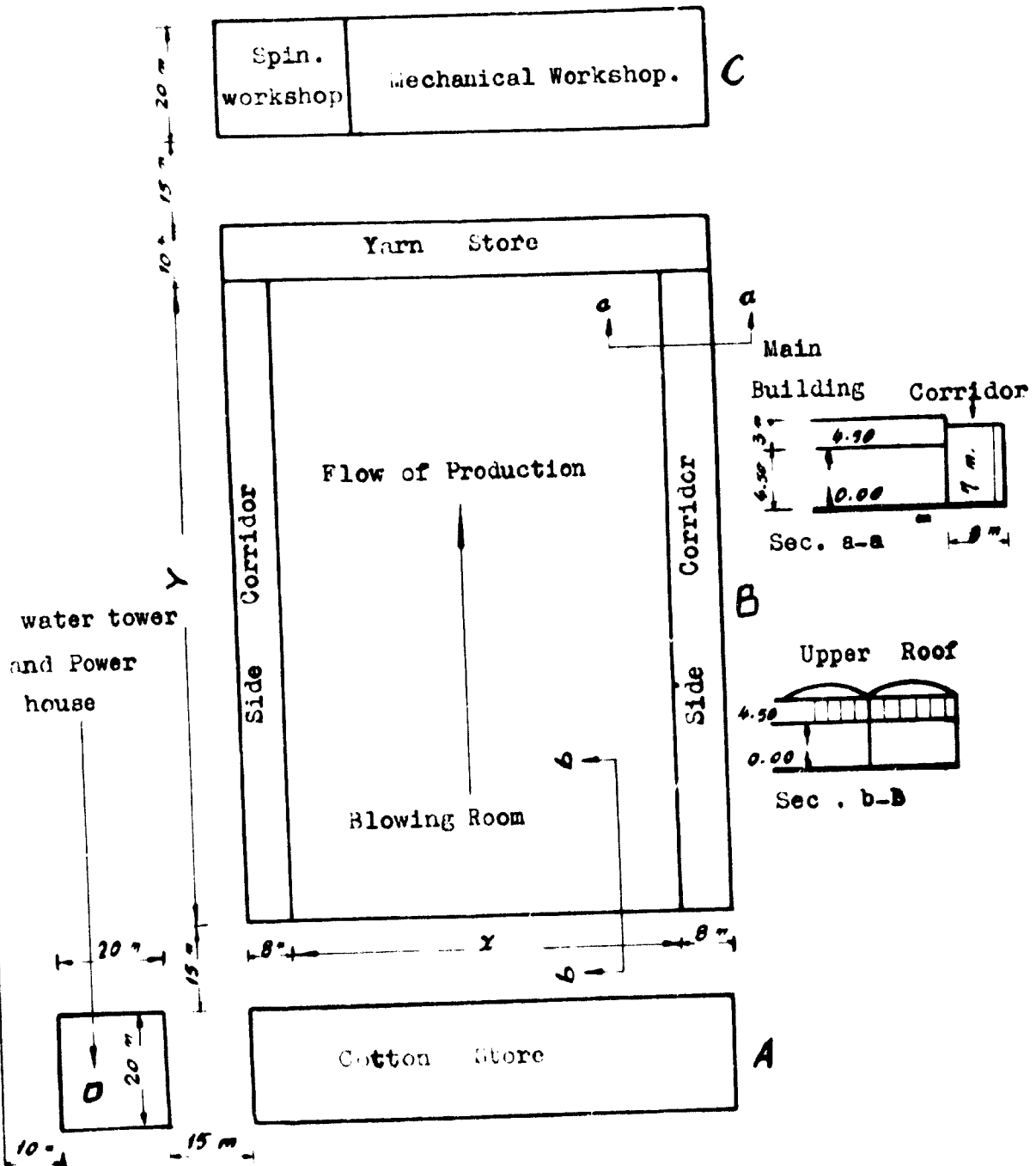
- 1) Spinning Machinery :
 - and - necessary spinning workshops
 - necessary spinning accessories such as cans, bobbins etc.
 - necessary testing laboratory
- 2) Power Supply Installation
 - and - Illumination
- 3) Air conditioning Installation
- 4) Sprinklers and Hydrants Installation
- 5) Transport Equipments. (Internal)
- 6) Mechanical and Electrical Workshops.

The building will be of the closed type, widowless double roof arch type.

TYPE OF BUILDING :

Closed Type Double Roof Arch Type.

Pre-Stressed Concrete.



Note : Side Corridors Would Contain :

- a - Air Conditioning Stations.
- b - Electric Substations.
- c - Maintenance rooms.
- d - Quality Control Lab .
- e - Services.

Offers were received from the following manufacturers :-

- 1) Messrs Platt Bros (England)
For item (1) Spinning machinery only complete and based on both systems but not including winding machines.
Power Consumption, labour required and spin plans for both systems were given.
- 2) Messrs Ingolstadt (Fed. Germany)
For item (1) Spinning machinery only and based on :
 - a) Automated system
 - b) Partially automated system
 - c) Conventional systemPower consumption, labour required and spin plans for the 3 systems were given. Not including winding machines.
- 3) Messrs
 - 1) Truttschler: (Fed. Germany)
for Blow Room Machinery and cards.
 - 2) Zinser:
for Draw Frames, Speeds and Ring Frames
 - 3) Schlafhorst:
for Automatic Winding Machines
- 4) Messrs Tayoda : (Japan)
for item (1) Spinning Machinery only and on the Conventional system only.
- 5) Messrs Investa : (Czecho-slovakia)
for Draw Frames and Open-End-Spinning machines and recommending.

Truttschlers: Blow Room machinery and cards.

Technical Specifications offered by manufacturers

Messrs Platt Bros.

Item	Automated	Conventional
<p>1- Blow Room</p>	<p>2- Lines of openers with 1- scatcher parts and Feed Chute</p> <p>each line consists of :- 1- Multi Bale Opener 1- Waste Hopper Feeder 30" wide 1- Feeder Blender, 1- Tufta blender 1- Single Gighton O., 1- Deliv. wh. 1- Beater parts 41" wide</p> <p>1- Trunk Feed arrangements 1- Type 540 Mark 2 airstream Cl. with super Jet unit & Beater 1- Two-way Dist., 1- Control panel 2- Pneu. Deliv. wh., 2- H.F 2- Beater parts. 1- Rotary Filter Station 2- Chute Feed systems</p> <p>2- Control Panels 2- Sets of Fire protection Equipment</p>	<p>2- Lines of openers with 1- scatchers and lap Forming</p> <p>each line consists of :- 3- H. Bale Openers 30" wide 1- Waste Hopper Feeder 1- Fan & Conveyor Belt 32" 1- Bye-pass valves for conveyor 1- Ultra cleaner with bye-pass 1- Two-way valve, 1- porc. Op 1- Two-way valve, 1- Deliv wh. 1- Ultra Cleaner 1- Airstream Cl. with super-Jet unit & Beater part 1- Two-way Dist., 1- Deliv. wh. 2- H.F, 2- Single Scatchers 2- Pneum. lap Doffer & lap Roller Extraction 2- Sets of lap Rods (120 per set) 1- Air Compressor 1- Control Panel 1- Rotary Filter Stations</p>
<p>2- Carding</p>	<p>32- High production cards prepared for Chute Feed 40" wide 36"x 42" high Air system for cleaning</p> <p>5- Hand cleaning Hose Assembly 8- Portable Brush Assem.</p> <p>- Waste separator & Filter Stations: 2 to serve 10 cards 1 for 12 cards</p> <p>- Card Grinding Access. - Wire Mounting & Grinding Equipment</p>	<p>32- High prod. cards lap Feed 40" wide, coiler for cans 36"x 42" high. Air system for cleaning</p> <p>5- Hand Cleaning Hose Assembly. 8- Portable Brush Assem.</p> <p>- Waste Separator & Filters Stations 2 to serve 10 cards 1 for 12 cards</p> <p>- Card Grinding Access. - Wire Mounting & Grinding Equipment</p>

Item	Automated	Conventional
<p>3- Drawing: <u>1st passage</u></p> <p><u>2nd passage</u></p>	<p>6- Mercury D.F., 1- deliv. 8 ends up, creel & coiler for cans 36" x 42" high auto. indexing auto-leveller with clutch amplifier, meter amplifier</p> <p>6- Mercury D.F., 1- deliv. 8 ends up. creel for cans 36" x 40" high coiler for cans 18" x 42" high auto. can change</p> <p>18- Special Trolleys each 1/4 cans</p> <p>1- Air compressor</p>	<p>6- Globe D.F., 2- deliv. 8 ends up, gantry creel for cans 36" x 42" high coiler cans 20" x 42" high.</p> <p>6- Globe D.F., 2- deliv. 8 ends up. creel for cans 20" x 42" high coiler for cans 18" x 42" high</p> <p>6- Mobile plat forms.</p>
<p>4- Roving:</p>	<p>10- MS2 Mark 3 Speed F. each 108 spindles</p> <p>8 3/4" Gauge, 11" Lift x 64" dia</p> <p>2/3 Rolls Double apron with SKF PK 528 Arms Bradson Creel</p> <p>2- Air Compressors</p> <p>10- Sets Pneumable over head cleaners</p>	<p>10- MS2 Mark 3 Speed F. each 108 spindles</p> <p>8 1/4" Gauge, 14" Lift x 62" dia</p> <p>2/3 Rolls Double apron with SKF PK 528 Arms Bradson Creel</p> <p>2- Air Compressors</p> <p>10- Sets Pneumable over head cleaners</p>
<p>5- Spinning</p>	<p>68- Type 800 super spinner Ring Frames 444 spindles, 3" G, 9" Lift 2" Rings, 2/3 Rolls Double Ap. Casablanca Kx3 Arms Bearings to all Bottom Rolls.</p> <p>- Traveller Cleaners Blow & Vacuum</p>	<p>68- Type 800 super spinner Ring Frames 444 spindles, 3" G, 9" Lift 2" Rings, 2/3 Rolls Double Ap. Casablanca Kx3 Arms Bearings to all bottom Rolls.</p> <p>- Traveller Cleaners Blow & Vacuum</p>

Item	Automated	Conventional
- Difference in Prices	> 9 %	-
- Total H.P. Difference	2091 > 55 H.P	2036 -
- Total hO of Labour Difference in Labour	111 < 6	117 -
no of labour/1000 Sp.	1.56	1.63

Spin Plan

Production in Kgs/24hrs

1- Mesets Platt Eros

Item	Process	Count No	Ends up	Draft	Twist Factor	Speed	Efficiency %	Waste %	Practical unit prodn	Regd prodn	Regd units	Machines Proposed
1	Blowing								13100	17426	1.33	
2	Carding	0.12			-	28 Rev/m doffer	90	3	547	7405	31.0	22- Cards
3	Drawing 1st passage	0.12	8	3	-	1500 ft/m	90	1	2920	16734	5.73	6- D.F. Single deck auto leveller
	2nd passage	0.12	8	8	-	1500 ft/m	90	1	2920	16457	5.67	6- D.F. Single deck.
4	Roving	0.95	1	7.92	1.3	11.0 R/m	75	2	15.47	16236	1050	10- Sp. F. 108 SF.
5	Spinning	24.0	1	25.26	3.4	1000 R/m	93	2	0.527	15511	30192	68- Kings 444 SF.

2) Messrs Ingolstadt

Item	Automated	Partly Automated	Conventional
1- Blow Room	<p>2- Lines of Openers with Scutcher parts and Feed Chute each line consists of</p> <p>2- Blending Robots</p> <p>1- Waste Opener 2- Conveyor Belt 1- H.F., 2- Step Cl. 2- Horizontal Op. 1- Auto. Blender - Filters 1- Twp-way Dist. 1- Control Panel 2- Chute Feed Instal. 1- Filter Piping</p>	<p>2- Lines of Openers with 4-Scutcher parts and Feed Chute each line consists of</p> <p>4- Bale Breakers</p> <p>1- Conveyor Belt 2- Condensers, 2- Feed Chutes 2- Step. Cl., 2- Hal Op. 1- Filter 1- Control Panel 2- Chute Feed Instal. 1- Individual Filter Piping</p>	<p>2- Lines of Openers with 4-Scutchers and lap Forming each line consists of</p> <p>4- Bale Breakers</p> <p>1- Conveyor Belt 2- Condensers, 2- Feed Chute 2- Step Cl., 2- Hal Op. 3- Filters + 1- Two- way Dist. 1- Control Panel 2- Scutchers and lap forming. Auto. Doff. and extraction lap Tube Piping.</p>
2. Carding	<p>24- High Prodⁿ Cards Prepared for Feed Chute abt 40" wide Cans: 40" x 42" high Suction system for Cleaning - Filters: Rotary with perlin Filter hoses - Card Grinding & Strip</p>	<p>24- High Prodⁿ Cards prepared for Feed Chute Cans 40" x 42" high</p> <p>Same</p> <p>Same</p>	<p>24- High Prodⁿ Cards with Lap Feed cans 40" x 42" high</p> <p>Same</p> <p>Same</p>
3. Drawing	<p>1st passage</p> <p>8- High Speed D.F. 6 ends up, 1- deliv. feed cans 40" x 42" high 3/4 draft Rolls. Coiler Cans 40" x 42" high - Auto. levellers</p> <p>2nd passage</p> <p>8- High Speed D.F. 6 ends up, 1- deliv. feed cans 40" x 42" high 3/4 draft rolls Coiler Cans 20" x 42" high</p>	<p>8- High Speed D.F. 8 ends up, 1- deliv. feed cans 40" x 42" high 3/4 draft Rolls. Coiler Cans 40" x 42" high - Auto. levellers</p> <p>8- High Speed D.F. 6 ends up, 1- deliv. feed cans 40" x 42" high 3/4 draft rolls Coiler Cans 20" x 42" high</p>	<p>8- High Speed D.F. 8 ends up, 1- deliv. feed cans 40" x 42" high 3/4 draft Rolls. Coiler for 40" x 42" high --</p> <p>8- High Speed D.F. 8 ends up, 1- deliv. feed cans 40" x 42" high 3/4 draft rolls Coiler Cans 20" x 42" high</p>

Item	Automated	Partly Automated	Conventional
	<ul style="list-style-type: none"> - Automatic Empty can magazine - Auto. Can changing of full Cans on Trolleys 3- Shifts Indicators 	<ul style="list-style-type: none"> - - Same - Same 	<ul style="list-style-type: none"> - - Same - Same
4. Roving	<ul style="list-style-type: none"> 10- Speed Frames 88 Spindles, Gauge 260 mm. Lift 350 mm. bobbin dia 175 mm. $\frac{2}{3}$ Rolls. Double aprons 12° incl. arm PK 521 - Electric Stop Motion at feeding by Vismat - Pneumatic Stop devices 	<ul style="list-style-type: none"> Same Same Same 	<ul style="list-style-type: none"> Same Same Same
5. Spinning	<ul style="list-style-type: none"> - 68 Ring F, 444 Sp. Gauge 75 mm., Rings 45 mm dia, Lift 220 mm. Fixed spindles, adjustable. Rings Umbrella Creels $\frac{2}{3}$ Rolls Double Apron Arm SKF 220, 45° incl. Broken-end suction - Auto. top bunch & underwinding - Auto. restanting - 3 shifts indicators - Prepared for Auto. Dofting - 3 Dofto mat pairs 	<ul style="list-style-type: none"> Same Same Same Same without without 	<ul style="list-style-type: none"> Same Same Same Same without without

Item	Automated	Partly Automated	Conventional
	- 3 Transport Carts - 123 meters tracks - 1 Doftomat pair, with transport cart as reserves	without without without	without without without
- Difference in prices %	> 11.6%	> 0.85%	-
- Total H.P Difference H.P	1799.95 + 11.57	1745.74 - 41.59	1787.33 -
- Total No. of Labour	90	105	108
Difference in Labour	< 18	< 3	-
- No. of Labour/ 1000 SP.	1.0	1.17	1.2

2- Ingotstadt

"Spin Plan"

1- "Fing Spinning"
"Automated System"

Production in Kgs per 10 hrs

Item	Process	Count No	Rods up	Draft	Twist Factor	Speed	Efficiency %	Waste %	Practical unit Prodn	High Prodn	High units	Proposed Machines
1	Blowing									8750		
2	Carding	0.12	-		-		90		350	8300	23.7	24- Cards
3	Drawing 1st passage 2nd passage	0.12	6	6	-	400 m/m	50		1060	8100	7.65	8- D.F.
		0.12	6	6	-	400 m/m	50	9- D.F.				
4	Roving	0.8	1	6.65	1.20	1150	77		9.25	7950	860 SP	13- SFF. 86 SP.
5	Spinning	24	1	30	3.4	13000	90		0.264	7820	30000	64- E.F. 443 SP.

- 3) Messrs Trutaschler : Blow Room and Cards
 Messrs Zinzer : Draw Frames, Speeds and Ring Frames
 Messrs Schlafhorst : Winding machines

Item	Automated	Conventional
<p>1- Blowing</p>	<p>2- <u>Lines of Openers with</u> <u>4- Scutchers parts</u> <u>and Feed Chute</u> each line consists of :- - <u>Plucking Installation:</u> 2- Multi Bale Pluckers 2- Step Cl. 1- Waste Op., 1- Conveyor - <u>Cleaning Line :</u> 1- Condenser, 1- Feed unit 1- Double Cl. 1- Two-way Distrib. 2- Condensers, 2- Feed unit 2- Fine Op., 2- Fans - <u>and Card Feeding Install.</u> 4- Branches 2- Panel Controls 2- Bale Lifters 2- Bale Reserve Conveyors - <u>Automatic Waste Suction</u> <u>and Filter Installation</u> <u>for Blow Room</u> <u>and Card machines</u> 4000- Kgs. Zinced iron sheets</p>	<p>2- <u>Lines of Openers with</u> <u>4- Scutchers</u> <u>and Lap Forming</u> each line consists of :- - <u>Bale Opener Installation</u> 3- Bale Op. 1- Fan. 1- Waste Op., 1- Conveyor 1- Condenser, 1- Feed unit 1- Step Cl., 1- Condenser 1- Feed unit, 1- Double Cl. 1- Two-way Distributor 2- Condensers, 2- Pneum. Feeders 2- Scutchers with Lap Removal 1- Elect. Panel Control. 1- Air Compressor Also : 4- Lap Tray Filting Device 4- Lap Rod Insert Device 4- Lap Scales 4- Lap Colour Codings 4- Lap Stores 8- Transport Carriage (for Cotton Tufts (Bale Openers). - <u>Automatic Waste Suction</u> <u>and Filter Installation</u> 4000- Kgs Zinced iron sheets</p>

Item	Automated	Conventional
5- Spinning	68- Ring Frames, 440 spindles Gauge 75 mm; Ring dia 48 mm. 240 mm. lift. - Filled for Automatic Doft. spinnatmat. (individual doffing app.)	68- Ring Frames, 440 spindles Same - No.
6- Winding	- Auto. Winding machines 50 Spindles each.	- ?

"Spin Plan"

3- Messers Trutzschler
Zisser
Schlafhorst

Prodⁿ in Kgs per 24 hrs

Item	Process	Count No	Ends up	Draft	Twist Factor	Speed	Efficiency %	Waste %	Practical unit Prod ⁿ per hour	Regd prod ⁿ	Regd units	Proposed Machines
1	Blowing			(Feed Chute)								2- Lines 4- Scutcher parts
2	Carding	0.12						3		15000		32- Cards
3	Drawing 1st passage	0.12	6	6	-	260 m/m	95	1	72.60 kg	14800	4.17	5- D.F. 2- delivs.
4	Roving	1.0	1	8.34	1.17	1080 R/min	75	2	624 g ^m	14450	960	10-SP.F. 96 SP.
6	Winging	24/1	1	-	-		85					mks 50 SP.

5- Messrs Investa

(Open-End- Spinning System)

Item	Automated	Conventional
I- Blowing	Recommending Trutzschler's	--
II Carding	Recommending Trutzschler's	
III Drawing <u>1st passage</u> <u>2nd passage</u>	5- D.F. 2-delivs 8 ends up. speed 450 m/min $\frac{3}{4}$ Rolls drafting Coiler Cans 20" x 42" high - Automatic Can change 9- D.F., 2- delivs 6ends up, speed 300 m/min $\frac{3}{4}$ Rolls drafting Coiler Cans 9" x 36" high - Automatic Can change	
IV, V, VI. Spinning	50- machines, 200 Spindles Speed 40,000 R/M.	
Total H.P.	1365.9 HP.	

Item	Process	Count No	Count No	Ends up	Draft	Twist Factor	Speed	Efficiency %	Waste	Practical unit Prodn	Regd Prodn	Regd units m/c	Proposed Machines
I	Blowing												
					R e c o m m e n d i n g Tritschler's								
II	Carding	0.21	0.126	-				90	5.0	825.6	25000	30.3	2- Lines 4- Butcher parts 32- Cards
III	Drawing 1st passage	0.22	0.132	3	8.36		450 m/min	90	0.6	5280	24800	4.7	5- D.F. 2- delivs
	2nd passage	0.28	0.168	6	7.64		300 m/min	90	0.6	2779.2	24600	8.85	9- D.F. 2- delivs
IV	Spinning	20	12	1									
V		34	20		71.4	)	40,000	92	1.5	813.6		)	50- machines
VI		41	24		121.3	)	R/min	93	1.5	429.6		)	200 Spl.
		51	30		146.4	)		94	1.5	300.0	15000)	
		29	17.4		182.1	)		95	1.5	206.4)	
	av.					)				484.8	24220)	

Comments on Offers :-

Judging by the offers made by the different manufacturers, with the exception of Investa Co. of Czechoslovakia who offered the "Open-End Spinning Machines", it was noted that there is no fundamental change in the machinery whether in using :-

- a) Automated System
- or b) The Conventional System

In connection with the Blow room machinery, Bale Pluckers can be used instead of the ordinary Bale Breakers. Also the automatic feeding of the carding engines, by Feed Chute, can be used in place of laps produced from lap Forming machines and the manual transportation of Laps on to the carding engines.

In some instances the method of using the ordinary Bale Breakers with automatic feeding of cards may be more suitable especially if the bales are not highly pressed.

Previously, a prevailing theory of the automated system was to provide automatic sequencing of machine units and handling of stock from the opening section to the finisher drawing section.

Another method was to connect automatically all machines up to the first draw frames. The latter fitted with automatic levelling apparatuses. Only one line of draw frames would be used but the speed frames would be fed by double cans to improve the regularity.

Recently with the extremely high productivity of the card engines and by using very big cans for the cards 36" - 40" dia. x 42", 45" and 48" high, it has been possible to do without automatically combining carding processes with drawing processes, since by using big cans in carding the work load of the labour is considerably reduced.

Also in drawing it was found that there is no need to combine automatically the first drawing frame with the finisher frame since it is also possible to use similarly big cans up to approximately 36" dia. x 42" or more in height in the first draw frame.

In the finisher drawing automatic can changing unit could be used as we are limited to produce relatively smaller dia. cans for the creel of the speed frames.

As for speed frames and ring frames, it is evident that there is no difference between the two systems except that automatic doffing apparatuses for the ring frames can be used. This could be done either individually (ie) one set of doffing apparatus per one ring machine or sets each serving a group of ring frames.

Concerning winding machines, it is advantageous, specially for those countries where labour tenters standards are not very high, to use the automatic winding machines in order to avoid faulty and hidden defects in the produced packages.

It is worth noting that the different manufacturers were not in a position, at this stage, to offer any other machines other than their own ie spinning machinery only.

To complete the project, for the sake of comparison, prices for the other items (ie (2), (3), (4), (5), and (6) were assumed, based and adapted on prices already received for a newly constructed spinning mill erected recently in Egypt.

In this paper, however, comparisons of the different machines by the different manufacturers with respect to specifications and prices will be omitted.

To construct the project, machines were chosen from one or the other manufacturer according to suitability and prices were estimated within the range of the manufacturer's offers.

Since there are no fundamental differences between the automated and conventional systems, discussions and comparisons will be limited to :-

- 1- Spinning Plant with Ring Spinning System versus.
- 2- Spinning Plant with Ringless Spinning System
ie (Open-End Spinning).

Choice of Machinery

Spinning Plant with

1) "Ring Spinning system".

Item	Machines	Price £ F&I. Automated
I	<p><u>Blow Room :-</u></p> <p>2- Cotton Blow Room Installations each consisting of :-</p> <p>a) 2- Multi Bale Pluckers + 1- Waste Opener & Picking + Opening machinery + 1- Two way Distribution + 2- Scutcher Parts</p> <p>and</p> <p>4- Card Feeding Installation with controls</p> <p>- 4000 Kg Zinced Iron Sheets for manufacturing of P.Pe Lines</p> <p>- 2 Bale Lifters and Bale Reserve Conveyers</p> <p>- Filter installation for Blow Room and Carding</p>	<p>150,414</p> <p>1420</p> <p>9281</p> <p>47000</p>
II	<p><u>Carding :-</u></p> <p>32- High Production Cards Coilers for Cans 36" x 42" high Fitted with unit air system of Cleaning (Waste Removal and Collecting all waste including undercasing) Doffer drive incorporates PIV gear Fitted with Crossrolls Stop Motions and signalling Devices</p>	<p>191,686</p>
III	<p><u>Drawing :-</u></p> <p><u>1st passage :-</u></p> <p>6- High Speed D.F. Single-delivery 8 ends up, suitable drafting system Suction Cleaning to drafting rollers and Coiler drums. Auto-levelling system Coilers for Cans 36" x 42" high Fully-automatic can change Stop motions with signal lamps.</p>	<p>40260</p>

Item	Machines	Price £ FOB. Automated
	<u>2nd passage :-</u> 6- High Speed D.F. Single- <i>c</i> ivery 8 ends up. Suitable drafting system Section Cleaning to drafting rollers and coiler trumpets. Coilers for cans 18" dia x 42" high Fully-automatic can change	25368
IV	<u>Roving:</u> 10- Speed Frames 96/108 spindles, Double apron } Rolls. Arm PK 521, } 12° stands Lift 14" x 6.5"/7" bobin dia. Suction device for broken end collection Automatic flyer positioning device Pneumatic stop device	96900
	10- Over-head Cleaning devices	5270
V	<u>Spinning :-</u> 68- Ring spinning Frames, 444 spindles abt. 3" Gauge, 9" Lift, 2" Rings Double apron } Rolls. Pendulum arm } SKF PK220, antifriction bearings to all } lines of Rollers Umbrella Creel, antiwedge Rings with adjustable Ring Holders. Fixed spindles in rails with finger brakes. Anti Balloon Rings and Re lust seperators Mechanism for S & Z Twists Suction Devices for broken end collection Automatic full bobbin stop motion Automatic Ring Tail Winding down motion Hank Indicators for 3 shifts	561884
	9- Travelling cleaners, combined blowing & suction units	16000
	Total Spinning Machinery Price £	1.148.485

Item	Machines	Price £ FOB. Automated
VI	<u>Winding</u> 12- Automatic winding machines each 20 drums, 2 - 140	325841
	Total Price of machinery automated system (ring) without auto-doffing units for Ring Frames	1.474.346
	- Suggested Spar Parts - Spinning Workshops (assumed) - Spinning Accessories ,, - Spinning Testing Lab.	90 000 16000 87800 11500
	Grand Total	£ 1.679.646

"Spin Plan"

1- "Ring Spinning"
Automated System

Production in Kgs per 24 hrs.

Item	Process	Count No	Ends Up	Draft	Twist Factor	Speed	Efficiency %	Waste %	Practical Unit Prodn	Reqd Prodn Units	Reqd Units
I	blowing		(with Feed Cautie)					4.5		17426	1.23 m/cs
II	Carding	0.12			-	28 Rev/min Doffer	90	3	545	16903	31 m/cs
III	Drawing: 1st passage	0.12	8	8	-	1500 ft/min	90	1	2920	16734	5.73
	2nd passage	0.12	8	8	-	1500 ft/min	90	1	2920	16567	5.67
IV	Roving	0.8	1	6.65	1.3	1000 Rev/min	75	2		16236	340 SP.
V	Spinning	2 1/4	1	30	3.4	10500 Rev/min	93	2	0.527	15911	30182 SP.
VI	Wincing	2 1/4	1	-	-	about 1000 Yd/min	85	2	28.2	15600	350 drums

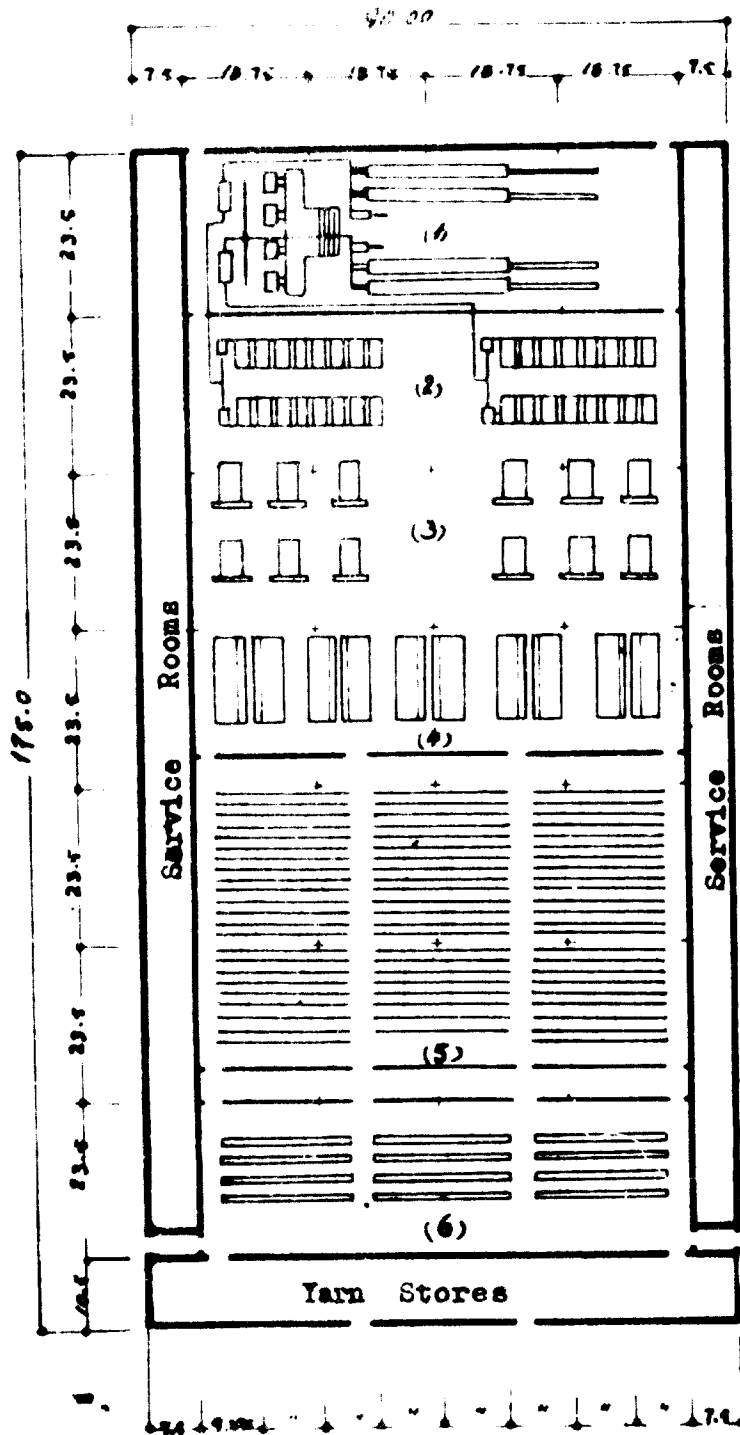
Total Productions :

1- Ring Spinning System = 15600 Kgs/day (24 hrs)

with waste % = 15.5 %

PROJECT.

1) Ring Spinning System.



Total Area : 175 m x 90 m = 15750 m²

Span Between Columns : 23.50m x 18.75 m

Total Cost Of Constructions : approx .

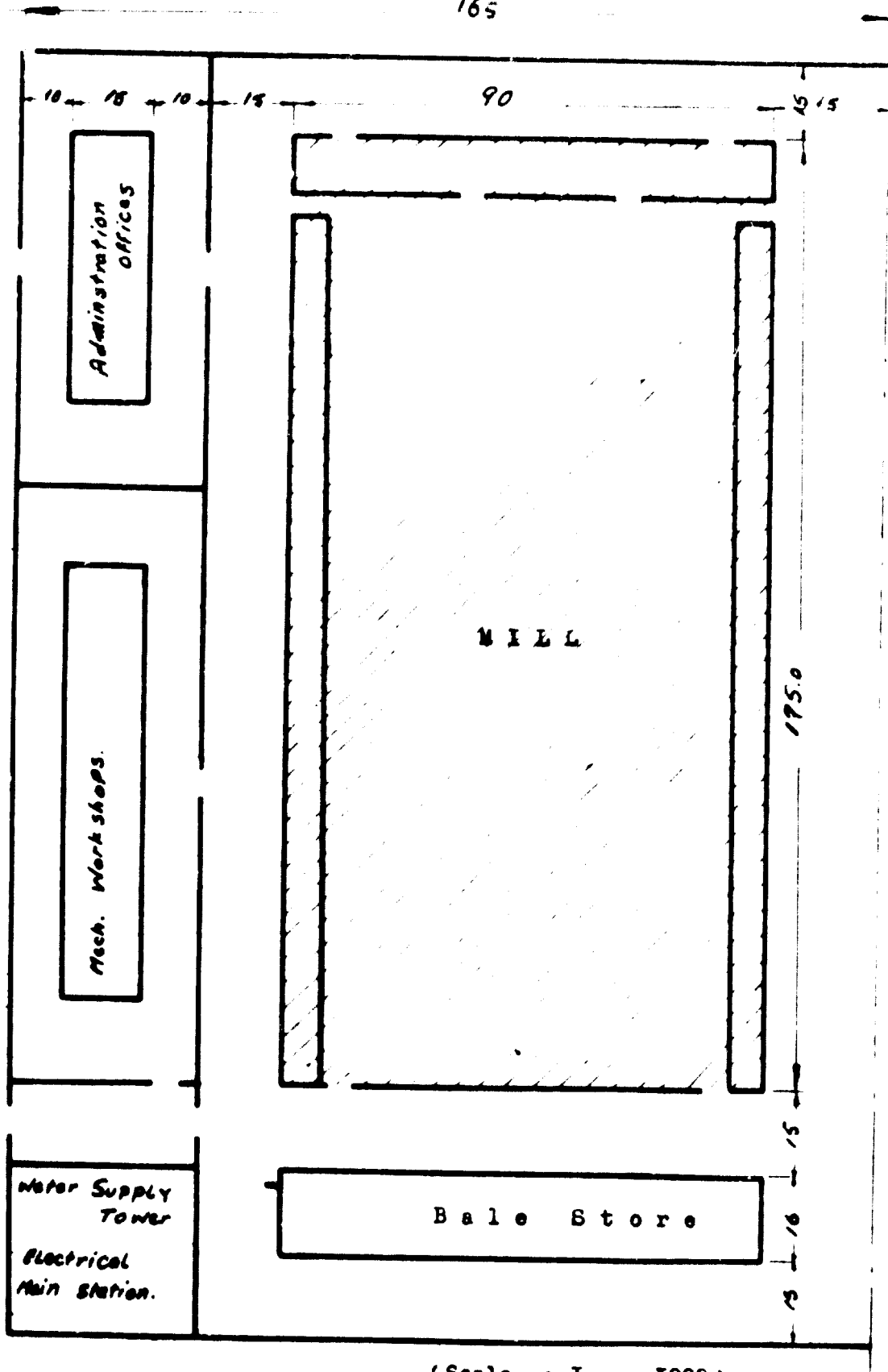
(av) :£ 370.000

(av. Cost per m² £ 22 to £ 26)

- | | |
|--------------------------------|------------------------------|
| 1) Blow Room 4-Scutcher Parts. | 5) 68-Ring Frames. |
| 2) 32 Cards. | 6) 12 Auto-Winding Machines. |
| 3) 6-Draw Frames 2 Passages. | |
| 4) 10-Speed Frames. | |

I) RING SPINNING SYSTEM

165



(Scale : 1 : 1000)

Total Area Of land = 236 m x 165 m = 38940 m².

is about 9 Acres.

Cost Of Land and Buildings : approx .

£ 500.000 .

Spinning Plant with :

2) "Open-End Spinning System".

Item	Machines	Price & FOB. Fully Auto.
I	<p><u>Blow Room :-</u></p> <p>2- Cotton Blow Room Installation each consisting of :-</p> <p>a) 2- multi Bale Pluckers * 1- waste Opener * Opening & Cleaning machinery 1- Two way Distribution * 2- Scutcher Parts</p> <p>and</p> <p>R- Card Feeding Installation with controls - 4000 Kg Zincd Iron Sheets for Pipe lines</p> <p>2- Bale Lifters for Pluckers and Bale Reserve Conveyors</p> <p>- Filter Installation for Blow Room and Carding</p>	<p>150,114</p> <p>1420</p> <p>9281</p> <p>47000</p>
II	<p><u>Carding :-</u></p> <p>32- High production cards, Coilers for Cans 36" x 42" high Fitted with unit air system of Cleaning (Waste Removal and Collecting all waste including undercasing). Differ drive incorporates PIV gears Fitted with crosrolls. Stop Motion and signalling Devices</p>	<p>194688</p>
III	<p><u>Drawing :-</u></p> <p><u>1st passage :</u></p> <p>6- High speed D.F., Single-delivery 8 ends up, suitable drafting system suction cleaning to drafting rollers and coiler trumpets</p> <p>Auto-levelling system Coilers for Cans 36" x 42" high Fully - Automatic Can Change Stop Motions with signal Lamps</p>	<p>4,0260</p>

"Spin Plan"

2- Ringless Spinning
(O.E. System)

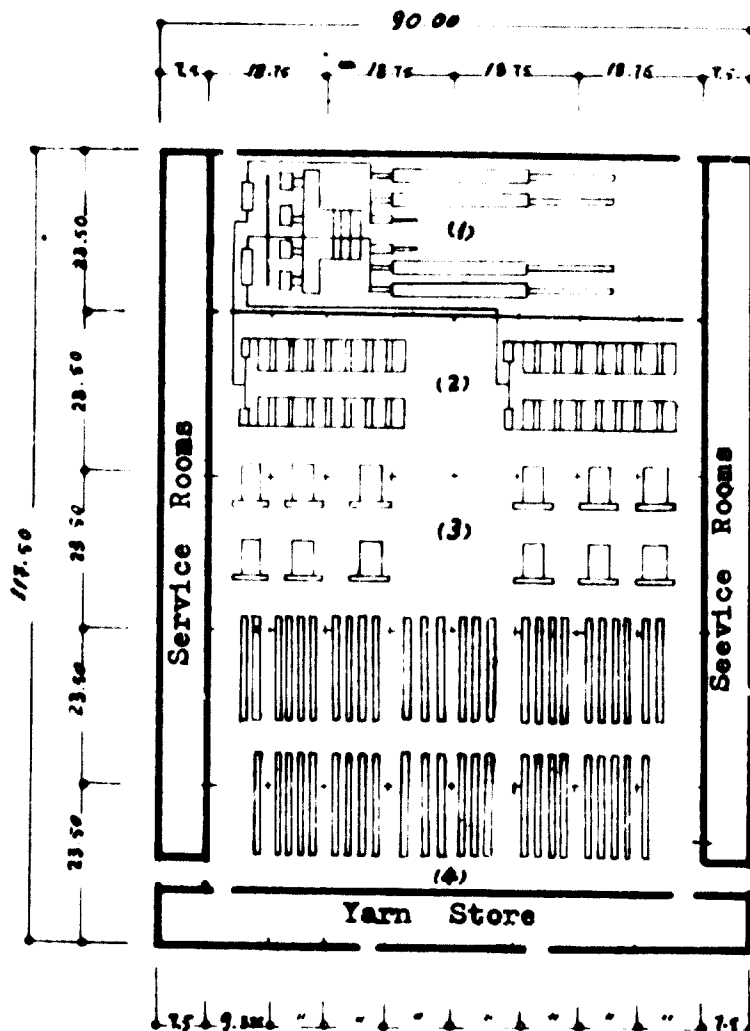
Production in Kgs per 24 hrs

Item	Process	Count Ne	Ends up	Draft	Twist Factor	Speed	Efficiency %	Waste %	Practical unite Prodn	Regd Prodn	Regd Units	Machines
I	Blowing		(With Feed Chute)				90	4.5		16200	1.23	2- Lines OP. 4- Scutcher parts
II	Carding	0.13				28 Rev/m Doffer	90	3.5	500	15600	31	32- Cards
III	Drawing:											
	1st passage	0.13	8	8.0	-	1500 ft/m	90	1.0	2680	15400	5.76	6- D.F. single- deliv.
	2nd Passage	0.14	8	8.6	-	800 ft/m	90	1.0	1290	15250	5.60	6- D.F. 2- delivs.
IV, V, VI	Spinning	24	1	170	-	46,000 R/min	24	1.5	300	15000	30	50- machines 200 spindles

PROJECT:

2) Open-End Spinning System

10,000 Spindles



(Scale 1 : 1000)

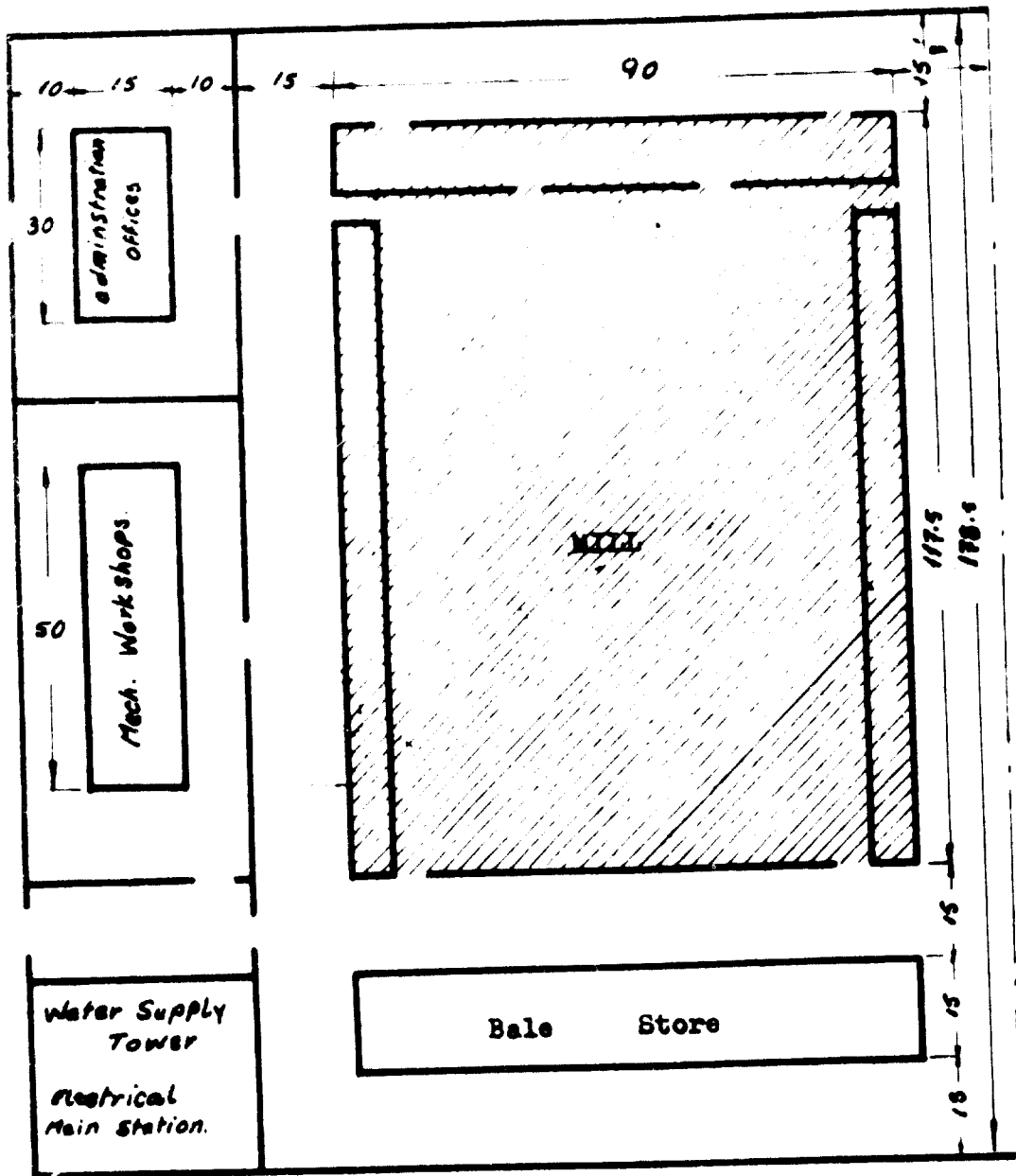
Total area : 117.5 m x 90 m = 10575 m².

Span Between Columns : 23.5 m x 18.75 m.

Total Cost Of Constructions : approx.
(av) £ 253800.

- (1) Blow Room 4. Sculcher Parts.
- (2) 32 Cards.
- (3) 6. Draw Frams 2 Passages.
- (4) 50. Spin machines.

165 2) OPEN END SYSTEMS



(Scale : 1 : 1000)

Total Area Of Land = 178.5m x 165m = 29450 m²

(ie about 7 acres)

Cost Of Land and Buildings : approx . £38 0.000.

Estimated Labour Distribution :

Project

1) Ring Spinning System :

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
<u>A) Direct Labour :</u>						
<u>a) Production</u>						
<u>Blow Room :</u>						
Over lockers	1	1	1	1	4	4- Bale Openers & 2 Lines Openers For the Mill...
Assist Over Lockers	1	1	1	1	4	For B.R., Carding, and Draw & Speeds
Bale Carriers	2	1	1	1	5	
Bale Feeding		2	2	2	6	
Waste Collecting & Cleaning		2	2	2	6	
Oilers	1	1	1	1	4	For B.R. & Carding
Reserves		1	1	1	3	
					<hr/> 32	
<u>Carding:</u>						
Card Tenters		2	2	2	6	32- Cards
Brushes & Grinding		2	2	2	6	
Transport		1	1	1	3	
Reserves		1	1	1	3	
					<hr/> 18	
<u>Drawings:</u>						
Drawing Tenters		3	3	3	9	6- D.F., 2 passages
Transport & Cleaning		2	2	2	6	
<u>Speed Frames:</u>						
Speed Tenters		5	5	5	15	10- Sp.F., 26 sps.
Transport & Cleaning		2	2	2	6	
Reserves		1	1	1	3	
					<hr/> 39	

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
<u>Ring Spinning:</u>						68- R.F., 44 Spls
Assist. Over Lookers	1	1	1	1	4	
Spin. Tenters		15	15	15	45	
Doffers		6	6	6	18	
Chief Doffers		1	1	1	3	
Roller Pickers		2	2	2	6	
Spindle Caps	1	1	1	1	4	
Oilers	1	1	1	1	4	
Transport		2	2	2	6	
Reserves		4	4	4	12	Total Labour till Rings = 191 No of Labours /1000 SP. = 2.2
					102	
<u>Winding:</u>						12-Auto. W., 50 Spls.
Assit. Over Lookers	1	1	1	1	4	
Winding Tenters		12	12	12	36	
Fixer		1	1	1	3	
Transport & Cleaning		2	2	2	6	Total up to winding = 249
Reserves		3	3	3	9	
					58	
<u>B) Maintenance:</u>						
Over Looker	1	-	-	-	1	All the Mill
Assist Overlooker	1	-	-	-	1	For B.R. & Carding.
Maint. Labourers	4	-	-	-	4	For B.R. & Carding.
Assist Overlooker	1	-	-	-	1	For D.P. & Speeds.
Maint. Labourers	5	-	-	-	5	For D.P. & Speeds.
Assist. Overlooker	1	-	-	-	1	For Rings.
Maint. Labourers	6	-	-	-	6	For Rings.
Assist. Overlooker	1	-	-	-	1	For Winding
Maint. Labourers	6	-	-	-	6	For Winding
					26	

2) Open End Spinning System

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
<u>A) Direct Labour :</u>						
<u>m) Production:</u>						
<u>Blow Room:</u>						
Over Lockers		1	1	1	4	4- Bale Openers & 2- Lines of Openers
Assist. Over Lockers	1	1	1	1	4	For All the Mill
Bale Carriers	2	1	1	1	5	For B.L., Carding D.F and Speeds.
Bale Feeding		2	2	2	6	
Waste Collecting & Cleaning		2	2	2	6	
Oilers	1	1	1	1	4	For B.R & Carding
Reserves		1	1	1	3	
					<hr/> 22	
<u>Carding :-</u>						
Card Tenters		2	2	2	6	32- Cards
Brush. & Grinding		2	2	2	6	
Transport		1	1	1	3	
Reserve		1	1	1	3	
					<hr/> 18	
<u>Drawing :</u>						
Drawing Tenters		3	3	3	9	6- D.F 2 Passages
Transport & Cleaning		2	2	2	6	
					<hr/> 15	
<u>Spinning :</u>						
Spin Tenters		25	25	25	75	50- O.E., 2000 Spls.
Oilers	1	1	1	1	4	Total Labours up to spinning =150
Transport		2	2	2	6	No of labours/ 1000 sps = 1.7
					<hr/> 85	including winding Process.

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
<u>b) Maintenance:</u>						
Over Looker	1	-	-	-	1	For All the Mill
Assist. Over Looker	-	-	-	-	1	) For B.K. &) Carding
Maint. Labourers	4	-	-	-	4	
Assist Over Looker	1	-	-	-	1	For D.F. & helps in spinning
Maint Labourers	5	-	-	-	5	
Assist Over Looker	1	-	-	-	1	Total = 19
Maint. Labourers	6	-	-	-	6	
					<hr/> 19	

For 1) Ring Spinning System

and 2) Open End Spinning System

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
B) Indirect Labour:						
<u>Bale Store :</u>						
Store keeper	1	-	-	-	1	
Weighing Tenter	1	-	-	-	1	
Transport	2	-	-	-	2	
Bale Arranging	2	-	-	-	2	
Truck Laborers	2	-	-	-	2	
					8	
<u>Yarn Store</u>						
Production						For O.E. System
Controllers	1	2	2	2	7	this department is omitted
Transport		2	2	2	6	
					13	
<u>Sales Store :</u>						
Store Keeper	1	2	2	2	7	
Transport		2	2	2	6	
Packing	5	-	-	-	5	
Packing Supervisor	1	-	-	-	1	
Clerks	1	-	-	-	1	
Reserve & Transport	4	-	-	-	4	
					24	
<u>Spinning Workshops:</u>						
Assist. Over Looker Mechanic	1	-	-	-	1	
	1	-	-	-	1	
Cot Grinders	2	-	-	-	2	
Flat Grinder	1	-	-	-	1	
Card Covering	1	-	-	-	1	
Transport	2	-	-	-	2	
					8	

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
<u>Spinning Testing Lab :</u>						
Assist Over Looker	1	-	-	-	1	
Calculator	1	-	-	-	1	
Worn analysers	3	-	-	-	3	
Raw Cotton analysers	2	-	-	-	2	
Twist analyser	1	-	-	-	1	
Unter Operators	2	-	-	-	2	
Yarn appearance	-	-	-	-	1	
Transport	2	-	-	-	2	
					<hr/> 13	
<u>2) Power Supply Inst.</u>						
Elect. Engineer	1	-	-	-	1	
Chief Electricians	1	1	1	1	4	
Electricians		2	2	2	6	
Motor Maint. Operators	1	-	-	-	1	
Mechanics	2	-	-	-	2	
Elect. Stations Operator	1	1	1	1	4	
					<hr/> 21	
<u>3) Air Conditioning:</u>						
Mech. engineer	1	-	-	-	1	Also for Mech. workshops.
Cond. Rooms Mechanic		1	1	1	3	
Maintenance Mechanics	3	-	-	-	3	
Transport	2	-	-	-	2	
					<hr/> 9	
<u>4) Splinkers Inst.:</u>						
Pump Mechanics	-	1	1	1	3	
Plumbers	2	-	-	-	2	
Diesel Mechanic	1	-	-	-	1	
Transport	2	-	-	-	2	
					<hr/> 8	

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
<u>5) Transport Equipment</u>						
Car Drivers	2	-	-	-	2	
Elect Truck Drivers	2	1	1	1	5	
Electrician	1	-	-	-	1	
Mechanics	2	-	-	-	2	
					10	
<u>6) Mechanical Workshops</u>						
Lathe Operators	4	-	-	-	4	
Universal Milling Op?	1	-	-	-	1	
Drilling Operator	1	-	-	-	1	
Mechanics	3	-	-	-	3	
Carpenters	3	-	-	-	3	
Plumbers	2	-	-	-	2	
Welders	2	-	-	-	2	
					16	
<u>Administrative Dept.</u>						
Manager	1	-	-	-	1	All over the Mill.
Assist Manager	1	-	-	-	1	
Chief personnel	1	-	-	-	1	
Clerks	4	-	-	-	4	
Labour Controllers	1	1	1	1	4	
Barristers	2	-	-	-	2	
Clerks	3	-	-	-	3	
Doctors	2	-	-	-	2	
Nurses	2	-	-	-	2	
Chief Officer	1	-	-	-	1	
Officers	1	1	1	1	4	
Gaurds		7	7	7	21	
Fire Gaurds		2	2	2	6	
Public Relations	3	-	-	-	3	
					55	
<u>Financial Dept.:</u>						
Assist Finance & Commercial Manager	1	-	-	-	1	
Chief auditor	1	-	-	-	1	

Item	Day Shift	1 Shift	2 Shift	3 Shift	Total	Remarks
Clerks	5	-	-	-	5	
Chief Accountant	1	-	-	-	1	
Clerks	11	-	-	-	11	
Chief Costing & Statistical	1	-	-	-	1	
Clerks	5	-	-	-	5	
Chief Production Controller	1	-	-	-	1	
Clerks	3	-	-	-	3	
					29	
<u>Commercial Dept.</u>						
Chief Purchase Dept.	1	-	-	-	1	
Clerks	2	-	-	-	2	
Chief Store Keeper	1	-	-	-	1	
Store Keepers	6	-	-	-	6	
Chief Sales Dept.	1	-	-	-	1	
Clerks	3	-	-	-	3	
					14	

Personnel	1) Ring Spinning System	2) Open End Spinning System
A) Direct Labour	249	150
B) Indirect Labour	254	247
	2	2
Total	503	460

- Necessary Spinning Workshops
(Approx.)

Item	Machines	Price f F.O.B.
1	Cylinder Grinding Machine	1400
1	Card Mounting Machine for Metallic Wire	4082
1	Electrical Stripping Brush	253
8	Hand Stripping Brushes	120
5	Hand Cleaning Hose Assembly	145
1	Card Grinding Accessories	1035
1	Mounting Press for Top Roller Cots	500
1	Grinding Machine for Top roller Cots	2300
1	Dust Collector Unit	120
2	Testing Instruments for Rollers	600
	Tools & Tables etc.	345
	f.	16000

- Necessary Testing Laboratory :

(Approx.)

Items	Apparatuses	Price £ FOB
	<u>Fibre Testing</u>	
1	Shirley Analyser	300
1	Pressley Tester	220
1	Precision Balance	77
1	Microscope	225
1	Fibre Scaple Diagram "Bear Sorter"	185
	<u>Yarn Testing</u>	
1	Wrap Reel motor driven	220
1	Lea Tester motor driven (300 lbs capacity)	450
1	Shadow-Graph (Count Balance)	250
2	Quadrant Balance for Counts	212
2	Rove Length Meters	80
1	Balance (chemical)	16
1	Sets of Weights	170
1	Yarn Twist Tester with motor	75
1	Seri-Plane with Stands and Boards	1950
1	Uster Evenness Tester (Complete)	3650
1	Dynamometer Thread (Uster)	2400
1	Conditioning Oven	170
	- Tools etc.	350
	Total	£ 11500

2- Power Supply :

(Estimated)

Item		Price £ FOB
I	<ul style="list-style-type: none"> - Primary High Tension Distribution Switch Board with necessary feeder panels battery and rectifier unit for control - Control desk for remote control and signalling 	15,000
II	<ul style="list-style-type: none"> - Load Centres Including : - Transformers incoming and outgoing feeders for H.T Ring - Condensers for Power Factor improvement L.T. distributing boards for supply to machines 	30,000 10,000
III	<ul style="list-style-type: none"> - Illumination : (Mill, Workshop - Store and Offices) 	40,000
IV	<ul style="list-style-type: none"> - H.T. Cables (Copper Conductors) for rings feeding transformer stations providing 100% continuity 	4,000
V	<ul style="list-style-type: none"> - L.T. Cables (copper conductors 4 cores). 	15,000
VI	<ul style="list-style-type: none"> - Control Cables - Paint & Electrical Tools and material for Erection - Spare Parts - Diesel Engine for Emergency 	600 3,400 3,000 5,000
Grand Total		£ 126,000

3- Air Conditioning :

(Estimated)

Item		Price £ FOB.
I	4 Air Conditioning units 2 in each side capacity of 200000 mt ³ /m each including prefabricated Sheet metal Ducts	50,000
II	Spare parts and assembling Tools	5,650
III	Ventilation for 4 Transformers	350
	Grand Total	£ 56,000

4) Sprinklers & Hydrants :

Item	Apparatuses	Price £ FOB.
1	Automatic sprinklers together with all the necessary internal fittings with the best materials etc., (also for stores).	18,000
2	Sets of wet pipe controlling valves with the necessary alarms and valves.	
3	The necessary underground cast Iron pipes and their fittings.	2,500
4	Automatic diesel engine driven fire pumping set complete with Press Vessels and Valves.	3,000
5	A complete hydrant system round the mill for fire protection complete with a separate suitable pump and required reservoirs according to your design.	7,000
6	A Co ₂ fire extinguishing plant is required for the electric installation.	1,500
	Spare parts for 2 Years.	1,000
	Total	£ 33,500

5) Transport Equipments :

No.	Apparatuses	Price in FOB.
	Hand Trucks	2,000
3	Electric trolleys capacity 1000 Kg.	1,800
3	Spare batteries.	400
2	Charging sets and Spares.	240
2	Electric fork lifts capacity	7,000
2	Spare batteries.	500
1	Battery charging set.	120
1	Diesel fork lift capacity 3000 Kg.	5,000
	Total	17,060

6) WORKSHOP 1

No.	Apparatuses	Price £ FOB.
I	Engine lathes 2000 mm. centre distance.	2,800
I	Universal milling m/c. 1000 mm.	2,200
I	Column type drilling m/c drilling capacity 30 mm.	320
I	Bench drilling m/c drilling capacity 10 - 15 mm.	160
I	Single pedestal grinder 200 mm diam.	60
3	Engine lathes 1000 mm. centre distance bending machine.	6,000
I	Suitable carpenter shop for maintenance	2,000
I	Tinsmith shop for cans, doffing boxes etc.,	2,400
	Total	£ 15,940

Total Costs of Projects based on :

- 1) Ring Frames Spinning System.
- 2) Open-End Spinning System.

(Estimated)

Item	Description	1) Ring Frame System	2) Open-End System
		£	£
1)			
I	Spinning Machinery	1,474,346	1,323,053
II	Spare Parts	90,000	60,000
III	Spinning Workshops	16,000	16,000
IV	Spinning Accessories	87,800	80,000
V	Testing Laboratory	11,500	11,500
	Total Item 1)	1,679,646	1,490,553
	Cost of Land & Building Trenches etc.	500,000	380,000
2)	Power Supply Installation	126,000	120,000
3)	Air Conditioning	56,000	40,300
4)	Sprinklers and Hydrant Inst.	32,000	26,000
5)	Transport Equip. (Internal)	17,060	17,060
6)	Mech. and Elect. Workshops	15,940	15,940
	Grand Total of Project	2,426,646	2,089,853
	<u>Information :</u>		
a)	Total Production in Kgs/24 hrs Count 24's	15,600	15,000
b)	Power Required: 1) for machines 2) for Illumination	1883 KW/hr	1366 KW/hr

Item	Description	1) Ring Frame System	2) Open-End System
c)	1) Total	15750 m ²	10475 m ²
	2) Area of Land needed	9 acres	7 acres
	Cost of Land & Building	£ 500,000	£ 380,000
d)	<u>Labour:</u>		
	1) Direct Labour (Spin.)	249	150
	2) Indirect Labour	251	217
		-----	-----
	Total Labour	503	397
	Average Yearly Wage	£ 429	£ 460
e)	Waste %	15.5 %	11.5 %
	Cotton Factor	1.184	1.130
f)	Average Yarn Price per ton	£ 560	£ 560

Assessment of Profit for Projects on :

1) Ring Spinning System and 2) Open-End System

Items	* £	* £	Items	* £	* £
	1) Ring System	2) Open-End system		1) Ring System	2) Open-End System
Wages Yearly	* 213680	* 182727	Total Sales of yarn	* 2620800	* 2520000
Ra. material	1320639	1211956	Sales of Waste	100750	66750
Power Consumed	107204	77767			
Illumination	12023	8086			
Spare Parts	22500	15000			
Depreciation	152231	141213			
Packing etc.	110319	106075			
Selling & Distribution Expenses	11052	10608			
Administrative & Financial Expenses	20899	30988			
Net Profit	672023 =====	752330 =====			
	2721560	2586750		2721550	2586750

Financial Indexes :

Item	Description	1) Ring Spinning System	2) Open-End Spinning
1)	Ratio of added Value to Cost of Investments	$\frac{1046934}{2426646}$ = 43 %	$\frac{1076270}{2089853}$ = 51 %
2)	Ratio of Output to Invested Capital	$\frac{2721550}{2426646}$ £ = 1.122	$\frac{2586750}{2089853}$ £ = 1.238
3)	Density of Invested Capital to Total Labour	$\frac{2426646}{503}$ £ = 4824	$\frac{2089853}{397}$ £ = 5264
4)	Ratio of Profit to Value of Production	$\frac{672023}{2721550}$ = 24.7 %	$\frac{752330}{2586750}$ = 29.1 %
5)	Worker's Productivity per £	$\frac{2721550}{503}$ £ = 5411	$\frac{2586750}{397}$ £ = 6516
6)	Productivity per man-hour	$\frac{2721550}{7200}$ £ = 376	$\frac{2586750}{7200}$ £ = 359
7)	Ratio of Man-Hour Productivity to added Value	$\frac{1046934}{7200}$ £ = 145	$\frac{1076270}{7200}$ £ = 149
8)	Wages Per Hour	$\frac{215680}{7200}$ £ = 30	$\frac{182727}{7200}$ £ = 25
9)	Invested Capital Turn-Over Ratio	$\frac{2721550}{2426646}$ = 1.1	$\frac{2586750}{2089853}$ = 1.2
10)	Rate of Return on Investment	$\frac{672023}{2426646}$ = 27.7 %	$\frac{752330}{2089853}$ = 36%

"Comments on Financial Indexes "

Ratio of Added Value to Cost of Investments:

In the first project Ring Spinning, the ratio is 43% where as with the second project Open-End spinning the ratio is 51% and therefore the O.E. Project is more efficient.

Ratio of Output to Invested Capital :

For the second project O.E. Spinning the ratio is 1.238 compared to the ratio 1.122 for the first project the Ring Spinning System, which means that the O.E. Project is preferable having a lower capital investment.

Ratio of Profit to Value of Production:

Comparing the ratios of the two systems, proves the Open-End Spinning more profitable as it has this ratio 27.1% compared with 21.7% .

Rate of Return on Investment :

For Spinning mills in general if this ratio approaches 15% it would be considered profitable. In our case this ratio reaches 26% for the Open-End Spinning and 27.7% for the Ring Spinning System.

It could easily be said that wage rates set forth in our calculations for both projects, which are lower than those for highly developed countries, could safely be raised to reach a percentage where the rate of profit or Return on Invested capital would be 15%

This % of raise in wages would be calculated as follows :-

	1) Ring Spinning	2) Open-End Spinning
Profit in present Projects :	£ 672023	£ 752330
acceptable 15% profit	£ 363997	£ 313478
	-----	-----
Safe margin of Extra Profit	£ 308026	£ 43852
Raise on calculated Wage Rate	142 %	240 %
(ie) average annual wages per labour could be reached safely	£ 610	£ 1000

Hence it is clear that all financial indexes indicate that in principle both projects are profitable, although, in the long run, the Open-End System appears to be commercially more advantageous.

Analysis of Production Cost :-

1- Wages :

Item	£ 1) Ring Spinning	£ 2) Open-End Spinning
Direct Wages	80834	54365
Indirect Wages	36308	36308
Administrative and Financial Wages:		
a) Financial	18113	18113
b) Administrative	16675	16675
c) Top Management	15095	15095
	-----	-----
Total Wages	175650	149181
Social Security 20%	35130	29836
Social Privileges £10/person	4900	3710
	*	*
Total Annual Wages	<u>215680</u>	<u>182727</u>
	■	
Total <u>Noof</u> Workers	503	397
average annual wages per labour	429	460

2- Raw Material :

Item	1) Ring Spinning System	2) Open-End Spinning
Total annual production (300 days)	1,680 Tons	1,500 Tons
Waste %	15.5 %	11.5 %
Cotton Factor	1.184	1.130
Raw Cotton Used	5541 Tons	5085 Tons
Cost per Ton of Raw Cotton (av. grade)	£ 238,339	£ 238.339
Price of Raw Cotton used/year	■ £ <u>1320639</u>	■ £ <u>1211956</u>

3- Power Consumed :

Item	1) Ring Spinning System	2) Open-End Spinning
Power Consumed per Hour for machinery	1883 K.W.	1366 K.W.
Total Working Hours per year	7200	7200
Yearly Consumption of Power per Year	13557600 K.W.	9835200 K.W.
Price per K.W. Hour	£ 0.0079	£ 0.0079
Total price of Power Consumption per Year	■ £ <u>107204</u>	■ £ <u>77767</u>

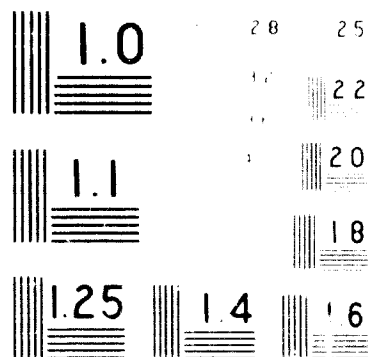


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4- Illumination :-

Item	1) Ring Spinning System	2) Open-End Spinning System
Total mill area	15750 m ²	10575 m ²
Yearly Energy Consumed per m ²	97 K.W.H.	97 K.W.H.
Total Yearly Consumption of Energy	1520250 K.W.H.	1022600 K.W.H.
Price per K.W.	£ 0.0079	£ 0.0079
Total Cost of Illumination	£ 12023	£ 8086

5- Spare Parts Consumption :-

Item	1) Ring Spinning System	2) Open-End Spinning System
Price of Required Spare Parts	£ 90000	£ 60000
Yearly Depreciation for Spare Parts	£ 22500	£ 15000

6- Depreciation :-

	1) Ring Spinning System			2) Open-End Spinning System		
	£	% Depric.	£ Depreciation	£	% Depric.	£ Depreciation
Spinning machinery	1474346			1323053		
Spinning Workshops	16000			16000		
Accessories	87000			80000		
Testing Laboratory	11500			11500		
Total	1589646	8%	127172	1430553	8%	1144444
Building :						
Mill Building	378000	25%	9450	254000	25%	6350
Stores	46000	2.0%	920	46000	2.0%	920
Roads	20000	5%	1000	20000	5%	1000
Trenches and Conditioning Stations	56000	2.5%	1400	60000	2.5%	1500
Total	500000		12770	380000		9770
Power Installation	126000	6%	7560	120000	6%	7200
Air Conditioning	56000	10%	5600	40300	10%	4030
Fire Protection	32000	6%	1920	26000	6%	1560
Transport Equip- ments	17060	20%	3412	17060	20%	3412
Mech. Workshops	15940	5%	797	15940	5%	797
Total	247000		19289	219300		16999
Grand Total	2336646		159231	2029853		141213

7- Packing etc. :-

Item	1) Ring Spinning System	2) Open-End Spinning syst.
	£	£
<u>(A) For Export :</u>		
Paper Cones	52098	50094
Card Board	48074	46225
Packing Paper	5415	5207
Card board Rings	2489	2394
adhesive paper 16 cm.	1521	1463
adhesive paper 5 cm.	324	312
Tissue paper for wrapping cones	17222	16560
Steel Bands 3"	7260	6981
Band Clips	295	283
Lead (for Stamping & Sealing Boxes).	454	435
Piano Wire (for fixing lead stamp).	29	28
(A) Total	135181	129982
<u>(B) For Local Market :</u>		
Paper Cones	48842	46963
Card board Boxes	35320	33960
adhesive paper 5 cm.	1294	1245
(B) Total	85456	82168
Average Packing Cost $\frac{(A) + (B)}{2}$	£ 110319	£ 106075
Figures based on productions 1) Ring Spinning System 15600 kg/day 2) Open-End Spinning System 15000 kg/day		

8- Selling & Distribution Expenses :

10% of Packing Expenses.

1) Ring Spinning

£ 11032

2) Open-End Spinning

£ 10608

9- Administrative and Financial expenses :-

Calculated on 5% basis of total manufacturing expenses.

1) Ring Spinning

£ 90899

2) Open-Ends Spinning

£ 30738

Yearly Revenue :

Item	1) Ring Spinning System	2) Open-End System
<u>1- Yarn Product :</u>		
Ready for Sale Production Yearly	4680 Tons	4500 Tons
Average Price/Ton (Export & Local Market)	£ 560	£ 560
Total Price of Sale (Yearly)	£ 2620800	£ 2520000
<u>2- Waste Production :</u>		
Raw material used	5541 Tons	5085 Tons
Total Yarn produced	4680 ,,	4500 ,,
Total Waste	861 Tons	585 Tons
Invisible Waste 1%	55	51
Waste for Sales	806 Tons	534 Tons
Price of Waste for Sales	£ 125	£ 125
Total Selling Price of Waste Yearly	£ 100750	£ 66750

Added Values :

Item	1) Ring Spinning System	2) Open-End System
Wages	£ 215680	£ 182727
Depreciation	159231	141213
Profit	672023	752330
Total Added Values	£ 1046934	£ 1076270
<u>Invested Capital :</u>		
Total Capital including Spare Parts	£ 2426646	£ 2089853

Conclusions :

In the Ring Spinning System, the differences between the Automated & Conventional Systems, have recently been reduced. The fundamental differences are :-

- 1) Use of Pluckers in place of Bale Breakers
- 2) Feed Chute to Cards instead of Laps produced by Scutcher Lap Forming units.
- 3) Doffing apparatuses for Ring Frames.

Otherwise the other machine processes are similar and since the introduction of very big Cans in Carding and first Passage Drawing, the need for combing the cards first Drawing and Finishing Drawing is no more an essential requirement for automated system.

It becomes evident from the comparison between :

- 1) The Ring Spinning System, and
- 2) The Open-End Spinning System,

that the latter appears to be commercially more profitable and advantageous.

Assuming the yarn produced on the O.E. System is to be used on chesses, i.e. no rewinding needed, the advantages of O.E. system over the Ring System will be as follows :-

- (a) Less Capital Invested due to elimination of speed frames and winding machines.
- (b) Less power, space, labour and cotton factor.
- (c) More profit. (with better financial Indexes).

Although the project of the Open-End system appears to be more attractive than the Ring Spinning System, the matter requires a more careful approach. The end uses of the yarn produced on the O.E. machines are the decisive factors since they are limited. The yarn produced there by has been successfully used for domestic fabrics, Sheetting, Pyjama, Cloths, Towelling, blankets and some other fabrics. But in other fields such as knitting fabrics, fine materials, combed yarns etc., the yarn is not entirely satisfactory. The machines require further development with view to producing yarn with equal characteristics as the Ring Frames yarn.

Following the Paris Textile machinery Exhibition 1971, it seems clear that the Open-End Spinning machinery has now reached the stage of development at which it will be commercially available in the very near future.

To what extent the Open-End Spinning will replace Ring Spinning, is a question left open to the machine manufacturers. The future of the Open-End Spinning machinery depends on the degree of perfection they will attain for the satisfaction of spinners in the different fields of the textile industry.





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