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The implementation of the "Just-in-Time" manufacturing philosophy into the South African furniture industry

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are necessary. The basic reason for resistance to change among middle and shop floor management at A.F. Dreyer related to a fear of the unknown. It was through education that this fear was alleviated.

Before any progress can be made in the conversion to JIT there must be a total understanding of how the techniques of the new system work, how they will change present operations and how it will affect the users. This can only be achieved through educating and training all employees. People will not become involved or make positive changes unless they accept and understand the basic principles of how the system works and the benefits that it will have.

No professionally presented training programs are currently available that are directed specifically towards the furniture industry. Other JIT training programs, which are directed at employees at all levels in other industries, are available, however it is hoped that the NPI Furniture Unit or the FITB will develop a program for the furniture industry in the near future. This program should be initially geared towards generating an awareness and an understanding of the philosophy.

In order to increase the workers' morale and encourage a positive attitude in plants towards productivity improvement programs, it is believed that involving employees is a key factor. There are numerous different employee involvement programs which could be attempted, all of which will work if presented honestly and professionally. Before selecting a program it is important that management understand the program and are prepared to support it

with patience. Changing peoples' behaviour is a slow process and will involve substantial education and training. This is particularly important in the South African environment where the working population's general education level is extremely poor.

Management must accept all employees as appreciating assets; team mates, not machines. Employees attitudes must change but that can only happen after management exhibits true commitment to employee participation and there must be positive reinforcement in exchange for employees efforts and accomplishments.

Just-in-Time can work in the furniture industry in South Africa but before it shows its full benefits the cultural and political barriers in the environment which block teamwork and progress must be broken.

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APPENDIX A

List of Interviewees

Company	Interviewee	Position
A.F. Dreyer	Mr. A. Dreyer	Owner / Manager
Anglo Dutch	Mr. Jansen	Production Manager
Duncan Bayne	Mr. T. Pouch	Production Manager
Grant Andrews	Mr. B. Smith	Production Manager
Grants Furnishers	Mr. I. Charne	Managing Director
Gyro Designs	Mr. Mynhart	Owner / Manager
Highpoint Furniture	Mr. Ross	Production Manager
Krost Brothers	Mr. S. Davis	Systems Engineer
Parker Knoll	Mr. Rosa	Production Manager
Star Furnishers	Mr. Jaksch	Production Manager
NPI Furniture Unit	Mr. R.E. Immelman	Senior Project Manager

APPENDIX B

QUESTIONNAIRE ON JIT AWARENESS AND IMPLEMENTATION ISSUES IN THE SOUTH AFRICAN FURNITURE INDUSTRY.

Section 1 Company specifics.

Company Name _____

Address _____

Telephone _____

Interviewee _____ Position _____

1.0 Furniture type _____

1.1 Type of Product
a Low volume and standardisation.
b Multiple products, low volume.
c Few major lines, medium volume.
d Many major lines, high volume.
e High volume and standardisation.

1.2 Type of process
a Jumbled flow (job shop).
b Disconnected line flow (batch).
c Connected line flow, (assembly line).
d Continuous flow, (process).

1.3 Total employees in company ? _____

1.4 What is the employee turnover per year (%) ? _____

1.5 How often is manufacturing planning carried out ? _____

1.6 Is manufacturing planning computer based ? _____

If yes, What system ? _____

1.7 intenance currently carried out ? _____

_____

1.8 How do you control and measure quality ? _____

_____

1.9 What percentage of your time do you allocate to :-

a Labour problems. _____

b Material problems. _____

c Overhead problems. _____

1.10 Do you have formalized lot sizing procedures ? _____

If yes, what procedures ? _____

1.11 What is the average lead time from receipt of an order to customer shipping date ? _____

1.12 What do you see as this companies strongest marketing advantage over other companies in the industry ?_____

_____

Section 2 Just in time.

2.0 Are employees of this company aware of JIT concepts ? ____

2.1 If yes who a Top management.

b Middle management.

c Shop floor management.

d Blue collar workers.

e Purchasing.

f Sales and marketing.

g Design.

2.2 Do you presently have a JIT program running ?_____

(If yes complete section 2 otherwise go to section 3)

2.3 What JIT techniques have been tackled in your program ?

a Inventory reduction.

b Lot size reduction.

c Total quality control.

d Total preventative maintenance.

e Setup time reduction.

f Layout.

g Group technology.

h Synchronized and undercapacity scheduling.

i Quality circles.

j Kanban.

k Process data collection.

l Multifunction workers.

m Product standardization.

n JIT purchasing.

2.4 What JIT training material has been used & towards whom has the training been targeted ?

a Videos._____

b Books._____

c Games._____

d In-house lectures._____

e External._____

a Top management._____

b Middle management._____

c Shop floor management._____

d Blue collar workers._____

2.2 Do you presently have a JIT program running ?_____

(If yes complete section 2 otherwise go to section 3)

2.3 What JIT techniques have been tackled in your program ?

a Inventory reduction.

b Lot size reduction.

c Total quality control.

d Total preventative maintenance.

e Setup time reduction.

f Layout.

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h Synchronized and undercapacity scheduling.

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2.4 What JIT training material has been used & towards whom has the training been targeted ?

a Videos._____

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c Games._____

d In-house lectures._____

e External._____

a Top management._____

b Middle management._____

c Shop floor management._____

d Blue collar workers._____

e Purchasing._____

f Sales and marketing._____

g Design._____

2.5 How have your black shop floor workers been trained w.r.t. JIT production techniques ?

a No training.

b On the job training.

c Informal discussions.

d Formal internal training.

e Formal external training.

Section 3 Non JIT companies.

3.0 Are there any particular reasons why you have not attempted JIT production ? _____

_____

_____

3.1 Do you have any other productivity programs presently under way ? _____

3.3 What is your most pressing problem in the manufacturing environment of your company ?_____

Section 4 Trade unions.

4.1 Are your employees unionized ? Yes/No _____

If Yes, what union predominates ? _____

4.2 How many working days have been lost (in the last year) due to labour unrest/strikes, etc.. _____

Section 5 Views on implementation.(Input to Chapter 5)

5.0 If implementing a productivity improvement program such as JIT would the company employ a consultant or facilitator to guide the implementation ? _____

5.1 Are you aware of any other S.A. furniture companies currently involved in JIT programs ? _____

_____

5.2 What do you see as the three largest problems associated with JIT implementation into the South African furniture industry in order of importance ?

_____

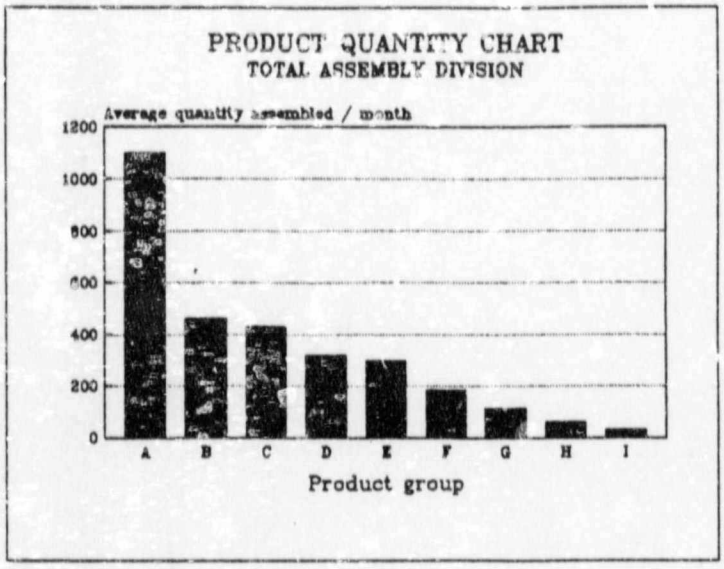
_____

_____

_____

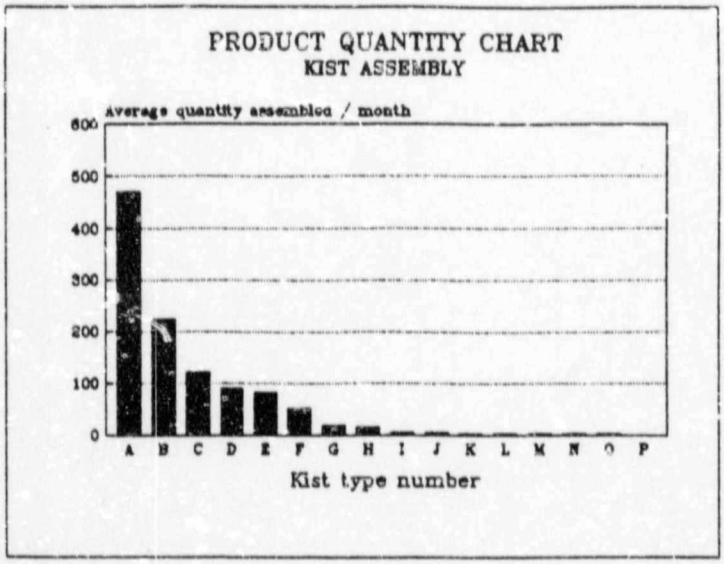
APPENDIX C Product Quantity Charts and Monthly Production Averages

Appendix C1 Total Assembly Shop Data.



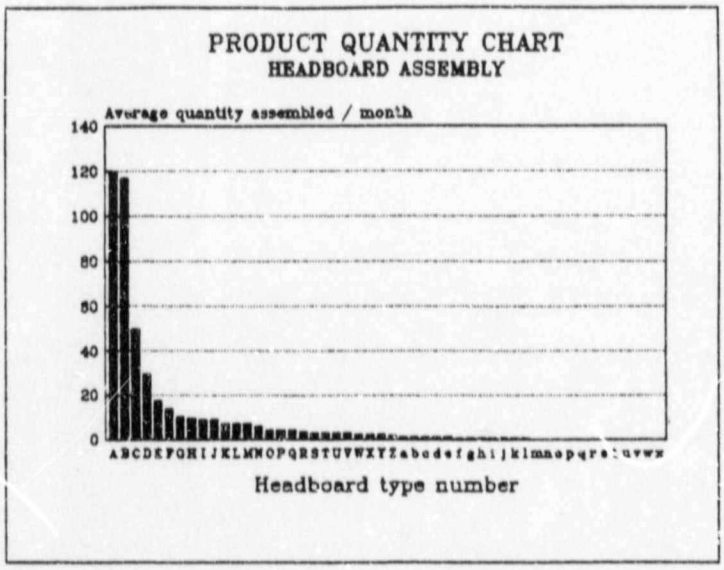
PRODUCT GROUP	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Kists	1101	36.6
B	Headboards	463	15.4
C	Stools	430	14.3
D	Dressing tables	300	10.0
E	Displays	319	10.6
F	Tables & Misc. units	183	6.2
G	Robes	114	3.8
H	TV and Video cabinets	64	2.1
I	Desks	31	1.0

Appendix C2 Kist Assembly Data



KIST TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Ball and claw / Junior	469	42.6
B	Special Imbuia	224	20.3
C	Andre / Alex	121	11.0
D	De Luxe	91	8.3
E	Standard	82	7.4
F	Elephant	52	4.7
G	Marlise	18	1.6
H	Lilian	16	1.5
I	Spanish	6	0.5
J	Maureen	5	0.5
K	Linnenfold	4	.4
L	Bokkie	4	0.4
M	Voortrekker	3	0.3
N	Duco	3	0.3
O	Oak	2	0.2
P	Kiaat	1	0.1

Appendix C3 Headboard Assembly Data

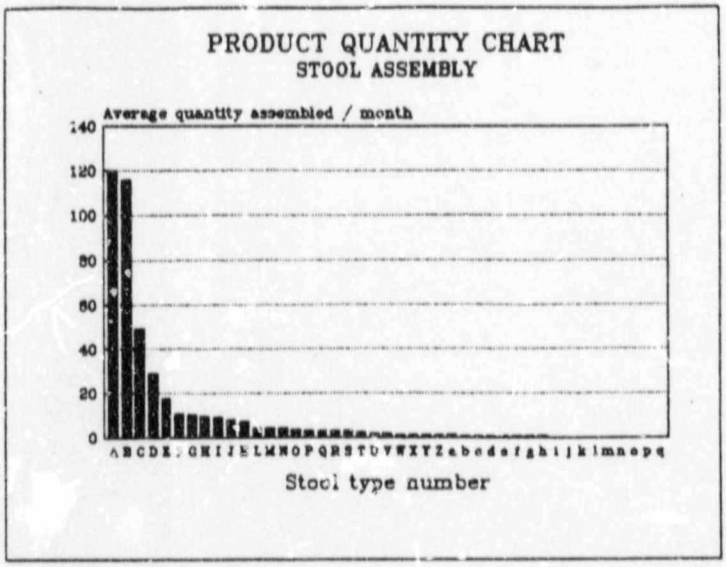


HEADBOARD TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Tina	119.3	25.7
B	Rozanne	117.1	25.3
C	Aquarius	49.5	10.7
D	Louise	29.5	6.2
E	Monica	17.7	3.8
F	Maureen	14.1	3.0
G	Hi tec Juvenile	10.3	2.2
H	Fame	9.8	2.1
I	Paramont	9.3	2.0
J	Linnenfold	9.0	1.9
K	Scorpio	7.5	1.6
L	Violet	7.5	1.6
M	Love	7.5	1.6
N	Lotus	6.3	1.4
O	Sandy	4.4	0.9
P	Tracy	4.4	0.9
Q	Sale	4.3	0.9
R	Daisy	3.4	0.7
S	Ceres	3.1	0.7
T	Petra	3.1	0.7
U	Apollo	2.9	0.6
V	Luna	2.9	0.6
W	Denise	2.3	0.5

CONT.

HEADBOARD TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
X	Denise	2.3	0.5
Y	Shelly	2.3	0.5
Z	Ilize	2.3	0.5
a	Cloud 9	2.1	0.4
b	Hi tec	1.5	0.3
c	Velana	1.3	0.3
d	Cindy	1.1	0.2
e	Tulbach	1.1	0.2
f	Caroline	1.1	0.2
g	Chantel	0.9	0.2
h	Ceres	0.7	0.2
i	Tiger moth	0.7	0.1
j	Fantasy	0.5	0.1
k	Anita	0.5	0.1
l	Marie	0.5	0.1
m	Angelo	0.4	0.1
n	Hazel	0.3	0.1
o	Chevron	0.3	0.1
p	Lara	0.3	0.1
q	Franschoek	0.3	0.1
r	Tania	0.1	0.03
s	Grace	0.1	0.03
t	Nandi	0.1	0.01
u	Rose	0.1	0.01
v	Madrid	0.1	0.01
w	Antoinette	0.1	0.01
x	Triangle	0.1	0.01

Appendix C4 Stool Assembly Data.

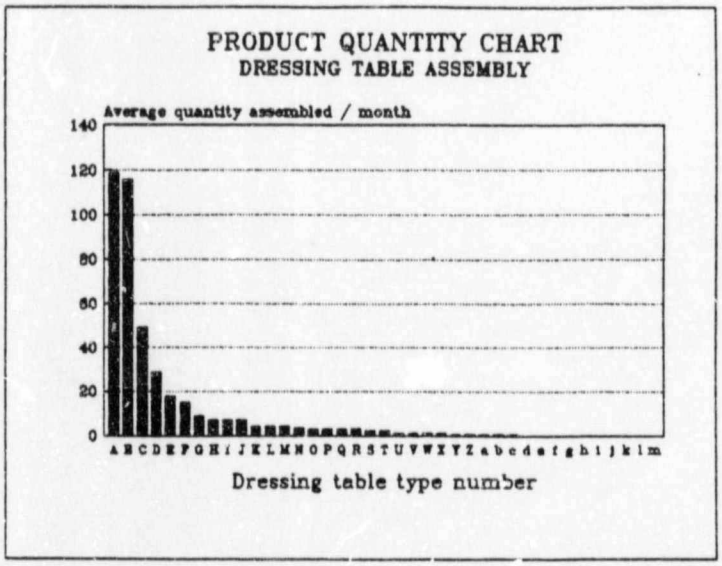


STOOL TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Tina	119.4	27.8
B	Rozanne	116.0	27
C	Aquarius	49.3	11.5
D	Louise	28.8	6.7
E	Monica	17.7	4.1
F	Balland claw	10.6	2.5
G	Hi tec Juvenile	10.3	2.4
H	Fame	9.6	2.2
I	Paramont	9.2	2.1
J	Scorpio	7.6	1.8
K	Violet	7.5	1.7
L	Sandy	4.4	1.0
M	Sale	4.3	1.0
N	Lotus	4.1	1.0
O	Daisy	3.4	0.8
P	Ceres	3.1	0.7
Q	Petra	3.1	0.7
R	Milkmaid	2.9	0.7
S	Apollo	2.9	0.7
T	Shelly	2.3	0.5
U	Denise	2.0	0.5
V	Cloud 9	2.0	0.5
W	Hitec	1.5	0.4

CONT.

STOOL TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
X	Maureen	1.4	0.3
Y	Velana	1.3	0.3
Z	Cindy	1.1	0.3
a	Caroline	1.1	0.2
b	Chantel	0.9	0.2
c	Tulbach	0.8	0.2
d	Tiger moth	0.7	0.2
e	Anita	0.5	0.1
f	Angelo	0.4	0.1
g	Fantacy	0.4	0.1
h	Marie	0.4	0.1
i	Lara	0.3	0.1
j	Franschoek	0.3	0.1
k	Chevron	0.3	0.1
l	Grace	0.1	0.03
m	Tania	0.1	0.03
n	Nandi	0.1	0.02
o	Ilize	0.1	0.02
p	Monaco	0.1	0.02
q	Rose	0.1	0.02

Appendix C5 Dressing Table Assembly Data.

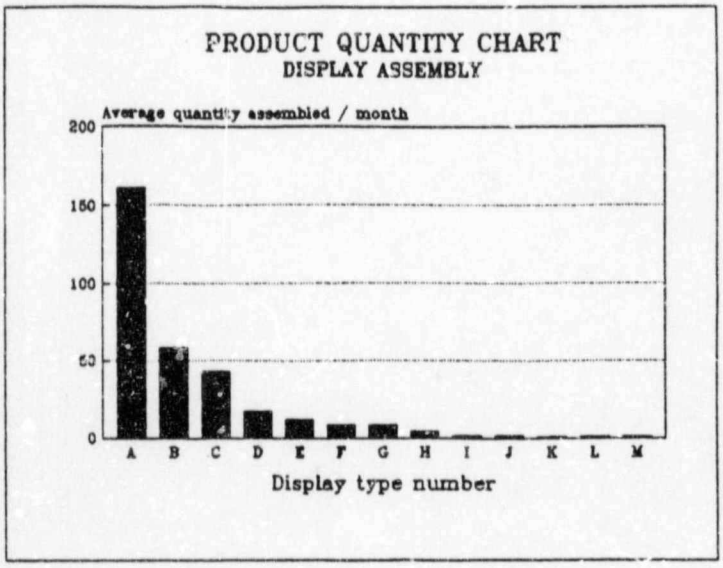


DRESSING TABLE TYPE NO	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Tina	119	39.6
B	Rozanne	116	38.6
C	Aquarius	49	16.4
D	Louise	29	9.6
E	Monica	18	5.8
F	Maureen	15	4.9
G	Paramont	9	3.0
H	Scorpio	7.5	2.5
I	Violet	7.5	2.5
J	Love	7.3	2.4
K	Sandy	4.4	1.5
L	Sale	4.3	1.4
M	Tracy	4.3	1.4
N	Daisy	3.4	1.1
O	Ceres	3.1	1.0
P	Petra	3.1	1.0
Q	Apollo	2.9	1.0
R	Luna	2.8	1.0
S	Shelly	2.3	0.8
T	Ilize	2.2	0.7
U	Hi tec	1.5	0.5
V	Velana	1.3	0.42
W	Cindy	1.1	0.38

CONT.

DRESSING TABLE TYPE NO	DESCRIPTION	QUANTITY / MONTH	PERCENT
X	Caroline	1.1	0.35
Y	Chantel	0.9	0.29
Z	Ceres	0.7	0.24
a	Marie	0.5	0.24
b	Anita	0.5	0.13
c	Angelo	0.4	0.11
d	Hazel	0.3	0.11
e	Franschoek	0.3	0.09
f	Chevron	0.3	0.09
g	Lara	0.3	0.05
h	Tania	0.1	0.05
i	Grace	0.1	0.02
j	Nandi	0.1	0.02
k	Triangle	0.1	0.02
l	Monaco	0.1	0.02
m	Rose	0.1	0.02

Appendix C6 Display Assembly Data.



DISPLAY TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Elegant display	161	50.5
B	Bell and claw	58	18.2
C	Master	43	13.5
D	Denise	17	5.3
E	Queen anne	12	3.8
F	Glass door cocktail	9	.2.8
G	Mercury	9	2.8
H	Atlas	4	1.3
I	Vincent	2	0.6
J	Sliding door	2	0.6
K	Loraine	1	0.3
L	Maureen	1	0.3
M	Angela	1	0.3

Appendix C7 Table and Misc. Assembly Data.

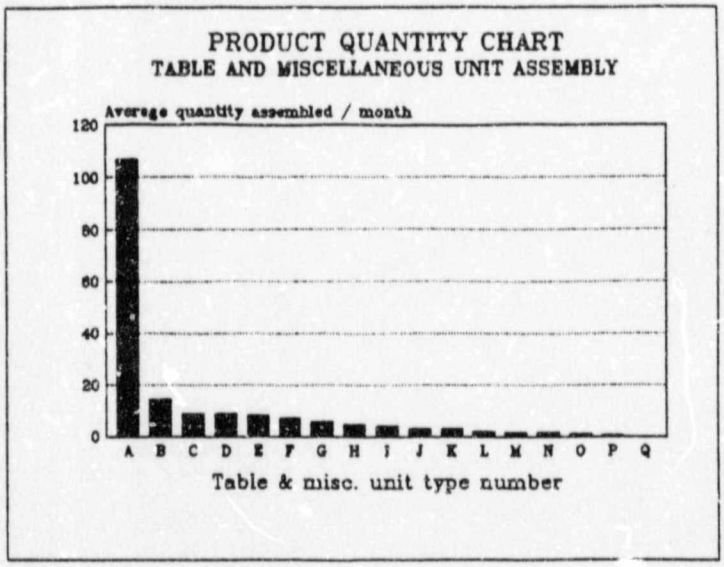
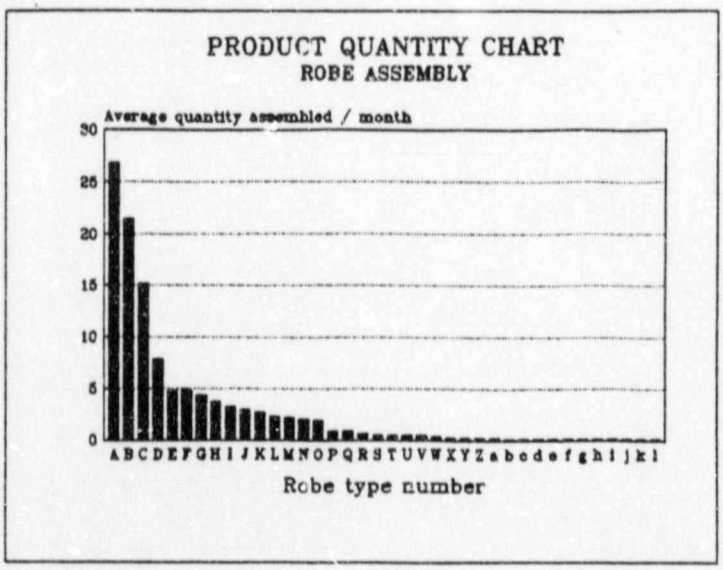


TABLE & UNIT TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Hazel coffee table	107.0	58.7
B	Wall table	14.5	8.0
C	Hi tec corner unit	8.9	4.9
D	Ball and claw	8.9	4.9
E	Kay coffee table	8.0	4.4
F	Lotus top box	7.1	3.9
G	Lotus pedistal	5.6	3.1
H	Maureen coffee table	4.8	2.6
I	Lotus bookcase	4.2	2.3
J	Scorpio box base	3.2	1.8
K	Lewis coffee table	3	1.6
L	Dan Hans coffee table	1.9	1.0
M	Hall stand	1.8	1.0
N	Lotus bed base	1.7	0.9
O	Hugenot Hall stand	1.3	0.7
P	Angelo corner unit	0.3	0.1
Q	Nandi corner unit	0.1	0.05

Appendix C8 Robe Assembly Data.

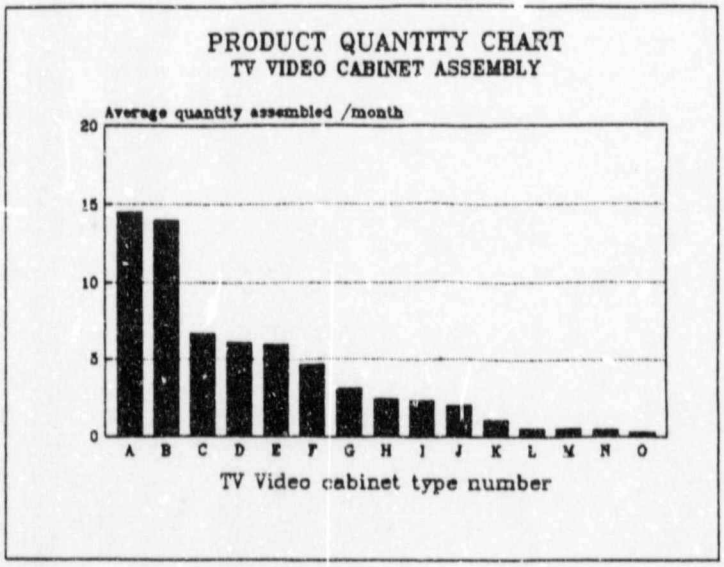


ROBE TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Rozanne	26.9	23.6
B	Tina	21.4	18.8
C	Maureen	15.2	13.3
D	Love	7.9	6.9
E	Daisy	4.7	4.2
F	Tracy	4.7	4.1
G	Carlton	4.4	3.9
H	Aquarius	3.7	3.3
I	Apollo	3.2	2.8
J	Luna	2.9	2.5
K	Ilize	2.7	2.3
L	Paramont	2.3	2.0
M	Special robe	2.2	1.9
N	Scorpio	2.1	1.9
O	Louise	1.9	1.6
P	Hi tec	0.9	0.8
Q	Lotus	0.9	0.6
R	Ceres	0.7	0.6
S	Chevron	0.5	0.5
T	Fame	0.5	0.5
U	Sandy	0.5	0.4
V	Chantel	0.5	0.4

CONT.

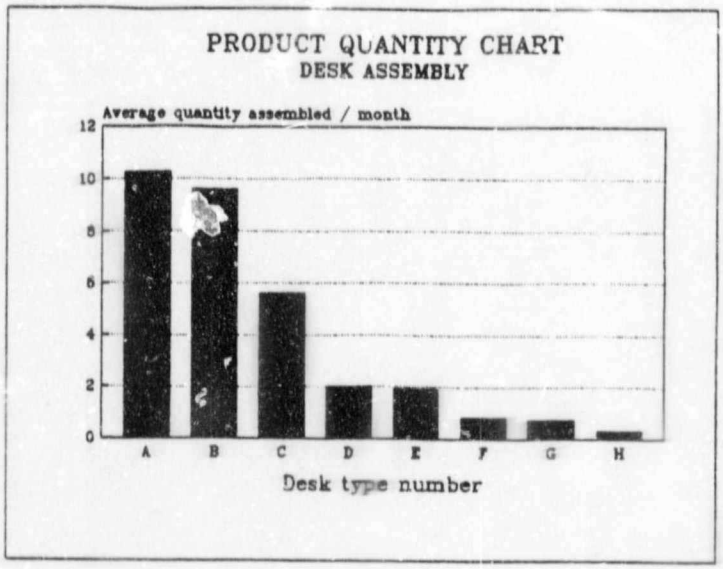
ROBE TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
W	Franschoek	0.4	0.4
X	Hazel	0.3	0.3
Y	Cindy	0.3	0.3
Z	Marie	0.3	0.3
a	Monaco	0.3	0.2
b	Madrid	0.2	0.2
c	Antoinnette	0.2	0.2
d	Caroline	0.2	0.2
e	Cloud 9	0.2	0.2
f	Velana	0.1	0.1
g	Rose	0.1	0.1
h	Lara	0.1	0.1
i	Monte Carlo	0.1	0.1
j	Denise	0.1	0.1
k	Grace	0.1	0.1
l	Imperial	0.1	0.1

Appendix C9 TV Video cabinet Assembly Data.



TV VIDEO CABINET TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Gala	14.5	22.6
B	Oslo	14.0	21.7
C	Open stand TV	6.7	10.5
D	Elite TV cabinet	6.1	9.4
E	Hillary TV video	6.0	9.3
F	Period TV	4.6	7.1
G	Helenski	3.1	4.8
H	TV video Cabinet	2.4	3.7
I	TV music centre	2.3	3.6
J	TV Tulbach	2.0	3.2
K	Copenhagen	1.0	1.6
L	Crystal	0.5	0.9
M	Olwana	0.5	0.8
N	Concordia	0.4	0.6
O	Entertainment	0.3	0.1

Appendix C10 Desk Assembly Data.



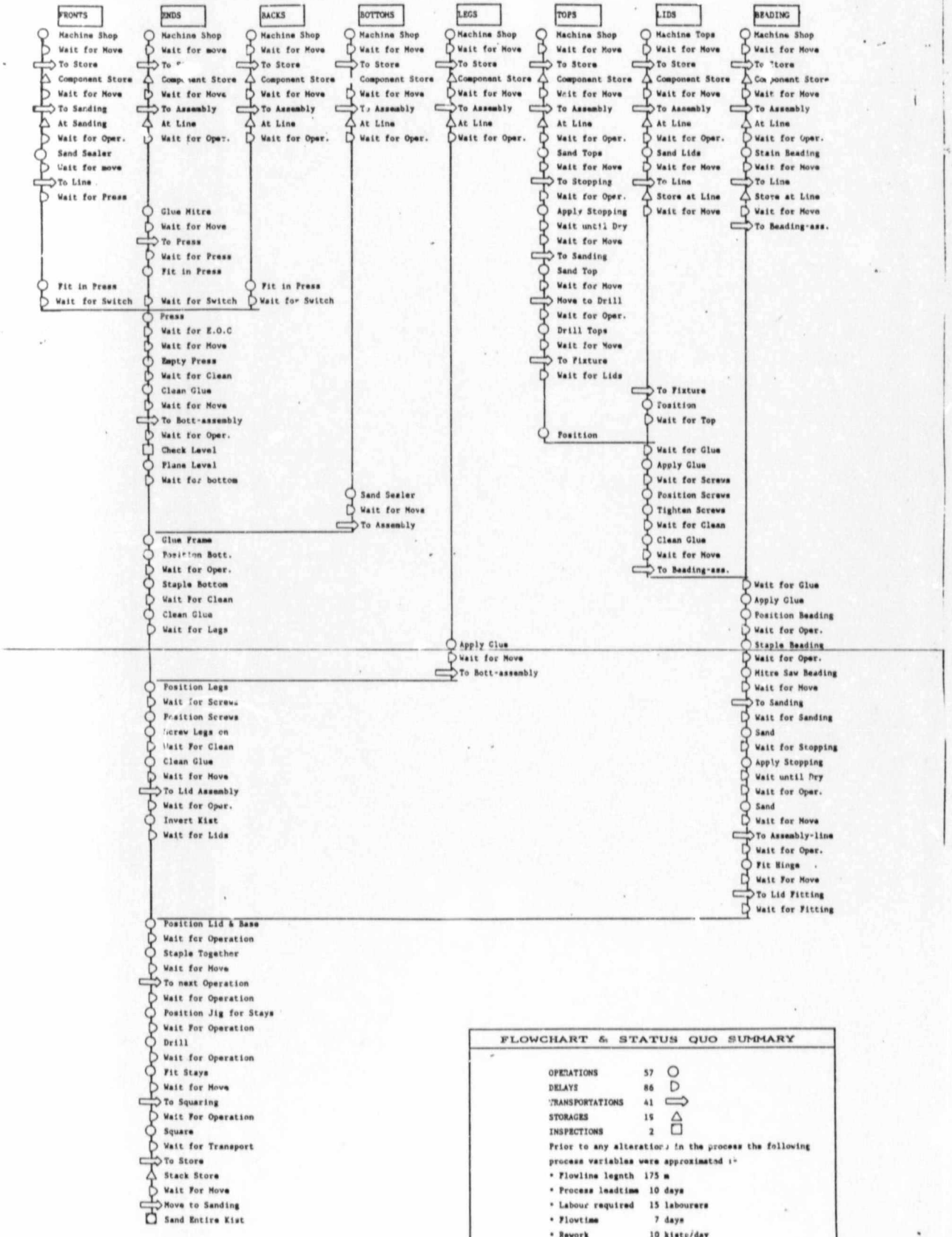
DESK TYPE NO.	DESCRIPTION	QUANTITY / MONTH	PERCENT
A	Hi tec Juvenile	10.3	33.0
B	Fame	9.6	30.7
C	Lotus	5.6	17.9
D	Cloud 9	2.0	6.4
E	Denise	1.9	6.2
F	Tulbach	0.8	2.6
G	Tiger moth	0.7	2.1
H	Fantasy	0.3	1.1

APPENDIX D FLOW PROCESS CHARTS

D1 Original Flow Process Chart

D2 Improved Flow Process Chart

FLOW PROCESS CHART JUNIOR KIST ASSEMBLY FEBRUARY 1987



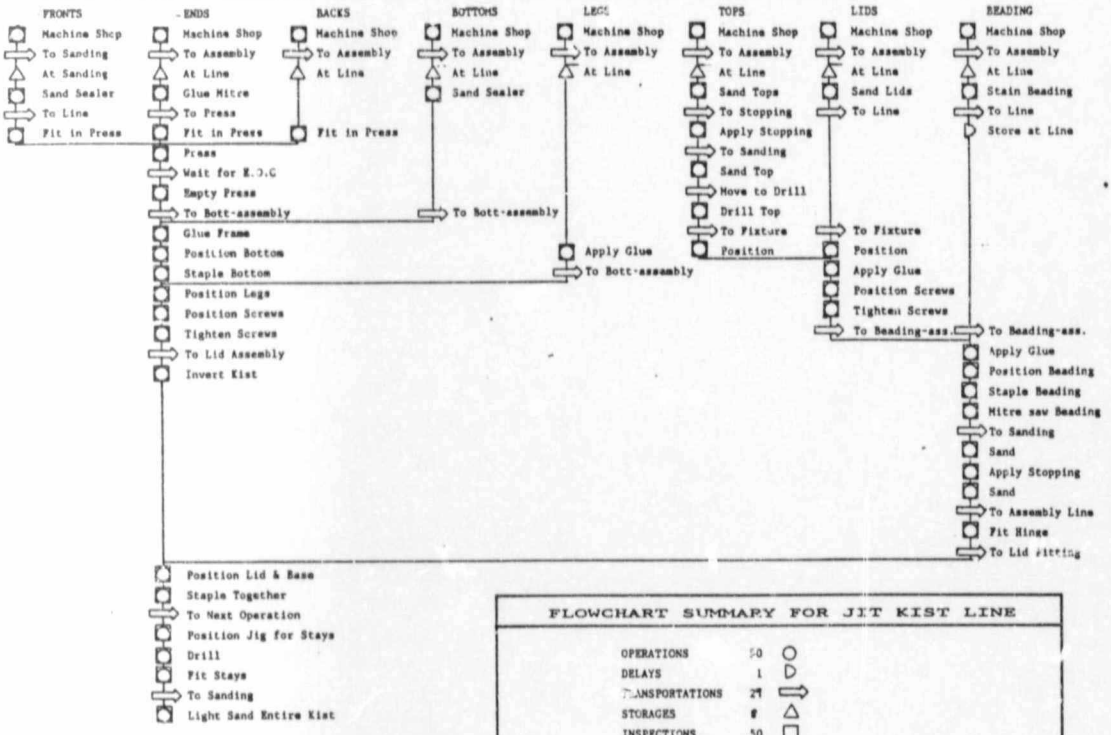
FLOWCHART & STATUS QUO SUMMARY

OPERATIONS	57	○
DELAYS	86	D
TRANSPORTATIONS	41	⇨
STORAGES	19	△
INSPECTIONS	2	□

Prior to any alteration in the process the following process variables were approximated :-

- Flowline legnth 175 m
- Process leadtime 10 days
- Labour required 15 labourers
- Flowtime 7 days
- Rework 10 kists/day
- Assembly rate ±65 kists/day

FLOW PROCESS CHART JUNIOR KIST ASSEMBLY LINE DECEMBER 1987.



FLOWCHART SUMMARY FOR JIT KIST LINE

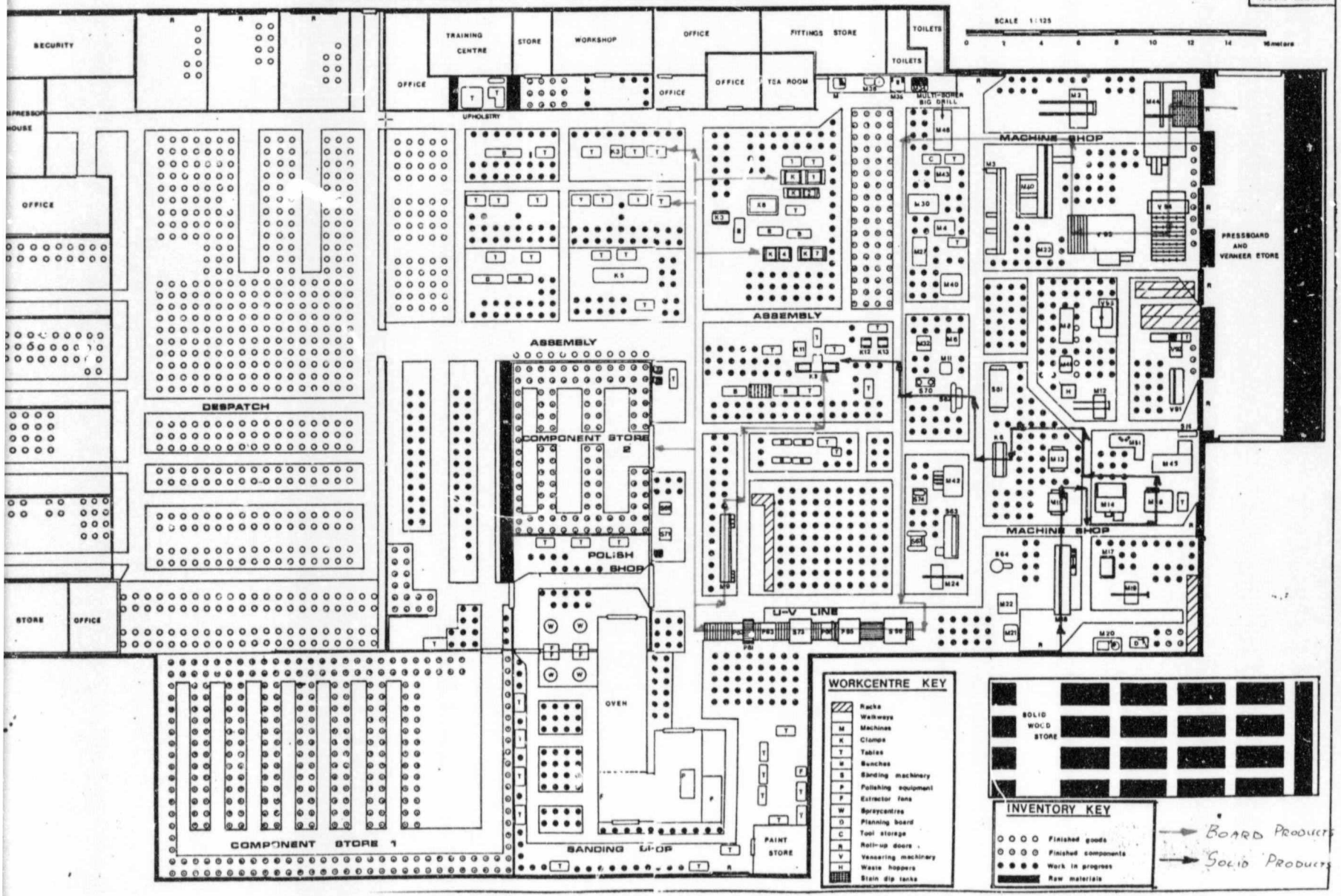
OPERATIONS	50	○
DELAYS	1	D
TRANSPORTATIONS	27	⇨
STORAGES	8	△
INSPECTIONS	50	□

After the line had been converted to a JIT pull line the following process variables were approximated :-

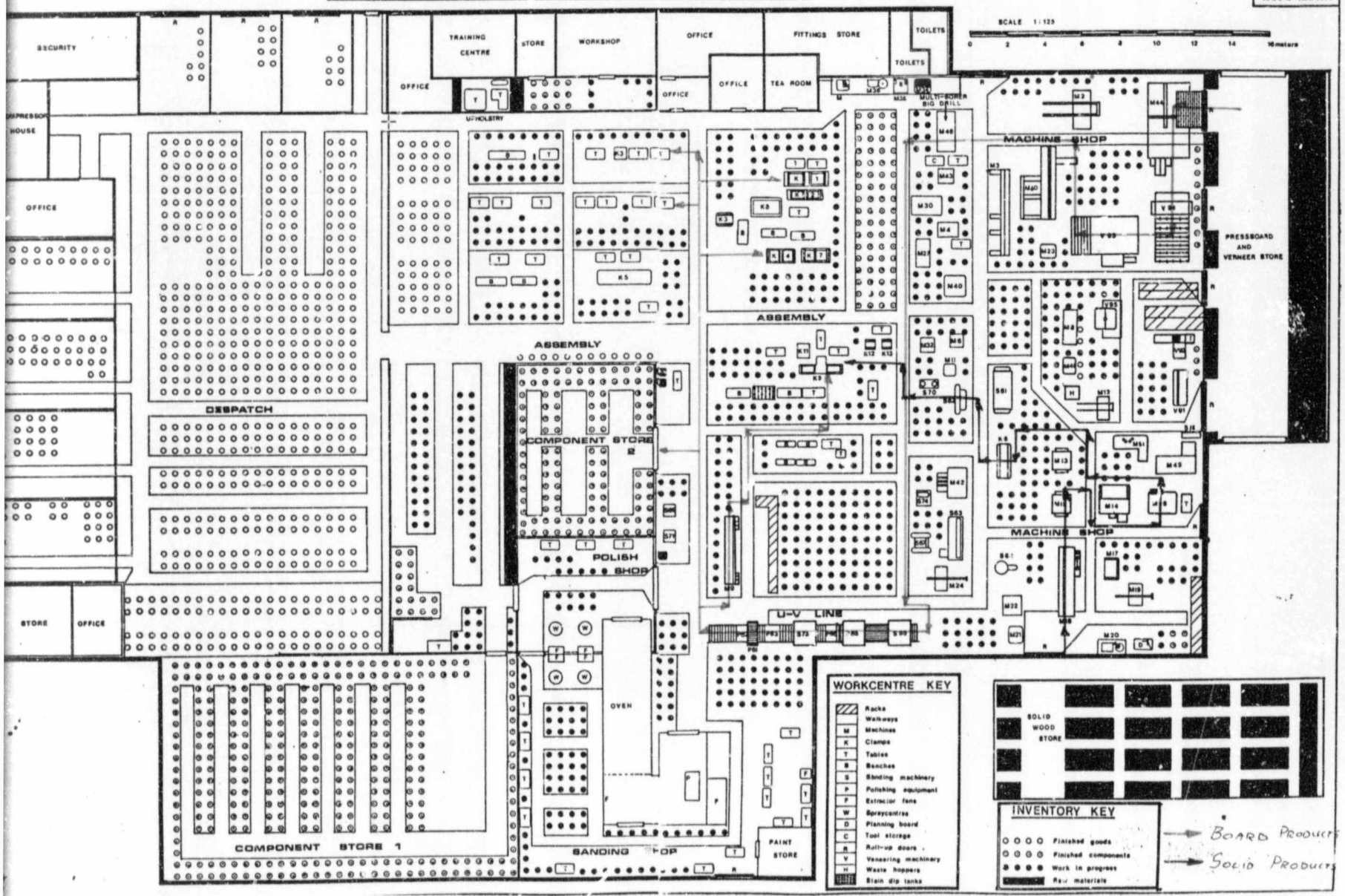
* Flowline legnth. 60 m
* Process leadtime. 1 day
* Labour required. 12 labourers
* Flowtime. 2 hours

APPENDIX E PLANT LAYOUT AS AT FEBRUARY 1987

LAYOUT AS AT FEB. 1987



LAYOUT AS AT FEB. 1987



LAYOUT AS AT FEBRUARY 1987 DIAGRAM KEY

M2 Double Crosscut saw
M3 Edging Machine
M4 Bandsaw
M6 Spindle
M8 Surfacer
M9 Edging Machine
M11 Spindle
M12 Double Crosscut Saw
M13 Thicknesser
M14 Frequency Press
M15 Surfacer
M16 Frequency Press
M17 Multi-drill
M18 Six Cutter
M19 Single Crosscot Saw
M21 Drill Press
M22 Moulder
M23 Trimming Spindle
M24 Single Crosscut
M27 Multi-borer
M30 Multi-borer
M31 Multi-borer
M32 Table Saw
M34 Blade Sharpener
M35 Grinder
M36 Pipe Cutter
M40 Boardsaw
M41 Dovetailer
M42 Auto Router
M43 Dowel Inserter
M44 Boardsaw
M45 Auto Shaper
M46 Multi-borer
M47 Spindle

V91 Veneer Guillotine
V92 Veneer Stitcher
V93 Veneer Press
V94 Glue Spreader
V95 Veneer Joiner

S61 Surfacer
S62 Vertical Belt Sander
S63 Horizontal Belt Sander
S64 Bobbin Sander
S65 Thicknesser
S66 Bobbin Sander
S67 Vertical Belt Sander
S70 Drum Sander
S71 Bobbin Sander
S73 Thicknesser
S74 Vertical Belt Sander

Author Azzie Maurice Michael
Name of thesis The Implementation Of The "just-in-time" Manufacturing Philosophy Into The South African Furniture Industry. 1988

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