

Apparel Internship

at

Raymond Limited,

Doddaballapur

Submitted as part of academic requirements for
Bachelor of Fashion Technology (Apparel Production)

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Submitted by

Aditi Galada | BFT/16/91



Department of Fashion Technology

National Institute of Fashion Technology, Chennai

Acknowledgement

Within the preview of the apparel industry there is much information pertaining to making of garments, disseminated by words in the books. But to see the whole process by your own eyes is a wonderful experience. We the students of Apparel production, Department of Fashion Technology, semester VII, of NIFT, Chennai would like to extend our sincere gratitude to the management of National Institute of Fashion Technology and Silver Spark Apparel Limited for providing us this opportunity to experience and learn the processes practiced in Apparel Industry.

Apart from our own efforts, the success of any project largely depends on the encouragement and guidelines of many others. We take this opportunity to express our gratitude to the people who have been instrumental in the successful completion of this project.

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Moreover, we would like to thank Mr. Nitin G Wankar, Plant Manager, SSAL Doddaballapur for supporting us throughout our apparel internship.

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It was a great learning experience throughout to see one of the most well planned and advanced garment manufacturing units.

Last but not the least we would like to thank the almighty for blessing us and making this project our success.

Mentor Signature

Declaration

We, Aditi Galada and Ambuj Deepak Gautam, hereby declare that the internship document submitted to the Department of Fashion Technology, National Institute of Fashion Technology, Chennai as a part of our academic requirement is an original work is an original work done by us under the supervision of Mr. Praveen D. Nagarajan, Assistant Professor and Center Coordinator, Department of Fashion Technology.

Aditi Galada

Certificate

This is to certify that the internship document submitted to the Department of Fashion Technology, National Institute of Fashion Technology, Chennai by Aditi Galada and Ambuj Deepak Gautam as a part of their academic requirement is an original work done by them.

Place: Chennai

Date: 19-09-19

Mr. Praveen D. Nagarajan

(Mentor)

Associated Professor and Center Coordinator

Department of Fashion Technology

NIFT Chennai

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Introduction

ABOUT RAYMOND LIMITED

Incorporated in 1925, Raymond Group is one of India's largest branded fabric and fashion retailers. It is one of the leading, integrated producers of worsted suiting fabric in the world, with a capacity of producing 31 million meters of wool & wool-blended fabrics. It is a \$ 500 million conglomerate fast heading to cross the \$ 1 billion mark, with major interests in textiles, ready to wear garments, retailing, as well as presence in engineering and prophylactics.

Trust, Excellence, Quality, These are some of the abiding values that have been associated with Raymond over the years. Today they have the distinction of being the world's largest integrated producers of worsted suiting fabrics.

In the carded woolen fabric the group has a joint venture with Lannificio F Fedora, the world's premier maker of carded woolen fabric with a capacity of 2.5 million Meters of jacketing and over coating fabric.

They produce nearly 20,000 design and colors of suiting fabric, that have found their way in over 55 countries including the European Union, USA, Canada, Japan and Australia among others. Even as their products evolve with the times, the brand still caters to the different faces of 'The Complete Man'- a man who is caring, sensitive and places a huge premium on relationships.

After making a mark in textiles, Raymond forayed into garmenting through highly successful ventures like Silver Spark Apparel Ltd., Ever Blue Apparel Ltd. (Jeanswear) and Celebrations Apparel Ltd. (Shirts). They also have some of the most highly respected apparel brands in our portfolio: Raymond, Raymond Premium Apparel, Manzoni, Park Avenue, Color Plus, Parx and Notting Hill.

The Raymond Group also has an expansive retail presence established through the exclusive chain of 'The Raymond Shop' and stand-alone brand stores. They are today one of the largest players in fabrics, designer wear, denim, cosmetics & toiletries, engineering files & tools, prophylactics and air charter services in national and international markets. All our plants are ISO certified, leveraging on cutting-edge technology that adheres to the highest quality parameters while also being environment friendly.

BUSINESSES

SUITING

Raymond is one of the largest vertically and horizontally integrated manufacturers of worsted suiting fabric in the world and commands a dominant market share of over 60 percent in the worsted suiting fabric space in India.

Raymond's state-of-the-art fabric manufacturing plants in

- Vapi (Gujarat)
- Chhindwara (Madhya Pradesh)
- Jalgaon (Maharashtra)

have an aggregate manufacturing capacity of 38 million metres of suiting fabric extending across all wool, poly-wool, silk, polyester viscose blend, cotton blend, linen blend and other premium blends.

SHIRTING

Raymond manufactures some of the finest shirting fabrics in India, marked by innovative designs and aligned to latest fashion trends. A B2B business, Raymond Luxury Cottons, produces the world's finest 340s count cotton and 150 lea pure linen fabrics.

With 26 million metres of capacity at its state-of-the-art manufacturing facility in Kolhapur (Maharashtra), the unit produces high value cotton and linen shirting and bottom weight fabrics for leading domestic and international brands.

GARMENTING

Raymond Group ventured into garmenting business through its wholly owned subsidiaries –

- Silver Spark Apparel Ltd (Suits)
- EverBlue Apparel Ltd. (Jeanswear)
- Celebrations Apparel Ltd. (Shirts)

A white label-integrated supplier to leading international brands, the garmenting business includes manufacturing of high-end suits, jackets, trousers and shirts with exports spanning to USA, Europe and Japan. Silver Spark Apparel Ltd is the only Indian manufacturer with an expertise to craft Full Canvas Suits.

RETAIL PRESENCE

Raymond Group is amongst the three leading branded apparel players in the menswear industry with a portfolio of four Power Brands –

- Raymond Ready-to-wear (RRTW)
- Park Avenue (PA)
- Color Plus (CP)
- Parx.

Over the last few years, there has been a rapid expansion – across all channels including 257 Exclusive Brand Outlets (EBOs), 3,300 Multi Brand Outlets (MBOs) (through distributor network), 800 Large Format Store (LFS) chains and leading online portals.

Marking its foray in the ecommerce space, Raymond launched raymondnext.com - a one-stop fashion solution for all brands under the Raymond umbrella.

DENIM

The business's fabric manufacturing facilities are located in

- Yavatmal (Maharashtra)
- Romania (Europe)

have an aggregated annual manufacturing capacity of 47 million metres. Having earned the respect of leading brands in domestic as well as international markets, Raymond UCO Denim meets the growing demands of fashion-conscious customers.

TOOLS & HARDWARE

Raymond Group ventured into the engineering business in early 1949, with the inception of JK Files & Tools. This segment comprises of manufacturing of steel files and cutting tools and marketing of hand tools and power tools. Today, JK Files & Tools is the largest manufacturer of Steel Files in the world.

With a strong manufacturing capacity of 71 million pieces of files and 21 million pieces of drills per annum, JK Files & Tools has state of the art manufacturing ISO 9000-2008 certified plants in India. This business holds over 60% market share in India and 30% share in the global markets and is the leader in the category.

FMCG

The Raymond Group has a noteworthy presence in the FMCG business through associate companies – Raymond Consumer Care Private Limited. With pioneering brands like Park Avenue and KS; home care segment through Premium brand and sexual wellness segment through KamaSutra brand, Raymond is steadfastly expanding its presence in the category.

AUTOMOTIVE COMPONENTS

Equipped with unparalleled & state-of-the-art infrastructure for critical processes and are certified with ISO/TS 16949 Quality system, Ring Plus Aqua offers unbeatable value proposition in the industry.

At the heart of the success is the continuous focus on producing products that exceed our customers' expectations with an emphasis on OTIF (On Time In Full) and Reliable Quality.

Ring Plus Aqua also caters to the JIT (Just-in-time) needs of its customers through its warehouses in United States & Europe. Ring Plus Aqua has annual production capacity 48 lac pieces for Ring Gears, 5 million pieces for Water Pump Bearings and 0.4 million pieces for Flex Plates.

EXECUTIVE LEADERS



GAUTAM HARI SINGHANIA

- Chairman & Managing Director



SANJAY BAHL

- Chief Finance Officer



DEEPAK KHETRAPAL

- Chief Operating Officer

President – FMCG and Retail: Aniruddha Deshmukh

President – Engineering Business: Harshal Jayavant

President – Corporate Affairs: H. Sunder

President – HR: K.A. Narayan

President – Strategic Initiatives: Nitin Jain

President – Shirting Fabric Business: Robert Lobo

President – Group Apparel: Shreyas Joshi

President – Textiles: S.K. Singhal

COMPANY PROFILE

Name of Company	Raymond Limited
Company Address	No.56, Majara Hosahalli, Doddaballapur, Bangalore - 561203
Date of Establishment	20 July 2000
Plant Manager	Mr. Nitin Wanker
Category of Company	Non-govt company
Class of Company	Public company

Raymond Limited was established on 20th July 2000. It is established in the rural area with objective of getting labour force at lower cost because it is a labour intensive industry, under this (which includes 85% female and 15% male) industry 2,500 employees are working which includes both staff and employees.

DEMOGRAPHIC

As of the latest India census, Doddballapur had a population of 30,530. Males constitute 51% population and females 49%. Doddballapur has an average literacy rate of 75%, higher than that of the national average of 61%: male literacy is 77% and female literacy is 65%. In Doddaballapur, 12% of the population is under 6 years of age.

SWOT ANALYSIS

STRENGTH	WEAKNESS
<ul style="list-style-type: none"> • Competitive • Excellent brand name • High quality • Low labour cost 	<ul style="list-style-type: none"> • Labour intensive industry • High labour turnover • Under-utilization of resources
OPPORTUNITY	THREATS
<ul style="list-style-type: none"> • No competition in made to measure • High demand for made to measure 	<ul style="list-style-type: none"> • Upcoming made to measure companies • Inability to ship orders on time

JOINT VENTURES

- Raymond UCO Denim Pvt. Ltd. - The manufacturers and marketers of denim fabrics.
- Raymond Zambaiti Pvt. Ltd. - A Greenfield facility manufacturing high value cotton shirting.
- J.K. Ansell Ltd. - The manufacturers and marketers of contraceptives and surgical gloves.
- J.K. Talabot Ltd. - Our Joint venture with MOB Outillage SA, manufacturing files and rasps for international markets.

BRANDS

- RAYMOND BRAND: Stylish and Sophisticated clothing for men.
- PARK AVENUE: A wardrobe offering for the corporate world.
- COLORPLUS: Trend-savvy, sophisticated premium range of clothing for men.
- RAYMOND READY TO WEAR: Boasts masterpieces of exceptional ease and luxury.
- PARX: premium casual lifestyle brand.
- ETHNIX: A modern range with contemporary touch and intricate details.
- RAYMOND HOME: versatile Home textiles collection.
- RAYMOND MADE TO MEASURE: allows the customer to personalize their ensemble.

ABOUT SILVER SPARK APPAREL LIMITED UNIT 1

PRODUCT PORTFOLIO

Silver spark Apparel Ltd (SSAL) is a part of an 80-year-old leading business group in the garment industry, Raymond India ltd. It is a wholly owned subsidiary of the Textile and Apparel major Raymond Limited making the group's foray in Global Apparel Outsourcing market.

The facility manufactures garments catering largely to export markets and are at par with best in class from Japan and Italy.

Premium Full Canvas Hand Made Suits	Manufactured only by Raymond in India	No use of any thermo fusible interlining inside it which makes it extremely soft and comfortable to wear with a very snug fit
Premium Half Canvas Suits	Manufactured only by selected handful manufacturers in India	Uses minimal thermo fusible interlining to achieve a perfect balance between comfort body movement and a crisp look
Made to Measure	Only Business model in India, integrating customised tailoring with factory finish. Presence: Pan India Middle East	Offers an unparalleled range of choice in fabric, style and personalisation
Trousers	State of Art manufactured only by selected handful manufacturers in India	Offers an unparalleled quality in fabric, and fit
Vest	Manufactured only by selected handful manufacturers in India	Offers an ensemble for The Complete Man
Lithography	Only Business model in India offering customised leather accessories with a personal touch from a Brand	Provides customers with customised premium range of leather accessories with a personal touch

QUALITY PRACTICES

8D Problem solving Methodology	Self and Sequential Inspection by the Operators	Quality Month Celebrations
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HIGH TECHNOLOGY INDEX

Sponging Machine	Roll Management Software	Lapel Roll Padding Machine
Used only for high end suits available only with a handful of suit manufacturers	A unique concept of additional cost savings available only with select few in India	A unique process specific to full & half canvas suit. Full canvas is only made in Raymond

KEY SUCCESS INDICATORS

Key Success Indicators	Value Proposition	Business goals
Vertical Integration with Raymond fabric	One stop shop for customers leading to cost optimisations and increased value	Supply chain Flexibility Lower Cost Base Enhanced Quality

	Reduced buying complexity	
Global Footprint	Manufacturing facility at various geographical location for faster servicing and business resiliency	Lower Cost Shorter Order Fulfilment Time
Premium Products: Half and Full Canvas	Offer the customers premium products over current portfolio and increase our share of this product mix	Product Margins Improved Business Revenues Product Variety
Direct to brands	Create enhanced customer experience through co-creation with brands	Preferred Supplier Status Revenue Continuity/ Enhanced Margins Enhanced Product Design
Partnership with core Customers	Create and ecosystem that makes products on “Made to availability” principles	Increased Revenue Better Profit Margins``
Made To Measure	Custom fit to the individual with the state of the art technology	Creating Upwardly Mobile Customer Increased Revenue

HUMAN RESOURCE PRACTICE

- Initiatives for Women Employees: Among the many initiatives taken to help women employees, the SSAL unit has a dedicated unit for production of sanitary napkins for women.
- Equal and Inclusive Opportunity Provider
- Open & Transparent Communication
- Preventive and Curative Health Initiatives - an emphasis on Holistic Health
- Awareness Programs: Various programs are held from time to time, for example, saplings are planted to celebrate World Environment Day and various yoga postures are taught to the operators on World Yoga Day.

RECOGNITIONS

- 22nd in Category of Large Businesses in Asia - 2016
- 2nd in manufacturing, in India - 2015
- 4th in manufacturing, in India - 2014
- Gold Category on debut– India Manufacturing Excellence Awards - 2015.
- 1st Prize CII-9th National Lean Six Sigma competition, 2015
- For Highest Unit Value Exporter & highest woolen exports consecutively For the 3 Years (FY10, 11 & 12)

UNITS WITHIN SSAL

SSAL consists of 3 units, namely,

- MTM Unit, which manufactures for Raymond's own Made to Measure brand,
- Bulk Unit, which manufactures for export solely. Major clients include:
 - Konaka (Japanese Buyer)
 - Charles Tyrwhitt
 - Peerless

- Levis
 - ST Lonia
 - J C Penny
 - Calvin Klein
 - Banana Republic
- Macintosh Unit, which manufactures made to measure garments for Tailor Brand, namely, Joseph Abboud.

The product categories include,

- Suit
- Jacket
- Trouser
- Vest

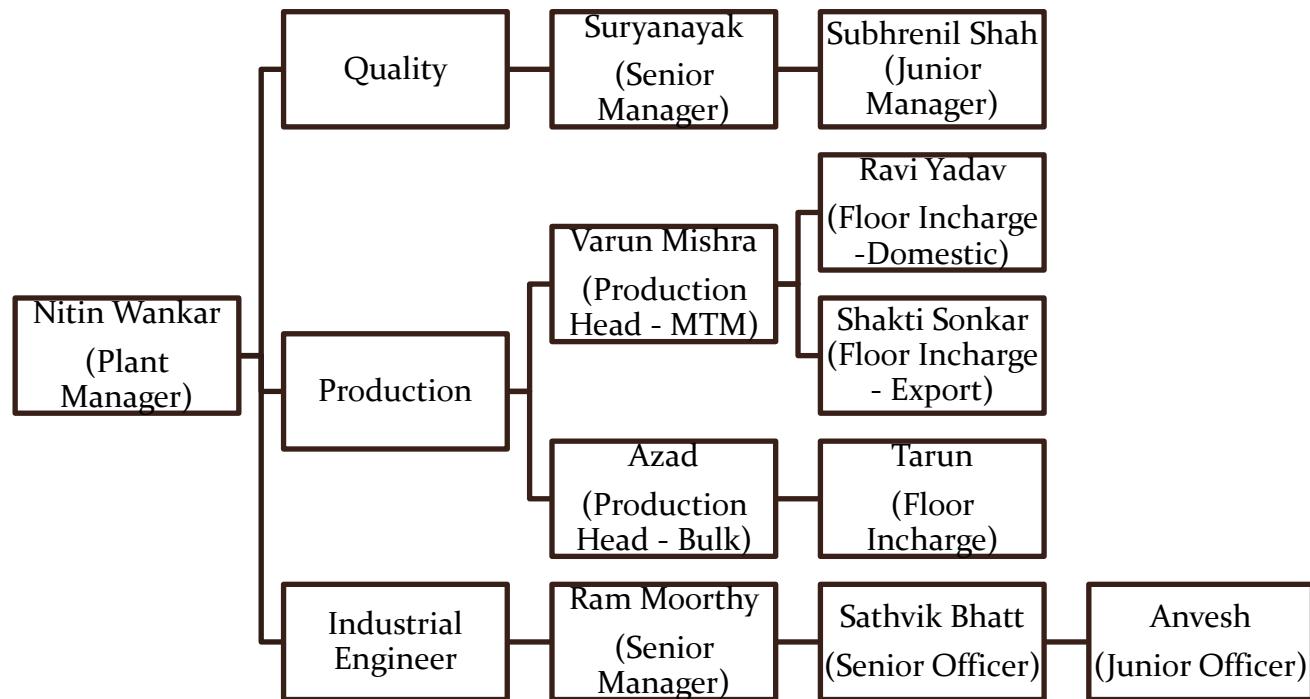
SSAL-1 produces:

- 0.80 million jackets annually
- 0.075 million vests annually
- 1.0 million trousers annually

The facility has a total built-up area of 2,00,000 square feet and houses some of the highly rated equipment including CAD – CAM.

Fully compliant with international quality norms, the facility has been audited and approved for commercial production by major American and Japanese menswear buyers. The major market for the firm is USA, and other markets are Japan, Canada and Europe.

ORGANIZATIONAL STRUCTURE



DEPARTMENTS

DEPARTMENTS IN MACINTOSH

1. Training
2. CAD

3. Store
4. Sub-store
5. Cutting
6. Sewing
7. Finishing
8. Quality Assurance
9. Warehouse

OTHER DEPARTMENTS

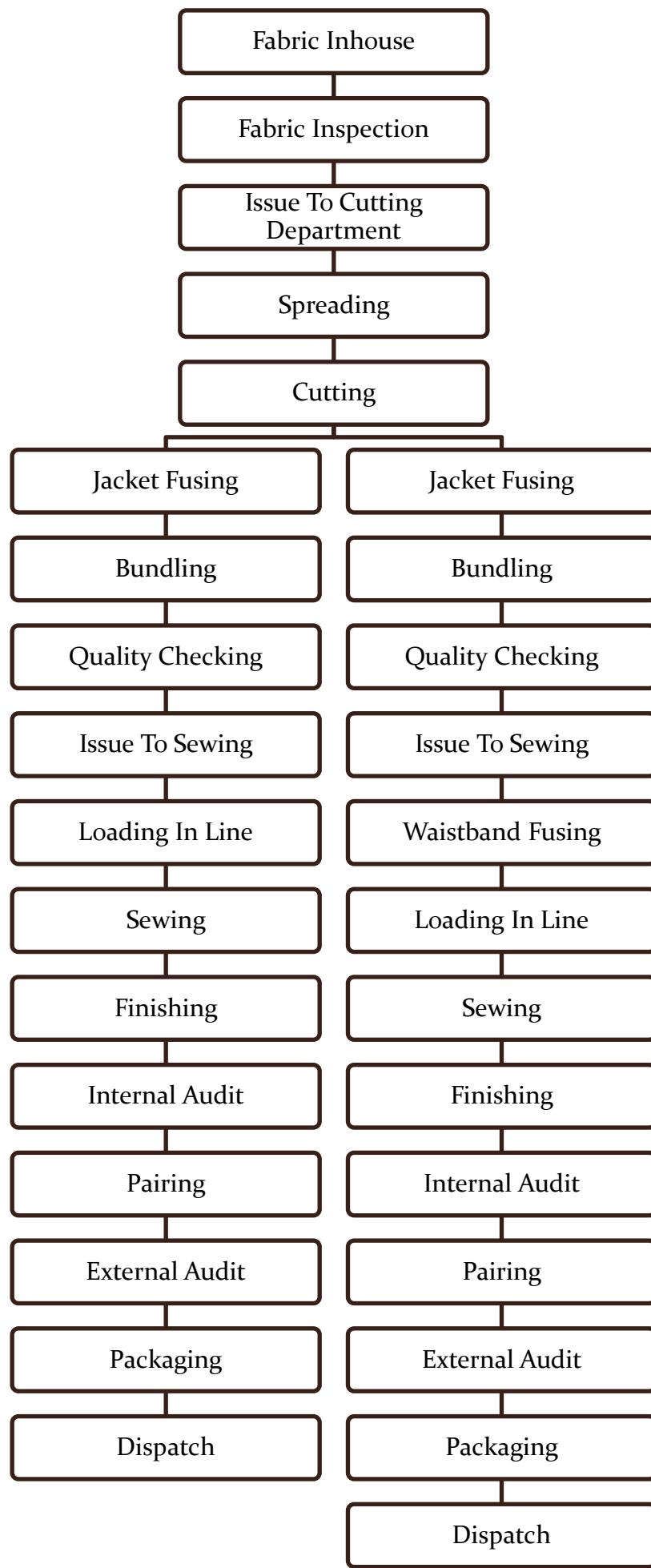
1. Industrial Engineering Department
2. Maintenance Department
3. Accounts and Finance Department
4. Human Resource Department
5. Information Technology Department
6. Bulk Production Unit

Macintosh

WORKFLOW

CAD	Receiving order from customer through XML Open order and print technical sheet Download ORD file Save and process the pattern File imported to ACCUMARK Put the pattern into nester Update actual consumption Barcode generation Technical sheet issue to fabric store
STORE	Technical sheet received from CAD Search and scan fabric roll Take out fabric roll and lining and check Ref No. Fabric and lining cut as per consumption & issued
CUTTING	Single ply laying for each order Scan barcode to open marker and cut Fusing Ready cutting Issue canvas + sleeve head + shoulder pad Barcode the canvas + sleeve head + shoulder pad Issue to quality after bundling
SEWING	Receiving bundle from QC table Sew front, lining, sleeve Pairing Assembly Endline checking and scanning Attaching Invoice with AWB Scanning of AWB
FINISHING	Finish the garment Final internal quality checking Attach jocker ticket Garment pairing and order completion Internal Audit Scan for order tracking
WAREHOUSE	Jacket output Trouser output Finished garment temporary storage Buyer QC audit Dusting Polycover and sealing Polycover Sticker Box packing/ Scan and pack Box storage at warehouse Pallet packing Shring Wrap Strapping

MATERIAL FLOW



MODELS

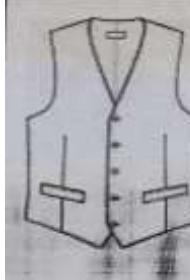
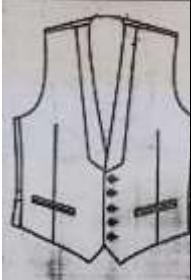
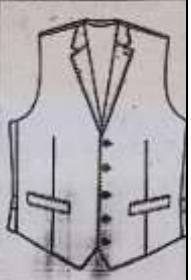
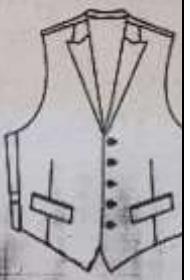
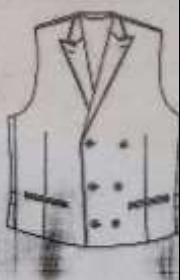
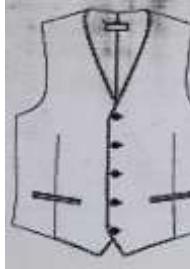
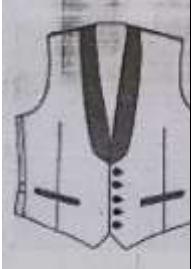
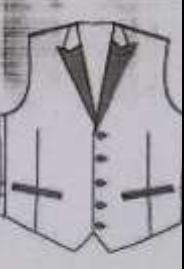
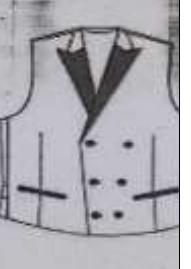
JACKET STYLES OFFERED BY MACHINTOSH JOE

Jacket	1 Button Peak Lapel	1 Button Tuxedo Shawl	2 Button Peak Lapel	2 Button Notch Lapel	3 Button Notch Lapel	Peak Double Breast 6 On 2
Jacket Sketch						
Extreme Slim	Venice	Dallas	Las Vegas	Melrose	Malden	Crosby
Slim	Blakey	Barl	Beverly	Grant	Garland	Derby
Modern	Chester	Chase	Charter	Chelsea	Lucca	Earl
Classic	Casino	Carmel	Columbus	Houston	Corpus	Cleveland
Portly	Etta	Eagle	Edison	Executive	Empire	

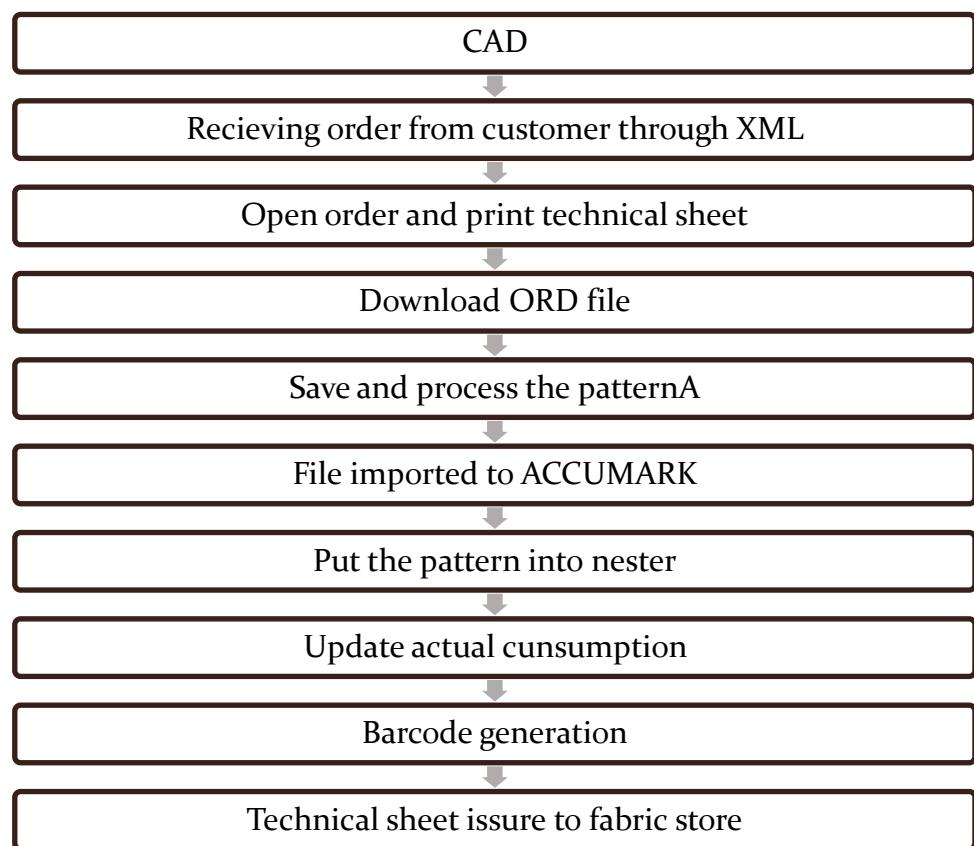
TROUSER STYLES OFFERED BY MACINTOSH JOE

Pants	Flat front	One pleat	Two pleats
Pant sketches			
Extreme Slim	Phil	Perry	Page
Slim	Lucky	Stefano	Lotto
Modern	Sven	Buddy	Brad
Classic	Duke	Arlo	Anthony
Portly	Executive FF	Executive 1P	Executive 2P

VEST COAT STYLES OFFERED BY MACINTOSH JOE

Vest	5 Button Vest	5 Button Shawl Lapel	5 Button Notch Lapel	5 Button Peak Lapel	Double Breast 6 Button Peak Lapel
Standard Vest Sketch					
Tuxedo Vest Sketch					
Extreme Slim	Rockford	Madison	Lacrosse	Aston	Disney
Slim	Weston	Monaco	Lyon	Arno	Delta
Modern	Signature	Memphis	London	Akron	Dalton
Classic	Concord	Malta	Lincoln	Austin	Denver
Portly	Executive VE	Moore	Liberty	Albany	Dresden

CAD DEPARTMENT



The Macintosh department receives orders in XML format from the buyer. XML is a software- and hardware-independent tool for storing and transporting data. XML or eXtensible Markup Language is much like HTML. It has sender information, receiver information, heading and the body.

This file sent by the buyer is downloaded and converted into .net format to obtain the tracksheet.

The important information in the tracksheet is:

- Order Number
- PO Number
- Order ID
- Assigned date
- Size
- Delivery Date
- Model Name
- Quantity
- Style Details
 - Jacket Type
 - Jacket Front
 - Lapel Type
 - No. of buttons
 - Back vent
 - Pocket Type
 - Personal Label
- Material Details
 - Fabric Code
 - Lining Code
 - Sleeve Lining Code
 - Button Code
 - Felt Color Code
 - Fabric Width

- Fabric Type
 - Shrinkage
- Measurements
 - Across Shoulder
 - Across Back
 - Center Back
 - Vent Length
 - Left Armhole
 - Right Armhole
 - Waist
 - Seat
 - Button Stance
 - Lapel Width
 - Breast Pocket Position
 - Front Pocket Flap Position
 - Bicep Circumference
- Thread Details
 - Buttonhole thread
 - Body lining thread
 - Sleeve lining thread
 - Collar felt thread
 - Zigzag thread
 - Shell seaming thread
 - Fusing color
 - Shoulder pad
- Tags for Lining, Sleeve, Front, Collar and Back with the necessary details. These tags were cut and attached to garment components before loading into the sewing line to provide the sewing machine operator with the required information.
- Barcodes for opening markers and tracking the piece at various stages.

This tracksheet is then printed on color coded sheets.

MACINTOSH	
MONDAY	
TUESDAY	
WEDNESDAY	
THURSDAY	
FRIDAY	
SATURDAY	
SUNDAY	

Fig: Color coding of track sheet

After this the tracksheet is passed to the next operator who downloads the ORD file. Then the patterns are saved and processed. There are limited number of models and the patterns are made automatically according to the model and size. Specifically, there are 29 models for jacket, 15 for vests and 25 for trousers

These patterns are then imported into the Accumark software in order to make the marker. The patterns appear on top of the window. The operators have to merely drag and drop the patterns to ensure best efficiency.

Once, they are satisfied with the marker, they write down the fabric consumption on the tracksheet and enter it in the ERP Software as well. The fabric consumption of shell fabric, body lining fabric, sleeve lining fabric, body fusing, lapel fusing, and knee lining is mentioned.

Parts such as pocketing fabric, sleeve head and chest canvas are not included in the marker. These parts are cut in bulk.

Then, they upload the marker onto the network from where the cutters in the cutting department can access them.

After the marker is made, the tracksheet is passed to the sticker printing process. Here stickers are printed for major parts of the garments. This process was implemented in order to eliminate the process of tagging (cutting parts of the tracksheet and tacking them to the respective parts).

The stickers for jacket include:

- Front Section
- Back Section
- Sleeve Section
- Lining Section
- Collar Section

The stickers for vest include:

- Lining Section
- Front Section

The stickers for trouser include:

- Front
- Back
- Waistband
- Left Fly
- Right Fly

The data in these stickers includes:

- Order ID
- Model Name
- PO Number
- Other required data for each component

These stickers are stapled to the tracksheet and removed in the cutting department after the garment has been cut and is ready to be stickered.

After the stickers are printed and stapled to the tracksheet, the tracksheet is sent to the taffeta label printing machine. Here, the taffeta label is printed and stapled to each tracksheet.

The taffeta label consists of the following information

- Order Number
- PO Number
- Customer
- Garment
- Fabric code
- Delivery date
- Assigned date
- Wash care Label

After all the above processes are completed, the track sheets are given to the sub-store in batches of 20 to 30 sheets throughout the day.

STORE

There are two stores of Macintosh, the main store which is further divided into fabric store and trims store and the sub store. The main store consists of numerous rolls of fabric, trims such as buttons, stationary etc. and the sub-store which is adjacent to the cutting department consists of one roll of every shell fabric, lining, body fusing, lapel fusing.

FABRIC STORE

The main store receives several consignments and maintains an inventory of all materials in on a computer which is linked to the ERP software Stage.

FUNCTIONS

- Receive the fabric as per BOM
- Inspect the fabric
- Conduct shrinkage and color fastness test

MATERIALS STORED

- Shell / main fabric
- Lining fabric
- Pocketing fabric
- Felt
- Canvas
- Fusing

SPONGING MACHINE

A pre-shrinkage process involves the dampening with a sponge to woolen and worsted fabrics. The process is accomplished by rolling in moist muslin, or by steaming. This is done prior to cutting to prevent contraction of the material in the garment.

- Make: Weishi
- Number of machines: 1
- Power 35KW
- Voltage 380V/3P/50Hz
- Steam pressure - 0.4-0.6 Mpa
- Steam consumption - 100-200kg/hr
- Speed range - 1-8m/min
- Work width - 1800 mm
- Dimension - 7700x2500x1750
- Weight -2500 kg
- Dimension - 8600 x2500 x 1750mm cube



Fig: Sponging Machine

FABRIC INSPECTION

1. GRADING FOR DEFECTS

There is a Ramson fabric inspection machine in the store where 10% inspection is done for every roll. Fabric is inspected using 4-point system.

- Rolls are kept at Feeding Roll (Back Winding Roll) which is aligned at the centre of machine
- Threading of the machine is done, while threading the Reset Meter Button is pressed. That resets the meter gauge at 00:00 position
- An empty paper roll is kept at Delivery Roll (Front Winding Roll) which is aligned at the centre of the Machine & wound for $\frac{1}{2}$ meter of fabric. It is ensured that paper roll is free from bend or crack.
- Edge sensor is aligned accurately. Edge sensor photocells are kept at the selvedge end.
- Fabric width is checked.
- Fabric checking is done at constant speed
- Appropriate stickers are put to identify the defect.
- In case of major defects chalk marks are also used.
- Fabric defects are noted down in the inspection sheet.
 - Double pick
 - Holes
 - Tight end
 - Stain or soils
 - Knots
 - Slub contamination
 - Weft bar floats
 - Grease
 - Lashing in
 - Sticky yarn
 - Broken pick
 - Distortion
 - Stop marks
 - Loose end
- Total defect points are calculated on the basic of 4-point system.
- Fabric flaws or defects are assigned points values based on the following

Length Of Defect	Points Assigned
In Warp/Weft Direction	
Up To 3 Cms	1
Over 3 Cms To 6 Cms	2
Over 6 Cms To 9 Cms	3
Over 9 Cms	4
Holes & Opening	

1 Inch Or Less	2
Over 1 Inch	4



Fig: Ramson Checking Machine

Rejected if % points is more than 40 per 100 yards or 42 per 100 meters, or as specified

$$\frac{\text{Total defect points in the piece} \times 100 \times 100}{\text{Length of the piece (in mts)} \times \text{width (in cms)}}$$

Fabric Roll Acceptance Criteria

Total defect points per 100 Square yard are calculated & fabric roll having more than 40 Points/100 Sq. yard are consider as seconds.

Maximum number of defect point per liner meter should be 4, if it is more than 4, reject that liner meter.

2. COLOR SHADE VARIATION

Machine

Name: Color matching machine

Brand: Spectra vide

Light source: D-65, TL-84, UVB,BULB,CWF Light

a. Roll to roll variation

The aim of this process is to check color shade variation between different rolls of the same fabric.

Swatch

Swatch size: 4 Inch * 8 Inch

Process

1. Sample is kept on 45 degree inclined plate of Colour Matching Machine.
2. The Face side of sample swatch is kept in lengthwise direction as well as width wise at the side of approved sample & compare for the Visual shade difference. And the decision taken if there is any visible difference.
3. All swatches are attached to the swatch card in a serial manner with roll no respectively.
4. All rolls are checked for roll to roll shade variation.
5. The swatch card is signed by the department heads of store, merchandising, quality control, cutting, sewing and finishing.

b. Centre to selvedge variation

The aim of this process is to check color shade variation across the width of the fabric from center to selvedge.

Swatch

Swatch size: 12 Inch *1/4th Fabric Width

Process

1. Swatches are stitched such that the selvedge swatches are between the swatches from the centre
2. The face side of stitched swatch is kept in lengthwise direction on 45 degree inclined plate of Colour Matching Machine
3. The Centre to Selvedge shade variation is checked by comparing for the visual shade difference between the adjacent pieces. And the decision is taken accordingly.
4. All swatches are attached to the swatch card in a serial manner with roll no respectively.
5. All rolls are checked for roll to roll shade variation.
6. The swatch card is signed by the department heads of store, merchandising, quality control, cutting, sewing and finishing.

3. SHRINKAGE

Shrinkage			
Type	Direction		
Fusing (heat)	Pressing (steam)	Warp way	Weft way

Fusing (heat) Shrinkage Test Process

1. A sample fabric of dimension 30cm x 30cm is cut.
2. The face side of the fabric is identified and marked.
3. 2 marks are made on the face side of the fabric.
 - a. Lengthwise direction
 - b. Widthwise direction
4. Length and width are recorded for original measurement.
5. The fusing material is cut of the dimension 29.5cm x 29.5cm.
6. The fusing material is then placed on the wrong side of the fabric.
7. It is then passed through the fusing machine, set at the required temperature, pressure and speed.

Pressure	3.5 bar
Time	18 secs
Speed	10.67 M/Min

8. Again, the length & width at a marked point are recorded for changed measurement.

9. The shrinkage % is calculated using the following formula:

$$\frac{[\text{Changed Measurement} - \text{Original measurement}]}{\text{Changed Measurement}} \times 100$$

10. A report is maintained for the shrinkage of the fabrics.

11. The report is signed by the department heads of store, merchandising, quality control, cutting, sewing and finishing.

Pressing (steam) Shrinkage Test Process

1. A sample fabric of dimension 30cm x 30cm is cut.
2. The face side of the fabric is identified and marked.
3. 2 marks are made on the face side of the fabric.
 - a. Lengthwise direction
 - b. Widthwise direction

4. Length and width are recorded for original measurement.
5. The fusing material is cut of the dimension 29.5cm x 29.5cm.
6. The fusing material is then placed on the wrong side of the fabric.
7. The pressing cycle is applied to the fused sample.

Pressure	3.5 bar
Time	18 secs
Speed	10.67 M/Min

8. Again, the length & width at a marked point are recorded for changed measurement.
9. The shrinkage % is calculated using the following formula:

$$\frac{[\text{Changed Measurement} - \text{Original measurement}]}{\text{Changed Measurement}} \times 100$$

10. A report is maintained for the shrinkage of the fabrics.
11. The report is signed by the department heads of store, merchandising, quality control, cutting, sewing and finishing.

FABRIC TYPES

There are various types of fabrics stored. They are placed on racks according to lot number and contain all its details in the piece card accompanied with the roll. The different types of fabric include:

SHELL FABRIC

This is the fabric which appears on the outer side of the garment. As Macintosh deals with suits they mostly contain the composition of all wool or wool blends. There are totally 57 shell fabric from which the customer can choose. 23 of these shell fabrics are checks, 3 are stripes and 31 are solid.

LINING FABRIC

This is the fabric under the shell fabric in contact with the body which is meant for its comfort. These are usually polyesters or polyester blends. There are 40 different linings to choose from.



Fig: Lining Fabrics

CANVAS

This is the fabric used between lining and shell in the jackets at chest and sleeve head area. It is important for giving shape to the garment.

SHOULDER PAD

Shoulder pads are used to give the illusion of broader and less sloping shoulders. They are sewn at top of the shoulder and fastened between the lining and shell fabric.

FELT

Felt is important part of the jacket as it provides shape as well as suppleness at the same time. They are used at sleeve head roll, chest area and at under collar.

POCKETING

As the name suggests this fabric is used for pocket bags.

FUSING

The fusing strengthens, supports and adds shape to fabric. There are 4 types of fusing:

1. Body Fusing
2. Lapel Fusing
3. Parts Fusing
4. NR Fusing

BIN CARD

Each fabric roll has a card with it which indicates its code, material and color along with the date and amount of fabric received or issued and the balance.

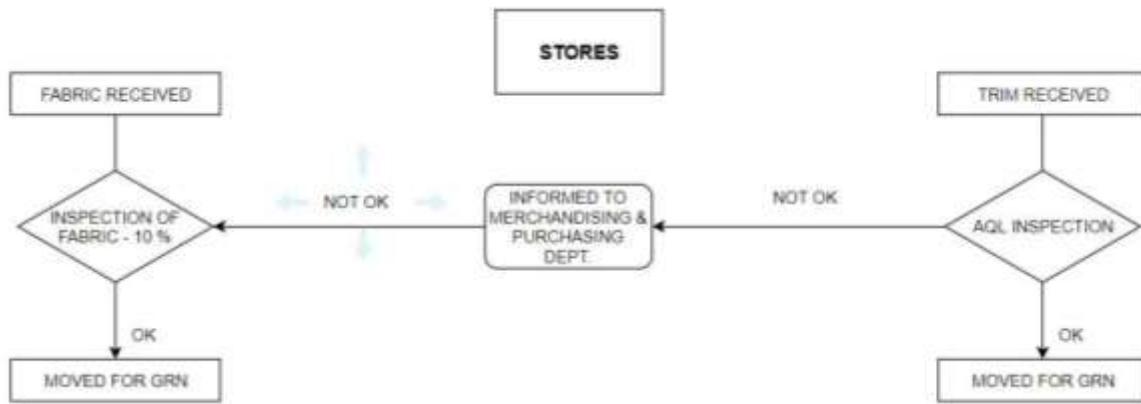
For easy identification, the bin cards for all these fabric types are of different colors. They are:

Fabric Type	Color
Shell	Blue
Lining	Pink
Canvas	Purple
Pocketing	Red
Fusing	White
Felt	Yellow



Fig: Bin Card

QUALITY PROCESS



TRIMS STORE

The trims store must supply material to all the departments, whether it is sewing, finishing, packing or any other department requiring stationery.

The main functions of the trims department are as follows:

- Receive the incoming material from different suppliers
- Do the quantity check by manual counting
- Store the trims till they are required
- Issue them as per production requirement
- Maintain record of incoming and outgoing material

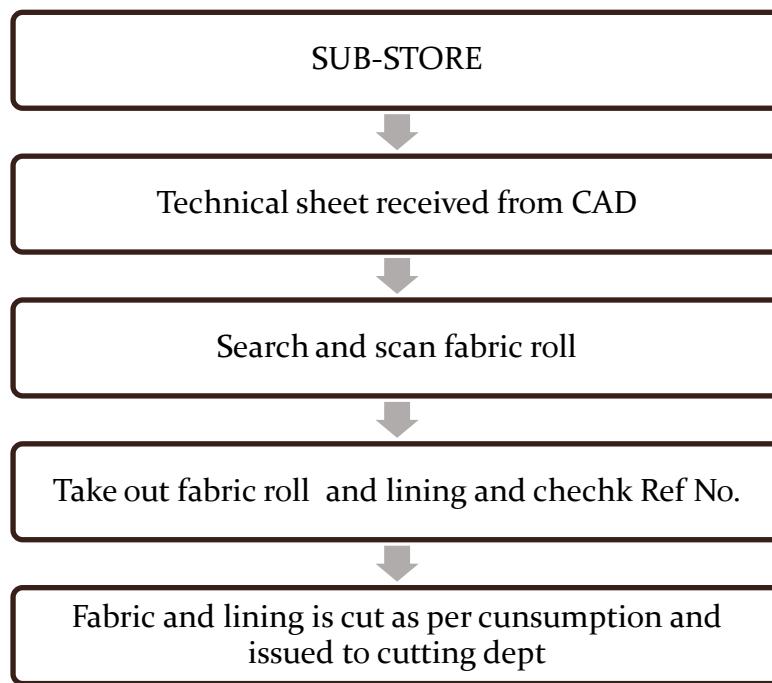
Types of material stored in the department are:

- **Sewing:**
 - Thread
 - Waist band lining
 - Buttons
 - Zippers
 - Sliders
 - Hook and bar
- **Labels:**
 - Size label
 - Brand label
 - Wash care label
- **Finishing and packing:**
 - Cartons
 - Poly bags
 - Hangers
 - Clips
 - Pins
- **Tags**
 - Brand tag
 - Price tag
 - Size tag
- **Pins, cello tape, general materials, spares, stationery material**

THE AQL SAMPLE SIZE FOR TRIMS

Required quantity	Sample	Pass	Fail
0-280	13	0	1
281-500	20	1	2
501-1200	32	2	3
1201-3200	50	3	4
3201-10000	80	5	6
10001-35000	125	7	8
35001 and above	300	14	15

SUB-STORE



The sub-store supplies shell fabric, lining, fusing and felt to the cutting department. The sub-store receives a list of orders for the day from the CAD department. Fabric is cut according to this list using the track sheets provided by the CAD department. The tracksheet has the shell fabric code, lining fabric code, knee lining color, fusing color and felt code. The sub-store operators refer to these details and put the fabrics in a tray which is picked by the cutter operators as and when required.

The list of orders provided by the CAD department is listed fabric wise. This makes it easier for the operators as when they take one fabric roll out, they cut fabrics for all orders having the same fabric. The operators tick the order on the list when its ready to be fed to the cutter. In this way, they avoid missing any orders.

The CAD department provides track sheets in batches of 20 to 30 track sheets throughout the day. The operators in the store scan the barcodes in the track sheets in the ERP software, Stage in order to update the location as well as confirm the fabric consumption written on the tracksheet.

The shell fabric is stored in tubes placed in a rack. These tubes are numbered from A1 – A16, B1 – B16 and C1 – C16. Apart from this, 15 shell fabrics are also stored in the carousel machine for easy and faster access. The barcode on the tracksheet is scanned which brings the required fabric roll in front so that the operator can cut the fabric. The fabric can be measured using a laser pointer. The required length of fabric is entered in a display which then sends the message to the pointer which moves to the required length. The operator then keeps weight at the end of the fabric and uses a rotary knife to cut the fabric.



Fig: Fusing precut and stored in rack (left), shell fabric in tubes (right)

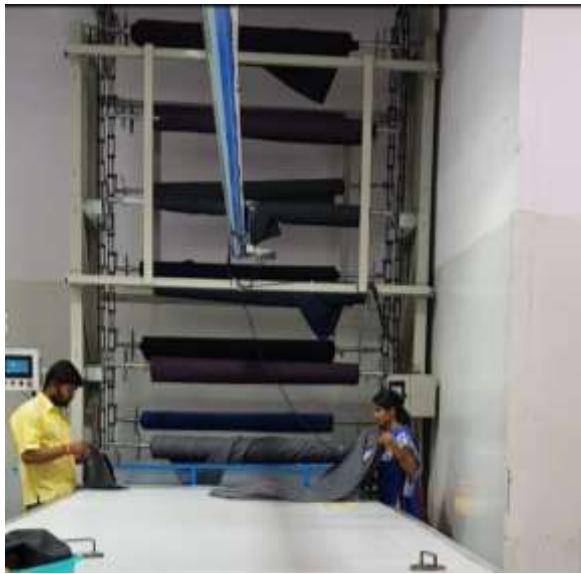
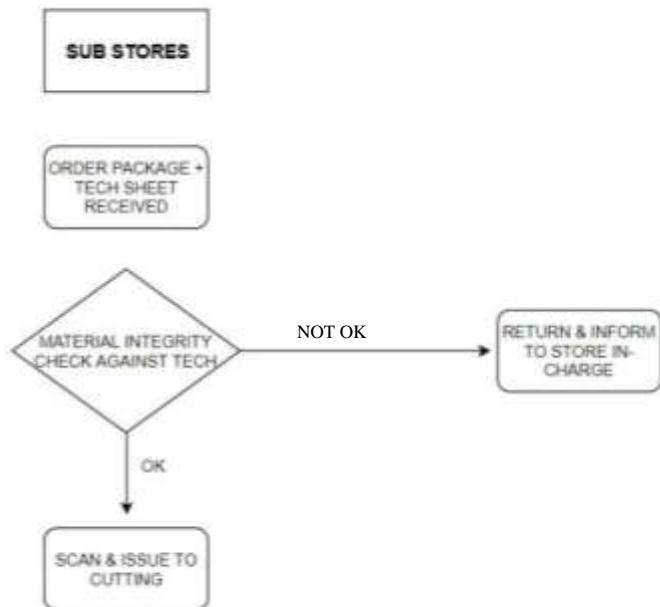


Fig: Shell fabric stored in carousel machine (left), lining fabric stored in racks (right)

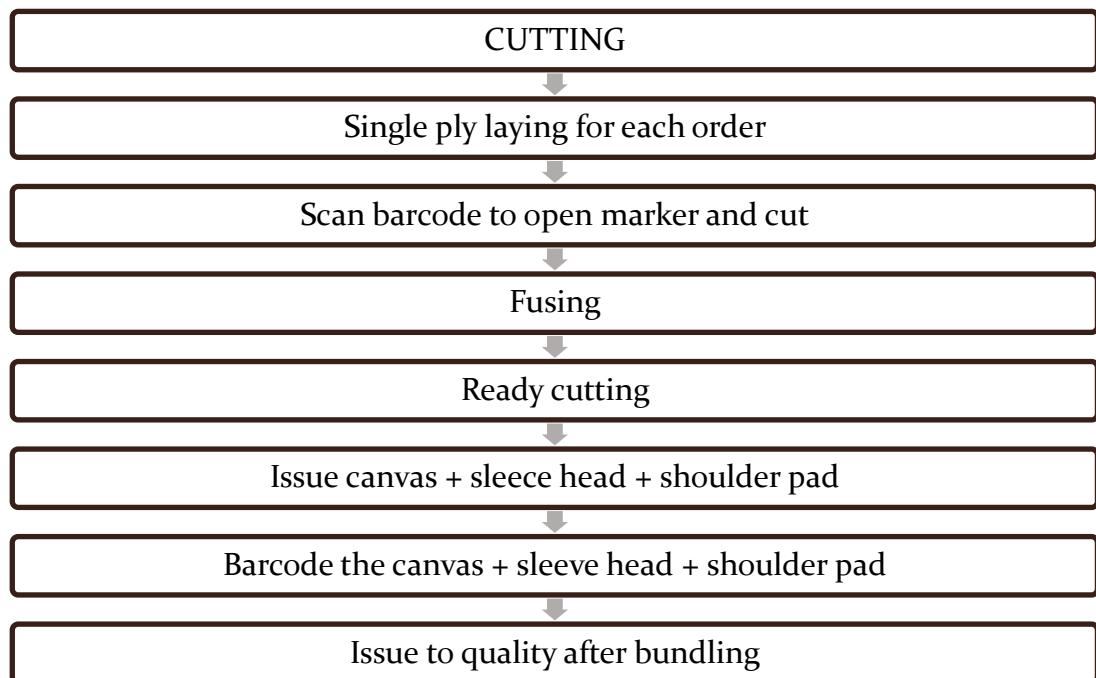
The lining fabric is stored on racks which are labelled with the lining code. The operators pull out the fabric, slash the fabric using a trimmer and then tear it.

The fusing fabric, body fusing, lapel fusing and parts fusing, are precut into a defined length to enable the store operators to provide the cutters with feed faster. They just must put the fusing into the tray. This eliminates the process of measuring the fabric and tearing it. This is possible only for fusing as it is cheaper compared to other fabrics.

QUALITY PROCESS



CUTTING DEPARTMENT



The cutting department has six cutting machines, consisting of two Ruizhou, three Ruk and one Gerber cutter.

Machine	Make/ Model	No of machines
CNC Cutter	GTXL	2
CNC Cutter	Ruk	3
CNC Cutter	Ruizhou	1
Pin Table (4m)	Vieth	2
Continuous Fusing Machines	Weishi	2

RUIZHOU

The Ruizhou cutting machine is a technologically advanced CNC cutting machine. It consists of two cutting heads which have a round knife and a straight knife each. The round knife is used to cut fusing material and the straight knife is used for cutting the shell as well as the lining of the garment. Each head of the machine can be used to cut at the same time. The software of the Ruizhou machine makes its own marker. The Ruizhou cutting machine can cut both solid and check fabrics. On an average it takes about 4:30 minutes to cut a suit on the Ruizhou cutter. A minimum of 3 operators ideally operate the machine.



Fig: Ruizhou cutting machine

Fig: Ruizhou cutting heads

PROCESS

The marker of the garment that is to be cut is opened by one operator which is then projected on the cutting bed using four projectors. The other 2 operators are lay the fabric (face either way) on the cutting bed while the marker is being opened. Once the laying is done adjustments are made so that the projected marker falls exactly on the fabric and no panel of the garment falls out. A layer of polythene is then spread on the spread fabric following which the operator gives the command to cut the fabric. The cut parts are picked and the wrong side of the cut parts are marked. Stickers provided by the CAD Dept. with the track sheet are then put on selected parts like Front, Back, Top Sleeve, Lapel and Collar jacket. For vests, front and lining parts are stickered. For trousers, front, back, left fly, right fly and the waistband are stickered. The cut parts then are made into bundles consisting of lining, fusing, shell small parts and shell big parts. The bundle is then wrapped in its track sheet and kept in a tray which is placed on a rack.

SPECIFICATION

Effective working area: 10000mm x 900mm

Cutting Speed: 100 – 1200 mm/s

Cutting Thickness: 0.1 – 50mm

Characteristics

- Knife Cutting
- Accurate – CNC controlled oscillating knife and servo motor
- Fabric saving with Ruizhou automatic nesting system

RUK

The RUK cutting machine is a CNC cutting machine which is used only for cutting solid fabrics. The RUK cutting machine has two cutting heads both of which are equipped with round knifes. Beside the round knifes, the Ruk cutting machine has a V- notch tool that is used to make notches. The Ruk software doesn't make its own marker meaning the operator has to manually place the garment parts next to each other in the software for cutting. The operators are also required to select the type of notch (v-notch or i-notch) before cutting the garment.

PROCESS

The marker of the garment that is to be cut is opened by one operator. The operator then works on arranging the panels in the software while the other two operators spread the fabric on the cutting bed. The marker is projected on the cutting bed using projectors. This marker is moved to make sure that no panel falls out of the fabric. Once everything is set, the operators spread a polythene sheet over the fabric and the cut command is given. The cut parts are then picked and bundled and finally put in a tray.

SPECIFICATION

Operation properties: works with any cad software

Cutting speed: 300-800mm/s

Cutting thickness - <=10mm

Fixing Method – Vacuum System

Driving System: Servo motor

Characteristics

- Knife Cutting
- Accurate – CNC controlled rotary knife and servo motor



Fig: RUK cutting machine

GERBER CUTTER

The Gerber cutter is the only full width cutter in the cutting department. It is primarily used for checks, and garments with different left and right measurements. It consists of a conveyor system which moves the cut parts to the picking table and pulls the fabric to be cut on the cutting bed.



Fig: Gerber cutter



Fig: Laying for Gerber cutter

PROCESS

The fabric that is supposed to be cut on the Gerber cutter is laid on a perforated brown sheet. Checks are matched using pin table. The shell fabric is then stapled to the perforated sheet to make sure that it doesn't move from its place. Once the laying of the shell, lining and fusing is complete, the perforated sheet is folded and kept behind the cutter. The cutting operator unfolds this roll and feeds it into the machine. The marker of this fabric is opened on the computer before the fabric is fed. Once the fabric is on the cutting bed, the operator sets the origin of the fabric and gives the cut command. For check fabrics, the operator must specify the center back point on the fabric in order to ensure matching of checks. Once the fabric is cut the conveyor moves it forward where the operator picks the cut parts. The conveyor also pulls the fabric that is to be cut on the cutting bed and the same process is repeated. The cut parts are stickered and wrong side of the cut parts are marked. The cut parts are then bundled and given for fusing.

SPECIFICATION

- Compressed fabric height: 5.2 cm (2.05 in)
- Cutting widths: 1.7 m (67 in)

- Cutting lengths: 1.7 m (67 in)
- Throughput: 9.5 m/min (375 in/min)
- Head acceleration: 2.4 m/s² (1/4 g)
- Maximum cutting speed: 30.5 m/min (1200 in/min)

Key Features:

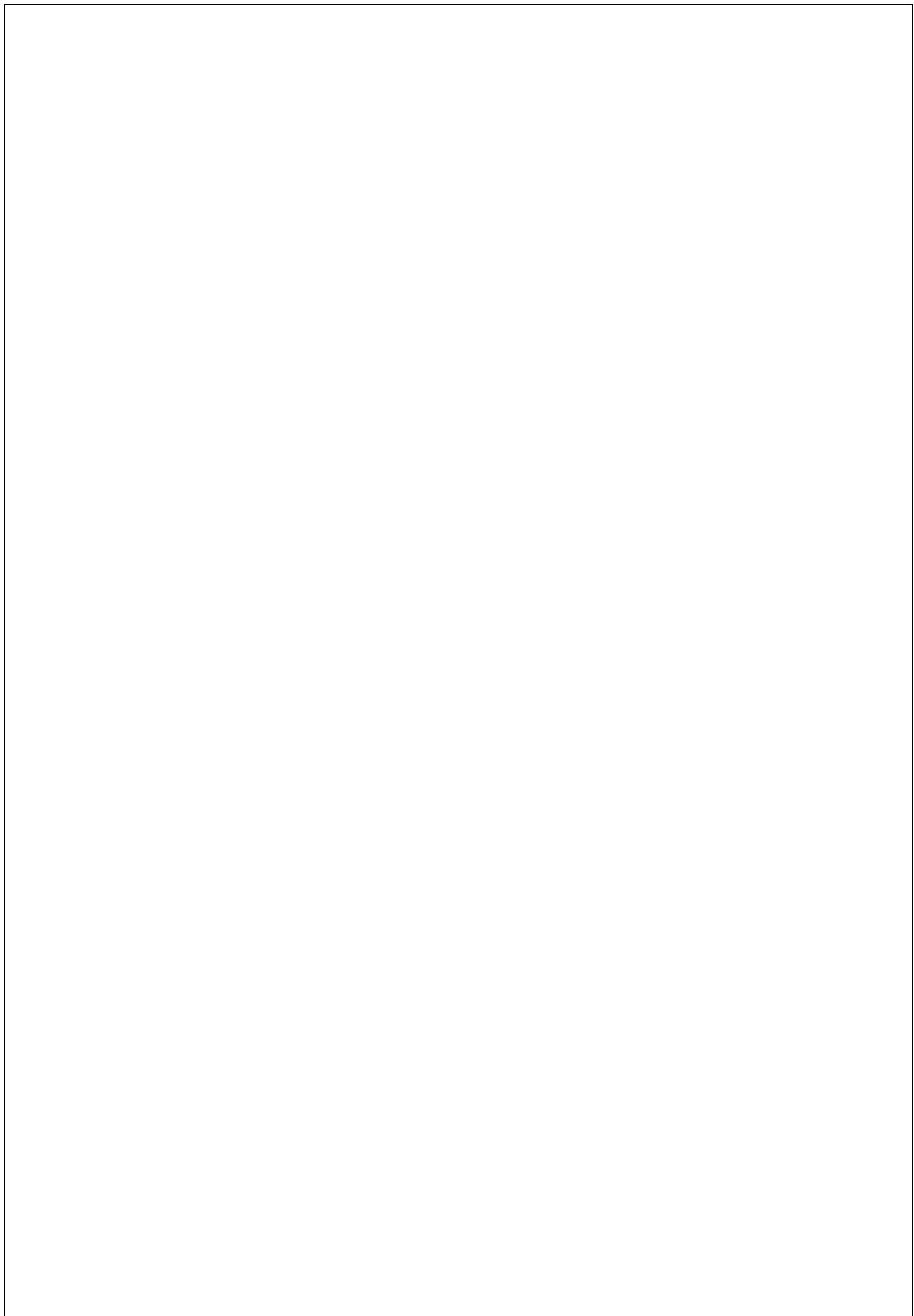
- Gerber Bristle Square cutting surface
- Knife blade penetrates without damage
- Automatically conveys material from spreading table to cutter and bundling area
- Integrated zoned vacuum system
- Long-life knife blades and variable knife reciprocation speed control
- PC-based software in Windows environment
- Sophisticated cut data file handling
- Modify notch and cutter parameter tables at the cutter
- Cut data file queuing
- Display of cut data geometry on-screen
- Preview geometric data for error prevention
- Preview piece cutting sequence
- Display cut pieces as cutting progresses
- Automatic knife sharpening maintains cutting efficiency

VALUE STREAM MAPPING BOARD

The cutting department has a value stream mapping board. The board is divided into eight rows and six columns one row for each hour of the first shift and one column for each cutting machine. Each row is further divided into four garment categories namely, Suit, Vest, Jacket and Trouser. The VSM board is updated by the cutting operators on an hourly basis. This helps the managers and supervisors to estimate the time required to cut orders of a day to avoid any backlog.



Fig: VSM board



FUSING

The cutting department has two fusing machines and 4 types of fusing are used.

MACHINE SPECIFICATIONS:

Brand Name: WEISHI

Model Number: NHJ-Q1000B

Voltage: 380v

Power: 24kw

Weight: 1100kg

Dimensions: (L*W*H):4500*2000*1200mm

Fusing width: 1000mm

All the garments can be fused on either machine. Eight operators operate on each machine, six of which fuse jackets and vests, one for trouser and one operator for bundling.



Fig: Fusing Machine

The following are the 4 types of fusing:

1. BODY FUSING:

Body fusing is used to give strength to the front panel of the jacket. It is a type of woven fusing.

Fusing Description

GSM = 72

Width = 150cm

52 dots/cm²

Colors = black and white

Fusing Parameters

	Temperature	Time	Pressure
Continuous Press	127°C - 142°C	12 – 18 sec	2.5 – 4 bar 25 – 40 N/cm ²
Flat Press	127°C - 142°C	12 – 18 sec	560 – 900 p/cm ²

GINETEX

Code: GXXBEZZ



Care Recommendation:

2. LAPEL FUSING

Lapel fusing is used to give strength to the collar, collar stand and lapel facing. It is a type of woven fusing.

Fusing Description

GSM = 48

Width = 150cm

110 dots/cm²

Colors = black and white

Fusing Parameters

	Temperature	Time	Pressure
Continuous Press	121°C - 142°C	12 – 18 sec	2.5 – 4 bar 25 – 40 N/cm ²
Flat Press	121°C - 142°C	12 – 18 sec	560 – 900 p/cm ²

GINETEX

Code: GXABEEZZ



Care Recommendation:

3. NR FUSING

NR Fusing is used to support the fabric while sewing is going on and it prevents distortion.

Fusing Description

GSM = 42

Width = 90cm

52 dots/cm²

Colors = medium grey mélange and white

Fusing Parameters

	Temperature	Time	Pressure
Continuous Press	121°C - 132°C	8 – 18 sec	2 – 4 bar 10 – 35 N/cm ²
Flat Press	121°C - 132°C	8 – 18 sec	300 – 500 p/cm ²

GINETEX

Code: GXXBEEZZ



Care Recommendation:

4. PARTS FUSING

Parts fusing is used to provide stiffness and robust look to various parts of the garment.

GSM = 42

Width = 150cm

52 dots/cm²

Colors = medium grey mélange and white

Fusing Parameters

	Temperature	Time	Pressure
Continuous Press	121°C - 132°C	8 – 18 sec	2 – 4 bar 10 – 35 N/cm ²
Flat Press	121°C - 132°C	8 – 18 sec	300 – 500 p/cm ²

GINETEX

Code: GXXBEEZZ

Care Recommendation: 

FUSING STANDARD PARAMETERS

Since all the fusions are to be passed through the same fusing machine, the following standard fusing parameters are used:



Pressure 3.5 bar
Time 18 secs
Temperature 137°C

Fig: Fusing parameters

JACKET

S.No.	Part	Body Fusing	Lapel Fusing	Parts Fusing	NR fusing
1.	Lapel		1		1
2.	Front	1			7
3.	Back		1	1	2
4.	Side Panel			2	1
5.	Top Sleeve			2	
6.	In Sleeve			2	
7.	Collar		1		
8.	Collar Stand		1		
9.	Breast Pocket			1	
10.	Pocket Flap			1	
11.	Pocket Bone			1	

TROUSER

S.No.	Part	Body Fusing	Lapel Fusing	Parts Fusing	NR fusing
1.	Left Fly			1	
2.	Right Fly			1	
3.	Pocket Bone			1	
4.	Waistband Extension			1	

VEST

S.No.	Part	Body Fusing	Lapel Fusing	Parts Fusing	NR fusing
1.	Front	1			6
2.	Lapel		1		
3.	Collar		1		
4.	Bottom facing				1
5.	Front pocket			1	

PROCESS

The fusing machine is operated by a maximum of 8 operators. 3 operators stand on either side of the fusing machine and fuse jackets and vests. There is one operator on any side of the fusing machine other than the six operator who fuses the trousers. Behind the fusing machine there is a single operator who bundles all the fused parts and passes them onto the ready cutting table.

3 operators fuse a single jacket. The first operator opens the bundle and takes out the in-sleeve and side panel for fusing. The second operator fuses the top-sleeve and back panel. The lapel is fused by either the first or the second operator who ever completes their share of panels first. The third operator fuses the front panel and the small parts of the jacket. 2 operators fuse vest. The first operator fuses the front and collar while the second operator fuses the lapel and the back belt. 1 single operator fuses the trouser.

READY CUTTING TABLE

Once the garment is fused the bundles are sent to the ready cutting table. Garments with checked shell fabric are ready cut here. This is done to ensure matching of checks in the garment. For jackets, the panels that are ready cut are collar, collar stand and in sleeve. These panels are cut as blocks on the cutter with one repeat extra on all sides of the panel. Collar and collar stand are always ready cut. For trouser the pocket facing is ready cut. In the case of Jackets with stripes shell fabric the lapel is ready cut. The operator does the ready cutting of the garments using patterns which are procured from the plotter.

Instruments used:

1. Rotary blade
2. Cutting board
3. Weights
4. White pencil
5. Trouser pocket facing template



Fig: Tools used

BUNDLING TABLE

Once the garments are ready cut, they are moved to the bundling table. The operators here issue the pocketing fabric, canvas chest piece, shoulder pads and sleeve head here. Stickers containing PO Number are printed here and the parts issued at the table are stickered. A record is maintained in order to track the flow of the pieces. Once the record is updated the piece moves onto the quality checking table for inspection.

EMBROIDERY SECTION

This section of the cutting department is given the task of making the personal label of the garment as specified by the customer. There are six embroidery machines in the department. The labels are first fused with a non-woven fusing and then embroidery is done using Bernina 700 embroidery machine. The operator aligns the label and feeds the data to the embroidery machine. The operator knows what to embroider by reading the personal label row in the tracksheet. Once the labels are ready, they are stapled in a file against the corresponding PO number. This file is then sent into the sewing line where the operator matches the PO number of the garment and label and then stitches the label.



Fig: Embroidery Machine

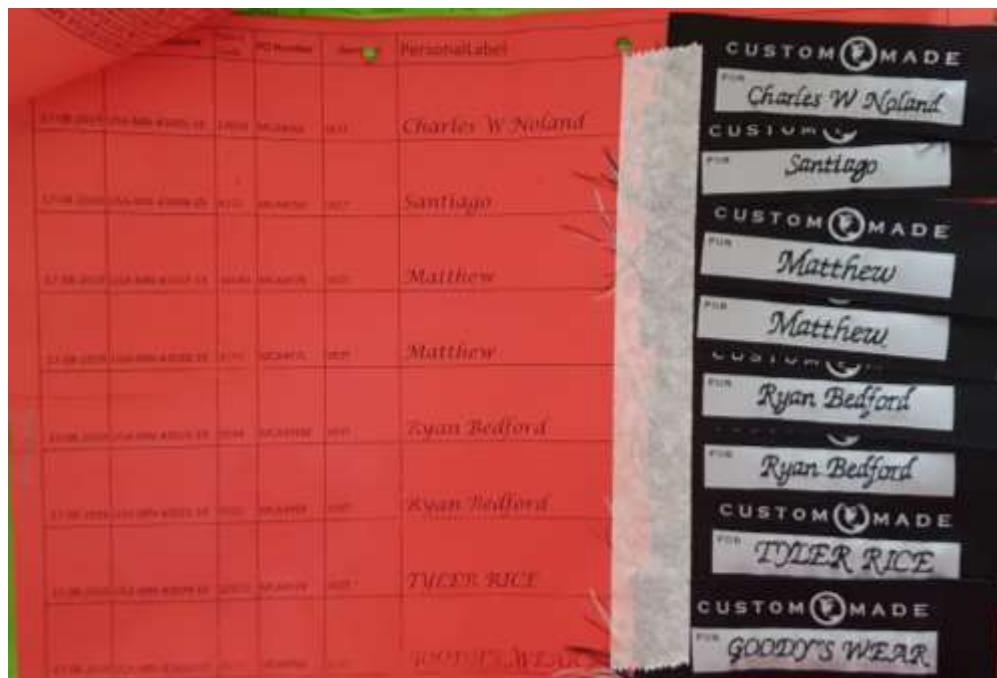


Fig: Sheets with PO number and labels

CANVAS SECTION

This section is responsible for the manufacturing of sleeve head and canvas for jackets.

SLEEVE HEAD

The sleeve head consists of 4 components, 1 felt and 3 canvas. The canvas is cut at bias to provide flexibility. A single operator manufactures the sleeve heads using a SNLS machine which is provided with an edge guide.



Fig: Sleeve head

CHEST PIECE

The canvas chest piece is made in the following way:

- The shoulder dart is opened, another piece is placed below and stitched using a zig zag machine. Two operators perform the same process.
- Felt is placed on this canvas and then stitched using a saddle stitch machine. Two operators perform this process.
- Basting tape is attached to the canvas on the center front using an SNLS machine. One operator performs this process.



Fig: Process of making chest canvas

QUALITY CHECKING TABLE

There are six quality checking tables. Three tables are assigned to check jackets, two for trouser and a single table for vets. The garments arrive at the qc table in the form of bundles. The operator then opens this bundle and checks if the fabric code, lining code and the color of the collar felt are the same as given in the tracksheet by comparing with the swatch and trim card. He then scans the barcode to open its .PLT files which contains all the panels of the garment. This file is projected on the table and the operator places all the panels of the garment on the projections to make sure that they of correct measurements. While doing so the operator also marks the dart points and the pocket placement points. The operator also checks if the face side of the panels is correct. Once this is done the operator bundles the piece and keeps it ready for loading in the sewing line if there are no problems with the bundle. In case there is any part missing or a need for recutting, the quality check operator returns the bundle to the recutting area to rectify the defects.

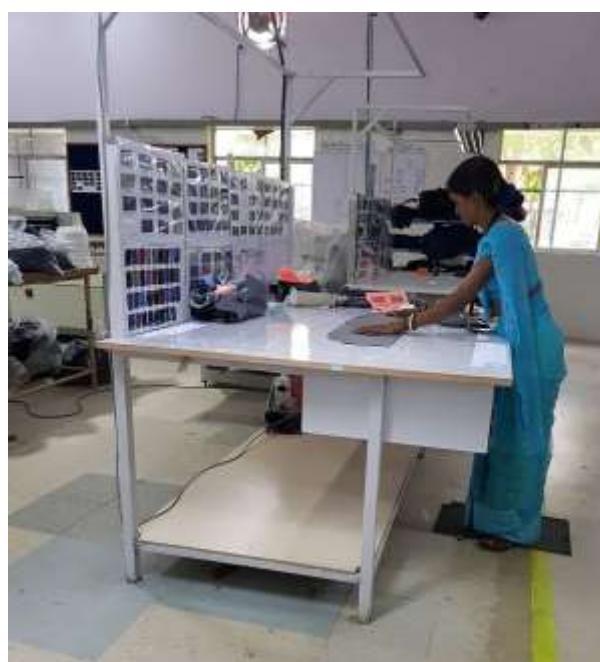


Fig: Quality checking table

QUALITY CHECKING – JACKET

The bundle of the garment is opened, and the barcode is scanned to open the plt file of the garment. The garment panels are then sorted by the operator. The operator then checks for the fabric code, lining code and felt code in the tracksheet and compares it with the swatch and trim card available with him. Once this is done the operator begins checking the garment starting with the pocket. Next the collar is checked for shape, not and measurement. In case of collar with check fabric the operator checks for mirror and matching with the center back panel. Next the facing lapel is checked following which the operator checks for the front and sleeve matching. Next, the operator checks for the matching in front and side panel. The top sleeve and under sleeve are checked for matching. Finally, the operator checks for the matching of checks in the back and side panel. Once the operator completes checking all the matching parameters he checks for the measurement of the back, front and side panel. The operator makes the pocket mark on the front and the lapel. Next the operator checks for the top and under sleeve size and notch. Finally, the operator bundles the garment again.

QUALITY CHECKING – TROUSER

The operator opens the bundle and scans the barcode to open the plt file of the garment. He then checks if the fabric code of the garment is correct. The operator then sorts the panels. Next, the size of the front panel and the knee lining is checked. The size of the back panel is checked. The size of the waistband is checked next. Finally, the operator checks for the left and right fly. Once this is done the operator bundles the garment.

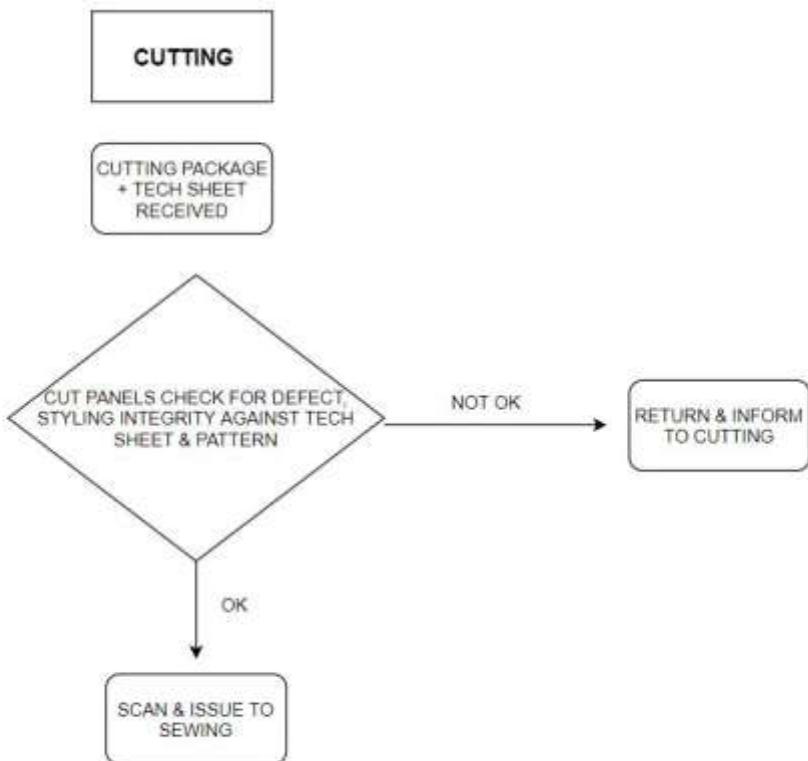
QUALITY CHECKING – VEST

The operator opens the bundle and scan the barcode to open the plt file of the garment. She then checks the fabric code of the garment and then checks whether the style is correct. She then checks the size and face side of the shell fabric panels followed by the lining panels. She also marks the points for pocket and darts. Finally, she bundles the garment.

The operators stand the whole day at the QC table and hence are provided with anti-fatigue rubber mats.

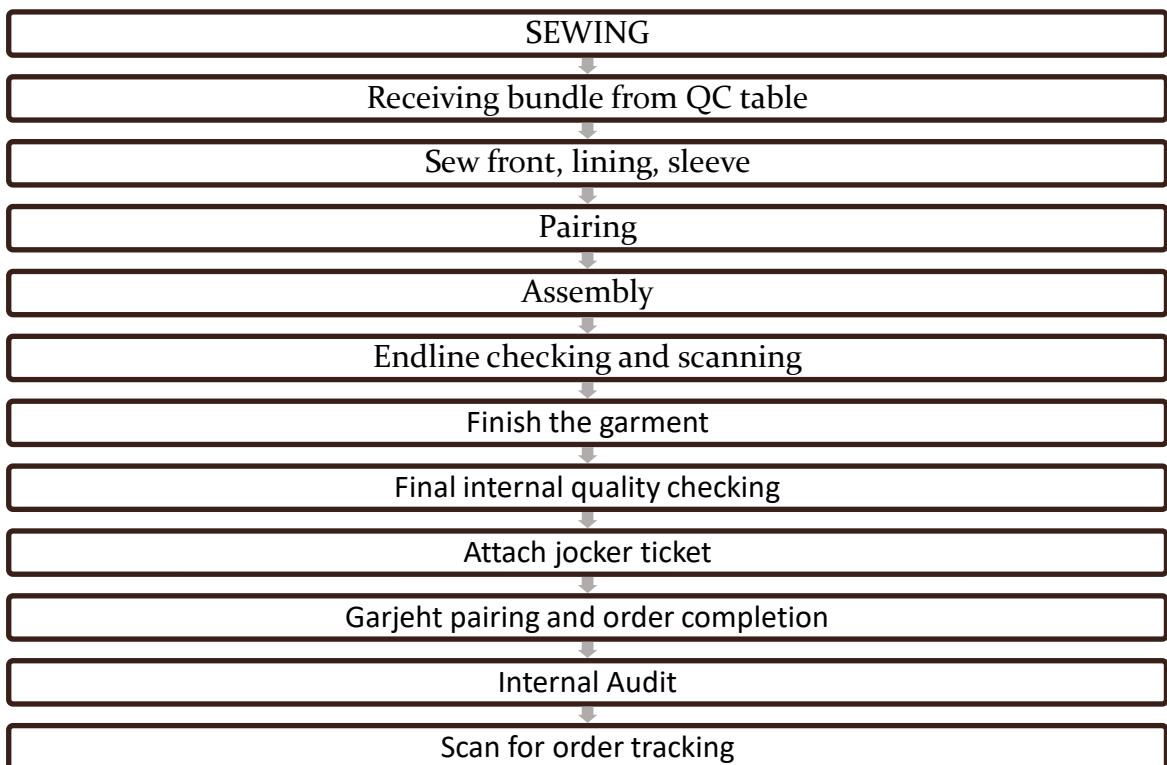
The QC table has swatches of shell fabric, felt and lining fabric in order to cross check the fabric code of the garment bundle. Each table also has the picture of all the models of the garments which are provided by Joseph Abboud.

QUALITY PROCESS



SEWING

Sewing department's function is the crucial and most vital job in a garment industry. This department makes the plans, pattern and material into a garment; this is the place where actual production takes place. After the fabric is released from cutting, it is passed on to the sewing department for the sewing. The various parts are stitched together to form the garments.



The sewing section is comprised of:

- 2 Jacket Lines
- 2 Trouser Lines
- 1 Vest Coat Line

THREADS USED

100%

polyester

- Shell - 120 TKT
- Lining - 150 TKT
- Shell & Lining - 120 TKT
- Buttonhole - 70 TKT
- Button Attach - 120 TKT
- Welt Pocketing - 120 TKT

NEEDLES USED

S.No.	Machine/ Operation	Needle
1.	SNLS	DPx5, DBx1
2.	Overlock	DCx1
3.	DNLS	DPx5, DPx17
4.	Pocket welting	DPx35, DPx85
5.	Basting	DPx35, DPx85
6.	Button Attach	MTx190 (front jacket)
7.	Buttonhole	DOx558
8.	Spot Tacking	1717 SRUE

9.	Saddle Stitch	DPx5, DPx12, CPx1
10.	Button Attach	DPx17
11.	Bartack	DPx5

Line No,	Installed capacity	Average daily prod.
Jacket line 1	400	170
Jacket line 2	400	170
Jacket line 3	350	150
Trouser line 1	400	200
Trouser line 2	400	200
Trouser line 3	350	150
Vest coat line 1	250	170

JACKET LINE

There are two jacket lines in Macintosh. Each jacket line is comprised of the following sections:

1. Sleeve
2. Lining
3. Collar
4. Front
5. Assembly
6. Finishing

PARTS OF A JACKET

SHELL FABRIC

1. Front – 2
2. Back – 2
3. Front facing – 2
4. Top Sleeve – 2
5. In Sleeve – 2
6. Side Panel – 2
7. Collar – 1
8. Collar Stand – 1
9. Pocket Bone – 2
10. Breast Pocket -1
11. Breast Pocket Facing – 1
12. Front Pocket Flap – 2

Total = 20

LINING FABRIC

1. Pocket Bag – 2 (optional)
2. Pocket Facing – 3
3. Sweat Shield - 4
4. Front upper – 2
5. Front Lower - 2
6. Front Side Panel – 2
7. Back – 2
8. Top Sleeve – 2
9. In Sleeve – 2
10. Pocket Flap - 2

11. Pocket Bone – 3

12. Felt Lining – 2

13. Triangle Flap – 1

Total = 31

CANVAS

1. Shoulder Pad - 2
2. Sleeve Head – 2
3. Chest Canvas – 2
4. Pocket Bag – 4

FELT

1. Undercollar felt

TRIMS AND ACCESSORIES

1. Shoulder Pad
2. Thread
3. Satin Tape
4. Brand Label
5. Personal Label
6. Wash Care Label
7. Bridle Tape
8. Armhole Tape
9. Double Sided Fusing with Paper
10. Double Sided Fusing without Paper
11. Polybag
12. Hanger

The SAM for a jacket is approximately 90-105 minutes. The jacket line follows the UPS system of production. The material moves on pneumatically controlled overhead hangers, which uses the principle of gravity beautifully. The Jackets produced at SSAL are world class and can be compared with the quality produced anywhere in the world.



Fig: Unit Production System

The sleeve, lining and front sections stitch the respective parts and send them to the assembly area where it waits for the other parts. This area is called the pairing area. Once all the parts of the garment have reached the pairing area they are moved into the assembly section, the various parts are matched according to the PO number. Once assembled the garments are passed to the finishing section.

LINING

	OPERATION	IMAGE	SAM	M/C	Attachment	MAKE
1.	CB panels attach Side Panel and CB attach		0:47	SNLS	Edge guide	Durkopp Adler
2.	Make CB pleat Front upper panel pleat making		0:35	SNLS	Edge guide	Durkopp Adler
3.	Attach lapel facing with upper and lower front lining panels with piping		0:39	SNLS	Piping folder Edge guide	Durkopp Adler
4.	Pressing Fusing attach at lapel bottom		0:45	Pressing Machine		Weishi
5.	Top stitch at facing		0:30	Saddle Stitch Machine		Durkopp Adler

6.	Triangle lining flap making and fusing		0:35	Pressing Machine		Macpi
7.	Welt Pocket Making		0:29	Auto Welter (SNLS)		Durkopp Adler
8.	Flip and iron welt pocket		0:47	Pressing Machine		Macpi
9.	Custom label and main label attach		0:47	Zig Zag Machine		Durkopp Adler
10.	Pocket facing attach		0:35	Automatic facing attach (SNLS)		Brother

11.	Pocket bag attach and close		0:35	SNLS (2)		Durkopp Adler
12.	Welt Pocket Bartack		0:32	Bartack		Jack
13.	Side panel, front & sweat shield attach Sweat shield tacking		0:46	SNLS	Edge guide	Durkopp Adler
14.	Collar attach to lapel		1:05	SNLS		Durkopp Adler
15.	Press seams and fuse pocket bag to body using fusing tape		0:40	Pressing Machine		Macpi

16.	Shoulder and side seam attach Collar attach with lining		1:20	SNLS (2)	Edge guide	Durkopp Adler	
17.	Press open lapel and collar seam		0:45	Pressing Machine		Sunshine	
18.	Bridal tape attach		0:35	Saddle stitch machine		Strobel	
19.	Quality Check			<ul style="list-style-type: none"> • Check seam allowance • Center neck notch • Felt visual appearance • Label • Style • Felt code • Saddle stitch • Bar tack • Pocket open • Sweat shield • Lapel Mirror • Collar mirror • Checks matching 			

COLLAR SECTION

1.	Collar and collar band attach Label attach to felt		0:50	SNLS	Edge guide	Durkopp Adler
2.	Felt lining attach Collar and collar felt attach		0:45	Zig-zag	Edge guide	Durkopp Adler
3.	Press open collar and collar band seam and fuse		0:35	Pressing machine		Macpi
4.	Satin tape attach on collar felt		0:20	SNLS	Edge guide	PFAFF
5.	Collar and collar felt edge attach and flip		0:25	SNLS		PFAFF
6.	Collar pressing and tape attach		0:40	Pressing machine		Ramsons Veit

SLEEVE

1.	Top sleeve in sleeve attach		0:40	SNLS	Edge guide	Durkopp Adler
2.	Side vent pressing		0:40	Pressing machine		Macpi
3.	Vent Making		0:45	SNLS		Durkopp Adler
4.	Sleeve press		1:00	Pressing machine		Macpi
5.	Sleeve lining seam attach		0:47	SNLS	Edge guide	Durkopp Adler

6.	Stitch $\frac{1}{4}$ " on sleevehead and shell		0:50	SNCS	Edge guide	Durkopp Adler
7.	Button attach at vent		0:57	Button attach machine		Brother
8.	Attach shell and lining		0:48	SNLS	One side presser foot	Durkopp Adler
9.	Join lining sleeve seam		0:32	SNLS	Edge guide Two presser foot	Durkopp Adler

10.	Press sleeve seam open		0:49	Pressing Machine		Macpi
11.	Attach lining and shell sleeve		0:45	SNLS		Durkopp Adler
12.	Press sleeve		0:35	Pressing Machine		Macpi

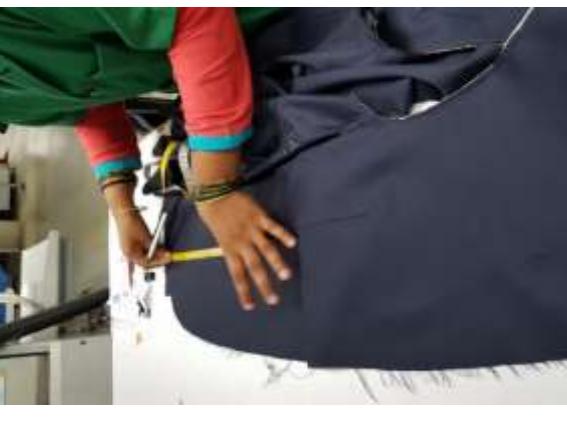
FRONT

1.	Attach center back Press open seam and attach bias strip		1:20	SNLS	Edge guide	Durkopp Adler
2.	Marking front lapel		1:15	Table		
3.	Mark and stitch dart		1:15	SNLS	One side presser foot Edge guide	Durkopp Adler
4.	Tack dart opening & attach side panel to front		1:45	SNLS		Durkopp Adler
5.	Fuse dart opening & press open seam		1:00	Pressing machine		Macpi

6.	Armhole tape attach		1:00	SNLS	Edge guide	Durkopp Adler
7.	Pocket flap run stitch		0:45	SNLS	Template Edge cutter	Loiva
8.	Flip and press pocket flap		0:30	Pressing machine		Macpi
9.	Cutting breast pocket from template and pressing		1:25	Pressing machine	Template	Macpi
10.	Breast pocket attach		1:18	SNLS		Durkopp Adler
11.	Pick stitch on pocket flap		1:30	Pick stitch		Gute

12.	Welt pocket making and flap attach		1:50	Autowelter SNLS		Durkopp Adler
13.	Pressing welt pocket		1:25	Pressing Machine		Macpi
14.	Pressing breast pocket		1:20	Pressing machine		Macpi
15.	Breast pocket zig zag		0:40	Zigzag stitching machine		PFAFF
16.	Breast pocket bag attach		0:40	SNLS		Durkopp Adler
17.	Welt pocket bag attach		0:45	SNLS	Double presser foot	Juki

18.	Welt pocket bag close		0:20	SNLS		Durkopp Adler
19.	Canvas tape fused to front		1:15	Pressing machine		Macpi
20.	Stitch canvas and welt pocket bag to front		1:00	Blind stitch		Maier
21.	Front panel press		0:25	Pressing machine		Weishi
22.	Trim excess canvas and stay stitch		1:07	SNLS	Edge cutter	Durkopp Adler

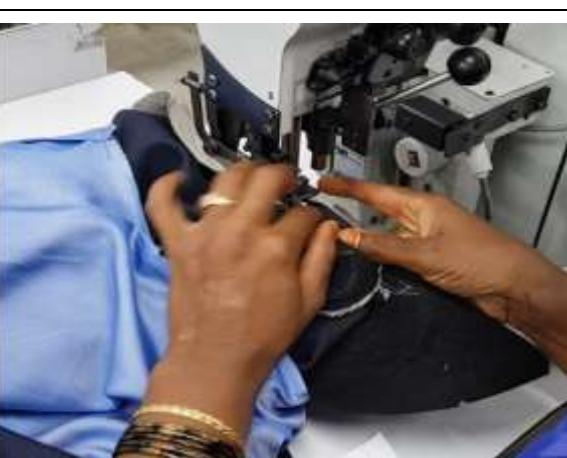
23.	Attach shoulder pad		0:43	SNLS		PFAFF
24.	Side seam attach		0:50	SNLS	Edge guide Double presser foot	Durkopp Adler
25.	Press open CB and press side seam towards back		1:12	Pressing machine		Weishi
26.	Quality Check				<ul style="list-style-type: none"> • Front measurement • Vent length • Back • Half wasit • Half seat • Hip • Pocket position • Mark bottom 	

27.	Bottom folding		0:45	Pressing machine	Laser	Macpi
28.	Shoulder attach		0:40	SNLS	Edge guide Double presser foot	PFAFF
29.	Press open shoulder seam		0:45	Pressing machine		Macpi
30.	Quality Check			<ul style="list-style-type: none"> • Untrimmed thread • Breast pocket • Flap • Side panel • CB panel • Dart • Seam open 		

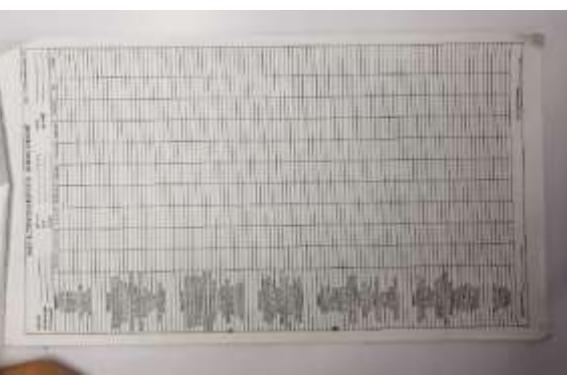
ASSEMBLY

1.	Attach front and lapel facing		2:00	SNLS (2)		Pfaff
2.	Felt attach to body		1:30	Zig-zag machine		Durkopp Adler
3.	Front edge sew		2:00	SNLS (2)	Edge Cutter	PFAFF
4.	Sticker removal and trimming		1:20			
5.	Front edge stitch press open		0:45	Pressing machine		Macpi

6.	Bottom closing		0:30	Snls		Pfaff
7.	Vent and bottom finishing					Durkopp adler
8.	Flip and iron peak and collar		1:00	Pressing machine		Macpi
9.	Iron bottom, vent and lapel		2:15	Pressing machine		Macpi
10.	Lapel press		2:00	Pressing machine		Macpi

11.	Sleeve attach		2:35	Snls (3)	Roller feed, edge guide	Durkopp Adler
12.	Sleeve head attach		1:30	Snls	Roller feed, edge guide	Durkopp Adler
13.	Press open sleeve attach seam		1:00	Pressing machine		Macpi
14.	Shoulder pad attach		0:45	Snls		Durkopp Adler

15.	Body basting		0:45	Snls		Durkopp Adler
16.	Attach sleeve		0:40	Snls (2)		Durkopp Adler
17.	Sleeve lining close		0:30	Snls		Durkopp Adler
18.	Vent top stitch		0:45	Snls		Brother
19.	Peak stitch		3:00	Snls	Edge guide	Gute

20.	Checking			<ul style="list-style-type: none"> • Mark lapel fold • Correct tracksheet • Measurements corresponding to tracksheet 	
21.	Buttonhole making		0:25	Button hole making machine	Durkopp Adler
22.	Flower hole making		0:25	Button hole making machine	Durkopp Adler
23.	Attach country of origin label		0:24	Bartack	Durkopp Adler
24.	Checking			<ul style="list-style-type: none"> • Notch Lapel • Front edge • Bartack • Vent • Bottom shape • Untrimmed thread • Buttonhole and flower hole • Sleeve attach • Armhole open • Body basting • Lining closing open 	

Finishing

1.	Sleeve pressing		0:30	Pressing machine		Macpi
2.	Front panel press		0:45	Pressing machine		Macpi
3.	Sleeve press		0:30	Pressing machine		Weishi
4.	Shoulder and lapel press		0:40	Pressing machine		Weishi

5.	Lapel Pressing					
6.	Collar pressing		0:25	Pressing machine		Weishi
7.	Elbow pressing		0:30	Pressing machine		Indupress
8.	Armhole nipping		0:35	Pressing machine		Weishi

9.	Sleeve blocking		1:00	Pressing machine (2)		Weishi
10.	Lining pressing		0:35	Pressing machine (2)		Weishi
11.	Touchup		1:00	Iron table (2)		Macpi
12.	Button attaching		0:30	Button attach machine		Pfaff

13.	Button securing		0:15	Button securing machine		mms
14.	Lapel pressing		0:45	Pressing machine		Weishi
15.	Final inspection			<ul style="list-style-type: none"> • Visual Appearance • Measurements • Style • Fabric • Collar • Finishing • Seams • Untrimmed thread • Label 		
16.	Labelling and tagging		0:45			Durkopp Adler

LINING

	OPERATION	SAM	SAM (sec)	M/C	MAKE
1.	CB panels attach	0.62	37.03	SNLS	Durkopp Adler
	Side Panel and CB attach				
2.	Make CB pleat	0.39	23.31	SNLS	Durkopp Adler
	Front upper panel pleat making				
3.	Attach lapel facing with upper and lower front lining panels with piping	0.26	15.4	SNLS	Durkopp Adler
4.	Pressing	0.23	14	Pressing Machine	Weishi
	Fusing attach at lapel bottom				
5.	Top stitch at facing	0.29	17.19	Saddle Stitch Machine	Durkopp Adler
6.	Triangle lining flap making and fusing	0.20	12.04	Pressing Machine	Macpi
7.	Welt Pocket Making	0.37	22.07	AutoWelter (SNLS)	Durkopp Adler
8.	Flip and iron welt pocket	0.78	46.63	Pressing Machine	Macpi
9.	Custom label and main label attach	0.55	32.73	Zig Zag Machine	Durkopp Adler
10.	Pocket facing attach	0.52	31.02	Automatic facing attach (snls)	Brother
11.	Pocket bag attach and close	0.66	39.48	SNLS (2)	Durkopp Adler
12.	Welt Pocket Bartack	0.46	27.73	Bartack	Jack
13.	Side panel, front & sweat shield attach	0.42	25.02	SNLS	Durkopp Adler
	Sweat shield tacking				
14.	Collar attach to lapel	0.44	26.13	SNLS	Durkopp Adler
15.	Press seams and fuse pocket bag to body using fusing tape	0.76	45.75	Pressing Machine	Macpi
16.	Shoulder and side seam attach	0.71	42.61	SNLS (2)	Durkopp Adler
	Collar attach with lining				
17.	Press open lapel and collar seam	1.25	75	Pressing Machine	Sunshine
18.	Bridal tape attach	1.15	69.11	Saddle stitch machine	Strobel

COLLAR

19.	Collar and collar band attach	0.24	14.46	SNLS	Durkopp Adler
	Label attach to felt				
20.	Felt lining attach	0.36	21.43	Zig-zag	Durkopp Adler
	Collar and collar felt attach				
21.	Press open collar and collar band seam and fuse	0.17	10.19	Pressing machine	Macpi

22.	Satin tape attach on collar felt	0.23	13.59	SNLS	PFAFF
23.	Collar and collar felt edge attach and flip	0.36	21.41	SNLS	PFAFF
24.	Collar pressing and tape attach	0.35	20.81	Pressing machine	Ramsons Veit

SLEEVE

25.	Top sleeve in sleeve attach	0.33	20.03	SNLS	Durkopp Adler
26.	Side vent pressing	0.34	20.52	Pressing machine	Macpi
27.	Vent Making	0.39	23.53	SNLS	Durkopp Adler
28.	Sleeve press	1.05	63.07	Pressing machine	Macpi
29.	Sleeve lining seam attach	1.35	80.76	SNLS	Durkopp Adler
30.	Stitch 1/4" on sleevehead and shell	0.40	24.15	SNCS	Durkopp Adler
31.	Button attach at vent	0.51	30.44	Button sewer	Brother
32.	Attach shell and lining	0.35	21.03	SNLS	Durkopp Adler
33.	Join lining sleeve seam	0.33	20.08	SNLS	Durkopp Adler
34.	Press sleeve seam open	0.31	18.55	Pressing Machine	Macpi
35.	Attach lining and shell sleeve	0.68	40.68	SNLS	Durkopp Adler
36.	Press sleeve	0.34	20.34	Pressing Machine	Macpi

FRONT

37.	Attach center back	0.77	46.32	SNLS	Durkopp Adler
	Press open seam and attach bias strip				
38.	Marking front lapel	0.76	45.76	Table	
39.	Mark and stitch dart	0.79	47.61	SNLS	Durkopp Adler
40.	Tack dart opening & attach side panel to front	0.66	39.76	SNLS	Durkopp Adler
41.	Fuse dart opening & press open seam	0.58	34.84	Pressing machine	Macpi
42.	Armhole tape attach	0.57	34.08	SNLS	Durkopp Adler
43.	Pocket flap run stitch	0.54	32.14	SNLS	Loiva
44.	Flip and press pocket flap	0.98	58.54	Pressing machine	Macpi
45.	Cutting breast pocket from template and pressing	0.82	49.38	Pressing machine	Macpi
46.	Breast pocket attach	0.89	53.13	SNLS	Durkopp Adler
47.	Pick stitch on pocket flap	0.77	46.12	Pick stitch	Gute
48.	Welt pocket making and flap attach	0.74	44.62	Autowelter SNLS	Durkopp Adler
49.	Pressing welt pocket	0.98	58.52	Pressing Machine	Macpi
50.	Pressing breast pocket	0.77	46.23	Pressing machine	Macpi
51.	Breast pocket zig zag	0.77	46.38	Zigzag machine	PFAFF
52.	Breast pocket bag attach	0.87	52.28	SNLS	Durkopp Adler
53.	Welt pocket bag attach	0.62	37.05	SNLS	Juki

54.	Welt pocket bag close	0.64	38.35	SNLS	Durkopp Adler
55.	Canvas tape fused to front	1.52	91.27	Pressing machine	Macpi
56.	Stitch canvas and welt pkt bag to front	0.69	41.29	Blind stitch	Maier
57.	Front panel press	1.52	91.32	Pressing machine	Weishi
58.	Trim excess canvas and stay stitch	0.83	49.72	SNLS	Durkopp Adler
59.	Attach shoulder pad	0.51	30.53	SNLS	PFAFF
60.	Side seam attach	1.05	62.79	SNLS	Durkopp Adler
61.	Press open CB and press side seam towards back	1.06	63.75	Pressing machine	Weishi
62.	Bottom folding	0.57	33.96	Pressing machine	Macpi
63.	Shoulder attach	0.51	30.53	SNLS	PFAFF
64.	Press open shoulder seam	0.68	40.85	Pressing machine	Macpi
ASSEMBLY					
65.	Attach front and lapel facing	1.45	87.04	SNLS (2)	Pfaff
66.	Felt attach to body	0.68	40.98	Zig-zag machine	Durkopp Adler
67.	Front edge sew	1.47	88	SNLS (2)	PFAFF
68.	Sticker removal and trimming	1.18	70.54	Manual	Manual
69.	Front edge stitch press open	1.20	72.25	Pressing machine	Macpi
70.	Bottom closing	1.51	90.35	Snls	Pfaff
71.	Vent and bottom finishing	2.33	140		Durkopp adler
72.	Flip and iron peak and collar	0.52	31.22	Pressing machine	Macpi
73.	Iron bottom, vent and lapel	0.55	33.15	Pressing machine	Macpi
74.	Lapel press	2.37	142.25	Pressing machine	Macpi
75.	Sleeve sttach	1.95	117	Snls (3)	Durkopp Adler
76.	Sleeve head attach	0.60	35.91	Snls	Durkopp Adler
77.	Press open sleeve attach seam	0.38	22.8	Pressing machine	Macpi
78.	Shoulder pad attach	0.41	24.42	Snls	Durkopp Adler
79.	Body basting	0.73	43.67	Snls	Durkopp Adler
80.	Attach sleeve	2.10	126	Snls (2)	Durkopp Adler
81.	Sleeve lining close	0.49	29.43	Snls	Durkopp Adler
82.	Vent top stitch	0.57	34.14	Snls	Brother
83.	Peak stitch	0.41	24.31	Snls	Gute
84.	Buttonhole making	0.28	16.53	Button holler	Durkopp Adler
85.	Flower hole making	0.37	22.04	Button holler	Durkopp Adler
86.	Attach country of origin label	0.24	14.19	Bartack	Durkopp Adler
FINISHING					
87.	Sleeve pressing	2.05	123.07	Pressing machine	Macpi

88.	Front panel press	1.58	94.64	Pressing machine	Macpi
89.	Sleeve press	0.71	42.57	Pressing machine	Weishi
90.	Shoulder and lapel press	0.78	47.04	Pressing machine	Weishi
91.	Lapel Pressing	0.27	15.95	Pressing machine	Weishi
92.	Collar pressing	1.17	70.12	Pressing machine	Weishi
93.	Elbow pressing	0.71	42.53	Pressing machine	Indupress
94.	Armhole nipping	0.58	35.07	Pressing machine	Weishi
95.	Sleeve blocking	0.65	39.23	Pressing machine (2)	Weishi
96.	Lining pressing	1.47	88.19	Pressing machine (2)	Weishi
97.	Touchup	0.78	46.52	Iron table (2)	Macpi
98.	Button attaching	0.30	18.09	Button sewer	Pfaff
99.	Button securing	0.18	10.53	Button securing m/c	mms
100.	Lapel pressing	0.86	51.43	Pressing machine	Weishi
101.	Labelling and tagging	0.79	47.24	Manual	Durkopp Adler
		75.28	4512.8 8		

VEST COAT LINE

There is one vest coat line in Macintosh. The line consists of very few operations and is in an S shape.

PARTS OF A VEST COAT

SHELL FABRIC

1. Front – 2
2. Lapel – 2
3. Bottom Facing – 2
4. Neck – 2
5. Breast Pocket – 2
6. Pocket Facing – 2
7. Pocket Bag – 2

LINING

1. Front – 2
2. Back – 4
3. Back Belt – 2

The SAM for a vest coat is approximately 35-45 minutes. The vestcoat line follows the UPS system of production. The UPS system of the vest coat line is more primitive as compared to the UPS system of the jacket line. It consists of a rod mounted down from the wall and hangers are manually moved by the operators. The Vests produced at SSAL are world class and can be compared with the quality produced anywhere in the world.

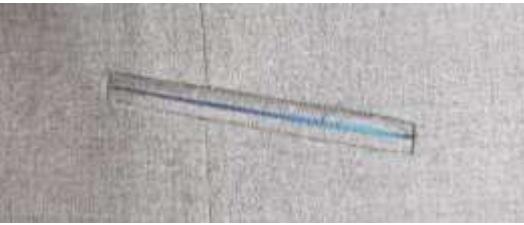


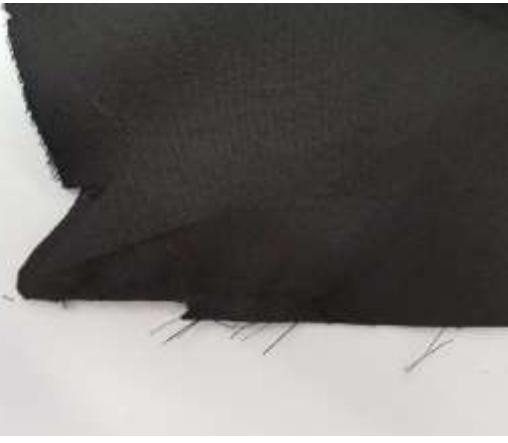
Fig: Unit Production System

VEST COAT

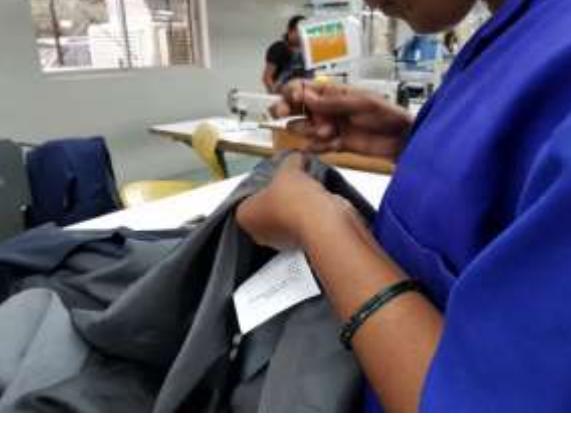
1.	Make front lining dart Attach front lining with lapel facing and bottom facing		1:30	SNLS		Highlead
1.	Attach centre back lining and make back dart		0:45	SNLS		Highlead
2.	Attach back belt Close dart Attach buckle		1:00	SNLS		Sunstar
3.	Attach back shell and lining bottom		0:30	SNLS		Jack

4.	Press open center back seam		1:04	Pressing machine		Macpi
5.	Custom label and main label attach		0:54	Zig-zag machine		Durkopp adler
6.	Cut and press breast pocket		0:47	Iron table		Macpi
7.	Attach pocket a. single welt pocket b. double welt pocket		1:45	a. SNLS b. Auto welter		a. Juki b. Durkop p adler

8.	Flip and press welt pocket		0:40	Iron table		Macpi
9.	Zig-zag stitch on single welt pocket		0:30	Zig-zag machine		Durkopp adler
10.	Pocket bag attach and close		0:45	SNLS		Durkopp adler
11.	Double welt pocket bartack		0:25	Bartack machine		Juki
12.	Quality check				<ul style="list-style-type: none"> • Front length • Back length • Lapel • Breast pocket • Welt pocket • Open seam • Belt length • Style check 	

13.	Run stitch collar Attach front and lapel facing		3:00	SNLS (2)		Sun star
14.	Front edge sew Lining neck attach		1:05	SNLS	Edge guide	Durkopp adler
15.	Cut excess seam allowance		0:58	SNLS	Edge cutter	Durkopp adler

16.	Press open front edge seam and bottom seam		0:45	Pressing machine		Macpi
17.	Lapel pressing		0:42	Pressing machine		Macpi
18.	Armhole close		1:00	SNLS		Sun star
19.	Armhole press		0:30	Pressing machine		Weishi
20.	Side seam close		1:08	Snls(2)		Juki

21.	Button hole marking		0:32			
22.	Button hole making		0:56	Button hole machine		Durkopp adler
23.	Close side seam		3:00	Hand stitch (2)		
24.	Pressing		1:05	Pressing machine		Macpi

25.	Button attach		1:00	Button attach machine		Jack
26.	Checking			<ul style="list-style-type: none"> • Style • Fabric code • Button up & down / wrong button color • Wrong label/ missing/ wrong spelling • Mismatch thread • Stitch open • Loose stitch • Lining tight or visible • Bone width uneven • Buckle wrong attach • Lapel shapeout • Stain • Peak uneven • Side seam pleat • Checks matching • Measurements 		

	Operation	Machine	Make	SAM	SAM in secs
1.	Make front lining dart	SNLS	Highlead	0.54	32.4
	Attach front lining with lapel facing and bottom facing				
2.	Attach centre back lining and make back dart	SNLS	Highlead	0.41	24.6
3.	Attach back belt	SNLS	Sunstar	0.57	34.2
	Close dart				
	Attach buckle				
4.	Attach back shell and lining bottom	SNLS	Jack	0.28	16.8
5.	Press open center back seam	Pressing machine	Macpi	0.46	27.6
6.	Custom label and main label attach	Zig-zag machine	Durkopp adler	0.32	19.2
7.	Cut and press breast pocket	Iron table	Macpi	0.46	27.6
8.	Attach pocket			0.53	31.8
	a. single welt pocket	a. SNLS	a. Juki		
	b. double welt pocket	b. Auto welter	b. Durkopp Adler		
9.	Flip and press welt pocket	Iron table	Macpi	0.42	25.2
10.	Zig-zag stitch on single welt pocket	Zig-zag machine	Durkopp adler	0.24	14.4
11.	Pocket bag attach and close	SNLS	Durkopp adler	0.38	22.8
12.	Double welt pocket bartack	Bartack machine	Juki	0.26	15.6
13.	Run stitch collar	SNLS (2)	Sun star	0.51	30.6
	Attach front and lapel facing				
14.	Front edge sew	SNLS	Durkopp adler	0.56	33.6
	Lining neck attach				
15.	Cut excess seam allowance	SNLS	Durkopp adler	0.21	12.6
16.	Press open front edge seam and bottom seam	Pressing machine	Macpi	0.46	27.6
17.	Lapel pressing	Pressing machine	Macpi	0.38	22.8

18.	Armhole close	SNLS	Sun star	0.35	21
19.	Armhole press	Pressing machine	Weishi	0.49	29.4
20.	Side seam close	Snls(2)	Juki	0.38	22.8
21.	Buttonhole marking	Manual	Table	0.21	12.6
22.	Buttonhole making	Button holler	Durkopp adler	0.28	16.8
23.	Close side seam	Hand stitch (2)	Table	0.36	21.6
24.	Pressing	Pressing machine	Macpi	0.51	30.6
25.	Button attach	Button sewer	Jack	0.31	18.6
				9.88	592.8

TROUSER LINE

There are two trouser lines in Macintosh. There is one waist band section for both the trouser lines.

PARTS OF A TROUSER

1. Left Fly – 1
2. Right Fly – 1
3. Waist Band – 2
4. Belt Loop – 2
5. Pocket Bone – 2
6. Back Facing – 2
7. Front Facing – 2
8. Back Pocket Bag – 2
9. Fly Lining – 1
10. Coin Pocket – 1
11. Front Pocket – 1
12. Knee Lining – 2
13. Back – 2
14. Front – 2
15. Extension – 2

The SAM for a trouser is approximately 35-45 minutes. The trouser line follows the UPS system of production. The UPS system of the trouser line is more primitive as compared to the UPS system of the jacket line. It consists of a rod mounted down from the wall and hangers are manually moved by the operators. The Trousers produced at SSAL are world class and can be compared with the quality produced anywhere in the world.



Fig: Unit Production System

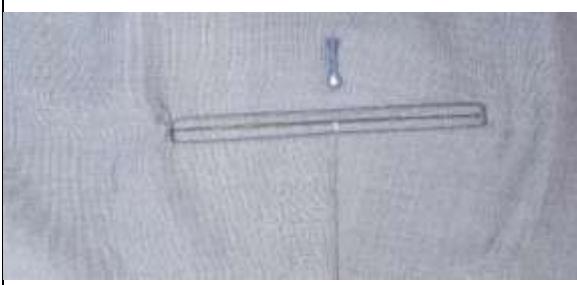
Waist band section

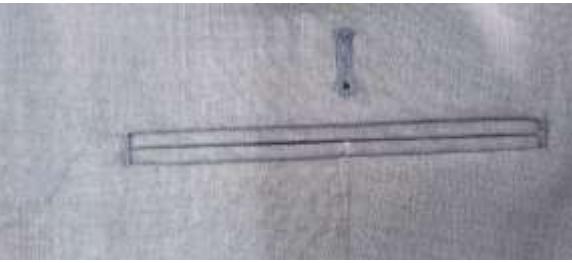
1.	Fuse waist band together		0:30	Iron table		Macpi
2.	Fuse waist band		0:45	Fusing machine		Reliant
3.	Attach waist band lining		0:47	SNLS		Durko pp adler
4.	Top stitch waist band lining		0:36	Snls		Juki
5.	Overlock facing		0:27	Overlock	Edge cutter	Siruba
6.	Pocket facing attach		0:30	Auto welter	snls	Durko pp adler

7.	Attach coin pocket		0:35	Snls		Durko pp adler
8.	Overlock pocket bag		0:25	Overlock machine	Edge cutter	Siruba
9.	$\frac{1}{4}$ " stitch on pocket bag		0:30	Snls	Edge guide	Durko pp adler
10.	Label attach to pocket bag		0:50	Snls		Durko pp adler
11.	Iron pocket bag Fuse back panel and front panel		1:30	Pressing machine		Macpi

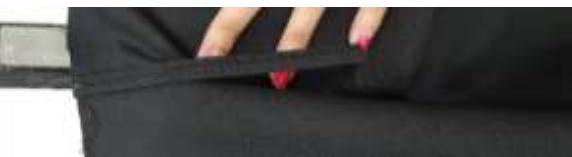
					
					
12.	Zipper attach		0:25	Snls	Durko pp adler
13.	Cut zipper		0:20	Zipper cutting machine	YKK
14.	overlock both flies together		0:20	Overlock machine	highlea d

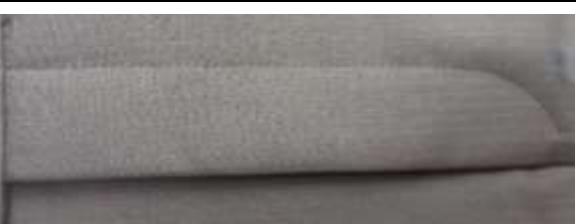
15.	Overlock Front and back panels		1:00	Overlock machine		Pegasus
16.	Front pocket bag attach		0:30	Snls	Edge guide	Durko pp adler
17.	Press front pocket bag		0:31	Pressing machine		Macpi
18.	Front pocket top stitch		0:30	Snls		Durko pp adler
19.	Front pocket stay stitch		0:30	Snls		Durko pp adler

20.	Attach pocket extension		0:45	Snls		Juki
21.	Overlock front rise		0:30	Overlock machine		Siruba
22.	Make welt pocket		1:00	Auto welter snls		Durko pp adler
23.	Edge stitch welt facing		0:45	Snls		Durko pp adler
24.	Button hole back pocket		0:30	Button hole machine		Durko pp adler
25.	Top lock welt pocket		0:36	Snls		Durko pp adler

26.	Bartack back pocket		0:25	Bartack machine		Durko pp adler
27.	Button attach		0:30	Button attach machine		Durko pp adler
28.	Close back pocket bag		0:30	Snls	Edge guide	Durko pp adler
29.	Attach bias tape to front rise		0:30	Snls	Bound seam folder	FDM
30.	Iron pocket bag, front rise and waistband		0:30	Pressing machine		Macpi

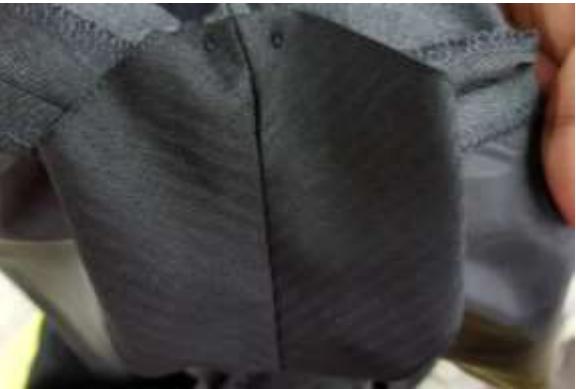
31.	Attach left fly and right fly		0:30	SNLS	Edge guide	Durko pp adler
32.	Attach inseam		1:20	SNLS	Edge guide	Durko pp adler
33.	Attach side seam		1:30	Snls	Edge Highle guide	ad
34.	Press open inseam and side seam		1:00	Pressing machine		Macpi
35.	Belt loop making		0:25			Strobel

36.	Close front pocket bag		1:00	Snls	Edge cutter	Durko pp adler
37.	Attach belt loop		1:00	Snls	Edge cutter	Durko pp adler
38.	Mark and cut waistband		0:30			
39.	Attach waistband		1:10	Snls (2)	Edge guide	durkop p adler
40.	Bound seam right fly		0:30	Snls	Bound seam flode r	Highle ad
41.	Attach waistband extension		1:30	Snls		Durko pp adler

42.	Flip and press waistband extension		1:00	Pressing machine		Macpi
43.	Buckle attach		1:14			Rapide
44.	Custom label attach		0:45	Snls	Edge	Pfaff guide
45.	right fly lining attach		0:55	Snls		Durko pp adler
46.	Pressing right fly		0:30	Pressing machine		Macpi
47.	J stitch		035			Durko pp adler

48.	Front rise tack		0:25	Snls	Durko pp adler
49.	Right fly top stitch		0:30	SNLS	Durko pp adler
50.	Zipper puller attach		0:35		YKK
51.	Front rise attach		0:45	DNCS	Highle ad
52.	Side seam & waistband pressing		1:00	Pressing machine	Macpi
53.	Checking			<ul style="list-style-type: none"> • Measurement • Style • Quality 	

54.	Bartack left and right fly		0:30	Bartack		Brother
55.	Wash care label attach		0:30	Snls		Durkopp adler
56.	Crotch lining attach		0:30	Snls		Durkopp adler
57.	Buttonhole waistband		0:36	Buttonhole machine		Brother
58.	Bartack belt loop		1:00	Bartack machine		Brother
59.	Curtain felling on waistband		0:45	Blind stitch		Strobel

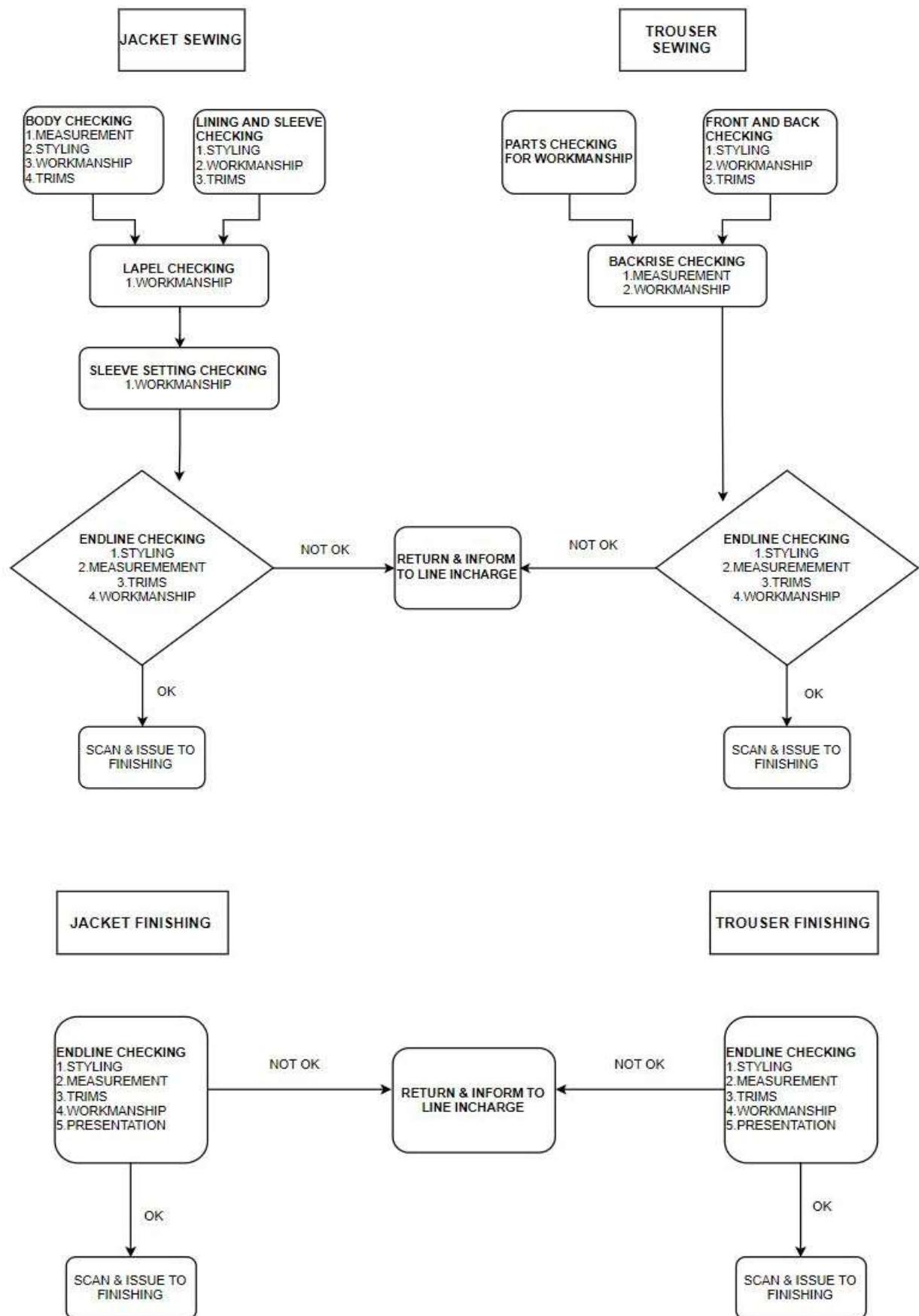
60.	Finishing crotch		0:35	Bartack		
61.	Spot tack waistband		0:35	Spot tack		Strobel
62.	Serge trouser bottom		0:45	Overlock machine		Siruba
63.	Cut untrimmed thread		(2)			

64.	Quality check	 <ul style="list-style-type: none"> • Pocket • Waist band lining • Felling • Label • Coin pocket • Shell pocket stitch • Crotch • Side seam • Inseam • Lining • Back pocket • Personal label • Bound seam • Open seam • Untrimmed thread
65.	Pressing	 <p>2:00</p> <p>Pressing machine (2)</p> <p>Macpi</p>
66.	pressing	 <p>2:00</p> <p>Pressing machine</p> <p>Macpi</p>
67.	QC	 <ul style="list-style-type: none"> • Untrimmed thread • Stains

	Operation	Machine	Make	SAM	SAM (secs)
Waistband					
1.	Fuse waist band together	Iron table	Macpi	0.2	12
2.	Fuse waist band	Fusing machine	Reliant	0.5	30
3.	Attach waist band lining	SNLS	Durkopp adler	0.58	34.8
4.	Top stitch waist band lining	SNLS	Juki	0.43	25.8
Pocket bag					
5.	Front pocket facing overlock(bottom)	3 thread overlock	Siruba	0.2	12
6.	Front pocket facing attach	Auto facing	Durkopp Adler	0.48	28.8
7.	Back pocket facing attach	Auto facing	Durkopp Adler	0.4	24
8.	Coin pocket hem and attach	SNLS drop feed	Durkopp Adler	0.35	21
9.	Overlock pocket bag	3 thread overlock	Siruba	0.2	12
10.	Top stitch on pocket bag	SNLS drop feed	Durkopp Adler	0.59	35.4
11.	Label attach	SNLS drop feed	Durkopp Adler	0.2	12
12.	Iron pkt bag, fuse back & front panels	Pressing machine	Macpi	0.6	36
Fly					
13.	Attach zip to left fly	Auto zipper/ DNCS	Durkopp Adler	0.24	14.4
14.	Cut zip	Ykk zip cutter	YKK	0.2	12
15.	Overlook right fly & zipper attach	3 thread overlock	Highlead	0.42	25.2
Front & back					
16.	Serge front and back panels	Double head serger	Pegasus	0.79	46.2
17.	Attach front pocket	SNLS differential feed	PFAFF	0.6	36
18.	Press front pocket	pressing machine	Macpi	0.34	20.4
19.	Top stitch front pocket	SNLS drop feed	Durkopp Adler	0.5	30
20.	Front pocket lock	SNLS drop feed	Durkopp Adler	0.7	42
21.	Attach pocket extension	SNLS drop feed	Juki	0.59	35.4
22.	Overlock front rise	3 thread overlock	Siruba	0.42	25.2
23.	Back pocket welting	auto welt	Durkopp Adler	0.59	35.4
24.	Welt press	pressing machine	Macpi	0.3	18
25.	Back pocket facing edge stitch	SNLS drop feed	Durkopp Adler	0.35	21
26.	Buttonhole back pocket	button holler	Durkopp Adler	0.35	21
27.	Top lock welt pocket	SNLS drop feed	Durkopp Adler	0.45	27
28.	Back pocket bartack	bartack	Durkopp Adler	0.4	24
29.	Button attach back pocket	button sewer	Durkopp Adler	0.17	10.2
30.	Close back pocket bag	SNLS drop feed	Durkopp Adler	0.3	18
31.	Attach bias tape to front rise	SNLS	FDM	0.43	25.8

32.	Iron pkt bag, front rise and waistband	Pressing machine	Macpi	0.55	33
33.	Attach left fly and right fly	SNCS	Durkopp Adler	0.45	27
34.	Attach inseam	SNCS	Durkopp Adler	1.35	81
35.	Attach side seam	SNCS	Highlead	1.5	90
36.	Press open inseam and side seam	pressing machine	Macpi	1	60
37.	Belt loop making	blind	Strobel	0.3	18
38.	Close front pocket bag	SNLS drop feed	Durkopp Adler	0.35	21
39.	Attach belt loop	blind stitch machine	Durkopp Adler	0.55	33
40.	Mark and cut waistband	manual	Manual	0.3	18
41.	Attach waistband	SNLS differential feed	Durkopp Adler	1.05	63
42.	Bound seam right fly	SNLS drop feed	Highlead	0.3	18
43.	Attach waistband extension	SNLS drop feed	Durkopp Adler	0.15	9
44.	Flip and press waistband extension	pressing machine	Macpi	0.49	29.4
45.	Hook and bar attach	hook and bar	Rapide	1.15	69
46.	Custom label attach	hook and bar	PFAFF	0.2	12
47.	Right fly lining attach	SNLS drop feed	Durkopp Adler	0.56	33.6
48.	Pressing right fly	pressing machine	Macpi	0.5	30
49.	J stitch	pick stitch machine	Durkopp Adler	0.25	15
50.	Front rise tack	SNLS drop fedd	Durkopp Adler	0.45	27
51.	Right fly top stitch	SNLS needle feed	Durkopp Adler	0.33	19.8
52.	Zipper puller attach	Ykk slider	YKK	0.32	19.2
53.	Back rise attach	TNCS	Highlead	0.45	27
54.	Side seam & waistband pressing	pressing machine	Macpi	0.55	33
55.	Bartack left and right fly	bartack	Durkopp Adler	0.4	24
56.	Wash care label attach	SNLS drop feed	Brother	0.4	24
57.	Crotch lining attach	SNLS drop feed	Durkopp Adler	0.55	33
58.	Buttonhole waistband	buttonholer	Durkopp Adler	0.42	25.2
59.	Bartack belt loop	bartack	Brother	0.35	21
60.	Curtain felling on waistband	curtain felling	Brother	0.45	27
61.	Finishing crotch	bartack	Strobel	0.4	24
62.	Spot tack waistband	spot tack	Strobel	0.5	30
63.	Serge trouser bottom	3 thread overlock	Strobel	0.43	25.8
64.	Cut untrimmed thread	manual	Manual	0.7	42
65.	Pressing	Buck press	Macpi	0.49	29.4
66.	Pressing	Buck press	Macpi	0.54	32.4
				31.6	1894.8

QUALITY PROCESS



INTERNAL AUDIT

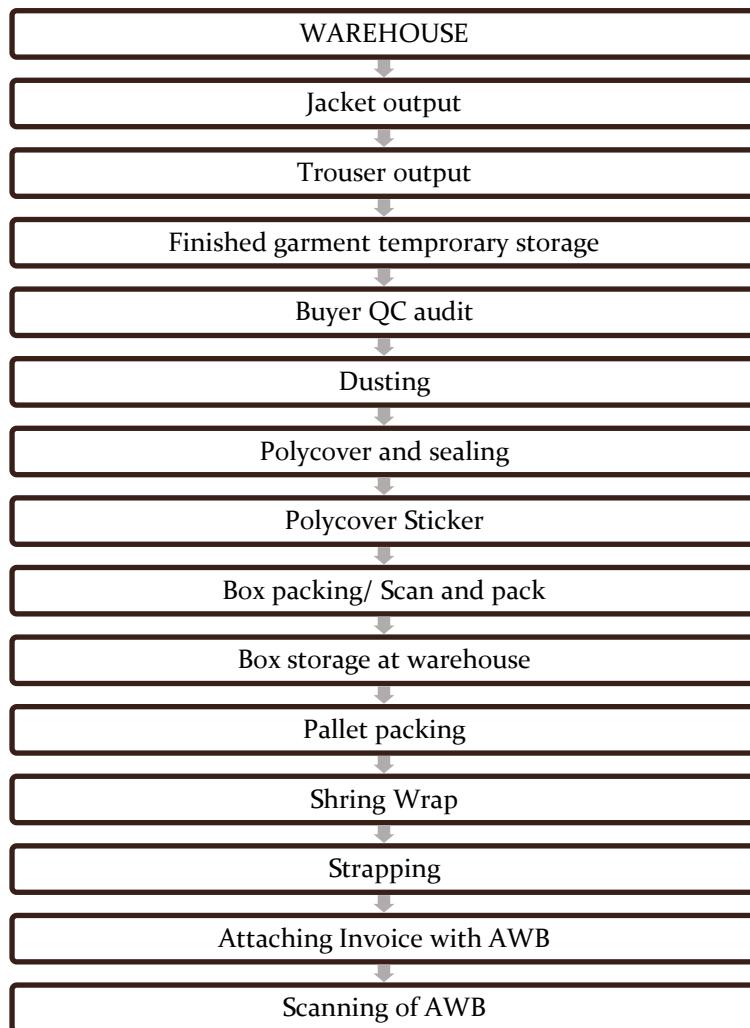
The internal audit department checks the garment's quality and measurement. 100% inspection is done for jackets, trousers and vest coat. This checking is done by employees hired by Macintosh. If the garment passes the internal quality check, its PO Number is entered in excel.

If the order is of an individual trouser, jacket or vest coat it is sent to the external audit room. If a trouser which is a part of a suit passes the internal audit and its jacket is still in line, it waits for the jacket in the pairing area. Similarly, if the jacket passes the internal audit and the trouser is still in line, it waits for the trouser in the pairing area. The same applies for vest coat if the order is of a 3-piece suit.

In the pairing area, pieces are sorted according to the date and color of the day. Once the whole order is ready, i.e., the jacket and trouser in case of a suit, the garments are put onto a conveyor which takes them directly to the Warehouse.

WAREHOUSE

Once the garment passes the internal audit process it is sent over to the warehouse where it is stored in a temporary storage area waiting for inspection. Then the garment is taken for external auditing in the external audit room.



EXTERNAL AUDIT

If a piece passes the internal audit, it is sent to the external audit room where employees of the buyer checks the garments. In external audit, the garment is again checked against the same parameters.

If a garment does not pass the external audit, it is sent back to the production department where it is either altered or remanufactured.

If the garment passes the external audit process it is put inside a polythene bag and is hanged in a hanger. Then the tracksheet of the garment is scanned and the corresponding label is put in a box along with the garment. This label contains details like:

- Fit
- Order
- Garment Type
- Barcode

Then an operator removes and sticks the label on each garment. Once the labels are stuck the garment is packed in the box and taped. Another label is printed and stuck on top of the box which contains the shipping details. These boxes are stacked on a pallet up to a height of 160 centimeters which is then wrapped with cling wrap and finally tied with a rope.

The following are stored in the warehouse

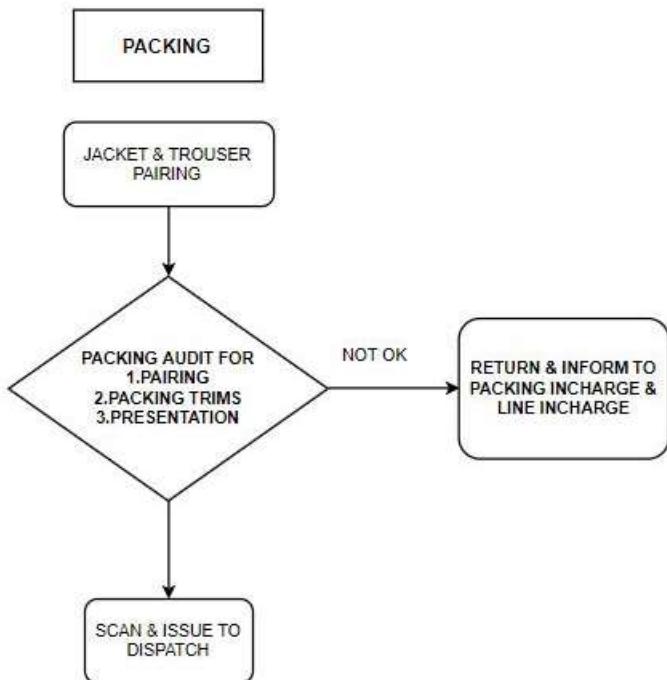
- Hanger – 15”, 17”, 18’, 19”, 21”
- Polythene Bag
- Cling Wrap
- Cartons
- Boxes
- Pallets
- Ropes

The garments do not wait for more than 1 one day in the warehouse. They are either shipped on the day they complete the external auditing process or on the following day.

The garments are shipped by air using DHL EasyShip.

DHL EasyShip streamlines the shipping process and increases speed and productivity.

QUALITY PROCESS



INDUSTRIAL ENGINEERING DEPARTMENT

Industrial engineering department is the brain of any industry and garment industry is no other exception. The industrial engineering department is responsible for all the factory operations. The

aim of the industrial engineering department is to increase the efficiency of the factory while reducing operator fatigue at the same time.

The short term aims of the department for the Macintosh Unit include:

- Calculating SAM of every operation
- Calculating the capacity of the factory
- Removing bottleneck operations from sewing line
- Improving material flow in Cutting Department
- Decrease material handling time
- Increasing output and efficiency of cutting machines

In the Bulk plant of SSAL, operation of this department starts from the receipt of the order from the buyer. Once the customers place the order the merchandise department forwards the order to the industrial engineering department for the processing. They then prepare the CM cost (cut make cost). This includes Operational run:

- SAM (standard allocated minute) for each individual operation
- Cost per machine hour is calculated
- Standard achievable efficiency, etc. are calculated and forwarded back to the merchandise department

The operation continues once the order is confirmed. The APS or the Approved Production Sample is given to the department, here the sequence of the process is studied, and the necessary suggestions for changes are made if required. And also in the receipt of the confirmed order the complete operation bulletin is prepared, along with all the attachments, guidelines and files the documents are forwarded to the production department with all other accessories.

They also have certain functions like going to the line while the batch is set, during menu style loading and so on. They ensure the process is running smoothly the go for continues checking till the first product comes out. After that they will have a periodic check for line balancing exercise for productivity improvement. They also monitor the manpower allotment. The finally the reports generate and the performance is evaluated as per the actual target and the achievement and the same report is sent to the management. The industrial engineering department also under takes projects, setting up lines maintenance &utility, R&D activities etc.

OBJECTIVES

- To increase productivity
- Process improvement by motion reducing.
- Reduce work in process (WIP) and remove the bottleneck.
- Increase efficiency of operations
- Reduce man machine ratio
- Process improvement to reduce cost, waste and rejection Reduce wastage and defects
- Fill up Key Performance Indicator (KPI) target.
- Keep workplace and environment safe
- Production planning and implementation
- Evaluate operator and staff performance, disciplinary matters, training needs, and their career development.
- Set the target, layout design of the machine requirement, material flow, and workstation to bring the best possible efficiency. Modern tools are used to design of the layout.
- Monitor factory performance in terms of quality, delivery, cost-efficiency and target improvements with the internal factory team and taking necessary corrective action.
- Manpower balancing, target setting, and monitoring achievements.

FUNCTIONS

- Estimating the SAM of the garment for a new style for costing
- Calculating thread consumption for garments
- Providing operational breakdown with SAM and target for each operation for an order (style)
- Selection of machines and work-aids and number of machines for each operation of a particular order
- Method improvements through method study
- Time study of the operators
- Capacity Study of operators
- Line Balancing
- Calculating direct labor cost
- Develop detailed production methods, from detailed manual movements to major decisions on technology.
- Documentation of all methods using manuals, computer-based system as appropriate.
- Operator performance improvement
- Operator training program
- Production Control system

ROLE OF INDUSTRIAL ENGINEER

- Safety
- Line balancing
- Quality – operation control
- Training – how to train new employees
- Operator output – maintains high output and improves abilities of those with low output.
- Loss control – minimize off-standard loss
- Waste control – in materials, supplies and machinery
- Standard conditions – in the workplace, in sewing method, in the machines

HUMAN RESOURCE DEPARTMENT

The Human Resource Department is headed by the HR manager, under who is the assistant manager.

OBJECTIVES

- To maintain the personnel documents
- To ensure employee's benefits timely
- To recruit new staff and employees
- To receive and solve the employee grievances

The department also comprises of junior managers for different sectors like Recruitment, Welfare, Transportation and Payroll. The total strength of the department is 16, including various office assistants and trainers.

The recruitment can be in various formats like Campus placement Cells, In-office recruitment, Recommendations or Walk-In Interviews depending on the requirements of various departments prior in hand with the HR.

Every employee and operator is made to set up a new salary account in which the paychecks are deposited every month. A muster roll and absentee register is maintained for proper records. All the operators are on a fixed wage basis. Overtime is paid as double the amount of their basic.

The HR is also responsible for making sure the presence of floaters and contracted labour.

The welfare segment takes care of the basic amenities of the operators since 95% of them are female operators. They are provided with the facility of Child-Day care. Also, once in a month, the operators are engaged in recreational activities.

IT DEPARTMENT

The information technology department consists of 3 people in all.

FUNCTIONS

- Dealing with MIS
- Maintenance of all hardware like computers, scanners, printers, xerox machine etc.
-

The ERP used is STAGE, on which end to end documents are synchronized from purchase order till shipment confirmation. The software is updated as soon as the latest version is available. It has been upgraded 4 times since adopted. It accommodates 50 users.

Other than the ERP, other software usage is in CAD/CAM department. Gerber 6.0 was adopted in 2004 during the establishment of the facility.

The IT department ensures that all computers are always connected to the network, if not, they repair the server. It is necessary that all computers are always connected to the network as the CAD department uploads markers to the network and then the computers are the cutter and the computers at the QC table access these markers for cutting and checking respectively.

The department follows a proper set Standard Operating Procedures. It states the terms and conditions about the usage of data by each employee along with their login id and password and other authorization details.

MAINTENANCE DEPARTMENT

The department is responsible for all the maintenance activities in the organization. This department does all sorts of maintenance, the machine maintenance, utility equipment maintenance, and other maintenance in the lines.

OBJECTIVES

- To maintain smoother production.
- To overcome the machinery and production system related problems.
- Reengineering efficiently to reduce pollution.

ORGANISATION STRUCTURE

The Head Manufacturing (GM) heads the department. The Manager Maintenance reports to the Head Manufacturing (GM) regarding the activities in the Maintenance Department. The Assistant Manager Maintenance supports the manager and has five senior executive and twenty junior executives reporting to him.

WORK DONE

- Servicing of machine
- Checking of Boilers for steam
- Repairing unit production system
- Electricity supply—if power is gone then starting of generator
- Building maintenance
- Oil change
- Replacement of defective parts
- Servicing of Motor
- Checking of Motor
- Maintaining conveyor system
- Issue of consumables, needles and knives

FUNCTIONS

- Inspection of sewing machines and other machinery in the factory, repairing and up gradation
- Maintaining and ensuring continuous power supply in the factory
- Maintaining proper water supply, compressors, boilers etc
- Maintaining Vacuum & Compressor
- Planning, design and implement any kind of expansion of the factory
- Purchase of new machinery
- Issuing of different spare parts and accessories according to the production requirement
- Air pollution control
- Housekeeping
- Gardening
- Carpentry Work
- New constructions, paintings, and furnishing of the factory
- Maintaining the water supply and drainage lines without a problem

PREVENTIVE MAINTENANCE

- Equipment checks
- Partial/ complete overhauls at specified periods
- Oil change
- Lubrication
- Record equipment deterioration

In the company preventive maintenance is done in the following ways:

- In automatic sewing workstation servicing is done every 20 days
- In sewing machines oiling is done every week and servicing is done in every 20 days

BREAKDOWN MAINTENANCE

Breakdown maintenance is not the best resort but most breakdowns in the cutting department are dealt with as when they happen. There is no preventive maintenance for the cutting machines. Whenever a knife breaks, the maintenance team changes the knife or if the vacuum is not strong enough, the machine is fixed when the problem occurs.

This is because of the pressure to cut large number of garments, time is not given for periodic maintenance of machines. Another reason is lack of knowledge of maintenance requirements of the machine.

MAINTENANCE STORE

The maintenance Store is responsible for looking after the spare parts and maintains the records of the maintenance department. The store of maintenance department issues different spare parts, needle and keep the records.

The basic purposes of this store are:

- Issuing of spare parts and needle.
- Updating daily stock records.

QUALITY CONTROL DEPARTMENT

The objective of the quality control department is to deliver quality product by thoroughly checking the quality of the product produced by the production department as per the requirement of the buyer.

Quality Assurance department has its presence in every stages of the production. The Quality Assurance Department's function starts with receipt of the fabric that is, once the fabric and trims reach the stores the quality of the fabric and trims are checked. The operation continues throughout cutting and sewing process.

After each operation the quality checks are done and in the finishing department a detailed quality check is done and is sent for alteration in case of any defects, finally approve the trousers and jackets for packing.

OBJECTIVE

- To ensure that the product has achieved the quality parameters of buyers.
- To restrict the defects in the final product
- To check the products for any defects
- To send back the pieces for alteration
- To recheck the altered pieces for any defects possible
- To clear the product for packing and shipment

Store	Check quality of fabric and trims 4 point inspection of fabric Send report to CAD
Cutting	Check cut parts Check marker for all parts
Fusing	Quality of fusible Check sorting Check placement of fusing
Sewing	100% inline inspection 100% endline inspection

JACKET

FRONT SECTION CHECK POINTS

MISCELLANEOUS

- Match the Garment ticket number
- Shade variation within panels and between 2 panels
- Damage & Weave defects
- SPI
- Style Check

POCKET

- Check the stripes/checks matching and bend for the breast pocket
- Check the Shape of the chest pocket, Flap and side pocket
- Check the chest pocket bone/welt stitch for puckering and stitch open
- Check the pocket bag open/improper
- Check the breast pocket, lower pocket Up & Down
- Check the breast pocket zigzag
- Check the breast pocket V-notch
- Check for pocket bone tacking
- Check for pocket welt smiling
- Check for front pocket folding
- Check for edge of the welt pocket for pleat, stitch open.
- Check for flap lining showing out, uneven
- Check for flap width evenness

FRONT

- Check stripes/checks matching and bend of the side panel
- Check the side seam for seam puckering
- Check the side seam for open stitch
- Check the seam allowance
- Check the dart bend, dimp, loose stitch and stitch open
- Check the shoulder seam
- Shoulder pad improper
- Chest piece improper
- Under armhole pressing uneven.
- Bridal tape tight/open

BACK

- Check stripes/checks matching and bend of the back seam
- Check the back seat for seam puckering
- Check the back seat for open stitch
- Check the back vent up and down
- Check for bottom folding

LINING CHECK POINTS

- Check shade variation
- SPI
- Damage
- Check lining pocket welt stitch
- Check center back seam loose stitching and puckering
- Check side seam loose stitch and puckering
- Check triangular flap
- Check brand label stitch uneven & cross
- Check for size label improper and stitch open
- Check for front side seam loose stitch and puckering
- Check for facing collar attaching up & down
- Check for facing collar attaching seam balance out
- Check for lining collar neck attaching notch to notch
- Check for lining collar neck attaching puckering/pleat
- Check for shoulder seam loose stitch & puckering
- Check for facing & piping uneven and pleat
- Check the saddle stitch uneven and miss stitch
- Check the checks matching at lining facing
- Check the bridle tape for tight/open
- Check for looseness & pleat in facing
- Check for pocket smiling
- Check for seam allowance

SLEEVE ATTACHMENT CHECKING

- SPI
- Fabric damage
- Shade variation
- Check the elbow seam loose stitch & puckering
- Check the elbow seam checks miss matching
- Check the sleeve bottom folding improper
- Check the lining elbow seam loose stitch & puckering
- Check the sleeve vents tacking miss & open
- Check the sleeve SAM hole stitch miss & open
- Check the sleeve bottom attaching wrong
- Check the sleeve button thread miss matching
- Check the sleeve bottom & lining stitch improper
- Check the sleeve button & lining stitch margin out
- Check the sleeve inseam loose stitch & open
- Check the sleeve lining loose stitch & open
- Check the sleeve inseam tacking tight & improper
- Check the elbow seam tacking miss and tight
- Check the sleeve gathering improper
- Check the sleeve vent up & down
- Sleeve attach puckering in front side
- Sleeve attach puckering in back side
- Sleeve attach stitch open & pleat
- Sleeve balance out
- Sleeve pad fold

- Sleeve checks miss matching
- Sleeve basting notch out
- Armhole closing improper/open/loose stitch
- Sleeve closing margin out
- Sleeve head roll fold
- Sleeve crown gathering
- Sleeve crown cross

ASSEMBLY-1 CHECK POINTS

- SPI
- Check the front edge shape out
- Check the peak fullness
- Check the zigzag seam and loose stitch
- Check the peak shape
- Label peak uneven and open
- Label and collar shape improper
- Front edge piping and shape improper
- Facing and front attaching improper
- Gorge seam improper and open
- Gorge seam pleat and shape out
- Front end fullness improper
- Lining bottom open and tacking miss
- Side vent improper
- Back vent improper
- Top stitch improper
- Button hole cross and bar tack miss
- Flower button hole miss and cross
- Bottom tight
- Bottom round shape improper
- Bottom uneven
- Seam open/loose stitch
- Collar felt visible
- Lapel break improper
- Collar and back stripe mismatching

MEASUREMENT CHECK POINTS

- Back body length- CB from neck
- Collar Height at CB
- Across shoulder (point to Point)
- Back neck width
- Button Stance
- Collar Point
- Lapel Point
- Lapel Width

ASSEMBLY -2 CHECK POINTS

- **COLLAR SECTION**
 - Collar Zigzag.
 - Open collar/felt open.
 - Stand stitch open.
 - Stripes/checks mirror images.
- **FRONT SECTION**
 - Damage and weaving.
 - Breast pocket improper/open.
 - Dart stitch open/improper.

- Side panel open/improper.
- Front bone stitch open/improper.
- Flap stripes/checks mismatching.
- Flap lining visible/improper.
- Front pocket open.
- Side stitch open/puckering.
- Back stitch open/puckering.
- Shoulder stitch open/improper.
- Shoulder pressing and piping

- **LINING SECTION**

- Lining damage/weaving.
- Facing stitch open/improper.
- Lining pocket open/improper.
- Pocket corner open/improper.
- Size label and brand label open/missing/improper.
- Lining open.
- Lining top stitch open/missing/improper.
- Lining shoulder stitch open.
- Saddle stitch open/missing/improper.
- Facing and collar attaching improper.

- **SLEEVE SECTION**

- Sleeve button missing/loose stitch.
- Elbow seam stitch open.
- Elbow seam checks not matching.
- Sleeve inseam stitch open.
- Sleeve vent improper.
- Sleeve inseam tacking & elbow tacking missing.
- Sleeve lining seam stitching open and loose.
- Sleeve bottom hem open.
- Prick stitch open.
- Bottom lining open.
- Lapel peak shape out.
- Front edge stitch open and loose stitch.
- Front edge shape out.
- Button hole cross & miss & stitch open.
- Flower button hole miss.
- Bar tack miss.
- Side vent stitch open & center vent stitch open.

GENERAL

- Hanger loop miss and thread change.
- Sleeve attaching puckering in front side.
- Sleeve attaching puckering in back side.
- Sleeve attaching stitch open and pleat.
- Sleeve balance out.
- Shoulder pad fold.
- Sleeve head roll fold.
- Sleeve checks miss matching.
- Sleeve basting notch out.
- Armhole closing improper/open/loose stitch.
- Sleeve closing margin out.
- Sleeve kinari stitch open and pleat.
- Sleeve crown gathering.
- Sleeve crown cross.

- SPI

TROUSER

MISCELLANEOUS:

- 1.Match the Garment ticket number
- 2.Shade variation within panels and between panels
- 3.Damage & Weave defects
- 4.SPI
- 5.Style check

POCKETS

- Check the stripes/checks of the side pocket matching with the front and back panel
- Check the Shape of the side pocket
- Check the pocket bag open/improper
- Check whether the left & right side pocket are mirror image of each other
- Check the top stitch of side pocket
- Check the stripes/checks of the welt pocket matching with the back panel
- Check for welt pocket lip
- Check the welt pocket bar tack
- Check for pocket bone tacking
- Check for edge of the welt pocket for pleat, stitch open.
- Check the welt pocket stitch for puckering and stitch open

FRONT & BACK

1. Check whether the front panels and back panels are the mirror image of each other
2. Check the checks/stripes matching at side seam
3. Check the checks/stripes matching at inseam
4. Check the side pocket shape
5. Check whether the left and right side pockets are mirror image of each other
6. Check the side pocket top stitch
7. Check for side pocket stitch open/puckering
8. Check the brand label placement
9. Check the brand label stitch open/ puckering
10. Check the side pocket bag tacking
11. Check for welt pocket lip
12. Check for welt pocket stitch for puckering / stitch open
13. Check for welt pocket bar tack
14. Check for the back dart bend, dimp, loose stitch and stitch open.
15. Check side seam for seam puckering/ open stitch
16. Check in seam for seam puckering/ open stitch
17. Check for seam allowance

ASSEMBLY

1. SPI
2. Check the waist band loop placement
3. Check the waist band attach seam for puckering/ open stitch
4. Check whether the left & right waist band are mirror image of each other
5. Check the waist band extension shape
6. Check the hook & bar placement
7. Check the J-stitch is proper
8. Check for the front rise & crotch attach
9. Check for the front rise seam open/ puckering
10. Check the slider is proper
11. Check the button hole stitch open/ button hole placement
12. Check the back rise seam open/puckering

13. Check the side pocket bartack proper
14. Check the fly bartack
15. Check the waistband button placement
16. Check the back pocket button placement
17. Check the belt loop bartack
18. Check the bottom overlock
19. Check the bottom hem
20. Check for loose button
21. Check the zipper and slider functioning properly
22. Check for bottom sergeing improper

TROUSER MEASUREMENT CHECKING METHOD:

Front: waist > thigh > knee > bottom > inseam > side seam > front rise > side pocket

Back: waist > back rise > back pocket > dart

MEASUREMENT CHECK POINTS

S.No.	Check points
1	Waist
2	Waist band height
3	Belt loop distance
4	Belt loop length
5	Side pocket length
6	Side pocket distance
7	Thigh(10cm from crotch)
8	Knee
9	Bottom opening
10	Inseam
11	Side seam
12	Front rise
13	Back rise
14	welt pocket length
15	Welt pocket width
16	Back dart length
17	Keyhole position
18	Hip circumference

PROJECT

DEVELOPMENT OF REAL TIME PRODUCTION MONITORING SYSTEM & ENHANCEMENT OF PRODUCTIVITY OF CUTTING DEPARTMENT

OBJECTIVE

- Increase output of cutting department
- Reducing idle time of cutting machine heads and increasing their cut time
- Reducing recutting
- Increasing order traceability

INTRODUCTION

The Macintosh unit is a job work unit for the buyer Joseph Abboud. Customers visit the Joseph Abboud showroom in USA where they choose the trims, style and fabric. They give their measurements in the store. This information is sent to the Macintosh unit in XML format.

The CAD department at Macintosh opens the order and downloads the tracksheet. This tracksheet contains all the information required to produce the garment such as measurements and style details. Then the ORD file is downloaded. The pattern is then saved and processed. In order to make the marker this file is imported into the marker making software, Accumark. For checks fabric, the marker is made manually and for solid fabric the marker is made automatically using the nester. The consumption is written on the tracksheet. The consumption is then updated into the ERP software. This is followed by printing of stickers containing the Order ID, PO Number, Style and Size. Next, the taffeta label is printed and attached to each garments tracksheet. These tracksheet are then sent to the sub-store.

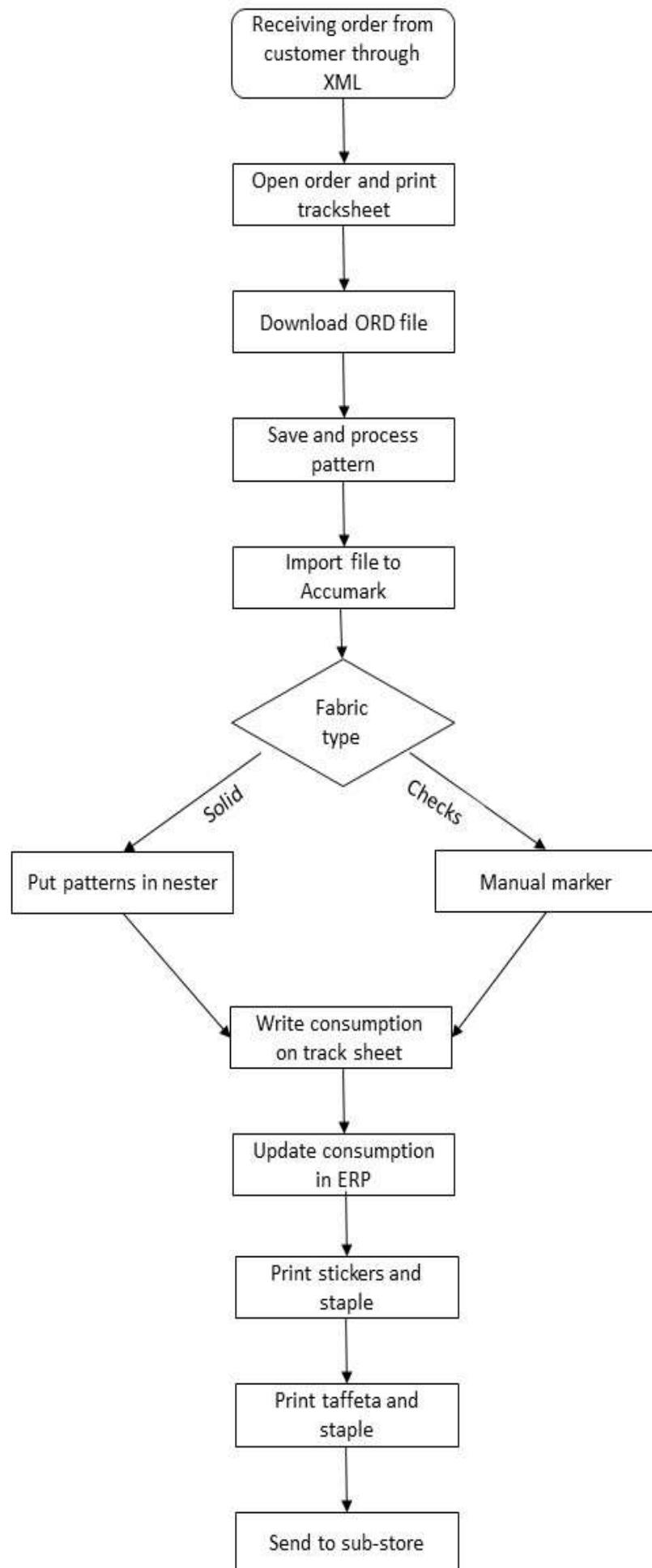
The tracksheets are scanned in the sub store to update their location and confirm the consumption as well. Then the operators in the store find the required fabric rolls (shell fabric and lining fabric), cut the same amount of fabric as mentioned in the tracksheet, mark the face side of the fabric and keep it in a tray. They also add the fusing and felt in the same tray. The tracksheet along with fabric, fusing and felt is given to the cutting machine operators in this tray. In other word, one purchase order is kept in one tray.

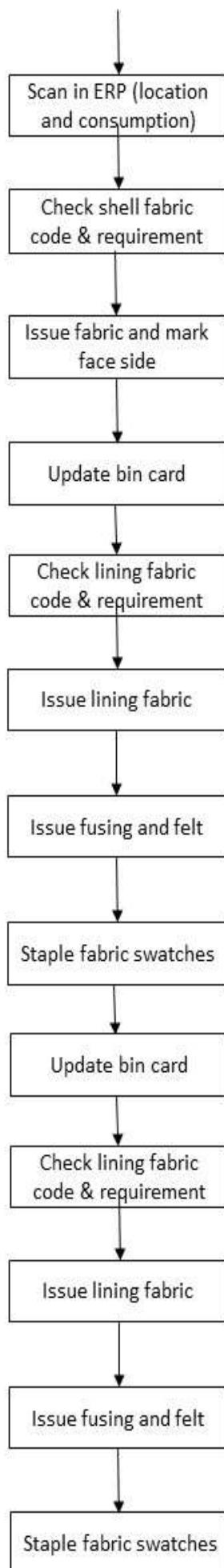
The cutting machine operators pick up this tray and scan the tracksheet to open the marker. Once the marker is opened, the marker is projected onto the cutting bed. The operators align the marker as required and then spread the fabric onto the cutting bed. If the fabric is checked, the operators need to match the checks of the two layers of the fabric. The parts of the lining were stickered by seeing the projection of the marker. The fabrics are then covered with polythene in order to prevent wrong cutting before giving the cut command. Once these garments are cut, operators' sticker the shell fabric, mark wrong side of all cut parts and then bundle the parts. The cutting machine operator writes the PO number and the garment type in a notebook in order to maintain record. Then they bundle the parts into 4 small bundles first, one contains the lining, second contains fusing, third contains small parts of shell and fourth contains the remaining parts of shell. These four bundles are then bundled together along with the tracksheet into one big bundle and kept in a rack.

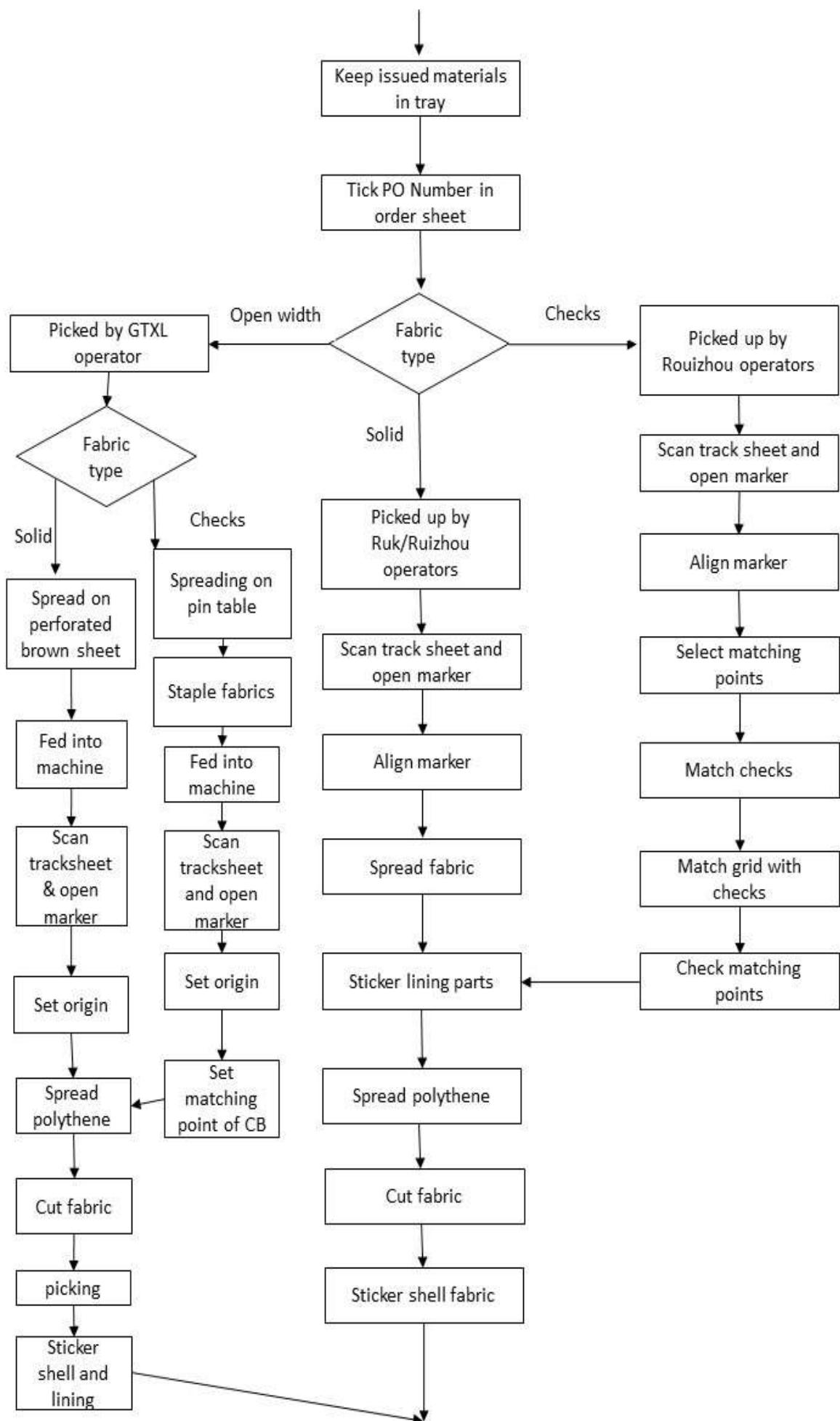
The fusing machine operators pick up bundles from these racks. They open the fusing and shell fabric bundles and split the panels to be fused among themselves. The fused parts are bundled by one operator standing behind the fusing machine and the PO number of each garment is noted down for record. This bundle is then passed to the ready cutting table.

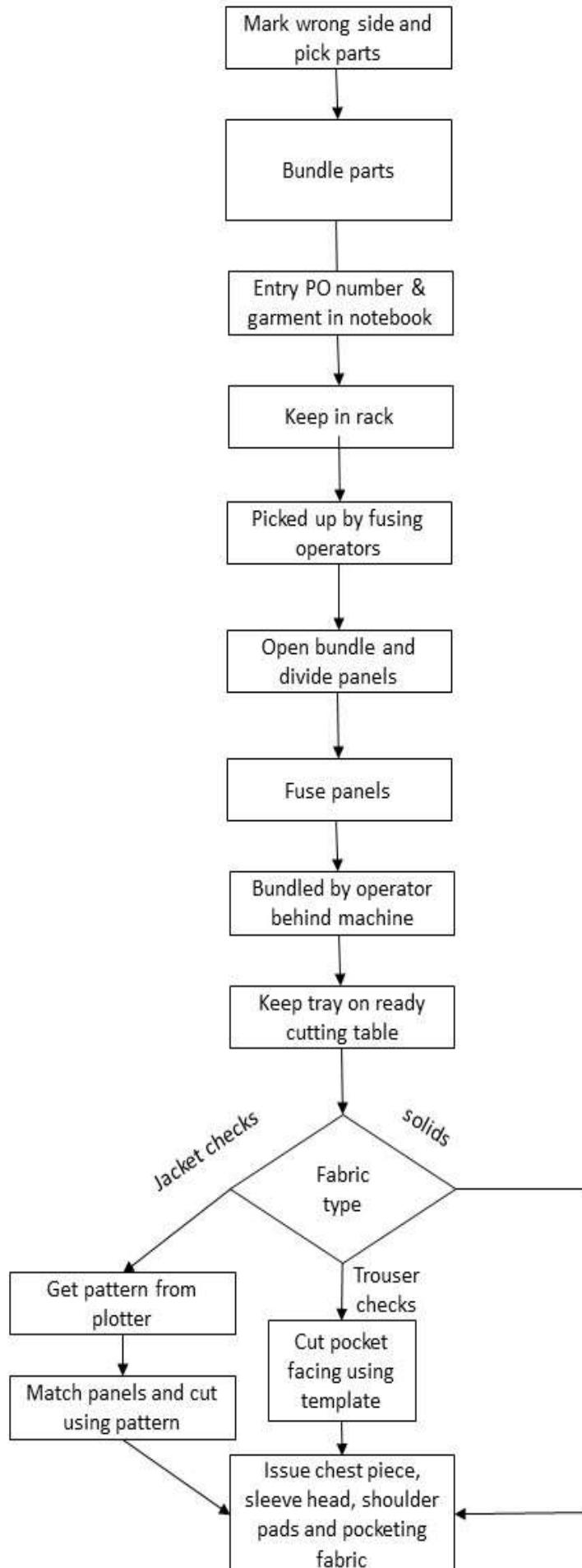
At the ready cutting table, block cut parts of garments with checked shell fabric are ready cut. The pattern is obtained from the pattern table and then the operator matches the checks and cuts the parts. Then the next operator adds pocketing fabric, chest canvas, sleeve head and shoulder pad to the bundles of checks as well as solid fabrics after stickering each with a sticker containing the PO number of the garment. The operator then highlights the PO number of the garment sent forward to the quality check.

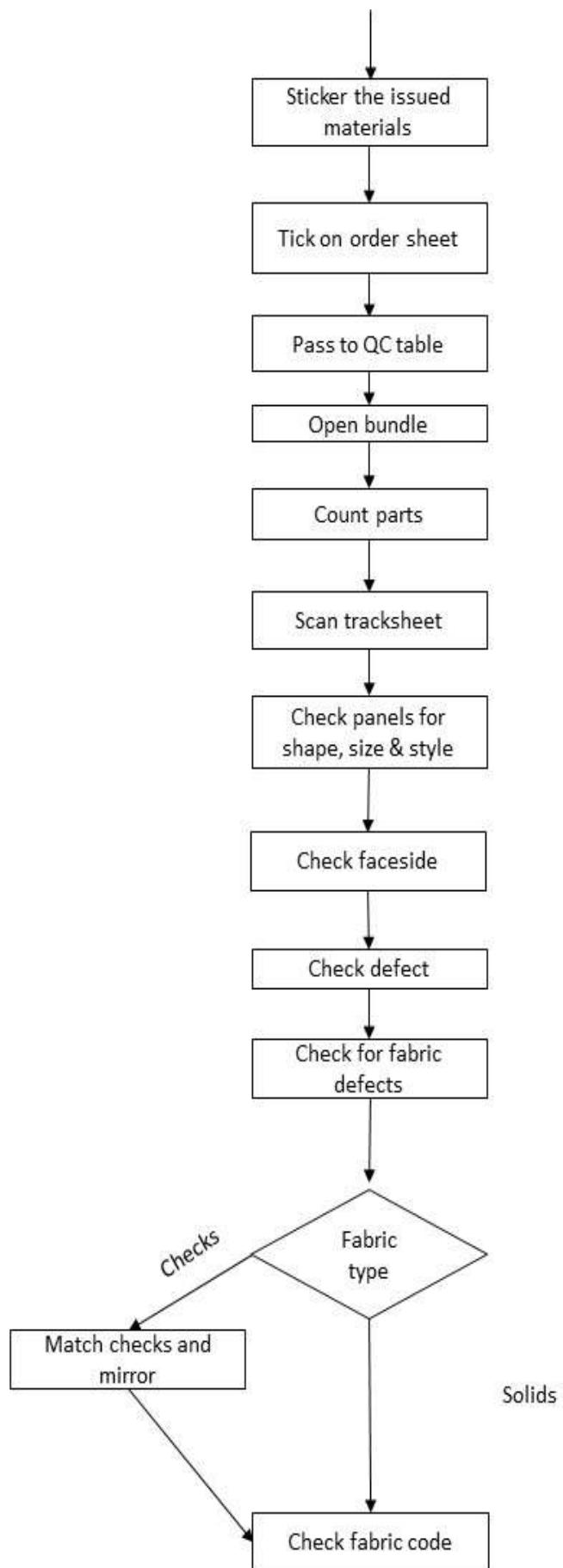
There are 3 quality checking tables for jackets, 2 for trousers and 1 for vest. Garments are sent to the respective QC tables where the operator opens the bundles and checks whether all parts are in the bundle. Then they scan the tracksheet to open the marker which is projected on their tables. They check the measurements and style by superimposing the panels with the projection. They then check whether the face side marked is correct and there are no fabric defects in the panels. In case of checks fabric, they check whether the checks match and mirror. They also check for the fabric code of shell, lining and felt. If the garment passes the quality check, the parameters on the tracksheet are ticked and signed by the quality checker, he also makes a note of the PO number of the garment checked in a notebook and keeps it in a loading rack and if it fails the quality check, the defect is written behind the tracksheet and in the notebook along with the PO number and sent to the recutting table. The recutting operator reads this defect and recuts the panel by getting the pattern from the pattern plotter. After recutting the panel, the bundle is sent to the QC table again where the QC operator checks the panel which was recut.

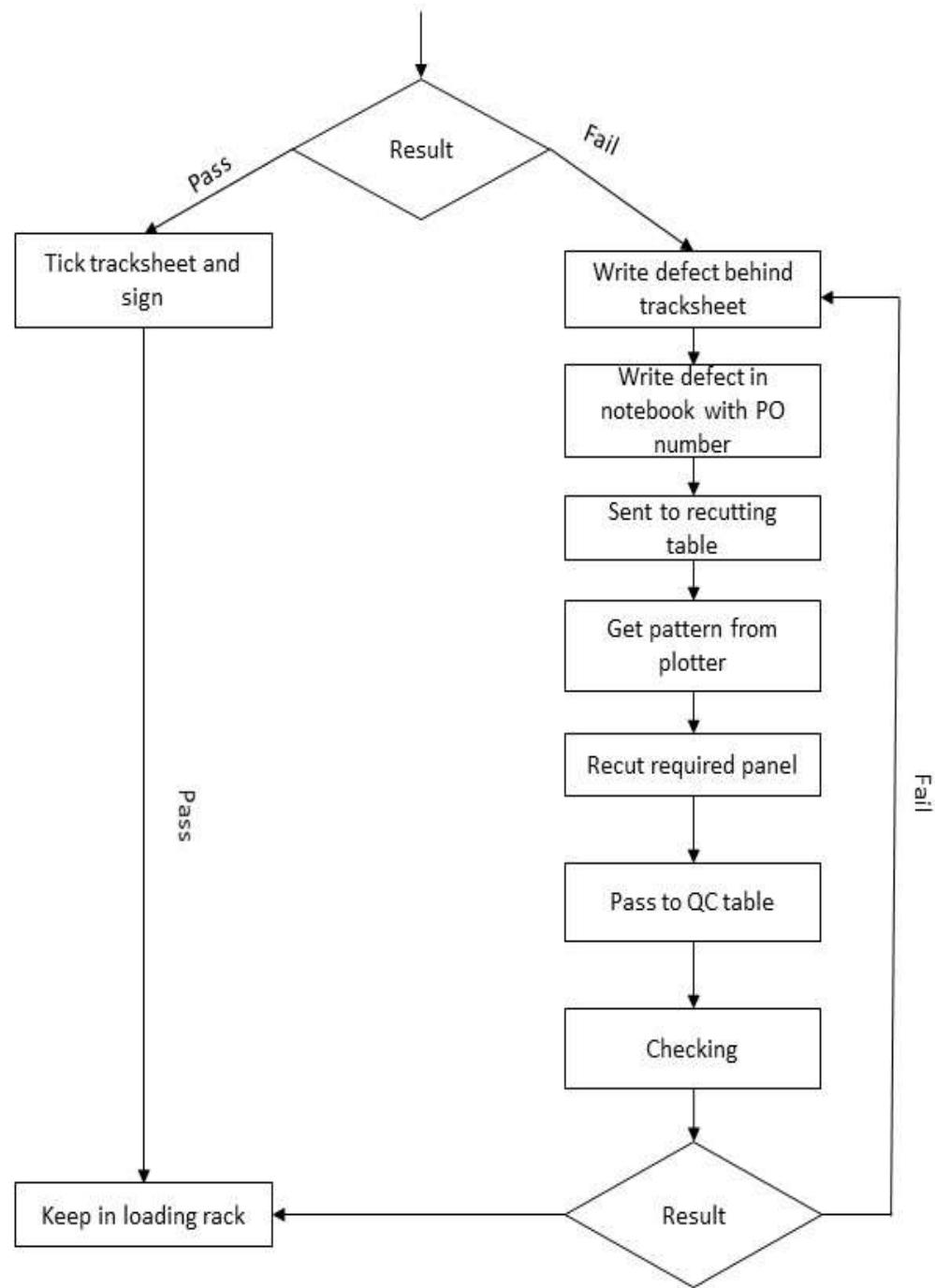












NEED

The buyer had decided to give the unit 1000 purchase orders per day. Currently, the unit was receiving 700 purchase orders per day and this number was bound to increase. The cutting department's output would not cross 200 purchase orders per shift, that is, 400 purchase orders per day. This caused a backlog and the delay in shipping orders increased day by day. In the Macintosh unit, the cutting department would always be the bottle neck because it was a mass customization unit where each order was cut separately and not in lays consisting of multiple plies. The output of the cutting department was about 25 pieces per hour and had to be increased to 60 pieces per hour in order to be able to fulfill the production requirement of 1000 orders per day.

DEPENDENCIES

- Machine Availability
- Absenteeism
- Feeding from stores
- Worker's efficiency
- Skill inventory

DATA COLLECTION METHODS

- Time Study
- Work Sampling
- Video Analysis
- Elemental Breakdown
- Why-Why Analysis

METHODOLOGY

In order to understand the reasons for the low output of the cutting department, first, elemental breakdown was done for every activity in the cutting department and then the time each operation took in the cutting department was found by performing a time study. The detailed time study was performed for 18 orders from when the purchase orders entered the sub store till their loading into the sewing line.

The various tasks performed by the operators and the time they performed each task was noted by carrying out work sampling and the amount of time the cutting head was idle was also found by performing work sampling of the cutting machine heads.

Then the reasons for re-cutting of orders were focused on. The quality report containing reasons why garments were sent to recutting from QC table were analyzed and a pictograph was made to determine which defects had to be targeted first. A why-why analysis was done to understand the reasons for these defects.

The cutting department was divided into various sub sections and studied independently.

1. Sub store section
 - a. A time study was performed to understand the process flow and the split up of the time it took to ready one tray to feed to the cutting section.
2. Cutting section
 - a. Work sampling was done to understand how much time the machine cutting head was idle and for how much time it was running and understand the actions of the operators and what operation they performed for majority of the time.
3. Fusing section

- a. The fusing section was analyzed to understand why the output of the fusing process was low and their output per hour was noted along with the time taken to fuse each part of the garment.
4. Ready cutting section
 - a. The ready cutting section was studied to understand why a huge WIP would build there. The layout and activities carried out were analyzed to understand this further.
5. Recutting section
 - a. The reasons for recutting were analyzed by performing a why-why analysis. Each cause found was further studied to find the root cause.

The reasons for recutting were divided into 8 broad categories:

1. Fabric code wrong
2. Parts missing
3. Knee lining bottom open
4. Improper fusing
5. Fusing wrong side
6. Style wrong
7. Checks mismatch
8. Wrong cutting

To find the various reasons for recutting the following were planned to be carried out:

- An elaborate why-why analysis was decided to be carried out
- Data regarding the type and number of defects was planned to be collected

The defects found were planned to be eliminated by making visual displays of the right way to do the task, simplifying processes and mistake proofing. Reasons were prioritized based on the number of times the defect occurred in the data collected.

The problem of inefficient order tracking was dealt with by developing a software that could track orders automatically without any human intervention.

UNDERSTANDING THE ACTIVITIES IN CUTTING DEPARTMENT

In order to understand the

- movement of materials
- obtain the time it took for orders to move from one sub section to another
- processes which were the most time taking and had to be targeted

orders with the shell fabric as checks were chosen as these orders followed the critical path. A comprehensive time study was done for 18 such orders (*Annexure 1*). The data shows that the average time a suit made of checks fabric takes to leave the cutting department is **169mins 25secs**. This total time taken has been distributed between various operations after removing the waiting time as given below:

S.No.	Operation	Time
1.	Cut shell fabric	5:22
2.	Cut Lining Fabric	3:45
3.	Cut Knee Lining	0:48
4.	Cut Sleeve Lining	1:49
5.	Attach Swatch	0:49
6.	Add Collar Felt & Fusing	0:28
	To prepare tray in store	13:01
7.	Spreading	11:14
8.	Cutting	5:06
9.	Picking	3:56
10.	Bundling	2:39
	To cut fabric on cutting machine	26:55
11.	Fusing Trouser	4:37
12.	Fusing Jacket	7:48
	To fuse the suit	12:25
13.	Print Pattern	2:37
14.	Ready Cut Jacket	6:49
15.	Add Canvas	1:03
16.	Ready Cut Trouser	4:37
	To ready cut	15:13
17.	Quality Check Jacket	15:00
18.	Quality Check Trouser	8:21
	To check quality	23:21
19.	Waiting	90:07

After performing this time study, the following problems were found and in order to increase production, the following areas were required to be targeted:

1. Bundle Missing
 - a. Time was consumed in finding missing bundles or recutting misplaced bundles
2. Store
 - a. Time required to cut shell fabric
 - b. Time required to measure shell fabric
3. Cutting
 - a. Time required to get fusing and felt from store
 - b. Time required to spread the fabric
 - c. Cutting machine breakdown
 - d. Time required to pick, sticker and bundle the cut parts
4. Fusing
 - a. Time required to search for fusing
5. Ready Cutting
 - a. Time required to print patterns and ready cut collar and collar stand
6. Bundling
 - a. Time required to issue materials
 - b. Time required to tag garment parts
7. Recutting
 - a. Time was consumed in recutting parts which were cut wrong

1. ORDER TRACKING

1.1. SCANNING AT STAGE CHECKPOINTS

Checkpoints were set up at various location such as the sewing line loading point, end line etc. with a dedicated operator whose sole responsibility was to scan purchase order bundles in order to update their location in the ERP software.

1.2. INSTALLATION OF SOFTWARE

PROBLEM

Around 30 purchase order's bundles would get misplaced everyday either within the cutting department or get loaded into the sewing line without being updated in the ERP software. In both the cases, the ERP software would show that the bundles were in the cutting department. If these pieces were found, they were scanned and updated into the ERP but if not, these pieces had to be cut all over again in order to ship it on the same day. As a result of this, hundreds of pieces were duplicate, i.e., one order was made two times and one garment would go waste.

SOLUTION

Track sheets were being scanned at various points in the cutting department in order to open the marker. It was proposed that all these points where tracksheet was previously being scanned be turned into a checkpoint.

Process

1. When the operators scanned the tracksheet at the cutting machine, the alphanumeric code scanned, date and time would be updated into a notepad file on the network.
2. When the operators scanned the tracksheet at the quality table, a pop-up box would ask the operators whether the piece they checked was ready to load into the sewing line or whether they had given it for recutting. This answer along with the PO number, time and date would be updated into the notepad file.

Checkpoints

1. Cutting machines (6)
2. QC tables (6)

1.2.1. INSTALLATION ON RUK CUTTING MACHINE

In the first stage it was decided to run the program only on RUK cutting machine. In order to do the same, the process of opening the marker was studied in detail. The process is given below:



When the operator scanned the tracksheet using a barcode scanner, the barcode scanner would mimic the PO number being typed and then mimicked the enter button being pressed. A prototype program was written in Python which would take a screenshot every time enter button was pressed. This screenshot would then be cropped to the size of the search box where the PO number could be found. An OCR open source code Tesseract was used to read the PO Number. This PO number was then stored in a notepad file. This program was tested on one RUK cutting machine.



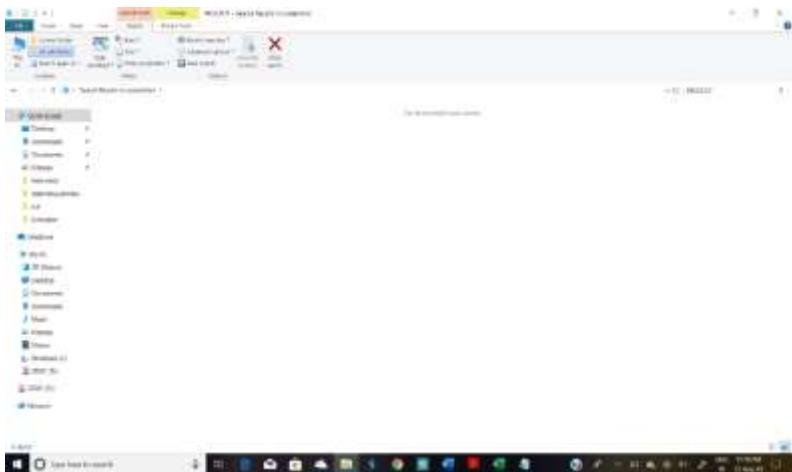


Fig: Screenshot taken by program
program

Fig: Screenshot cropped by

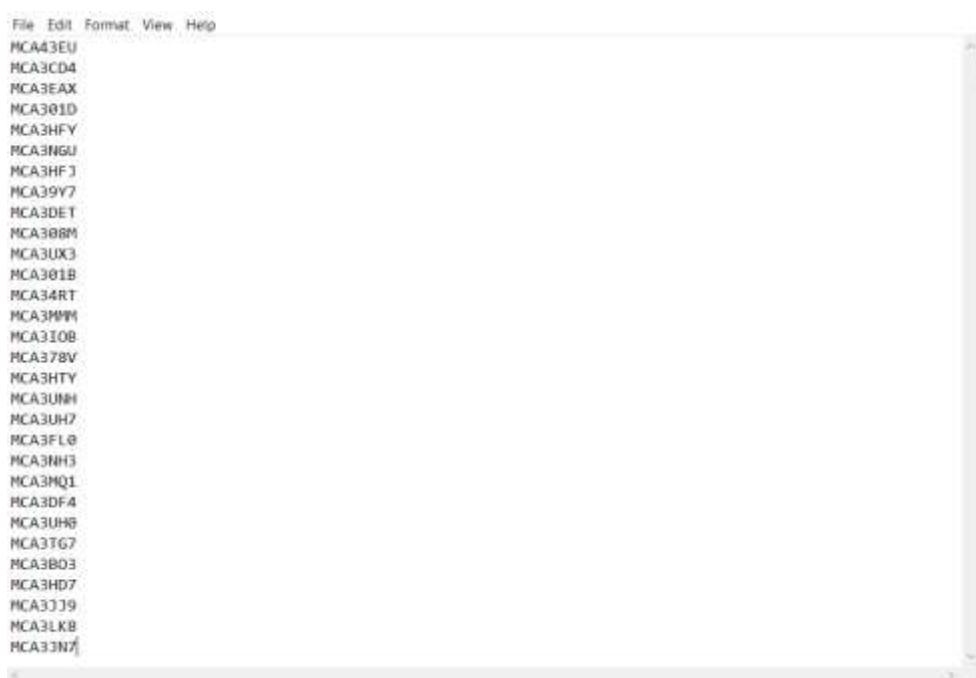


Fig: PO number written in notepad file

Limitations

1. The OCR did not read the text accurately always. Sometimes the program would get confused between similar looking characters, for example, 5 and S, 1 and I, U and V and so on. These small errors made the program lose its entire purpose. The right PO number could not be found and thus the pieces could not be tracked with accuracy.
2. The program only wrote the PO numbers being scanned at the workstation. It did not write at what time and what date the piece was scanned. This reduced the trackability of pieces.

1.2.2. IMPROVISING THE SOFTWARE

The limitation of OCR was targeted in this stage. The logic behind the code was altered to eliminate the use of OCR. Instead of taking screenshots and reading what was written in the search box, the program would now directly read what was being typed in the search box. It would store strings that started with “MCA” and were 7 characters long to identify PO numbers. The program would then store this string in a notepad file along with the time and date when it was scanned.

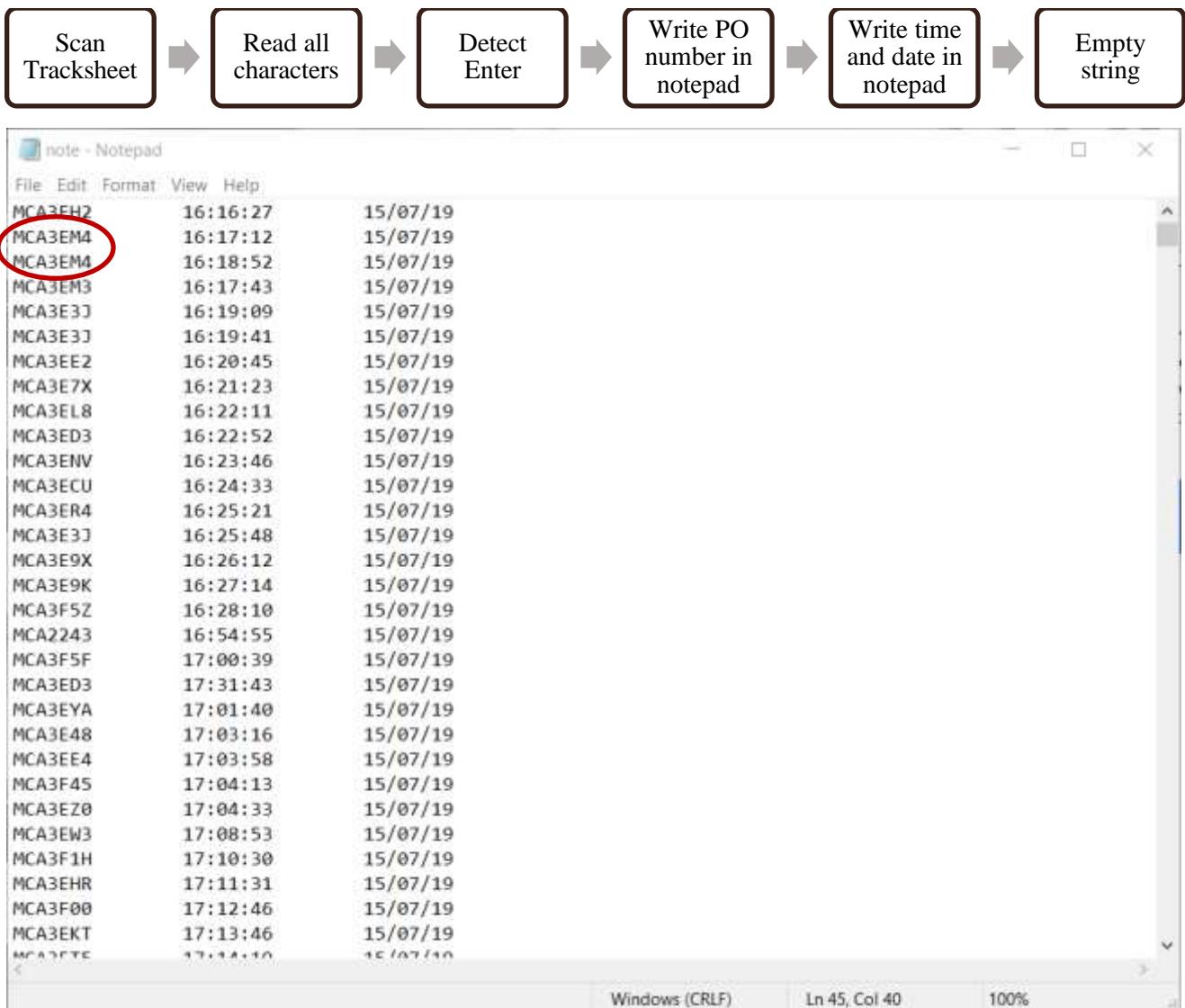


Fig: Snippet of notepad file

Limitations

1. Redundancy

It was found that operators would scan the same barcode more than once sometimes. This led to duplication of the same PO number more than 1 times in the notepad file.

2. Barcode scanner not being used

It was noted that the code did not work when the operators typed the PO number instead of scanning it using a barcode scanner. After further research, it was found that this was because the operators did not press enter after typing the PO number and the program looked for an enter command to write the PO number in the notepad file. Even if they pressed enter, the program did not read backspace and thus ended up writing wrong PO numbers if the operator made any typing error.

1.2.3. REMOVING REDUNDANCY

The program was modified to remove redundancy. Whenever a new PO number was found, it would compare it with all the existing PO numbers in the notepad file, if the PO number already existed it would delete the previous entry.

The program was also made capable of reading backspace, if backspace button was pressed it would delete the last character from the string. The program was also modified to find PO numbers without the enter button being pressed, that is, whenever MCA was pressed, and it was followed by four characters an entry would be made in the notepad file.

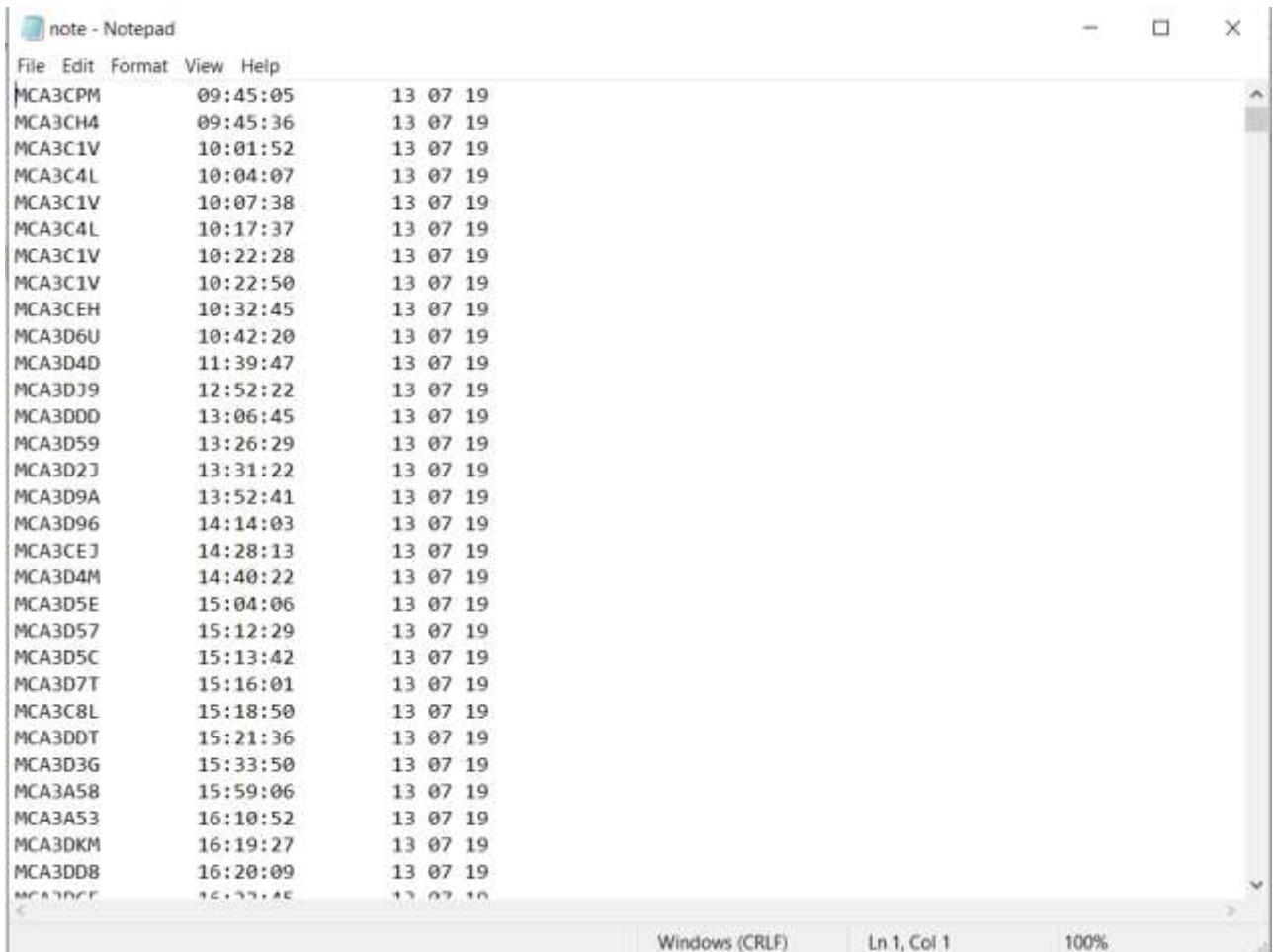
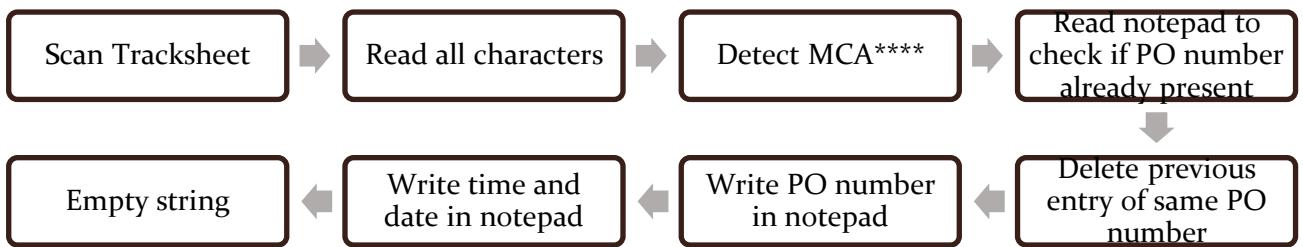


Fig: Snippet of notepad file

Result

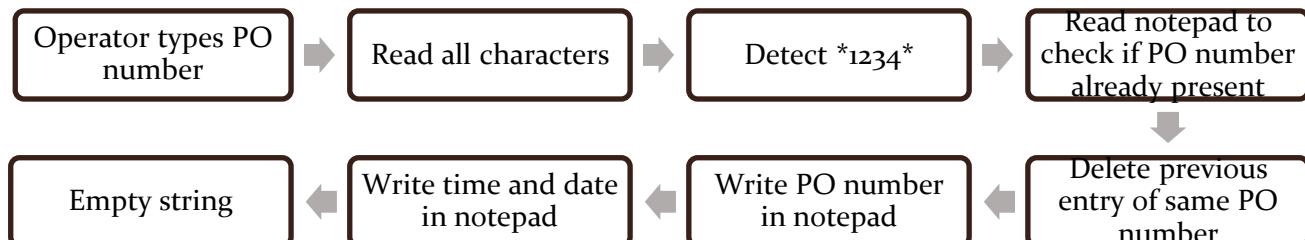
1. This program was implemented on all 3 RUK cutting machines.
2. Daily report was generated on all the RUK cutting machines. Management was now able to track pieces being cut on RUK cutting machines

1.2.4. INSTALLING THE SOFTWARE ON RUIZHOU CUTTING MACHINE

In order to implement the same tracking system on Ruizhou cutting machine the process of opening marker on the Ruizhou cutting machine was studied in detail. The process is given below:



The operator would click the file button and then click open which would open a pop up box where they would type the PO number. This would then show a list of marker from which they would select the required marker and click open. The program was modified to read string starting with *, followed by four alphanumeric characters and ending with *, for example, *1234* instead of strings starting with MCA and 7 characters long.



Result

A few changes made in the code enabled the program to run on the Ruizhou cutting machine. Cutting report was being generated on the Ruizhou machine and supervisors were being provided with live data. This data was written in the same format as the data of Ruk cutting machine, that is, PO Number, Time and Date.

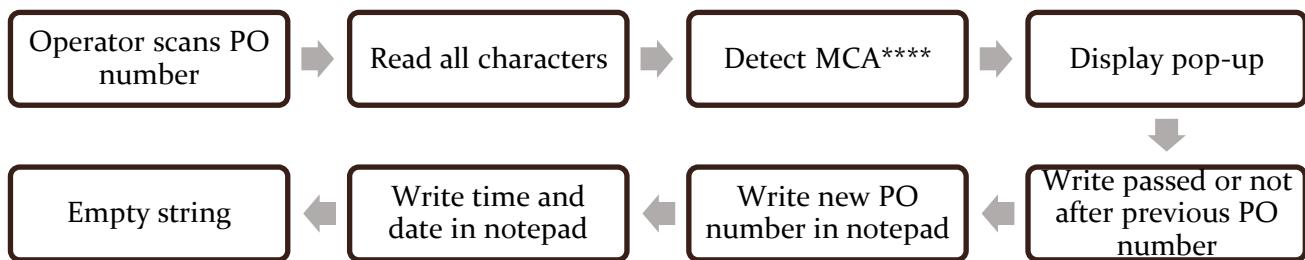
This allowed the supervisors to track pieces being cut on the cutting machines, their hourly output and also check whether the operators were writing the correct production details on the VSM board.

1.2.5. INSTALLING THE SOFTWARE ON QC TABLES

In this stage tracking was implemented on the QC tables. In order to implement this, process of opening the marker on the QC table was studied in detail. The process is given below:



The program for the QC table was written such that whenever a new PO number was scanned or typed, a pop up would come up and ask whether the previous piece passed or not. If the operator chose the YES option “passed” would be written next to the PO number in the notepad file and if they chose NO “not passed” would be written.



note - Notepad			
File	Edit	Format	View
MCA4AV2	05:33 PM	08/08/19	passed
MCA4CW0	05:46 PM	08/08/19	passed
MCA4AU2	06:01 PM	08/08/19	passed
MCA4CPZ	06:10 PM	08/08/19	passed
MCA4ATX	06:21 PM	08/08/19	passed
MCA4C62	06:30 PM	08/08/19	passed
MCA4C60	06:39 PM	08/08/19	passed
MCA4CNL	06:49 PM	08/08/19	passed
MCA4CH2	07:00 PM	08/08/19	passed
MCA4ANT	07:08 PM	08/08/19	passed
MCA4C3K	07:17 PM	08/08/19	passed
MCA4CF4	07:31 PM	08/08/19	passed
MCA4CC7	08:16 PM	08/08/19	not passed
MCA4CWM	08:26 PM	08/08/19	passed
MCA4C33	08:35 PM	08/08/19	not passed
MCA4CYH	08:48 PM	08/08/19	passed
MCA4CAD	08:56 PM	08/08/19	passed
MCA4C1X	09:08 PM	08/08/19	not passed
MCA4CMC	09:21 PM	08/08/19	not passed
MCA4CER	09:31 PM	08/08/19	passed
MCA4C16	09:39 PM	08/08/19	passed
MCA4C30	10:02 PM	08/08/19	not passed
MCA4DG0	09:14 AM	09/08/19	not passed
MCA4ANN	09:20 AM	09/08/19	not passed
MCA4DKZ	09:32 AM	09/08/19	not passed
MCA4CUE	09:43 AM	09/08/19	not passed
MCA4D61	09:57 AM	09/08/19	not passed
MCA4CK6	10:35 AM	09/08/19	not passed
MCA4CK8	10:49 AM	09/08/19	not passed
MCA4APC	10:53 AM	09/08/19	

Fig: Snippet of notepad file

The operators of the quality checking table were given a training session of half an hour on how to use the program. They were explained the reasons behind the implementation of the program and explained how to answer the pop-up box. They were asked to press yes when they kept the piece for loading and press no in case, they gave the piece for recutting.



Fig: Training Session

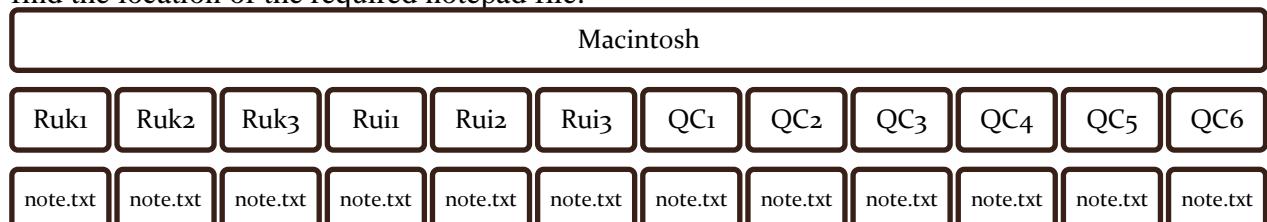
Result

The report of every QC table was being generated along with the information concerning whether the garment passed the quality check and was loaded into the sewing line or whether it failed the quality check and was returned to the re-cutting table.

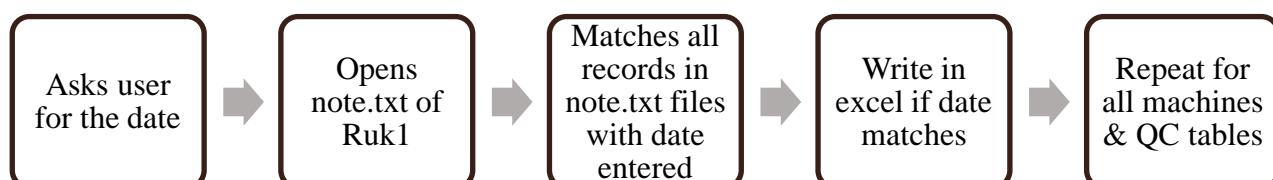
This helped find whether pieces which were shown in the cutting department according to the ERP software were actually in the cutting department or were loaded into the sewing line without updating into ERP. This helped save time spent in searching for pieces in the sewing line.

1.2.6. INSTALLING THE COMPILER PROGRAM

A compiler program was written which would first ask the user for the date whose records were to be drawn. When the user enters the date, the program reads all the notepad files and compiles all the data into one excel file which has the following columns: PO number, Time, Date, Location and Status. The compiler would identify the source folder of the notepad file in order to find the location of the required notepad file.



In order to find all records scanned on the date entered by the user, the program searches all the above notepad files for the same date and extracts the PO number, time, date, location and status of the records whose dates match. This extracted information is written in their respective columns in an excel file. The program repeats this until it reads all the notepad files completely.



	A	B	C	D	E	F	G
1	PO Number	Time	Date	Cutter			
2	MCA3K49	5:23 PM	02/08/19	RUK 1			
3	MCA3K53	6:34 PM	02/08/19	RUK 1			
4	MCA3K43	2:12 PM	02/08/19	RUK 2			
5	MCA3K41	2:52 PM	02/08/19	RUK 2			
6	MCA3K4H	4:13 PM	02/08/19	RUK 2			
7	MCA4RFE	10:12 AM	02/08/19	RUK 3			
8	MCA3KE5	10:43 AM	02/08/19	RUK 3			
9	MCA3NB5	1:53 PM	02/08/19	RUIZHOU 1			
10	MCA3REV	3:19 PM	02/08/19	RUIZHOU 2			
11	MCA3TY6	3:28 PM	02/08/19	RUIZHOU 2			
12	MCA3VB8	3:49 PM	02/08/19	RUIZHOU 2			
13	MCA3VWZ	2:39 PM	02/08/19	QC TABLE 1			
14	MCA3FFF	4:21 PM	02/08/19	QC TABLE 2			
15	MCA3RET	4:34 PM	02/08/19	QC TABLE 2			
16	MCA3RTG	5:16 PM	02/08/19	QC TABLE 3			
17	MCA3GBR	7:40 AM	02/08/19	QC TABLE 4			
18	MCA3EAC	1:32 PM	02/08/19	QC TABLE 5			
19	MCA3FCD	1:48 PM	02/08/19	QC TABLE 5			
20	MCA3GV5	2:12 PM	02/08/19	QC TABLE 5			

Fig: Snippet of the compiled excel file

For the complete excel file for the date 20/6/19 refer annexure 5.

RESULT

The supervisors could now find the location of the garment bundles by just pressing ctrl + F in excel and typing the required PO number. For example, if they wanted to find the piece MCA3K54 they would simply run the compiler and check the excel file. When the supervisor does this, they can see at what time the piece was cut and at which cutter, they can also know if the piece was never cut, i.e., was not fed from the store. If cut at the cutter, they would next see at which QC table it was checked if it was not scanned at any QC table, but was cut at some cutter, then it meant that the piece was either at fusing or at recutting table. If it was scanned at QC table, then the supervisor could check whether the piece had passed or not from the same file. If it said “passed” he would have to search for the piece in the sewing line and if not, the piece would be at re-cutting table.

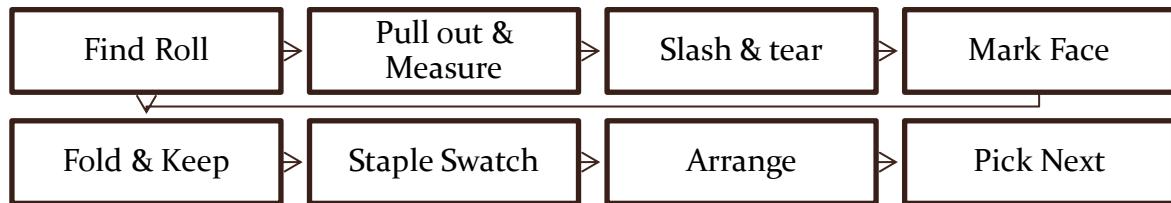
Increased traceability	Improved estimation of WIP	Increased number of checkpoints	No manual intervention
Easy operation	Improved backtracking	No set up cost.	No maintenance cost
Increased accountability	No addition manpower requirement	Live cutting machine & QC table reports	Accessibility from any computer

The duplication of pieces reduced drastically after the implementation of the software and the time wasted on searching for pieces was also reduced. The supervisors could now focus on improvement of the cutting department instead of only getting pieces recut.

2. STORE

2.1. RECEIVING ONLY LINING & SHELL FABRIC

The basic function of the sub-store was to provide shell fabric and lining fabric. In detail, the operator would first read the tracksheet to find the fabric code, then find the fabric roll with the same code, then he would pull out the required length fabric, slash and tear the same. Then he would mark the face side of the fabric, fold it and put it in the tray after this he would cut a swatch of the fabric and staple it to the tracksheet, arrange the fabrics and then pick up the next tracksheet.



Output per hour

Time	Suit	Jacket	Trouser	Vest	Total
1-2	23	7	2	1	33
2-3	21	6	5	0	32
3-4	20	7	4	2	33
4-5	19	8	3	1	31
5-6	16	4	4	1	25
	99	32	18	5	154

2.2. SUPPLY SHELL FABRIC IN ROLL FORM TO CUTTING MACHINE

PROBLEM

The sub store was not able to provide cutters with the required feed and this resulted in the cutters being idle. This further led to delay in production and inability to ship the days orders.

SOLUTION

The cutting department began to give shell fabric in roll form to cutters if more than 10 purchase orders had the same fabric. The cutter would cut all the garments with that shell fabric continuously.

The advantages were:

1. All purchase orders with the same fabric code would be cut together which made it easier to load them into the sewing line.
2. The problem of lack of feed was eliminated to a large extent as only lining had to be provided from store for most purchase orders.

RESULT

Output per hour

Time	Suit	Jacket	Trouser	Vest	Total
1-2	25	5	3	3	36
2-3	27	4	2	1	34
3-4	29	1	2	2	34
4-5	30	4	3	2	39
5-6	29	3	2	1	35
	140	17	12	9	178

2.3. PROVIDE FULL KIT

PROBLEM

1. The cutting operators would go to the sub store in order to get body and lapel fusing. This wasted the cutting machine operators' time thus reducing the productivity of the cutters.
2. Felt was not provided by the store, instead it was cut manually on the ready cutting table.
3. Parts fusing was cut in bulk and kept at the fusing machine. Due to this, the fusing had to be trimmed at the fusing table. This trimming process limited the fusing output to 7 purchase orders per hour.

SOLUTION

At this stage, the store began to provide the following in every bin:

1. Shell Fabric (if not provided in roll form)
2. Sleeve & Body Lining Fabric
3. Knee Lining Fabric
4. Lapel, Body and Parts Fusing
5. Felt

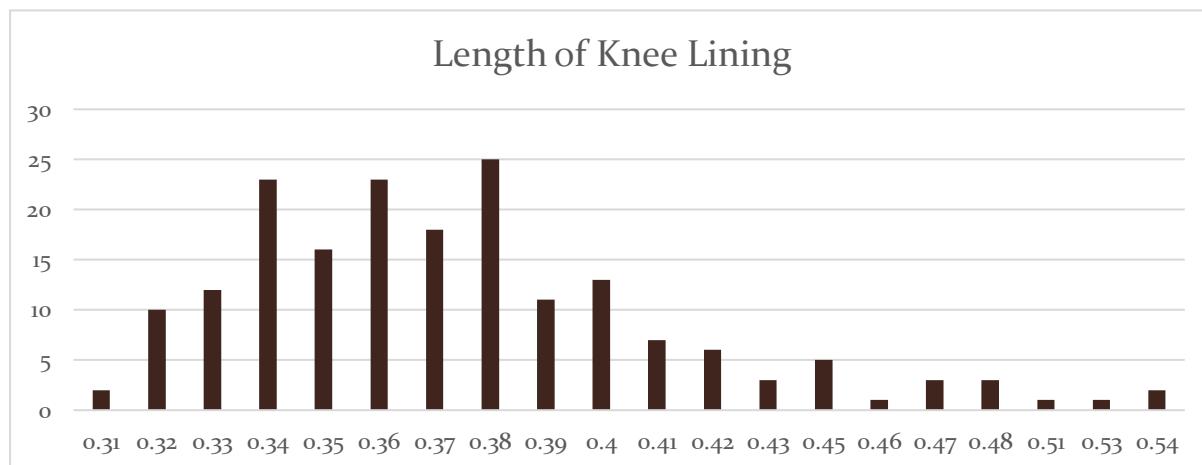
Fusing was cut into 1m long bits and stored in a rack. The sub store operators would simply have to pick up this fusing and put it in the rack. This helped save about 30 seconds per purchase order. By providing lapel and body fusing from the store, the time spent by the cutting operator on going to the store and getting the fusing for each purchase order was saved.

Providing parts fusing and felt from store meant that these would be cut at the cutter. Cutting parts fusing at the cutter saved the time lost on trimming excess fusing and cutting felt at the cutter eliminated the process of cutting felt manually at the ready cutting table.

Knee lining fabric was cut in bulk and placed in a rack in the store based on an intensive study. (Annexure 4).

The length of knee lining cut by the operator as compared to the length of knee lining written on the tracksheet was about 5 cm more.

The maximum number of knee linings were of the length 38cm and the maximum length was 54cm. Thus, knee lining was cut in four standard lengths, 34cm, 36cm, 38cm and 54cm and stored in a rack.



The operators could simply pick up one of the four lengths and add it to the bin instead of measuring, slashing and tearing the fabric every time.

In order to provide all these materials from the store, the manpower of the store was increased from 6 to 8 operators.

RESULT

Output per hour

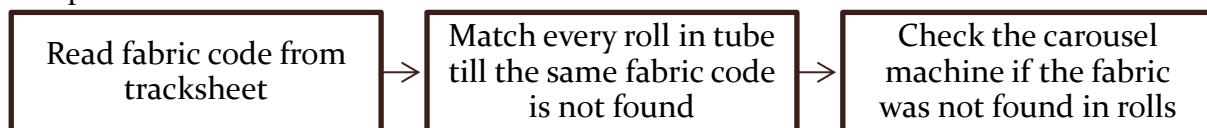
Time	Suit	Jacket	Trouser	Vest	Total
1-2	27	5	6	3	41
2-3	25	6	8	4	43
3-4	29	4	5	2	40
4-5	31	4	4	4	43
5-6	30	5	4	3	42
	142	24	27	16	209

2.4. INCREASING PRODUCTIVITY

PROBLEM

The store had 57 shell fabrics stored in tubes, labeled with the fabric code. The operator would check the fabric code in the tracksheet and then search for the same code on the tube to find the required fabric. The font of the fabric code was extremely small, and the operator had to strain their eyes to read each fabric code. This was a very tedious and time-consuming process as the operator would have to walk close to every tube and check its number before they could find the right tube.

The process can be illustrated as below:

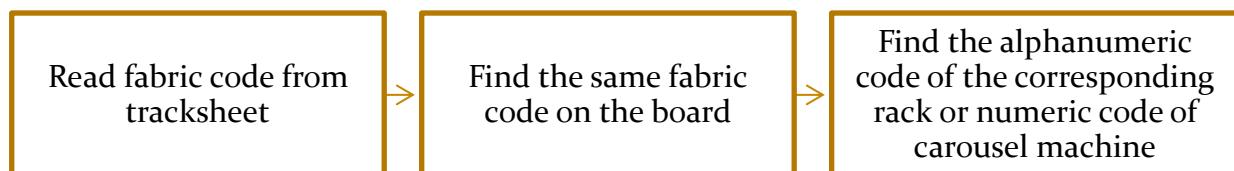


SOLUTION

A. REDUCING THE TIME REQUIRED TO FIND THE SHELL FABRIC

Each fabric roll was labelled from A1 to A18, B1 to B18 and C1 to C18 and the fabric rolls in the carousel machine were labelled from 1 to 16. These codes were then written along with the fabric codes on a board with a large font size such that the operator standing near the center table would know which tube has the required fabric or if the fabric is in the carousel machine. The operator could then walk straight to the required fabric.

The new process is illustrated below:



B. PLACING THE TABLE IN THE CENTER

A table was present in the store where the operators would keep the fabric and arrange the same after cutting the lining and shell fabric. This table was previously present in one corner of the store. It was observed that it took the operators nearly 5 to 10 seconds more to walk to the fabric roll when the roll was at the other end of the store. Moving the table to the center of the store reduced this walking time and thus increased the productive time.



Fig: Before installation of board



Fig: After installation of board

A1	4137
A2	9545
A3	4128
A4	4187
A5	4188
A6	4139
A7	4121
A8	4192
A9	4196
A10	4191
A11	4194
A12	12662
A13	4189
A14	4151
A15	4166
A16	4157
A17	4143
A18	9548
B1	12658
B2	4130
B3	9547
B4	4174
B5	4149
B6	4193
B7	4123
B8	9543
B9	4155
B10	9544
B11	4177
B12	4152
B13	4150
B14	4127
B15	4133
B16	4159
B17	16640
B18	4163
C1	12660
C2	12661
C3	4122
C4	16635
C5	16636
C6	6967
C7	16634
C8	6972
C9	6971
C10	6968
C11	6970
C12	6969
C13	17068
C14	17070
C15	17063
C16	17072
C17	17069
C18	17071
1	4130
2	17065
3	17064
4	17063
5	4166
6	17070
7	17069
8	9548
9	4163
10	4150
11	4137
12	4127
13	4177
14	4152
15	17071
16	

Fig: Board with fabric codes

RESULT

The operators began to refer to the board to find where the fabric roll was. This reduced the time required to find the shell fabric. The operators also had to walk less in order to reach the fabric and come back to the table. This improved the productivity of the sub store as the time required to find and reach the fabric was drastically reduced.

TIME STUDY (BEFORE)

Element/ Cycle	1	2	3	4	5	6	7	8	9	10
Find Roll	30	46	40	35	45	37	38	32	38	42
Pull out & Measure	17	30	20	32	15	27	20	17	27	22
Slash & tear	29	135	34	60	20	40	57	25	45	41
Mark Face	39	44	54	92	86	47	63	71	66	57
Fold & Keep	40	175	45	110	23	54	83	33	90	67
Staple Swatch	64	202	71	140	45	73	90	47	93	97
Arrange	167	214	115	148	60	76	120	54	165	69
Pick Next	65	219	86	176	72	66	79	109	179	98
Time in seconds										

OUTPUT PER HOUR (BEFORE)

Time	Suit	Jacket	Trouser	Vest	Total
1-2	25	6	7	4	42
2-3	28	5	5	3	41
3-4	29	6	4	3	42
4-5	31	4	4	2	41
5-6	29	4	6	3	42
	142	25	26	15	208

TIME STUDY (AFTER)

Element/ Cycle	1	2	3	4	5	6	7	8	9	10
Find Roll	10	16	10	15	15	17	16	3	1	2
Pull out & Measure	12	20	14	21	26	17	10	1	3	4
Slash & tear	37	98	53	67	32	43	13	5	7	6
Mark Face	21	32	66	32	54	76	20	2	9	2
Fold & Keep	54	29	39	79	84	36	13	0	5	0
Staple Swatch	33	49	66	97	109	42	75	36	48	59
Arrange	106	123	52	64	120	49	118	38	129	74
Pick Next	85	194	66	107	79	72	94	62	103	115
Time in seconds										

OUTPUT PER HOUR (AFTER)

Time	Suit	Jacket	Trouser	Vest	Total
1-2	35	7	8	5	55
2-3	37	6	4	6	53
3-4	36	5	7	5	53
4-5	40	4	5	4	53
5-6	41	4	4	3	52
	189	26	28	23	266

2.5. AUTOMATION IN THE STORE

PROBLEM

The manpower required in the store was high and to reduce the manpower requirement certain processes had to be automated.

Apart from this to eliminate the problem of shorter fabric length due to manual error while cutting, the process of measuring fabric manually had to be removed.

SOLUTION

The manual work in the store had to decreased by automating a few of its processes. The main process which had to be automated was the process of taking out roll from the tubes. This process was not only time consuming but also most operators could not pull the roll out. In order to do this, two steps were taken:

- Order was placed for additional carousel machines. These machines would automatically bring the required fabric roll to the front when the fabric code on the tracksheet was scanned.
 - This saved the time wasted in pulling out rolls from the tubes.
 - This also made the process easier and any operator could cut the shell fabric now as they did not have to lift the roll.
- A laser light, round knife cutting machine and a table were installed in front of the carousel machine. When the consumption was entered in a touch screen monitor the laser light would move the required distance. The operator would simply pull out the fabric till the laser light and cut the fabric using the round knife cutting machine placed at the end of the table.

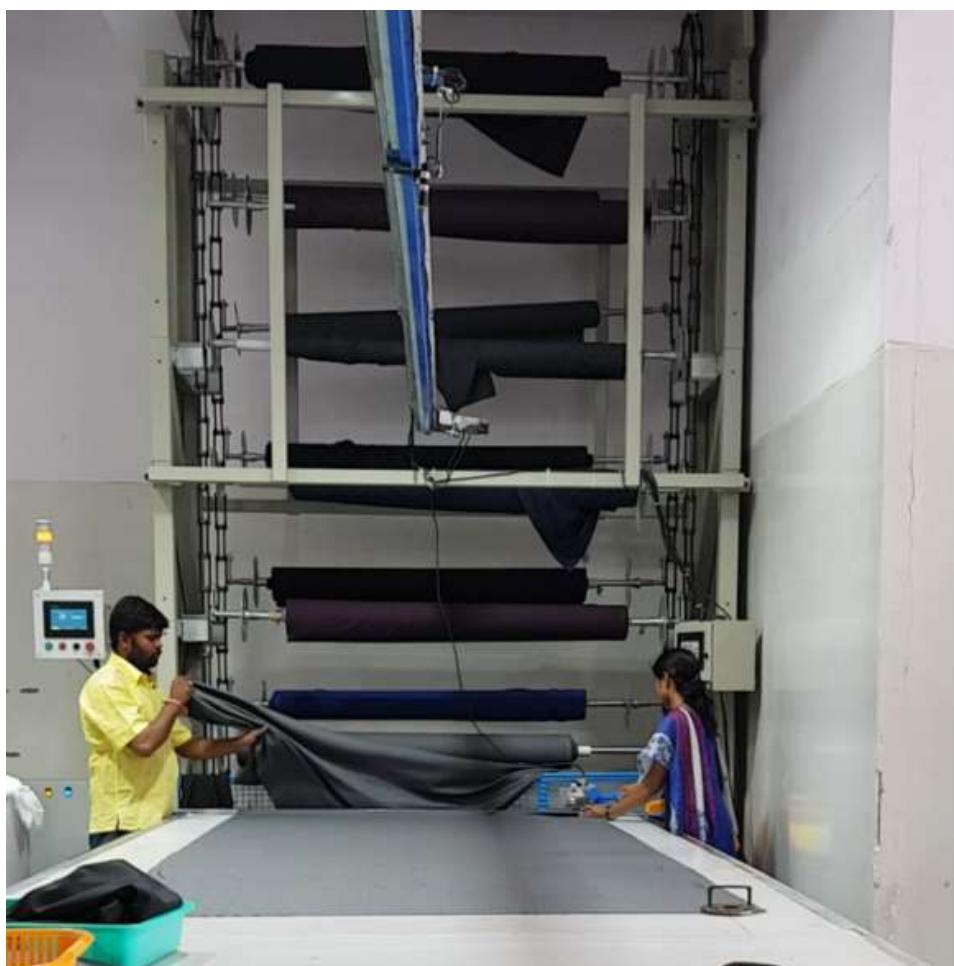


Fig: Laser light with carousel machine

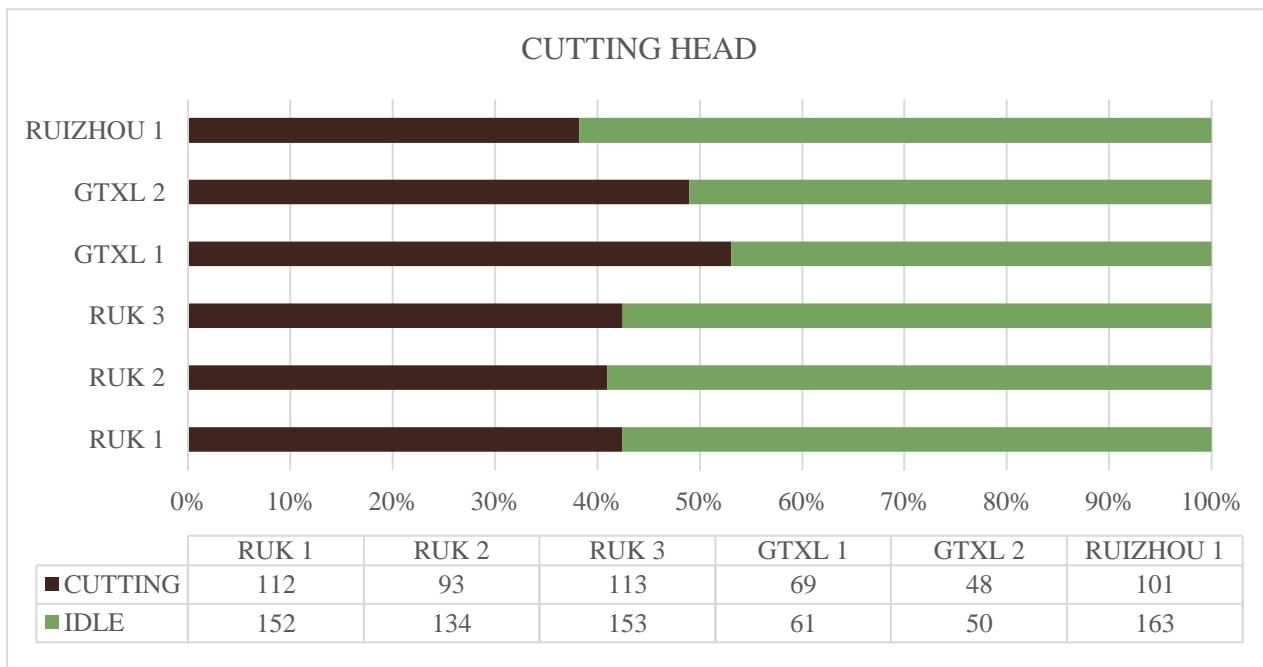
RESULT

Output per hour

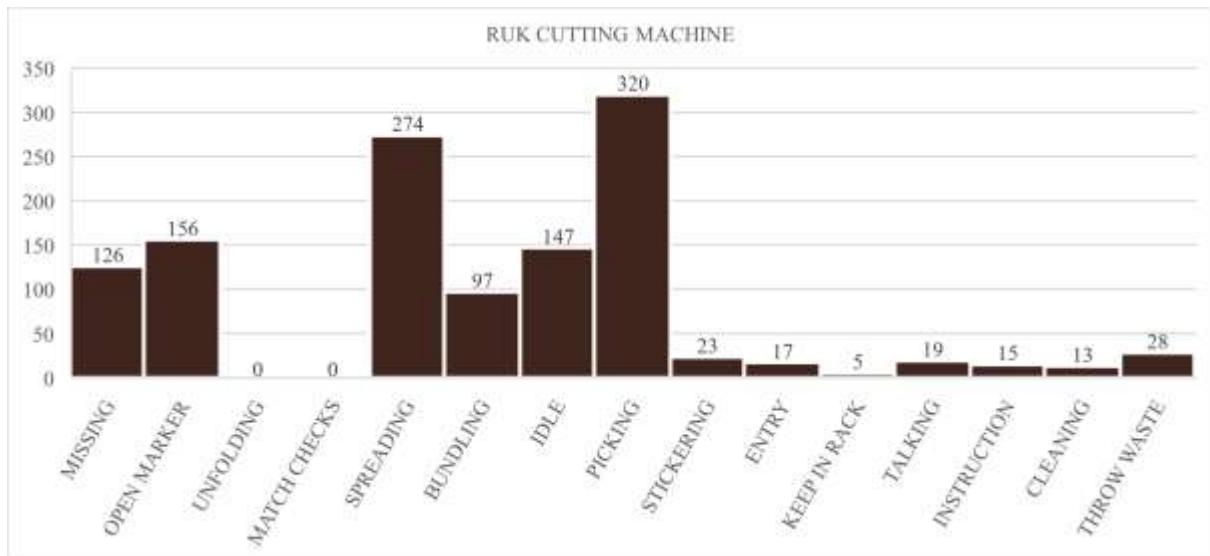
Time	Suit	Jacket	Trouser	Vest	Total
1-2	44	8	11	12	75
2-3	47	7	9	9	72
3-4	48	9	8	8	73
4-5	46	10	9	10	75
5-6	49	7	8	9	73
	234	41	45	48	368

3. CUTTING

In order to understand why the production of the cutting machines was low an elaborate work sampling was done of all the 6 cutting machines. (*Annexure 3*) The analysis of this work sampling showed that the cutting head of Ruizhou machine operated for less than 40% of the time which was unacceptable. Cutting heads of Ruk cutting machine operated for more than 40% of the time and the cutting heads of GTXL machine operated for about 50% of the time.

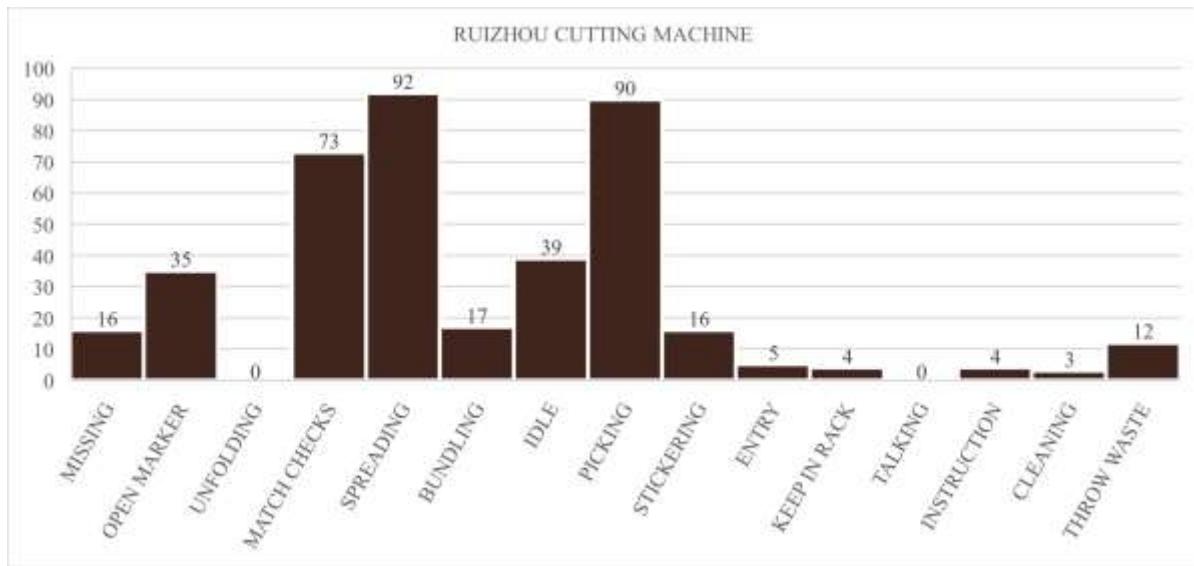


A further detailed analysis was done to understand the time spent by the operators of the three types of machines on various tasks.



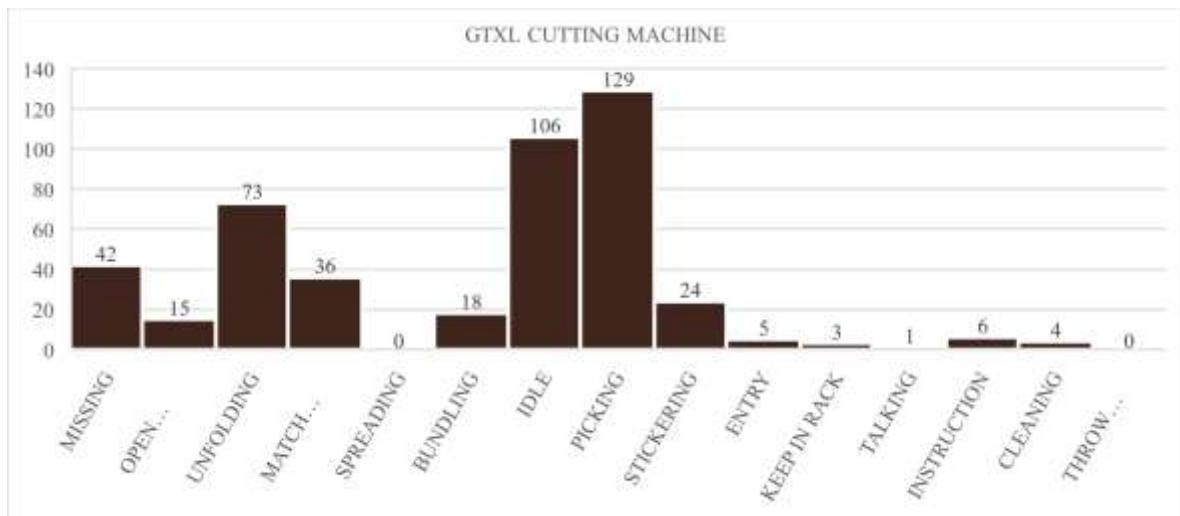
From the above graph, we can understand that:

1. Picking: The operators spent the maximum amount of time picking cut parts from the bed. This resulted in the cutting head remaining idle too.



From the above graph, we can understand that:

1. Picking: The operators spent a lot of time picking cut parts from the bed. This resulted in the cutting head remaining idle too.
2. Matching Checks: The operators spent a lot of time trying to match the grid of the Ruizhou Machine with that of the repeat size of the fabric. About 1 minute was spent on every garment for this process.



From the above graph, we can understand that:

1. Picking: Picking could not be done simultaneously on GTXL Machine, this was a major drawback. Two operators had to be assigned for just picking up the cut parts. This time could not possibly be reduced.
2. Idle: All the operators would remain idle till the first 1 meter of fabric of that order was not cut. This time could not be reduced as picking could not be done simultaneously.
3. Unfolding Fabric: The laying operators would come in the first shift and create WIP for the whole day. They would spread the fabric on perforated sheet, fold them and stack them. Later the cutting machine operators would have to unfold this fabric and feed it. This took about 2 minutes every time.

The above graphs showed that the reason behind the low output of the cutting machines were:

- Frequent knife break in the Ruizhou cutting machine
- Time required for checks matching
- Picking
- Spreading
- Operator missing – get fusing from store

Another observation:

- High operator idle time

3.1. KNIFE BREAK ON RUIZHOU CUTTING MACHINE

PROBLEM

The Ruizhou machine is used to cut garments with checked shell fabric. The fabric is laid on fold. In order to match the checks and prevent the layers from moving, the operators would staple the fabric onto the bed.



Fig: Use of staples on Ruizhou Machine Bed

This enabled them to cut garments with checks matching perfectly but the con of attaching stapler pins to the bed was that when they pulled out the remaining fabric after cutting to throw the waste, these pins would fall on the bed. These pins would go unnoticed and the operators would spread the next fabric on top of it. If this pin was lying on the perimeter of any pattern on the marker, the knife would cut through the pin, which resulted in the knife breaking. This led to both time and money being wasted.

- Cost
 - The cost of each blade was Rs.750
 - Nearly 4 blades were getting damaged on daily basis.
- Time
 - Each knife break would cost about 20 minutes (refer annexure 2) as
 - the operator would have to find and call the maintenance personnel who would then get the new knife and change the damaged one.
 - The garment cut with the damaged knife would have joint cuts on all parts and thus cutting them with scissors would take a long time. This would lead to the machine head being idle till all parts were revived from the bed.
- Hazard

- The knife would sometimes only get dented but if it was moving at a faster speed, the knife would break into two. This was a potential hazard to the operators working on the machine.



Fig: Damaged Ruizhou Knife



Fig: Staples Removed from Bed Using Magnet



Fig: Rash Cutting due to Blunt Knife



Fig: Joint Cuts due to Damaged Knife

SOLUTION

The magnetic property of the pins was used in order to remove all the pins from the bed before laying the next fabric. A powerful magnet provided to the machine operators who were trained to pick up all the pins from the bed using the magnet by just moving it across the bed. This was done after every time a fabric was pinned to the bed.

RESULT

Picking up pins using the magnet took about 15 seconds. This time was extremely less as compared to the time taken to fix a broken blade and deal with consequences of cutting using a broken blade.

The new blade lasted for 3 days when the magnet was being used to pick up pins which proved to be cost saving.

Apart from this, it was also safer for the operators.

OUTPUT PER HOUR BEFORE USE OF MAGNET

Time	Garment				Total
	Suit	Jacket	Trouser	Vest	
6 am – 7 am	3	1	1	1	6
7 am – 8 am	4	0	0	2	6
8 am – 9 am	4	0	4	0	8
9 am – 10 am	4	1	1	0	6
10 am – 11 am	1	0	3	2	6
11 am – 12 pm	4	0	0	1	5
12 pm – 1 pm	5	0	0	0	5
1 pm – 2 pm	4	1	1	0	6
2 pm – 3 pm	5	0	2	1	8
3 pm – 4 pm	2	0	0	1	3
4 pm – 5 pm	1	0	0	1	2
5 pm – 6 pm	4	2	1	0	7
6 pm – 7 pm	3	2	1	0	6
7 pm – 8 pm	3	1	1	1	6
8 pm – 9 pm	4	0	0	2	6
9 pm – 10pm	5	0	0	1	6
Total	56	8	15	13	92

OUTPUT PER HOUR AFTER USE OF MAGNET

Time	Garment				Total
	Suit	Jacket	Trouser	Vest	
6 am – 7 am	5	0	0	3	8
7 am – 8 am	3	1	1	1	6
8 am – 9 am	4	2	0	0	6
9 am – 10 am	4	0	3	0	7
10 am – 11 am	3	0	2	2	7
11 am – 12 pm	4	0	0	0	5
12 pm – 1 pm	3	0	0	0	5
1 pm – 2 pm	4	1	0	0	5
2 pm – 3 pm	4	0	2	0	6
3 pm – 4 pm	3	2	1	1	7
4 pm – 5 pm	3	1	2	2	8
5 pm – 6 pm	3	1	3	0	7
6 pm – 7 pm	4	2	1	1	8
7 pm – 8 pm	4	0	0	3	7
8 pm – 9 pm	5	0	0	0	5
9 pm – 10pm	4	0	0	2	6
Total	60	10	15	15	100

3.2. CHECKS MATCHING TIME ON RUIZHOU CUTTING MACHINE

PROBLEM

On the Ruizhou Cutting Machine, the checks matching process included a step where a projected grid was resized in order to match the checks on the fabric. This process took about one minute per garment being cut. This took up a lot of time of the operators and it also impacted the production negatively.

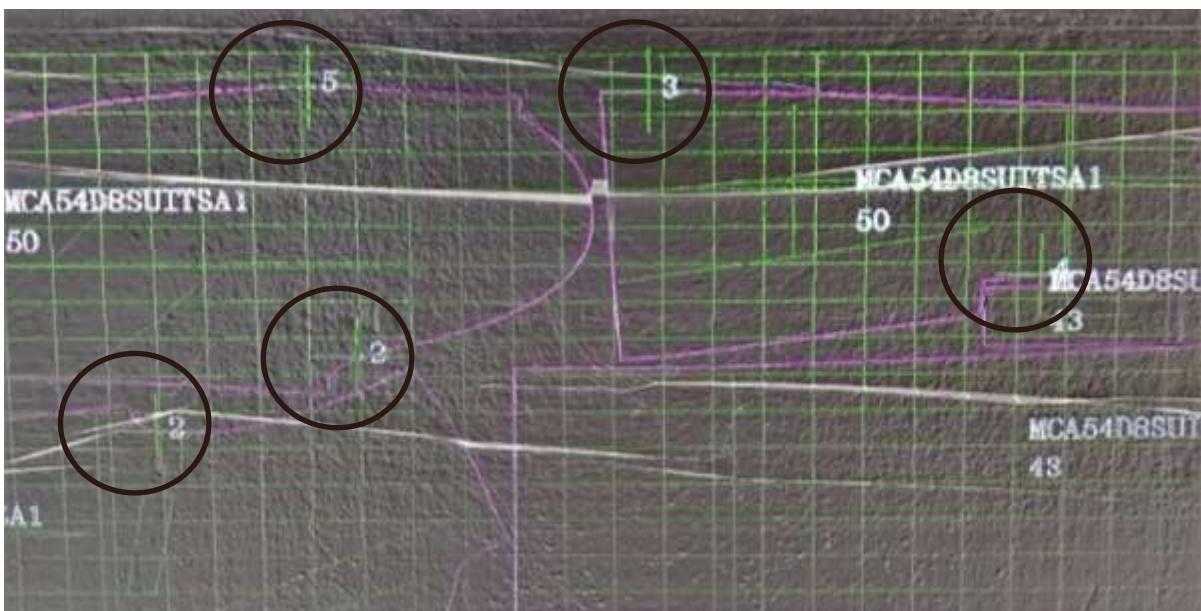


Fig: Matching of the projected grid with checks of the fabric

Checks fabrics were being cut only on Ruizhou & Gerber Cutting machines. This resulted in a huge WIP of checks fabrics to be cut which not only delayed orders but also created pressure on the operators to deliver a higher output. Under this pressure the operators would try to cut more pieces per hour, but this ended up creating a lot of checks matching problem as they did not have enough time to spread the fabric properly to meet the matching parameters.

Sometimes the orders or feed of solid fabric would get exhausted and the three Ruk cutting machines would remain idle and Ruizhou and Gerber cutters would have a lot of WIP.

SOLUTION

It was then thought that if checks fabrics could be cut on the three Ruk cutting machines, not only would the backlog of the check's fabrics be eliminated but it would also reduce the pressure on Ruizhou and Gerber cutters. In order to implement this change, a swatch file of all the available checks fabrics was created. Each checks fabric's x and y direction were identified such that x was along the selvedge and y was perpendicular to the selvedge. Then, the repeat size of the checks was measured in both, x and y direction and written in the file along with the fabric code and color.

This file was then given to the CAD department which would then use these measurements to make markers to cut fabric on Ruk cutting machine.

Fabric Code	REPEAT SIZE	
	X (CM) (Along selvedge)	Y (CM) (Perpendicular to selvedge)
4149	4.7	3.9
4163	4.7	3.8
4123	4.3	3.6
9548	3.8	3.5
4127	4.9	4
17071	5	4.7
4139	4.8	4
4152	5.4	4.2
17070	4.5	3.5
17069	5	4.5
4137	5.3	4.6
4150	4.8	3.9
4174	5.3	4
4177	4.7	3.7
4166	5	4
4130	6	5.3

Fig: Repeat size of checked fabrics

RESULT

1. Ready Cutting of Checks Fabric on Ruk Cutting Machine

The CAD department had the required information which was previously preventing them from creating markers for cutting fabric on Ruk cutting machine. They were now empowered to make markers of checks fabric for any cutter. This would not only reduce the load on a limited number of cutters and distribute it among all the cutters.

2. Reduction of Grid Matching Time on Ruizhou Cutting Machine

By obtaining the size of the repeat of every checks fabric being cut, the time required to cut the garment would be reduced drastically as the size of this grid can be preset and there would be no need to match the grid every time. This would increase the production of Ruizhou machine by at least 8-10 purchase orders per day.

3.3. PICKING TIME

PROBLEM

The operators would pick, mark the wrong side and sticker the cut parts while they were still on the cutting machine bed. This process consumed about 2.5 minutes and the cutting head would have to remain idle till the operator had not picked up all the parts.

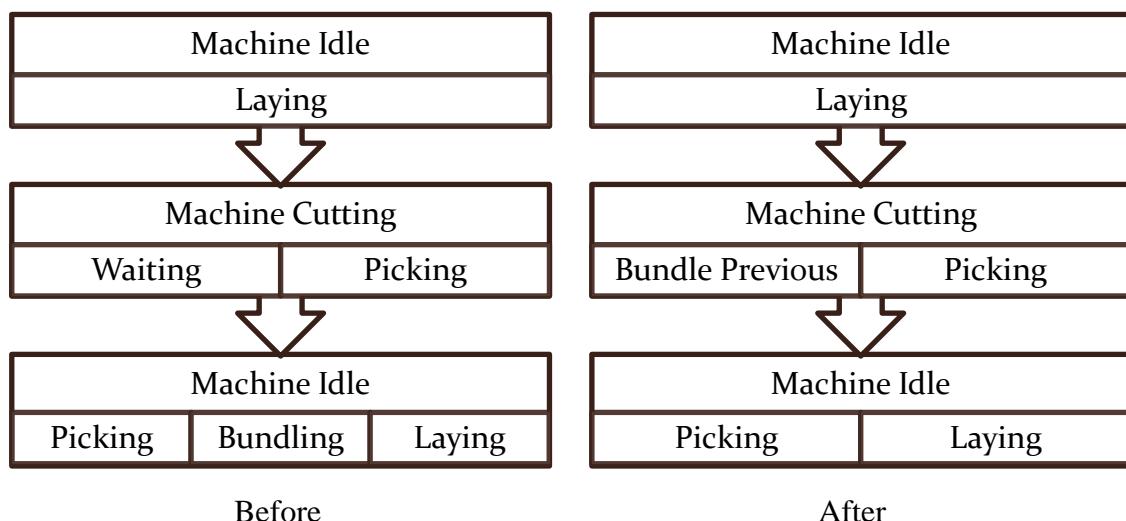
The machine bed was also used to keep tray of orders which had to be cut in the next hour. This used up useful cutting space.



Fig: Trays placed on cutting bed

SOLUTION

A table was placed behind each cutting machine. The operators were trained to simply pick the parts and place them on the table and spread the next fabric to be cut. Once the cut command was given for the next fabric, the operators would mark the wrong side on each part, sticker the parts, bundle them and then start picking the next garment. This prevented the cutting head from being idle while picking was done.



The operators were asked to use the entire cutting bed. Previously, they'd keep trays on the cutting bed and were therefore unable to use the entire length.



Fig: Utilization of entire cutting machine bed

RESULT

The waiting time of cutting machine head reduced drastically as when it finished cutting the garment, parts were picked quickly and laying of the next order was started. This change can be seen in the time study given below:

Before

Activity	Machine	Activity	Man
Idle	2:23	Laying	2:47
Cutting	4:46	Idle	1:26
Cutting	4:54	Picking	1:12
Idle	1:47	Picking	1:14
Idle	1:35	Bundling	1:18
Idle	1:46	Laying	2:43
Cutting	5:13	Idle	1:29

Idle time of machine = 7:31

Cutting time of machine = 14:53

After

Activity	Machine	Activity	Man
Idle	1:24	Laying	2:34
Cutting	4:48	Bundling (Previous)	1:12
Cutting	4:56	Picking	1:05
Idle	1:16	Picking	1:11
Idle	1:18	Laying	2:22
Cutting	5:21	Idle	1:18

Idle time of machine = 3:58

Cutting time of machine = 15:05

3.4. SPREADING TIME

PROBLEM

The height of the cutting bed of Ruk cutting machine was 3 feet. This made it difficult for shorter operators to spread fabric on the machine bed. They had to walk all the way around the machine to remove any wrinkles from the other side of the fabric. This increased the spreading time of the machine.

SOLUTION

The operators were allocated to machine based on their heights. The Ruizhou cutting machine head was comparatively lower at a height of 2.75 feet. Thus, it was easier for shorter operators to spread fabric on the Ruizhou Cutting machine.

RESULT

Spreading Time (Before)

Order	Spreading Time
1.	3:12
2.	3:35
3.	3:02
4.	3:15
5.	2:57
6.	3:31
7.	2:43
8.	2:58
9.	3:39
10.	3:08

Spreading Time (After)

Order	Spreading Time
1.	2:13
2.	2:15
3.	2:17
4.	1:54
5.	1:52
6.	1:41
7.	1:39
8.	2:03
9.	1:28
10.	1:37

3.5. OPERATOR MISSING (GETTING FUSING FROM STORE)

PROBLEM

The cutting machine operators were provided only with shell and lining fabric from the store in the bins. They had to go to the store, cut the required length of fusing and get it. This consumed time of the cutting machine operators and increased the idle time of the cutting machine head.

SOLUTION

The operators were provided with a full kit containing, shell fabric, lining fabric, fusing and felt. This kit and its advantages have been elaborated in 2.3.

RESULT

The time spent by operators in going and getting fusing fabric from store for every order was eliminated.

Time Study (Before)

Order	Time spent to get fusing
1.	0:23
2.	0:37
3.	0:32
4.	0:29
5.	0:35
6.	0:46
7.	0:28
8.	0:32
9.	0:29
10.	0:35

After implementation of system of providing full kit from the store, the time required by fusing operators to get fusing from store was reduced to 0 as they could simply pick it from the bin provided by the store.

3.6. HIGH OPERATOR IDLE TIME

PROBLEM

The work sampling graphs showed a high idle time for cutting machine operators. The cutting machine operators were observed to be idle for 10% of the time.

SOLUTION

This data was shown to the management and recommended that the number of operators per machine be reduced as operators were idle or working at a slower pace as they knew they had no other work till the machine finished cutting. Sometimes one operator would not have any work as the other three operators would suffice in completing the required task.

RESULT

One operator was eliminated from every machine saving the company Rs.7000 per month per machine. This meant that the company would save Rs.56,000 per month.

Apart from this, the productivity of cutting machines did not drop, instead, operator began to work at a higher efficiency.

3.7. REASON FOR LOW PRODUCTIVITY ON GTXL MACHINE

PROBLEM

The output of GTXL machine would not cross a maximum of 5 suits per hour. It was not possible to achieve the required production target with such low output.

The idle time of workers was also too high on GTXL machine as seen in the analysis of the work sampling.

It was necessary to understand the reasons for the above two problems.



Fig: GTXL Cutting Machine



Fig: Laser light used to set origin

SOLUTION

To get an explanation as to why the output was less, the average time required for cutting a piece was obtained by performing a thorough time study of the garments being cut on the GTXL machine. The time study data is given below:

VEST								
Order No.	MCA1UWR	MCA1UVG	MCA1R5E RECUT	MCA10KG RECUT	MCA10Y3 RECUT	MCA1Y4E	MCA1Y6P	MCA1Y21
Shell	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
1. Spreading	0:22	0:10	0:16	0:48	0:40	0:53	0:03	0:10
2. Open Marker	0:16	0:07	0:14	3:08	0:07	0:05	0:10	0:16
3. Set Origin	0:28	0:42	0:12	0:20	0:24	2:00	0:24	0:10
4. Cutting	1:07	1:14	0:39	1:13	2:20	0:40	0:54	0:45
Lining								
1. Spreading	STACKED	STACKED	STACKED	STACKED	STACKED	STACKED	STACKED	STACKED
2. Open Marker								
3. Set Origin								
4. Cutting	1:07	1:16	1:21	1:13	1:41	1:00	0:44	1:41
Fusing								
1. Spreading	0:13	0:33	0:17	0:19	0:21	0:07	1:30	0:42
2. Open Marker	0:31	0:12	0:10	0:23	0:10	0:16	0:09	0:08
3. Set Origin	0:28	0:13	0:10	0:19	0:22	0:24	0:23	0:16
4. Cutting	1:01	1:06	0:41	1:01	1:06	0:24	0:26	0:45
Changeover Time	0:32	0:41	0:37	0:47	0:28	0:38	0:30	0:43
	6:05	6:14	4:37	9:31	7:39	6:27	5:13	5:36
JACKET								
Order No.	MCA1Y9X	MCA1Y94	MCA1ZRN	MCA1WX7	MCA1WXF			

Shell	Checks	Checks	Checks	Checks	Checks
1. Spreading	0:09	0:30	0:36	0:30	1:00
2. Open Marker	0:10	0:10	0:04	0:07	0:08
3. Set Origin	1:35	2:05	2:28	2:00	1:35
4. Cutting	6:33	2:30	2:12	2:42	3:45
Lining					
1. Spreading	0:20	0:26	0:17	0:22	0:19
2. Open Marker	0:11	0:15	0:10	0:27	0:16
3. Set Origin	0:25	0:31	0:53	0:37	0:20
4. Cutting	2:50	2:51	1:19	2:44	2:32
Fusing					
1. Spreading	0:05	0:50	0:29	0:14	0:10
2. Open Marker	0:10	0:07	0:07	0:20	0:12
3. Set Origin	0:19	0:25	0:58	0:33	0:25
4. Cutting	0:34	1:15	1:00	0:29	0:56
Sleeve Lining					
1. Spreading	0:07	SAME	SAME	SAME	SAME
2. Open Marker	0:05				
3. Set Origin	0:03				
4. Cutting	0:26				
Changeover Time	0:33	9:04	0:41	0:37	0:59
	14:35	20:59	11:14	11:42	12:37

3PC SUIT

Order No.	MCA1Y6R	MCA1Y76	MCA1ZM	
Shell	Checks	Solid	3pc Checks	
1. Spreading	1:02	0:05		0:30
2. Open Marker	0:05	0:06		0:17
3. Set Origin	1:51	0:25		1:45
4. Cutting	5:23	9:36		5:03
Lining				
1. Spreading	0:16	0:04		0:10
2. Open Marker	0:15	0:05		0:05
3. Set Origin	1:13	0:21		0:30
4. Cutting	3:07	4:49		3:43
Knee Lining				
1. Spreading	Stacked with Lining	1:00		0:10
2. Open Marker		0:06		0:07
3. Set Origin		0:06		0:14
4. Cutting		0:09		0:10
Fusing				
1. Spreading	1:35	0:30		0:18
2. Open Marker	0:09	0:12		0:17
3. Set Origin	0:19	0:21		0:27
4. Cutting	1:07	0:45		1:23

Sleeve Lining								
1. Spreading	SAME FABRIC			SAME FABRIC			SAME FABRIC	
2. Open Marker								
3. Set Origin								
4. Cutting								
Changeover Time	0:37			13:17			3:44	
	17:08			18:41			18:53	

TROUSER

Order No.	MCA1UVC MCA1UU6	MCA1UTH MCA1UVF	MCA0X0G	MCA0WYP MCAPWRR	MCA1Y6H MCA1Y6K	MCA0X4E	MCA1Y3E
Shell	Solid	Solid	Solid Recut	Solid	Solid	Solid	Solid
1. Spreading	0:22	0:15	6:40	0:30	0:12	0:20	0:42
2. Open Marker	0:20	0:15	0:10	0:19	0:13	0:12	0:06
3. Set Origin	0:33	0:56	1:00	1:12	1:00	0:42	1:00
4. Cutting	6:02	4:00	5:10	9:08	4:26	1:56	1:56
Knee Lining							
1. Spreading	SAME	SAME	0:30	0:37	0:21	0:10	0:42
2. Open Marker			0:10	0:08	0:10	0:06	0:04
3. Set Origin			0:07	0:07	0:08	0:07	0:14
4. Cutting			0:10	0:08	0:10	0:08	0:08
Changeover Time	0:41	0:46	0:36	0:42	0:37	0:42	0:28
	7:58	6:12	14:33	12:51	7:17	4:23	5:20

2PC SUIT

Order No.	MCA1UP5	MCA1UND	MCA1YAP	MCA1Y39	MCA1Y47	MCA1Y9R	MCA1YC8	MCA1Y93	MCA1Y3M	MCA1Y3G	MCA1Y27	MCA1IZM	MCA1ZNE
Shell	Solid	Solid	Checks	Checks	Checks	Solid	Solid	Solid	Solid	Solid	Solid	Checks	Solid
1. Spreading	1:22	0:20	1:14	1:10	1:03	7:55	0:10	0:25	0:20	0:24	0:30	1:25	0:30
2. Open Marker	0:10	0:08	0:05	0:10	0:20	0:07	0:04	0:15	0:09	0:29	0:20	0:10	0:14
3. Set Origin	1:11	1:06	3:29	1:02	1:56	0:32	1:06	1:23	1:20	1:53	0:27	1:07	0:18
4. Cutting	3:41	3:30	4:59	4:23	4:07	5:20	4:00	4:52	1:49	3:24	4:28	4:05	5:15
Lining													
1. Spreading	0:16	0:17	0:19	0:18	0:37	0:21	Stacked with shell	0:10	0:17				
2. Open Marker	0:26	0:20	0:09	0:13	0:24	0:10						0:03	0:07
3. Set Origin	0:27	0:42	0:41	0:42	0:17	0:35						2:34	0:41
4. Cutting	2:15	2:30	2:08	2:30	2:28	2:15						2:32	2:17
Knee Lining													
1. Spreading	Stacked with Lining	Lining	0:14	Stacked with Lining	Lining	0:10	0:21	0:30	0:19	1:00	0:17	0:13	0:14
2. Open Marker			0:17			0:05	0:06	0:07	0:08	0:10	0:08	0:05	0:10
3. Set Origin			0:21			0:07	0:11	0:06	0:07	0:11	0:06	0:07	0:07

4. Cutting	0:09	0:10	0:10	0:08	0:10	0:08	0:08	0:09	0:09	0:09	0:09	0:08	0:11
Fusing													
1. Spreading	0:17	0:13	0:15	0:34	0:20	0:16	0:29	0:22	0:36	0:16	0:20	0:25	0:19
2. Open Marker	0:15	0:12	0:23	0:05	0:07	0:09	0:15	0:04	0:08	0:35	0:10	0:03	0:18
3. Set Origin	0:21	0:18	0:48	0:52	0:24	0:52	0:22	0:11	0:30	0:25	0:19	0:22	0:20
4. Cutting	0:43	0:50	0:54	0:33	0:34	0:56	0:28	0:52	1:29	0:35	0:45	2:09	1:06
Sleeve Lining													
1. Spreading	SAME FABRIC	SAME FABRIC	0:14	SAME FABRIC									
2. Open Marker			0:05										
3. Set Origin			0:13										
4. Cutting			0:26										
Changeover Time	0:39	0:44	0:33	0:37	0:39	0:07	0:25	0:30	0:36	0:43	0:35	0:31	0:31
	12:12	11:20	17:57	13:17	13:26	20:05	10:25	13:02	20:06	22:30	18:42	16:09	12:55

KEY	
Reasons	Frequency
1 - INSTRUCTION	1
2 - OPERATOR MISSING	7
3 – TALKING	8
4 - SYSTEM ERROR	8
5 - SPREADING NOT DONE	2
6 - REPLACE ROLL	3
7 - FABRIC MOVED	4
8 - BRUSH CHANGE	1
9 - TRACKSHEET MISSING	1
10 - SHORTER FABRIC	2
11 - POLYTHENE PULLED IN	1

From the above data, it is evident that the preparatory time for the cutting process that is spreading and setting origin was about one minute for every fabric of the garment, i.e., shell fabric, lining fabric, fusing fabric, knee lining fabric and sleeve lining fabric. This time was not required in Ruk and Ruizhou cutting machines and thus the time required for cutting a garment was lesser in these machines.

The average time required to cut a garment on GTXL cutting machine was found to be:

Average Time	
2pc Suit	13:57
3pc Suit	18:21
Trouser	6:22
Vest	6:25
Jacket	11:51

RESULT

The problem with the GTXL machine was in the way it cut garments and it required a lot of non-value adding processes in order to start the cutting. These processes could not be eliminated, and the time required to cut garments could not be reduced further after a point of time. As a result of this time study and continuous low production of GTXL machine, the machine was replaced with a Ruizhou Cutting machine.

4. FUSING

5.1. FUSING CUT IN BULK

Parts fusing for the macintosh department was previously cut in bulk and then given to the fusing operators. The problem here was that fusing of the size 42, 50, 60. This was a major problem as the operators at the fusing table had to search for the appropriate size and trim the excess fusing which took a lot of time. Operators were only able to fuse around 6-7 jackets per hour which resulted in a huge WIP at the fusing table. Also this lead to a huge amount of fusing being wasted every time the operators trimmed the fusing. Sometimes the operators would not trim the fusing properly which resulted in garments being rejected at the QC table for improper fusing.

OUTPUT PER HOUR

Time period	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
9-10	7	7	8	6	8	7	9
10-11	8	8	6	8	10	6	7
11-12	9	8	7	7	8	6	6
12-1	7	10	8	8	7	7	8
1-2	8	7	9	9	8	8	7
2-3	6	6	8	7	9	9	7
3-4	7	8	7	6	7	8	6
4-5	8	7	8	7	6	7	7
5-6	7	7	9	8	6	8	7
	67	68	70	66	69	66	64

5.2. INSTALLATION OF RACK AND CONVEYOR

PROBLEM

Previously, there was no proper space for keeping the fusing of various parts of the garment. The operators would keep the fusing along the railing beside them, obstructing their workspace. It would also be difficult and time consuming for the operators to search for the required fusing. The operators would set the fusing on the shell fabric on a table and then move this set to the conveyor of the fusing machine. This only allowed them to fuse 6 to 7 jackets per hour, thus increasing the WIP at the fusing machine.

Often, fusing would fall onto the conveyor and get stuck to the belt of the fusing machine, thereby making the belt sticky and as a result of which small parts of garments would remain stuck to the belt and not come out of the machine.

There was no standard operating procedure. Operators would fuse any panel randomly. There was a lack of coordination which would lead to a lot of parts being missed at the fusing machine.

Crowded work space

Less productivity

Parts Missing

No SOP



Fig: Fusing Machine before Installation of Rack

SOLUTION

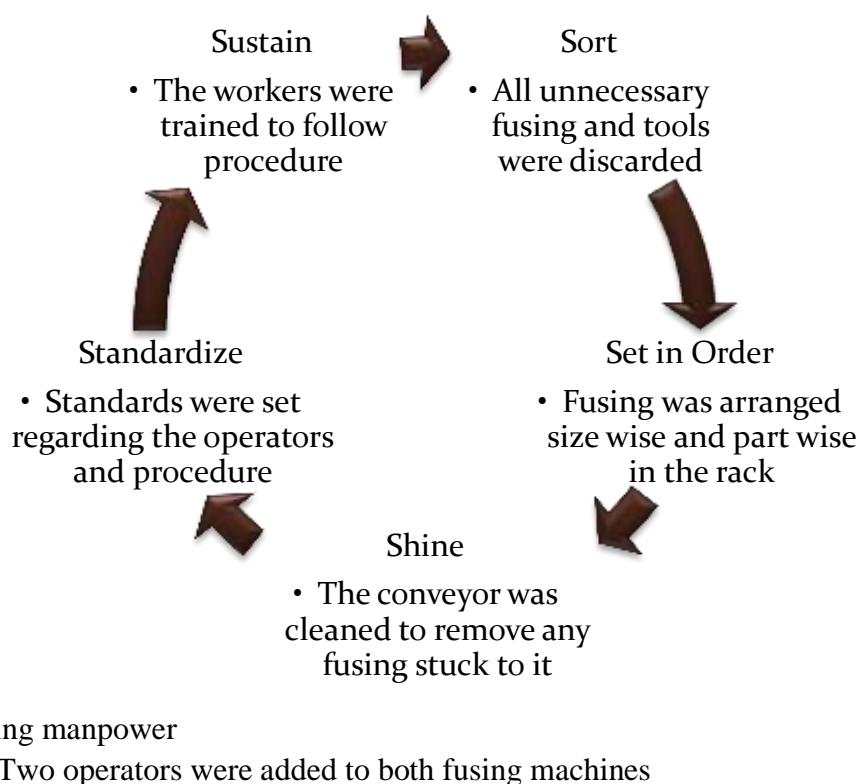
To solve this problem, a rack and conveyor set up was added in front of the fusing machine.

- Conveyor: A longer conveyor was added in front of the fusing machine, so that operators could directly put the pieces onto the conveyor once the fusing and shell set up was ready.
- Panel over the conveyor: Panels were made of acrylic sheets to keep on top of the conveyor between railings. This increased the workspace for the operators.
- Angled rack: Two racks were placed back to back at a 120° angle. These racks were divided into 3 color coded columns and 4 rows. Each column was assigned one operator. Thereby, a total of 3 operators were assigned on each side of the rack for fusing jacket and vest. Each row contained fusing of a specific size.
 - First Section
 - The first three columns were a part of this section and were painted yellow. This decision was based on the psychology of the color. It is perceived as a high energy color and creates a sense of energy. It is also the most attention-grabbing color.
 - These shelves were used to store the fusing of in sleeve and side panel.
 - Second Section
 - The next three columns were a part of the second section and were painted orange. This decision was based on the psychology of the color. Orange being a combination of yellow and red is considered an energetic color. It is often used to draw attention.
 - These shelves were used to store fusing of top sleeve, back and lapel.
 - Third section
 - The next five columns were part of this section and were painted white. This decision was based on the psychology of the color. This is related to cleanliness and creates a sense of space. It provides mental clarity and promotes efficiency.
 - These shelves were used to fusing of front panel and small parts.



Fig: Fusing Machine after Installation of Rack

- Job Reengineering: Specialization of labor is the hallmark of job engineering. High level of specialization was intended to
 - Allow employees to team a task rapidly
 - Permit short work cycles so that performance can be almost automatic and involve little or no mental effort
- Each operator was assigned to work on specific panels. As they worked on the same panels repeatedly, their efficiency increased.
- Implementation of 5S



RESULT

The addition of the conveyor in front of the fusing machine made it easy for the operators to pass the panels into the fusing machine. They did not have to disturb other operators nor carry the panel themselves to the conveyor which also sometimes disturbed the set up and consumed a lot of time. The conveyor thus helped decrease the unproductive time.

The panels of the acrylic sheet over the conveyor increased the workspace of the operators. This made their workstations less crowded and allowed them to focus on their work. Apart from this, it also resulted in lesser missing and mix up of parts.

The racks placed over the conveyor allowed the sorting of the fusing and made it easier for the operators to fuse the panels as they didn't search for the fusing anymore. It also helped define a standard operating procedure.

Job engineering and implementation of 5s helped increase the productivity by 100%. The previous output of 6 to 7 pieces was now significantly increased to 12 to 14 pieces per hour which can be seen below:

OUTPUT PER HOUR

Time period	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
9-10	9	14	15	14	13	16	16
10-11	9	13	15	17	15	14	13
11-12	10	13	15	14	16	14	15
12-1	11	16	17	15	14	15	13
1-2	12	13	15	14	16	13	15
2-3	10	15	16	14	15	14	12
3-4	12	15	13	12	14	12	15
4-5	13	14	12	14	15	16	14
5-6	12	14	13	15	12	13	14
	98	127	131	129	130	127	127

5.3. PARTS FUSING CUT AT CUTTER

PROBLEM

The fusing output had to be increased further to reduce WIP at the cutting machine rack. Since fusing was cut in bulk, a lot of time was wasted in trimming excess fusing. This limited the productivity of operators.

SOLUTION

Since the fusing cut in bulk had to be trimmed for so many garments which lead to both time and money being wasted, it was decided that the fusing be cut along with the garment itself. This resulted in a drastic increase in output at the fusing table as the operators didn't have to trim the fusing as it was of the same size as the garment.

Fusing was cut in bulk and provided to the fusing machines even though parts fusing was being cut at the cutter. This fusing was stored in the rack. In case, some fusing was not cut properly, was damaged or misplaced, the fusing operators could use the fusing in the rack, trim it and fuse the garment.



Fig: Parts fusing cut at the cutting machine

RESULT

This led to an increase in the output at the fusing machine. The operators were now able to fuse 15-18 jackets per hour.

OUTPUT PER HOUR

Time period	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
9-10	12	11	12	11	14	14	18
10-11	9	8	9	8	7	9	7
11-12	10	13	13	12	12	16	15
12-1	13	11	15	14	15	17	14
131-2	10	13	14	13	16	18	13
2-3	12	12	12	12	15	16	14
3-4	11	11	11	14	14	13	15
4-5	13	13	15	11	13	14	14
5-6	9	12	13	13	14	15	14

6. READY CUTTING

6.1. CUTTING COLLAR & COLLAR STAND MANUALLY

The collar and collar stand of garments with checked fabric were block cut and later the CB notch was matched and cut manually using a paper pattern.

Once the piece was received by the ready cutting operator, she would take this piece to the pattern table where the pattern plotter operator would print the pattern of collar and collar stand and give it to the ready cutting operator. Then the ready cutting operator would match the checks and cut the pattern using a rotary.



Fig: Block Cutting Collar



Fig: Print paper pattern



Fig: Rotary knife used to cut collar



Fig: Collar cut using rotary

6.2. CUTTING COLLAR & COLLAR STAND ON CUTTING MACHINE

PROBLEM

The process of cutting collar and collar stand of checks garments was a very tedious process. The garment bundle had to move to the ready cutting table then the pattern table and to the ready cutting table again before it could resume its normal process flow.



This had three inherent problems:

1. The throughput time of checked garments was high
2. Two operators were required to ready cut garments
3. The movement increased the probability of pieces getting lost

SOLUTION

To cut the collar and collar stand of garments faster and to reduce their throughput time, the collar and collar stand of checked garments were cut on the cutting machine. The cutting machine operator was trained the center back checks with the collar and to match the mirror as well. The operator would do this by aligning the panel with the projection.

The bundles of checks fabric would be collected and sent to the Ruk cutting machine where numerous collars would be cut one after the other automatically instead of cutting individual collar with patterns.



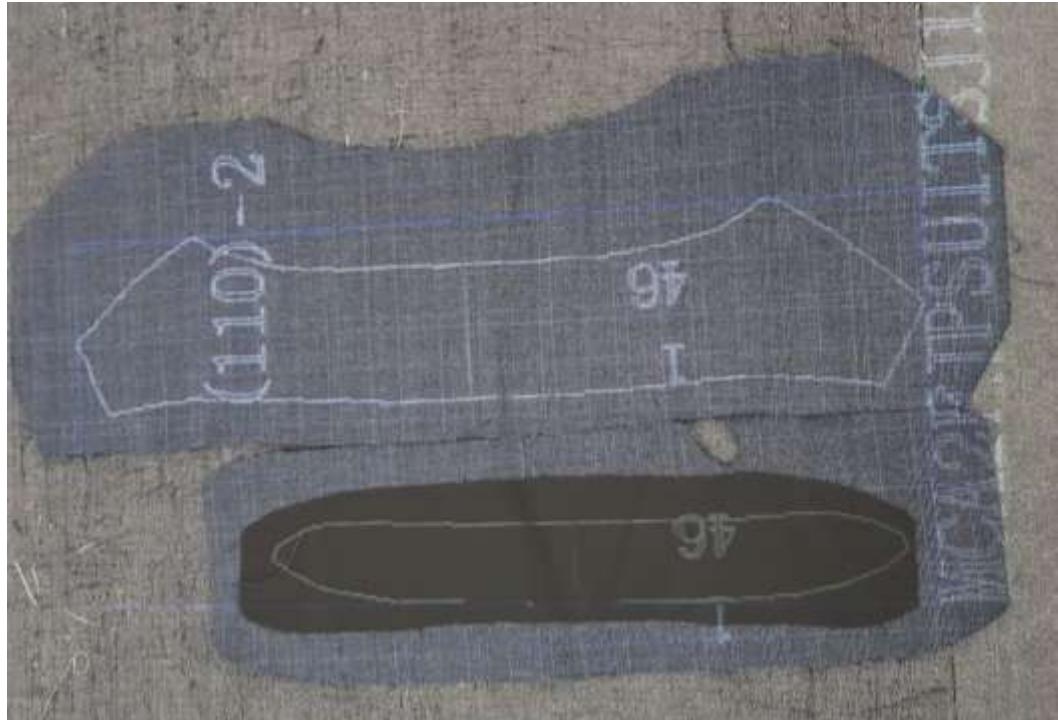


Fig: Matching checks with projection

RESULT

- Time saved: the waiting time and the time required to print the pattern was eliminated by this process. Apart from this, the cutting time was also reduced.
- Output: The cutting machine could cut about 40 collars in one hour as compared to an operator who could cut only 7 collars in one hour.
- Manpower saved: the manpower required to cut collars could be eliminated as the same work could be done at the cutting machine in a much more efficient way.

7. BUNDLING TABLE

7.1. WIP ON BUNDLING TABLE

The following processes would take place at the bundling table:

1. Counting number of pieces and checking
2. Cut parts which had been block cut at the cutter
3. Issue shoulder pad, canvas, sleeve head and pocketing fabric
4. Tagging of garment parts

Due to the large number of processes taking place at the bundling tables huge levels of WIP would collect and create a bottleneck.

7.2. LABELLING AND STANDARDIZATION

PROBLEM

The canvas and pocket bag issue area had a storage rack for keeping chest canvas, sleeve head, pocketing fabric and lining fabric. This shelf was highly unorganized and there was no assigned place for keeping the materials. None of the items were sorted size wise which led to a lot of time being wasted in finding the material of the right size. This led to a high WIP being created in this area.

Operators with experience in this area would know where the required items were kept but the new recruits struggled to find these items. Due to the lack of labelling, operators would sometimes issue the wrong type of pocketing fabric or wrong size of sleeve head or chest piece.

SOLUTION

Every shelf of the rack was labelled, and corresponding items were placed. The rack was sorted in the following manner:

Straight Pocket Bag	Vest Pocket Bag (Black)	Vest Pocket (White)	MOD 35 – 42 (Small)	SLIM 35-43 (Small)
Felt	FQTP	Straight Pocket Bag (Black)	MOD 43 – 50 (Medium)	SLIM 43-50 (Medium)
OSSP	OSSP	Slant Pocket Bag (White)	MOD 51-60 (Large)	Slim 51-60 (Large)
FDBP	FDBP	Straight Pocket Bag (White)	MOD 51-60 (Large)	Tuxedo Lapel Fabric



Fig: Labeling of Bundling Table Rack

1 & 2 button	34,35,36	37,38,39	40,41,42	43,44,45	46,47,48	50,52	54,56	58,60
3 button	34,35,36	37,38,39	40,41,42	43,44,45	46,47,48	50,52	54,56	58,60
Double breasted	34,35,36	37,38,39	40,41,42	43,44,45	46,47,48	50,52	54,56	58,60
Ex Slim/ slim fit	34,35,36	37,38,39	40,41,42	43,44,45	46,47,48	50,52	54,56	58,60



Fig: Labeling of Bundling Table Rack

RESULT

The sorting of the rack placed in the trims issue area allowed operators to issue the materials required easily and faster without any mismatch. This resulted in a drastic reduction in WIP in this area.

New operators could now be trained faster and with ease as they could independently figure out where the required items were kept and were no longer dependent on the operators with experience.

7.3. REPLACING TAGGING PROCESS WITH STICKERING

PROBLEM

Track sheets were cut into 5 parts, namely, lining section, sleeve section, front section, collar section and back section using a rotary knife. This paper was then tagged with the respective part using a tagging machine. This was a very time-consuming process as

- the tagging machine would not always work properly
- cutting the track sheet took time



Fig: Tagging Process

SOLUTION

The tagging process was eliminated by a stickering process. Stickers were printed from the CAD department which had the same information as the tracksheet. The cutting machine operators would simply stick these stickers onto the respective panels.



Fig: Stickering Process

RESULT

The stickering process hardly took 20 seconds and could be done simultaneously along with picking as compared to the earlier process where tagging of parts took about one and half minute.

TAGGING PROCESS	STICKERING PROCESS
1:25	0:26
1:37	0:23
1:29	0:29
1:46	0:32
1:27	0:28
1:43	0:31
1:21	0:45
1:45	0:27
1:21	0:29
1:53	0:37

7.4. IMPROVING STICKER QUALITY

PROBLEM

There was one problem with these stickers. Most the components being fused had these stickers. In a jacket, stickers were attached to the front panel, back panel, top sleeve, lapel facing and collar. All these parts had to be fused. Similarly, in a trouser sticker were attached to the left fly, right fly, waistband, front panel and back panel. Out of these left fly and right fly were the parts that had to be fused. In a vest coat the front panel and lapel were stickered both of which had to be fused. These stickers were color coded just as the track sheet of the garment.

When these parts were fused, the sticker was attached on top of the fusing and passed through the fusing machine. As a result of the heat the ink of the stickers would smudge and become illegible. The whole point of attaching the stickers was rendered useless.

SOLUTION

A sample containing 7 stickers, one of each color was taken and fused using two methods.



Fig: stickers before fusing

In the first method, each panel was fused separately (without sandwiching). In this case, only the text on the white and pink stickers were still readable, other stickers were completely smudged.



Fig: clarity of stickers after fusing without sandwiching

In the second method, two panels of the either sides were kept on top of each other and the sticker was stuck to the fusing which was in between them (with sandwiching). In this case too, only the text on pink and white were still legible and the others were smudged and thus caused confusion.



Fig: clarity of stickers after fusing with sandwiching

Since, sandwiching the layers was not a possible solution, the carbon paper used was changed with a one that had a high heat resistance.

RESULT

The new stickers were again tested in the fusing machine. These stickers did not smudge and were legible even after passing through the fusing machine. This helped saved the time of reprinting stickers that had smudged in the fusing machine. It also reduced a lot of confusion caused by trying to interpret smudged purchase order numbers on the sticker.

7.5. TRAINING BOARD FOR CUTTING MACHINE OPERATORS

PROBLEM

There was yet another problem faced by the cutting machine operators. The problem faced was that these operators at the cutting machines were unaware of the parts on which the sticker was to be attached.

This problem was more predominant among the new recruits. Since the labor turnover of the unit was very high, this was a major problem.

Since this was a new process to everyone, sometimes even the experienced personnel would get confused between the various panels. This increased the idle time of the cutters as the cutting head would remain idle till the operators did not sticker the parts and pick them up from the cutting bed.



Fig: Stickering of various parts of the garment

SOLUTION

In order to make the stickering process easier for cutting operators, 3 display boards, 1 for two cutting machines, were made containing all the parts that were to be stickered. In these boards, miniature patterns of the parts to be stickered were pasted so that the operators could easily recognize them and know which sticker was to be attached to that panel.



Fig: Training Board for Stickering Process

RESULT

These display boards helped reduce the time required for stickering garments since operators who did not have knowledge about the various parts of the garment also could sticker the cut pieces independently and did not have to depend on trained and experienced personnel.

It also helped experienced operators as they did not have to spend time figuring out the parts, they would just look at the board and match the part of the garment visually and sticker the same.

The data below shows that the time required for stickering reduced after the installation of the boards.

BEFORE DISPLAY OF BOARD		AFTER DISPLAY OF BOARD	
Operation	Time	Operation	Time
Spread Shell	1:51	Waiting	2:16
Spread Polythene	0:11	Give Cut Command	0:17

Open Marker	0:35		Execute	0:07
Execute	0:44		Cutting	4:00
Cutting	4:06		Picking & Stickering	2:46
Picking & Stickering	3:19		Spreading Shell	1:23
Remove Waste	0:18		Spreading Knee Lining	0:24
Spread Shell	1:27		Spreading Polythene	0:21
Spread Polythene	0:06		Give Cut Command	0:26
Give Cut Command	0:03		Execute	0:03
Execute	1:36		Cutting	2:59
Cutting	3:42		Picking & Stickering	2:15
Picking & Stickering	2:54		Bundling	0:29
Bundling	0:55		Remove Waste	0:15
Idle	1:00		Spreading Shell	1:00
Remove Waste	0:15		Spreading Knee Lining	0:12
Spread Shell	0:59		Spreading Polythene	0:11
Spread Polythene	0:17		Give Cut Command	0:07
Give Cut Command	0:31		Execute	0:05
Execute	0:14		Cutting	2:45
Cutting	4:32		Picking & Stickering	2:05
Picking & Stickering	2:56		Bundling	0:21
Removing Waste	0:45		Removing Waste	0:17
Spreading Felt	0:29		Spread Knee Lining	0:10
Spreading Polythene	0:03		Spreading Shell	0:40
Give Cut Command	0:04		Spread Polythene	0:12
Execute	0:05		Give Cut Command	0:13
Cutting	1:35		Execute	0:05
Picking & Stickering	3:03		Cutting	1:39
Remove Waste	0:30		Picking & Stickering	2:21
Idle	0:56		Remove Waste	0:32
Spread Shell	1:19		Bundling	0:34
Idle	5:02		Spreading Shell	0:25
Spread Polythene	0:47		Spreading Polythene	0:13
Give Cut Command	0:21		Waiting	2:16
Execute	0:07		Give Cut Command	0:17

7.6. PROCESS CHANGE

PROBLEM

Huge WIP was getting collected near the bundling table. This disrupted the process flow and caused the operators of the following processes to remain idle.

SOLUTION

To further reduce the WIP, the processes at the bundling table were further reduced. The checking of parts at the bundling table was eliminated. This was because once the lining bundle was tied it would not be opened before the quality check. The quality checking operators would be the only ones to count the number of pieces directly after cutting and in case there is an issue, they'd give the bundle to the recutting table.

The bundle of shell fabric would be opened at the fusing table and the responsibility of counting the number of panels and ensuring all parts were there was given to the fusing machine operators.

Small parts of lining which were likely to be missed were cut in bulk and provided to the sewing line. 1000 pieces were provided to each sewing line for every lining every month.

RESULT

These changes removed the bottleneck issue of the bundling table and took the factory closer to the single piece flow system.

The time required for one bundle to pass reduced drastically and hence was operator was also removed from the bundling table.

<i>Before</i>		<i>After</i>	
Order	Time required	Order	Time required
1.	1:03	1.	0:24
2.	0:57	2.	0:36
3.	0:59	3.	0:23
4.	1:07	4.	0:34
5.	1:09	5.	0:27
6.	1:07	6.	0:29
7.	1:03	7.	0:23
8.	1:08	8.	0:37
9.	1:09	9.	0:32
10.	1:10	10.	0:26

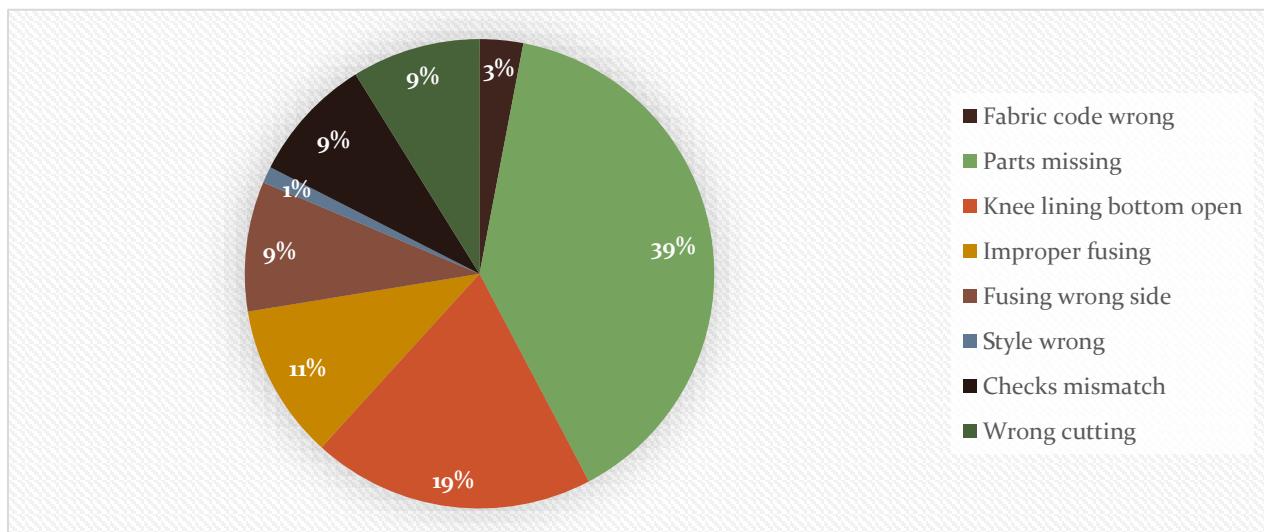
8. RECUTTING

8.1. RECORDING DEFECTS

The quality checkers would write down the PO Number of each garment they check and write the defect against it, if any in a notebook. These defects were then summed up at the end of each shift by the quality checking supervisors.

Using these records and observation the primary reasons for re-cutting were identified to be the following:

Day	Fabric code wrong	Parts missing	Knee lining bottom open	Improper fusing	Fusing wrong side	Style wrong	Checks mismatch	Wrong cutting
1.	6	40	23	10	8	3	12	10
2.	4	37	17	11	8	2	9	6
3.	5	29	19	13	6	0	7	6
4.	6	47	21	14	9	0	10	7
5.	4	62	16	15	5	1	11	11
6.	2	54	24	10	9	2	8	13
7.	3	48	18	9	12	1	9	10
8.	4	32	23	11	10	0	12	13
9.	0	38	26	13	11	0	7	9
10.	3	43	20	8	9	0	6	8
11.	1	47	18	9	7	1	11	13
12.	2	32	16	12	8	0	8	9
13.	3	39	19	11	11	1	6	12
14.	4	27	14	10	12	3	7	8
15.	2	40	23	13	10	2	8	6
16.	3	38	24	11	8	4	6	7
17.	0	34	19	8	9	0	10	5
18.	2	43	18	9	11	2	9	8
19.	5	40	17	12	7	1	9	11
20.	3	29	21	8	12	0	11	8



To find the causes of these defects root cause analysis was done.

Problem	1	2	3	4
Delay in Order Closing	Parts missing at cutter	Lack of knowledge of parts	Lack of Training	Insufficient Time
				Pressure of order closing
		Negligence while picking the parts	Carelessness	No sense of ownership
			Pressure to increase production	Pressure to meet target
		Slow picking on GTXL-parts fall in bin	Lack of manpower	Absenteeism
			Lack of experience	Employees under training
		Fabric lifting messing lay on GTXL Machine	Machine design problem	Wear and Tear
	Parts missing at fusing machine	Parts stuck in fusing machine	Small Parts	Conveyor not able push
			Excess fusing not trimmed	Improper cutting
			Sticky Conveyor	Fusing stuck to conveyor
		Small Parts Fall Down	Gap between conveyors	Machine design problem
		Mixing of parts of different orders	Orders with same fabric moving simultaneously	Large number of orders
				Inavailability of order with different fabric
			Lack of knowledge of parts fused	New employees
				Ineffecient training
Fusing wrong side	Wrong face side marked at store	Face side mark missing	Negligence	
			Marking after cutting causes errors	Not following procedure
			Pressure to increase production	Pressure to meet target
		Wrong face side marked at cutter	New employee	Ineffecient training
			Pressure to increase production	Pressure to meet target

		Fusing operators don't check the mark	New employee	Lack of willingness to learn
			Carelessness	No sense of ownership
			Pressure to increase production	Pressure to meet target
	Checks matching problem	Incorrect Laying	Folding of fabric after laying	To create WIP for GTXL
			Folds in fabric	Negligence
		Bowing	Defective roll	Improper inspection
		Inability to match lower layer with matching point (Ruizhou)	No pin table	Machine design problem
			Not able to match with grid	Inadequate skill set
				Pressure of increasing production
	Measurement Problem	Folds during spreading	Incorrect spreading	Ineffecient training
				Pressure to increase production
		Wrong Marker Opened	Confusion regarding tracksheet	Bundle opened simultaneously
		Cutting outside fabric	Incorrect spreading	Ineffecient training
				Pressure to increase production
	Felt Missing	Felt not added to tray at store	Negligence	Adaptation to new method
		Felt missed at cutting table	Negligence	Not picked up after cutting
				Adaptation to new method
		Felt missed at Ready Cutting Table	Felt missed while bundling	Large WIP
			Added to another bundle	Large WIP
	Shape Out	Improper spreading	Ineffecient Training	Lack of time
			Negligence	Pressure to increase production
		Joint cutting	Blunt knife	Manually cut wrong
	Rash Cutting - RUK	Blunt knife	Wear and tear	Knife not changed
		Improperly spread polythene	Negligence	Pressure to meet target

		Fabric folds	Improper spreading	Negligence
	Rash Cutting - GTXL	Inability to adjust bowl pressure	Lack of knowledge	Ineffecient training
				Lack of willingness to learn
		Improper bed	Wear and tear	Improper maintenance
	Selvedge in Parts	Improper spreading	Ineffecient Training	Lack of time
			Negligence	Pressure to increase production
		Less cutable width	Improper roll	Ineffecient inspection
	Improper Fusing	Fusing shape out	Cut wrong at cutter	Incorrect spreading
		Incorrect trimming	Work in haste	Pressure to meet target
		Gum side of both fusing face same side	Negligence	Working without concentration
		Pulling fabric	Joint cut	Blunt knife
	Fabric Thread Out	Rash cutting	Blunt Knife	Wear and tear
		Weaving defect	Improper inspection	Ineffecient training
		Pulling fabric	Joint cut	Blunt knife
	Knee Lining Bottom Open	Improper Spreading	Ineffecient training	Inadeqaute time
			Negligence	Pressure to meet target
	Fabric or Felt Wrong	Negligence at store	Large order quantities	Pressure to meet target
		Fabric Interchanged	Simultaneous bundle opening	Confusion
				Pressure to increase production
	Joint Cutting	Blunt knife	Non-replacement	Improper maintenance
		Rotary knife size diminished	Corrosion of knife	Wear and tear
	Checks Collar Cutting	Block patterns not available	Misplaced	Lack of knowledge
		Lack of skill	Inability to cut at cutter	Lack of training

			Inability to print pattern by themselves	Lack of skill
	Short Length Fabric	Store	Measurement error	New employees
				Poor recollection
		CAD	Manual copying error	Negligence
			Entry on wrong tracksheet	Confusion due to more orders
	Marker Not Opening	CAD issue	Cut file not made	Missed due to many orders
			Cut file not opening	Too many files in folder
		Cutter issue	Typing error at cutter	Lack of concentration
			Barcode damaged	Tracksheet in bad condition
		Network error		
	Wrong Cutting due to Marker Wrong	Typing error at cutter	Illegible numbers	Damaged tracksheet
		Wrong track sheet	Simultaneous bundle opening	Large number of orders
			Confusion when cutting 3 pc suit	Many tracksheets
	Tracksheet Change	Confusion	Crowded workstations	Tables filled with large WIP
			Simultaneous bundle opening	Large number of orders
			Cutting 3pc suit	Many tracksheets

8.2. FABRIC CODE WRONG

PROBLEM

Fabric code wrong was an issue which arose from the sub-store. This happened when the operators in the sub-store misread the fabric code and cut the fabric from the wrong roll and fed it to the cutting department. This problem happened mainly because the fabric code written on the roll had an extremely tiny font and the operators had to strain their eyes in order to read the code of the fabric from the roll.

SOLUTION

A board with all the fabric codes and rack number was put up in a large font size to avoid any confusion and avoid the problem of illegibility. Each fabric roll was labelled from A1 to A18, B1 to B18 and C1 to C18 and the fabric rolls in the carousel machine were labelled from 1 to 16. These codes were then written along with the fabric codes on the board with a large font size such that the operator standing near the center table would know which tube has the required fabric or if the fabric is in the carousel machine.



Fig: Board with fabric codes

RESULT

The operators began to refer to the board and this enabled them to find the right fabric roll without any chance of error. This reduced the fabric code wrong problem to an extent. This helped save a lot of fabric as when fabric code was wrong the whole garment had to be recut. It also helped avoid the time wasted in cutting the piece again when the fabric code wrong was detected at the quality check table.

NUMBER OF FABRIC CODE WRONG BEFORE INSTALLATION OF BOARD

DAY	NUMBER OF PIECES
1	1
2	2
3	3
4	4
5	2
6	3
7	0

8	2
9	5
10	3

NUMBER OF FABRIC CODE WRONG AFTER INSTALLATION OF BOARD

DAY	NUMBER OF PIECES
11	2
12	0
13	1
14	1
15	4
16	2
17	2
18	1
19	0
20	2

8.3. PARTS MISSING

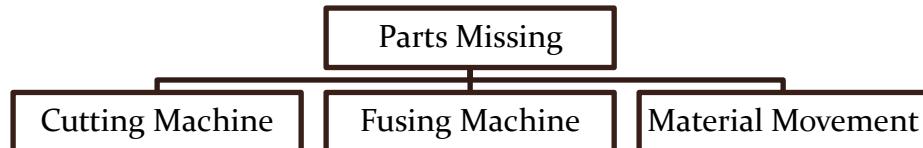
PROBLEM

Parts missing was a major problem in Macintosh. Around 100 orders per day had at least one part missing which had to be recut. This not only wasted fabric but also wasted a lot of time. Two operators had to be allocated for just recutting of these lost parts.

Parts were sometimes not picked up at the machine bed because the operators were not able to identify these parts and threw it with the waste.

Apart from this, parts would sometimes be mixed up behind the fusing machine while bundling if garments of similar colors were being fused at the same time.

Parts would also fall off the bundle sometimes and operators wouldn't know which bundle the part belonged to and hence couldn't return it to that bundle.



SOLUTION

All the parts of the garments were being stickered before laying the polythene and cutting the fabric. A bright white sticker was used, the PO number of the garment was written on the sticker before sticking it to all parts of the garment. Since the stickers were visible easily, the cutting machine operators would not miss any part while picking. This ensured that the parts missing at the cutters was reduced.

These stickers would also help the bundling operator behind the fusing machine know which part belongs to which bundle in case she got confused when same color fabric was being fused at the same time. This would prevent parts of one garment getting mixed with another garment.

Even if a part was fallen anyone could identify to which bundle the part belonged and return it to that bundle.



Fig: Before Stickering All Parts



Fig: After Stickering All Parts

RESULT

The number of parts missing per day was reduced considerably by stickering all parts of the garment. This was evident by the study carried out at the Ruizhou cutting machine. During the

course of this study, the PO numbers of all the garments cut on the machine on that day were noted and these PO Numbers were checked with the Quality Checking report to clarify if any parts of these garment were missed. It was noticed that these pieces did not have to come back for recutting because of any parts missing problem, i.e., **none of the pieces had any parts missing.**

The only reason that this process could have been rejected was the assumption that the time required for stickering was high and would reduce production. But after carrying out a detailed time study, it was found that the time required to sticker the garments was indirectly compensated in the picking time which reduced because the operators could identify the parts faster and this increased their picking speed. The time study supporting the above statement is given below:

BEFORE STICKERING

SPREADING										
Shell	09:30	06:29	07:53	09:35	17:01	08:03	08:32	8:14	6:36	9:21
Lining	03:27	02:16	02:19	02:34	1:38	01:38	02:19	2:51	2:11	2:24
Fusing And Felt	00:39	00:56	00:47	00:54	00:59	00:38	00:47	0:54	0:57	0:48
CUTTING										
Shell	04:36	03:53	03:55	03:44	04:42	04:44	04:48	4:38	4:58	4:39
Lining, Fusing & Felt	04:48	04:27	04:57	06:24	4:59	04:37	04:18	4:26	4:03	4:11
PICKING										
Shell	02:36	02:47	01:59	02:12	06:55	05:22	04:26	2:32	2:21	2:36
Lining	02:18	2:52	02:23	02:13	02:38	04:47	02:37	2:26	2:45	2:39
Bundling	04:43	04:06	03:18	02:24	04:41	01:57	02:14	2:47	3:19	2:58

AFTER STICKERING

SPREADING										
Shell	07:36	09:19	06:37	07:08	07:29	08:58	04:34	07:36	10:15	08:43
Lining	02:45	02:45	2:56	2:33	2:12	2:58	01:13	02:30	02:13	01:43
Fusing And Felt	00:27	00:41	00:35	00:25	00:32	00:30	00:15	00:46	0:47	0:58
Stickering	0:12	0:16	0:14	0:15	0:12	0:14	0:13	0:09	0:12	0:14
CUTTING										
Shell	05:03	05:17	04:30	04:59	04:37	05:00	03:40	04:30	4:35	4:48
Lining, Fusing & Felt	04:37	04:39	04:41	04:30	04:47	04:55	02:55	04:30	4:43	5:03
PICKING										
Shell	1:59	02:15	01:55	01:57	02:05	01:57	02:34	02:34	2:12	2:09
Lining	02:17	03:01	03:09	02:37	02:57	02:34	00:54	02:34	2:31	2:37
Bundling	01:45	02:12	02:35	02:19	01:38	01:57	02:27	05:53	2:19	2:27

8.4. FUSING WRONG

PROBLEM

The quality of fusing was not up to the standard and this resulted in a lot of pieces being rejected by the quality check point. The operators were not aware of the exact placements and the gaps to be left from the edges of the shell fabric while fusing.

SOLUTION

A board was made which displayed the various fusible parts of a jacket and the placement of the fusing along with its type.

It clearly showed that the body fusing, and lapel fusing had to be smaller than the component of the garment cut in shell fabric.

This visual was made back to back and placed on top of both the fusing machines to ensure that the operators can see the board while working and new operators could refer to the board in case they were not sure about the placement or type of fusing to be used.



Fig: Training Board for Fusing Operators

RESULT

The number of quality issues due to improper fusing reduced. Mistakes made by new operators were also brought down as they had a reference which they could see to prevent any component from being fused wrongly. It also aided in the training of new recruits.

The problem of improper fusing was solved with the help of this board. The below data further proves the same.

NUMBER OF DEFECTS FOUND DAILY BEFORE INSTALLATION OF DISPLAY

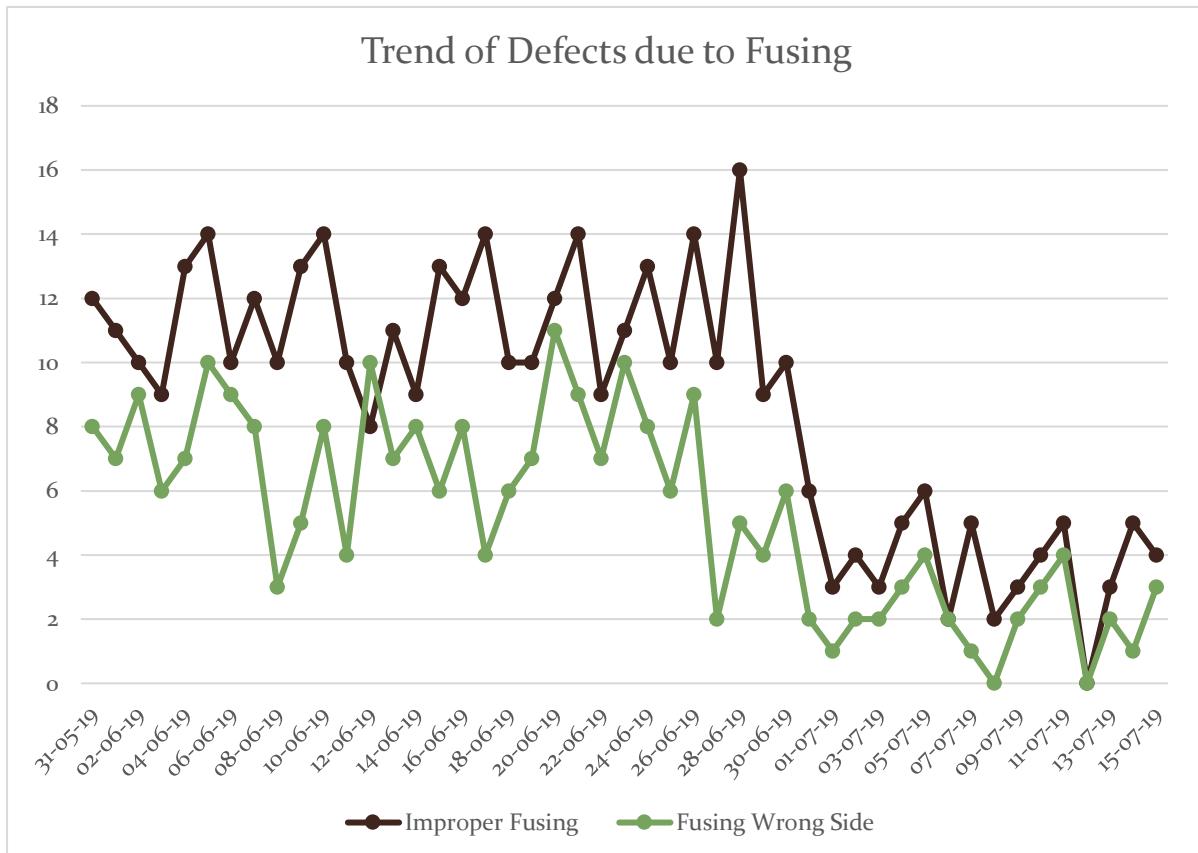
Date	Improper fusing	Fusing wrong side
31/05/19	12	08
01/06/19	11	07
02/06/19	10	09
03/06/19	09	06
04/06/19	13	07
05/06/19	14	10
06/06/19	10	09
07/06/19	12	08
08/06/19	10	03

09/06/19	13	05
10/06/19	14	08
11/06/19	10	04
12/06/19	08	10
13/06/19	11	07
14/06/19	09	08
15/06/19	13	06
16/06/19	12	08
17/06/19	14	04
18/06/19	10	06
19/06/19	10	07
20/06/19	12	11
21/06/19	14	09
22/06/19	09	07
23/06/19	11	10
24/06/19	13	08
25/06/19	10	06
26/06/19	14	09
27/06/19	10	02
28/06/19	16	05
29/06/19	09	04
30/06/19	10	06

NUMBER OF DEFECTS FOUND DAILY AFTER INSTALLATION OF DISPLAY

Date	Improper fusing	Fusing wrong side
31/06/19	6	2
01/07/19	3	1
02/07/19	4	2
03/07/19	3	2
04/07/19	5	3
05/07/19	6	4
06/07/19	2	2
07/07/19	5	1
08/07/19	2	0
09/07/19	3	2
10/07/19	4	3
11/07/19	5	4
12/07/19	0	0

13/07/19	3	2
14/07/19	5	1
15/07/19	4	3



8.5. KNEE LINING BOTTOM OPEN

PROBLEM

The knee lining fabric is finished along the selvedge such that it does not unravel. This is done because the bottom of the knee lining is left without closing it with a seam to prevent it from adding any unwanted bulk to the fabric.

To ensure that the bottom is not cut, the fabric is laid such that when the knife moves to cut the bottom line of the knee lining, the fabric is not cut. This is explained in the image below:

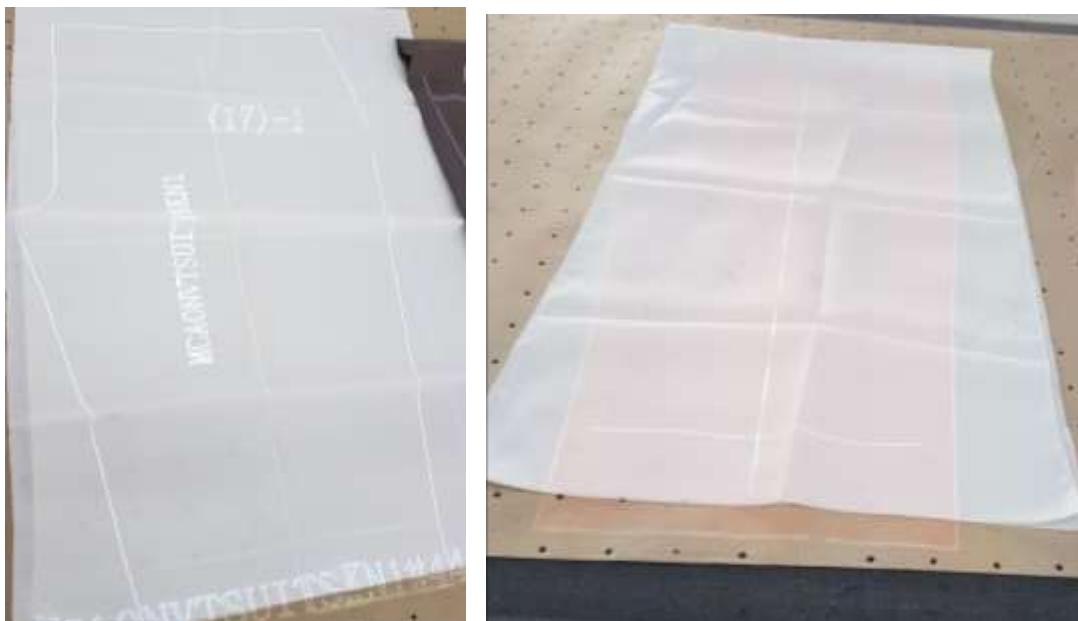
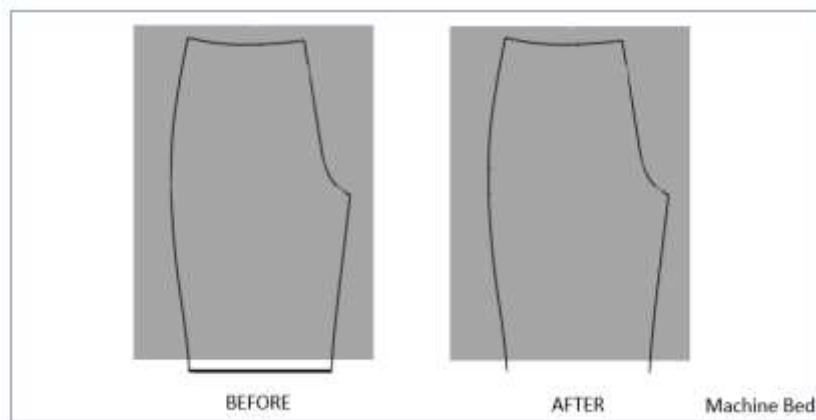


Fig: Spreading of Knee Lining

Sometimes the operators would be negligent when spreading the knee lining fabric and spread it such that the lower line of the knee lining would be cut on the fabric. This would result in the bottom of the knee lining unraveling and it having to be recut. There was no way the already cut knee lining could be altered and this resulted in a lot of knee lining fabric going waste everyday.

SOLUTION

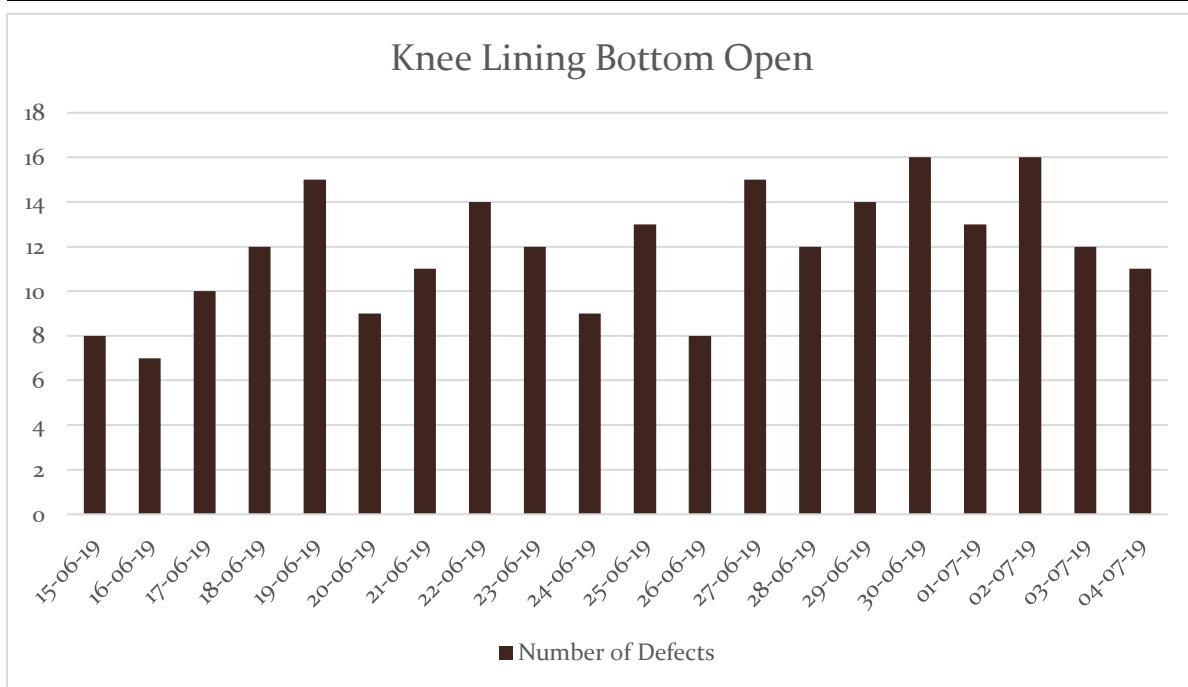
After a meeting with the CAD department, it was sought that if the bottom line could be deleted from the pattern of the knee lining itself, the problem of knee lining bottom open could be eliminated completely. It was decided that the knife would not make the bottom cut at all, even outside the fabric.



RESULT

The number of recuts due to knee lining open before this change in pattern was implemented is given below:

S.No	Date	Frequency
1.	15/06/19	8
2.	16/06/19	7
3.	17/06/19	10
4.	18/06/19	12
5.	19/06/19	15
6.	20/06/19	9
7.	21/06/19	11
8.	22/06/19	14
9.	23/06/19	12
10.	24/06/19	9
11.	25/06/19	13
12.	26/06/19	8
13.	27/06/19	15
14.	28/06/19	12
15.	29/06/19	14
16.	30/06/19	16
17.	01/07/19	13
18.	02/07/19	16
19.	03/07/19	12
20.	04/07/19	11



The number of recuts due to knee lining bottom open were reduced to zero by bringing about this change. It was a permanent solution to the knee lining bottom open problem.

8.6. STYLE WRONG

PROBLEM

Style wrong is a problem which happens when the operators interchange tracksheets while cutting the garment or make a typing error while searching for the marker on the network. This results in a completely different garment being cut. This defect cannot be found before the garment reaches the quality checking table.

SOLUTION

In order to avoid style wrong a step was taken to provide all cutting machines with barcode scanners, the RUK and GTXL cutting machines already had barcode scanners and the data made it evident style wrong happened rarely on this cutters. However, the Ruizhou cutting machine did not have bar code scanners. The cutting machine operators had to type the purchase orders in the following format: “*1234*”. The operators had to find this number on the tracksheet and write the same in the pop-up box that would open when they gave the open command.

In order to mistake proof, the process of opening the marker, personnel of the Ruizhou company were contacted. They made changes in the Ruizhou software which enabled the cutting machine operators to open the required marker directly by scanning the barcode.

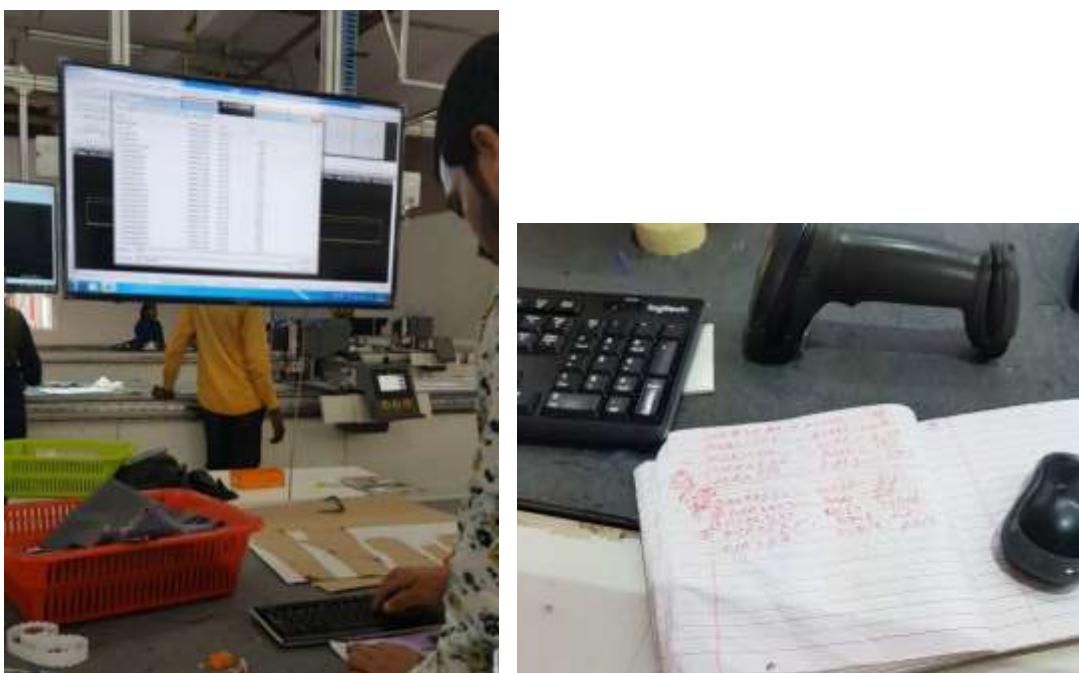


Fig: Operator typing the PO number (left), barcode scanner (right)

RESULT

The style wrong problem reduced after a barcode scanner was provided to the Ruizhou machine too. This not only reduced the style wrong problem but also decreased the time taken by the operator to open a marker.

RESULT

1. OUPUT

As a result of all the above changes there was an increase in production from 98 jackets, 104 trousers and 18 vests in one day to 386 jackets , 381 trousers and 68 vests in one day.

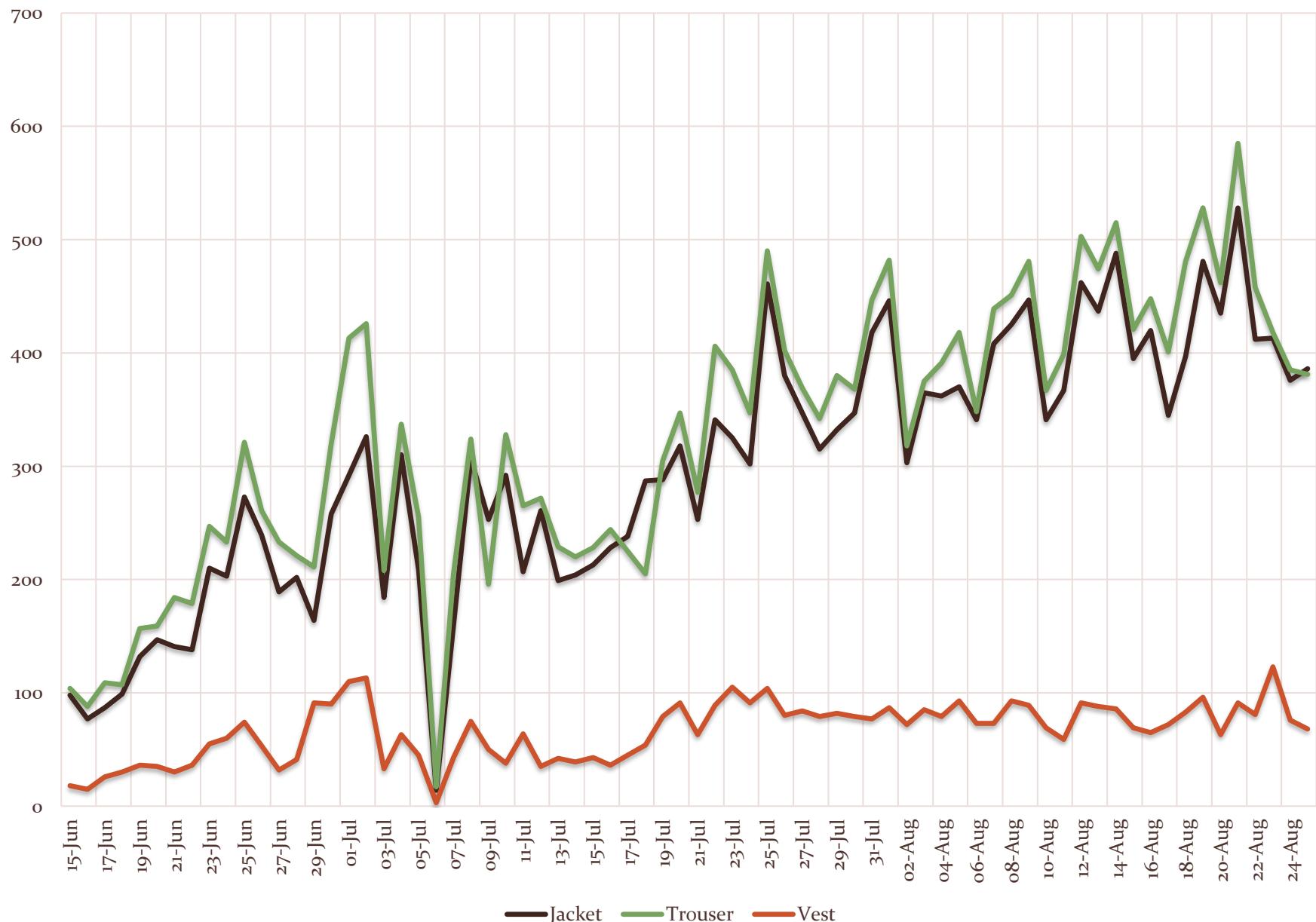


Fig: VSM Boards (left-before right-after)

S.NO.	DATE	JACKET	TROUSER	VEST	S.NO.	DATE	JACKET	TROUSER	VEST
1.	15-Jun	98	104	18	37.	21-Jul	253	277	63
2.	16-Jun	77	88	15	38.	22-Jul	341	406	89
3.	17-Jun	87	109	26	39.	23-Jul	325	385	105
4.	18-Jun	99	107	30	40.	24-Jul	302	347	91
5.	19-Jun	132	157	36	41.	25-Jul	461	490	104
6.	20-Jun	147	159	35	42.	26-Jul	380	402	80
7.	21-Jun	141	184	30	43.	27-Jul	347	369	84
8.	22-Jun	138	179	36	44.	28-Jul	315	342	79
9.	23-Jun	210	247	55	45.	29-Jul	332	380	82
10.	24-Jun	203	233	60	46.	30-Jul	347	368	79
11.	25-Jun	273	321	74	47.	31-Jul	418	447	77
12.	26-Jun	239	261	53	48.	01-Aug	446	482	87
13.	27-Jun	189	233	32	49.	02-Aug	303	318	72
14.	28-Jun	202	221	41	50.	03-Aug	365	375	85
15.	29-Jun	164	211	91	51.	04-Aug	362	391	79
16.	30-Jun	258	320	90	52.	05-Aug	370	418	93

17.	01-Jul	292	413	110		53.	06-Aug	341	348	73
18.	02-Jul	326	426	113		54.	07-Aug	408	439	73
19.	03-Jul	184	208	33		55.	08-Aug	425	451	93
20.	04-Jul	310	337	63		56.	09-Aug	447	481	89
21.	05-Jul	209	255	45		57.	10-Aug	341	367	69
22.	06-Jul	14	17	3		58.	11-Aug	367	399	59
23.	07-Jul	160	205	43		59.	12-Aug	462	503	91
24.	08-Jul	307	324	75		60.	13-Aug	437	474	88
25.	09-Jul	253	196	50		61.	14-Aug	488	515	86
26.	10-Jul	292	328	38		62.	15-Aug	395	421	69
27.	11-Jul	207	265	64		63.	16-Aug	420	448	65
28.	12-Jul	261	272	35		64.	17-Aug	345	401	72
29.	13-Jul	199	229	42		65.	18-Aug	397	481	83
30.	14-Jul	204	220	39		66.	19-Aug	481	528	96
31.	15-Jul	213	228	43		67.	20-Aug	435	462	63
32.	16-Jul	228	244	36		68.	21-Aug	528	585	91
33.	17-Jul	238	225	45		69.	22-Aug	412	458	81
34.	18-Jul	287	205	54		70.	23-Aug	413	418	123
35.	19-Jul	288	305	79		71.	24-Aug	376	385	76
36.	20-Jul	318	347	91		72.	25-Aug	386	381	68

Cutting Output per Day

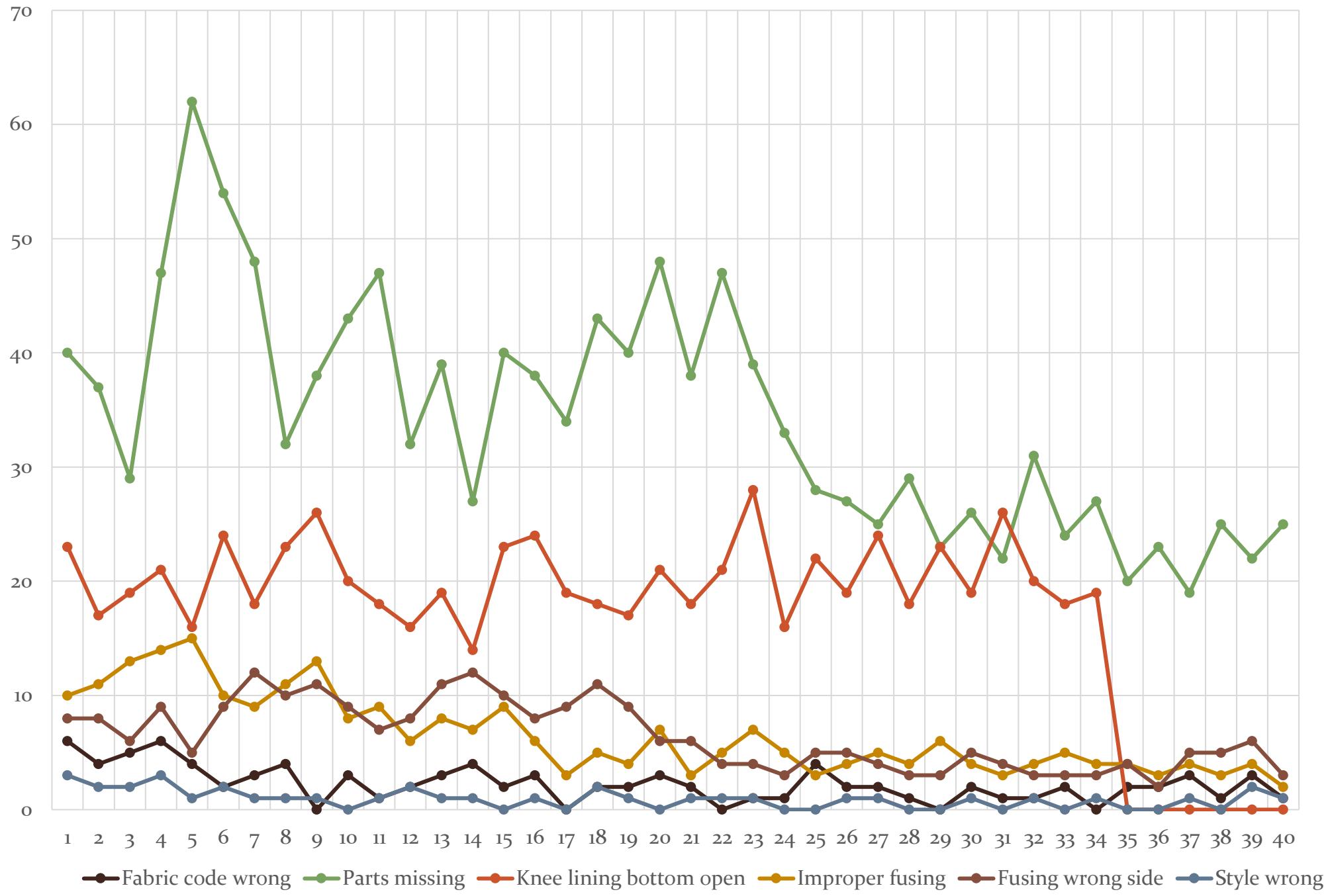


2. RE-CUTTING

As a result of the changes made in the cutting department, re-cutting was either reduced or eliminated in turn saving money, time, resources and manpower.

Defect	Fabric code wrong	Parts missing	Knee lining bottom open	Improper fusing	Fusing wrong side	Style wrong
1.	6	40	23	10	8	3
2.	4	37	17	11	8	2
3.	5	29	19	13	6	2
4.	6	47	21	14	9	3
5.	4	62	16	15	5	1
6.	2	54	24	10	9	2
7.	3	48	18	9	12	1
8.	4	32	23	11	10	1
9.	0	38	26	13	11	1
10.	3	43	20	8	9	0
11.	1	47	18	9	7	1
12.	2	32	16	6	8	2
13.	3	39	19	8	11	1
14.	4	27	14	7	12	1
15.	2	40	23	9	10	0
16.	3	38	24	6	8	1
17.	0	34	19	3	9	0
18.	2	43	18	5	11	2
19.	2	40	17	4	9	1
20.	3	48	21	7	6	0
21.	2	38	18	3	6	1
22.	0	47	21	5	4	1
23.	1	39	28	7	4	1
24.	1	33	16	5	3	0
25.	4	28	22	3	5	0
26.	2	27	19	4	5	1
27.	2	25	24	5	4	1
28.	1	29	18	4	3	0
29.	0	23	23	6	3	0
30.	2	26	19	4	5	1
31.	1	22	26	3	4	0
32.	1	31	20	4	3	1
33.	2	24	18	5	3	0
34.	0	27	19	4	3	1
35.	2	20	0	4	4	0
36.	2	23	0	3	2	0
37.	3	19	0	4	5	1
38.	1	25	0	3	5	0
39.	3	22	0	4	6	2
40.	1	25	0	2	3	1

Recutting per Day



3. ORDER TRACKING

- Flexible daily reports
 - Flexible daily reports could be produced using the data collected through this program. Detailed daily output of individual cutters and quality checking tables could be found.
- Improved traceability
 - The implementation of the order tracking system improved traceability. Through the compiled excel file the supervisors could find missing garment bundles which saved them a lot of time and avoided pieces being cut all over again causing duplication of the same purchase order which not only wasted time but also money and resources. It was much easier to find garment bundles as they would know where to look.

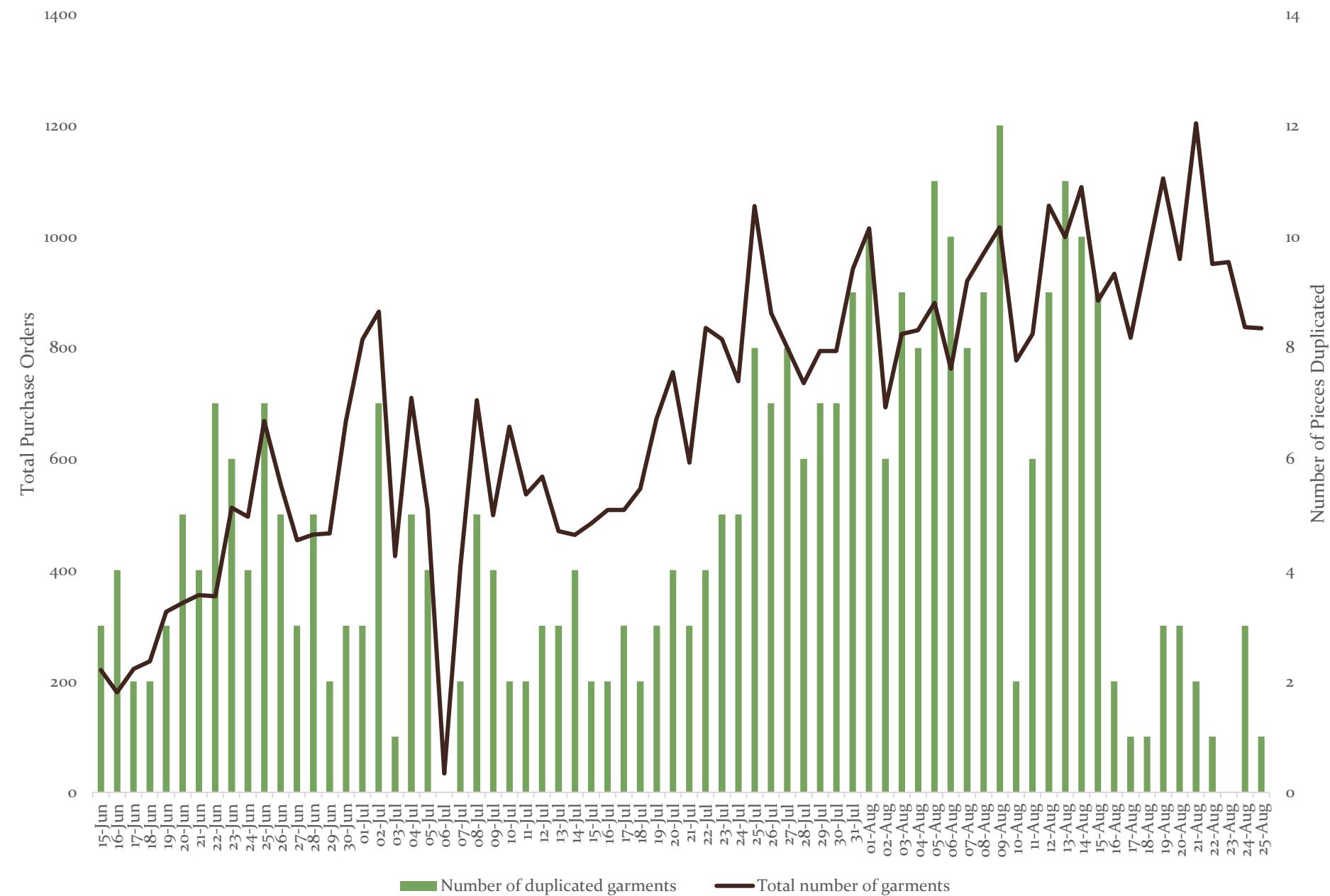
Event	Estimated Location
Not scanned at any cutter	Store, Cutting Machines
Scanned at cutter	Cutting machine / Fusing / Ready Cutting Table
Scanned at QC table	Passed – Sewing line Not passed – Recut table

- Monitor operators
 - Supervisor could also keep a check on the data written by the operators on the value stream mapping board.
- Hold operator accountable
 - In case of wrong cutting or improper quality check the supervisors would know whom to hold accountable. This in turn increased the sense of responsibility of an operator as they knew they would be scrutinized for any negligence.
- Reduced duplication
 - Helped find missing garment bundles
 - Saved time, money and resources

S.NO.	DATE	GARMENTS		S.NO.	DATE	GARMENTS
1.	15-Jun	3		37.	21-Jul	3
2.	16-Jun	4		38.	22-Jul	4
3.	17-Jun	2		39.	23-Jul	5
4.	18-Jun	2		40.	24-Jul	5
5.	19-Jun	3		41.	25-Jul	8
6.	20-Jun	5		42.	26-Jul	7
7.	21-Jun	4		43.	27-Jul	8
8.	22-Jun	7		44.	28-Jul	6
9.	23-Jun	6		45.	29-Jul	7
10.	24-Jun	4		46.	30-Jul	7
11.	25-Jun	7		47.	31-Jul	9
12.	26-Jun	5		48.	01-Aug	10
13.	27-Jun	3		49.	02-Aug	6
14.	28-Jun	5		50.	03-Aug	9
15.	29-Jun	2		51.	04-Aug	8
16.	30-Jun	3		52.	05-Aug	11
17.	01-Jul	3		53.	06-Aug	10
18.	02-Jul	7		54.	07-Aug	8

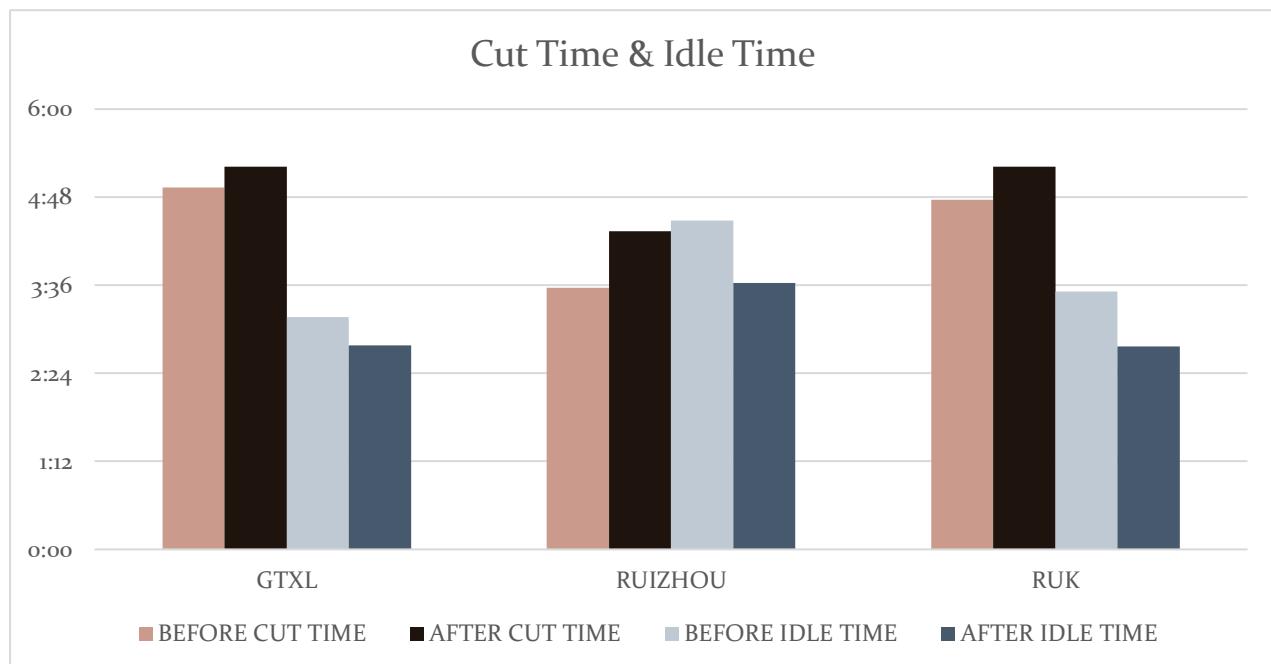
19.	03-Jul	1		55.	08-Aug	9
20.	04-Jul	5		56.	09-Aug	12
21.	05-Jul	4		57.	10-Aug	2
22.	06-Jul	0		58.	11-Aug	6
23.	07-Jul	2		59.	12-Aug	9
24.	08-Jul	5		60.	13-Aug	11
25.	09-Jul	4		61.	14-Aug	10
26.	10-Jul	2		62.	15-Aug	9
27.	11-Jul	2		63.	16-Aug	2
28.	12-Jul	3		64.	17-Aug	1
29.	13-Jul	3		65.	18-Aug	1
30.	14-Jul	4		66.	19-Aug	3
31.	15-Jul	2		67.	20-Aug	3
32.	16-Jul	2		68.	21-Aug	2
33.	17-Jul	3		69.	22-Aug	1
34.	18-Jul	2		70.	23-Aug	0
35.	19-Jul	3		71.	24-Aug	3
36.	20-Jul	4		72.	25-Aug	1

Duplication of Purchase Orders



4. INCREASED CUT TIME & REDUCED IDLE TIME

Machine	BEFORE						Average cut time	Average idle time
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6		
GTXL 1	4:47	4:53	5:13	4:48	5:02	4:34	04:52	03:26
GTXL 2	5:21	4:56	5:13	4:28	4:57	5:06	05:00	02:54
RUIZHOU	3:23	3:41	3:49	3:33	3:29	3:31	03:34	04:29
RUK 1	4:23	4:44	4:28	4:52	4:23	4:19	04:31	03:41
RUK 2	4:36	4:41	4:29	4:48	4:38	4:32	04:37	03:28
RUK 3	4:28	4:34	4:29	4:41	4:42	4:35	04:34	03:25
AFTER								
Machine	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Average cut time	Average idle time
GTXL 1	5:22	5:13	4:55	5:21	5:38	4:57	05:14	02:46
GTXL 2	4:48	4:58	5:18	5:23	5:28	5:19	05:12	02:48
RUIZHOU 1	4:28	4:19	4:21	4:17	4:12	4:23	04:20	03:40
RUIZHOU 2	4:20	4:31	4:27	4:31	4:13	4:19	04:23	03:37
RUIZHOU 3	4:36	4:23	4:19	4:11	4:20	4:21	04:21	03:39
RUK 1	5:11	5:21	5:17	5:06	5:09	5:19	05:13	02:47
RUK 2	5:07	5:18	5:20	5:14	5:11	5:12	05:13	02:47
RUK 3	5:18	5:05	5:16	5:22	5:13	5:17	05:15	02:45



The lead time of orders decreased from 15 days to a maximum of 6 days.

5. MANPOWER SAVING

Before

- Tagging: 4/shift
- Ready cutting: 3/shift
- Counting: 4/shift
- Cutter: 4 operators/shift

After

- The tagging process was eliminated by using stickers to label parts on the cutting machine itself.

- The ready cutting of parts was reduced to only trouser facing and parts in which there was checks mismatch. The rest of the parts were cut at the cutter.
- The counting process at the bundling table was eliminated by giving responsibility to fusing operators for counting shell fabric and cutter operators for counting lining fabric
- The number of operators on each cutter was reduced to 3 operators per machine from 4.

6. COST SAVING

- Salary of Operators
 - Salary per month = 15 operators * 7000 Rs/per month = Rs. 1,05,000/mo
 - Savings per year = Rs. 12,60,000 /year
- Tagging
 - Tag guns & pins = Rs. 4000/mo
 - Savings per year = Rs. 48,000/year
- Cutting Machine Blade
 - Cost per knife = Rs. 750
 - Breakage per day = 3 times
 - Cost per month = Rs. 68,000/mo
 - Savings per year = Rs. 6,16,000 /year

SUGGESTIONS

1. LAYOUT

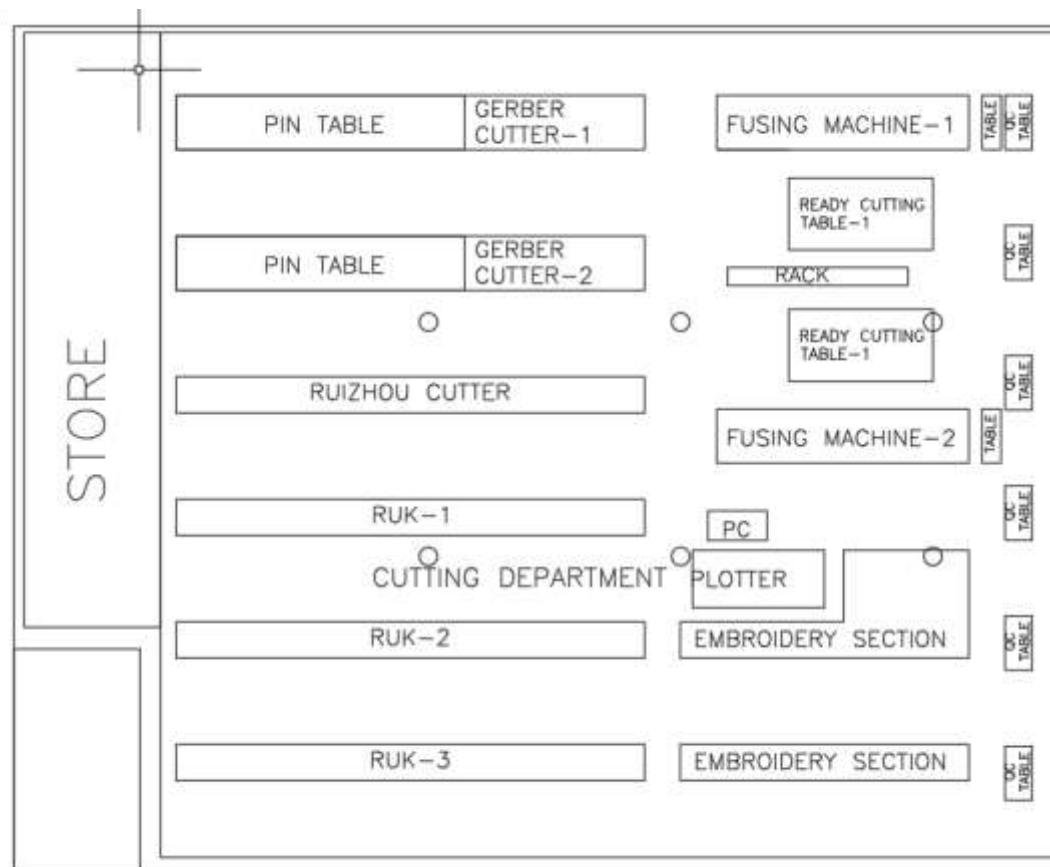
PROBLEM

The layout of the cutting department had a couple of problems. The factory had been started in February 2019 and was set up in a hurry to start production. Not much attention was given to the layout then. The problems in the layout were:

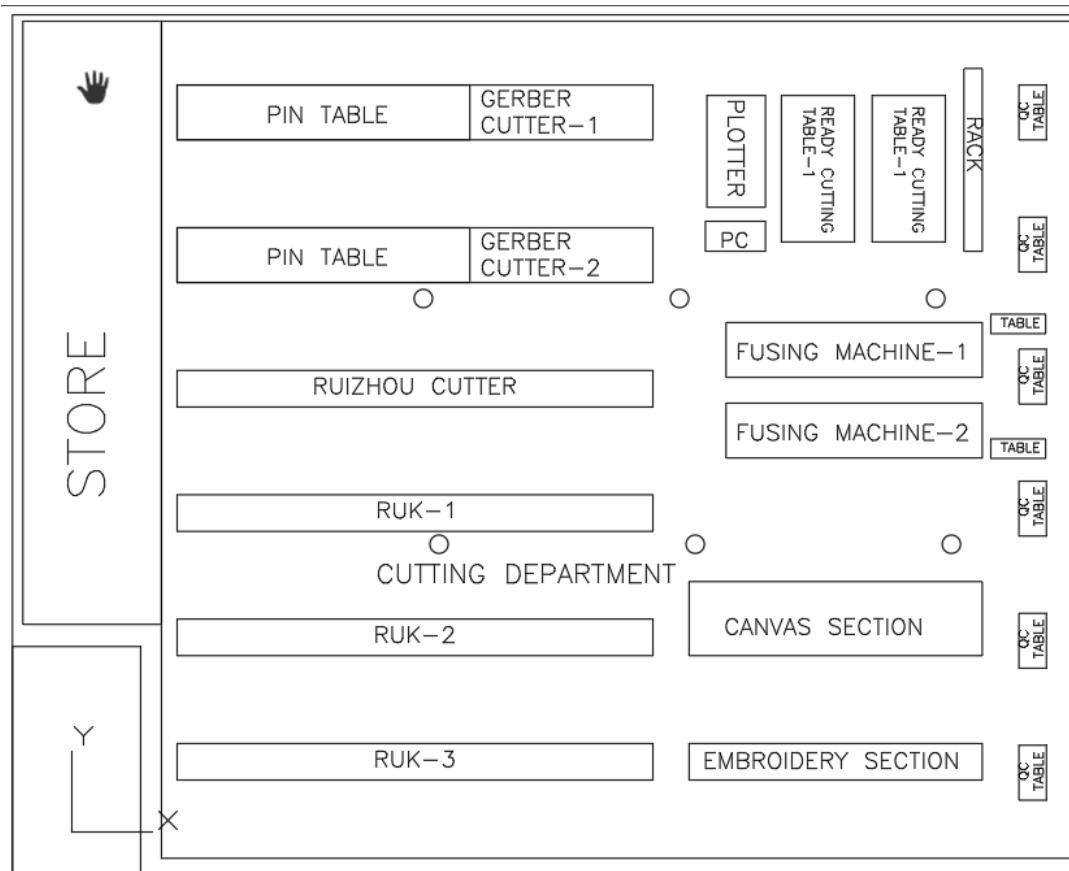
1. Fusing Machine: The two fusing machines in the cutting department were placed away from each other. This complicated the material movement. Placing the two machines together would define the flow of material.
2. Ready cutting table & plotter: The ready cutting table and the plotter were placed far from each other even though the plotter would feed patterns directly to the ready cutting table.
3. Pattern Plotter: The arrangement of the computer giving command the pattern plotter was such that the operator had to walk around the pillar to get each pattern after giving the print command
4. Rack for issuing of trims: The rack was huge and was placed between the two fusing machines with two tables on both sides. This rack blocked the view of supervisors who could not see the operators behind the rack.
5. Table behind Fusing Machine: The table behind the fusing machine was kept parallel to the conveyor of the fusing machine. The operator would have to turn 180^0 in order to keep each part on the table.

SOLUTION

FLOOR PLAN (BEFORE)



FLOOR PLAN (AFTER)



1. **Fusing Machine:** The two fusing machines were moved next to each other to ensure all pieces moved in a single line.
2. **Ready cutting table & plotter:** The ready cutting table and the plotter were placed next to each other to avoid unnecessary movement of garments.
3. **Pattern Plotter:** The computer was placed side by side with the plotter to ensure the operator could just pick the patterns by just turning towards the plotter.
4. **Rack for issuing of trims:** The rack was moved parallel to the qc tables to ensure supervisors had the complete view of the cutting floor.
5. **Table behind Fusing Machine:** The table behind the fusing machine was turned at 90^0 to the fusing conveyor so that the operator had to turn less as compared to before

2. CHOOSING RUIZHOU FOR LARGER SIZES

PROBLEM

To ready cut on the GTXL cutting machine, panels which were to be matched were placed side by side. But in the cases of larger sizes, that is, sizes above 48, one or two panels were always block cut as it did not fit in the width of the fabric. Ready cutting of these panels consumed time and delayed the loading of orders into the sewing line.

SOLUTION

If these orders were cut on the Ruizhou cutting machine block cutting would not be required. The Ruizhou machine's software makes its own marker and ensures matching of points. If all larger sizes were cut on the Ruizhou machine, block cutting could be reduced.

3. REDUCED MANUAL WORK IN CAD DEPARTMENT

PROBLEM

The CAD department writes the consumption of

- Shell
- Lining (body & sleeve)
- Knee Lining
- Lapel Fusing
- Body Fusing
- Parts Fusing

On every tracksheet as they made the marker for every fabric. This was a time consuming process and increased the manpower required in CAD department.

SOLUTION

The lapel fusing, body fusing, and parts fusing were cut in bulk and provided to the cutters. The measurement written by CAD department on the tracksheet was never referred to. The store operators would simply pick the pre-cut fusing material and add it to the tray. The process of writing consumption of fusing materials could be eliminated.

4. ACTIVATION OF SUB-STORE ON FIRST FLOOR

PROBLEM

The 8 cutting machines of Macintosh had been divided and placed on two floors. The sub-store of Macintosh was only present on ground floor. This created a problem as the sub-store would not know if there was a lack of feed to the machines on the first floor. The cutting machine operators would waste their time in coming to the sub-store on the ground floor to pick up trays. This reduced productivity and wasted time.

SOLUTION

If a sub-store was activated on the first floor too, the lack of feed problem could be eliminated. If the cutter did not have feed the sub-store on the first floor could immediately replenish its supply, preventing any time from being wasted, thus improving productivity.

ANNEXURES

ANNEXURE 1: TIME STUDY OF ORDERS IN CUTTING DEPARTMENT

	24559	24573	24617	24612	24624	24631	24333	24392	25150	25125	25224	25237	26009	26034	25899	25836	26064	26310
STORE																		
SHELL																		
Find fabric	0:47	1:12	0:43	0:32	0:47	0:58	0:17	0:13	1:16	0:54	1:46	1:54	0:23	2:09	0:43	1:19	1:24	0:39
Fill bincard	0:39	0:43	1:30	1:12	0:43	0:37	1:56	0:49	0:29	1:12	0:18	0:12	0:19	0:43	0:48	0:30	0:36	0:10
Measure fabric	0:36	0:54	0:49	1:23	1:07	0:59	1:03	2:15	0:47	1:34	1:37	0:39	1:18	0:47	0:36	0:53	0:24	0:42
Tear fabric	0:11	0:19	0:17	0:15	0:10	0:14	0:24	0:33	0:15	0:14	0:24	0:14	1:05	0:11	0:25	0:09	0:12	0:10
Put roll back	0:31	0:26	0:15	0:19	0:00	0:00	0:09	0:00	0:35	0:00	0:41	0:19	0:00	0:00	1:13	0:00	0:00	0:32
Fold fabric	1:07	1:02	1:50	0:55	0:47	1:24	0:25	0:47	0:54	1:34	0:43	1:21	0:54	0:48	1:18	0:57	0:24	0:38
Mark face	0:43	0:39	0:20	0:59	0:23	0:53	0:20	0:07	0:26	0:36	0:23	0:22	0:56	0:43	0:32	0:56	0:37	0:12
Staple swatch	0:31	0:56	0:47	0:25	0:38	0:00	0:34	0:29	0:49	0:39	1:12	0:54	1:26	0:38	2:47	0:42	1:12	0:25
LINING																		
Waiting	0:22	1:51	1:34	0:45	0:00	0:36	1:21	0:00	0:23	1:46	1:32	2:46	5:38	0:57	3:46	0:00	5:24	2:18
Find fabric	0:07	0:31	0:26	0:24	0:19	0:20	0:54	0:13	0:16	0:27	0:19	0:09	0:58	1:45	0:47	0:18	0:09	0:09
Measure fabric	0:11	0:15	0:18	0:25	0:30	0:21	0:09	0:18	0:10	0:16	0:15	0:13	0:16	0:09	0:35	0:10	0:28	0:30
Tear fabric	0:09	0:20	0:15	0:19	0:30	0:24	0:32	0:23	0:04	0:37	0:09	0:10	0:11	0:37	0:08	0:15	0:11	0:17
Mark face	0:23	0:10	0:20	0:18	0:31	0:38	0:22	0:11	0:29	0:35	0:38	0:34	0:29	0:43	0:22	0:36	0:29	0:17
Fold fabric	0:25	0:17	0:34	0:19	0:31	0:14	0:10	0:10	0:28	0:31	0:46	0:21	0:34	0:20	0:17	0:26	0:21	0:28
KNEE LINING																		
Find Knee Lining	0:07	0:09	0:11	0:06	0:09	0:12	0:04	0:10	0:09	0:05	0:05	0:08	0:05	0:08	0:07	0:05	0:09	0:05
Measure	0:23	0:14	0:19	0:08	0:11	0:14	0:07	0:12	0:18	0:12	0:16	0:20	0:16	0:17	0:21	0:27	0:21	0:16
Tear	0:16	0:12	0:09	0:16	0:09	0:11	0:11	0:07	0:19	0:07	0:08	0:07	0:14	0:16	0:21	0:30	0:10	0:09
Fold	0:13	0:10	0:09	0:13	0:09	0:14	0:12	0:05	0:08	0:08	0:43	0:10	0:12	0:09	0:12	0:11	0:12	0:10
SLEEVE LINING																		
Find Sleeve Lining	0:00	0:00	0:00	0:21	0:00	0:15	0:00	0:00	0:09	0:00	0:00	0:00	0:43	0:00	0:00	0:54	0:00	0:00
Measure	0:00	0:00	0:00	0:27	0:00	0:11	0:00	0:00	0:13	0:00	0:00	0:00	0:19	0:00	0:00	0:12	0:00	0:00
Tear	0:00	0:00	0:00	0:26	0:00	0:09	0:00	0:00	0:07	0:00	0:00	0:00	0:13	0:00	0:00	0:16	0:00	0:00
Face	0:00	0:00	0:00	0:12	0:00	0:23	0:00	0:00	0:36	0:00	0:00	0:00	0:42	0:00	0:00	0:32	0:00	0:00
Fold	0:00	0:00	0:00	0:29	0:00	0:25	0:00	0:00	0:10	0:00	0:00	0:00	0:18	0:00	0:00	0:32	0:00	0:00
Swatch	0:45	0:28	0:38	0:49	0:59	0:32	0:53	0:31	0:57	1:34	1:37	0:48	1:19	0:56	0:42	1:28	0:43	0:45
Collar Felt & Fusing	0:18	0:12	0:15	0:21	0:27	0:11	1:05	0:23	1:34	0:54	1:17	0:27	0:35	0:29	0:09	0:18	0:13	0:18
Tick on Orders Sheet	0:52	0:47	0:49	0:30	1:12	0:39	0:32	0:00	0:59	0:16	0:18	0:36	0:57	0:41	0:54	1:56	0:12	0:52
TOTAL	9:36	11:47	12:28	12:48	10:12	11:14	11:40	7:56	13:00	14:11	15:07	12:44	20:20	13:26	17:03	14:32	13:51	10:02

CUTTING MACHINE	Ruizho u	GTXL	Ruizho u	Ruizho u	Ruizho u	Ruizho u	Ruizho u	Ruizho u	Ruizho u	GTXL								
Waiting In Rack	6:56	5:27	4:16	15:49	10:23	7:35	0:13	7:36	0:00	58:08	2:28	0:23	0:00	5:18	0:00	20:37	0:00	
Waiting on Machine	3:17	0:00	5:12	2:17	4:19	5:46	3:19	0:00	4:10	15:49	0:48	5:18	0:00	4:28	0:00	2:38	4:58	
SPREADING																		
Shell	7:36	9:19	6:37	7:08	7:29	8:58	4:34	7:36	7:35	10:58	10:15	8:43	12:54	9:30	6:29	7:53	9:35	
Lining	2:45	2:45	2:52	2:19	2:34	2:43	1:13	2:30	3:15	2:09	1:43	3:18	3:43	3:27	2:16	2:19	02:34	
Fusing And Felt	0:27	0:41	0:35	0:25	0:32	0:30	0:15	0:46	0:25	1:34	0:33	0:45	0:41	0:39	0:56	0:47	0:54	
Waiting	0:00	13:17	9:53	0:00	10:47	11:49	0:00	0:00	0:00	5:46	0:00	0:10	0:00	0:19	0:00	0:19	0:00	
CUTTING																		
Shell	5:03	5:17	4:30	4:59	4:37	5:00	3:40	4:30	7:20	3:47	4:12	4:19	3:45	4:36	3:53	3:55	03:44	
Lining, Fusing and Felt	4:37	4:39	4:41	4:30	4:47	4:55	2:55	4:30	5:15	2:30	3:58	4:30	4:13	4:48	4:27	4:57	6:24	
PICKING																		
Shell	2:15	2:30	1:55	2:07	2:25	1:57	1:02	1:54	2:05	0:00	1:42	2:09	2:35	2:36	1:47	1:59	2:12	
Lining	2:17	3:01	3:09	2:37	2:57	2:34	0:54	2:34	1:10	0:00	2:36	2:36	2:45	1:18	0:52	1:23	2:13	
Bundling	1:45	2:12	2:35	2:19	1:38	1:57	2:27	5:53	0:21	2:16	2:13	3:27	1:29	4:43	4:06	3:18	2:24	
Waiting on Machine	2:06	0:00	0:00	1:47	2:25	1:59	2:10	0:00	0:00	2:17	4:24	2:15	1:09	0:00	0:00	5:18	1:18	
Waiting in Rack	4:09	0:00	0:00	6:49	5:35	4:38	0:00	1:14	3:49	0:00	2:19	0:28	0:37	0:00	1:08	0:56	1:25	
TOTAL	43:13	49:08	43:23	50:47	57:54	57:38	22:42	39:03	35:25	105:14	37:11	38:21	22:29	41:42	25:54	56:19	28:17	41:02
FUSING MACHINE																		
Waiting	7:04	0:00	10:08	6:53	8:13	9:51	6:12	2:05	23:01	17:47	2:39	2:35	0:00	0:00	4:25	2:53	0:55	
PANT																		
welt facing	0:51	0:34	1:23	1:57	0:49	1:03	0:00	1:15	0:43	0:53	1:09	0:39	1:43	0:45	1:26	1:42	1:09	
Flap	0:46	0:31	1:21	0:54	0:39	1:12	0:00	1:16	0:56	0:34	0:36	0:36	0:47	0:32	1:37	0:54	0:23	
Right Fly	0:47	0:27	1:46	0:36	0:59	1:24	0:00	0:35	0:34	1:25	0:27	0:54	0:39	2:47	1:15	0:43	00:36	
Left Fly	0:18	0:23	1:07	0:39	0:41	0:21	0:00	0:27	0:43	0:43	0:19	0:25	0:49	0:20	1:25	0:29	0:45	
Facing	0:31	0:34	0:48	0:45	0:39	0:55	0:00	0:54	0:27	0:56	0:48	0:27	0:38	0:27	0:26	0:19	00:12	
Bundling Pant	0:48	0:57	1:35	1:28	0:37	1:03	0:00	0:29	0:27	0:32	0:52	0:29	0:19	0:27	0:48	0:43	1:13	
JACKET																		
Open Bundle & sort	1:35	2:15	1:57	1:41	2:35	2:09	0:48	1:43	1:13	2:09	1:59	1:58	2:36	0:49	1:28	2:47	2:00	
Side Panel	0:59	0:45	1:23	1:07	0:53	1:31	1:12	0:36	0:47	0:54	1:25	2:47	1:28	1:00	2:04	2:06	0:32	
Insleeve	1:53	1:45	2:27	2:15	2:05	1:56	2:17	1:12	0:54	1:12	1:58	2:48	03:41	2:18	3:25	1:58	1:23	
Breast Pocket	0:22	0:27	0:53	0:47	0:38	0:56	0:23	0:21	0:27	0:23	0:32	0:48	0:18	0:34	0:29	0:46	0:34	
Back	0:27	0:53	0:43	0:34	0:38	0:31	0:36	0:29	0:49	1:42	1:38	1:19	2:12	2:13	0:35	0:17	3:34	

Collar band block	0:45	0:43	0:52	0:39	0:27	0:36	0:49	0:44	0:36	0:37	0:28	0:49	1:59	1:58	1:00	0:52	0:23	0:16
Collar Block	0:48	0:53	0:59	1:45	2:15	0:47	0:31	0:41	2:45	0:49	2:39	0:36	1:26	1:59	1:33	0:17	2:20	1:56
Pocket Flap	0:51	0:46	0:59	1:14	1:27	0:54	0:40	0:31	2:47	0:57	1:07	0:54	1:19	1:34	1:44	0:59	1:22	1:12
Top Sleeve	0:52	0:56	1:16	1:45	0:46	1:36	0:59	0:55	1:15	2:40	1:09	2:15	2:22	1:49	2:03	1:38	1:13	1:15
Facing Lapel	2:24	2:17	2:56	3:09	1:57	2:01	1:48	1:57	1:36	2:18	1:49	2:19	2:05	2:48	2:09	2:00	1:09	1:23
Front Panel	1:15	1:45	2:03	1:36	2:00	2:15	2:15	2:09	1:07	2:35	2:19	1:58	2:14	1:47	1:25	2:18	2:56	2:16
Picket Bone	0:32	0:33	0:41	0:51	0:43	0:37	0:52	0:42	0:37	0:56	0:38	0:49	0:39	0:41	0:39	0:47	0:46	0:47
Bundling Jacket	0:35	0:22	0:35	0:43	0:27	0:41	0:28	0:47	0:27	1:10	0:36	0:48	1:53	1:29	2:24	1:32	0:38	0:49
write in book	0:37	0:20	0:14	0:13	0:16	0:11	0:13	0:14	0:15	0:12	0:18	0:14	0:14	0:12	0:18	0:14	0:37	0:29
Waiting	0:00	1:00	0:24	2:15	1:37	0:59	1:04	0:00	0:00	0:34	0:39	0:00	1:50	1:28	0:00	2:17	0:00	0:00
TOTAL	24:28	17:30	34:43	32:03	29:55	32:05	19:13	18:22	41:34	41:46	21:59	25:24	24:32	27:04	31:41	27:30	16:17	26:05
Ready Cutting																		
Waiting	7:09	10:07	8:06	0:00	0:49	10:09	1:55	1:20	12:56	23:38	13:24	26:39	15:59	1:29	23:45	21:49	18:01	17:38
Jacket																		
Waiting On Rd Table	0:00	0:00	3:09	4:29	0:00	2:49	0:00	0:00	1:14	21:00	0:00	0:00	3:13	7:21	2:52	10:39	0:00	0:00
Waiting On Pattern Table	7:15	3:38	6:45	8:50	4:59	0:56	5:20	0:11	3:07	10:09	13:35	10:03	6:53	8:18	0:00	2:16	15:48	12:39
Open Pattern	1:15	1:00	1:14	0:52	1:30	1:16	1:15	0:41	1:16	1:23	1:25	1:25	1:15	1:09	1:27	2:18	1:43	1:32
Print	1:08	1:15	0:50	1:04	0:57	1:19	1:08	1:00	0:57	1:07	1:21	1:28	2:52	1:13	1:19	1:00	1:44	1:29
Waiting On Pattern Table	0:00	0:00	2:29	0:00	4:37	3:45	0:00	0:37	3:18	0:43	2:58	5:29	3:23	5:26	4:18	0:00	0:44	0:00
Waiting At Rd Table	4:29	3:51	2:14	4:16	2:45	3:19	9:47	8:31	1:18	5:17	6:58	20:09	18:23	19:08	5:17	22:44	2:51	3:58
Pick And Open	0:45	0:32	1:34	0:54	1:19	0:34	0:31	0:47	0:23	0:36	0:58	0:53	0:58	2:18	1:29	2:19	1:20	1:09
Sort And Check	1:31	1:06	0:53	1:27	1:49	0:56	2:32	1:54	0:37	1:30	2:48	1:56	1:17	2:09	1:37	1:59	1:32	1:48
Pocket Bag	0:32	0:09	0:11	0:13	0:10	0:09	0:11	0:10	0:10	0:17	0:17	0:48	0:09	0:18	0:09	0:31	0:10	0:24
Block Cut Collar	1:45	1:09	2:15	2:35	1:57	1:34	3:58	1:57	2:18	2:16	2:47	1:57	2:07	1:28	2:51	2:03	1:42	1:36
Block Cut Collar Stand	1:18	0:57	0:51	1:47	1:39	1:20	2:01	1:23	1:26	1:07	0:48	1:23	1:38	1:46	1:09	0:53	0:38	0:49
Block Cutting Insleeve	3:21	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	3:21	0:00	0:00	0:00	0:00	0:00
Fuse Insleeve	5:38	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	2:34	0:00	0:00	0:00	0:00
Felt Missing	0:00	0:00	3:59	0:00	3:15	0:00	3:02	2:51	0:00	0:00	0:00	0:00	0:00	1:52	0:00	0:00	0:00	0:00
Felt Cutting	0:00	0:00	0:34	0:00	0:46	0:00	2:53	1:03	0:00	0:00	0:00	0:00	0:00	0:00	1:16	0:00	0:00	0:00
Bundle	0:10	0:16	0:14	0:29	0:24	0:18	0:38	0:54	0:18	0:12	0:21	1:13	1:55	0:52	0:29	0:25	0:21	0:19
Pass	0:09	0:17	0:14	0:13	0:17	0:27	0:10	0:15	0:07	0:10	0:12	0:15	1:18	0:19	1:08	0:19	0:44	0:26
Pull Out Canvas	0:10	0:21	0:18	0:25	0:09	0:17	1:44	0:47	1:16	0:21	0:24	0:25	0:31	0:19	0:15	0:32	0:41	0:37
Sticker	0:14	0:19	0:12	0:24	0:31	0:27	2:12	0:15	1:07	0:25	0:29	0:25	0:23	0:19	0:37	0:21	0:33	0:21
Trouser																		
Waiting On Rd Table	0:51	0:43	1:29	1:37	0:59	1:05	0:00	11:30	17:06	11:09	5:57	5:12	2:18	5:19	1:19	2:39	0:00	0:46
Pick And Open	1:23	1:58	1:06	0:49	1:18	0:56	0:00	0:47	0:54	0:05	0:08	1:48	0:53	0:39	0:38	1:29	0:36	0:33

Pocket Bag	0:38	0:54	0:43	1:16	1:29	0:57	0:00	0:28	0:32	0:08	0:15	0:09	0:28	0:11	0:47	0:19	0:13	0:19
Check	1:54	1:43	1:49	1:31	2:26	1:58	0:00	0:31	0:45	1:44	1:32	2:18	1:35	2:11	2:39	1:27	1:37	1:44
Match Facing	0:48	0:24	0:37	0:52	0:39	0:29	0:00	0:48	1:24	0:00	0:25	1:19	0:57	1:18	1:16	2:39	0:58	0:42
Fold	0:10	0:12	0:16	0:21	0:10	0:15	0:00	0:15	0:13	0:36	0:50	0:35	0:29	0:22	0:18	0:18	0:18	0:14
Pass	0:05	0:07	0:10	0:08	0:05	0:12	0:00	0:07	0:09	0:06	0:13	0:15	0:17	0:08	0:09	0:15	0:04	0:06
Bundle	0:18	0:21	0:19	0:23	0:17	0:21	0:19	0:18	0:22	0:16	0:18	0:17	0:19	0:22	0:19	0:18	0:13	0:15
Waiting At Rd Table	2:07	2:18	1:45	1:57	2:38	1:39	0:00	2:17	16:09	12:08	9:21	0:00	0:00	0:00	0:00	0:00	1:13	35:15
Tick	0:47	0:52	1:12	1:04	0:38	1:21	0:00	0:51	1:14	0:09	0:53	0:15	0:49	0:28	0:35	0:39	0:16	0:38
Waiting At Rd Table	0:00	0:00	2:15	0:00	1:19	0:00	0:00	1:21	0:08	2:26	2:23	0:00	0:00	0:00	0:00	0:00	0:00	0:00
TOTAL	45:50	34:20	47:32	37:43	39:41	38:39	39:25	43:39	70:44	98:58	71:00	86:36	76:14	67:58	56:42	80:11	54:00	85:17
Quality Check																		
JACKET																		
Waiting At QC Table	13:39	6:45	0:00	11:26	5:44	19:48	21:37	05:17	11:32	120:43	45:39	56:47	38:39	0:00	08:43	07:29	11:18	09:57
open marker	0:15	0:13	0:19	0:27	0:33	0:28	00:22	00:34	00:45	00:46	00:38	00:32	00:18	00:34	00:28	00:31	00:27	00:46
Sorting & countng	1:31	1:49	1:34	2:13	2:25	1:52	01:54	1:38	00:13	02:19	01:59	02:49	02:09	01:19	01:42	01:08	01:19	02:06
Checking Pocket	0:21	0:29	0:54	0:32	0:39	0:17	00:34	0:21	00:33	00:39	00:43	00:38	00:29	00:17	00:37	00:22	00:29	00:48
Checking Collar	2:27	2:19	2:01	1:39	2:50	1:21	02:56	2:19	02:12	02:18	01:48	02:10	01:47	01:56	01:28	01:42	01:48	01:55
Facing Lapel	0:22	0:47	0:26	0:34	0:28	0:43	01:59	0:41	00:34	00:47	00:29	00:31	01:28	00:48	00:52	00:44	00:57	01:08
Front & Sleeve Match	0:18	0:21	0:48	0:38	0:27	0:19	00:25	0:13	00:20	00:25	00:18	00:34	00:23	01:29	00:37	00:26	00:41	00:25
Front & Side Panel Match	0:24	0:57	0:48	0:35	0:31	0:52	00:59	0:30	00:36	00:35	00:49	02:11	00:34	00:48	00:27	00:42	00:53	00:35
Sleeve & insleeve Match	0:33	0:39	0:41	0:27	0:58	1:34	00:28	0:54	01:27	00:58	00:34	00:48	00:59	01:19	00:38	00:42	00:56	00:46
Back & Side Panel Match	0:30	0:56	0:52	0:23	0:36	0:49	00:48	0:27	00:34	00:58	00:25	01:26	00:48	00:34	00:44	00:38	00:54	01:08
Back Size	0:12	0:29	0:34	0:15	0:37	0:53	01:07	0:19	00:26	00:19	00:23	00:37	00:19	00:37	00:38	00:45	00:41	00:53
Side Panel Size	0:04	0:07	0:10	0:05	0:11	0:37	00:15	0:06	00:18	00:09	00:08	00:10	00:18	00:19	00:17	00:16	00:21	00:15
Front Pocket Mark	0:45	1:34	1:36	1:18	0:57	0:49	00:19	0:35	00:47	00:43	01:25	01:18	00:58	01:17	00:44	00:58	01:19	01:32
Lapel Pocket Mark	0:27	1:48	1:31	0:45	0:53	0:30	00:28	0:19	00:44	00:42	00:35	00:41	00:57	02:18	00:41	00:56	00:36	01:08
Sleeve Size & Notch	0:31	1:15	1:29	0:32	0:47	1:36	00:38	0:37	00:31	00:54	01:26	01:57	00:49	00:36	00:53	00:59	01:23	00:47
Undersleeve Size & Notch	0:30	0:43	0:27	1:56	1:06	1:18	00:57	0:24	00:31	00:32	00:47	00:27	00:39	00:30	00:57	00:28	00:58	00:49
Check fabric code	0:36	0:45	0:25	0:37	0:34	1:04	00:22	0:29	00:37	00:21	00:19	00:37	00:56	00:18	00:22	00:19	00:32	00:17
Bundling	0:16	0:18	0:30	0:28	0:36	0:20	00:18	0:19	00:29	00:19	00:17	00:28	01:09	00:16	00:18	00:23	00:28	00:14
Tracksheet	0:24	0:31	0:39	0:26	0:35	0:25	01:15	0:21	00:26	00:25	00:18	00:35	00:17	00:24	00:33	00:27	00:32	00:21
Write In Book	0:09	0:11	0:11	0:16	0:21	0:19	00:07	0:10	00:13	00:08	00:09	00:07	01:28	00:05	00:14	00:10	00:08	00:12
Pass	0:10	0:09	0:06	0:12	0:14	0:09	00:15	0:16	00:14	00:15	00:10	00:09	00:08	00:12	00:16	00:12	00:09	00:18
TROUSER																		
Waiting At QC	0:45	1:55	2:15	1:24	4:20	0:00	00:00	01:43	19:21	36:07	09:46	15:47	14:49	13:31	10:06	15:37	11:26	05:08
open marker	0:17	0:14	0:16	0:12	0:15	0:14	00:09	00:11	00:09	0:15	00:14	00:09	00:12	00:11	00:11	00:15	00:13	00:12
Sorting	1:05	1:30	1:27	0:57	1:36	1:23	00:00	02:58	02:07	01:54	01:07	01:43	01:03	00:54	01:36	00:58	01:24	00:53

Front Size	0:23	0:45	0:49	0:24	0:53	0:31	00:00	00:25	00:27	00:53	00:36	01:57	00:34	00:21	00:33	00:41	00:32	00:35
Knee Lining Size	0:43	0:23	0:46	0:55	0:27	0:35	00:00	00:35	00:45	00:43	00:29	00:54	00:57	00:49	00:42	00:53	00:28	00:31
Back Size	0:19	0:45	0:32	0:38	0:26	0:38	00:00	00:21	00:27	00:25	00:19	00:27	00:54	00:23	00:38	00:41	00:27	00:35
Waistband Size	0:34	0:37	0:34	0:41	0:56	0:53	00:00	00:21	00:56	00:54	00:24	00:36	00:56	00:23	00:52	00:42	00:38	00:57
Front & Back Match	1:21	1:53	1:36	1:47	1:09	1:45	00:00	00:55	01:53	01:58	02:18	01:03	01:38	01:23	01:19	01:27	01:31	01:24
Facing Match	1:05	1:46	0:57	0:50	1:36	1:21	00:00	01:09	01:24	01:26	01:09	01:15	02:18	01:08	01:09	01:25	01:03	00:57
Waistband Match	0:39	0:45	0:35	0:58	0:34	0:46	00:00	01:53	00:35	00:31	00:24	00:59	00:21	01:25	00:27	00:45	00:38	00:44
Left And Right Fly Check	1:15	1:35	1:45	0:57	0:48	1:06	00:00	00:25	00:54	01:29	01:57	00:54	00:52	02:14	01:08	00:57	01:33	01:24
Bundling	0:09	0:11	0:14	0:09	0:15	0:31	00:00	00:09	00:14	00:10	00:15	00:09	00:13	00:12	00:11	00:14	00:09	00:13
Write In Book	0:10	0:09	0:13	0:29	0:09	0:12	00:00	00:08	00:07	00:16	00:10	00:09	00:08	00:25	00:21	00:14	00:23	00:12
Pass	0:07	0:09	0:12	0:17	0:07	0:27	00:00	00:08	00:12	00:08	00:07	00:19	00:25	00:09	00:11	00:07	00:09	00:13
TOTAL	33:16	35:42	28:12	36:22	35:33	46:25	38:12	28:10	53:33	182:24	78:34	101:53	80:52	39:24	41:33	21:13	23:23	16:18
RECUT TABLE																		
Waiting at recut table	0:00	0:00	0:00	13:08	0:00	0:00	0:00	5:02	0:00	0:00	0:00	0:00	37:48	0:00	0:00	27:53	0:00	0:00
Analyse problem	0:00	0:00	0:00	0:45	0:00	0:00	0:00	1:13	0:00	0:00	0:00	0:00	1:57	0:00	0:00	0:53	0:00	0:00
Waiting at pattern table	0:00	0:00	0:00	5:06	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	5:35	0:00	0:00	1:42	0:00	0:00
Make marker	0:00	0:00	0:00	1:35	0:00	0:00	0:00	0:54	0:00	0:00	0:00	0:00	1:46	0:00	0:00	1:13	0:00	0:00
Print	0:00	0:00	0:00	1:40	0:00	0:00	0:00	0:56	0:00	0:00	0:00	0:00	1:29	0:00	0:00	1:26	0:00	0:00
Waiting at pattern table	0:00	0:00	0:00	1:06	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	7:29	0:00	0:00
Waiting at recut table	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	13:24	0:00	0:00
Issue Fabric	0:00	0:00	0:00	6:57	0:00	0:00	0:00	1:19	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00
Cut	0:00	0:00	0:00	2:15	0:00	0:00	0:00	1:03	0:00	0:00	0:00	0:00	2:06	0:00	0:00	2:49	0:00	0:00
Bundle	0:00	0:00	0:00	0:45	0:00	0:00	0:00	0:29	0:00	0:00	0:00	0:00	1:15	0:00	0:00	1:08	0:00	0:00
Waiting at recut table	0:00	0:00	0:00	1:58	0:00	0:00	0:00	1:15	0:00	0:00	0:00	0:00	2:18	0:00	0:00	0:00	0:00	0:00
TOTAL	0:00	0:00	0:00	11:15	0:00	0:00	0:00	12:11	0:00	0:00	0:00	0:00	54:14	0:00	0:00	57:57	0:00	0:00
Waiting at QC Table	0:00	0:00	0:00	5:23	0:00	0:00	0:00	25:00	0:00	0:00	0:00	0:00	16:07	0:00	0:00	20:48	0:00	0:00
Analyse problem	0:00	0:00	0:00	0:39	0:00	0:00	0:00	1:07	0:00	0:00	0:00	0:00	1:09	0:00	0:00	0:43	0:00	0:00
Check Part	0:00	0:00	0:00	2:17	0:00	0:00	0:00	1:13	0:00	0:00	0:00	0:00	2:35	0:00	0:00	1:57	0:00	0:00
Bundle	0:00	0:00	0:00	0:58	0:00	0:00	0:00	0:15	0:00	0:00	0:00	0:00	0:15	0:00	0:00	0:12	0:00	0:00
Tick sheet	0:00	0:00	0:00	0:47	0:00	0:00	0:00	0:18	0:00	0:00	0:00	0:00	0:18	0:00	0:00	0:18	0:00	0:00
Pass	0:00	0:00	0:00	0:56	0:00	0:00	0:00	0:09	0:00	0:00	0:00	0:00	0:10	0:00	0:00	0:09	0:00	0:00
TOTAL	0:00	0:00	0:00	11:00	0:00	0:00	0:00	28:02	0:00	0:00	0:00	0:00	20:34	0:00	0:00	24:07	0:00	0:00
TOTAL TIME	156:23	148:00	165:43	215:19	172:27	185:19	130:41	176:38	228:10	306:57	149:37	345:14	296:43	251:54	212:00	335:08	211:08	155:50

ANNEXURE 2: KNIFE BREAK

TIME STUDY BEFORE USE OF MAGNET

Time (sec)	Ruizhou head 1	Time (sec)	Ruizhou head 2
0:56	Cutting	2:23	Parts revival
2:25	Parts revival	4:29	Spreading
12:54	Spreading	4:50	Cutting
4:08	Cutting (Knife Break)	0:57	Parts revival
15:35	Knife Change	1:00	Waiting
3:30	Re-cutting	4:08	Spreading
1:08	Parts revival	3:36	Cutting
8:15	Spreading	1:51	Parts revival
4:11	Cutting	4:33	Spreading
3:30	Parts revival	3:34	Waiting
9:22	Spreading	7:25	Spreading
2:07	Cutting	3:24	Cutting
7:38	Joint cut	3:02	Parts revival
4:27	Parts revival	4:32	Spreading
13:15	Spreading	2:12	Cutting
4:18	Cutting	4:59	Parts revival
1:49	Joint Cut	0:16	Spreading
14:29	Knife Change	9:06	Waiting (matching other side)
12:67	Parts revival	0:56	Spreading
15:54	Spreading	3:38	Cutting
4:23	Cutting	4:13	Parts revival
2:40	Parts revival	4:24	Spreading
9:12	Spreading	3:38	Cutting
5:44	Cutting	3:45	Parts revival
3:04	Parts revival	2:52	Spreading
7:10	Spreading	2:27	Cutting
3:56	Cutting	2:21	Parts revival
2:01	Parts revival	3:45	Spreading
1:01	Waiting	2:01	Cutting
9:30	Spreading	3:20	Parts revival
2:48	Cutting	3:11	Spreading
5:09	Parts revival	3:48	Cutting
0:35	Waiting	2:42	Parts revival
8:02	Spreading	3:10	Spreading

2:21	Cutting	4:54	Cutting
2:32	Parts revival	4:48	Parts revival
9:24	Spreading	4:12	Spreading
2:03	Waiting	4:25	Cutting
4:25	Cutting	2:13	Parts revival
1:58	Parts revival	2:23	Spreading
7:38	Spreading	4:08	Cutting
4:08	Cutting	3:03	Parts revival
3:20	Parts revival	3:42	Spreading
0:38	Waiting	4:06	Cutting

TIME STUDY AFTER USE OF MAGNET

Time (sec)	Ruizhou head 1	Time (sec)	Ruizhou head 2
4:38	Cutting	3:43	Spreading
5:45	Parts revival	3:55	Cutting
8:19	Spreading	3:25	Parts revival
4:04	Cutting	4:36	Spreading
1:43	Parts revival	4:19	Cutting
1:16	Cutting	2:26	Parts revival
1:13	Parts revival	2:58	Spreading
7:26	Spreading	3:58	Cutting
4:43	Cutting	3:14	Parts revival
4:27	Parts revival	5:37	Spreading
2:57	Waiting	4:34	Cutting
5:29	Spreading	3:07	Parts revival
4:57	Cutting	4:02	Spreading
2:32	Parts revival	2:14	Cutting
8:14	Spreading	2:56	Parts revival
3:53	Cutting	3:40	Spreading
1:55	Parts revival	3:49	Cutting
7:43	Spreading	3:12	Parts revival
3:37	Cutting	2:43	spreading
2:13	Spreading	4:33	Cutting
3:21	Cutting	1:43	Parts revival
4:34	Parts revival	5:40	Spreading
8:25	Spreading	4:56	Cutting

5:20	Cutting	2:57	Parts revival
1:53	Parts revival	1:12	Waiting
7:35	Spreading	2:51	Spreading
4:32	Cutting	5:14	Cutting
6:45	Spreading	2:06	Parts revival
4:36	Cutting	4:33	Cutting
3:45	Parts revival	1:43	Parts revival
6:25	Spreading	5:40	Spreading
5:20	Cutting	4:56	Cutting
1:53	Parts revival	2:57	Parts revival
7:35	Spreading	2:51	Spreading
4:47	Cutting	5:34	Cutting
2:42	Parts revival	3:03	Parts revival
9:10	Spreading	3:57	Spreading
4:54	Cutting	4:26	Cutting
4:48	Parts revival	3:32	Parts revival
6:12	Spreading	0:54	Waiting
4:25	Cutting	3:12	Spreading
2:13	Parts revival	4:12	cutting
7:48	Spreading	3:29	Parts revival
1:16	Waiting	2:58	spreading

ANNEXURE 3: WORK SAMPLING

DAY 1

Time	Ruk 1						SHIFT 1						Ruk 3						
	Head 1	Head 2	1	2	3	4	Head 1	Head 2	1	2	3	4	Head 1	Head 2	1	2	3	4	5
9:00	idle	idle	open marker	spreading	spreading	picking			machine stop				idle	idle	open marker	idle	missing	opening roll	picking
9:15	idle	idle	open marker	spreading	picking	idle			machine stop				idle	cutting	bundling	idle	picking	moved	missing
9:30	cutting	idle	spreading	picking	spreading	picking	idle	idle	picking	missing	spreading	idle	idle	cutting	open marker	picking	picking	moved	idle
9:45	idle	cutting	open marker	picking	picking	picking	idle	cutting	open marker	picking	idle	picking	idle	cutting	open marker	picking	picking	moved	missing
10:00	idle	cutting	open marker	picking	idle	picking	idle	cutting	missing	picking	picking	spreading	idle	idle	spreading	bundling	spreading	moved	picking
10:30	cutting	idle	open marker	missing	spreading	missing	cutting	idle	open marker	idle	bundling	idle	idle	bundling	missing	missing	moved	missing	
10:45	idle	cutting	open marker	bundling	idle	idle	idle	cutting	open marker	idle	instruction	idle	cutting	idle	open marker	picking	idle	picking	idle
11:00	idle	cutting	open marker	spreading	picking	picking	cutting	idle	open marker	keep in rack	idle	missing	cutting	idle	spreading	moved	idle	picking	talking
11:15	idle	idle	open marker	idle	idle	spreading	idle	cutting	open marker	picking	spreading	spreading	idle	cutting	spreading	moved	picking	idle	spreading
11:30	cutting	idle	spreading	spreading	picking	picking	idle	cutting	open marker	idle	picking	picking	cutting	idle	open marker	moved	stickerering	picking	picking
11:45	cutting	idle	spreading	bundling	idle	spreading	idle	cutting	open marker	stickerering	spreading	spreading	idle	cutting	open marker	moved	picking	spreading	spreading
12:00	idle	cutting	open marker	bundling	idle	picking	cutting	idle	open marker	picking	idle	picking	cutting	idle	picking	picking	idle	missing	idle
12:15	cutting	idle	open marker	spreading	idle	picking	idle	cutting	open marker	idle	picking	picking	idle	idle	open marker	keep in rack	spreading	picking	spreading
12:30	cutting	idle	spreading	bundling	idle	picking	idle	cutting	open marker	stickerering	idle	spreading	idle	idle	idle	idle	picking	picking	picking
12:45	idle	cutting	open marker	spreading	idle	bundling	idle	idle	open marker	picking	missing	spreading	cutting	idle	picking	open marker	picking	picking	picking
1:00	cutting	idle	open marker	picking	picking	picking	cutting	idle	open marker	spreading	picking	idle	idle	missing	cleaning	spreading	moved	moved	
1:15	idle	cutting	open marker	bundling	picking	picking	idle	cutting	open marker	picking	stickerering	idle	cutting	idle	idle	idle	moved	moved	
1:30	idle	cutting	open marker	spreading	idle	spreading	idle	idle	open marker	idle	spreading	picking	idle	cutting	open marker	spreading	spreading	moved	moved
1:45	idle	idle	missing	bundling	idle	idle	cutting	idle	open marker	talking	picking	spreading	cutting	idle	open marker	talking	picking	moved	moved
2:00	idle	idle	open marker	spreading	spreading	bundling	idle	idle	open marker	idle	bundling	picking	idle	idle	open marker	idle	picking	moved	moved
SHIFT 2																			
Time	Ruk 1						Ruk 2						Ruk 3						
	Head 1	Head 2	1	2	3		Head 1	Head 2	4	5			Head 1	Head 2	6	7	8	9	
2:30	cutting	idle	spreading	open marker	picking				machine stop				idle	idle	open marker	bundling	idle	bundling	
2:45	cutting	idle	spreading	picking	picking		cutting	idle	open marker	picking			idle	idle	open marker	cleaning	picking	picking	
3:00	idle	idle	missing	open marker	picking		idle	idle	spreading	spreading			idle	idle	open marker	stickerering	moved	spreading	
3:15	cutting	idle	spreading	open marker	picking		idle	idle	open marker	picking			cutting	idle	spreading	picking	moved	picking	
3:30	cutting	idle	spreading	spreading	picking		idle	idle	spreading	spreading			cutting	idle	bundling	picking	moved	picking	
3:45	cutting	idle	cleaning	open marker	picking		cutting	cutting	open marker	picking			idle	cutting	open marker	picking	moved	picking	
4:00	idle	cutting	spreading	open marker	picking		idle	idle	stickerering	spreading			cutting	idle	open marker	picking	moved	picking	
4:15	cutting	idle	spreading	open marker	picking			machine stop					idle	idle	open marker	bundling	moved	bundling	
4:30	cutting	idle	spreading	picking	bundling		cutting	idle	picking	spreading			idle	idle	spreading	bundling	moved	moved	
4:45	idle	idle	spreading	open marker	picking		idle	cutting	open marker	picking			idle	idle	missing	spreading	bundling	spreading	
5:00	cutting	idle	spreading	open marker	picking		idle	cutting	picking	picking			idle	idle	missing	missing	missing	picking	
5:15	idle	cutting	bundling	open marker	picking		cutting	idle	roll change	spreading			cutting	idle	spreading	spreading	missing	picking	
5:30	idle	idle	picking	spreading	picking		idle	idle	spreading	spreading			idle	idle	spreading	picking	moved	spreading	

DAY 1

SHIFT 1														
	GTXL 1				GTXL 2				RUIZHOU					
Time	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
9:00	cutting	laying	laying	idle	picking	cutting	talking	picking	missing	idle	idle	checks matching	picking	bundling
9:15	cutting	laying	laying	idle	picking	cutting	picking	picking	picking	idle	cutting	spreading	missing	picking
9:30	idle	laying	laying	unfolding fabric	unfolding fabric	idle	unfolding	unfolding	picking	idle	cutting	spreading	picking	stickering
9:45	idle	laying	laying	origin setting	picking	idle	unfolding	stickering	picking	idle	cutting	spreading	throw waste	open marker
10:00	idle	laying	laying	missing	missing	idle	origin setting	idle	picking	idle	cutting	open marker	picking	picking
10:30	idle	laying	laying	unfolding fabric	picking	idle	origin setting	picking	picking	cutting	idle	spreading	missing	spreading
10:45	idle	laying	laying	open marker	idle	idle	unfolding	bundling	unfolding	idle (knife break)	cutting	open marker	idle	picking
11:00	idle	laying	laying	origin setting	idle	idle	stickering	idle	idle	idle	idle	spreading	spreading	picking
11:15	cutting	laying	laying	idle	picking	idle	idle	idle	idle	idle	cutting	picking	spreading	picking
11:30	idle	laying	laying	idle	missing	idle	origin setting	idle	idle	cutting	idle	checks matching	missing	open marker
11:45	idle	missing	laying	unfolding fabric	unfolding fabric	idle	unfolding	missing	unfolding	idle	idle	spreading	stickering	open marker
12:00	cutting	lay	laying	idle	picking	idle	stickering	picking	missing	idle	idle	spreading	stickering	open marker
12:15	cutting	laying	laying	missing	unfolding fabric	cutting	stickering	picking	missing	idle	idle	spreading	missing	open marker
12:30	idle	missing	missing	unfolding fabric	idle	idle	origin setting	picking	idle	idle	idle	spreading	spreading	picking
12:45	cutting	laying	laying	missing	picking	idle	origin setting	picking	idle	idle	cutting	open marker	throw waste	bundling
1:00	cutting	missing	missing	picking	picking	cutting	unfolding	picking	unfolding	idle	idle	checks matching	picking	picking
1:15	idle	laying	laying	origin setting	picking	cutting	missing	stickering	idle	idle	idle	spreading	open marker	throw waste
1:30	cutting	laying	laying	stickering	picking	cutting	entry	stickering	picking	idle	cutting	picking	spreading	spreading
1:45	idle	laying	laying	origin setting	missing	cutting	idle	stickering	idle	idle	cutting	bundling	open marker	spreading
2:00	cutting	missing	missing	idle	bundling	cutting	missing	missing	idle	idle	idle	spreading	idle	idle

SHIFT 2														
	GTXL 1				GTXL 2				RUIZHOU					
Time	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
2:30	idle	origin setting	stickering			cutting	missing	idle	idle	cutting	idle	spreading	spreading	picking
2:45	cutting	idle	picking			cutting	origin	missing	idle	idle	cutting	stickering	bundling	spreading
3:00	cutting	entry	stickering			cutting	idle	stickering	picking	cutting	idle	stickering	entry	picking
3:15	cutting	idle	picking			cutting	SPREADING	picking	idle	idle	idle	checks matching	checks matching	idle
3:30	cutting	idle	unfolding fabric			cutting	picking	missing	idle	idle	idle	checks matching	open marker	spreading
3:45	cutting	laying	picking			idle	origin setting	idle	idle	idle	idle	checks matching	open marker	picking
4:00	idle	laying	laying			idle	origin setting	SPREADING	idle	idle	cutting	spreading	open marker	idle
4:15	idle	laying	picking			idle	origin setting	SPREADING	idle	idle	idle	bundling	open marker	spreading
4:30	cutting	cutting	missing			cutting	unfolding	picking	unfolding	cutting	idle	open marker	idle	picking
4:45	idle	missing	missing			idle	missing	stickering	idle	cutting	cutting	open marker	picking	picking
5:00	cutting	origin	bundling			cutting	entry	stickering	picking	cutting	idle	open marker	spreading	picking
5:15	cutting	idle	missing			cutting	idle	stickering	idle	idle	idle	idle	spreading	polythene
5:30	cutting	idle	bundling			cutting	missing	missing	idle	idle	idle	spreading	idle	idle

DAY 2

	Ruk 1						Ruk 2						Ruk 3						SHIFT 1	
Time	Head 1	Head 2	1	2	3	4	Head 1	Head 2	5	6	7	8	Head 1	Head 2	9	10	11	12	13	
9:00	idle	idle	opening marker		spreading	spreading			machine stop				idle	cutting	opening marke	spreading	spreading			
9:15	cutting	idle	opening marker		spreading	spreading			machine stop				idle	cutting	opening marke	spreading	spreading			
9:30	idle	cutting	spreading		stickerering	picking			machine stop				idle	idle	stickerering	picking	bundling			
9:45	idle	cutting	bundling		picking	picking			machine stop				cutting	idle	opening marke	picking	spreading			
10:00	cutting	idle	spreading		picking	picking			machine stop				cutting	idle	bundling	picking	picking			
10:30	idle	cutting	opening marker		stickerering	spreading			machine stop				idle	idle	opening marke	bundling	picking			
10:45	idle	idle	opening marker		spreading	spreading			machine stop				cutting	idle	spreading	spreading	spreading			
11:00	cutting	idle	entry		missing	spreading			machine stop				idle	cutting	opening marke	picking	stickerering			
11:15	cutting	idle	bundling		idle	spreading			machine stop				idle	cutting	spreading	spreading	picking			
11:30	idle	cutting	opening marker		spreading	picking			machine stop				cutting	idle	spreading	bundling	picking			
11:45	cutting	idle	spreading		stickerering	bundling	idle	idle	opening marke	spreading	picking		idle	idle	opening marke	picking	picking			
12:00	idle	cutting	spreading		spreading	bundling	idle	cutting	spreading	picking	get fusing		cutting	idle	vsm	picking	missing			
12:15	cutting	cutting	bundling		missing	picking	cutting	idle	opening marke	picking	spreading		idle	idle	spreading	picking	missing			
12:30	idle	idle	opening marker		spreading	bundling	idle	idle	spreading	picking	spreading		idle	idle	spreading	picking	missing			
12:45	idle	idle	spreading		picking	spreading	idle	idle	opening marke	spreading	spreading		idle	cutting	opening marke	picking	picking			
1:00	idle	cutting	talking		idle	cleaning	idle	idle	spreading	bundling	picking		idle	idle	spreading	spreading	picking			
1:15	idle	idle	opening marker		idle	spreading	idle	idle	spreading	bundling	picking		idle	idle	opening marke	bundling	picking			
1:30	idle	idle	spreading		idle	spreading	idle	cutting	opening marke	bundling	picking		idle	idle	instruction	bundling	picking			
1:45	cutting	cutting	opening marker		entry	bundling	idle	idle	spreading	missing	throw waste		cutting	idle	opening marke	picking	picking			
2:00	idle	cutting	opening marker		picking	spreading	cutting	idle	opening marke	spreading	picking		idle	cutting	opening marke	picking	spreading			

	Ruk 1						Ruk 2						Ruk 3						SHIFT 2	
Time	Head 1	Head 2	1	2	3		Head 1	Head 2	4	5	6		Head 1	Head 2	6	7	8	9		
2:30	idle	cutting	picking	spreading	picking		cutting	idle	spreading	picking	picking		cutting	idle	opening marke	picking	spreading			
2:45	cutting	idle	talking	bundling	picking		idle	cutting	picking	picking	idle		idle	cutting	opening marke	picking	get fusing			
3:00	cutting	idle	bundling	open marker	spreading		idle	cutting	picking	picking	cleaning		idle	cutting	entry	throw waste	bundling			
3:15	cutting	idle	picking	stickerering	spreading		idle	idle	spreading	missing	picking		cutting	idle	opening marke	picking	spreading			
3:30	idle	cutting	cleaning	spreading	talking		cutting	idle	missing	picking	idle		idle	cutting	opening marke	picking	throw waste			
3:45	idle	cutting	spreading	open marker	picking		idle	cutting	open marker	picking	picking		idle	idle	spreading	throw waste	spreading			
4:00	cutting	idle	picking	stickerering	spreading		cutting	idle	entry	picking	idle		idle	idle	spreading	throw waste	spreading			
4:15	idle	idle	throw waste	spreading	spreading		idle	cutting	open marker	missing	throw waste		idle	idle	bundling	picking	picking			
4:30	idle	cutting	bundling	open marker	spreading		idle	cutting	open marker	bundling	idle		idle	cutting	opening marke	talking	picking			
4:45	idle	cutting	bundling	spreading	picking		idle	idle	missing	bundling	throw waste		idle	idle	missing	bundling	spreading			
5:00	idle	cutting	spreading	spreading	idle		cutting	idle	talking	picking	talking		idle	cutting	opening marke	picking	bundling			
5:15	cutting	idle	picking	open marker	idle		idle	cutting	open marker	spreading	picking		cutting	idle	open marker	idle	picking			
5:30	cutting	idle	picking	entry	spreading		idle	cutting	picking	bundling	picking		idle	idle	open marker	picking	picking			

DAY 2

SHIFT 1														
Time	GTXL 1					GTXL 2				RUIZHOU				
	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
9:00	idle	laying	missing	origin setting	picking		Machine Stop		idle	cutting	missing	picking	stickering	
9:15	cutting	missing	missing	open marker	idle		Machine Stop		cutting	idle	spreading	missing	spreading	
9:30	cutting	laying	laying	open marker	picking		Machine Stop		idle	idle	spreading	picking	unfolding	
9:45	idle	laying	laying	idle	picking		Machine Stop		cutting	cutting	picking	spreading	spreading	
10:00	idle	laying	laying	entry	idle		Machine Stop		cutting	idle	missing	picking	throw waste	
10:30	cutting	laying	missing	origin setting	bundling		Machine Stop		idle	idle	picking	picking	bundling	
10:45	idle	laying	laying	origin setting	picking		Machine Stop		idle	cutting	checks matching	checks matching	idle	
11:00	cutting	laying	laying	stickering	picking		Machine Stop		idle	cutting	open marker	stickering	picking	
11:15	cutting	laying	laying	unfolding fabric	missing		Machine Stop		cutting	cutting	open marker	stickering	picking	
11:30	idle	laying	laying	missing	picking		Machine Stop		cutting	idle	checks matching	spreading	idle	
11:45	idle	laying	laying	entry	idle		Machine Stop		idle	idle	checks matching	spreading	missing	
12:00	cutting	laying	laying	origin setting	picking		Machine Stop		idle	idle	picking	throw waste	bundling	
12:15	cutting	laying	laying	idle	bundling		Machine Stop		idle	idle	picking	missing	idle	
12:30	cutting	laying	laying	open marker	picking		Machine Stop		cutting	idle	picking	picking	open marker	
12:45	cutting	laying	laying	bundling	picking		Machine Stop		idle	cutting	open marker	stickering	picking	
1:00	idle	laying	laying	origin setting	idle		Machine Stop		idle	idle	picking	stickering	open marker	
1:15	idle	laying	laying	picking	picking		Machine Stop		idle	idle	throw waste	picking	bundling	
1:30	idle	idle	laying	stickering	picking		Machine Stop		cutting	cutting	picking	stickering	picking	
1:45	cutting	laying	missing	origin setting	missing		Machine Stop		cutting	idle	missing	picking	stickering	
2:00	idle	laying	missing				Machine Stop		idle	idle	spreading	missing	spreading	
SHIFT 2														
Time	GTXL 1					GTXL 2				RUIZHOU				
	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
2:30	cutting			idle	picking		Machine Stop		idle	idle	spreading	idle	idle	
2:45	idle			idle	unfolding fabric		Machine Stop		cutting	idle	spreading	spreading	picking	
3:00	cutting			unfolding fabric	unfolding fabric		Machine Stop		idle	cutting	stickering	bundling	spreading	
3:15	cutting			idle	picking		Machine Stop		cutting	idle	stickering	entry	picking	
3:30	cutting			idle	bundling		Machine Stop		idle	idle	checks matching	checks matching	idle	
3:45	cutting		origin setting	stickering			Machine Stop		idle	idle	checks matching	open marker	spreading	
4:00	idle			idle	picking		Machine Stop		idle	idle	open marker	spreading	spreading	
4:15	cutting			idle	picking		Machine Stop		idle	idle	idle	layt	idle	
4:30	idle			stickering	picking		Machine Stop		cutting	cutting	spreading	picking	unfolding	
4:45	idle			unfolding fabric	unfolding fabric		Machine Stop		idle	cutting	picking	spreading	spreading	
5:00	cutting			origin setting	picking		Machine Stop		idle	cutting	bundling	open marker	spreading	
5:15	cutting			idle	idle		Machine Stop		idle	cutting	picking	throw waste	bundling	
5:30	cutting			stickering	stickering		Machine Stop		cutting	cutting	picking	missing	idle	

DAY 3

Ruk 1					Ruk 2					Ruk 3							
Head 2	1	2	3	4	Head 1	Head 2	5	6	7	8	Head 1	Head 2	9	10	11	12	13
idle	spreading	picking	cleaning		idle	idle	open marker	spreading	bundling		idle	cutting	open marker	bundling	picking		
cutting	open marker	picking	picking		cutting	idle	open marker	picking	throw waste		cutting	idle	spreading	idle	picking		
idle	spreading	bundling	bundling		cutting	cutting	entry	picking	bundling		idle	idle	missing	bundling	picking		
idle	instruction	talking	talking		cutting	idle	spreading	picking	spreading		cutting	idle	spreading	instruction	picking		
idle	open marker	picking	picking		idle	idle	open marker	spreading	spreading		idle	cutting	spreading	spreading	picking		
idle	instruction	idle	idle		idle	idle	instruction	idle	idle		cutting	idle	open marker	picking	spreading		
idle	instruction	missing	missing		idle	idle	open marker	spreading	talking		idle	idle	get fusing	stickeringing	picking		
idle	idle	picking	picking		idle	idle	idle	spreading	idle		idle	idle	entry	bundling	bundling		
idle	open marker	picking	spreading		idle	idle	spreading	picking	picking		cutting	idle	spreading	spreading	picking		
idle	stickeringing	picking	picking		idle	idle	talking	idle	spreading		idle	cutting	spreading	picking	stickeringing		
idle	idle	idle	idle		idle	idle	open marker	picking	picking		idle	cutting	open marker	bundling	idle		
idle	entry	picking	picking		idle	idle	spreading	idle	spreading		idle	idle	spreading	throw waste	stickeringing		
cutting	open marker	spreading	spreading		idle	cutting	instruction	missing	picking		cutting	idle	open marker	cleaning	idle		
cutting	missing	bundling	picking		idle	cutting	open marker	idle	picking		idle	idle	get fusing	bundling	bundling		
idle	get fusing	spreading	spreading		idle	idle	get fabric	idle	idle		idle	idle	spreading	picking	picking		
cutting	instruction	missing	bundling		idle	cutting	spreading	bundling	spreading		idle	idle	open marker	spreading	spreading		
idle	talking	bundling	spreading		idle	cutting	picking	picking	missing		idle	idle	spreading	idle	spreading		
idle	spreading	picking	picking		cutting	idle	open marker	picking	picking		idle	cutting	get fabric	picking	bundling		
idle	spreading	bundling	picking		cutting	idle	open marker	picking	throw waste		idle	idle	get fusing	throw waste	idle		
cutting	get fusing	idle	idle		idle	idle	spreading	spreading	picking		idle	cutting	entry	spreading	picking		

SHIFT 1

Ruk 1					Ruk 2					Ruk 3							
Head 2	1	2	3		Head 1	Head 2	4	5	6		Head 1	Head 2	6	7	8	9	
cutting	open marker	spreading	picking		idle	idle	spreading	spreading	spreading		cutting	idle	get fabric	stickeringing	spreading	picking	
idle	instruction	picking	spreading		cutting	idle	open marker	bundling	spreading		idle	cutting	open marker	spreading	picking	idle	
idle	open marker	talking	missing		cutting	idle	open marker	picking	spreading		cutting	cutting	open marker	picking	picking	picking	
idle	spreading	picking	spreading		machine stop						idle	idle	open marker	picking	picking	spreading	
idle	idle	idle	idle		machine stop						idle	idle	idle	idle	idle	idle	
cutting	open marker	throw waste	bundling		machine stop						idle	idle	open marker	picking	picking	throw waste	
cutting	open marker	picking	picking		machine stop						idle	cutting	open marker	picking	picking	idle	
idle	entry	picking	instruction		idle	cutting	idle	picking	idle		idle	idle	idle	idle	idle	idle	
idle	spreading	picking	spreading		idle	idle	idle	idle	idle		idle	idle	spreading	bundling	idle	spreading	
idle	spreading	spreading	picking		idle	idle	picking	bundling	idle		idle	idle	picking	idle	idle	idle	
idle	open marker	picking	missing		idle	idle	open marker	spreading	idle		idle	cutting	missing	entry	picking	idle	
cutting	open marker	picking	bundling		idle	idle	open marker	spreading	idle		cutting	cutting	open marker	spreading	spreading	picking	
idle	throw waste	picking	cleaning		cutting	idle	idle	idle	spreading		idle	idle	missing	idle	idle	spreading	

SHIFT 2

DAY 3

SHIFT 1														
Time	GTXL 1				GTXL 2				RUIZHOU					
	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
9:00	cutting	spreading	spreading	cutting	missing	cutting	idle	picking		cutting	idle	spreading	open marker	spreading
9:15	idle	spreading	spreading	missing	missing	cutting	stickering	bundling		idle	idle	open marker	spreading	spreading
9:30	cutting	spreading	spreading	origin	bundling	idle	stickering	picking		cutting	idle	spreading	picking	spreading
9:45	cutting	missing	missing	idle	missing	cutting	unfolding	picking		idle	idle	checks matching	cleaning	idle
10:00	idle	spreading	idle	open marker	picking	cutting	idle	bundling		cutting	cutting	open marker	open marker	picking
10:30	cutting	spreading	spreading	origin	picking	idle	SPREADING ca	picking		idle	cutting	spreading	open marker	spreading
10:45	cutting	spreading	spreading	unfolding fabric	picking	cutting	missing	missing		idle	idle	checks matching	checks matching	throw waste
11:00	cutter	spreading	spreading	picking	picking	idle	picking	missing		idle	idle	checks matching	open marker	picking
11:15	idle	spreading	spreading	unfolding fabric	unfolding fabric	cutting	idle	idle		idle	cutting	separating joint	idle	picking
11:30	cutting	spreading	spreading	open marker	picking	cutting	idle	picking		idle	idle	spreading	bundling	throw waste
11:45	idle	spreading	spreading	picking	picking	idle	picking	picking		cutting	cutting	missing	open marker	picking
12:00	idle	spreading	spreading	idle	picking	cutter	sushma	red coat		idle	idle	checks matching	checks matching	throw waste
12:15	idle	spreading	missing	origin setting	idle	idle	origin	idle		idle	idle	spreading	open marker	picking
12:30	idle	spreading	spreading	origin setting	idle	cutting	idle	picking		cutting	idle	open marker	spreading	spreading
12:45	cutting	spreading	spreading	idle	picking	idle	unfolding	unfolding		idle	cutting	picking	open marker	picking
1:00	cutting	spreading	spreading	unfolding fabric	idle	idle	origin	picking		cutting	idle	open marker	spreading	spreading
1:15	idle	spreading	spreading	origin setting	picking	idle	origin	picking		cutting	cutting	idle	vsm	picking
1:30	idle	spreading	spreading	unfolding fabric	unfolding fabric	idle	open marker	idle		cutting	cutting	picking	open marker	picking
1:45	cutting	spreading	spreading	idle	picking	idle	entry	picking		cutting	cutting	picking	entry	idle
2:00	cutter	spreading	spreading	red coat	yellow	cutting	spreading	picking		cutting	cutting	picking	open marker	picking
SHIFT 2														
Time	GTXL 1				GTXL 2				RUIZHOU					
	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
2:30	idle	origin	idle			cutting	spreading	picking		idle	cutting	picking	bundling	picking
2:45	idle	origin	idle			idle	open marker	picking		idle	idle	spreading	throw waste	throw waste
3:00	cutting	open marker	picking			idle	spreading	spreading		cutting	cutting	idle	idle	idle
3:15	idle	open marker	picking			idle	picking	picking		idle	idle	open marker	spreading	spreading
3:30	cutting	origin	picking			cutting	idle	bundling		cutting	cutting	idle	vsm	picking
3:45	cutting	unfolding fab	picking			idle	picking	picking		idle	cutting	picking	open marker	picking
4:00	cutting	origin	idle			cutting	idle	picking		idle	idle	picking	entry	idle
4:15	idle	missing	spreading			cutting	picking	picking		idle	idle	picking	open marker	picking
4:30	cutting	origin setting	idle			cutting	SPREADING ca	SPREADING		idle	cutting	open marker	spreading	spreading
4:45	idle	unfolding fab	unfolding fabric			idle	idle	bundling		idle	idle	spreading	picking	spreading
5:00	cutting	idle	picking			cutting	missing	picking		cutting	cutting	checks matching	cleaning	idle
5:15	idle	open marker	idle			cutting	unfolding	picking		idle	idle	open marker	open marker	picking
5:30	cutting	missing	spreading			idle	picking	picking		cutting	cutting	spreading	open marker	spreading

DAY 4

SHIFT 1																		
Ruk 1					Ruk 2					Ruk 3								
Head 1	Head 2	1	2	3	4	Head 1	Head 2	5	6	7	8	Head 1	Head 2	9	10	11	12	13
cutting	idle	open marker	bundling	picking		idle	idle	open marker	spreading	picking	picking	cutting	idle	open marker	picking	stickeringing		
idle	cutting	open marker	picking	picking		idle	idle	spreading	spreading	picking	picking	cutting	idle	open marker	spreading	picking		
idle	cutting	spreading	spreading	picking		idle	idle	open marker	spreading	spreading	idle	cutting	idle	open marker	spreading	spreading		
idle	cutting	open marker	spreading	spreading		idle	cutting	spreading	spreading	picking	picking	idle	idle	open marker	idle	spreading		
cutting	idle	instruction	idle	bundling		cutting	idle	missing	spreading	bundling	throw waste	cutting	idle	open marker	idle	picking		
idle	idle	open marker	picking	bundling		idle	idle	open marker	idle	missing	idle	idle	idle	open marker	bundling	idle		
idle	idle	instruction	missing	missing		idle	idle	open marker	spreading	talking	picking	idle	idle	get fusing	stickeringing	picking		
idle	idle	idle	picking	picking		idle	idle	idle	spreading	idle	idle	idle	idle	entry	bundling	bundling		
cutting	idle	open marker	picking	spreading		idle	idle	spreading	picking	picking	idle	cutting	idle	spreading	spreading	picking		
idle	idle	stickeringing	picking	picking		idle	idle	talking	idle	spreading	throw waste	idle	cutting	spreading	picking	stickeringing		
idle	cutting	open marker	bundling	missing		cutting	idle	spreading	spreading	picking	idle	cutting	idle	open marker	spreading	picking		
idle	cutting	open marker	missing	picking		idle	idle	spreading	throw waste	cleaning	picking	idle	idle	open marker	spreading	spreading		
cutting	idle	open marker	throw waste	bundling		idle	idle	spreading	spreading	picking	picking	cutting	idle	entry	picking	spreading		
cutting	idle	spreading	spreading	picking		idle	idle	spreading	missing	bundling	idle	idle	idle	open marker	idle	spreading		
cutting	idle	open marker	bundling	picking		cutting	idle	open marker	missing	cleaning	missing	idle	idle	missing	missing	picking		
cutting	idle	open marker	bundling	spreading		idle	idle	open marker	throw waste	picking	picking	idle	idle	open marker	picking	picking		
idle	cutting	spreading	picking	picking		idle	idle	open marker	idle	missing	idle	idle	cutting	open marker	idle	picking		
idle	cutting	spreading	bundling	picking		idle	idle	bundling	throw waste	spreading	picking	idle	idle	spreading	picking	spreading		
cutting	idle	instruction	idle	bundling		cutting	idle	missing	spreading	bundling	throw waste	cutting	idle	open marker	idle	picking		
idle	idle	open marker	picking	bundling		idle	idle	open marker	idle	missing	idle	idle	idle	open marker	bundling	idle		
SHIFT 2																		
Ruk 1					Ruk 2					Ruk 3								
Head 1	Head 2	1	2	3	4	Head 1	Head 2	5	6	7	8	9	10	11	12	13	14	15
cutting	idle	open marker	spreading	picking		idle	idle	open marker	instruction	picking		idle	cutting	open marker	throw waste	picking		
idle	idle	picking	open marker	picking		idle	cutting	open marker	picking	spreading		cutting	idle	open marker	missing	picking		
cutting	cutting	open marker	picking	cleaning		idle	cutting	entry	picking	spreading		idle	idle	spreading	spreading	spreading		
idle	idle	picking	open marker	bundling		cutting	cutting	open marker	idle	idle		cutting	cutting	open marker	missing	picking		
cutting	cutting	idle	entry	picking		idle	idle	get fusing	spreading	picking		idle	idle	get fusing		bundling		
idle	cutting	keep in rack	bundling	picking		idle	idle	throw waste	picking	idle		cutting	idle	spreading	picking	spreading		
idle	cutting	open marker	picking	bundling		idle	idle	open marker	spreading	idle		cutting	cutting	open marker	spreading	spreading		
cutting	idle	throw waste	picking	cleaning		cutting	idle	idle	idle	spreading		idle	idle	missing	idle	idle		
cutting	idle	stickereringing	picking	picking		cutting	idle	open marker	spreading	idle		idle	idle	keep in rack	spreading	idle		
idle	cutting	entry	throw waste	picking		cutting	cutting	entry	picking	missing		idle	cutting	spreading	missing	bundling		
cutting	idle	talking	bundling	throw waste		idle	idle	other work	pening marke	idle		idle	cutting	open marker	keep in rack	talking		
idle	cutting	cut fusing	picking	idle		idle	idle	open marker	spreading	idle		cutting	idle	open marker	picking	spreading		
cutting	idle	open marker	bundling	picking		idle	idle	open marker	throw waste	bundling		idle	idle	open marker	missing	spreading		

DAY 4

SHIFT 1														
	GTXL 1				GTXL 2				RUIZHOU					
Time	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
9:00	idle	laying	laying	unfold fabric	idle	idle	open marker	picking	picking	cutting	cutting	changing fabric	re	picking
9:15	cutting	laying	laying	stickering	idle	cutting	open marker	picking	picking	idle	idle	open marker	throw waste	missing
9:30	idle	laying	laying	picking	missing	cutting	open marker	picking	picking	idle	idle	checks matching	spreading	bundling
9:45	cutting	laying	laying	unfold fabric	missing	idle	origin setting	idle	idle	cutting	cutting	picking	entry	idle
10:00	idle	laying	laying	missing	missing	cutting	idle	picking	picking	cutting	cutting	picking	open marker	picking
10:30	cutting	laying	laying	origin setting	bundling	cutting	open marker	picking	stickering	cutting	idle	stickering	missing	picking
10:45	cutting	missing	missing	idle	missing	cutting	open marker	idle	idle	idle	idle	open marker	spreading	idle
11:00	idle	laying	laying	unfold fabric	unfold fabric	idle	origin setting	idle	idle	idle	idle	spreading	bundling	idle
11:15	cutting	laying	laying	open marker	picking	cutting	origin setting	picking	picking	cutting	cutting	stickering	idle	picking
11:30	idle	laying	laying	picking	picking	cutting	idle	idle	idle	cutting	idle	throw waste	spreading	picking
11:45	cutting	laying	laying	idle	picking	idle	unfold	bundling	picking	idle	idle	changing fabric	re	open marker
12:00	idle	laying	missing	origin setting	idle	idle	SPREADING	SPREADING	idle	cutting	idle	open marker	idle	picking
12:15	idle	laying	laying	origin setting	idle	idle	missing	missing	missing	cutting	cutting	open marker	picking	picking
12:30	cutting	laying	laying	idle	picking	cutting	idle	picking	picking	cutting	idle	open marker	spreading	picking
12:45	cutting	laying	laying	unfold fabric	idle	cutting	stickering	bundling	idle	idle	idle	idle	spreading	idle
1:00	idle	laying	laying	origin setting	picking	idle	stickering	picking	picking	cutting	idle	spreading	open marker	idle
1:15	idle	laying	laying	unfold fabric	unfold fabric	cutting	unfold	picking	idle	idle	idle	open marker	spreading	spreading
1:30	cutting	laying	laying	idle	picking	cutting	idle	bundling	picking	cutting	idle	spreading	picking	spreading
1:45	cutting	laying	missing	origin setting	picking	idle	origin setting	picking	picking	idle	idle	checks matching	cleaning	idle
2:00	idle	laying	laying	unfold fabric	unfold fabric	cutting	missing	missing	idle	cutting	cutting	open marker	open marker	picking
SHIFT 2														
	GTXL 1				GTXL 2				RUIZHOU					
Time	cutter	1	2	3	4	cutter	1	2	3	head 1	head 2	1	2	3
2:30	idle	origin setting	idle			idle	picking	picking	picking	idle	cutting	separating joint	idle	picking
2:45	cutting	open marker	picking			idle	unfold	unfold	idle	idle	idle	spreading	bundling	throw waste
3:00	idle	open marker	picking			idle	origin setting	idle	picking	cutting	cutting	missing	open marker	picking
3:15	cutting	origin setting	picking			cutting	idle	picking	picking	idle	idle	checks matching	open marker	picking
3:30	cutting	unfold fabric	picking			idle	unfold	unfold	idle	idle	idle	spreading	open marker	picking
3:45	cutting	origin setting	idle			idle	origin setting	picking	idle	cutting	idle	open marker	spreading	spreading
4:00	idle	missing	laying			idle	origin setting	picking	idle	idle	cutting	picking	open marker	picking
4:15	idle	open marker	picking			idle	open marker	idle	picking	cutting	idle	open marker	spreading	spreading
4:30	cutting	idle	picking			idle	picking	missing	missing	idle	cutting	spreading	open marker	spreading
4:45	idle	open marker	idle			cutting	idle	idle	unfold	idle	idle	checks matching	checks matching	throw waste
5:00	idle	origin setting	idle			cutting	idle	picking	picking	idle	idle	checks matching	open marker	picking
5:15	idle	unfold fabric	idle			idle	unfold	bundling	picking	cutting	idle	spreading	bundling	throw waste
5:30	cutting	open marker	picking			idle	origin setting	idle	idle	cutting	idle	open marker	spreading	spreading

ANNEXURE 4: KNEE LINING DATA COLLECTION

S.No.	PO No.	Size	Model	Length	Color						
1	MCA157U	36 R	SVEN	0.36	IVORY	58	MCA16FR	34R	PHIL	0.35	IVORY
2	MCA15P5	35 S	MELROSE	0.32	IVORY	59	MCA15T6	34R	LUCKY	0.34	IVORY
3	MCA15KR	36R	LUCKY	0.36	BLACK	60	MCA15V5	38S	SVEN	0.38	IVORY
4	MCA15X5	40R	LUCKY	0.38	BLACK	61	MCA15V9	36R	LUCKY	0.36	IVORY
5	MCA15JG	36R	LUCKY	0.36	IVORY	62	MCA15JY	30R	LUCKY	0.32	IVORY
6	MCA15H4	42R	LUCKY	0.4	IVORY	63	MCA15RN	32R	LUCKY	0.33	IVORY
7	MCA15NK	46R	CHELSEA	0.37	IVORY	64	MCA15G9	34L	LUCKY	0.34	IVORY
8	MCA15VT	56R	DUKE	0.51	IVORY	65	MCA16CL	37R	LUCKY	0.37	IVORY
9	MCA15L1	36R	LUCKY	0.35	IVORY	66	MCA15V3	38S	SVEN	0.38	IVORY
10	MCA15FJ	34R	PHIL	0.34	IVORY	67	MCA15G1	40R	PHIL	0.38	BLACK
11	MCA15FA	32R	PHIL	0.33	IVORY	68	MCA15V8	34R	LUCKY	0.34	BLACK
12	MCA15G6	44R	SVEN	0.41	IVORY	69	MCA15MA	38L	ARLO	0.39	BLACK
13	MCA15EL	33R	PHIL	0.34	IVORY	70	MCA15V1	38S	SVEN	0.38	BLACK
14	MCA15GL	34R	PHIL	0.34	IVORY	71	MCA15TW	38R	DUKE	0.39	BLACK
15	MCA15PN	29S	PHIL	0.31	IVORY	72	MCA15PE	34R	SVEN	0.35	BLACK
16	MCA15LU	34R	SVEN	0.35	IVORY	73	MCA15K7	38S	LUCKY	0.37	IVORY
17	MCA15NJ	46R	CHELSEA	0.38	IVORY	74	MCA15LZ	34L	LUCKY	0.34	IVORY
18	MCA15HR	46R	GRANT	0.37	ivory	75	MCA15G0	51R	SVEN	0.47	IVORY
19	MCA15XF	34L	SVEN	0.35	IVORY	76	MCA15K1	36R	SVEN	0.36	IVORY
20	MCA15UR	32R	LUCKY	0.33	IVORY	77	MCA15JF	36R	LUCKY	0.36	BLACK
21	MCA15HJ	34R	SVEN	0.35	BLACK	78	MCA15TA	40L	SVEN	0.4	BLACK
22	MCA15TG	58R	EXECUTIVE	0.53	BLACK	79	MCA15WF	32R	LUCKY	0.33	IVORY
23	MCA15HT	38R	LUCKY	0.37	IVORY	80	MCA15H9	37R	SVEN	0.37	IVORY
24	MCA15WN	33R	SVEN	0.34	IVORY	81	MCA15RV	40R	SVEN	0.39	IVORY
25	MCA15N1	36R	LUCKY	0.36	IVORY	82	MCA15UV	42R	LUCKY	0.4	IVORY
26	MCA15Z0	34R	SVEN	0.35	IVORY	83	MCA15HV	35R	SVEN	0.36	IVORY
27	MCA15XG	40R	LUCKY	0.38	IVORY	84	MCA15R5	31R	LUCKY	0.33	IVORY
28	MCA1688	46S	SVEN	0.4	IVORY	85	MCA15KE	37L	DUKE	0.38	IVORY
29	MCA15WA	36R	ARIO	0.38	IVORY	86	MCA15KL	50R	EXECUTIVE	0.48	IVORY
30	MCA15R3	42S	SVEN	0.4	IVORY	87	MCA15G4	38R	SVEN	0.38	IVORY
31	MCA15M1	33R	LUCKY	0.34	IVORY	88	MCA15MR	36R	SVEN	0.37	IVORY
32	MCA15T4	56R	ANTHONY	0.54	IVORY	89	MCA164G	47R	DUKE	0.45	IVORY
33	MCA15EA	30R	LUCKY	0.31	IVORY	90	MCA15G8	34L	LUCKY	0.35	IVORY
34	MCA15L0	32R	SVEN	0.34	IVORY	91	MCA15VR	34R	LUCKY	0.35	IVORY
35	MCA15TL	35S	SVEN	0.36	IVORY	92	MCA15XT	46R	SVEN	0.43	IVORY
36	MCA15Z4	38R	SVEN	0.38	IVORY	93	MCA15GD	44L	SVEN	0.42	IVORY
37	MCA15KV	42R	SVEN	0.4	IVORY	94	MCA15TY	40L	DUKE	0.4	IVORY
38	MCA15KW	33R	SVEN	0.34	IVORY	95	MCA15J1	40R	SVEN	0.39	IVORY
39	MCA15H5	40R	LUCKY	0.38	IVORY	96	MCA15TC	32S	SVEN	0.34	IVORY
40	MCA15JV	34R	SVEN	0.35	IVORY	97	MCA15L2	44R	LUCKY	0.4	IVORY
41	MCA15T1	40R	SVEN	0.39	IVORY	98	MCA15PH	38S	BRAD	0.41	IVORY
42	MCA15V2	38S	SVEN	0.38	IVORY	99	MCA15TK	39R	SVEN	0.39	IVORY
43	MCA15PV	44R	SVEN	0.39	IVORY	100	MCA15H8	44R	SVEN	0.42	IVORY
44	MCA15L3	34R	LUCKY	0.34	IVORY	101	MCA15GM	40R	SVEN	0.39	IVORY
45	MCA15PD	34R	SVEN	0.35	IVORY	102	MCA15YF	34R	LUCKY	0.34	IVORY
46	MCA15PX	42S	SVEN	0.4	IVORY	103	MCA15UZ	38S	SVEN	0.38	IVORY
47	MCA15JH	42L	DUKE	0.42	IVORY	104	MCA15TC	32S	SVEN	0.34	IVORY
48	MCA15Y5	32S	LUCKY	0.33	IVORY	105	MCA15R6	36L	SVEN	0.37	IVORY
49	MCA15RX	40R	LUCKY	0.38	IVORY	106	MCA15EG	38S	BRAD	0.41	IVORY
50	MCA15RZ	40R	LUCKY	0.38	IVORY	107	MCA15K4	36R	LUCKY	0.36	IVORY
51	MCA15V4	38S	SVEN	0.38	IVORY	108	MCA15YE	30R	LUCKY	0.32	IVORY
52	MCA15JZ	38S	SVEN	0.37	IVORY	109	MCA15X6	34R	PHIL	0.35	IVORY
53	MCA15T7	44R	BRAD	0.45	IVORY	110	MCA15JW	30R	LUCKY	0.32	IVORY
54	MCA15V6	38S	SVEN	0.38	IVORY	111	MCA15K2	34L	LUCKY	0.35	BLACK
55	MCA15RY	40R	LUCKY	0.38	IVORY	112	MCA15FL	45R	SVEN	0.43	BLACK
56	MCA15T8	30S	LUCKY	0.32	IVORY	113	MCA15KH	52R	SVEN	0.47	BLACK
57	MCA15M2	33R	LUCKY	0.34	IVORY	114	MCA15M4	33R	SVEN	0.34	BLACK

116	MCA15K5	32R	LUCKY	0.32	BLACK
117	MCA15T3	56R	ANTHONY	0.54	BLACK
118	MCA15V7	36L	SVEN	0.37	BLACK
119	MCA15WH	32R	LUCKY	0.33	BLACK
120	MCA15Y8	34R	SVEN	0.35	BLACK
121	MCA15P9	36R	LUCKY	0.36	BLACK
122	MCA15JN	43R	SVEN	0.41	BLACK
123	MCA15L5	31S	LUCKY	0.32	BLACK
124	MCA15LV	34R	SVEN	0.35	BLACK
125	MCA15FY	42L	LUCKY	0.4	BLACK
126	MCA15JM	32R	LUCKY	0.32	BLACK
127	MCA15NZ	42R	ANTHONY	0.45	BLACK
128	MCA15GV	40R	BUDDY	0.41	BLACK
129	MCA15UT	33R	SVEN	0.34	BLACK
130	MCA15PG	38S	BRAD	0.41	BLACK
131	MCA15PK	37R	SVEN	0.37	BLACK
132	MCA15TM	35S	SVEN	0.36	BLACK
133	MCA15NR	42R	SVEN	0.4	BLACK
134	MCA15FX	40R	SVEN	0.4	BLACK
135	MCA15JE	36R	LUCKY	0.36	BLACK
136	MCA15NF	36R	LUCKY	0.36	BLACK
137	MCA15RJ	34S	LUCKY	0.33	BLACK
138	MCA15KD	38R	SVEN	0.38	BLACK
139	MCA15XR	46R	SVEN	0.43	BLACK
140	MCA15P3	42R	ANTHONY	0.45	BLACK
141	MCA15TH	39R	SVEN	0.38	BLACK
142	MCA15W9	36R	LUCKY	0.36	BLACK
143	MCA15P4	42R	ANTHONY	0.45	IVORY
144	MCA15U5	30R	LUCKY	0.32	IVORY
145	MCA15NG	40R	SVEN	0.39	IVORY
146	MCA15KK	43L	ANTHONY	0.46	IVORY
147	MCA15GG	38R	LUCKY	0.37	IVORY
148	MCA15PU	42L	DUKE	0.4	IVORY
149	MCA15Y2	48XL	ANTHONY	0.48	IVORY
150	MCA15PA	38R	SVEN	0.38	IVORY
151	MCA15ZF	34R	PHIL	0.34	IVORY
152	MCA15YK	30R	LUCKY	0.32	IVORY
153	MCA15TJ	39R	SVEN	0.38	IVORY
154	MCA15UH	37R	SVEN	0.37	IVORY
155	MCA15FE	36R	LUCKY	0.36	IVORY
156	MCA15JA	31S	SVEN	0.33	IVORY
157	MCA15FK	34R	LUCKY	0.34	IVORY
158	MCA15MG	44R	LUCKY	0.41	IVORY
159	MCA15GX	34R	LUCKY	0.34	IVORY
160	MCA15MD	40R	SVEN	0.39	IVORY
161	MCA15Y1	48XL	ANTHONY	0.48	IVORY
162	MCA15W4	36R	SVEN	0.37	IVORY
163	MCA15H3	34L	LUCKY	0.34	IVORY
164	MCA15R8	34S	DUKE	0.36	IVORY
165	MCA15UJ	37R	SVEN	0.37	IVORY
166	MCA15J4	40R	BRAD	0.42	IVORY
167	MCA15TN	36S	SVEN	0.36	IVORY
168	MCA15YX	34S	BUDDY	0.37	IVORY
169	MCA15HL	38R	SVEN	0.38	IVORY
170	MCA15M9	52R	SVEN	0.47	IVORY
171	MCA15ML	44L	SVEN	0.42	IVORY
172	MCA15HX	35R	SVEN	0.36	BLACK
173	MCA15JT	32R	LUCKY	0.33	BLACK
174	MCA15WV	38R	SVEN	0.38	BLACK

175	MCA15UG	37R	SVEN	0.37	BLACK
176	MCA15RA	32R	LUCKY	0.33	BLACK
177	MCA15K3	34R	SVEN	0.35	BLACK
178	MCA15K6	40R	LOTTO	0.42	BLACK
179	MCA15U3	32R	LUCKY	0.33	BLACK
180	MCA15PP	36R	LUCKY	0.36	BLACK
181	MCA15KA	40L	PHIL	0.34	BLACK
182	MCA15HW	35R	SVEN	0.36	BLACK
183	MCA15HF	40R	SVEN	0.39	BLACK
184	MCA16G0	36R	SVEN	0.36	BLACK
185	MCA15UF	37R	SVEN	0.37	BLACK
186	MCA0T8J	36R	LUCKY	0.35	IVORY
187	MCA0TEE	42R	SVEN	0.41	IVORY
188	MCA0TEX	48L	BUDDY	0.46	IVORY
189	MCA0T9M	40R	LUCKY	0.38	IVORY
190	MCA0T44	30R	LUCKY	0.32	IVORY
191	MCA0TDG	38R	LUCKY	0.37	IVORY
192	MCA0TCX	38R	SVEN	0.38	IVORY
193	MCA0T5R	36R	SVEN	0.36	IVORY
194	MCA0THY	38R	SVEN	0.38	IVORY
195	MCA0TCG	34S	SVEN	0.35	IVORY
196	MCA0T6A	34R	LUCKY	0.34	IVORY
197	MCA0THD	34R	DUKE	0.36	IVORY
198	MCA0TEM	38R	LUCKY	0.37	IVORY
199	MCA0TGP	42R	SVEN	0.4	IVORY
200	MCA0T71	34R	LUCKY	0.35	IVORY
201	MCA0T6E	34R	LUCKY	0.34	IVORY
202	MCA0U61	34R	LUCKY	0.35	BLACK
203	MCA0U7E	34S	SVEN	0.35	BLACK
204	MCA0U0A	34R	LUCKY	0.34	BLACK
205	MCA0UOY	34R	SVEN	0.35	BLACK
206	MCA0TN0	35R	LUCKY	0.35	IVORY
207	MCA0U2D	32L	LUCKY	0.33	BLACK
208	MCA0TE5	38R	BUDDY	0.4	BLACK
209	MCA0TF0	38R	SVEN	0.38	BLACK
210	MCA0T5D	34R	SVEN	0.35	BLACK
211	MCA0TV5	38R	LUCKY	0.37	BLACK
212	MCA0TMF	38R	DUKE	0.39	BLACK
213	MCA0TAD	30R	LUCKY	0.32	IVORY
214	MCA0TX3	38R	SVEN	0.38	IVORY
215	MCA0T6N	32R	LUCKY	0.33	IVORY
216	MCA0TVH	38R	SVEN	0.38	IVORY
217	MCA0TXG	33R	LUCKY	0.34	IVORY
218	MCA0TVJ	36R	LUCKY	0.36	IVORY
219	MCA0TXF	32R	LUCKY	0.33	IVORY
220	MCA0TWU	43R	SVEN	0.41	IVORY
221	MCA0TN1	35R	LUCKY	0.35	IVORY
222	MCA15B2	36 R	SVEN	0.32	IVORY
223	MCA15P5	35 S	MELROSE	0.45	IVORY
224	MCA15KR	36R	LUCKY	0.42	IVORY
225	MCA15X5	40R	LUCKY	0.43	IVORY
226	MCA15JG	36R	LUCKY	0.38	IVORY
227	MCA15H4	42R	LUCKY	0.46	IVORY
228	MCA15NK	46R	CHELSEA	0.32	IVORY
229	MCA15VT	56R	DUKE	0.33	IVORY
230	MCA15L1	36R	LUCKY	0.34	IVORY
231	MCA15FJ	34R	PHIL	0.33	IVORY
232	MCA15FA	32R	PHIL	0.35	BLACK
233	MCA15G6	44R	SVEN	0.33	IVORY

234	MCA15EL	33R	PHIL	0.35	BLACK
235	MCA15GL	34R	PHIL	0.36	IVORY
236	MCA15PN	29S	PHIL	0.37	IVORY
237	MCA15LU	34R	SVEN	0.33	BLACK
238	MCA15NJ	46R	CHELSEA	0.33	BLACK
239	MCA15HR	46R	GRANT	0.38	IVORY
240	MCA15XF	34L	SVEN	0.36	IVORY
241	MCA15UR	32R	LUCKY	0.34	IVORY
242	MCA15HJ	34R	SVEN	0.34	IVORY
243	MCA15TG	58R	EXECUTIVE	0.37	IVORY
244	MCA15HT	38R	LUCKY	0.36	IVORY
245	MCA15WN	33R	SVEN	0.34	IVORY
246	MCA15N1	36R	LUCKY	0.37	IVORY
247	MCA15Z0	34R	SVEN	0.36	IVORY
248	MCA15XG	40R	LUCKY	0.39	IVORY
249	MCA1688	46S	SVEN	0.36	IVORY
250	MCA15WA	36R	ARIO	0.37	IVORY
251	MCA15R3	42S	SVEN	0.38	BLACK
252	MCA15M1	33R	LUCKY	0.35	BLACK
253	MCA15T4	56R	ANTHONY	0.44	BLACK
254	MCA15EA	30R	LUCKY	0.37	BLACK
255	MCA15L0	32R	SVEN	0.36	BLACK
256	MCA15TL	35S	SVEN	0.4	BLACK
257	MCA15Z4	38R	SVEN	0.36	BLACK
258	MCA15KV	42R	SVEN	0.36	BLACK
259	MCA15KW	33R	SVEN	0.46	BLACK
260	MCA15H5	40R	LUCKY	0.44	BLACK
261	MCA15JV	34R	SVEN	0.37	BLACK
262	MCA15T1	40R	SVEN	0.39	BLACK
263	MCA15V2	38S	SVEN	0.33	BLACK
264	MCA15PV	44R	SVEN	0.42	BLACK
265	MCA15L3	34R	LUCKY	0.34	IVORY
266	MCA15PD	34R	SVEN	0.41	IVORY
267	MCA15PX	42S	SVEN	0.38	IVORY
268	MCA15JH	42L	DUKE	0.34	IVORY
269	MCA15Y5	32S	LUCKY	0.35	IVORY
270	MCA15RX	40R	LUCKY	0.38	IVORY
271	MCA15RZ	40R	LUCKY	0.36	IVORY
272	MCA15V4	38S	SVEN	0.39	IVORY
273	MCA15JZ	38S	SVEN	0.4	IVORY
274	MCA15T7	44R	BRAD	0.33	IVORY
275	MCA15V6	38S	SVEN	0.54	IVORY
276	MCA15RY	40R	LUCKY	0.37	IVORY
277	MCA15T8	30S	LUCKY	0.33	IVORY
278	MCA15M2	33R	LUCKY	0.33	IVORY
279	MCA16FR	34R	PHIL	0.37	IVORY
280	MCA15T6	34R	LUCKY	0.34	IVORY
281	MCA15V5	38S	SVEN	0.47	IVORY
282	MCA15V9	36R	LUCKY	0.45	IVORY
283	MCA15JY	30R	LUCKY	0.38	IVORY
284	MCA15RN	32R	LUCKY	0.38	IVORY
285	MCA15G9	34L	LUCKY	0.37	IVORY
286	MCA16CL	37R	LUCKY	0.36	IVORY
287	MCA15V3	38S	SVEN	0.39	IVORY
288	MCA15G1	40R	PHIL	0.36	IVORY
289	MCA15V8	34R	LUCKY	0.46	IVORY
290	MCA15MA	38L	ARLO	0.34	IVORY
291	MCA15V1	38S	SVEN	0.37	IVORY
292	MCA15TW	38R	DUKE	0.36	IVORY

293	MCA15PE	34R	SVEN	0.41	IVORY
294	MCA15K7	38S	LUCKY	0.38	IVORY
295	MCA15LZ	34L	LUCKY	0.32	IVORY
296	MCA15G0	51R	SVEN	0.39	IVORY
297	MCA15K1	36R	SVEN	0.42	IVORY
298	MCA15JF	36R	LUCKY	0.37	IVORY
299	MCA15TA	40L	SVEN	0.46	IVORY
300	MCA15WF	32R	LUCKY	0.35	IVORY
301	MCA15H9	37R	SVEN	0.35	IVORY
302	MCA15RV	40R	SVEN	0.46	IVORY
303	MCA15UV	42R	LUCKY	0.46	IVORY
304	MCA15HV	35R	SVEN	0.39	IVORY
305	MCA15R5	31R	LUCKY	0.34	IVORY
306	MCA15KE	37L	DUKE	0.37	IVORY
307	MCA15KL	50R	EXECUTIVE	0.35	IVORY
308	MCA15G4	38R	SVEN	0.32	IVORY
309	MCA15MR	36R	SVEN	0.34	IVORY
310	MCA164G	47R	DUKE	0.38	IVORY
311	MCA15G8	34L	LUCKY	0.43	IVORY
312	MCA15VR	34R	LUCKY	0.32	IVORY
313	MCA15XT	46R	SVEN	0.41	IVORY
314	MCA15GD	44L	SVEN	0.34	IVORY
315	MCA15TY	40L	DUKE	0.38	IVORY
316	MCA15J1	40R	SVEN	0.34	IVORY
317	MCA15TC	32S	SVEN	0.36	IVORY
318	MCA15L2	44R	LUCKY	0.33	IVORY
319	MCA15PH	38S	BRAD	0.43	IVORY
320	MCA15TK	39R	SVEN	0.34	IVORY
321	MCA15H8	44R	SVEN	0.32	IVORY
322	MCA15GM	40R	SVEN	0.32	IVORY
323	MCA15YF	34R	LUCKY	0.35	IVORY
324	MCA15UZ	38S	SVEN	0.42	IVORY
325	MCA15TC	32S	SVEN	0.33	IVORY
326	MCA15R6	36L	SVEN	0.33	IVORY
327	MCA15EG	38S	BRAD	0.42	IVORY
328	MCA15K4	36R	LUCKY	0.4	IVORY
329	MCA15YE	30R	LUCKY	0.39	IVORY
330	MCA15X6	34R	PHIL	0.33	IVORY
331	MCA15JW	30R	LUCKY	0.45	IVORY
332	MCA15K2	34L	LUCKY	0.32	IVORY
333	MCA15FL	45R	SVEN	0.38	IVORY
334	MCA15KH	52R	SVEN	0.37	IVORY
335	MCA15M4	33R	SVEN	0.45	IVORY
336	MCA15RG	37R	LUCKY	0.36	BLACK
337	MCA15K5	32R	LUCKY	0.32	BLACK
338	MCA15T3	56R	ANTHONY	0.33	BLACK
339	MCA15V7	36L	SVEN	0.34	BLACK
340	MCA15WH	32R	LUCKY	0.32	BLACK
341	MCA15Y8	34R	SVEN	0.36	IVORY
342	MCA15P9	36R	LUCKY	0.36	IVORY
343	MCA15JN	43R	SVEN	0.43	IVORY
344	MCA15L5	31S	LUCKY	0.33	IVORY
345	MCA15LV	34R	SVEN	0.38	IVORY
346	MCA15FY	42L	LUCKY	0.38	IVORY
347	MCA15JM	32R	LUCKY	0.35	IVORY
348	MCA15NZ	42R	ANTHONY	0.35	IVORY
349	MCA15GV	40R	BUDDY	0.33	IVORY
350	MCA15UT	33R	SVEN	0.36	IVORY
351	MCA15PG	38S	BRAD	0.45	IVORY

352	MCA15PK	37R	SVEN	0.32	IVORY
353	MCA15TM	35S	SVEN	0.38	IVORY
354	MCA15NR	42R	SVEN	0.46	IVORY
355	MCA15FX	40R	SVEN	0.33	IVORY
356	MCA15JE	36R	LUCKY	0.39	IVORY
357	MCA15NF	36R	LUCKY	0.34	BLACK
358	MCA15RJ	34S	LUCKY	0.37	BLACK
359	MCA15KD	38R	SVEN	0.32	BLACK
360	MCA15XR	46R	SVEN	0.36	BLACK
361	MCA15P3	42R	ANTHONY	0.36	IVORY
362	MCA15TH	39R	SVEN	0.39	IVORY
363	MCA15W9	36R	LUCKY	0.34	IVORY
364	MCA15P4	42R	ANTHONY	0.4	IVORY
365	MCA15U5	30R	LUCKY	0.33	IVORY
366	MCA15NG	40R	SVEN	0.36	IVORY
367	MCA15KK	43L	ANTHONY	0.37	IVORY
368	MCA15GG	38R	LUCKY	0.33	IVORY
369	MCA15PU	42L	DUKE	0.36	IVORY
370	MCA15Y2	48XL	ANTHONY	0.39	IVORY
371	MCA15PA	38R	SVEN	0.32	IVORY
372	MCA15ZF	34R	PHIL	0.35	IVORY
373	MCA15YK	30R	LUCKY	0.35	IVORY
374	MCA15TJ	39R	SVEN	0.41	IVORY
375	MCA15UH	37R	SVEN	0.4	IVORY
376	MCA15FE	36R	LUCKY	0.39	IVORY
377	MCA15JA	31S	SVEN	0.36	IVORY
378	MCA15FK	34R	LUCKY	0.37	BLACK
379	MCA15MG	44R	LUCKY	0.39	BLACK
380	MCA15GX	34R	LUCKY	0.55	BLACK
381	MCA15MD	40R	SVEN	0.35	IVORY
382	MCA15Y1	48XL	ANTHONY	0.38	IVORY

383	MCA15W4	36R	SVEN	0.34	IVORY
384	MCA15H3	34L	LUCKY	0.38	IVORY
385	MCA15R8	34S	DUKE	0.37	IVORY
386	MCA15UJ	37R	SVEN	0.42	IVORY
387	MCA15J4	40R	BRAD	0.37	IVORY
388	MCA15TN	36S	SVEN	0.39	IVORY
389	MCA15YX	34S	BUDDY	0.38	IVORY
390	MCA15HL	38R	SVEN	0.42	IVORY
391	MCA15M9	52R	SVEN	0.36	IVORY
392	MCA15ML	44L	SVEN	0.4	IVORY
393	MCA15HX	35R	SVEN	0.34	IVORY
394	MCA15JT	32R	LUCKY	0.34	IVORY
395	MCA15WV	38R	SVEN	0.33	IVORY
396	MCA15UG	37R	SVEN	0.35	IVORY
397	MCA15RA	32R	LUCKY	0.35	IVORY
398	MCA15K3	34R	SVEN	0.44	IVORY
399	MCA15K6	40R	LOTTO	0.37	IVORY
400	MCA15U3	32R	LUCKY	0.42	IVORY
401	MCA15PP	36R	LUCKY	0.33	IVORY
402	MCA15KA	40L	PHIL	0.33	IVORY
403	MCA15HW	35R	SVEN	0.38	BLACK
404	MCA15HF	40R	SVEN	0.34	BLACK
405	MCA16G0	36R	SVEN	0.37	BLACK
406	MCA15UF	37R	SVEN	0.36	BLACK
407	MCA0T8J	36R	LUCKY	0.49	BLACK
408	MCA0TEE	42R	SVEN	0.39	BLACK
409	MCA0TEX	48L	BUDDY	0.46	BLACK
410	MCA0T9M	40R	LUCKY	0.53	BLACK
411	MCA0T44	30R	LUCKY	0.33	BLACK
412	MCA0TDG	38R	LUCKY	0.35	BLACK

ANNEXURE 5: COMPILED EXCEL FILE

PO Number	Time	Date	Cutter	Status
MCA4V2Z	06:03 AM	20/08/19	QC TABLE 1	not passed
MCA4UWL	06:22 AM	20/08/19	QC TABLE 1	not passed
MCA4UUZ	06:37 AM	20/08/19	QC TABLE 1	not passed
MCA4UJV	06:54 AM	20/08/19	QC TABLE 1	not passed
MCA4UNP	07:21 AM	20/08/19	QC TABLE 1	not passed
MCA4UZ1	07:38 AM	20/08/19	QC TABLE 1	not passed
MCA4UZ1	07:40 AM	20/08/19	QC TABLE 1	passed
MCA4UZ1	07:40 AM	20/08/19	QC TABLE 1	not passed
MCA4VHG	07:48 AM	20/08/19	QC TABLE 1	not passed
MCA4VHG	08:02 AM	20/08/19	QC TABLE 1	not passed
MCA4UKY	08:32 AM	20/08/19	QC TABLE 1	passed
MCA4WNE	08:59 AM	20/08/19	QC TABLE 1	passed
MCA4WLU	09:06 AM	20/08/19	QC TABLE 1	passed
MCA4WCF	09:11 AM	20/08/19	QC TABLE 1	passed
MCA4VTF	09:18 AM	20/08/19	QC TABLE 1	passed
MCA4VRT	09:27 AM	20/08/19	QC TABLE 1	passed
MCA4WJA	09:37 AM	20/08/19	QC TABLE 1	passed
MCA4WUA	09:42 AM	20/08/19	QC TABLE 1	passed
MCA4WGX	09:51 AM	20/08/19	QC TABLE 1	passed
MCA4UDN	10:04 AM	20/08/19	QC TABLE 1	passed
MCAA4WF	10:25 AM	20/08/19	QC TABLE 1	passed
MCA4WFC	10:36 AM	20/08/19	QC TABLE 1	passed
MCA4WFC	10:36 AM	20/08/19	QC TABLE 1	passed
MCA4WFC	10:38 AM	20/08/19	QC TABLE 1	passed
MCA4WFC	10:39 AM	20/08/19	QC TABLE 1	passed
MCA4W8D	10:43 AM	20/08/19	QC TABLE 1	passed
MCA4W8D	10:43 AM	20/08/19	QC TABLE 1	passed
MCA4VVY	10:52 AM	20/08/19	QC TABLE 1	passed
MCA4WD7	11:01 AM	20/08/19	QC TABLE 1	passed
MCA4W13	11:18 AM	20/08/19	QC TABLE 1	passed
MCA4W13	11:18 AM	20/08/19	QC TABLE 1	passed
MCA4WEX	11:21 AM	20/08/19	QC TABLE 1	passed
MCA4WEC	11:26 AM	20/08/19	QC TABLE 1	passed
MCA4W5W	11:30 AM	20/08/19	QC TABLE 1	not passed
MCA4W5W	11:31 AM	20/08/19	QC TABLE 1	not passed
MCA4W79	11:31 AM	20/08/19	QC TABLE 1	not passed
MCA4VVR	11:32 AM	20/08/19	QC TABLE 1	passed
MCA4VRD	11:33 AM	20/08/19	QC TABLE 1	passed
MCA4W6C	11:33 AM	20/08/19	QC TABLE 1	passed
MCA4WWE	11:33 AM	20/08/19	QC TABLE 1	passed
MCA4VZ6	11:34 AM	20/08/19	QC TABLE 1	passed
MCA4WWF	11:34 AM	20/08/19	QC TABLE 1	passed
MCA4VWN	11:34 AM	20/08/19	QC TABLE 1	passed
MCA4W78	11:34 AM	20/08/19	QC TABLE 1	passed
MCA4WKK	12:05 PM	20/08/19	QC TABLE 1	passed
MCA4UVL	12:14 PM	20/08/19	QC TABLE 1	passed
MCA4UVL	12:14 PM	20/08/19	QC TABLE 1	passed
MCA4VRF	12:16 PM	20/08/19	QC TABLE 1	passed
MCA4W4D	12:20 PM	20/08/19	QC TABLE 1	passed
MCA4WLC	12:25 PM	20/08/19	QC TABLE 1	passed
MCA4WWV	12:43 PM	20/08/19	QC TABLE 1	passed
MCA4W5A	12:50 PM	20/08/19	QC TABLE 1	passed

MCA4WM0	12:58 PM	20/08/19	QC TABLE 1	passed
MCA4PXF	01:07 PM	20/08/19	QC TABLE 1	passed
MCA4W22	01:14 PM	20/08/19	QC TABLE 1	passed
MCA4PL5	01:19 PM	20/08/19	QC TABLE 1	passed
MCA4PFU	01:24 PM	20/08/19	QC TABLE 1	passed
MCA4WMH	01:31 PM	20/08/19	QC TABLE 1	passed
MCA4WMH	01:40 PM	20/08/19	QC TABLE 1	not passed
MCA4VUY	01:41 PM	20/08/19	QC TABLE 1	not passed
MCA4WCW	01:41 PM	20/08/19	QC TABLE 1	not passed
MCA4WCW	01:42 PM	20/08/19	QC TABLE 1	not passed
MCA4VYH	01:42 PM	20/08/19	QC TABLE 1	not passed
MCA4WDP	01:42 PM	20/08/19	QC TABLE 1	not passed
MCA4W1D	01:43 PM	20/08/19	QC TABLE 1	not passed
MCA4W8X	01:43 PM	20/08/19	QC TABLE 1	passed
MCA4WA4	01:43 PM	20/08/19	QC TABLE 1	passed
MCA4VRP	01:44 PM	20/08/19	QC TABLE 1	passed
MCA4VV8	01:44 PM	20/08/19	QC TABLE 1	passed
MCA4WGR	01:44 PM	20/08/19	QC TABLE 1	passed
MCA4VZL	01:45 PM	20/08/19	QC TABLE 1	passed
MCA4W7G	01:45 PM	20/08/19	QC TABLE 1	passed
MCA4W88	01:46 PM	20/08/19	QC TABLE 1	passed
MCA4WN0	01:47 PM	20/08/19	QC TABLE 1	passed
MCA4WLW	01:47 PM	20/08/19	QC TABLE 1	passed
MCA4WMH	01:54 PM	20/08/19	QC TABLE 1	not passed
MCA4W89	02:00 PM	20/08/19	QC TABLE 1	passed
MCA4W89	02:03 PM	20/08/19	QC TABLE 1	not passed
MCA4V8X	02:08 PM	20/08/19	QC TABLE 1	not passed
MCA4VN2	02:14 PM	20/08/19	QC TABLE 1	not passed
MCA4W05	02:21 PM	20/08/19	QC TABLE 1	not passed
MCA4W26	02:29 PM	20/08/19	QC TABLE 1	not passed
MCA4V38	02:31 PM	20/08/19	QC TABLE 1	not passed
MCA4W26	02:33 PM	20/08/19	QC TABLE 1	not passed
MCA4WF5	02:37 PM	20/08/19	QC TABLE 1	not passed
MCA4VT6	02:39 PM	20/08/19	QC TABLE 1	not passed
MCA4WA5	02:44 PM	20/08/19	QC TABLE 1	passed
MCA4WA5	02:45 PM	20/08/19	QC TABLE 1	passed
MCA4V0V	02:53 PM	20/08/19	QC TABLE 1	not passed
MCA4VV1	03:00 PM	20/08/19	QC TABLE 1	passed
MCA4VV1	03:02 PM	20/08/19	QC TABLE 1	not passed
MCA4W4U	03:06 PM	20/08/19	QC TABLE 1	passed
MCA4W4U	03:09 PM	20/08/19	QC TABLE 1	not passed
MCA4WH6	03:13 PM	20/08/19	QC TABLE 1	not passed
MCA4VPW	03:18 PM	20/08/19	QC TABLE 1	not passed
MCA4VUJ	03:26 PM	20/08/19	QC TABLE 1	not passed
MCA4WXR	03:36 PM	20/08/19	QC TABLE 1	passed
MCA4W2L	03:46 PM	20/08/19	QC TABLE 1	passed
MCA4WE9	03:52 PM	20/08/19	QC TABLE 1	not passed
MCA4TRA	03:53 PM	20/08/19	QC TABLE 1	not passed
MCA4UZ1	10:37 AM	20/08/19	QC TABLE 2	not passed
MCA4ULP	10:40 AM	20/08/19	QC TABLE 2	passed
MCA4UZX	10:47 AM	20/08/19	QC TABLE 2	passed
MCA4UG3	10:53 AM	20/08/19	QC TABLE 2	not passed
MCA4MCA	10:59 AM	20/08/19	QC TABLE 2	passed
MCA4W0Y	11:00 AM	20/08/19	QC TABLE 2	not passed
MCA4W0Y	11:09 AM	20/08/19	QC TABLE 2	not passed

MCA4V43	11:09 AM	20/08/19	QC TABLE 2	passed
MCA4VFV	11:11 AM	20/08/19	QC TABLE 2	passed
MCA4VFV	11:11 AM	20/08/19	QC TABLE 2	passed
MCA4UVL	11:12 AM	20/08/19	QC TABLE 2	passed
MCA4UVL	11:12 AM	20/08/19	QC TABLE 2	passed
MCA4WCZ	11:16 AM	20/08/19	QC TABLE 2	passed
MCA4WLP	11:21 AM	20/08/19	QC TABLE 2	passed
MCA4VWF	11:28 AM	20/08/19	QC TABLE 2	passed
MCA4UHJ	11:32 AM	20/08/19	QC TABLE 2	passed
MCA4UHJ	11:33 AM	20/08/19	QC TABLE 2	passed
MCA4UVN	11:36 AM	20/08/19	QC TABLE 2	passed
MCA4R5A	11:41 AM	20/08/19	QC TABLE 2	passed
MCA4UK0	11:46 AM	20/08/19	QC TABLE 2	passed
MCA4UK0	11:46 AM	20/08/19	QC TABLE 2	not passed
MCA4V4U	12:03 PM	20/08/19	QC TABLE 2	not passed
MCA4V4U	12:03 PM	20/08/19	QC TABLE 2	not passed
MCA4UWL	12:14 PM	20/08/19	QC TABLE 2	passed
MCA4UWL	12:14 PM	20/08/19	QC TABLE 2	passed
MCA4ULP	12:17 PM	20/08/19	QC TABLE 2	passed
MCA4ULP	12:17 PM	20/08/19	QC TABLE 2	passed
MCA4UVN	12:20 PM	20/08/19	QC TABLE 2	passed
MCA4VGV	12:46 PM	20/08/19	QC TABLE 2	passed
MCA4W8U	12:56 PM	20/08/19	QC TABLE 2	passed
MCA4W8U	12:59 PM	20/08/19	QC TABLE 2	not passed
MCA4WEY	01:03 PM	20/08/19	QC TABLE 2	passed
MCA3WEY	01:03 PM	20/08/19	QC TABLE 2	passed
MCA4VC5	01:06 PM	20/08/19	QC TABLE 2	not passed
MCA4UZX	01:11 PM	20/08/19	QC TABLE 2	passed
MCA4UZX	01:15 PM	20/08/19	QC TABLE 2	passed
MCA4UZX	01:15 PM	20/08/19	QC TABLE 2	passed
MCA4WC2	01:20 PM	20/08/19	QC TABLE 2	not passed
MCA4WC2	01:22 PM	20/08/19	QC TABLE 2	passed
MCA4TX8	01:26 PM	20/08/19	QC TABLE 2	passed
MCA4TX8	01:28 PM	20/08/19	QC TABLE 2	passed
MCA4UNT	01:29 PM	20/08/19	QC TABLE 2	passed
MCA4UNT	01:29 PM	20/08/19	QC TABLE 2	passed
MCA4VDS	01:31 PM	20/08/19	QC TABLE 2	passed
MCA4VDS	01:31 PM	20/08/19	QC TABLE 2	passed
MCA4VDS	01:31 PM	20/08/19	QC TABLE 2	passed
MCA4VDS	01:31 PM	20/08/19	QC TABLE 2	passed
MCA4VD2	01:31 PM	20/08/19	QC TABLE 2	passed
MCA4UNR	01:34 PM	20/08/19	QC TABLE 2	passed
MCA4V38	01:37 PM	20/08/19	QC TABLE 2	passed
MCA4V38	01:37 PM	20/08/19	QC TABLE 2	passed
MCA4V5P	01:43 PM	20/08/19	QC TABLE 2	passed
MCA4VC5	01:47 PM	20/08/19	QC TABLE 2	passed
MCA4UKW	01:54 PM	20/08/19	QC TABLE 2	passed
MCA4TC8	02:00 PM	20/08/19	QC TABLE 2	passed
MCA4TC8	02:08 PM	20/08/19	QC TABLE 2	not passed
MCA4VW2	02:08 PM	20/08/19	QC TABLE 2	passed
MCA4WTW	02:15 PM	20/08/19	QC TABLE 2	passed
MCA4WTW	02:24 PM	20/08/19	QC TABLE 2	passed
MCA4VYR	02:30 PM	20/08/19	QC TABLE 2	passed
MCA4WEN	02:35 PM	20/08/19	QC TABLE 2	passed
MCA4WEN	02:35 PM	20/08/19	QC TABLE 2	not passed
MCA4WEN	02:40 PM	20/08/19	QC TABLE 2	passed

MCA4VTP	02:41 PM	20/08/19	QC TABLE 2	passed
MCA4VTP	02:41 PM	20/08/19	QC TABLE 2	passed
MCA4VXV	02:48 PM	20/08/19	QC TABLE 2	passed
MCA4WFM	02:52 PM	20/08/19	QC TABLE 2	passed
MCA4VT4	02:57 PM	20/08/19	QC TABLE 2	not passed
MCA4VT4	03:02 PM	20/08/19	QC TABLE 2	not passed
MCA4VWU	03:03 PM	20/08/19	QC TABLE 2	passed
MCA4WDG	03:14 PM	20/08/19	QC TABLE 2	passed
MCA4WDG	03:19 PM	20/08/19	QC TABLE 2	not passed
MCA4W41	03:20 PM	20/08/19	QC TABLE 2	not passed
MCA4WHV	03:26 PM	20/08/19	QC TABLE 2	passed
MCA4WHV	03:31 PM	20/08/19	QC TABLE 2	passed
MCA4VZA	03:33 PM	20/08/19	QC TABLE 2	not passed
MCA4VA8	03:35 PM	20/08/19	QC TABLE 2	not passed
MCA4VZU	03:38 PM	20/08/19	QC TABLE 2	passed
MCA4VZ1	03:46 PM	20/08/19	QC TABLE 2	not passed
MCA4WAJ	03:51 PM	20/08/19	QC TABLE 2	not passed
MCA4WJP	05:16 PM	20/08/19	QC TABLE 2	not passed
MCA4VC5	05:21 PM	20/08/19	QC TABLE 2	passed
MCA4WC8	11:04 AM	20/08/19	QC TABLE 4	not passed
MCA4WC8	11:08 AM	20/08/19	QC TABLE 4	passed
MCA4WC8	11:12 AM	20/08/19	QC TABLE 4	passed
MCA4W2A	11:13 AM	20/08/19	QC TABLE 4	passed
MCA4WMM	11:13 AM	20/08/19	QC TABLE 4	passed
MCA4W8D	11:14 AM	20/08/19	QC TABLE 4	passed
MCA4VVY	11:14 AM	20/08/19	QC TABLE 4	passed
MCA4VRK	11:14 AM	20/08/19	QC TABLE 4	passed
MCA4WHF	11:15 AM	20/08/19	QC TABLE 4	passed
MCA4W2N	11:15 AM	20/08/19	QC TABLE 4	passed
MCA4VWE	11:16 AM	20/08/19	QC TABLE 4	passed
MCA4VVT	11:17 AM	20/08/19	QC TABLE 4	passed
MCA4WGY	11:19 AM	20/08/19	QC TABLE 4	passed
MCA4WK7	11:19 AM	20/08/19	QC TABLE 4	passed
MCA4WGE	11:19 AM	20/08/19	QC TABLE 4	passed
MCA4VXM	11:19 AM	20/08/19	QC TABLE 4	passed
MCA4WLN	11:20 AM	20/08/19	QC TABLE 4	passed
MCA4WNZ	11:20 AM	20/08/19	QC TABLE 4	passed
MCA4W3R	11:20 AM	20/08/19	QC TABLE 4	passed
MCA4WHD	11:22 AM	20/08/19	QC TABLE 4	passed
MCA4VV6	11:22 AM	20/08/19	QC TABLE 4	passed
MCA4WCF	11:22 AM	20/08/19	QC TABLE 4	passed
MCA4WLU	11:22 AM	20/08/19	QC TABLE 4	passed
MCA4VTF	11:23 AM	20/08/19	QC TABLE 4	passed
MCA4VYX	11:23 AM	20/08/19	QC TABLE 4	passed
MCA4WNE	11:23 AM	20/08/19	QC TABLE 4	passed
MCA4WAZ	11:23 AM	20/08/19	QC TABLE 4	passed
MCA4WAZ	11:23 AM	20/08/19	QC TABLE 4	passed
MCA4WMX	11:25 AM	20/08/19	QC TABLE 4	not passed
MCA4WLZ	11:29 AM	20/08/19	QC TABLE 4	not passed
MCA4W3E	11:31 AM	20/08/19	QC TABLE 4	passed
MCA4WGX	11:38 AM	20/08/19	QC TABLE 4	passed
MCA4WD8	11:40 AM	20/08/19	QC TABLE 4	not passed
MCA4WCJ	11:44 AM	20/08/19	QC TABLE 4	passed
MCA4V4T	11:49 AM	20/08/19	QC TABLE 4	passed
MCA4VHV	11:51 AM	20/08/19	QC TABLE 4	passed

MCA4VXH	11:53 AM	20/08/19	QC TABLE 4	not passed
MCA4WHJ	11:57 AM	20/08/19	QC TABLE 4	not passed
MCA4WU0	12:02 PM	20/08/19	QC TABLE 4	passed
MCA4WU0	12:02 PM	20/08/19	QC TABLE 4	passed
MCA4WNU	12:03 PM	20/08/19	QC TABLE 4	not passed
MCA4VT6	12:03 PM	20/08/19	QC TABLE 4	passed
MCA4WF6	12:03 PM	20/08/19	QC TABLE 4	passed
MCA4WMV	12:04 PM	20/08/19	QC TABLE 4	passed
MCA4WG6	12:08 PM	20/08/19	QC TABLE 4	passed
MCA4VPU	12:12 PM	20/08/19	QC TABLE 4	passed
MCA4VPU	12:13 PM	20/08/19	QC TABLE 4	passed
MCA4WAN	12:16 PM	20/08/19	QC TABLE 4	passed
MCA4W8W	12:21 PM	20/08/19	QC TABLE 4	passed
MCA4W02	12:25 PM	20/08/19	QC TABLE 4	passed
MCA4WN8	12:29 PM	20/08/19	QC TABLE 4	passed
MCA4W7D	12:37 PM	20/08/19	QC TABLE 4	passed
MCA4VTH	12:41 PM	20/08/19	QC TABLE 4	passed
MCA4W37	12:45 PM	20/08/19	QC TABLE 4	passed
MCA4VTE	01:03 PM	20/08/19	QC TABLE 4	passed
MCA4WFX	01:05 PM	20/08/19	QC TABLE 4	passed
MCA4WFX	01:07 PM	20/08/19	QC TABLE 4	passed
MCA4NYF	01:07 PM	20/08/19	QC TABLE 4	passed
MCA4WFX	01:15 PM	20/08/19	QC TABLE 4	passed
MCA4W5D	01:16 PM	20/08/19	QC TABLE 4	not passed
MCA4W5D	01:20 PM	20/08/19	QC TABLE 4	not passed
MCA4WL9	01:20 PM	20/08/19	QC TABLE 4	passed
MCA4WJ4	01:24 PM	20/08/19	QC TABLE 4	passed
MCA4WF0	01:29 PM	20/08/19	QC TABLE 4	passed
MCA4P05	01:36 PM	20/08/19	QC TABLE 4	passed
MCA4UWW	02:06 PM	20/08/19	QC TABLE 4	passed
MCA4UL9	02:06 PM	20/08/19	QC TABLE 4	not passed
MCA4VV5	02:08 PM	20/08/19	QC TABLE 4	passed
MCA4PY8	02:08 PM	20/08/19	QC TABLE 4	passed
MCA4P05	02:08 PM	20/08/19	QC TABLE 4	passed
MCA4WKC	02:11 PM	20/08/19	QC TABLE 4	passed
MCA4P0M	02:11 PM	20/08/19	QC TABLE 4	passed
MCA4VT9	02:14 PM	20/08/19	QC TABLE 4	not passed
MCA4W7H	02:16 PM	20/08/19	QC TABLE 4	passed
MCA4W10	02:22 PM	20/08/19	QC TABLE 4	passed
MCA4W1K	02:25 PM	20/08/19	QC TABLE 4	passed
MCA4VY1	02:28 PM	20/08/19	QC TABLE 4	passed
MCA4WML	02:31 PM	20/08/19	QC TABLE 4	passed
MCA4VY8	02:34 PM	20/08/19	QC TABLE 4	passed
MCA4W6T	02:39 PM	20/08/19	QC TABLE 4	passed
MCA4W7Y	02:44 PM	20/08/19	QC TABLE 4	passed
MCA4WEK	02:47 PM	20/08/19	QC TABLE 4	passed
MCA4WAF	02:49 PM	20/08/19	QC TABLE 4	passed
MCA4VFK	02:55 PM	20/08/19	QC TABLE 4	passed
MCA4WCD	02:58 PM	20/08/19	QC TABLE 4	passed
MCA4WC6	03:02 PM	20/08/19	QC TABLE 4	passed
MCA4W1X	03:07 PM	20/08/19	QC TABLE 4	not passed
MCA4W6U	03:11 PM	20/08/19	QC TABLE 4	passed
MCA4WKD	03:16 PM	20/08/19	QC TABLE 4	passed
MCA4W5X	03:18 PM	20/08/19	QC TABLE 4	passed
MCA4W5X	03:20 PM	20/08/19	QC TABLE 4	passed

MCA4W8L	03:24 PM	20/08/19	QC TABLE 4	passed
MCA4W42	03:28 PM	20/08/19	QC TABLE 4	passed
MCA4W7E	03:32 PM	20/08/19	QC TABLE 4	not passed
MCA4W08	03:41 PM	20/08/19	QC TABLE 4	passed
MCA4VZ3	03:43 PM	20/08/19	QC TABLE 4	passed
MCA4VV3	03:47 PM	20/08/19	QC TABLE 4	passed
MCA4VYT	03:49 PM	20/08/19	QC TABLE 4	passed
MCA4WGF	04:45 PM	20/08/19	QC TABLE 4	passed
MCA4W5V	04:49 PM	20/08/19	QC TABLE 4	passed
MCA4W0P	04:51 PM	20/08/19	QC TABLE 4	passed
MCA4VFW	04:57 PM	20/08/19	QC TABLE 4	passed
MCA4WU2	04:57 PM	20/08/19	QC TABLE 4	passed
MCA4WE5	05:00 PM	20/08/19	QC TABLE 4	passed
MCA4VZJ	05:04 PM	20/08/19	QC TABLE 4	passed
MCA4W18	05:11 PM	20/08/19	QC TABLE 4	passed
MCA4WA2	05:22 PM	20/08/19	QC TABLE 4	passed
MCA4W8V	05:27 PM	20/08/19	QC TABLE 4	passed
MCA4W3L	05:30 PM	20/08/19	QC TABLE 4	not passed
MCA4W3V	05:42 PM	20/08/19	QC TABLE 4	passed
MCA4VWL	05:49 PM	20/08/19	QC TABLE 4	passed
MCA4VW1	06:05 PM	20/08/19	QC TABLE 4	passed
MCA4W44	06:12 AM	20/08/19	QC TABLE 5	passed
MCA4VV9	06:19 AM	20/08/19	QC TABLE 5	passed
MCA4V2Y	06:23 AM	20/08/19	QC TABLE 5	passed
MCA4W87	06:25 AM	20/08/19	QC TABLE 5	passed
MCA4VUN	06:31 AM	20/08/19	QC TABLE 5	passed
MCA4WXR	06:35 AM	20/08/19	QC TABLE 5	passed
MCA4WJA	06:42 AM	20/08/19	QC TABLE 5	passed
MCA4WHK	06:46 AM	20/08/19	QC TABLE 5	passed
MCA4WGY	06:50 AM	20/08/19	QC TABLE 5	passed
MCA4WL6	06:55 AM	20/08/19	QC TABLE 5	passed
MCA4VUM	06:57 AM	20/08/19	QC TABLE 5	passed
MCA4W4V	07:02 AM	20/08/19	QC TABLE 5	passed
MCA4VT0	07:05 AM	20/08/19	QC TABLE 5	passed
MCA4WHE	07:08 AM	20/08/19	QC TABLE 5	passed
MCA4VM9	07:10 AM	20/08/19	QC TABLE 5	passed
MCA4VUR	07:14 AM	20/08/19	QC TABLE 5	passed
MCA4VUR	07:14 AM	20/08/19	QC TABLE 5	passed
MCA4WKZ	07:16 AM	20/08/19	QC TABLE 5	passed
MCA4WFM	07:18 AM	20/08/19	QC TABLE 5	passed
MCA4WDJ	07:21 AM	20/08/19	QC TABLE 5	passed
MCA4WK7	07:23 AM	20/08/19	QC TABLE 5	passed
MCA4WLN	07:25 AM	20/08/19	QC TABLE 5	passed
MCA4VWT	07:27 AM	20/08/19	QC TABLE 5	passed
MCA4VWT	07:28 AM	20/08/19	QC TABLE 5	passed
MCA4UL0	07:31 AM	20/08/19	QC TABLE 5	passed
MCA4W8P	07:33 AM	20/08/19	QC TABLE 5	passed
MCA4W63	07:35 AM	20/08/19	QC TABLE 5	passed
MCA4UJF	07:37 AM	20/08/19	QC TABLE 5	passed
MCA4W9J	07:39 AM	20/08/19	QC TABLE 5	passed
MCA4W9J	07:39 AM	20/08/19	QC TABLE 5	passed
MCA4W9J	07:40 AM	20/08/19	QC TABLE 5	passed
MCA4VTR	07:42 AM	20/08/19	QC TABLE 5	passed
MCA4W78	07:44 AM	20/08/19	QC TABLE 5	passed
MCA4WA1	07:46 AM	20/08/19	QC TABLE 5	passed

MCA4WCE	07:49 AM	20/08/19	QC TABLE 5	passed
MCA4WM5	07:51 AM	20/08/19	QC TABLE 5	passed
MCA4W77	10:33 AM	20/08/19	QC TABLE 5	passed
MCA4W2E	10:38 AM	20/08/19	QC TABLE 5	passed
MCA4W85	10:41 AM	20/08/19	QC TABLE 5	passed
MCA4W85	10:44 AM	20/08/19	QC TABLE 5	passed
MCA4W18	10:48 AM	20/08/19	QC TABLE 5	passed
MCA4VYR	10:51 AM	20/08/19	QC TABLE 5	passed
MCA4WNE	10:55 AM	20/08/19	QC TABLE 5	passed
MCA4WLA	10:59 AM	20/08/19	QC TABLE 5	passed
MCA4WLA	10:59 AM	20/08/19	QC TABLE 5	passed
MCA4WKJ	11:09 AM	20/08/19	QC TABLE 5	passed
MCA4WKJ	11:10 AM	20/08/19	QC TABLE 5	passed
MCA4WLA	11:12 AM	20/08/19	QC TABLE 5	passed
MCA4WLA	11:12 AM	20/08/19	QC TABLE 5	passed
MCA4WGY	11:13 AM	20/08/19	QC TABLE 5	passed
MCA4WGY	11:13 AM	20/08/19	QC TABLE 5	passed
MCA4WXR	11:14 AM	20/08/19	QC TABLE 5	passed
MCA4WXR	11:14 AM	20/08/19	QC TABLE 5	passed
MCA4W08	11:14 AM	20/08/19	QC TABLE 5	passed
MCA4W08	11:14 AM	20/08/19	QC TABLE 5	passed
MCA4WXR	11:16 AM	20/08/19	QC TABLE 5	passed
MCA4WGY	11:16 AM	20/08/19	QC TABLE 5	passed
MCA4WNE	11:16 AM	20/08/19	QC TABLE 5	passed
MCA4VYR	11:16 AM	20/08/19	QC TABLE 5	passed
MCA4WLA	11:16 AM	20/08/19	QC TABLE 5	passed
MCA4W08	11:16 AM	20/08/19	QC TABLE 5	passed
MCA4W2E	11:17 AM	20/08/19	QC TABLE 5	passed
MCA4W77	11:17 AM	20/08/19	QC TABLE 5	passed
MCA4VYT	11:17 AM	20/08/19	QC TABLE 5	passed
MCA4WHH	11:17 AM	20/08/19	QC TABLE 5	passed
MCA4W18	11:17 AM	20/08/19	QC TABLE 5	passed
MCA4WAL	11:17 AM	20/08/19	QC TABLE 5	passed
MCA4WKJ	11:17 AM	20/08/19	QC TABLE 5	passed
MCA4W1X	11:18 AM	20/08/19	QC TABLE 5	passed
MCA4WJD	11:18 AM	20/08/19	QC TABLE 5	passed
MCA4W6U	11:18 AM	20/08/19	QC TABLE 5	passed
MCA4VV8	11:19 AM	20/08/19	QC TABLE 5	passed
MCA4VTH	11:23 AM	20/08/19	QC TABLE 5	not passed
MCA4WRY	11:27 AM	20/08/19	QC TABLE 5	passed
MCA4WPG	11:31 AM	20/08/19	QC TABLE 5	not passed
MCA4WJ9	11:36 AM	20/08/19	QC TABLE 5	passed
MCA4VU6	11:44 AM	20/08/19	QC TABLE 5	passed
MCA4VU6	11:44 AM	20/08/19	QC TABLE 5	passed
MCA4VU6	11:44 AM	20/08/19	QC TABLE 5	passed
MCA4WA5	11:45 AM	20/08/19	QC TABLE 5	passed
MCA4WA5	11:45 AM	20/08/19	QC TABLE 5	passed
MCA4WHK	11:45 AM	20/08/19	QC TABLE 5	passed
MCA4WHK	11:45 AM	20/08/19	QC TABLE 5	passed
MCA4WC2	11:47 AM	20/08/19	QC TABLE 5	passed
MCA4WC2	11:48 AM	20/08/19	QC TABLE 5	passed
MCA4WC2	11:48 AM	20/08/19	QC TABLE 5	passed
MCA4W1K	11:51 AM	20/08/19	QC TABLE 5	passed
MCA4W52	11:55 AM	20/08/19	QC TABLE 5	not passed

MCA4W21	11:59 AM	20/08/19	QC TABLE 5	passed
MCA4WJ3	12:03 PM	20/08/19	QC TABLE 5	passed
MCA4VT6	12:07 PM	20/08/19	QC TABLE 5	passed
MCA4WDH	12:12 PM	20/08/19	QC TABLE 5	passed
MCA4W3E	12:12 PM	20/08/19	QC TABLE 5	passed
MCA4WNV	12:12 PM	20/08/19	QC TABLE 5	passed
MCA4W5X	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4VW9	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4WN5	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4WN5	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4WJU	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4VRY	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4VPT	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4VXV	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4VWW	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4W45	12:13 PM	20/08/19	QC TABLE 5	passed
MCA4W8X	12:14 PM	20/08/19	QC TABLE 5	passed
MCA4W8X	12:14 PM	20/08/19	QC TABLE 5	passed
MCA4VT3	12:17 PM	20/08/19	QC TABLE 5	passed
MCA4WM0	12:21 PM	20/08/19	QC TABLE 5	passed
MCA4W8K	12:24 PM	20/08/19	QC TABLE 5	passed
MCA4VVV	12:28 PM	20/08/19	QC TABLE 5	passed
MCA4VVV	12:29 PM	20/08/19	QC TABLE 5	passed
MCA4WF5	12:46 PM	20/08/19	QC TABLE 5	passed
MCA4WG0	12:50 PM	20/08/19	QC TABLE 5	passed
MCA4W4D	12:54 PM	20/08/19	QC TABLE 5	passed
MCA4VYV	12:57 PM	20/08/19	QC TABLE 5	passed
MCA4WCX	01:00 PM	20/08/19	QC TABLE 5	not passed
MCA4VN1	01:03 PM	20/08/19	QC TABLE 5	not passed
MCA4WCX	01:04 PM	20/08/19	QC TABLE 5	passed
MCA4WL9	01:05 PM	20/08/19	QC TABLE 5	not passed
MCA4W79	01:09 PM	20/08/19	QC TABLE 5	passed
MCA4WF6	01:13 PM	20/08/19	QC TABLE 5	not passed
MCA4WTW	01:19 PM	20/08/19	QC TABLE 5	passed
MCA4VPW	01:22 PM	20/08/19	QC TABLE 5	passed
MCA4W89	01:26 PM	20/08/19	QC TABLE 5	passed
MCA4VYH	01:30 PM	20/08/19	QC TABLE 5	passed
MCA4VZY	01:36 PM	20/08/19	QC TABLE 5	passed
MCA4VZY	01:36 PM	20/08/19	QC TABLE 5	passed
MCA4VX2	01:37 PM	20/08/19	QC TABLE 5	passed
MCA4VX2	01:38 PM	20/08/19	QC TABLE 5	passed
MCA4WJC	01:38 PM	20/08/19	QC TABLE 5	passed
MCA4WJC	01:38 PM	20/08/19	QC TABLE 5	passed
MCA4VY1	01:39 PM	20/08/19	QC TABLE 5	passed
MCA4VY1	01:39 PM	20/08/19	QC TABLE 5	passed
MCA4WN2	01:39 PM	20/08/19	QC TABLE 5	passed
MCA4WN2	01:39 PM	20/08/19	QC TABLE 5	passed
MCA4WCG	01:40 PM	20/08/19	QC TABLE 5	passed
MCA4VN2	01:44 PM	20/08/19	QC TABLE 5	passed
MCA4VN2	01:44 PM	20/08/19	QC TABLE 5	passed
MCA4VUY	01:45 PM	20/08/19	QC TABLE 5	passed
MCA4VRF	01:50 PM	20/08/19	QC TABLE 5	passed
MCA4VRF	01:54 PM	20/08/19	QC TABLE 5	passed
MCA4VRF	01:55 PM	20/08/19	QC TABLE 5	passed
MCA4WDL	02:03 PM	20/08/19	QC TABLE 5	not passed

MCA4V9P	02:12 PM	20/08/19	QC TABLE 5	passed
MCA4UMW	02:16 PM	20/08/19	QC TABLE 5	not passed
MCA4WAW	02:25 PM	20/08/19	QC TABLE 5	passed
MCA4WHJ	02:30 PM	20/08/19	QC TABLE 5	passed
MCA4VWH	02:35 PM	20/08/19	QC TABLE 5	passed
MCA4W29	02:40 PM	20/08/19	QC TABLE 5	passed
MCA4TDG	02:45 PM	20/08/19	QC TABLE 5	passed
MCA4VU2	02:51 PM	20/08/19	QC TABLE 5	passed
MCA4UMW	02:58 PM	20/08/19	QC TABLE 5	passed
MCA4WAF	03:02 PM	20/08/19	QC TABLE 5	not passed
MCA4WDL	03:07 PM	20/08/19	QC TABLE 5	not passed
MCA1234	03:10 PM	20/08/19	QC TABLE 5	passed
MCA4WFG	03:10 PM	20/08/19	QC TABLE 5	not passed
MCA4VYY	03:16 PM	20/08/19	QC TABLE 5	passed
MCA4VUC	03:20 PM	20/08/19	QC TABLE 5	passed
MCA4WMH	03:24 PM	20/08/19	QC TABLE 5	not passed
MCA4TZD	03:28 PM	20/08/19	QC TABLE 5	not passed
MCAA4TR	03:31 PM	20/08/19	QC TABLE 5	not passed
MCA4TZD	03:32 PM	20/08/19	QC TABLE 5	passed
MCA4W7D	03:34 PM	20/08/19	QC TABLE 5	not passed
MCA4WKC	03:41 PM	20/08/19	QC TABLE 5	passed
MCA4WMW	03:44 PM	20/08/19	QC TABLE 5	passed
MCA4WHF	03:50 PM	20/08/19	QC TABLE 5	not passed
MCA4W87	10:13 AM	20/08/19	QC TABLE 6	passed
MCA4VV9	10:17 AM	20/08/19	QC TABLE 6	passed
MCA4VTR	10:17 AM	20/08/19	QC TABLE 6	passed
MCA4WL6	10:17 AM	20/08/19	QC TABLE 6	passed
MCA4WPW	10:17 AM	20/08/19	QC TABLE 6	passed
MCA4W44	10:18 AM	20/08/19	QC TABLE 6	passed
MCA4WHD	10:18 AM	20/08/19	QC TABLE 6	passed
MCA4WHD	10:18 AM	20/08/19	QC TABLE 6	passed
MCA4W4V	10:18 AM	20/08/19	QC TABLE 6	passed
MCA4W87	10:18 AM	20/08/19	QC TABLE 6	passed
MCA4WJA	10:18 AM	20/08/19	QC TABLE 6	passed
MCA4WFM	10:19 AM	20/08/19	QC TABLE 6	passed
MCA4VWT	10:19 AM	20/08/19	QC TABLE 6	passed
MCA4VUM	10:19 AM	20/08/19	QC TABLE 6	passed
MCA4VUN	10:19 AM	20/08/19	QC TABLE 6	passed
MCA4VZM	10:20 AM	20/08/19	QC TABLE 6	passed
MCA4VZM	10:20 AM	20/08/19	QC TABLE 6	passed
MCA4WGK	10:21 AM	20/08/19	QC TABLE 6	passed
MCA4VX9	10:21 AM	20/08/19	QC TABLE 6	passed
MCA4WJV	10:21 AM	20/08/19	QC TABLE 6	passed
MCA4WK6	10:21 AM	20/08/19	QC TABLE 6	passed
MCA4VRP	10:22 AM	20/08/19	QC TABLE 6	passed
MCA4WM5	10:22 AM	20/08/19	QC TABLE 6	passed
MCA4WDG	10:22 AM	20/08/19	QC TABLE 6	passed
MCA4WAZ	10:23 AM	20/08/19	QC TABLE 6	passed
MCA4W8V	10:23 AM	20/08/19	QC TABLE 6	passed
MCA4W7G	10:23 AM	20/08/19	QC TABLE 6	passed
MCA4W7H	10:23 AM	20/08/19	QC TABLE 6	passed
MCA4WNU	10:23 AM	20/08/19	QC TABLE 6	passed
MCA4VU5	10:23 AM	20/08/19	QC TABLE 6	passed
MCA4WKW	10:23 AM	20/08/19	QC TABLE 6	passed
MCA4WAP	10:23 AM	20/08/19	QC TABLE 6	passed

MCA4WDP	10:24 AM	20/08/19	QC TABLE 6	passed
MCA4WAY	10:24 AM	20/08/19	QC TABLE 6	passed
MCA4WKD	10:24 AM	20/08/19	QC TABLE 6	passed
MCA4WP2	10:24 AM	20/08/19	QC TABLE 6	passed
MCA4WF0	10:24 AM	20/08/19	QC TABLE 6	passed
MCA4WWV	10:25 AM	20/08/19	QC TABLE 6	passed
MCA4WHE	10:25 AM	20/08/19	QC TABLE 6	passed
MCA4WKZ	10:25 AM	20/08/19	QC TABLE 6	passed
MCA4VT0	10:25 AM	20/08/19	QC TABLE 6	passed
MCA4WDJ	10:25 AM	20/08/19	QC TABLE 6	passed
MCA4W9J	10:25 AM	20/08/19	QC TABLE 6	passed
MCA4WLN	10:26 AM	20/08/19	QC TABLE 6	passed
MCA4W6K	10:26 AM	20/08/19	QC TABLE 6	passed
MCA4VZT	10:33 AM	20/08/19	QC TABLE 6	passed
MCA4WA1	10:34 AM	20/08/19	QC TABLE 6	passed
MCA4WK7	10:34 AM	20/08/19	QC TABLE 6	passed
MCA4WAN	10:34 AM	20/08/19	QC TABLE 6	passed
MCA4VUR	10:34 AM	20/08/19	QC TABLE 6	passed
MCA4WGR	10:34 AM	20/08/19	QC TABLE 6	passed
MCA4W78	10:34 AM	20/08/19	QC TABLE 6	passed
MCA4WCE	10:35 AM	20/08/19	QC TABLE 6	passed
MCA4W8P	10:35 AM	20/08/19	QC TABLE 6	passed
MCA4W63	10:35 AM	20/08/19	QC TABLE 6	passed
MCA4W5W	10:36 AM	20/08/19	QC TABLE 6	passed
MCA4VVR	10:36 AM	20/08/19	QC TABLE 6	passed
MCA4XW92	10:36 AM	20/08/19	QC TABLE 6	passed
MCA4W60	10:36 AM	20/08/19	QC TABLE 6	passed
MCA4VY9	10:36 AM	20/08/19	QC TABLE 6	passed
MCA4VV6	10:36 AM	20/08/19	QC TABLE 6	passed
MCA4VPU	10:37 AM	20/08/19	QC TABLE 6	passed
MCA4WTF	10:37 AM	20/08/19	QC TABLE 6	passed
MCA4VXK	10:37 AM	20/08/19	QC TABLE 6	passed
MCA4W17	10:37 AM	20/08/19	QC TABLE 6	passed
MCA4WD8	10:37 AM	20/08/19	QC TABLE 6	passed
MCA4W6T	10:37 AM	20/08/19	QC TABLE 6	passed
MCA4W5K	10:38 AM	20/08/19	QC TABLE 6	passed
MCA4WEG	10:38 AM	20/08/19	QC TABLE 6	passed
MCA4WJF	10:38 AM	20/08/19	QC TABLE 6	passed
MCA4W6C	10:38 AM	20/08/19	QC TABLE 6	passed
MCA4WDF	10:40 AM	20/08/19	QC TABLE 6	passed
MCA4WDF	10:40 AM	20/08/19	QC TABLE 6	passed
MCA4WJR	10:40 AM	20/08/19	QC TABLE 6	passed
MCA4WDF	10:40 AM	20/08/19	QC TABLE 6	passed
MCA4WWR	10:40 AM	20/08/19	QC TABLE 6	passed
MCA4WV7	10:41 AM	20/08/19	QC TABLE 6	passed
MCA4WNZ	10:41 AM	20/08/19	QC TABLE 6	passed
MCA4VXZ	10:42 AM	20/08/19	QC TABLE 6	passed
MCA4WA1	10:42 AM	20/08/19	QC TABLE 6	passed
MCA4W44	10:42 AM	20/08/19	QC TABLE 6	passed
MCA4VV9	10:42 AM	20/08/19	QC TABLE 6	passed
MCA4VZM	10:42 AM	20/08/19	QC TABLE 6	passed
MCA4W5A	10:51 AM	20/08/19	QC TABLE 6	passed
MCA4WDD	10:54 AM	20/08/19	QC TABLE 6	passed
MCA4WE7	10:58 AM	20/08/19	QC TABLE 6	passed
MCA4W59	11:00 AM	20/08/19	QC TABLE 6	passed

MCA4WDD	11:12 AM	20/08/19	QC TABLE 6	passed
MCA4WDD	11:12 AM	20/08/19	QC TABLE 6	passed
MCA4WE7	11:13 AM	20/08/19	QC TABLE 6	passed
MCA4W5A	11:13 AM	20/08/19	QC TABLE 6	passed
MCA4VUN	11:13 AM	20/08/19	QC TABLE 6	passed
MCA4WAM	11:13 AM	20/08/19	QC TABLE 6	passed
MCA4WN8	11:13 AM	20/08/19	QC TABLE 6	passed
MCA4W3R	11:13 AM	20/08/19	QC TABLE 6	passed
MCA4W5V	11:14 AM	20/08/19	QC TABLE 6	passed
MCA4WLU	11:14 AM	20/08/19	QC TABLE 6	passed
MCA4W06	11:14 AM	20/08/19	QC TABLE 6	passed
MCA4WLR	11:14 AM	20/08/19	QC TABLE 6	passed
MCA4VV5	11:14 AM	20/08/19	QC TABLE 6	passed
MCA4WCF	11:14 AM	20/08/19	QC TABLE 6	passed
MCA4WLW	11:15 AM	20/08/19	QC TABLE 6	passed
MCA4W41	11:15 AM	20/08/19	QC TABLE 6	passed
MCA4WFC	11:15 AM	20/08/19	QC TABLE 6	passed
MCA4VRD	11:15 AM	20/08/19	QC TABLE 6	passed
MCA4WKM	11:15 AM	20/08/19	QC TABLE 6	passed
MCA4WCJ	11:15 AM	20/08/19	QC TABLE 6	passed
MCA4WGX	11:16 AM	20/08/19	QC TABLE 6	passed
MCA4WU2	11:16 AM	20/08/19	QC TABLE 6	passed
MCA4W2U	11:16 AM	20/08/19	QC TABLE 6	passed
MCA4VYX	11:16 AM	20/08/19	QC TABLE 6	passed
MCA4VWD	11:16 AM	20/08/19	QC TABLE 6	passed
MCA4W3L	11:16 AM	20/08/19	QC TABLE 6	passed
MCA4WAG	11:17 AM	20/08/19	QC TABLE 6	passed
MCA4WT1	11:17 AM	20/08/19	QC TABLE 6	passed
MCA4W2L	11:17 AM	20/08/19	QC TABLE 6	passed
MCA4VY0	11:17 AM	20/08/19	QC TABLE 6	passed
MCA4WLZ	11:17 AM	20/08/19	QC TABLE 6	passed
MCA4WWF	11:17 AM	20/08/19	QC TABLE 6	passed
MCA4WGE	11:17 AM	20/08/19	QC TABLE 6	passed
MCA4WD7	11:18 AM	20/08/19	QC TABLE 6	passed
MCA4W5E	11:18 AM	20/08/19	QC TABLE 6	passed
MCA4W0X	11:18 AM	20/08/19	QC TABLE 6	passed
MCA4W2N	11:18 AM	20/08/19	QC TABLE 6	passed
MCA4VT8	11:18 AM	20/08/19	QC TABLE 6	passed
MCA4WL5	11:18 AM	20/08/19	QC TABLE 6	passed
MCA4W9N	11:18 AM	20/08/19	QC TABLE 6	passed
MCA4WGD	11:19 AM	20/08/19	QC TABLE 6	passed
MCA4W13	11:23 AM	20/08/19	QC TABLE 6	passed
MCA4W13	11:23 AM	20/08/19	QC TABLE 6	passed
MCA4VYZ	11:23 AM	20/08/19	QC TABLE 6	passed
MCA4VWE	11:24 AM	20/08/19	QC TABLE 6	passed
MCA4W93	11:24 AM	20/08/19	QC TABLE 6	passed
MCA4W8Y	11:24 AM	20/08/19	QC TABLE 6	passed
MCA4W0P	11:24 AM	20/08/19	QC TABLE 6	passed
MCA4W6E	11:24 AM	20/08/19	QC TABLE 6	passed
MCA4VXM	11:26 AM	20/08/19	QC TABLE 6	not passed
MCA4VXM	11:27 AM	20/08/19	QC TABLE 6	passed
MCA4VY1	11:31 AM	20/08/19	QC TABLE 6	not passed
MCA4VY1	11:33 AM	20/08/19	QC TABLE 6	not passed
MCA4W59	11:34 AM	20/08/19	QC TABLE 6	passed
MCA4W3Z	11:36 AM	20/08/19	QC TABLE 6	passed

MCA4W7R	12:16 PM	20/08/19	QC TABLE 6	passed
MCA4W7R	12:16 PM	20/08/19	QC TABLE 6	not passed
MCA4W6H	12:16 PM	20/08/19	QC TABLE 6	passed
MCA4W8W	12:16 PM	20/08/19	QC TABLE 6	passed
MCA4W80	12:16 PM	20/08/19	QC TABLE 6	not passed
MCA4W3Z	12:17 PM	20/08/19	QC TABLE 6	passed
MCA4W10	12:17 PM	20/08/19	QC TABLE 6	passed
MCA4VU3	12:17 PM	20/08/19	QC TABLE 6	passed
MCA4W85	12:17 PM	20/08/19	QC TABLE 6	passed
MCA4W2A	12:17 PM	20/08/19	QC TABLE 6	passed
MCA4WE9	12:17 PM	20/08/19	QC TABLE 6	passed
MCA4WEN	12:18 PM	20/08/19	QC TABLE 6	passed
MCA4WGL	12:21 PM	20/08/19	QC TABLE 6	passed
MCA4W72	12:24 PM	20/08/19	QC TABLE 6	passed
MCA4VZA	12:26 PM	20/08/19	QC TABLE 6	passed
MCA4W04	12:29 PM	20/08/19	QC TABLE 6	passed
MCA4WKK	12:43 PM	20/08/19	QC TABLE 6	passed
MCA4WKK	12:43 PM	20/08/19	QC TABLE 6	passed
MCA4WH6	12:43 PM	20/08/19	QC TABLE 6	passed
MCA4WPN	12:47 PM	20/08/19	QC TABLE 6	not passed
MCA4WJC	12:52 PM	20/08/19	QC TABLE 6	passed
MCA3Z8D	12:54 PM	20/08/19	QC TABLE 6	passed
MCA4WN0	12:59 PM	20/08/19	QC TABLE 6	passed
MCA4W0J	01:04 PM	20/08/19	QC TABLE 6	passed
MCA4VV3	01:08 PM	20/08/19	QC TABLE 6	passed
MCA4WG1	01:14 PM	20/08/19	QC TABLE 6	passed
MCA4W8L	01:18 PM	20/08/19	QC TABLE 6	passed
MCA4VYA	01:21 PM	20/08/19	QC TABLE 6	passed
MCA4W3G	01:25 PM	20/08/19	QC TABLE 6	passed
MCA4W3G	01:25 PM	20/08/19	QC TABLE 6	passed
MCA4W11	01:29 PM	20/08/19	QC TABLE 6	passed
MCAXWPN	01:38 PM	20/08/19	QC TABLE 6	passed
MCA4W6H	01:38 PM	20/08/19	QC TABLE 6	passed
MCA4VTH	01:38 PM	20/08/19	QC TABLE 6	passed
MCA4W3Z	01:38 PM	20/08/19	QC TABLE 6	passed
MCA4W3Z	01:38 PM	20/08/19	QC TABLE 6	passed
MCA4W3Z	01:38 PM	20/08/19	QC TABLE 6	passed
MCA4W24	01:38 PM	20/08/19	QC TABLE 6	passed
MCA4VUH	01:39 PM	20/08/19	QC TABLE 6	passed
MCA4W1D	01:39 PM	20/08/19	QC TABLE 6	passed
MCA4WPG	01:39 PM	20/08/19	QC TABLE 6	passed
MCA4WU0	01:39 PM	20/08/19	QC TABLE 6	passed
MCA4WM9	01:42 PM	20/08/19	QC TABLE 6	not passed
MCA4WC1	01:47 PM	20/08/19	QC TABLE 6	not passed
MCA4WC1	01:47 PM	20/08/19	QC TABLE 6	passed
MCA4WC1	01:47 PM	20/08/19	QC TABLE 6	not passed
MCA4WC1	01:54 PM	20/08/19	QC TABLE 6	not passed
MCA4W3G	01:58 PM	20/08/19	QC TABLE 6	passed
MCA4W3G	02:00 PM	20/08/19	QC TABLE 6	passed
MCA4W52	02:12 PM	20/08/19	QC TABLE 6	passed
MCA4VX5	02:14 PM	20/08/19	QC TABLE 6	passed
MCA4VXH	02:20 PM	20/08/19	QC TABLE 6	passed
MCA4WE5	02:25 PM	20/08/19	QC TABLE 6	passed
MCA4VTG	02:29 PM	20/08/19	QC TABLE 6	passed
MCA4WJH	02:34 PM	20/08/19	QC TABLE 6	passed

MCA4W61	02:38 PM	20/08/19	QC TABLE 6	passed
MCA4WAJ	02:45 PM	20/08/19	QC TABLE 6	passed
MCA4TRR	02:46 PM	20/08/19	QC TABLE 6	passed
MCA4WAJ	02:53 PM	20/08/19	QC TABLE 6	passed
MCA4VPL	02:57 PM	20/08/19	QC TABLE 6	passed
MCA14W4	03:08 PM	20/08/19	QC TABLE 6	passed
MCA4WC4	03:12 PM	20/08/19	QC TABLE 6	passed
MCA4VZU	03:21 PM	20/08/19	QC TABLE 6	passed
MCA4VRJ	03:25 PM	20/08/19	QC TABLE 6	passed
MCA4VUA	03:29 PM	20/08/19	QC TABLE 6	passed
MCA4W8D	04:46 PM	20/08/19	QC TABLE 6	passed
MCA4WLH	04:50 PM	20/08/19	QC TABLE 6	passed
MCA4V0M	04:55 PM	20/08/19	QC TABLE 6	passed
MCA4W9H	04:59 PM	20/08/19	QC TABLE 6	passed
MCA4WWE	05:03 PM	20/08/19	QC TABLE 6	passed
MCA4VR1	05:09 PM	20/08/19	QC TABLE 6	passed
MCA4WDK	05:15 PM	20/08/19	QC TABLE 6	passed
MCA4WC8	05:20 PM	20/08/19	QC TABLE 6	passed
MCA4W97	05:24 PM	20/08/19	QC TABLE 6	passed
MCA4W42	05:29 PM	20/08/19	QC TABLE 6	passed
MCA4WHV	05:38 PM	20/08/19	QC TABLE 6	passed
MCA4VPT	05:44 PM	20/08/19	QC TABLE 6	not passed
MCA4W20	05:49 PM	20/08/19	QC TABLE 6	passed
MCA4VZ1	05:53 PM	20/08/19	QC TABLE 6	passed
MCA4WJJ	05:57 PM	20/08/19	QC TABLE 6	passed
MCA4WA4	06:00 PM	20/08/19	QC TABLE 6	passed
MCA4VUP	06:04 PM	20/08/19	QC TABLE 6	passed
MCA4W86	06:09 PM	20/08/19	QC TABLE 6	passed
MCA4WLE	06:15 PM	20/08/19	QC TABLE 6	passed
MCA4VUD	06:24 PM	20/08/19	QC TABLE 6	passed
MCA4WER	06:29 PM	20/08/19	QC TABLE 6	not passed
MCA4WEY	02:47:59	20/08/19	RUK 1	
MCA4WKK	03:00:52	20/08/19	RUK 1	
MCA4W21	03:16:35	20/08/19	RUK 1	
MCA4VUW	03:31:07	20/08/19	RUK 1	
MCA4VUX	03:32:17	20/08/19	RUK 1	
MCA4W7A	04:01:57	20/08/19	RUK 1	
MCA4VRL	04:08:07	20/08/19	RUK 1	
MCA4WFK	04:14:38	20/08/19	RUK 1	
MCA4W04	04:22:13	20/08/19	RUK 1	
MCA4W9H	04:25:25	20/08/19	RUK 1	
MCA4WAM	04:26:29	20/08/19	RUK 1	
MCA4W96	04:31:23	20/08/19	RUK 1	
MCA4WFY	04:41:01	20/08/19	RUK 1	
MCA4WH7	04:44:30	20/08/19	RUK 1	
MCA4WMM	04:52:18	20/08/19	RUK 1	
MCA4VTG	05:11:27	20/08/19	RUK 1	
MCA4WKV	05:14:41	20/08/19	RUK 1	
MCA4VZ7	05:19:54	20/08/19	RUK 1	
MCA4W5D	05:34:21	20/08/19	RUK 1	
MCA4W27	05:38:49	20/08/19	RUK 1	
MCA4W26	05:39:14	20/08/19	RUK 1	
MCA4W39	06:13:44	20/08/19	RUK 1	
MCA4WNG	06:28:01	20/08/19	RUK 1	
MCA4VZC	06:35:46	20/08/19	RUK 1	

MCA4WP4	06:45:47	20/08/19	RUK 1	
MCA4V0V	06:58:11	20/08/19	RUK 1	
MCA4X9R	07:00:13	20/08/19	RUK 1	
MCA4XG4	07:17:27	20/08/19	RUK 1	
MCA4WYT	07:29:13	20/08/19	RUK 1	
MCA4UPE	07:45:54	20/08/19	RUK 1	
MCA4X9W	08:02:24	20/08/19	RUK 1	
MCA4X83	08:03:54	20/08/19	RUK 1	
MCA4UJM	08:15:27	20/08/19	RUK 1	
MCA4X93	08:18:57	20/08/19	RUK 1	
MCA4VGL	08:26:08	20/08/19	RUK 1	
MCA4XCN	08:31:46	20/08/19	RUK 1	
MCA4XX2	09:11:46	20/08/19	RUK 1	
MCA4XR3	09:22:06	20/08/19	RUK 1	
MCA4X9Y	09:34:04	20/08/19	RUK 1	
MCA4XF4	09:42:36	20/08/19	RUK 1	
MCA4Y0F	09:56:24	20/08/19	RUK 1	
MCA4WZJ	10:45:57	20/08/19	RUK 1	
MCA4X1V	10:52:57	20/08/19	RUK 1	
MCA4XPC	11:19:39	20/08/19	RUK 1	
MCA4X77	11:21:07	20/08/19	RUK 1	
MCA4X3H	11:31:13	20/08/19	RUK 1	
MCA4XEM	11:51:50	20/08/19	RUK 1	
MCA4XWM	12:07:22	20/08/19	RUK 1	
MCA4VA0	12:16:10	20/08/19	RUK 1	
MCA4V5P	12:16:50	20/08/19	RUK 1	
MCA4V8X	12:17:20	20/08/19	RUK 1	
MCA4XY0	12:18:09	20/08/19	RUK 1	
MCA4XD2	12:23:15	20/08/19	RUK 1	
MCA4WZH	12:27:42	20/08/19	RUK 1	
MCA4TLW	12:35:48	20/08/19	RUK 1	
MCA4X33	12:46:27	20/08/19	RUK 1	
MCA4X32	12:47:30	20/08/19	RUK 1	
MCA4XMA	12:48:54	20/08/19	RUK 1	
MCA4XKA	13:06:08	20/08/19	RUK 1	
MCA4Y17	13:15:44	20/08/19	RUK 1	
MCA4X4L	13:26:50	20/08/19	RUK 1	
MCA4XAW	13:37:57	20/08/19	RUK 1	
MCA4VFK	14:08:00	20/08/19	RUK 1	
MCA4X6J	14:14:47	20/08/19	RUK 1	
MCA4XTW	14:17:14	20/08/19	RUK 1	
MCA4X2G	14:25:26	20/08/19	RUK 1	
MCA4XGN	14:35:00	20/08/19	RUK 1	
MCA4PKP	14:46:55	20/08/19	RUK 1	
MCA4XL1	14:56:02	20/08/19	RUK 1	
MCA4XL2	15:01:25	20/08/19	RUK 1	
MCA4WJU	15:05:13	20/08/19	RUK 1	
MCA4XM8	15:16:27	20/08/19	RUK 1	
MCA4XL8	15:21:51	20/08/19	RUK 1	
MCA4W4M	15:28:37	20/08/19	RUK 1	
MCA4W0R	15:34:11	20/08/19	RUK 1	
MCA4WC3	15:34:57	20/08/19	RUK 1	
MCA4X2D	15:42:46	20/08/19	RUK 1	
MCA4XJJ	16:04:20	20/08/19	RUK 1	
MCA4XN4	16:35:29	20/08/19	RUK 1	

MCA4X4P	16:45:24	20/08/19	RUK 1	
MCA4X8D	17:12:04	20/08/19	RUK 1	
MCA4X87	17:21:20	20/08/19	RUK 1	
MCA4V16	17:29:04	20/08/19	RUK 1	
MCA4X1Z	17:40:33	20/08/19	RUK 1	
MCA4X7V	17:46:53	20/08/19	RUK 1	
MCA4XF3	18:31:38	20/08/19	RUK 1	
MCA4W80	18:33:45	20/08/19	RUK 1	
MCA4X6L	18:36:59	20/08/19	RUK 1	
MCA4X8M	18:43:53	20/08/19	RUK 1	
MCA4XTC	18:45:04	20/08/19	RUK 1	
MCA4XNM	18:53:51	20/08/19	RUK 1	
MCA4XY8	18:59:32	20/08/19	RUK 1	
MCA4WF3	19:07:09	20/08/19	RUK 1	
MCA4XF0	19:16:05	20/08/19	RUK 1	
MCA4XDP	20:04:36	20/08/19	RUK 1	
MCA4XL9	20:08:28	20/08/19	RUK 1	
MCA4X40	20:18:08	20/08/19	RUK 1	
MCA4XGT	20:21:31	20/08/19	RUK 1	
MCA4X4H	20:25:29	20/08/19	RUK 1	
MCA4VTA	20:30:16	20/08/19	RUK 1	
MCA4TLA	20:53:34	20/08/19	RUK 1	
MCA4UDN	20:56:58	20/08/19	RUK 1	
MCA4X7Y	21:19:43	20/08/19	RUK 1	
MCA4XXM	21:24:26	20/08/19	RUK 1	
MCA4X4Y	22:02:47	20/08/19	RUK 1	
MCA4XN0	22:15:24	20/08/19	RUK 1	
MCA4XF8	22:22:46	20/08/19	RUK 1	
MCA4X3J	22:37:22	20/08/19	RUK 1	
MCA4XTE	22:46:23	20/08/19	RUK 1	
MCA4X75	23:00:17	20/08/19	RUK 1	
MCA4XC9	23:24:39	20/08/19	RUK 1	
MCA4XVV	23:32:15	20/08/19	RUK 1	
MCA4X65	23:42:43	20/08/19	RUK 1	
MCA4XY5	06:38:38	20/08/19	RUK 2	
MCA4YKG	06:47:03	20/08/19	RUK 2	
MCA4Y9M	06:56:05	20/08/19	RUK 2	
MCA4YHN	07:30:01	20/08/19	RUK 2	
MCA4Y44	07:30:49	20/08/19	RUK 2	
MCA4YWM	07:33:47	20/08/19	RUK 2	
MCA4YZA	07:43:12	20/08/19	RUK 2	
MCA4YTN	07:52:39	20/08/19	RUK 2	
MCA4Z5A	07:59:56	20/08/19	RUK 2	
MCA4Z61	08:08:19	20/08/19	RUK 2	
MCA4YCL	08:15:21	20/08/19	RUK 2	
MCA4XCW	08:27:05	20/08/19	RUK 2	
MCA4XTF	08:40:44	20/08/19	RUK 2	
MCA4Z69	09:06:14	20/08/19	RUK 2	
MCA4YXT	09:20:15	20/08/19	RUK 2	
MCA4Z5Y	09:26:17	20/08/19	RUK 2	
MCA4YZH	09:30:39	20/08/19	RUK 2	
MCA4Z2R	09:36:17	20/08/19	RUK 2	
MCA4Z1L	09:47:25	20/08/19	RUK 2	
MCA4WMP	09:55:11	20/08/19	RUK 2	
MCA4Z62	10:43:11	20/08/19	RUK 2	

MCA4YYF	11:06:11	20/08/19	RUK 2	
MCA4YXA	11:11:49	20/08/19	RUK 2	
MCA4X69	11:13:47	20/08/19	RUK 2	
MCA4Y5F	11:15:05	20/08/19	RUK 2	
MCA4Z0Z	11:23:01	20/08/19	RUK 2	
MCA4YN1	11:31:39	20/08/19	RUK 2	
MCA4YX8	11:44:03	20/08/19	RUK 2	
MCA4Z0M	11:44:52	20/08/19	RUK 2	
MCA4YN0	11:49:19	20/08/19	RUK 2	
MCA4UY2	11:50:24	20/08/19	RUK 2	
MCA4YKT	12:00:20	20/08/19	RUK 2	
MCA4Z11	12:02:39	20/08/19	RUK 2	
MCA4YZ9	12:07:56	20/08/19	RUK 2	
MCA4YHY	13:06:08	20/08/19	RUK 2	
MCA4V9M	13:16:14	20/08/19	RUK 2	
MCA4UJY	13:17:32	20/08/19	RUK 2	
MCA4YDP	13:24:44	20/08/19	RUK 2	
MCA4YCN	13:36:16	20/08/19	RUK 2	
MCA4R0A	13:45:42	20/08/19	RUK 2	
MCA4Y9V	13:52:41	20/08/19	RUK 2	
MCA4YVT	14:01:05	20/08/19	RUK 2	
MCA4WH4	14:07:11	20/08/19	RUK 2	
MCA4Y3W	14:08:32	20/08/19	RUK 2	
MCA4Z52	14:28:47	20/08/19	RUK 2	
MCA4YTA	14:38:26	20/08/19	RUK 2	
MCA4Y9D	14:49:51	20/08/19	RUK 2	
MCA4W50	15:16:06	20/08/19	RUK 2	
MCA4UZT	15:18:33	20/08/19	RUK 2	
MCA4XN5	15:20:50	20/08/19	RUK 2	
MCA4XK0	15:21:29	20/08/19	RUK 2	
MCA4XYN	15:22:00	20/08/19	RUK 2	
MCA4XUA	15:23:01	20/08/19	RUK 2	
MCA4X5X	15:24:14	20/08/19	RUK 2	
MCA4X6W	15:24:44	20/08/19	RUK 2	
MCA4X8K	15:25:42	20/08/19	RUK 2	
MCA4XJY	15:28:42	20/08/19	RUK 2	
MCA4VVE	15:34:12	20/08/19	RUK 2	
MCA4X3P	15:40:18	20/08/19	RUK 2	
MCA4XP9	15:43:23	20/08/19	RUK 2	
MCA4WYW	15:44:09	20/08/19	RUK 2	
MCA4X1T	15:44:52	20/08/19	RUK 2	
MCA4XM7	15:46:28	20/08/19	RUK 2	
MCA4XCN	15:47:32	20/08/19	RUK 2	
MCA4XTE	15:48:30	20/08/19	RUK 2	
MCA4WYD	15:49:51	20/08/19	RUK 2	
MCA4X5R	15:50:47	20/08/19	RUK 2	
MCA4Z6Z	16:55:11	20/08/19	RUK 2	
MCA4Z6N	17:31:04	20/08/19	RUK 2	
MCA4YA5	17:44:03	20/08/19	RUK 2	
MCA4XC9	17:48:59	20/08/19	RUK 2	
MCA4XV1	17:49:53	20/08/19	RUK 2	
MCA4X33	17:50:34	20/08/19	RUK 2	
MCA4XKZ	17:51:18	20/08/19	RUK 2	
MCA4Z2K	17:55:17	20/08/19	RUK 2	
MCA4YWH	18:06:31	20/08/19	RUK 2	

MCA4Z5C	18:14:58	20/08/19	RUK 2	
MCA4YZ3	18:25:22	20/08/19	RUK 2	
MCA4YAY	18:36:04	20/08/19	RUK 2	
MCA4YZ1	18:44:43	20/08/19	RUK 2	
MCA4YXF	18:53:32	20/08/19	RUK 2	
MCA4Y68	19:02:49	20/08/19	RUK 2	
MCA4UW7	19:09:33	20/08/19	RUK 2	
MCA4Z2U	19:09:53	20/08/19	RUK 2	
MCA4YYV	19:29:56	20/08/19	RUK 2	
MCA4Y77	20:05:25	20/08/19	RUK 2	
MCA4WL3	20:15:17	20/08/19	RUK 2	
MCA4XJC	20:16:37	20/08/19	RUK 2	
MCA4XWN	20:17:35	20/08/19	RUK 2	
MCA4XUP	20:18:11	20/08/19	RUK 2	
MCA4VVW	20:31:25	20/08/19	RUK 2	
MCA4YRT	20:32:38	20/08/19	RUK 2	
MCA4Z38	20:41:05	20/08/19	RUK 2	
MCA4WHJ	20:55:49	20/08/19	RUK 2	
MCA4YCP	20:57:12	20/08/19	RUK 2	
MCA4YW4	21:07:34	20/08/19	RUK 2	
MCA4Z3V	21:12:00	20/08/19	RUK 2	
MCA4WZY	21:12:30	20/08/19	RUK 2	
MCA4YZV	21:18:07	20/08/19	RUK 2	
MCA4V6X	21:29:16	20/08/19	RUK 2	
MCA4Y5J	21:48:26	20/08/19	RUK 2	
MCA4Y7A	21:48:52	20/08/19	RUK 2	
MCA4Z3Z	21:49:24	20/08/19	RUK 2	
MCA4XPF	21:51:14	20/08/19	RUK 2	
MCA4XK8	21:51:43	20/08/19	RUK 2	
MCA4LM7	06:12:25	20/08/19	RUIZHOU 1	
MCA4LDF	06:20:23	20/08/19	RUIZHOU 1	
MCA4LKG	06:33:57	20/08/19	RUIZHOU 1	
MCA4MEC	06:42:16	20/08/19	RUIZHOU 1	
MCA4M7H	06:57:06	20/08/19	RUIZHOU 1	
MCA4KXD	07:01:12	20/08/19	RUIZHOU 1	
MCA4KLR	07:02:03	20/08/19	RUIZHOU 1	
MCA4LTL	07:26:15	20/08/19	RUIZHOU 1	
MCA4KW7	07:33:18	20/08/19	RUIZHOU 1	
MCA4GCD	08:34:28	20/08/19	RUIZHOU 1	
MCA4LFM	08:36:20	20/08/19	RUIZHOU 1	
MCA4FJC	08:49:39	20/08/19	RUIZHOU 1	
MCA4LDJ	08:51:38	20/08/19	RUIZHOU 1	
MCA4M47	09:08:25	20/08/19	RUIZHOU 1	
MCA4L60	09:11:14	20/08/19	RUIZHOU 1	
MCA4M1G	09:25:45	20/08/19	RUIZHOU 1	
MCA4MCK	09:33:07	20/08/19	RUIZHOU 1	
MCA4M0Y	09:43:34	20/08/19	RUIZHOU 1	
MCA4LJ8	09:57:45	20/08/19	RUIZHOU 1	
MCA4LNW	10:14:29	20/08/19	RUIZHOU 1	
MCA4LXH	10:32:40	20/08/19	RUIZHOU 1	
MCA4M3Z	10:46:33	20/08/19	RUIZHOU 1	
MCA4M02	10:57:41	20/08/19	RUIZHOU 1	
MCA4M03	10:58:53	20/08/19	RUIZHOU 1	
MCA4LJ9	11:00:09	20/08/19	RUIZHOU 1	
MCA4LFK	11:01:34	20/08/19	RUIZHOU 1	

MCA4M58	11:17:59	20/08/19	RUIZHOU 1	
MCA4NLN	11:24:13	20/08/19	RUIZHOU 1	
MCA4MLH	11:38:55	20/08/19	RUIZHOU 1	
MCA4K80	11:45:32	20/08/19	RUIZHOU 1	
MCA4N45	11:49:42	20/08/19	RUIZHOU 1	
MCA4FWL	11:54:16	20/08/19	RUIZHOU 1	
MCA4MZK	12:10:03	20/08/19	RUIZHOU 1	
MCA4NN7	12:16:02	20/08/19	RUIZHOU 1	
MCA4C62	12:29:29	20/08/19	RUIZHOU 1	
MCA4NMJ	13:08:29	20/08/19	RUIZHOU 1	
MCA4MPM	13:20:35	20/08/19	RUIZHOU 1	
MCA4NTV	13:44:51	20/08/19	RUIZHOU 1	
MCA4NEC	13:52:36	20/08/19	RUIZHOU 1	
MCA4NT0	13:59:22	20/08/19	RUIZHOU 1	
MCA4N51	13:59:52	20/08/19	RUIZHOU 1	
MCA4M12	14:19:00	20/08/19	RUIZHOU 1	
MCA4NGD	14:23:14	20/08/19	RUIZHOU 1	
MCA4MXP	14:37:14	20/08/19	RUIZHOU 1	
MCA4GHD	14:39:02	20/08/19	RUIZHOU 1	
MCA4K62	14:56:20	20/08/19	RUIZHOU 1	
MCA4K9K	15:31:23	20/08/19	RUIZHOU 1	
MCA4HE9	15:35:22	20/08/19	RUIZHOU 1	
MCA4LVT	15:47:43	20/08/19	RUIZHOU 1	
MCA6M89	15:50:08	20/08/19	RUIZHOU 1	
MCA4LVL	16:13:46	20/08/19	RUIZHOU 1	
MCA4NUW	16:16:50	20/08/19	RUIZHOU 1	
MCA4NP1	16:32:08	20/08/19	RUIZHOU 1	
MCA4L4L	16:40:34	20/08/19	RUIZHOU 1	
MCA4MHW	16:56:19	20/08/19	RUIZHOU 1	
MCA4ME1	17:19:38	20/08/19	RUIZHOU 1	
MCA4MFA	17:32:11	20/08/19	RUIZHOU 1	
MCA4KFN	17:33:00	20/08/19	RUIZHOU 1	
MCA4NV7	17:33:34	20/08/19	RUIZHOU 1	
MCA4KNZ	17:36:29	20/08/19	RUIZHOU 1	
MCA4NH5	17:43:05	20/08/19	RUIZHOU 1	
MCA4NHZ	17:50:26	20/08/19	RUIZHOU 1	
MCA4K91	17:55:51	20/08/19	RUIZHOU 1	
MCA6KT0	18:08:20	20/08/19	RUIZHOU 1	
MCA4LPF	18:16:21	20/08/19	RUIZHOU 1	
MCA4KT0	18:16:49	20/08/19	RUIZHOU 1	
MCA4MGP	18:31:56	20/08/19	RUIZHOU 1	
MCA4N92	18:45:49	20/08/19	RUIZHOU 1	
MCA4MTK	18:57:16	20/08/19	RUIZHOU 1	
MCA4MT4	19:11:03	20/08/19	RUIZHOU 1	
MCA4N8X	19:23:57	20/08/19	RUIZHOU 1	
MCA4MV3	20:04:02	20/08/19	RUIZHOU 1	
MCA4NF8	20:13:57	20/08/19	RUIZHOU 1	
MCA4JRR	20:20:51	20/08/19	RUIZHOU 1	
MCA4JJP	20:37:58	20/08/19	RUIZHOU 1	
MCA4JJ8	20:48:40	20/08/19	RUIZHOU 1	
MCA4FLK	20:56:11	20/08/19	RUIZHOU 1	
MCA4MYN	21:02:58	20/08/19	RUIZHOU 1	
MCA4MG5	21:14:49	20/08/19	RUIZHOU 1	
MCA4MAD	21:15:30	20/08/19	RUIZHOU 1	
MCA4NC0	21:22:48	20/08/19	RUIZHOU 1	

MCA4JJR	21:25:29	20/08/19	RUIZHOU 1	
MCA4MWC	21:39:30	20/08/19	RUIZHOU 1	
MCA4N6C	21:53:57	20/08/19	RUIZHOU 1	
MCA4RH0	06:19:48	20/08/19	RUIZHOU 2	
MCA4PN4	06:26:45	20/08/19	RUIZHOU 2	
MCA4PU1	06:39:58	20/08/19	RUIZHOU 2	
MCA4RD9	06:47:47	20/08/19	RUIZHOU 2	
MCA4P6J	06:54:32	20/08/19	RUIZHOU 2	
MCA4PX4	06:55:33	20/08/19	RUIZHOU 2	
MCA4PX9	07:04:32	20/08/19	RUIZHOU 2	
MCA4R7R	07:05:20	20/08/19	RUIZHOU 2	
MCA4PWP	07:14:03	20/08/19	RUIZHOU 2	
MCA4PY0	07:17:57	20/08/19	RUIZHOU 2	
MCA4R5U	07:21:23	20/08/19	RUIZHOU 2	
MCA4PXD	07:27:35	20/08/19	RUIZHOU 2	
MCA4PML	07:33:34	20/08/19	RUIZHOU 2	
MCA4RAL	07:48:18	20/08/19	RUIZHOU 2	
MCA4PUD	08:11:03	20/08/19	RUIZHOU 2	
MCA4NHF	08:15:08	20/08/19	RUIZHOU 2	
MCA4NM9	08:18:20	20/08/19	RUIZHOU 2	
MCA4PR2	08:20:18	20/08/19	RUIZHOU 2	
MCA4PL6	08:31:30	20/08/19	RUIZHOU 2	
MCA4P23	08:41:11	20/08/19	RUIZHOU 2	
MCA4M71	08:59:02	20/08/19	RUIZHOU 2	
MCA4RFH	09:10:59	20/08/19	RUIZHOU 2	
MCA4P8D	09:12:34	20/08/19	RUIZHOU 2	
MCA4MD5	09:21:11	20/08/19	RUIZHOU 2	
MCA4P8H	09:22:58	20/08/19	RUIZHOU 2	
MCA4P7G	09:31:10	20/08/19	RUIZHOU 2	
MCA4R36	09:42:16	20/08/19	RUIZHOU 2	
MCA4R2J	09:53:20	20/08/19	RUIZHOU 2	
MCA4HGE	10:44:48	20/08/19	RUIZHOU 2	
MCA4R7T	10:54:28	20/08/19	RUIZHOU 2	
MCA4RCK	11:05:04	20/08/19	RUIZHOU 2	
MCA4PYN	11:16:07	20/08/19	RUIZHOU 2	
MCA4R0U	11:23:04	20/08/19	RUIZHOU 2	
MCA4R7J	11:43:12	20/08/19	RUIZHOU 2	
MCA4P10	11:56:21	20/08/19	RUIZHOU 2	
MCA4NZL	12:14:57	20/08/19	RUIZHOU 2	
MCA4R28	12:20:31	20/08/19	RUIZHOU 2	
MCA4RKE	12:32:12	20/08/19	RUIZHOU 2	
MCA4NTP	12:33:31	20/08/19	RUIZHOU 2	
MCA4R6G	12:39:55	20/08/19	RUIZHOU 2	
MCA4P1M	12:48:10	20/08/19	RUIZHOU 2	
MCA4RA1	12:59:16	20/08/19	RUIZHOU 2	
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MCA4R4Z	13:41:32	20/08/19	RUIZHOU 2	
MCA4RGL	13:48:15	20/08/19	RUIZHOU 2	
MCA4PMM	14:04:33	20/08/19	RUIZHOU 2	
MCA4R7X	14:06:37	20/08/19	RUIZHOU 2	
MCA4PXG	14:12:00	20/08/19	RUIZHOU 2	
MCA4RE0	14:18:04	20/08/19	RUIZHOU 2	

MCA4RA9	14:19:45	20/08/19	RUIZHOU 2	
MCA4R6H	14:25:58	20/08/19	RUIZHOU 2	
MCA4NVV	14:31:01	20/08/19	RUIZHOU 2	
MCA4NVL	14:32:12	20/08/19	RUIZHOU 2	
MCA4PE6	14:34:20	20/08/19	RUIZHOU 2	
MCA4PC5	14:34:50	20/08/19	RUIZHOU 2	
MCA4PE5	14:52:41	20/08/19	RUIZHOU 2	
MCA4PU6	15:03:29	20/08/19	RUIZHOU 2	
MCA4RJ5	15:15:50	20/08/19	RUIZHOU 2	
MCA4RDE	15:26:55	20/08/19	RUIZHOU 2	
MCA4P7C	15:37:25	20/08/19	RUIZHOU 2	
MCA4PEA	15:45:47	20/08/19	RUIZHOU 2	
MCA4NAC	15:49:58	20/08/19	RUIZHOU 2	
MCA4R65	15:56:54	20/08/19	RUIZHOU 2	
MCA4RC7	16:11:10	20/08/19	RUIZHOU 2	
MCA4RCX	16:24:09	20/08/19	RUIZHOU 2	
MCA4PJG	16:45:11	20/08/19	RUIZHOU 2	
MCA4NWM	16:53:08	20/08/19	RUIZHOU 2	
MCA4P1K	17:11:41	20/08/19	RUIZHOU 2	
MCA4RG6	17:21:22	20/08/19	RUIZHOU 2	
MCA4R2A	17:26:11	20/08/19	RUIZHOU 2	
MCA4PTM	17:31:51	20/08/19	RUIZHOU 2	
MCA4P8E	17:42:46	20/08/19	RUIZHOU 2	
MCA4R85	17:52:47	20/08/19	RUIZHOU 2	
MCA4N11	18:05:55	20/08/19	RUIZHOU 2	
MCA4PAW	18:09:08	20/08/19	RUIZHOU 2	
MCA4PNM	18:27:13	20/08/19	RUIZHOU 2	
MCA4R22	18:42:16	20/08/19	RUIZHOU 2	
MCA4PKZ	18:42:45	20/08/19	RUIZHOU 2	
MCA4UDR	18:50:21	20/08/19	RUIZHOU 2	
MCA4TYE	18:55:41	20/08/19	RUIZHOU 2	
MCA4U16	19:12:17	20/08/19	RUIZHOU 2	
MCA4U35	19:15:25	20/08/19	RUIZHOU 2	
MCA4TYT	19:29:24	20/08/19	RUIZHOU 2	
MCA4TXY	20:07:38	20/08/19	RUIZHOU 2	
MCA4KWW	20:21:05	20/08/19	RUIZHOU 2	
MCA4KF1	20:35:24	20/08/19	RUIZHOU 2	
MCA4KEP	20:36:53	20/08/19	RUIZHOU 2	
MCA4KU1	20:42:25	20/08/19	RUIZHOU 2	
MCA4L7L	20:48:24	20/08/19	RUIZHOU 2	
MCA4L6L	20:51:21	20/08/19	RUIZHOU 2	
MCA4KZD	20:57:21	20/08/19	RUIZHOU 2	
MCA4TXV	21:01:01	20/08/19	RUIZHOU 2	
MCA4TRA	21:11:51	20/08/19	RUIZHOU 2	
MCA4PFC	21:19:32	20/08/19	RUIZHOU 2	
MCA4TUF	21:21:13	20/08/19	RUIZHOU 2	
MCA4PUK	21:41:04	20/08/19	RUIZHOU 2	
MCA4U2E	21:46:55	20/08/19	RUIZHOU 2	
MCA4L41	21:51:17	20/08/19	RUIZHOU 2	
MCA4RWE	21:58:41	20/08/19	RUIZHOU 2	