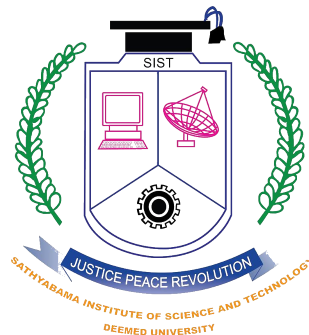


INTERNSHIP REPORT

**SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE AWARD OF
BACHELOR OF SCIENCE – FASHION DESIGN**

by

DEEPTHI. A (41105002)



**DEPARTMENT OF FASHION DESIGN
SCHOOL OF BUILDING AND ENVIRONMENT**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with “A++” by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI – 600119

JULY 2023

SCHOOL OF BUILDING AND ENVIRONMENT

DEPARTMENT OF FASHION DESIGN

INTERNSHIP REPORT (S105AINT)

2023 – 2024

Name of the Student : DEEPTHI.A

Reg No : 41105002

Semester : V

Batch : 2021-2024



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SCHOOL OF BUILDING AND ENVIRONMENT
DEPARTMENT OF FASHION DESIGN
INTERNSHIP REPORT (S105AINT)
2023 – 2024

VIVA –VOCE EXAMINATION

This is to certify that the Internship (S105AINT) is the work of DEEPTHI.A- 41105002, during semester V, is a student of Fashion Design department had undergone training in SHAHI EXPORTS PVT LTD. has been monitored by the continuous assessment from 11/05/2023 to 03/06/2023.

Submitted for Viva Voce examination held on: **06.09.2023**

Mentor

Class Coordinator

Internal Examiner

External Examiner

Head of the Department

Head of the Department
Fashion Design

Sathyabama Institute of Science and Technology
Chennai-680 119.



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DECLARATION

I DEEPTHI.A here by declare that the Internship (S105AINT) for 21 days from 11/05/2023 to 03/06/2023 done by me under the guidance of Miss. S. SAVITHIRI, is my original work and is prepared based upon the data and information collected during my internship period is submitted in partial fulfillment of the requirements for the completion of practical training session.

Date: 06.09.2023

Place: CHENNAI

SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of **SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY** for their kind encouragement in doing this Internship and completing it successfully. I am grateful to them.

I convey my thanks to **Dr. DEVYANI GANGOPADHYAY** Dean, School of Building and Environment for providing me constant support and guidance. Your dedication to fostering a positive and nurturing academic environment has made a significant impact on my personal and professional growth.

I express my deep sense of gratitude to **Mrs. S. KRITHIKA** Head of the Department, Department of Fashion Design, School of Building and Environment, for providing me the assistance and knowledge at the right time during the progressive reviews.

I would like to extend my sincere gratitude to **Mrs. SWAPNA NARRA** for giving me the chance to be a part of your esteemed organization and gain practical experience in the industry. I admire, the great opportunity that has provided to us and all the elements that made a contribution toward my understanding throughout this period

I would like to express my sincere and deep sense of gratitude to **Miss. S. SAVITHIRI** for her valuable guidance, suggestions and constant encouragement. I feel privileged to have the opportunity to be under your guidance, that paved the way for the successful completion of my internship.

Last but not the least, I would also like to thank all my **FAMILY MEMBERS, FRIENDS AND RELATIVES** who shared their support to me during the Internship period.

BONAFIDE CERTIFICATE FROM COLLEGE



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

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www.sathyabama.ac.in

Ref: SHD/2023/04/24/44

24 April, 2023

BONAFIDE CERTIFICATE

This is to certify that Ms. DEEPTHI A, Register Number 41105002 is a Bonafide student of our Institution pursuing 2nd year BACHELOR OF SCIENCE in FASHION DESIGN during the academic year 2022-2023. She will be completing the course in the year 2024.

This certificate is issued for the purpose of Applying INTERNSHIP.

DEAN (STUDENT AFFAIRS)

Dr. G. SUNDARI, M.E., Ph.D.,
DEAN (STUDENT AFFAIRS)

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Jepiaar Nagar, Rajiv Gandhi Salai
Chennai - 600 119.

MAIL REQUEST FROM DEPARTMENT TO COMPANY



MAIL ACCEPTANCE FROM COMPANY

From: **G Sudhakar**
<sudhakar.gummaraju@shahi.co.in>
Date: Mon, Apr 24, 2023 at 3:09 PM
Subject: Re: [External] Internship of our students regarding
To: T Murali Krishna
<murali.krishna@shahi.co.in>
Cc: GAYATHRI N
<gayathri.design@sathyabama.ac.in>,
<murali.krishna@shahi.com.in>,
FASHION HOD
<fashionhod@sathyabama.ac.in>,
Swapna Narra
<swapna.narra@shahi.co.in>

Dear Murali Sir,

Noted please.

Regards,
Sudhakar G

On Mon, 24 Apr, 2023, 3:07 pm T Murali Krishna, <murali.krishna@shahi.co.in> wrote:

Hi Gayathri,

You can send your students on the dates provided below for the internship, please.

Dear Mr. Sudhakar: Please permit the below persons please.

Regards
Murali

PERFORMANCE REPORT

DEPARTMENT OF FASHION DESIGN

INTERNSHIP REPORT 2023

(Continuous progress report of the trainee for the period of 21 days in the industry to be submitted to HOD by the Trainee Incharge of the Organization)

1. **Name of the Industry:** SHAHI EXPORTS PVT LTD.
2. **Address** : A - 7/3, Road No: 12, Mini Apparel Park,
Nacharam, Hyderabad -500076.
3. **Name of the student** : Deepthi. A
4. **Duration** : 11-05-2023 to 03-06-2023
5. **Total No. of days** : 21 days

Evaluation of performance criteria shall be on

Note: Kindly grade the student as per her overall performance in the office during the assessment days, which will be converted to the allotted 40 marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding the Industry		✓			
Participation in the Industry	✓				
Handling the given work		✓			
Punctuality	✓				
Coordination With Other Workers	✓				
Oral communication		✓			
Attitude	✓				
OVERALL PERFORMANCE	Good				

Any other Remarks : Nil

CERTIFICATE

SHAHI EXPORTS PVT. LTD.

Regd. Office : F-88 Okhla Industrial Area, Phase-I, New Delhi - 110020
CIN-U18101DL2005PTC138730

Date:03.06.2023

TO WHOM IT MAY CONCERN

This is to certify that DEEPTHI A from Satyabhama Institute of Science & Technology had under gone internship at our organization I.e., (11/05/2023 to 03/06/2023) duration of three weeks.

Her internship activity includes familiarization to all the departments and there operations and processes with the production process of the company.

She had majorly involved in an activity of complete "Production Process from Pre Production to Shipment ", During the period of her internship program with us she had been exposed to different process was found punctual, hardworking and inquisitive. We wish her every success in her life and career.

For SHAHI EXPORTS PVT LTD


T MURALI KRISHNA
GM - OPERATIONS

Correspondence Address:

Plot No. A- 7/3, Road No.12, Mini Apparel Park,
Nacharam, Hyderabad - 500075, Telangana, India

Telephone No

+91 040-27150910, 27170960, 27170970

E-Mail

delhi@shahi.co.in

INTERNSHIP DETAILS

6. INDUSTRY / ORGANIZATION: SHAHI EXPORTS PVT LTD.

Mentor Name : **Mrs. Swapna Narra**

Designation of the mentor: **Assistant General Manager**

Contact Number : **9959097117**

Address : **A - 7/3, Road No: 12, Mini Apparel Park,
Nacharam, Hyderabad -500076.**

7. INSTITUTION: SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

Mentor Name : **Miss. S. Savithiri**

Designation of the mentor: **Assistant Professor**

Student Name : **Deepthi. A**

Department : **Fashion Design**

Address : **Jeppiaar Nagar, Rajiv Gandhi Salai,
Chennai- 600119 Tamil Nadu, INDIA.**

DAILY REPORT

DATE	REPORT
11/5/2023	Fabric department, Spreading, Cutting
12/5/2023	Fabric Department - Shrinkage checking, Fabric inspection guidelines
13/5/2023	Store room Department
15/5/2023	Industrial Engineering (IE) Department
16/5/2023	IE Department
17/5/2023	Cad Department, Training Department
18/5/2023	Sampling Department
19/5/2023	PPC Department
20/5/2023	Cutting and Spreading
22/5/2023	Quality Department
23/5/2023	Sewing Department
24/5/2023	Sewing Department
25/5/2023	Sewing Department
26/5/2023	Finishing Department
27/5/2023	Finishing Department
29/5/2023	Washing Department
30/5/2023	Packing Department
31/6/2023	Sampling Department
01/6/2023	Overall Organization
02/6/2023	Overall working process from fabric to packing
03/6/2023	Overall Working Process

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ABSTRACT

This internship report presents an in-depth analysis of the garment manufacturing industry with a focus on enhancing efficiency and sustainability in the production process. The internship was conducted at a leading garment manufacturing facility, aiming to gain practical insights into the industry's operations and identify areas for improvement. The report offers a comprehensive overview of the key aspects of garment production, including design, cutting, sewing, quality control, and finishing.

Throughout the internship, various techniques and strategies were explored to streamline production operations, reduce waste, and promote sustainable practices. The report highlights the adoption of lean manufacturing principles, which led to significant improvements in production flow, resource optimization, and overall productivity. Additionally, efforts were made to incorporate sustainable materials and implement eco-friendly practices to minimize the industry's environmental impact.

An essential aspect of the internship involved observing and participating in the quality control processes to ensure that the garments produced met international standards and customer expectations. This report delves into the methodologies employed to identify and rectify defects, ultimately enhancing the overall quality of the products.

Furthermore, the report examines the challenges faced by the garment manufacturing industry, such as fluctuating raw material costs, workforce management, and maintaining social compliance standards. Innovative solutions were proposed to address these challenges, contributing to a more sustainable and socially responsible production process.

In conclusion, this internship report sheds light on the critical role of efficiency and sustainability in the garment manufacturing industry. By implementing lean principles and eco-friendly practices, the company can reduce costs, increase competitiveness, and make strides towards a greener future. The findings of this report aim to provide valuable insights for both the garment manufacturing company and the broader industry, facilitating continuous improvement and progress in this dynamic sector.

1. COMPANY PROFILE

Shahi Exports Pvt Ltd.

Shahi is India's largest Apparel Manufacturer and exporter, operating 65 state-of-the-art manufacturing facilities and 3 textile mills across 10 Indian States.

Established in 1974 by Mrs. Sarla Ahuja, Shahi directly employs over 113,000 people, 77,000 of whom are women.

Delivering products across Women's, Men's, and Kids wear, their vertically integrated operations, diversified product range, and a strong commitment to sustainable operations have established Shahi as one of the most preferred garment manufacturers in the World. Shahi is people focused Business with an emphasis on promoting and advancing ethical working practices across the industry.

They are also committed to continuous improvement of environmental footprint across all of the operations. They hold a wide range of accreditations and certifications and are proud to be trusted supplier to many of the world's leading apparel retailers including C&A, Calvin Klein, Columbia Sportswear, GAP Inc., H&M, Inditex, Kohl's, Marks & Spencer, PVH, Uniqlo, Walmart and many more.

1.1. ACHIEVEMENTS OF SHAHI EXPORTS:

➤ **GLOBAL PRESENCE:** Shahi Exports has established manufacturing units in multiple states of India, including Delhi, Haryana, Uttar Pradesh, Tamil Nadu, Karnataka, and Andhra Pradesh.

➤ **LARGE WORKFORCE:** Shahi company worked over 55,000 employees, Shahi Exports is one of the largest Apparel manufacturers in India. Their skilled workforce plays a crucial role in Maintaining high production standards and delivering quality products.

➤ **DIVERSE PRODUCT RANGE:** Shahi Exports including men's and women's apparel, as well as home products. Their diverse product portfolio caters together, To different market segments and customer preferences as well.

➤ **QUALITY RECOGNITION:** The company has been recognized for its commitment to quality. Shahi product standards and has Been ranked as one of the best in Asia by renowned retailers like J.C. Penney.

➤ **TECHNOLOGICAL ADVANCEMENTS:** Shahi Exports embraces innovation and technology in Its manufacturing processes. The company invests in advanced machinery, automation and digital solutions to enhance efficiency, precision, and productivity.

➤ **SOCIAL AND ENVIRONMENTAL RESPONSIBILITY:** Shahi Exports places a strong emphasis on Social and environmental responsibility. They have implemented sustainable practices, including water and energy conservation, waste management, and fair labor practices etc.

➤ PARTNERSHIPS WITH INTERNATIONAL BRANDS: Shahi Exports has established successful Partnerships with renowned international brands and retailers. Their collaboration with requirements of prestigious customers.

1.2. AWARDS & ACHIEVEMENTS:

- Shahi exports 'Best performance training' (category B) under DDUGKY by the ministry of rural development of India in 2017.
- Excellence in sustainable and award by H&M in 2014.
- Best supplier – flexibility provided and growth achievement by decathlon in 2014.
- SHAHI top- factory award by cordon performance improvement initiative, Germany in 2014 and 2015.
- Award for resource conservation by Sweden textiles water initiative in 2015.
- Community impact award given by gap Inc in 2015.
- Eco factory standard achievement award by marks & spencer in 2014 & 2015.
- Shahi has been Awarded higher global exports by apparel export promotion council AEPC in 2008.
- Shahi has been developed a fair product innovation award by Kohl's in 2013.

Present buyers at Shahi Exports, Hyderabad:

The logo for JC Penney, featuring the brand name in a bold, red, sans-serif font.

Figure 1 – JC Penny logo



Figure 2 - Kroger logo



Figure 3 - H&M logo



Figure 4 -C&A logo



Figure 5 – Atlast logo

2. FABRIC DEPARTMENT

2.1. SHRINKAGE

- Using template, mark 50 cm × 50cm on fabric and mention roll no, meterage and grain line.
- Overlock stitch is to be done on all sides.
- Mark with template.
- Wash the swatch with the approved wash recipe.
- Steam the washed Swatch.
- Relaxation is to be done minimum for an hour.
- Measure with measurement scale at the 3 sides.
- Update the average of three reports into the system.



Figure 6 – Shrinkage template

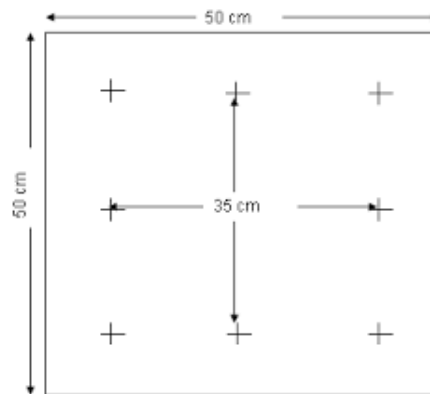


Figure 7 – Shrinkage template with scale

- The fabric lot will go for 100% shrinkage if
 - (a) More than + / -3% shrinkage in 10% rolls (+ / -5% for rayon, above that reprocessing)
 - (b) Variation more than 2%
- If shrinkage fails in above criteria, then production /sourcing /merchandising may take collective call-outs, if required.

2.2. FABRIC SHADE SEGREGATION

Shading is an important defect to catch before step into production. Whenever apparel industry purchases required fabric from the supplier, they may find different fabric shade after recipient. It may occur during fabric dyeing. When fabric mills produce lots of fabric and during dyeing fabric color may differ from one lot to another lot. As per buyer advice, quality should separate shade of any incoming fabric whenever those receive at material control department (MCD) and then have to make swatch. The bundle has the responsibility to check for shade problems before allowing

the bundles to be put into the line. Both rolls and cut should be checked for shading problems. The procedure which QC is following for making swatches and shade separations describing below: –

1. When material department receives any fabric for a certain Invoice, they sent those to QC department to make shade. QC cut one small piece (size –4-inch square Swatch) from every roll whatever the consignment is small or big in quantity. It is important to obtain a sample from every roll so that the rolls are checked 100%.
2. QC has to write all rolls information onto those cut pieces; compare with Buyer approved standard swatches and need to watch all swatches very carefully. All samples should be laid out and grouped by shade. If find shade variation they have to segregate those pieces into different shades on the basis of closer shade like Shade# A, Shade# B, Shade# C etc. This area must be well lit in order to properly shade the rolls.



Figure 8 – Shade cards

3. If found some rolls of shade A and some rolls of shade B, QC collect more three pieces (size – 4” x 3”) from selected roll among certain shade group and attach it to swatch board as a representative of particular shade group. Rolls should be grouped together accordingly by shade. Moreover, QC writes down all rolls number, lot number, and quantity under particular shade group and makes four copies of swatch board with all information.
4. Out of 4 swatch boards, QC has to send one copy to material control department (MCD), one copy to merchandiser, one copy to concern cutting (production) and remaining one copy of their individual record and reference.
5. In case of serious shade variation QC has to make more shade cards, for example material control department received 100 rolls/10,496 yards of fabric item: – Citation Twill, Color – Work wear Blue from Brook wood USA. QC inspector has to make six Swatch cards with detail information of all rolls. Three cards needed for merchandiser (one for supplier, one for buyer lesion office and other for own keeping), one card for store, one for Cutting and another one for QA record. As per our previous fabric receiving records, QC team have to make six swatch cards of even 600 rolls in future which will take more manpower and long time that will affect our normal fabric inspection procedure seriously.



Figure 9 – Shade segregation samples

6. Production/cutting has to make a plan which shade group can be cut for which PO and which country on the basis of order break down so that no different shade group fabric is used for one country or any Purchase Order.

2.3. FABRIC INSPECTION

Fabric should be inspected in accordance with ASTM
4 POINT SYSTEM

Up to 3 In	1 point
Up to 6 In	2 points
Up to 9 In	3 points
Over 9 In	4 points

ACCEPTANCE LEVEL

Greige fabrics	20 points per 100 sq. mts
Mill made fabrics	25 points per 100 sq. mts
Power loom fabrics	44 points per 100 sq. mts

2.4. FABRIC CHECKING MACHINE

A machine that is used for fabric inspection and fabric checking in the textile mills and in the garment production unit, is known as fabric inspection machine. The fabric inspection machines facilitate in fabric inspection process, by mechanical unrolling and rerolling of fabric. The fabric inspection machines also come with fabric length counter (length measurement), which measures fabric length while fabric checking is done.

Fabric inspections machines are equipped with all necessary features like tensionless handling, accurate length measuring, appropriate illumination, Straight roll selvedge, variable roll hardness, auto cutting of fabrics in case big rolls are converted in batch rolls. Machines are equipped AC motor thus ensuring saving of power.

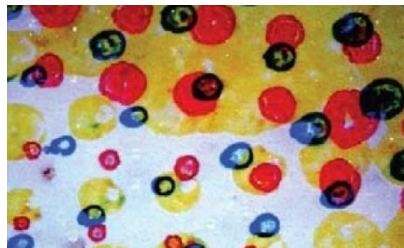


Figure 10 – Fabric checking machine

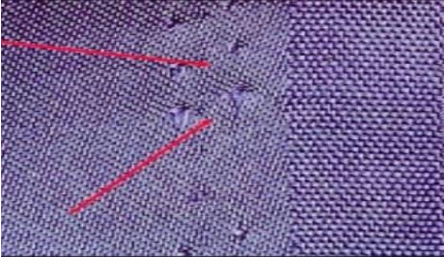
Machine speed

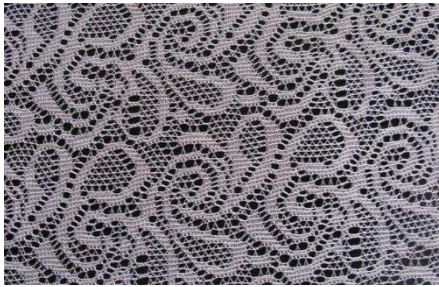
Printed fabric	5mtr per minute
Y/D checks	10mtr per minute
Solid	10mtr per minute
Greige	20mtr per minute

2.5. FABRIC DEFECTS

Miss print	
------------	--

Design Out	
Miss Yarn	
Shade variations	
Contamination	

Hole	
Temple mark	
Distortion	
Slubs	

Stop Mark	
Thick Yarn	
Lace Damaged	
Embroidery Placement	

Miss Embroidery



2.6. FLOW CHART OF FABRIC INSPECTION DEPARTMENT

1. Fabric Unloading by Store Team.
2. Verify quantity and enter the details of incoming materials.
3. Incoming Materials are stored in specified location in store that's called 'Receiving Location'.
4. Enter in the system and create GRN number.
5. Bill enters in the system as per GRN number & Meterage of Rolls that's called 'GRN Entry'.
6. Fabric will be fed on Shade Lotting Table from Receiving Location. Fabric Checking as per given by PPC or Merchant.
7. On Shade Lotting Table, below process will be done:
 - a. Cutting of swatch for Shrinkage-25" width-10% Roll. In case, Rayon, Denim and Tencel 100% Rolls.
 - b. Cutting of swatch for CS-8" width-10% Roll. Cut the CS Swatches in 5 Parts & give the number 1,2,3,4,5 then reshuffle in 4,1,3,5,2. Stitch the swatches and review the Major/Minor Center Selvedge Color Variation.
 - c. Prepare only 10% Shade Continuity Card & in system Shade Lotting 100% done on roll and 25cm three swatches cut for every New Lot.
 - d. Cutting of swatches for Bowing-25" in width-10% Roll. After Cutting, Place sticker on each Swatch & on Rolls. Width & Length Measure and update in system
8. Fabric inspects on inspection table/Machine Minimum 10% for Defect and Meterage with 4-Point System. If Found Excess Point of Defects which is Rejected then we inspect 100%. All Defects finding update in system. Two sets of defect swatch and LWV mocks will be collected as per observation.
9. Shrinkage swatches handover on Shrinkage table From Shade lotting Table, Firstly cut the swatch as per Shrinkage Template (50 x 50cm). Mark the swatches with permanent marker as per Template (35 X 35cm) after sides overlock & also mention Item No, Roll No, Dispatch Qty on every Swatch then swatches send to Washing. After Washing, will be Steam & Measure the Shrinkage/Elongation as well as update in system.
10. Bowing swatches handover on Bowing table From Shade Lotting Table, Firstly Pull out the Weft Yarn & draw a line of 90 angle on that. Then measure the highest distance between draw line & pull- out yarn as well as update in system.

11. After this whole process we make the report then review all report and swatches/Mocks by QA & after confirmation final comments feed in Fabric Inspection Report then mocks/swatches sent to Merchant by Runner, meanwhile fabric placed in put way Location by Feeder.
12. After received the Approved swatches again review by QA. If, Reports having Excess defects then Alert Mail send to all concerned Factory & Marketing Team.
13. Put way the fabric in Data Upload to movex.

2.7. CS SWATCH

- For CS swatches, roll head cutting of 8-inch width is done.
- Making on the fabric for division into five parts is done.



- Numbering on the middle bottom position on back side of panels.
- Cutting into the components.
- Placing the system generated stickers on all 5 points. The sticker contains information about: roll number, GRN number etc.
- Placing the panels in the sequence 41352 and stitching to review the maximum variation across width.
- Ensure that the face side of fabric is upwards.



2.8. GSM

The standard method of measuring fabric GSM is using the calibrated GSM testing equipment. For testing or measuring the fabric weight, one needs a

1. Circular GSM cutter, which will cut an area of fabric 1/100 of a square meter. Hydraulic GSM cutter is also available for cutting circular GSM sample.
2. One digital weighing balance.
3. Fabric sample cutting pad.



Figure 11 – GSM cutting machine



Figure 12 – Digital weight machine

2.9. FABRIC INSPECTION GUIDELINES

APPROVED FABRIC REFERENCE

- A reference Swatch of the approved fabric in all color ways must be available during visual fabric inspection.
- Swatch should be minimum 10×10 inch or 25×25 cm.
- Buyer and Head office inspected the fabric (lab test) then only it comes for bulk production.

ROLL TICKET INFORMATION (BAR CODE)

The fabric supplier must mark each roll with the following information:

- Supplier name
- Fabric description
- Fabric mill
- Fabric content
- Fabric color standard name and number
- Roll number
- Roll length
- Cuttable width
- Production lot
- Shade

INSPECTION EQUIPMENT

A Fabric inspection machine providing:

- Flat viewing area (table)

- Interruptible speed controller fabric rewind
- Lighting 1075 lux per minute
- Meter/yardage counter

INSPECTION PROCEDURE

Inspection Quantity

- If received above 1000 meters fabric, we have to check 10% of the fabric.
- Less than 1000 meters or 1000 meters we have to check 100% of the fabric.
- Supplier should check 100 % of the fabric before dispatch.
- They should dispatch with proper documents (Quality reports).
- Four point system
- Fabric should be Inspected in accordance with ASTM D5430 Standard Test Methods for Visually Inspecting and Grading Fabrics (Option A-4 Point System). No more than 4 points shall be assigned per each linear yard (or meter), regardless of the size of the individual defects 4 point defects should be marked with colored threads or stickers. See Table 1 for point assignments. Fabric should be inspected at a speed comfortable to the inspector and according to the fabric quality. We suggest to set the machine speed according to fabric type using 15 to 20 yards per minute as a general guideline. Solid color fabrics can run at higher speeds while print, artwork and handwork should run at a lower speed.

Color Continuity

The Global Color Group has a specific process in place to capture color inspiration, convert it to a specification, and work with the supply chain to assure that production is executed as it was envisioned by the designer. The method of evaluation will determine the standard to follow for production

Method of Evaluation	Standard
Solids:	QTX Digital File- Archroma/Pantone Standard QTX Digital File of approved Lab dip Physical Lab dip Physical Lab dip
Digital	
Digital BCD (Best Can Do)	
Visual	
Visual BCD (Best Can Do)	
Patterns:	Approved Strike Off Approved Hand Loom
Prints	
Yarn Dyes	

2.10. BOWING AND SKEWING

- Place both the selvage of given Swatch parallel to each other.
- Using scale draw a 90° perpendicular to guide line.
- From one end of this drawn line, select a weft yarn and pull it through the whole width.
- Join the resulting empty points on both selvages with a straight line.

- Note the maximum variation in width from the perpendicular drawn above. It is the skew of the fabric.
- Note the maximum distance between the line drawn above and the bow shape formed due to pulled weft yarn. It is the bowing.
- Whichever among bowing or skewing has larger magnitude is to be feed into the system.

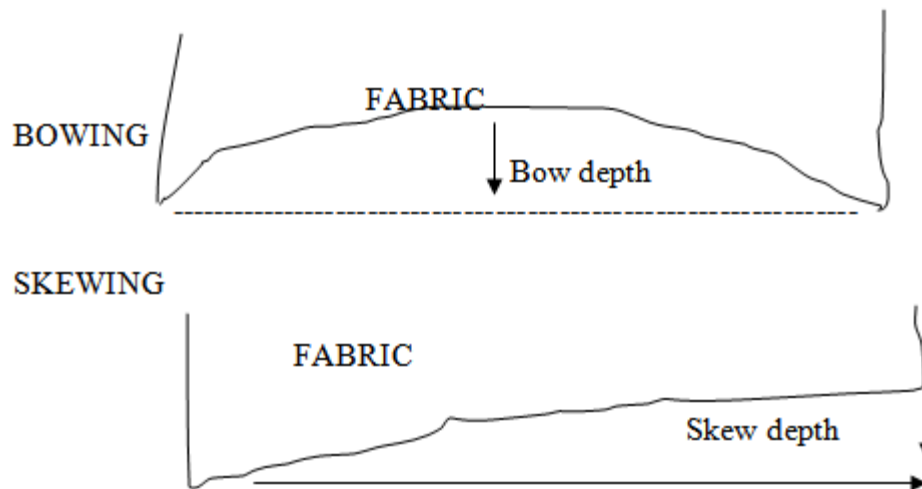


Figure 13 – Bowing and skewing

Calculation

$$\frac{A}{\text{Cuttable width}} \times 100 = \text{maximum \%}$$

Rolls that exceed the following tolerance have failed.

Tolerance %

Fabrication	Woven	Knits
Solid colors	3%	5%
Stripes / yarn dyes	3%	5%
Prints	3%	5%

Defects & Tolerance

Points calculation

$$\text{Points/100 yd}^2 = \frac{\text{points} \times 3600}{\text{cuttable width in inches} \times \text{yards inspected}}$$

$$\text{Points/100 sq. yard} = \frac{\text{points} \times \text{gsm} \times \text{actual width} \times 0.1843}{\text{Actual poundage of roll} \times \text{cuttable width}}$$

Acceptance point count

GROUP NUMBER	FABRICATIONS	Points per 100 yd ²	
		Max. Points per roll	Max. Points per shipment
I	Dress shirting Worsted fabric	15	12
II	Woven shirting Woven synthetic Twill Tailoring suiting	20	15
III	Basic knits, specialty knits, Flannel, chamois, Canvas, Chambray, Corduroy, Velvet, Fleece, French terry dobby, Jacquard, Denim, Rayon and Challin	25	20
IV	Linen, Linen blends slub Jersey, Silk Indian power loom	30	25

2.11. FABRIC INSPECTION REPORT

It requires the following information to be included on the Fabric Inspection Report:

- Inspection Date
- Fabric PO
- Fabric Supplier
- Garment Supplier
- Fabric Mill Reference
- Fabric Description
- Color Name
- Shade
- Dye Lot Number
- Roll Number
- Roll Length (Ticketed, Actual)
- Cuttable Width (Ticketed/ Actual)
- Bowing/Skewing
- Total Points in Roll
- Points/100 yd
- Result: Pass or Fail
- Total yards inspected
- Total rolls inspected

2.12. FABRIC RELAXATION

- Select the fabric rolls based on priority as instructed by the supervisor.
- Remove the poly cover on the roll with scissors.
- Keep the fabric roll on the feed rollers.
- Threading and align the ply.
- Fix the speed of the unwinding machine according to roll weight / type of fabric.
- Align the roll according to the sensor and then align the edge guide according to roll length.
- Switch on the machine.
- Pull the poly cover under the machine base for all the white color fabrics while relaxing process.
- Let the fabric unroll/unwind in unwinding machine.
- Dispose the paper tubes in the bins provided.
- Put the relaxation tag for relaxed roll with information (roll number/ bale number, meters, relaxation start and end time, width, shade and shrinkage).
- Relaxation is carried based on the type of fabric like lycra is minimum 12-24 hours depends on lycra %.
- Viscose / twill fabric is 4-6 hours.



Figure 14 – Fabric relaxation machine

- Taka from fabric is to be opened and relaxed for 1 hour.
- Store the unwind rolls for relaxation and not keep roll on roll.
- Place the unrolled fabric on the pallet or relaxation storage racks with reports start time, date and issue date and time.
- Ensure before issuing the fabric relaxed roll are meeting the requirement.

3. TRIMS AND ACCESSORIES DEPARTMENT

- Trims and accessories unloading by security guard or store keeper.
- Security guard and store executive will verify quantity and enter the details of incoming materials.
- Incoming materials are stored in specified location in store and store executive enter it on the system and create GRN number.
- Specified quantity of all items are sent for lab test and is mentioned in Lab test request form.
- Lab test report is received from lab and shared with merchant and production if required.
- Bulk trim header is made from representative picked from the bulk quantity.
- Sending bulk trim header to concerned merchant.
- After getting approval from concerned merchant team for shade /colour and quality.
- Shade grouping is carried out for some trims categories, if required.
- Visual inspection of trims as per the defined SOP. If trim inspection is pass then 100% quantity verification is done. If fail, communicate with merchant for decision making. Segregate quantity into pass and fail. If rejected then Complete quantity rejection.

CHECK LIST TRIMIS	CHECK POINT
Main label	Letter color, Language, supplier number, label code number, label size, material quality
Wash care label	Wash care instruction, language, care symbols, supplier number, label size, material quality.
Other label	Approved art work, label color, material quality.
Sewing thread	Counts, ply color and shade number, meter counting, color matching, rubbing on contrast color, color fastness.
Buttons	Material quality, ligne(size), Number of holes, color matching, color fastness on contrast color, Design.
Snaps/Grippers	Colour matching, matching colour, colour fastness, after attaching presser, size, material quality, pull test.
Shoulder tape	Tape stability, material quality, mobilan tape (check heat proof), stretchability, relaxation, tearing strength
Neck tape/binding	Fabric quality, colour matching, colour fastness, rubbing on contrast width.
Ornamental/ Embroidery	Embroidery thread color/shade number/counts, ply/colour matching with art work, colour fastness, rubbing on contrast.
Interlining	Material quality, fusing fix ability based on temperature, pressure and gumming, colour.
Contrast fabric	Colour fastness, rubbing, material quality.
Hang tags	Order number, style number, SKU number, barcode number, scanner reading, price, country code, size, material colour and sticker on card quality.
Sticker/UPC tags	Order number, style number, SKU number, barcode number, scanner reading, price, country code, size, material colour and sticker on card quality.

Swift tag	Brand name, colour and material quality.
Poly bag	Size width length, quality, gauge warning instruction and any instruction given by the buyer,
Poly bag stickers	Order number, style number, SKU number, barcode number, scanner reading, price, country code, size, material colour and sticker on card quality.
Hangers	Hanger size, material quality, colour.
Hanger size clip	Size and color, material quality, number of ply, garn, gumming at corners (no metal parts) breaking strength / bursting strength

3.1. SUPPLIER LIST

PRODUCT	APPROVED SUPPLIER LIST
Threads	Madura coats/ Vardhaman yarns and threads
Labels	Check point/ R-Pac/ Natco industries / Join Tek Labels/ Creation
Satin tape/ cord elastic	Stitch Aid
Buttons	Jindal Poly Buttons/ Aero Enterprises/ Gold star filments
Metal ring adjusters	Jindal Poly Buttons
Snap buttons	Good luck fashions
Elastic	Tulip elastic/ Paras narrow fabric / Red wood
Smocking	Balaji industries
Price tags	Check point/ R-Pac/ Natco industries / Avery Dennisan /Join Tek Labels
Poly bags	Amman poly plast/ Sachdeva enterprises/ together trading company

Hangers / sizers	Mainetti / Good luck fashions
Cartons	Purnachandra/ APU Corrumate packaging / Deeraj corrugators

3.2. TRIMS DEFECTS OBSERVED

- Missing print, misplacement of the print, cut out on the labels.
- Colour shade on the moblin tape.
- Missing details, mismatched details on the barcode stickers.
- Print on the double side, misprint, shaded and unclear print on the wash care labels.
- Broken strap rings.
- Damaged yarn in elastics.
- Broken hangers.
- Broken buttons
- Incorrect mentioning of size on the hanger sizer.
- Incorrect dollar on the tag.
- Wrong dimensions on the carton.

4. SAMPLING DEPARTMENT

4.1. PROCESS FLOW

- Tech pack is received from marketing and co -ordinated with central planning to PU planner.
- Planner on priority wise will hand over the tech pack to the sampling department.
- Sampling incharge review the tech pack against approved sample/ trims and pattern.
- If it is pass, checked fabric and trims are collected from the stores. Then trial pes will be done at production unit as per received pattern to verify the requirements and note comments.
- Incorporate the trail pes comments and sample request as per buyer instruction for sizes, colour and number of pieces.
- If any trail comments found, it will be incorporated in size set pattern and print will be taken for cutting.
- Then verified pattern is issued to sampling cutting section.
- Checked fabric and trims are used for size set samples.
- Before loading to sewing line, meeting will be conducted with all department head's for styling purpose.
- Verified cuttings are issued to sampling sewing lines.
- If patterns received against buyer comments is fail, have to communicate with the concerned merchandiser for the deviation. If merchandiser said okay, patterns are issued for cutting.
- Samples will be verified by sampling Quality checker, comments are recorded and measurements will be carried out.

- Before and after pressing visual and measurement will be carried.
- If washing is required, samples are send for washing. After wash, check the hand feel quality parameters and measurement before and after pressing. Offer samples to QAD.
- If pass, offer samples to designated NQC. If it fails, remake the samples and incorporate the comments. It is recorded in FSA audit report.
- If offer samples to designated NQC is pass, they conduct PPM with all department head's. Offer samples to buyer QA, then they conduct external PPM.
- After meeting, incorporated patterns released to pattern section for pilot run.
- Necessary arrangements are done in cutting for pilot pieces cutting.
- After Pilot run cutting, making (100-500) pieces as per order quantity.
- Review and analysis of pilot run pieces is done and it is recorded in pilot run report.
- Minor amendment of pattern is carried out due to shrinkage, if required.
- Final revised pattern is authorized and send to cutting for bulk production.
- The sampling department consists of an order file with the details of the Merchant cut order, Purchase Order, Tech pack, Marker details, Testing reports, Trim card, OB sheet, Thread consumption report, Product structure SAM update requirement details, Pattern design system details.

4.2. RED TAG SEAL SAMPLE (RTS)

- A sample with a red tag is an identification of a sample that buyer had approved and sealed that particular sample for production.
- A sealed sample means approved garment construction, approved trims attached to the garment. Receiving a Red tag sample from buyer is the approval for production go-ahead to the factory.
- Buyers attach colored tags to approved samples and send back to the suppliers.
- A buyer uses different colour tags for the different sample type, like green tag is used for Size set samples and Red Tag is used for PP samples (Pre-Production sample).
- Once attached these tags can not be removed easily from the sample garment.
- Tag is attached to a sample (some buyers also include comment sheets) so that suppliers can not replace sealed sample or can not show any other garments as an approved sample.
- Tags are attached to sample to ensure that no unapproved sample is referred to in production.
- Red Tag helps merchandisers, production team and quality personnel to identify easily the correct sealed sample for production from other samples of the same style.
- If there is any confusion related to garment construction at the time of production, the production department just refers to the Red tag sealed sample.
- At the time of quality inspection, buyer representative refers to the sealed sample and buyers comments on that sample.
- Shipment inspection is done based on the sealed sample

4.3. SIZE SET SAMPLE

- For Size set samples, garments are made in all sizes and send to the buyer.
- The main purpose of Size set sample is to check the factory's capability to make the samples in all sizes.
- Actual fabric and trims are to be used for Size set samples.
- The buyer specifies the number of quantity to be sent for each sizes.
- If sizes are more in number then buyer may ask to skip some sizes, this is then called Jump Size set sample.
- This sample can be made along with GPT samples.

4.4. GOLD SEAL SAMPLE

- This is the ultimate sample after approval of which the production activity begins.
- This is the standard for the bulk production, and based on this the bulk production samples are made.
- The factory can start bulk production only after the PP sample is approved.
- The original fabric along with all original trims and embroidery or print (if any) should be used in the sample.

4.5. PILOT RUN SAMPLE

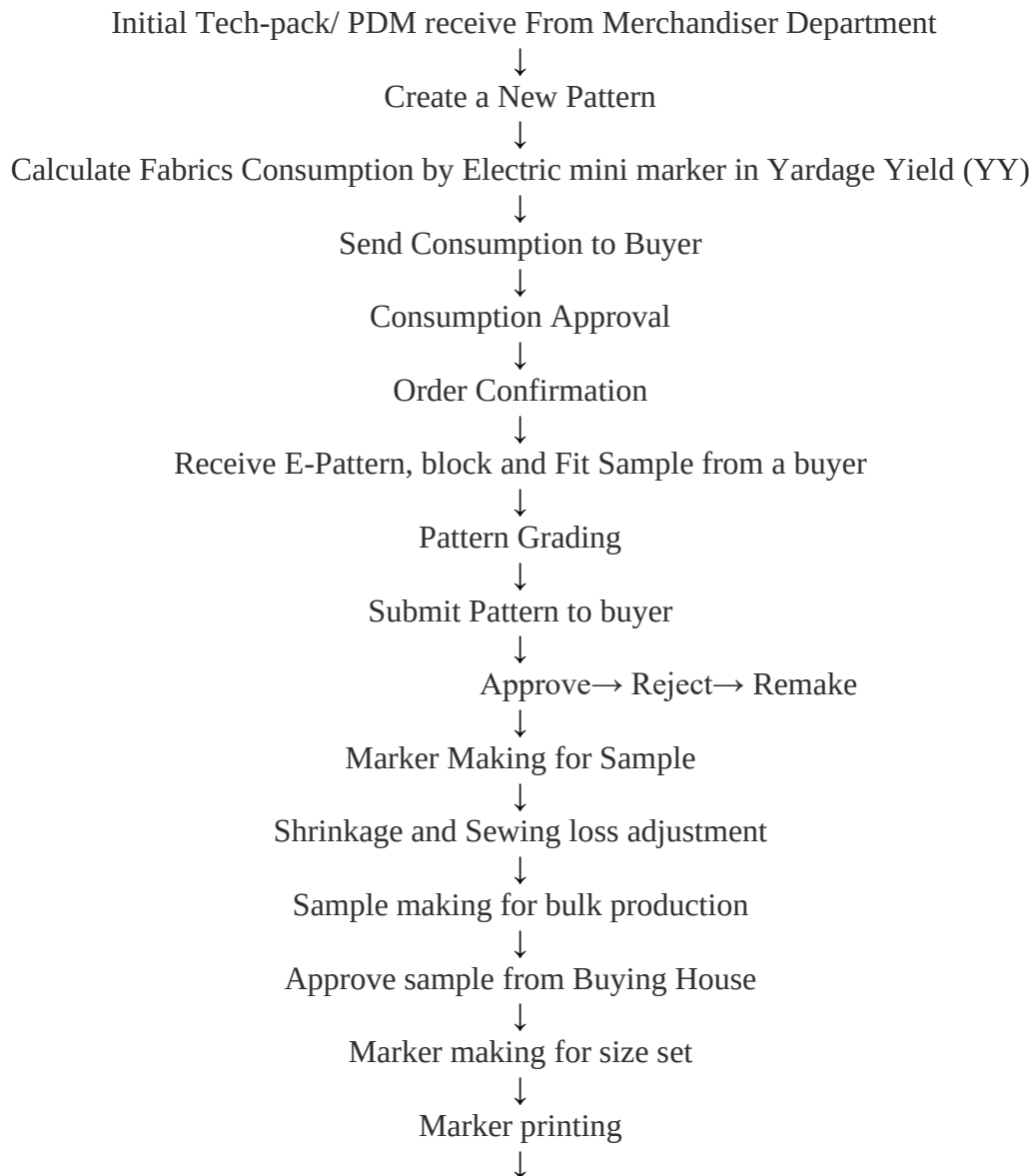
- 2-5% of total production quantity is made in the separate sewing line before the actual bulk production.
- The purpose of making these samples is to assure buyer about the actual bulk production capability of the factory.
- The pilot run can be named as a trial production run.
- A pilot run is done after approval of the PP sample and before bulk cutting.
- The pilot run for a style (order) is conducted if the buyer asked for it. Many garment manufacturers set pilot-run as standard procedure.
- In those companies, Pilot run is must for all styles irrespective of buyer requirement.
- Pilot run in garment production Garment manufacturer cut around 100-200 garments per style for the pilot run.
- This production is done based on PP comments. All 200 pieces are treated as mini production.
- Factory follows complete processes planned for the order. Factory sets up stitching line.
- Production for the pilot run is done as it to be done for the bulk production.
- Points to be considered while making pilot run Pilot must be processed in the production line instead of sampling section.
- All sizes and all colors are included in the pilot quantity (factory may cut jump sizes instead of all sizes).
- If pilot run is requested by buyer, quality of the pilot run pieces may be checked by buyer QA Pilot run pieces are included in bulk quantity in finishing and are sent with the shipment (if there is no variation than the buyer quality specification)

4.6. TOP OF PRODUCTION (TOP) SAMPLE

- This sample is sent to the buyer as soon as the initial pieces are out of the sewing line from the bulk production.
- The buyer checks the quality of bulk production through this sample.
- TOP sample is also checked by the buyer for the packing.

5. CAD DEPARTMENT

5.1. PROCESS FLOW



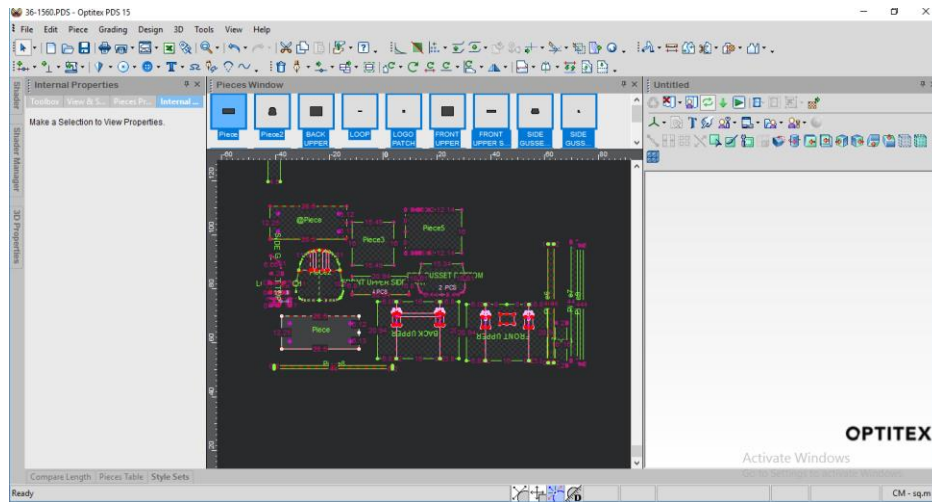
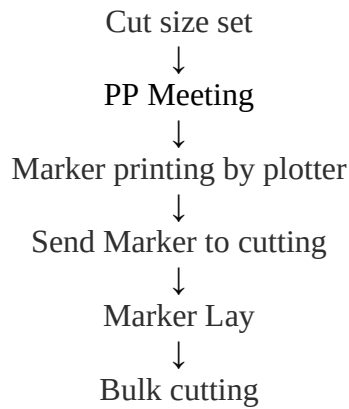


Figure 15 – Optitex software

OPTITEX PDS (pattern design system) - Garment Sector

Purpose of using CAD in Garments:

1. For reducing time in marker making.
2. For reducing Marker Wastage.
3. For increasing marker efficiency.
4. To make the marker accurate.
5. To calculate the fabric consumption accurately.

5.2. CAD SECTION FLOW CHART SOP

Initial tech pack/PDM receives from merchandising department:

Firstly have to know about the tech pack / PDM (Product development Method) sheet. The sheet which contains all detailed descriptions of a definite garment is known as the tech pack/PDM sheet. CAD section collects it from the merchandiser at first.

Create a new Pattern:

In this step, the CAD department develops a pattern according to tech pack requisition. “Pattern” is a hard paper that contains all single parts of a garment.

Calculate fabric consumption by an electric mini marker in yds:

Consumption means – How much fabric needs to produce a garment. With the revolution of scientific invention nowadays it does not need to calculate manually. It is already calculated by CAD section automated Lectra/Gerber/Red tree software.

Send consumption to Buyer:

After calculating the consumption, the report sends to the buyer for approval. The less consumption you can submit the more chance to get an order for those styles.

Consumption Approval:

If the buyer is satisfied with the consumption report, Then a buyer approved the report and agrees to place an order.

Order Confirmation:

Here Order is confirmed by the buyer. If the buyer confirms an order, the garments maker may go forward with the next process.

Receive E-Pattern, Block and fit sample from a buyer:

CAD section receives E-pattern, Block, and fit samples from the buyer. A block sample means the pattern without allowance. Fit sample means the sample fit for a dummy.

Pattern Grading:

Grading means the size variation from the master size. Firstly a pattern is created with the standard size, then it would be graded according to all sizes. suppose, S, M, L, XL, XXL sizes are ordered. L is the master size pattern. Then S, M, XL, XXL are created based on master size.

Submit to the buyer:

After completing grading the complete pattern is submitted to a buyer for approval.

If approve, then goes for marker making for a sample. If not, it will be rejected and comments for the remake.

Marker Making for a sample:

For Sample making marker is created. A marker is a thin piece of paper that bears all the parts of garments. Here Marker is created by CAD software.

Shrinkage and sewing loss adjustment:

During pattern making, they adjust the shrinkage and sewing thread loss tendency at the warp and weft direction.

Sample Making for bulk production:

Now the sample is created for bulk production.

Approve sample from buying a house:

In this step, the sample for bulk is approved from buying the house. Then go for bulk.

Marker making for size set:

According to the required size, the marker is produced by CAD.

Marker Printing:

Now the created marker is ready for print.

Cut size set:

Size set marker used for trial cutting. Then check measurement before and after wash.

P.P meeting:

P.P means (pre-production) meeting. Here the P.P meeting arranged so that styling never be a mistake.

Pattern Correction:

If any problem is found in the size set, In the P.P meeting the solution will be given where the pattern would be correct.

Marker printing by Plotter:

The plotter machine is used for marker printing. The completed marker is printed through it.

5.3. TYPES OF MARKERS

- Normal / regular marker
- Checks marker
- Centre to Selvage Variation marker
- Length to Selvage Variation marker
- Block marker
- One garment - one way marker
- All garment – one way or two way marker
- Non directional marker
- CAD marker efficiency:

Marker efficiency % = $\text{Area of marker used for garment} / \text{Area of total marker} \times 100$

5.4. PLOTTER MARKER MACHINE

- The plotter machine is used for marker printing.
- A plotter is a printer that interprets commands from a computer to make line drawings on paper with one or more automated pens.
- A plotter can draw continuous point-to-point lines directly from vector graphic files or commands.



Figure 16 – Plotter marker machine

6. SPREADING AND CUTTING DEPARTMENT

6.1. SPREADING

- Place brown paper for the first ply to avoid damage to fabric due to rough surface of the table.
- Receive fabric handling instruction from cutting in charge.
- Sequence of spreading.
- Mount the roll on the machine.



Figure 17 - Spreading

- Pull the fabric to far end position.
- Position the fabric at the far end.
- Align the ply.
- Cut the ply after each lay.
- Repeat the above operations until the entire roll is spread.
- Identify the remnant end piles with sticker indicating item number, layer number, roll number, shade, shrinkage and length in meters.
- In case of checks and stripes where matching is required, spreads should align the fabric according to laser line and threads.
- On completion of spreading place the marker on the Spread and secure it by means of brass pins having broad head on each pattern section.
- The QC shall authenticate for its accuracy.

MAX. LAY HEIGHT – QUALITY STANDARDS	
100% Cotton	3 ½ Inches
100% Viscose	3 Inches
100% Polyester	2 ½ Inches
Polyester cotton blends	3 Inches
Polyester viscose blends	3 Inches
Cotton Spandex blends	3 Inches
Viscose Spandex blends	3 Inches

6.2. CUTTING

- Adjust the knife guard according to the height of the stack.
- Ensure the position of blade, its sharpness and the reciprocating speed of the machine.
- Cut the stack of fabric by propelling the cutting machine instrument on the marking line with precision.



Figure 18 – Cutting machine

- Provide projections for each pattern section to facilitate the sorter in numbering the cut sections if possible.
- Provide notchers at appropriate places with required depth.
- Mark the position of pockets, embroidery, logo etc. by drilling small hole throughout the stack with correct drill bit to prevent gauging of the fabric.
- Discard the cut scarp into the bins.
- While cutting, operator shall put on metal hand gloves and mask.

6.3. STRAIGHT KNIFE CUTTING MACHINE

- Receive the lay record from the layer and layer stickers from stickering helper.
- Ensure marking chalk, straight knife machine, patterns and lay weights are available.
- Place the pattern /marker on the lay according to the mini marker plan and lay record.
- Paste the lay stickers on all the garment parts of marker.



Figure 19 – Straight knife cutting machine

- Place the weights on the pattern to be cut to keep the plies intact.
- Wear metal gloves, mask and apron.
- Cut the part according to the pattern.
- Ensure all the notches are marked and the cut edges are smooth.
- Shift the cut parts for quality check.
- Cut the block containing the parts cut on the band knife.
- Transfer it to the designated place for band knife.

6.4. BAND KNIFE CUTTING MACHINE

- Receive the block to be cut with lay record from the straight knife cutter.
- Ensure marking chalk, patterns and lay holding clamps are available.
- Ensure gloves, masks and apron is worn.



Figure 20 – Band knife cutting machine

- Make sure all the parts to be cut in band knife have top stickers with lot number, cut number and size.
- If the entire lay is being cut on band knife. Then verify the lay record for number of lays.
- Place the pattern by referring the lay sticker on the block and fix.

6.5. FUSING

- To set the machine temperature, pressure and speed according to the supplier report.
- Re-check the temperature and fuse line of the machine using a thermo strip for proper fusing.
- Same fusing to be used on the same fabric according to the file.
- Hourly all the machine parameters are to be checked.
- To put the swatch of the running style of the machine.
- To maintain good working conditions of the work place.



Figure 21 – Fusing machine

6.6. NUMBERING AND BUNDLING

- Segregate the block of cut component size wise and arrange small components and body component separately and in sequential manner.
- Tie the cut stack along with the cut sections of the master marker in a bundle along with lager chart.
- In the sticker, the first two digits indicate shade/lot code, then two digits indicate the size and remaining four digits indicate the serial number.
- Put the sticker according to the shrinkage wise colour on layer of the cut component by stickering machine.



Figure 22 – Stickering machine



Figure23 - Bundling

Sticker colour according to shade wise

S.NO	SHADE WISE	STICKER COLOUR
1	A	
2	B	
3	C	
4	D	
5	E	
6	F	
7	G	

7. INDUSTRIAL ENGINEERING DEPARTMENT (IE)

- Industrial Engineering is the concept that deals with the elimination of waste of time (working hours), money, machine and machine time, manpower, material, energy and other resources which are not required for production; and optimization of available resources.
- It ensures the best productivity and efficiency with better quality products.
- The combination of mathematics, physics, ergonomics, architecture and social science and the application of engineering analysis, industrial psychology to design, measure, specify, forecast and evaluate the results.
- The IE Department achieves and sustains the monthly efficiency of 75% for sewing.
- The department reduces and arranges Work In Process (WIP) in the sewing line to less than 2 days in more than 90% sewing lines.
- It supports the production floor with line layout and line balancing and maintains the skill matrix of the operators.

7.1. APPLICATIONS OF IE

- Synchronize and make a better use of industrial resources like man, machine, materials, method, money and management.
- Analyze the factory production cost and find the ways to minimize it.
- Analyze the factory historical data for prediction that is helpful for planning.
- Analyze the new style to develop.
- Analyze the work method and find the ways to improve it.
- Plan the line layout according to the style operation flow.
- Make to the Operation Breakdown (OB) for new/existing style.
- Calculate the product SMV (Standard Minute Value).
- Calculate the thread consumption and other measurable trims consumption (like ribbon, elastic, lace, etc.) of one garment.
- Prepare the line balancing and the line target (like WIP, production target per day, target efficiency).
- Calculate the CMT (Cut, Make& Trim) calculation.
- Prepare the worker evaluation sheet.
- Identify the bottleneck operations (critical operation which gives the lowest output in the line) and improve them.
- Identify the waste elements in the process and reduce/remove them.
- Identify the departmental manpower requirements and allocate them accordingly.
- Identify whether there is a need for training to the worker/employee and provide accordingly if necessary.
- Identify the man-machine requirement for new/existing styles.
- Monitor the hourly production and compare with the target required.
- If the production rate is lower than the target rate, the production process has to be improved.
- Monitor the productivity and efficiency of each sewing line.

- Monitor the industry profitability, industry rules, and new projects and plan the production accordingly.
- Coordinate the order plan with the planning department to follow-up and achieve the plan.
- Coordinate with the training department for skill development of the operators.
- Coordinate with the buyer regarding average production and efficiency of the industry.
- Coordinate with the merchandiser regarding the new/upcoming styles and modifications of existing styles.
- Make/Bring improvements in the production process, work method, layout of the production floor, operator movements, helpers' job, garment quality and the overall system for better productivity.
- Implement the lean tools and the new work system.
- Improvement of the new improved methods and process.
- Maintain the factory database, machine profiles (details), the work study, skill matrix and the SAM bank.
- Work study is the measure of work in order to improve efficiency through time study, method study, motion study and work sampling.
- Time study is the determination of the time to complete a task.
- Method study is the examination of the job and finding a more efficient method to perform the job.
- Motion study is the analysis of the basic hand, arm, body movements, of workers as they perform the work (in order to eliminate the ineffective movements).
- Work sampling is used to find the percentage of a certain activity by random observations and measure the percentage of productive time and the idle time of machines.
- Skill matrix is the framework used to map workers skills and levels.
- Increase the production by developing process and the operator skills by training provision.
- Increase the efficiency by removing the extra activities and time.
- Increase the awareness among the workers.
- Ensure the ergonomic working environment.
- Ensure safety in the workplace.
- Ensure better quality in the products.
- Ensure equal capacity distribution in work.
- Control WIP (Work-In-Process).
- Control excess overtime and eliminate it.
- Control labour cost.
- Control worker absenteeism and turnover.
- Remove/reduce 7 wastes.
- Remove/reduce the hazards from the workplace.
- Remove/reduce the non-value adding activities.
- Publish the daily production and efficiency reports.
- Publish weekly/monthly performance reports.
- Publish factory KPI (Key Performance Indicator - a well-defined measurement to monitor, analyze and optimize the production processes regarding their quality, quantity as well as different cost aspects).
- Plan the operators' incentives plan.

- Arrange the necessary requirements to the production.
- Audit the factory process.
- Audit the Product quality.
- Audit the worker safety (to check whether the workers are following the safety measures or not).
- Audit the ergonomic workplace.
- In merchandising section, the IE can work on the product analysis to -
- Determine the optimum method of construction to achieve required finished product efficiency.
- Establish the operation bulletin.
- Specify the equipment type and work aids to be used.
- Operation bulletin is an important tool used for product analysis. It is a documented form of sequence of operations in a product which contains all the information about the machine required and the total no. of operations and operators required.
- Operation bulletin contains standard time of each operation, required equipment type, machine attachments, workplace engineering aids, etc. The other parameters are - daily output, target efficiency, minutes per day, total standard time, total no. of work places.
- The lowest output point in the production line, where the supply is gathered and production goes under capacity is called bottleneck.
- Bottleneck arise: Bottleneck before input in line
- If the cut bundles/trims are not supplied in time from MCD and the sub-store.
- If the issue comes delay.
- Issues serial number mistake.
- Bundling mistake.
- Wrong issue supply.
- Pattern problem etc.
- Bottleneck in line : Worker selection might be wrong.
- Wrong workflow/sequence of works.
- Non-balance allocation of elements.
- Work negligence by workers.
- Worker absenteeism.
- Machine breakdown/disturbances/out of order.
- Lack of supply.
- Non-serial supplies forward from the workers.
- Color shading.
- Quality problem.
- If anybody becomes sick.

7.2. CHARACTER OF BOTTLENECK

- By checking counter machine - after specific period, it is easy to find out the bottleneck which counter is shown poor/lowest production.

- By observing serial number of supplied issue - after checking some operators, it is found that someone is sewing/working on lowest serial number of issue and it is not reasonable difference with others.
- By observing gathered supply - those areas are bottleneck areas where pile of supply is observed.
- By performing cycle check - we can realize bottleneck from different on time.
- Making a graph is the best and scientific way to find out the real bottleneck.

7.3. WAYS OF REDUCING THE BOTTLENECK

- Make the size set sample minimum 10- 15 days before input.
- Arrange pre-production meeting in time.
- Prepare layout sheet before input in the line.
- Check the fabrics and trims before issuing in the line.
- Submit the layout sheet to maintenance section minimum 2-3 days before the better preparation.
- Check the pattern before supply in the line.
- Reduce excess works from the workers.
- Select right workers for the right work.
- Keep supply available in time.
- Maintain serial number.
- Rejected garments should not be forwarded.
- Supply should be checked and forwarded.
- Alert when bundling.
- Improving work method and work performance, reducing sewing burst.

7.4. PROCEDURE FOLLOWED BY IE DEPARTMENT

- Training is given to the new Operators.
- Recruitment of the trained operators is taken place.
- A grade is given to the operator according to their skills.
- Style allocation plan is collected from the Planning team (PPC).
- The style file and the scaler sample is reviewed and the critical operation in that particular style is identified
- The operation bulletin is received from the centralized IE Department (CID).
- If there is any deviation observed, then the operation bulletin is revised and sent to CID for approval.
- Trim and accessories consumption is calculated.
- If there is any deviation observed, it is informed to the merchandiser.
- Pre-Production Meeting (PPM) is conducted to follow up the comments.
- The operator batch is planned as per the line plan and allocation of the operators to the appropriate operation according to their skill matrix.
- Target efficiency is fixed according to the SAM as per style given by the management.
- Planning sheet will be issued to the production team.

- Multi Skill Operators (MSO) are allotted to the critical operation to achieve productivity.
- Operation cycle time is calculated based on the TAKT time of all operations.
- Cycle time is analyzed and the layout is prepared.
- Calculation of the hourly production and time study is conducted.
- Operators are educated about the bottleneck operations by proper line balancing.
- Work Process is tracked and it will be followed and maintained for 2 days.
- Average thread consumption is calculated.
- Daily efficiency and absenteeism is monitored to reach the target efficiency.

7.5. STANDARD OPERATION PROCEDURE OF IE

- Teck pack/ reference sample is submitted by the product development merchant.
- Tentative SAM is calculated by IE-PDS and given to the production merchant.
- Costing is done by the production merchant and sends the buyer for approval. If approved, making the reference sample based on the teck pack if required.
- Order clarity detail - Merchants send the order clarity details to central IE-PDS team.
- Central IE-PDS provide SAM for various processes involved in the product.
- If costing is not approved by the buyer, then SAM will be revised based on any comments from the buyer if possible.
- Costing is revised and locked based on modifications and comments.
- GSD cell SAM calculation - Sample is sent to the Bangalore unit for calculation of SAM in GSD-cell.
- IE-PDS update the details in MOVEX (ERP) about the order after getting the feedback form the GSD-cell.
- Style review production - sample is sent to the factory IE team.
- Review of the style is done that how many operations to be involved to make the garment.
- Suggest the changes to concerned merchant team if required by maintaining appearance. The changes might not be required for all styles.
- The changes are either approved by the concerned merchant or seek approvals from buyers if required.
- Critical operations are identified.
- Line layout will be prepared based on the suggested changes, if approved by the OAD/customers.
- In any point of time, buyer changes any operation/construction before line setting.
- Then the same would be corrected in the OB sheet. And the up charge/down-charge is communicated to the client if required.
- This is carried out only before line setting.
- Line setting is carried out as per the line layout.
- Refer the skill matrix when required.
- Update skill matrix in every 3 months.
- Time study is carried out when the first output pieces are reached to the final checking table, then the line is balanced accordingly.

- Repeated time study is carried out if required. Time study is either in routine or scheduled or when bottleneck arises in the line.
- First output - thread average is calculated accurately per garment and then inform the trim store accordingly.
- Hourly output is noted from the final checking report and displayed on the hourly production display board.
- Daily and hourly output is monitored for each operation.
- Monitoring and modifying line set to achieve target efficiency based on the time study,
- Bottleneck operations, skill matrix, absenteeism etc.
- 10.4. Points discussed in the Pre-Production Meeting:
- Department wise potential problems and actions with remarks are considered and discussed in Pre-Production Meeting.
- Cutting Department discussions include the fabric relaxation method, total cut components and fusing details.
- Label placement, Thread details such as count, colour etc., Zipper details such as type, colour, length etc., Button details such as type, size, colour, stitching etc., Snap details such as placement, strength test, colour, size, pre-shrunk details of the tape and elastic.
- Colour, Fusible or Non-fusible details of interlining; Colour and construction of lining:
- Embroidery, printing and heat transfer methods, beading, patch work types; ring and adjuster details if applicable are discussed in the PPM.
- Block pattern, pattern grading for all sizes, pattern adjustment table details, knitting chart and garment weight only for flat knit, embellishment grading and placement details if applicable, Golden Seal Sample (GSS) approval details and the comments mentioned in Technical/pattern team.
- Neck shaping, armhole shaping, gatherings, smoking shape and measurements in the Sewing and assembly section.
- Type and requirement details of wet and dry processing, hand feel, kind of washing, approval of shade band, other applicable details in Washing.
- Ironing, Garment packing methods such as hanger, table laid, roll pack etc., packing accessories placement such as hangtag, size strip, size sticker etc., Carton dimensions and other details in Pressing, finishing and packing.
- Inline/ in-process check points, End-line/ before check points, after check points in quality control/ assurance.
- Critical measurements, prohibited components, cords and drawstrings, sequins, buttons, pompoms, tassels, zippers, electric or battery-operated components and novel features etc. are the things concerned to be checked in the product safety category.
- Overall comments and actions to follow up are listed and discussed.

Productivity improvement planning:

- Motion study and faulty motions correction.
- Hourly production of operators and capacity checking.
- Using the best possible line layout.
- Scientific workstation layout of lines.
- Reduced line setting time.

- Improve line balancing.
- Used work aids, attachments, guides, correct pressure foots and folders.
- Continuous feeding to the sewing lines.
- Sewing operator training program for skill enhancement.
- C Line supervisor training program.
- Setting targets for the operators individually.
- Eliminating the non-productive time such as off standard time or loss time.
- Usage of auto trimming sewing machines.
- Offering incentives to the operators.
- Contacting research and development team for garment styles.
- Improving the cutting quality.

Line Setting Time:

- Pre-planning the machines and the requirements for the machinery to complete the task as soon as possible.
- Pre-planning the manpower requirement for line balancing.
- Pre planning the critical operations for operator training. Checking the style start up trims before the production starts.
- Checking the style input availability before starting off the style. Using a skill matrix for the operator's skill level fixing

7.6. KEY POINTS OF INDUSTRIAL ENGINEERING

1. SAM = Basic minute (1+MD%) (1+PF%) + B.H.T
= Basic minute (1+PF%+MD%=MD%*PF%) + B.H.T
2. BASIC MINUTE = Average single cycle time × Rating %
BASIC MINUTE = $\frac{SAM - BHT}{(1 + PF\%)(1 + MD\%)}$
3. BUNDLE HANDLING TIME = Small parts = 0.024 PF = 20%
= Big parts = 0.036
4. EFFICIENCY = $\frac{Output \times SAM \times 100}{Working\ minutes \times (NO.of\ operators + helpers)}$
5. EFFICIENCY = $\frac{Output \times 100}{Input}$
6. TARGET OUTPUT = $\frac{Target\ efficiency \times WM \times Strength \times 100}{SAM}$
7. SAM PRODUCED = No. of pieces produced × SAM

8. WORKING MACHINE	= On Standard time 4 – Off Standard time
9. ON STANDARD TIME	= Working minutes – Off Standard time
10. Off STANDARD TIME	= Working minutes – On Standard time
11. TARGET	= Clock time / SAM
12. PERFORMANCE	$= \frac{SAM\ Produced}{On\ standard\ time} \times 100$
13. UTILIZATION	$= \frac{On\ standard\ time}{Clock\ time} \times 100$
14. OPERATION REQUIREMENT	$= \frac{Target \times SAM}{Clock\ time}$
15. PIECES PER MACHINE	$= \frac{Output}{No.of\ machines}$
16. WIP	= Large operation in parts + Assembly * PPM/C
17. WIP	= No. of operation in critical part * 1 hour WIP
18. NO. OF WORKERS	$= \frac{SAM \times Target}{Line\ efficiency} \times 480$
19. BATCH TARGET	$= \frac{Workers \times Line\ efficiency \times 480}{SAM}$
20. ESTIMATED ACTUAL TIME	$= \frac{SAM}{Target\ efficiency} \times 100$
21. CAPACITY	$= \frac{Basic\ minute}{Average\ SCT} \times 100$
22. OPERATORS PER GARMENT	= SAM/ Garment × Estimated target O/P / Clock Time × Estimated efficiency
23. BASIC PITCH TIME	= Operator SAM / No. of operators
24. UCL	= Basic pitch time / Planned efficiency
25. LCL	= (2×BPT) _ UCL
26. STD SMV'S	= Button hole 0.12 mins Button attach 0.10 mins Key hole attach 0.20 mins Bar tack attach 0.08 mins

7.7. MACHINE DELAY PERCENTAGE

S.NO	MACHINE	DELAY PERCENTAGE
1	Single needle lock stitch	12.5
2	Double needle lock stitch	17.5
3	Single needle edge cutter	12
4	3 thread overlock	7.5
5	5 thread overlock	9.5
6	Feed of arm	9.5
7	3 thread chain stitch	10.5
8	4 thread chain stitch	12.5
9	Button hole chain stitch	3,5
10	Button hole lock stitch	5
11	Bar tack	5
12	Pressing	2.5
13	Flat lock	18.5

7.8. THREAD CONSUMPTION

S.No	Stitch Class	Type	Ratio	Lopper TH%	Bobbin TH%
1	301	Lock Stitch	2.5	50	50
2	101	Single thread C/S	4	100	0
3	401	Two thread C/S	5.5	25	75
4	301	DNLS	5	50	50

5	504	3 Thread O/L	14	20	80
6	514	4 Thread O/L	16	-	-
7	516	5 Thread O/L	20	20	80
8	601	3 Thread Flat Lock	18	$3T(2N+1L)$	-
9	602	4 Thread Flat Lock	25	$4T(2N+1L+1C)$	-
10	605	5 Thread Flat Lock	28	$5T(3N+1L+1C)$	-
11	607	6 Thread Flat Lock	32	$6T(4N+1L+1C)$	-
12	401	Feed of ARM	11	25	75

8. PRODUCTION DEPARTMENT

Production analysis and set up target for line

- Find the critical operation of the product by analyzing the product and decide where need help, which operator works on which operation.
- After analyzing the product line target is set for per hour production.
- Line supervisor monitoring target production achieved or not

Set up machine layout on the basis of Target

- On the basis of operation layout and target of per line, machine layout is setup to ensuring target per hour production.

Line balancing

- Line balancing is a tool used for production line to capacitate the flow line of production.
- If line is not balanced properly, required target result will not be achieved properly.
- Some work have higher work load, some have lower load which caused bottleneck in the line.

Bundle Input to Line

- After ensuring line balancing, bundle wise cut panel input to line as per pre-determined manner to workers.

Sewing

- Workers sew different parts as per pre-determined manner according to machine layout for ensuring right operation is made by right machine and right operator.

Online Quality check

- In this stage, front and back part sewing quality checked by on-line quality inspector.
- If found any defect, send the garment to that operator who sew the defective for repair the sewing faults.

End line Quality check

- Here Full garments of both inside and outside checked properly to ensure the garments is defect free.
- If found any defect, repair that defect by who are responsible for that defect.
- Here also count the body to comparing if target is achieved or not.

Body sends to finishing section

- After end line quality inspector, garments are sending to finishing section for finished the body for shipment as per buyer's requirements.

Shortform in sewing line defects

UM (unbalanced/ unmatched)

- Thread to operator attaching marking should be equal.
- Add marking before attaching the panel.
- Mark the measurement on machine bed.
- Change marking pattern
- Replace operator by trained operator.

RO (run off)

- Replace pressure foot with compensatory foot.
- Set guide on machine for equal marking.
- Educate to operator in presence of supervisor.
- Add light on machine because of dark color fabric.
- Teach the operator to ensure uniform seam allowance.

PP (puckering/ pleating/ roping)

- Change the feed dog of machine.
- Check needle and change size.
- Add pressing before operation.
- Train to operator for add cut before oil.
- Attach the panel with proper marking.
- Reset the machine tension and proper threading of machine.

RE (raw edge)

- Add edge cutter machine then attach the panel.
- Clean the loose thread before operation.
- Change blade of machine.
- Add stay stitch to avoid fraying.
- Change folder and resetting machine.

WS (wavy stitching)

- Add stay stitch follow it's as guide.
- Change oil guide for proper margin.
- Guide operation in the presence of supervisor.
- Improve operator handling in presence of supervisor.
- Add guide on machine.

BS (broken/ insecure skip/untidy/joint)

- Change the needle of machine.
- Teach to operator for correct threading of machine.
- Reset machine tension.
- Replace SN machine with UBT machine.
- Change spring of machine and rectify thread tension.

Daily maintenance checklist

- Date, line number, item number, mechanic & QC is mentioned in the report.
- S.no from 1-10 are critical operation and S.no 11-20 are normal operation.
- Frequency of critical operation: Daily
- Frequency of normal operation: One in four days
- Correct settings ✓
- Wrong settings ×
- Not applicable –

Garment measurement sheet

- Byer, item number, audit date, audit by is mentioned in the top of the report.
- It is divided into two categories – Washed and Unwashed
- Points of measurement, total, size, color and shrinkage is calculated.
- Each operation has five number of measurement.

Operation prone to puckering

- Daily audit for operation prone to Puckering.
- This process is done by QC.
- It is the process report of checking the garment.
- Puckering DHU = (A/5100)

Traffic light system - operation wise defect frequency

- It is the process report of checking the defect and rectification.
- Defects per hundred units (DHU)
- Line QC, QC executive, QC manager and production manager signature is mandatory in the report.

There are two types of lock stitch sewing machine used in a garments factory.

- Single needle lockstitch machine
- Double(two) needle lockstitch machine

Single needle lockstitch machine

- A single needle lockstitch machine is mostly used as a industrial sewing machine.
- The needle penetrates the fabric from the top and brings the needle thread through the fabric to the bottom to form a stitch.
- Modern single needle lockstitch machine has a thread trimmer which operates at the highest speed of its kind.

Parts of single needle lockstitch machine

- Bobbin winder
- Thread wiper device
- Lifting lever
- Knee lifter plate
- Power stitch
- Oil gauge window
- Oil feeding pocket

- Operation panel
- Cotton stand
- Control box
- Power indicator
- USP port
- Pulley cover
- The thread take up cover
- Finger guard



Figure 24 – Single needle lockstitch machine

Overlock machine

- Overlock machine is a machine make stitches on the edge of fabric.
- The stitches on the edge serve as fabric reinforcement and also to smooth the edge of the fabric.
- There are many types of overlock machine such as 3 thread Overlock machine, 4 thread Overlock machine, 5 thread Overlock machine and 6 thread Overlock machine.
- To operate the Overlock machine tweezers tool is much required.
- This tool is a sewing machine tool that serves to insert the thread in the needle hole.

Parts of overlock machine

- Telescope thread guide
- Stitch length dial
- Differential feed dial
- Power cor attachment
- Power switch
- Balance wheel

- Upper looper thread tension dial
- Looper cover
- Side cover
- Needle plate
- Presser foot
- Left needle thread tension dial
- Right needle thread tension dial
- Lower looper thread tension dial



Figure 25 – Overlock machine

Lockstitch machine

- Machine used at flat portion like collar, pocket and cuff.
- At the both sides of the fabric similar stitch is done.
- In this individual stitches get interlocked.
- Difficult to remove stitches.
- Bobbin & Bobbin case is used to feed bottom thread.



Figure 26 – Lockstitch machine

Edge cutter machine

- Lockstitch sewing machine with edge cutter are mainly used where it is necessary to maintain a constant distance of the seam from the edge.
- The LED control panel is easy to use and intuitive easy to reset which allows the operator to use the machine with minimal training.
- It provides a crisp edge for facing, collar, pocket or any situation where it is needed professional finish along a seamed edge.

Chain Stitch machine

- A chain-like pattern is formed when two or more sets of threads are woven together to form the chain stitch, which belongs to class 100.
- The substance being utilized is penetrated by one or more needle threads, which then create a loop there.
- Chain stitching is commonly used on clothing's decorative elements and other places where some work may improve aesthetics.

9. WASHING DEPARTMENT

9.1. PROCESS FLOW OF WASHING DEPARTMENT

- Description of the style, washing process, and washing standard swatch is received from the buyer.
- Developing the washing standard and the recipe from the previous history of the description.
- Developing the sample and sending it to the merchant and buyer for the approval.
- If the wash standard is approved by the buyer, the developed recipe will be locked.
- In the case of the normal wash, there is no requirement of the development of the recipe.
- After the confirmation is given by the buyer, washing of the pilot run pieces takes place as per the approved wash recipe.
- Bulk production along with the washing standards is received.
- The details of the wash recipe is displayed on the relevant machine as well as the display board.
- Bulk washing followed by hydro-extraction as per the standards takes place.
- After the completion of the hydro-extraction, tumble drying is done.
- For normal wash, audit is taken place as per the AQL 1.5 for the shade lot, hand feel, odour, etc.



Figure 27 Washing unit

- For denim and dye wash, 100% checking for the shade lot, hand feel, odour, etc. is done.
- The pieces will be dispatched to the finishing department.

9.2. WASHING INSTRUCTIONS

- To take the merchant approval for hand feel and shade lot after washing 50 pieces for each new style.
- If there are any new shades emerging during bulk washing an approval has to be taken for shade variation from the merchant.
- After the approval of the recipe from the merchant, washing is done.
- Garment pH has to be maintained as per the buyer instructions. The prevention of the excessive loading into the machines has to be ensured.
- Safety precautions have to be mandatorily followed by the workers.
- The delicate fabrics have to be kept in the mesh bags and line dried.
- Maintenance cards have to be updated.

9.3. CHEMICAL HANDLING

- All the incompatible chemicals for proper storage in case of hazard class are segregated.
- The chemicals that are similar to each other should be stored together far away from the other group of chemicals that might cause dangerous reactions if they got mixed.
- All of the flammable chemicals should be stored in an approved, dedicated, and flammable material storage cabinet if the volume exceeds 10 gallons.
- A suggested storage pattern is included in the storage area where the chemicals shall be stored separately from the non-compatible hazard classes.
- The chemicals in the liquid forms should be stored in an unbreakable or double contained packaging. If not, the storage cabinet should have the capacity to hold the contents if the container breaks.

9.4. CHEMICAL LIST

Chemical name	Chemical type	Physical form
Sodium Hypo chloride	Alkaline	Liquid
Denimcol	Fixer	Liquid
Clax Ultra	Detergent	Powder
Hydrogen Peroxide	Oxidizing Agent	Yellowish Liquid
Oxalic Acid	Acid	Liquid
Biopol	Fixer	Liquid
SGL PC-8	Lubricant	Liquid
MP Compound	Desizer	Liquid
Citric Acid	Acid	Powder
Optifix	Colour Fixer	Liquid

Kieralon	Wetting agent	Liquid
Novochlor Neutra	Neutralizer	Liquid
Resil NT03	Softener	Liquid
Invatex AC	Acid	Liquid
Acetic Acid	Acid	Liquid
Ramido WD	Softener	Liquid
Transop	Soap	Liquid
Power Soft	Softener	Liquid
Fornax W	Softener	Liquid
Asny	Softener	Liquid
Ultrafab Bloom	Softener	Pale yellow liquid
ABS PDR	Anti-back staining agent	Powder
Maxiclean XPZ	Anti-back staining agent	Liquid
Soda Ash	Detergent	Powder

- Acetic acid is a flammable chemical, excluding it, the remaining chemicals are non-flammable in nature.
- The above mentioned chemicals have to be stored in dry and cool area.
- The gloves should be compulsorily used while handling the chemical.

9.5. TUMBLE DRYING

- Tumble drying is simply machine drying rather than line drying or laying flat to dry.
- This method is called “Tumble Dry” because clothes tumble in the dryer drum where airflow, along with heat, dries clothes quickly.
- But not all fabrics are made to be tumble dried—always check the care tag first.
- Tumble dry low is a low heat setting that is typically used for fabrics that are delicate or prone to shrinkage.
- Garments made from delicate or shrink prone fabrics such as cotton, wool, linen, or polyester (can you shrink polyester).
- Should use the tumble dry low setting in the dryer.
- Tumble dryer machine capacity is set for 70% of clothes.
- Once the garments are loaded in the dryer, close the dryer cap to lock it and switch on the machine.
- Temperature of 50°C-65°C should be maintained for the cotton fabrics.

- The dryer should run continuously minimum for 30 min.
- A gumboot has to be used by the operator while operating the machine.
- At the regular intervals, the tumbler should be cleaned.
- If loose electric wires of machine are observed, inform the senior immediately.



Figure 28 – Tumble dryer machine

10. PRODUCTION PLANNING AND CONTROL

- The role of production and control (PPC) in garment manufacturing industry is to ensure that materials and equipment are available when needed and that everything runs smoothly.
- They also co-ordinate with all related department to ensure that shipment goes on time as per committed delivery demand OCR (Order completion report) has been closed within the stipulated time after shipment.

10.1. PRODUCTION PLANNING ACTIVITIES

Production planning

- Production planning mainly deals with planning of work.
- Planning involves with collection of material, data, machines etc.
- The planning team interacts with the merchant and central planning for resource and capacity utilization.

Trims planning

- Preparation of material requirement sheet according to the materials described in information and buyer specification sheet.
- Consumption of materials (fabric, thread, button and label) is calculated and estimated cost of each materials.

Line planning

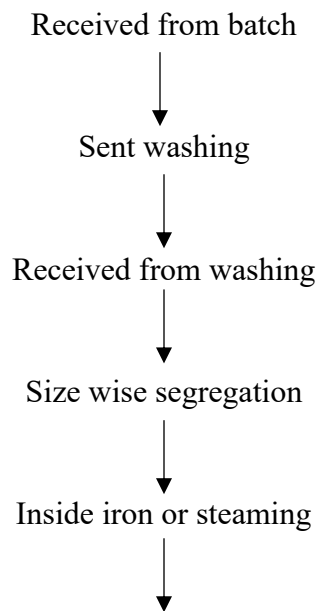
- Once the order allocation is done from buyer, PPC team would inform the factory for line planning.
- Line planning is done for particular order, quantity and depends mainly on delivery dates.
- The line plan should be received from the head office two months before implementation.
- Line planning also helps the production manager as well as line supervisor with information such as what is the daily production target for line and how many days the style would run in the production.

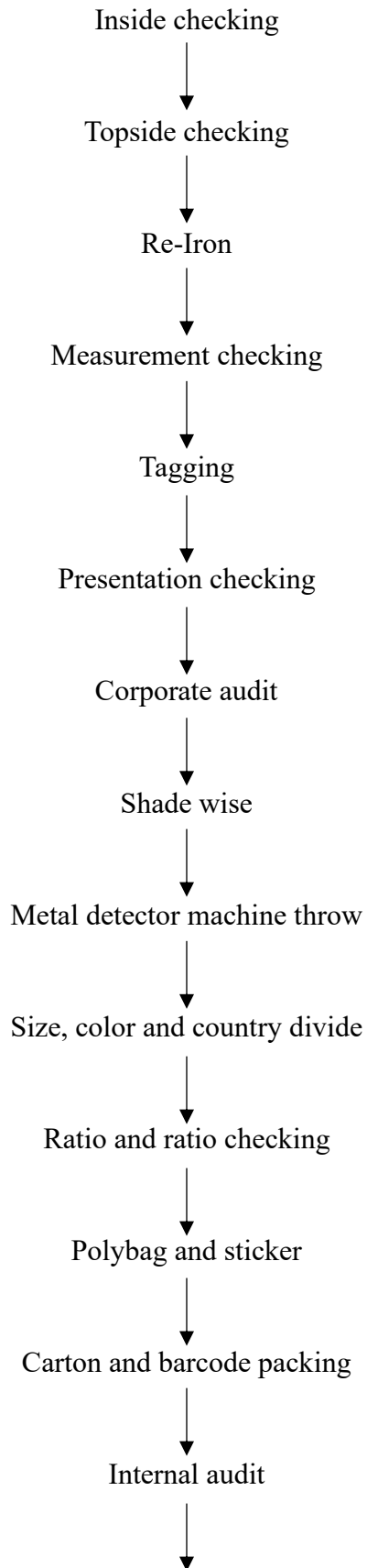
Production follow up

- Production follow up is done to ensure that the production process are occurring according as per the plan or any deviation or delay in taking place.

11. FINISHING DEPARTMENT

11.1. PROCESS OF FINISHING DEPARTMENT





Final audit



Throw shipment

In the production department garments are stitched by sewing machines. Stitched garments are finished in the finishing department. Finishing activities are performed prior packing garments into poly bags. The major activities of a finishing department include thread trimming, checking garments and ironing.

11.2. THREAD TRIMMING

- In the stitching department, thread trails and thread chains are not trimmed neatly.
- Uncut threads and thread tails in garments are trimmed in the finishing department by helpers.
- Uncut and loose threads on garments are considered defects.

11.3. CHECKING GARMENTS

- All garments are checked at the finishing stage for visuals and measurement.
- Finishing checkers check the complete garment inside and out.
- Checking is done for garment detailing, such as care labelling, and trims.

11.4. REMOVING STAINS

- Stains and spots are found on garments.
- Spots are removed using a hand spot gun or by using a stain removing machine prior to pressing.
- Dust and stains can be removed by machine washing.
- So, many times finishing department wash garments inside department.

11.5. REPAIR WORK AND MENDING

- Defective garments may need to repair for stitching and fabric defects.
- All repair activities are done in finishing department itself instead of sending defective garments to stitching department.

11.6. FOLDING AND TAGGING

- Pressed garments are folded in a specified dimension.
- Tags, such as price tags and hang tags are attached to the garment by means of a kimble gun or threads.

11.7. PRESSING

- Garment is pressed as per the approved sample provided.
- The pressing instruction are followed as per style requirements.

- In case of any defect arises while pressing like glaze mark then it is informed to supervisor.
- All parts of the garment are covered while pressing.
- Re-press of is done if required.
- Buck is used while pressing
- Rubber mat & shoes are used while working on pressing table
- Steam pressure is checked before starting pressing process
- If water is coming out from the steam press then pressing process is the stopped and informed to mechanic.
- Checked whether water mark is left on the garment after pressing.



Figure 29 Pressing machine

11.8. MEASUREMENT CHECKING

- Measurement checking is done for 100% garments.
- Check the measurements table is calibrated before use.
- Check measurement with tolerance give in the measurement sheet.
- All the required/critical measurement as per style are to be measured.
- In case any measurement is found to be out of tolerance, the garment is to be kept separately and sent for rework.
- The garment is to be issued for label change or any further modifications required in the garment.
- If measurement found out of tolerance after rework, the garment to be rejected.
- The zone of garments means to indicate the important part of garments.
- Zone of garments are divided into two types.
 1. Zone A
 2. Zone B

ZONE A

- The obvious area of the garments include the whole collar, placket, pocket and upper part of the garments in where any kind of fault can be appeared easily is called Zone-A.

- In zone-A any kind of minor fault is considered to be major fault.

ZONE B

- The non obvious area of the garments normally lower part of the garment in where any kind of fault cannot be easily appeared is called zone-B.
- In zone-B any major fault can be considered as minor fault.

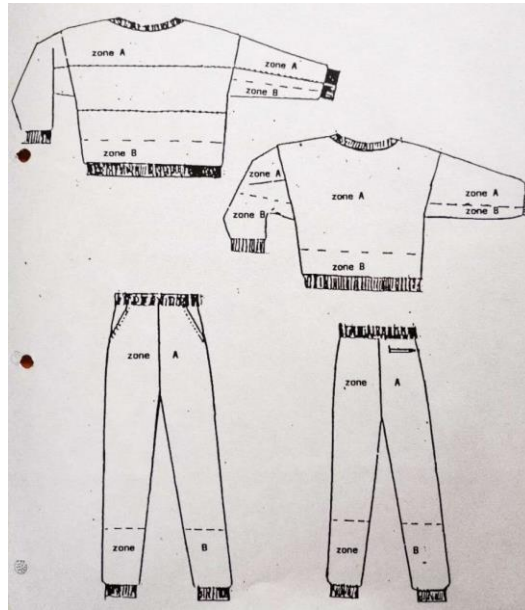


Figure 30 – Garment fault checking zone wise

11.9. CLOCKWISE INSPECTION

Garments Inspection first start from inside & left hand side after complete inside inspection then start topside inspection on the same way. Based on PEI quality requirements, each factory is required to have a location for the purpose of conducting finished product quality inspection.

11.10. GARMENT DEFECTS

MAJOR DEFECTS

- Damage
- Open seam
- Raw edges
- Strip stitch
- Railway track stitch
- Joint stitch
- Uneven width
- Uneven piping

CRITICAL PARAMETERS

- Broken needle
- Insecure lock
- Blood stain
- Sharp edge

MINOR DEFECTS

- Untrim thread
- Small stain

12. PACKING DEPARTMENT

12.1. SOP OF MOISTURE CONTROL MANAGEMENT IN PACKING

- The store manager have to make sure that the delivered fabric/thread /accessory goods are well protected in a good condition. The packed goods have to be stored in a clean ventilated room on pallets not touching the wall.
- If any goods are not received in a good/ protected condition, the store manager will immediately inform the relevant merchandiser and they will take further steps to resolve the issue.
- According to the sampling plan- AQL 1.5 (Level 2), accessories inspector will check the accessories' moisture and keep the record in moisture check form.
- Housekeeping should make sure that the working surfaces are regularly cleaned. Walls, Ceilings and floors are regularly cleaned with the dilute detergent/ dis-infectant/ dilute bleach. Dust will be removed from shelves and will clean the factory regularly.
- Garments have to be protected in a clean condition and kept off the floor during production.
- Wet and damp products should not be packed until the goods are properly dried.
- After pressing the garments, they are not packed immediately as there is a possibility of some moisture from steaming present on the pressed garments.
- Pressed garments should not be stacked too high as the middle garments will not be cooled properly and damp will remain on the garments.
- The ironing steam standard should be maintained in minimum.
- Aqua body moisture meter should be used for moisture and humidity check. Aqua body moisture meter indicates two different readings. The top scale indicates the accurate measurement of moisture percentage and the lower scale indicates the moisture content of sample in percentage. The QC will keep the both recordings.
- For Aqua body moisture meter calibration check, it is checked with skin humidity (100% is normal for the human body) and the red button is pressed to check the battery, white button to measure moisture in percentage.
- The acceptance level of top scale is 56% and the lower scale is 7%.
- When the moisture and the humidity levels are out of tolerance, the comments should be mentioned in the report.

- Before cartooning , the moisture level is checked randomly to the ready-to-packed goods.
- 10% finished cartons will be opened to check the moisture from each PO and each lot and the garments will be checked as per AQL.
- If is necessary to mention the buyer's name, order number, color name, and lot number in the report.
- From each sample carton top, middle and bottom garments will be checked for moisture and humidity.
- Some documents should be photographed with report of the order.
- This report have to be signed by the quality manager with name.
- The moisture meter will be calibrated every year.

Carton Box Internal Auditing

- Checking the Carton physically for the garment quantities in case of solid pack and the ratio pack.
- After checking the quantities, a seal is put inside the carton before closing.
- If there is any deviation found in the quantities or carton, it has to be updated in the carton audit report and has to be brought to the notice of finishing and quality in charge.
- Offering the cartons to the internal QA for inspection.
- Dispatching the passed cartons to the cartons to the carton storage area.
- If any failures have been observed, it should be sent back for re-checking.
- Sending the passed and sealed cartons to the storage area as per the instructions given.
- The cartons that arc opened by both the internal OA to be re-checked for the same packing parameters by the carton auditor.
- After the re-check the seal or the signature has to be put for the second time before closing the carton.

12.2. METAL DETECTOR MACHINE

- The sample passes through the electromagnetic induction channel of needle detector.
- After detecting the metal substance, the electronic integrated control system receives the signal, and after processing, outputs an alarm signal and drives the device conveyor belt to return the detection sample.



Figure 31 - Metal detector machine

13. QUALITY DEPARTMENT

13.1. PROCESS FLOW OF QUALITY DEPARTMENT

- The planning assistant reviews allocation, tech-pack, and reference sample from planning.
- The sample manager reviews the tech-pack of the sample to clarify any deviation with merchant.
- Sampling head should proceed with the sampling process.
- Fabric quality checker should follow up for the fabric inspection, collecting the reports from the supplier, reviewing and taking the necessary actions.
- The trim card is verified as per the bill of materials by the store quality checker.
- The sample manager conducts the meeting to give the guidelines for the size set, Internal PP, SMS Sample, GS Sample and other sample making.
- Size set, external and internal PP, SMS sample, counter sample and other samples required are executed by the sample manager.
- The fabric QC should follow up on the garment check report and internal program Specific report.
- 100% shade variation, CSV, shrinkage, width segregation are done as per the requirements by the fabric QC.
- 10% fabric inspection and shade variation is done based on 4-point inspection system.
- If the inspection fails, another 10% inspection is carried out.
- Even if this inspection fails, it is informed to the correspondent merchant.
- If the inspection passes, colour coding is done and the fabric is stored in fabric racks with identification.

- Colour fastness of all labels is observed by attaching it to the body or a white fabric, Visibility of markings which is done by approved markers on body after the fabric is washed and nickel test is conducted for metal trims in the centralized lab.
- Trims audit is done at a level of at AQL 1.5.
- If this audit fails, checking is done at level 2. Though it fails, the trims stored are placed at the rejected area with identification for further actions.
- If the audit passes, the trims are stored at the designated area with identification.
- Trims store by the store assistant.
- The sampling quality checker reviews the size set sample, internal PP, SMS sample, Counter sample for technical aspects.
- If the technical aspects of the sample fail, patterns Will be revised by taking necessary actions and remaking the size set.
- If the size set review passes, it is offered to the buyer.
- If the buyer approves the size set, the buyer reference sample is dispatched to the head-office.
- The reference sample is handed-over to the nominated QA and an updated patterns for pilot run will be released.
- The quality assurance manager follow ups on shade and shrinkage grouping from the Pattern section, fabric relaxation as per the requirements, fabric face-side combination card approval and FPT reports from the merchant.
- Conducting pre-production pull test for button/snap, metal detection for metal trims and internal and external PPM.
- Necessary actions such as fabric combination card, shade shrinkage report, mini marker, defect standard, numbering placement are followed on reviewing in cutting section.
- Fit fails, necessary actions are taken in coordination with the concerned department.
- If it passes, pilot run pieces are cut depending upon the order quantity of all sizes.
- Sewing quality executives and supervisors execute the pilot run.
- Review of the pilot run is done by the NQA (National Quality Assurance).
- If the review fails, pilot run is remade.
- If it passes, pilot run is offered to the buyer.
- If the buyer approves the quality run, an approval to the cutting section for proceeding to the bulk cutting.
- The cutting quality checker (QC) inspects the lay marker.
- If there are any deviations in the lay marker, corrections are done.
- As per the approved pattern, cut parts are inspected for shape and size by cutting QC.
- If there are any deviations in the patterns, corrections are made.
- The helpers collect these cut parts for numbering and bundling.
- Panel inspection is done for the big panels in the style by the checker.
- If there are any requirements of embroidery and printing, the quality checker conducts an audit.

- Cutting QC conducts an inspection at AQL If the inspection passes, the cut panels/bundles are issued to the sewing section.
- The follow-up on the necessary actions based on the review in sewing section for cut Parts delivery challan for shade.
- Shrinkage, fabric and trims approval card, marking templates, PP sample with comments, size set pilot run comments is done.
- If it fails, necessary action is taken in coordination with concerned department.
- If it passes, bulk production is executed.
- Garment inside checking, inline quality audit based on AQL 1.5 or 2.5 is done as per buyers
- Garment topside checking, trim visual inspection and garment topside ironing is performed.
- 100% measurement checking for key measurements and 2 pieces per hour for measurements.
- End-line quality audit is performed at AQL 1.5 as per the buyer requirement.
- Shade segregation is followed and metal detection machine operator performs the metal detection process.

13.2. DEFECTS LIST

- Miscuts (MC)
- Cutting unbalanced/ unmatched (CM)
- Raw edges (RE)
- Past Missing (SP)
- Match plaids / Strips (MP)
- Match shade (MS)
- Needle Mark (CK)
- Cutting as per pattern
- On gain
- Cross grain
- Bias grain
- Numbering

13.3. BUTTON PULLING TEST

- Button pulls test is employed to work out the pulling strength of any sort of button and snaps utilized in garments.
- It's also want to determine the holding or breaking strength of prong ring attached snap fasteners onto garments to make sure the button fixed on the clothes product properly.

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Figure 32 – Button pulling machine

- Pull tests should be done five pieces from each style 2 times a day and keep records and documents for each test.



Figure 33 – Button pulling test

14. TRAINING DEPARTMENT

14.1. SOP OF TRAINING DEPARTMENT

- Development training Module:
Training module are designed, developments received as per the requirements of the particular department, which may be useful for their needs that can be received time to time as per the feedback & based needs.
- Preparation of Annual Training Calendar:
Annual training in which in prepared in which different activities are given different frequency.
- Routine training.
 1. Daily operator training.
 2. Operation training is done as per training calendar development by senior trainer.
 3. One completed sewing line is covered each day & the frequency is of 45 days.
 4. The attendance include QA manager, QA executive, line QC, Initial Final checkers, IE executive maintenance, mechanic, line supervisor, line supervisor, Incharge Operation, pressing helpers, Feeders trainer.
 5. The training is given via video & power point presentation with the operations The topic covered are as follows previous operations check.
 6. Self checking of operations

7. Self trimming
8. Wipe functioning
9. DHU
10. Line Alteration
11. Common defects with solution
12. Threading tension checking
13. Water soluble thread SOP
14. Self checking body work station.

- Daily morning operation counselling:
 1. Daily operator counseling is done by training, QA manager, QA executive, line QC, line supervisor, IE executive & maintenance mechanic.
 2. Top five DHU operation & top 5 uncut thread operations are counselled.
- Finishing checkers Training:
 1. Both the initial & final Checkers are trained. The point discussed are as follow.
 2. The nature of defects begins found.
 3. Finishing top 3 Defects DHU.
 4. The garment parts / regions covered by different checking sequence.
 5. The frequency is once in a week.
- Daily Finishing Checking Counselling:
 1. The Counselling is carried out each day in the morning based on the previous day final checkers pieces DHU based in Auditor audit.
 2. The counselling is conducted by finishing QA, finishing supervisor & Trainer. Counselling is based on the defects per hundred units (DHU%) based on finished auditors finding & Defectives pieces are shown.
- Fabric Inspection checkers training :
 1. The training is conducted for fabric inspection department checkers. The training is based on the common defects found in a fabric type/ construction.
 2. The frequency of fabric department training is 45 days.
 3. Written test is conducted based on the training module and evaluation done.
- Assessment based training :
 1. This training is complementary to the regular training. The training is based on the requirement.
 2. Analysis is done based on which the personnel required for training are selected. The parameters and criteria are attached as annexure.

14.2. SCHEDULE FOR 15 DAYS TRAINING PROGRAM

Days	Training Operation
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Day 1	A brief on the training program is given to the operators.
Day 2	Basics of the sewing machine is explained to the operators.
Day 3	Test 1 is started
Day 4	Trainers make operators perform burst and round exercises.
Day 5	Rectangle exercises are trained to the operators.
Day 6	Different types of stitches, fabric handling and machine controlling are trained
Day 7	Different types of seams, fabric handling and machine controlling are trained.
Day 8	Test 2 is started. Cuff making and the mind games are trained.
Day 9	Stitching of the essential components of the garment are trained.
Day 10	Test 3 is started.
Day 11 & 12	Sleeve and placket stitching is trained.
Day 13	Pocket, Pocket Flap , front placket stitch are trained
Day 14	Binder ,and folder operation are trained.
Day 15	Test 4 is started.

CONCLUSION

Overall, my internship experience at SHAHI EXPORTS PVT LTD was incredibly valuable. I learned a lot about the garment manufacturing industry, including the different stages of the production process, the importance of quality control, and the challenges of managing a global supply chain.

During my time at the company, I had the opportunity to work on a variety of projects. These experiences helped me develop my skills in Fabric department, Spreading, Cutting, Quality Department etc., I'm grateful for the support and guidance of my colleagues, who were always willing to answer my questions and provide feedback on my work.

Moving forward, I plan to apply the knowledge and skills I gained during my internship to my future academic and professional pursuits. I'm excited to continue exploring the garment manufacturing industry and learning more about the challenges and opportunities it presents.

Finally, I want to thank everyone at company for making my internship experience so rewarding. I'm grateful for the friendships I made and the lessons I learned, and I look forward to staying in touch in the future.

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