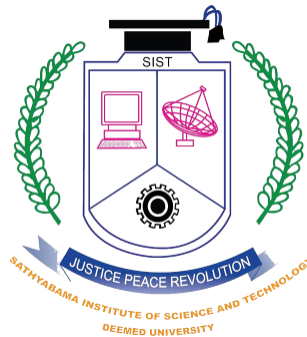


INTERNSHIP REPORT

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

by

NIVASHINI. M (41105011)



**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: NIVASHINI. M

Reg No : 41105011

Semester : V

Batch : 2021-2024



SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
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SCHOOL OF BUILDING AND ENVIRONMENT

DEPARTMENT OF FASHION DESIGN

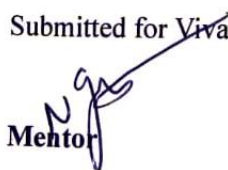
INTERNSHIP REPORT (S105AINT)

2023 – 2024

VIVA –VOCE EXAMINATION

This is to certify that the Internship (S105AINT) is the work of NIVASHINI.M - 41105011, during semester V, is a student of Fashion Design department had undergone training in SHAHI EXPORTS has been monitored by the continuous assessment during 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-600 119.



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DECLARATION

I NIVASHINI.M here by declare that the Internship (S105AINT) for 21 days from May2023 to June 2023 done by me under the guidance of Mrs. N. GAYATHRI, 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

Nivashini.M

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 the 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 **MR. MURALI KRISHNA** 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 **Mrs. GAYATHRI** for her valuable guidance, suggestions and constant encouragement. I feel privileged to have the opportunity to be under your guidance, that paved 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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Ref: SHD/2023/04/24/52

24 April, 2023

BONAFIDE CERTIFICATE

This is to certify that **Ms. NIVASHINI M**, Register Number **41105011** 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]

Jeppiaar Nagar, Rajiv Gandhi Salai
Chennai - 600 119.

MAIL REQUEST FROM DEPARTMENT TO COMPANY

Internship of our students
regarding Inbox



GAYATHRI N Apr 24

to murali.krishna@shahi.... ▾



Dear Sir,
I am N. Gayathri, working as Assistant Professor in Fashion Design department of Sathyabama Institute of science and Technology. Students pursuing B.Sc. Fashion Design degree from our department needs to complete their internship for 21 days in their Second year as a part of their curriculum. we request you to kindly permit our students for their internship in your esteemed organization for 21 days from 11th May to 3rd June 2023. Kindly confirm your acceptance by mail.

please find attached students name list with their register number.

Sri Saranya V.M - 41105017

Deepthi. A - 41105002

Nivashini.M - 41105011

Sowmiya.M - 41105016

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 APPRAISAL

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 In charge of the Organization)

1. **Name of the Industry** : Shahi Export
2. **Address** : Road no. 12, Mini Apparel Park, Nacharam, Hyderabad.
3. **Name of the student** : Nivashini. M
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 of departments	✓				
Participation in the Industry	✓				
Handling the given work		✓			
Punctuality	✓				
Coordination With Other Workers	✓				
Oral communication		✓			
Attitude	✓				
OVERALL PERFORMANCE	Outstanding				

CERTIFICATE

SHAHI EXPORTS PVT. LTD.

Regd. Office : F-88 Okhla Industrial Area, Phase-I, New Delhi - 110029
CIN-U18101DL2005PTC138730

Date:03.06.2023

TO WHOM IT MAY CONCERN

This is to certify that NIVASHINI M 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 - 500076, Telangana, India

Telephone No
+91 040-27150910, 27170980, 27170970

E-Mail
delhi@shahi-exports.in

INTERNSHIP DETAILS

1. INDUSTRY / ORGANIZATION: SHAHI EXPORTS

Mentor Name : **Mrs. Swapna narra**

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

Contact Number : **9959097117**

Address : **Shahi export Pvt Ltd Mini Apparel Park, Road
No 12, Nacharam-500076**

2. INSTITUTION: SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

Mentor Name : **Mrs. N. Gayathri**

Designation of the mentor: **Assistant Professor**

Student Name : **Nivashini. M**

Department : **Fashion Design**

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

DAILY REPORT

DATE	REPORT
11/05/2023	Fabric Department
12/05/2023	Fabric Department
13/05/2023	Store Room Department
15/05/2023	Industrial Engineering Department
16/05/2023	Industrial Engineering Department
17/05/2023	CAD Department & Training Department
18/05/2023	Sampling Production Department
19/05/2023	PPC – Preproduction control
20/05/2023	Cutting & spreading
22/05/2023	Quality Department
23/05/2023	Sewing Department
24/05/2023	Sewing Department
25/05/2023	Sewing Department
26/05/2023	Finishing Department
27/05/2023	Finishing Department
29/5/2023	Washing Department
30/05/2023	Packing Department
31/06/2023	Sampling Department
01/06/2023	Overall Origination
02/06/2023	Overall Working Process from Fabric to Packing
03/06/2023	Mentor Review

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1. COMPANY PROFILE

SHAHI EXPORT PVT LTD is the India's largest apparel manufacturer and exporter, operating in 65 state of manufacturing facilities and 3 textile mills across 10 Indian States. Established in 1974 by Mrs. Sari a Ahuja and directly employs over 113,000 people in which 77,000 are women. They manufacture products for category of 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. They are people focused Business with an emphasis on promoting and advancing ethical working practices across the industry. They are a committed to continuous improvement of environmental footprint across all of the operations. They have 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 etc....

1.1. ACHIEVEMENTS OF SHAHI EXPORTS:

- GLOBAL PRESENCE: They have established manufacturing units in multiple states of India, including Delhi, Haryana, Uttar Pradesh, Tamil Nadu, Karnataka, and Andhra Pradesh.
- LARGE WORKFORCE: It 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: They include 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: This 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. They invest in advanced machinery, automation and digital solutions to enhance efficiency, precision, and productivity.
- SOCIAL AND ENVIRONMENTAL RESPONSIBILITY: They 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 export have established successful Partnerships with renowned international brands and retailers. Their collaboration with requirements of prestigious customers.

1.2. AWARDS & ACHIEVEMENTS:

- They achieved '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.
- They are awarded 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.
- They had 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.



Figure 1 – Awards & Achievement

CURRENT BUYERS OF SHAHI EXPORT



Figure 2

JCPenney

Figure 3



Figure 4



Figure 5

AtLAST.

Figure 6

2. FABRIC DEPARTMENT

2.1 QUALITY INSPECTION

- In fabric inspection, fabric rolls are opened and passed through a fabric checking machine having the light under the fabric and fabric checker does the visual inspection of the fabric.
- While checking fabric, checker mark the defects with sticker on the defects.
- Quality Softline products begin with quality fabric. It is to ensure fabric is of good quality and is suitable for the intended garment, including garment treatments.
- It is dual responsibility of the buyer and fabric supplier to conduct fabric inspection in order to eliminate many quality problems before the manufacturing process begins.
- Visual inspection should be performed accordance to ASTM D5430 Standard Test methods for Visual Inspection and Grading fabrics.



Figure 7 – Fabric inspection machine

2.1.1. MACHINE SPEED

Printed	-	5 meter per minute
Y/D Checks	-	10 meter per minute
Solid	-	10 meter per minute
Greige	-	20 meter per minute

2.2 GSM MACHINE

- GSM testing machine is used to calculate grams or square meter of any kind of fabric.
- GSM cutter is used to cut the fabric sample into exactly 100 square cm piece as per standards.
- It is known as one of the popular methods to determine the weight of different kind of fabric.



Figure 8 – GSM Machine

2.3. FABRIC INSPECTION – 4 POINT SYSTEM

Up to 3 in. 1 points

Up to 6 in. 2 points

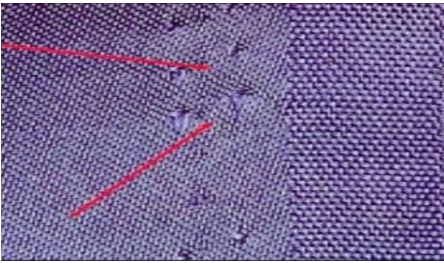
Up to 9 in. 4 points

2.3.1. ACCEPTANCE LEVEL

- Greige fabric: (Raw, unfinished / unprocessed woven fabric)
 - 20 points per 100 sq MTS
- Mill made fabric: (Checked fabric)
 - 25 points per 100 sq MTS
- Power loom fabric
 - A4 points per 100 sq MTS

2.4. FABRIC DEFEATS

Miss print	
Design Out	
Miss Yarn	
Shade variations	
	

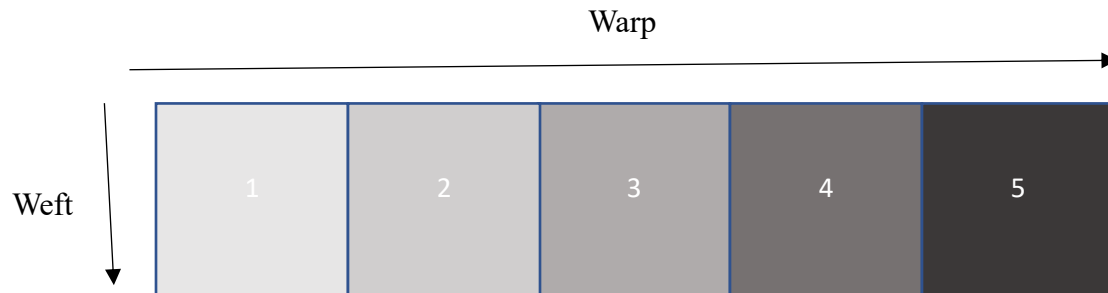
Hole	
Temple mark	
Distortion	
Slubs	
Stop Mark	

Thick Yarn	
Lace Damaged	
Embroidery Placement	
Miss Embroidery	

Table 1 – Fabric defeats

2.5. CS SWATCH

- For CS swatches, roll head cutting of 8” width is done
- Marking on the fabric for division into 5 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 the 5 panels. The sticker contains information about roll no., GRN no etc....
- Placing the panels in the sequence 41352 and stitching to review the maximum variation.



- The criteria for classification are as follows:
 - Grey scale rating 5: Ok (Normal marker in cutting)
 - Grey scale rating 4/5: Semi CSV marker
 - Grey scale rating 4: Major CSV (Use special CSV marker)
 - Cannot be rated through grey scale (Rejected)

2.6. FABRIC INSPECTION REPORT REQUIREMENT

- 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
- Result: Pass or fail
- Total yards inspection
- Total rolls inspection

2.7. CHECKING

- Checking the supplier's name, color and quantity of the provided dispatch.
- Match the dispatch with approved bulk header to ensure that the color and fabric are same.
- Shade matching for 100% rolls / thanes and updation in system.
- If any new lot emerges, take 25cm * 25cm cutting and provide with the report.
- Check width for 100% thanes / rolls and update in system.
- Check for length wise color variation & print bowing and update to seniors.
- From 10% rolls / thanes of each GRN, take 60cm cutting for shrinkage and mention roll number and meterage on it.
- Check 10% rolls / thanes for C/S. If different degree of C/S – both minor as well as major is found then go for 100% mocks and feed into the system.
- For fabric bowing measurement, from the 10% of GRN rolls / thanes 50 cm of full width fabric with roll number mentioned on it is be provided.
- Check at least 30% of GRN quantity for visual defects.
 - Yarn dyed: 10%
 - Poly knit: 10%
 - Minimum to check: 200m
- Provide the swatch of defects found during inspection
- Check for any undesirable odor and update in system accordingly.

2.8. SHRINKAGE

- Using template, mark 50cm * 50cm on fabric and mention roll number, 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.
- Relation is to be done minimum for an hour.
- Measure with measurement scale at the three sides.
- Update the average of three reports into the system.

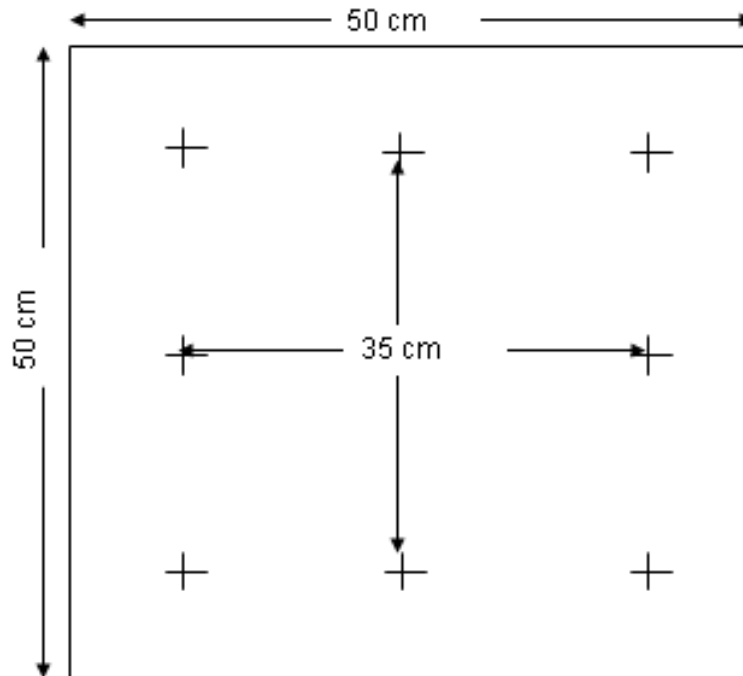


Figure 9- Shrinkage measurement chart

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

2.9. GOALS AND OBJECTIVES:

- To reduce the percentage of fabric defects with respect to the total cut quantity for relevant styles order completion stage to less than 0.2%.
- To reduce the average daily work in process (WIP) of fabric pending for inspection in the central fabric warehouse to less than 2 lacs meters.
- To reduce the percentage of garment, send for part changing due to fabric defects with respect to total cut quantity.
- To monitor the percentage of fabric for which cutting was done with respect to total cut quantity.

2.9.1. PURPOSE

To establish and maintain a system to provide secure storage areas / stock rooms and fabric inspection procedure in controlled condition to avoid any further delays in production.

2.9.2. SCOPE

The procedure is applicable to incoming fabric either from all suppliers.

2.10. BOWING AND SKEWING

2.10.1. BOWING

- Bowing is a condition where filling yarn are displaced from a line perpendicular to the selvage and lie in an arc across the width of the fabric.
- Bowing appears as rows of courses or yarn-dyed stripes forming a bow shaped curvature along the fabric width.

2.10.2. SKEWING

- Skewing is a similar condition in which filling yarns are angularly displaced from a line perpendicular to the edge or side of the fabric.
- Bowing and skewing affects striped or pattern fabric quality more than for solid color fabric as the greater contrast in patterns makes the distortion more prominent.
- Refer figure no.4 for understanding.

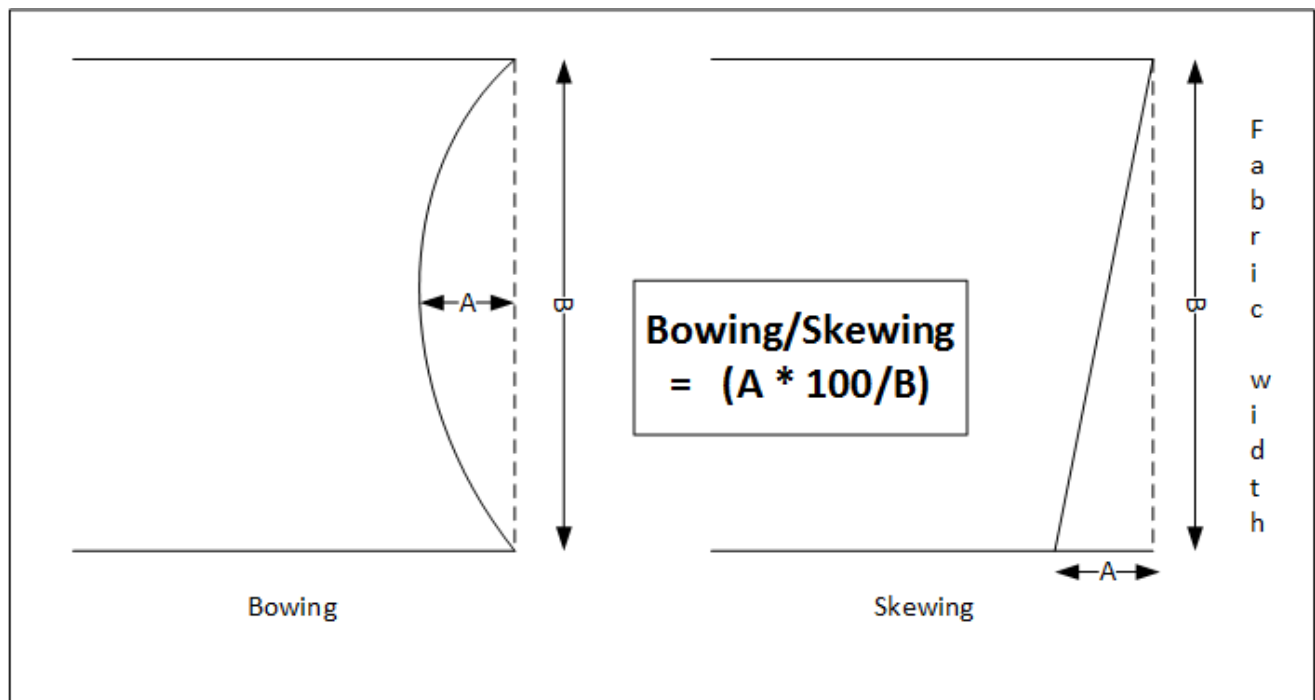


Figure 10 – Bowing & Skewing diagram

3. TRIMS AND ACCESSORIES STORE DEPARTMENT

APPROVED SUPPLIER LIST	PRODUCT
Madura coasts / Vardhaman yarns & threads	Threads
Check point / R -Dac / Natco industries / Join tek label / Creation	Labels
Stitch aid	Satin tape / Cord elastic
Jindal poly buttons / Aero enterprises / Gold star filments	Buttons
Jindal poly buttons	Metal ring adjusters
Good luck fashions	Snap buttons
Tulip elastic / Paras narrow fabric / Red wood	Elastic
Balaji industries	Smocking
Check point / R-Pac / Natco industries / Avery dennison / Join tek label	Price tag
Amman poly plast / Sachdeva enterprises / Together trading company	Poly bag
Mainettic / Good luck fashion	Hangers / Sizars
Purnachandra / APU Corrumate packing / Derraj corrugates	Cartons

Table 2 – Approved supplier list and products

3.1. PROCESS FLOW

- Trims & Accessories are being unloaded.
- Quantity are verified & details is entered of incoming materials.
- Incoming materials are stored in specified location in store .

- Each trim has its GRN number.
- Specified quantity of all items is sent for lab test.
- Lab test report is received from lab & shared with merchant & production if required.
- Bulk trims header is made for representative picked from the bulk quantity.
- Sending bulk trim header to concerned merchant.
- After getting approval from concerned merchant team for shade / color & quality.
- Shade grouping is carried out for some trims categories.

3.1.1. HANGTAGS

- Order number
- Style number
- SKU number
- Barcode number
- Scanner reading
- Price
- Country code
- Size
- Material color
- Sticker on card quality

POLY BAG & STICKER

- Size
- Width
- Length
- Quality
- Warning instruction
- Any instruction given by the buyer.
- Order number & Style number
- Sticker card quality

3.2. PRE-SHRINKAGE

3.2.1. WATER DIP

In a plastic materials handling container, water to be filled half and unwinded elastic are to be dipped inside it for minimum 2-3 hours.

3.2.2. HYDRO EXTRATION

Then all these elastics it be loaded in hydro extraction machine and should run minimum 2 minutes with minimum 600 rpm.

3.2.3. TUMBLE DRYING

After completion of hydro extraction then the elastic to be loaded inside the material handling trolleys and then tumble dried for minimum 50-60 degree centigrade, 30 minutes minimum.

3.2.4. RELAXATION

Cooling: Soon after tumble drying, the elastic is to be cooled in normal atmospheric room temperature for minimum 30 minutes inside the materials handling trolleys.

3.2.5. STEAMING

Then the relaxed & cooled elastic are to be transported in a materials handling trolley to be steam chambers & kept for 30 minutes under minimum 3-4 kg.

3.2.6. REPACKING

All elastic of continuous length is to be repacked inside the polyethene after cooling in very loose condition & transported issuance for further process.

3.3. TRIM CARD

- A trim card is used to show approved trims by attaching all garment trims and accessories on the trim card.
- The trim card is made of white paper which is little thicker than the normal A4 printing paper.
- The company name, company logo and company address are printed on the top.
- Garment production team needs the guideline for making and reference of right thread size, label and other trims to be added to the garment with correct specification and trim card make the process efficient.
- Store department follows the approved trim card to verify trims and fabric quality that they issue against an order.



Figure 11 – Trim card

4. SAMPLING DEPARTMENT

4.1. 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 color 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 cannot be removed easily from the sample garment.
- Tag is attached to a sample (some buyers also include comment sheets) so that suppliers cannot replace sealed sample or cannot show any other garments as an approved sample.
- Tags are attached to sample to ensure that no unapproved sample is referred to in production.
- Secondly, a Red Tag as shown in the above image 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.

4.2. 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.
- Size set sampling includes three samples of each size which are made with the fabric and finishings intended for the final product.
- After this is complete, mass production can start once the brand gives their approval to the factories.
- The buyer specifies the number of quantities to be sent for each size.
- 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.
- Generally, buyers ask size set sample in jump sizes, like S, L, XXL.
- Buyer check size set sample and give feedback to factory if anything needs to be corrected.

4.3. 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.

4.4. 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)

4.5. 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



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/ DEPARTMENT FLOW CHART SOP

5.2.1. INITIAL TECH PACK/PDM RECEIVES FROM MERCHANDISING DEPT

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.

5.2.2. 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.

5.2.3. 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.

5.2.4. 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.

5.2.5. CONSUMPTION APPROVAL

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

5.2.6. 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.

5.2.7. 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.

5.2.8. 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.

5.2.9. 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.

5.2.10. 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.

5.2.11. SHRINKAGE AND SEWING LOSS ADJUSTMENT

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

5.2.12. SAMPLE MAKING FOR BULK PRODUCTION

Now the sample is created for bulk production.

5.2.13. APPROVE SAMPLE FROM BUYING A HOUSE

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

5.2.14. MARKER MAKING FOR SIZE SET

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

5.2.15. MARKER PRINTING

Now the created marker is ready for print.

5.2.16. CUT SIZE SET

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

5.2.17. P.P MEETING

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

5.2.18. 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.

5.2.19. 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 % = Area of marker used for garment /Area of total marker* 100

5.4. PLOTTER MARKER MACHINE

- The plotter machine is a graphic printing machine that can provide large-sized printouts.
- The plotter machine is used for marker printing.
- This plotter machine is specially designed to produce images on various specific media such as paper.
- 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.
- The plotter machine has good print speed and quality.
- The results of the plotter machine prints are better and not blurry.



Figure 12 – Plotter machine

6. SPREADING AND CUTTING

6.1. SPREADING

- Place the 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
- 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.



Figure 13- Spreading

6.2. QUALITY STANDARD – LAY HEIGHT

FABRIC COMPOSITION	LAYER HEIGHT
100% Cotton	Max 3.5 inches
100% Viscose	Max 3 inches
100% Polyester	Max 2.5 inches
Polyester cotton blends	Max 3 inches
Polyester viscose blends	Max 3 inches
Cotton spandex blends	Max 3 inches
Viscose spandex blends	Max 3 inches

Table 3 – Quality standard

6.3. 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.
- Provide projections for each pattern section to facilitate the sorter in numbering the cut sections if possible.
- Provide notches 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.

6.3.1 STRAIGHT KNIFE CUTTING MACHINE

- Straight knife cutting machine is used to cut components of differing size.
- This is the most frequently used equipment for cutting garments in bulk. It is moved along the cut contours, while the fabric spread remains in a fixed position.
- The machines are moveable and capable of curvilinear cutting.

- Available in all standard electrical configurations, with the largest variety of sizes and blade speeds in the industry.



Figure 14 – Straight knife cutting machine

6.3.2. SAFETY DEVICES

- A presser foot is used to compress the fabric plies and helps to protect operator's hands from accidental cuts.
- A machine may be also equipped with an auto stop trigger that switches the power off when the operator's hand is removed from the lever.
- During cutting, the operator must wear special protective gloves.
- These are made from stainless steel chain mail and give a certain level of protection against stab wounds or cuts that could occur when the blade moves close to the operator's hands.



Figure 15 – Metal gloves

6.3.3. BAND KNIFE CUTTING MACHINE

- Band knife cutting m/c is used for cutting the fabric rolls without cardboard inner tube.
- This type of cutting m/c has done its job automatically according to the height of the relevant material.
- In the case of a band knife cutting m/c, an endless knife is used.
- Here, the band knife is fixed but the fabric is moveable.
- Band knife cutting m/c is endless and looks like a loop.
- In-band knife cutting m/c, the high-speed motor is used.
- Balls in the air blower help to move the fabric in a different direction.
- Band knife is usually narrower than a straight knife.
- In the case of a band knife cutting m/c, the automatic grinder is used.
- Here, block pieces of fabric are required to cut.
- Band knife cutting m/c comprises a series of three or more pulleys, which provide the continuous rotating motion of the knife.
- Here, an air blower blows the air to minimize the weight of the fabric.
- Here, knife lifetime dependent on the types of fabric and use of the machine.
- Here the saw-mill technique is applied for fabric cutting.



Figure 16 – Band knife cutting machine

6.4. FUSING

- During fabric fusing, an adhesive resin is applied to one side of the interlining, and then bonded to another piece of fabric by applying heat and pressure.
- The resin solidifies as it cools, strengthening the bond between the two parts.
- 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 thermos 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.
- The first step of fabric fusing is spreading the fabric onto a flat surface.
- The fusing machine should be set to the required preheating temperature, bearing in mind that overheating can cause garment shrinkage.
- Then, resin is applied to a fusible interlining and attached to the fabric.
- The interlining and fabric are fed into the fusing machine and heated to a specific temperature depending on manufacturer requirements.
- The machine also presses the fabric and interlining together at a preadjusted pressure.
- Once this is done, the fabric is put aside for cooling, and the glue begins to solidify and strengthen.



Figure 17 – Fusing machine

6.5. NUMBERING AND BUNDLING

- Segregate the block of cut component size wise and arrange small components and body component separately and in sequential manner.



Figure 18 – Numbering machine

- 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 color on layer of the cut component by stickering machine.



Figure 19 - Bundling

7. IE DEPARTMENT (INDUSTRIAL ENGINEERING)

7.1. INDUSTRIAL ENGINEERING

- 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.
- Pocket, pocket flap, front placket stitching is trained.
- Binder and folder operations are trained.
- Test 4 is started.
- 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.

7.2. 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 $\times$ 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 $\times$ 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

7.3. APPLICATION OF IE:

- It supports the production floor with line layout and line balancing and maintains the skill matrix of the operators.
- 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 labor 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.
- Work negligence by workers.
- Worker absenteeism.
- Machine breakdown/disturbances /out of order.

7.4. 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.

7.5. 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.

7.6. PROCEDURE FOLLOWED IN 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 are 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.

7.7. STANDARD OPERATION PROCEDURE OF IE:

7.7.1. SUBMISSION OF THE TECK PACK

- Teck pack/reference sample is submitted by the product development merchant.

7.7.2. TENTATIVE SAM CALCULATION

- Tentative SAM is calculated by IE-PDS and given to the production merchant.

7.7.3. COSTING

- It is done by the production merchant and sends the buyer for approval.
- If approved, making the reference sample based on the tack pack if required.

7.7.4. 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.

7.7.5. 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.

7.7.6. 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

7.7.7. TIME STUDY

- It 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.

7.7.8. FIRST OUTPUT - THREAD AVERAGE

- It is calculated accurately per garment and then inform the trim store accordingly.

7.7.9. HOURLY OUTPUT

- It is noted from the final checking report and displayed on the hourly production display board.
- Daily and hourly output is monitored for each operation.

7.8. 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, color etc., Zipper details such as type, color, length etc., Button details such as type, size, color, stitching etc., Snap details such as placement, strength test, color, size, pre-shrunk details of the tape and elastic:
- Color, Fusible or Non-fusible details of interlining; Color 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.

7.9. 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.

7.10. 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.
- All necessary attachments, needles, guides need to be arranged well in advance and tested in sampling or Research and development center.
- Dedicated maintenance and quality personal to be provided during line setting.

7.11. 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

Table 4 – Thread consumption

7.11.1. TIME STUDY

- Stop watch is to be used for carrying out time study.
- Time study should be done in one flow without any break for whole line.
- Time study sheet is to be used.
- Continuous 5 reading of operation to be taken to calculate cycle time.

7.11.2. PROCEDURE

- First the operation name should be mentioned in the sheet and the operator's name with type.
- Five random continuous cycle time (59,60,58,59,57) is taken.
- Then add those value and find the average of the five number (58).

7.12. INDUSTRIAL ENGINEERING CALCULATION

- Industrial engineering calculation in garment production factory is the most powerful waste quantifying and reduction tool.
- These calculations are important because without setting up a target it is highly unlikely that you will be able to achieve what is expected.
- Once the target is set and we know that what is expected so we can take steps to achieve the target production.
- It gives industrial engineer clear picture about the performance of Sewing operation, supervisor and the sewing line.

7.12.1. ON STANDARD TIME

- It is actual time worker spent on production work.
- The time spend in doing measured work is called on standard time.
- Example: Stitching, bundle handling etc....

7.12.2. OFF STANDARD TIME

- The time spend during unmeasured on non-value adding work is called off Stanford time
- Example: Machine breakdown, waiting time etc....

7.12.3. PERFORMANCE

- Performance is primarily the measure of both the skills and motivation of the operation and calculated daily.
- It is usually calculated for individuals and sometimes average for a section as a superior.
- Minute earned on STD = No. of pieces produced $\times$ SAM
- Time spends on STD = Total available time - Total off standard time.

7.12.4. UTILIZATION

- It is the time spend on production time out of total attended time.
- It is the percentage of attended time working earning standard minutes (SM).
- It is usually calculated for a line as it is a measure of how well the supervisor is running the line.
- Time spends on STD= Total available time - Off standard time
- Total available time = Total worked minutes

7.13.5. EFFICIENCY

- It is primarily a measure of the effectiveness of the manager and supervisor and as such is best applied to section/ department/ factories and not the individual operator.
- Efficiency is directly related to both operator performance and the utilization of the operator.
- In efficiency both the available minutes and minutes earned by actual production to measure the performance of the complete Sewing line.

8. PRODUCTION DEPARTMENT

8.1. 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.

8.1.1. 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.

8.1.2. 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 has higher work load, some have lower load which caused bottleneck in the line.

8.1.3. BUNDLE INPUT TO LINE

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

8.1.4. 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.

8.1.5. 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.

8.1.6. 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.

8.1.7. 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.

8.2. SHORTFORM IN SEWING LINE DEFECTS

8.2.1. 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.

8.2.2. 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.

8.2.3. 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.

8.2.3. 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.

8.2.4. 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.

8.2.5. 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.

8.2.6. DUMMY FIT REPORT

- Parts description is noted down on the report.
- Time is allotted for morning & afternoon checking (10.00AM, 12.00AM, 2.00PM, 4.00PM)
- Comments are given.
- If there is an error then the action is taken (solution) is mentioned on the dummy fit report.

8.2.7. WHY WHY ANALYSIS

- Line number, date & QC is mentioned in the report.
- The problem statement is written and five why's are given to calculate why the problem occurred and to find the solution to the problem.

8.3. DAILY MAINTANENCE 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 –

8.3.1. DETAILS

- S.no
- Machine no.
- Operation
- Needle tension
- Bobbin tension
- Bobbin winding tension
- Tension springs
- Needle bar pressure
- Threading method (diagram)
- Threading nylon bush
- Feed dog condition
- Throat plate size
- RPM
- Overlock guide
- Wiper / UBT functioning
- Pre (needle / pulley eye guard)

8.4. 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
 - Unwashed
- Points of measurement, total, size, color and shrinkage are calculated.
- Each operation has five number of measurements.

8.4.1. 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)

8.4.2. 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.

8.5. SINGLE NEEDLE LOCK STITCH MACHINE

- A single needle lockstitch machine is mostly used as an 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.
- There are two types of lock stitch sewing machine used in a garments factory.
 - Single needle lockstitch machine
 - Double(two) needle lockstitch machine



Figure 20 – Single needle lock stitch machine

8.5.1. PARTS

- 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 takes up cover
- Finger guard

8.6. 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 threads 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.



Figure 21 – Overlock machine

8.6.1. PARTS OF OVERLOCK MACHINE

- Telescope thread guide
- Stitch length dial
- Differential feed dial
- Power cord 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

8.7. 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.

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

9.2. WASHING INSTRUCTION

- 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	Color 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

Table 5 – Chemical list

- 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 lying 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 22 – Tumble dry 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. PURCHASE ORDER (PO)

- Purchase order is the very first document which is being forwarded by the buyer.
- It covers all the information regarding the goods.
- Once the order is received, the first decision is to whether it will be filled based upon the approval of credit.
- The purchase order (PO) is an official document outlining expectation between the supplier and buyer.
- The sheet organized size breakdown and order quantities.
- This is the most important document for merchandise, warehouse, cutting/sewing and packing department.
- The PO sheet and includes packing specification.
- The shipment date is included in the PO sheet, to ensure the order is packed and shipped on time.
- If the factory delay 's the order, the buyer can choose to request a penalty as per the PO per sheet.
- A purchase order sheet is included in a teck pack after the design and materials are approved.
- In a PO sheet there are information on product style, PO number, fabric cost, trims cost, garment unit cost, shipment destination etc....

10.2. PRODUCTION PLANNING ACTIVITIES:

10.2.1. 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.

10.2.2. 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 material.

10.2.3. LINE PLANNING

- Line planning is scheduling and allocating orders to production lines according to product setting (product is being made in the line) and due dates of production completion.
- It helps the production manager as well as the line supervisor with information such as what is the daily production target for a line.
- They set up their production line (arranging the machines and manpower) accordingly.
- 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.
- Line planning is one of the major planning processes
- 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.



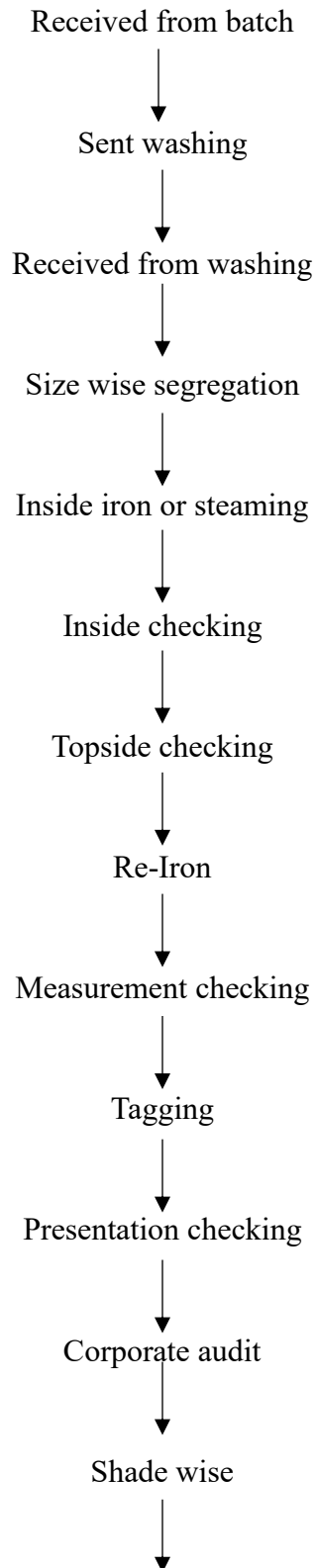
Figure 23 – Line planning

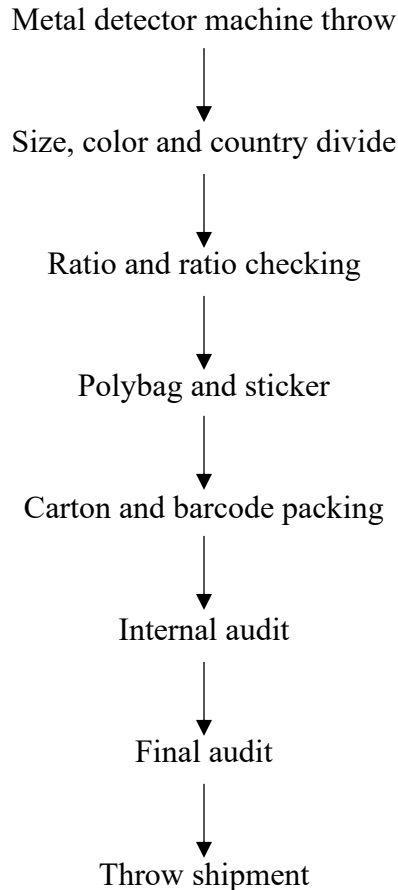
10.3. PRODUCTION FOLLOW UP

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

11. FINISHING DEPARTMENT

11.1. FLOW PROCESS OF FINISHING DEPARTMENT





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 mechanics.
- Checked whether water mark is left on the garment after pressing.



Figure 24 - Pressing

11.8. CLOCKWISE CHECKING

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.

11.9. MEASUREMENT CHECKING



Figure 25 – 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 is divided into two types.
 - Zone A
 - Zone B

11.9.1. ZONE A

- The obvious area of the garments includes 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.

11.9.2. 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 26 – A & B Zone diagram

11.10. GARMENT DEFECTS (MAJOR)

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

11.10.1. CRITICAL PARAMETERS

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

11.10.2. MINOR DEFECTS

- Untrim thread
- Small stain

12. PACKING DEPARTMENT

12.1. Process flow

- Style and PO details are received from production merchant/ PPC.
- Receive the checked/inspected pieces from the finished department for metal detection.
- All the garments are passed through metal detection machine is carried out in every 2 hours.
- Cooling period of two hours is followed for all garments. If there is any failure during this period, then all the garments kept in the cooling box are passed through metal detection to ensure that there is no metal contamination.
- If some style/garment have the attached trims of metal content, then the garment is passed through metal detection machine before the trims is used/attached to the garment.
- 100% of the garment are checked for tags, size label, main label and other label in the loose garment audit, before going to start packing process.
- Wrong pieces are sent back to finishing for correction.
- In case of passed, the garment is received by packing department.
- Segregation of packed pieces as per approved lot, if required one lot should be packed in one carton.
- Packing trim card is displayed in packing section after approval by merchant/DQA.
- One sample is displayed with all packing specifications and approval trims by DQA/concerned merchant.
- Tagging may carry out occasionally in packing case critical packing specifications only when there is thread Kimble is used to tagging and tag gun must not be used inside the packing section.
- Putting hanger and size to the garment.
- Folding is carried out, whenever required in packing specification.
- Putting the Pcs in to the specified poly bag as per buyer specification or approval trim card.
- Packing list is made or received from production merchant/ PPC.
- Make blisters, assortment or solid packing as per specification.
- Carton packing is carried out as per the packing list with the specified cartons approved by DQA/merchant.
- Carton making is carried out as per specification given by the customer or specified on the buyer's packing manual.
- First carton evaluation is carried out when the first carton is ready with all specification required by the buyer.
- Hourly packing audit is carried out by the packing QA.
- Sample size of this audit is 10% of the packed cartons on every hour with zero defects.
- Final packing audit is carried out on specified AQL by the buyer, when 100% of the PO quantity is packed with complete carton making.
- Final/Pre-final inspection is carried out after the PO is completed packing.
- If the FRI is failed for any reason, the whole lot is sent back to finishing/packing department for rescreening.

12.2. STANDARD OPERATING PROCEDURE OF MOISTURE CONTROL MANAGEMENT IN PACKING:

- The store manager has 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 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 has to be signed by the quality manager with name.
- The moisture meter will be calibrated every year.

12.3. METAL DETECTOR

- 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 27 – Metal detector

12.4. PREVENTIVE MAINTENANCE SHEDULE FOR METAL DETECTOR

12.4.1. DAILY

Machine cleaning by the operator.

Check free movement of the conveyor belt.

9-point calibration.

12.4.2. WEEKLY

To check for any vibration or sound.

12.4.3. MONTHLY

Check electrical panel for inside cleaning and any loose connection.

12.5. 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 are opened by both the internal QA 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.



Figure 28 – Carton's box

13. QUALITY DEPARTMENT

13.1. QUALITY DEPARTMENT PROCESS FLOW

- 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 is done as per the requirements by the fabric QC.
- 10% fabric inspection and shade variation are 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, color coding is done and the fabric is stored in fabric racks With identification.
- Color 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 follows 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 are 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 CODE LIST:

- Defects & Codes
- Miscuts (MC)
- Uneven (CM)
- Ragged edges (CE)
- Past Missing (SP)
- Match plaids / Strips (MP)
- Match shade (MS)
- Selvedge / holds visible (CW)
- Needle Mark (CK)
- Cutting as per pattern
- On gain
- Cross grain
- Bias grain
- Numberings

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



Figure 29 – Button pulling machine

13.4. TRAINING DEPARTMENT

SCHEDULE FOR 15 DAYS TRAINING PROGRAM FOR NEW JOINERS:

Days	Training Operation
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 is trained
Day 14	Binder, and folder operation are trained.
Day 15	Test 4 is started.

Table 6 – Training schedule for new joiner of Shahi Export

13.4.1. STANDARD OPERATION PROCEDURE 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.
 - Daily operator training.
 - Operation training is done as per training calendar development by senior trainer.
 - One completed sewing line is covered each day & the frequency is of 45 days.
 - The attendance includes QA manager, QA executive, line QC, Initial Final checkers, IE executive maintenance, mechanic, line supervisor, line supervisor, in charge Operation, pressing helpers, Feeders trainer.
 - The training is given via video & power point presentation with the operations The topic covered are as follows previous operations check.
 - Self-checking of operations
 - Self-trimming
 - Wipe functioning
 - DHU
 - Line Alteration
 - Common defects with solution
 - Threading tension checking
 - Water soluble thread SOP
 - Self-checking body work station.
- Daily morning operation counselling:
 - Daily operator counseling is done by training, QA manager, QA executive, line QC, line supervisor, IE executive & maintenance mechanic.
 - Top five DHU operation & top 5 uncut thread operations are counselled.
- Finishing checkers Training:
 - Both the initial & final Checkers are trained. The point discussed are as follow.
 - The nature of defects begins found.
 - Finishing top 3 Defects DHU.
 - The garment parts / regions covered by different checking sequence.
 - The frequency is once in a week.
- Daily Finishing Checking Counselling:
 - The Counselling is carried out each day in the morning based on the previous day finial checkers pieces DHU based in Auditor audit.
 - 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:
 - The training is conducted for fabric inspection department checkers. The training is based on the common defects found in a fabric type/ construction.
 - The frequency of fabric department training is 45 days.
 - Written test is conducted based on the training module and evaluation done.

CONCLUSION

Me personally completed the internship training successfully in Shahi Export Pvt Ltd. It was an opportunity for me to gain corporate knowledge. The training in textile productions enabled me to know the raw materials required for manufacturing and also production process such as fabric inspection, cutting, stitching, packing & finally inspection. During my internship, I was able to gain technical knowledge and update my knowledge as per the current trend. All managers and employees were very informative.

During the internship period the staffs of various departments inside the organization helped me to know the nature of all duties performed by them as well as dos and don'ts of all the functions in the organization. The experience and the study that me personally had undergone in Shahi Export has given me a practical knowledge about the functioning of the unit and has helped me to know about the principles and procedures about the organization.

The modern infrastructure and well-equipped facilities of the organization created a good atmosphere. Their organizational structure and latest technology are the keys for their success which keeps them growing in this competitive field. This internship training was the right platform which helped me to apply the theoretical knowledge which have gained through college. The internship helped me to compare and contrast between theoretical and practical Knowledge. Thanks to the management, executives and all employees of Shahi Export for supporting and helping me complete my internship training.



Figure 30 – Daily report picture in the entrance of Shahi Export



Figure 31 – Picture with Mr. Murali Krishna (General Manager) of Shahi Exports

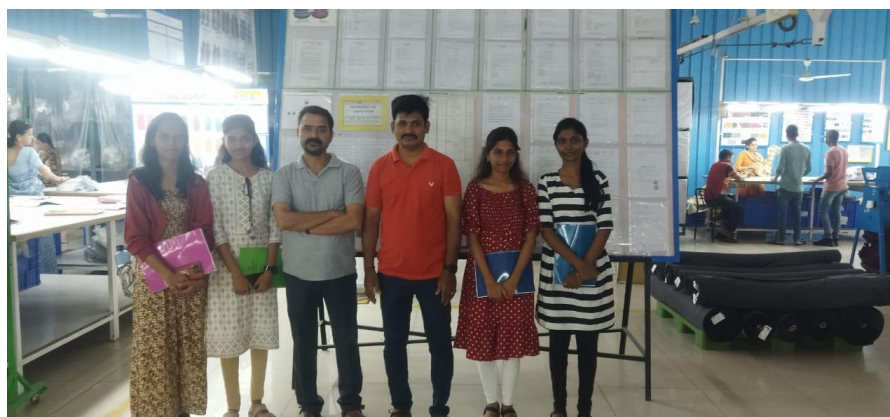


Figure 32 – Picture with the heads of fabric and cutting department in Shahi Exports



Figure 33 – Picture with the head (Mrs. Sangeetha) and coworkers of the store department of Shahi Exports

BIBLIOGRAPHY

This report is created as a primary source of document which is collected in different department of Shahi Exports. Following reference are some of guidelines provided by the industry mentor.

<https://www.sciencedirect.com/topics/engineering/garment-industry>

<https://www.textileschool.com/7379/method-study-in-garment-industry/>

<https://www.ibef.org/industry/indian-textiles-and-apparel-industry-analysis-presentation>