



**Daffodil**  
*International*  
**University**

**REPORT ON**

**Industrial Attachment**

**At**

**Sinha Denim & Rope Denim Ltd.  
Kanchpur, Narayanganj, Dhaka**

**Course Title: Industrial Attachment**

**Course Code: TE-410**

**Academic Supervisor**

**Professor Dr. Md. Mahbubul Haque  
Head, Dept. of TE**

**Submitted By**

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**Department of Textile Engineering  
Faculty of Engineering  
Daffodil International University**



## DECLARATION

We hereby declare that, this internship has been done by us under the supervision of Prof. Dr. Md. Mahbubul Haque, head, Department of Textile Engineering, Faculty of Engineering, Daffodil International University. We also declare that, neither this report nor any part of this has been submitted elsewhere for award of any degree or diploma.

This is to certify that the above declaration made by the candidate is correct to the best of our knowledge.

### Supervised By

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**Professor Dr. Md .Mahbubul Haque**

Head

Department of TE Faculty of

Engineering

Daffodil International University

### Prepared By

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## ACKNOWLEDGEMENT

At First we express our heartiest thanks and gratefulness to almighty Allah for His divine blessing makes us possible to complete this report successfully.

We fell grateful to and wish to our Supervising teacher **Professor Dr. Md. Mahbul Haque. Department of TE, Faculty of Engineering, and Daffodil International University.** Deep Knowledge & keen interest of our supervisor in the field development of influenced us to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project. We would like to express our heartiest gratitude to other faculty member of TE department of Daffodil International University.

We would also like to thank to **Shakhawat Hossain Rizvi, CEO, Sinha Denim Ltd. & Sinha Rope Denim Ltd.** To give us the opportunity to complete our Industrial Attachment in this reputed factory. We want to express our sincere gratuity to **SM Noor-A-AlamSiddique, Senior Manager-Admin, HR & Compliance, Sinha Denim Ltd. & Sinha RopeDenim Ltd.** To give us the special guideline to complete our Industrial Attachment. Also thanks to the **Manager of Dyeing Sector, and R&D** for co-coordinating us to complete our Industrial Attachment in Sinha Denim Ltd. & Sinha Rope Denim Ltd and also for their useful guidance throughout the course.

We are also grateful to the supervisors, technicians, operators and all other staffs of Sinha Denim Ltd. & Sinha Rope Denim Ltd who were most cordial and helpful to me during the tenure of internship.

Finally, we would like to express a sense of gratitude to my beloved parents and friends for their mental support, strength and assistance throughout writing the training repot.



# Chapter- 1

summary



## **Executive Summary:**

Textile education cannot be completed without industrial training, because this industrial training minimizes the gap between theoretical and practical knowledge and make accustomed to industrial environment. Without adequate practical experience it is impossible to understand theoretical aspects and its implication. Industrial attachment is the process, which builds understanding, skills and attitude of the performer, which improve one's knowledge in boosting productivity and services. Through this attachment, we can know about theoretical implementation on industrial basis. We can know more about the machines used at the different departments and their technical specifications, parameters, operating system, etc. and we think without doing this type of industrial attachment it is not possible to acquire industry based knowledge properly about textile engineering.

This report has been arranged on the basis of Industrial Attachment on Denim Manufacturing Technology (Warping, Dyeing, Sizing, Weaving, Finishing, Inspection, and R&D). Here in this report we present different working procedure for production of denim of the industry. we are present here the procedure and process of different types of warping system, dyeing method, weaving, fabric inspection, pretreatment, laboratory processing, quality control, finishing, necessary information about utilities, number of machines, machine specifications, manpower, maintenance, name of the buyer, production capacity, dyes and chemicals, layout of the different section, work shift.

Our internship period was between **15th January, 2018 to 15th March, 2018**,for two months in **Sinha Denim Ltd. & Sinha Rope Denim Ltd.**



# Chapter -2

## Factory Information

## 2.1 About Opex & Sinha Textile Group:

The Opex & Sinha Textile Group is a composite textile manufacturing complex built on an area of 43 acres of land at Kanchpur, about 20 km away from Dhaka on the bank of river Shitalakkha. It is one of the largest complexes of its kind in South Asia producing high quality yarn, gray fabrics, dyed fabrics, printed fabrics and knit fabrics. Swiss, Italian, German, and French made computer-controlled machineries have been installed in each of the divisions to deliver quality textiles, which meet the demand of European and American customers.

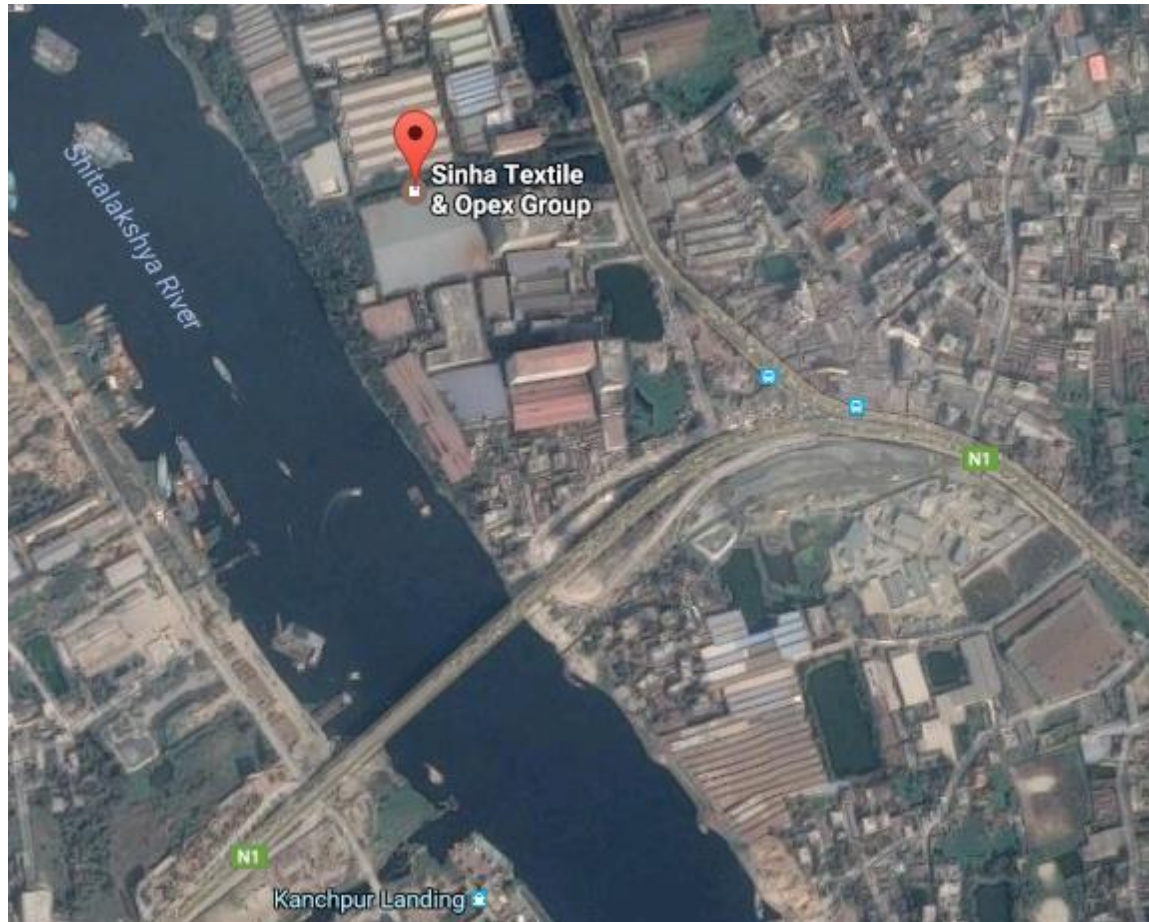
Major portion of turnover of the textile segment are for RMG units. Total fabrics requirement for the group RMG segment is around 50 million yards per year. Out of the same, the textile units supplied around 18 million yards per year. To mention apart from cost advantage, sourcing from own backward linkage ensures quality of the product as well as lead-time advantage for the RMG segment.

The Opex & Sinha RMG division has an annual capacity of 6 million dozen of RMG unit with a lead time of 60-75 days. It comprises of 28 companies with 170 standards production lines and a total covered factory space of 9,72,000 square feet. The main product of Opex & Shina are in both woven and knit fabrics; such as - shirts, pants, shorts, short-all, jumpers, overalls, jackets, vests, sportswear, sleep wear, ladies dresses, T-shirts, and fleece items, with imported fabrics from all over the world.

Most of the main RMG companies of the group are based in their Kanchpur Complex. Opex & Sinha Industries Ltd, one of the largest companies of the group, established in 2005 is in the Kanchpur Complex and has 16 lines of Denim RMG production.



## 2.2 Company Location Map (Satellite View):



## 2.3 Company Profile:

|                             |  |
|-----------------------------|--|
| <b>Name of the Company</b>  | : Opex & Sinha Textile Group   |
| <b>Owner of the Company</b> | : Mr. Anisur Rahman Sinha  |
| <b>Factory Location</b>     | : Mohakhali, Kanchpur, Mirpur.   |
| <b>Address of Factory</b>   | : Head Office:<br>Mohakhali Tower<br>82, Mohakhali, C/A<br>Dhaka-1212<br><br>Merchandising Office (Kanchpur Zone):<br>Sinha Textile Complex, Kanchpur<br>Sonargaon, Narayanganj. |





Merchandising Office (Dhaka Zone):

House #56/1, Block -C,

Mirpur#13, Dhaka-1216, Tel: 037-77000573-78

Fax: 880-2-8013522

Hongkong Office:

Joyful Miles Ltd.

16B, Alpha House 27-33 Nathan Road

Tsimshatsui, Hongkong.

U.S.A Office:

8409, Haalli Ford Ct, Plano

Texas: 75025

- Year of Establishment** : 1984
- Buyers** : 1. AMC, 2. American eagle, 3. Celio, 4. H &M,  
5. Cortefiel, 6. DorbyFrocks, 7.GAP, 8. Gymboree,  
9. Charming Shoppes, 10. J.C. Penney.  
11. Jhon Forsyth of Canada, 12. Joni Blair,  
13. Levi Strauss, 14. Mervyns, 15. Phillips Van Heusen,  
16. Regatta, 17. Scarlet, 18. Sears, 19. Seiden Sticker,  
20. Squeeze, 21.Target, 22. V. F. Asia Etc.
- Nature Of Business** : 100% Export-Oriented Knit & WovenGarments Factory.
- Nature of Company** : Private Limited Company.
- Total Employees** : More Than 40,000
- Name and Address of Bank** : Pubali Bank,
- Local Office** :KashimpurBazar Gazipur, Bangladesh
- Building** : One Storied, Two Storied, Multi Storied, Spinning,  
Weaving, Knitting, Dyeing, Finishing & Garments Area.
- Certificate** : ISO 9001:2000,
- Fabric Types** : Single Jersey, Heavy Jersey, Pique, Lacoste,  
Interlock, Rib, Jacquard, Terry, 2/3ThreadFleece



|                          |  |
|--------------------------|--|
|                          | (Brushed/Unbrushed), &Etc With<br>Open Width and Tubular Finish Knit, Woven, Denim etc.  |
| <b>Garments</b>          | : T-Shirt, Pants, Polo Shirt, Short/Trouser, LeggingTank<br>Tops, Jogging Suits, Fashion Dress and Children Wear Etc.  |
| <b>Payment Terms</b>     | : Confirmed Irrevocable Letter Of Credit.  |
| <b>Main Production</b>   | : The Main Product of Opex Are in Both Knit &Woven<br>Fabric, Such As Shirts, Pants, Shorts, Short-All, Jeans,<br>Jumper, Jacket,Sports Wear, Sleep Wear, Ladies<br>Dresses,T-Shirts, and Fleece Item. |
| <b>Number of Machine</b> | : 10200  |
| <b>Production Line</b>   | : 170  |
| <b>Capacity / Day</b>    | : 170000-204000 Pieces   |
| <b>Main Market</b>       | : EU, USA, UK &Canada.   |

#### 2.4 Social Policy:

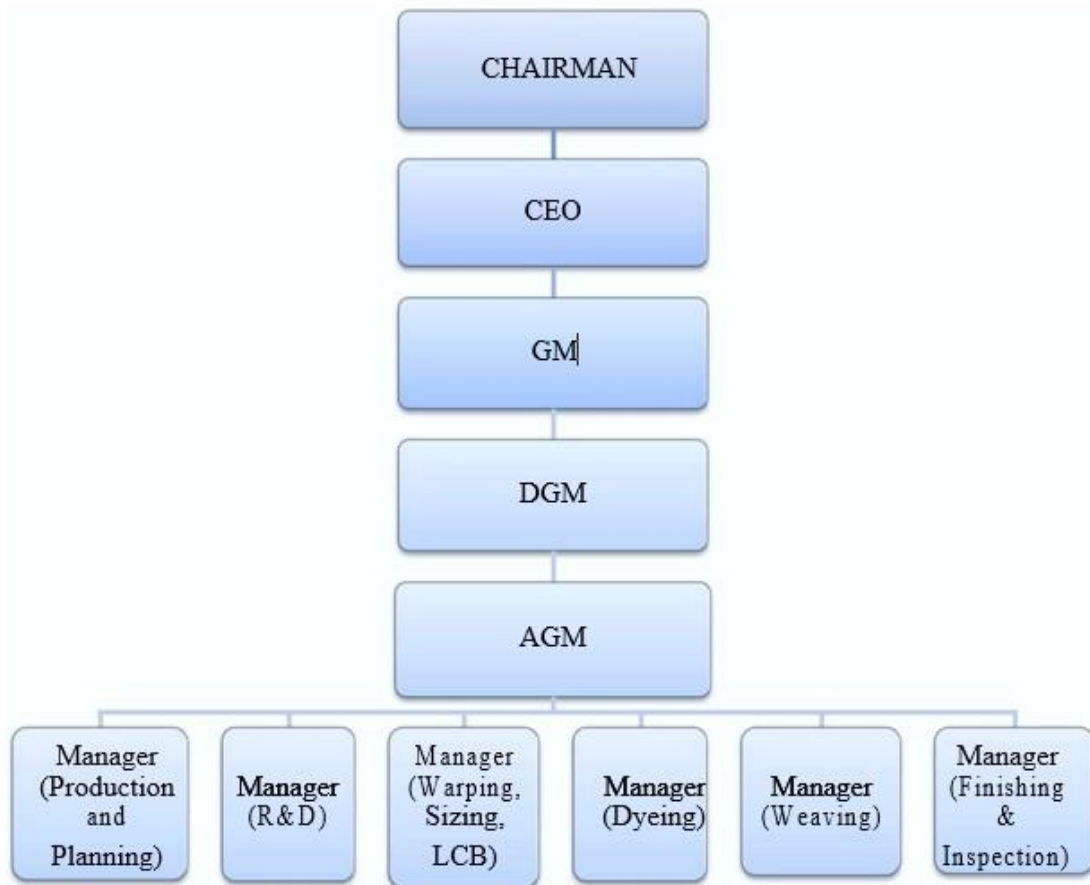
The Opex and Sinha Textile Group is focused on the best human working environment rehearses. They will probably persistently enhance their Human Resource arrangements and systems through education, training, correspondence and employees inclusion. To that end Opex and Sinha Textile Group has recognized eight (8) zones of significance. The organization focuses on management audit, employees open correspondence, policy development and coordination with the SA 8000 standard to agree to all state/neighborhood laws and industrial/processing plant laws of people groups republic of Bangladesh to give an ideal employment environment that regards comprehends the requirements of its employees. The organization resolves to educate all employees of its policy and position on the SA 8000 standard. All employees will be made mindful of the policy and friends articulation upon execution.

Going ahead every new worker will be prepared on SA 8000 in new employees' introduction. Occasionally during the time the organization will reaffirm its responsibility regarding the SA 8000 policy through worker correspondences, for example, office notice, exhibit and finance stuffers.The eight (8) identified areas are:

1. Child labor
2. Forced labor
3. Health & Safety
4. Freedom of assembly/ Right to collectively bargain
5. Discrimination
6. Disciplinary practices
7. Working hours
8. Remuneration/ Compensation.

## 2.5 Organ gram of Sinha Denim Ltd:

Sinha Denim Ltd. the Managing Director/ Chairman who controls the entire factory. And the others respective departmental chief controls their own department in Sinha factory. In this below the organ gram of administration and the others department is showing:





# Chapter-3

## Details of Attachment

### 3.1 ABOUT DENIM

#### 3.1.1 Introduction:

Denim is a solid cotton warp-faced textile in which the weft passes under at least two warp strings. This twill weaving produces a diagonal ribbing impact. The most well-known denim is indigo denim, in which the warp string is colored, while the weft string is left white. Because of the warp-faced twill weaving, one side of the textile is overwhelmed by the blue warp strings and the opposite side is commanded by the white weft strings. This makes Levis be white within. The indigo coloring process, in which the center of the warp strings stays white, makes denim's mark fading attributes. An extensive variety of shade in denim is conceivable to create by different washing framework. Presently a-days denim has an awesome request in household and world markets.



#### 3.1.2 Types of Denim Produced in Sinha:

Types of denim produced according to buyer requirement in Sinha are given below:

##### 1. Dry Denim:

Dry denim is a type of jeans that are unwashed and have minimal wear, also referred to as raw denim. Jeans made out of dry denim are stiff with a deep indigo color.

##### 2. Stretch Denim:

Stretch denim incorporates an elastic component, such as spandex. This creates a certain amount of "Stretch" in garments made from stretch denim.

##### 3. Poly Denim:



It is the blends that appeal to those who like the look of denim but prefer polyester blends that wash and dry quickly and are lighter weight and a bit dressier.

#### **4. Ramie Cotton Denim:**

It is the blends that are found in a variety of combinations, with a wide price variance. Ramie is a plant fiber usually added because it reduces wrinkling and adds a silky luster to the fabric.

##### **3.1.3 Characteristics of Denim:**

- Warp yarns are colored (usually with indigo, vat, blue or sulphur black).
- Structure: Right hand or left hand twill, i.e. z/s-twill of 2/1 or 3/1 construction.
- Usually made of cotton yarns of coarser count (7s, 10s, 14s, 16s, etc).
- Coarser cloth (weight lies between 6-14 oz/sq.yd) and used for pant and jackets.
- Rotor yarn is usually used.

##### **3.1.4 Classification of Denim:**

###### **As Per Weight /Unit Area:**

- Light weight: 4.5 to 7 oz/sq.yd
- Medium weight: 7 to 10 oz/sq.yd
- Heavy weight: 11 and above.

###### **As Per Hue and Color:**

- Indigo vat
- Sculpture black
- Pigment

###### **As Per Slub Yarns:**

- Warp yarns are slub only
- Weft yarn are slub only
- Cross Hatch: both way slub i.e. both warp and weft yarn are slub

###### **As Per Fabric Structure /Design:**

- Plain
- Twill (S-twill, Z-twill, and Herringbone or Zigzag twill).

##### **3.1.5 Manufacturing Processes of Denim in Sinha:**

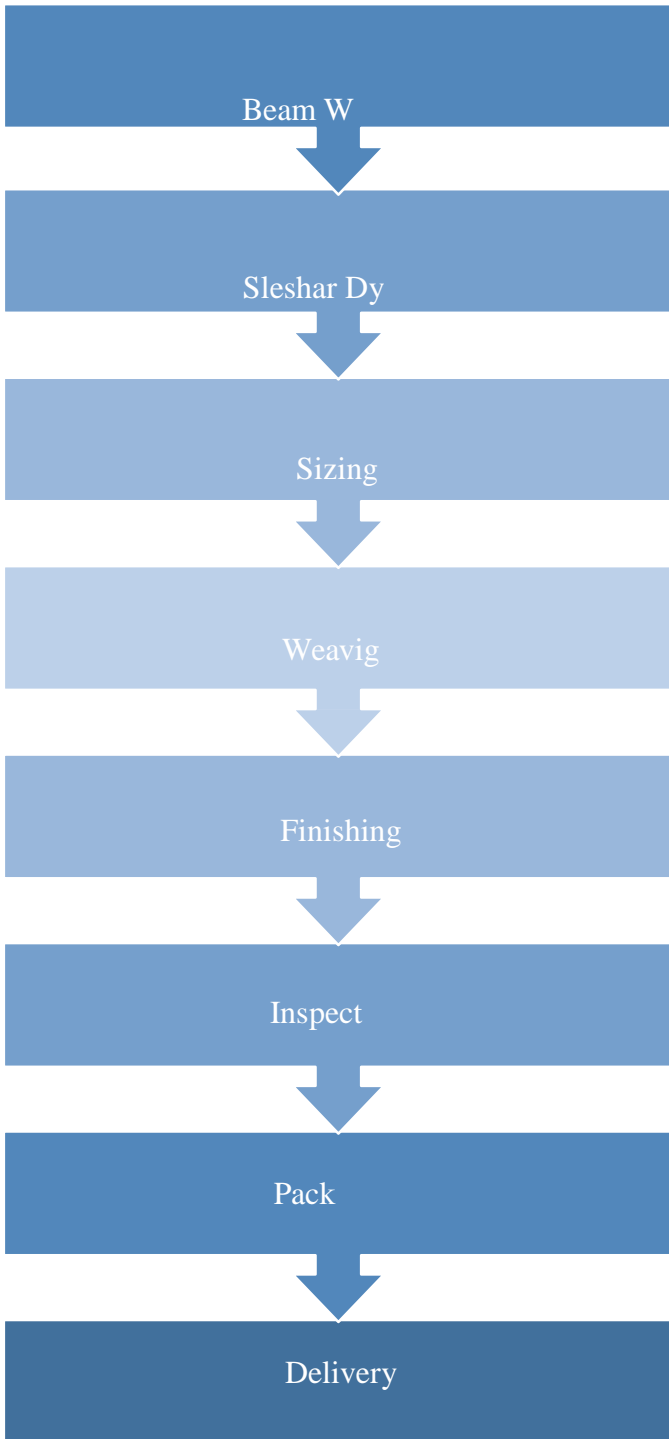
The warp yarn (length-wise) utilized as a part of denim fabrics is exceptionally arranged for denim manufacturing contrasted with ordinary woven fabrics. The yarn experiences various processing steps before it is set on the weaving machine. Not at all like the warp yarn, most filling yarn (width-wise) is put onto yarn packages and conveyed straightforwardly to the weaving machine where it is embedded into the fabric with no further arrangement in an indistinguishable way from the customary woven fabrics. The accompanying two stream outlines uncover the essential steps in the produce of denim fabrics:

#### **1. Continuous Process**

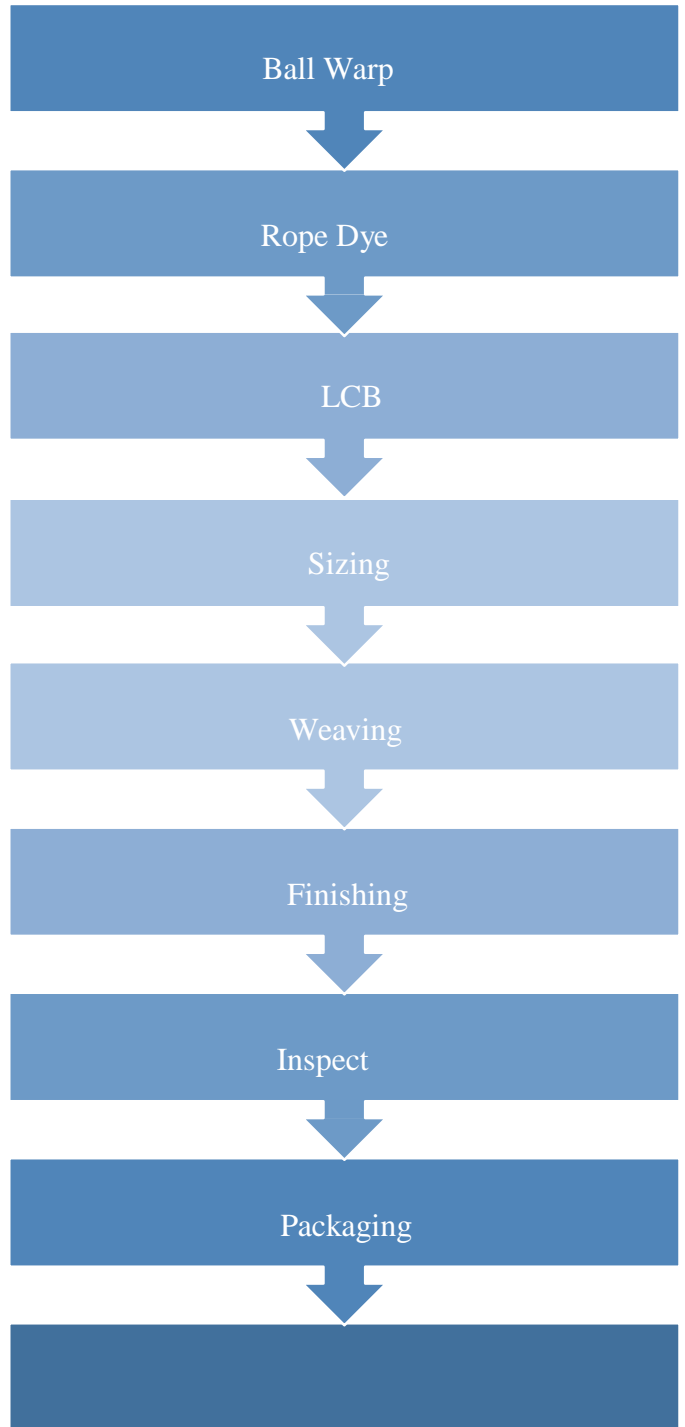
#### **2. Discontinuous Process**



### Continuous Process



### Discontinuous Process





# Chapter-4

## Warping





#### 4.1 Definition:

In general terms, warping is transferring many yarns from a creel of single-end packages forming a parallel sheet of yarns wound onto a beam or a section beam. The warp beam that is installed on a weaving machine is called the weaver's beam. A weaver's beam can contain several thousand ends and for different reasons it is rarely produced in one operation.

#### 4.2 Objects of Warping:

- ✓ Development of warp yarn shaft.
- ✓ Construction of a parallel of yarn shafts.
- ✓ Modifying the issues of yarn like thick and thin places, extensive bunches and so on.
- ✓ Winding the pre-decided length of yarn.
- ✓ Combination of little packages.
- ✓ Finding long length of warp yarn.
- ✓ Quickening the following processes.

#### 4.3 Importance of Warping:

- ✓ Followings are the most widely recognized significance of warping:
- ✓ Warp pillars are built by warping.
- ✓ Parallel yarn sheets are developed by this process.
- ✓ Predetermined yarns are twisted from the yarn bundle.
- ✓ Small packages are joined by this process.
- ✓ Long length of warp yarns is found in this process.
- ✓ Various yarn issues like thick and thin place.
- ✓ Larger bunches are changed by this process.
- ✓ Small packages progress toward becoming re-useable by this process.
- ✓ Warping quickens the following process.

#### 4.4 Types of Warping:

There are four types of warping, which are as follows:

1. Direct Warping
2. Indirect or Sectional Warping
3. Ball Warping
4. Draw Warping

##### 4.4.1 Direct Warping:

In coordinate warping, the yarns are pulled back from the single-end yarn packages on the creel and specifically twisted on a beam. Direct warping can be used to straightforwardly deliver the weaver's beam in a single activity. This is suitable for strong yarns that don't require sizing and when the quantity of warps on the warp beam is moderately small. This is also called coordinate beaming. It can also be used to make smaller, transitional beams called warper's beams. These smaller beams are joined later at the slashing stage to create the weaver's beam. This process is called beaming.

#### 4.4.2 Indirect or Sectional Warping:

In Indirect warping, a section beam is produce first. It is also called band warping or drums warping. The section beam is tapered at one end. Warp yarn is wound on the beam in sections, starting with the tapered end of the beam. Each section has multiple ends that are traversed together slowly during winding along the length of the section to form the angle. Due to the geometry of the yarn sections, the last section on the beam will have a tapered end that will make the whole yarn on the beam stable. It is important that each layer on the beam contain the same number of yarns. The same length of yarn is wound on each section. After all the sections on the beam are wound completely, then the yarn on the beam is wound on to a regular beam with flanges, before slashing. This process is called re-beaming.

#### 4.4.3 Ball Warping:

Ball Warping is mainly used in manufacturing of denim fabrics. The warp yarns are wound on a ball beam in the form of a tow for indigo dyeing. After the dyeing process, the tow is separated and wound on a beam. This stage is also called long chain beaming or re- beaming.

#### 4.4.4 Draw Warping:

Draw Warping is combining the drawing of filament yarns with heat setting and warping processes to achieve uniform stretching and heating for improved dye uniformity, end to end.

It is used for weaving of thermoplastic yarns.

#### 4.5 Types of Warping Done in Sinha:

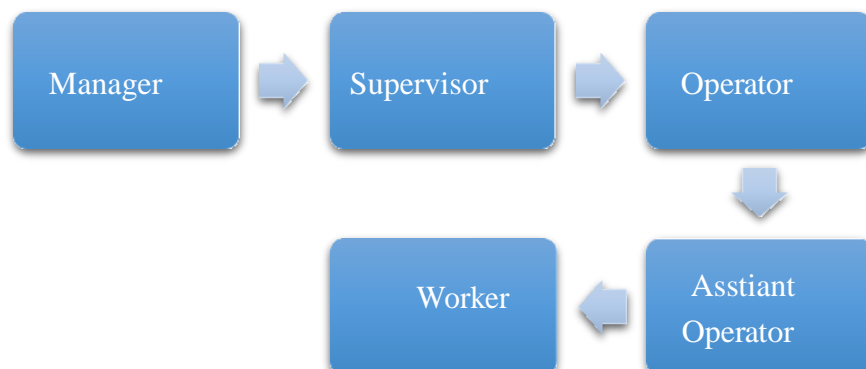
There are two types of warping done in Sinha, which are as follows:

##### 1. Direct Warping

##### 2. Ball Warping

#### 4.5.1 Direct Warping

#### 4.5.2 Organogram of Direct Warping Section:



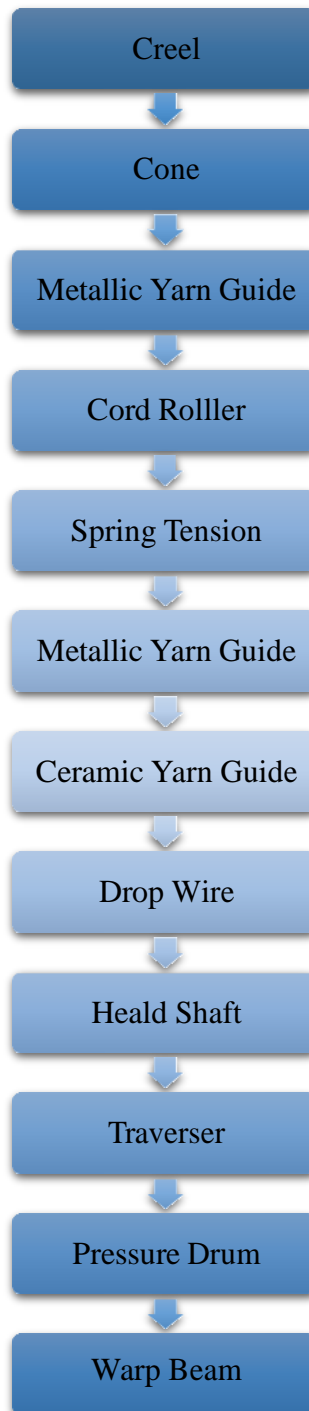


#### 4.5.3 Diect Warping in Sinha Denim Ltd:

In this system single end of the yarn from the cones or packages are straightforwardly injured on the warping beams. This is the twisting of aggregate number of warp ends in full width in a single Operation from creel bobbin. This process or system is used for the mass generation. This is used to make smaller middle beams called warper's beams. In Sinha Denim Ltd. the immediate/beam warping section is working under the Manager of Preparatory Section. Suker Muller warping machine with H-creel is used here. The department is associated with coloring section straightforwardly and working 24 hrs. Research and development department inspects the cones which is changed over in beams of required length and sent to coloring section.

#### Machine Specification:

| Brand Name            | Suker Muller |
|-----------------------|--------------|
| Model                 | 2005         |
| Machine Serial No.    | 100040161    |
| Origin                | Germany      |
| Working Width         | 71"          |
| Manufacturing Year    | 2005         |
| Max Beam Diameter     | 140.9cm      |
| Max Warping Speed     | 850Mtr/min   |
| Creel Type            | H            |
| Creel Capacity        | 432          |
| Reed to Reed Distance | 0.8cm        |
| Manpower              | Six          |
| Max Warping Capacity  | 20000Mtr     |
| Stop Motion           | Auto         |

**Process Parameter of Direct Warping Machine:**

## Components of a Warping Machine:

The warping machine is mainly divided into two major components-

### 1. Components of Creel:

- Yarn clearer
- Stop device
- Indicator
- Tensioners
- Yarn guide
- Package holder
- Blower or suction fan



**Fig: Creel Section**

### 2. Components of Headstock

- Adjustable v-wraith
- Measuring and marking device
- Yarn speed controlling device
- Pneumatic or hydraulic pressure unit
- Break assembly
- Driving drum
- Stop motion
- Building drum
- Beam bracket
- Lease rod

**Procedure of Direct Warping:**

The creel stand has most extreme limit of six cones for each stand. The yarn from the cones is unwound and passes from bar by cross wound, holed by a catcher guided to the tensioning zone when cone rotates anticlockwise. There are three types of tension in warping i.e. catcher tension, bar tension, and sacker tension. Attractive tensioner is used for yarn tension. At that point the yarn comes to the winding zone or headstock. Combs straighten the yarns towards pressure drum, which supports beam, and yarns in an arrangement so that every single yarn end can wound separately. Static charges because of contact of yarns on metal surface cause of static charges, which are evacuated through an antistatic gadget. At that point the yarn is wounded on beam in this route for a required length if beam is changed after one filling of beam at that point knotting of yarns is made. Similarly if cones are finished on one edge side then trolley system of cone changing is used in this way chains rotates the entire casing of discharge side and new filled side of casing is sent again knotting is done between the new cones yarn and as of now winded yarn. Additional yarn is then expelled through cutting. Sensors sense any sort of yarn breakage and in case of yarn breakage knotting is finished.

**Count wise Drum Pressure:**

| Count | Drum Pressure (daN) |
|-------|---------------------|
| 6     | 500                 |
| 7     | 500                 |
| 8     | 500                 |
| 9     | 400                 |
| 10    | 400                 |
| 12    | 400                 |
| 14    | 400                 |
| 16    | 400                 |
| 20    | 350                 |

**Fig: Pressure Drum****4.8 Calculations:**

Some examples are given below to show the concept of warping plans.

**Problem: 01**

If Weight of Bag: 60 Kg

Total Number of Cone: 20

Count: 7 OE

Then find out the length of yarn in one cone.



**Solution:**

Bag wt.  $\times$  2.2046  $\times$  .9144  $\times$  Count  $\times$  840

Length of yarn in one cone = \_\_\_\_\_

Total number of cone

$60 \times 2.2046 \times .9144 \times 7 \times 840$

= \_\_\_\_\_

20

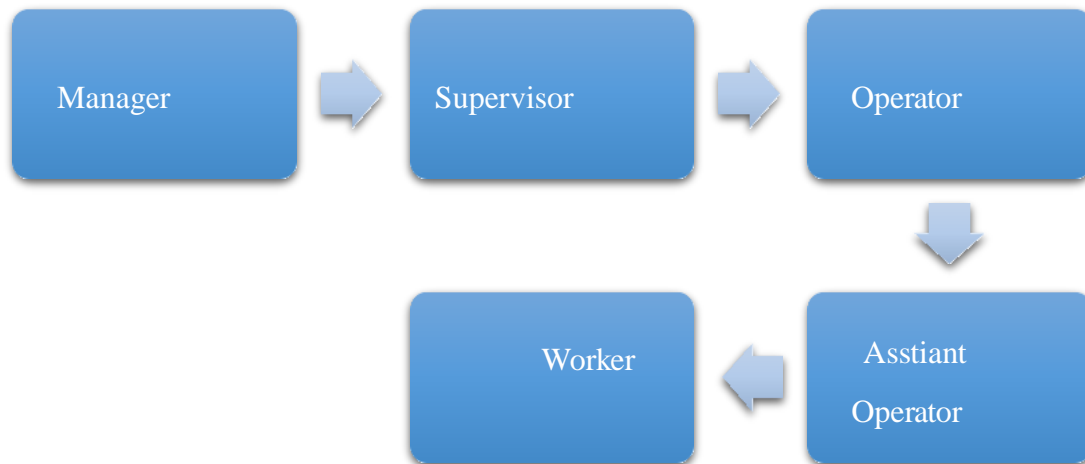
= 3550 m

**Answer:** Length of 7 OE = 35550 m



## 4.6 Ball warping

### 4.6.1 Organogram of Ball Warping Section:



### 4.6.2 Ball Warping in Sinha Denim Ltd:

In this system the substantial no the strands of the yarn of specific length as loose untwist rope are wounded. This system is fundamentally used when the yarn is colored for denim fabrics. Such a beam is named as ball. After the withering process the rope ends are again separated and wound on another warping beams (Long Chain Beaming). Warp beam so created are then consolidated on the sizing machine for applying the size and afterward wound on a weaver's beams. In Sinha, ball warping 250 to 448 yarn ends are pulled from the creel. There are four Ball Warping Machines in SRDL. The yarns at that point pass through a brush like gadget (sometimes called a hack or reed), which keeps each warp yarn separate and parallel to its neighboring ends. At intervals of each 500 or 1000 yards (or meters), a lease string is set across the sheet of warp yarns to help yarn separation for the re-beaming activity, which will happen later. The yarns at that point experience a channel shaped gadget called a trumpet or condenser, which collapses and condenses the sheet of yarn into rope frame. This gadget is situated at the base of the warper head and traverses forward and backward, managing the recently shaped rope of yarn onto a log. The rope must be wound at a constant tension to shield the yarns from tangling.

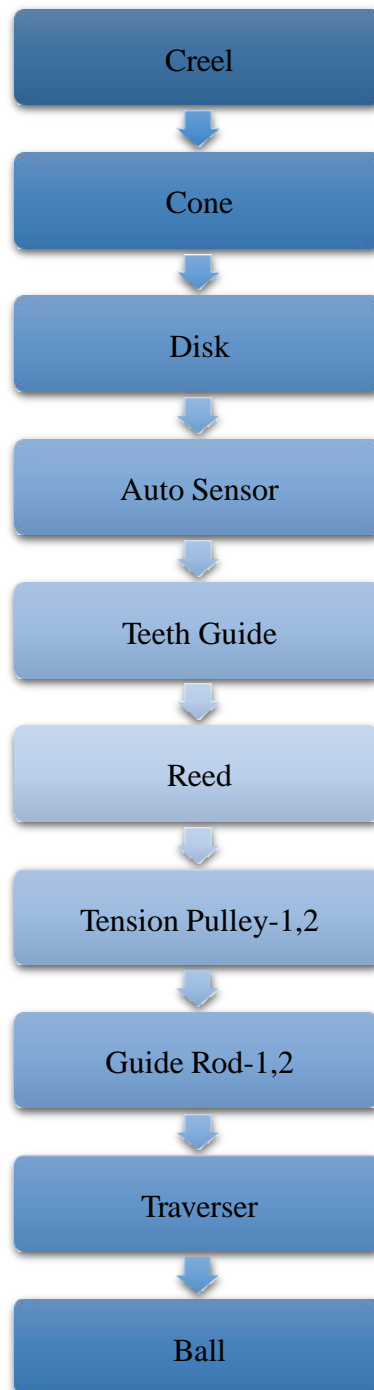


**Fig: Ball warping machine**

**Machine specification:**

| Brand Name             | West Point |
|------------------------|------------|
| Machine Serial No      | WO#173725  |
| Origin                 | America    |
| Working Width          | 46"        |
| Manufacturing Year     | 2005       |
| Max Beam Disc Diameter | 15"        |
| Max Warping Speed      | 500Mtr/min |
| Creel Type             | H          |
| Creel Capacity         | 448        |
| Stop Motion            | Auto       |
| Manpower               | Six        |
| Max Warping Length     | 18500Mtr   |
| Ball Width             | 53"        |

### Flow Chart of Ball Warping:



#### 4.7 Some Faults Found in Ball Warping:

##### 1. Warp off center of the ball:

###### Causes:

Due to not carefully placing of creel wraith and ball.

###### Remedies:

Ball and wraith placed properly.



## 2. Uneven ball warping:

### Causes:

- This effect due to winding of small no of ends on larger ball.
- When the dents are bent or the spacing between dents is uneven.
- Mixed count.

### Remedies:

Higher no of ends be used.

## 3. Crossed ends:

### Causes:

- Due to faulty knotting after yarn breakage.
- Tying of broken ends.
- Loose warps.

### Remedies:

Knotting and tension controlled.

## 4. Snarl formation in the warp:

### Causes:

- Due to over tension.
- Improper twist.
- Position of guide.

### Remedies:

By proper tension and twist.

## 5. Missing ends:

### Causes:

- Due to faulty stop device.
- Exhausted cone or bobbin.
- Absence of cone or bobbin on creel.

### Remedies:

By correct stop device is used

## 6. Hard ball:

### Causes:

Due to high tension.

### Remedies:

Tension and pressure maintained properly.



### 7. Unequal length:

**Causes:**

Due to faulty measuring device.

**Remedies:**

Correct measuring device.

### 8. Broken ends:

**Causes:**

Due to improper join of the yarn

**Remedies:**

To be knotted the yarn carefully.

**Similar faults may occur in Direct/beam warping.**

### 4.8 Comparative Study between Ball Warping & Direct Warping:

| Ball Warping                 | Direct Warping                                     |
|------------------------------|--|
| Wound in a Ball              | <b>Wound in a warper's beam</b>                    |
| Yarn is wound in a rope form | <b>Yarn is directly wound</b>                      |
| Max warping Speed 500Mtr/min | <b>Max warping Speed 850Mtr/min</b>                |
| Next process is rope dyeing  | <b>Next process is Slasher dyeing &amp; sizing</b> |
| Production Comparatively Low | <b>Production Comparatively High</b>               |
| Creel capacity is Max 448    | <b>Creel capacity is Max 432</b>                   |



# Chapter-5

## Dying



## 5.1 Introduction:

The process by which textile products like fibers, yarns, and fabrics is to be changed physically or chemically, so that it looks mono uniform colored is called dyeing. All commercial textile dyeing processes take place by the application of a solution or a dispersion of the dyes to the textile material followed by some type of fixation process. The dye solution or dispersion is almost always in an aqueous medium. A major objective of the fixation step is normally to ensure that the colored textile exhibits satisfactory fastness to subsequent treatment in aqueous wash liquors. Dyeing is mainly depends on the type of fabric, structure of fabric and the properties of dyes.

## 5.2 Objects of Dyeing:

- ✓ The textile goods are colored consistently with single shading.
- ✓ To increase the attractiveness of the textile goods.
- ✓ To make the fabric suitable for various usages.
- ✓ To make the textile goods suitable for embellishing purposes.

## 5.3 Theory of Dyeing:

The whole process of dyeing is completed by four steps as follows:

- ✓ Dye molecules go to the fabric surface from the color shower.
- ✓ Fiber absorbs the color atom from the external surface of the fiber to the inside surface of the cellulose.
- ✓ Migrate the color molecules wherever of the fiber molecules.

## 5.4 Dyes Use for Denim.

### 1. Vat Dyes/Indigo Dyes

### 2. Sulphur Dyes

#### 5.4.1. Vat Dyes:

Vat dyes are used most frequently in coloring and printing of cotton and cellulose fibers. They can also be connected for coloring polyamide and polyester blends with cellulose fibers. The scope of colors is wide, however shades are by and large dull. From a concoction perspective, vat dyes can be distinguished into two groups: indigoid vat dyes and anthraquinoid dyes. Indigo dyes are almost exclusively used for coloring warp yarn in the generation of blue denim. Vat dyes are not the same as reactive dyes. Disperse dyes, basic dyes, corrosive dyes or azoic shading yet its application process is close similar as sulfur dyes. Vat dyes are regular shading materials which are solubilized in a vat by the aging process called vatting. Vat dyes are insoluble in water yet it becomes in soluble frame by vatting process. The process of changing over insoluble vat dyes into soluble shape is known as vatting

**Properties of Vat Dyes:**

- ✓ Vat color is water insoluble and can't be connected specifically on textile material.
- ✓ Mainly use cellulose fiber coloring yet in protein fiber coloring PH should be controlled.
- ✓ Rubbing fastness is bad.
- ✓ Various shades are found.
- ✓ Dyeing process is troublesome.
- ✓ Washing fastness of vat color is great with rating 4-5.

**5.4.2 Sulphur Dyes:**

Sulfur dyes are synthetic natural substantive dyes for cellulosic. They are water insoluble dyes and have no partiality for the cellulosic as such, however solubilized when treated with a powerless soluble solution of sodium sulfide or some other lessening operator to shape a leuco compound. These leuco compounds are water soluble and have proclivity for the cellulosic materials such as cotton, viscose, jute and flex and so forth. These dyes are absorbed by the cellulosic material in the leuco shape from aqueous solution and when oxidized by suitable oxidizing agents, got changed over into insoluble parent color, which is fast to typical shading fastness parameters. These dyes are so called because they contain sulfur atoms in their molecules. The fibers most promptly shaded with sulfur dyes are the characteristic and man-made cellulosic fibers.

**Properties of Sulphur Dyes:**

- ✓ Economical coloring with incredible tinctorial esteem and great develop properties.
- ✓ Good general colorfastness properties such as wash fastness, light fastness, perspiration fastness and so forth. Direct fastness to crocking and poor fastness to chlorines blanching agents such as dyeing powder and sodium hypochlorite.
- ✓ Limited shade range to deliver just dull shades and there is no evident red color in the
- ✓ These dyes can be connected by exhaust, semi continuous or continuous coloring methods on piece of clothing, yarn, knits, fabric as well as loose stock and so on.
- ✓ Available in powder, granules and fluid forms.
- ✓ Sulfur dark 1 is the significant dark color used world wide for coloring of cellulosic.
- ✓ The customary coloring process is not environment inviting because of contamination problems of sodium sulfide as well as sod/pot dichromate.
- ✓ When colored by using non-contaminating decreasing and oxidizing agents the process is environment agreeable.

**5.5 Types of Shade of Denim:**

There are several types of shade available in denim. But in Bangladesh 4(four) types of dyeing processes are used:





1. Pure Indigo
2. Topping or Indigo Bottoming
3. Sulphur Topping (IBST) Bottoming or Sulphur Bottoming
4. Indigo Topping (SBIT) Pure Black/Sulphur

### **Pure Indigo:**

Indigo dye is an important dyestuff with a distinctive blue color. The natural dye comes from several species of plant, but nearly all indigo produced today is synthetic. Among other uses, it is used in the production of denim cloth for blue jeans. The form of indigo used in food is called “indigo tine”, and is listed as FD&C Blue No. 2.

### **Topping or Indigo Bottoming Sulphur Topping:**

In this method two type dyes are used for developing the required shed. In the topping method the Indigo dyes are used to develop the blue in the bottom part of the yarn sheet or Slasher whereas the Sulphur dyes are used to develop the black color shed in the top part of the yarn sheet or Slasher.

### **Bottoming or Sulphur Bottoming Indigo Topping:**

In this shed of sheet or Slasher dyeing process, two dyes are also used to develop color in the sheet or Slasher which finally wound in the weaver’s after sizing done in the continuous process of the production of the weaver’s beam. Here Sulphur dyes are used to develop the black color shed in the bottom part of the sheet whereas the Indigo dyes used to develop the blue in the top part of the sheet. To do this 10 to 12 warp beams are organized in proper way. Each of the warp beams contains 366 to 401 ends of yarn which varies according to the ends required in the final fabric as well as the design of the fabric.

### **Pure Black:**

Sulphur black dyes are low-intensity dyes that require large amounts for dark shades. The amount of sulphur black that will produce the darkest shade when applied properly is 4% of a 100% powder or 18% of a 20% liquid. It is difficult for cotton to easily absorb that quantity of dye in a way that produces a very dark shade. One method that has been used to produce darker, more colorfast sulfur blacks on yarn is to apply 50% of the dye, then dry the cotton, air oxidize and without washing, proceed to a second dye-box where the dye is applied again, dried oxidized with air again and washed.

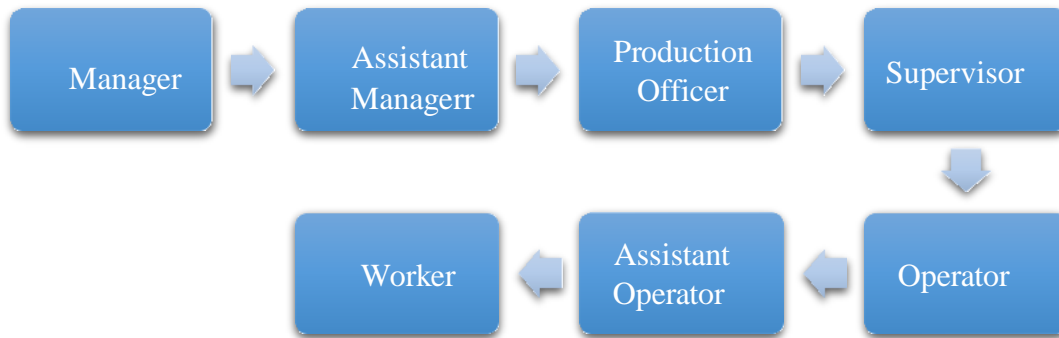
3.4.8 Types of Dyeing Done for Denim Production: There are two types of dyeing used for manufacturing denim in Sinha.

### **1. Slasher Dyeing**

### **2. Rope Dyeing**

#### 5.6 Slasher Dyeing

### **Organogram of Slasher Dyeing Section:**



**Slasher Dyeing in SDL:**

In continuous Slasher/sheet dyeing and sizing machine, direct warping beams are used, instead of ball warping logs in case of Indigo rope dyeing system. The Slasher Dyeing machine is capable of handling Ne count form 9/s to 30/s (OE and Slub both). Typical schematic sheet dyeing range is shown in Figure. At the back end of the Slasher/sheet dyeing range, the direct warping beams are creeled. The yarns sheet from each beam is pulled over and combined with the yarns from the other beams so that multiple sheets of yarns can be made. When dyeing according to the sheet dyeing method, instead of cables the warp threads are fed to the machine parallel next to each other. These are much smaller compared to the rope dyeing machines. Another advantage is that the cables don't need to be open after dyeing.

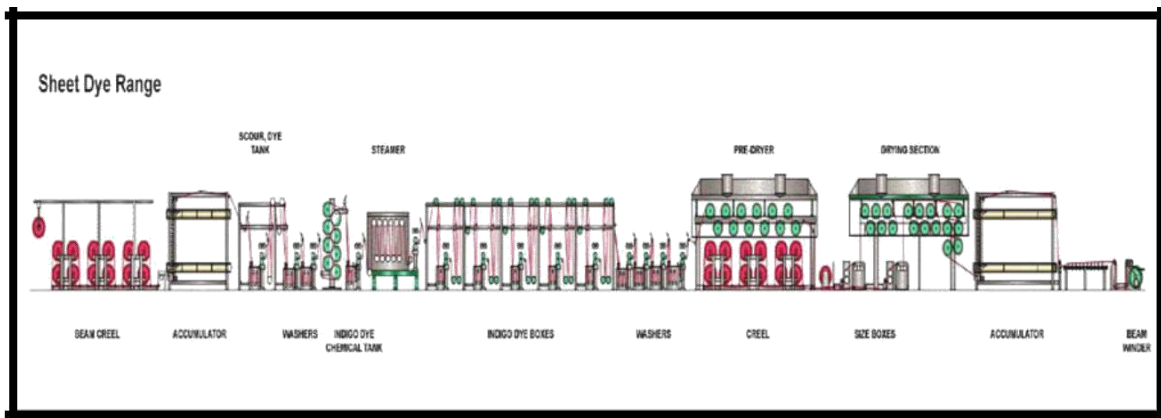


Figure: Sheet Dyeing Range

Moreover, each yarn wets much faster and in this way reduces the dipping and wetting times during dyeing. All in all, each thread has a larger surface compared to a dyeing cable and this requires somewhat more hydro- sulphite to prevent a premature oxidation of the indigo.





Fig: Slasher Dyeing Machine

## Machine Specification:

| M/C Name            | Slesher Dyeing Machine   |
|---------------------|--------------------------|
| Brand Name          | Sucker Muller            |
| Origin              | Germany                  |
| Manufacturing Year  | 1995                     |
| Creel Capacity      | 16                       |
| No. of Dye Bath     | 8                        |
| Total No. Of Box    | 14                       |
| Production Capacity | Continuous Dyeing Method |
| Storage Capacity    | 1400Ltr                  |
| Stop Motion         | Auto                     |

## SOP For Slasher Dyeing Machine Operation:

**Purpose:** To ensure the smooth operation of Slasher dyeing machine.

**Scope:** All Slasher dyeing machines operation at Sinha Denim Limited

**Responsibility:** Shift in-charge, Operators

**Procedure:**

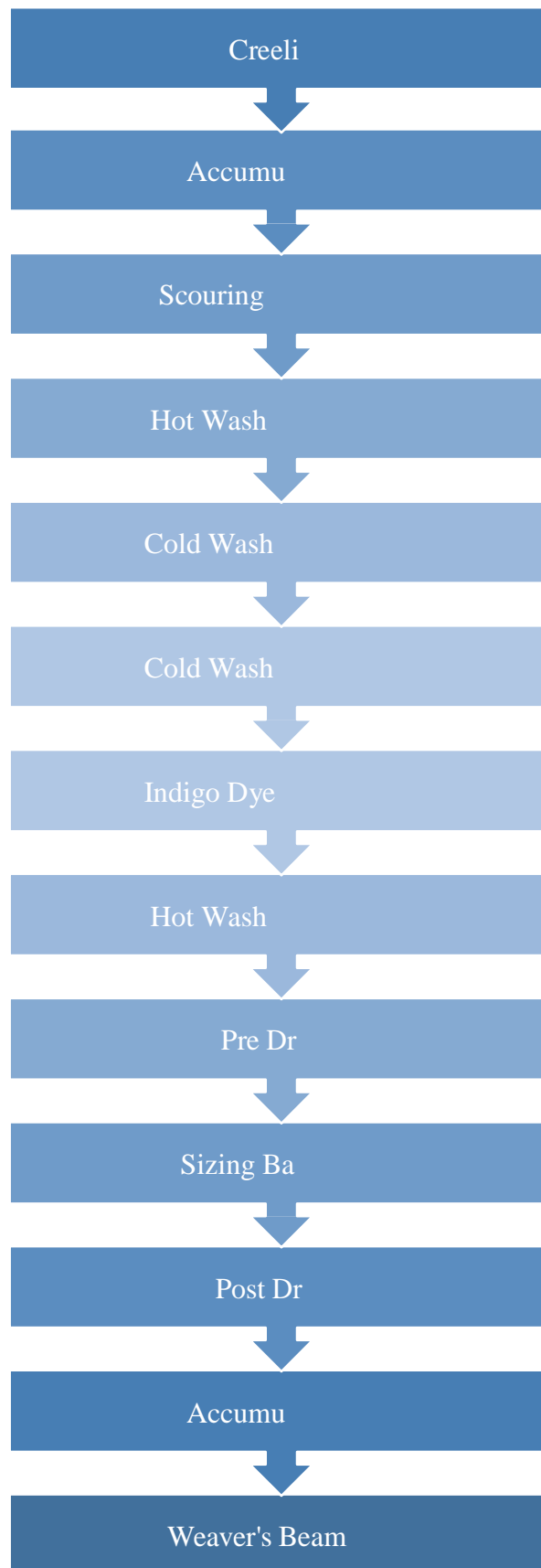
1. For activity Slasher coloring machine, first we have to check the power association of the machine. This will be done on the presence of electrical person.
2. At that point we should catch up that each engine of the machine is alright.
3. For finish Slasher biting the dust process, at first we need to see the programs on log book.
4. This is created by arranging dept. After see the program we should catch up on ball warping section, that program is alright or not. On the off chance that the program is prepared then the program has to get on coloring creel and join with pioneer rope.
5. For finish coloring process we should ensure that indigo, hydro, mercerize solution, caustic solution, softener solution planning is alright.
6. Presently we should plan color enclose sense of with respect to process. Illustration: Indigo fixation 2%, color box-6, hydro-6 g/l, pH-11.80
7. Subsequent to getting ready color box, we need to flow the color solution no less than 30 min. after appropriate fixation at that point take shading from color box and must be check focus by titration machine. In the event that it show the result alright at that point color solution is prepared for machine running.



8. After preparing dye solution we need to fill up wash box and softener box. After that we need to set up squeeze pressure in coiler zone we need to setup empty can for delivered dyed yarn.
9. After pressure setting, have to ensure that every dancer roller are in even position
10. Now machine is ready for running. After switching the machine we have to ensure that adjust fan is running for proper oxidation.

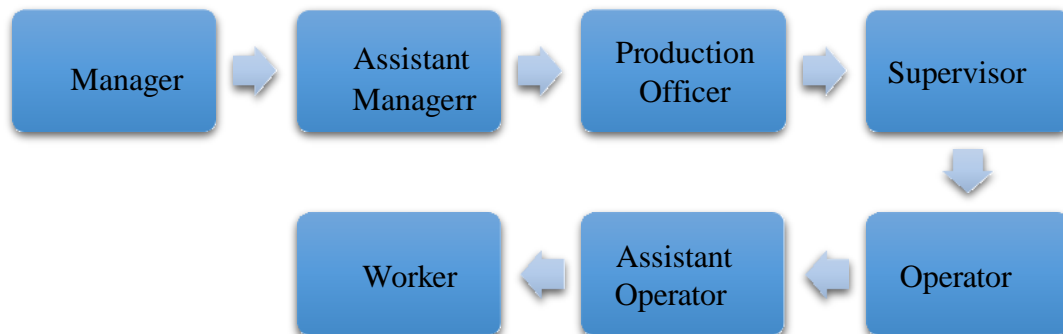


Flow Chart of Slasher Dyeing:



## 5.7 Rope Dyeing

Organogram of Rope Dyeing Section:



### Rope Dyeing in SRDL:

Rope coloring is the process in which the single warped or weft yarn is to be colored. The best possible indigo coloring methods for yarn, the threads of denim yarn are at first twisted into a rope, and afterward experience a dreary sequence of plunging and oxidization. The more successive the plunging and oxidizing the stronger the Indigo shade. Indigo passing on technique is not just the process for coating biting the dust on to the yarn segment. Sulfur dyes, Bottoming (process), Topping (process) are the process for kicking the bucket the yarn segments (It depends on the necessity of the shade) It's Consists of twisting the yarns into a rope that is then immediately plunged into indigo baths. It is considered the best technique for coloring denim as the short coloring time does not enable the indigo to completely penetrate the fibers.

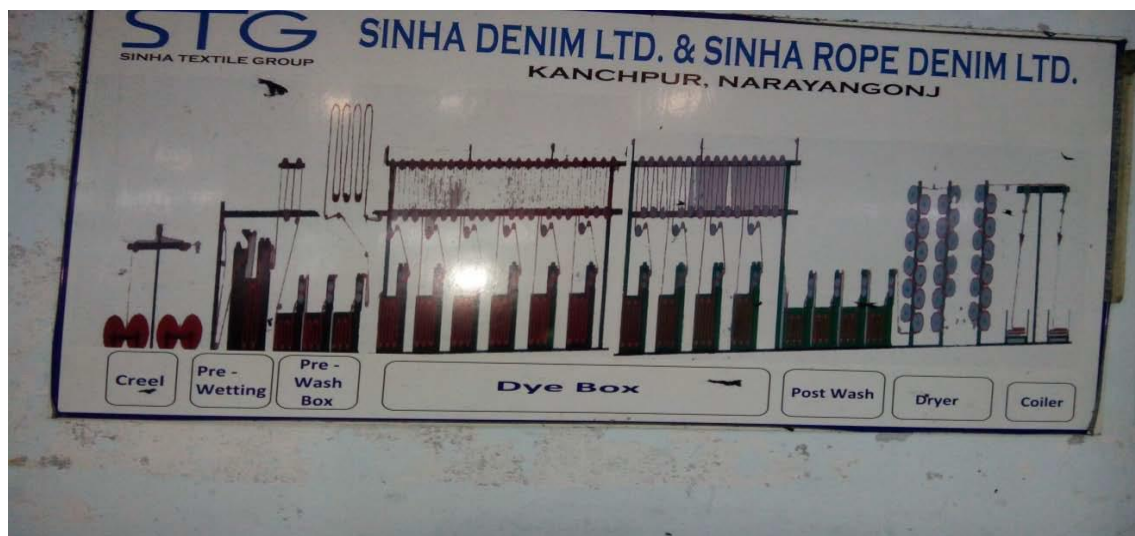


Fig: Rope Dyeing Range



Fig: Rope Dyeing Machine



## Machine Specification:

| M/C Name            | Rope Dyeing M/C          |
|---------------------|--------------------------|
| Brand Name          | Morrison                 |
| Origin              | America                  |
| Dryer               | 36                       |
| Air Consumption     | 60-70Kn                  |
| Model               | 2007                     |
| Manufacturing Year  | 2007                     |
| Creel Capacity      | 24                       |
| No. of Dye Bath     | 10                       |
| Total No of Box     | 18                       |
| Steam Supply        | 5000-6000lb/hr.          |
| Water Supply        | 500-600lb/h              |
| M/C Speed           | 35Mtr/min                |
| Production Capacity | Continuous Dyeing Method |
| Storage Capacity    | 3000ltr                  |
| Stop Motion         | Auto                     |

## SOP for Rope Dyeing Machine Operation:

**Purpose:** To ensure the smooth operation of rope dyeing machine.

**Scope:** All rope dyeing machines operation at Sinha Denim Limited & Sinha Rope Denim Limited.

**Responsibility:** Shift in-charge, Operators.

**Procedure:**

1. For task rope coloring machine, first we have to check the power association of the machine. This will be done on the presence of electrical person.
2. At that point we should catch up that each engine of the machine is alright.
3. For finish rope biting the dust process, at first we need to see the programs on log book.
4. This is created by arranging dept. After see the program we should catch up on ball warping section, that program is alright or not. In the event that the program is prepared then the program has to get on coloring creel and join with pioneer rope.
5. For finish coloring process we should ensure that indigo, hydro, mercerize solution, caustic solution, softener solution readiness is alright.
6. Presently we should get ready color enclose sense of with respect to process. Case: Indigo focus 2%, color box-6, hydro-6 g/l, pH-11.80
7. Subsequent to getting ready color box, we need to flow the color solution no less than 30 min. after legitimate focus at that point take shading from color box and must be check fixation by titration machine. In the event that it shows the result alright at that point color solution is prepared for machine running.

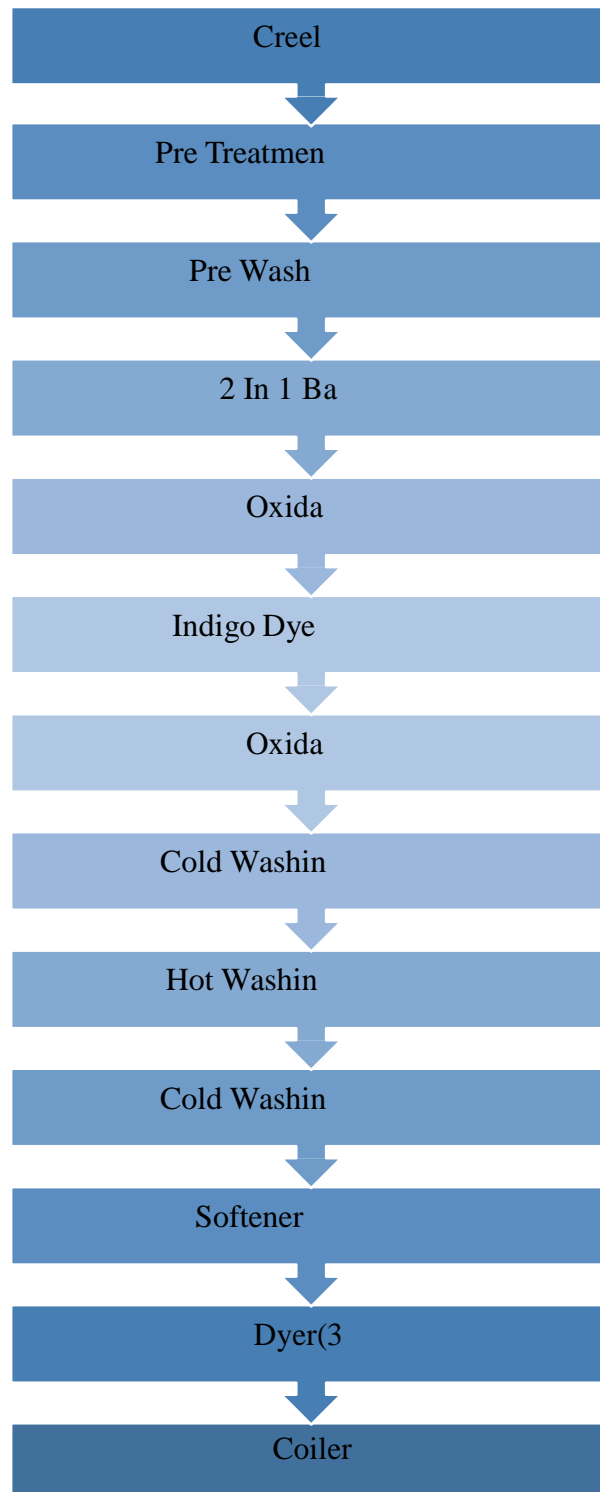




8. In the wake of planning color solution we have to top off wash box and softener box. After that we have to set up squeeze pressure in coiler zone we have to setup purge can for conveyed colored yarn.
9. After pressure setting, need to ensure that each artist roller are in even position
10. Presently machine is prepared for running. Subsequent to switching the machine we need to ensure that adjust fan is running for legitimate oxidation.



Flow Chart of Rope Dyeing Machine:



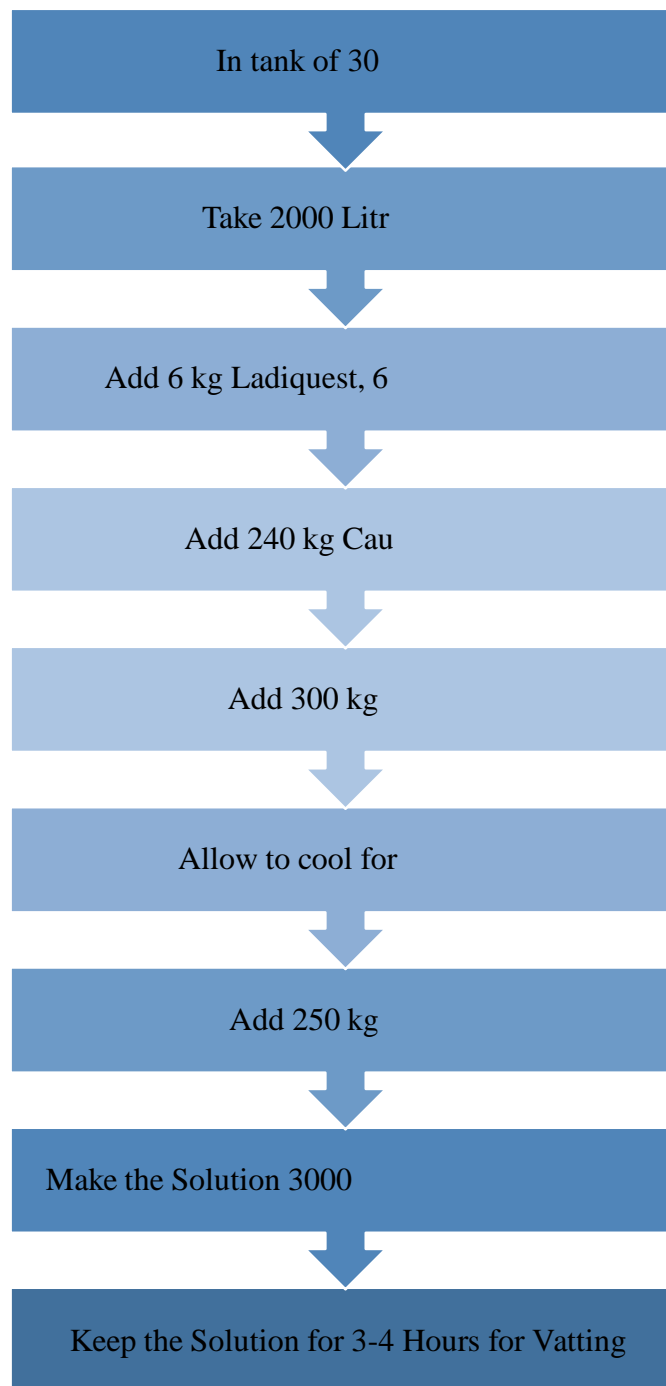


Indigo Stock Solution Recipe:

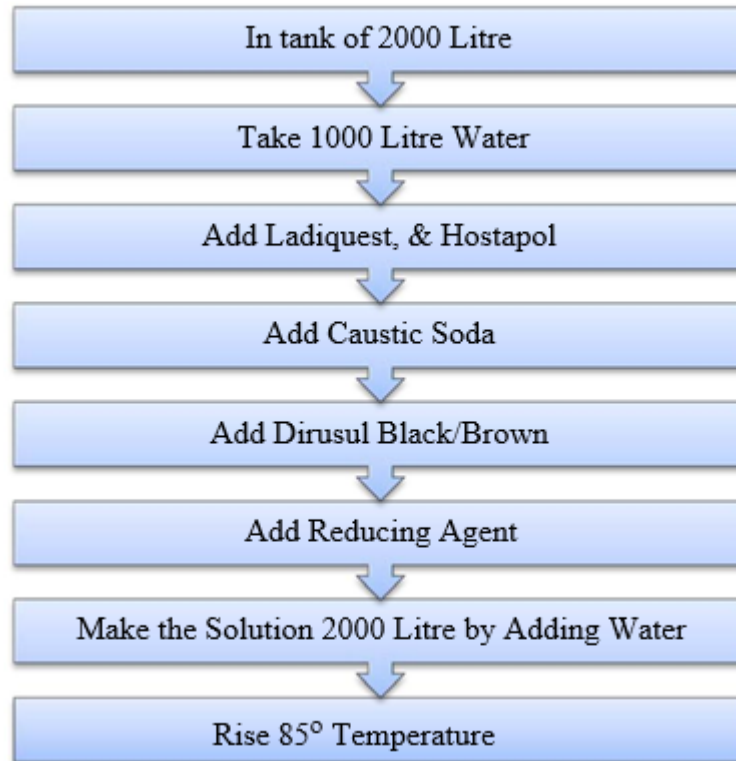
| <b>Chemicals</b>    | <b>Concentration<br/>(gm/ltr)</b> | <b>Quantity<br/>(kg)</b> |
|---------------------|-----------------------------------|--------------------------|
| <b>Indigo</b>       | <b>100</b>                        | <b>300</b>               |
| <b>Hydrose</b>      | <b>85</b>                         | <b>255</b>               |
| <b>Caustic Soda</b> | <b>80</b>                         | <b>240</b>               |
| <b>Setamol</b>      | <b>2</b>                          | <b>06</b>                |
| <b>Primasol</b>     | <b>5</b>                          | <b>15</b>                |
| <b>Ladquest</b>     | <b>2</b>                          | <b>06</b>                |
| <b>TotalVolume</b>  |                                   | <b>3000ltr</b>           |



Indigo Preparation Sequence :



**Dark Black/Dark Brown Preparation Sequence:**



#### **Sulphur Dye (Powder) Preparation Sequence:**



#### **Some Faults Found In Rope Dyeing:**



### **1. Entanglement of rope:**

#### **Causes:**

Improper working of load cell oil squeezing roller.

#### **Remedies:**

Pressure has to distribute properly.

### **2. Leakage of steam in drying cylinders:**

#### **Causes:**

Not proper working the steam valve

#### **Remedies:**

Proper maintenance of the steam valve

### **3. Shade variation:**

#### **Causes:**

Faults in dosing system

#### **Remedies:**

Dosing pump, filter and outer have to maintenance properly.

### **4. Broken yarn in tile rope:**

#### **Causes:**

Improper alignment of the yarn in the rope.

#### **Remedies:**

Change the pressure of the guide roller.

### **5. Irregular rope:**

#### **Causes:**

Improper alignment of the rope

#### **Remedies:**

Guide roller has to work properly.

## **5.8 Comparative Study between Rope Dyeing & Sheet Dyeing:**



- In case of Slasher sizing the yarns are unwound from a very heavy and large warper's beam, as the yarns are unwound in a sheet form there is every possibility of single end breakage due to the heavy weight of the beam. In case of rope dyeing, the dyed rope are just let off from a can and separate in L.C.B section by wound in a warper's beam where there is no tension at all.
- Ropes are stronger and suffer from less end breaks, even if they occur they will pass through the machine. But the yarns in the direct warping beam is not stronger compared to ropes, so there is sure possibility to end breaks.
- Ropes are braided from let-off creels to provide continuous operation. Therefore there is no yarn waste from beam set. In case of sheet dyeing process, there is possibility of yarn wastage.
- Rope dyeing eliminates the side to side variation of shades. While sheet dyeing couldn't because of dyeing the yarns in a sheet form.

### 5.9 Difference between Rope Dyeing & Sheet Dyeing:

| Criteria                 | Rope Dyeing     | Sheet Dyeing       |
|--------------------------|-----------------|--------------------|
| Floor Space              | Higher          | Lower              |
| Count                    | Can be Low      | Comparatively High |
| Dye Bath Capacity        | Higher(3000Ltr) | Lower(1500Ltr)     |
| LCB Process              | Needed          | No Need            |
| Shade Variation          | Lower           | Higher             |
| Wastage                  | Lower           | Higher             |
| Breakage Rate            | Lower           | Higher             |
| Stripe Fabric Production | Possible        | Not Possible       |
| Dyeing Quality           | High            | Comparatively Low  |
| Production               | Higher          | Lower              |
| Manpower                 | Higher          | Lower              |



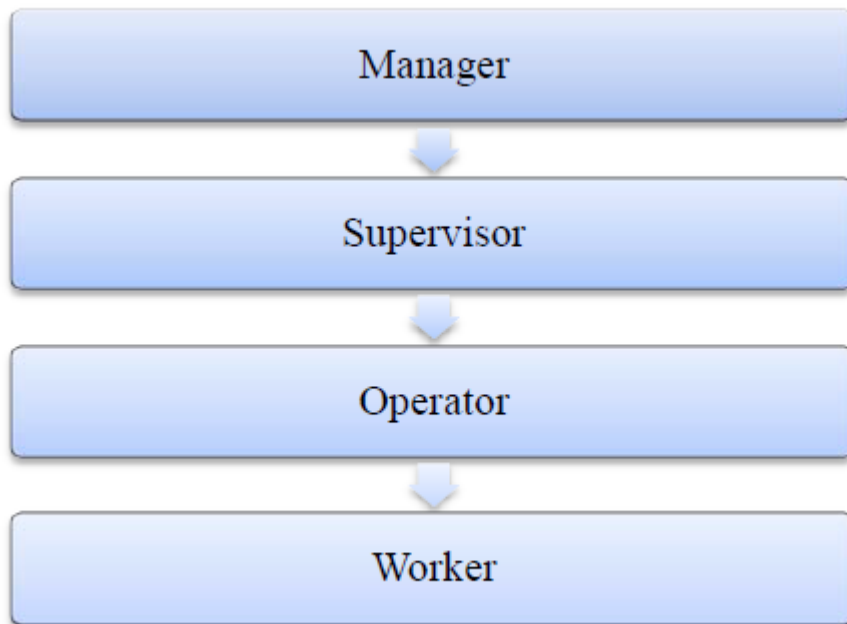
# Chapter-6

## Long Chain Beaming





## 6.1 Organogram of LCB Section:



## 6.2 Long Chain Beaming (LCB) in SRDL:

The warp yarns are rope dyed, it is then important to change the yarn arrangement from a rope frame to a sheet shape before entering the following procedure, which is slicing or sizing. Beaming or re-beaming includes hauling the ropes of yarn out of capacity tubs and moving them upward to a directing gadget. After the rope dyeing of warp yarn in denim production, the following task is the Long Chain Beamer (LCB). At the point when the rope has been dyed and dried in the rope dyeing range, it is taken in substantial cans in coiler segment. In Sinha in rope dyeing range, if the machine has a limit 24 ropes, at that point there will be 24 isolate coilers which convey 24 ropes in particular cans. These cans are exchanged to the Long Chain Beaming zone. The essential motivation behind long chain beamer is to open the rope into a sheet type of yarn and wind onto a warper beam which thus exchanged to the sizing machine. In Long Chain Beamer, the yarn arrangement in the dyed rope is change from a rope frame to a sheet shape.

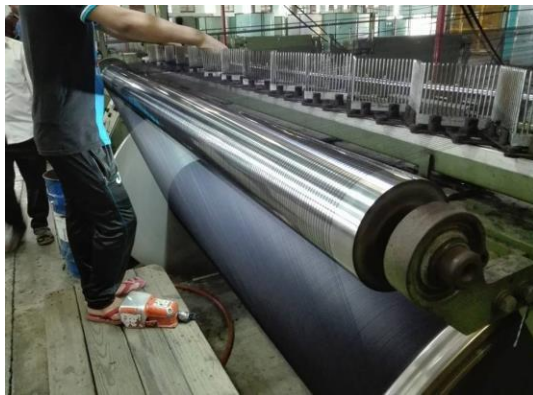


Fig: LCB

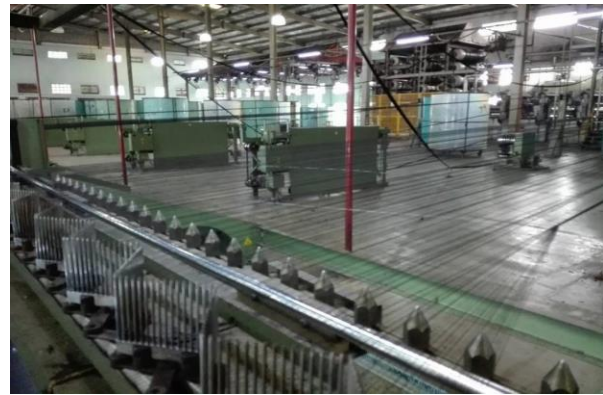


Fig: LCB



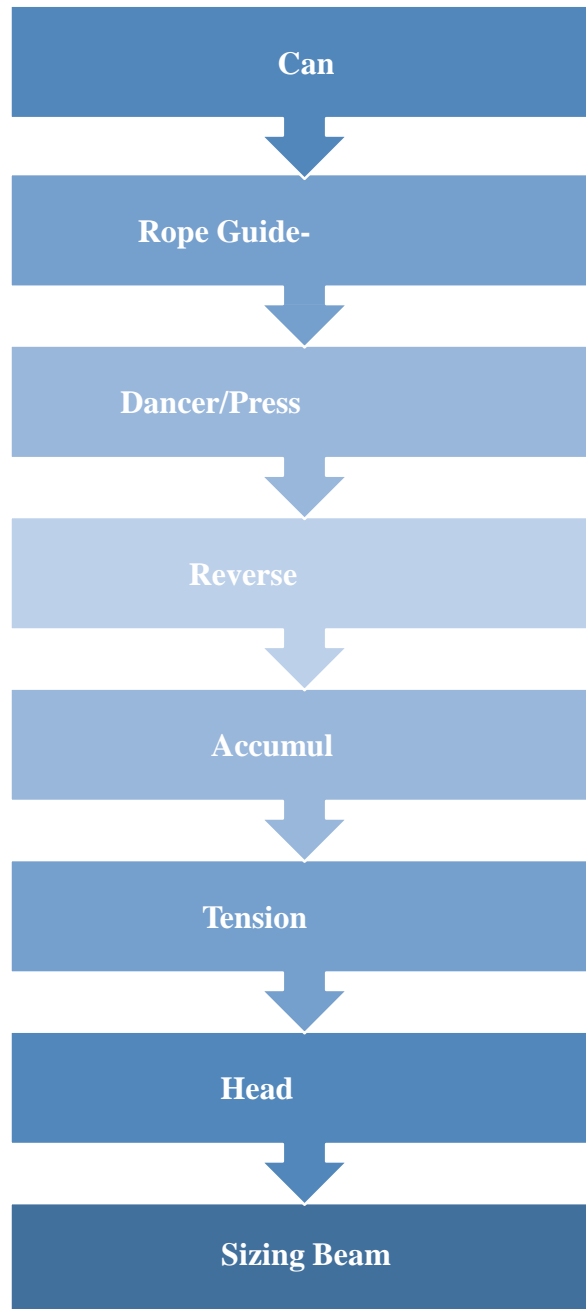
**Machine Specification:**

| <b>Brand Name</b>                | <b>West point</b> |
|----------------------------------|-------------------|
| <b>Serial No.</b>                | WO#173733         |
| <b>Origin</b>                    | America           |
| <b>Max. Speed</b>                | 500 m/min         |
| <b>Max. Yarn Tension</b>         | 450 N             |
| <b>Working Width</b>             | 1,800 mm          |
| <b>Max. Beam Flange Diameter</b> | 1000 mm           |
| <b>Stop Motion</b>               | Auto/Manual       |



|                                  |             |
|----------------------------------|-------------|
| <b>Serial No.</b>                | WO#173733   |
| <b>Origin</b>                    | America     |
| <b>Max. Speed</b>                | 500 m/min   |
| <b>Max. Yarn Tension</b>         | 450 N       |
| <b>Working Width</b>             | 1,800 mm    |
| <b>Max. Beam Flange Diameter</b> | 1000 mm     |
| <b>Stop Motion</b>               | Auto/Manual |

Flow Chart of LCB:





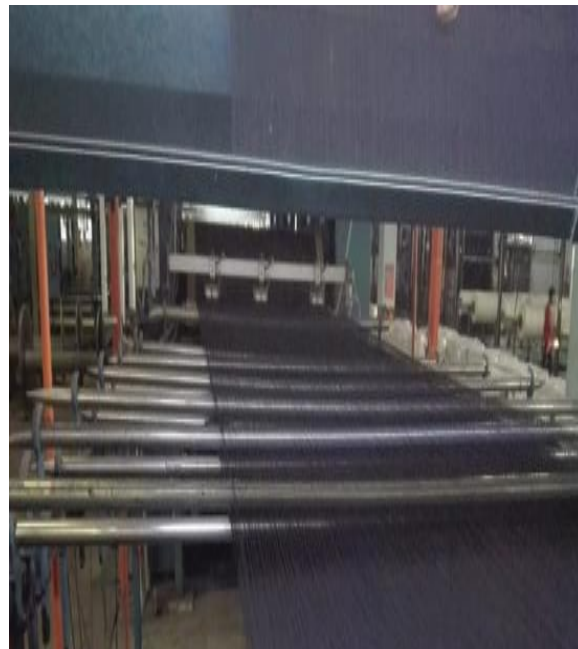
# Chapter-7

## Sizing

### 7.1 Definition:

The process of applying a protective adhesive coating upon the yarn surface is called sizing. This is the most important operation to attain maximum weaving efficiency specially for blended and filament yarns.

Figure of sizing :





## 7.2 Objects of Sizing:

- ✓ To enhance the weave capacity of warp yarn.
- ✓ To expand the ductile or breaking quality for cellulose yarn.
- ✓ To keep up great quality texture.
- ✓ To diminish shagginess, shortcoming of material materials.
- ✓ To evacuate electrolytic arrangement for engineered or mixed yarn.
- ✓ To build flexibility.

## 7.3 Changes in Yarn due to Sizing:

- ✓ Breaking quality: Increase
- ✓ Abrasion Resistance: Increase
- ✓ Stiffness: Increase
- ✓ Elasticity: Increase
- ✓ Frictional Resistance: Increase
- ✓ Yarn Diameter: Increase
- ✓ Extension: Decrease
- ✓ Electrostatic Charger: Decrease

## 7.4 Types of Sizing According to Application:

1. **Pure sizing:** When sizing is done in yarn which produces unbleached fabric is called pure sizing. So, ingredients are on the weight of yarn 7 to 10%.



2. **Light sizing:** This is used for dyeing and printing. 11 to 15% sizing ingredients are used on the weight of yarn.

3. **Medium sizing:** For increase of strength and weight of the yarn 16 to 40% sizing ingredients are used on the weight of yarn.

4. **Heavy sizing:** It is used to increase the weight of yarn. Above 40% sizing ingredients are used on the weight of yarn.

## 7.5 Used Size Ingredients and Their Function:

### Starch or Adhesive:

- To improve the strength.
- To increase smoothness.
- To increase elasticity.
- To increase stiffness.

### Softening Agents:

- To make the yarn soft and slippery.
- To smoothen the yarn.
- To reduce the stiffness.
- To reduce flexibility and friction.

### Antiseptic or Anti mildew Agent:

- To prevent mildew formation.
- To prevent size material for a long time.
- To protect yarn from bacteria or fungi.

### Hygroscopic Agents:

- Function:
- To moisture the yarn.
- To prevent excessive prevent of yarn.

### Weighting Agents:

- To increase the weight of yarn during finishing.
- To impart fullness and to fell the fabric.
- To prevent opening of the cloth.

### Wetting Agents:

- To increase size exhaust.
- To obtain a distribution of the sizing solution.





### Antifoaming Agents:

- To prevent foam formation.
- To give uniform size pick up.
- Squeeze rollers do not work properly:
- Causes: Incorrect shaft adjustment

### 7.6 Organogram of Sizing Section:



### 7.7 Sizing in SRDL:

The beams are creeled in the creeling zone. There are 12 pre-beams limit. Pre-beams are creeled here. Pre-beams are adversely moved by the strain of warp sheet from front side of m/c. Must need to keep up same speed and pressure on each pre-beam. Here is a control board to control the speed of pre-beam. The beams can be controlled in gatherings or independently. The let-off can be singular let-off, single gathering let-off or warp-round let-off. There are two creels introduce on the machine keeping in mind the end goal to supplant the utilized creel rapidly with a creel on which beams are as of now introduced. The back beams are mounted in the back beam unit with embed capable diaries. The Unwinding pressure is bestowed by pneumatically stacked and consequently directed band brakes and break shoes. The upper beam backings can be moved pneumatically making it simpler to mount the base beam. To accomplish these properties on the warp yarns, a defensive covering of polymeric film shaping specialist (estimate) is connected to the warp yarns before weaving. This procedure is called cutting or sizing. One sizing tank is given after the drying zone. The limit of the size box is around 500 liters. Sizing material is given consequently by dosing framework or it can be physically included.



Fig: Sizing Machine

### Machine Specification:

| Brand Name                   | Jupiter      |
|------------------------------|--------------|
| Serial No.                   | 17480/7/2007 |
| Origin                       | India        |
| Machine Speed                | 40-80Mtr/min |
| No. of Squeeze Roller        | 2 Pairs      |
| No. of Size Dryer            | 14           |
| Creel Capacity               | 12           |
| Preparation Tank Temperature | 90°C         |
| Cooking Time                 | 25-40 Minute |
| Manpower                     | Six          |



## **Sizing Recipe:**

### **Some Faults Found in Sizing:**

#### **1. Squeeze rollers do not work**

##### **properly: Causes:**

Incorrect shaft adjustment

##### **Remedies:**

Shaft adjustment has to check properly

#### **2. Pressure rollers do not work properly:**

##### **Causes:**

Incorrect shaft adjustment, whipe roller covering, shed closure wrong

##### **Remedies:**

Shaft adjustment, Whip roller covering have to done properly.

#### **3. Size dust-off:**

##### **Causes:**

Size chemicals are not properly mixed and presence of dirt-dusts.

##### **Remedies:**

Size box have to accommodate in a proper condition.

#### **4. Uneven sizing:**

##### **Causes:**

Less or excessive size dozing.

##### **Remedies:**

Size box's chemicals ratio have to maintain properly.



# **CHAPTER-8**

## **Weaving**

## 8.1 Definition:

The way toward delivering a fabric by interweaving warp and weft strings is known as weaving. The machine utilized for weaving is known as weaving machine or loom. Weaving is a craftsmanship that has been polished for a huge number of years. The soonest utilization of weaving goes back to the Egyptian human advancement. Throughout the years, both the procedure and also the machine has experienced exceptional changes. Starting today, there is an extensive variety of looms being utilized, ideal from the least difficult handloom to the most complex loom.

## 8.2 Basic Weave Designs:

- Plain weave
- Twill weave
- Zigzag twill
- Herringbone twill
- Broken twill

Most of the other weaves are derived from these basic weaves. The immediate derivatives of these structures are warp rib, filling rib, and basket weave.

### 8.2.1 Plain Weave:

Plain weave is the simplest of all weaves. It has one-over one-under interlacing for both warp and filling yarns, therefore the plain weave formula repeats on two warp and two filling yarns. Plain weave requires only two harnesses. In Denim manufacturing this weave is called Chambray.

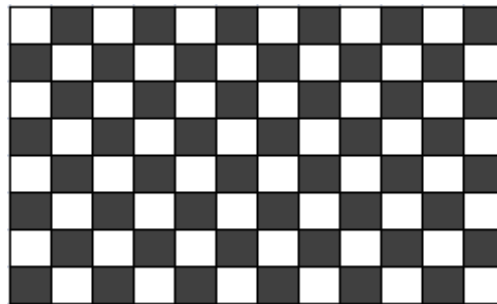


Figure: 1/1 plain weave (Chambray)

### 8.2.2 Twill Weave:

The path toward conveying a texture by interweaving warp and weft strings is known as weaving. The machine used for weaving is known as weaving machine or loom. Weaving is a craftsmanship that has been cleaned for countless. The soonest use of weaving backpedals to the Egyptian human headway. Consistently, both the strategy and furthermore the machine has encountered remarkable changes. Beginning today, there is a broad assortment of weaving machines used, perfect from the minimum troublesome handloom to the most complex loom.

## 8.3 Classification of Modern Weaving Machines:

Modern Weaving machines are classified according to their filling insertion mechanism. The classification is as follows:



- Rapier
- Projectile
- Air-Jet
- Water-Jet

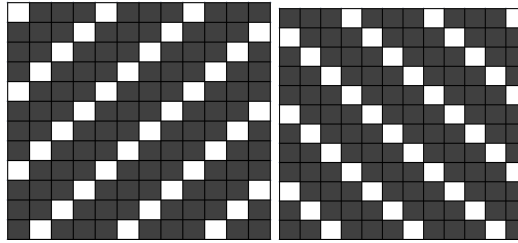


Figure: 3/1 Right Hand Twill (RHT)

Figure: 3/1 Left Hand Twill (LHT)

### 8.3.1 Air-Jet Weaving:

Air-jet weaving is a sort of weaving in which the filling yarn is embedded into the warp shed with compressed air. Air-jet framework uses a various spout frameworks and a profiled reed. Yarn is drawn from a documenting supply bundle by the recording feeder and each pick is estimated for the filling inclusion by methods for a plug. Endless supply of the filling yarn by the plug, the filling is bolstered into the reed burrow by means of couple and primary spouts, which give the underlying speeding up. The transfer spouts give the high air speed over the weave shed. Profiled reed gives direction to the air and isolates the filling yarn from the warp yarn.

### 8.3.2 Rapier Weaving:

In Rapier weaving, an adaptable or unbending strong component, called rapier, is utilized to embed the filling yarn over the shed. The rapier head gets the filling yarn and helps it through the shed. In the wake of achieving the goal, the rapier head returns discharge to get the following filling yarn, which finishes the cycle. A rapier plays out a responding motion.

#### Rapier weaving machines can be of two types:

**Single Rapier Machines:** A single, rigid rapier is used in these machines. The rigid rapier is a metal or composite bar usually with a circular cross section. The rapier enters the shed from one side, picks up the tip of the filling yarn on the other side and passes it across the loom width while retracting. Therefore, a single rapier carries the yarn in one way only and half of the rapier movement is wasted. Also there is no yarn transfer since there is only one rapier. The single rapier's length is equal to the width of the loom

**Double Rapier Machines:** Two rapiers are utilized as a part of these machines. One rapier, called the provider, takes the filling yarn from the yarn aggregator on one side of the loom, conveys it to the focal point of the machine



Figure: Relay Nozzles



Figure: Rapier head

And transfers it to the second rapier which is called the taker. The taker retards and brings the filling yarn to the other side. Similar to the single rapier machines, only half of the rapier movements is used for filling insertion.

### 8.3.3 Projectile Weaving:

Projectile weaving machines use a projectile equipped with a gripper to insert the filling yarn across the machine. The gripper projectile draws the filling yarn into the shed. The Projectile glides through the shed in a rake- shaped guide. Braked in the receiving unit, the Projectile is then conveyed to its original position by a transport device installed under the shed.

### 8.3.4 Water-Jet Weaving:

A water-jet weaving machine embeds the filling yarn by exceedingly pressurized water. The relative speed between the filling yarn and the water jet gives the alluring power. In the event that there is no speed contrast, at that point there would be no pressure on the yarn brings about twisting and growling of the yarn. Water-jet weaving machine must be utilized for hydrophobic strands.

### 8.4 Weaving in Sinha Denim & Sinha Rope Denim Ltd:

Air-jet weaving is a type of weaving in which the filling yarn is inserted into the warp shed with Compressed air. Air-jet system utilizes a multiple nozzle systems and a profiled reed. Yarn is drawn from a filing supply package by the filing feeder and each pick is measured for the filling insertion by means of a stopper. Upon release of the filling yarn by the stopper, the filling is fed into the reed tunnel via tandem and main nozzles, which provide the initial acceleration.



Fig: Air Jet Loom

#### 8.4.1 Machine Specification (Airjet):

|                              |                           |
|------------------------------|---------------------------|
| <b>Brand Name</b>            | Picanol                   |
| <b>Model</b>                 | PICANOL OMNI Plus 800     |
| <b>Origin</b>                | Belgium                   |
| <b>Machine Speed</b>         | 850 rpm                   |
| <b>Reed</b>                  | Profile Reed              |
| <b>Shedding</b>              | Tappet Shedding Mechanism |
| <b>Air Pressure</b>          | 9.5bar                    |
| <b>Total Relay Valve</b>     | 14                        |
| <b>Number of Heald Shaft</b> | 4                         |
| <b>Number of cutter</b>      | 2                         |
| <b>Let Off Motion</b>        | Electrical                |
| <b>Take Up Motion</b>        | Electrical                |



### Flow Chart Of weaving:



#### 8.4.2 Shedding Mechanism:

The shedding mechanism separates the warp threads into two layers or divisions to form a tunnel known as 'shed'. The shed provides room for passage of the shuttle. A shed may be formed by means of tappets, dobby and jacquard.

**Shedding Components:** There are two main shedding components:

- Heald frame
- Cam

#### The Heald or Heddle:

Interchange vertical developments as per the advancement of the warp yarn and the section of the picks drive the heddles. Recuperated outline or heddles comprises of a wooden casing, which comprise of mended wires. To give straight way to the death of the warp. These are curved and metallic wires, which slides on level bars inside the casing

**Healed Shaft:**

A healed shaft consists of a wooden or metal frame carrying healed wires. The width of a healed shaft is slightly greater than that of the warp sheet and is usually 36 to 48 cm deep. The functions of a healed shaft are:

- To carry healed wires and maintain warp yarns in their correct positions
- To form a shed line.

**8.4.3 Picking Mechanism:**

The picking mechanism passes weft thread from one selvage of the fabric to the other through the shed by means of a shuttle, a projectile, a rapier, a needle, an air-jet or a water-jet. The inserted weft thread is known as “pick”.

**Components of Picking Mechanism:****Cone Stand:**

The purpose of this stand is to hold the cones. The main components of cone stand are:

- Cone holder
- Disc
- Tensioner

**Cone Holder:**

The shape of the cone holder is a little bit like an aero plane. It contains two propeller shape rubber stopper so as to stop the forward and backward slippage of the cone during running condition and to provide grip.

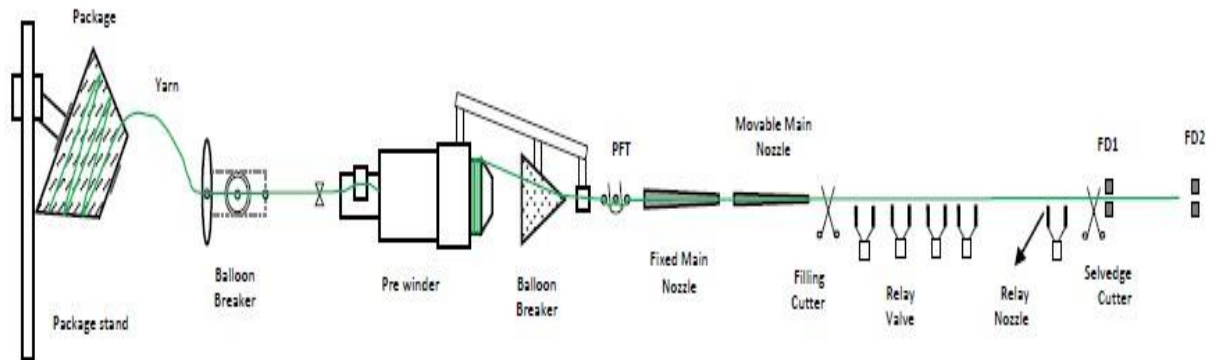
**Plastic Disc:**

The inspiration driving the cam is to control the motion of seat plots, the lift of reed and the weave plan. Possible weave cases of surface are 1/1, 2/1, 3/1 and 4/1. There are 4 cams in the air jet loom and a singular cam is twofold plated. The cam gets outstanding twisted shape. Different cam setting can be used for different weave plan. It is the required condition that the machine change should facilitate with adjust system furnish extent is adjusted by the weave plan.

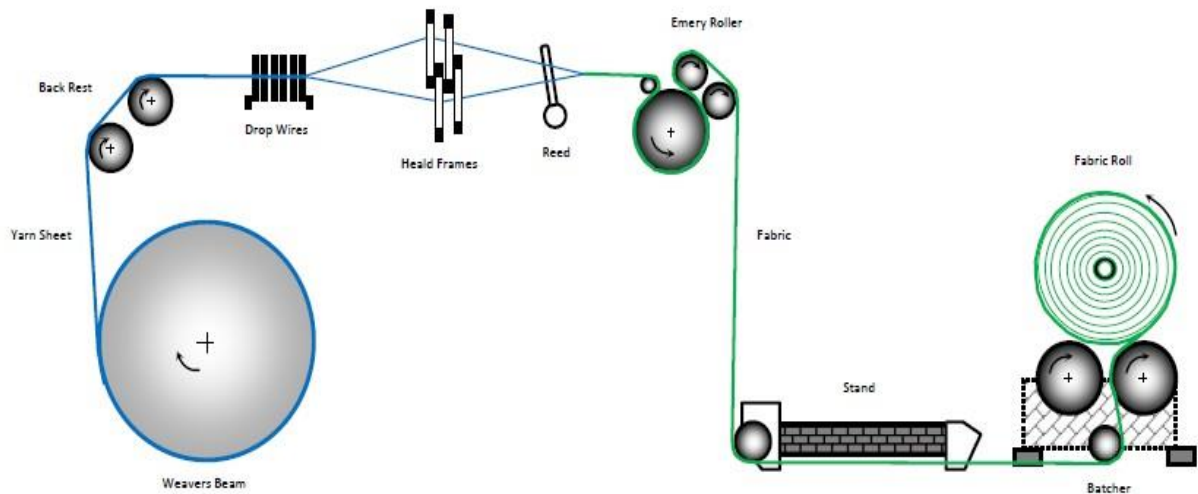
**Tensioner:**

The utilization of tensioner is to offer tension to the weft yarn generally the weft yarn curls inside its self. This tensioner comprises of two little circles or plates. A spring is likewise given along the edge of one circle with the goal that the plates can change themselves as indicated by the tally of the weft yarn. On the off chance that tally is fine at that point low tension is required though coarser check required moderately higher tension. The arrangement of the circle and the cone is such that a free way is given to the weft yarn.

**Weft Yarn Path Diagram (Air jet):**



**Warp Yarn Path Diagram (Air jet):**



**Cone Break Detector:**

Cone break finder recognizes filling yarn breaks that happen between the cone and prewinder. The cone break locator stops the weaving machine before the prewinder is vacant. Cone break finder between the cone and the prewinder prevents begins up marks.

**The Filling Tensioner:**

Filling tensioner is important to guarantee a most uniform yarn tension between the cones and prewinder drum, thusly guaranteeing an outright uniform tension under filling yarn twisting with no circle arrangement.

**Weft Accumulator or Pre-winder:**

The prewinder draw filling yarn from a cone, twisting it on the winder drum which thus, makes for delicate pick addition. The weft yarn is drawn off the bundle and twisted on to estimating groups and fingers by the turning motion of string controlling tube. The distance across of the estimating band can be balanced by the width of the loom. Modifying the estimating groups and the quantity of loops sets the pick length. The electro attractively controlled plug stick discharges the weft yarn at the machine edge set.

**Storage Control:**

As it takes time to rise the motor rpm to the standard rpm at starting required weft yarn for next insertion is wound in advance to secure smooth weft insertion. While the loom is running, corresponding length weft yarn to one insertion is supplied to the prewinder, and storage is controlled in the prewinder.

**Filling Cutter:**

The function of cutter cuts the filling at the left hand and right hand side of an insertion. The cutter is driven by the motor and is completely independent of the machine drive. The position, the movement of cutting and the condition of the filling cutter are very important for the insertion. Cutter is mounted on both ends of the fabric. On yarn supply side, yarn is securely cut every time reed is beaten. On driving side preceding yarn is cut between the temple and the space roll. The motion of the cutter cam attached to the main shaft is transmitted through cutter cam lever and cutter rod to cutter edge.

**Filling Detectors:**

The filling detectors or sometimes called feelers mounted at the reed holder on the loom and the end of the driving side photo electrically monitors whether there is weft yarn arrive or not.

**8.4.4 Beat Up Mechanism:**

The beat-up mechanism beats or pushes the newly inserted length of weft thread (pick) into the already woven fabric at a point known as “fell of the cloth”. These three mechanisms namely shedding, picking and then beat-up are done in sequence.

**Beating Components:**

The sley is a metal frame. In case of air jet contains profile reed, relay nozzles, filling detector, stretch nozzle and side detector. At its forward motion the last pick is beaten up to the fell of the cloth, and at its forward motion the weft is allowed to insert through relay nozzles through the open shed. The heavy reciprocating sley with the help of a reed firmly beats up the last pick to the fell with the sufficient velocity.

**Reed:**

The reed is a course of action if vertical steel wires separated a given separation separated a safely affixed at the best and base by the ties. The separated between two wires is known as "mark". Reeds are made with any want number of gouges per inch, as indicated by the prerequisites of the fabric that will be woven. A reed contains an unmistakable number of imprints on a given length; this is named as the tally, the pitch, or the quantity of reed. The reeds are named in an unexpected way. Reeds are named from the quantity of marks contained in one inch. The shape and thickness of the metal wires utilized as a part of the reed is critical. Reed determination relies upon a few contemplations including texture appearance; texture weight (closes per unit width), beat up constrain, air space prerequisites and weave plan.

**Available Reeds in Sinha Denim & Sinha Rope Denim Ltd Denim:**

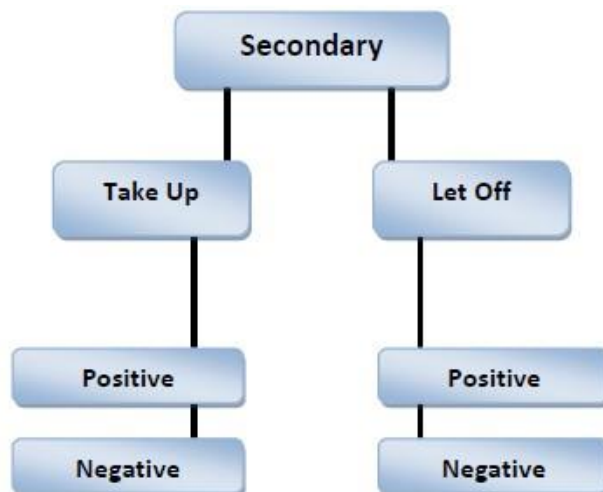
Reeds are very expansive machine parts and its correct use makes it long time running. In fine counts reed damages very quickly. A good manager is that who runs his weaving shed with minimum number of reeds rather than investing a large amount on reeds and storing them. In Sinha Denim & Sinha Rope Denim Ltd the shed of 168 looms is running on following reeds. With these reeds Sinha Denim has made almost all of these orders.

|             |             |
|-------------|-------------|
| <b>590</b>  | <b>1742</b> |
| <b>652</b>  | 1742        |
| <b>869</b>  | 1740        |
| <b>931</b>  | 1739        |
| <b>1085</b> | ---         |
| <b>1190</b> | 1738        |

**8.5 Secondary Mechanisms:**

These mechanisms are next in importance to the primary mechanisms. If weaving is to be continuous, these mechanisms are essential. So they are called the “secondary mechanisms”. They are:

- Take-up motion
- Let-off motion.



### 8.5.1 Take-up motion:

The take-up motion pulls back the fabric from the weaving territory at a steady rate to give the required pick-separating (in picks/inch or picks/cm) and after that breezes it on to a material roller. The fundamental piece of the instrument is the take up rollers, which draws the fabric at the general rate, and the quantity of picks per inch chooses this rate. The take up roller is secured with emery material or hard elastic relying on the kind of fabric woven. The drive to the take up roller is by a prepare of apparatus wheels put into motion specifically from the fundamental shaft.

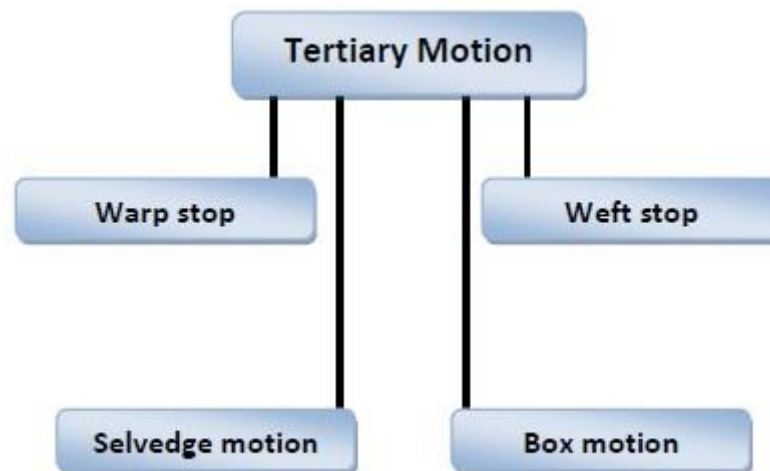
### 8.5.2 Let-off motion:

The let-off motion conveys the warp to the weaving region at the required rate and at consistent tension by loosening up it from the weaver's beam. The optional motions are done at the same time. The speed of the servo engine is transmitted to warp beam outfit by means of decrease adapt, in this way driving beam.

### 8.6 Tertiary Mechanisms:

To get high productivity and good quality of fabric, additional mechanisms, called auxiliary mechanisms, are added to a loom. The auxiliary mechanisms are useful but not absolutely essential. This is why they are called the “auxiliary mechanisms”. These are listed below.

- Weft stop motion
- Temples
- Brake
- Warp stop motion



**Weft stop motion:**

The object of the weft stop motion is to stop the loom when a weft thread breaks or gets exhausted. This motion helps to avoid cracks in a fabric.

**Warp stop motion:**

The object of the warp stop motion is to stop the loom immediately when a warp thread breaks during the weaving process.

**Brake:**

The brake stops the loom immediately whenever required. The weaver uses it to stop the loom to repair broken ends and picks.

**8.7 Special Features of PICANOL:****Unique Sumo main motor:**

The oil-cooled Sumo primary engine drives the weaving machine straightforwardly, without belt or grip and brake. The short drive prepare is straightforward and minimal, and the machine is up to full speed appropriate from the First pick. The speed of the engine is controlled electronically, without a recurrence converter, in this manner decreasing force utilization and allowing more noteworthy adaptability. The shed intersection time is set completely from the show. This blend of the Sumo engine with electronic settings makes it simple to acquire the most astounding conceivable modern rates considering the yarn quality, number of tackles and weaving design, and impressively diminishes the set-up times.

**Picanol PC Suite:**

The oil-cooled Sumo essential motor drives the weaving machine direct, without belt or hold and brake. The short drive prepare is clear and negligible, and the machine is up to full speed fitting from the First pick. The speed of the motor is controlled electronically, without a repeat converter, in this way diminishing power use and permitting more essential flexibility. The shed crossing point time is set totally from the show. This mix of the Sumo motor with electronic settings makes it easy to obtain the most amazing possible present day rates thinking about the yarn quality, number of handles and weaving plan, and impressively decreases the set-up times.

**Automatic full pick finding:**

The machine has a programmed full pick discoverer driven by the Sumo principle engine. Pick finding is done using a change capable gear on the Sumo engine, with the goal that no moderate motion engine and grip are required. In the event of a broken pick the machine stops and just the saddle outlines are gotten motion consequently so as to free the broken pick, without the reed touching the beat-up line. This decreases the stop time in the event of a filling break and abstains from beginning imprints.

**Exchangeable shed formation:**

The PICANOL can be fitted with a positive cam motion, electronic positive dobbie or electronically determined jacquard. The essential machine structure for the cam, dobbie and jacquard variants is indistinguishable, rolling out it conceivable to improvement the shed arrangement framework whenever later on. For instance, it is conceivable to change rapidly from cam to dobbie, and the other way around. It



is even superbly conceivable to change over to jacquard.

### **Electronic Let-Off and Take-Up:**

The electronically controlled let-off (ELO) and take-up (ETU) are fitted as standard. The ETU makes it possible to weave fabrics with variable pick densities, with highly accurate settings.

### **Easy fitting and removal of warp beam and cloth roll:**

The warp beam is driven by an electronically controlled let-off system via a separate gearwheel that remains on the machine. Fitting the warp beam and changing the cloth roll are done by means of quick connections - no tools are required.

### **Perfect lubrication:**

Lubrication means for a focal dissemination framework controlled by pressure and pressure distinction sensors. Steady separating of the oil guarantees culminate oil. The quantity of oil lines has been incredibly lessened, while the lines themselves are shorter and are made of remolded elastic.

### **Double pressure roller:**

The double pressure roller ensures a better grip of the sand roller onto the cloth. Because of the division of the pressure of one pressure roller over two pressure rollers a zone contact is established instead of a line contact (obtained with one pressure roller). This zone contact provides a better control of take-up and allows weaving of heavily beat-up fabrics in an easier way.

### **Optimized sley drive:**

The sley is driven by a cam and cam follower system, for perfect beat-up and balanced lower inertia for higher speeds.

### **Electronic Selvedge System and Electronic Rotary Leno:**

The one of a kind Electronic Selvedge Systems (ELSY) are driven by particular stepper engines that are controlled electronically. The selvedge examples and intersection times can be modified freely of the shed intersection. This should be possible even while the machine is running, so the weaver promptly observes the consequence of the new settings. The intersection time of the Electronic Rotary Leno (ERL) can likewise be modified while the machine is running.

### **CAN plus pre-winders (Airjet):**

. The CAN in addition to pre-winders have a sensor for the hold windings and may have a worked in optical yarn break finder. Because of the movable motion and power of the attractive stick, the OMNI in addition to 800 can weave yarns running from to a great degree light to coarse

### **Programmable Filling Tensioner (Airjet)**

The Programmable Filling Tensioner (PFT) diminishes the pinnacle tension in the yarn toward the finish of addition when the attractive stick on the pre-winder closes. This makes it conceivable to weave weaker, more sensitive or flexible yarns at higher velocities. The PFT is naturally strung alongside the pre-winder when the last is strung pneumatically. The PFT is mounted on the inflatable breaker





guaranteeing him perfect addition line together with the settled principle nozzle.

### **Clamp on the movable main nozzle (Airjet):**

At the entrance to the main nozzle a pneumatically controlled mechanical clamp holds the yarn during the non-insertion period, enabling the continuous airflow to be kept at a very low level. This improves the fabric quality and reduces the number of stops with weaker yarns.

### **Fixed and movable main nozzles (Airjet):**

The altogether new air supply framework and more proficient primary nozzles allow higher execution. The situation of both the settled and the versatile primary nozzles is easy to alter. Additionally, the airjet pressure and timing can be balanced independently, giving decreased air utilization. The Electronically-controlled Low Continuous Airflow (ELCA) framework holds the filling yarn in the perfect position amid the non-addition period. The advanced setting for each channel prevents the yarn unwinding.

### **New relay nozzles and valves (Airjet):**

The OMNI plus 800 relay nozzles are optimized for more efficient use of air. The shape of the nozzles and the position of the holes give a higher Pitot value and enable maximum use to be made of the available insertion time. The new D-type relay nozzle has 16 holes instead of 19, which makes it more efficient for the same air pressure. Air consumption can be reduced with up to 15%. The new Diamond-Like Coating (DLC) on the relay nozzles ensures a significantly longer lifetime when weaving abrasive yarns. The electro-magnetic valves on the relay nozzles have been redesigned and are easy to reach, so that changing the width can be done quickly and easily. The airlines between valve and relay nozzle have been made as short as possible, thus further reducing air consumption.

Some Faults Found in the Fabric:

- ✓ Starting Mark
- ✓ Reed mark
- ✓ Double Pick
- ✓ Miss pick/broken pick
- ✓ Warp Breakage
- ✓ Loose or Tight (Sizing Fault)
- ✓ Filling Stop
- ✓ Oil Mark or Crease,
- ✓ Hole
- ✓ Contamination



- ✓ Patti
- ✓ Crease Mark
- ✓ Warp Breakage
- ✓ Double Pick
- ✓ Filling Stop
- ✓ Shade Variarion



# Chapter-9

## Finishing



### 9.1 Introduction:

Finishing process is one of the most important and essential process for production of good end product. In general, before marketing the final product, all the process which is applied on the fabric after weaving is called finishing.

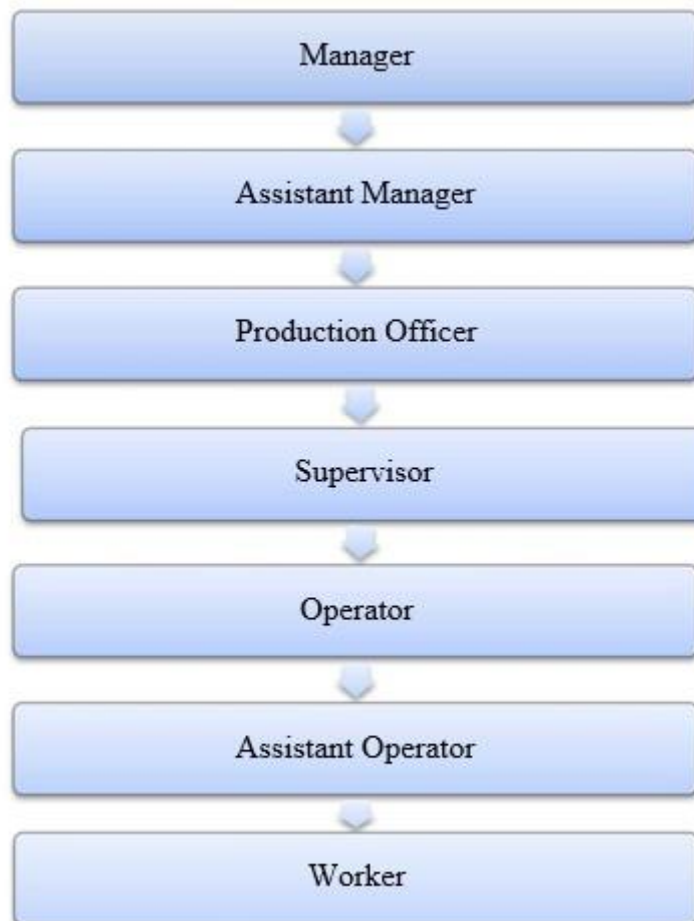
### 9.2 Objects of Finishing:

- To increase the attractiveness of fabric.
- To increase the service ability.
- To increase the beauty and glitterness of fabric.
- To increase the fineness and to ensure smoothness.
- To ensure the softness of the fabric.
- To free from hairiness of the fabric.

### 9.3 Types of Finishing in Sinha:

1. Physical/Mechanical Finishing
2. Chemical Finishing

### Organogram of Finishing Section:



#### 9.4 Finishing in Sinha Denim Ltd:

. Sinha Denim finishing office is a settled current area with an appropriate scope of the finishing forms required for denim. Division is working under the supervision of administrator of finishing. Legitimate finishing process is important generally the texture will be dismissed by the purchaser. If there should arise an occurrence of denim principally controlling of the shrinkage and the skew of the texture is done. Furthermore, finishing process finishing segment need to complete a great deal of others work like texture putting away, investigation, test preparing and so forth. So a finishing segment in a denim industry assumes a key part



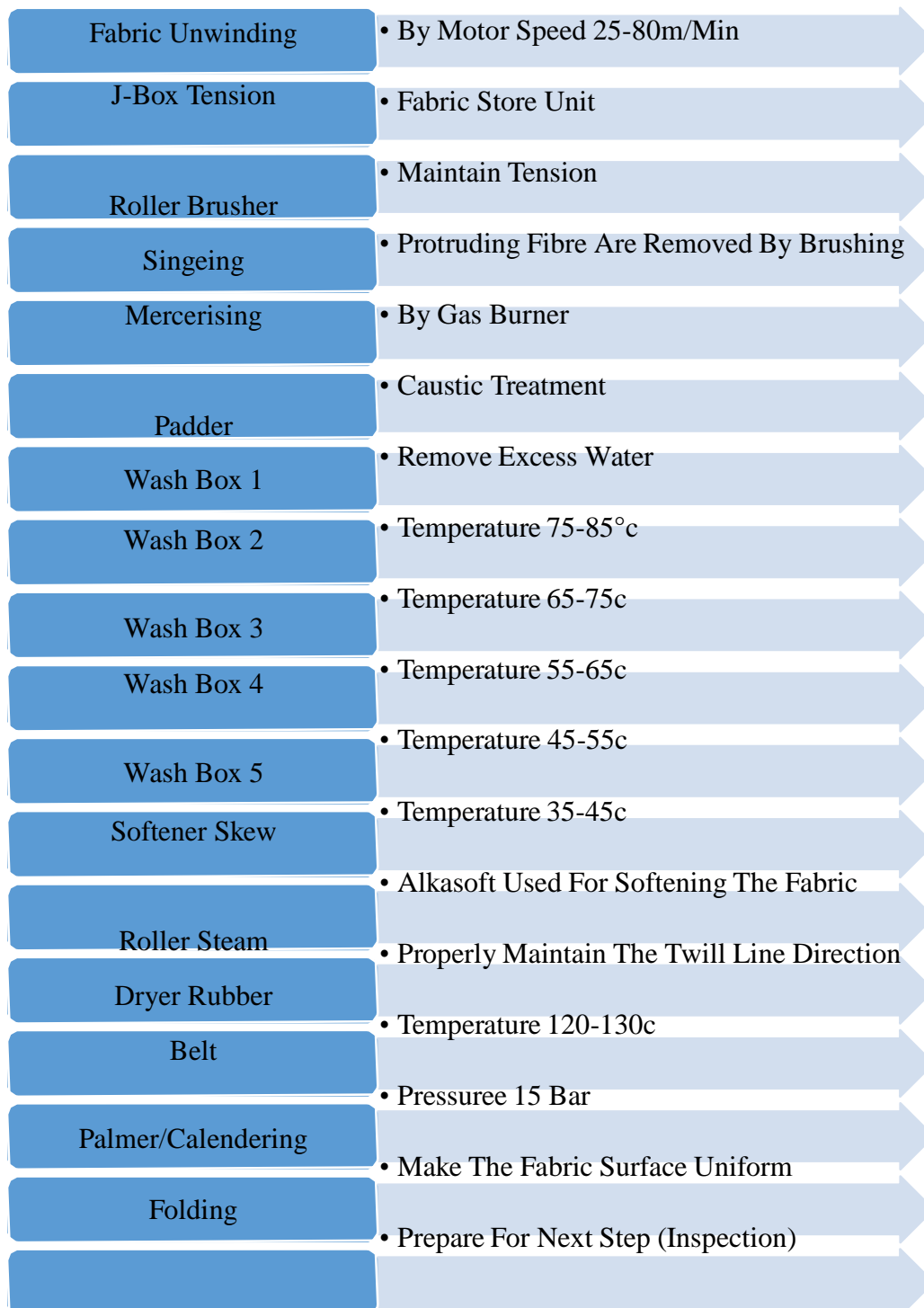
Fig : Finishing section



### Machine Specification:

|   |                  |
|---|------------------|
| <b>Brand Name</b>                         | <b>Morrison</b>  |
| <b>Serial No.</b>                         | T98              |
| <b>Origin</b>                             | America          |
| <b>Model</b>                              | M80SF            |
| <b>Manufacturing Year</b>                 | 2006             |
| <b>Power</b>                              | 65.5KW           |
| <b>Machine Length × Width</b>             | 105m × 1.83m     |
| <b>Shrinkage Control Warp/Weft/ Lycra</b> | 10-15/5-7/20-25% |
| <b>Machine Capacity</b>                   | 80Mtr/min        |

### Flow Chart of Finishing of Denim:





## The Processes Involved in Finishing Section:

- Singeing
- Softening
- Over Dyeing
- Skew Control
- Sanforizing
- Calendaring
- Desizing
- Mercerizing
- Resin Finishing
- Quality Control
- Heat Setting

### 9.5 Process Sequence of Denim Finishing:

#### 1. J-Box:

Store the fabric for some while during the process. This unit is important when change of batcher. Stored fabric supports the continuous operation.

#### 2. Brushing:

In the brushing stage, the dim texture is brushed to expel the free build up and free cushion from the texture surface. It additionally raised the distending strands on the texture surface which are expelled in the following phase of burning procedure.

#### 3. Singeing:

The fabric is then singed in both or only faces side which burn off the protruding fibers from the fabric surface. Normally denim fabric is singed twice in a single passage of a singeing machine. The denim finished fabric must have soft and pleasant handle.

#### Types of Singeing:

Singeing can be classified into two types:

- a) **Direct Singeing:** Direct singeing is the most popular procedure. The fabric passes either glowing metal with contact (mainly for pile fabric) or a direct gas flame. Important for both techniques, when the machine stops, the fabric is moved from the metal and the flame stops, too.
- b) **Indirect Singeing:** The indirect singeing works with highly heated ceramic modules. Infrared beams are burning the loose fibers. Speed controls the singeing effect



#### 4. Softening:

After the singeing stage, the fabric is subjected to a chemical pad treatment. Softeners are often used in the chemical treatment in order to impart soft feeling of the fabric.

#### 5. Skewness Control:

The skewness in denim texture, especially in twill weave makes a significant issue in resulting article of clothing assembling and its washing. Leg contort is a noteworthy issue in denim producing. Because of this issue the leg is turned the other way of the twill of the texture in the wake of washing. Leg turn is thought to occur because of the directional yarn stresses. These are innate in standard twill weave textures and created amid weaving. Amid washing the yarn stresses is casual which change the general position of interlacement amongst warp and filling yarns. Because of this reason the legs are wound. Regularly leg curve not appeared on piece of clothing stage. It just saw subsequent to washing of the piece of clothing. In spite of the fact that leg wind shows up after first washing and it increments continuously with rehashed launderings.

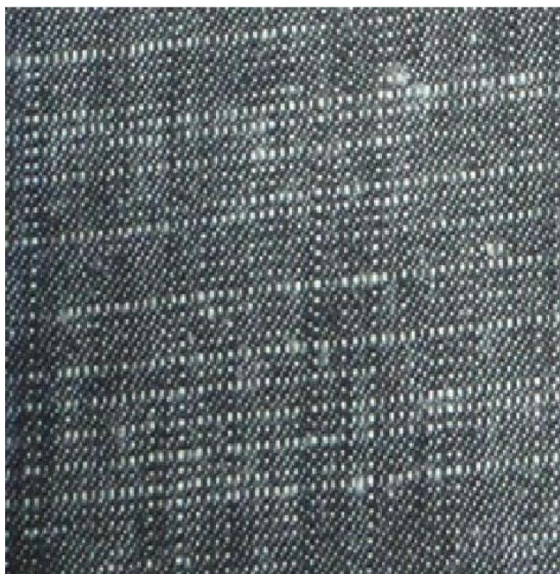


Fig: Fabric With Skew  
Skew

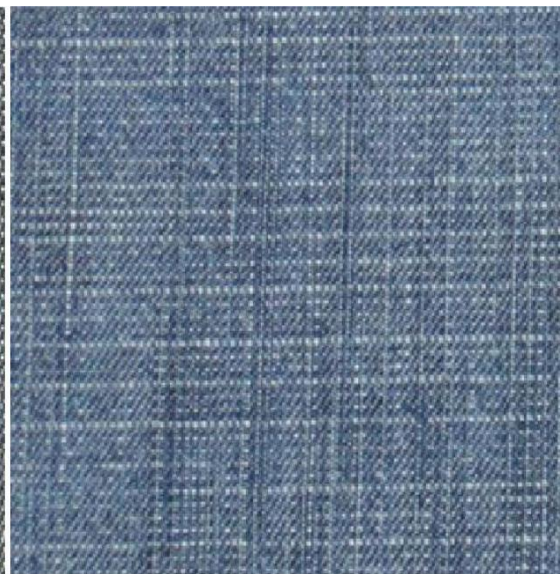


Fig: Fabric Without  
Skew

Ideally warp and weft should be at right angle to each other in normal fabric. Skew in the fabric occurs when the warps are displaced from their vertical position or when the weft is displaced from their horizontal position. The leg twist is created due to tensions in the fabrics. It is related to the twill direction.

#### 6. Dryer:

Wet fabric is dried in this section. Steam produced by boiler heating the cylinder drum. It increase the inside temperature of the drum. The temperature can be adjusted by changing steam pressure. There are 20 drums for drying.

#### 7. Stenter:

Stenter is used for control the width of fabric by fixing a definite width.



## **8. Sanforizing:**

Sanforizing is a mechanical finishing process of treating textile fabrics to prevent the normal dimensional alternation of warp & weft. After sanforizing the residual shrinkage of woven fabric may be zero. The sole objective of sanforizing is to control the length wise shrinkage of fabric

## **9. Shrinkage Phenomenon:**

During spinning, weaving, bleaching, dyeing and the various finishing processes, yarns and cloth are under a continuous tension. Yarns and/or fabrics are not fixed materials. They consist of separate, stretchable fibers which submit to the tension.

In other words, fabrics do stretch in length and width. The tension within the yarns, which is caused by this stretching, can be eliminated when the friction within the fabric is reduced. This reduction in friction occurs during laundering where both water and soap act as a lubricant. The lubricant, along with the mechanical action of the washer, helps the fibers relax and contract to their original length before the elongation takes place. This means that the fabric shrinks and recaptures its original equilibrium.

## **10. Controlled Compressive Shrinkage Process:**

. The reason for the procedure is to shrivel textures such that materials made up of these textures don't contract amid washing. The measure of potential wash shrinkage must be resolved before contracting. A full width test is wash-tried by the test technique. After the long way and widthwise shrinkage has been resolved, the compressive shrinkage machine can be balanced likewise

## **11. Calendaring:**

After grey fabric is subjected to singeing, softening, skewness, sanforizing etc. it is finally dried to retain its true shape and dimensions. But in this state the fabric becomes least lustrous. Because for those operations the threads in fabric become weave and crimped. But if a fabric is to appear highly lustrous then its surface should be parallel to each other and all should lie in the length direction

## **12. Mercerization:**

. Mercerization is a physio-chemical process where yarn (cotton) is treated with 15-25% acidic soap arrangement at a temperature of 200-300°C. It is important to hold the texture under tension and wash completely



# Chapter-10

## Inspection

## 10.1 Introduction:

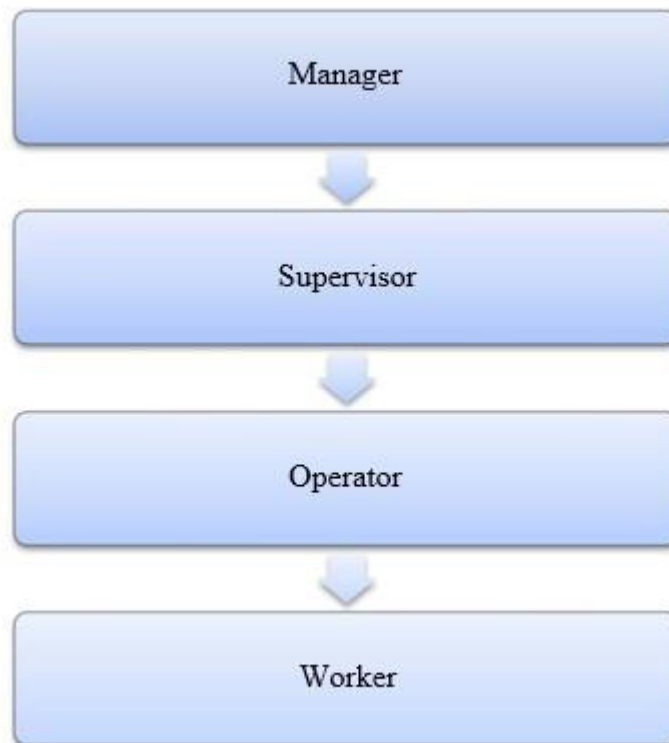
Quality is extreme concern; each and every yard of the denim experiences examination division and appraised by a point check framework to guarantee that quality is up to standard before pressing. Inadequate texture pieces are dismissed and sold as seconds and generally minor damaged focuses are checked plainly utilizing stickers to alarm cutters. Ten assessment edges of Taiwan are utilized. Information is done texture and yield is investigated texture roll.



## 10.2 Inspection Process:

Fabric is set at the rear of machine outfitted with rollers which gives texture loosening up. Examination table is covered white to improve the deformity distinguishing proof. Four tube lights are given to advance the lighting. Estimating counter is given before the examination table for controlling length. It has forward, invert, begin and stop catch controls. Investigation is done on white board table. The fabric is pulled over the white board table by a variable speed engine and distinctive material imperfections are recorded for quality control reason. They assess the texture as per 4 point framework. After review texture is twisted on roller.

### 10.3 Organogram of Inspection Section:



### 10.4 Four (4) Point System Followed by SDL:

This is issued by the American Society for Testing and Materials with reference to the designation: ASTM D5430-93. Faults are scored with penalty points of 1, 2, 3 and 4 according to their size and significance.

| Size Of Defect (Length in Inches)    | Penalty Points |
|--------------------------------------|----------------|
| 3 inches or less                     | 1              |
| Over 3 inches but less than 6 inches | 2              |
| Over 6 inches but less than 9 inches | 3              |
| Over 9 inches                        | 4              |

### Machine Specification:

|                                 |                                 |
|---------------------------------|---------------------------------|
| <b>Name</b>                     | Inspection Machine              |
| <b>Brand</b>                    | STT Machinery                   |
| <b>Model</b>                    | Amoeba                          |
| <b>M/C Dimension</b>            | 2580mm x 2920mm x 2310mm(L×W×H) |
| <b>Speed</b>                    | 0 – 80yds/min                   |
| <b>Size of Inspection Board</b> | 860mm (height                   |
| <b>Motor Power</b>              | 3 HP                            |
| <b>Roller Width</b>             | 72"                             |



|                             |      |
|-----------------------------|------|
| <b>Fabric Roll Diameter</b> | 450m |
|-----------------------------|------|

### 10.5 Types of Fabric Defects:

- Removable defects.
- Non removable defects.
- Major Fabric Faults:

#### **Starting Mark:**

##### **Causes:**

Main cause is loom stoppage.

##### **Remedy:**

This cannot be avoided but can be controlled by starting mark setting.

#### **Reed Mark:**

##### **Causes:**

If any fault occur at reed Faulty denting in the reed.

##### **Remedy:**

Right selection of the reed and right denting.

#### **Snarl:**

##### **Causes:**

- Excess main nozzle pressure.
- Low filling tension.

##### **Remedy:**

- Main nozzle air pressure control.
- Correct setting of the PFT finger value.

#### **Double Pick:**

##### **Causes:**

- Cutting problem of the cutter.
- Faulty setting of the air pressure.

##### **Remedy:**

- Cutter position is to be set correctly.
- Air pressure should be reset.



### **Miss pick/ broken pick:**

#### **Causes:**

Excess air pressure of main nozzle.

#### **Remedy:**

Main nozzle air pressure should be reduced.

### **Warp Breakage:**

#### **Causes:**

- Bad sizing.
- Low strength of the yarn.
- Crossing of the warp yarn.

#### **Remedy:**

Re knotting Proper sizing.

### **Loose or Tight (Sizing Fault):**

#### **Causes:**

Knotting is given, when breaks yarn, the yarn tension does not match with other yarn as a result Loose or tight occurs.

### **Filling Stop:**

#### **Causes:**

- If weft is failed to reach FD1.
- If weft is too long & reach FD2.

#### **Remedies:**

- Correct setting of the weft length.
- Correct setting of different nozzles.
- Proper setting of air pressure.
- Proper setting of pre-winder.
- Proper setting of creel position.

### **Oil Mark or Crease, Hole:**

When fabric gets spots of oil lubrication from any part.

### **Contamination:**

It is a yarn fault, Plastic Others are mixed with yarn.

### **Patti:**

It is the dark color or thick weft lines in the fabric.

**Crease Mark:**

Creases occur due to improper finishing.

**Warp Breakage:****Causes:**

- Bad sizing.
- Low strength of the yarn.
- Crossing of the warp yarn.

**Remedies:**

- Correct setting of relay nozzle.
- Proper setting of main nozzle.
- Proper setting of pre-winder.

**Double Pick:****Causes:**

- Cutting problem of the cutter.
- Faulty setting of the air pressure.

**Remedy:**

- Cutter position is to be set correctly.
- Air pressure should be reset.

**10.6 Quality Assurance Procedure:**

At first grey fabric is inspected thoroughly with the help of the inspection machine if any defect is present there then the fault code number is written in inspection sheet. When 100yards fabric inspections is completed then stop the operation & fabric is cut by scissor. Next, types & no. of fault is converted into point system as mentioned below.

This point is expressed as percentage by using the following formula:

$$\text{Total Point} \times 36$$

$$\text{Inspection Calculation Formula} = \frac{\text{Total Point} \times 36}{\text{Fabric Length} \times \text{Fabric Width}} \times 100$$

Surface batcher is set at the back of machine furnished with rollers which surrenders surface relaxing. Examination table is secured white to enhance the distortion recognizing evidence. Four tube lights are given to propel the lighting. Assessing counter is given before the examination table for controlling length. It has forward, modify, start and stop get controls. Examination is done on white board table. The fabric is pulled over the white board table by a variable speed motor and unmistakable material flaws are recorded for quality control reason. They survey the surface according to 4 point system. After survey surface is curved on roller





# Chapter-11

**RESEARCH & DEVELOPMENT (R&D)**



### **11.1 Introduction:**

Research and Product advancement office is an essential office for any material industry. This assumes an immediate part on building up an item. Sinha Denim Ltd. has additionally a Research and Development (R&D) division with present day civilities which corresponds exceptionally well with the up and coming new item. Constant research modified is carried-on here, which is finished result advancement. The R&D division is free and prepared to instantly imagine new plans for new form and build up purchaser's necessities convenient. This division shields all reports from coloring formula to fabric development and keeps ace move to keep shade in same steady even finished a more drawn out brokenness.

### **11.2 R&D Department in Sinha Denims Ltd:**

Sinha dependably examines to grow new mold according to the world necessity and in addition to keep up comfort and toughness. Frequently this office makes new item based on new outline and structure by their own inventiveness as indicated by the present market request and after that offer it to the purchaser. In the event that this outline is endorsed by the purchaser then it is put away. They effectively created more than 5000 examples. At the point when a request originates from purchaser in type of washed example, the specialized individual decides the shade rate, sum and kind of washing to that fabric to get the appearance like the example. So it is vital to wash the example fabric to legitimize his suspicion. For this reason a little washing unit is built up in the processing plant. Each request initially comes into R&D division by means of showcasing people groups via mail or swatch. The R&D specialists examine these examples and match it with their created tests. On the off chance that they find comparable examples then this is sent to purchasers for support. In the event that purchasers affirm it then the R&D segment goes for production.

### **Developed Samples:**

#### **Samples According to Weave:**

- 3/1 (both RHT & LHT)
- 2/1 (both RHT & LHT)
- 4/1 (both RHT & LHT)
- 1/1 plain weave
- Broken Twill

#### **Samples According to Yarn Used :**

- Regular – OE & Ring
- Rotor
- Slub, Cross Slub, Stretch Denim
- Polyester Denim
- Lycra

#### **Samples According to Weight (Oz/Yd<sup>2</sup> to 15.75 Oz/Yd<sup>2</sup>):**



- Light weight: 4.5 Oz/Yd<sup>2</sup>
- Medium weight: 7.5 Oz/Yd<sup>2</sup>
- Heavy weight: 15.75 Oz/Yd<sup>2</sup>

**Samples According to Width of Finished fabric:**

- 45"
- 46"
- 47"
- 48"
- 50"
- 58"
- 59"
- 60"

Average 45" -60" width fabrics are produced in Sinha Denims Ltd according to buyer requirement.

**Samples According to Color :**

- Indigo, Special Indigo
- Dark Indigo, Blue Black, Black, Ash

**11.3 The Tests That Can Be Performed in R&D Department:**

- Skew
- Weight (Oz/Yd<sup>2</sup>)
- Shrinkage warp %
- Shrinkage weft %
- Pilling ICI
- Tensile strength
- Wash fastness
- Rubbing Fastness

#### 11.4 Equipments Used in R&D of Sinha Denim Ltd:

- Quick Wash Plus
- GSM balance
- GSM Cutter
- Sewing Machine
- Shrinkage Measurement Scale
- Tensile Strength Tester
- Spectrophotometer
- Grey Scale



Fig: Counting Glass



Fig: Digital Balance



Fig: GSM Cutter



Fig: Spectrophotometer



# Chapter-12

## Impact of Internship



#### From Warping Section:

We have learnt about various kinds of warping framework, warping machine, warping machine particulars, working system, the flaws which may happen from warping, and so on.

#### From Dyeing Section:

We have learnt about the kinds of colors and chemicals utilized for denim production and their capacities, dyeing machine determinations, working method, imperative parameters for dyeing, the issues which may happen from dyeing, and so forth.

#### From Sizing Section:

We have learnt about the sorts of chemicals and fixings utilized for sizing, sizing machine particulars, working methodology, impact of sizing, and so forth.

#### From Weaving Section:

We have learnt about various type of weaving systems, weaving machine specifications, working procedure, the faults which may occur from weaving.

#### From Finishing Section:

We have learnt about the effect of finishing (singeing, over dyeing, mercerizing, heat setting, skewness, calendaring etc.), finishing machine specifications, working procedure, the faults which may occur from finishing, etc.

#### From R & D Section:

We have learnt how to investigate, assess and build up another formula, fabric, outline, monetary process by giving most extreme quality to final result, examination of an example, examination of shade, and so on.



# Chapter-13

## Conclusion



## Conclusion

Hypothetical learning will be more viable and productive when we could actualize the information and ability in our functional field. Mechanical preparing is a critical and fundamental piece of instruction as through this preparation we take in every one of the executions of the procedures which we have examined hypothetically. It gives us a chance to contrast the hypothetical learning and pragmatic certainties and consequently build up our insight and aptitudes. This mechanical preparing additionally gives us a chance to expand my insight into material organization, generation arranging, acquisition framework, creation process, upkeep framework and about different hardware and furthermore show us to adjust with the modern life. Since, we have some impediment to compose this report on account of the mystery demonstration the information on costing and showcasing exercises has not been provided and subsequently this report prohibits those sections. we had an extremely constrained time in show disdain toward out ready to think about more points of interest it was impractical to do as such. A few purposes of various section are not depicted as a result of the inaccessibility. Finally yet not at any rate, the entire procedure is such a troublesome activity to tie in such a little edge as a report; thus we attempt to compressing our exertion on this report. we have discovered our self-lucky to have our mechanical preparing at Opex and Sinha Textile Group. It has a colossal generation limit with an exceptionally proficient creation group. SinhaDenim Ltd. (SDL) and Sinha Rope Denim Ltd. (SRDL) has a decent, well equipped and current research facilities and creating an extensive variety of denim shades by applying different sorts of coloring and washing framework. Amid our preparation period we have seen that SDL and SRDL is extremely worry about their quality and they once in a while have any quality grumble. The administration of SDL and SRDL is extremely sorted out, pre-dynamic and co-agent for their proficient generation. The consistence arrangement of the business is well and standard.

By the day's end we have understood that mechanical preparing has improved our insight and ability through the down to earth sees and has made us more sure to confront any issue in fate of our expert life. We are extremely such a great amount of profited by doing this report.





THE

END

