Department of Textile Engineering
Faculty of Engineering

Course Title: Industrial Attachment
Course Code: TE 431

A report
on
Sim Fabrics Ltd.

Submitted by
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ID: 113-23-2691

Supervised by
Dr. S.M. Mahbub Ul Haque Majumder
Founder and Professor
Dept. of TE, DIU

A report submitted in partial fulfillment of the requirements for the degree of Bachelor of Science in Textile Engineering

Summer-2015

Letter of Approval

August 1, 2015

To
The Head
Department of Textile Engineering
Daffodil International University
102,Sukrabad,Mirpur Road, Dhaka 1207

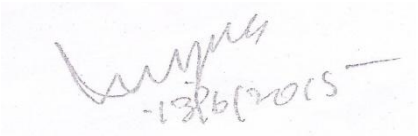
Subject: Approval of final year project report.

Dear Sir,

I am writing to let you know that this industrial report titled as "**Sim Fabrics Ltd."** has been completed for final evaluation. The whole report is prepared based on proper investigation and understanding though critical analysis of empirical data with required belongings. The students were directly involved in their project activities and the report becomes vital to spark off many valuable information for the readers.

Therefore, it will highly be appreciated if you kindly accept this project report and consider it for final evaluation.

Yours Sincerely,



Dr. S.M. Mahbub Ul Haque Majumder
Founder & Proffesor
Department of Textile Engineering
Faculty of Engineering
Daffodil International University

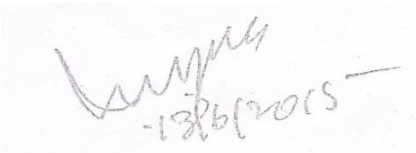
Declaration

I hereby declare that, this internship has been done by me under the supervision of **Dr. S.M. Mahbub Ul Haque Majumder, Founder and Professor**, Department of Textile Engineering, Faculty of Engineering, Daffodil International University. I also declare that, neither this report nor any part of this has been submitted elsewhere for award of any degree or diploma.

Submitted by

Jakia Sultana
ID: 113 -23-2691
Department of TE
Daffodil International University

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



Dr. S.M. Mahbub Ul Haque Majumder
Supervisor

Date

Acknowledgement

First of all I want to pay gratitude to almighty Allah. The industrial training was conducted in Sim fabrics limited. I am highly thankful to the Sim fabrics Ltd. authority for their whole hearted Cooperation and cordial support in providing information and assisting my training activities. Especially I would like to thank Engr. Md Jolhas Ali Bhuiyan,COO, Sim fabrics limited for giving me the opportunity to perform my training in this industry. I am also Grateful to Md. Shahnawaj Khan Anik, Incharge in RND, Sim Fabrics Limited, for his valuable guidance And for giving me his precious tune and valuable discussion during the training period. It has been a great opportunity to be a trainee under his supervision.

Guidance form Tanvir Ahmed Chowdhury, Senior Lecturer, Department of Textile Engineering, Daffodil International University, have made my efforts for training & report writing successful.

During the Two month long training period, a number of staffs of Sim fabrics helped me.

Last but not the lest we are thank full to all other people whose name is not mentioned here but without their help & support this training could not come out with success.

This internship report is dedicated to my loving
Father and Mother *whose affection, love, encouragement and prays made me able to get such kind of success and honor*

Table of Contents

Contents **Page No.**

CHAPTER-1
EXECUTIVE SUMMARY

Chapter-1
Executive Summary

The purpose of the Industrial Training is to provide me exposure on practical engineering fields. Through this exposure, we will have better understanding of engineering practices and sense of frequent and possible problems. This training is part of the learning process. So, the exposure that uplifts the knowledge and experience needs to be properly documented in the form of a report. Textile Engineering can't be completed without industrial training. Because this industrial training minimizes the gap between theoretical and practical knowledge and make me accustomed to industrial environment.

I got an opportunity to complete **two months (8 Weeks)** long industrial training from **May 02 to July 02** in **Sim Fabrics Limited** which is 100% export oriented composite Home Textile Industry and internationally recognized home textile manufacturing company by meeting day by day's market requirement achieving customer's satisfaction. During this period I saw many types of machinery in dyeing & stitching section. Like in dyeing section Osthoff m/c, Goller bleach m/c, Bab cock stenter m/c, Zimmer m/c etc. & in stitching section Cutter m/c, overlock m/c, eyelet m/c etc. I observed the function of these machineries very carefully. It also provide me sufficient practical knowledge about production management, work study, efficiency, industrial management, purchasing, utility and maintenance of machinery and their operation techniques etc. I worked there in Home Dyeing where including Pre-treatment, Printing, Dyeing, Finishing and supporting Sections.

The above mentioned cannot be achieved successfully by means of theoretical knowledge only. This is why it should be accomplished with practical knowledge in which it is based on Industrial attachment make me reliable to be accustomed with the industrial atmosphere and improve courage and inspiration to take self responsibility.

CHAPTER-2
INFORMATION ABOUT FACTORY

GENERAL INFORMATION ABOUT SIM FABRICS LTD

- Name of the Company : SIM FABRICS LIMITED
- Status : Private Ltd. Company
- Business Type : 90% Export oriented Factory
- Address

- Head office : Roadno#ll, House no #02
  Block # K,
  Baridhara,
  DHAKA -1111.
- Factory : Thakurbari Tech., Masumabad, Bhulta, Rupgonge, Narayangonge, Bangladesh.

Production Capacity

- Weaving section : 776000 yds per month

Product Mix **:** 3/1 Twill (With & Without Lycra)
: 2/1 Twill (With & Without Lycra)
: 1/1 Poplin
: 1/1 Canvas (With & Without Lycra)
: Matt fabric

Different Departments

- R&D Section
- Weaving Section : Weaving
  :Inspection
- Inspection section : Inspection
  : Cutting

- Pre- treatment Section
- Dyeing Section
- Finishing Section
- Store Section
- Marketing Section
- Production Planning & Control
- Administration Section
- Security Section
- Technical Service Department : Electrical

: Mechanical

Total Manpower of Different Section

- Weaving section : 120
- Inspection section : 140
- Cleaning section : 9
- Cloth carries section : 11
- Security section : 15
- Pre- treatment Section : 45
- Dyeing Section : 90
- Finishing Section : 24

CHAPTER-3
DETAILS OF ATTACHMENT

3.1 SIZING SECTION

3.1 Sizing

3.1.1. Ingredients Usad in the Size Cooking Tanks

- Starch
- Size CA
- CMS -60 (Above 80% solidity) [Highly modified starch]
- Wax
- Fat
- Softener Capacity of cooking tank- 750 Ltr

Size paste waste- 95 Ltr (m/c-1) [After set complete]
Cooking Temperature- 80-86°c
Cooking time- 25-60 min
Pick up: (Higher pickup?': for finer count so that lower squeezing pressure)
Cylinder temperature- 90-110°c
Squeezing pressure- (by top roller)
Delivery squeeze pressure- 15-25 KN

- Lowest- 11-17 KN
- Highest- 1 5-20 KN
- At 20 m/min speed squeezing pressure- 1 8 KN Stretch- 1.1 -1.5%

Sidng Temperature- 85-84°c
1 8- 20 % moisture in the yarn is required after sizing

3.1.2. Sizing machine

Brand : Bennenzcr (Zcll Piece;
Creel capacity — *2*
Beam stand - 11 (double)
Sow box -01
Squeezing roller - 02
Immersion roller -02
Cylinder -14
Wax box - 01
Head stroke - fixed roller 01
Tension roller 01 Blower -02

Sample data

- Total feed= 9468m
- Total delivered= 9600 m
- Actual stretch = 1.25 %

3.1.3. Drafting

This plan indicates the number of Heald Shafts used to produce. In which the warp ends are Threaded through the depend on the design of the fabric. If the design is complicated the drafting Plan is also complicated. This is very important step of weaving because, what types of machine is used for producing the fabric according to the design. Drafting plane is done manually or by means o automatic machine.

Manual drafting/Drawing-in:-
The beam is taken from the slashing room to the drawing area, where there are frames on which The drop wires, harness frame and the reed are supported in the order in which they are found on The loom. A length of warp yarn, just enough to rc^ch to the other cidc ? Warp at this stage Simplifies separate the yarns. In normal piacuccs, two opcia*au.* Toe lug bach other across the Frame and the operator facing the reed passes a hooked needle through the heddle eyes and drop Wires.

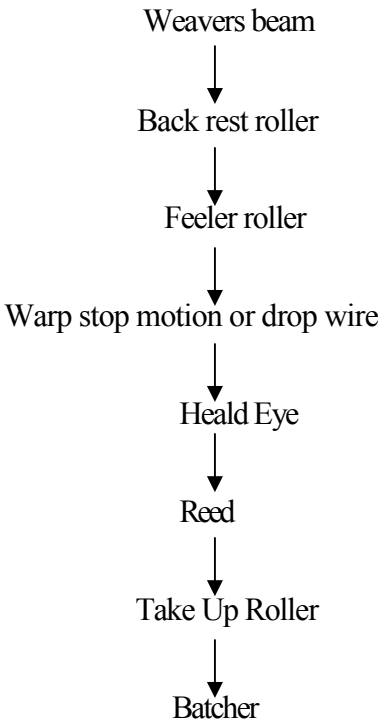
3.1.4. Denting

Both the wires and the slots in the reed are known as dents (namely, teeth). The warp threads pass through the dents after going through the heddles and before becoming woven cloth. The Number of dents per inch determines the fineness of the cloth. One or more warp threads go through each dent. The number of warp threads that go through each dent depends on the warp, and it is possible that the number of threads in each dent is not constant for a whole warp. The Number of threads per dent might not be constant if the weaver alternates 2 and three threads per Dent, in order to get a number of ends per inch that is 2.5 tunes the number of dents per inch, or if The thickness of the warp threads were to change a that point, and the fabric to have a thicker or Thinner section. One thread per cent is most common for coarse work, for finer work (20 or more ends per inch)
Two or more threads are put through each dent.'[81] Threads can be doubled in every other space, so That a reed with 9 dents per inch could give 15 ends per inch, or 20 if the threads were simply Doubled. Also, threads can be put in every other dent so as to make a cloth with 6 ends per inch from a reed with 11 dents per inch. Putting more than one thread through each dent reduces Friction and the number of reeds that one weaver needs, and is used in weaving mills. If too many Threads are put through one dent there may be reed marks left in the fabric, especially in linen and cotton.

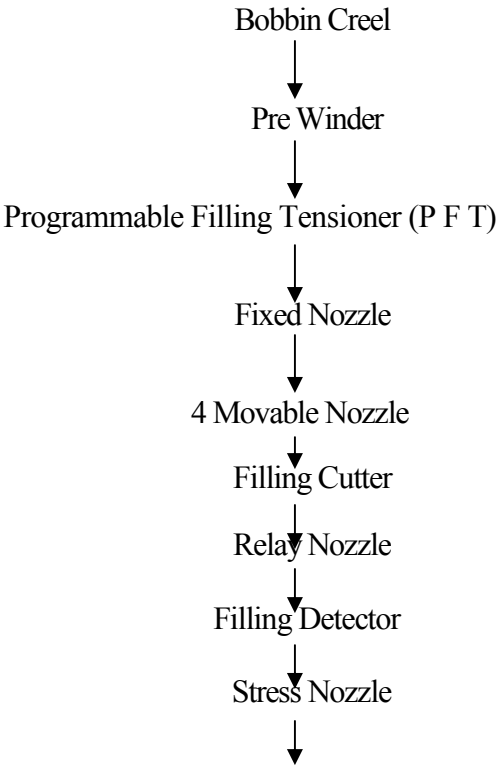
3.2 WEAVING SECTION

3.2 **Yarn Path on the loom:**

Warp yarn path on the loom-



Weft Yarn Path on the loom:



3.2.1. Important Parameter and their effect in fabric production

a. GSM

- Gray GSM should be less than finish GSM
- If shrinkage increase then GSM increase

b. Count

- If count increase then fabric width increase
- GSM depends on yarn count

c. Design

- Cam setting Cover Factor
- Contraction Factor

3.2.2. MACHINE SPECIFICATION:

➢ Air Jet Loom Specification:

> M/CNAME: TSUDAKOMA
> MODEL NO: ZA205
> POWER CONSUMPTION: 3.6 KW (at cool state)
2.6 KW (at warm state)
> AIR CONSUMPTION: 65 m3 /hr
> REED SPACE: 180cm > ORIGIN: GERMANY

➢ Cam Box Specification:

COMPANY NAME: Staubli

> M/C TYPE: 1661 > ORIGIN: France
> MANUFACTURING DATE: December, 2005

➢ Pre winder Specification:

> MODEL: Picanol 2231 CAN Plus -300V DC

3.2.3. GSM Calculation

Production calculation Raw materials calculation

Yarn count = Length (cm) X 0.0058 Wt(gm)

Yarn weight = Sample weight X90X90 /SampleLengthX SampleWicfthX33.8063

For example,

Construction = 71X51
Total yam = 10 Length of
fabric = 3.45cm Weight of
fabric = .03 gm
Count=l 1X3.45X0.0058 /
0.03
=7.46
Weight = 0.4XiOOXlOO
3.45X2.886X33,8063
=10.83oz/yd^2

Crimp %:

Warp Length - Actual Warp Length Production / Warp Length * 90

Shrinkage %:

Actual Production - Finishing Production / Actual Production *90

3.3 DYEING SECTION

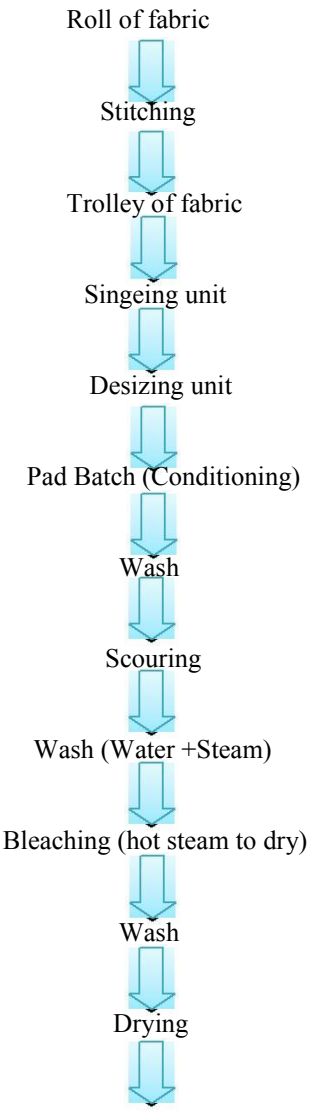
3.3.1. Pre-Treatment

Natural fibers and synthetic fibers contain primary impurities that are contained naturally, and secondary impurities that are added during spinning, weaving processes. Textile pretreatment is the series of cleaning operations. All impurities which cause adverse effect during dyeing and printing is removed in pretreatment process.

Pretreatment process includes-

- **SINGEING**
- **DESIZING**
- **SCOURING**
- **BLEACHING**
- **MERCERIZATION**

A process flow-chart of pre-treatment section is given below-



Go to mercerization section

❖ SINGEING

Singeing is the process which is carried out for the purpose of removing the loose hairy fibers protruding from the surface of the cloth, thereby giving it a smooth, even and clean looking face. Singeing is an essential process for the goods or textile material which will be subjected to mercerizing, dyeing and printing to obtain best results from these processes.

Generally there are 3 types singeing machine:

- **Gas singeing machine**
- **Roller singeing machine &**
- **Plate singeing machine**

Objects of singeing

1. The risk of pilling, especially with synthetics and their blends, is reduced in case of singed fabrics.
2. Protruding fibers are removed in singeing which could cause diffused reflection of light.
3. To obtain a uniform & smooth fabric surface by removing hairiness.
4. To ensure uniform optical reflectance throughout the fabric surface in subsequent fabric wet process.

In this factory, gas singeing machine is used.

Figure: Singeing Machine

Summary and Solution to Problem in Singeing:

Problem	Possible Cause	Counter measure
In complete singeing	1. Too low flame intensity. 2. Too fast fabric speed. 3. Too far distance between Two burners. 4. In appropriate singeing Position (not severe enough). 5. Too much moisture in the Fabric incoming for singeing.	1. Optimum flame intensity. 2. Optimum fabric speed. 3.Optimum distance betweenthe fabric and the burner. 4. Optimum singeing position. 5. No excess moisture in thefabric incoming for singeing.
Uneven singeing (Width ways)	1. Non-uniform moisture content across the fabric Width. 2. Non-uniform flame intensity across the fabric Width. 3. Uneven distance between the burner and the fabric.	1. Uniform moisture content Across the fabric width. 2. Uniform flame intensity Across the fabric width. 3. Uniform distance between the burner and the fabric.
Uneven singeing (Length ways)	Non-uniform moisture Content along the fabric length. 2. Non-uniform flame intensity along the fabric Length. 3. Change in fabric speed During singeing. 4. Change in the distance between the fabric and the Burner along the length.	1. Uniform moisture content Along the fabric length. 2. Uniform flame intensity Along the fabric length. 3. Uniform fabric speed During singeing. 4. Uniform distance betweenthe fabric and the burner alongthe length.

Required parameters:

- **Steam-**steam is supplied to the steam box of the m/c.
- **Compressed air-** the standard air supply pressure requirement is 4 kg/cm^2
- **Water-** the standard water supply pressure requirement is 1-1.2kg/cm^2
- **Natural gas**- the standard gas supply pressure requirement is 3kg/cm^2

❖ DESIZING

After singeing, fabric goes to Desizing unit.

Desizing is the process of removing size materials from the fabric, which is applied in order to increase the strength of the yarn which can withstand with the friction of loom. Fabric which has not been desized is very stiff and causes difficulty in its treatment with different solution in subsequent processes.

In de-sizing, the hydrolysis reaction is carried out up to the stage of **soluble dextrin** only & no further to alpha-glucose.

Object of de-sizing:

- Remove starch from the fabric
- To increase the absorbency of the fabric
- To reduce the stiffness & make the fabric soft
- To make fabric ready for the subsequent process.

Desizing chemicals are given below-

- **Wetting Agent**
- **Sequestering Agent**
- **Enzyme (Oxidative Desizing)**

Factors that influence de-sizing:

Size removal depends essentially on the following factors:

- Viscosity of the size in solution.
- Ease of dissolution of the size film on the fiber
- Amount of size applied.
- Nature and amount of the plasticizers.
- Fabric construction.
- Method and nature of washing-off.
- Temperature of washing-off.

Summary and Solutions to Problems in De-sizing:

Problem	Causes	Counter measure
In complete de-sizing	1.Inappropriate de-sizing bath pH 2. Inappropriate de-sizing bath Temperature. 3. Insufficient fabric pick up. 4. Insufficient digestion time. 5. Poor enzyme activity. 6.Deactivation of enzyme due to presence of metals or other Contaminants. 7. Ineffective wetting agent. 8. Incompatible wetting agent.	1. Optimum pH. 2. Optimum temperature. 3. Optimum squeeze pressure. 4. Use of wetting agent. 5. Optimum digestion time. 6. Use of good enzymes. 7. Use of soft water. 8. Use of appropriate Sequestering agents. 9. Use of good and effective Wetting agents. 10.Use of compatible wetting Agent.
Uneven de-sizing (Width ways)	1. Uneven pad pressure. (across the width) 2. Non-uniform pad temperature 3. Non uniform chemical Concentration in the bath.	1. Uniform squeeze pressure. 2. Uniform bath temperature. 3. Uniform chemical Concentration.
Uneven de-sizing (Length ways)	1. Uneven pick-up. (along the length) 2. Preferential drying of outer Layers of the batch. 3. Temperature variation During digestion.	1.Uniform pick-up along the fabric length. 2. Covering the batch with polythene or other suitable sheet. 3. Keep the batch rolling.
Uneven de-sizing (Random)	1. Poor wetting agent. 2. Use of effective and Compatible wetting agent. 2.Optimum bath temperature. 3. Use of appropriate Deformers. 4.Uniform liquor distribution during padding. 5.Thorough and uniform washing after	1. Use of effective and compatible wetting agent. 2.Optimum bath temperature. 3. Use of appropriate Deformers. 4. Uniform liquor distribution during padding. 5.Thorough and uniform washing after de-sizing.

In this factory singeing & desizing both processes is done at the same time & same parameters with the help of the following machine:

1. Osthoff singe.
2. Poong-Kwang singe.

Specification of this m/c:

M/C Name	M/C Quantity	Company	Country
OSTHOFF Singe	**03**	**OSTHOFF**	**Germany**
Poong-Kwang Singe	**01**	**Poong-Kwang**	**Korea**

Singeing & Desizing process used in this factory:

- **Singeing:**

  All most Gas singeing process is used in this factory.

- **Desizing:**

  Enzyme based desizing is used in this factory.

M/C parameters:

⇒ No. of burner----------02
⇒ Flame height---------- 2-3 inch
⇒ Burner Width----------128 inch
⇒ Burner Flame Intensity----------16-18 m/bar
⇒ P^H of bath ----------5.5-6.5
⇒ Temperature of desizing box---60^0-90^0C
⇒ Machine speed----------50-100 m/min
⇒ Padder Pressure----------2.5 m/bar
⇒ Pick Up %----------80%

Recipe for every process

For desizing:

⇒ ***Recipe for Enzyme based desizing:***

Chemical Name	**Quantity**	**Brand**
ULTRA DESIZER	1-2g/l	Chung Jung /CHT
HOSTAPAL XTRA LIQUID	1-2g/l	Archroma
SIRRIX 2UD	1-2g/l	Archroma

#Function of different chemical agent:

⇒ **HOSTAPAL XTRA:** It is a wetting agent. Its function is to remove surface tension of the water & minimize interfacial tension.
⇒ **ULTRA DESIZER:** It is a desizing agent. Its function is to remove the size materials from the fabric.
⇒ **SIRRIX 2UD:** It is a sequestering agent. Its function is to remove the water hardness & Deactivate metal ions.

#Controlling point of the singeing & desizing m/c:

⇒ Flame intensity
⇒ Fabric speed
⇒ Singeing position
⇒ Distance between flame burner and fabric
⇒ Flame width
⇒ Temperature
⇒ Time & P^H
⇒ Padder pressure for desizing.

After desizing process, the fabric is batched in roll form and the batch is wrapped with polyethene and conditioned with continuous rotation for about 8 to 16 hours. Polyethene wrapping prevent evaporation of chemicals from the fabric surface and continuous rotation

prevents percolation of the desizing chemicals. After completion of the rotation period, it goes for the next process.

FIGURE:

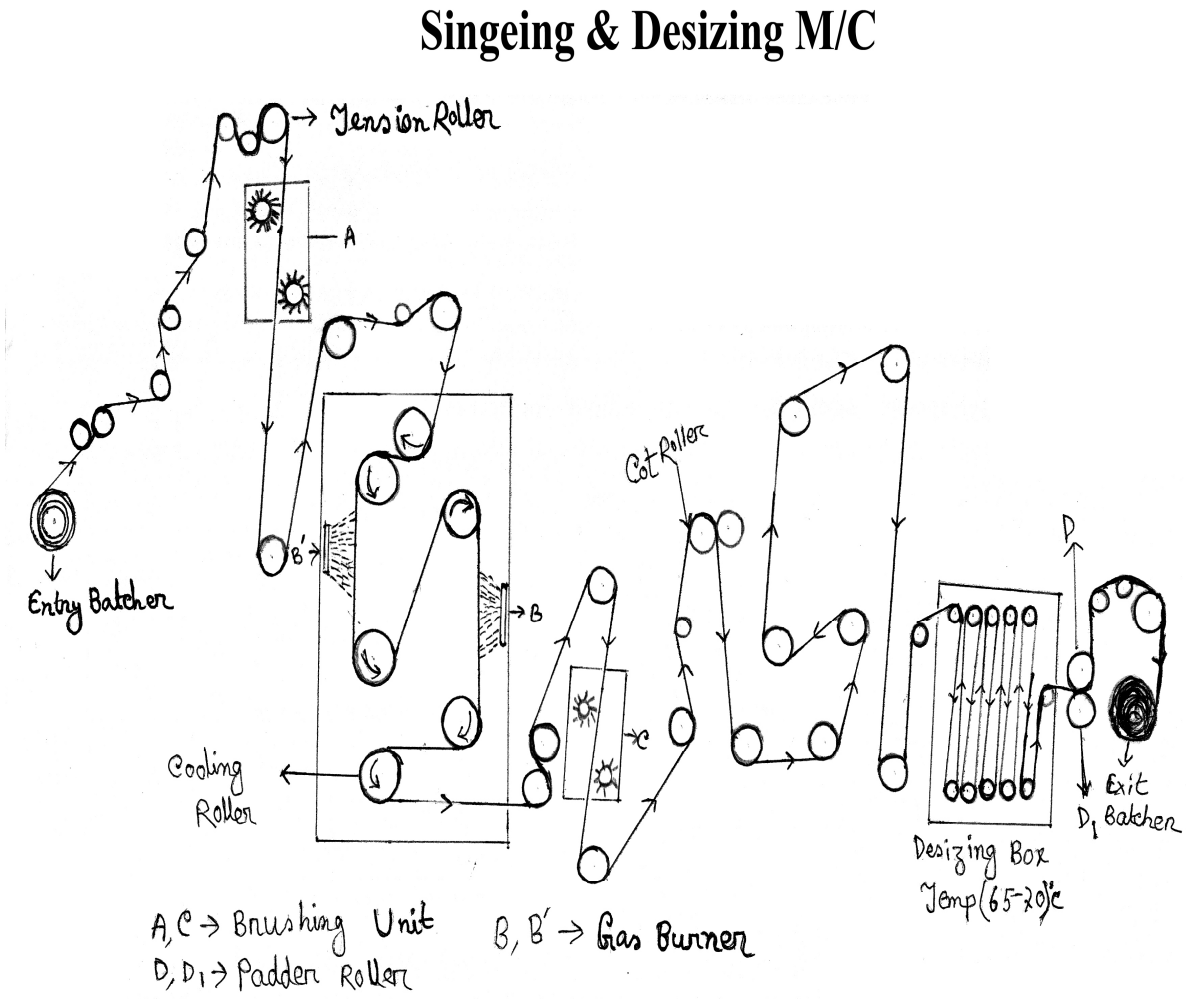


Fig: Line diagram of singeing & desizing m/c

Flow Chart of SINGE & DESIZE:

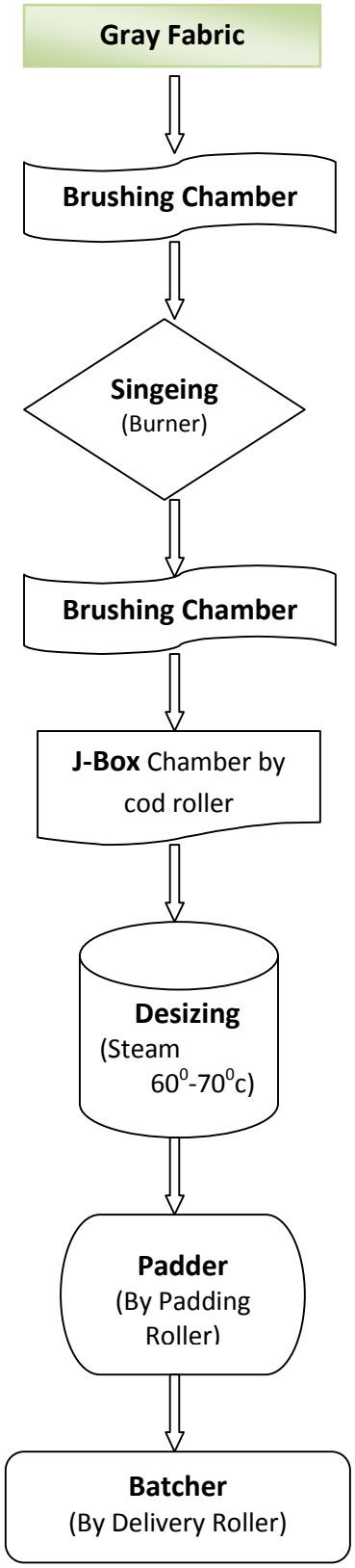


Fig: Singeing and Desizing M/C [OSTHOFF-03]

Fig: Singeing and Desizing M/C [OSTHOFF-04]

❖ SCOURING AND BLEACHING

Scouring is the process by which natural (oil, wax, gum. fat etc.) as well as added (during fabrication process) impurities of essentially hydrophobic character are removed as completely as possible and leave the fabric in a highly absorptive condition without undergoing chemical or physical damage of the fabric significantly.

Objectives of scouring

1. The main purpose of scouring is to remove the impurities from the textile materials.
2. The textile materials are leave in a highly absorptive condition without undergoing any chemical or physical damage significantly.
3. To produce hydrolytic characteristics.
4. To increase absorbency of fabric.
5. To remove natural nitrogenous coloring materials, dirt, dust, husk, broken seed, protein, leaf, etc by oxidizing on chemical treatment.
6. After scouring process, material becomes suitable for the next process bleaching.

Bleaching process can be defined as the destruction of natural coloring matters from the textile materials in order to achieve a clean white end product. Different types of bleaching agent are used during bleaching.

Objectives of bleaching

1. The main objective of bleaching is to get a sufficiently high and uniform degree of whiteness in the textile materials**.**
2. To produce a clean material by adding alkali.
3. To obtain pure & permanent white color.
4. To get a high and uniform absorptive in the textile materials.
5. To prepare the fabric for the next process mercerizing or dyeing.

In Sim Fabrics Limited, scouring and bleaching is done in the same machine one after another. Otherwise it can say that, scouring & bleaching unit are consecutively interconnected.

Scouring &bleaching process used in this factory

- **Scouring:** Continuous scouring process with NaOH used in this factory.
- **Bleaching:** Continuous peroxide bleaching process is used in this factory.

In this factory scouring& bleaching both processes is done at the same time & same parameters with the help of the following machine:

1. Bleaching m/c-1
2. Bleaching m/c-2

#Specification of this m/c:

M/C Name	M/C Quantity	Company	Country
Scouring & Bleaching m/c	02	Goller	Germany
Bleaching m/c	01	Brugman	Holland

M/C parameters:

⇒ pH for printing:
   a) Pigment printing-6-7
   b) Reactive Printing-7-7.5

⇒ pH for dyeing:
   a) Pigment dyeing 5.5-6
   b) Reactive dyeing-7-7.5
   c) Disperse dyeing-3-7.5

⇒ Speed:
   a) For cotton-70-80 m/min
   b) For PC-70-100 m/min

⇒ Temperature:
   a) For Washing bath-65^0-95^0C
   b) For Steaming chember-95^0-115^0C
   c) For Chemical bath-40^0-60^0C
   d) For Cylinder dryer-150^0-200^0C

⇒ pH of bath----------10-11

Critical to Quality (CTQ) Machine Parameter List:

- M/C Goller-01

Pre-Bleaching Wash		Post-Bleaching Wash				
Chamber-1	Chamber-2	Chamber-3	Chamber-4	Chamber-5	Chamber-6	Chamber-7
20˚c-80˚c	60˚c-90˚c	75˚c-90˚c	75˚c-90˚c	75˚c-90˚c	75˚c-90˚c	40˚c-60˚c
Steamer Temp.	Steamer Bed Time	M/C Speed	Pick Up%	pH Post Bleaching		
98˚c-102˚c	16-20 min	50-70 m/min	80%	5.5-6.5		

- M/C Goller-02

Pre-Scouring Wash			Post-Scouring Wash		
Chamber-1	Chamber-2	Chamber-3	Chamber-4	Chamber-5	Chamber-6
70˚c-90˚c	70˚c-90˚c	60˚c-80˚c	70˚c-95˚c	70˚c-95˚c	60˚c-80˚c
Post-Bleaching Wash					
Chamber-7	Chamber-8	Chamber-9	Chamber-10		
70˚c-95˚c	70˚c-95˚c	70˚c-95˚c	60˚c-80˚c		
Steamer Temp.	Steamer Bed Time	M/C Speed	Pick Up%	pH Post Bleaching	
98˚c-102˚c	18-20 min	60-80 m/min	70-90%	5.5-6.5	

- M/C Brugman

Pre-Bleaching Wash				
Chamber-1	Chamber-2	Chamber-3	Chamber-4	Chamber-5
65˚c-90˚c	65˚c-90˚c	65˚c-90˚c	65˚c-90˚c	65˚c-90˚c
Post-Bleaching Wash				
Chamber-6	Chamber-7	Chamber-8		
65˚c-90˚c	65˚c-90˚c	65˚c-90˚c		
Steamer Temp.	Steamer Bed Time	M/C Speed	Pick Up%	pH Post Bleaching
98˚c-102˚c	18-20 min	50-70 m/min	70-90%	5.5-6.5

Recipe for every process:

Recipe for scouring process:

Chemical Name	Quantity	Brand
CAUSTIC (NaOH)	45 ml/kg	Arabial Alkali
HOSTAPAL XTRA LIQUID	2-3 ml/kg	Archrom
SIRRIX 2UD	2-3 ml/kg	Archroma

Recipe for bleaching process:

Chemical Name	Quantity	Brand
HYDROGEN PEROXIDE (H_2O_2)	35 ml/kg	Samuda
CAUSTIC (NaOH)	20 ml/kg	Arabial Alkali
HOSTAPAL XTRA LIQUID	2-3 ml/kg	Archrom
SIRRIX 2UD	2-3 ml/kg	Archrom
STABILIZER Fcb/ Contavan GD-T	4-5 ml/kg	Archroma/CHT

#Function of different chemical agent:

- ⇒ **HOSTAPAL XTRA:** It is a wetting agent. Its function is to remove surface tension of the water & minimize interfacial tension.
- ⇒ **SIRRIX 2UD:** It is a sequestering agent. Its function is to remove the water hardness. Deactivate metal ions.
- ⇒ **NaOH(alkali):** To neutralize acidic materials. Swell the fiber & saponify glycerides & to remove the oil, fats, wax & additive impurities form the fabric.
- ⇒ **H_2O_2:** It's a universal bleaching agent. H_2O_2 is virtually the only bleaching agent available for protein fibers & is extensively used for cellulose fibers .It's function to break the cellulose particles & remove the natural coloring matter & produce permanent whiteness to the fabric.
- ⇒ **Stabilizer**: Stabilizer effects at various condition of P^H, temperature, liquor ratio & water hardness. It's function to maintain the proper power of H_2O_2 at high temperature.

 # Controlling point of the scouring & bleaching m/c:

- pH
- Temperature
- Speed & time
- Concentration of hydrogen per oxide(H_2O_2) & Caustic (NaOH)
- Liquor ratio
- Water hardness

#***Figure:***

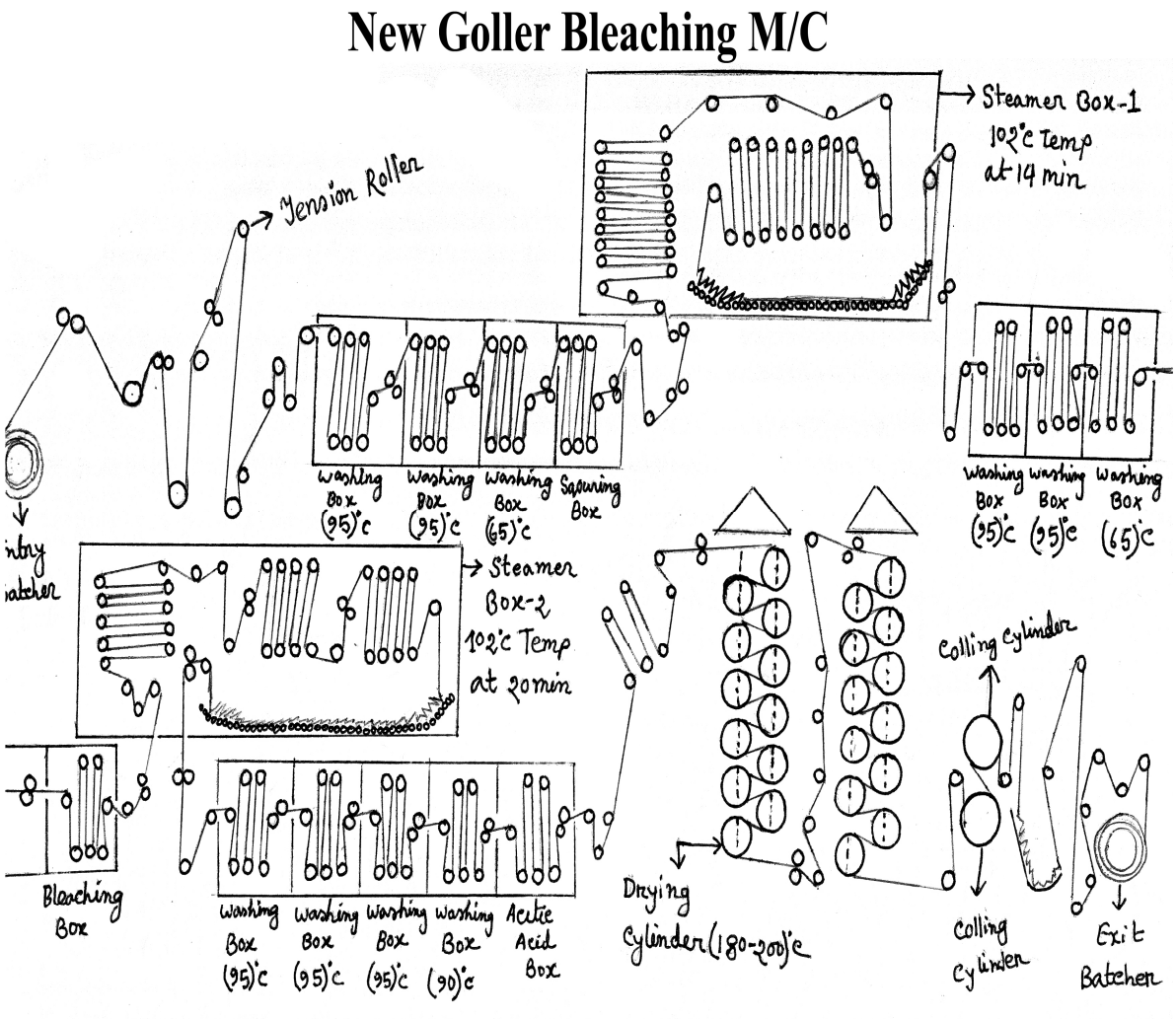
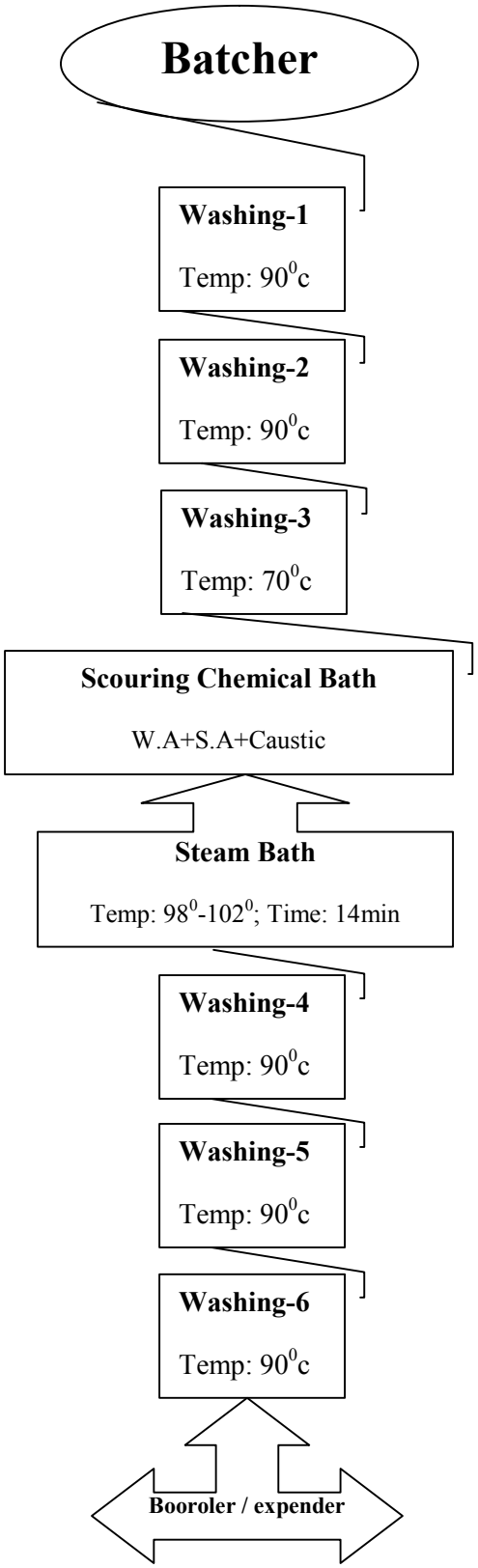
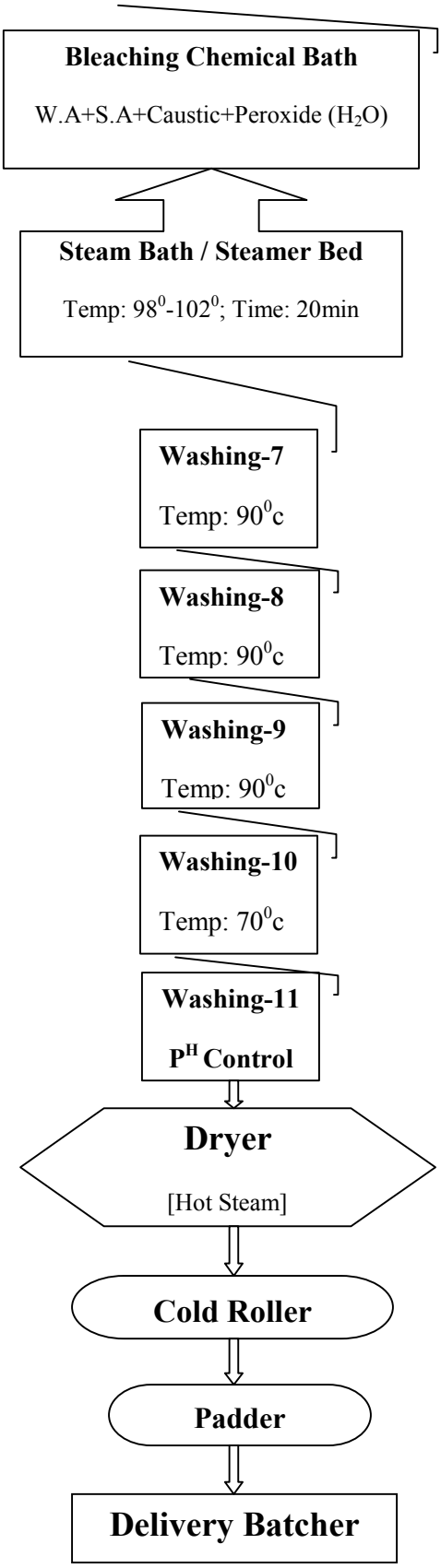


Fig: Line diagram of scouring & bleaching m/c.

Flow chart of Scouring & Bleaching in Sim Fabrics Limited:





➢ Bleach Fabrics Faults:

⇒ Whiteness
⇒ Absorbency
⇒ P^H
⇒ Size Chemical
⇒ Optical Brightness
⇒ Holes
⇒ Distortion
⇒ Black Spot
⇒ Iron Spot
⇒ Others Spot
⇒ Crease Mark

Controlling point of the scouring & bleaching machine:

⇒ pH
⇒ Temperature
⇒ Speed & Time
⇒ Concentration of hydrogen peroxide (H_2O_2)& caustic soda(NaOH)
⇒ Water hardness etc.

After scouring and bleaching, following tests are done in the 'Online QC' booth:

✓ Concentration of H_2O_2 (gm/Lt) in Bleaching bath
✓ pH test (Drop test method)
✓ Tegwa rating (Drop test method)
✓ Concentration of NaOH(gm/Lt) in scouring /Bleaching bath
✓ Whiteness
✓ After bleach width (Optional)
✓ Absorbency test (Capillary test method)

Fig: Scouring and Bleaching M/C

❖ MERCERIZATION

Mercerization is one of the most important processes of back process or pretreatment section. Mercerizing is the treatment of cotton with concentrated caustic soda under fabric tension. It imparts gloss to the fiber, increases its hygroscopicity, strength and improves its dye affinity.

Objects of mercerization

1. Length wise shrinkage and swelling axially.
2. Untwisting of fiber.
3. Changes of cross section of the fiber due to swelling.
4. Increase tensile strength.
5. Decrease the extension at break.
6. Increase luster.
7. Increase smoothness of fiber.
8. Increase affinity to dyestuffs and chemicals.

Mercerization is done for some several purposes-

- To increase luster
- To increase affinity to dyes
- To control fabric width and for dimensional stability
- To increase tensile strength and save dye.

Features:

- Auto dozing of NaOH solution.
- Bo's indicator.
- Auto acid dozing & P^H controller.
- Auto stop motion
- Width & moisture controller.

Mercerization process:

Mercerization (for luster) can be carried out in two ways:

1. By unrestricted swelling (by treating the cotton with sodium hydroxide solution, allowing it to Shrink to the maximum extent), following by stretching to the original width or length.
2. By restricted swelling (by treating the cotton under tension, with strong sodium hydroxide Solution without allowing it to shrink and then washing while still in the stretched condition).

In this factory mercerization process is done with the help of the following machine:

1. Mercerize m/c-1
2. Mercerize m/c-2

List of mercerizing machines: Total 3 machines.

Machine name	Company	Origin
Mercerizing Machine	Goller	Germany
Mercerizing Machine	Benninger	Germany
Mercerizing Machine	Kusters	Germany

#Mercerization process used in this factory:

Mercerization process is done in this factory by using Caustic (NaOH).

M/C parameters:

⇒ Feed to delivery fabrics----------160 m
⇒ Temperature of stabilizer----------80^0C
⇒ Number of washing bath----------5
⇒ Temperature of washing bath ------70-95^0C
⇒ Number of acetic bath----------01
⇒ Maximum m/c speed----------60m/min
⇒ Normally speed ----------25-50m/min
⇒ Number of drying cylinder----------10
⇒ Temperature of drying cylinder----180-200^0C
⇒ Number of cooling cylinder---------02
⇒ Caustic of Bo:

a.For printing----------22-24 Be

b.For dyeing----------28 Be

⇒ Cotton- 28 baume
⇒ P.C-26 baume
⇒ Twill-28-30 baume
⇒ Cotton Sateen- 28 baume
⇒ Sheeting- 28 baume

Recipe for mercerization process:

⇒ NaOH (28^0) Bo
⇒ Mercerize oil
⇒ Acetic acid

Function of differant chemical agent:

⇒ **NaOH(28^0 Bo):** To neutralize acidic materials. Swell the fiber & saponify glycerides & to remove the oil, fats wax & additive Impurities form the fabric.
⇒ **Mercerize oil:** It is a wetting agent. Its function is to remove surface tension of the water& minimize interfacial tension.
⇒ **Acetic acid:** To maintain proper value of $P^{H.}$

#*Controlling point of the mercerizing m/c:*

⇒ pH
⇒ Temperature
⇒ Fabric speed
⇒ Time
⇒ Concentration of NaOH
⇒ Etc.

#***Figure:***

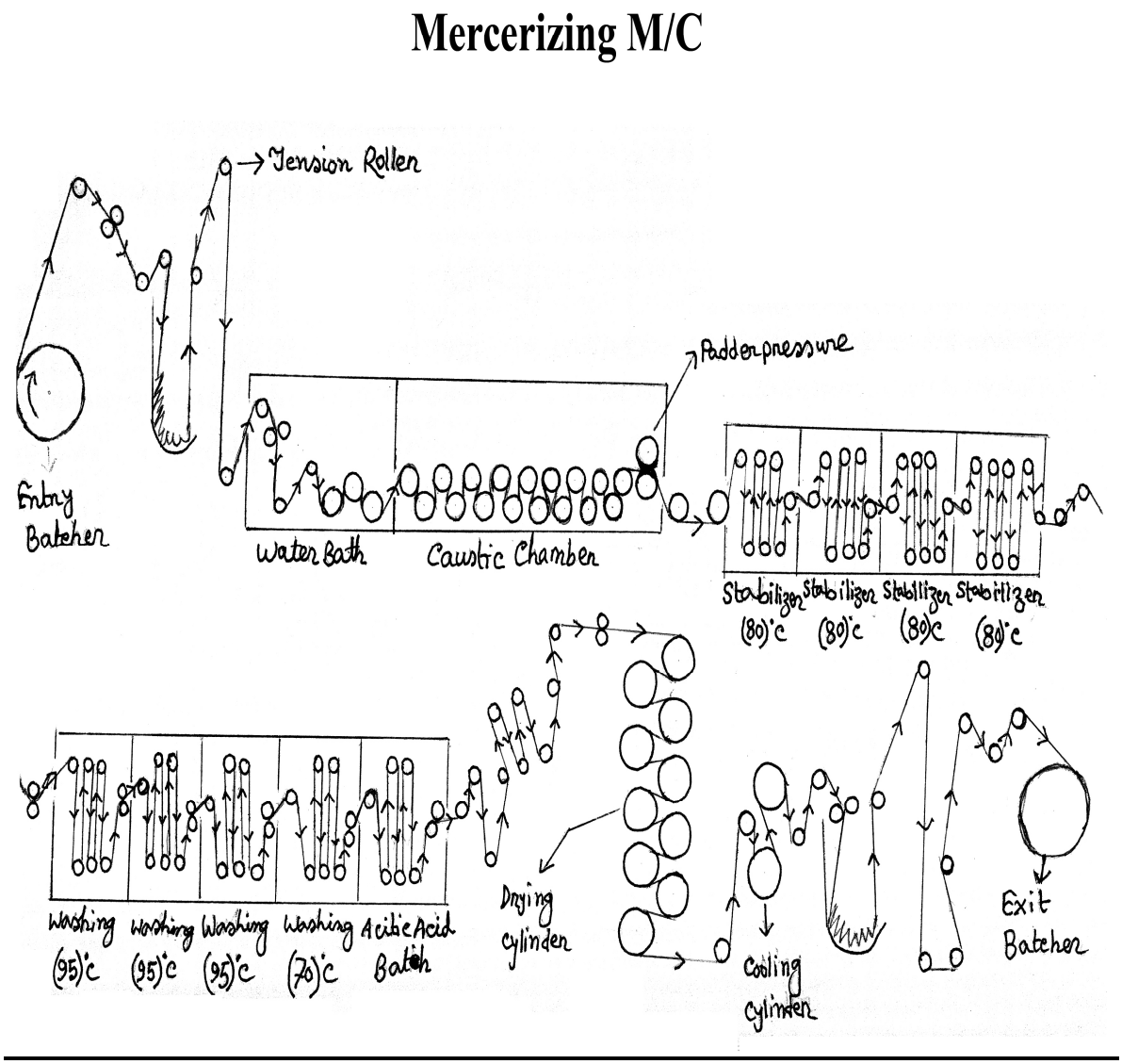


Fig: Line diagram of mercerizing m/c.

Flow Chart of Mercerizing:

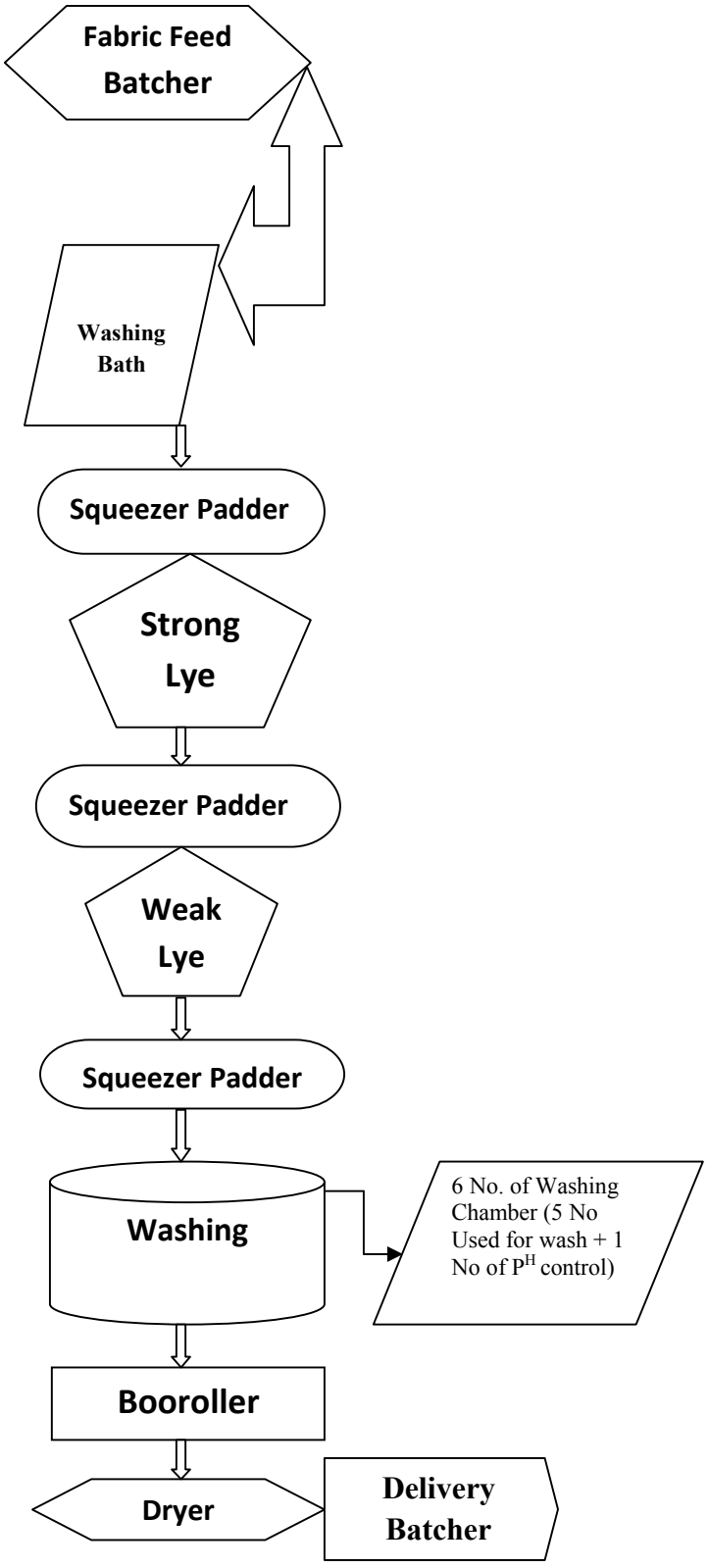


Fig: Mercerizing M/C

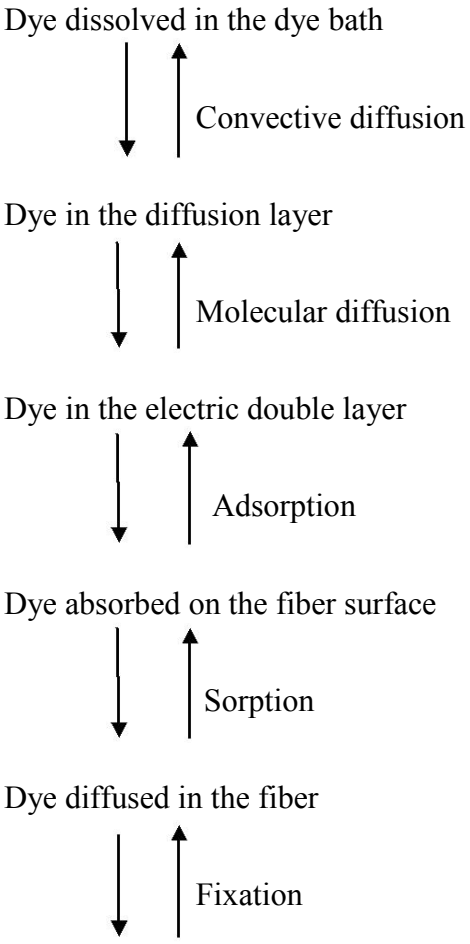
Mercerizing process fault:

- pH variation
- Crease
- Water drop mark
- Spot
- Problem from sigar
- Holes
- Distortion of dimensional stability

3.3.2. Dyeing

Dyeing is the process of coloring textile materials by immersing them in an aqueous solution of dyes called dye liquor.

Dyeing Process sequence



In Sim Fabrics Limited, **Continuous Dyeing Process** is used. Under dyeing department machines are used. They are-

- ✓ **THERMOSOL M/C**
- ✓ **PAD STEAM M/C**
- ✓ **COLD PAD BATCH (CPB) M/C**
- ✓ **JIGGER M/C**

❖ List of Machineries

In Sim fabrics Limited, Home Dyeing machineries are –

Machine Name	Machine Quantity	Capacity	Company	Origin
THERMOSOL	02	40000	Monforts	Germany
PAD STEAM	03	25000	Goller/ Beninger/Babcock	Germany
JIGGER	01	1000		China

❖ Description of dyeing machines:

THERMOSOL MACHINE

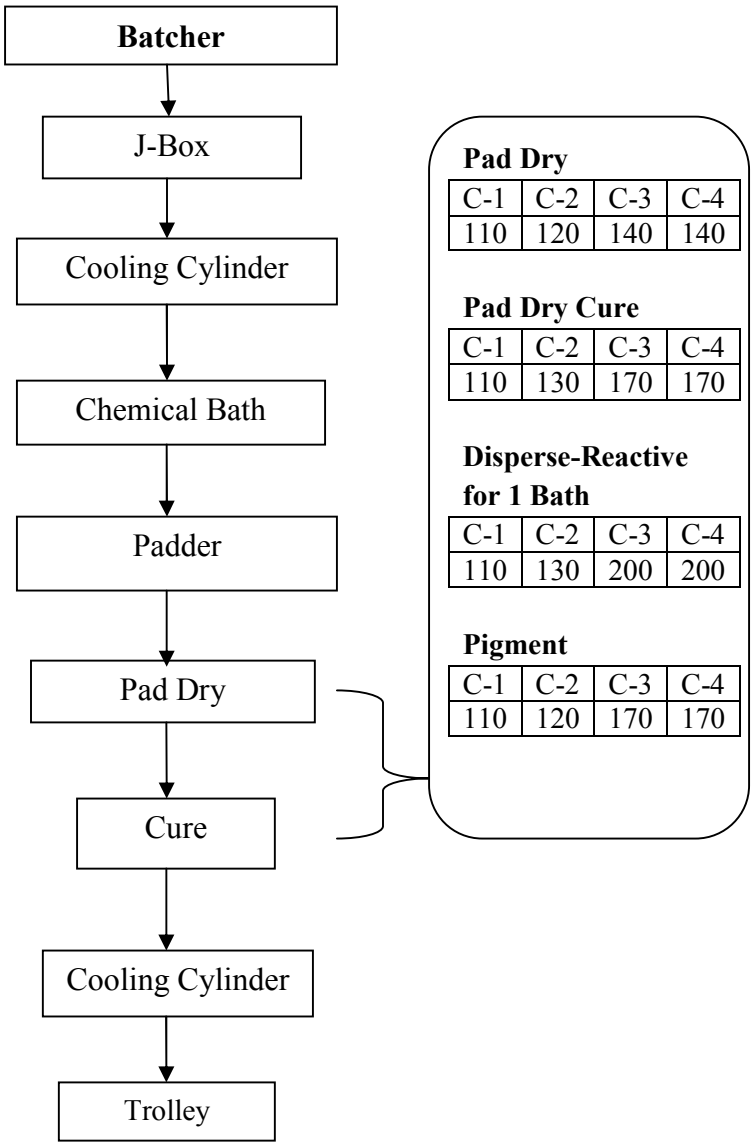
Thermosol dyeing process proffers the mainly economical and expedient technique of dyeing cotton fabric with reactive and vat dyes, as is a continuous dyeing method which is applied mainly for the polyester/cotton blended materials. The water and energy consumptions are very low and addition of salt is reduced, thus depicting it extra eco-friendly and the dye fixation rate is at an elevated rate as well. The Thermosol dyeing is a trouble - free procedure as simple step concerned is the channel of textile fabric from side to side of the dye – bath.

Figure: Thermosol Machine

M/C Specification:

01. Speed Meter
02. Padder Pressure
03. Infra Red (IR)1,2
04. Color Level Control
05. Chamber Temperature 1,2,3,4(Burners)
06. Circulation Fans
07. Cooling Cylinder

Thermosol Process Flowchart:



Recipes:

- **Recipe for PDC(Pad Dry Cure) Process:**

Dyes	**As per Lab dip**
Urea	**200g/l**
Soda Bi Carbonate(Na_2CO_3)	**20g/l**
Primasol V/Flolux AM(Anti Migrant)	**20g/l**
Primasol NF (Wetting Agent)	**2g/l**

- **Recipe for PD(Pad Dry) Process:**

Dyes	**As per Lab Dip**
Urea (If Requiered)	**200g/l**
Primasol V / Flolux AM (Anti Migrant)	**20g/l**
Primasol NF (Wetting Agent)	**2g/l**

Color Making Procedure for PAD DRY CURE (S.O.P) [Standard Optimization Procedure]:

- ✓ Take Water 50%
- ✓ Add Urea
- ✓ Add Primasol-V(Anti Migrant)
- ✓ Add Primasol- NF (W.Agent)
- ✓ Add Dyes
- ✓ Add Soda Bi Carbonate
- ✓ Add water to required level
- ✓ Stirrer for 10 minutes

Color Making Procedure for PAD DRY (S.O.P) [Standard Optimization Procedure]:

- ✓ Take Water 50%
- ✓ Add Urea [If Required]
- ✓ Add Primasol-V(Anti Migrant)
- ✓ Add Primasol- NF (W. Agent)
- ✓ Add Dyes
- ✓ Add water to required level
- ✓ Stirrer for 10 minutes

Test required during Thermosol operation

1. Pick up testing

2. Shade listing identification

Pick up testing: Before going to Thermosol machine, pick up of the fabric should be calculated and based on their result, liquor is prepared.

Shade listing identification: After each 1000 meter shade is tested in light box. Here listing problem is visualized and can be solved by increasing or decreasing padder pressure.

Test required after dyeing

- ✓ Shade Check / Design Check
- ✓ Rubbing Fastness
- ✓ Washing Fastness
- ✓ Water Fastness
- ✓ Perspiration
- ✓ pH Test

Thermosol Fault:

- Insects Spot
- Oil Spot
- Color Spot
- Drop Mark
- Crease Mark
- Foam Spot
- Fabric Hole
- Line Mark

PAD STEAM MACHINE

Pad steam is the essential machine for developing color after thermosoling in CPS process. Generally the color which is applied on the fabric surface is fixed in this stage and provides required color shade. Here not only chemical padding is done but also application of color is also possible if required shade is not achieved. Stripping process is also done in this machine.

Figure: Pad Steam Machine

Pad Steam Process Sequence

Padding liquor bowl

⇩

Padding liquor bowl with migration inhibitor

⇩

Drying chamber

⇩

Chemical padding

⇩

Steam fixation

⇩

Rinse

⇩

Soaping

⇩

Rinse

Recipes:

- Recipe for CPS (Chemical Pad steam) Process

Glauber Salt (Na_2SO_4)	250 g/l
Soda Ash (Na_2CO_3)	20 g/l
Caustic Soda (NaOH)	6–8 g/l

- Recipe for R.C (Reduction Cleaning) Process

Sodium Hydro Sulfate / Hydrose ($Na_2S_2O_4$)	40-50 g/l
Caustic Soda (NaOH)	30-40 g/l

N.B: It is used for P.C Fabric after Polyester dyeing with disperse

- Recipe for CPB (Chemical Pad Batch) Process

Glauber Salt (Na_2SO_4)	125 g/l
Soda Ash (Na_2CO_3)	10 g/l
Caustic Soda (NaOH)	6–8 g/l

N.B: It is used for conditioning dyeing

- Recipe for Stripping Process

Hydrose ($Na_2S_2O_4$)	50 g/l
Caustic Soda (NaOH)	50g/l

❖ Dyes List of Home Dyeing used in Zaber & Zubair Fabrics Ltd.

DYES
Bezaktive Navy SLF
Drim. Black CLS
Drim. Red HF-3B
Drim. Turquoise CL-B
Drimarine Deep Red HF-4B
Levafix Yellow CA
Levafix Red CA
Remazol Blue RGB
Remazol Navy RG-B
Remazol Turquise Blue G.133
Remazol ULTRA Carmine RGB
Remazol ULTRA Orange RGB

❖ Production Calculation:

From Running Production get
Fabric Cons.: 30 X 30 / 76 X 68
Fabric Quantity: 5000m
Fabric width: 117”

$$\text{Pick Up \%} = \frac{\text{Wet Weight after Padding} - \text{Air Dry Weight}}{\text{Air Dry Weight}} \times 100$$

$$= \frac{198 - 120}{120} \times 100$$

$$= 65\%$$

GSM = 120g

$$\text{GLM} = \frac{\text{GSM X Fabric width}}{39.37}$$

$$= \frac{120 \text{ X } 117”}{39.37}$$

$$= 356$$

$$\text{Liquor Required} = \frac{\text{GLM X Fabric Quantity X Pick Up \%}}{1000}$$

$$= \frac{356 \text{ X } 5000 \text{ X } 60\%}{1000}$$

$$= 1068 \text{ Ltr.}$$

❖ Production Parameters:

THERMOSOL

FOR ALL DVALA SHADES (PAD DRY CURE)

Const.	GSM	Dyes	Speed m/m	Padder Pressure N/mm	IR-1 OR IR-2	Color Level	Chamber-1		Chamber-2		Chamber-3		Chamber-4		Coolling Cylinder
							Temp C°	Circulation	Temp C°	Circulation	Temp C°	Circulation	Temp C°	Circulation	
SET POINT	120gm	REACTIVE	40 m/m	25 36 30	750	350	110	35%	130	45%	170	65%	170	75%	ON
30x30/76x68 Cotton	120gm	REACTIVE	35-50 m/m	25 33 29 TO 25 36 39	650 TO 850	300 MM	100 -120	35%-45%	120 -140	40%-55%	160 -180	55%-75%	160 -180	55%-75%	ON

FOR ALL DVALA SHADES (PAD DRY)

Const.	GSM	Dyes	Speed m/m	Padder Pressure	IR-1 OR IR-	Color Level	Chamber-1		Chamber-2		Chamber-3		Chamber-4		Coolling Cylinder
							Temp C°	Circulation	Temp C°	Circulation	Temp C°	Circulation	Temp C°	Circulation	
SET POINT	120gm	REACTIVE	40 m/m	25 36 30	750	350	110	35%	120	40%	140	55%	150	50%	ON
30x30/76x68 Cotton	120gm	REACTIVE	35-50 m/m	25 36 25 TO 25 36 35	650 TO 800	300 MM	100 -120	35%-45%	115 -125	40%-55%	130 -145	45%-65%	130 -145	45%-65%	ON

⇒ CHECK FRONT & BACK CONTINUOUSLY
⇒ CHECK LISTING AFTER EVERY 500 METER
⇒ CONTINUE CHECK COLOR LEVEL
⇒ MAINTAIN TEMPARATURE AS PER REQUIRMENT
⇒ SHADE SHOULD BE CHECK AFTER EVERY 1000 METER

PAD STEAM

CHEMICAL PAD STEAM

Const.	GSM	Speed m/m	Padder Pressure N/mm	Color Level	Steaming Temp.	Chamber-1 Temp.	Chamber-2 Temp.	Chamber-3 Temp.	Chamber-4 Temp.	Chamber-5 Temp.	Chamber-6 Temp.	Chamber-7 Temp.	Chamber-8 Temp.	Chamber-9 Temp.	pH	Cylinder Dryer
SET POINT		40	35 - 30 - 35	300	102	40	95	95	95	95	95	95	95	40	4	
20x20/104x52 doby	198gm	30 - 50	30 - 25 - 30 to 40 - 35 - 40	280 - 320	95 - 105˚C	30 -50˚C	85 - 99˚C	85 - 99˚C	85 - 99˚C	85 - 99˚C	85 - 99˚C	85 - 99˚C	85 - 99˚C	40-60˚C	3.5 - 4.5	FULL DRY

CHEMICAL PAD BATCH

Const.	GSM	Speed m/mm	Padder Pressure	Trough Level	Winder	Rotation Time
SET POINT	120gm	40	3.5 - 3.0 - 3.5	300	UP SIDE	10 hrs
30x30/76x68 COTTON	120gm	30-50	3.5 - 3.0 - 3.5	300 MM	UP SIDE	8-12 hrs

3.4 Lab & QC Section

The quality department is assigned to maintain consistently uniform quality of the material in process & various stage of its manufacturing.

In Sim Fabrics Ltd quality is controlled in the following way-

- Off line
- On line
- Color pilot plan (Lab dip)

Off line

- Color fastness to rubbing
- Color fastness to washing
- Color fastness to light
- Perspiration test (Acid & Alkali)
- Pilling test
- Tear strength
- Tensile strength
- Dimensional stability
- Fabric analysis (Count, EPI, PPI, GSM, Blend test)
- Abrasion test
- Chemical purity test

On line

- Pick up check
- Size check
- Titration
- Whiteness
- Absorbency
- Drop method
- Wicking method
- Core pH
- Shade continuity of running dyed fabric
- Dye liquor pH check
- Fastness properties of running printing fabric
- Chemical purity test
- Water hardness test

➢ Lab Dip

Lab-dip Submission

1) Lab dip request received from marketing
2) Registration
3) Assign to technician
4) Preparation of recipe and others
5) Prepare solution
6) Pad with solution
7) Dry and cure
8) Wash and dry
9) Shade assessment in light box with provided swatch
10) Shade assessment in data color if needed
11) If shade match proceed to the following. (if not matched, then trial again with correction recipe)
12) Submission to the marketing section or buyer
13) Received approval from marketing section or buyer
14) Recipe submit to the production floor when shade is approved
15) Record keeping

Lab-dip approval procedure

1) Prepare three options (A, B & C) of given shade and paste it in folder.
2) Send a copy to customer/buyer and concern person of marketing department and keep one copy in the folder for record.
3) Concern person of marketing department send an approval and rejection of lab dips.
4) If shade approved then send recipe of approved option (A, B or C) to dyeing department.
5) If shade is rejected, again work on it according to customer's comments.
6) Color matching in charge is responsible for lab-dip approval.

- **Lab dip preparation process**

Reactive Dyeing

Process CPS (Chemical-Pad-Steam)

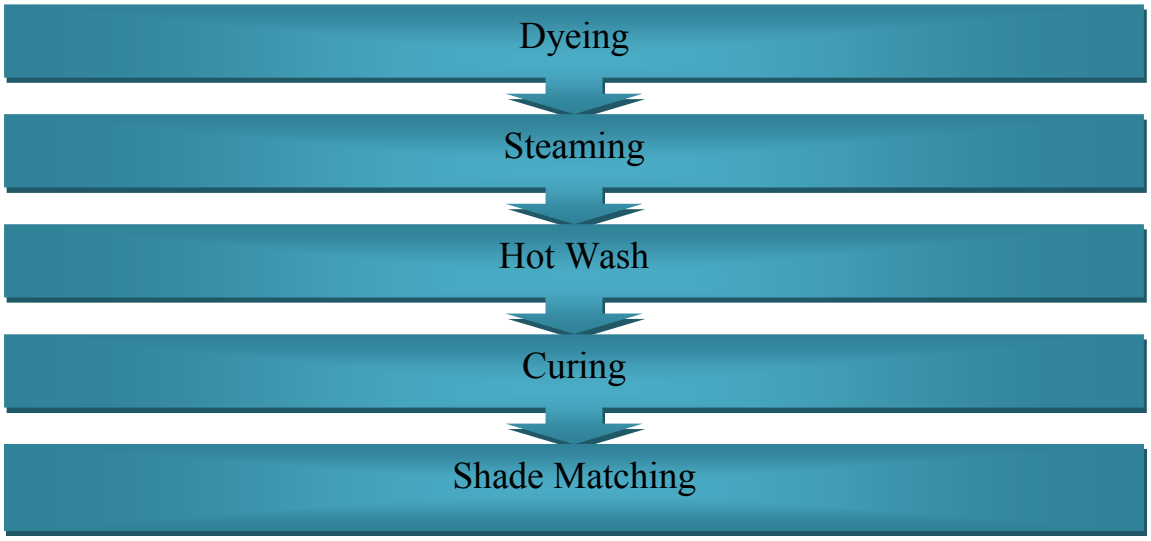


Table: Alkali requisition for CPS process

Shade	Light	Dark
Caustic soda (NaOH)	2 g/l	6 g/l
Soda ash (Na_2CO_3)	10 g/l	10 g/l

Process CPB (Cold-Pad-Batch)

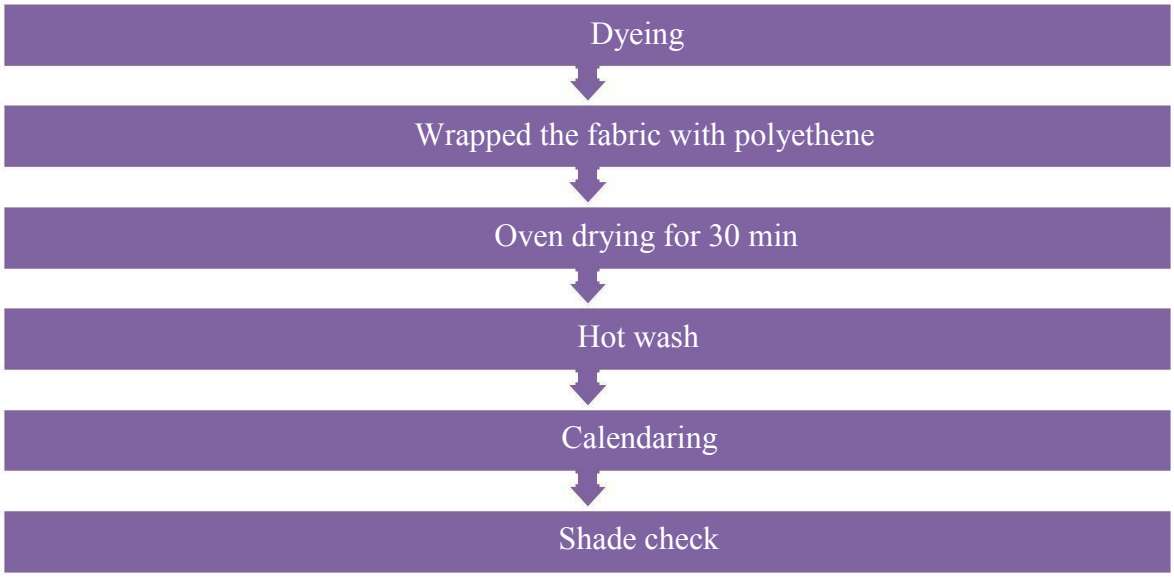


Table: Alkali requisition for CPB process

Shade	Light	Medium	Dark
Sodium silicate (48°Be)	30 g/l	45 g/l	60 g/l
Caustic soda (38°Be)	6 g/l	12 g/l	16 g/l

➢ Lab Tests

1) Yarn count (ISO 7211-5)
2) Fabric weight[gm/sqm] (ISO 3801)
3) Tear strength (ISO 13937-1)
4) Seam slippage (ISO 13936-2)
5) Tensile strength (ISO 13934-2)
6) Dimensional stability (ISO 6330 2A)
7) Abrasion resistance (ISO 12947-2)
8) Color fastness to washing and laundering (ISO 105 C06)
9) Color fastness to rubbing (ISO 105 X12)
10) Color fastness to perspiration (ISO 105 E04)
11) Color fastness to light (ISO 105 B02)
12) pH (DIN EN 1413)
13) Fiber content

➢ Description of some of the Lab tests

Yarn count (ISO 7211-5)

Purpose: To determine the yarn count of the fabric.

Apparatus: Scale, Scissor, Weight balance.

Procedure:

1. Ten (10) yarns from warp direction is unrove from the fabric
2. The length of yarns are measured without crimp by a scale
3. Weight of the yarns are taken by electric balance
4. Then count is calculated by the following formula

$$\text{Count} = \frac{\text{No. of Yarn x Length in inch x } 0.0059}{\text{Weight of yarns in gm}}$$

5. Similar procedure is done to determine the weft yarn count

Fabric weight [gm/sqm] (ISO 3801)

Purpose: To determine the GSM of the fabric.

Apparatus: GSM cutter, Weight balance.

Procedure for measuring GSM:

1. GSM cutter is used which is circular in shape having a diameter of 11.2 cm
2. Fabric is placed over a plain surface pad and cut by GSM cutter
3. Then the weight of the fabric is taken by weight balance
4. From the electric balance GSM can be found directly or the weight in gm is multiplied by 100 gives the GSM of the fabric.

Tear Strength (ISO 13937-1)

Purpose: To assess the tear strength of the fabrics.

Apparatus: Digital Tear Tester

Specimen:

For weft tear strength:	58 mm in warp direction 80 mm in weft direction
For warp tear strength:	58 mm in weft direction 80 mm in warp direction

Procedure:

1. Clamp a test specimen in the jaws so that 80 mm side of specimen with trimmed edge is parallel to the base and 58 mm side of the specimen is at right angles to the base.
2. Mark the cut in the specimen.
3. Set the pointer to the starting point.
4. Depress the pendulum stop to release the pendulum, allow the pendulum to sewing a full cycle before releasing stop.
5. Read off and record the position of the pointer on the scale.

Result: Result is taken and converts it to grams.

Tensile Strength (ISO 13934-2)

Purpose: To assess the tensile strength of woven fabric.

Apparatus: Titan strength tester.

Procedure:

1. Initial separation between the top and bottom jaw is 200 mm.
2. Ensure the testing equipment is set up exactly as described and calibrated according to the manufacturing instruction.
3. Movement started when mount a specimen centrally and vertically in the jaw ensuring the jaw have no tension applied.
4. Set the machine in motion and measure the load required to break the specimen.

Result: Report the load in lbs.

Color Fastness to Washing and laundering (ISO 105 C06)

Purpose: To assess the color fastness to washing and laundering.

Apparatus: Gyro wash, Grey scale.

Sample size: Dyed sample - 10cm X 4 cm
Multifibre - 10cm X 4 cm

Recipe:

Soap- 5 g/l
Sodium carbonate – 2 g/l
Temperature – 95°C
Time – 4 hrs
Number of steel ball- 10
M:L – 1:50

After treatment: The specimen was dried at temperature below 60°C.
Evaluation: the sample was evaluated by grey scale for-

- Color change in shade
- Color staining.

Dimensional Stability (ISO 6330, 5770)

Purpose: To assess the dimensional stability that means shrinkage.

Apparatus: 1. Washing machine. 2. Sewing machine.

Specimen: Cutting length: Weft= 105 cm
Warp= 60 cm

Measuring length: Weft= 100 cm
Warp= 50 cm

Procedure:

1. At first sample is cut according to the specimen.
2. Then the measuring length is marked.
3. Then the sample is sewed around the 4 side.
4. Then it goes to the washing machine for hot water wash.
5. Then dried.
6. Then again measured to get the shrinkage %.

Color Fastness to Perspiration (ISO 105 E04)

The part of garments which come into contact with the body where perspiration is heavy may suffer serious local discoloration. This test was intended to determine the resistance of color of dyed textile to the action of acid and alkali perspiration.

Recipe:

Chemical	Alkali medium	Acid medium
L-histidinemonohydrochloride monohydrate ($C_6H_9O_2N_3HCl.H_2O$)	0.5 gm	0.5 gm
Di-sodium hydrogen orthophosphatedihydrate ($Na_2HPO_4.2H_2O$)	2.5 gm	2.2 gm
Sodium chloride (NaCl)	5.0 gm	5.0 gm
Distilled water (H_2O)	1000 ml	1000 ml
P^H (adjusted with 0.1 N NaOH or0.1 NCH_3COOH)	8.0	5.5

Temperature = 37 ± 2°C
Time = 4 hours
M : L = 1:50
Pressure = 10 lb

Sample size:

(10 cm X 4 cm) dyed sample and (10 cm X 4 cm) multifiber sample.

Apparatus:

1. Perspirometer
2. Multifiber
3. Grey scale

Procedure:

Perspiration fastness was carried out following ISO 105 E04 method where first multi-fiber and fabric face side was attached in shorter edge. Then the composite specimen was wetted in the above mentioned perspiration solution at room temperature, liquor ratio 1:50 for 30 minutes. Excess solution was poured off and composite test specimen was placed between two glass plates under pressure of 10 lb and then placed in an oven (Temperature 37± 2°C) for 4 hrs.
After treatment: The specimen was dried at temperature below 60°C
Evaluation: The sample was evaluated by grey scale for-

1. Color change in shade
2. Color staining

Color Fastness to Rubbing (ISO 105 X12)

Apparatus and Materials

1. Crock meter
2. Crocking cloth
4. Grey scale for staining

Sample size:

Specimen size	14 cm x 5 cm
Crocking cloth size	5 cm x 5 cm

Procedure:

- Each test specimen was fastened by means of clamps to the baseboard of the testing device so that the long direction of the specimen follows the track of the device.
- For the dry rubbing test, the conditioned rubbing cloth was placed flat over the end of the finger.
- At a rate of one cycle per second, to and fro movement in a straight line was rubbed. The rubbing was carried out by moving 10 times in 10 seconds, with a downward force of 9 ± 0.2 N.
- Then the specimen was removed from the baseboard, conditioned and rated with grayscale.
- For wet rubbing, the conditioned crocking cloth was weighed and then thoroughly soaked in distilled water and reweighted to ensure take-up of 95% to 100%.
- Then it was clipped in the finger and carried out the procedure as it is in case of dry rubbing and rated similarly by the grey scale.

Evaluation:

Conditioning and then evaluating was done by using grey scale for color staining.

- **Machineries list of Laboratory**

Machine name	Company	Origin	No. of Machines
Spectrophotometer	X-rite	USA	2
Steamer	Textilmaschinen	Switzerland	2
Tex Steamer	DAELIM STARLET CO. LTD	Korea	1
Rapid Padder	-	China	4
Oven Dryer	DAIHAN LAB TECH CO. LTD	Korea	1
Washing Machine	Siemens	Germany	2
Washing Machine	LG	Korea	1
Washing Machine	Whirpool	USA	1
Washing Machine	James H Heal	England	2
Gyrowash	James H Heal	England	1
Perspirometer	Carbolite	-	1
P^H Meter	HANNA Instruments	USA	1
Electronic balance	SHIMADZU CORPORATION	JAPAN	1
Crockmaster	James H Heal	England	1
Titan strength tester	James H Heal	England	1
Digital tear tester	James H Heal	England	1
Light and weather	James H Heal	England	1
fastness tester			
Hygro/Thermograph	-	-	1
Digital shaker	-	-	1
Pilling tester	James H Heal	England	1

3.5 Finishing Section

Textile finishing is the term used for a series of processes to which all bleached, dyed, printed and certain grey fabrics are subjected before they put on the market. The object of textile finishing is to render textile goods fit for their purpose or end-use and/or improve serviceability of the fabric.

Finishing of fabric is carried out for both aesthetic and functional purposes to improve the quality and look of a fabric. Fabric may receive considerable added value by applying one or more finishing processes.

The finishing process may be classified into two main classes:

- Physical finish.
- Chemical finish.

The physical or mechanical processes range from simple drying over steam- heated cylinders, or on a stenter which both dries stretches the cloth, to a complicated series of calendaring.

Chemical finishes indicate the application or deposition of chemical compounds on fabrics to improve the appearance the chemical finishing is performed by treatment with starch, dextrin, glue, gums, china clay, Epsom-salt, glycerol, soaps, & soluble oils, for stiffening, weighting, & softening, as required.

The compounds used in finishing may be classified as follows:

- Long-chain fatty compounds
- Synthetic resins
- Cellulose derivatives
- Quaternary ammonium compounds.

The finishing can also be divided into temporary & permanent. A finish can only be considered permanent if it remains unaffected through all the conditions of wear& treatment to which a fabric may be subjected during its life.

Finishing section of **Zaber and Zubair Fabrics Ltd** contains the following machineries-

- **Curing Machine**
- **Stenter Machine**
- **Sanforize Machine**
- **Calendar Machine**

3.5.1. CURING MACHINE

Purpose of curing:

Curing is a process in which fabric passes over a chamber which maintains temperature range 140-160c for dwelling 5-8 mints. For pigment printing curing is necessary due to fixation of color.

Objective of loop steaming:.

After printing and drying, the dye is not transferred into the fabric in fact. During steaming the printed & dried fabric is exposed to the action of moist, saturated or super heated steam at atmosphere or higher pressure over a range of temperature 100-130°c for 6-7 mints. As a result high concentration of the dye is rapidly transferred into the fabric from the thickener film.

Fig: Curing Machine

In Sim fabrics Limited, Curing machineries are –

Machine Name	Machine Quantity	Company Name	Origin / Made By
Curing M/C	03	Arioli	Germany
Curing M/C	02	Noor	Pakistan
Curing M/C	01	Stork	Germany

3.5.2. STENTER MACHINE

Stenter machine is the most versatile machine in the finishing section of processing department. Several operations can be carried out in this machine, such as -

1) Application of finishing chemicals
2) Control of shrinkage
3) Fabric width control
4) Drying
5) Application of dyes
6) To control bowing of fabric
7) To control skewness of fabric
8) Curing etc.

Fig: Stenter Machine

In Sim fabrics Limited, Stenter machineries are –

Machine Name	Machine Quantity	Company Name	Origin / Made By
Stenter M/C	04	Babcock	Germany
Stenter M/C	02	Sunsuper	South Korea
Stenter M/C	06	Monforts	Germany

➢ Machine Parameter:

EQUALIZING FOR MERCERIZE & DYEING

Const.	GSM	Speed m/m	Padder Pressure	Over Feed	Chamber-1 Temp.	Chamber-2 Temp.	Chamber-3 Temp.	Chamber-4 Temp.	Chamber-5 Temp.	Chamber-6 Temp.	Chamber-7 Temp.	Chamber-8 Temp.	Cool Air
SET POINT	120 gm	65 m/m	2.5 bar	1.50%	190	190	190	190	190	190	190	190	ON
30x30/76x68 COTTON	120gm	50-80 m/m	2.5-4 bar	1-1.5%	180 TO 210	180 TO 210	180 TO 210	180 TO 210	180 TO 210	180 TO 210	180 TO 210	180 TO 210	ON

FINISHING

QUALITY	GSM	FINISH TYPE	SPEED m/m	PADDER PRESSU	OVER FEED	CHAMBER-1 TEMP	CHAMBER-2 TEMP	CHAMBER-3 TEMP	CHAMBER-4 TEMP	CHAMBER-5 TEMP	CHAMBER-6 TEMP	CHAMBER-7 TEMP	CHAMBER-8 TEMP	EXHAUST
SET POINT	120	RESIN	45 m/m	3 Bar	MAXIMUM	170	175	175	175	175	175	175	175	70%
30x30/76x68 COTTON	120	RESIN	35-55 m/m	2.5-4 Bar	MAXIMUM	160-190°C Circulation 80%-90%	170-190°C Circulation 80%-90%	170-190°C Circulation 80%-90%	170-190°C Circulation 80%-90%	170-190°C Circulation 80%-90%	170-190°C Circulation 80%-90%	170-190°C Circulation 80%-90%	170-190°C Circulation 80%-90%	60-70%

- ❖ SKEW / BOW MUST BE UNDER 3%

➢ Controlling point:

- Over feeding
- Temperature for each chamber
- Speed of fabric
- Chemical used for finishing
- P^H of chemical liquor.

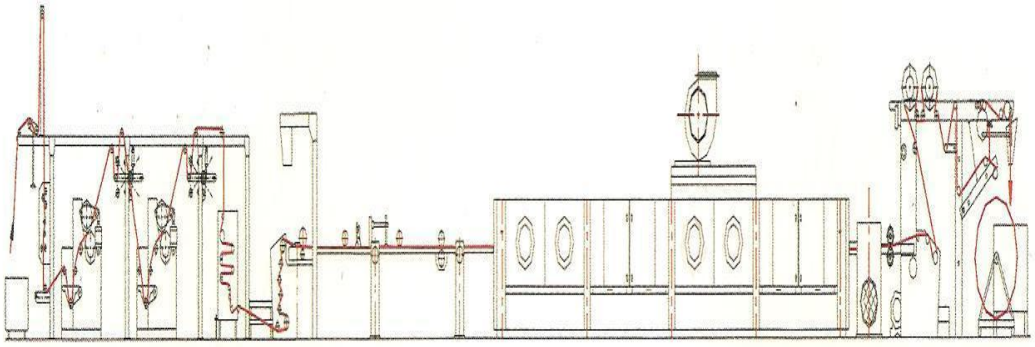


Figure: Line diagram of Stenter machine

Recipe for finishing (pigment print)

Arco fix NETLF	= 40g/l
Catalyst (MgCl2)	= 10g/l
Solo soft UP	= 15g/l
MRN	= 01g/l
Acetic acid	= 0.3g/l
Temperature	= 180°c
Speed	= 60m/min

Recipe for finishing (Rective print)

☐ Arco fix NZK	= 70g/l
☐ Ceranine	= 20g/l
☐ Siligen SIS	=10g/l
☐ Ceralob PHD	=20g/l
☐ Urea	= 10g/l
☐ Acetic acid	=0.8g/l
☐ Temperature	= 180°c
☐ Speed	= 50m/min

➢ Chemical used in Stenter machine

Chemicals	Function
ALBAFIX R	Fixer
ACETIC ACID	pH controller
ALBATEX ECO	-
ALBAFLOW PAD	Wetting agent
CERALUBE PHD LIQ C	-
SOLUSOFT NWA	Softening agent
SOLUSOFT TOW	Softening agent
TURPEX ACN NEW	Soft + Tear improver
ULTRATEX FMI	Softening agent
SILIGEN SOFTENER FFUK	Silicone finish
SAPAMINE CSN	Softening agent
SAPAMINE SFC	Softening agent
UREA	-
BINDER 707	Rubbing fastness improver
V A A	Paper Touch
SIRRIX NE PK	-
TEXBOND FA	-

➢ Main units of stenter machine

- Feed roller
- J-Box
- Guide roller
- Padder
- Mahlo
- Over feed roller
- Under feed roller
- Heating chamber (burner)
- Width control device (width sensor)
- Selvedge control device
- Exhaust fan
- Blower
- Delivery roller (tension roller)

➢ Critical to Quality (CTQ) list of stenter machine

1) Speed meter
2) Mahlo
3) Tough level control
4) Padder pressure
5) PIV roller (over feed)
6) Chamber temperature
7) Exhaust fan

3.5.3. CALENDARING MACHINE

Calendaring is a mechanical finishing process. Calendaring is an operation to improve fabric aesthetics. In this process fabric passes between vertically heavily loaded rollers and with the help of heat & pressure; some properties of fabric e.g. luster, smoothness, brightness etc. are generated on the fabric surface.

Objects of calendaring

1. To upgrade the fabric hand and to impart a smooth, silky touch to the fabric.
2. To compress the fabric and reduce its thickness.
3. To improve the opacity of the fabric.
4. To reduce the air permeability of the fabric by changing its porosity.
5. To impart different degree of luster to the fabric.
6. To reduce the yarn slippage.

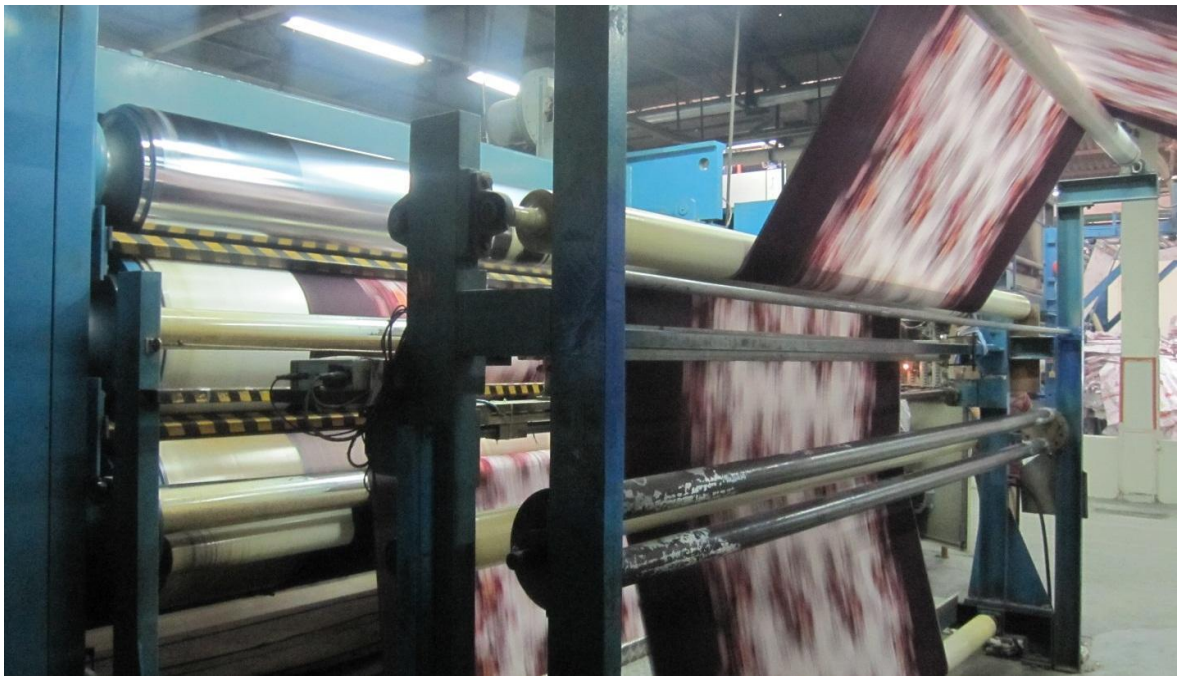


Figure: Calendaring Machine

In Sim fabrics Limited, Calendar machineries are –

Machine Name	Machine Quantity	Company Name	Origin / Made By
Calendar M/C	01	Ramisch	Italy
Calendar M/C	02	Kuster	Germany

➢ Machine parameter

- No of roller - 03
  a. Steel roller
  b. Rubber roller
  c. Cotton roller
- Roller pressure - 25-30 mbar
- Roller temperature - 90°C
- Speed - 85-90 m/min

➢ <u>Controlling point</u>

- Roller pressure
- Steam pressure
- Roller temperature
- Fabric speed
- No. of roller

➢ SANFORIZING MACHINE

This machine has a larger size cylinder or drum. In this process the fabric is treated with a tight condition on the contact of larger cylinder with the help of a hot shoe and an endless woolen blanket and thus giving the fabric an anti-shrinkage treatment by a proper sanforizing range.

It is a mechanical finishing process which removes the tendency of shrink from the fabric.Sanforizing process is used to create shrinkage on the fabric by a rotating elastic felt blanket which is curved tightly around a small diameter shaft. When a thick blanket is passed on this shaft, the outer surface of this blanket is expanded and after passing the shaft it compresses and reverses to its original shape. If a piece of cotton cloth is passed tightly with the surface of the blanket, it is found that the cloth is longer than the blanket while passing the shaft and as a result, the cloth compresses in order to conform the compressed surface of the blanket just after passing the shaft by rearrangement of the yarns.

Mainly sanforizing machine has 3 functions. Such as-

- ⇒ Shrinkage control
- ⇒ Hand feel
- ⇒ GSM control

Figure: Sanforizing Machine

In Sim fabrics Limited, Sanforizing machineries are –

Machine Name	Machine Quantity	Company Name	Origin / Made By
Sanforizing M/C	01	Monforts	Germany
Sanforizing M/C	01	Tepa	Italy

➢ Machine parameter

- Pressure of rubber blanket 2-2.5
- Steam pressure 2-3
- Hot shoe
- Clip expender roller
- Endless woolen blanket
- Skyer
- Hot cylinder
- Water spraying unit.

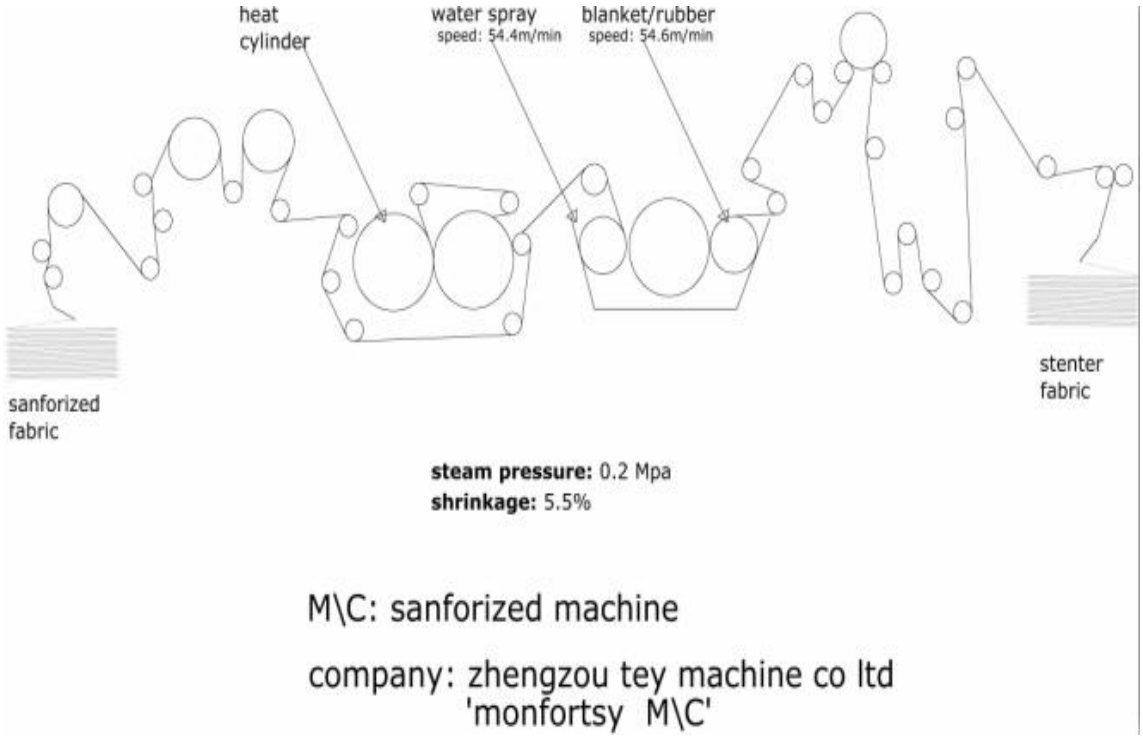


Figure: Line diagram of Sanforizing Machine

❖ Main units of sanforizing machine

- Rubber blanket
- Hot shoe
- Clip expender roller
- Endless woolen blanket
- Skier
- Hot cylinder
- Water spraying unit

➢ Controlling point

- Pressure of rubber blanket.
- Steam pressure
- Fabric speed
- Speed of endless woolen blanket
- Width of clip expender roller

3.6 Maintenance Section

Maintenance is a process by which equipment is looked after in such a way the equipment can give the best services of it. Machine, buildings and other facilities are subjected to deterioration due to their use and exposure to environmental condition. Process of deterioration, if unchecked, culminates in rendering these service facilities unserviceable and brings them to a standstill. In Industry, therefore has no choice but to attend them from time to time to repair and recondition them so as to elongate their life to the extent it is economically and physically possible to do so.
Maintenance increases the life tune of the machine. Now a days maintenance has become the essential for the modern time industrialization.

- **Objectives of maintenance:**

1. To keep the factory plants, equipments, machine tools in an optimum working condition.
2. To ensure specified accuracy to product and time schedule of delivery to customer.
3. To keep the downtime of machines to the minimum thus to have control over the production program.
4. To keep the production cycle within the stipulated range.
5. To modify the machine tools to meet the need for production

- **Types of maintenance:**
  - MAINTENANCE
  - PERIODIC
  - PREVENTIVE
  - BREAKDOWN
  - MECHANICAL
  - ELECTRICAL
  - MECHANICAL
  - ELECTRICAL
  - MECHANICAL
  - ELECTRICAL

3.6.1. Periodic Maintenance:

Maintenance of different machines is prepared by expert engineer of maintenance department for a period of time. Normally in case of dyeing machine maintenance after 30 days complete checking of different important parts are done.

- **Preventive Maintenance:**

Preventive maintenance is a predetermined routine actively to ensure on time inspection / checking of facilities to uncover conditions that may lead to production break downs or harmful description.

- **Break down maintenance:**

In this case, repairs are made after the equipment is out of order or broken and it can not perform its normal functions.

3.6.2. Flowchart of maintenance:

Problem

↓

Inform to maintenance department

↓

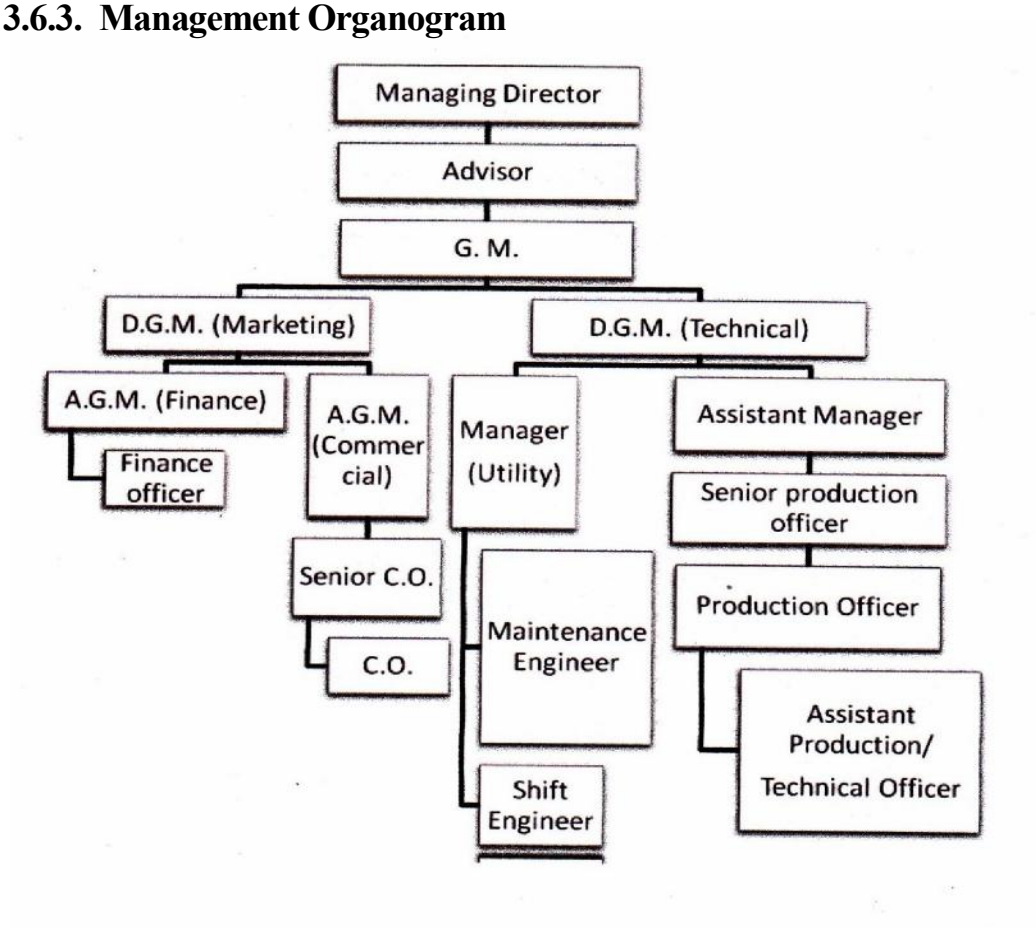
Detect problem

↓

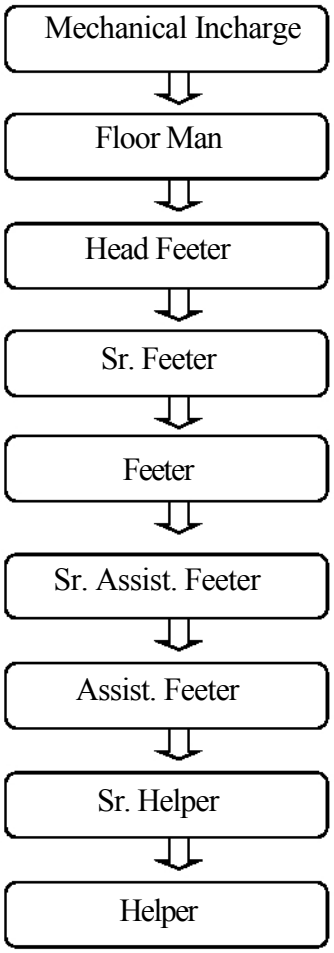
Problem can be repairing or replacing

Repair can be solved immediately, replacing requires tune (parts needed to buy & then solved the problem)

3.6.3. Management Organogram



3.6.4. Mechanical Manpower



3.7 Inspection Section

3.7.1. Objects of Quality Control:

1) Specification test
2) Raw material control
3) Process control
4) Process development
5) Product testing
6) Research

3.7.2. Quality Control of Weaving & Dyeing Section

To produce high quality fabric it is necessary to inspect the fabric roll after receiving from different machine. This is done to assure the quality of the fabric before dyeing.

List of equipments used in inspection

a. Inspection m/c
b. Electronic balance
c. GSM cutter
d. Dyeing Measurement Parameter

3.7.3. Quality Standard

Sim Fabrics Ltd. Follows the four point grading system to inspect the body of the fabric. In the four point system the faults are found by inspection and are given points against the fault. Then the total no. is calculated. The following table shows the four point system.

Four Point Grading System

Size of defects	Penalty Points
3 inches or less	1
Over 3 inch but not over 6 inch	2
Over 6 inch but not over 8 inch	3
Over 8 inch	4

3.7.4. Calculations of points is done by-

- If point grade is 40 or below then the fabric is ok. If the result is more than 40 points, then inform it to GM or respective merchandiser
- The fabric is also checked for shading defect in side by side and length. Any non-conformities/ shading will be notified to asst. manager using inspected reports. Roll wise color uniformly card is maintained for identification of shade variations.
- During the fabric inspection if the yardage of any roll is reported more or less by the fabric inspection machine then the one specified in the roll, the roll will be measured manually using measuring tapes. Only calibrated measuring tape should be used.
- The result of fabric inspection shall be recorded in fabric inspection report.

3.7.5. MACHINE SPECIFICATION:

- Machine Name: Modular Design Inspection Winding M/C
- Company Name: S T T Machinery Co Ltd
  (S T T = Shiaw Tai Tong)
- Model: STT - IE W 9272
- Patent No: 187203
- Serial No: 2887-2
- Manufacturing Date: 2006
- Origin: Taiwan

3.7.6. Quality Assurance System:

Quality assurance procedure may be divided into two major parts

a) Online quality control b) Offline quality control

3.7.7. Online Quality Control:

Online quality control comprises with the raw material control, process control & finish fabric inspection.

Raw material control:

As the quality product depends upon the raw material quality, quality assurance department must ensure the best qualities of raw material are used in production.

- The yarn should be with a known concentration and high degree of purity
- The fabric must be without faults, with proper absorbency, whiteness as per requirement of the subsequent process.

3.7.8. Process Control:

- The method chosen for process must be provided with necessary parameters.
- During weaving samples should be checked at each stage of process.
- GSM, width, shrinkage (both length & width) should be maintaining as per buyer requirement.

3.7.9. **Offline quality control:**

Offline quality control generally comprises different tests of final product so that it is to identify Whether it pass against the norms given by buyer, the following test are generally done-

- GSM test
- Shrinkage test
- Shade Check
- Wash fastness test
- Fastness to water
- Rubbing fastness test
- Perspiration test
- Durability test
- Dimensional stability

3.8 Marketing Information

Marketing Information:

Sim fabrics Ltd. Is a 90% export oriented woven dyed fabric manufacturer. So they sell their Product to export market. They also take some initiative for market development through communicating with new buyer and taking part in different international garments fair.

Product & Customer:

As it is a woven industry, its main products are 3/1, 2/1, 2/2,1/1 L.H.T & R.H.T and 3/1 broken twill. The factory ensures faults free fabrics & even dyed fabric as per customer requirements, through practice of faults free control procedures

- **Country of Export:**

a) England
b) USA
c) Germany
d) Sweden
e) Spain
f) Italy
g) France
h) Denmark

3.9 Costing

Costing:

Costing is a very complex procedure, with set patterns and guidelines followed by the industry, and it is difficult to find out costs for every process as there are some inbuilt costs while costing.

3.9.1. Amount of raw material or GSM of the fabric:

Amount of raw material is reflected by the weight or GSM (grams/sq m) of the fabric. GSM is directly dependent on the EPI and PPI or construction of the fabric and is inversely proportional to the count of the yarn. Relation between GSM and cost is a little complex. For the same variety of the fabric, as the GSM increases the cost increases. But when the yarn becomes very fine and there is a variation in picks per inch in the fabric, then the cost of spinning and weaving plays a more important role than the GSM and even when the GSM is similar, the cost of voile fabric with finer yarns and more picks per inch is more.

Weight of the fabric is the weight of warp and weft which can be calculated by the formula below:

Weight of warp in grams/sq m of fabric = (EPI x 0.6) / Count of Warp ~ A Weight of weft in grams/sq m of fabric = (PPI x 0.6) / Count of Weft = B GSM = A+B

3.9.2. Sizing and Dye Chemicals Cost:

The sizing cost depends upon the count of the yarns. The count becomes finer the size and chemical cost increases as a rich solution, better quality of size and chemicals is required for better strength.
One needs to add Rs 35/kg as additional cost which includes steam, power or wages. For two plied yarn no sizing is required.

3.9.3. Production cost or cost of weaving & Dyeing process:

It includes machine running cost, maintenance, labor cost, power & fuel, etc. The weaving cost is affected by the beam size if the beam is small in length, the cost will be more as beam gaiting and knotting will add to the cost.

3.9.4. Costing of the product:

Costing system mainly describe how the cost of the final product is fixed by the company / top managements. As it is a garments manufacturing factory, so according to the buyer / customer requirements of final garments, merchandiser give the consumption of fabric with specifications. Then it is calculated how much dyestuffs & chemicals are required for processing. After that, the final cost is fixed including some profit. Then the unit price is offered to the buyer for their approval.

- Sales and caring cost
- Others cost -

Profit, etc.

Remarks:

The costing of the product is most secret matter of the Industry. They are not interested to flash the cost related data. So we could not collect the Costing process of the products.

3.10 Effluent Treatment Plant

Effluent Treatment Plant Description of the ETP Process:

1. Equalization tank consist raw effluent. At the beginning raw effluent is led to the mixing tank/ reaction tank by pumping.
2. In Reaction tank Lime & Ferous Sulphate are added with effluent. Here blower is used to mix them properly
3. At the end of reaction tank the solution is led to the flocculation tank where polyelectrolyte is added for further reaction.
4. From the flocculation tank solution is drained to Tube settler-1. Here sludge is divided and placed in the sludge sump.
5. After the operation of tube settler-1 the solution is brought to p^H control chamber where HC1 is mixed to control the required p^H.
6. After the completion of p^H control the solution is led to the biological reaction tank 1 & 2. In this tank Bacteria Media is used to absorb the harmful insects that exist in effluent. An amount of Di-arnmonium phosphate and Urea is used as food of Bacteria.
7. From the Biological Reaction tank water is again drained to Tube Setler-2. Like Tube Setler-1 sludge is divided here and placed in the sludge sump.
8. *The* cleaner effluent is passed through the filter feed tank to the sand filter and activated carbon filter for final filtration. After the final filtration the treated water is drained out in the air. Before draining out the Biological Oxygen Demand and Chemical Oxygen Demand are to check and keep it in required range.
9. The less contaminated liquid that is obtained from different operations except dyeing is stored min the less contaminated reservoir. It needs to be filtrated too before drain out.
10. In another operation, liquid sludge is collected from sludge sump and makes it inject into Sludge thickening tank.
11. In sludge thickening tank divination of raw sludge is occurred by centrifuge hydro extractor and the filtrated liquid is led to the equalization tank for further processing.
12. The Centrifuge hydro extractor is used to convert the sludge into cake which later brought to the air by the help of hand drum. After hydro extracting the rest substance is drained to the equalization tank for further processing.
13. The tested temperature of the equalization tank is approx 42°c. Here blowers are used to maintain the proper circulation of the effluent.

CHAPTER-4
IMPACT OF INTERNSHIP

Chapter-4
Impact of the Internship

It was a tremendous experience that I have availed with devotion and commitment. I have an interest in textile industry that's because Textile is the back bone of the economy of the country.

During my training period, I have also undertaken sort of responsibilities which are really helpful for my future life .I always try to learn best knowledge of the industrial activities especially pretreatment section and different printing process. We saw the starting process to finishing process of a sample.

Industrial training is essential part of a Graduation. Anybody can not perfect without training of his profession. My industrial training was grate helpful for my present and future life; because I learnt the industrial environment, how to maintain the workers, how to make a plan, how you can improve to your knowledge and how you can apply your knowledge at working field. I have also prepared an industrial attachment according to base our industrial training. I think it provide too much assistance for my future life particularly to our working field.

Finally, I tried my best to gather all necessary information but it is true that within this short period it is impossible to achieve 100% success but as I tried to get the best from this industry and once again I would like to thank the authority of "Sim Fabrics Ltd" as well as my honorable teachers of Daffodil International University for their altruistic help and advice. I am fortunate enough that I have got an opportunity to have training in this industry. During the training period I have received enough co-operation and association from the authority and all personnel. I wish the best of "Sim Fabrics Ltd."

CHAPTER-5
CONCLUSION

Conclusion Findings:

Industrial training is an essential part for textile education because it minimizes the gap between theoretical and practical knowledge. Undoubtedly, this industrial training taught us lot about textile technology, production processes, textile machineries, industrial management, and made us comfortable to industrial life. Besides it gave us the first opportunity to work in industry.

Limitations:

- We had a very limited time. In spite of willingness to study in more details it was not possible to do so.
- Some of the points in different chapters are not include as these were not available.
- It is not possible to compose the whole process in such a small frame as this report.