



Daffodil
International
University

“INDUSTRIAL TRAINING REPORT ”

AKH KNITTING & DYEING LTD
92, Phulbaria, Tetuljhora,
Savar, Dhaka, Bangladesh

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ACKNOWLEDGEMENT

All pleasure goes to the Almighty Allah to give us strength and ability to complete our two months long industrial attachment at **AKH Knitting and Dyeing Ltd.** It was a great opportunity for us to complete the industrial attachment with the assistance of persons employed in **AKH Knitting and Dyeing Ltd.**

We feel grateful to our academic supervisor **Sumon Mazumder**, Assistant Professor, Department of Textile Engineering, Daffodil international University as well as to **Md. Zahid Al Hasan**, AGM (Dyeing division), our factory supervisor for his continuously guiding us about the development and preparation this industrial training report. He has enriched us with sharing necessary theoretical and practical ideas and supervised us to complete this report on time.

We also wish to express our gratitude to **Prof Dr. S.M. Mahbub ul Haque Majumder**, Dean,

Faculty of Science and Information Technology, Daffodil international University for his continuous guidance to prepare this report about training. We would like to express our thanks to

Prof. Dr. Md. Mahbub ul Haque, Head, Department of Textile Engineering, Faculty of Science and Information Technology, Daffodil international University for his kind help to finish our industrial attachment report.

We would like to express our sincere gratitude to Managing Director, **Md. Shamsul Alam** to gives us the opportunity to make our industrial attachment at **AKH Knitting and Dyeing Ltd.**

While preparing the report we have taken help from various references so our cordial thanks to them. Finally we hope that the report will help in understanding the knitting, dyeing, printing, finishing, cutting, embroidery, sewing, garments merchandizing, production, quality, banking in apparel industry in a clear and concise way.

Our thanks go to the Supervisors, Technicians, Operators and all other staffs of **AKH Knitting and Dyeing Ltd.**, who were most cordial and helpful to us.

Finally we wish to avail ourselves of this opportunity, express a sense of gratitude and love to our beloved parents and our friends for our beloved parents and our friends for their mental support, strength and help and everything.



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CHAPTER 01

INTRODUCTION



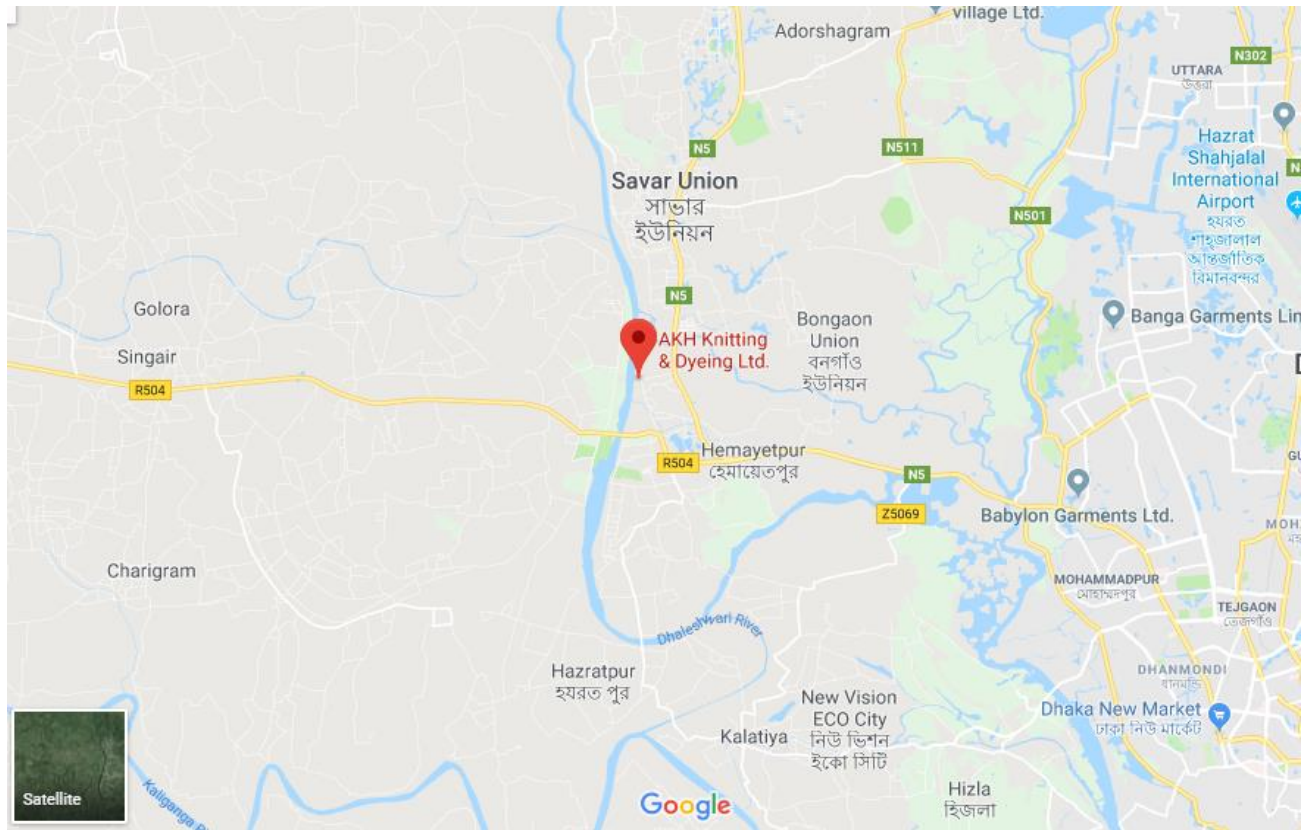
Textile engineering education is based on the industrial ground. The theoretical background is not sufficient so, industrial training is an essential part of the study it makes an engineer technically sound in this field. Industrial training provides us that opportunity to gather practical knowledge. AKH Knitting & Dyeing Ltd. (AKDL) has the capability to offer a complete product range for the export and domestic textile markets. The goal of the textile division is to become the preferred partner for sourcing high-quality fabrics and clothing from Bangladesh. With high advanced technology and an emphasis on developing local human resources, the textile division has the potential to make an important contribution to the nation's growing readymade garments export sector.

In view of our practical knowledge, this opportunity helps us broadening knowledge of textile engineering systems and processes, the opportunity to work with artisans and experience the the environment they work in, a broader knowledge of human relations, exposure to the organization policy and culture, understanding of company structure and hierarchy, contact with other employees in general, contact with other engineering disciplines, introduction to communication procedures used

Chapter 2

General Information about Factory

2.1 Location Map of AKH Knitting and Dyeing Ltd:



2.2 Company Profile:

1. Name of Factory : AKH KNITTING & DYEING LTD.
2. Production Type : A 100% Export Oriented Composite Knit Factory
3. Factory Location : 92, Phulbaria, Tetuljhora, Savar, Dhaka. Bangladesh
4. Telephone Fact. : 00 88 02 7741727-8
5. Fax : 00 88 02 7710788
6. E-mail : hossain@akhfashions.com
alam@akhfashions.com
kashem@akhfashions.com
7. Head Office : 133-134, Hamayetpur, Savar, Dhaka. Bangladesh.
Fax: (880-2) 8155640 – 41.
Phone : 880-2-7744001-8, 880-2-7741830-31.



8. Management : Md. Delwar Hossain – Chairman
Md. Shamsul Alam – Managing Director
Md. Abul Kashem – Dy. Managing Director
Md. Shamim Haque – Director
9. Legal Status : Private Limited Company
Bonded Warehouse No. 106/CUS-SBW/2001
E.R.C No. RA 53894
10. BGMEA Reg. No. : 3890 (AKDL)
11. Bank : Export-Import Bank of Bangladesh
Gulshan Branch, 75, Gulshn Avenue, Dhaka 1212, Bangladesh.
Phone: 9886296, 9862262, 8819711.
Telex: 632125 EXN GL BJ. Fax: 880-2-8818703.
E-mail: eximgul@bttb.net.bd.
Swift # EXBKBDDH 007.
12. Company Established : 2004
13. Annual Turnover : 45.00 Million US \$
14. Factory Type : 100% Export Oriented
- Knitting Fabric
Dyeing & Finishing
Cutting
Printing & Embroidery
Sewing & Readymade Garments
15. Total Land Area : Around – 3.72 Acre (1,62043 sqft./15,054sqm.)
16. Factory Size : 2,45,200 Sft.(22,780 sqm)
17. Manufacturing Area : 2,05,000 Sft.
18. Warehouse Area : 34,000 Sft./3,158 sqm
19. Total No. of workers : 3,888 Persons (Incl. Knitting & Dyeing)
20. No. of male workers : 2,422 Persons
21. No. female workers : 1,466 Persons
22. Estimated Project Value: \$9 Million US Dollar
23. Production Capacity : 16,00,000 Pcs. per month.
24. Main Product : T-Shirt, Polo Shirt, Sweat Shirt, Tank Top, Boxer Shorts,
Jogging Suit, Pajama Sets & Brief (Men's & Ladies) etc.

2.3 Major Consumers of AKH Knitting and Dyeing Ltd. are:

Serial No.	Buyers	Country Name
1.	G.Gueldenpfennig GmbH	Germany
2.	Centerline	Germany
3.	Western Store	Germany
4.	Tchibo	Germany
5.	ALDI	Germany
6.	Gustav Daiber	Germany
7.	Ernsting's Family GmbH	Germany
8.	C&A	Germany
9.	LIDL	Germany
10.	Mackays Store	UK
11.	Gus / Shop Direct	UK
12.	Surgent Major	UK
13.	Sainsbury's	UK
14.	CDF, Kappa, Marcopolo	Spain
15.	B&C	Belgium
16.	Rafa, Wal Mart	USA/ Canada
17.	Target	The USA etc.

2.4 Sister Concerns:

1. Woven Division:

- I. AKH Fashion Ltd(Unit 1&2)
- II. AKH Shirt Ltd (Unit 1,2,&3)
- III. Angshuk Ltd
- IV. AKH Apparel Ltd

2. Knit Division:

- I. AKH Knitting and Dyeing Ltd
- II. AKH Knitwear Ltd
- III. AKH Stitch Art Ltd

3. Accessory Division:

- I. AKH Packaging and Accessories Ltd
- II. AKH Trims Ltd

4. Washing Division:

- I. AKH Washing Ltd

5. C &F Division:

- I. Sabah Ttrade International Ltd

6. Cargo Division:

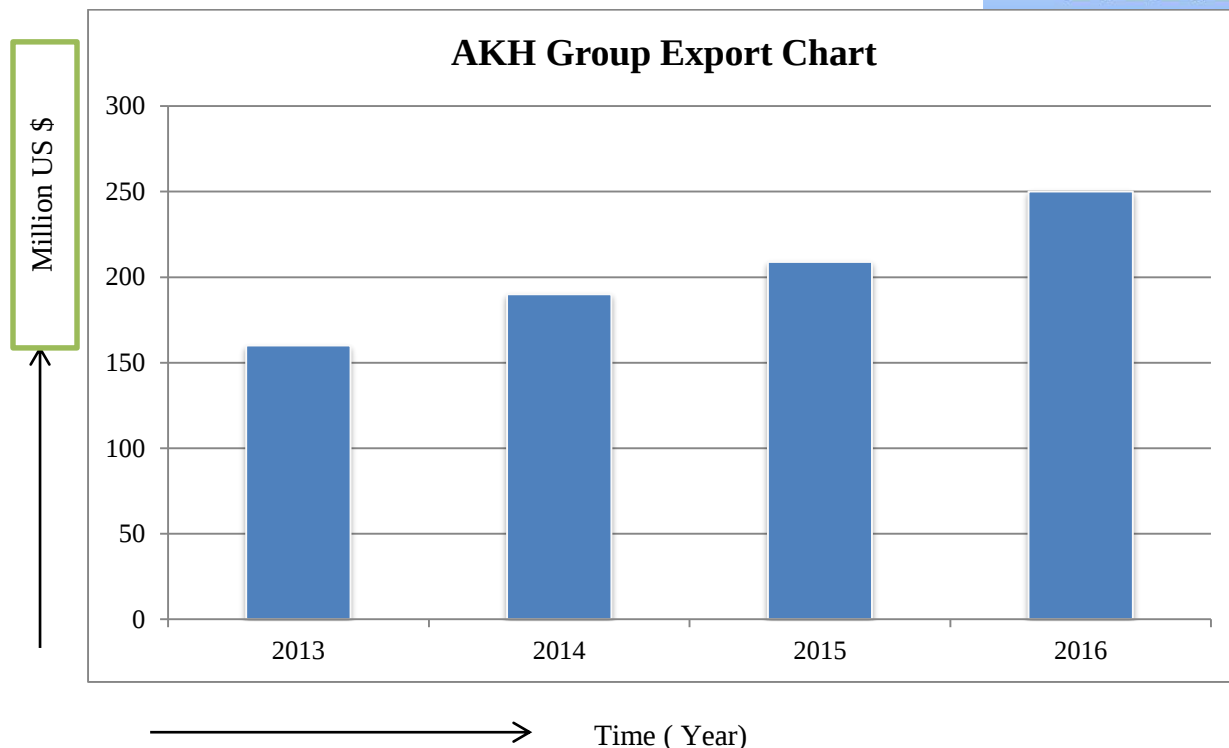
- I. AKH Cargo Service

7. Textiles Division:

- I. AKH Textiles Ind. Ltd(Proposed)

8. Oil Refinery:

- I. AKH Oil Refinery Ltd (Chittagong beside Karnaphuli River)



2.6 Environmental Data (2016) of Akh Knitting and Dyeing Ltd :

Serial No.	Name	Total Amount
1.	GHG Emission (Indirect)	1006.89 Ton CO ₂ e
2.	Waste Water Discharge	549674 m ³
3.	GHG Emission (Direct)	15027.92 Ton CO ₂ e
4.	Solid Waste Generation	2426.69 Ton
5.	Water Consumption	698971 m ³
6.	Diesel Consumption	98131 Liters
7.	Natural Gas Consumption	7825143 m ³
8.	Electricity Consumption (REB)	1750755 KWH
9.	Solar Electricity Consumption	3319 KWH
10.	Total Electricity Consumption	12323.98 MWH

2.7 AKH ECO Apparels:

Location: Dhamrai (by the side of Dhaka-Aricha highway)

Area : 13 Acre

Workers : About 4500

Photos of AKH Eco Apparels:



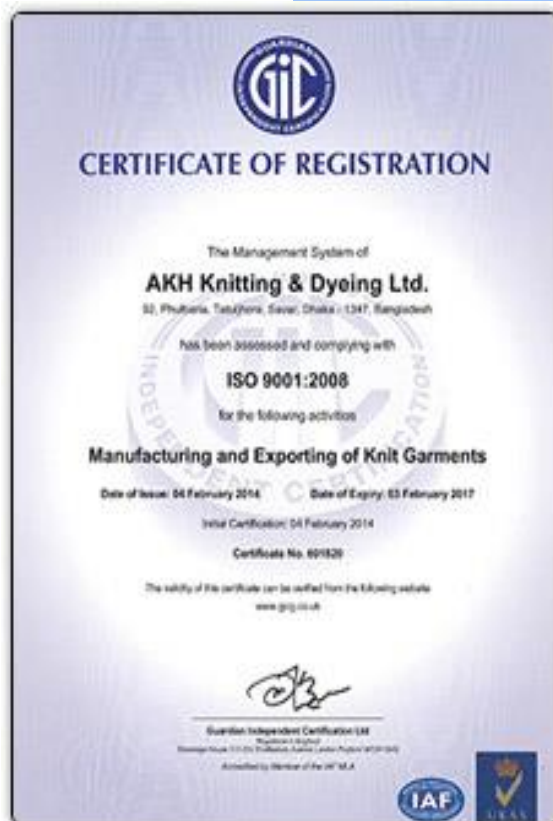


2.8 Different Departments of AKH Knitting and Dyeing Ltd:

- ❖ HR & Administration
- ❖ Operation & Planning
- ❖ Knitting
 - I. Grey Inspection
 - II. Batch Preparation
- ❖ Wet Processing
 - I. Dyeing Section
 - II. Finishing Section
 - III. Quality Assurance
 - IV. R & D
 - V. Laboratory
 - VI. Fabric Inspection
- ❖ Maintenance
- ❖ Utility
 - I. Electrical
 - II. Mechanical
 - III. Compressed Air
 - IV. Water
 - V. Electricity
 - VI. Steam
- ❖ ETP
- ❖ WTP

2.9 Certificate & Achievement of AKH Group: AKH Group always conscious about the environment , workers safety, buyers satisfaction. So they try to their best achieved their goal. Now AKH Group is very reputation and first-grade industry in Bangladesh and achieved so much national and international certificates. Some of them are-







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CEO & FOUNDING CHAIRMAN
S. Richard Fedrizzi

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Margo Anderson
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CHAIR ELECT
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Arup

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TREASURER
Stuart Corron
Energize Re, LLC

SECRETARY
Lisa Fay Matthiesen
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David Gottfried
Michael Italiano
S. Richard Fedrizzi

12/07/2015

Abul Kashem
Deputy Managing Director
AKH Group
AKH Tower, 133-134, Hemayetpur, Savar
Dhaka, 1304
Bangladesh

Greetings,

On behalf of the U.S. Green Building Council, I congratulate you on achieving LEED certification for AKH ECO APPARELS LIMITED. Your project has achieved LEED gold certification under the LEED for New Construction Rating System with a total of 66 points.

LEED certification identifies AKH ECO APPARELS LIMITED as a showcase example of sustainable design and demonstrates your leadership in transforming the building industry. In honor of this impressive achievement and in appreciation of your participation in LEED, we are pleased to present you with the enclosed certificates recognizing your accomplishment.

Now that your project has achieved LEED certification, we encourage you to share your project with the green building community. Please follow the prompt in LEED Online to make it a "public" project. Public projects appear in our LEED project directory, in our Green building Information Gateway (GBIG), and you will have the ability to share your story by creating a LEED project profile to post to USGBC.org.

Congratulations on earning LEED certification, and thank you for your commitment to our common goal of building a healthy, sustainable future.

Sincerely,

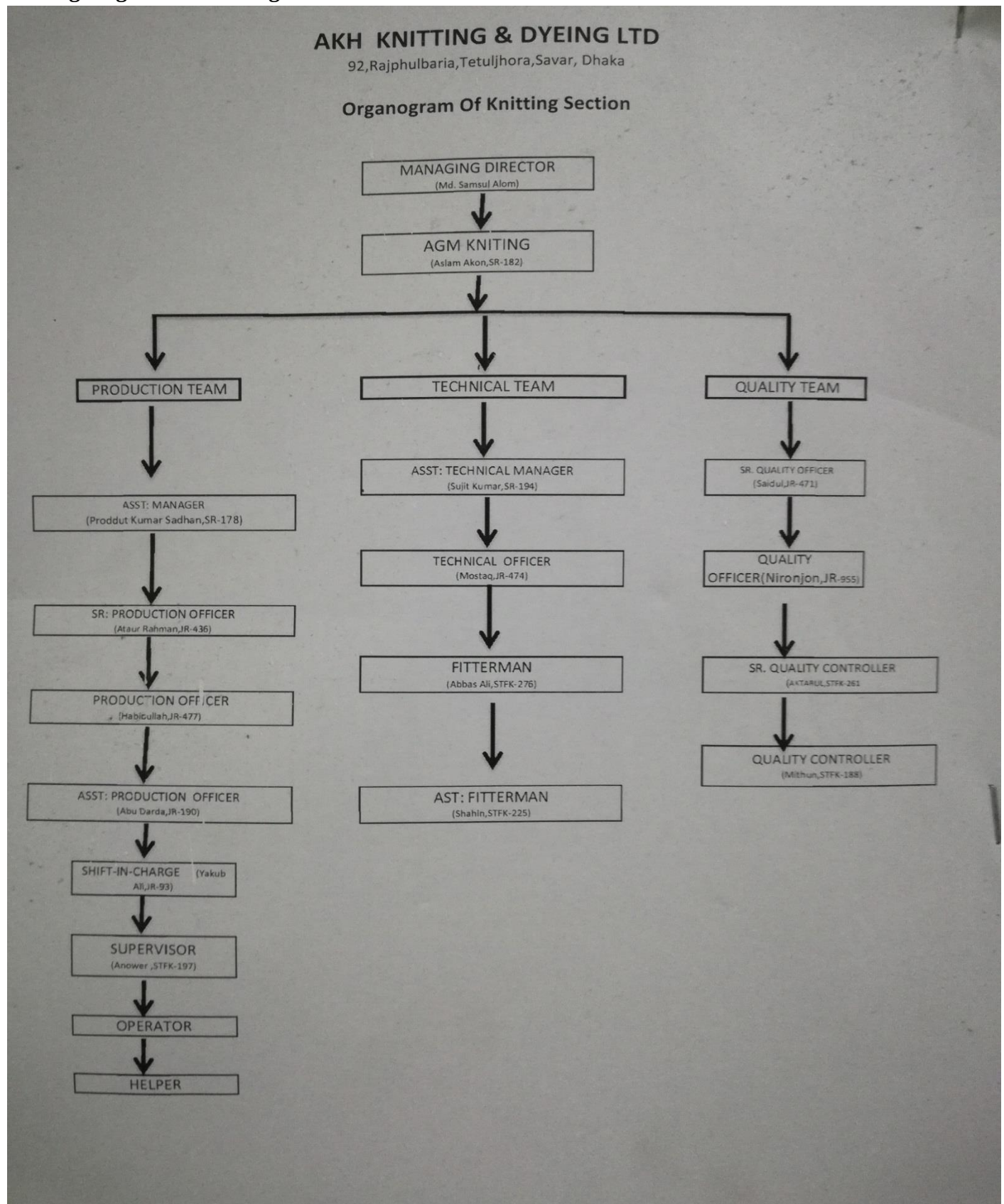


S. Richard Fedrizzi
CEO & Founding Chairman
U.S. Green Building Council

CHAPTER 03

KNITTING SECTION

3.1 Organogram of Knitting Division:



3.2 Introduction: The word knitting comes from “Knot or to Knot” .Knitting is a technique for producing a two-dimensional fabric made from a one-dimensional thread or yarn. In knitting, fabrics are made by forming loops with the help of the needle. The knitted fabrics can stretch up to 500%. There are mainly two types of knitting are- Warp knitting and Weft knitting. After weaving knitting is the most popular process to produce fabrics from thread or yarn.

3.3 Raw Material for Knitting: The main raw materials for knitting is yarn. During producing knitted fabric different types of yarn composition, yarn count is used in AKH Knitting and Dyeing Ltd. During the time of my internship, I had a great opportunity to know and gather knowledge about different yarns, yarn count, fabric GSM, fabric design etc which are produced in AKH Knitting and Dyeing Ltd.

3.4 Yarn counts used in AKH knitting and dying are:

- 28s
- 26s
- 32s
- 40s
- 40s (combed)
- 28s (combed)
- 24s (combed)
- 20s
- 24s
- 30s
- 34s (combed)
- 36s
- 20D
- 40D etc.

3.5 Fiber percentage of yarn which are used in AKH knitting and dyeing Ltd :

- 80%cotton + 20% polyester
- 77%organic cotton +18% polyester +4% Elastane
- 50%polyester + 38%cotton +12% viscose
- 100% Cotton
- 60% cotton +40% polyester
- 60%cotton +40% viscose
- 100% cotton melange
- 50%cotton +50% polyester
- 100%Viscose

- 50%viscose +50% cotton
- 50%cotton +50%modal(rayon)
- 100%modal(Rayon)
- 50%viscose +50% polyester
- 95%viscose +5% Elastane
- 50% organic cotton + 50% Lenzing viscose
- 100% BCI cotton
- 95% organic cotton +5% Elastane
- 50% organic cotton +50% polyester
- 100% BCI cotton slub
- 51% organic cotton +44% polyester+5% Elastane
- 40D Elastane +100% spandex etc.

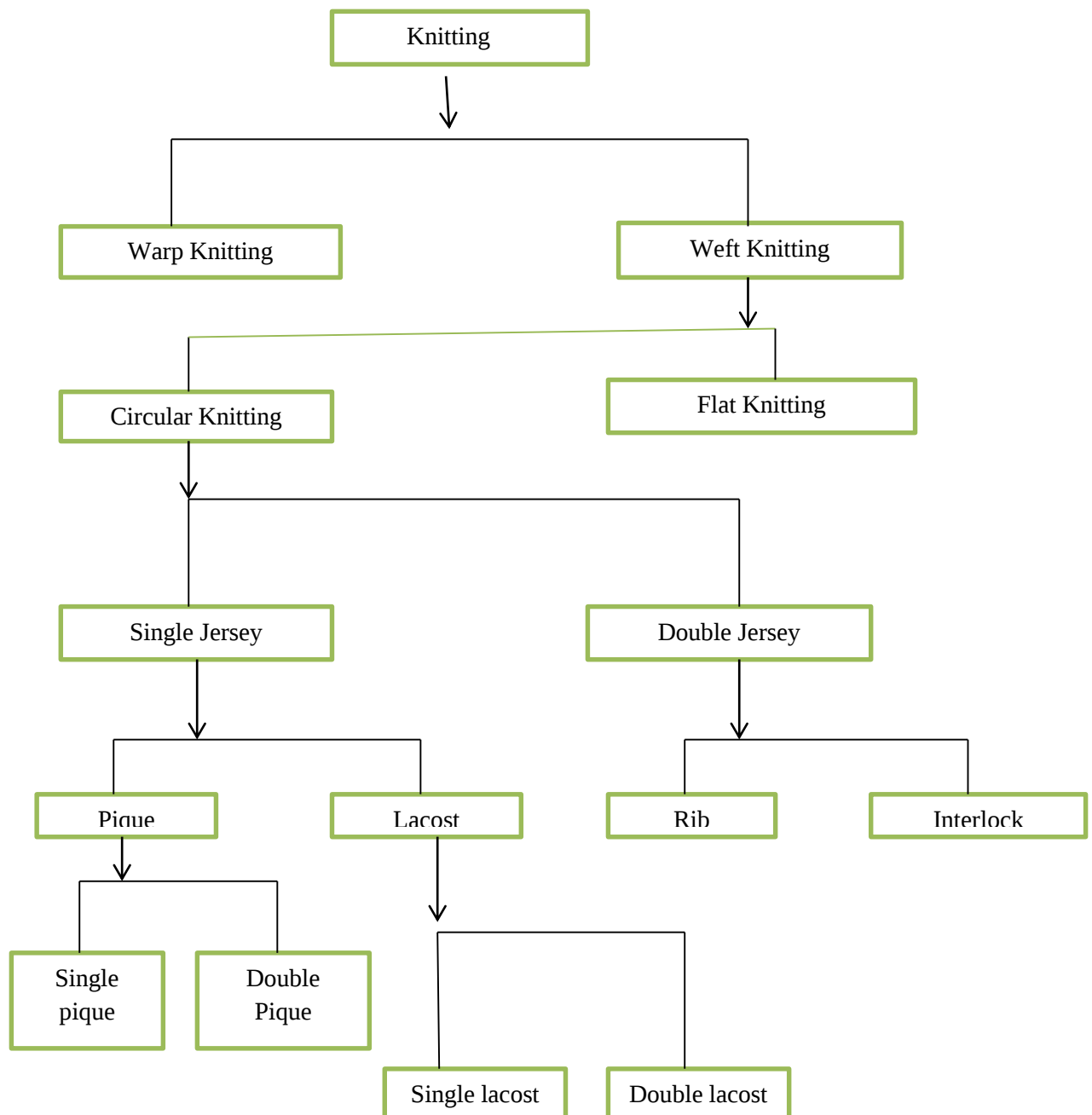
3.6 The required yarns are supplied by:

- Prime Spinning Mill
- Rk Spinning Mill
- Jk Spinning Mill
- Akij Spinning Mill
- Pahartoli Spinning Mill
- Youth Spinning Mill

3.7 Special yarns are from

- Bardhaman
- Sudan
- Korea
- Singapore &
- India

3.8 Classification of knitting :



3.9 Knitting Machine specification which are used in AKH knitting and dyeing Ltd:

3.9.1 Specification circular knitting:

Machine No: 01 M/c Type : Lycra single jersey Brand Name: SANTONI Made in : China Model No : Altas Hs Open 220 Diameter : 30 inch Feeder : 88 F Gauge : 28 G M/c serial No: A000121 Needles : 2640 R.P.M. : 22 m/min	Machine No: 03 M/c Type : Lycra single jersey Brand Name: SANTONI Made in : China Model No : Altas Hs Open 245 Diameter : 34 inch Feeder : 100 F Gauge : 28 G M/c serial No: A000124 Needles : 2976 R.P.M. : 25 m/min
Machine No: 02 M/c Type : Lycra single jersey Brand Name: SANTONI Made in : China Model No : Altas Hs Open 245 Diameter : 34 inch Feeder : 100 F Gauge : 28 G M/c serial No: A000123 Needles : 2976 R.P.M. : 25 m/min	Machine No: 04 M/c Type : Lycra single jersey Brand Name: SANTONI Made in : China Model No : Altas Hs Open 245 Diameter : 34 inch Feeder : 100 F Gauge : 28 G M/c serial No: A000019 Needles : 2976 R.P.M. : 25 m/min

Machine No: 05

M/c Type : Lycra Single jersey
 Brand Name: SANTONI
 Made in : China
 Model No : Altas Hs Open 220
 Diameter : 32 inch
 Feeder : 94 F
 Gauge : 28 G
 M/c serial No: A000122
 Needles : 2808
 R.P.M. : 25 m/min

Machine No: 06

M/c Type : Single jersey
 Brand Name: SANTONI
 Made in : China
 Model No : Altas Hs Open 220
 Diameter : 30 inch
 Feeder : 88 F
 Gauge : 28 G
 M/c serial No: A000120
 Needles : 2640
 R.P.M. : 25 m/min

Machine No: 07

M/c Type : Single jersey
 Brand Name: Mayer & Cie
 Made in : Germany
 Model No : S4-3.2 ii
 Diameter : 32 inch
 Feeder : 102 F
 Gauge : 28 G
 M/c serial No: 70299
 Needles : 2808
 R.P.M. : 25 m/min

Machine No: 08

M/c Type : Single jersey
 Brand Name: Mayer & Cie
 Made in : Germany
 Model No : S4-3.2 ii
 Diameter : 32 inch
 Feeder : 102 F
 Gauge : 28 G
 M/c serial No: 70298
 Needles : 2808
 R.P.M. : 25 m/min

Machine No: 09

M/c Type : Single jersey

Brand Name: SANTONI

Made in : China

Model No : Atlas Hs Open 220

Diameter : 30 inch

Feeder : 88 F

Gauge : 28 G

M/c serial No: A000018

Needles : 2640

R.P.M. : 21 m/min

Machine No: 10

M/c Type : Single jersey(closed width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 4.0

Diameter : 26 inch

Feeder : 105 F

Gauge : 24 G

M/c serial No: 65707

Needles : 1944

R.P.M. : 25 m/min

Machine No: 11

M/c Type : Single jersey

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 4.0

Diameter : 30 inch

Feeder : 120 F

Gauge : 24 G

M/c serial No: 65708

Needles : 2268

R.P.M. : 25 m/min

Machine No: 12

M/c Type : Single jersey

Brand Name: Mayer & Cie

Made in : Germany

Model No : S4-3.2 ii

Diameter : 30 inch

Feeder : 96 F

Gauge : 24 G

M/c serial No: 70297

Needles : 2640

R.P.M. : 25 m/min

Machine No: 13

M/c Type : Single jersey(open width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : S4-3.2 ii

Diameter : 30 inch

Feeder : 96 F

Gauge : 28 G

M/c serial No: 70296

Needles : 2640

R.P.M. : 27 m/min

Machine No: 14

M/c Type : single jersey

Brand Name: Mayer & Cie

Made in : Germany

Model No : S4-3.2 ii

Diameter : 38 inch

Feeder : 108 F

Gauge : 28 G

M/c serial No: 70300

Needles : 2988

R.P.M. : 25 m/min

Machine No: 15

M/c Type : single jersey

Brand Name: Zentex

Made in : Singapore

Model No : Altas Hs Open 220

Diameter : 24 inch

Feeder : 72 F

Gauge : 24 G

M/c serial No: 2834

Needles : 1811

R.P.M. : 25 m/min

Machine No: 16

M/c Type : single jersey

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 4.0

Diameter : 34 inch

Feeder : 135 F

Gauge : 24 G

M/c serial No: 66270

Needles : 2544

R.P.M. : 30 m/min

Machine No: 17

M/c Type : Single jersey(open width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 4.0

Diameter : 36 inch

Feeder : 144 F

Gauge : 24 G

M/c serial No: 65709

Needles : 2712

R.P.M. : 18 m/min

Machine No: 18

M/c Type : Single jersey(open width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : S4-3.2 ii

Diameter : 34 inch

Feeder : 108 F

Gauge : 28 G

M/c serial No: 66269

Needles : 2544

R.P.M. : 20 m/min

Machine No: 19

M/c Type : Double jersey(Interlock)

Brand Name:Mayer & Cie

Made in : Germany

Model No : D4-3.2

Diameter : 36 inch

Feeder : 114 F

Gauge : 24 G

M/c serial No: 64437

Needles : 2712

R.P.M. : 20 m/min

Machine No: 20

M/c Type : Double jersey (Interlock)

Brand Name: Mayer & Cie

Made in : Germany

Model No : D4-3.2

Diameter : 36 inch

Feeder : 114 F

Gauge : 24 G

M/c serial No: 64436

Needles : 3168

R.P.M. : 20 m/min

Machine No: 21

M/c Type : Double jersey(Rib)

Brand Name: Polo Orizio

Made in : Italia

Model No : Cmoal

Diameter : 30 inch

Feeder : 60 F

Gauge : 18 G

M/c serial No: 1027439

Needles : 1680

R.P.M. : 16 m/min

Machine No: 22

M/c Type : Single jersey(Open width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 3.2 ii

Diameter : 30 inch

Feeder : 96 F

Gauge : 24 G

M/c serial No: 65250

Needles : 2268

R.P.M. : 20 m/min

Machine No: 23

M/c Type : Single jersey(Open width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 3.2 ii

Diameter : 32 inch

Feeder : 102 F

Gauge : 28 G

M/c serial No: 65251

Needles : 2400

R.P.M. : 20 m/min

Machine No: 24

M/c Type : Single jersey(Open width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 3.2 ii

Diameter : 34 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No: 65252

Needles : 2544

R.P.M. : 20 m/min

Machine No: 25

M/c Type : Single jersey(Open width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 3.2 ii

Diameter : 34 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No: 65253

Needles :2544

R.P.M. : 20 m/min

Machine No: 26

M/c Type : Single jersey(Open Width)

Brand Name: Mayer & Cie

Made in : Germany

Model No : Relanit 3.2 ii

Diameter : 36 inch

Feeder : 114 F

Gauge : 24 G

M/c serial No: 65254

Needles : 2712

R.P.M. : 20 m/min

Machine No: 27

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 34 inch

Feeder : 102 F

Gauge : 24 G

Needles : 2568

R.P.M. : 20 m/min

Finished dia :74 inch

Machine No: 28

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 34 inch

Feeder : 102 F

Gauge : 24 G

Needles : 2568

R.P.M. : 20 m/min

Finished dia :70 inch

Machine No: 29

M/c Type : Single jersey slub

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

Needles :2544

R.P.M. : 18 m/min

Finished dia :73 inch(open)

Machine No: 30

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

Needles : 2712

R.P.M. : 22 m/min

Finished dia :72inch (open)

Machine No: 31

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 44 inch

Feeder : 132 F

Gauge : 24 G

Needles :3312

R.P.M. : 15 m/min

Finished dia :82inch(open)

Machine No: 32

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 44 inch

Feeder : 132 F

Gauge : 24 G

M/c serial No: TY07092722

Needles : 3312

R.P.M. : 22 m/min

Machine No: 33

M/c Type : Double jersey(Rib)
 Brand Name: Ta Yu
 Made in : China
 Model No : Ty-D21
 Diameter : 38 inch
 Feeder : 80 F
 Gauge : 18 G
 M/c serial No: 1504-2
 Needles :2160
 R.P.M. : 15 m/min

Machine No: 34

M/c Type : Double jersey(Rib)
 Brand Name: Ta Yu
 Made in : China
 Model No : Ty-D21
 Diameter : 44 inch
 Feeder : 92 F
 Gauge : 18 G
 M/c serial No: 1504-1
 Needles : 2472
 R.P.M. : 15 m/min

Machine No: 35

M/c Type : Double jersey(Interlock)
 Brand Name: Ta Yu
 Made in : Taiwan
 Diameter : 42 inch
 Feeder : 88 F
 Gauge : 24 G
 Needles :3165
 R.P.M. : 15 m/min
 Finished dia :92inch

Machine No: 36

M/c Type : Double jersey(Rib)
 Brand Name: Ta Yu
 Made in : Taiwan
 Diameter : 42 inch
 Feeder : 88 F
 Gauge : 18 G
 Needles : 2374
 R.P.M. : 13 m/min
 Finished dia ; 39inch

Machine No: 37

M/c Type : Single jersey(pique)

Brand Name: Zentex

Made in : Singapore

Model No : ZN3XSJ

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No: 2932

Needles :2712

R.P.M. : 19 m/min

Machine No: 38

M/c Type : Single jersey(Lycra)

Brand Name: Zentex

Made in : Singapore

Model No : ZN3XSJ

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No: 2933

Needles : 2712

R.P.M. : 20 m/min

Machine No: 39

M/c Type : Double jersey(Rib)

Brand Name: Santoni

Made in : China

Model No : VIGNONI ORION-SV

Diameter : 40 inch

Feeder : 80 F

Gauge : 18 G

M/c serial No: 2470

Needles :2256

R.P.M. : 13 m/min

Machine No: 40

M/c Type : Double jersey(Rib)

Brand Name: Santoni

Made in : China

Model No : VIGNONI ORION -SV

Diameter : 40 inch

Feeder : 80 F

Gauge : 18 G

M/c serial No: 2472

Needles : 2256

R.P.M. : 14 m/min

Machine No: 41

M/c Type : Double jersey(Interlock)

Brand Name: Santoni

Made in : China

Model : VIGNONI ORION -SV

Diameter : 36 inch

Feeder : 72 F

Gauge : 18 G

M/c serial No: 2468

Needles : 2016

R.P.M. : 11 m/min

Machine No: 42

M/c Type : Double jersey(Interlock)

Brand Name: Santoni

Made in : China

Model No : VIGNONI ORION -SV

Diameter : 36 inch

Feeder : 72 F

Gauge : 18 G

M/c serial No: 2467

Needles : 2016

R.P.M. : 13 m/min

Machine No: 43

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 44 inch

Feeder : 132 F

Gauge : 24 G

Needles : 2760

R.P.M. : 19 m/min

Finished dia : 84 inch

Machine No: 44

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model No : TY-S30

Diameter : 30 inch

Feeder : 90 F

Gauge : 24 G

M/c serial No: 15A4-7

Needles : 2256

R.P.M. : 20 m/min

Machine No: 45

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model : TY-S30

Diameter : 30 inch

Feeder : 90 F

Gauge : 24 G

M/c serial No: 15A4-6

Needles :2256

R.P.M. : 22 m/min

Machine No: 46

M/c Type : Double jersey(Rib)

Brand Name: Ta Yu

Made in : Taiwan

Diameter : 40 inch

Feeder : 85 F

Gauge : 18 G

M/c serial No: 2256

Needles : 2016

R.P.M. : 14 m/min

Finished dia :22inch(Tube)

Machine No: 47

M/c Type : Double jersey(Rib)

Brand Name: Ta Yu

Made in : Taiwan

Model : TY-D21

Diameter : 40 inch

Feeder : 85 F

Gauge : 18 G

M/c serial No: 903-7

Needles :2256

R.P.M. : 15 m/min

Machine No: 48

M/c Type : Double jersey(Lycra Rib)

Brand Name: Santoni

Made in : China

Model No : VIGNONI ORION -SV

Diameter : 38 inch

Feeder : 76 F

Gauge : 18 G

M/c serial No: 2136

Needles : 2016

R.P.M. : 13 m/min

Machine No: 49

M/c Type : Double jersey(Rib)

Brand Name: KING HWA

Made in : Taiwan

Model : KHD 42

Diameter : 42 inch

Feeder : 84 F

Gauge : 24 G

M/c serial No: BH001

Needles :3165

R.P.M. : 12 m/min

Machine No: 50

M/c Type : Double jersey(Rib)

Brand Name: Ta Yu

Made in : China

Model No : TY-D21

Diameter : 42 inch

Feeder : 89 F

Gauge : 18 G

M/c serial No: 903-9

Needles : 2374

R.P.M. : 14 m/min

Machine No: 51

M/c Type : Double jersey(Rib)

Brand Name: Ta Yu

Made in : China

Model : TY-D21

Diameter : 44 inch

Feeder : 93 F

Gauge : 18 G

M/c serial No: 903-6

Needles :2374

R.P.M. : 14 m/min

Machine No: 52

M/c Type : Double jersey(Rib)

Brand Name: Ta Yu

Made in : China

Model No : TY-D21

Diameter : 44 inch

Feeder : 93 F

Gauge : 18 G

M/c serial No: 903-8

Needles : 2487

R.P.M. : 15 m/min

Machine No: 53

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model : TY-S30

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No: 14A4-1

Needles : 2712

R.P.M. : 20 m/min

Machine No: 54

M/c Type : Single jersey(Auto Stripe)

Brand Name: Mayer & Cie

Made in : Germany

Model : S4-3.2R

Diameter : 30 inch

Feeder : 94 F

Gauge : 24 G

M/c serial No: 65445

Needles : 2268

R.P.M. : 13 m/min

Machine No: 55

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model : TY-S30-OW122

Diameter : 36 inch

Feeder : 108 F

Gauge : 28 G

M/c serial No: 15A3-9

Needles : 3168

R.P.M. : 20 m/min

Machine No: 56

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model No : TY-S30-OW122

Diameter : 36 inch

Feeder : 108 F

Gauge : 28 G

M/c serial No: 15A3-8

Needles : 3168

R.P.M. : 20 m/min

Machine No: 57

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model : TY-S30-OW122

Diameter : 36 inch

Feeder : 108 F

Gauge : 28 G

M/c serial No: 15A3-10

Needles :3168

R.P.M. : 20 m/min

Machine No: 58

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model : TY-S30

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No:15A4-2

Needles : 2712

R.P.M. :20 m/min

Machine No: 59

M/c Type : Single jersey(Lycra)

Brand Name: Ta Yu

Made in : China

Model : TY-S30

Diameter : 34 inch

Feeder : 102 F

Gauge : 24 G

M/c serial No: 15A4-4

Needles :2568

R.P.M. : 20 m/min

Machine No: 60

M/c Type : Single jersey

Brand Name: Ta Yu

Made in : China

Model No : TY-S30

Diameter : 34 inch

Feeder : 102 F

Gauge : 24 G

M/c serial No: 15A4-5

Needles : 2568

R.P.M. : 20 m/min

Machine No: 61

M/c Type : Double jersey(Lycra Rib)

Brand Name: Santoni

Made in : China

Model : ORION TUBULAR

Diameter : 40 inch

Feeder : 80 F

Gauge : 28 G

M/c serial No: R000030

Needles :2256

R.P.M. : 15 m/min

Machine No: 62

M/c Type : Double jersey(Lycra Rib)

Brand Name: Santoni

Made in : China

Model No : ORION TUBULAR

Diameter : 34 inch

Feeder : 68 F

Gauge : 18 G

M/c serial No: R000028

Needles : 1920

R.P.M. : 15 m/min

Machine No: 63

M/c Type : Single jersey

Brand Name: ZENTEX

Made in : Singapore

Model : ZN3XSJ

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No: 2837

Needles :2712

R.P.M. : 19 m/min

Machine No: 64

M/c Type : Double jersey(Lycra Rib)

Brand Name: Santoni

Made in : China

Model No : ORION TUBULAR

Diameter : 34 inch

Feeder : 68 F

Gauge : 18 G

M/c serial No: R000027

Needles : 1922

R.P.M. : 14 m/min

Machine No: 65

M/c Type : Single jersey

Brand Name: Zentex

Made in : Singapore

Diameter : 30 inch

Feeder : 90 F

Gauge : 24 G

Needles : 2256

R.P.M. : 18 m/min

Finished dia : 58inch

Machine No: 66

M/c Type : Single jersey

Brand Name: Polo Origio

Made in : Italia

Model No : JOHN/C

Diameter : 30 inch

Feeder : 90 F

Gauge : 24 G

M/c serial No: 1026892

Needles : 2260

R.P.M. : 22 m/min

Machine No: 67

M/c Type : Double jersey(Lycra Rib)

Brand Name: Ta Yu

Made in : China

Model : CMOAL

Diameter : 36 inch

Feeder : 72 F

Gauge : 18 G

M/c serial No: 1028506

Needles : 1920

R.P.M. : 13 m/min

Machine No: 68

M/c Type : Double jersey(Lycra Rib)

Brand Name: Polo Origio

Made in : Italia

Model No : COMAL

Diameter : 36 inch

Feeder : 72 F

Gauge : 18 G

M/c serial No: 1028426

Needles : 1920

R.P.M. : 16 m/min

Machine No: 69

M/c Type : Lycra jersey(Lycra)

Brand Name: Polo Origio

Made in : Italia

Model : JOHN/C

Diameter : 30 inch

Feeder : 90 F

Gauge : 24 G

M/c serial No: 1026908

Needles :2260

R.P.M. : 18 m/min

Machine No: 70

M/c Type : Single jersey(Slub)

Brand Name: Zentex

Made in : Singapore

Model No : ZN3XSJ

Diameter : 30 inch

Feeder : 90 F

Gauge : 24 G

M/c serial No: 2931

Needles : 2260

R.P.M. : 20 m/min

Machine No: 71

M/c Type : Single jersey

Brand Name: Zentex

Made in : Singapore

Model : ZN3XSJ

Diameter : 36 inch

Feeder : 108 F

Gauge : 24 G

M/c serial No: 2836

Needles :2712

R.P.M. : 20 m/min

Machine No: 72

M/c Type : Single jersey

Brand Name: Zentex

Made in : Singapore

Model No : ZN3XSJ

Diameter : 26 inch

Feeder : 78 F

Gauge : 24 G

M/c serial No: 2835

Needles : 1960

R.P.M. : 18 m/min

Machine No: 73

M/c Type : Double jersey(Rib)

Brand Name: Santoni

Made in : China

Model : Orion Tubular

Diameter : 38 inch

Feeder : 76 F

Gauge : 18 G

M/c serial No: R000029

Needles :2136

R.P.M. : 17 m/min

Machine No: 74

M/c Type : Single jersey

Brand Name: Santoni

Made in : China

Model : Zenit HS Open

Diameter : 38 inch

Feeder : 114 F

Gauge : 28 G

M/c serial No: Z001395

Needles : 3312

R.P.M. : 26 m/min

Machine No: 75

M/c Type : Single jersey

Brand Name: Santoni

Made in : China

Model : Zenit HS Open

Diameter : 38 inch

Feeder : 114 F

Gauge : 28 G

M/c serial No: Z001394

Needles :3312

R.P.M. : 26 m/min

Machine No: 76

M/c Type : Single jersey

Brand Name: Fukuhara

Made in : Japan

Model No : MXC-S32RE

Diameter : 34 inch

Feeder : 110 F

Gauge : 24 G

M/c serial No: 1714088

Needles : 2591

R.P.M. : 18 m/min

Machine No: 77

M/c Type : Double jersey(AUTO STRIPE)

Brand Name: FUKUHARA

Made in : Japan

Model : M-FY6

Diameter : 36 inch

Feeder : 50 F

Gauge : 18 G

M/c serial No: 1727747

Needles :2035

R.P.M. : 15 m/min

Machine No: 78

M/c Type : Single jersey(AUTO STRIPE)

Brand Name: FUKUHARA

Made in : Japan

Model No : MX-DFFY6

Diameter : 34 inch

Feeder : 54 F

Gauge : 20 G

M/c serial No: 1714045

Needles : 2035

R.P.M. : 12 m/min

Machine No: 79

M/c Type : Single jersey(AUTO STRIPE)

Brand Name: FUKUHARA

Made in : Japan

Model : MX-DFFY6

Diameter : 34 inch

Feeder : 54 F

Gauge : 20 G

M/c serial No: 1714046

Needles :2035

R.P.M. : 13 m/min

Machine No: 80

M/c Type : Single jersey(AUTO STRIPE)

Brand Name: FUKUHARA

Made in : Japan

Model No : MX-DFFY6

Diameter : 30 inch

Feeder : 48 F

Gauge : 20 G

M/c serial No: 2835

Needles : 1884

R.P.M. : 13 m/min

3.9.2 Flat knitting machine: The machines which produces cuffs and collars and are in flat form in shape is called flat knitting machines.

Flat knitting machines are 3 types:

- Plain
- Semi jacquard
- Jacquard

3.9.3 Specification of flat knitting machines of AKH Knitting and Dyeing Ltd. are:

Machine No: 01 M/c Type : Cuff and Collar Brand Name : MATSUYA Made in : China, Japan Model : MC-172SJ Cylinder length : 68 inch Feeder : 6 F Gauge : 14 G M/c serial No : MC0777 Needles : 1904 R.P.M. : 4-5 m/min	Machine No: 02 M/c Type : Cuff and Collar Brand Name : MATSUYA Made in : China, Japan Model : MC-172SJ Cylinder length : 68 inch Feeder : 6 F Gauge : 14 G M/c serial No : MC0779 Needles : 1904 R.P.M. : 4-5 m/min
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Machine No: 03

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : China, Japan
 Model : MC-172SJ
 Cylinder length : 68 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : MC0778
 Needles : 1904
 R.P.M. : 4-5 m/min

Machine No: 04

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : China, Japan
 Model : MC-172SJ
 Cylinder length : 68 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : MC0780
 Needles : 1904
 R.P.M. : 4-5 m/min

Machine No: 05

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : Japan
 Model : M-100
 Cylinder length : 40 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : 8068
 Needles : 1120
 R.P.M. : 4-5 m/min

Machine No: 06

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : Japan
 Model : M-100
 Cylinder length : 40 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : 8071
 Needles : 1120
 R.P.M. : 4-5 m/min

Machine No: 07

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : Japan
 Model : M-100
 Cylinder length : 40 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : 8066
 Needles : 1120
 R.P.M. : 4-5 m/min

Machine No: 08

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : Japan
 Model : M-100
 Cylinder length : 40 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : 8069
 Needles : 1120
 R.P.M. : 4-5 m/min

Machine No: 09

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : Japan
 Model : M-100
 Cylinder length : 40 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : 8072
 Needles : 1120
 R.P.M. : 4-5 m/min

Machine No: 10

M/c Type : Cuff and Collar
 Brand Name : MATSUYA
 Made in : Japan
 Model : M-100
 Cylinder length : 40 inch
 Feeder : 6 F
 Gauge : 14 G
 M/c serial No : 8070
 Needles : 1120
 R.P.M. : 4-5 m/min

Machine No: 11

M/c Type : Cuff and Collar
Brand Name : MATSUYA
Made in : Japan
Model : M-100
Cylinder length : 40 inch
Feeder : 6 F
Gauge : 14 G
M/c serial No : 8065
Needles : 1120
R.P.M. : 4-5 m/min

Machine No: 12

M/c Type : Cuff and Collar
Brand Name : MATSUYA
Made in : Japan
Model : M-100
Cylinder length : 40 inch
Feeder : 6 F
Gauge : 14 G
M/c serial No : 8067
Needles : 1120
R.P.M. : 4-5 m/min

Machine No: 13

M/c Type : Cuff and Collar
Brand Name : JY-LEN
Made in : TAIWAN
Model : JL-303
Cylinder length : 52 inch
Feeder : 6 F
Gauge : 14 G
Needles : 1456
R.P.M. : 4-5 m/min

Machine No: 14

M/c Type : Cuff and Collar
Brand Name : JY-LEN
Made in : TAIWAN
Model : JL-303
Cylinder length : 52 inch
Feeder : 6 F
Gauge : 14 G
Needles : 1456
R.P.M. : 4-5 m/min

Machine No: 15

M/c Type : Cuff and Collar

Brand Name : JY-LEN

Made in : TAIWAN

Model : JL-303

Cylinder length : 52 inch

Feeder : 6 F

Gauge : 14 G

Needles : 1456

R.P.M. : 4-5 m/min

Machine No: 16

M/c Type : Cuff and Collar

Brand Name : JY-LEN

Made in : TAIWAN

Model : JL-303

Cylinder length : 52 inch

Feeder : 6 F

Gauge : 14 G

Needles : 1456

R.P.M. : 4-5 m/min

Machine No: 17

M/c Type : Cuff and Collar

Brand Name : MATSUYA

Made in : China

Model : M-172SJ

Cylinder length : 68 inch

Feeder : 12 F

Gauge : 14 G

M/c serial No : DTS0695

Needles : 1904

R.P.M. : 5-6 m/min

Machine No: 18

M/c Type : Cuff and Collar

Brand Name : MATSUYA

Made in : China

Model : M-172SJ

Cylinder length : 68 inch

Feeder : 12 F

Gauge : 14 G

M/c serial No : DTS0692

Needles : 1904

R.P.M. : 5-6 m/min

Machine No: 19

M/c Type : Cuff and Collar
Brand Name : MATSUYA
Made in : China
Model : M-172SJ
Cylinder length : 68 inch
Feeder : 12 F
Gauge : 14 G
M/c serial No : DTS0690
Needles : 1904
R.P.M. : 5-6 m/min

Machine No: 20

M/c Type : Cuff and Collar
Brand Name : MATSUYA
Made in : China
Model : M-172SJ
Cylinder length : 68 inch
Feeder : 12 F
Gauge : 14 G
M/c serial No : DTS0694
Needles : 1904
R.P.M. : 5-6 m/min

Machine No: 21

M/c Type : Cuff and Collar
Brand Name : MATSUYA
Made in : China
Model : M-172SJ
Cylinder length : 68 inch
Feeder : 12 F
Gauge : 14 G
M/c serial No : DTS0693
Needles : 1904
R.P.M. : 5-6 m/min

Machine No: 22

M/c Type : Cuff and Collar
Brand Name : MATSUYA
Made in : China
Model : M-172SJ
Cylinder length : 68 inch
Feeder : 12 F
Gauge : 14 G
M/c serial No : DTS0696
Needles : 1904
R.P.M. : 5-6 m/min

Machine Study:



Picture: Single Jersey circular knitting machine

3.10 Main Parts of knitting machine are :

- Yarn feeder guide
- Needle retaining spring
- Needle
- Cam box
- Sinker
- Cam plate
- Cam
- Inventor
- Cylinder
- Belt
- VDQ pulley
- Pattern wheel
- Sinker cam cap
- Sinker trick ring
- Dial etc.

3.11 Knitting Machine Operation procedure:

- Production testing runs process:
 - Analysis of the sample (design, m/c gauge, GSM, weight etc)
 - Collect the information against required weight & width.
 - Check the shade.
 - Adjust the parameter if required based on the sample.
 - Get the production confirmation.
 - Start bulk production.

- Bulk production process:
 - Clean the m/c
 - Setup required a count of yarn in the creel.
 - Make not with old yarn
 - Check air pressure m/c condition and adjust the pc controller.
 - Keep the door closed
 - Switch on power.
 - Run the machine by the hard drive for a while.
 - If the machine is not running smoothly adjust the machine as required.
 - Run the machine with very low speed for 3-5 minutes.
 - Adjust all parameters.
 - Run the machine at full speed.
 - Check the yarn tension for all feeders.
 - Check the fabric quality and tension during operation.
 - After completing knitting stop the machine.
 - Open the door.
 - Take out the knitted roll.

3.12 Fabric GSM which are produced at AKH Knitting & Dyeing Ltd. are:

- 120
- 140
- 160
- 180
- 188
- 190
- 200
- 230
- 240
- 255
- 280

- 300
- 320 etc.

3.13 Fabric design is found at AKH knitting and Dyeing Ltd. are:

- (2*1) Rib
- Single Jersey
- Single Jersey slub
- Single Jersey neps
- Pique
- Fleece
- (2*2) Rib
- (1*1) Rib
- Interlock
- Lycra Single Jersey
- Lycra Interlock
- Waffle
- Fleece double
- Designed terry
- Mock rib
- (1*1) Rib Designed
- (4*1) Rib
- Fleece double
- Look back terry
- France terry
- France terry slub
- Lycra terry
- Pointer rib
- Mash
- Pique Interlock etc.

3.14 Production calculation:

$$\text{RPM} \times \text{No. of feeder} \times \text{No. of Needle} \times \text{Stitch length}$$

$$\text{Production/Shift in kg} = \frac{\text{RPM} \times \text{No. of feeder} \times \text{No. of Needle} \times \text{Stitch length}}{3527.80 \times \text{Yarn count}}$$

$$\text{➤ Production/Shift in meter} = \frac{\text{RPM} \times \text{No. of feeder} \times 60 \times 12 \times \text{Efficiency}}{\text{Course/cm} \times 100}$$

$$\text{➤ Fabric width in meter} = \frac{\text{Total no of wales}}{\text{Wales/cm} \times 100}$$

$$= \frac{\text{Total no of Needles used in knitting}}{\text{Wales/cm} \times 100}$$

3.15 Production Parameter depends on:

- No. of yarns feed or feeders in use
- Machine Gauge
- Count of yarn
- Machine Diameter
- Machine rpm
- Machine running efficiency

3.16 Ways to increase production:

- By increasing the number of feeders
- By increasing machine speed
- By using higher machine gauge
- By reducing yarn breakage
- Increasing m/c efficiency By expert operator etc.

3.17 Knitting parameters are:

- Stitch length
- GSM
- Fabric width
- Wales per inch
- M/c gauge
- Yarn count
- Shrinkage etc.

3.18 The relationship between knitting parameters are:

- If stitch length increase then fabric width increase and Wales per inch decrease.
- If machine gauge increase then fabric width decrease
- If yarn count increase (courser) then fabric width increase.
- Stitch length increase with the decrease of GSM.
- If shrinkage increases then fabric width decrease but GSM and Wales per inch increase.
- For a finer gauge, finer count yarn should use.

3.19 Controlling of GSM By:-

- Controlling diameter of VDQ pulley
- Controlling the needle bed
- Controlling Tension of take up roller
- Controlling tension point of the cam box

3.20 Knitting faults with their reasons & remedies are:

1. Hole mark: Two types- Hole<1 and Hole>1

Causes:

- I. Variation in yarn and fabric tension
- II. Yarn breakdown
- III. Count variation
- IV. Badly feeding or knot etc.

Remedies:

- I. Ensure proper yarn and fabric tension
- II. Ensure proper knot and feeding system
- III. Avoid count variation

2. Needle Line:

Causes:

- I. Due to needle breakdown
- II. Due to needle or needle hook bending

Remedies :

- I. The needle should be set up properly

3. Miss yarn:

Causes:

- I. Two or more yarn is plied together during knitting
- II. Yarn count variation

Remedies:

- I. Yarn count should be maintained properly
- II. Ensure yarns are not plied together during knitting

4. Oil stain spot:

Causes:

- I. When oil lick through the needle trick then it passes on the fabrics and make a line.

Remedies:

- I. Ensure that oil does not pass on the fabrics.
- II. Well maintenance as well as proper oiling.

5. Lycra missing:

Causes:

- I. Due to missing or breakdown lycra during knitting.

Remedies:

- I. Ensure lycra is not broken down or missing

6. Fly yarn:

Causes:

- I. During knitting, so much lint are flying in the knitting floor.
- II. Due to low quality and twisted yarns

Remedies:

- I. Continuously blowing air for cleaning different parts
- II. Use separate pipe for each yarn from creel to m/c feed
- III. Use ducting system for cleaning the floor

7. Black spot:

Causes:

- I. If any rust on the machine parts.
- II. Improper greasing

Remedies:

- I. Properly maintain the machine parts and machines

8. Loop set-up:

Causes:

- I. Break 4-5 needle together

9. Barre: A fault in weft knitted fabric is a dark or lighter stripe in width or course wise.

Causes:

- I. Due to faulty yarn
- II. Due to different lustrous and dye affinity of fibers in the yarn

Remedies :

- I. Use this type of fabric in white color

10. Yarn conta:

Causes:

- I. If foreign fiber mixing with yarn during knitting
- II. Mixing of yarn lot or different count of yarn

Remedies:

- I. Ensure yarn lots are not mixed
- II. Use pipe for every yarn and net for every machine

11. Slub of yarn:

Causes:

- I. Poor carding
- II. Defective ring frame drafting
- III. Bad piecing

Remedies:

- I. Use good quality yarn

12. Neps of yarn:

Causes:

- I. Poor carding
- II. Bad piecing and drafting in the ring frame

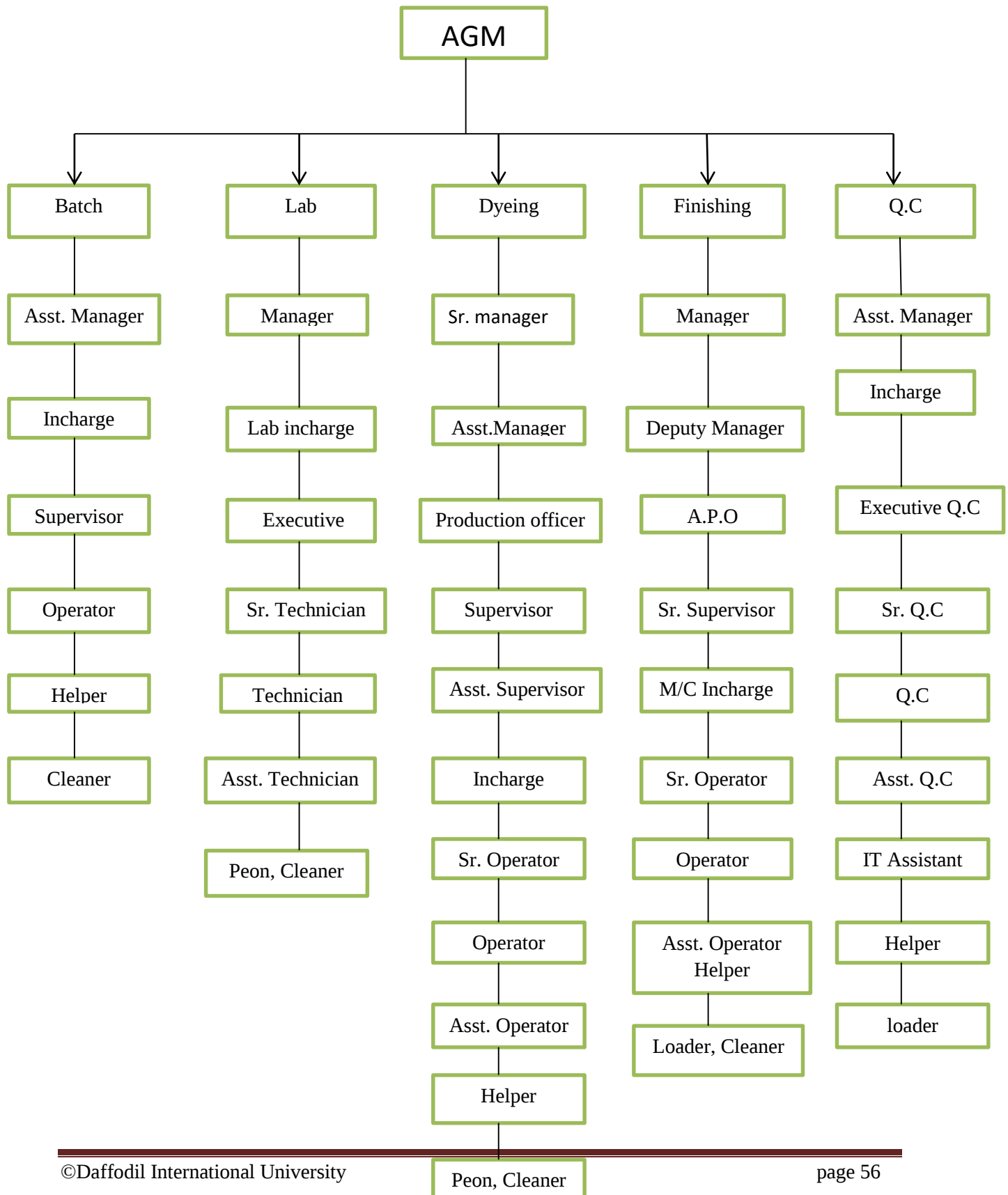
Remedies:

- I. Avoid faults during carding and spinning

CHAPTER 04

DYEING SECTION

4.1 Organogram of Dyeing Division:





4.2 Laboratory Section:

4.2.1 The function of the laboratory: Dyeing laboratory is the heart of wet processing because before production lab reports help and confirm us about color shade matching and required quality according to buyers requirements.

4.2.2 Machine Specification of Laboratory:

Machine No: 01

M/c Type : Contact heat
Brand Name : Roches
Made in : UK
Model : M-172SJ
Serial : 20452
Function : Color fastness to heat pressing

Machine No: 02

M/c Type : Open air shaker
Brand Name : Jeio Tech
Made in : Korea
Model : 05-3000
Serial : X125218

Machine No: 03

M/c Type : Hot Plate Stirrer
Brand Name : Lab Tech
Made in : Korea
Model : LMS-1003
Serial : 09090817

Machine No: 04

M/c Type : pH Meter
Brand Name : Hanana
Made in : Romania

Machine No: 05

M/c Type : Electric Iron
 Brand Name : Philips
 Made in : USA

Machine No: 06

M/c Type : Laboratory drying woven
 Brand Name : Ximen Rapid
 Made in : China
 Model : R-17
 Serial :3378

Machine No: 07

M/c Type : Eco-Ahiba Nuance
 Brand Name : Data Color/Ahiba-IR
 Made in : USA
 Function :Sample Dyeing

Machine No: 08

M/c Type : Incubator(Binder) Woven
 Brand Name : Roches
 Made in : England
 Model : M-172SJ
 Serial :1197(BI)
 Function :Color fastness to perspiration,water and phenolic yellowing test

Machine No: 09

M/c Type : Woven
 Brand Name : Memmert
 Model : IN55
 Made in :Germany

Machine No: 10

M/c Type : Martindale abrasion and pilling tester
 Brand Name : Roaches

Machine No: 11

M/c Type : GSM Cutter

Brand Name : Roaches

Machine No: 12

M/c Type : GSM Cutter

Brand Name : Roaches

Machine No: 13

M/c Type : Crock Master

Brand Name : James Heal

Model : 670 HD Crockmaster

Made in :UK

Serial : 1459

Machine No: 14

M/c Type : Crock Master

Brand Name : Roaches

Serial : 323703

Machine No: 15

M/c Type : ICI Pilling Tester

Brand Name : Roaches

Serial : 376803

Made in :England

Machine No: 16

M/c Type : Tumble Dryer

Brand Name : Electrolux

Model : N1130E17

Serial : 60130/0202728

Made in : Sweden

Machine No: 17

M/c Type : Tumble Dryer

Brand Name : Electrolux

Model : N1130E17

Made in : Sweden

Machine No: 18

M/c Type : Washing Machine

Brand Name : Electrolux

Model : W555H

Made in : Sweden

Machine No: 19

M/c Type : Washing Machine

Brand Name : Miele

Model : Edition 111,W3370

Made in : Germany

Machine No: 20

M/c Type : Washtec-p
 Brand Name : Roaches
 Serial : 379003
 Made in : England
 Function : Color fastness to washing

Machine No: 21

M/c Type : De-ionized water plant
 Function : Ion free water for different fastness test perpose

Machine No: 22

M/c Type : Fabric Relaxation Chamber(Constant Climate)
 Brand Name : Memmert
 Model : HPP260
 Function : GSM and Dimentional Stability test
 Made in : Germany

Machine No: 23

M/c Type : Tumble Dryer
 Brand Name : Electrolux
 Model : T5190
 Serial : 0530010214327
 Made in : Sweden
 Capacity : 110.5 kg

Machine No: 24

M/c Type : Washing Machine
 Brand Name : Roaches
 Made in : England
 Function : Washing and Shrinkage test

Machine No: 25

M/c Type : Washing Machine
 Brand Name : Roaches
 Serial : 00520/0119629
 Made in : Sweden
 Function : Washing and Shrinkage test
 Capacity : 7 kg

Machine No: 26

M/c Type : Quick Wash Plus
Function : Quick Shrinkage test

Machine No: 27

M/c Type : Electronic Balance
Serial : AR 2130
Made in : USA
Function : Measuring Weight
Max wt. : 210 gm

Machine No: 28

M/c Type : Laboratory Padding Mangle
Brand Name : Rapid
Made in : China
Function : De-watering, Squeezing, Hydro Extractor

Machine No: 29

M/c Type : Eco-Ahiba Nuance
Brand Name : Data Color
Serial : 03207
Made in : USA
Function : Sample Dyeing

Machine No: 30

M/c Type : Infra -Red
Brand Name : Roaches
Model : Pyrotec-2000
Serial : 420306
Made in : UK
Function : Sample Dyeing

Machine No: 31

M/c Type : Spectro Photometer
Brand Name : Data Color
Model : Datacolor 850
Made in : USA
Function : Recipe Prediction, Color Matching, Shade variation measurement.

Machine No: 32

M/c Type : Pilling Assesment Viewer
Brand Name : Verivide
Made in : England

Machine No: 33

M/c Type : Light Box
Brand Name : Verivide
Made in : England

Machine No: 34

M/c Type : Digital Reeling Twist Tester

Brand Name : Roaches

Made in : UK

Serial : 20514

Machine No: 35

M/c Type : Roving Count Measuring Reel

Brand Name : Fangyuan

Model : YG086E

Serial : 101005

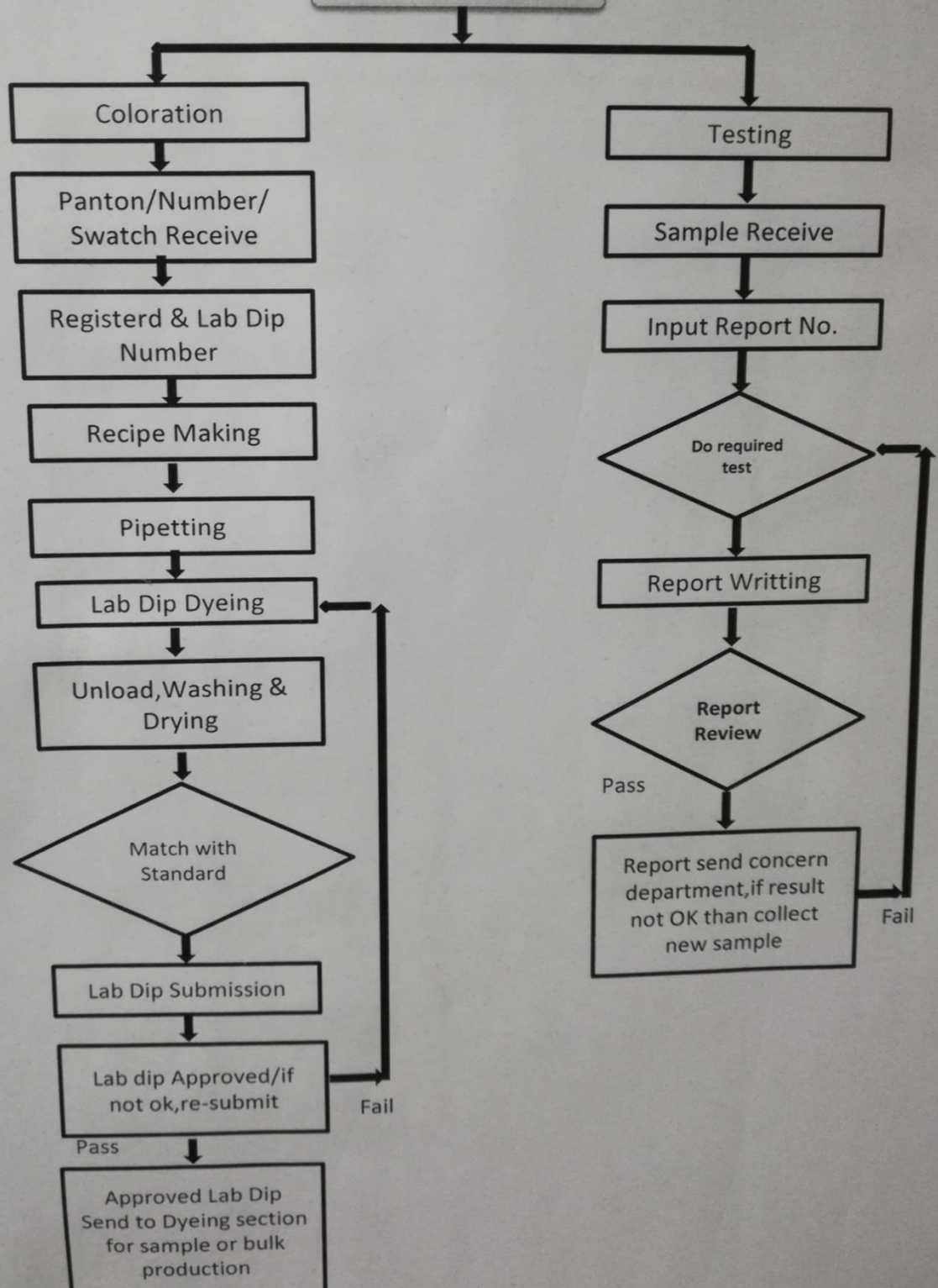
Made in : China

AKH Knitting & Dyeing Ltd.

92, Phulbaria, Savar, Dhaka

Laboratory Flow Chart

LABORATORY



4.2.4 The procedure of lab deep preparation for 100% cotton fabric:

4.2.4.1 Equipment list:

- Lab deep machine
- Scissor
- Electronic balance
- Pots
- Beaker
- Conical flask
- Glass stirrer
- Automatic Pipette
- Datacolor
- Lightbox
- Hand gloves
- pH meter etc.

4.2.4.2 Recipe:

Rema Blue RR -1.122% (Stock Soln = 1%)
 React Red -2.014% (Stock Soln = 1%)
 React Yellow -1.486% (Stock Soln = 1%)
 Salt -70% (Stock Soln = 15%)
 Soda Ash - 5 g/l (conc.20%)
 Caustic Soda - 1.32% (Stock Soln = 5%)
 M:L - 1:7
 Sample Wt. = 5 gm

4.2.4.3 Calculation:

$$\text{Dyes} = \frac{\text{Shade \%} \times \text{Weight of fabric sample}}{\text{Stock solution \%}}$$

$$\text{Required amount\%} \times \text{Total liquor} \times 100$$

$$\text{Auxiliaries} = \frac{\text{Stock soln.\%} \times 1000}{\text{Required amount\%} \times \text{Total liquor} \times 100}$$

4.2.4.4 Working procedure:

- I. At first, calculate the recipe
- II. Weighting the sample fabric
- III. Take and ready beakers by washing
- IV. Take required amount of dyes, chemicals, and water on the beakers
- V. Then put the sample on the beakers
- VI. Set the beakers on the sample dyeing machine
- VII. Set the dyeing temperature 60°C for 60 minute
- VIII. After 30 minutes add soda ash and run again 30 minute
- IX. After dyeing time hot and cold wash is done
- X. Then acid washing
- XI. Soaping with required soap for 10 minutes at a 90°C temperature
- XII. Then take out the sample and drying in the dryer
- XIII. Finally, the samples compared with a standard sample.

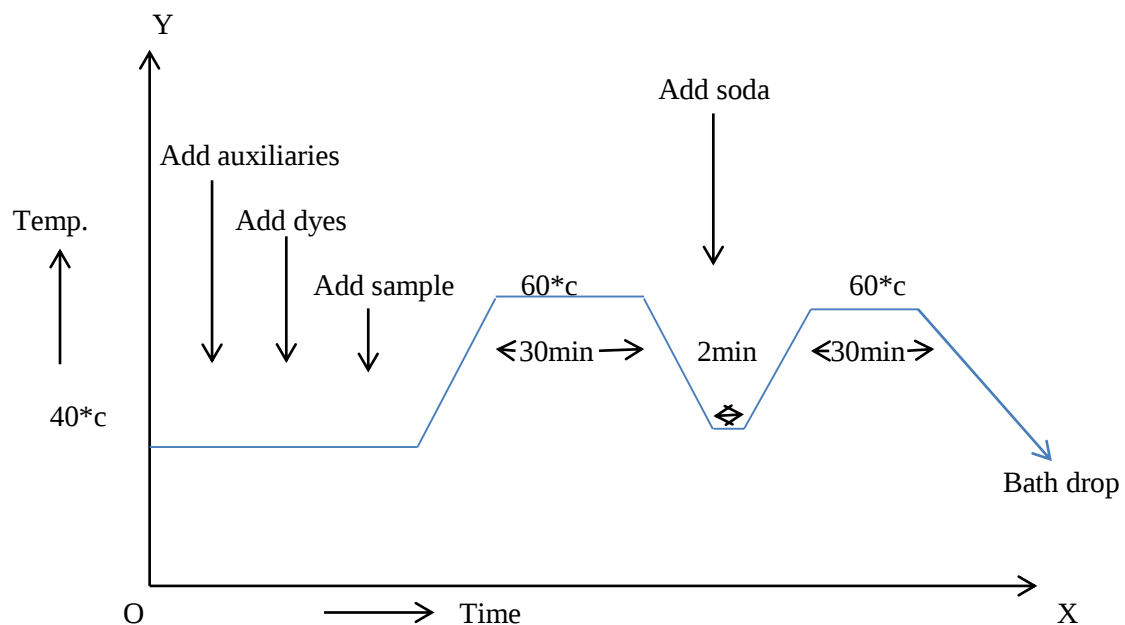




Figure: Lab dyeing process curve of cotton 100%

4.2.5 Dyeing Laboratory Machines Photos are:



Figure: Heat pressing m/c



Figure: Open air shaker



Figure: Hot Plate stirrer



Figure: pH meter



Figure: Laboratory drying m/c



Figure: Laboratory drying m/c



Figure: Laboratory dyeing m/c

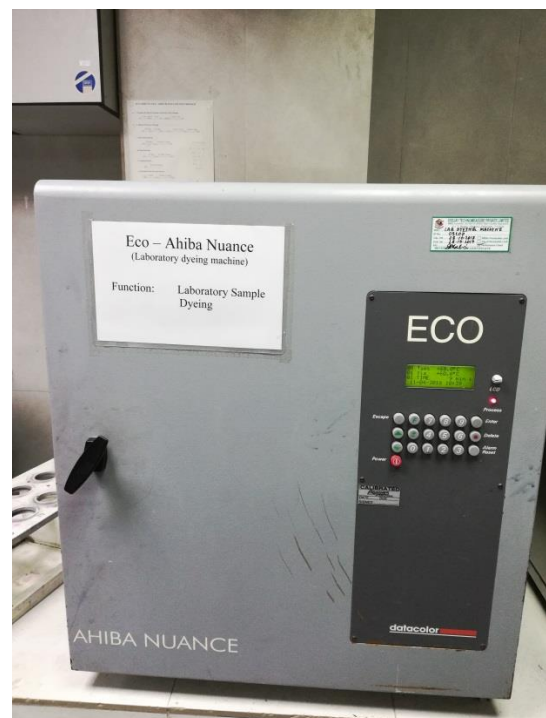


Figure: Laboratory dyeing m/c



Figure: Laboratory padder m/c



Figure: Laboratory drying m/c



Figure: Laboratory drying woven m/c



Figure: Martindale Abrasion and Pilling Tester



Figure: Crock Master



Figure: ICI Pilling Tester



Figure: Electrolux Tumble Dryer



Figure: Electrolux Tumble Dryer



Figure: Electrolux Washing m/c



Figure: Miele Washing m/c



Figure: Washtec-p m/c



Figure: De-ionized Water Plant

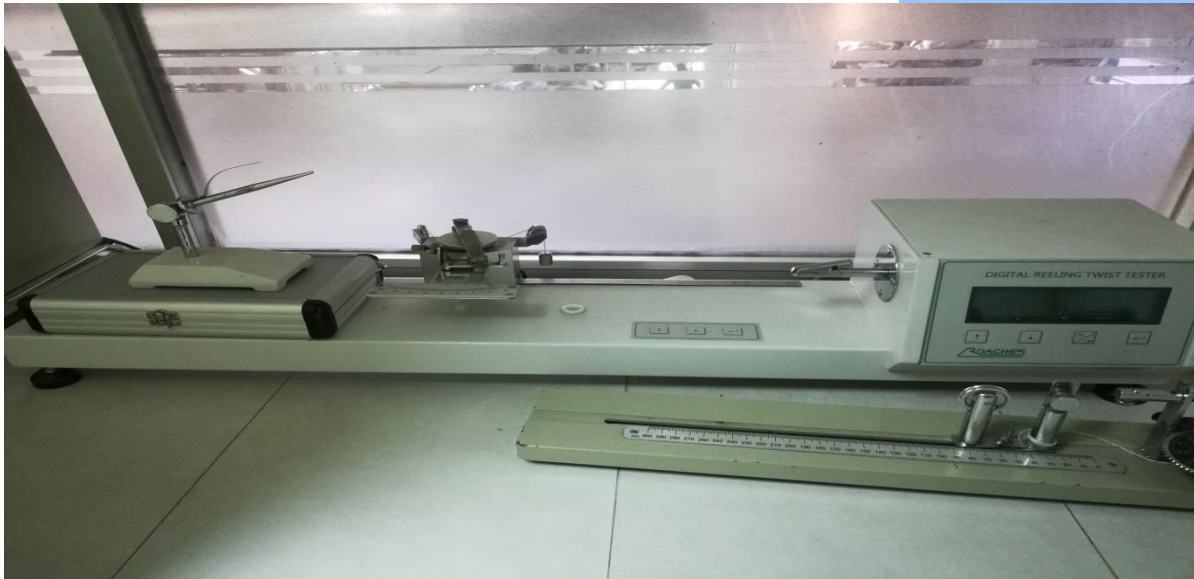
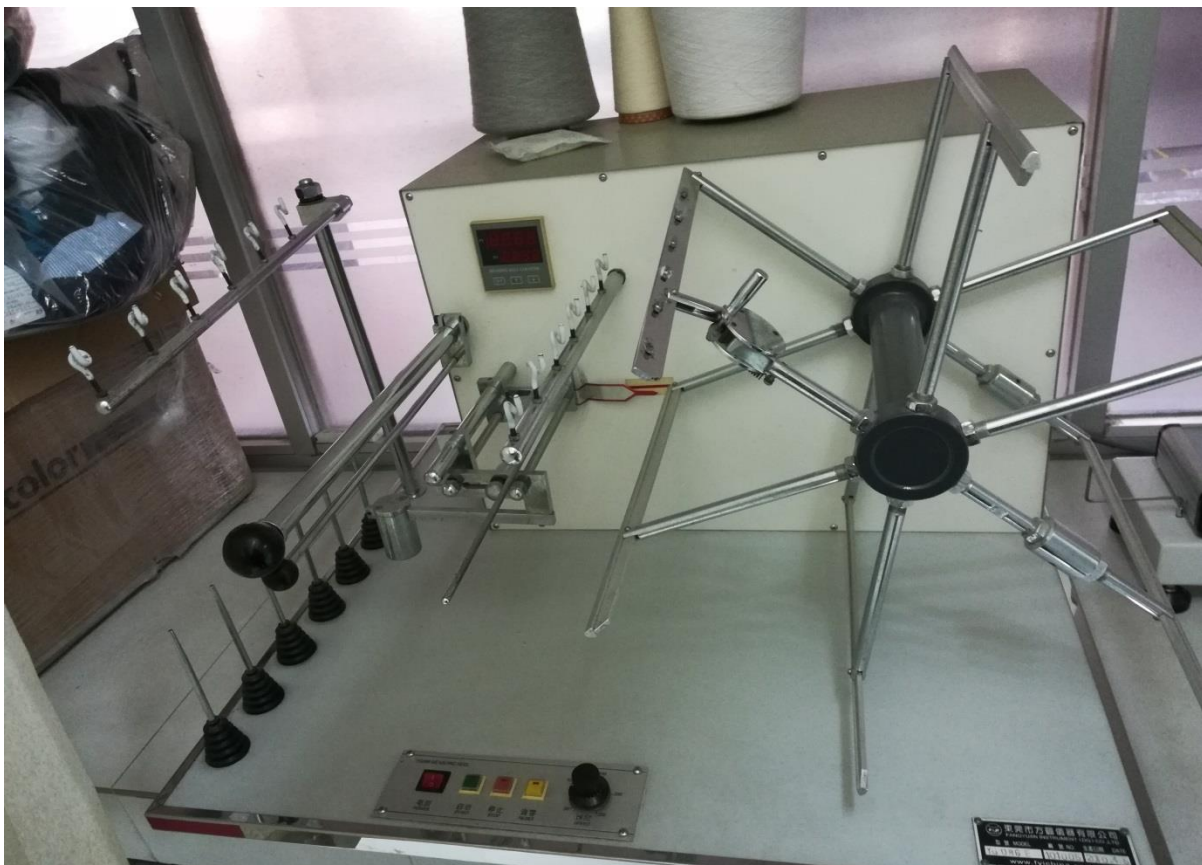


Figure: Digital Reeling Twist Tester



4.2.6 List of Lab Testes are:

1. Dimensional Stability (Shrinkage) & Related test
 - I. Dimensional Stability to washing
 - II. Spirality/Twisting of Fabric & Garments
 - III. Appearance After Washing
2. Colour Fastness Test
 - I. Color Fastness to Washing
 - II. Color Fastness to Rubbing(Dry/Wet)
 - III. Color Fastness to Perspiration
 - IV. Color Fastness to Water
 - V. Color Fastness to Saliva
 - VI. Color Fastness to Sea Water
 - VII. Color Fastness to Chlorinated Water
 - VIII. Color Fastness to Hot Pressing
 - IX. Color Fastness to Artificial Light
 - X. Color Fastness to Artificial Light & Perspiration combined
 - XI. Color Fastness to Phenolic Yellowing
 - XII. Color Fastness to Dry Transfer in Storage
3. Ecological Tests
 - I. pH Value of Textile Items
 - II. Nickel Release Test
4. Construction Analysis
 - I. Mass Per Unit Area(GSM Test)
 - II. Yarn TPI(Twist Per Inch)
 - III. Fiber Analysis(Qualitative & Quantitive)
 - IV. Yarn Counts/Yarn Size
5. Others
 - I. Determination of Surface Fuzzing and to Pilling(ICI & Martindale Method)
 - II. Stretch & Recovery Test(Determination of the Elasticity of fabrics)
 - III. Fabric's Absorbency test/ Drop Test
 - IV. Button Pull Test
 - V. Print Durability Test

4.2.7 Some lab tests are in details:

- **Shrinkage test:** It means the change of finished garments of fabrics dimensionally after washing.
For this test, sample garments are taken and pointed along length and width wise by the marker and measure the value. Then the fabric is washed in washing m/c for 30 min. After washing and drying the length and width are measured again.

Calculation:

Let us, Length before washing = L

Length after washing = l

$$\begin{aligned}\text{So, Shrinkage\%} &= \frac{\text{Length before wash} - \text{length after wash}}{\text{Length after wash}} \times 100\% \\ &= \frac{L - l}{L} \times 100\%\end{aligned}$$

Again. Width before wash = B

Width after wash = b

$$\begin{aligned}\text{So, Shrinkage \%} &= \frac{\text{Width before wash} - \text{Width after wash}}{\text{Width before wash}} \times 100\% \\ &= \frac{B - b}{B} \times 100\%\end{aligned}$$

- **Washing Fastness test:** Is the test by which we can measure the color removed from the dyed fabric after washing with different soap or detergent with the help of Multifiber.
For this test, a rectangular fiber sample is attached with multifiber by sweating. Then it took on a pot with required soap and detergent and run it at 50°C for 30 minutes in washing m/c. After washing the grade of multifiber for washing fastness is measured with the help of spectrometer.
- **Rubbing Fastness test:** Is the test by which we can know and measure the color removed from the dyed fabric after rubbing. There are two types of rubbing test-dry test, wet test.

For these test, a standard cotton fabric is set upper jaw of a crockmeter and dried fabric at the bottom jaw. Then operate crock meter for 10 cycles manually. Color

absorbed by standard fabric after remove from fabric is measured with the help of spectrometer. For wet test standard cotton is wet by water before rubbing.

- Perspiration test: This test means the rate of color removes when the fabric is in contact with human sweat.

Human sweat is two types:

- I. Acidic perspiration (From men body)
- II. Alkaline perspiration (From women body)

Chemicals for acidic perspiration are:

- I. Di-sodium hydrogen
- II. Sodium chloride
- III. L-Histidine monohydrochloride monohydrate
- IV. Acetic acid (CH_3COOH)

Chemicals for alkaline perspiration are:

- I. Di-sodium hydrogen
- II. Sodium chloride
- III. L-Histidine monohydrochloride monohydrate
- IV. Sodium Carbonate (Na_2CO_3)

For this test artificial perspiration solution are taken in a bath then sample fabric with multifiber are immersed in the solution for 30 minutes. Then the fabric with multifiber is placed in perspirometer. Then apply standard pressure and wait for 8 hours. Finally, multi fibers are graded with the help of spectrometer.

- Pilling test: Pilling means small balls of fluff on the fabric surface due to rubbing. For this test sample fabric are swing and making tube sample then it wears over a rubber tube. Then the rubber tube with fabric is placed on ICI pilling tester box and run it for 14000 cycles. Then the fabric is taken and counting pilling by pilling counter.
- Colorfastness to light: This means changes in color shade due to sunlight. For this test in the lab using artificial sunlight by machine. The sample(half side clipped) fabric are placed in artificial sunlight m/c and wait for 18 hours. Then the sample(middle clipped two sides open) are again placed in m/c for 18 hours. Then put out the sample and compare the shade difference.
- Fiber identification test: For this test small length of yarn(1-2mm) are taken in a slide then fibers are separated by the needle. Then the slide is placed under electronic microscope nozzle and watching the fibers visually.

4.3 Batch Section: Is very important before dyeing because in batch section fabric are prepared and fully ready the fabric for suitable dyeing.

4.3.1 Objectives of the batch section:

- I. Open width fabrics are swing into tube fabric
- II. Reversing the tube fabric (Face inner Back other side)
- III. The same role of fabric is swing and make long length fabric which is suitable for dyeing.
- IV. Fabrics are arranged for suitable loading on dyeing m/c
- V. Separate the fabrics according to- buyers, design, gsm, yarn count,dia, order etc.

4.3.2 Machine Specification of the batch section are:

Machine No: 01

M/c Type : Air Turning m/c

Brand Name: Dong Nam

Model : DNAT-400

Serial : DN0341

Made in : Korea

Machine No: 03

M/c Type : Air Turning m/c

Brand Name: Dong Nam

Model : DNAT-400

Serial : DN1008

Made in : Korea

Machine No: 03

M/c Type : Slitting Machine

Brand Name: Bianco

Model : RW2600×FW2400

Serial : TGCAP00181K0738

Made in : ITALIA

Year Build : 2017

Max.Speed :40

Machine No: 04

M/c Type : Bag Sweing m/c

Brand Name: Bianco

Model : CCM240-2600×2400

Serial : CCSAP00230F0521

Made in : Italia

Year Bbuild :2013

Max.Speed :40

Machine No: 05

M/c Type : Bag Sweing m/c

Brand Name: Bianco

Serial : CCSAP00046B0121

Made in : ITALY

Year Build : 2009

Max.Speed :40m/min

Machine No: 06

M/c Type : Bag Sweing m/c

Brand Name: Bianco

Model : CCM240-2600×2400

Serial : CCSAP00181K0739

Made in : Italy

Year Bbuild :2009

Max.Speed :40m/min

Machine No: 07

M/c Type : UZU Cloth Inspection m/c

Model : UZ-90031/72”

Serial : 0094744

Made in : Thailand

Year Build : 2004

4.4 Dyeing Section: Dyeing is the coloration of textiles like-fibers, yarns, and fabrics by the application of dyes or pigments with the help of others chemicals. In AKH Knitting and Dyeing Ltd. only knit fabrics are dying. There are two types of dyeing machine used in this factory are:

- I. Winch Dyeing m/c
- II. Jet Dyeing m/c.

4.4.1 Raw Materials for Dyeing:

- I. Grey Fabric
- II. Dyes
- III. Chemicals

Grey fabrics are collected from a knitting fabric store but some fabric like waffle, fleece etc are imported from mainly China. Dyes and chemicals are imported from some countries like-India, Germany, Singapore, Italy, Belgium etc.

4.4.2 Got Approved Chemicals list:

1. Anticreasing Agent:
 - I. Anti crease-200
 - II. Albafluid –C
 - III. Lubrimax –TLE

2. High-Performance Anticrease:
 - I. Cross-color –NLD

3. Anti back Staining(Hi-Performance Wash off):
 - I. Crosden –LPD

4. Black Scouring:
 - I. Sarabid –MIP

5. Oxidising :
 - I. Cross color -ARI Liq

6. Wash off:
 - I. Cross color -BCSR
 - II. Eripon R Liq

7. Detergent:
 - I. Crosprep HES
 - II. Ultravon –RW

8. Sequestering for high hardness:
 - I. Cronquist HRO

9. Sequestering Agent:
 - I. Optacon -4UD

10. Dyebath Sequesterant:

I. Optacon –SV

11. Levelling Agent(For Critical Color-Green, Turq):

I. Cross color -ADM

12. Levelling Agent:

I. Setavin –RCO

II. Chimisperse –FA

III. Albatex DCB

13. Carrier for PES fabrics:

I. Setavin SUE

14. pH Buffer:

I. Albatex –AB-45

15. Peroxide Killer:

I. Fino Scav-V6

II. Invatex PC

16. Enzyme:

I. Cellusoft Conc L

II. Retrocell PL-ECO

III. Conzyme DL-10

17. Stabilizer:

I. Clarite CBB

18. Antifoaming Agent:

I. AlBaflow- JET

II. Cross color –MIRO

19. Cationic Softener:

I. EVCS-11

II. E-31(Non-Ionic Softener)

20. Silicon Softener:

- I. C Soft NBC Ultra X
- II. ASL-300
- III. Ultratex-SI
- IV. Ultratex-TTK
- V. Sebacel 540
- VI. C. Soft MIS

21. Hydrophilic Silicon Softener:

- I. Cefasoft –SHD/Crosoft HSD
- II. Midori JWN

22. Softener for:

- I. Katamin Uni Liq

23. For Quick Dry Finish:

- I. Sapamine –KL-NEW
- II. Ultraphil –HTC

24. Liquid Softener:

- I. Crosoft AMFO-X

25. White Brightener:

- I. Uvitex -2B
- II. Uvitex –BBT Liq

26. Dispersing:

- I. Invalon –DAM
- II. Cross color –PLD

27. Catalyst:

- I. Crosprep CAT

28. Anti Yellowing(Cotton):

- I. Protelan –LGA
- II. Reduction –RCA

4.4.3 Got Approved dyes list:

Serial No.	Name of Chemicals	Manufacturer/Supplier
1.	Remazol Blue RR	Dystar Singapore pte Ltd.
2.	Remazol Brill. Blue RSPL	Dystar Singapore Pte Ltd.
3.	Remazol Red RR	Dystar Singapore Pte Ltd.
4.	Remazol Turquoise Blue –G 133%	Dystar Singapore pte Ltd.
5.	Remazol Yellow RR	Dystar Singapore Pte Ltd.
6.	Remazol Brill. Yellow -3GL	Dystar Singapore Pte Ltd.
7.	Remazol Organe RR	Dystar Singapore pte Ltd.
8.	Remazol Organe SAM	Dystar Singapore pte Ltd.
9.	Remazol Yellow SAM	Dystar Singapore Pte Ltd.
10.	Remazol Red SAM	Dystar Singapore Pte Ltd.
11.	Remazol Blue SAM	Dystar Singapore pte Ltd.
12.	Remazol Brill. Blue –BB 133%	Dystar Singapore Pte Ltd.
13.	Remazol Navy RGB	Dystar Singapore Pte Ltd.
14.	Remazol Ultra Yellow RGBN	Dystar Singapore Pte Ltd.
15.	Remazol Ultra Red RGB	Dystar Singapore pte Ltd.
16.	Remazol Ultra Carmine RGB	Dystar Singapore pte Ltd.
17.	Remazol Ultra Crimson RGB	Dystar Singapore pte Ltd.
18.	Remazol Navy Blue GG	Dystar Singapore Pte Ltd.
19.	Remazol Yellow GR 133%	Dystar Singapore Pte Ltd.
20.	Remazol Brill. Blue RN	Dystar Singapore Pte Ltd.
21.	Remazol Brill. Red F3B	Dystar Singapore Pte Ltd.
22.	Levafix ECO Forest	Dystar Singapore Pte Ltd.
23.	Polafix Navy Blue -BS	Jin Won Trading Co. Ltd.
24.	Polafix Red –3BS 150%	Jin Won Trading Co. Ltd.
25.	Polafix Yellow -3RS 150%	Jin Won Trading Co. Ltd.
26.	Polazol Black –GR 110%	Jin Won Trading Co. Ltd.
27.	Reactive Black-B 150%	Aim Tech
28.	Liyuansol Yellow 3RS 150%	Aim Tech
29.	Rifazol Blue EDRS	Rifa Ind. Co. Ltd.
30.	Rifacion Red HE 3B	Rifa Ind. Co. Ltd.
31.	Rifacion Yellow HE 4G	Rifa Ind. Co. Ltd.
32.	Rifalon Navy Blue -HER	Rifa Ind. Co. Ltd.
33.	Rifafix Yellow -4GL 150%	Rifa Ind. Co. Ltd.
34.	Elbezol Black –B 150%	Elbe International Co. Ltd.
35.	Elbezol Red -3BSN 150%	Elbe International Co. Ltd.
36.	Elbezol Yellow 3RS 150%	Elbe International Co. Ltd.
37.	Novacron Blue ECR	Huntsman(Swiss Color)
38.	Novacron Blue TS 3G	Huntsman(Swiss Color)
39.	Novacron Navy FN BN	Huntsman(Swiss Color)

40.	Novacron Orange W3R	Huntsman(Swiss Color)
41.	Novacron Brill. Red FN-3GL	Huntsman(Swiss Color)
42.	Novacron Red –FN 2BL	Huntsman(Swiss Color)
43.	Novacron Yellow LS 4G	Huntsman(Swiss Color)
44.	Novacron Navy WB	Huntsman(Swiss Color)
45.	Novacron Deep Red ECD IN	Huntsman(Swiss Color)
46.	Novacron Red HD	Huntsman(Swiss Color)
47.	Novacron Red TS3B	Huntsman(Swiss Color)
48.	Novacron Dark Blue WR/Navy ECR	Huntsman(Swiss Color)
49.	Novacron Super Black -G	Huntsman(Swiss Color)
50.	Novacron Ocean S-R	Huntsman(Swiss Color)
51.	Novacron Ruby S-3B	Huntsman(Swiss Color)
52.	Novacron Yellow FN 2R	Huntsman(Swiss Color)
53.	Novacron Red EC-3B	Huntsman(Swiss Color)
54.	Novacron BRI. T/Q EC-GN	Huntsman(Swiss Color)
55.	Novacron Yellow S3R	Huntsman(Swiss Color)
56.	Avitera Yellow SR	Huntsman(Swiss Color)
57.	Avitera Bri Yellow SE	Huntsman(Swiss Color)
58.	Avitera Blue SE	Huntsman(Swiss Color)
59.	Avitera Red SE	Huntsman(Swiss Color)
60.	Avitera Light Red SE	Huntsman(Swiss Color)
61.	Avitera Light Blue SE	Huntsman(Swiss Color)
62.	Avitera Gold SE	Huntsman(Swiss Color)
63.	Terasil Blue BGE 01	Huntsman(Swiss Color)
64.	Terasil Blue –WW-2GS	Huntsman(Swiss Color)
65.	Terasil Yellow –W6GS	Huntsman(Swiss Color)
66.	Terasil G/Y Yellow –W3R	Huntsman(Swiss Color)
67.	Novacron Navy SGI	Huntsman(Swiss Color)
68.	Lebafix Bri. Yellow CA	Dystar Singapore Pte Ltd.

4.4.4 List of Approved Organic Chemicals and dyes(Cottover):

Serial No.	Name of Chemicals	Manufacturer
1.	Albaflow Jet	Huntsman
2.	Crosprep HES	Eurodye CTC
3.	Optavon 4UD	ZSM
4.	Ac-200	Bangpoo Chemicals
5.	Cross color ADM	Eurodye CTC
6.	Cross color BCSR	Eurodye CTC
7.	Sapamine CSN	Huntsman
8.	Uvitex BBT LIQ	Huntsman
9.	Cross color PLD	Eurodye CTC
10.	Albatex AB-45	Huntsman
11.	Fino Scav V6	Martek's
12.	Cefasoft SHD	ZSM
13.	Ultrapil HTC	Huntsman
14.	Uvitex -2B	Huntsman

15.	Remazol Yellow RR	Dystar
16.	Remazol Red RR	Dystar
17.	Remazol Navy RGB 150%	Dystar
18.	Remazol Ultra Red RGB	Dystar
19.	Remazol Ultra Yellow RGBN	Dystar
20.	Remazol Orange RR Gran	Dystar
21.	Remazol Br Yellow 3GL Gran	Dystar
22.	Novacron Ocean S-R	Huntsman
23.	Polazol Black GRN 200%	Jin Won Trading
24.	Remazol Br Blue R Spec	Dystar
25.	Remazol Navy Blue GG	Dystar
26.	Novacron Navy FN BN	Huntsman
27.	Novacron Yellow S3R	Huntsman
28.	Levafix ECO Forest	Dystar
29.	Terasil Blue BGE 01-200%	Huntsman
30.	Terasil Yellow W6GS	Huntsman
31.	Terasil Black WW KSN	Huntsman
32.	Terasil Blue WW 2GS	Huntsman
33.	Terasil Navy WW GSN	Huntsman
34.	Terasil Red WW BFS 01-200%	Huntsman

4.4.5 Reactive DyeStuffs Trichomie Selection:

1. Pale to Light Shade(Below0.5%)
 - I. Avitera Gold SE
 - II. Avitera Light Red SE
 - III. Avitera Light Blue SE

2. Light to Medium Shade(0.5-1.5%)
 - I. Avitera Gold SE
 - II. Novacron Red TS-3B
 - III. Novacron Blue EC-GC

3. Medium to Dark Shade(1.5-3%)
 - I. Novacron Yellow S-3R
 - II. Novacron Ruby S-3B/Spice Red W-3B
 - III. Novacron Navy S-GI

4. Dark to Extra Dark Shade(above 3%):

- I. Novacron Yellow S-3R
- II. Novacron Deep Red EC-D/Spice Red W-3B
- III. Novacron Navy W-B

5. Burgandy, Chocolate Shade:

- I. Avitera Gold SE/ Novacron Yellow S-3R
- II. Novacron Deep Red EC-D
- III. Novacron Blue EC-GC/Navy S-GI

6. Green and Lime /Turquoise:

- I. Avitera Brill. Yellow SE
- II. Novacron Brill. Blue EC-B
- III. Novacron Brill. Turquoise EC-GN

7. Navy :

- I. Novacron Navy W-B(Above 1.5%)
- II. Novacron Navy S-GI(For Light Navy)

8. Black:

- I. Novacron Super Black G(For Deep Black)
- II. Novacron Black NN(For Light Black)

9. Royal , Purple and Violet:

- I. Novacron Ocean S-R/Brill. Blue EC-B
- II. Novacron Ruby S-3B

4.4.6 Specification of Dyeing Machine:

Machine No : 01 (sample) Machine Type : Sample dyeing machine Brand : Yabo Origin : China No. of Nozzle : 02 Year Built : 2007 Design Temp. : 130°C Capacity : 6 kg Max Working pressure: 2.5 bar Material Liquor Ratio: 1: 7	Machine No : 03 (sample) Machine Type : Sample dyeing machine Brand : FONGS Origin : CHINA Model : All Fit -10 Serial no : 42036882 No. of Nozzle : 01 Year Built : 2018 Design Temp. : 140°C Capacity : 20kg Max Working pressure: 3.5 bar Material Liquor Ratio: 1: 7
Machine No : 01 (sample) Machine Type : Sample dyeing machine Brand : Sclavos Origin : Greece Model : Athena S2 20H Serial no : 05-1C-3799 No. of Nozzle : 01 Year Built : 2017 Design Temp. : 140°C Capacity : 20kg Max Working pressure: 2.8 bar Material Liquor Ratio: 1: 7	Machine No : 04 (sample) Machine Type : Sample dyeing machine Brand : FONGS Origin : CHINA Model : All Fit-30 Serial no : 42036883 No. of Nozzle : 01 Year Built : 2018 Design Temp. : 140°C Capacity : 30kg Max Working pressure: 3.5 bar Material Liquor Ratio: 1: 7

Machine No : 05 (sample)

Machine Type : Sample dyeing machine

Brand : FONGS

Origin : CHINA

Model : All Fit -10

Serial no : 32021728

No. of Nozzle : 01

Year Built : 2007

Design Temp. : 140°C

Capacity : 10kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 06 (sample)

Machine Type : Sample dyeing machine

Brand : FONGS

Origin : CHINA

Model : All Fit-30

Serial no : 32021728

No. of Nozzle : 01

Year Built : 2007

Design Temp. : 140°C

Capacity : 30kg

Max Working pressure: 3.5 bar

Machine No : 07 (sample)

Machine Type : Sample dyeing machine

Brand : Scroll

Origin : Switzerland

Model : RL-14-10104

Serial no : 203106

No. of Nozzle : 01

Year Built : 2003

Design Temp. : 140°C

Capacity : 20kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 08 (sample)

Machine Type : Sample dyeing machine

Brand : Scroll

Origin : Switzerland

Model : RMN 14-10106

Serial no : 203098

No. of Nozzle : 02

Year Built : 2003

Design Temp. : 140°C

Capacity : 55kg

Max Working pressure: 3.5 bar

Machine No : 09 (sample)

Machine Type : Sample dyeing machine

Brand : Lab Pro GmbH

Origin : Switzerland

Model : Autoclave SFM Plus

Serial no : 212014

No. of Nozzle : 01

Year Built : 2012

Design Temp. : 140°C

Capacity : 30kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 10 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Sclavos

Origin : Greece

Model : Athena -2

No. of Nozzle : 03

Year Built : 2009

Design Temp. : 140°C

Capacity : 750kg

Max Working pressure: 38 Mpa

Material Liquor Ratio: 1: 7

Machine No : 11 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : FONGS

Origin : CHINA

Model : Eco-6-3T

No. of Nozzle : 03

Year Built : 2005

Design Temp. : 140°C

Capacity : 700kg

Max Working pressure: 3.8 bar

Material Liquor Ratio: 1: 7

Machine No : 12 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Scroll

Origin : Switzerland

Model : RC 14-10206

No. of Nozzle : 01

Year Built : 2003

Design Temp. : 140°C

Capacity : 380kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 13 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Scroll

Origin : Switzerland

No. of Nozzle : 02

Year Built : 2003

Design Temp. : 140°C

Capacity : 760kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 14 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Scroll

Origin : Switzerland

No. of Nozzle : 03

Year Built : 2003

Design Temp. : 140°C

Capacity : 1140kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 15 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Sclavos

Origin : Greece

Model : Athena -2

No. of Nozzle : 04

Year Built : 2009

Design Temp. : 140°C

Capacity : 1000kg

Max Working pressure: 28Mpa

Material Liquor Ratio: 1: 7

Machine No : 16 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Sclavos

Origin : Switzerland

No. of Nozzle : 03

Year Built : 2007

Design Temp. : 142°C

Capacity : 750kg

Max Working pressure: 28Mpa

Material Liquor Ratio: 1: 7

Machine No : 17 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Sclavos

Origin : Greece

Model : Athena -3A

No. of Nozzle : 06

Year Built : 2018

Design Temp. : 142°C

Capacity : 1500kg

Max Working pressure: 38Mpa

Material Liquor Ratio: 1: 7

Machine No : 18 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Sclavos

Origin : Greece

Model : Athena -2

No. of Nozzle : 01

Year Built : 2009

Design Temp. : 142°C

Capacity : 150kg

Max Working pressure: 28Mpa

Material Liquor Ratio: 1: 7

Machine No : 19 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Sclavos

Origin : Greece

Model : Athena -3A

No. of Nozzle : 02

Year Built : 2018

Design Temp. : 142°C

Capacity : 500kg

Max Working pressure: 38Mpa

Material Liquor Ratio: 1: 7

Machine No : 20 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Fongs

Origin : China

Model : Eco-6-1T

No. of Nozzle : 01

Year Built : 2005

Design Temp. : 140°C

Capacity : 250kg

Max Working pressure: 3.8 bar

Material Liquor Ratio: 1: 7

Machine No : 21 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Lab-Pro GmbH

Origin : Germany

Model : Autoklav FM 14-0310-45

No. of Nozzle : 03

Year Built : 2012

Design Temp. : 140°C

Capacity : 630kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 22 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Lab-Pro GmbH

Origin : Germany

Model : Autoklav FM 14-0410-45

No. of Nozzle : 04

Year Built : 2018

Design Temp. : 140°C

Capacity : 840kg

Max Working pressure: 3.5 bar

Material Liquor Ratio: 1: 7

Machine No : 23 (Bulk)

Machine Type : High Temperature dyeing m/c

Brand : Sclavos

Origin : Switzerland

Model : Athena -3A

No. of Nozzle : 05

Design Temp. : 140°C

Capacity : 1240kg

Max Working pressure: 3.8 bar

Material Liquor Ratio: 1: 7

Machine No : 24

Machine Type : Dyeing Chemical Measuring

Brand : Logic Art

Origin : Taiwan

Model : LA-301-24A-45

Serial : 301-15158

Year Built : 2015



Figure: Dyeing machine

4.4.7 Dyeing Machines Parts Name:

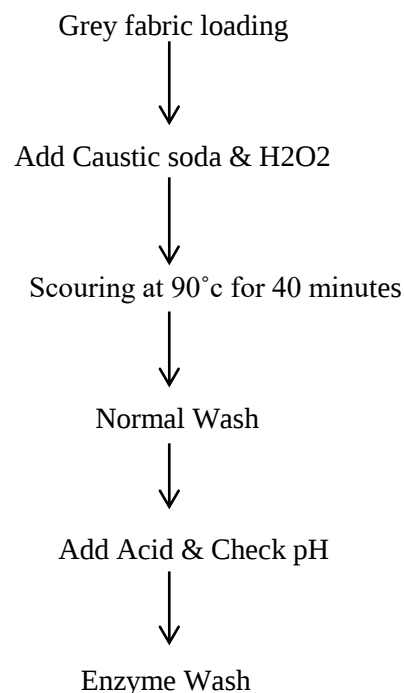
- I. Main Tank
- II. Reserve Tank/ PT Tank
- III. Mixing Tank
- IV. Main Pump
- V. Heat Exchanger
- VI. Filter
- VII. Dosing Tank
- VIII. Dosing Valve
- IX. Nozzle
- X. Salt Tank
- XI. Monitor
- XII. Steam valve
- XIII. Water level indicator etc.

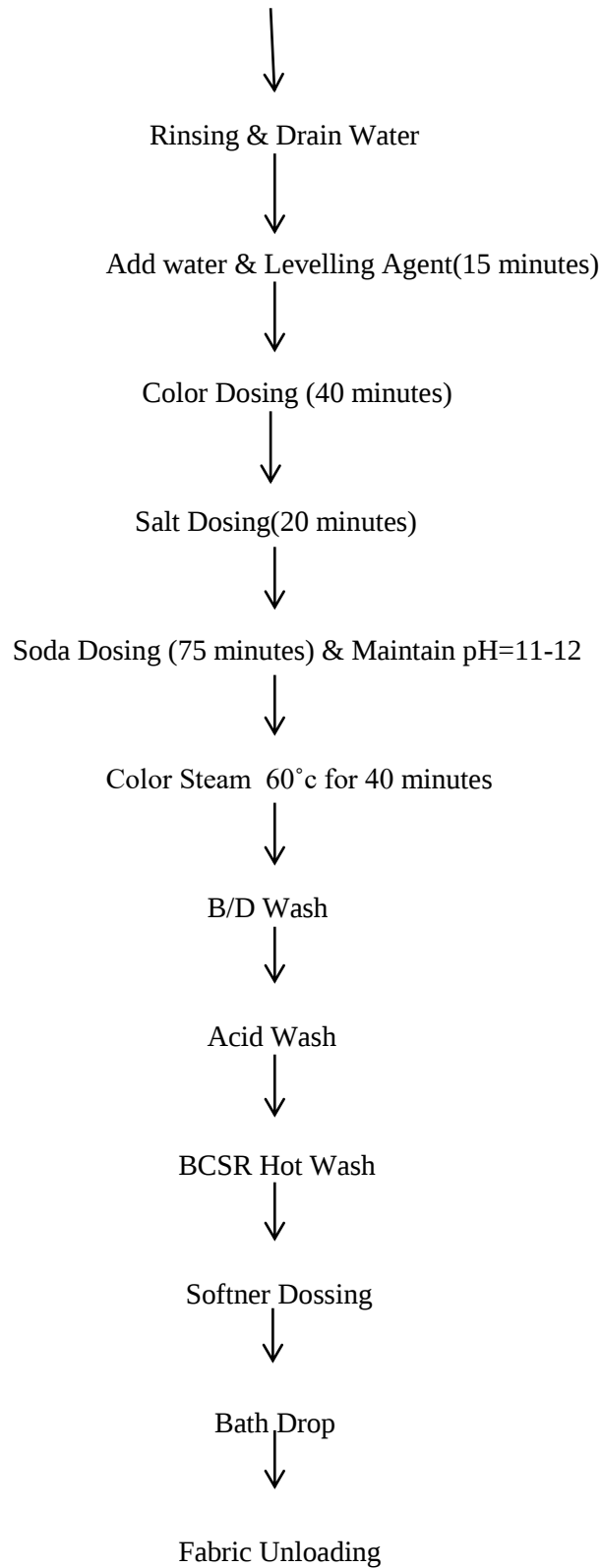
4.4.8 Works of different parts of dyeing machine are:

1. **Main Tank:** Hold the fabric properly and ensure uniform movement of fabrics and dyes.
2. **PT/Reserve Tank:** Reserve requires temperature water for the next process.
3. **Mixing Tank:** Ensure mixing and dosing of chemical-water.
4. **Main Pump:** Ensure liquor circulation and monitoring the whole dyeing process.
5. **Heat Exchanger:** Control the temperature of the dyeing process.
6. **Filter:** Filter the water during drain out from the dye bath.
7. **Dosing Tank and Valve:** Help proper dosing of dyes & chemicals during dyeing.
8. **Nozzle:** Help loading and unloading of fabrics.
9. **Steam Valve:** Control the flow of steam during dyeing.

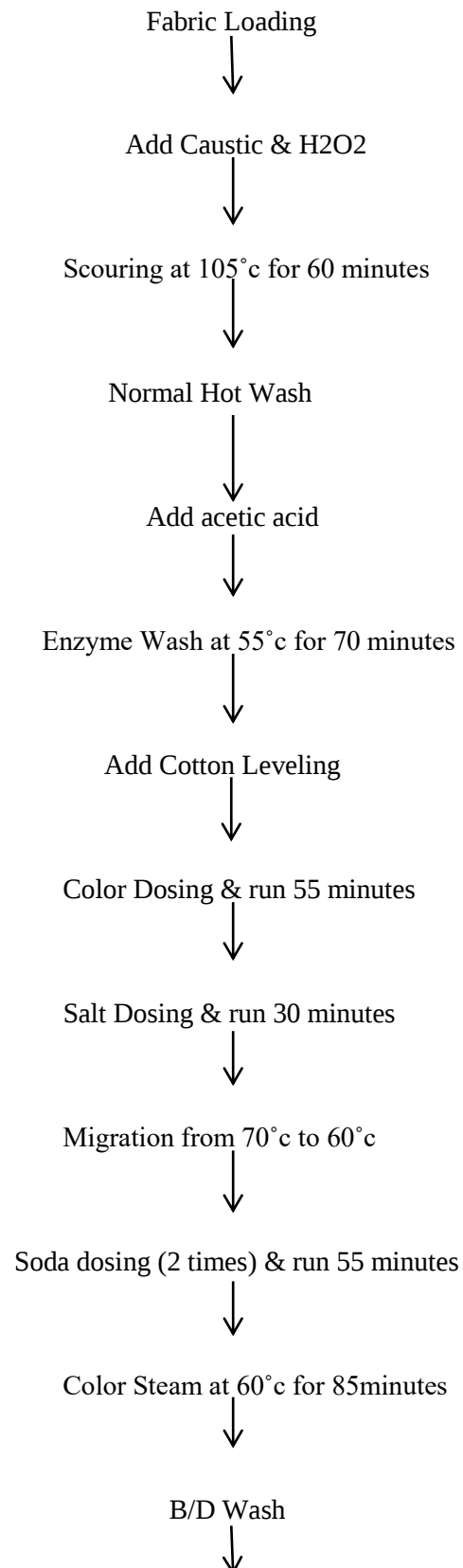
4.4.9 Bulk Dyeing process in AKH Knitting and Dyeing Ltd:

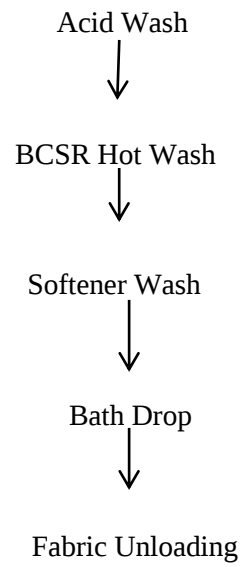
4.4.9.1 Red Color Process:





4.4.9.2 Green color process:





4.4.10 Dyeing Process is done in There stage:

- 1. Pre-treatment:**
 - i. Scouring
 - ii. Neutralization
 - iii. Bio-polishing
- 2. Dyeing**
- 3. After Treatment:**
 - i. Washing
 - ii. Neutralization
 - iii. Fixation
 - iv. Softening

4.4.11 Dyeing Faults and their remedies:

1. Uneven Dyeing:

Causes:

- I. Uneven Pre-treatment
- II. Improper color dosing
- III. Lack of control and using Dyes of high fixation properties

Remedies:

- I. By ensuring perfect pre-treatment
- II. Ensuring proper color dosing
- III. Ensuring proper control of m/c and dye fixation

2. Crease Mark:

Causes:

- I. Higher m/c speed
- II. Improper reel speed and pump pressure
- III. Stress cooling of synthetic materials

Remedies:

- I. Using higher liquor ratio
- II. Ensure proper reel speed and pump pressure
- III. Slowly rising and cooling temperature

3. Dye Spot:

Causes:

- I. Improper dissolve of dyes and chemicals

Remedies:

- I. Ensuring proper dissolving of dyes and chemicals
- II. Using a mesh strainer for removing un-dissolved dyes and chemicals

4. Batch to Batch Shade variation:

Causes:

- I. Dyes lot variation
- II. Improper reel speed, pump speed, and liquor ratio
- III. Variation of temperature and weight of dyes and chemicals

Remedies:

- I. Use standard dyes and chemicals
- II. Maintain proper reel speed, liquor ratio
- III. Ensure same temperature and dyeing time for all batch

5. Roll to roll variation:

Causes:

- I. Hardness of water
- II. Improper m/c speed
- III. Poor migration of dyes

Remedies:

- I. Use soft water
- II. Maintain proper m/c speed

6. Softener Mark:

Causes:

- I. Unsuitable softener mixing
- II. Enlargement of fabric during softener application
- III. The improper running time of fabric during softener solution

Remedies:

- I. Proper reel and pump speed
- II. Ensure suitable softener mixing

Chapter: 05

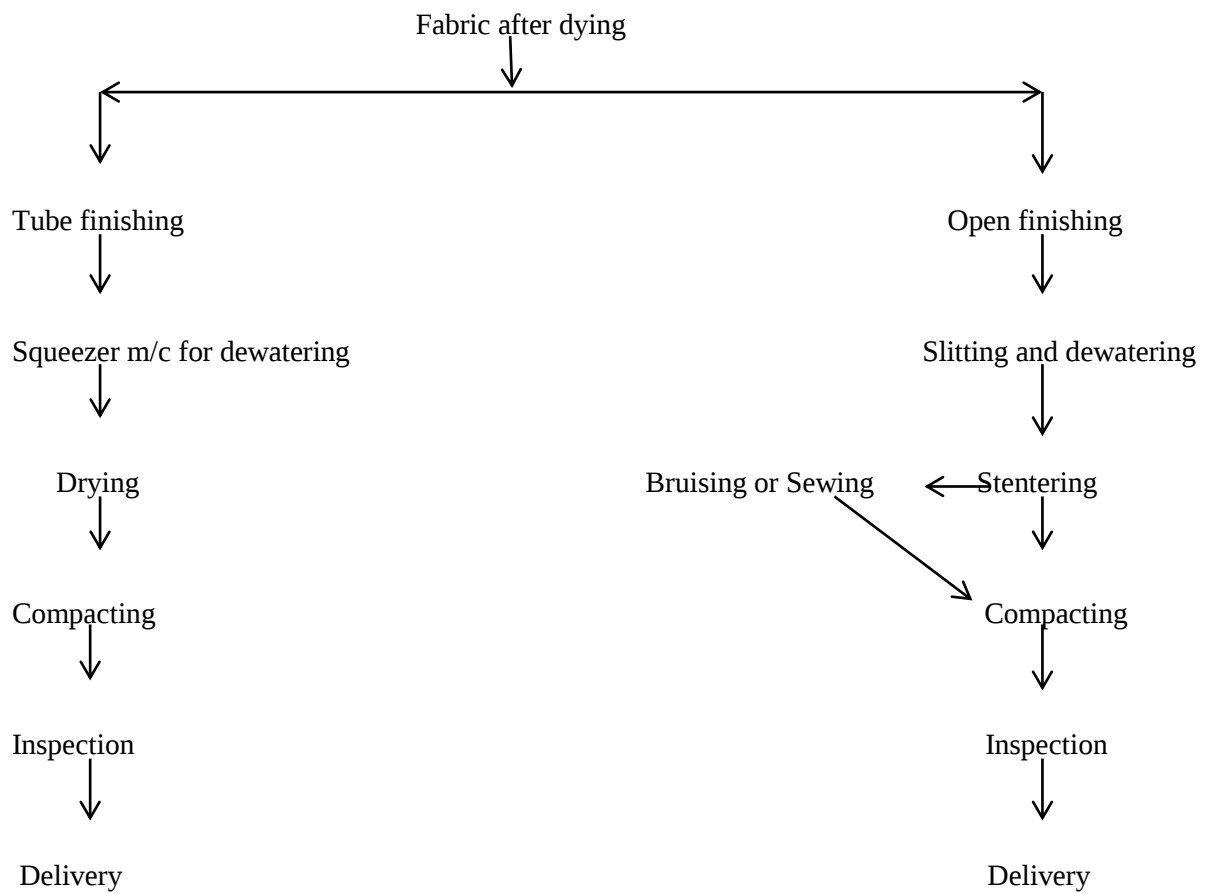
FINISHING SECTION

5.1 About Finishing: Finishing means the treatment of textiles fabrics or yarns after dyeing or printing. It improved lifetime, durability, look, performances and hand feel of the finished textiles. Finishing may be done physically or chemically. After dyeing fabrics contain huge water on it so it needs to remove. In finishing fabric GSM, diameter, shrinkage etc. are controlled and drying the fabric.

5.2 Finishing objectives:

- I. Improve fabric appearance
- II. Improve hand feels, the luster of fabric surfaces
- III. Ensure accurate GSM, the diameter of the fabric
- IV. Remove or minimize fabrics faults after dying
- V. Ensure accurate color shade and other properties
- VI. Increase serviceability
- VII. Improve special properties of fabrics like-waterproof, Flame retardant etc.

5.3 Finishing process flow chart:



5.4 Finishing machine specification:

Machine No : 01 Machine Type : Fabric Squeezer m/c Brand : SANTEX Origin : Switzerland Model : CH-9555 TOBEL Year Built : 2003	Machine No : 03 Machine Type : Tube Compactor m/c Brand : TUBE-TEX Origin : USA Model : PAK-NIT ii-DELTA PLUS-SP
Machine No : 02 Machine Type : Belt Dryer m/c Brand : SANTEX Origin : Switzerland Model : CH-9555 TOBEL Year Built : 2018	Machine No : 04 Machine Type : Henry Industrial Laundry Extractor Brand : HON YING Origin : China Model : SHE-28 M/C No. : 93926

Machine No : 05

Machine Type : Whole Plant Extractor

Brand : SHENG MEEI

Origin : Taiwan

Model : CH-9555 TOBEL

Year Built : 2003

Machine No : 06

Machine Type : Slitting m/c (01)

Brand : BIANCO

Origin : Italy

Model : EVE 0800220

Year Built : 2010

Machine No : 07

Machine Type : Stenter m/c (01)

Brand : TTM (Teknik Tekstil Makine)

Origin : Turkey

Model : S260068

Year Built : 2009

Serial : MRM 131

Machine No : 08

Machine Type : Compactor m/c (01)

Brand : TAXEN

Origin : Italy

Model : KSA 500 Runner

Serial : 10KS02787

Machine No : 09

Machine Type : Tumble m/c (01)

Brand : SHENG MEEI

Model : TMBI-125

Origin : Turkiye

Year Built : 2009

Serial : 4178-T

Machine No : 10

Machine Type : Tumble m/c (02)

Brand : SHENG MEEI

Origin : Turkiye

Model : TMBI-125

Year Built : 2009

Serial : 4179-T

Machine No : 11

Machine Type : Brushing m/c

Brand : HAS

Origin : Turkiye

Model : RCM EVO111 H2400

Year Built : 2009

Serial : 2284-T

Machine No : 12

Machine Type : Suiding m/c (01)

Brand : HAS

Origin : Turkiye

Model : CSM EVO111 H2200

Year Built : 2009

Serial : 3CSM 041-T

Machine No : 13 Machine Type : Fabric Relaxing m/c Brand : Nixtex Origin : UK Serial : 18-BD-AKH-1 Machine No : 14 Machine Type : Line Slitting m/c (02) Brand : BIANCO Origin : Italy Year Built : 2013 Serial : TELTP00230F6520 Max. Speed : 80 m/min	Machine No : 15 Machine Type : Tension less Slitting m/c (03) With enzyme washing Brand : BIANCO Origin : Italy Model : RW 2600× FW 2400 Year Built : 2017 Serial : TELTP00181K0787 Max. Speed : 80m/min Machine No : 16 Machine Type : Stenter m/c (02) Brand : BRUCKNER Origin : Germany Model : Power-Frame VN SEP 26/8 Year Built : 2013 Serial : 4.3804.00 Max. Drying temp.: 210°c
---	--

Machine No : 17

Machine Type : Stenter m/c (03)

Brand : MONFRONTS

Origin : Germany

Model : MATEX6000Finish/MONTEX
8500

Year Built : 2017

Serial : 40.A83581

Machine No : 18

Machine Type : Compactor m/c (02)

Brand : FERRARO Spa

Origin : Italy

Model : Comptex-RE-2800

Year Built : 2017

Serial : 6358

Machine No : 19

Machine Type : Compactor m/c (03)

Brand : LAFER Spa

Origin : Italy

Model : KSA500

Year Built : 2013

Serial : 10KSO 3548

Machine No : 20

Machine Type : Fabric Folding m/c

Brand : SUNTECH

Origin : China

Model : SI-FKIM-03-240

Year Built : 2015

Serial : 15241BB

Machine No : 21

Machine Type : Fabric Inspection m/c

Brand : NITEX

Origin : UK

Serial : 18-BD-AKH-2

5.5 The working procedure of different finishing machine: Finishing procedure of the dyed fabrics in AKH Knitting & Dyeing Ltd. Are done by some machines like-

1. Squeezer m/c
2. Dryer m/c
3. Compactor m/c
4. Slitting m/c for open fabric
5. Stenter m/c for open fabric

1. **Squeezer m/c:** Squeezer machine is called as dewatering machine in which water and another liquor hold in dyed fabric removed comparatively high pressure. Two padders or roller is used to apply appropriate compression of the fabrics. It should be careful when stress applied to the fabrics because high compression may alteration the light and standard shades. Silicon softener and Ciba-CWS softener is used in squeezer m/c to create the finished fabrics smooth and soft.

2. **Dryer m/c:** The fabrics after from the squeezer m/c are wet. It is delivered through the dryer machine to eliminate free wetness. Dryer use in AKH Knitting & Dyeing Ltd. has two chambers. Temperature, speed, and other factors are fully computer controlled. Air delivered by two blowers from the reverse side of the burners is blown the fire and create the chamber hot. The fabrics flow through the conveyer belt. IR camera is used to control-

- I. The hotness of the dryer.
- II. Fabrics movement speed
- III. Fabrics exist heat
- IV. Machine speediness
- V. Measuring the moisture.

3. Slitting m/c for open fabric:

The function of the Machine:

- I. Used to take away extra water after dying.
- II. It can control the thickness of fabric and GSM and shrinkage by overfeeding mechanism.
- III. To open the tube fabric by the knife and prepared for Stenting
- IV. Before pressing balloon is made with the support of compressed air passing by a Nozzle or air spray.

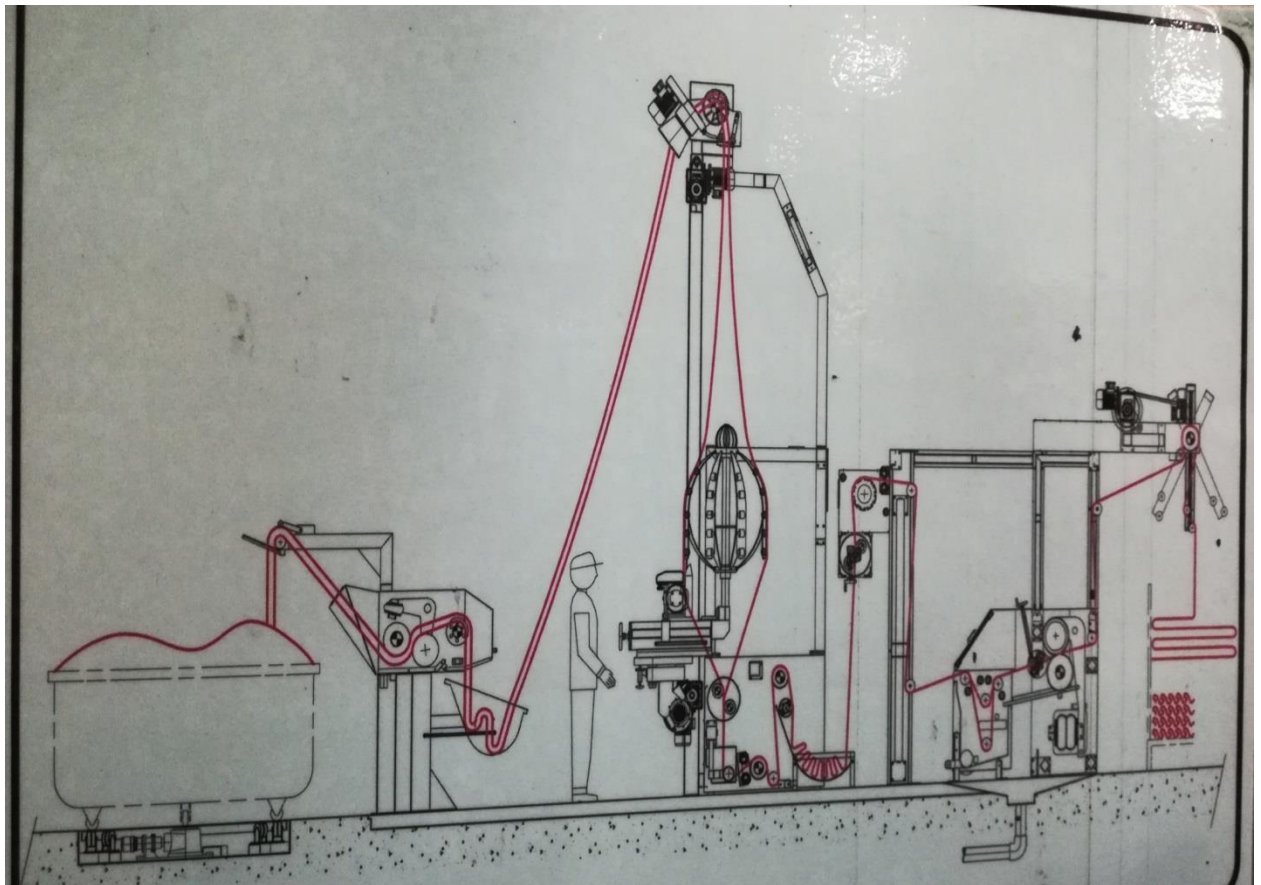


Figure: Passage diagram of slitting m/c

Important parts name of slitting m/c are:

- I. Squeezer
- II. De-twister
- III. Rotary Knife
- IV. Overfeeding wheels
- V. Folding device
- VI. Rubber coated Padder
- VII. Mini padder

4. Stenter m/c for open fabric:

The function of stenter m/c:

- I. Drying of fabric
- II. Shrinkage controlling
- III. Heat setting
- IV. Width controlling
- V. Finishing chemical application.
- VI. Moisture control
- VII. Diameter controlling

Stenter Machine

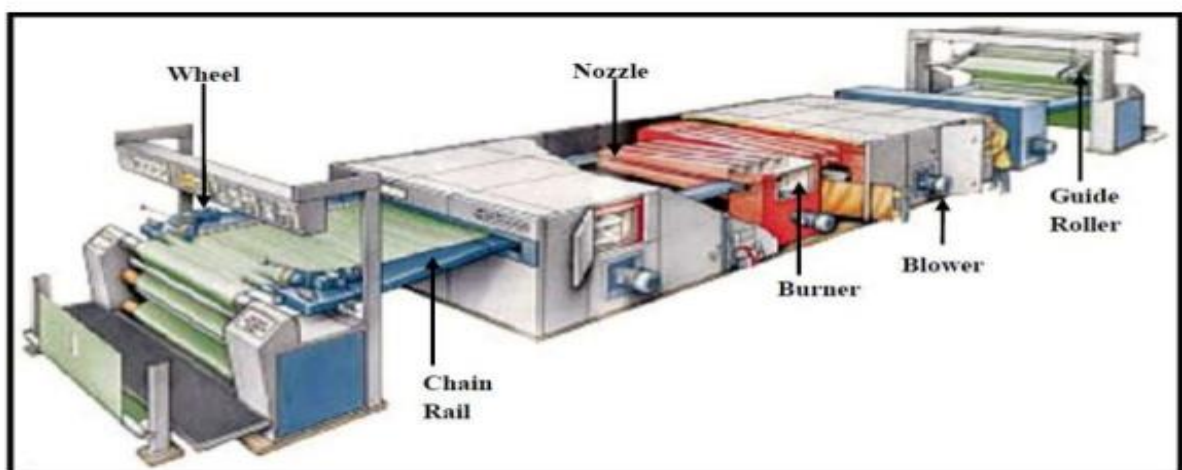


Figure: Stenter m/c

Main parts of the machine:

- i. Feed zone
- ii. Fixing device
- iii. Chemical padding zone
- iv. Squeezing roller
- v. Chemical dish
- vi. Bowing control zone
- vii. Bending roller
- viii. Chain entry
- ix. Straightening roller device
- x. Sensors
- xi. Brush roller
- xii. Drying area
- xiii. Gas burner
- xiv. Refrigeration zone
- xv. Delivery

CHAPTER 06

OTHER SECTIONS

6.1 Printing: The term of printing has come from a Latin word which means pressing. It indicates a procedure that uses pressure. Textile printing is one type of localized dyeing where dyes or pigments & chemical are applied by any technique which can create a specific effect of color on fabric according to the design. So we can say, Applying decorated patterns and designs to a finished fabric is called Printing.

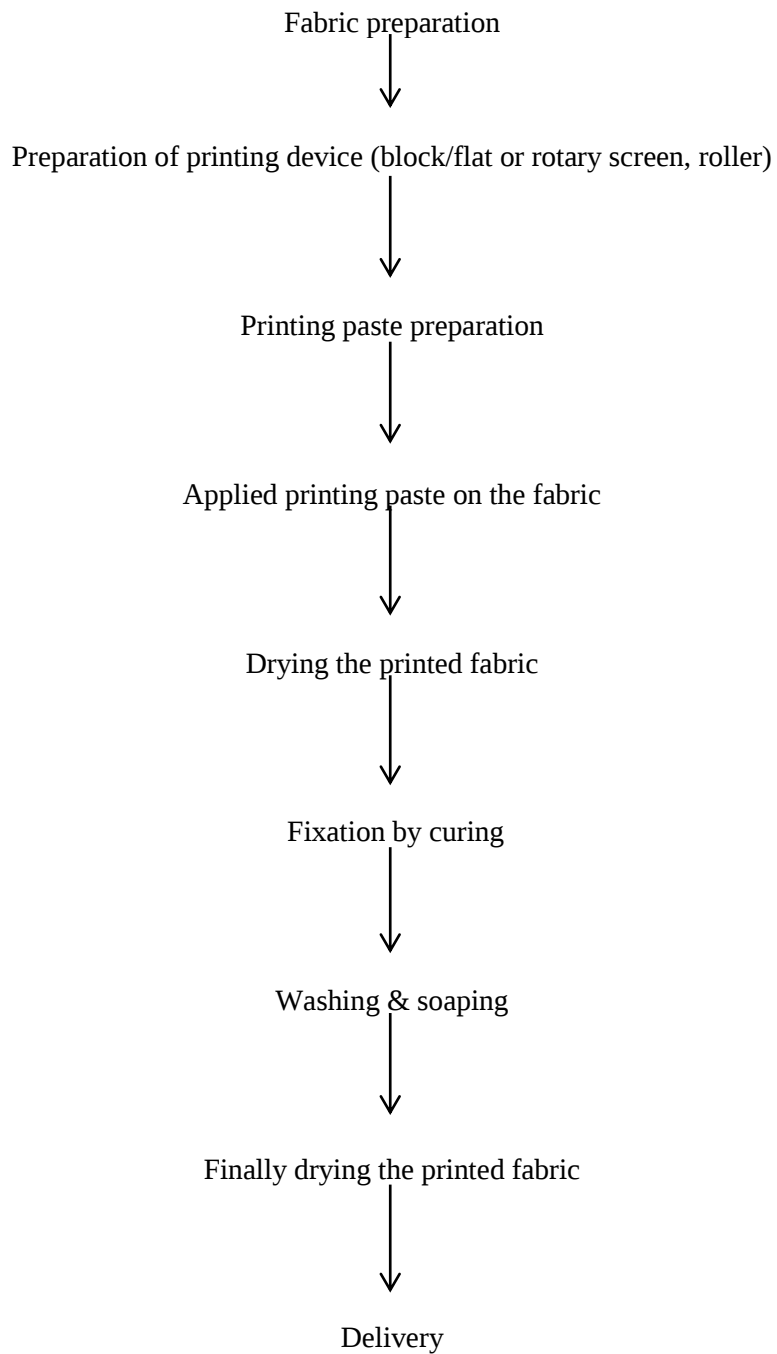
6.1.1 Main methods of textile printing are:

- I. Block printing
- II. Roller printing
- III. Screen printing
- IV. Heat transfer printing

6.1.2 Styles of printing at AKH Knitting & Dyeing Ltd. are:

- I. Rubber printing
- II. Pigment printing
- III. Puffs printing
- IV. Glitter printing
- V. Foil printing
- VI. High density(HD) printing
- VII. Crack printing
- VIII. Discharge printing
- IX. Pearls printing

6.1.3 Process flowchart of textile printing:



6.1.4 Printing m/c specification:

Machine No: 01

M/c Type : Printing Dryer
 Brand Name : TRANSMATIC
 Model No : 346
 M/c serial No : 65100
 Connecting voltage : 400V/50/60Hz
 Control voltage : 53000 W
 Year build : 2017

Machine No: 02

M/c Type : Printing Dryer
 Brand Name : TRANSMATIC
 Model No : TMCR 600
 M/c serial No : 40451
 Connecting voltage : 380/400 V A/C 50Hz
 Control voltage : 11500 W
 Year build : 2016

Machine No: 03

M/c Type : MS- Printing(JP-7)
 Model No : MS-JP 7 All Paper
 M/c serial No : 3418-01017
 Connecting voltage : 400V/50/60Hz 3 ϕ
 Control voltage : 220V/24V DC
 Max. current : 80 A
 Year build : 2017

Machine No: 04

M/c Type : MS-Printing(JP-4)
 Model No : MS-JP 4
 M/c serial No : 3418-02-17
 Connecting voltage : 380/400 V A/C 50Hz 3 ϕ
 Control voltage : 24V A/C
 Max. current : 32 A
 Year build : 2017

Machine No: 04

M/c Type : Automatic oval & Digital screen
 printing machine(CNTOP)
 Model No : D10L
 M/c serial No :1611021
 Voltage :3 phase380/440 Volt+N+PE 220V
 50Hz 3 ϕ
 Control voltage : 24V DC
 Max. current : 130 Amp
 Total power : 201 KW
 M/C r.p.m : 0-40
 Made in : China
 Year build : 2016

Machine No: 05

M/c Type : Automatic Printing m/c
 Brand : M&R
 Model No : SCHQRT557038350
 M/c serial No :423127372
 Connecting voltage :3phase 380/415 V A/C
 50Hz
 Control voltage : 27V A/C
 Max. current : 27 Amps
 Year build : 2018

Machine No: 06

M/c Type : Octopass Printing m/c(01)
 Brand : M&RPrinting m/c/0300
 Model No :KBLBI14110806201150M
 M/c serial No :PL021803305D
 Connecting voltage :220/240 V A/C 50/60Hz
 Control voltage : 5A
 Year build : 2018

Machine No: 07

M/c Type : Actopass Printing m/c(02)
 Brand : M&RPrinting m/c/0301
 Model No :KBLBI14110806201150M
 M/c serial No :PL021803305D
 Connecting voltage :220/240 V A/C 50/60Hz
 Control voltage : 5A
 Year build : 2018

Machine No: 08

M/c Type : Actopass Printing m/c(03)
 Brand : M&RPrinting m/c/0302
 Model No :KBLBI14110806201150M
 M/c serial No :PL021803305D
 Connecting voltage :220/240 V A/C 50/60Hz
 Control voltage : 5A
 Year build : 2018

Machine No: 09

M/c Type : Belt curing m/c
 Brand : Fine Art
 Model :T2000-4C110BL
 M/c serial No :BL9A141
 Connecting voltage :3Phase 440 V 50Hz
 Made in : Taiwan
 Year build : 2009

Machine No: 10

M/c Type : Heat Pressing m/c
 Brand : ASKME
 Model No :TIRD-3C318
 M/c serial No :BS504038-13
 Connecting voltage : 3Phase 440 V 50Hz
 Made in : Taiwan
 Year build : 2017

6.1.5 Photos of some textile printing m/c:



Figure: Automatic Printing m/c



Figure: Octopus printing m/c



Figure: Belt curing m/c



Figure: Heat Pressing m/c

6.1.6 Printing Chemicals Used at AKH Knitting & Dyeing Ltd. are:

AKH Knitting and Dyeing Ltd. Inventory Status Report as on 25-Nov-18			AKH Knitting and Dyeing Ltd. Issue Summary Report by Job from 24-Nov-18 to 24-Nov-18		
Sl. No	Product	Qty. Unit	Sl. No	Product	Qty. Unit
CHEMICAL			Printing		
1	ANTI TACK B-7	214.000 KG	1	BEZAPRINT RED HBB	0.250 KG
2	ASULAK SILVER 7	110.000 KG	2	BOLTING CLOTH MESH- 130	5.000 YDS
3	ASUPRINT E FOSFOR FF	120.000 KG	3	COLORMATCH CITRON 102 GOT	0.400 KG
4	ASUPRINT E LUXOR	240.000 KG	4	Daco/Swan (Aica)	2.000 LITRE
5	Aquasol TS	3.000 KG	5	Dutex Green DA-G (AF)	0.200 KG
6	CHEMLUB PTIS-S CONC	16.000 KG	6	FLORITEX FHR	1.200 KG
7	CHT POWDER TS	5.000 KG	7	GLITTER SILVER	2.000 KG
8	Crack Binder 812(N)	50.000 KG	8	HS-161C	3.000 KG
9	Daco/Swan (Aica)	234.000 LITRE	9	NK Binder R-5 HN	10.000 KG
10	FLORITEX FHR	130.200 KG	10	NK COUPER EL-594-HN	3.000 KG
11	FOIL GUM	6.000 KG	11	NK Plaster EH-HN	10.000 KG
12	GLITTER GOLDEN	3.500 KG	12	NK RESIN ST-60HN	5.000 KG
13	GLITTER GOLDEN AFSON	164.000 KG	13	OXAL EC	5.750 KG
14	GLITTER PINK	44.600 KG	14	PRINTPERFEKT BLANC FF	3.000 KG
15	GLITTER SILVER	6.200 KG	15	Photocure TXR	1.000 KG
16	GLITTER SUGER(M-15)	30.000 KG	16	RYUDYE-W FIXER CN	0.250 KG
17	GLITTER Silver Afson	206.000 KG	17	TUBASSIST FIX 104W	0.350 KG
18	GLITTER Turquoise Blue	1.000 KG	18	White NR -101 HN	2.000 KG
19	HARDENER (A+DL)	42.000 KG	Printing Total		54.400
20	HS-1009	770.000 KG	Printing-2		
21	HS-161C	293.500 KG	1	FLORITEX FHR	2.600 KG
22	HS-A10	70.000 KG	2	HS-161C	3.000 KG
23	HS-B11	860.000 KG	3	NK Binder R-5 HN	2.000 KG
24	HS-B52D	756.000 KG	4	NK COUPER EL-594-HN	2.000 KG
25	HS-B52W	490.000 KG	5	NK Plaster EH-HN	7.000 KG
26	MET ORANGE POWDER	5.650 KG	6	OXAL EC	1.750 KG
27	MET RED POWDER	4.350 KG	7	RYUDYE-W BINDER TP-M1	5.000 KG
28	MET WHITE POWDER	2.000 KG	8	SILVER FOIL - 2(high)	1.000 ROLL
29	Matsumin Stretch Clear 301 SC	1.409.000 KG	9	TRANSLAC BOND 55	5.000 KG
30	Matsumin Stretch White 301 SW	891.500 KG	10	TUBASSIST FIX 104W	0.200 KG
31	NK Binder R-5 HN	300.000 KG	11	White NR -101 HN	2.500 KG
32	NK COUPER EL-594-HN	3.040.000 KG	Printing-2 Total		32.050
33	NK COUPER NR-351HN	825.500 KG	Grand Total		86.450
34	NK Plaster EH-HN	1.493.000 KG	AKH Knitting and Dyeing Ltd. Issue Summary Report by Job from 25-Nov-18 to 25-Nov-18		
35	NK RESIN ST-60HN	673.000 KG	Sl. No	Product	Qty. Unit
36	NK SKY RESIN SP - 37HN	150.000 KG	Printing		
37	ORIENT NR- 251 HN	2.793.000 KG	1	BEZAPRINT BLUE RR/BT	0.100 KG
38	OXAL EC	981.000 KG	2	BEZAPRINT YELLOW RR	0.750 KG
39	PLASTIC SOLD- OIL	1.000 KG	3	BOLTING CLOTH GLITTER MESH	5.000 YDS
40	PLASTIC SOLD- WHITE	2.000 KG	4	BOLTING CLOTH MESH- 130	15.000 YDS
41	PLS CLEAR	5.000 KG	5	COLORMATCH CITRON 102 GOT	0.350 KG
42	PRINTGEN EG - 1026	150.000 KG	6	Daco/Swan (Aica)	2.000 LITRE
43	PRINTPERFEKT BLANC FF	614.500 KG	7	HARDENER (A+DL)	1.250 KG
44	PRINTPERFEKT CLEAR FF	1.411.000 KG	8	HS-161C	2.000 KG
45	PRINTPERFEKT DC FF	25.000 KG	9	Matsumin Stretch Clear 301 SC	16.000 KG
46	PRINTPERFEKT DC FF WHITE	7.000 KG	10	Matsumin Stretch White 301 SW	6.000 KG
47	Photocure TXR	65.500 KG			
48	RUBBER JELL(PT-500)	45.000 KG			
49	RYUDYE-W BINDER NF-03E	42.000 KG			
50	RYUDYE-W BINDER TP-M1	799.000 KG			
51	RYUDYE-W BINDER TR-TOP	40.000 KG			
52	RYUDYE-W FIXER CN	72.000 KG			
53	RYUDYE-W KN CLEAR SP-01	363.000 KG			
54	RYUDYE-W PAL Binder M-20ENF	16.000 KG			

55	SEIKAPASTE VA 1000 PC	1,059.000 KG	11	NK Binder R-5 HN	10.000 KG
56	SEIKAPASTE VA 1600 PW	1,352.000 KG	12	NK COUPER EL-594-HN	16.000 KG
57	SFX 001 ScreenFix Adhesiv	144.000 KG	13	NK COUPER NR-351HN	1.500 KG
58	SFX002 ScreenFix Catalyst	7.300 LITRE	14	NK Plaster EH-HN	11.000 KG
59	THICKENER FS 2000	15.500 KG	15	ORIENT NR- 251 HN	10.000 KG
60	TRANSLAC BOND 55	522.000 KG	16	OXAL EC	7.750 KG
61	TUBASSIST FIX 104W	65.150 KG	17	Photocure TXR	6.000 KG
62	TUBVINYL 270 FF	302.000 KG	18	RYUDYE-W BINDER TP-M1	10.000 KG
63	TUBVINYL 270 FF WHITE	401.000 KG	19	RYUDYE-W FIXER CN	0.250 KG
64	WHITE NR-151HN	588.500 KG	20	SEIKAFIX BLACK FLI CONC.	1.100 KG
65	White NR -101 HN	2,201.000 KG	21	SEIKAFIX RED FL3G CONC	2.800 KG
CHEMICAL Total		27,748.450	22	SEIKAFIX VIOLET FL3R	0.100 KG
CLOTH FOIL PAPER			23	SFX 001 ScreenFix Adhesiv	2.000 KG
1	BOLTING CLOTH GLITTER MESH	13.000 YDS	24	SFX002 ScreenFix Catalyst	0.150 LITRE
2	BOLTING CLOTH MESH- 110	520.000 YDS	25	WHITE NR-151HN	1.500 KG
3	BOLTING CLOTH MESH- 12	30.000 MITRE	26	White NR -101 HN	5.000 KG
4	BOLTING CLOTH MESH- 130	5,195.000 YDS	Printing Total		133.600
5	BOLTING CLOTH MESH- 16	44.000 MITRE	Printing-2		
6	BOLTING CLOTH MESH-90M	430.000 YDS	1	NK COUPER EL-594-HN	2.000 KG
7	BOLTING DPP43T-80 WHITE(GWI)	840.000 MITRE	2	NK Plaster EH-HN	7.000 KG
8	BOLTING DPP61T-64 WHITE(GWI)	576.000 MITRE	3	ORIENT NR- 251 HN	1.000 KG
9	BOLTING DPP77T-55 WHITE(GWI)	248.000 MITRE	4	OXAL EC	1.000 KG
10	GOLDEN FOIL (Super)	8.000 ROLL	5	SEIKAFIX BLACK FLI CONC.	0.250 KG
11	MULTI FOIL	3.000 ROLL	6	TUBASSIST FIX 104W	0.100 KG
12	Pallet Paper	180.000 MITRE	7	White NR -101 HN	1.000 KG
13	SILVER FOIL - 2(high)	306.000 ROLL	Printing-2 Total		12.350
14	TRANSFER PAPER	2,200.000 MITRE	Grand Total		145.950
15	Violet Foil	2.000 ROLL			
CLOTH FOIL PAPER Total		10,595.000			
DYES					
1	BEZAFLOUR ORANGE RS-NF	28.000 KG			
2	BEZAFLOUR PINK	2.000 KG			
3	BEZAFLOUR YELLOW BS-NF	18.000 KG			
4	BEZAPRINT BLACK GOT	25.250 KG			
5	BEZAPRINT BLUE GOT	12.000 KG			
6	BEZAPRINT BLUE RR/BT	10.450 KG			
7	BEZAPRINT NANY GOT	19.750 KG			
8	BEZAPRINT ORANGE GOT	2.500 KG			
9	BEZAPRINT RED HBB	12.500 KG			
10	BEZAPRINT VIOLET KB	4.900 KG			
11	BEZAPRINT YELLOW RR	56.150 KG			
12	COLORMATCH CITRON 102 GOT	182.650 KG			
13	Dutex Green DA-G (AF)	15.500 KG			
14	Dutex Orange DA-RR(AF)	9.000 KG			
15	Dutex Turquoise Blue DA - BN (AF)	12.000 KG			
16	Ryudye-W Rubine FF2B	67.000 KG			
17	SEIKAFIX BLACK FLI CONC.	202.150 KG			
18	SEIKAFIX NAVY BLUE FL3R CONC	6.500 KG			
19	SEIKAFIX PEACOCK Blue FL3G Conc	4.000 KG			
20	SEIKAFIX RED 3R-D	58.950 KG			
21	SEIKAFIX RED FL3G CONC	298.600 KG			
22	SEIKAFIX VIOLET FL3R	9.900 KG			
23	SW-112 GREEN	13.000 KG			
24	SW-113 RED	2.000 KG			
25	SW-117 PINK	19.900 KG			
26	SW-128 BLUE	5.250 KG			
27	SW-137 RUBINE	11.000 KG			
DYES Total		1,108.900			
Grand Total		39,452.350			

6.2 Boiler: Boiler is a closed pot / mechanical device in which water is transformed into steam by the application of heat. In AKH Knitting & Dyeing Ltd. fire tube boiler is used where flows outside the tubes and hot products of the burning of fuel (flame or hot gases) pass through the tube. It is three pass, low-pressure steam boiler (since steam pressure < 20 kg). Steam is used in Dyeing, Compacting & garments for ironing.

6.2.1 Specification of the boiler which is used at AKH Knitting & Dyeing Ltd. are:

M/c type	: Marshall C Boiler	M/c type	: Shellmax 3-pass smoke boiler
Brand	: Forbes Marshall	Brand	: Thermax
Origin	: India	Origin	: India
Serial No	: JNM -891	Model	: SM 80B/10.54/10
Mfg. Serial no	: JNM .07.838	Mfg. Serial no	: JNM .07.838
Evaporation	: 6300kg/hr.	Evaporation	: 8000kg/hr.
Working pressure	: 10.55kg/sq.Cm(G)	Working pressure	: 10.3 bar
Hyd. test pressure	: 15.83kg/sq.Cm(G)	Connection volt.	: 3phase 380V 50 Hz
Year built	: 2008	Fuel	: Naturel Gass
		Year built	: 2003

The main objectives of the boiler are to producing steam and the steam are used in the industries like-

- I. For controlling temperature during dyeing, finishing, printing
- II. The steam is used for heat during laundering the finished fabrics

CHAPTER 07

CONCLUSION & DISCUSSION

7.1 Conclusion:

At the end of my B.Sc. (Eng.) programme on "TE" from Daffodil International University. It is important to minimize the difference between practical and theoretical knowledge. I am very pleased to get a chance to do my industrial internship project work in a renowned company as AKH Knitting & Dyeing Ltd. As a developing country to improve in industrial sector textile industries give Bangladesh lightly in the dark. One of the industrial sectors which are controlling our national economic improvement is a textile sector. As we have many hard working people only industrial

Development can play a significant change in our economic development.

Textile dyeing or wet processing is a very important & critical procedure where the success depends on completing the required color shade and quality of the finished fabric. Quality of dyeing & finishing is directly connected to the quality of chemicals are used to process. There are much wet processing plants in Bangladesh. Most of them use various chemicals and coloring materials that are imported. If we would have as many chemical plants to manufacture textile chemical and dyestuffs in Bangladesh then we will be able to save huge money. We have a lot of skilled people and also have a chance to set up chemicals manufacture plant but we need to take a real step. Only a right thinking and good application of our resources can help us to manufacture textile chemicals & dyestuff which will provide us with more profit.

AKH Knitting & Dyeing Ltd. is one of the upgrading textile composite industries. The raw materials are yarn, chemicals, and dyestuff but finish product is readymade garments. It has a good installment of different equipment and instrument. Up-to-date technology is used in the dyeing section. Most of their dyeing machines are imported from Switzerland, Greece, and China. Fully computerize PLC control machines name "SCHOOL", "SCALAVOS" & "FONGS" are used to dyeing various type of knit fabric.

The company has a good exercise in high-class management. It has a team of highly trained stuff and workers. Their product quality is well valued by many European buying companies. The factory is located in a beautiful place with good communication to Dhaka. It has own power generation station, good water treatment plant. They have well apparatus for quality control of dyed fabric but they have not well equipment for quality control of various chemicals and dyestuff. So if there are any problems in chemicals or dyestuff they are not easily predicated about it. Time requirement for dyeing of each batch depends on the skill of stuff and workers but there is not a technique to determine the time requirement before dying. Suitable steps taking in time management can moderate the time consumption hence increase productivity. Though I got some problems I was really pleased with the authority of AKH Knitting & Dyeing Ltd. All of the officers and stuff so much cordial with me. Their cordial help in understanding many hard and critical phenomena really influenced me. I shall never forget their unbelievable help.

In two month training period I have learned a lot of things of knit dyeing which was not familiar to me. Such long duration training made me self-confident on how to serve a industry as a textile Engineer. The practical knowledge that I have achieved is will be very helpful in my future life. So, I like to thank the authority of AKH Knitting & Dyeing Ltd.

7.2 There are some suggestions from me within my limited knowledge:

- I. The dyeing floor is wet most of the time: it should be cleaned all the time.
- II. To increase overall efficiency, more skilled labor should be used.
- III. The m/c stoppage time should be evaluated and minimized.
- IV. The maintenance should be carried out when the m/c is out of action (wherever possible) and should be maintenance routine regularly.
- V. There should be built a yarn dyeing project.
- VI. The sitting arrangement of production officers should be improved.

7.3 Limitations of the Report:

- I. I didn't have the chance to work in the lab. So in spite of having the facility, I could not get the chance to learn about it.
- II. Because of the privacy act, the data on costing and marketing activities have not been provided in details.
- III. In spite of my limited time, I could not study in detail.
- IV. Some of the points in the different chapter are not described as these were not available.
- V. The whole process is not possible to fix in such a small frame as this report, therefore my effort spent on brief them.

I tried my best to collect all essential information but it is true that within this short time it is fairly difficult to achieve 100% success but as a whole, this industrial training was a Satisfactory one and once again I would like to thank the authority of AKH Knitting and Dyeing Ltd. as well as our honorable teachers for their great help and advice. I am blessed enough that I have got an opportunity to have training in this industry. During the training time, I have received enough co-operation and friendship from the authority and all persons. All staff and officers were very sincere and devoted their duties to achieve their goal.