



Daffodil
International
University

Faculty of Engineering
Department of Textile Engineering

Course Code: TH-519

Course Title: Thesis

**Analysis of Defect in Dyeing & Finishing Department: A
Study in Comfit Composite Knit Ltd.**

Submitted by:

Md. Shajal Shekh

ID: 193-32-408

Department of Textile Engineering
Faculty of Engineering
Daffodil International University

Supervisor by:

Mr. Tanvir Ahmed Chowdhury

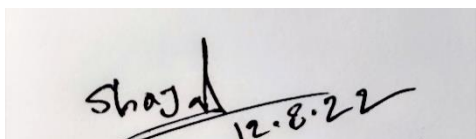
Assistant Professor
Department of Textile Engineering
Faculty of Engineering
Daffodil International University

This report submitted in partial perfection of the requirements for the degree of
Master of Science in Textile Engineering

Fall 2022

DECLARATION

I hereby declare that, the research work of this Thesis has been conducted by me under the supervision of **Mr. Tanvir Ahmed Chowdhury**, Assistant Professor Department of Textile Engineering. Faculty of Engineering, Daffodil International University. I also declare that neither this thesis report nor any part of it has been submitted elsewhere for award of any degree or diploma.



Md. Shajal Shekh

ID: 193-32-408

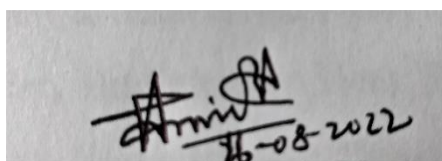
Department of Textile Engineering

Daffodil International University

LETTER OF APPROVAL

Titled of the thesis Analysis of Defect in Dyeing & Finishing Department: A Study in Comfit Composite Knit Ltd.

This thesis report prepared by Md. Shajal Shekh bearing ID: 193-32-408 is approved in Partial Fulfilment of the Requirement for the Degree of MASTER OF SCIENCE IN TEXTILE ENGINEERING. This student has completed his thesis work under my supervision. During the research period I found his sincere, hardworking and earnest. The whole report is prepared based on proper investigation and interpretation though critical analysis of data with required belongings.



A handwritten signature in black ink, appearing to read 'Tanvir Ahmed Chowdhury', with the date '26-08-2022' written below it.

Mr. Tanvir Ahmed Chowdhury

Assistant Professor

Department of Textile Engineering

Faculty of Engineering

Daffodil International University

ACKNOWLEDGEMENT

Firstly, I express my gratefulness to almighty Allah for his blessing makes us possible to complete this thesis work successfully.

I am grateful to my supervisor **Mr. Tanvir Ahmed Chowdhury**, Assistant Professor Department of Textile Engineering, Faculty of Engineering, Daffodil International University. Deep knowledge and keen interests of my supervisor in the field of textile dyeing and finishing influenced us to carry out the thesis work. His endless patience, scholarly guidance, continual encouragement, energetic supervision, constructive criticism, valuable advice, reading many inferior drafts and correcting these at all stages have made it possible to complete this thesis. for his fruitful guidance, criticism, painstaking help, constant inspiration and for providing all necessary support for completing this project. I also like to thank **Dr. Md. Mahbubul Haque**, Professor and Coordinator, Research & Industrial Collaboration Department of Textile Engineering for his necessary advice, guidelines and cordial supervision to conduct the research work and to accomplish this thesis report.

I would like to express my thanks to **Mr. Md. Mominur Rahman**, Assistant Professor & Head (In-Charge), Department of Textile Engineering, Faculty of Engineering, Daffodil international University for his kind help to finish my thesis report. I would like to express my thanks to **Prof. Dr. Md. Zulhash Uddin**, Dean BUTex, for providing us necessary information to complete the report on time.

I would like to take this opportunity to thank all those people who helped me in this thesis and special thanks to **Shanto Bessha**, Executive, **Md. Jahangir Alom**, Sr. Manager, Department of IE & Planning, **Tanmoya Kumer Gope**, Executive, **Nazmul Hasan Himel**, Manager, Department of Dyeing, Comfit composite knit ltd. who was related with the thesis at the beginning by boosting his guideline and suggestions which helped me a lot.

Finally, I would like to express a sense of gratitude to our beloved parents and friends for their mental support, strength and assistance throughout writing the thesis report. I like to thank all respected teachers of the Department of Textile Engineering, DIU for their insightful information, advice and suggestions.

***THIS PROJECT REPORT IS
DEDICATED TO OUR BELOVED
PARENTS***

ABSTRACT

The main purpose of this research work was to know the defects and problems in dyeing and finishing department. The entire research work was done in Comfit Composite Knit Ltd. It was collected the data of defects and problems in dyeing and finishing department for one year. Then the data was analyzed critically. Efficiency mainly depends on the machine running time in a shift. During this study, it was found that machine downtime depends on some important factors such as batch problem, trolley problem, lab problem, schedule maintenance, breakdown maintenance, air problem, water problem, steam problem, power problem and others. The defects of the department were also analysed similarly. It was also tried to identify and to provide remedy suggestions for dyeing and finishing problems.

Table of Contents

Contents	Page No
DECLARATION	i
LETTER OF APPROVAL	ii
ACKNOWLEDGEMENT	iii
ABSTRACT.....	v
LIST OF CONTENTS	Vi-Viii
LIST OF FIGURES	ix
LIST OF TABLES	x
Chapter-01: Introduction (1-3)	
1.1 Background of the work	2
1.2 The Specific Objectives of this study	3
Chapter-2: Literature Review (4-20)	
2.1 Dyeing	5
2.1.1 Types of Dyeing	5
2.1.2 Yarn Dyeing	5
2.1.3 Woven Dyeing.....	5
2.1.4 Knit dyeing.....	6
2.2 There are mainly three dyeing processes	6
2.2.1 Continuous dyeing process.....	6
2.2.2 Semi-continuous dyeing process	6
2.2.3 Batch dyeing process.....	7
2.3 Pigment	7
2.4 Pre-treatment	8
2.5 Binder	9
2.6 Dyes.....	10
2.6.1 Acid Dyes.....	11
2.6.2 Natural Dyes.....	12
2.6.3 Basic Dyes.....	13
2.6.4 Synthetic Dyes	13
2.6.5 Direct Dyes.....	13
2.6.6 Disperse Dyes.....	13
2.6.7 Sulphur Dyes	13
2.6.8 Pigment Dyes	14

2.6.9 Mordant Dyes	14
2.6.10 Vat Dyes	14
2.6.11 Reactive Dyes	14
2.6.12 Macromolecular Dyeing	16
2.6.13 Metalized Dyes	16
2.6.14 Naphthol Dyes	16
2.6.15 Developed Dyes	16
2.6.16 Azo Dyes	16
2.7 Dyeing Floor Machine stoppage machinery problem	17
Batch Problem	17
Trolley Problem	17
Lab Problem	17
Schedule Maintenance	17
Breakdown Maintenance	17
Air Problem	17
Water Problem	17
Steam Problem	17
Power Problem	17
2.7.1 Various type Machine Breakdown Problem	17
2.8 Dyeing & Finishing faults	17
2.10 Color fastness	18
2.11 Grey scale	19
2.11.1 Color change grey scale	19
2.11.2 Degree of staining grey scale/ Color staining grey scale	19

Chapter-3: Methodology (21-39)

3.1 Material	22
3.2 Methods	22
3.2.1 Batch section in Textile	22
3.2.3 Batch Processing Flow Chart	23
3.3 Cotton Dyeing Mechanism	24
3.3.1 Cotton Dyeing Flow Chart	26
3.3.2 Cotton Dyeing Recipe	27
3.4 The Polyester dyeing is considered to take place in the following simultaneous steps	27
3.5. Polyester Dyeing Flow Chart	28
3.5.1 Polyester Dyeing Recipe	29
3.5.2 Stage of Dyeing	29

3.5.3 Standard Time for Dyeing.....	30
3.5.4 Right First Time Dyeing (RFT)	31
3.5.5 Benefits of RFT dyeing	31
3.6 Picture Dyeing floor and Finishing section	32
3.7 Various type of Picture attachment dyeing stoppage problem	34
3.7.1 Different type faults	36
3.8 Goal setting And Action step for Dyeing efficiency in 2022	37
3.9. Goal setting And Action step for Water consumption Lt/Kg in 2022	38
3.9.1 How will achieve goal and action and step	38
3.10 Goal setting And Action step for Water consumption Lt/Kg in 2022	39
3.10.1 How will achieve goal and action and step	39
Chapter-4: Discussion of Results (40-60)	
4.1 Dyeing Problem and faults found in Comfit Composite Knit Ltd.	41
4.2 Common problem Monthly Occurred Comfit Composite Knit Ltd.....	42
4.3 Common problem One year Occurred Comfit Composite Knit Ltd.....	43
4.4 Defect of finished fabric in 2021.....	47
4.4.1 Department wise One year Occurred Defects diagram.....	48
4.4.2 Faults of finished fabric by Detective Quality control Department data'2021.....	49
4.4.3 Common Faults Based on total inspection One year Occurred Defect %	50
4.4.4 RFT Bulk to Bulk Monthly Data.....	51
4.4.5 RFT Lab to Bulk Monthly Data	52
4.4.6 Report on Re Work % of Monthly Analysis	53
4.4.7 Process Loss Monthly Data.....	54
4.5 Dyeing Monthly All Summary Status	55
4.6 Dyeing fault and finishing faults causes & Remedies	56
4.6.1 I found less dyeing and finishing faults if I follow the following way	58
4.7 Many Problems of Machinery.....	59
4.7.1 If we want to reduce the dyeing machine stop then we have to follow the instructions.....	59
Chapter-5: Conclusion (60-64)	
5.1 Conclusion.....	61
Reference	63

List of Figures

Figure No.	Title of the Figure	Page No.
Figure 3.4.3	Standard Time for Dyeing in Comfit composite knit ltd.	30
Figure 3.6.1	Image of Inspection Table.	32
Figure 3.6.2	Image of Inspection Light box	33
Figure 3.6.3	Image of Finish Fabric	33
Figure 3.7	Picture attachment	34-35
Figure 3.8.1	Goal setting And Action step for Dyeing efficiency in 2022	37
Figure 3.9.1	Goal setting And Action step for Water consumption in 2022	38
Figure 3.10.1	Goal setting And Action step for Re-Process in 2022	39
Figure 4.1.1	Column diagram representing Monthly Total dyeing machinery stoppage problem found in Comfit Composite Knit Ltd.	42
Figure 4.1.2	Pie diagram representing one year dyeing machinery stoppage problem found in Comfit Composite Knit Ltd.	43
Figure 4.4.1	Column diagram representing Department wise One year Occurred Defects in Comfit Composite Knit Ltd.	48
Figure 4.4.3	Column diagram representing one-year Total dyeing & finishing faults found in Comfit Composite Knit Ltd.	50

List of Tables

Table No	Title of the Table	Page No
Table 2.7.1	Various type Machine Breakdown Problem	17
Table 2.11	Fastness grade explanation of grey scale for color change and color staining	20
Table 3.3.2	Cotton Dyeing Recipe	27
Table: 3.5.1	Polyester Dyeing Recipe	29
Table 3.5.2	Stage of Dyeing	29
Table 3.5.3	Shade wise SAH (Standard Allowed Hour) for Dyeing	30
Table 4.1	Monthly Dyeing machinery stoppage problem data found in Comfit Composite Knit Ltd.	41
Table 4.4	Defect wise finish fabric	47
Table 4.4.2	Faults wise finish fabric Defect % comparison based on Garments QC data'2021	49
Table 4.4.4	RFT Bulk to Bulk	51
Table 4.4.5	RFT Lab to Bulk	52
Table 4.4.6	Report on Re Work %	53
Table 4.4.7	Process Loss	54
Table 4.5	Dyeing Monthly Summary Status-2021	55

CHAPTER-1

INTRODUCTION

Charterer-1

Introduction

1.1 Background of the work:

Dyeing is the process of adding color to textile products like fibers, yarns, and fabrics. Dyeing is normally done in a special solution containing dyes and particular chemical material. After dyeing, dye molecules have uncut chemical bond with fiber molecules. The temperature and time managing are two key factors of dyeing.

Production is the process of converting raw materials or inputs into finished products or products in a manufacturing process. In other words, it means creating something from basic input. Productivity in economics measures output per unit of input, such as labor, capital, or any other resource. It is often calculated for the economy as a ratio of gross domestic product (GDP) and working hours.

Batch is a process, monitored and supervised in the batching section by the dyeing manager. This involves preparing a batch for dyeing on the basis of machine capacity (so that an equal amount of fabric passes through each nozzle of a dyeing machine), order and priority. Gray fabric is collected from the gray fabric storage or knitting department to color a certain shade of color.

Here only knit dyeing is happening. Here only one type of dyeing machine that was winch dyeing machine. During knit dyeing process, some dyeing parameters should be adjusted according to form of products- lower GSM and higher GSM garments need the dyes with better migration properties, higher dyeing temperature, lower liquor ratio and careful circulation of goods. Many problems are related with it, most commonly tailing problem such as shade variation along the length of the fabric. Sometimes listing shade variation from side-to-side, center to right, and left of width of the fabric is also a problem.

There are many types of problems in the Knit Dyeing section and the cause of stoppage dyeing machinery and faults. stoppage reason Batch Problem, Trolley Problem, Lab Problem, Schedule Maintenance, Breakdown Maintenance, Air Problem, Water Problem, Steam Problem, Power Problem, Others and faults Color spot, uneven shade, Running shade, Oil spot, Crease mark, foreign yarn, Chemical mark, Hole mark etc.

1.2 The Specific Purpose of this study:

The broad purpose of the research is to find out the causes and remedies of various types of problems and stoppages in dyeing machinery and causes and remedies of efficiency and production interruptions in the knit dyeing industry.

The specific objectives of this study are mainly to-

- To know about how to find out the remedies of faults.
- To know the result of different types of dyeing machinery stoppage and faults on knit dyed fabric.
- To Find out which reason is most responsible for wasting the most time.
- To know about how we can remove or reduce these dyeing machinery stoppage and faults.
- To determine which machine wastes more time during production.
- To determine about how we can recover the productivity and quality of the processed fabrics.

CHAPTER-2

LITERATURE REVIEW

Chapter-2

Literature Review

2.1 Dyeing:

Dyeing is the process of adding color to textile products like fibers, yarns and fabrics. Dyeing is normally done in a special solution containing dyes and particular chemical material. After dyeing, dye molecules have uncut chemical bond with fiber molecules the temperature and time monitoring are two key factors in dyeing. There are mainly two classes of dye, natural and man-made. The primary source of dye, historically, has generally been nature, with the dyes being extracted from animal or plants.

2.1.1 Types of Dyeing:

Dyeing are three types,

- Knit Dyeing
- Woven Dyeing
- Yarn Dyeing

2.1.2 Yarn Dyeing:

Yarn dyeing is very popular for making stripe effects in fabrics and it's approved out in different form like hank, package or beam.

2.1.3 Woven Dyeing:

Woven fabrics are possible to dye with same principle in different form of dyeing machine such as jet dyeing machine. During Woven dyeing process, some dyeing parameters should be familiar according to form of products- heavy GSM garments need the dyes with better migration properties, higher dyeing temperature, lower liquor ratio & careful circulation of goods.

2.1.4 Knit dyeing:

Knit fabrics dyeing in batch process is very common in which dyeing machine. Piece dyeing is approved out open-width or rope form in depending on machine type, product type & end use. Usually, these materials are dyed in exhaust dyeing method in a single dyeing machine with different structure.

2.2 There are mainly three dyeing processes:

These are:

1. Continuous dyeing process,
2. Semi-continuous dyeing process,
3. Batch dyeing process,

2.2.1 Continuous dyeing process:

According to Industry Assessments Continuous dyeing is a popular dyeing method and accounts for around 62% of total yardage of the products that are dyed. A Continuous dyeing process typically consists the following. Dye application, dye fixation with heat or chemicals and finally washing. Continuous dyeing has been found to be most suitable for woven fabrics [1].

2.2.2 Semi-continuous dyeing process:

In the process of semi-continuous dyeing, the dyeing process consists of pad-batch, pad- jig, pad-roll the fabric is first saturated with the dye-liquor in, what is called a padding machine. Then it is subjected to batch wise treatment in a jigger. It could also be stored with a slow rotation for some hours. In the pad-batch this treatment is done at room temperature while in pad-roll it is done at increased temperature by employing a heating chamber. This helps in fixation of the dyes on to the fiber. After this fixation process, the material in full width is thoroughly cleansed and rinsed in continuous washing machines. There is only one point of difference between Continuous and semi-continuous dyeing process is that in semi-continuous dyeing, the dye is applied continuously by padding. The fixation and washing remaining discontinuous [1].

2.2.3 Batch dyeing process:

Batch Dyeing Process is the most popular and common method used for dyeing of textile materials. Batch dyeing is also sometimes referred to as Exhaust dyeing. This is because in this process, the dye gets slowly transferred from a comparatively large volume dye bath to the substrate or material that is to be dyed. The time taken is also longer. The dye is meant to 'exhaust' from dye bath to the substrate. In batch processes, textile substrates can be easily dyed at any stage of their assemblage into the desired textile product. This includes fiber, yarn, fabric or garment. Some type of batch dyeing machines can function at temperatures only up to 1000^oC. For example, cotton, rayon, nylon, wool etc. can be dyed at 1000^oC or lower temperatures. While polyester and some other synthetic fibers are dyed at 1000 Centigrade or even higher temperatures. There are three general types of batch dyeing machines. The first type is the one where there is circulation of fabric. Second type is the one where the dye bath gets circulated while the material that is being dyed remains stationary, and finally the third type where both the bath and material to be dyed gets circulated. Examples of dyeing machines that utilizes batch dyeing process are Beck, Jet, Jigs, Beam Package dyeing machines etc. [1].

2.3 Pigment:

A pigment is a material that changes the color of reflected or transmitted light as the result of wavelength-selective absorption. This physical process differs from fluorescence, phosphorescence, and other forms of luminescence, in which a material emits light [2].

Pigments are insoluble coloring matter mostly inorganic and organic have been used for the coloration of metal wood, stone, and textile material. Pigments have no direct affinity to textile fibers. They are fixed on textile materials with the help of a binding agent in form of a thin invisible Coating. Acranium, Acron, Aquabond, Aquaprint, Helizarine, Imperon, Noepralae, Seabond, lifebond, Syntrofixetc are the mostly used pigments in textile industries [3].

Classification of Pigments:

1 Organic:

Dyes converted into pigments.

- i. Dyes made insoluble by precipitation on substrates.
- ii. Vat dyes converted into pigments.

- 1.1 Azo pigments
- 1.2 Phthalocyanine pigments.
- 1.3 Quinacridone pigments.
- 1.4 Iso-indoline pigments.

2. Inorganic:

- a. White pigments.
- b. Colored inorganic pigment.
- c. Ultramarine pigments.
- d. Cadmium pigments.
- e. Iron oxides pigments.

2.4 Pre-treatment:

Pre-treatment is a heart of processing of textile. In Pre-treatment, all these impurities are removed and fabric is taken to a stage where it is more absorbent and whiter and can be easily processed further. The process which is done to make the textile materials suitable for dyeing and printing is called pre-treatment [4].

There are several processes that are under pre-treatment. These are:

1. Bleaching,
2. De-sizing,
3. Mercerizing etc.
4. Scouring,
5. Singing,

1. Bleaching: It is used to remove the natural color from the fiber.

2. De-sizing: It is used to remove the size material from the woven fabric.

3. Mercerizing: It is the process by which textile fibers become more lustered and softer.

4. Scouring: It is used to remove the impurities from the surface of the fiber.

5. Singing: It is used to remove the projecting fibers from the surface of the fabric.

After these processes textile fibers are ready for dyeing and printing. For this reason, pre-treatment is called heart of textile processing.

2.5 Binder:

Binders are film forming substances which play an important role in achieving optimum fastness properties. Pigments have no affinity towards textile materials. So actually pigment particles are sticker on the surface of the fabric. Binders are those adhesive type coating forming polymeric materials which sticks pigment particle on fiber/fabric surface. It forms a very thin invisible film on fabric surface during curing. Under these film pigment particles are remain sticker.

There are various types of binder. These are listed below:

1. According to origin:

There are two types of binder-

A. Natural binder

B. Synthetic binder

2. According to chemical groups:

There are two types of binder-

C. IG binder

D. AG binders

Binders play a most important role in pigment dyeing. Without binder pigment dyeing is not thinkable. It holds the dye molecules on the surface of the fabric. For this reason, pigment can be applied to all types of fabric [5].

2.6 Dyes:

Dyes are Substances that add color to textiles. They are incorporated into the fiber by chemical reaction, absorption, or dispersion. Dyes differ in their resistance to sunlight, perspiration, washing, gas, alkalis, and other agents; their affinity for different fibers; their reaction to cleaning agents and methods; and their solubility and method of application [6].

Types of Dyes:

- ❖ Acid Dyes
- ❖ Azo Dyes
- ❖ Basic Dyes
- ❖ Developed Dyes
- ❖ Direct Dyes
- ❖ Disperse Dyes
- ❖ Macromolecular Dyes
- ❖ Metallized Dyes
- ❖ Mordant Dyes
- ❖ Naphthol Dyes
- ❖ Natural Dyes
- ❖ Pigment Dyes
- ❖ Reactive Dyes
- ❖ Sulphur Dyes
- ❖ Synthetic Dyes
- ❖ Vat Dyes

2.6.1 Acid Dyes:

A class of dyes used on wool, other animal fibers, and some manufactured fibers. Acid dyes are seldom used on cotton or linen since this process needs a mordant. Acid dyes are widely used on nylon when high wash fastness is required. In some cases, even higher wash fastness can be obtained by after treatment with fixatives [7].

Chemical structure of acid dyes:

These dyes are normally very complex in structure but have large aromatic molecules, having a sulphonyl or amino group which makes them soluble in water. Most of the acid dyes belongs to following three main structural molecules,

1. Anthraquinon type
2. Azo dye type
3. Triphenylmethane type.

Different types of acid dyes:

The basic dyes are classified into several groups, based on the levelling properties, economy of the dyeing and fastness properties, however generally these are classified into these three classes. Such as:

1. Neutral acid dyes:

These are supra milling or fast acid dyes, having medium to good wet fastness properties, some of the dyes have poor light fastness in pale shades. many of the dyes are used as self-shades only. These are applied to the fibre in a weakly acid or neutral PH.

2. Weak acid dyes:

These dyes belong to the milling class of dyes. These dyes have good fastness properties but light fastness is moderate to poor.

3. Strong acid dyes:

These dyes are applied in a strongly acidic medium and also called levelling dyes, however there wet fastness properties is a limitation. These dyes are very good to produce the combination shades.

Classification according to dyeing characteristics:

Acid dyes are commonly classified according to their dyeing behaviour, especially in relation to the dyeing pH, their migration ability during dyeing and their washing fastness. The molecular weight and the degree of sulphonation of the dye molecule determine these dyeing characteristics. The original classification of this type, based on their behaviour in wool dyeing, is as follows:

1. Fast acid dyes;
2. Level dyeing or equalising acid dyes;
3. Milling acid dyes;
4. Super-milling acid dyes.

Milling is the process in which a woollen material is treated, in weakly alkaline solution, with considerable mechanical action to promote felting. Dyes of good fastness to milling are essential to avoid colour bleeding during the process.

Properties of acid dyes:

Since these are sold as a sodium salt, therefore these form a large anion in the aqueous medium. The main properties of acid dyes are;

1. These dyes are anionic in nature.
2. These dyes are suitable for wool, silk, polyamide and modified acrylics.
3. These are applied from a strongly acidic to neutral pH bath.
4. These dyes have no affinity for cotton cellulose's, hence not suitable for cellulosic.
5. These dyes combine with the fibre by hydrogen bonds, Vander Waals forces or through ionic linkages.

2.6.2 Natural Dyes:

Direct Printing, it is the most common approach to apply a color pattern onto a fabric. If done on colored fabric, it is known as overprinting. The desired pattern is produced by pressing dye on the fabric in a paste form. To prepare the print paste, a thickening agent is added to a limited amount of water and dye is dissolved in it. Earlier starch was preferred as a thickening agent for printing. Nowadays gums or alginates derived from seaweed are preferred as they allow better

penetration of color and are easier to wash out. Most pigment printing is done without thickeners because the mixing up of resins, solvents and water produces thickening anyway.

2.6.3 Basic Dyes:

Basic dyes are water-soluble and are mainly used to dye acrylic fibers. They are mostly used with a mordant. A mordant is a chemical agent which is used to set dyes on fabrics by forming an insoluble compound with the dye. With mordant, basic dyes are used for cotton, linen, acetate, nylon, polyesters, acrylics and mod acrylics. Other than acrylic, basic dyes are not very suitable for any other fiber as they are not fast to light, washing or perspiration. Thus, they are generally used for giving an after treatment to the fabrics that have already been dyed with acid dyes.

2.6.4 Synthetic Dyes:

Synthetic dyes are classified based upon their chemical composition and the method of their application in the dyeing process.

2.6.5 Direct Dyes:

Direct dyes color cellulose fibers directly without the use of mordant. They are used for dyeing wool, silk, nylon, cotton, rayon etc. These dyes are not very bright and have poor fastness to washing although they are fairly fast to light.

2.6.6 Disperse Dyes:

Disperse dyes are water insoluble. These dyes are finely ground and are available as a paste or a powder that gets dispersed in water. These particles dissolve in the fibers and impart color to them. These dyes were originally developed for the dyeing of cellulose acetate but now they are used to dye nylon, cellulose triacetate, and acrylic fibers too.

2.6.7 Sulphur Dyes:

Sulfur Dyes are insoluble and made soluble by the help of caustic soda and sodium sulfide. Dyeing is done at high temperature with large quantities of salt so that the color penetrates into the fiber. After dyeing the fabric is oxidized for getting desired shades by exposure to air or by using chemicals. Excess dyes and chemicals are removed by thorough washing. These dyes are fast to light, washing and perspiration and are mostly used for cotton and linen.

2.6.8 Pigment Dyes:

Although pigments are not dyes in a true sense, they are extensively used for coloring fabrics like cotton, wool and other manmade fibers due to their excellent light fastness. They do not have any affinity to the fibers and are affixed to the fabric with the help of resins. After dyeing, the fabrics are subjected to high temperatures.

2.6.9 Mordant Dyes:

The mordant or chrome dyes are acidic in character. Sodium or potassium dichromate is used with them in the dye bath or after the process of dyeing is completed. This is done for getting the binding action of the chrome. They are mostly used for wool which gets a good color fastness after treatment with mordant dyes. They are also used for cotton, linen, silk, rayon and nylon but are less effective for them.

2.6.10 Vat Dyes:

Vat dyes are insoluble in water and cannot dye fibers directly. However, they can be made soluble by reduction in alkaline solution which allows them to affix to the textile fibers. Subsequent oxidation or exposure to air restore the dye to its insoluble form. Indigo is the original vat dye. These dyes are the fastest dyes for cotton, linen and rayon. They are used with mordant to dye other fabrics such as wool, nylon, polyesters, acrylics and mod acrylics.

2.6.11 Reactive Dyes:

Reactive dyes react with fiber molecules to form a chemical compound. These dyes, they are either applied from alkaline solution or from neutral solutions which are then alkalinized in a separate process. Sometimes heat treatment is also used for developing different shades. After dyeing, the fabric is washed well with soap so as to remove any unfixed dye. Reactive dyes were originally used for cellulose fibers only but now their various types are used for wool, silk, nylon, acrylics and their blends as well.

The dyeing mechanism of material with reactive dye takes place in 3 stages:

1. Exhaustion of dye in presence of electrolyte or dye absorption.
2. Fixation under the influence of alkali.
3. Wash-off the unfixed dye from material surface.

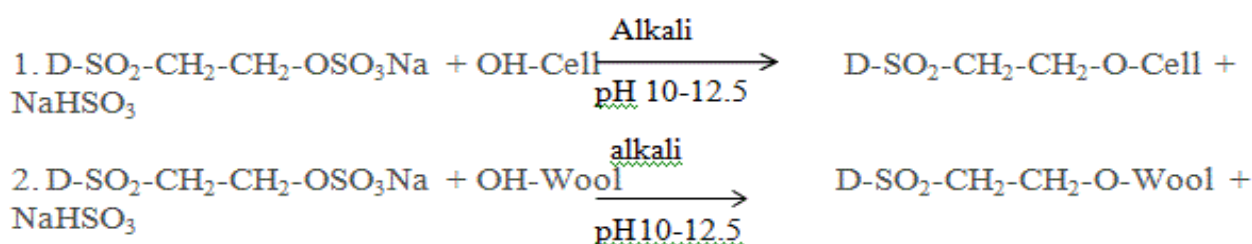
Now they are mentioned below;

1. Dye absorption:

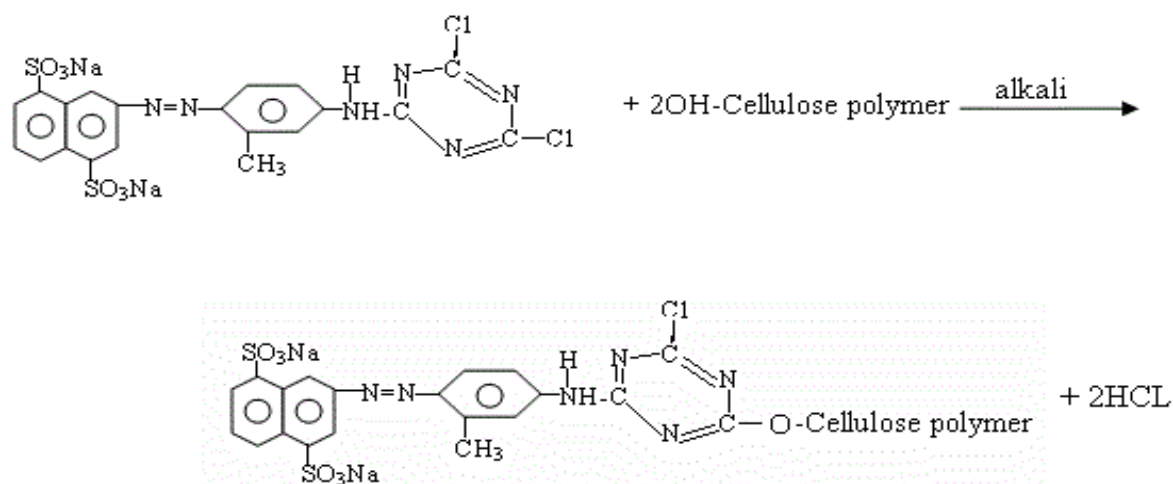
When fibre is immersed in dye liquor, an electrolyte is added to assist the exhaustion of dye. Here NaCl is used as the electrolyte. This electrolyte neutralize the negative charge formed in the fibre surface and places extra energy to increase dye absorption. So when the textile material is presenting to dye liquor the dye is exhausted on to the fibre.

2. Fixation:

Fixation of dye means the reaction of reactive group of dye with terminal –OH or-NH₂ group of fibre and thus forming strong covalent bond with the fibre and thus forming strong covalent bond with the fibre. This is an important phase, which is controlled by maintaining proper pH by adding alkali. The alkali used for this purpose depends on brand of dye and dyeing temperature. Here generally caustic soda, soda ash or NaHCO₃ is used as alkali depending upon reactivity of dye. They create proper pH in dye bath and do as the dye-fixing agent. The reaction takes place in this stage is shown below; [6]



3.



3. Wash-off:

As the dyeing is completed, a good wash must be applied to the material to remove extra and unfixed dyes from material surface. This is necessary for level dyeing and good wash-fastness. It is done by a series of hot wash, cold wash and soap solution wash.

2.6.12 Macromolecular Dyeing:

A group of inherently colored polymers. They are useful both as polymers and as dyes with high color yield. The chromophores fit the recognized CI classes, i.e., azo, anthraquinone, etc., although not all CI classes are represented. Used for mass dyeing, hair dyes, writing inks, etc.

2.6.13 Metalized Dyes:

A class of dyes that have metals in their molecular structure. They are applied from an acid bath.

2.6.14 Naphthol Dyes:

A type of azo compound formed on the fiber by first treating the fiber with a phenolic compound. The fiber is then immersed in a second solution containing a diazonium salt that reacts with the phenolic compound to produce a colored azo compound. Since the phenolic compound is dissolved in caustic solution, these dyes are mainly used for cellulose fiber, although other fibers can be dyed by modifying the process.

2.6.15 Developed Dyes:

Dyes that are formed by the use of a developer. The substrate is first dyed in a neutral solution with a dye base, usually colorless. The dye is then diazotized with sodium nitrate and an acid and afterwards treated with a solution of B-naphthol, or a similar substance, which is the developer. Direct dyes are developed to produce a different shade or to improve wash fastness or lightfastness.

2.6.16 Azo Dyes:

Dyes characterized by the presence of an azo group (-N=N-) as the chromophore. Azo dyes are found in many of the synthetic dye classes.

2.7 Dyeing Floor Machine stoppage machinery problem:

Major Reason Dyeing Floor Machine stoppage machinery problem:

1. Batch Problem
2. Trolly Problem
3. Lab Problem
4. Schedule Maintenance
5. Breakdown Maintenance
6. Air Problem
7. Water Problem
8. Steam Problem
9. Power Problem
10. Others

Table: 2.7.1 Various type Machine Breakdown Problem:

Machine Breakdown Problem			
Motor Problem	Gasket Problem	Dosing Motor Problem	Switch Problem
Level Indicator Problem	Filter Problem	Dosing Valve Problem	Addition Tank Problem
Filter Nut Problem	Cooling Valve Problem	Winch Problem	Steam Valve Problem
Operator Crisis	Nozzle Problem	Drain Valve Problem	Steam Motor Problem
Condense Line Problem	Tank Problem	Heat Exchanger Problem	Reserve Tank Problem
Monitor Problem	Reel Problem	Cooling Exchanger Problem	Rubber Stick Change
Main Pump Problem	High Pressure Problem	Main Valve Problem	Cooling Valve Problem
Pump Switch Problem	Safety Valve Problem	Power Stop Problem	Water Line Problem
steam silencer Problem	Flow Meter Problem	Water Level Problem	Stock Tank Problem
Programing set Problem	Steam Line Problem	Chemical Tank Problem	PLC Card Problem

2.8 Dyeing & Finishing faults:

Major dyeing faults which occur during dyeing are mentioned below:

1. Uneven Dyeing
2. Batch to Batch shade variation
3. Roll to roll variation or meter to meter shade variation

4. Crease mark
5. Dye spot
6. Softener Mark
7. Pin hole
8. Running shade
9. Oil spot
10. Lycra out
11. GSM Variation
12. Softener Mark
13. Pilling

2.9 Process loss: Process loss is one of the major problems in textile manufacturing industries. Due to process loss lots of problems are created such as wastage formation, less shipment, delay in shipment etc. Huge profit is hampered due to process loss. Generally, major portion of process loss occurs in dyeing and finishing. It's a tough challenge for a dye house to minimize the process loss as it directly effects on company's benefit and improvement. QC circle have taken a project to minimize the process loss. Through brainstorming, fish bone diagram and other tools we have tried to find out the root causes of process loss. After exploring the root causes, we have found out the best possible solutions. I accomplished the solutions for our company to advancement of it. Thus, we have been able to minimize process loss from 10.7% to 9.83% and saved 47,500 kg fabrics that worth around 2,37,500 US. Onwards, we hope that we will be able to minimize process loss as much as possible to uphold the dignity& further progress of our company.

2.10 Color fastness:

Color fastness is the resistance of the color to fade or bleed by some agencies like washing, light, water, chlorine, perspiration, ironing etc. [12].

According to the agencies tending to fade the color shade, color fastness considered in different types;

1. Color fastness to Light
2. Color fastness to Wash
3. Color fastness to Rubbing
4. Color fastness to Water
5. Color fastness to Perspiration
6. Color fastness to Sea-water
7. Color fastness to acid
8. Color fastness to alkalis
9. Color fastness to bleaches
10. Color fastness to mercerizing
11. Color fastness to cross-dyeing
12. Color fastness to anti-shrinkage treatment

2.11 Grey scale:

Grey scale is an empirical scale containing a series of pairs of neutrally colored chips, showing increasing contrast within pairs.

It is used visually to assess contrasts between the pairs of patterns. For example, in order to give numerical assessment of color changing and staining two sets of standard grey scales are used [13].

2.11.1 Color change grey scale

2.11.2 Degree of staining grey scale/ Color staining grey scale

Color change grey scale:

- These scales consist of 5 pairs of grey colored materials rated from 1-5.
- Number-5 has two identical greys.
- Whereas number-1 shows the greatest contrast.
- Number-2, 3, and 4 have intermediate contrasts.

After appropriate treatment, the treated and original specimens are kept side by side and the change in color of the treated specimen when compared to the original one is assessed and graded with reference to grey scale. When there is no change in color of the test specimen it would be classified as '5'. If there is a change it is then classified with the number of the scale that shows the same contrast as that between treated and original specimens.

Degree of staining grey scale:

A different set of grey scale is used for measuring staining. Fastness rating 5 shows by two identical white samples and rating 1 shows a white and grey sample. The other numbers show the geometrical steps of contrast between white and a series of grey. Here a piece of untreated, unstained cloth is compared with the treated sample which was in contact with the test dyed specimen during the staining test. Finally, this is compared with staining grey scale and thus a grading i.e. numerical assessment of degree of staining is given.

Table: 2.11 Fastness grade explanation of grey scale for color change and color staining

Fastness grade	Shade change of tested sample	Fastness quality	Staining of adjacent white sample
5	No change	Excellent	No staining
4	Slight loss in depth	Good	Very slight staining
3	Applicable loss	Fair	Moderate staining
2	Significant loss	Poor	Significant staining
1	Great loss in depth	Very poor	Deep staining

CHAPTER-3
METHODOLOGY

Chapter-3

Methodology

3.1 Material:

For this thesis work I took 10 various types of machine stoppage reason knit dyeing fabrics and 8 various types knit fabrics. Some of them are Batch Problem, Trolley Problem, Lab Problem, Schedule Maintenance, Breakdown Maintenance, Air Problem, Water Problem, Steam Problem, Power Problem, Others. Single jersey, Double jersey, Terry, Rib, Lycra, Single Lacoste, Double Lacoste, Pique fabric. Those fabrics had different parameters such as different GSM, Diameter, WPI, CPI and those fabrics constructed yarn count was also different.

3.2 Methods:

I'm note down the cause of the dyeing machine stoppage per day. Then I get some more problems as like Batch Problem, Trolley Problem, Lab Problem, Schedule Maintenance, Breakdown Maintenance, Air Problem, Water Problem, Steam Problem, Power Problem, Others. dyeing process completed then the dyeing fabric transported to the finishing section and then finishing process completed. In front of this machine have inspection table and a light box (tube light). Here finished fabric is passed over the inspection table and under the light box. I am observed dyeing and finishing fault of the finished fabric by using inspection table and light box. I am standing in front of inspection table for found dyeing and finishing faults per day. Then I get some different faults like as uneven shade, Crease mark, Oil spot, Dye spot, GSM variation, softener mark, Patta formation, needle mark, sinker mark, Lycra out, running shade, Pin hole, Slub, stitch missing etc. Here Pin hole, sinker mark, needle mark, dye spot, crease mark, uneven dyeing, Oil spot are comparatively more occurs then the other faults. Finally, I learnt how to minimize machine stoppage problem and dyeing and finishing faults.

3.2.1 Batch section in Textile:

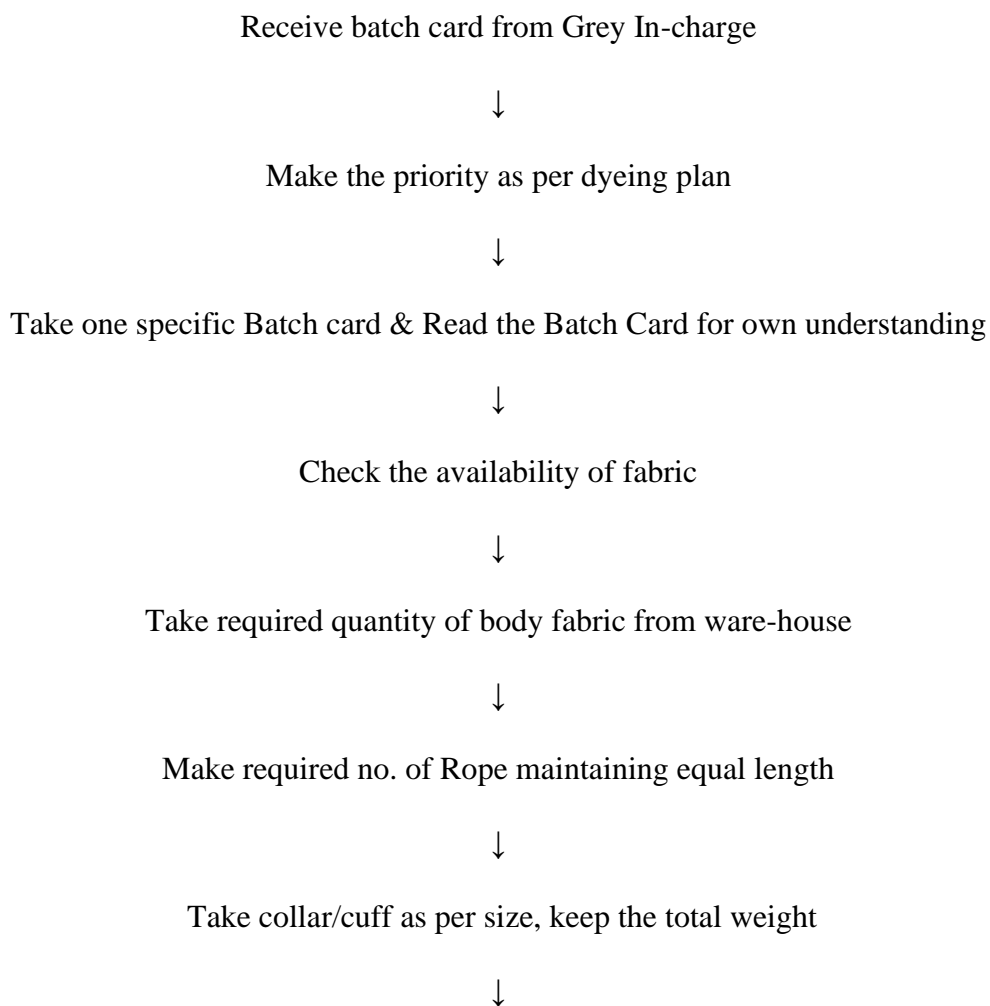
The batch section is a preparatory stage of dyeing. This is the receiving section of the gray fabric and the transmitting section of the gray fabric dyeing section which will color. Batching is the process of preparing fabrics that should be dyed and processed for a specific lot of a particular order.[22]

3.2.2 Function or purpose of the batch section:

Batching is the sending of the gray fabric to the receiving section and the dyeing section of the gray fabric which will dye. Batching is the process of preparing fabrics that should be dyed and processed for a specific lot of a particular order.[22]

- ❖ Roll-forming gray fabrics are obtained from the knitting section or other sources.
- ❖ Turning for gray fabric is done by turning machine if required.
- ❖ Prepare batches of fabric for dyeing according to the following criteria.
- ❖ To send the gray fabric with a batch card to the dyeing floor
- ❖ Keep records for each previous dyeing

3.2.3 Batch Processing Flow Chart:



Stitch the fabric



Write down the weight against roll no. in the back side of the Batch Card



Write the total weight in Batch card



Put signature and date & fill up the production report form

3.3 Cotton Dyeing Mechanism:

The dyeing mechanism of cotton with reactive dye takes place in 3 stages: -

1. Exhaustion of dye in presence of electrolyte or dye absorption.
2. Fixation under the influence of alkali.
3. Wash-off the unfixed dye from material surface.

Now they are mentioned below:

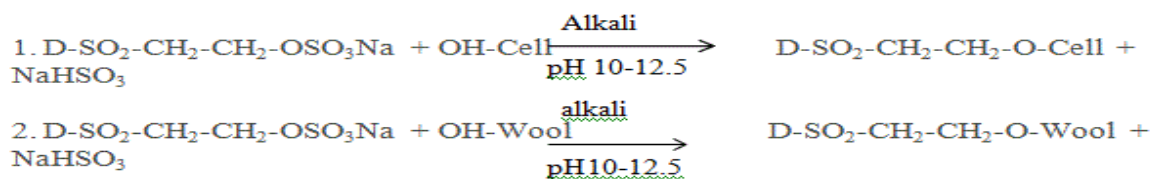
1. Dye absorption:

When fiber is immersed in dye liquor, an electrolyte is added to assist the exhaustion of dye. Here NaCl is used as the electrolyte. This electrolyte neutralizes the negative charge formed in the fiber surface and puts extra energy to increase dye absorption. So, when the textile material is introducing to dye liquor the dye is exhausted on to the fiber.

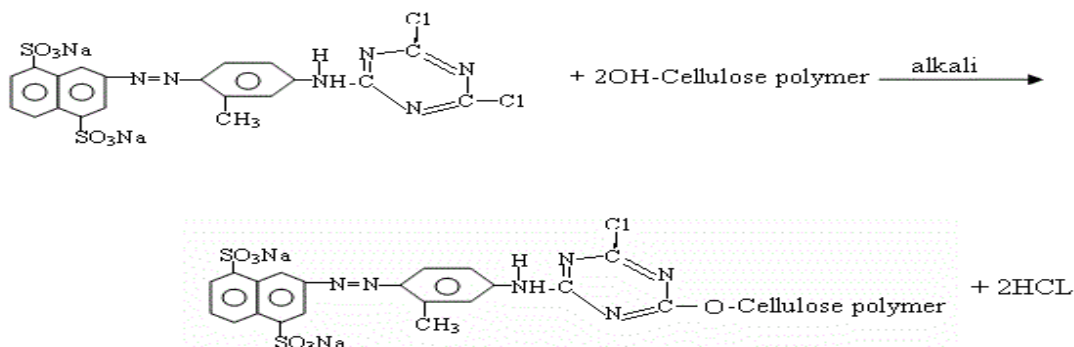
2. Fixation:

Fixation of dye means the reaction of reactive group of dye with terminal –OH or-NH₂ group of fiber and thus forming strong covalent bond with the fiber and thus forming strong covalent bond with the fiber. This is a most important phase, which is controlled by maintaining proper pH by adding alkali. The alkali used for this purpose depends on brand of dye and dyeing

temperature. Here generally caustic soda, soda ash or NaHCO₃ is used as alkali depending upon reactivity of dye. They create proper pH in dye bath and do as the dye-fixing agent. The reaction takes place in this stage is shown below;



3.



3. Wash off:

As the dyeing is completed, a good wash must be applied to the material to remove extra and unfixed dyes from material surface. This is compulsory for level dyeing and good wash-fastness. It is done by a series of hot wash, cold wash and soap solution wash [14].

3.3.1 Cotton Dyeing Flow Chart:

Collection of pre-treated samples



Set water level



Add leveling agent



Add dye solution



Add salt solution



Add soda ash solution



Add fabric sample



Raise the temperature to 60⁰ C



Run time for 30 minutes



Bath drop



Rinsing



Hot wash at 90⁰ for 10 minutes



Drying [21]

3.3.2 Cotton Dyeing Recipe:

SL	Process Parameter	Unit	Dossing	Stock Solution
01	Levelling Agent	g/L	1	1%
02	Sequestering Agent	g/L	1	1%
03	Reactive Red	%	0.5	1%
04	Reactive Yellow	%	0.5	1%
05	Reactive Blue	%	1	1%
06	Glauber Salt	g/L	40	15%
07	Soda Ash	g/L	10	10%
08	Sample Weight	Gm	5	---
09	M:L	-----	1:30	---
10	Temperature	°C	60	---
11	Time	Min	20	----

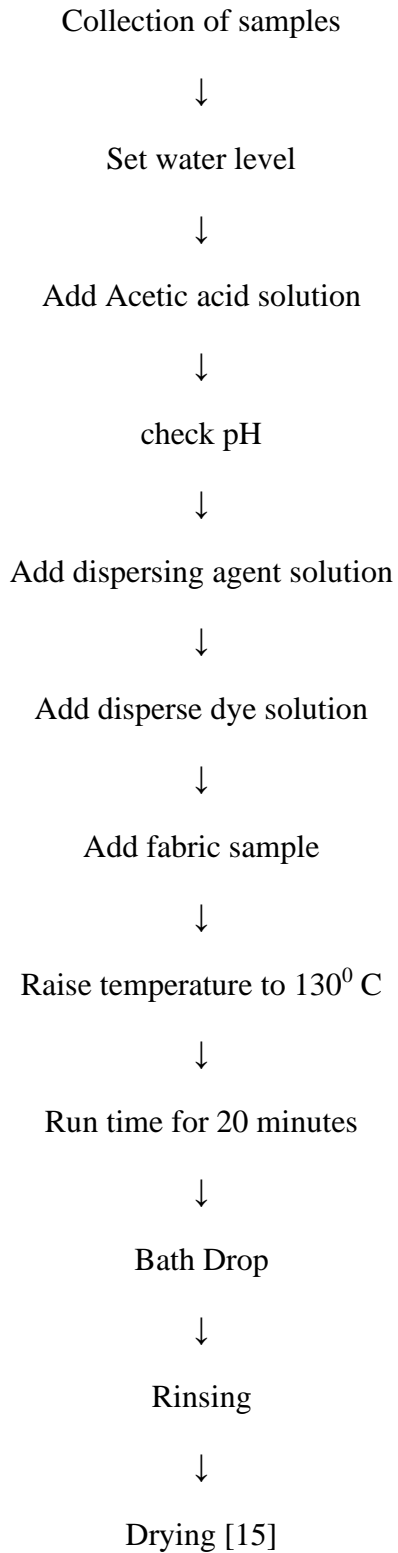
Table: 3.3.2 Cotton Dyeing Recipe

3.4 The Polyester dyeing is considered to take place in the following simultaneous steps:

1. Diffusion of dye in solid phase into water by contravention up into individual molecules. This diffusion depends on dispensability and solubility of dyestuff and is aided by the presence of dispersing agents and increasing temperature.
2. Adsorption of the dissolved dye from the solution onto the fiber surface. This dyestuff adsorption by fiber surface is influenced by the solubility of the dye in the dye bath and that in the fiber.

3. Diffusion of the adsorbed dye from the fiber surface into the interior of the fiber substance towards the center. In normal condition, the adsorption rate is always higher than the diffusion rate. And this is the governing step of dyeing [15].

3.5. Polyester Dyeing Flow Chart:



3.5.1 Polyester Dyeing Recipe:

SL	Process Parameter	Unit	Dossing	Stock Solution
01	Levelling Agent	g/L	1	1%
02	Dispersing Agent	g/L	1	1%
03	Disperse Red	%	1	1%
04	Disperse Yellow	%	0.5	1%
05	Disperse Blue	%	0.5	1%
06	Acetic Acid	mL	1	-----
07	pH	-----	4.5 - 5.5	-----
08	Sample Weight	Gm	5	---
09	M:L	-----	1:40	---
10	Temperature	°C	130	---
11	Time	Min	20	----

Table: 3.5.1 Polyester Dyeing Recipe

3.5.2 Stage of Dyeing:

Stage of Dyeing	Standard Time
Loading to Levelling	3:30 Hrs.
Loading to Levelling (No Enzyme)	2:30 Hrs.
Loading to Levelling (Cont. S/C)	2:00 Hrs.
Loading to Levelling (Cont. S/C + No Enzyme)	1:00 Hrs.
Levelling to BD	3:30
BD to Unload	3:00 Hrs. (Dk) 2:3hrs (Med) 2:00 Hrs. (Lt)

N.B. - For Reduction (Lycra & High GSM) 30 Minutes extra time will be added.

Table: 3.5.2 Stage of Dyeing

3.5.3 Standard Time for Dyeing:

Table: Shade wise SAH (Standard Allowed Hour) for Dyeing

Shade type	Existing SAH for all Buyer Time	SAH Only for TNF & E/B Buyer	SAH Only for Jako Buyer	Shade %	Remarks
Y/D	2.50	2.50	2.50		
Y/D (QEI)	3.00	3.00	3.00		
White	3.5	3.5	3.50		4 hrs. with Brightener
Grey Mellange	3.00	3.00	3.00		3.5 hrs. with Brightener
Lt Color	7.50	9.00	9.50	0.01% - 0.99%	
Medium color	9.00	10.50	11.00	1% - 2.99%	
Dark color	10.00	11.00	12.00	3% - 5.5%	
Ex. Dark	10.50	11.00	12.00	5.5% - Above	
Turquoise/ Royal Blue	11.00	12.00	13.00		
Both Part (Color)	Lt-10.00	11	11.00		
	ME-11.00	12	12.00		
	DK-11.50	12.50	12.00		
	EX.DK-12	13.50	13.00		
Both Part (White)	7	7	7		
Only Polyester Part (100% Polyester)	5.5	5.5	5.5		
Only Polyester Part with Scouring	8	8	7		

Note:

1. Efficiency are done according to Standard time (Hrs.) & Remarks.
2. If there is any Cont. S/C batch, 2.5 hrs. are deducted from standard time.
3. Reduction time 50 mins are added.
4. S/C U/L, Poly Part U/L & Incomplete U/L Batches use time is added when those batches are completed next time. And 1st time, lost time of those batches are deducted from given time schedule.
5. Schedule Maintenance Time are deducted from loss time.
6. If there are any batches are unloaded before standard time (If have no reason), this time will be considered as a new standard time.

Comfit Composite Knit Ltd
Gorai, Mirzapur, Tangail
Shade Wise SAH (Standard Allowed Hour) for Dyeing

Sl No.	Shade type	Existing SAH for all Buyer	SAH Only for TNF & E/B Buyer	SAH Only for JAKO Buyer	Excess time need for TNF & E/B Buyer due to:	Excess time need for JAKO Buyer due to:	Remark
1	Yarn Dyed	2.50	2.50	2.50			
2	Grey Mellange						
	Without Brightener	3.00	3.00	3.00			
	With Brightener	3.50	3.50	3.50			
3	White						
	Without Brightener	3.50	3.50	3.50			
	With Brightener	4.00	4.00	4.00			
4	Both Part Dyeing (White)	7.00	7.00	7.00			
5	Lt. Color	7.50	9.00	9.50	1. Critical color combination.	1. Critical color combination.	
6	Medium Color	9.00	10.50	11.00			
7	Dark Color	10.00	11.00	12.00	2. Long dyeing process due to risk of quality problem.	2. Extra hot wash, normal wash & Fixing process due to high fastness requirement.	
8	Ex. Dark	10.50	11.00	12.00			
9	Turquoise	11.00	12.00	13.00			
10	Both Part Dyeing (Color)				3. Shade matching with data color & visual both way.	3. Long dyeing process due to risk of quality problem.	
	Lt. Color	10.00	11.00	12.00			
	Medium Color	11.00	12.00	12.50			
	Dark Color	11.50	12.50	13.50			
	Ex. Dark	12.00	13.50	14.50			

Figure: 3.4.3 Standard Time for Dyeing in Comfit composite knit ltd.

3.5.4 Right First Time Dyeing (RFT):

As a general, and maybe provocative statement it can be argued that the dyeing and finishing industry does not have a good reputation for quality and reliability. There is a mentality perhaps based on tradition that accepts that rework is part of our normal day-to-day practice. RFT dyeing means “Right First Time Dyeing.” This term is used to define the dyeing efficiency, if the efficiency is more than the dyeing capability of that company is very good otherwise not good. This term actually defines how we can dye a fabric. If we can complete our dyeing at first time then we can say that this is RFT dyeing but if we cannot than we say that this is not RFT dyeing. So, we can say that “If the dyeing process is completed properly without any fault & there is no need to put the dyed fabric into the bath to get the proper shade then this dyeing is called RFT dyeing”. [23]

3.5.5 Benefits of RFT dyeing:

Modern dyehouses now require the dyestuffs that they purchase to be compatible in terms of dyeing rate and dye uptake and to provide uniformly high levels of color fastness to washing, light, and wet and dry rubbing (crock fastness), as well as to bleach-activated detergents. The ability of a trichromat to build up on tone is an important factor in many difficult shades where high RFT dyeing levels are the norm. In this connection most reputable dye manufacturers now offer advanced trichromats that have been carefully selected and engineered to provide high reproducibility within the laboratory, as well as between laboratory and bulk dyeing, and high repeatability in repeat batches of the same color. Dyestuff ranges have been refined, with different trichromats for different end uses, or different depths of shade, or particular areas of the color gamut. [24]

The advances that have been made in sophisticated spectrophotometers for accurate color measurement of dyed yarns and fabrics have been potent factors in accurate database preparation. Recipe prediction is now very rapid, with alternatives been presented for evaluation. For example, the most cost-effective recipe combination, highest color fastness to washing or to light, the technically best recipe, the least metameric combination, etc. The ability to measure color differences accurately and to predict a recipe for correction purposes where RFT dyeing has not succeeded is also important in minimizing processing times and costs.

RFT dyeing avoids the extra costs associated with correction of faulty dyeing but also promotes other benefits. Shorter processing times in RFT dyeing procedures result in less fiber degradation and improved product quality after dyeing. This can be important if chemical

finishing treatments such as chemical cross-linking finishes are to be applied on cellulosic and cellulosic blend fabrics. RFT dyeing ensures higher levels of machine productivity and dyeing capacity, coupled with improved production planning and less capital expenditure on processing equipment.

RFT dyeing also economizes on the costs of chemicals and auxiliaries used in dyeing. Many dye makers now offer complete dyeing packages in which the dyestuffs, chemicals and auxiliaries have been specifically selected to provide optimum level dyeing performance. Many dyehouses, however, will persist in using cheaper textile auxiliary products which often are less effective when used with the same dyestuffs and typically are less concentrated in terms of their active chemical constituents. As a result, the RFT dyeing performance is impaired. Inferior RFT dyeing performance using cheaper auxiliaries will thus turn out to be the more expensive option for the dyehouse in the long run.

RFT dyeing is usually more easily accomplished where all aspects of the bulk dyeing process are standardized and automated. Thus, in exhaust dyeing the processes of filling the machine to the appropriate liquor ratio, controlling the rate of temperature rise and liquor circulation, maintaining top temperature for the requisite period of time, cooling back and draining must be reproducible and accurate measurement of temperature and pH must be carried out by appropriate monitoring and control equipment. Modern advanced dye cycle controllers are robust, easy to program and ensure high levels of reproducibility.[25]

3.6 Picture Dyeing floor and Finishing section:



Figure: 3.6.1 Image of Inspection Table.




Figure: 3.6.2 Image of Inspection Light box




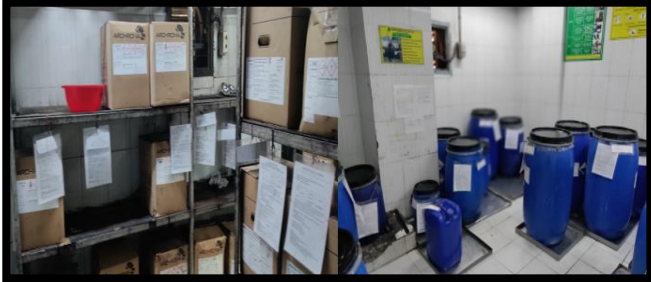


Figure: 3.6.3 Image of Finish Fabric

3.7 Various type of Picture attachment dyeing stoppage problem:

Picture attachment

Problem Name	Picture
Batch Problem	
Trolley Problem	
Lab Problem	
Breakdown Maintenance	
Schedule Maintenance	

<p>Air Problem</p>	
<p>Steam Problem</p>	
<p>Power Problem</p>	
<p>Others</p>	

3.7.1 Different type faults:

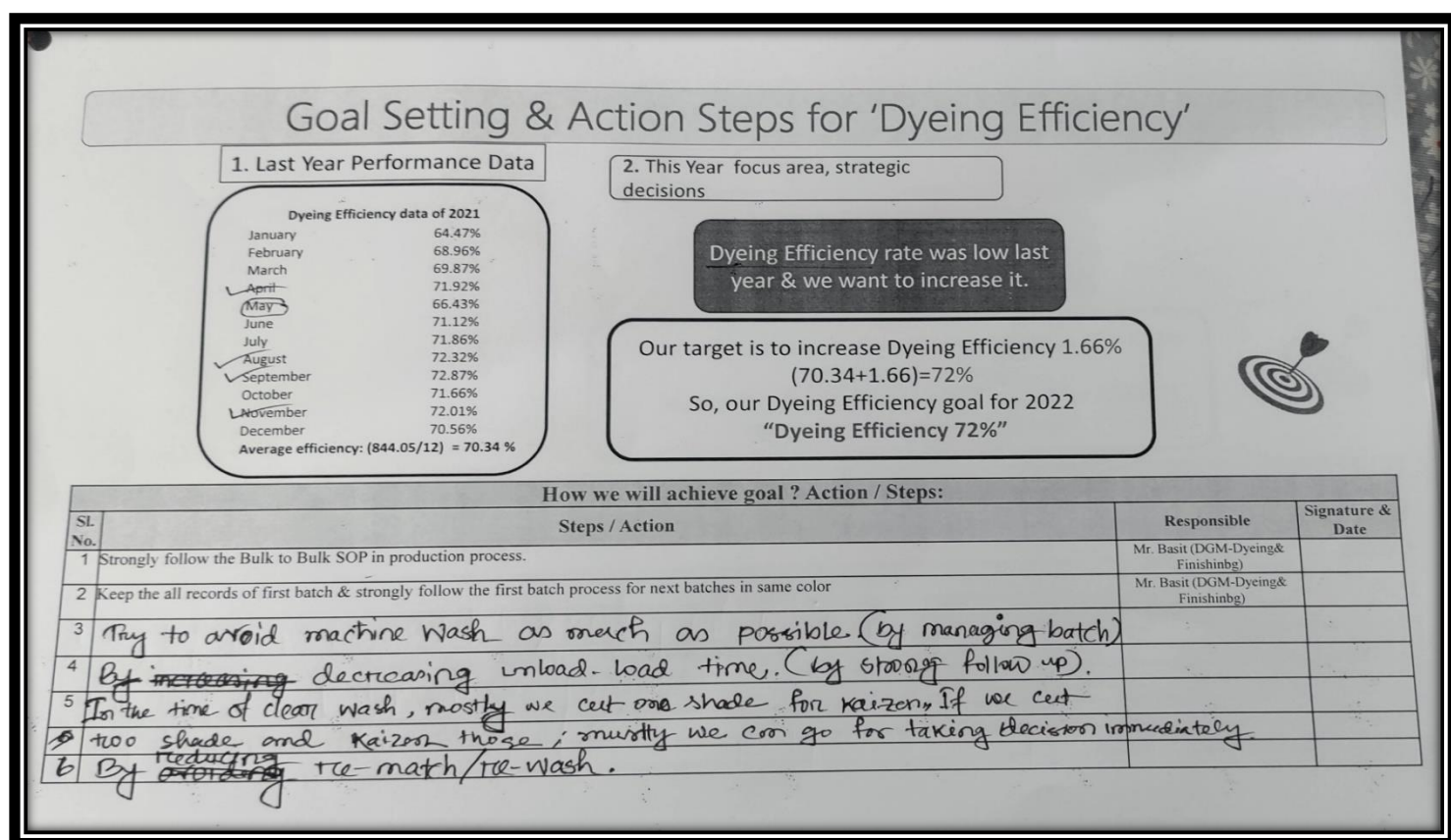
Yarn Faults	Dyeing & Finishing Faults
Yarn conta, Slub, dead ctn	Softener spot, Dust
Hairiness	Color spot, Dirty Spot
Patta (Thick & thin)	Running shade
Knitting Faults	Loose Turn /Singeing problem
Dia Variation	Crease mark
Gsm Variation	Water Mark
Sinker Mark	Hand feels hard
Dia mark	Compaction mark, shining mark, abrasion mark
Oil spot	Pin hole from stenter m/c
Needle drop	Sueding mark
hole / Excess Hole	Slitting problem (Needle line)
Bowing	Cut Pcs
All over Print (AOP) Faults	Dia Variation
Color Bleet/ 2 Side Color Bleet	Gsm Variation
Any kinds of Print Problem	
Stripe measurement up-down	

Defects Name			
Rub Out/Rub Mark	Softener Spot	Two side back Sewing hole	Hole
Skin Mark	Color Spot	Shadow	Hole
Chemical Spot	Color Spot	Loss Knit	Hole
Color band	Color Spot	Sewed uneven	Seweding Mark
Machine Stopes	Dirty Spot	Line Mark	Sinker Mark
Bad Smell	Dirty Spot	Oil line mark, Gum Problem	Oil Spot
Iron Spot	Dirty Spot	Lycra Missing	Needle Drop
Stain	Dirty Spot	Any Type of Contamination	Yarn Conta
Dirty Line Mark	Dirty Spot	Singing Problem	Hairiness
Color Uneven	Shade Variation	Length stripe Angel/ Angel	Bowing
Running Shade	Shade Variation	Back Sewing Hole	Stenter M/C
Side Center Side Shade	Shade Variation	Recovery Fail Problem, Elasticity Problem	stenter
Roll Join Shade	Shade Variation	Salvage Defect	Slitting Problem
Dull Bright (Shade)	Shade Variation	Pin Hole	Pin Hole from Stenter M/C
Curling Mark	Shining Mark	In side color spot	Color Spot
Two side curling mark	Shining mark	Major Inside Brush Problem	Hairiness
Pressure Mark	Shining Mark	Busting Fail	Busting Fail
Color Bleet/ 2 Side Color Bleet	AOP	Miss Yarn	Needle Drop
Any kinds of Print Problem	AOP	Inside Loop Problem	Needle Drop
Stripe measurement up-down	AOP	Flaming Problem	Singeing

3.8 Goal setting And Action step for Dyeing efficiency in 2022:

3.8.1 How will achieve goal and action and step:

- Strongly follow the Bulk-to-Bulk SOP in production Process.
- Keep the all records of first batch & strongly follow the first batch process for next batch in same color.
- Try to avoid machine wash as much as possible by managing batch.
- Strong follow up and by decreasing unload load time.
- In the time of clear wash, mostly we cut one shade for kaizen those, mostly we can go for taking decision immediately.
- By reducing Re-wash or Re-Match.

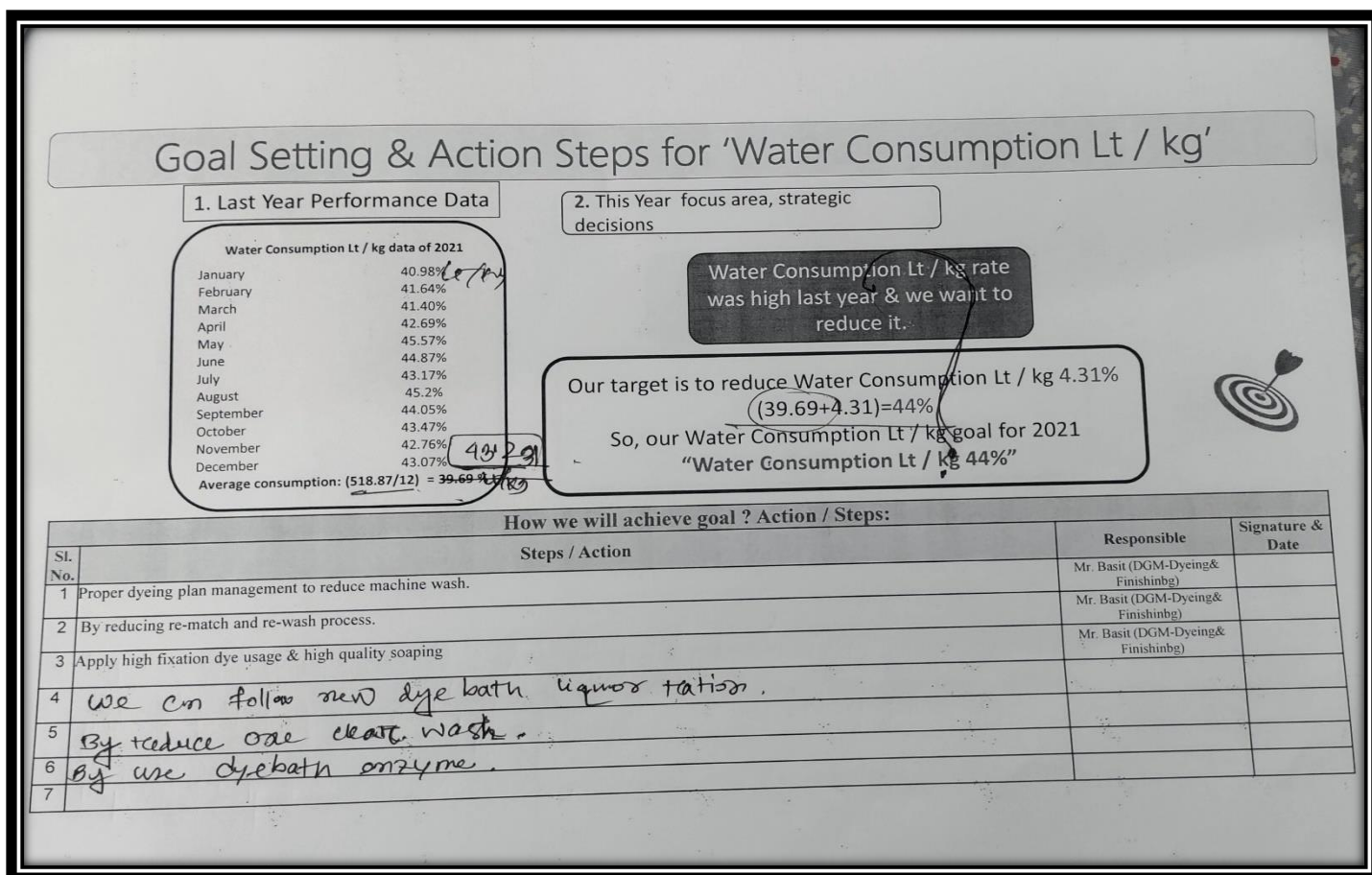


3.8.1 Figure: Goal setting And Action step for Dyeing efficiency in 2022

3.9. Goal setting And Action step for Water consumption Lt/Kg in 2022:

3.9.1 How will achieve goal and action and step:

- Proper dyeing plan management to reduce machine wash.
- By reducing Re-match and Re-wash process.
- Apply high fixation dye usage & high-quality soaping.
- By use dye bath enzyme.
- Reduce other use water in floor.
- Right first time (RFT)

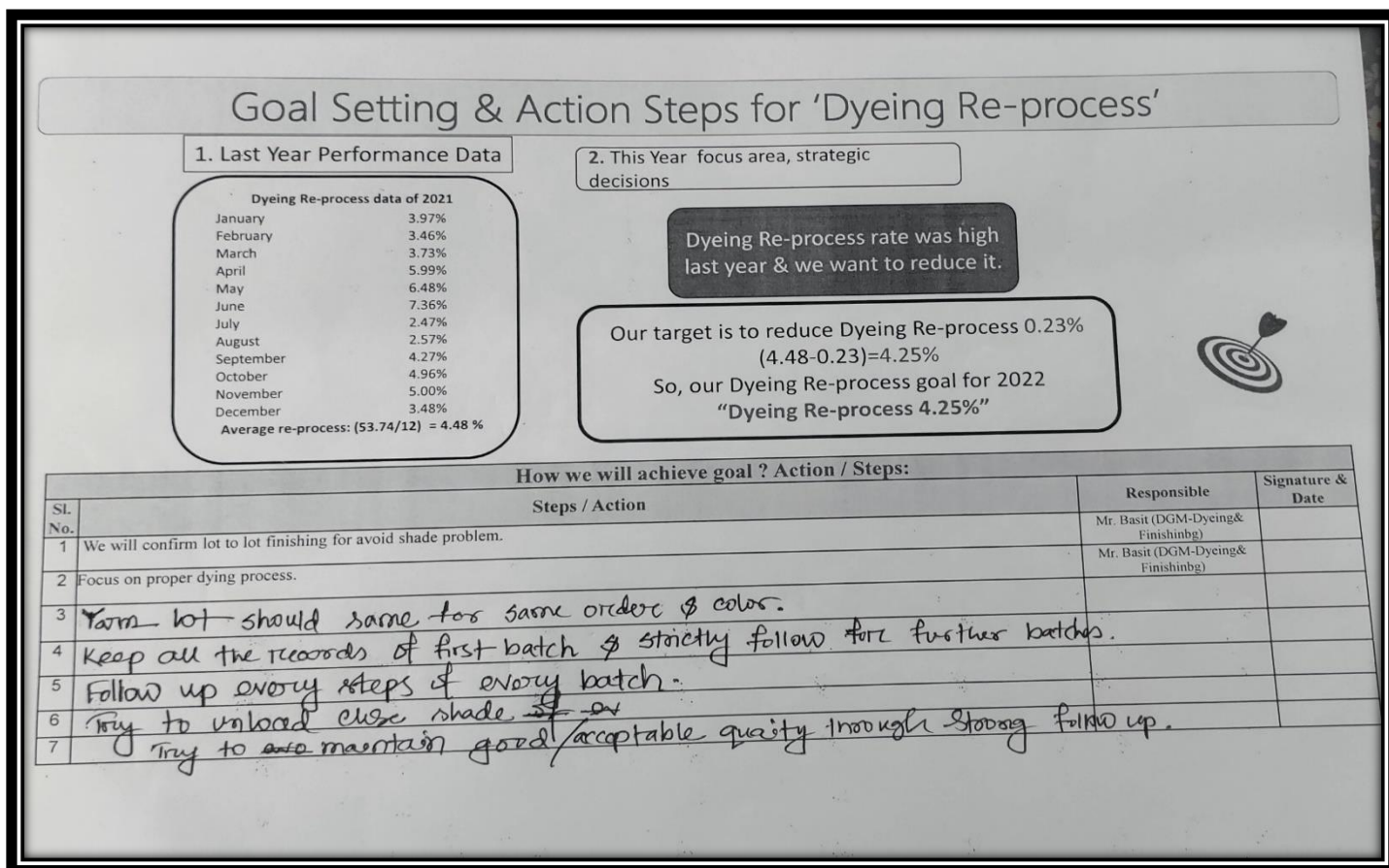


3.9.1 Fiigure: Goal setting And Action step for Water consumption in 2022

3.10 Goal setting And Action step for Water consumption Lt/Kg in 2022:

3.10.1 How will achieve goal and action and step:

- We will confirm lot to lot finishing for avoid shade problem
- Focus on proper dying Process
- Yarn lot should same for same order and color
- Keep all the records of first batch & strictly follow for further batch.
- Try to unload nearby shade
- Try to maintain good and acceptable quality through strong follow up
- Through strong follow-up



3.10.1 Figure: Goal setting And Action step for Re-Process in 2022

CHAPTER-4

RESULT & DISCUSSION

4.1 Dyeing Problem and faults found in Comfit Composite Knit Ltd:

I have practically worked in the following industries for a survey on the causes and problems at the dyeing machinery stop of Knit Fabric: Comfit Composite Knit Limited (Practically Worked). The causes and problems in various dyeing machinery stops from this industry are given below;

Table 4.1: Monthly Dyeing machinery stoppage problem data found in Comfit Composite Knit Ltd.

Dyeing Working Hour Utilization Calculation

Utilization %	96.79%	3.21%												
Date	Total W. HR/ Day	Total Lost HR/ Day	% Of lost hour	Batch Problem	Trolley Problem	Lab Problem	Schedule Maintenance	Breakdown Maintenance	Air Problem	Water Problem	Steam Problem	Power Problem	Others	Remarks
January-21	13392	754.07	5.63%	160.81	2.83	13.59	69.99	38.16	0	0	457.15	0.7	10.84	31 Days
February-21	11664	288.5	2.47%	169.66	4.66	11.25	58.34	29.41	0	0	2.16	6.52	6.5	28 Days
March-21	13392	267.26	2.00%	136.22	14.5	9.5	57.76	22.91	0	0	24.5	1.87	0	31 Days
April-21	12960	260.44	2.01%	96.41	7.5	9.67	76.01	44.75	0	0	15.83	10.27	0	30 Days
May-21	13392	431.35	3.22%	112.06	1	9.42	48.5	51.09	0	0	141.78	63	4.5	31 Days
June-21	12960	296.8	2.29%	185.15	12.5	10.33	55.5	29.18	0	0	0	4.14	0	30 Days
July-21	9936	258.82	2.60%	120.33	65.32	0	38.66	11.51	0	0	18.5	4.5	0	23 Days
August-21	13392	418.25	3.12%	219.28	81.25	4	47.17	37.99	0	0	18	7.56	3	31 Days
September-21	12960	332.94	2.57%	214.85	6	8.33	66.92	36.84	0	0	0	0	0	30 Days
October-21	13392	489.84	3.66%	292.13	43.5	5.5	106.25	30.82	0	0	0	4.14	7.5	31 Days
November-21	12960	322.99	2.49%	208.18	11.84	1	46.67	33.93	0	0	1	20.37	0	30 Days
December-21	13392	821.92	6.14%	340.46	110.25	2.17	59.83	32.17	0	0	255.41	20.3	1.33	31 Days
Total	153792	4943.18	3.21%	2255.54	361.15	84.76	731.6	398.76	0	0	934.33	143.37	33.67	
Total Problem %				46%	7.31%	1.71%	14.80%	8.07%	0.00%	0.00%	18.90%	2.90%	0.68%	

4.2 Common problem Monthly Occurred Comfit Composite Knit Ltd.:

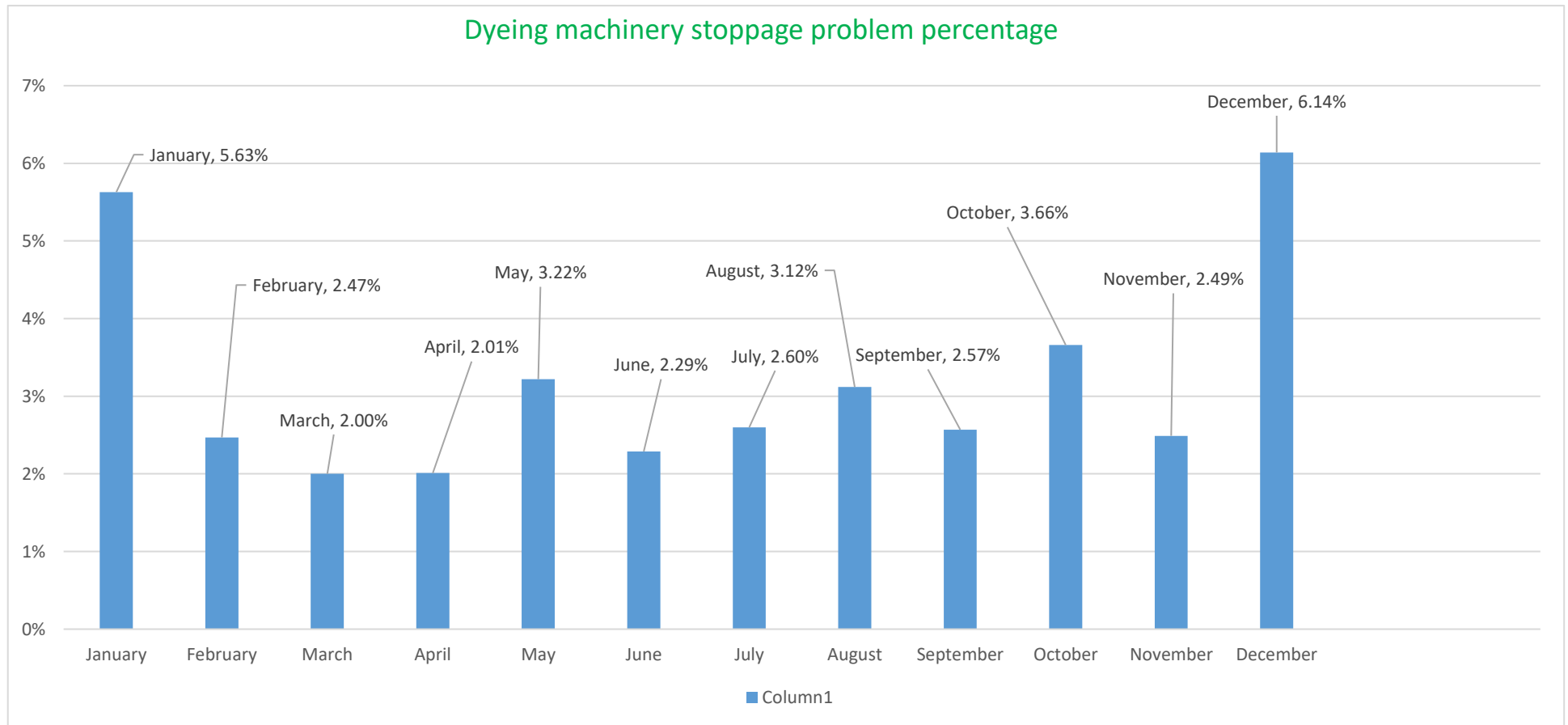


Figure: 4.1.1: Column diagram representing Monthly Total dyeing machinery stoppage problem found in Comfit Composite Knit Ltd.

4.3 Common problem One year Occurred Comfit Composite Knit Ltd.:

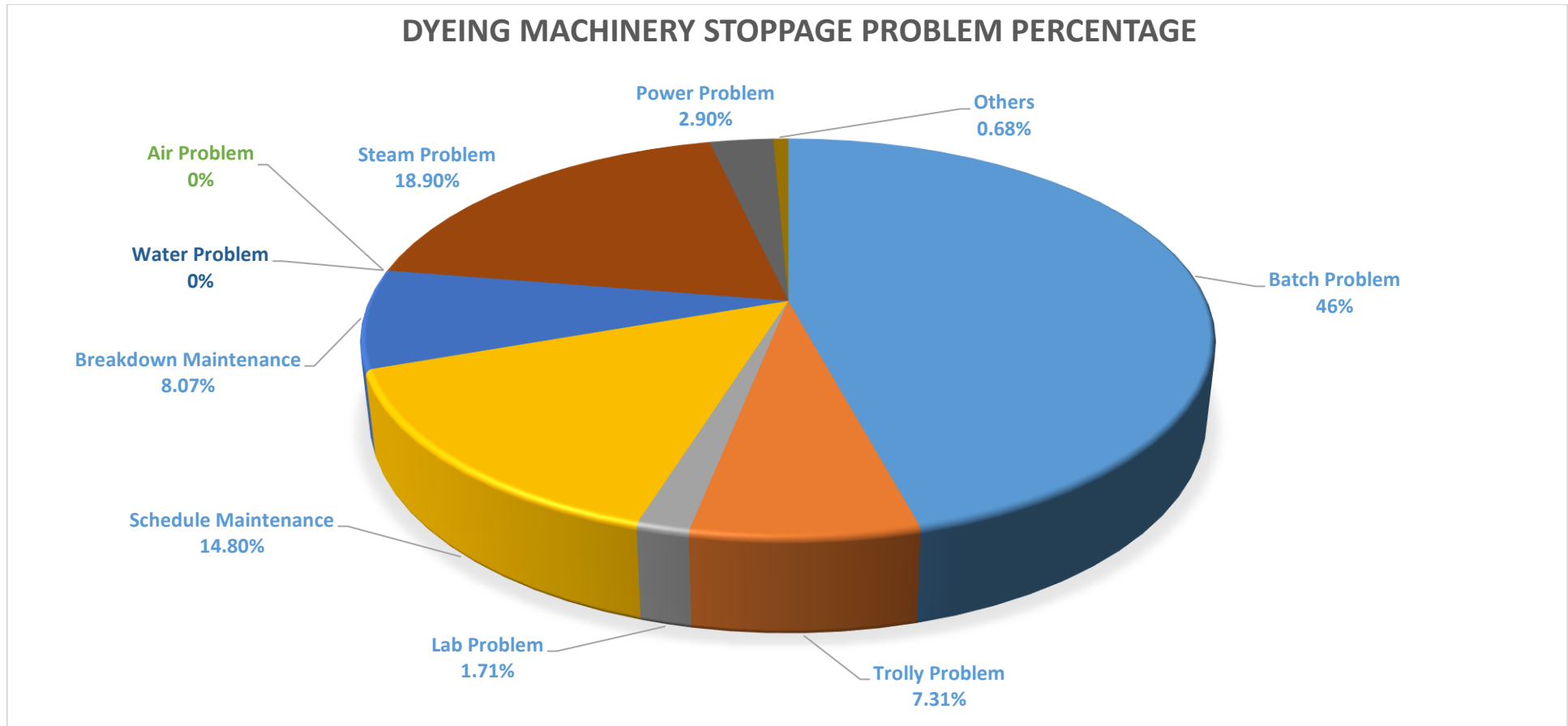


Figure: 4.1.2: Pie diagram representing one year dyeing machinery stoppage problem found in Comfit Composite Knit Ltd.

I noticed many dyeing machinery stoppage problems on the dyeing floor of Comfit Composite Knit Limited and here I found some different problems every month. And the percentage of that problem is changing every month. Like I got a 5.63% total problem percentage in January month. I got the total problem percentage in February 2.40 %. I got a 2.00 % total problem percentage in March month. I got total problem percentage in April 2.01 %. I got 3.22 % total problem percentage in May month. I got a 2.29% total problem percentage in June month. I got a 2.60% total problem percentage in July month. I got the total problem percentage in August 3.12%. I got a 2.57% total problem percentage in September month. I got a 3.66% total problem percentage in October month. I got a 2.49% total problem percentage in November month. I got a 6.14% total problem percentage in December month.

I have observed many dyeing machinery stoppage problems on the dyeing floor of Comfit Composite Knit Limited and here I have found some different problem and the percentage of those problem is variable every month. Like

I got a 46% batch problem percentage in one year. it is more of a problem than another problem. it's can be removed by ensuring available order and through proper planning.

I got steam problem percentage in one year 18.90 %. many causes of a steam problem such as the gas crisis, to remove this problem, we need to ensure that there is no gas problem.

Here I got Breakdown Maintenance problem percentage one year 8.07 %. many causes of a Breakdown Maintenance such as Breakdown problem is the mechanical issue, many problems Break down Problem this machinery prats, to remove this problem, we need to make sure that the maintenance team is properly monitored.

Here I got other problems such as (trolley problem, lab problem, power problem) percentage per month 13%. many causes of other problems. These problems are most often caused by operators not being carefully maintained.

There are different causes for happening machine stop during dyeing floor. Here dyeing machinery stoppage problem and their Remedies are point out further down.

Like as Batch Problem Causes Due to Delay in fabric knitting section or other source. Due to Delay in fabric knitting section or other source. Decision Pending and due to immediate change. Storage capacity not available store room so randomly batches are kept, which is too late to find. Night shift supervisor not properly monitoring. Urgently shipment But Batch section not make batch according to urgent shipment. Order Crisis.

Dyeing machines capability and turning machines Capability are not the same. So, batch problems are created And Remedies in Batch Problem, to receive the grey Fabric Actual time knitting section or other source. Right decision plan. Batch storage serially. Night shift supervisor monitor properly. To make Batch plan urgently shipment. Make sure order available. Turning machine must be increased.

Like as Trolley Problem Causes Due to excess white Batch and Y/D Batch Fabric dyeing the trolley stuck due to finishing section. Due to Decision pending both part dyeing. Due to only one part dyeing so stuck trolley. Due to the Delay drying of the finish Fabric Due to crises trolley. Due to Re-process dyeing so stuck trolley. The wheel of the trolley breaks a lot of the time and repaired delay. And Remedies in Trolley Problem White Batch and Y/D Batch fabric dyeing According to dyeing plan. Finish early and given by trolley. Properly decision make and try to dye both parts together. Buy trolley. Early Drying. Properly dyeing complete. Carefully take the trolleys so that the wheel does not break.

Like as Lab Problem Causes Properly lab not close. Decision delay. Accurate process not maintain. On time not delivery. Urgently bulk section fabric dyeing due to shipment. And Remedies Properly lab close to provide Bulk section. Properly make decision accurate time. Actual recipe provides. Timely recipe provides. Properly plan before Shipment time.

Like as Schedule Maintenance Causes Schedule maintenance team due to time delay. Properly not maintain actual time maintenance team. All m/c set time monthly repairing scheduling. And Remedies Schedule Maintenance team maintain scheduling time and properly make accurate time. Properly maintain actual time maintenance team. Control properly m/c monitoring. Active maintenance term and control all m/c properly monitor. Reduce m/c problem maintenance term.

Like as Machine Breakdown Problem causes Breakdown problem is the mechanical issue, many problems Break down Problem this machinery parts. Not properly monitor maintenance team. Delay to actual time flow up. Not control maintenance team so time delay. Not monitoring operator. and remedies Properly monitoring maintenance team. Problem solves the maintenance team. Reduce machinery problem maintenance tram. Properly control all issues maintenance. Properly monitoring operator.

Like as Air Problem Causes Air problem is the electrical and compressor issues properly not gas supply this problem create. And Mechanical issues. And remedies in Air Problem Properly compressor gas supply. Properly maintain maintenance team.

Like As Steam Problem Causes Steam problem is the gas crises. Supply not Available. And Remedies Make sure properly supply Steam.

Like as Power Problem Causes Power problem is the electricity crises. Generator not properly supply and suddenly stop. And Remedies Make sure properly supply.

Like as others Problem Maintenance Delay, Sewing Problem, Dyes Crisis, Decision Pending Causes Properly Not Monitoring Maintenance team. Properly not flow up batch section sewing and turning. Properly not make recipe. Plan and decision make pending. And Remedies Properly Monitoring Maintenance team. Properly flow up batch section sewing and turning. Properly make recipe. Plan and decision make before.

I have discussed about in this thesis Various type of dyeing stoppage machine problem and Difference type of dyeing and finishing faults in knitting product which influence in the productivity of dyeing industry. When I have done practical work completed for this thesis, i apprehended it is very common issue for dyeing floor, dyeing and finishing sector. It is destroying hamper productivity and destroying original appearance of fabric, Interrupted beauty of fabric, minimize quality of fabric, shape fashion etc. and also know it is Interrupted production.

4.4 Defect of finished fabric in 2021:

Table 4.4 Defect of finished fabric

Date	Defects Area	Total Inspected Qty.(kg)	Fabric Quality Held Up Qty (Kg)	Defects %
1st January/2021 to 31st December /2021	Yarn	11,029,948	307160.5	2.78%
	Knitting		685371.8333	6.21%
	Dyeing & Finishing		2296459.167	20.82%
	AOP		95726.5	0.87%
	Total	11,029,948	3384718	30.69%

Major 5 Defects	Defects Qty. (kg)	Defects %
Running Shade (Inside)	1710212	15.51%
GSM Variation	395889	3.59%
Dia Variation	271861	2.46%
Patta	154544	1.40%
Yarn conta, Slub, dead ctn	150855	1.37%
Others	701356	6.36%
Total	3384718	30.69%
1st January/2021 to 31st December /2021		
Shade	Defects Qty.	Defects %
Running Shade (Color)	1359356	12.32%
Running Shade (Solid) Only White	350856	3.18%
Total	1710212	15.51%

4.4.1 Department wise One year Occurred Defects diagram:

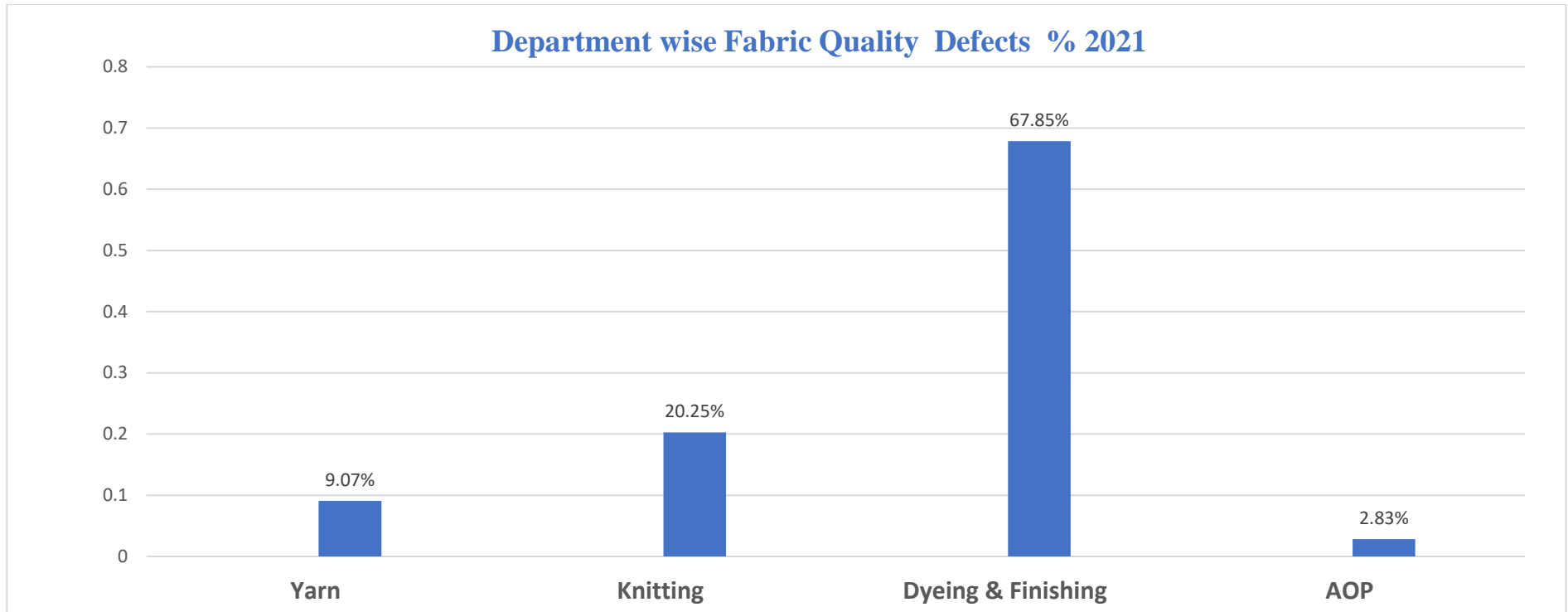


Figure: 4.4.1: Column diagram representing Department wise One year Occurred Defects in Comfit Composite Knit Ltd.

4.4.2 Faults of finished fabric by Detective Quality control Department data'2021:

Data Table 4.4.2: Faults of finished fabric Defect %

Faults	Based on total inspection qty												
	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Year- 2021
Softener spot, Dust	0.07%	0.15%	0.00%	0.67%	0.35%	0.47%	0.23%	0.40%	0.11%	0.23%	0.25%	0.24%	0.26%
Colour spot, Dirty Spot	0.69%	0.62%	0.45%	0.36%	0.77%	0.30%	0.17%	0.41%	0.61%	0.89%	0.31%	0.39%	0.50%
Shade Variation	15.34%	15.30%	14.81%	14.83%	16.65%	18.61%	18.00%	16.55%	14.15%	15.58%	15.55%	12.83%	15.51%
Loose Turn /Singeing problem	0.08%	0.26%	0.24%	0.29%	0.36%	0.34%	0.13%	0.23%	0.48%	0.00%	0.14%	0.02%	0.20%
Crease mark	0.61%	0.41%	0.36%	0.27%	0.58%	0.37%	0.80%	0.32%	0.79%	2.36%	1.21%	1.89%	0.89%
Water Mark	0.02%	0.00%	0.01%	0.01%	0.00%	0.04%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.01%
Hand feel hard	0.03%	0.01%	0.14%	0.15%	0.17%	0.10%	0.11%	0.13%	0.02%	0.03%	0.04%	0.01%	0.07%
Compaction mark, shining mark, abrasion mark	0.24%	0.06%	0.06%	0.14%	0.23%	0.23%	0.10%	0.16%	0.07%	0.02%	0.16%	0.31%	0.15%
Pin hole from stenter m/c	0.00%	0.04%	0.12%	0.01%	0.03%	0.04%	0.00%	0.03%	0.03%	0.05%	0.04%	0.03%	0.04%
Sueding mark	0.03%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Slitting problem (Needle line)	0.21%	0.13%	0.10%	0.03%	0.02%	0.07%	0.19%	0.78%	0.00%	0.00%	0.05%	0.11%	0.14%
Cut Pcs	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%	0.00%	0.00%
Dia Variation	1.99%	1.90%	3.78%	4.05%	2.26%	3.12%	2.16%	1.98%	2.82%	1.87%	1.15%	2.70%	2.46%
Gsm Variation	3.50%	4.56%	3.21%	2.85%	2.19%	3.60%	3.82%	3.56%	3.44%	3.44%	4.43%	4.18%	3.59%
Sinker Mark	1.17%	1.06%	1.16%	0.45%	0.51%	0.17%	0.09%	1.74%	2.98%	2.19%	1.22%	0.95%	1.21%
Dia mark	0.23%	0.94%	0.49%	0.17%	0.23%	0.52%	0.12%	0.28%	0.29%	0.13%	0.24%	0.13%	0.30%
Oil spot	0.02%	0.06%	0.19%	0.07%	0.04%	0.15%	0.28%	0.13%	0.03%	0.05%	0.17%	0.14%	0.11%
Needle drop	0.23%	0.47%	0.54%	0.70%	0.35%	0.38%	0.54%	1.11%	0.58%	0.14%	0.83%	0.40%	0.53%
Yarn conta, Slub, dead ctn	1.19%	1.30%	0.85%	0.95%	0.99%	0.61%	1.93%	1.61%	1.39%	1.47%	2.42%	1.42%	1.37%
hole / Excess Hole	1.63%	1.02%	0.94%	0.92%	0.92%	1.53%	0.46%	0.33%	0.27%	0.57%	0.65%	1.46%	0.89%
Hairiness	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.05%	0.00%	0.00%	0.07%	0.02%	0.02%
Patta (Thick & thin)	1.52%	0.85%	0.65%	0.52%	1.35%	1.03%	0.58%	1.99%	1.12%	0.97%	1.86%	3.21%	1.40%
Bowing	0.00%	0.00%	0.39%	0.11%	0.04%	0.32%	0.16%	0.01%	0.01%	0.08%	0.18%	0.36%	0.14%
AOP Problem	0.74%	1.46%	0.34%	0.55%	1.05%	1.21%	1.37%	1.85%	0.73%	0.68%	0.55%	0.37%	0.87%
Total held up%	29.54%	30.64%	28.84%	28.11%	29.11%	33.22%	31.24%	33.65%	29.98%	30.78%	31.52%	31.17%	30.69%

4.4.3 Common Faults Based on total inspection One year Occurred Defect %:

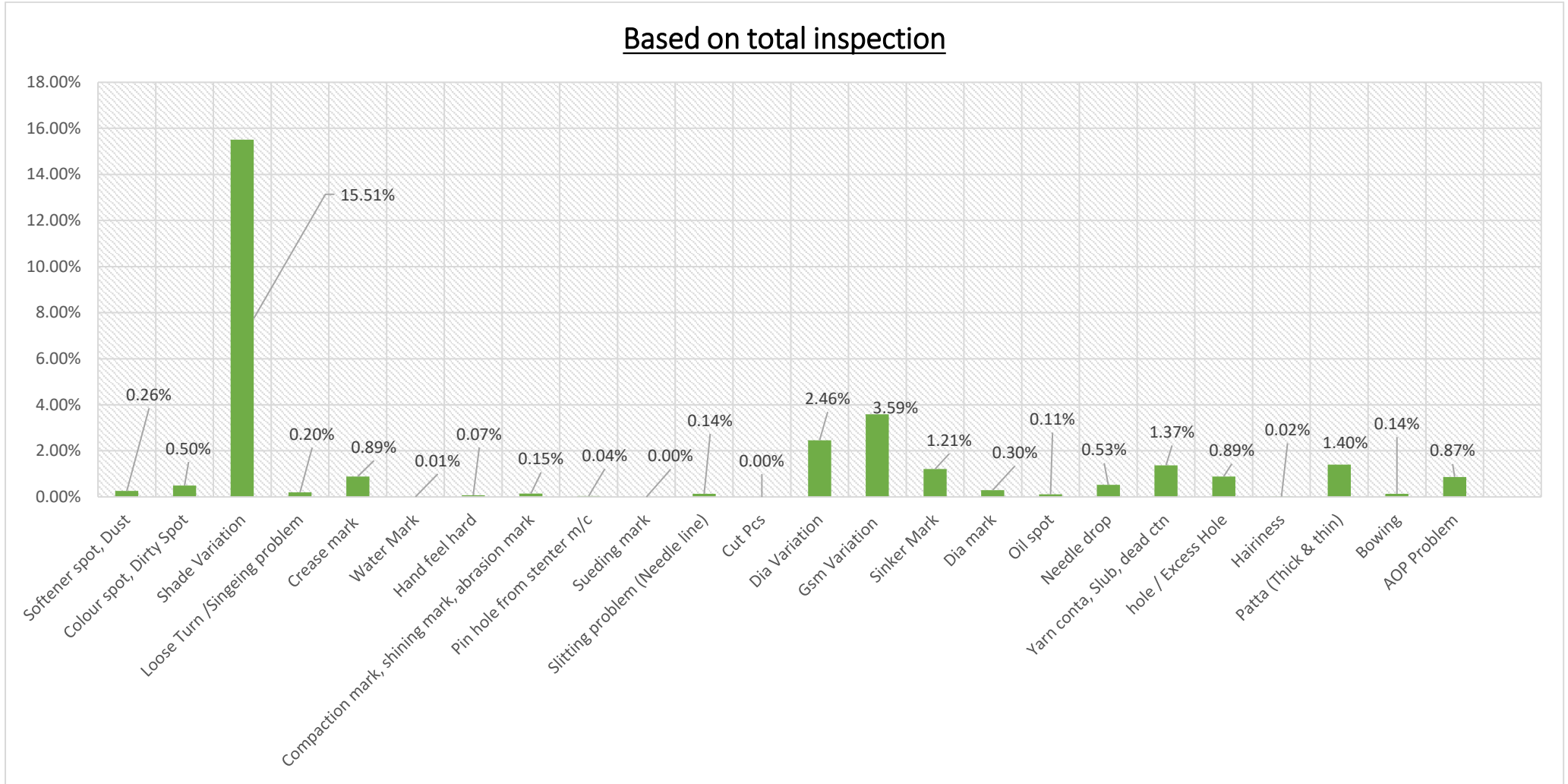


Figure: 4.4.3 Column diagram representing one-year Total dyeing & finishing faults found in Comfit Composite Knit Ltd.

4.4.4. RFT Bulk to Bulk Monthly Data:

Comfit Composite Knit Ltd.

Table 4.4.4: RFT Bulk to Bulk

SL No.	Month	Unit-1							Unit-2							TTL						
		TTL Qty	OK Qty	Topping	Re-Match	Color Addition	RFT %	Non RFT%	TTL Qty	OK Qty	Topping/ Re Match	Re-Match	Color Addition	RFT %	Non RFT%	TTL Qty	OK Qty	Topping/ Re Match	Re-Match	Color Addition	RFT %	Non RFT%
1	Jan-21	763	697	13	17	36	91.35 %	8.65 %	414	350	7	9	48	84.54 %	15.46 %	1177	1047	20	26	84	88.95 %	11.05 %
2	Feb-21	683	620	20	6	37	90.78 %	9.22 %	390	357	4	2	27	91.54 %	8.46 %	1073	977	24	8	64	91.05 %	8.95 %
3	Mar-21	767	660	14	21	72	86.05 %	13.95 %	471	428	9	10	24	90.87 %	9.13 %	1238	1088	23	31	96	87.88 %	12.12 %
4	Apr-21	775	679	12	17	67	87.61 %	12.39 %	422	374	3	12	33	88.63 %	11.37 %	1197	1053	15	29	100	87.97 %	12.03 %
5	May-21	704	610	15	14	65	86.65 %	13.35 %	359	310	7	17	25	86.35 %	13.65 %	1063	920	22	31	90	86.55 %	13.45 %
6	Jun-21	764	683	2	15	64	89.40 %	10.60 %	401	359	4	11	27	89.53 %	10.47 %	1165	1042	6	26	91	89.44 %	10.56 %
7	Jul-21	575	509	11	15	40	88.52 %	11.48 %	306	291	5	2	8	95.10 %	4.90 %	881	800	16	17	48	90.81 %	9.19 %
8	Aug-21	799	694	9	30	66	86.86 %	13.14 %	469	435	3	8	23	92.75 %	7.25 %	1268	1129	12	38	89	89.04 %	10.96 %
9	Sep-21	803	705	5	25	68	87.80 %	12.20 %	420	367	6	9	38	87.38 %	12.62 %	1223	1072	11	34	106	87.65 %	12.35 %
10	Oct-21	812	717	8	21	66	88.30 %	11.70 %	451	416	3	11	21	92.24 %	7.76 %	1263	1133	11	32	87	89.71 %	10.29 %
11	Nov-21	838	763	7	17	51	91.05 %	8.95 %	397	358	6	15	18	90.18 %	9.82 %	1235	1121	13	32	69	90.77 %	9.23 %
12	Dec-21	832	748	8	16	60	89.90 %	10.10 %	474	443	6	2	23	93.46 %	6.54 %	1306	1191	14	18	83	91.19 %	8.81 %
Total		9115	8085	124	214	692	88.70 %	11.30 %	4974	4488	63	108	315	90.23 %	9.77 %	14089	12573	187	322	1007	89.24 %	10.76 %

4.4.5 RFT Lab to Bulk Monthly Data:

Comfit Composite Knit Ltd.

Table 4.4.5: RFT Lab to Bulk

SL No.	Month	Unit-1						Unit-2						TTL					
		TTL Qty	OK Qty	Topping/ Re Match	Color Addition	RFT %	Non RFT%	TTL Qty	OK Qty	Topping/ Re Match	Color Addition	RFT %	Non RFT%	TTL Qty	OK Qty	Topping/ Re Match	Color Addition	RFT %	Non RFT%
1	Jan-21	91	77	5	9	84.62%	15.38%	78	68	4	6	87.18%	12.82%	169	145	9	15	85.80%	14.20%
2	Feb-21	66	54	5	7	81.82%	18.18%	62	56	5	1	90.32%	9.68%	128	110	10	8	85.94%	14.06%
3	Mar-21	60	52	5	3	86.67%	13.33%	62	56	3	3	90.32%	9.68%	122	108	8	6	88.52%	11.48%
4	Apr-21	47	41	4	2	87.23%	12.77%	45	39	5	1	86.67%	13.33%	92	80	9	3	86.96%	13.04%
5	May-21	55	50	1	4	90.91%	9.09%	74	65	9	0	87.84%	12.16%	129	115	10	4	89.15%	10.85%
6	Jun-21	37	32	4	1	86.49%	13.51%	64	60	2	2	93.75%	6.25%	101	92	6	3	91.09%	8.91%
7	Jul-21	27	25	0	2	92.59%	7.41%	27	23	4	0	85.19%	14.81%	54	48	4	2	88.89%	11.11%
8	Aug-21	43	39	2	2	90.70%	9.30%	40	35	2	3	87.50%	12.50%	83	74	4	5	89.16%	10.84%
9	Sep-21	55	48	4	3	87.27%	12.73%	68	64	0	4	94.12%	5.88%	123	112	4	7	91.06%	8.94%
10	Oct-21	43	38	1	4	88.37%	11.63%	75	68	1	6	90.67%	9.33%	118	106	2	10	89.83%	10.17%
11	Nov-21	36	32	3	1	88.89%	11.11%	73	66	5	2	90.41%	9.59%	109	98	8	3	89.91%	10.09%
12	Dec-21	39	35	2	2	89.74%	10.26%	69	64	1	4	92.75%	7.25%	108	99	3	6	91.67%	8.33%
Total		599	523	36	40	87.31%	12.69%	737	664	41	32	90.09%	9.91%	1336	1187	77	72	88.85%	11.15%

4.4.6 Report on Re Work % of Monthly Analysis:

Comfit Composite Knit Ltd.
Table 4.4.6: Report on Re Work %

SL No.	Date	Unit- 1			Unit- 2			TTL			Remarks
		Dyeing Production (kg)	Total Re Work (kg)	Re Work %	Dyeing Production (kg)	Total Re Work (kg)	Re Work %	Dyeing Production (kg)	Total Re Work (kg)	Re Work %	
1	Jan-21	469176	20901	4.45%	403145	13741	3.41%	872321	34642	3.97%	
2	Feb-21	412356	22476	5.45%	364090	4403	1.21%	776446	26879	3.46%	
3	Mar-21	444957	16294	3.66%	419399	15987	3.81%	864356	32281	3.73%	
4	Apr-21	436201	22413	5.14%	366588	25712	7.01%	802789	48125	5.99%	
5	May-21	425250	30628	7.20%	344343	19234	5.59%	769593	49862	6.48%	
6	Jun-21	453636	51145	11.27%	378866	12414	3.28%	832502	63559	7.63%	
7	Jul-21	361131	14078	3.90%	278314	1702	0.61%	639445	15780	2.47%	
8	Aug-21	497408	15331	3.08%	421429	10631	2.52%	918837	25962	2.83%	
9	Sep-21	477035	20826	4.37%	418708	17395	4.15%	895743	38221	4.27%	
10	Oct-21	488642	29969	6.13%	460480	17097	3.71%	949122	47066	4.96%	
11	Nov-21	495859	24042	4.85%	396647	20614	5.20%	892506	44656	5.00%	
12	Dec-21	467618	19095	4.08%	465345	10605	2.28%	932963	29700	3.18%	
Total		5429269	287198	5.29%	4717354	169535	3.59%	10146623	456733	4.50%	

		456735	4.50%
SL. No.	Re-Process Type	Re-Process Qty (Kg)	Re-Process %
1	Re-Match	167439	1.65%
2	Re-Wash	216086	2.13%
3	Re-Enzyme	28924	0.28%
4	Only Softener	16886	0.17%
5	Shade + Softener	1044	0.01%
6	Only Fixing	2648	0.03%
7	Stripping	3984	0.04%
8	Leveling Wash/ China Qty Wash/Dust Wash	1513	0.01%
9	Rub Mark Wash	2778	0.03%

4.4.7 Process Loss Monthly Data:

Comfit Composite Knit Ltd.

Table 4.4.7: Process Loss

Dyeing & Finishing						
SL No.	Month	Grey Fabric Received Qty (kg)	Finished Fabric Delivery Qty (kg)	Fabric Loss Qty (Kg)	Process Loss %	Remarks
1	Jan-21	864252	800036	64217	7.43%	
2	Feb-21	736394	684998	51396	6.98%	
3	Mar-21	762713	708851	53862	7.06%	
4	Apr-21	816947	756431	60516	7.41%	
5	May-21	696509	644610	51900	7.45%	
6	Jun-21	809028	747169	61859	7.65%	
7	Jul-21	640746	593461	47285	7.38%	
8	Aug-21	883690	818125	65565	7.42%	
9	Sep-21	767792	709863	57930	7.54%	
10	Oct-21	882644	811535	71109	8.06%	
11	Nov-21	833662	770425	63237	7.59%	
12	Dec-21	792905	733600	59306	7.48%	
Total		9487284	8779103	708181	7.46%	

4.5 Dyeing Monthly All Summary Status:-

Comfit Composite Knit Limited
Table 4.5: Dyeing Monthly Summary Status-2021

Month	Dyeing Production (Kg)			Efficiency %		RFT %		No. Of Batch	Process Loss %		Re-Process%	Water Consumption	
	Bulk (Kg)	Sample (Kg)	Total Production (Kg)	Overall Efficiency	On Standard Efficiency	Lab To Bulk%	Bulk To Bulk%		Solid	Print		Dyeing Process (Lt/Kg)	Maintenance (Lt/Kg)
January-21	872321	27070	899391	64.43%	76.04%	85.80%	88.95%	2.41	8.55%	-1.97%	3.97%	40.98	88.92
February-21	776446	23508	799954	68.99%	76.76%	85.94%	91.05%	2.48	8.53%	-1.94%	3.46%	41.64	90.22
March-21	864356	25615	889971	69.82%	76.96%	88.52%	87.88%	2.43	8.64%	-1.92%	3.73%	41.40	86.65
April-21	802789	25315	828104	71.92%	79.27%	86.96%	87.97%	2.39	8.57%	-1.99%	5.99%	42.69	82
May-21	769593	21280	790873	69.32%	77.70%	89.15%	86.55%	2.14	8.66%	-1.97%	6.48%	45.57	72.79
June-21	832502	24367	856869	71.18%	81.22%	91.09%	89.44%	2.34	9.43%	-1.86%	7.63%	44.87	81.14
July-21	639445	16347	655793	72.96%	81.18%	88.89%	90.81%	2.26	8.87%	-1.49%	2.47%	43.17	76.27
August-21	918837	22561	941398	72.32%	82.20%	89.16%	89.04%	2.42	8.88%	-2.16%	2.83%	45.20	73.76
September-21	895743	22301	918044	73.25%	81.32%	91.06%	87.65%	2.49	9.31%	-1.65%	4.27%	44.05	74.50
October-21	949122	24096	973218	72.00%	80.98%	89.83%	89.71%	2.47	9.26%	-0.40%	4.96%	43.47	70.16
November-21	892506	25478	917984	72.01%	80.73%	89.91%	90.77%	2.49	8.85%	-1.61%	5.00%	42.76	83.26
December-21	932963	24860	957823	70.56%	80.99%	91.67%	91.19%	2.53	8.89%	-0.35%	3.18%	41.73	106.81
Average				70.67%	79.60%	88.85%	89.24%	2.41	8.88%	-1.58%	4.50%	43.12	82.38

I have observed many machines on Comfy Composite Knit Limited Dyeing Floor and here I have found some different problems and the percentage of those faults is variable every month. I have noticed that some industries have higher proportions of dyeing problems and some industries have lower proportions of defects. The basis of harmful activity is some major problems (batch problem, steam problem, breakdown maintenance, trolley problem, power problem, etc.). The main problem is very dangerous for the industry. Because it disrupts production and disrupts garment quality. It can be recovered through reprocessing. And the minor problems can be recovered by a system maintained (temperature, time, liquor ratio, chemical used) proper follow-up, and careful work done. But we know that reprocessing system will increase the cost.

4.6 Dyeing fault and finishing faults causes & Remedies:

Fabric Faults Produced During Dyeing and Finishing:

There are different causes for happening fabric faults during dyeing and finishing. Here dyeing faults and finishing faults their Remedies are point out further down.

Like As Uneven Dyeing Causes Uneven pretreatment (uneven scouring & bleaching Process). Improper color dosing. Using dyes of high fixation property. Water hardness. Uneven heat-setting. Accurate pH value not maintained. Poor scouring & bleaching of the grey fabric. Incorrect migration. Incorrect soda dosing. Rapid addition of dyes & chemical. And Its Remedies Maintain the accurate pH value. Properly Scouring & bleaching. Maintained water hardness. Appropriate migration. Ensuring uniform pretreatment. Ensuring uniform heat setting. Correct soda dosing. Appropriate dosing of dyes and chemicals. Accurate controlling of dyeing machine [8].

Like As Crease Mark Causes Cycle time more. Lower opening of the fabric rope. Irregular of heating & Cooling rate. Not equal pump pressure & reel speed. High speed machine running. Not properly fabric movement. Lower liquor ratio. Higher machine load. And Remedies in Crease Mark Providing proper reel speed & pumps speed. Properly rising and cooling the temperature. Reducing the machine load. Proper liquor ratio. Maintaining cycle time. Used Anti-creasing agent.

Like As Dye Spot Causes of faults Colored spots due to dye freezing on the machine. Improper mixing of dye stuff into the solution. Improper dyes & chemicals mixing. Not proper Calculation. Not agitation of dyestuff. Dye bath hardness. They're Remedies Properly neat and clean machine.

Properly dissolving of dyeing and chemicals. Acceptable amount sequestrates to lower bath hardness use. Correct agitation. Use right amount of water. Properly calculation. Properly controlled time and temperate.

Like as Softener mark Causes Not proper mixing of the Softener. Not proper running time of the fabric during application of softener. Embarrassment of the fabric during application of softener. Not maintaining reel speed & pumps speed. And Remedies Properly controlled reel speed & pumps speed. Properly Mixing of the softener before addition. Prevent the Embarrassment of the fabric during application of softener. Use the right softener & the accurate procedure for the application. Controlling the correct pH value of the softener before application.

Like as Running shade Causes Higher machine loading. Lower nozzle pressure High temperature bath draining. Not accurate Fabric seed. Change in pick up % along the length of fabric [9]. They're Remedies Accurate nozzle pressure. Maintaining temperature bath draining. Ensured correct cycle time. Proper machine loading.

Like as Pin hole Causes Inappropriate amount of stabilizer in H_2O_2 . Water hardness. By during to present Fe^+ and Cu^+ ions in process bath. By soda dosing done at high temperature then present of O_2 created can Pin hole. Excess NaOH use. The lack of proper operating. And Remedies By use water in dyeing should be free from water hardness. By Soda dosing should be not more than $60^\circ C$. Accurate NaOH use. Special operating in dyeing [10].

Such as Oil Spot Causes Not careful machinery maintenance. Improper during lubrication. Excessive oiling of needle beds. Oil released on the fabric. And Remedies Machine Maintenance Properly. Properly handling machinery. Proper during lubrication. Oil spot removed scouring process but some lubrication not can be removed. Properly Clean all machinery. After cleaning grooves of the Cylinder Dial & Sinker ring with dry air.

Such as GSM variation Causes Stitch length variation in the fabric roll to roll. Improper machine setting. Properly machinery not maintenance. Process parameters in the roll-to-roll variation of the fabric such as

- Overfeed
- Width wise stretching of the dyed fabric,
- On the Stentering, laundering & Compactor machines.

Their Remedies of GSM variation Proper process parameters maintain. Properly machinery setting. Properly dia, temperature maintain. Same process parameter makes sure that all the fabric rolls in a lot, are processed under. Knitting Machine settings, such as Diameter Quality Pulley etc. should never be changed.

Such as Lycra out Causes Increase temperature. Excess chemical used. Excess processing time. Irregular tension Lycra. Breaking of Lycra yarn. And Remedies Accurate chemical use. Accurate process time. Maintain even tension. Proper maintain the temperature.

Such as Pilling Causes Not proper enzyme treatment. Use poor quality yarn. By due to friction of fabric. To high mechanical stress. Excess speed during processing. Their Remedies Accurate enzyme treatment. Use good quality yarn. proper speed during processing. Maintain mechanical stress.

Such as Patta Causes Variation yarn count. Variation yarn tension. And Remedies Maintained yarn count. Maintained yarn tension.

Such as Slub Causes Increase of fly and fuzz on the machine parts. By a thick or heavy place in yarn ling getting on to yarn feeds. Poor carding. Faulty ring frame drafting and bad And Remedies Use good quality yarn. Properly carding. Change faulty ring frame drafting and bad.

Like AS Stitch missing Causes Defective positive feed system. Incorrect feeder setting. Tension variation. Yarn breakage. Defective stop motion. And Remedies Replace yarn feeding system. Replace stop motion. Correcting proper tension. Removing fly from yarn feeding path.

Such as Needle mark Causes Needle Hooks, bent latches & Needle stems. Rough needles in grooves. Selection wrong needle. And Remedies Checked the grey fabric on the knitting machine for any Needle lines. Inspect the Needle filling sequence in the Cylinder / Dial grooves (tricks). Replacement all the defective needle, bent latches and hook. Replacement any bent needles running tight in the tricks [11].

Such as Sinker mark Causes Defect sinker. Worn or bent out sinker. The sinker ring grooves and tight. Dirty sinker. And their Remedies Sinker has to be clean. Replace of defected sinkers.

4.6.1 I found less dyeing and finishing faults if I follow the following way:

- ❖ Modern machinery used.
- ❖ Fabric selecting and inspection system.
- ❖ Skilled and technical person have a lot.
- ❖ By used better chemical.
- ❖ Maintained carefully all processing

4.7 Many Problems of machinery:

Machine Breakdown Problem			
Motor Problem	Gasket Problem	Dosing Motor Problem	Switch Problem
Level Indicator Problem	Filter Problem	Dosing Valve Problem	Addition Tank Problem
Filter Nut Problem	Cooling Valve Problem	Winch Problem	Steam Valve Problem
Operator Crisis	Nozzle Problem	Drain Valve Problem	Steam Motor Problem
Condense Line Problem	Tank Problem	Heat Exchanger Problem	Reserve Tank Problem
Monitor Problem	Reel Problem	Cooling Exchanger Problem	Rubber Stick Change
Main Pump Problem	High Pressure Problem	Main Valve Problem	Cooling Valve Problem
Pump Switch Problem	Safety Valve Problem	Power Stop Problem	Water Line Problem
steam silencer Problem	Flow Meter Problem	Water Level Problem	Stock Tank Problem
Programing set Problem	Steam Line Problem	Chemical Tank Problem	PLC Card Problem

4.7.1 If we want to reduce the dyeing machine stop then we have to follow the instructions:

- ❖ Batch problems need to be reduced.
- ❖ Mechanical problems are to be minimized.
- ❖ Trolley problem needs to reduce the problem.
- ❖ Steam problem and gas crisis remove.
- ❖ Ensures power supply and generator supply
- ❖ Properly lab close to provide Bulk section timely and accurate recipe provide
- ❖ To importance skilled operator & technical person & carefully follow up.

If we can apply these above instructions then we could be minimizing the dyeing machinery stop in the dyeing sector. And finally, we will be able to increase productivity and earn remittances in the country. Which take in important contribution worldwide market of textile sector.

CHAPTER-5
CONCLUSION

Chapter-5

Conclusion

5.1 Conclusion:

By this thesis, I have a clear knowledge about dyeing machinery stop remedies and causes and dyeing and finishing faults and their remedies and causes. This research work has been conducted to measure the how much disruption in production and how much efficiency is hampered. I noted down the reasons for closing the dyeing machine every day. In this thesis, I am referring to the problems of one year. Let's try to find a reason to solve it.

Then I got some different problems such as batch problems, trolley problems, Lab problems, Schedule Maintenance, Breakdown Maintenance, Air problems, Steam problems. Power Problem, Others, etc., finally say that I am learning how to minimize the dyeing machine stoppage. I will be able to increase production and efficiency.

- Through this thesis I have learned about the Dyeing process and also know about various dyeing machinery problems. batch problems, trolley problems, Lab problems, Schedule Maintenance, Breakdown Maintenance, Air problems, Steam problems. Power Problem, Others, etc., I can minimize these dyeing problems machinery by properly monitoring & follow-up.
- By this thesis I have learnt about Dyeing process and also know about different dyeing faults. uneven dye, dye spot, running shade, crease mark, oil spot, GSM variation are commonly occurred during dyeing process. I can minimize these dyeing faults by proper pre-treatment, by use standard dyes and chemicals, proper dosing of different dyes and chemicals, by taking proper time and temperature during dyeing process.
- Faults found in dyeing mainly originated from three separate aspects e.g. (i) Faults due to yarn, (ii) faults occur during knitting and (iii) faults occur due to environment. In order to ensure quality of knitted fabric one must ensure coordination of all the three aspects mentioned above. I believe that my work will help the people working in the composite factory to identify the source of detected faults & proposes specific solutions for these faults causes. So, dyeing can take necessary remedial steps to overcome the faults. Various type

faults are remained till the fabric is finished but this type of fault easily remove by dyeing condition. This report is able to give a deep concept about dyeing faults, causes and their remedies.

- Finishing faults are also common in Textile Industry. There are various types of finishing faults occurred in Textile Industry like water spot, oil spot, crease mark, pin hole, unwanted folding etc. Finishing faults can be minimizing by controlling proper dyeing process, by controlling Stentor machine properly.
- In finishing used to improve appearance, impart functionality and enhance durability as well as process ability of the textile products Different processes associated with complete production of fabrics are required to get finished fabric. An effort is made to formulate all the finishing production steps. This paper also gives an idea of different processes and machineries used usually in a fast growing and mass productive knit-dyeing factory. Major processes control parameters in all machines are discussed briefly to optimizing the faults through this machine control process and some visible hindrance.

Finally based on the overall performance it is concluded that this paper tries to gather all the information related to knit dyeing-finishing factory and analysis fault's causes and suggest some ideas which can meet modern textile trends and customer demand.

REFERENCE

- [1] Mauritz, A., et al., *Review of applications for advanced three-dimensional fiber textile composites*. Composites Part A: applied science and manufacturing, 1999. 30(12): p. 1445-1461
- [2] A. D. Broadbent, *Basic Principle of Textile Coloration*. 2001, England: Society of Dyers and Colorists
- [3] M. F. Hossain, *Practice of Textile Coloration*. Vol. 1. 2007, Dhaka: Book Fair Publications
- [4] J. E. Both, *Principle of Textile Toasting* 1968, England: Butter-worth's
- [5] P. S. Chinta and S. Dhar, *Problems in Dyeing and Their Remedies*, Research Gate, 2007
- [6] E. FEILMANN, *Some Unsolved Dyeing Problems*, Journal of the Society of Dyers and Colorists, 2008
- [7] W. S. Perkins, *Textile Coloration and Finishing*. 1996, U.S.A: Carolina Academic Press
- [8] Md. Tanjin Amin, Overview of a Knit-Dyeing Factory with Necessary Production Formulas, Global Journal of Researches in Engineering, Volume XIV Issue 1 Version 1 Year 2014, P17
- [9] Moin, C.J., and Mahabubuzzaman, A.K.M. 2009. Process for level dyeing of 100% cotton knit fabrics with reactive dye. J. innov.dev. strategy 3(4): 01-08.
- [10] <http://textilesite.blogspot.com/2012/03/dyeing-process.html>
- [11] <https://en.wikipedia.org/wiki/Pigment>
- [12] M clark, Handbook of textile and industrial dyeing. Volume 2: Applications of
- [13] H Dr. Panda, Modern Technology of Textile Dyes & Pigments, Vol-2,
- [14] Dyes, vol-1 & vol-2
- [15] <http://textilelearner.blogspot.com/2012/01/dyeing-mechanism-of-reactive-dye.html>
- [16] http://textilelearner.blogspot.com/2012/01/acid-dyes-properties-of-acid-dyes_21.html
- [17] <https://textileapex.blogspot.com/2014/04/dyeing-faults-their-remedies.htm>
- [18] <http://www.garmentsmerchandising.com/faults-of-knit-fabric-produced-in-textile-industry/>
- [19] <https://textileapex.blogspot.com/2014/04/finishing-faults-remedies.html>
- [20] <http://textilelearner.blogspot.com/2013/01/faultsdefects-in-knitted-fabrics.html>
- [21] https://www.researchgate.net/publication/301915955_Dyes_and_Pigments_Their_Structure_and_Properties
- [22] http://textilelearner.blogspot.com/2011/08/colour-fastness-to-rubbing- rubbing_1201.html
- [23] <http://textilelearner.blogspot.com/2012/01/dyeing-mechanism-of-reactive-dye.html>

- [24] <http://textilelearner.blogspot.com/2012/01/dyeing-of-polyester-fabric-with.html>
- [25] <https://diutestudents.blogspot.com/2018/06/lrwp3-1.html>
- [26] <http://textilelearner.blogspot.com/2012/08/finishing-faultsdefects-different-types.html>
- [27] <http://textilelearner.blogspot.com/2012/03/dyeing-faults-and-remedies-common.html> (
- [28] <http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/20.500.11948/1539/P05885.pdf?sequence=1&isAllowed=y>
- [29] http://ijens.org/Vol_15_I_02/150102-6969-IJET-IJENS.pdf
- [30] <http://www.garmentsmerchandising.com/faults-of-knit-fabric-produced-in-textile-industry/>
- [31] <https://www.textileflowchart.com/2015/03/process-flow-chart-of-batch-section-in-textile-industry.html>
- [32] <https://www.slideshare.net/RiponSayan/right-first-time-dyeing>
- [33] <http://dyeingworld1.blogspot.com/2009/12/right-first-time-dyeing.html>
- [34] <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwjZiJ6S9YbXAhWHs48KHajRBawQFgg1MAI&url=https%3A%2F%2Fwww.ijser.org%2Fresearchpaper%2FRight-First-Time-dyeing-in-Textile-using-Six-Sigma-methods.pdf&usg=AOvVaw0ExnVQFireQFDm0tnGJiRJ>

Turnitin Originality Report

Processed on: 17-Oct-2022 11:01 +06

ID: 1927376026

Word Count: 16405

Submitted: 1

Thesis Report on Defect of Dyeing & Finishing By
Shajal Shekh

Similarity Index

28%

Similarity by Source

Internet Sources: 28%
Publications: 5%
Student Papers: 21%

3% match (Internet from 18-Nov-2020)

<https://textilelearner.blogspot.com/2012/01/dyeing-mechanism-of-reactive-dye.html>

2% match (student papers from 15-Apr-2018)

[Submitted to Daffodil International University on 2018-04-15](#)

1% match (Internet from 29-Oct-2020)

https://textilelearner.blogspot.com/2011/07/dyeing-process-different-types-of-dye_1720.html

1% match (Internet from 19-Nov-2020)

https://textilelearner.blogspot.com/2012/01/acid-dyes-properties-of-acid-dyes_21.html

1% match (student papers from 16-Apr-2018)

[Submitted to Daffodil International University on 2018-04-16](#)

1% match (Internet from 18-Aug-2022)

<http://dspace.daffodilvarsity.edu.bd:8080/bitstream/handle/123456789/5609/171-23-4889%20%2817-%29%20Clearance.pdf?sequence=1>

1% match (Internet from 01-Aug-2015)

<http://article.sapub.org/10.5923.j.materials.20150503.01.html>