REPORT ON

Industrial Attachment

At

Sinha Textile & Opex Group

Kanchpur, Narayanganj, Dhaka.

Course code: TE-431 Course Title: Industrial Attachment

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Advanced in Fabric Manufacturing

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December, 2018

DECLARATION

We hereby declare that, this internship has been done by us under the supervision of Senior Lecturer Shamima Akter Smriti, Department of Textile Engineering, Faculty ofEngineering, Daffodil International University. We also declare that, neither this report nor any part of this has been submitted elsewhere for award of any degree or diploma.

.

Supervised By

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Table of Contents

Supervised By ii
ACKNOWLEDGEMENT ii
1.Executive Summary 1
Chapter-2 3
Information about Factory 3
1.Information about Factory 4
Location Of the group 8
2.2 Departments Shina & Opex group 8
2.3 Management System 9
2.4Organogram 11
2.5 Major buyer with their logo 12
Chapter-3 14
Details of Attachment 14
3.Layout of knitting floor 15
3.1 Organogram of Knitting 16
3.2 Machine Specification 17
3.3 Knitting Machine of Sinha group: 30
3.3.1 Part's of single jersey circular knitting machine : 30
3.4 Auto striper machine: 35
3.5 Knitting Calculation 36
3.6 Some important Conversion of count: 37
3.6 Production calculation: 38
3.6.1 M/C no : 2(1x1 Rib Fabric): 38
3.6.2 M/C no : 20 38
3.6.3 M/C no : 15 39
3.6.4 M/C no : 42 40
3.6.5 M/C No : 28 41
3.7 Calculation of yarn amount for fleece fabric 42
3.8 Calculation of yarn for stripe fabric 44
3.9 Fabric Costing in shina knitting section 46
3.10 Design Analysis of Knitting 46

3.10.2 1x1 Interlock Fabric 48
3.10.3 1x1 Rib fabric 49
3.10.4 2x2 Rib fabric 50
3.10.5 Twill fleece 51
3.10.6 Polo pique 53
3.10.7 Double Lacoste 54
3.10.8 Fleece fabric 56
3.11 Quality check of knit fabric figure are given below 57
3.11.1 Some fault during knitting 57
3.12 4 Point system 61
3.13 Flat bed machine 62
3.13.1 Collar machine 63
3.13.2 Parts of collar machine 63
3.13.3Collar 66
3.13.4 Production 68
3.13.5 Design or type of Collar sample normally they produce 69
3.14 Dyeing 71
3.14.1 Types of Dyes 71
3.14.2 Methods of Dyeing 72
3.14.3 Knit dyeing 72
3.14.4 Sequence of Operation for Knit Fabric Dyeing: 72
3.14.5 Scouring: 73
3.14.6 Bleaching 74
3.14.7 Specification Of Machines 74
Chapter 4 77
Impact of Internship 77
4.1 Impact of Internship 78
Chapter-5 79
Conclusion 79
5.Conclusion 79

Chapter 1

Executive Summary

1.Executive Summary

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

This report has been arranged on the basis of Industrial Attachment on knit fabric Manufacturing Technology. Here in this report we present different working procedure for production of Knit fabric of the industry. we are present here the procedure and process of different types of Knit fabric production, design, knitting, knit fabric inspection, pretreatment, quality control, finishing , number of machines, machine specifications, manpower, organogram, maintenance, name of the buyer, production capacity, dyes and chemicals, layout of the different section, work shift.

Chapter-2
Information about Factory

1.Information about Factory

About Opex & Sinha Group

The opex and Sinha textile group is the largest manufacturing and exporter of RMG in Bangladesh . OG's Chairman, Mr. Anisur Rahman Sinha , has strategically built a production house that stands out among other leading producers because of :

- Integrated operation : OG has developed following backward linkage operations for exclusively catering to group requirements :
- Spinning Mill : Producing customized yarn in line with fabrics .
- Yarn Dyeing : Meeting the specific dyeing requirement of the yarn for ultimate fabrics.
- Weaving & Knitting : Producing woven/knit fabric for RMG units.
- Washing Plant : Supporting the fabric unit for specific washing requirement , particularly for the bottoms .
- Accessories: Producing garments accessories for RMG units.

The group has a wide range of products, which includes woven garments, knit garments , sweaters and home textile . OG is one of the few groups in the industry that capability to provide sizeable quantity of each product range. Over the years (more than two decades) the group maintains excellent track record with major world class buyers, which includes some of the renowned chain stores / merchandisers for ready-mad garments (Sears, JC Penny, AMG , Levi's , Target, VF Asia , etc.) Total buyer base is constituted of over 50 buyers where top 20 buyers constitute almost 90% of the total export performance. The group has its own industrial park with effluent plant, childcare facility, adequate ventilation , spacious lay out , school , hostels , etc.

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

the divisions to deliver quality textiles, which meet the demand of European and American customers.

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

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

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

Company Profile

Owner of the factory : Mr. Anisur Rahman Sinha

Company Name : Opex Group (Garments Manufacturing Division)

Sinha Textile Group (Spinning , Weaving , Dying Division)

Status : Private Ltd. Company

Type & Business of the company : Export of RMG

Export of Textile products as backward linkage of RMG

Year of Establishment : 1984

Address

Hade office : House no # 368 , Rode no # 28, New DOHS , Mohakhali , C/A Dhaka-1212, Bangladesh

Tel : 88-02-8828860-4 , 9891390-1

Fex : 880-2-8828856-7

Merchandising Office : (Kanchpur Zone) : Sinha Textile complex , Kanchpur Sonargaon , Narayanganj.

Tel : 7618066, 7618055 , 7617788

Merchandising Office (Dhaka Zone) : 56/1 , Block#C , Section#13 , Mirpur , Dhaka-1216

Hong Kong Office : Joyful Miles Ltd. 16B , Alpha House 27-33 Nathan Road Tsimshatsui , Hong Kong .

Tel : 2721-1950(5 line)

Fex : 2721-1967

U.S.A Office : 8409 Haalli Ford Ct , Plano Texax : 7502

2.1Social Policy:

The Opex and Sinha Textile Group is committed to the best human workplace practices. Their goal is to continuously improve their Human Resource policies and procedures through education, training, communication and employees involvement. To that end Opex and Sinha Textile Group has identified eight (8) areas of importance. The company commits to management review, employees open communication, policy development and coordination with the SA 8000 standard to comply with all state/local laws and industrial/factory laws of peoples republic of Bangladesh to provide a favorable employment environment that respects understands the needs of its employees. The company commits to inform all employees of its policy and position on the SA 8000

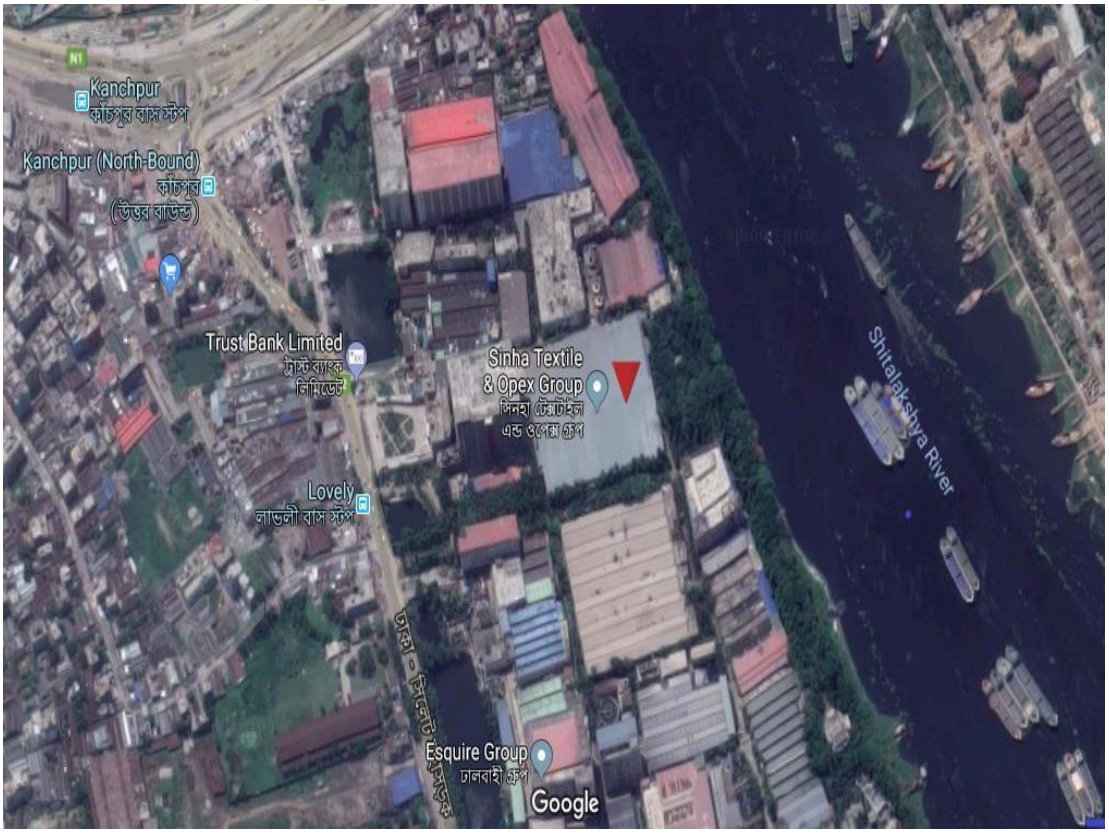
standard. All employees will be made aware of the policy and company statement upon implementation.

Going forward all new employees will be trained on SA 8000 in new employees' orientation. Periodically throughout the year the company will reaffirm its commitment to the SA 8000 policy through employee communications such as office notice, demonstration and payroll stuffers.

The eight (8) identified areas are:

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

Location Of the group



2.2 Departments Shina & Opex group

Production Oriented Department:

- Production Planning & Control
- Yarn
- Weaving Knitting
- Batch Preparation
- Dyeing
- Finishing
- Lab & Quality assurance
- Dye Warehouse
- Maintenance
- Utility

- Finished Warehouse Supporting Department:

- Personal administration
- Procurement
- Marketing
- IE
- HR
- Finance & Accounting

Dyeing Section:

- Batch section
- Dye house
- Dyeing lab
- Quality control & Finishing

Maintenance:

- Electrical
- Mechanical Admin section:

- Time section
- Cleaning
- Security
- Store

2.3 Management System

STG has skilled administration, management and marketing team guide by proficient, dexterous & experienced leaders who offer right solution for the consumers with the right eminence & wit the shortest lead-time for the export market in Bangladesh.

Shifting System

There are three shift in knitting, dying & finishing factory and each shift is of 8hours, shift changed of every person in the production floor after every seven days. General shift is available for employees of other departments.

A Shift: 6:00 AM – 2:00 PM

B Shift: 2:00 PM – 10:00 PM

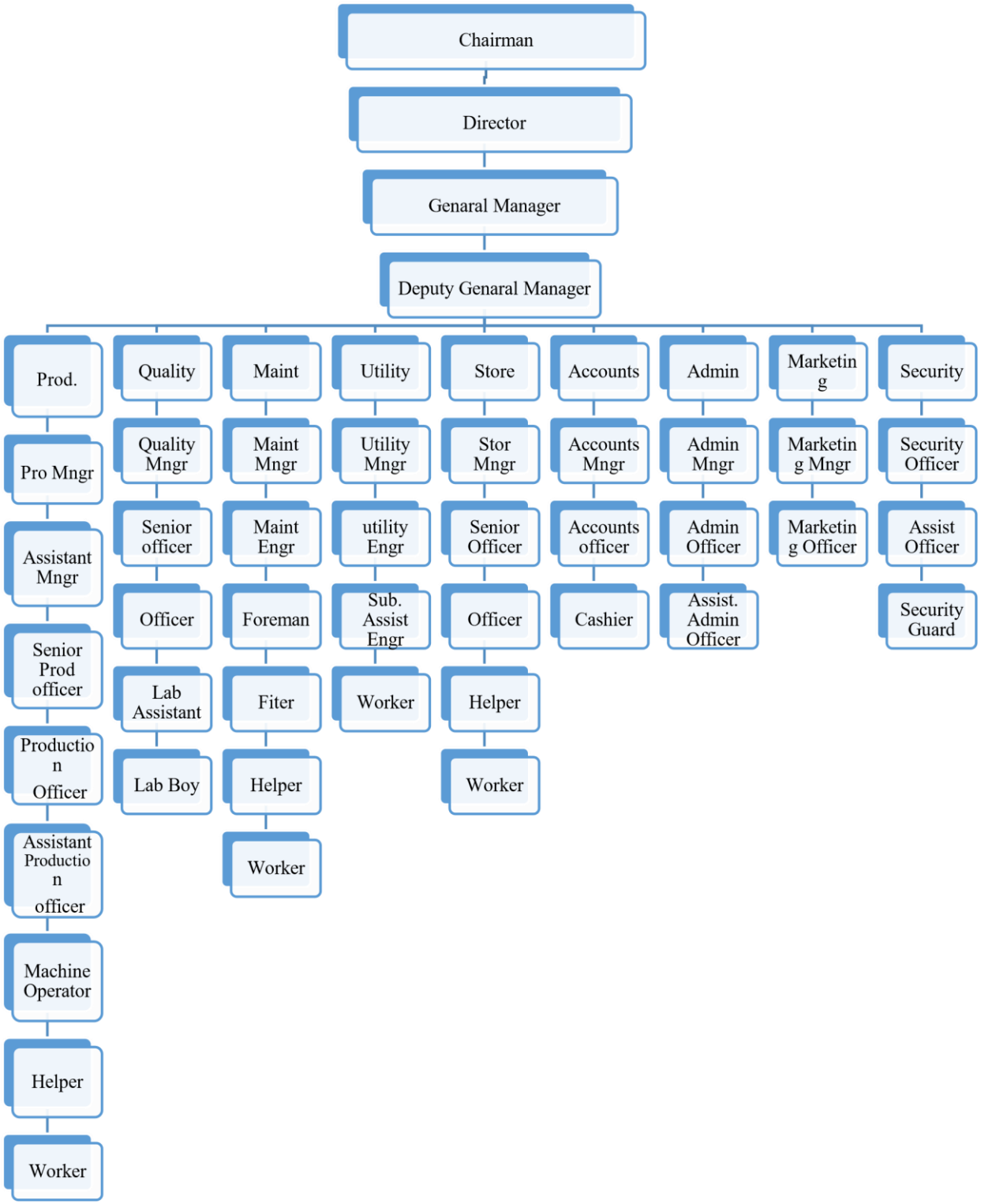
C Shift: 10:00 PM – 6:00 AM

General Shift: 9:00 AM – 6:00 PM

Manpower of Sinha textile group (STG)

Sinha textile group is running with strong manpower in total. At present about 66,000 people involve here. Every section of STG has sufficient manpower to ensure its smooth running of production in every shift.

2.4Organogram



2.5 Major buyer with their logo

Buyer	Logo
Levi's	
H&M	
American Eagle	

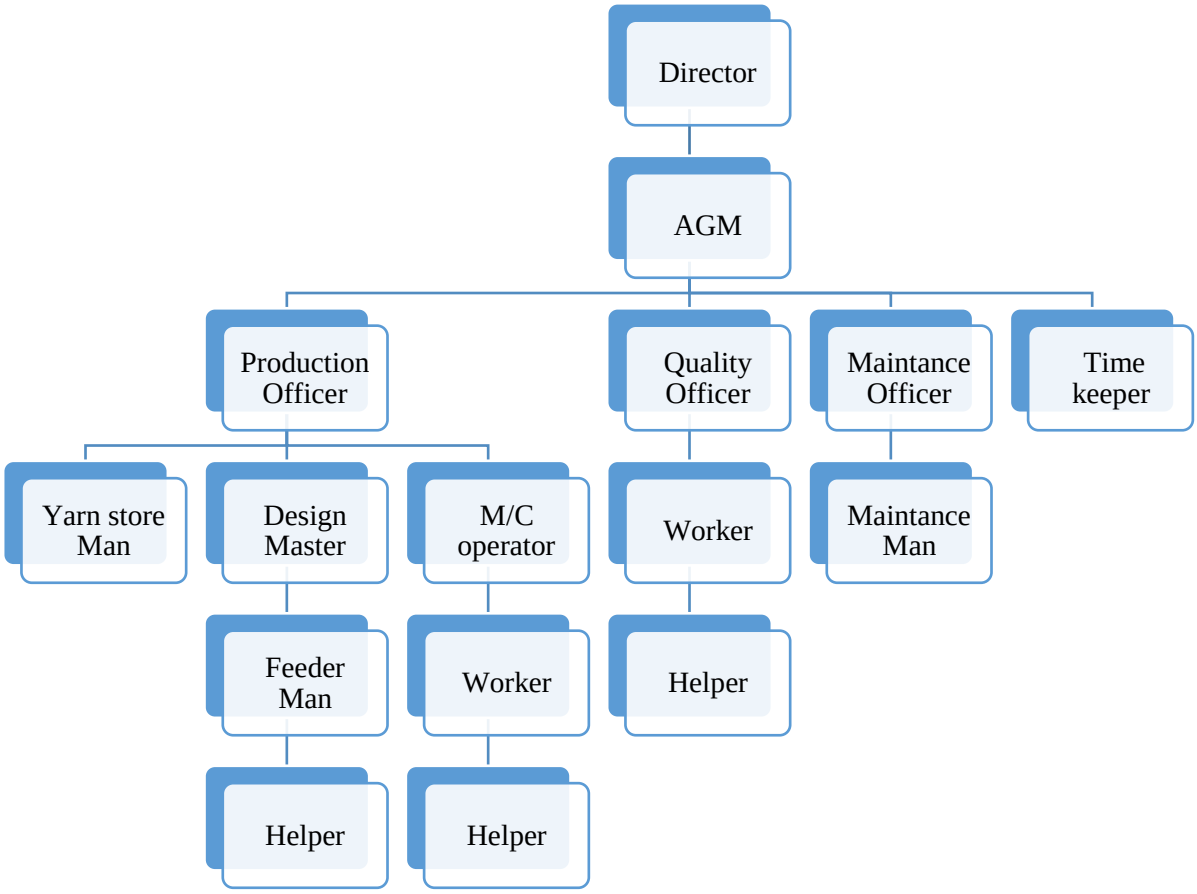
Cortefiel	CORTEFIEL
Jhon Forsyth of Canada	JOHN FORSYTH SHIRT CO. LTD. FORSYTH OF CANADA, INC
Target	Target

Chapter-3

Details of Attachment

3.Layout of knitting floor

3.1 Organogram of Knitting



Man power of Shina knitting

Total man power = 115

3.2 Machine Specification

Machine No : 01	
M/C Type	Interlock
Dia & Gauge	30" Dia 22 GG
Avg RPM	18
Avg Capacity/Day	60*3 = 180 kg
Brand	Terrot
Origin	Gurmany
Model No	1-1108
No of Needle	4146

Machine No : 02	
M/C Type	Rib
Dia & Gauge	30" Dia 16 GG
Avg RPM	18
Avg Capacity/Day	70*3=210kg
Brand	Terrot
Origin	Germany
Model No	R H-296
No of Needle	3016

Machine No : 03	
M/C Type	Rib
Dia & Gauge	30"Dia 16 GG
Avg RPM	18
Avg Capacity/Day	60*3=180 Kg
Brand	Terrot
Origin	Germany
Model No	R H-296

No of Needle	3015

Machine No : 05	
M/C Type	Rib Interlock
Dia & Gauge	30" Dia 20 GG
Avg RPM	18
Avg Capacity/Day	60*3=180 kg
Brand	Terrot
Origin	Germany
Model No	13P-154
No of Needle	3770

Machine No : 06	
M/C Type	Interlock
Dia & Gauge	30" Dia 22 GG
Avg RPM	18
Avg Capacity/Day	60*3=180 kg
Brand	Terrot
Origin	Germany
Model No	13p-154
No of Needle	4144

Machine No : 07	
M/C Type	Interlock
Dia & Gauge	30" Dia 20 GG
Avg RPM	18
Avg Capacity/Day	60*3=180 kg
Brand	Terrot
Origin	Germany
Model No	13p-154

No of Needle	3768

Machine No : 08	
M/C Type	S/J
Dia & Gauge	22" Dia 22GG
Avg RPM	50
Avg Capacity/Day	60*3=180kg
Brand	Hubter
Origin	Taiwan
Model No	H.S-94.0
No of Needle	1520

Machine No	11
M/C Type	S/J
Dia & Gauge	30" Dia 22 G
Avg RPM	20
Avg Capacity/Day	70*3=210
Brand	Terrot
Origin	Germany
Model No	S-296
No of Needle	2072

Machine No	12
M/C Type	S/J
Dia & Gauge	30" Dia 22 G
Avg RPM	20
Avg Capacity/Day	70*3=210kg
Brand	Terrot
Origin	Germany
Model No	S-296

No of Needle	2072

Machine No : 13	
M/C Type	Rib
Dia & Gauge	34" Dia 18 GG
Avg RPM	18
Avg Capacity/Day	80*3=240
Brand	Mayer & Cie
Origin	Germany
Model No	FV-20
No of Needle	3844

Machine No	14
M/C Type	S/J
Dia & Gauge	24" Dia 22 G
Avg RPM	50
Avg Capacity/Day	65*3=195 kg
Brand	Hubter
Origin	Taiwan
Model No	H.S-94.0
No of Needle	1658

Machine No:	15
M/C Type	Fleece/S.J
Dia & Gauge	30" Dia 20 G
Avg RPM	16
Avg Capacity/Day	60*3=180kg
Brand	Terrot
Origin	Germany
Model No	S>B.f-296

No of Needle	1884

Machine No	16
M/C Type	Fleece
Dia & Gauge	30" Dia 20 G
Avg RPM	16
Avg Capacity/Day	60*3=180kg
Brand	Terrot
Origin	Germany
Model No	S>B.F-296
No of Needle	1884

Machine No : 17	
M/C Type	S/J
Dia & Gauge	30" Dia 20GG
Avg RPM	20
Avg Capacity/Day	70*3=210 kg
Brand	Terrot
Origin	Germany
Model No	S-296
No of Needle	1884

Machine No : 18	
M/C Type	S/J
Dia & Gauge	30" Dia 20 GG
Avg RPM	20
Avg Capacity/Day	70*3=210kg
Brand	Terrot
Origin	Germany
Model No	R H-296

No of Needle	1884

Machine No	19
M/C Type	S/J
Dia & Gauge	30" Dia 22 G
Avg RPM	20
Avg Capacity/Day	70*3=210kg
Brand	Terrot
Origin	Germany
Model No	S-296
No of Needle	2072

Machine No : 20	
M/C Type	S/J
Dia & Gauge	30" Dia 24 GG
Avg RPM	20
Avg Capacity/Day	70*3=210kg
Brand	Terrot
Origin	Germany
Model No	R H-296
No of Needle	2262

Machine No : 22	
M/C Type	S/J
Dia & Gauge	34" Dia 24 GG
Avg RPM	16
Avg Capacity/Day	50*3=150kg
Brand	Mayer & Cie
Origin	Germany
Model No	1.6R

No of Needle	2268

Machine No : 23	
M/C Type	S/J(Auto Stripe)
Dia & Gauge	30" Dia 24 GG
Avg RPM	20
Avg Capacity/Day	50*3=150kg
Brand	Mayer& Cie
Origin	Germany
Model No	1.6R
No of Needle	2260

Machine No : 24	
M/C Type	S/J
Dia & Gauge	34" Dia 22 GG
Avg RPM	16
Avg Capacity/Day	60*3=180kg
Brand	Mayer & Cie
Origin	Germany
Model No	1.6R
No of Needle	2340

Machine No : 27	
M/C Type	S/J
Dia & Gauge	26" Dia 24 GG
Avg RPM	24
Avg Capacity/Day	80*3=240kg
Brand	Mayer & Cie

Origin	Germany
Model No	Relanit-3.2
No of Needle	1960

Machine No : 28	
M/C Type	S/J
Dia & Gauge	34" Dia 24 GG
Avg RPM	24
Avg Capacity/Day	120*3=360kg
Brand	Mayer & Cie
Origin	Germany
Model No	Relanit-3.211
No of Needle	2562

Machine No : 29	
M/C Type	S/J
Dia & Gauge	34" Dia 24 GG
Avg RPM	24
Avg Capacity/Day	120*3=360kg
Brand	Mayer & Cie
Origin	Germany
Model No	Relanit-3.211
No of Needle	2562

Machine No : 35	
M/C Type	S/J
Dia & Gauge	26" Dia 22 GG
Avg RPM	16
Avg Capacity/Day	35*3=105kg
Brand	Mayer & Cie

Origin	Germany
Model No	Relanit-1.6R
No of Needle	1800

Machine No : 36	
M/C Type	S/J(Auto Stripe)
Dia & Gauge	26" Dia 22 GG
Avg RPM	20
Avg Capacity/Day	40*3=120kg
Brand	Mayer & Cie
Origin	Germany
Model No	Relanit-1.6R
No of Needle	1796

Machine No : 37	
M/C Type	S/J
Dia & Gauge	38" Dia 22 GG
Avg RPM	16
Avg Capacity/Day	35*3=105kg
Brand	SANG YOUNG
Origin	Korea
Model No	S6C
No of Needle	2640

Machine No : 38	
M/C Type	S/J
Dia & Gauge	38" Dia 22 GG
Avg RPM	16
Avg Capacity/Day	35*3=105kg
Brand	SANG YOUNG

Origin	Korea
Model No	S6C
No of Needle	2640

Machine No : 39	
M/C Type	S/J(Auto Stripe)
Dia & Gauge	26" Dia 22 GG
Avg RPM	20
Avg Capacity/Day	40*3=120kg
Brand	Mayer & Cie
Origin	Germany
Model No	Relanit- 1.6 R
No of Needle	1796

Machine No : 40	
M/C Type	S/J(Auto Stripe)
Dia & Gauge	30" Dia 22 GG
Avg RPM	20
Avg Capacity/Day	50*3=150kg
Brand	Mayer & Cie
Origin	Germany
Model No	Relanit- 1.6 R
No of Needle	2072

Machine No :	42
M/C Type	S/J
Dia & Gauge	24 " Dia 24G
Avg RPM	24
Avg Capacity/Day	60*3=180kg
Brand	Mayer & Cie

Origin	Germany
Model No	MV - 4.3.2
No of Needle	1808

Machine No : 43	
M/C Type	S/J
Dia & Gauge	30" Dia 28 GG
Avg RPM	24
Avg Capacity/Day	100*3=300kg
Brand	Mayer & Cie
Origin	Germany
Model No	Relanit-3.211
No of Needle	2638

Machine No : 44	
M/C Type	S/J
Dia & Gauge	30" Dia 24 GG
Avg RPM	24
Avg Capacity/Day	100*3=300kg
Brand	Mayer & Cie
Origin	Germany
Model No	Relanit-3.211
No of Needle	2260

Machine No : 45	
M/C Type	Interlock
Dia & Gauge	30" Dia 22 GG
Avg RPM	20
Avg Capacity/Day	90*3=270kg
Brand	Mayer & Cie

Origin	Germany
Model No	OV 3.2 Q.C
No of Needle	2064

Machine No :	46
M/C Type	Interlock
Dia & Gauge	30" Dia 22G
Avg RPM	20
Avg Capacity/Day	90*3=270 kg
Brand	Mayer & Cie
Origin	Germany
Model No	OV 3.2 QC
No of Needle	2064

Machine No : 48	
M/C Type	S/J
Dia & Gauge	30" Dia 22 GG
Avg RPM	16
Avg Capacity/Day	45*3=135kg
Brand	Fukuhara
Origin	Japan
Model No	VX-RSY6RE
No of Needle	2088

Machine No : 47	
M/C Type	S/J
Dia & Gauge	30" Dia 24 GG
Avg RPM	16
Avg Capacity/Day	45*3=135kg
Brand	FUKUHARA

Origin	Japan
Model No	VX-RSY6RE
No of Needle	2088

Machine No : 49	
M/C Type	S/J
Dia & Gauge	30" Dia 22 GG
Avg RPM	16
Avg Capacity/Day	45*3=135kg
Brand	Fukuhara
Origin	Japan
Model No	VX-RSY6RE
No of Needle	2088

Machine No : 50	
M/C Type	S/J(Auto Stripe)
Dia & Gauge	30" Dia 22 GG
Avg RPM	20
Avg Capacity/Day	50*3=150kg
Brand	Fukuhara
Origin	Japan
Model No	VX-RSY6RE
No of Needle	2072

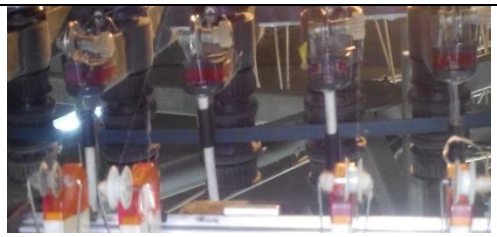
3.3 Knitting Machine of Sinha group:

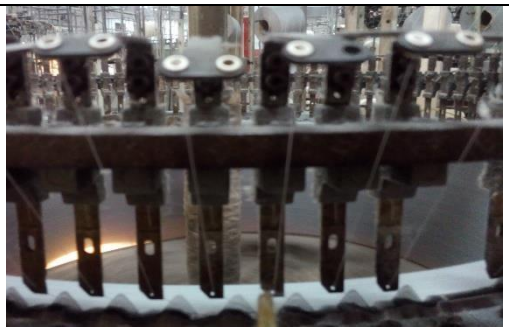
Single jersey circular knitting machine:

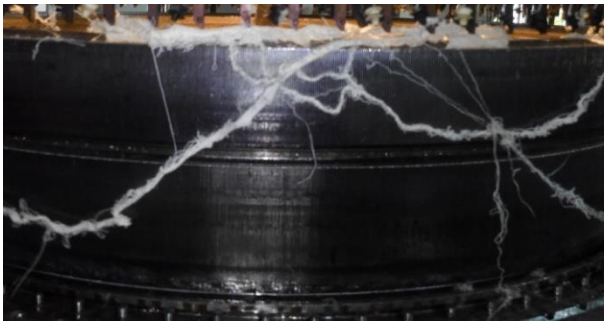
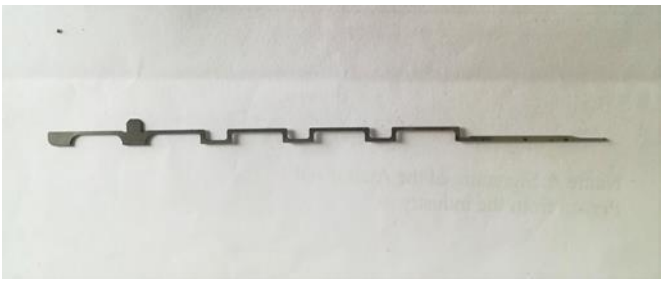
Figure: Single jersey circular knitting machine

3.3.1 Part's of single jersey circular knitting machine :

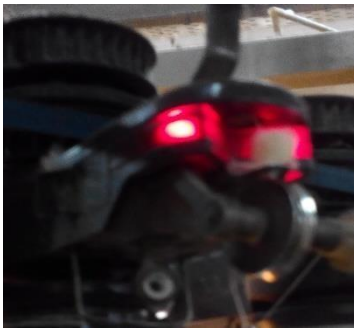
Yarn Cone: It contain yarn. Yarn are feed from cone.	

Creel: It is like a stand .Yarn cone are placed here. Yarn are supplied from here through the pipe.	
Yarn tensioner: It is used to maintain yarn tension .	
Positive feeder : Positive feeder store the yarn and feed yarn . It avoid the slippery of yarn and maintain uniform tension.	

Yarn guide : It is used to guide yarn and maintain tension .	

Cylinder : It is a important part of knitting machine . All the needle are set here and some time sinker also . It is a rotating part . Cylinder diameter are the fabric diameter . Cylinder gauge means number of needle in per inch .	
Needle: Needle is the most important element in circular knitting machine. It form loop of knitting machine.	
Sinker : Sinker is used to hold the loop and support the thread .	

Cam box : It is used to hold the cam according to the fabric design.	

Cam : Cam are three types knit, tuck, miss . Knit cam produce knit loop, tuck cam produce tuck loop and miss loop can't produce any loop .	
VDQ pulley : VDQ means variable dia for quality pulley. It controls the quality of the fabric. VDQ pulley is very important in maintaining proper stitch length. .If pulley moves towards the positive directive then the G.M.S is decrease and in the reverse direction G.M.S will increase.	
Stop motion & Indictor: This device helps to stop the machine when yarn break and a light indicator indicate that.	

Fabric take-up : Fabric are takeup in fabric roller .	

Handle : Cylinder are driven manually by handle .	
Lycra feeding device and indicator: Lycra feeder feed Lycra. If Lycra break the stop motion stop the machine and indicate light.	
Air nozzle: It produce high pressure of air. If help to clean machine dust.	
Oil & Air Pipe: Those pipe produce air and oil. Oil is used to lubricate the needle path and air is used to clean dust. Organogram	

Machine switch: Red color switch stop the machine, green color switch star the machine & Yellow color switch produce inching motion to the machine.	

3.4 Auto striper machine:

Figure: Auto striper machine

3.5 Knitting Calculation

Some important term and formula for knitting:

Count: Count is a numerical expression which indicate the coarseness or fineness of a yarn.

Count are two types:

1. Direct count/Fixed length system
2. Indirect count/Fixed weight system

Direct count: Direct count is used for measurement of weight per unit length of yarn, where length is consider as constant. For direct count higher number of count indicate more coarseness yarn. This system used for manmade fiber yarn. Direct count types are given below:

i. Tex
ii. Denier iii. Decitex iv. Pounds per spindle

Example:

Yarn count 30 tex means there are 30 grams of yarn per 1000m yarn.

Yarn count 30 denier means there are 30gams of yarn per 9000m yarn.

Yarn count 30 decitex means there are 30gams of yarn per 10000m yarn.

20 pound per spindle means there are 20lbs of yarn per 14400m yarn.

Indirect count: In indirect system yarn count are measuring of length per unit yarn where weight is consider as constant. High number of yarn count indicate more fineness of yarn.
Indirect system used for natural fiber. Types of indirect count system are given below:

i. English count(Ne) ii.
Metric count(Nm)

Example:

Yarn count 30Ne means there 30 hanks per 1lb. Each hank contain 840yds yarn.

30Ne=840ydsX30hank=1lb

3.6 Some important Conversion of count:

$$\text{Tex} = \frac{590.5}{\text{Ne}}$$

$$\text{Ne} = \frac{5315}{\text{Denier}}$$

Denier = 9 Tex

Nm = 1.693 x Ne

Some important formula for knit fabric calculation:

$$\text{Production in length} = \frac{\text{No of feeder x cylinder R.P.M x Time x efficiency}}{\text{CPI x 36}}$$

$$\text{Fabric width} = \frac{\pi \text{ x diameter of cylinder x m/c gauge}}{\text{wales per cm}}$$

Production calculation for single jersey(kg) =

$$\frac{\text{No of feeder x No of needle x cylinder R.P.M x SL(mm) x efficiency x 60 x 24}}{10 \text{ x } 2.54 \text{ x } 36 \text{ x } 840 \text{ x count x } 2.2046}$$

For double jersey it is multiplied by 2.

$$\text{Stitch density} = \frac{\text{Course per cm}}{\text{Wales per cm}}$$

3.6 Production calculation:

3.6.1 M/C no : 2(1x1 Rib Fabric):

M/c dia = 30”

M/c gauge = 16

R.P.M = 18

Yarn count = 24 Ne

SL = 2.81 mm

Efficiency = 85%

No of feeder = 52

Production per shift =

$$2 \times \frac{\text{No of feeder} \times \text{No of needle} \times \text{cylinder R.P.M} \times \text{SL(mm)} \times \text{efficiency} \times 60 \times 24}{10 \times 2.54 \times 36 \times 840 \times \text{count} \times 2.2046}$$

$$= 2 \times \frac{\pi DG \times 52 \times 18 \times 2.81 \times 60 \times 8 \times .85}{10 \times 2.54 \times 36 \times 840 \times 24 \times 2.2046}$$

= 79.64 kg

1x1 Rib fabric production per shift is 79.64 kg.

3.6.2 M/C no : 20

Single jersey fabric

Dia = 30”

Gauge = 24

SL = 3.15

Count = 24Ne

R.P.M = 22.90

No of feeder = 96

Efficiency = 85%

No of needle = 2262

Production per shift =

$$\frac{\text{No of feeder x No of needle x cylinder R.P.M x SL(mm) x efficiency x 60 x 24}}{10 \times 2.54 \times 36 \times 840 \times \text{count} \times 2.2046}$$

$$= \frac{2262 \times 96 \times 3.15 \times 22.90 \times 60 \times 8 \times .85}{10 \times 2.54 \times 36 \times 840 \times 24 \times 2.2046}$$

157.26 kg

3.6.3 M/C no : 15

Double lacost fabric

Dia = 26

Gauge = 22

R.P.M = 10.7

Yarn count = 150 D filament

No of feeder = 84

SL = 2.55 mm

No of needle = 1797

Efficiency = 85%

Now,

$$Ne = \frac{5315}{Denier}$$

$$= \frac{5315}{150}$$

=35.43 Ne

=35 Ne

Production per shift =

$$\frac{\text{No of feeder x No of needle x cylinder R.P.M x SL(mm) x efficiency x 60 x 24}}{10 \times 2.54 \times 36 \times 840 \times \text{count} \times 2.2046}$$

$$= \frac{1797 \times 84 \times 10.7 \times 60 \times 8 \times 2.55 \times 85}{10 \times 2.54 \times 36 \times 840 \times 35 \times 2.2046}$$

= 28.34 kg

3.6.4 M/C no : 42

Single jersey fabric

Dia = 24”

Gauge = 24

SL = 3.02

Count = 24Ne

R.P.M = 24

No of feeder = 78

Efficiency = 85%

No of needle = 1810

Production per shift =

$$\frac{\text{No of feeder x No of needle x cylinder R.P.M x SL(mm) x efficiency x 60 x 24}}{10 \times 2.54 \times 36 \times 840 \times \text{count} \times 2.2046}$$

$$= \frac{1810 \times 78 \times 24 \times 60 \times 8 \times 3.02 \times .85}{10 \times 2.54 \times 36 \times 840 \times 24 \times 2.2046}$$

= 102.72 kg

3.6.5 M/C No : 28

Single jersey

Dia = 34”

Gauge = 24

SL = 3.15 mm

Count = 24Ne

R.P.M = 24

No of feeder = 108

Efficiency = 85%

No of needle = 2562

Production per shift =

$$\frac{\text{No of feeder x No of needle x cylinder R.P.M x SL(mm) x efficiency x 60 x 24}}{10 \times 2.54 \times 36 \times 840 \times \text{count} \times 2.2046}$$

$$= \frac{2562 \times 108 \times 3.15 \times 24 \times 60 \times 8}{10 \times 2.54 \times 36 \times 840 \times 2.2046}$$

=210 kg

3.7 Calculation of yarn amount for fleece fabric

1. How much yarn will need for 7000kg fleece fabric? Here yarn 32Ne count yarn having 3.85mm SL, 150D yarn having 3.10 SL & 8Ne yarn count having SL 2mm.

Now,

$$150D = \frac{5315}{Ne}$$

$$Ne = \frac{5315}{150}$$

= 35.4 Ne

Now we have to convert all yarn count into one. 35.4Ne, 8Ne yarn count convert into 32Ne count.

For 35.4Ne

$$\frac{32 \times 3.10}{35.4}$$

SL = 2.8mm

For 8Ne

$$\frac{32 \times 2}{8}$$

SL = 8mm

Now total SL =2.8+3.85+8 = 14.65

Now in 32Ne,

In 14.65 SL 32Ne count yarn has = 3.85 SL

In 1 SL 32Ne count yarn has = $\frac{3.85}{14.65}$ SL

In 100 SL 32Ne count Yarn has = $\frac{3.85 \times 100}{14.65}$

= 26.28 %

Similarly,

For 35.4Ne yarn count has 19.11% SL

For 8Ne yarn count has 54.61% SL

Now,

Yarn need for 32Ne count

In 100 it has = 26.26

In 1 it will = $\frac{26.36}{100}$

In 7000 will = $\frac{26.26 \times 7000}{100}$

= 1838.2 kg

Similarly,

For 35.4Ne =1337.7 kg

For 8Ne = 3822.7 kg

So, for 32 Ne count yarn need 1838.2kg, for 35.4Ne count Yarn need 1337.7kg, for 8Ne count yarn need 3822.7kg.

3.8 Calculation of yarn for stripe fabric

For 2000kg knit stripe fabric,

Color	Strie length in cm
White	5cm
Black	1cm
White	1cm
Black	1cm
White	5cm
Yellow	5cm
White	15cm
Green	5cm
White	25cm
Total stripe	63cm

Calculate the amount of yarn. How much yarn need for individual color for 2000kg stripe fabric

Amount of white color stripe = 51cm Amount

of green color stripe = 5cm

Amount of yellow color stripe = 5cm

Amount of black color stripe = 2cm

In total 63cm stripe amount of white stripe = 51cm

In 1cm stripe amount of white stripe = $\frac{51}{63}$ cm

In 100cm stripe amount of white stripe = $\frac{51 \times 100}{63}$

So White = 80.95%

Similarly,

Green = 7.94 %

Yellow = 7.94%

Black = 3.17 %

Now,

In 100 kg white need = 80.95kg

In 1 kg white need = 80.95/100 kg

In 2000 kg white need = $\frac{80.95 \times 2000}{100}$

White yarn = 1619 kg

Similarly,

Green = 158.8kg

Yellow = 158.8 kg

Black = 63.4 kg

So amount of white yarn 1619kg, green yarn 158.8kg, yellow yarn 158.8kg & black yarn 63.4kg needed.

3.9 Fabric Costing in shina knitting section

Yarn =	$3.10
Knitting =	$0.20
Dyeing & Finishing =	$1.50
Total	$4.80
Porcess loss(12%)	$0.58
Total	$5.38
Corporate profit(5%)	$0.27
Commercial profit(1%)	$0.05
Others(1%)	$0.05
Cost of per kg knit fabric	$5.75

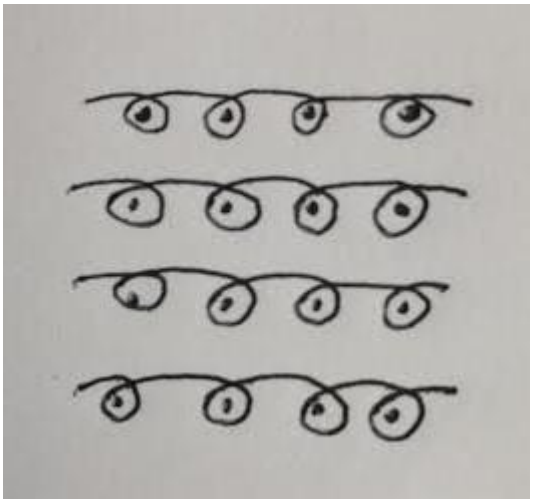
3.10 Design Analysis of Knitting

Design analysis of knit fabric: Here are some knit fabric design analysis and there technical face and back side are given below with fabric attachment.

3.10.1 Single jersey

Face Side	Back Side

Notation diagram:



Cam arrangement

K	K
K	K

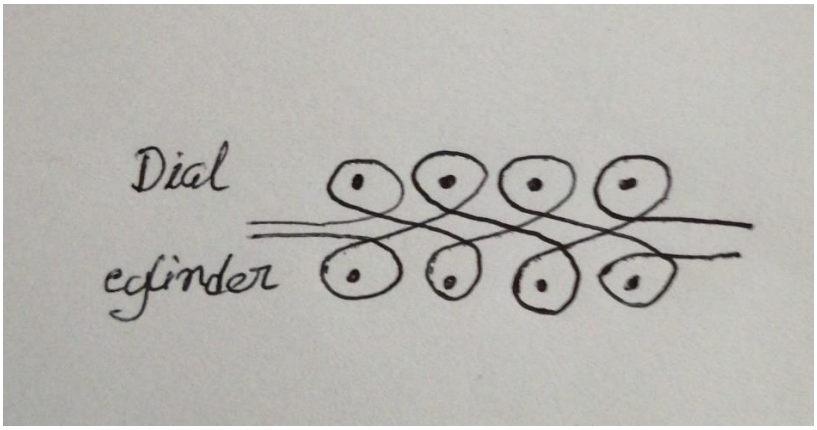
Needle arrangement

1	2	1	2

3.10.2 1x1 Interlock Fabric

Face Side	Back Side

Notational diagram



Cam arrangement

K	M	K	M
M	K	M	K

Cylinder

Dial

K	M	K	M
M	K	M	K

Needle arrangement

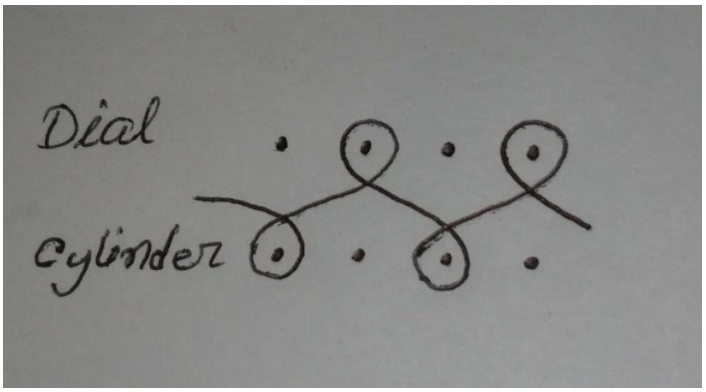
L		L	
	S		S

	S		S
L		L	

3.10.3 1x1 Rib fabric

Face Side	Back Side

Notation diagram



Cam arrangement Needle arrangement

K	k	K	k
k	K	k	K

Dial

1		1	
	2		2

K	k	K	k
k	K	k	K

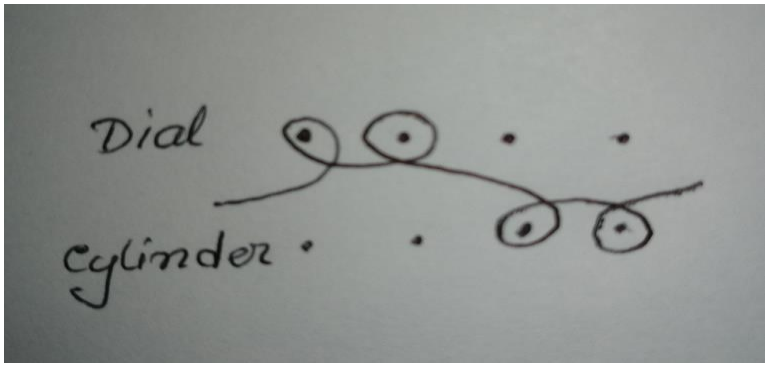
Cylinder

2		2	
	1		1

3.10.4 2x2 Rib fabric

Face Side	Back Side

Notation Diagram



Cam arrangement

K	k	K	k	Dial
k	K	k	K	

K	k	K	k		
k	K	k	K	Cylinder	

Needle arrangement

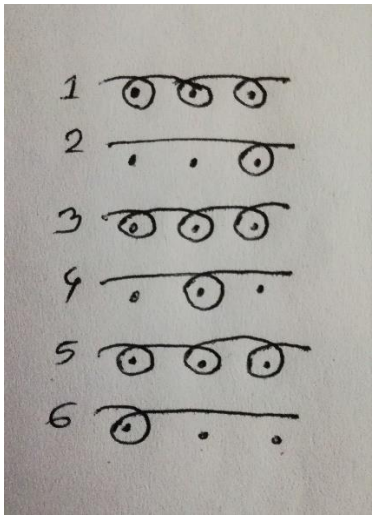
1				1	
	2		2		

		2		2	
	1				1

3.10.5 Twill fleece

Face Side	Back Side

Notation diagram



Cam arrangement

1	2	3	4	5	6
K	M	K	M	K	K
K	M	K	K	K	M
K	K	K	M	K	M

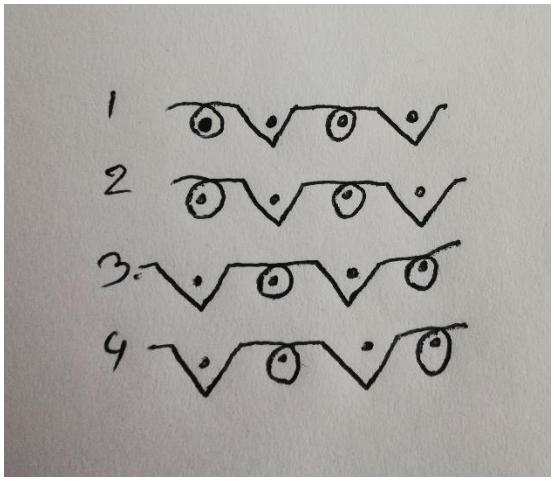
Needle arrangement

1	2	3	1	2	3

3.10.6 Polo pique

Face Side	Back Side

Notation diagram



Cam arrangement

1	2	3	4
K	K	T	T
T	T	K	K
K	K	T	T
T	T	K	K

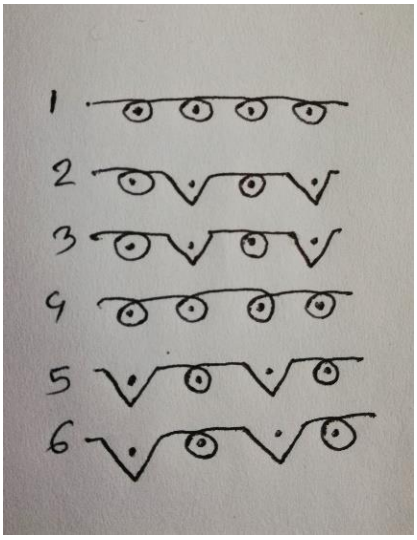
Needle arrangement

1	2	3	4	1	2	3	4

3.10.7 Double Lacoste

Face Side	Back Side

Notation Diagram



Cam arrangement

1	2	3	4	5	6
K	K	K	K	T	T
K	T	T	K	K	K
K	K	K	K	T	T
K	T	T	K	K	K

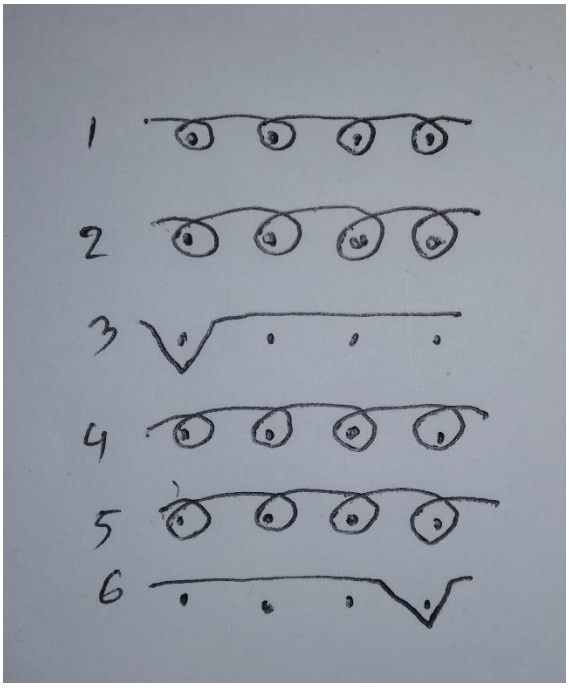
Needle arrangement

1	2	3	4	1	2	3	4

3.10.8 Fleece fabric

Face Side	Back Side

Notation Diagram



Cam arrangement

K	**K**	**T**	**K**	**K**	**M**
K	**K**	**M**	**K**	**K**	**M**
K	**K**	**M**	**K**	**K**	**M**
K	**K**	**M**	**K**	**K**	**T**

Needle arrangement

1	**2**	**3**	**4**	**1**	**2**	**3**	**4**

3.11 Quality check of knit fabric figure are given below

3.11.1 Some fault during knitting

Drop stitch:

Causes of drop stitch

- High Yarn Tension
- Yarn Overfeed or Underfeed
- High Fabric Take Down Tension
- Defects like Slubs, Neps, Knots etc.

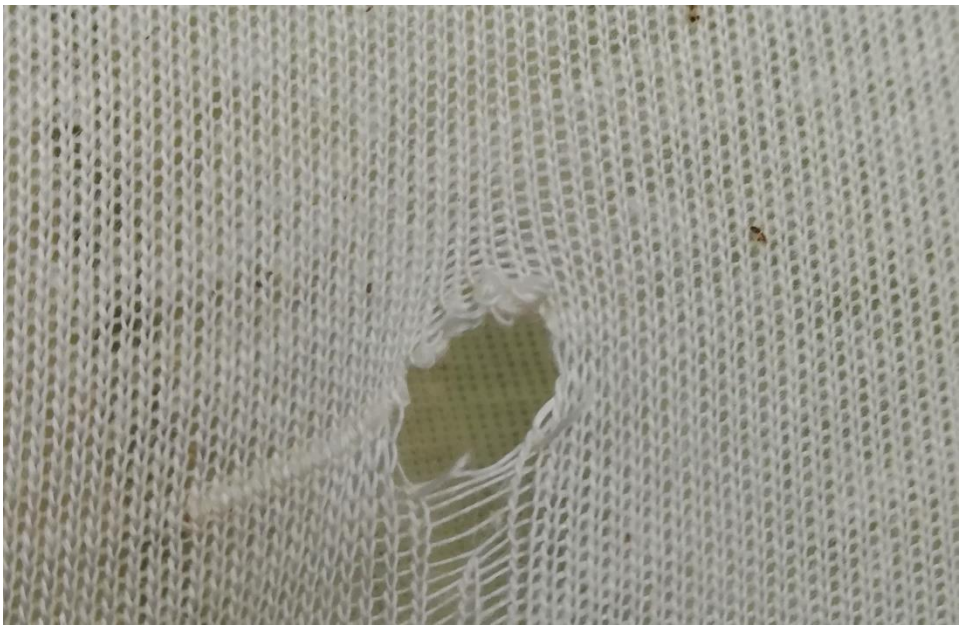


Figure: Loop In fabric

Slub:

- Thick & thin place in yarn
- Dirt & dust

Figure: Slub in Fabric

Needle Missing:

- If worker are not attentive this problem is heepen

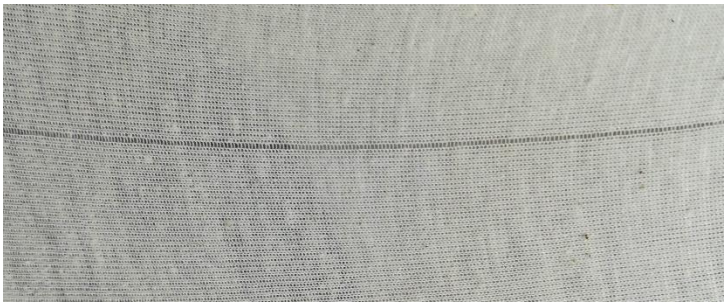


Figure: Needle Missing in fabric

Oil mark:

- Fibers & fluff accumulated in the needle tricks which remain soaked with oil.
- Excessive oiling of the needle beds.

Figure: Oil mark

Hole: Needle bend, needle decay cause hole. Also dirt dust in needle can make a hole in fabric.

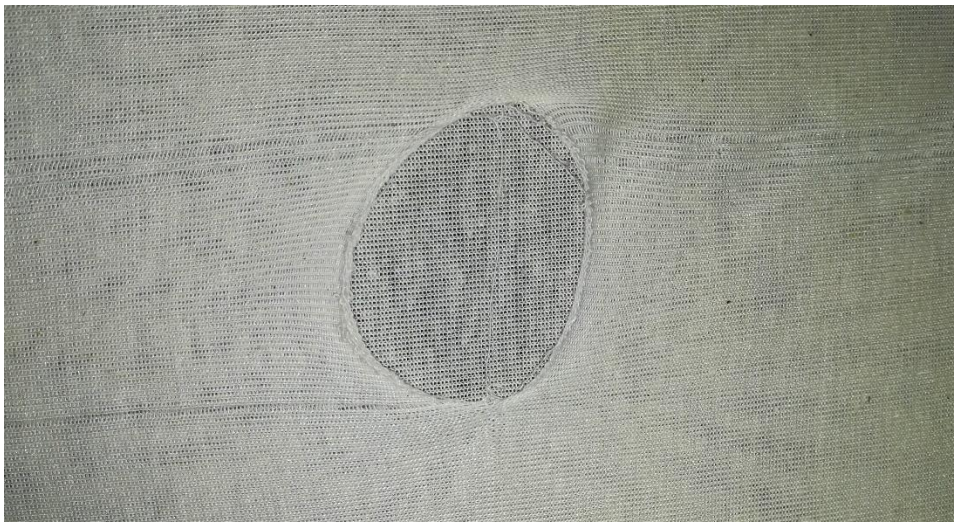


Figure: Hole in fabric

3.12 4 Point system

4 point system for fabric inspection is the standard method

Measure the fabric width & GSM

Convert fabric kg to Yds

Conversion of knit fabric kg to yds

$$1kg = \frac{45055}{dia \times GSM}$$

Category of penalty in 4point system

Defect side	Penalty point
Loop	4
Star mark	4
Hole	4
Knot	1
Slub	1
Foreign fiber	1

3.13 Flat bed machine

3.13.1 Collar machine

Figure: Collar machine

3.13.2 Parts of collar machine

a) Carriage(Cam is inside of carriage)

b) Knit cam, Miss cam

c) Feeder

d) Feeder guide

e) Amp

f) Amp tensioner

g) Tension guide (Control gsm by scale)

h) 2 butt needle(Short butt, Long butt)

i) Drum

j) Guti

Drum:

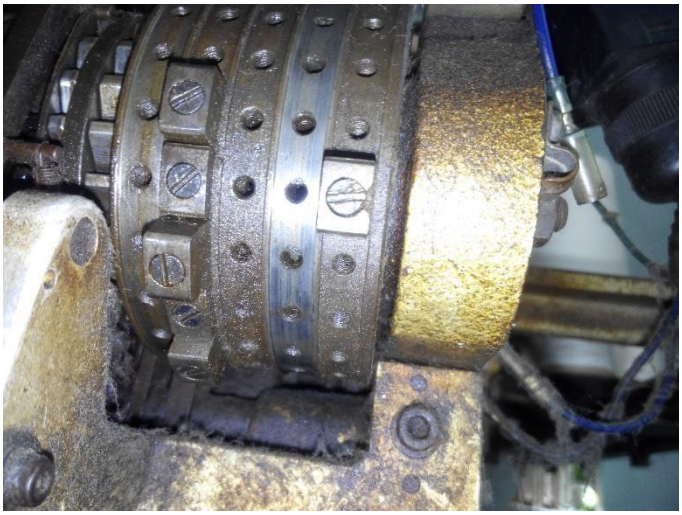


Figure: Drum

Chain or guti: Here two types of chain or guti black and white. Each chain have teeth. Black guti run the drum, 24 black guti causes 1 cycle of drum. White guti select the collar width(Less or high

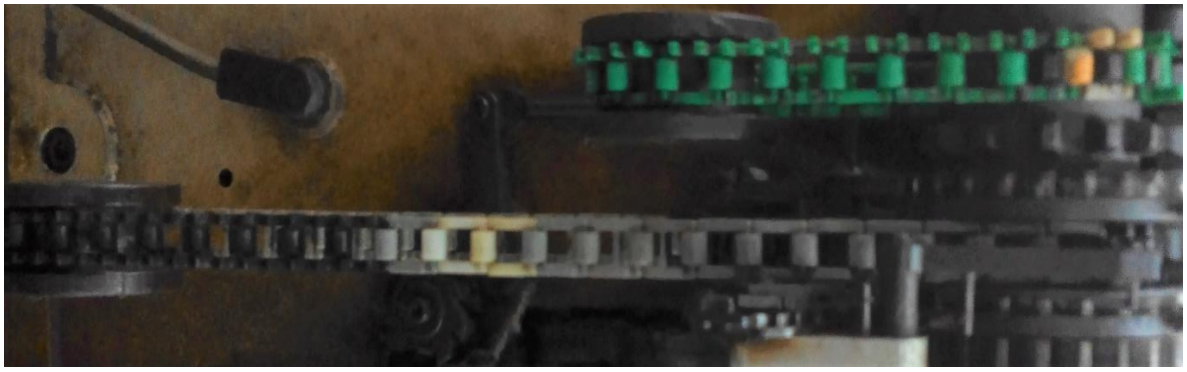


Figure: Chain or guti

Amp

Figure: Amp

Amp tensioner

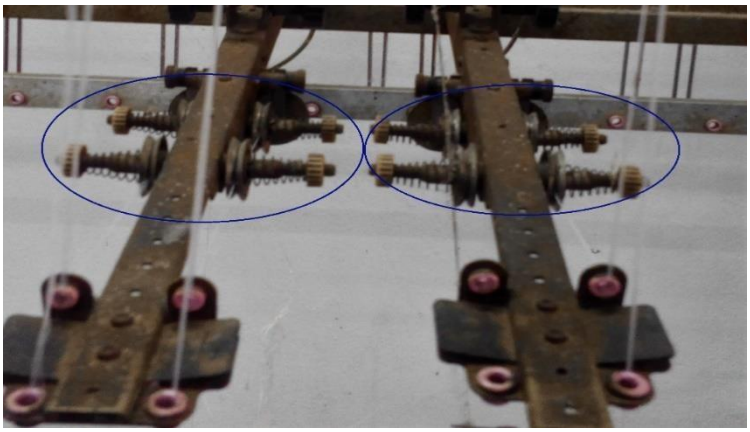


Figure: Amp tensioner

Carriage: Carriage is an important parts of collar machine. Cam are inside of the carriage(Knit cam , miss cam)

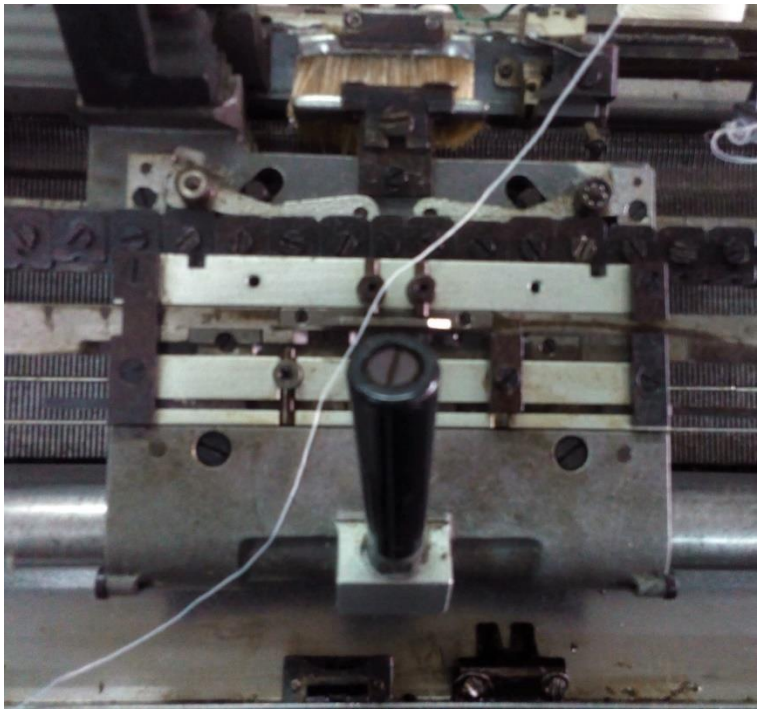


Figure: Carriage

3.13.3Collar

Length of collar depends on number of needle

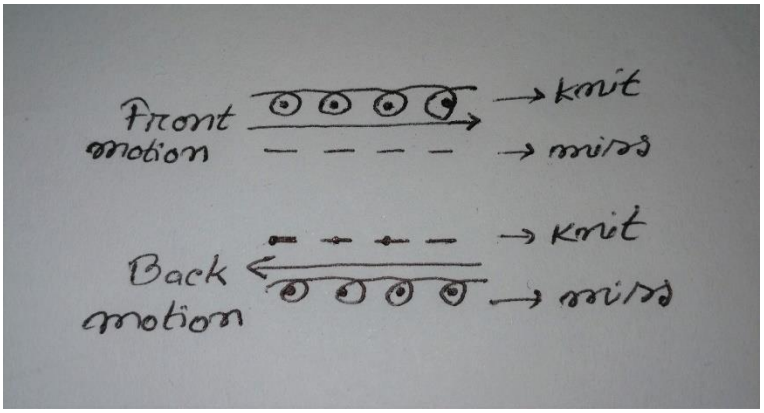
Width of collar depends on white guti.

A collar has three parts

i. Band

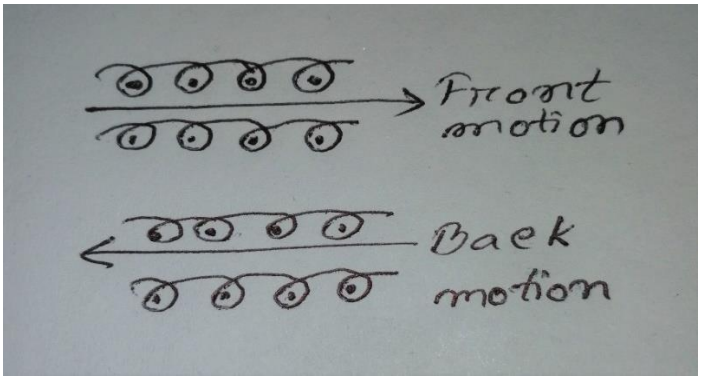
ii. Separation iii. Tube iv. Body

For tube (carriage)



Tube (carriage)

For body (carriage)



Body (carriage)

Needle number for 42.5cm collar

For shrinkage allowance 10% needle add

Suitable gauge = 14

Calculated length of collar = 42.5 + 10%

= 42.5 + 4.25

= 46.75

$$\text{Needle no} = \frac{\text{length x gauge}}{2.54}$$

$$= \frac{46.47 \text{ x } 14}{2.54}$$

= 256.13

≈ 256

Needle for one side. For both side it is multiplied by 2

Yarn normally use in Sinha knitting section

i. 150D filament(polyester 100%) ii. Cotton iii. PC iv. CVC

20Ne 3 ply

30Ne 5 ply

40Ne 6 py

24Ne 4ply

28Ne 5ply

3.13.4 Production

For solid collar gms is normally in between 750-850

For solid cuff gsm is normally in between 750-850

Production of collar per shift = 100

Production of cuff per shift = 200

Production are calculate manually in shina knitting section

Fault of collar and cuff

i. Side cut ii. Needle break iii. Oil spot iv. Needle

mark(Lace problem)

v. Hole

vi. Thick & thin place

3.13.5 Design or type of Collar sample normally they produce

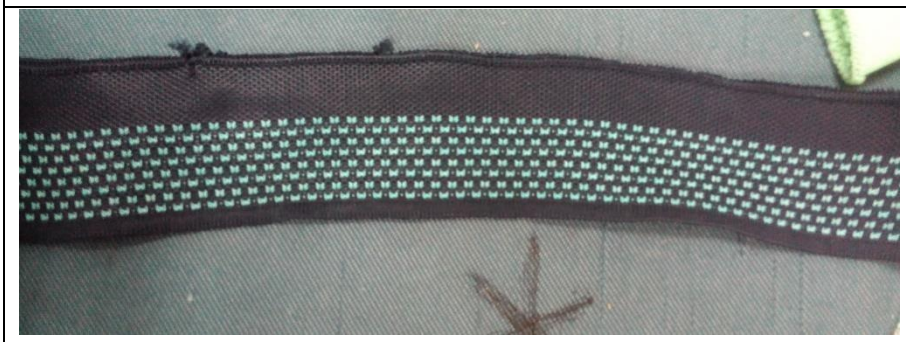


Figure: Sample collar

3.14 Dyeing

What is Dyeing?

Dyeing is the application of dyes or pigments on textile materials such as fibers, yarns, and fabrics with the objective of achieving color with desired fastness. Dyeing is normally done in a special solution containing dyes and particular chemical material. Dye molecules are fixed to the fiber by absorption, diffusion, or bonding with temperature and time being key controlling factors. The bond between dye molecule and fiber may be strong or weak, depending on the dye used. Dyeing and printing are different applications; in printing color is applied to a localized area with desired patterns and in dyeing it is applied to the entire textile.

3.14.1 Types of Dyes

Before discussing some dye types, It should know that there are many different types of dyes and only some of them is going to discuss. Now, let's review two primary categories before moving on to dye types. Natural dyes come from sources like plants, minerals and animals. They have a long history but aren't used much for commercial textiles anymore. There will find artists and craftspeople using them for hand-made products and for traditional crafts. Synthetic dyes, made in a laboratory, are chemicals often derived from sources like coal tar or petroleum-based substances.

Basic dye dissolves in water and requires a mordant, a chemical that forms a bond with the dye to make it insoluble, which means the color stays on the textile when it's rinsed following dyeing. This process tends to be used with fabrics like nylon and polyester. Direct dyes, on the other hand, don't require a mordant, and they are used to dye natural fibers like wool, cotton, and silk. Then there are vat dyes, made of materials like indigo, a plant that provides a deep blue color and is one of the oldest natural dyes. Substances used in vat dyes must be first treated with a liquid alkaline substance (something that reduces acid) to allow them to be used as a dye.

3.14.2 Methods of Dyeing

There are many ways to dye textile materials. In most dyeing processes, water is used with the dye and other additives to affix color to textiles. When the textile is rinsed, the color stays. A dye may also be pressed into a fabric through a thick paste, or the textile material may be immersed into a dye vat or tub. Sometimes dyeing textiles requires high temperatures and some synthetics like polyester dye more easily at temperatures above 100 degrees. But why there are so many different kinds of dyes and ways to use them? Because no kind of dye effectively colors all natural and synthetic textiles. Different dyes and dyeing processes work best on different materials.

3.14.3 Knit dyeing

Knit dyeing is a technique of dyeing the knitted fabrics. The dyeing of knitted fabrics occurs in the exhaust method or in batch-wise process. Knit dyeing process is near similar to yarn dyeing process but there is some difference in quality measurement. Generally all types of single jersey, double jersey and their derivatives are dyed by different way.
Flowchart of knit fabric dyeing describe shortly.

3.14.4 Sequence of Operation for Knit Fabric Dyeing:

Grey fabric inspection

↓

Batching

↓

Fabric turning

↓

Loading to the m/c

↓

Pre-treatment (Scouring & Bleaching)

↓

Dyeing

↓

Dewatering

↓

Drying

↓

Compacting & Calendaring

↓

Final inspection & packing

3.14.5 Scouring:

The term ‘scouring’ applies to the removal of impurities such as oils, was, gums, soluble impurities and sold dirt commonly found in textile material and produce a hydrophilic and clean cloth.

Objectives of Scouring:

- To remove natural as well as added impurities of essentially hydrophobic character as completely as possible
- To increase absorbency of textile material

- To leave the fabric in a highly hydrophilic condition without undergoing chemical or physical damage significantly.

3.14.6 Bleaching

Textile bleaching is one of the stages in the manufacture of textiles. All raw textile materials, when they are in natural form, are known as 'greige' material. This greige material will have its natural color, odor and impurities that are not suitable for clothing materials.

Objectives of Bleaching:

- Removal of coloured impurities.
- Removal of the seed coats.
- Minimum tendering of fibre.
- Technically reliable & simple mode of operation.
- Low chemical & energy consumption. Increasing the degree of whitenes

3.14.7 Specification Of Machines

M/C No.	Name	Brand	Manufacturer	Year	Type
1	Dyeing Machine 1	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	2000	Atmospheric
2	Dyeing Machine 2	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	1996	Atmospheric

3	Dyeing Machine 3	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	1996	Winch
4	Winch Tecninox	Tecninox	Portugal	1996	High Temp. & High Pressure
5	Winch Tecninox	Tecninox	Portugal	1996	High Temp. & High Pressure
6	Winch Tecninox	Tecninox	Portugal	1996	High Temp. & High Pressure
7	Jet dyeing Machine	SASTON COUNTC		1996	Jet
8	Dyeing Machine 8	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	1996	Atmospheric
9	Dyeing Machine 9	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	1996	Atmospheric
10	Dyeing Machine 10	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	1996	Atmospheric
11	Dyeing Machine 11	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	2000	Winch
12	Dyeing Machine 12	FONG'S GN18-2T	FONG'S International Eng. CO.LTD	2000	Atmospheric

13	Sample Dyeing Machine 1	FONG'S ALLFIT 60	FONG'S International Eng. CO.LTD	1996	Atmospheric
14	Sample Dyeing Machine 2	FONG'S ALLFIT 61	FONG'S International Eng. CO.LTD	1996	Atmospheric
15	Sample Dyeing Machine 3	FONG'S ALLFIT 62	FONG'S International Eng. CO.LTD	2015	Atmospheric

Chapter 4
Impact of Internship

4.1 Impact of Internship

From knitting section

We learn about knitting production. We learn in details of fabric design, notation diagram, needle arrangement, cam arrangement. Needle set up in cylinder, sinker set up in cylinder. Knitting production of machine. Amount of yarn need for fleece fabric, amount of yarn need for stripe fabric. We learn about fabric quality inspection, fabric fault and fabric fault remove, about yarn store. We learn about amount needle need for 1x1 Rib, Interlock, 2x2 Rib fabric. Learn about air consumption and oil consumption if knitting machine.

From collar section

We learn about flat bed machine parts, use of needle amount in flat bed machine, collar fault, reduce & increase of collar length, production capacity of collar & cuff, yarn use for collar making,

From dying & finishing section

We learn about different types of dye & chemical , their function, dying flow chart, dying in lab section, pipetting.

Chapter-5
Conclusion

5.Conclusion

Theoretical knowledge will be more effective and fruitful when we could implement the knowledge and skill in our practical field. Industrial training is an important and essential part of education as through this training we learn all the implementations of the processes which we have studied theoretically. It gives us an opportunity to compare the theoretical knowledge with practical facts and thus develop our knowledge and skills. This industrial training also gives us an opportunity to enlarge my knowledge of textile administration, production planning, procurement system, production process, maintenance system and about various machineries and also teach us to adapt with the industrial life. Since, we have some limitation to write this report because of the secrecy act the data on costing and marketing activities has not been supplied & hence this report excludes those chapters. we had a very limited time in spite out willing to study more details it was not possible to do so. Some points of different chapter are not described because of the unavailability. At last but not at the least, the whole process is such a difficult job to bind in such a small frame as a report; hence we try to summarizing our effort on this report. we have found our selffortunate to have our industrial training at Opex & Sinha Textile Group.