



Faculty of Engineering
Department of Textile Engineering

“Study of fabric inspection systems in different RMG Industries
in Bangladesh”

Course Code: TE417 Course Title: Project (Thesis)

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This thesis is submitted in partial fulfillment of the requirements for the **Degree
of Bachelor of Science in Textile Engineering.**

Advance in Fabric Manufacturing Technology

April, 2015



ACKNOWLEDGEMENT

At first we express our heartiest thanks and gratefulness to almighty Allah to give us strength and ability to complete the project work and project paper. We have made our life more bountiful.

We fell grateful to and wish our indebtedness to **Professor Dr. Md. Mahbubul Haque**, Head of the Department, Department of Textile Engineering, Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of Fabric Manufacturing influenced us to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project.

Above all, we would like to acknowledge our deep debt to all teachers of our University and especially of Fabric Manufacturing Technology department for their kind inspiration and help, which remain us the backdrop of all our efforts.

Finally, we would like to acknowledge with due respect the constant support and patients of our parents.



DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Professor Dr. Md. Mahbubul Haque**, Head of the Department , Department of Textile Engineering, **Daffodil International University**. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree and it is submitted in partial fulfillment of the requirement of Bachelor of Science in Textile Engineering degree of Daffodil International University and we also remain responsible for the inadequacies & errors.

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ABSTRACT

This project is on “**Study of fabric inspection systems in different RMG Industries in Bangladesh**”. This project is based on important characteristics of RMG industry called Fabric Inspection system.

Textile Fabric materials are used to prepare different categories and types of Fabric products in the textile industry. In the textile industry, fabric faults or defects are responsible for nearly 85% of the defects. Manufactures recover only 45-65% of their profit from second or off quality goods. It is very important to detect, to identify and to prevent these defects from reoccurring. There are many kinds of fabric defects found in woven fabric.

In the textile industry, inspection is done to assure the fabric’s quality before any shipments are sent to customers, because defects in fabrics can reduce the price of a product by 45% to 65%.

In order to produce quality product a RMG industry must be checked out the fabric defects and quality before processing as it is fulfill the buyer requirement.

By assessing the defect with the help of inspection system a fabric supplier and a garment manufacturer both can get idea about how much extra fabric are required to produce total quantity of garment.

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CHAPTER 01

INTRODUCTION

1.1 Introduction

The economy of Bangladesh is largely dependent on agriculture. However the Ready-Made Garments (RMG) sector has emerged as the biggest earner of foreign currency. The RMG sector has experienced an exponential growth since the 1980s. The sector contributes significantly to the GDP. It also provides employment to around 4.2 million Bangladeshis, mainly women from low income families.

It was started in the late 1970s. Soon it became one of the major economical strength for Bangladesh. The RMG sector has added very much in earning foreign exchange, balancing export and import, huge unemployment problem for the country and empowerment of women along with given them financial support.

Fabrics are the main and costly raw materials of a garment. So it is very important to use fabric efficiently and control wastage of fabric. On the other hand fabric defects are the maximum defects of garments, for which many-unexpected problem may occur in a clothing industry. Such as- short shipment, discount, low price etc.

To avoid all above problems and to take preventive measures fabric inspection is very important for a clothing industry.

Inspection is the process of determining whether a product has deviated from a given set of specifications. Fabric defect detection can be defined as the process of determining the location and/or extend of a collection of pixels in a fabric image with remarkable deviation in their intensity values or spatial arrangement with respect to the background texture.

In the textile industry, inspection is done to assure the fabric's quality before any shipments are sent to customers, because defects in fabrics can reduce the price of a product by 45% to 65%.Currently, the quality assurance of web processing is mainly carried out by manual inspection. However, the reliability of manual inspection is limited by ensuing fatigue and inattentiveness. Indeed, only about 70% of defects can be detected by the most highly trained inspectors.

In present inspection by using fabric inspection machines in the most used way to classify faults after weaving and finishing. Generally, faults are classified by type and by frequency in the inspected fabric roll. The judgment of fabric quality depends on faults tolerance levels fixed by each producer and could be in some cases subjective because it is based on the number of faults and number of fault size and gravity.

CHAPTER 02

LITERATURE SERVEY

2.1.1 Introduction of Woven Fabric

Woven fabric is a textile formed by weaving. It is produced on a loom, and made of many threads woven on a warp and a weft.

Weaving is the textile process in which two distinct sets of yarn called the warp. And the filling or weft, are interlaced with each other to form a fabric or cloth. The warp yarns run lengthways of the piece of fabric, and the weft runs across from side to side. By weaving we get woven fabric.

Weaving, the art of forming a fabric by interlacing at right angles two or more sets of yarn or other material. It is one of the most ancient fundamental arts, as indicated by archaeological evidence. Discoveries in the early 1990s in the Czech Republic point to a possible origin in the Paleolithic period some 27,000 years ago. Moreover, the earliest literatures often mention the products of the loom. In primitive cultures weaving was practiced mainly by women.

Although weaving sprang up independently in different parts of the world and was early known in Europe, its high development there in the middle Ages was brought about by Eastern influences operating through Muslim and Byzantine channels of culture. Byzantium became a center of silk weaving in the 6th cent. In the 9th cent. Greece, Italy, and Spain became proficient. In Flanders a high degree of skill was attained by the 10th cent., especially in the weaving of wool. Flemish weavers brought to England by William the Conqueror and later by Queen Elizabeth I gave a great impetus to the craft there, and Lancashire became an important center. Tapestry weaving was brought to a high art in France. In colonial America weaving was a household industry allied with agriculture.

The 18th-century weaving and spinning inventions marked the transition from the old era of domestic craftsmanship to the tremendous, organized industry of today. The factory system of machine weaving produces quantities of standardized material for mass consumption; the result is a loss of the distinctive elements of quality and design. Some of the finest silks, velvets, table linens, and carpets are still woven on handle.

2.1.2 Process flow chart of manufacturing woven fabric (Modern)

Different fabrics are produced In Weaving Industry. These fabrics are weaved by using various looms and related machines. Before going straightly to the Weaving process; some pretreatment and pre-process should be carried out.

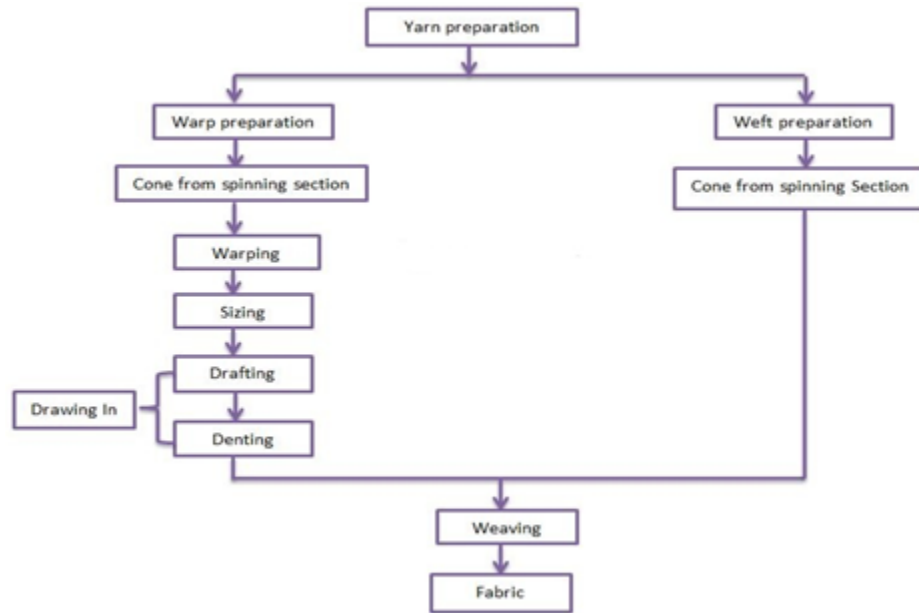


Figure 1: Process flow chart of manufacturing woven fabric (Modern).

2.1.3 Introduction of Inspection

Inspection in reference to the apparel industry can be defined as the visual examination or review of raw materials partially finished components of the garments. It also examines completely finished garments by measuring the garments to check if they meet the required measurements, in relation to some requirements, standards or specifications.

2.1.4 Objective of Fabric Inspection

The main objective of inspection is the detection of the defects and nonconformance's as early as possible in the manufacturing process so that time and money are not wasted later on in either correcting the defect or writing off defective garments. Fabric inspection is use to the following aspects:

- Improve product quality
- Minimize wastage
- Reduce the cost
- Avoid short shipment/Order cancellellation
- Increase productivity

2.1.5 Fabric inspection methods

The quality of a final garment depends on the quality of a fabric when it is received as a roll. Defective materials cannot be compensated by even the most outstanding manufacturing methods. They inspect 20% of the rolls that they receive and evaluate them based on different systems.

In this way, fabric related quality problems can be avoided before it is put into production. During the inspection the fabric may be found to contain different defects. The defects depending on the magnitude, frequency of occurrence, position, importance, effect on the purpose, consequence in the further process etc., shall be classified and graded under various systems.

So, for the fabric inspection to remove defects, we can use different types of systems, which are given below.

1. 4- point system
2. 10 point system
3. Graniteville “78” system
4. Dallas System.

2.2.1 Woven Fabric Defect

A Fabric Defect is any abnormality in the Fabric that hinders its acceptability by the consumer. Fabric faults, or defects, are responsible for nearly 85% of the defects found by the garment industry. An automated defect detection and identification system enhances the product quality and results in improved productivity to meet both customer demands and to reduce the costs associated with off quality. Higher the production speeds make the timely detection of fabric defects more important than ever.

According to the woven fabric defects can be organized into three basic categories. The weft direction defects, the warp direction defects and defects with no directional dependence. Some of them in the weft direction are irregular weft density, double pick, broken pick, weft yarn defect, and float; defects in the warp direction are broken end, double end and warp yarn defect. Defects with no directional dependence involve defects: stain, hole and foreign body.

2.2.2 List of defects in woven fabric is given bellow:

- Coloured flecks
- Knots
- Slub
- Broken ends woven in a bunch
- Broken pattern
- Double end
- Float
- Gout
- Hole, cut, or tear
- Lashing-In
- Local distortion
- Missing ends
- Missing Pick
- Oil and other stain
- Oily ends
- Oily picks
- Reed mark
- Slough of
- Shuttle smash
- Snarls
- Stitches
- Untrimmed loose threads
- Weft bar

2.2.3 Causes and mending of some common defects in Woven Fabric

Colored Flecks

Presence of colored foreign matter in the yarn.

Causes:

Cotton fibres getting contaminated during the ginning stage with leaves, immature fibre, yellow fibre, etc.

Mending:

Coloured portion is removed from the yarn with a plucker. The resultant bare patch can be corrected by combing with metallic comb.

Knots

Knot is a fastening made by tying together the ends of yarn.

Causes:

Thread breaks during process of winding, warping, sizing or weaving.

Mending:

Non Mendable.

Slub

Slub is a bunch of yarn having less twist or no twist and has a wider diameter compared to normal spun yarn.

Causes:

- Improper carding/combing.
- Broken tooth in the chain of gear system.

Mending:

The slub should be cut with the clipper from both the ends. The resultant bare patch can be corrected by combing with a metallic comb or by insertion of a separate thread with the help of fine needle.

Broken pattern

A broken pattern is the non continuity of a weave/ design/ pattern.

Causes:

- Wrong drawing in of threads.
- Incorrect shedding.

Mending:

Non Mendable.

Broken ends woven in a bunch

This defect is caused by a bunch of broken ends woven into the fabric.

Causes:

Failure of the weaver in attending the warp breaks properly.

Mending:

The broken ends woven in a bunch can be removed by using a plucker and the resulting loose ends should be cut with clipper.

Double end

When two or more ends gets woven as one. This defect is characterized by a thick bar running parallel to the warp.

Causes:

Wrong drawing, taking more ends in heald eye.

Mending:

This fault can be corrected by pulling out the extra end with the help of needle. A bare patch is formed and can be filled by combing in both directions with the help of metallic comb.

Float

Float is the improper interlacement of warp and weft threads over a certain area.

Causes:

- Improper sizing (ends sticking).
- Broken end entangling with the other ends.

Mending:

Only minor floats can be rectified. The floating threads are cut with a clipper. Combing in both directions rectifies the resultant patch.

Gout

Gout is a foreign matter accidentally woven into the fabric.

Causes :

- Improper loom cleaning.
- Unclean environment.

Mending :

The extra foreign matter can be pulled out with a plucker. Combing in both direction rectifies the resultant patch.

Hole, Cut, Tear

This is self explanatory.

Causes :

- Sharp edges on cloth roll.
- Hard substance between layers of fabric in cloth roll.
- Course temples used for fine fabric. During removal of hard particles like,

Mending:

Non mendable.

Missing Ends

Missing Ends : The fabric is characterized by a gap, parallel to the warp. The number of ends missing may be one or more.

Causes :

- Loom not equipped with warp stop motion.
- Dirty drop wires or accumulation of lint may prevent their dropping.
- In electric warp stop motion, the electric bars are dirty or corroded.

Mending:

When there are only two adjacent ends missing, the fault can be rectified by combing in both directions using a metallic comb. This may fill the bare patch formed due to missing ends.

Missing Picks

A narrow streak running parallel with weft threads caused due to absence of weft.

Causes:

- Faulty let-off and take-up motion.
- Faulty weft-stop motion.
- Fell of the cloth not adjusted after loom stoppage for mending.

Mending:

When there are only two adjacent picks missing, the fault can be rectified by combing in both directions using a metallic comb.

Stitches

A Single thread float.

Causes :

- Two adjacent ends sticking together during shedding for a brief period of time.
- In case of synthetic yarns, ends sticking together due to static charge during weaving.

Mending:

Stitches are cut with a clipper from both the ends. Combing in both the directions with the help of a metallic comb may rectify the resultant bare patch formed.

Untrimmed loose threads

Any hanging threads on the face of the fabrics are termed as loose threads.

Causes :

- Tail ends not trimmed after piecing up.

Mending:

These defects can be easily rectified with the help of clipper.

Weft bar

An unwanted bar, running across the full width of a piece which differs in appearance from the adjacent normal fabric.

Causes :

- Difference in count, twist, colour, lustre.
- Faulty let-off and take-up motion.

Mending:

Non mendable.

Shuttle smash

Ruptured cloth structure characterised by many broken warp ends and floating picks.

Causes :

- Improper timing.
- Insufficient picking force.
- Slack ends in certain portion. The sagging ends obstruct shuttle flight.

Mending:

Non mendable.

Lashing in

An extra piece of yarn woven into the fabric in the vicinity of the selvage.

Causes :

- Defective setting of the shuttle box.
- Early or late picking.

- In case of auto loom, weft cutters worn out or not set properly

Mending:

This defect can be corrected by pulling out the extra pick from the selvedge end, which can be clipped with the help of clipper. A bare patch is formed and can be filled by combing in both directions with the help of metallic comb.

Oil Or Stain

These are spot defects of oil, rust, grease or other stains found in the fabric.

Causes :

- Improper oiling/greasing of looms.
- Oil stained Take up roller.

Mending:

- 1) Keep the stained portion of the fabric over an absorbent pad. Apply the stain remover, wetting the stain and surrounding portion thoroughly.
- 2) Rub gently to quicken the penetration of the stain remover.
- 3) Rubbing should be done towards the centre of stain to avoid spreading.

Oily Ends

These are oily warp ends.

Causes:

- Improper handling and storage of material in spinning department.
- Oil-contaminated guides and oily hands during process of warping.
- Improper handling of warp beams.

Mending:

- 1) Keep the stained portion of the fabric over an absorbent pad. Apply the stain remover, wetting the stain and surrounding portion throughly.
- 2) Rub gently to quicken the penetration of the stain remover.
- 3) Rubbing should be done towards the centre of stain to avoid spreading.

Oily Weft

These are oily weft picks.

Causes:

- Improper handling and storing in spinning department.
- Weft package falling on oily ground.
- Handling the weft with oily hands.
- Weft carring baskets having oil.

Mending:

- 1) Keep the stained portion of the fabric over an absorbent pad. Apply the stain remover, wetting the stain and surrounding portion thoroughly.
- 2) Rub gently to quicken the penetration of the stain remover.
- 3) Rubbing should be done towards the centre of stain to avoid spreading.

Local Distortion

A Distortion occurs when there is displacement of warp and/or weft threads from their normal position.

Causes:

- The emery roll is worn out.
- In filament fabric having low reed picks.

Mending:

This defect can be corrected by combing in both directions using a metallic comb.

Slough off

A slough-off is a bunch of weft woven into the fabric.

Causes:

- Improper winding of the yarn onto the weft pirn.
- Improper shape and size of the pirn.
- Harsh picking.

Mending:

The bulk yarn can be pulled out by means of plucker. Combing in both direction with help of metallic comb can fill up the resultant bare patch.

Reed Marks

A warp way crack caused by a damaged or defective reed.

Causes:

- Defective or damaged reed.

Mending:

Non Mendable.

Broken pattern due to defective piles

A broken pattern is the result of non-continuity of the design/pattern in the pile fabric.

Causes:

- Improper working of terry motion on loom.
- Improper functioning of jacquard.
- Missing pick.

Mending:
Non mendable.

Pile less spot

It is a spot without the pile

Causes:

- Improper working of terry motion on loom.
- Improper functioning of jacquard.

Mending:

- Non mendable

2.3.1 4 Point System

It was published in 1959 by the National Association of Shirt Pajama Sportswear Manufacturers. It is widely used and adopted in knitted fabric.

Amount to select

It inspects around 20% of the total rolls of the shipment.

Selection of rolls

Select at least one roll of each color. Choose the additional roles in proportion to the total number of roles per color received, if more than one role must be selected.

Defects classification

The length of the defect is used to determine the penalty point.

Table 01: Defect point value for 4 point system.

Size of defects in fabric	Points allotted (Penalty)
Up to 3"	1
Over 3" up to 6"	2
Over 6" up to 9"	3
Over 9"	4
Holes and opening (large dimensions)	
1" or less	2
Over 1"	4

General Inspection Procedures

- Fabric inspection is done in suitable and safe environment with enough ventilation and proper lighting.
- Fabric passing through the frame must be between 45-60 degree angles to inspector and must be done on appropriate Cool White light 2 F96 fluorescent bulbs above viewing area. Back light can be used as and when needed.
- Fabric speed on inspection machine must not be more than 15 yards per minute.
- Standard approved bulk dye lot standards for all approved lots must be available prior to inspection (if possible)
- Approved standard of bulk dye lot must be available before starting inspection for assessing color, construction, finish and visual appearance.
- Shade continuity within a roll by checking shade variation between centre and selvage and the beginning, middle and end of each roll must be evaluated and documented.
- Textiles like knits must be evaluated for weight against standard approved weight.
- Fabric width must be checked from selvage to selvage against standard.
- All defects must be flagged during inspection.
- The length of each roll inspected must be compared to length as mentioned on supplier ticketed tag and any deviation must be documented and reported to mill for additional replacement to avoid shortage.
- If yarn dyed or printed fabrics are being inspected the repeat measurement must be done from beginning, middle and end of selected rolls.

No penalty points are recorded or assigned for minor defects. Only major defects are considered.

Major Defects

Mostly woven fabric defects include slubs, holes, missing yarns, yarn variation, end out, soiled yarns, and wrong yarn. But they are not limited to these.

Calculation

Once the rolls are inspected, the Points per 100 Square Yards or Meter must be calculated to determine acceptability of the roll and / or shipment. The formulas for the calculations are shown below:

For Individual Roll:

$$\text{Point per 100 Square Yards} = \frac{(\text{Total Points for the roll} \times 3600)}{\text{Inspected Yards} \times \text{Cut able Fabric Width (inch)}}$$

For Shipment:

$$\text{Total Shipment Points per 100 Sq. Yards} = \frac{(\text{Total Average points per linear Yard} \times 3600)}{\text{Shipment Inspected Yards} \times \text{Cut able Fabric Width (inch)}}$$

The total defect points per 100 square yard are calculated. The fabric rolls containing more than 40 points per 100 square yard are considered as “B”. However, a garment may use more or less than 40 points per 100 square yards as an acceptance criteria. The standard acceptance/grading criteria are given bellow:

Table 02: Standard defects point for Acceptance or Rejection.

Total Point	Grade
≥40	A
Above 40-60	B
Above60-80	C
Over 80	Rejected

Advantages

- Point system has not width limitation.
- Worker can easily understand it.

2.3.2 10 Point Grading System

In 1955, the ‘ten point system for piece goods evaluation’ was approved by the Textile distributors institute and the National Federation of Textile.

It is the earliest inspection system. It is designed to identify defects and to assign each defect a value based on severity of defect.

Defects classification

The system assigns penalty points to each defect depending on its length and whether it is in the warp (ends) or weft (fill) direction. It can get quite complicated in practical use, while sounding simple.

Table 03: Defect point value for 10 point system.

Size of defects in fabric	Points allotted (Penalty)
Warp defects	
Up to 1”	1
Over 1” up to 5”	3
Over 5” up to 10”	5
Over 10” up to 36”	10
Weft defects	
Up to 1”	1
Over 1” up to 5”	3
Over 5” up to ½ width	5
Over ½ width	10

Deciding fabric quality

For width less than 50”

First Quality = Total Defect Points < Total Yards inspected

Otherwise it is second Quality.

For more than 50” width

First Quality = Total Defects X 1.1 Points < Total Yards Inspected

Maximum defects allotted /yard = 10.

Otherwise it is second quality.

Advantages

- It is the most used and oldest when it comes to woven finished fabric.
- It uses the length of fabric and along the length of warp and weft defects are identified.

Disadvantages

- It has width limitation.
- It is difficult in practical use.

2.3.3 Graniteville “78” System

For the field of fabric grading, it was introduced in 1975. The system divided defects into major and minor types.

Defects classification

The defect which was very obvious and leads the goods to second quality was the major defect. The defect which may or may not have cause garment to second, depending on its location in the end use item was the minor defect.

Table 04: Defect point value for Graniteville “78” system.

Size of defects in fabric	Points allotted (Penalty)
Up to 9”	1
Over 9” up to 18”	2
Over 18” up to 27”	3
Over 27 up to 36”	4

- The principle was established in garment cutting piece, which the short length defects (less than 9”) will normally be removed.
- The system tries to balance the importance of longer defects (over 9”) and put less weight on 1-10” defects such as slub.

- The system also suggests the viewing distance of 9 foot instead of normal 3-foot viewing distance. It also tends to eliminate very small defects from the total penalty score.

Disadvantages

- As this system is used on cutting pieces according to one point of view it also increases the cost of production.

2.3.4 Dallas System

In 1970's, there was also a Dallas System published. That system was developed specifically for knits. According to this system, if any defect was found on a finished garment the garment would then be termed a second. In regard to fabric, this system defines a second as "more than one defect per ten linear yards, calculated to the nearest ten yards."

Disadvantage

- The defect is located after the garment is finished. As a result of this the cost of production increases.

CHAPTER 03

EXPERIMENTAL DETAILS

In order to collect various information about fabric inspection systems, we have visited three woven garments industries such as Interfab Shirt Manufacturing Ltd (ISML) ; Babylon Group & Shanin Group.

3.1 Interfab Shirt Manufacturing Ltd

During our project work we have visited Interfab Shirt Manufacturing Ltd and collected information which are required in the project.

3.1.1 The fabric inspection machine

The fabric inspection machine used in Interfab Shirt Manufacturing Ltd is given below as figure.



Figure 02: Fabric Inspection machine at Interfab Shirt manufacturing Ltd.

3.1.2 Specification of the Inspection machine

- Viewing Glass (inches) – 72 x 21
- Max Fabric Width (inches) – 65
- Machine Speed (mtrs/min) – Variable upto 15
- Supply Voltage – 220V/50HZ/Single Phase
- Approx Weight (kgs) – 450

3.1.3 Data of the Fabric Inspection at Interfab Shirt Manufacturing Ltd.

The fabric inspection report of Interfab Shirt Manufacturing Ltd is given in following figure:




 Interfab Shirt Mfg. Ltd.		FABRICS INSPECTION REPORT										DATE : 28.09.2014																		
Buyer : <u>M/S</u> P.O. No : <u>T-11</u> Supplier Name : <u>CHANGZHOU WUJIN</u>		Received Qty : <u>4550</u> M/Yds Checked Qty : <u>1452</u> M/Yds		METHOD OF INSPECTION 4 POINTS SYSTEM $\text{No of Points} \times 100/3600 = \frac{3600 \times 429}{56'' \times 1452} = 18.77\% \text{ Points}$ $\text{No of Metres / Yds width}$								<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>Length of Defect</th> <th>Points Considered</th> </tr> <tr> <td>0" -3"</td> <td>1</td> </tr> <tr> <td>3" -6"</td> <td>2</td> </tr> <tr> <td>6" -9"</td> <td>3</td> </tr> <tr> <td>Above 9"</td> <td>4</td> </tr> <tr> <td colspan="2" style="text-align: center;">In Case of HOLE</td> </tr> <tr> <td>0" -1"</td> <td>2</td> </tr> <tr> <td>Above 1"</td> <td>4</td> </tr> </table>			Length of Defect	Points Considered	0" -3"	1	3" -6"	2	6" -9"	3	Above 9"	4	In Case of HOLE		0" -1"	2	Above 1"	4
Length of Defect	Points Considered																													
0" -3"	1																													
3" -6"	2																													
6" -9"	3																													
Above 9"	4																													
In Case of HOLE																														
0" -1"	2																													
Above 1"	4																													
Roll No.	Colour Code	FABRICS WIDTH			FABRICS LENGTH		FABRICS DEFECT						Total Points	% Points	Points Per Yards	REMARKS														
		Reqd	Min	Max	Marked	Actual	Shade	Hole	Soil	Colour Yarn	Miss Yarn	Thread Knot					Slab	Spot												
①	YPTGO 802	57"	56"	57"	148	148				8	10	3	22	2	45	19.54	0.13													
②	"	"	"	"	141	141				6	8	2	20	3	39	17.78	0.12													
③	"	"	"	"	155	155				7	11	3	24	2	47	19.49	0.12													
④	"	"	"	"	137	137				6	8	3	18	3	38	17.83	0.13													
⑤	"	"	"	"	143	143		04		5	10	4	20	2	45	20.22	0.14													
⑥	"	"	"	"	167	167				8	12	4	26	2	52	20.01	0.11													
⑦	"	"	"	"	147	147				7	10	3	22	3	45	19.67	0.13													
⑧	"	"	"	"	139	139				6	9	2	18	4	37	18.03	0.12													
⑨	"	"	"	"	145	145		04		5	8	3	21	2	43	19.06	0.13													
⑩	"	"	"	"	130	130				4	8	4	19	3	36	17.80	0.13													
					1452	1452		08		62	94	31	208	26	429	/	/													
COMMENTS FABRIC INSPECTION RESULT ACCEPTABLE.										RAFIQ+BORHA Quality Inspector		 Cutting Incharge		 QAM		Copy To : 1. MD 2. PM 3. Merchandiser 4. SO														

Figure 03: Fabric Inspection report of Interfab Shirt manufacturing Ltd.

Table 05: Interfab Shirt Manufacturing Ltd. fabric inspection

Sl No	Buyer	Color Code	Fabric Length (Yds)	Fabric Width (Inch)	Fabric Defects						Total Points	% Point (100yd ²)	Remarks
					Hole	Color Yarn	Miss Yarn	Thread Knot	Slab	Spot			
1.	M&S	YPT60802	148	56		8	10	3	22	2	45	19.54	Accepted
2.	M&S	YPT60802	141	56		6	8	2	20	3	39	17.78	Accepted
3.	M&S	YPT60802	155	56		7	11	3	24	2	47	19.49	Accepted
4.	M&S	YPT60802	137	56		6	8	3	18	3	38	17.83	Accepted
5.	M&S	YPT60802	143	56	4	5	10	4	20	2	45	20.22	Accepted
6.	M&S	YPT60802	167	56		8	12	4	26	2	52	20.01	Accepted
7.	M&S	YPT60802	147	56		7	10	3	22	3	45	19.67	Accepted
8.	M&S	YPT60802	139	56		6	9	2	18	4	39	18.03	Accepted
9.	M&S	YPT60802	145	56	4	5	8	3	21	2	43	19.06	Accepted
10.	M&S	YPT60802	130	56		4	8	4	17	3	36	17.80	Accepted
Total		-	1452	56	8	62	94	31	208	26	429	18.99	Accepted

Method of inspection: 4 point system

$$\text{Point / 100 yds}^2 = \frac{(\text{Total Points for the roll} \times 3600)}{\text{Inspected Yards} \times \text{Cut able Fabric Width (inch)}}$$

3.2 Babylon Group

During our project work we have visited Babylon Group and collected information which are required in the project.

3.2.1 The fabric inspection machine

The fabric inspection machine used in Babylone Group in given below as figure.



Figure 04: Fabric Inspection machine at Babylon Group.

3.2.2 Specification of the Inspection machine

- Viewing Glass (inches) – 90×24
- Max Fabric Width (inches) – 90
- Machine Speed (mtrs/min) – Variable upto 15
- Supply Voltage – 415 V/50Hz/Three Phase
- Spreader Motor (hp) – 0.5 x 3 nos
- Dimensions (L x B x H)(mm) – 3130 x 1950 x 2380
- Approx Weight (kgs) – 550

3.2.3 Data of the Fabric Inspection at Balyon Group

The fabric inspection report of Babylon Group is given in following figure:

Babylon Group

2-B/1, Darius Salam Road, Mirpur, Dhaka-1216

UNIT CODE B.GL

PAGE NO. : 01 of 01
RCVD. DATE : 29.07.13
INSPECTION DATE: 04.08.13


PRE CUTTING-FABRIC INSPECTION REPORT

FORM NO. EIGHT

BUYER'S NAME : PERRY ELLIS	FAB. DESCRIPTION :	INSPECTION SUMMARY	
ORDER NO. : 43 NW 3046	FAB. COMPOSITION : 100% COTTON FABRIC	PIECE IN P.O. : 36 ROLL	PIECES REJECTED :
SUPPLIED BY : NANJONG TEX. CO. LTD (S.K)	FAB. CONSTRUCTION :	PCS INSPECTED : 03	
QTY. OF FAB. : 41247YDS	WIDTH AS PER PI : 57 7/8"	AVERAGE POINTS : 10.49	
		P.O PASSED <input checked="" type="checkbox"/>	P.O FAILED <input type="checkbox"/>

COLOUR	DYE LOT Roll No.	TTL.YDS. ACT. YDS.	REQ. WIDTH ACT. WIDTH	NAME OF DEFECTS										TOTAL PENALTY POINTS	TOTAL POINTS	FINAL DISPOSITION									
				SLUB 1pt	SPOT 1pt	SUNDRY FAULTS 1pt	FOREIGN YARN 1pt	NAPS 1pt	WEFT BAR 4pts	SHADE BAR 4pts	HOLE 4pts	CHECK MISSING 4pts	MISSING YARN 2pts 3pts 4pts				THICK YARN 2pts 3pts 4pts								
NAVY	1 2	1022 / 1022	07 1/2" / 58"	WH II		I	WH II											1	25	852	(PASS)				
410	2 1	1007 / 1007	" / "	WH WH		WH II	I											1	26	9.54	(PASS)				
"	3 8	1048-87 / 1048-51	" / 57 1/2"	WH WH		WH I	II													26	1557	(PASS)			

SHRINKAGE AFTER WASH : WARP _____ % WEFT _____ %
SHRINKAGE AFTER PRESSING : WARP _____ % WEFT _____ %
COLOUR CHANGE AFTER IRONING : YES NO
IN WASH COLOUR BLEEDS : YES NO
TOTAL PENALTY POINTS 32 POINTS x 36" x 100 = 10.49 POINTS/100sq. YDS.
ROLL-LENGTH 465.7 YDS x FAB. WIDTH 58" x 100 = 11.09 NOF TOTAL FAB.
*ACCEPTABLE RANGE = 28 POINTS/100sq. YDS. REPORT ON 11.09 NOF TOTAL FAB.
if defective breast ref 100 'sq. yds than will be fail.

CHECKED BY:  MUSA

COMMENTS: THE FABRIC IS UNABLE TO PASS INSPECTION. SO PROCESSED WITH CUTTING. BY ORDERING. THE FABRIC DEFECTS




 MANAGER (STORE)
 MANAGER QC & QA
 MANAGER CUTTING

Figure 05: Fabric Inspection report at Babylon Group.

Table 06: Babylon Group fabric inspection

Sl No	Buyer Name	Fabric Composition	Color	Fabric Length (Yds)	Fabric Width (Inch)	Fabric Defects					Total Penalty Points	Total Point	Final Disposition	
						Slub	Sundry Faults	Foreign Yam	Hole	Thick Yam				
						1pt	1pt	1pt	4pts	4pts				
1	PERRY ELLIS	100% cotton	NEIGHT 410	142	58	8	2	7	1	1	25	8.52	Pass	
2	PERRY ELLIS	100% cotton	NEIGHT 410	169	58	10	7	1	1	1	26	9.54	Pass	
3	PERRY ELLIS	100% cotton	NEIGHT 410	104.5	58	10	6	2	2		26	15.57	Pass	
Total					455.5	58	28	15	10	16	8	77	10.49	Pass

3.3 Shanin Group

During our project work we have visited Shanin Group and collected information which are required in the project.

3.3.1 The fabric inspection machine

The fabric inspection machine used in Shanin Group is given below as figure.



Figure 06: Fabric Inspection machine at Shanin Group.

3.3.2 Specification of the Inspection machine

- Viewing Glass (inches) – 72×21
- Max Fabric Width (inches) – 65
- Machine Speed (mtrs/min) – Variable upto 15
- Supply Voltage – 220 V/Single Phase/ 50 Hz
- Spreader Motor (hp) – 0.5 x 2 nos
- Dimensions (L x B x H)(mm) – 2000 x 2100 x 1750
- Approx Weight (kgs) – 550

3.3.3 Data of the Fabric Inspection at Shanin Group

The fabric inspection report of Shanin Group is given in following figure:

SHANIN GROUP
 NAME OF UNIT : THE SHANIN CORP. LTD

DATE : 21-11-13
 NO OF POINT X 100 285 % POINTS
 NO OF METERS/YDS

FABRIC QUALITY INSPECTION REPORT

BUYER: <u>ALCSTA</u>	TOTAL ROLL RCVD: <u>28-ROLL</u>	TOTAL DEFECT (PENALTY POINTS):	
STYLE/PO NO:	TOTAL YDS/MTR RCVD: <u>3058-785</u>	POINTS PER 100 YDS/MTR:	REJECT: <input type="checkbox"/>
FABRIC SUPPLIER: <u>EVIDA TTX LTD</u>	TOTAL YDS/MTR INSPECT: <u>520-785</u>		ACCEPT: <input checked="" type="checkbox"/>
DATE OF INSPECTION: <u>21-11-13</u>			
FABRIC DESCRIPTION: <u>130x80/40x40</u>			

4.0 SYSTEM : 1" TO 3" = 01 POINT, 3" TO 6" = 02 POINT, 6" TO 9" = 03 POINT, 9" TO ABOVE = 04 POINT.

SL NO.	ROLL NO.	COLOR	LOT NO.	LENGTH	WIDTH	SHADE DEF YDS	FABRIC DEFECT (PENALTY POINTS)										TOTAL PENALTY POINTS	AV %	COMMENTS		
							SLUB/CONTRAST/YARN				FND OUT	KNOT	SPOT	HOLE	THICK YARN	FOREIGN YARN				MISSING YARN	TOTAL DEF
							1	2	3	4											
1	3			179	59"												4.55%				
2	9			152	"												1.96%				
3	14			179	"												1.79%				
							5	6	3	4	15			2.85%							

MAY be approved
 after cutting

INSPECTED BY: [Signature] 21-11-13
 CUTTING IN CHARGE: [Signature] 21/11/13
 (K. M. Zakirullah) ASST. General Manager
 G.M. [Signature] 21-11-13

Figure 07: Fabric Inspection report of Shanin Group.

3.4.1 Fabric Inspection System used in these RMG Industry

There are various system to inspect the woven fabric such as 4 point system; 10 point system; Graniteville “78” system; Dallas System etc. But most of the industries follow the four point system.

The common procedure followed by the industries which are visited by us for collecting information is given below:

- At first fabric roll is feed to the fabric inspection machine from the fabric store .
- The defects are located, marked and recorded on a frame.
- Fabric defect point values are taken by the industries measurement which is developed by own.
- Fabric point/ yards² or point / 100 yds² are calculated by the following formula.

$$\text{Point / 100 yds}^2 = \frac{(\text{Total Points for the roll} \times 3600)}{\text{Inspected Yards} \times \text{Cut able Fabric Width (inch)}}$$

- Depending on this point value, the fabric is accepted or rejected according to the buyer requirement.
- The acceptance point value varies one industry to another industry.

3.4.2 Inspection documentation

The Fabric Inspection Report is the primary document used to record the quality characteristics of the individual rolls inspected as well as identifying acceptance or rejection of the entire shipment. The information contained in the report may be used for communication with the millor other production areas within the factory. As a result, it is important that the following information be complete and recorded accurately.

- Factory Name
- Mill Name
- Fabric Name / Article Number
- Fabric P.O. Number
- Mill / Supplier roll number
- Roll length Ticketed & Actual length
- Number of defect points per roll by defect category
- Defect result calculated by roll in points/ 100 Sq Yards/Meters
- Inspector comments per roll, if applicable
- Accept / Reject decision per roll and
- Note: Factory reserves the right to request copies of documentation at any time.

3.4.3 Fabric defects are found in these Industry

We have visited three woven garment producing factory and them uses to mark the defects which are given below:



Figure 08: Foreign Yarn/ Colored yarn

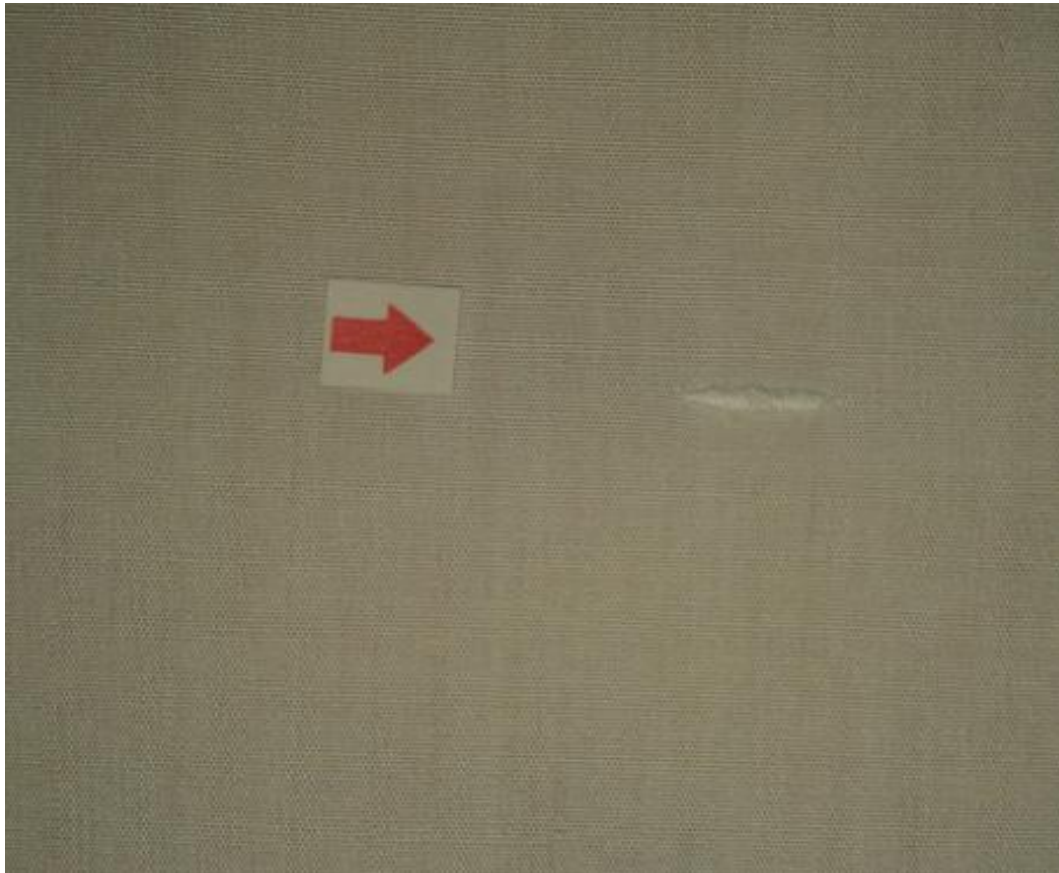


Figure 09: Knots



Figure 10: Spot



Figure 11: Soil



Figure 12: Shade Variation



Figure 13: Miss Yarn/ Miss Pick



Figure 14: Oil Stain



Figure 15: Slub



Figure 16: Printed Miss



Figure 17: Bad Selvedge

CHAPTER 04

DISCUSSION OF RESULTS

4.1 Fabric Inspection Machine used

The fabric inspection machine is very important for inspection of fabric. Because the fabric inspection machines are varies from one industry to another industry. The following table will give the idea about the various fabric inspection machines in different RMG industries which we have visited and compare among them with the basis of some criteria.

Table 08: Compare Fabric inspection machine in three RMG Industries.

Subject	Interfab Shirt Manufacturing Ltd.	Babylon Group	Shanin group
Max Fabric Width (inches)	65	90	65
Machine Speed (mtrs/min)	Variable upto 15	Variable upto 15	Variable upto 15
Supply Voltage	220V/50HZ/Single Phase	415 V/50Hz/Three Phase	220V/50HZ/Single Phase
Approx Weight (kgs)	450	550	550
Viewing Glass (inches)	72 x 21	90×24	72×21

From the table we observe that the fabric inspection machine is varies from one industry to another industry on the basis of fabric width; machine speed; supply voltage; weight; viewing glass etc.

4.2 Inspection system used

Most of the Woven garment industries are used 4 point system to inspect fabric defect and take decision for further decision on the basis of this inspection system. But acceptable limit of defect value varies various industries to industries i.e. if one industry produce poor quality product, than the acceptable limit of defect is high in other hand, if one industry produce high quality product the acceptable limit of defect is low.

The garment industries we have visited, all of them used 4 point system for fabric inspection, but the acceptable defects value is different for different industry. A table of acceptable defect value is given below:

Table 09:Acceptable defects value.

Name of the Industry	Acceptable defect value
Interfab Shirt Manufacturing Ltd.	≤20
Babylone Group	≤28
Shanin Group	≤15

From the table we found that the acceptable defect point values are varies industry to industry and in order to produce high quality product the acceptable defect point value is low.

For this low defect value of a the fabric is considered as high quality fabric and nearly fault free.

4.3 Common Faults

From our project work we have found that there are some common defects which are marked and inspected in these garment industries. These defects names are given below:

- Broken pick
- Miss pick
- Oil spot
- Reed mark
- Slub
- Oil stained yarn
- Crease mark
- Hole
- Shade Variation
- Subcontracts/ Yarn
- Thick yarn
- Knot etc.

4.4 Processes are responsible for these defects

Name of Defects	Name of Process
Slub	Spinning
Broken pick	Weaving
Miss pick	Weaving
Oil spot	Weaving and sometime finishing
Reed mark	Weaving
Knot	Warping and Spinning
Oil stained yarn	Spinning
Crease mark	Finishing
Hole	Finishing
Shade Variation	Dyeing and Finishing
Subcontracts/ Yarn	Weaving
Thick yarn	Spinning

4.5 Effects of defects on Fabric quality

Fabric fault has greater effects on the quality of the fabric. The quality of the fabric depends on the amount of faults. Thus greater amount of fault leads the loss of quality. If the fabric has higher number of defects i.e. poor quality than the fabric is rejected by the buyer which is checked by the inspection system.

4.6 Effects of defects on production

If the amount of faults in the fabric is acceptable range than the production will not hamper, but if the amounts of defects is higher than the manufacturer has to reject these defected fabric as a result the production will be hampered largely. Thus the productivity is decreased highly.

The profit of a company depends on many things like productivity, cost of production, rejection etc. profit decreases with decreases of the productivity. And the profit also reduced with the increased of production cost and rejection. Because higher rejection leads to high production cost.

For rejection of the fabric the manufacturer has to reproduction the fabric as a result the production cost goes up and profit goes down and production rate highly hampered.

CHAPTER 05

CONCLUSIONS

Conclusion

In this project we learned about various types of woven fabric faults and their causes and the system which is used to inspect the fabric in order to get decision to accept or reject the fabric for further processing i.e. cutting. Their many types of system for inspection are invented but 4 point system is used widely for fabric inspection. By this method a company can get an idea about the fabric quality and the faults, because faults reduced the fabric quality. So in order to produce high quality fabric or garment product the fabric faults should be minimum as soon as possible. And the acceptable limit of defect point is less.

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