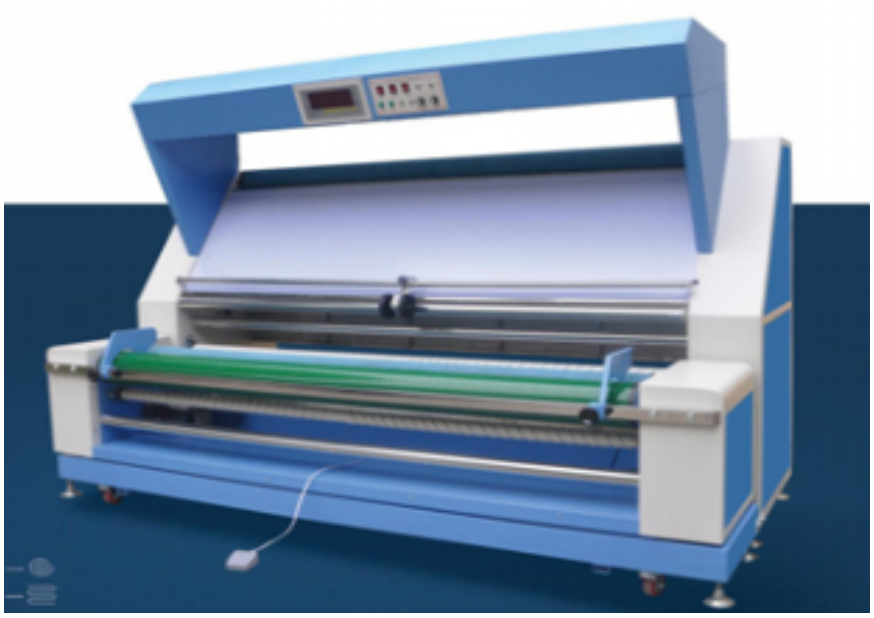
Textile Processing Technology

Level-II

Based on June 2022, Curriculum Version 1



Module Title: - Performing final inspection and packaging of finished Textiles

Module code: IND TPT2 M07 0222

Nominal duration: 60Hours

Prepared by: Ministry of Labour and Skill

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Table of Content

Acknowledgment

Ministry of Labor and Skills wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

Acronym

1. **SOP**: Standard operating procedure
2. **WHS**: Work Health And Safety
3. **PPE**: Personal Protective Equipment
4. **QC**: Quality Controller
5. **AQL**: Acceptable Quality Level
6. **AAMA**: American Apparel Manufacturers Association
7. **VOC**: Volatile Organic Compounds
8. **EHS**: Environmental Health and Safety
9. **LAP**: Learning Activity Performance
10. **FFL**: Fixed Focal Length

11. **LED:** Light Emitting Diodes

Introduction to the Module

In Textile Processing Technology filed; to know the quantity of work; to prepare work pieces and workstation; to operating inspection and packaging tasks and to dispatch complete work, particularly for the unit of competency: **Performing final inspection and packaging of finished textiles.**

This module is designed to meet the industry requirement under the Textile Processing Technology occupational standard, particularly for the unit of competency: Perform final finishing operations

This module covers the units:

- Job requirements
- Work pieces and workstation
- Inspection and packaging tasks
- Complete work

Learning Objective of the Module

- Determine job requirements
- Prepare work pieces and workstation
- Operating, inspection and packaging tasks
- Dispatch completed work

Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the "LAP test" giver at the end of each unit and
5. Read the identified reference book for Examples and exercise

Unit one: Job requirements

This unit is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying job requirements
- Standard operating procedures (SOPs)
- Complying with work health and safety (WHS)

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Follow standard operating procedures (SOPs)
- Comply with work health and safety (WHS) requirements at all times
- Use appropriate personal protective equipment (PPE) in accordance with SOPs
- Identify job requirements from specifications, drawings, job sheets or work instructions

1.1. Standard operating procedures (SOPs)

1.1.1. OHS practices

For processes involving hazardous substances, hot liquids, pressurized equipment, and any other processes that may incur risks to safety and health, hazard information and risk control measures should be stated clearly in the respective standard operating procedures and made known to the employees concerned.

• PPE

• Safe material handling

• Hazard control measures

• Housekeeping

Containers

Use robust containers with a closable lid for storage. However, repeated removal and replacement of container lids and opening and closing of bags can also generate more dust. Plan to dispose of containers safely. Bags especially can cause problems and are best placed into disposal sacks at the workstation. Also plan how you will deal with damaged containers and how to dispose of unwanted dyes.

• Areas where dyes are handled should be easy to clean, with walls and floors that are sound and smooth. Rounded corners are easier to clean. Shelving and workbenches should be easy to clean too or else covered with impervious, disposable covering. They should have a lip to retain spills.

Cleaning and dealing with spillages

Dry vacuum cleaning, using a piped system or a type H industrial vacuum cleaner, is best for larger dry spillages and most cleaning tasks. Wet vacuuming or other wet cleaning methods may be appropriate in some situations or for smaller spillages. Don't use brushes or brooms or compressed air, as these will simply spread the dust into the air

• Ergonomic arrangements of workplace

• Reporting accidents and incidents

1.2. Complying with work health and safety (WHS)

The major safety and health issues in the textile industry can be stated as under:

1) Exposure to cotton dust:

The workers engaged in the processing and spinning of cotton are exposed to significant amounts of cotton dust. They are also exposed to particles of pesticides and soil. Exposure to cotton dust and other particles leads to respiratory disorders among the textile workers. The fatal disease of byssinosis, commonly known as brown lung, is caused among people working in the textile industry on account of excessive exposure to cotton dust. The symptoms of this disease include tightening of the chest, coughing, wheezing and shortness of breath.

2) Exposure to chemicals:

Workers in the textile industry are also exposed to a number of chemicals, especially those engaged in the activities of dyeing, printing and finishing. Chemicals based on benzidine, optical brighteners, solvents and fixatives, crease-resistance agents releasing formaldehyde, flame retardants that include organ phosphorus and organ bromine compounds and antimicrobial agents are used in textile operations.

3) Exposure to noise:

High levels of noise have been observed in most of the units engaged in the textile industry, particularly those in developing countries. In the long run, exposure to high noise levels has

been known to damage the eardrum and cause hearing loss. Other problems like fatigue, absenteeism, annoyance, anxiety, reduction in efficiency, changes in pulse rate and blood pressure as well as sleep disorders have also been noted on account of continuous exposure to noise. Lack of efficient maintenance of machinery is one of the major reasons behind the noise pollution in a majority of the units. Though it causes serious health effects, exposure to noise is often ignored by textile units because its effects are not immediately visible and there is an absence of pain.

4) Ergonomic issues:

Ergonomic issues are observed in a majority of the units engaged in textile-related activities. Most of these units have a working environment that is unsafe and unhealthy for the workers. Workers in these units face a number of problems such as unsuitable furniture, improper ventilation and lighting, and lack of efficient safety measures in case of emergencies. The workers in such units are at risk for developing various occupational diseases. Musculoskeletal disorders like carpal tunnel syndrome, forearm tendinitis, bicapital tendinitis, lower back pain, epicondylitis, neck pain, shoulder pain, and osteoarthritis of the knees are some of the occupational diseases that have been observed among the workers on account of poor ergonomic conditions. These issues are more common in developing nations as compared to developed ones.

1.2.1. Hazard identification and control

The hazards and risks involved in the textiles industry are comparable to other industries, with minimal emphasis on textile industry. Many accidents do not come to the legal formalities. Many people are not aware that health and safety workers are unemployed; management has not given importance to promoting safety devices in the textile industry. The main risks are physical, chemical, ergonomics and physiologically, working hours, incorrect ventilation, dust chemical and noise are some of the things that can cause harm.

Major risks are physical, electrical, chemical ergonomics and physiological hazards. Some of these complications produce more work time, noise, dust, chemical and improper ventilation. These problems are controlled by using checklists, give recommendation and suggestions also give proper remedial measures. The proper design of human body capabilities and equipment only works in accordance with the environment. With the aim of continuous improvement, the workforce will focus on realizing their health and safety in the workplace.

Chemical Hazards

Respiratory & Dermal contact hazards

Dust:

Exposure to fine particulates is mainly associated with natural fibers and yarn manufacturing processes. Cotton dust is generated during the handling or processing of cotton and contains cotton fibers and other potential chemical and microbiological contaminants (e.g. bacteria, fungi, pesticides, and herbicides). Exposure to cotton dust can generate respiratory hazards (e.g. byssinosis in cotton manufacturing, chronic bronchitis, asthma, and emphysema).

Prevention and control of occupational health and safety hazards relevant to natural fiber dust include the following

- Installation of dust extraction, recycling and ventilation systems to remove dust from work areas, especially in cotton mills;
- Use of vacuum cleaning of surfaces instead of compressed air “sweeping” techniques;
- Implementation of regular housekeeping procedures, especially in the “flocking” area;
- Use of mechanical methods to handle cotton and cotton waste;
- Use of personal protective equipment (PPE) for exposed workers, such as masks and respirators, as necessary.
- Workplace exposure to asbestos dust during fiber production represents a known risk of lung cancer (mesothelioma) and injury to the bronchial tubes. The use of asbestos fiber is prohibited. Appropriate dust extraction systems in facilities where inorganic natural fibers are processed should be implemented (e.g. filters using nano-whiskers).

Volatile Organic Compounds (VOC):

Exposure to VOC emissions is related to the use of solvents in textile printing processes, fabric cleaning, and heat treatments (e.g. thermo fixation, drying, and curing). Worker exposure can cause skin and respiratory impacts. Exposure to certain compounds (e.g. carbon disulphide in rayon manufacturing) may have significant toxic effects, including nervous system and heart diseases.

Prevention and control techniques to reduce VOC exposure hazards include the following:

- Use of hoods and enclosed equipment;
- Use of well-ventilated rooms, with a slight positive pressure, for process control operators, and as worker rest stations;
- Use of shift and task rotation strategies for workers to minimize VOC exposure;

- Installation of extraction and air recycling systems to remove VOCs from the work area with
- Use of appropriate abatement technologies (e.g. scrubbers employing activated carbon absorbers) or routing the extracted vapors to the combustion system;
- Use of personal protective equipment (PPE), such as respirators, as necessary.

Chromium

It is a major cause of allergic contact dermatitis among dye house workers and workers who perform dyeing operations and handle dyestuffs containing chromium.

Prevention and control of this potential hazard include reduction in the proportion of soluble chromium in dyestuffs and the use of adequate PPE to prevent dermal contact, as described in the General EHS Guidelines.

Explosion

Organic dusts, including cotton dust, are combustible and present a potential explosion hazard. This hazard is most effectively controlled through the measures for prevention of dust accumulation as above. In addition, all possible sources of ignition where organic dusts may form clouds or accumulate should be removed. VOC use, such as solvents, may form potentially explosive mixtures in air. Electrical equipment in these areas should be rated for ignition prevention.

Physical Hazards

Activities related to the maintenance operations of industry specific equipment (e.g. cards, spinning machinery, looms, and stenters) may expose workers to physical impacts, particularly with reference to hot surfaces and moving equipment. Prevention and control of these impacts include the implementation of general protection measures (e.g. machine guarding and lock-out-tag-out systems and procedures), as described in the General EHS Guidelines.

Heat

The most significant risk of exposure to heat and high humidity occurs during wet processing and dry finishing operations and is caused by the use of steam and hot fluids in these processes.

Noise

The main sources of noise in textile plants are associated with yarn processing (e.g. texturizing and twisting and doubling) and woven fabric production. Noise management, including the use of personal hearing protection.

Ionizing and Non-Ionizing Radiation

X-ray stations are sometimes used for continuous monitoring of the foam thickness in continuous foam dyeing and for tank level control systems. Operators of this equipment should be protected through the use of ionizing radiation protection measures to limit exposure doses.

1.2.2. Risk assessment

Risk assessment is the risk hazard assessment or safety evaluation. The purpose is ensuring the enterprise economic interests' security for export enterprises which use quantitative analysis or qualitative analysis. Controlling the possibility for risk and damage degree will develop appropriate management decisions. Currently, the commonly used risk assessment methods are qualitative evaluation, quantitative assessment methods, probabilistic risk assessment methods, risk assessment software and soon.

Qualitative assessment method is the ability to assess based on the experience and technology of production systems, equipment, environment, personnel, management and other aspects of qualitative evaluation. Included in this type of assessment method are Safety Checklist, Preliminary Hazard Analysis, fault type and hazard analysis and other research methods that affect operability.

What is characteristic of this method is being simple and yielding intuitive results. Quantitative assessment method means assessing the risk on the basis of quantization which mainly relies on historical statistics, and mathematical method of constructing mathematical models for evaluation. Quantitative evaluation methods include probabilistic assessment method, mathematical model calculations and relative valuation method.

Probabilistic Risk Assessment Act is based on the probability of calculating the risk accidents. Risk assessment software b through software to help people find out the cause of the accident, understanding the severity of the potential risks and identifying risk mitigation approaches. There are four main types such as hazard identification software, consequences of accidents modelling software, accident frequency analysis software and comprehensive quantitative risk analysis software.

Generally, risk is composed of risk factors, risk accidents and losses. Risk factors increase opportunity for the risk accidents. Risk accidents are the direct reason for losses. Normally, risk losses refer to the economic losses or other additional losses. There are four types of risk control:

First: one is risk aversion which means designedly discarding the risk project;

Second: is loss control which refers to trying to control losses to lowest degree even if something is unavoidable;

Third: one is risk defection which needs to use insurance or contract to other participants.

Last one is risk retention which refers to self–insurance with or without plan.

- Unplanned means bearing the loss by enterprise after risk occurrence.
- Planned means found compensation can be acquired through insurance or other methods before risk occurrence

Risk assessment on textile finishing requires knowledge of the properties of chemicals and the reactions involved in the concerned chemical processes.

Due consideration should be given to the factors listed in the following paragraphs.

Physical form of the chemicals

The physical forms of the chemicals used in textile finishing have pronounced effects on the hazards of the chemicals. For those in the state of gases, vapours, fumes, aerosols, airborne particulates, the risk of entry into the human body as well as the risk of fire and explosion is increased. It should be noted that aerosol, particulate and powder forms of combustible materials can form explosive/flammable mixtures with oxidizing agents, including air.

Chemical changes

If chemical change is involved, the chemical reaction and the products should be studied. The hazards associated with the chemical reaction as well as hazardous properties of the reactants and products in textile finishing processes should be identified. Special attention should be paid to any possible side reactions and by-products.

Temperature and pressure changes

Many physical and chemical changes may evolve heat, causing a rise in temperature during the finishing processes. They may result in:

(a) Formation of hazardous gases, vapours or fumes;

(b) Pressure increase in the container causing explosion;

(c) Rapid bubbling causing splashing of hot hazardous fluids; or

(d) Increase in reaction rate generating even more heat.

These effects can be intensified if there is no effective means to dissipate the heat evolved which may result in localised heating and superheating of the reaction mixture. It should also be noted that some exothermic reaction initiated by a rise in temperature may auto-accelerate and the reaction rate may become out of control.

Scale of the process

The scale of the process determines the amount of hazardous chemicals involved. Change in the scale affects the heating effect of the operation as well as heat dissipation and pressure change in the system.

Extent of exposure

The extent of exposure to hazardous chemicals is affected by:

(a) Frequency, duration and mode of exposure;

(b) Rate of generation and concentration of the hazardous chemicals in the atmosphere; and

(c) Effectiveness of control and protective measures in minimizing the exposure.

Working environment

The working environment ranging from the containers holding the chemicals to the general conditions of the workplace is an important aspect in the risk assessment of textile finishing. The following factors should be considered:

a. Size and shape of the container where chemical or physical changes take place, especially the headspace in the container and passage for release of pressure; if the container cannot withstand or release the increase in pressure, explosion may occur;

b. Presence of nearby ignition source, if explosive/flammable mixtures are encountered;

c. Whether processes undertaken or chemicals stored or used are sensitive to air, moisture, temperature or light; and

d. Ventilation of the environment.

Implementation of risk reduction measures

The following points are some examples to reduce risk in textile operation:

- Identify the risks in the textile industry and provide the right solutions for it.
- Measure work environment issues such that noise, temperature lighting humidity.
- Detect unsafe working condition in the Textile industry.

- Develop a framework for understanding the risks textile workers were exposed to due to lack of health and safety standards in the industry.
- Identify areas in which the hazards are involved.
- Identify how to industry can made free from risk.
- Give suggestion for avoiding the hazards.

1.3. Identifying job requirements

General requirements for final inspection

The following points should be taken care for the final inspection.

- Work area must be well lighted and the measuring table should be large enough to hold the entire garment spread out flat and buttoned.
- Use a soft fibre glass ruler or a metal ruler that has been calibrated against a rigid steel ruler.
- Cuts should be stored in the auditing storage area to facilitate the access of the boxes for the auditor.
- Sample boxes must be randomly obtained. Cuts that are only partially boxed are not ready for the final statistical audit and should not be audited until all boxes are complete. Samples must be randomly obtained from finished sealed boxes.
- Final Statistical Audits are done following a 4.0 AQL (Acceptable quality level).
- Auditors should establish a routine for inspecting garments in order to eliminate the possibility of overlooking an operation.
- The auditor must be aware of the specifications of the fabric.
- All operations must be checked in the final audit. Also, tacks, shading, long threads, raw edges, skip stitches, and other defects must be checked.
- Fabrics with major defects are to be marked by colored tape and set aside for repair.
- Detailed records should be recorded and major defects must be properly recorded with their code.
- Cuts that have not passed a final audit or that have only been partially audited should not be loaded on the truck.
- After inspection, the remainder of the garments in the box must be counted and checked for size. The label on the exterior of the box must reflect what is inside the box.

- Garments that have passed the inspection must be returned to the box in the same manner that they were in when they were taken out. All repairs should be set aside and marked.
- Detailed records of any defects must be recorded.

Self-check-1

Instruction1: Select the correct answer for the given choice. You have given 1 Minute for each question. Each question carries 2.5 Point.

1. ---------- is/ are respective standard operating procedures and made known to the employees concerned.

   A. PPE C. Safe material handling

   B. Hazard control measures D. Housekeeping E. all

2. ---------- is workers engaged in the processing and spinning of cotton are exposed to significant amounts of cotton dust.

   A. Ergonomic issues: C. Exposure to noise:

   B. Exposure to cotton dust D. Exposure to chemicals E. all

Instruction2: Write the answer for the given question. You are provided 3 minute for each question and each point has 5 Points.

1. List and explain Major and optional safety and health issues in the textile industry inspection department.
2. Discuss prevention and control techniques to reduce VOC exposure hazards.
3. Identify and describe each physical and chemical hazards
4. Describe general requirements for final inspection.
5. Describe working environment to inspection room.

Note: Satisfactory rating – above 30% Unsatisfactory - below 30%

You can ask you teacher for the copy of the correct answers

Unit Two: Work pieces and workstation

This unit to provide you the necessary information regarding the following content coverage and topics:

- Work pieces or materials are laid out in sequence
- Work area, bench or seating are set up or prepared according to work health and safety (WHS) requirements
- Machine or process is set up
- Routine minor maintenance & simple adjustments are performed as required according to manufacturer specifications
- Any problems are reported and recorded

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Lay out work pieces or materials in sequence
- Set up or prepare work area
- Set up machine or process
- Perform routine minor maintenance & simple adjustments
- Record and report problems

2.1. Laying out work pieces or materials in sequence

Laying out is the planning of the work on the surface of the material that is to be made into the finished part. In order to ensure the accuracy of the work and to reduce the chance of errors, the various types of lines making up a layout must be laid out in a definite sequence. This sequence is outlined in the illustration at the end of this lesson. Make sure you fully

understand the correct technique and sequence of operations to correctly lay out a work piece. A poor job of layout will result in a scrap part.

- Work pieces or materials are laid out in sequence
- Work area, bench or seating are set up or prepared according to OH&S practices
- Machine or process is set up
- Routine minor maintenance is performed as required according to manufacturer specifications
- Any problems are reported and recorded
- Specifications concerning design, fabrics, accessories and finish are confirmed with designer/customer/client, as required
- Workplace health and safety requirements, including personal protection needs, are observed throughout the work
- Materials, work method and sequence are determined
- suitable work area is selected, prepared and cleaned of any contaminants
- Appropriate equipment and tools are selected and checked for safe operation
- Furniture frames/foundations are checked for quality of construction, contaminants and appropriateness to specifications, and modified and/or repaired in accordance with workplace procedures
- Material panels are checked in terms of quantity, quality, contaminants, size, pattern and consistency
- Trims are selected and checked to in terms of quantity, quality, contaminants, size, pattern and consistency
- Appropriate tools and equipment, plain and patterned fabrics, trims, furniture, inspection machine, labeling and stamping machine, rolling and folding machines, packaging machine, cart and trolley, frames and foundations, fixing materials and tools, work order, workplace information including work procedures and/or equipment instructions.

2.2. Setting up or preparing work area

Plan and organize activities, including the preparation and layout of the work area and the obtaining of equipment and materials to avoid any back tracking, workflow interruptions or wastage. Use pre-checking and inspection techniques to plan work, avoiding re-working and wastage. Use the limited workplace technology related to the application of final material covers to upholstered furniture using decorative techniques

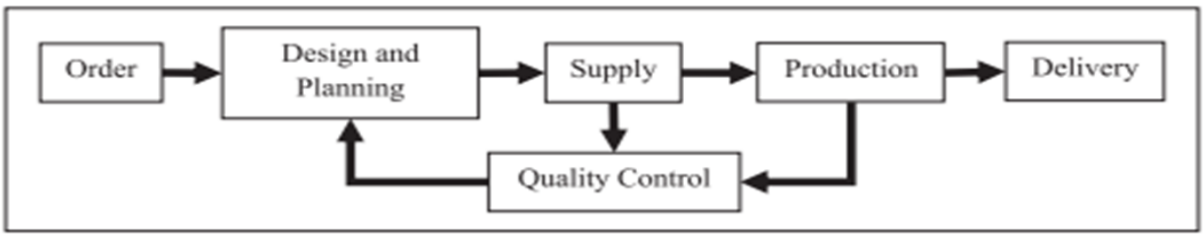

Figure 2. 1: Production flowchart in textile industry

2.3. Setting up machine or process

- Packing or finishing machines should be set up according to the standard operating procedures
- Inspection machine
- Labeling and stamping machines
- Rolling and folding machines
- Packaging machine, cart and trolley

Apply machine operation techniques

- Operating procedures and safe operation of inspection, rolling, folding and packing machines
- Quality standards and practices
- Machine maintenance and repair techniques
- OHS practices, including hazard control measures
- Workplace practices; recording and reporting practices

2.4. Performing routine minor maintenance & simple adjustments

1. Cleaning work area
2. Minor adjustments to machine settings or components
3. Oiling or lubricating
4. Safety Instructions For Maintenance

2.5. Recording and reporting problems

Fabric defect detection system components

1. Camera selection

On-loom fabric image acquisition has some difficulties to acquiring high-quality images. One of the difficulties is the camera selection.

Generally, two types of cameras are used for fabric defect detection: area scan and line scan cameras.

1. Line scan camera can obtain images from the fabric surface area at high speeds in the form of lines. Line scan camera must be synchronized to the moving fabric by means of encoder.

Camera-encoder interface application is utilized to obtain the true movement direction of the manufactured fabric. This interface provides accurate image-line triggering for line scan camera.

2. Area scan camera may obtain at a more reduced speed, but it acquires the blurred fabric images.

In Fig2.2: images obtained from different fabrics captured through area scan camera are shown. In the first column shows the stabile images and the second column shows the moving images. If looked carefully, image of the moving fabric is obtained too blurred to do any transactions on it.

To eliminate the blur in the images obtained by area scan camera, line scan cameras are preferred in the analysis of high-speed objects. Today, line speed cameras with 140 kHz (approximately 140,000 lines in 1 s) can be produced. In Fig. 3, the data package obtained in 1 s from a line scan camera with the rate of 140 kHz, and how these data packages are converted into frames are shown.

As a result, the fact that area scan camera should be used in the analysis of static fabric. In addition, line scan camera should be used in the analysis of moving fabric.

2. Lens selection

After the selection of the suitable camera, an appropriate selection of lens is needed. The area to see and field of view with a camera depends on the lens used. Therefore, the most right lens should be chosen taking such values as the working distance, field of view and the size of the sensor. Due to the fact that the sizes of the picture to be formed, its shape and clarity are directly related to lens selection. For this reason, focal length f value should be calculated. f value can be calculated by the following formula:

Fig 2.2: The fabric images obtained by area scan camera (First row: 2518 × 1900 resolution. Second row: 780 × 640 resolution. First column: The machine is stationary. Second column: The machine is running).

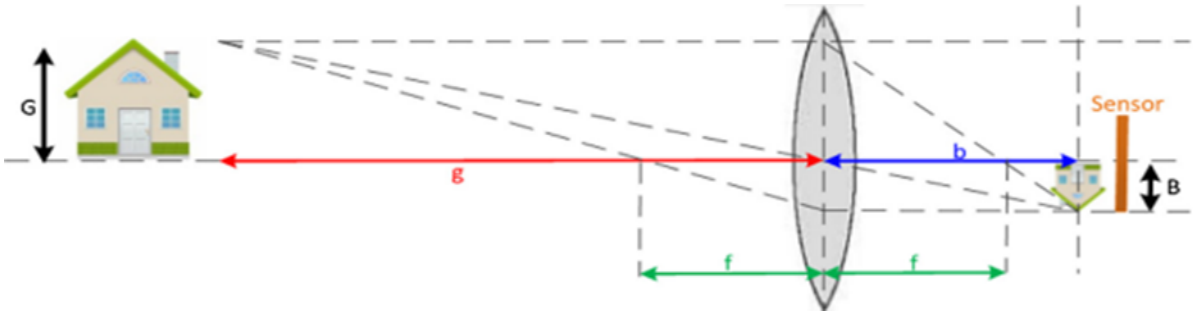

Fig2.2: A schematic diagram of the relationship between image and object distance (b and g, respectively) and lens focal length (f).

Where B and G are the image size and object size, respectively. b and g are the image distance and object distance, respectively. Fig2.2: presents the geometric relationships between image and object distance (b and g, respectively) and lens focal length (f). Each lens has Fixed Focal Length (FFL) values. Any lenses between the calculated value of the f and the FFL values of lenses equalizing $f - 2 \leq FFL \leq f + 2$ can be selected. For the selection of the lens, a web-based application can be accessed from. The above formulation formally defines a measure of focal length that is related to the vague distance between object and camera. In the industrial image processing applications, magnification factors >1:10 (sensor size: object size) are required.

3. Light selection

Lighting is a fundamental problem for many machine vision and image acquisition systems. Four different lighting schemes are used for automatic fabric control systems. These are the front, back, fiber-optic and structural lighting techniques. The front lighting technique is generally used for examining the thick fabrics and is positioned at the same location with the camera on the front of the fabric. As for the backlighting technique, it is used to eliminate the effects of ghosting in the semi-transparent fabric structures. When compared with the front side lighting, the line light source located at the back of the fabric allows us to obtain images with more appropriate contrast. Fiber optic lighting type is not economical for the images of fabric larger than 1.82m. In order to be able to distinguish between defected and defect-free fabric images, infrared light and high frame rate camera are used in structural lighting systems. In the literature studies, fluorescent lamps, halogen lighting, and different designs of Light Emitting Diodes (LED) light sources are in general used. Some light source prototypes are shown in Fig2.2.

The width of light is very important to capture the quality images. The following formula can be used to select an optimal width of the light:

Light width (mm) = illuminated area + (2 ∗ camera working distance)

In electromagnetic spectrum, the human eye can see the radiations between 400 − 700 nm wavelength range. LED lighting provides lighting in a quality close to the human eye. For this reason, in fabric control systems developed in recent years, in order to achieve effective and successful machine vision, line LED lighting is preferred. For effective use of LED lighting, the width of the light must be selected according to the formula given above

Fig 2.3: (a) Halogen light source, (b) fluorescent light source, (c) linear light source.

4. Frame grabber

Frame grabbers are used as an element of data transfer between the camera and the data processing unit. In order to transfer from camera to the data processing unit, each data must be stored and delivered quickly. As high-speed line cameras are needed for fabric defects detection process, it is essential to use the frame grabbers. Otherwise, there will be losses in camera data produced sequentially. Multiple camera data can be transferred to the computer at the same time owing to frame grabber. In Fig 2.3: frame grabbers with different numbers of ports are shown.

Self-check-2

Instruction1: Select the correct answer for the given choice. You have given 1 Minute for each question. Each question carries 2 Points.

1. ---------- Camera may obtain at a more reduced speed, but it acquires the blurred fabric images.
   A. Areas scan C. Camera encoder
   B. Lines scan D. A & C E. all
2. ---------- is a fundamental problem for many machine vision and image acquisition systems.
   A. Lens selection C. Camera selection
   B. Frame grabber D. Light selection

Instruction2: write the answer for the given question. You are provided 3 minute for each question and each point has 4 Points.

1. Describe the effects of light in inspection operation.
2. Discuss small, medium and large maintenance of machine.
3. Discuss the purposes of fabric defect detection system components.
4. Discuss routine minor maintenance & simple adjustments.

Note: Satisfactory rating – above 20% Unsatisfactory - below 20%

You can ask you teacher for the copy of the correct answers

Unit Three: Operating inspection and packaging tasks

This unit to provide you the necessary information regarding the following content coverage and topics:

- Operating machine or conducting process
- Inspecting fabric and recording faults
- Grading inspected fabrics
- Packing inspected fabric
- Assessing work quality

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Operate Machine or conduct process
- Inspect fabric and record faults
- Grade inspected fabrics according to given standard

• Pack inspected fabric Assess work for compliance with quality

3.1. Operating machine or conducting process

Operating machine

Fabric defect detection is the determination process of the location, type and size of the defects found on the fabric surface. Generally, human inspection is used for fabric defect detection. It provides instant correction of small defects, but human inspection cannot detect errors due to carelessness, optical illusion and small defects. However, human inspection fails on detection defects in terms of accuracy, consistency and efficiency, as workers are subject to boredom and thus inaccurate, uncertain inspection results are often occurred. Thus, automated fabric inspection becomes an efficient method forward to improve fabric quality. In automated inspection, defect detection is carried out during the production process. In real-time inspection, these systems detect the defect and are able to stop the production process just when the defect has occurred. Automated systems are able to provide detailed information about the defect to the operator.

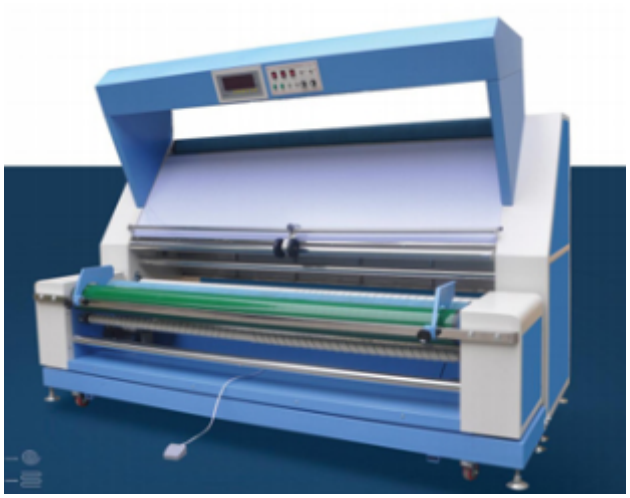

Fig3.1: Automatic Edge Alignment Fabric Inspection Machine

Suitable for: Knit, woven, elastic fabric and other general fabric

Features:

- Inspection, fabric rolling, fabric folding, measurement, automatic edge alignment for re-rolling fabric.
- Electronic eye automatically sense, realize releasing fabric without tension. Smoothing fabric function
- Use with imported electric control appliances.
- Max. roll fabric diameter: 40cm
- Max. fabric width: 2100mm

2.5.1. Fabric inspection

Fabric inspection can be defined as the visual examination or review of fabric produced. It is common to inspect ‘‘first meter’’ of each roll during fabric production. The first meter is taken by maintenance in-charge and handed over to quality supervisor or folding inspector. In first meter, the ends per inch, picks per inch, warp count and brand, weft count and brand, width of the fabric, reed, and weave design is inspected. The first meter is inspected as soon as it is produced to avoid fabric faults in subsequent fabric production.

Apart of first meter, each roll of fabric and also inspected in folding department, where fabric roll is graded as A or B grade etc. Some mendable faults are also mended during inspection to improve the grade of fabric roll. There are various grading systems of fabric inspection are acceptable which are discussed in section grading systems.

Product inspection is an important aspect in modern manufacturing industries such as in case of electronics, automotive and medical industries. This process is a preventive one that could be broadly defined as the process of determining if a product deviates from a given set of specifications. Mainly, fabric defect detection has two distinct possibilities]. The first one is the product or end (offline) inspection in which the manufactured fabric has to be inspected through fabric inspection machines. The second possibility is the process inspection (online) in which the weaving process (or its parameters) can be constantly monitored for the occurrence of defects.

1. **Visual (Traditional) fabric inspection**

Fabric like many intermediate products is available in a web form (continuous rolls) where a typical fabric web is 1.5-2 meter wide. In addition, defects to be detected by inspection are numerous and present complex appearance.

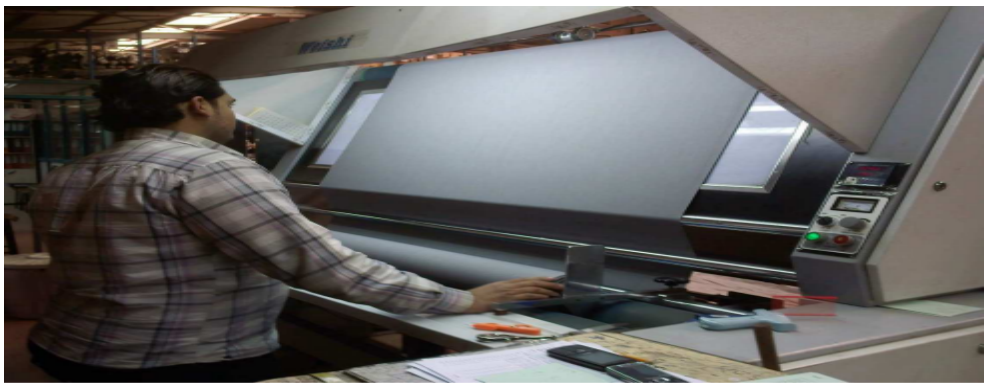

Fig3.2: Visual (traditional) fabric inspection

When the inspector notices a defect on the moving fabric, he stops the machine, records the defect and its location, and starts the motor again. For each inspected fabric roll, the number of defects per meter length is calculated and the fabric is classified. The early detection of repetitive defects and extraordinary defect rate is left to the operators or so called (roving inspectors).

Drawbacks of visual fabric inspection

Typically, the inspection process relies strictly on the human eye and is done after the fabric formation process. A key fact: that even with the best-designed man-machine interface, the probability of human error cannot in practice be reduced to zero.

The following points are some examples of drawbacks:

1. Human experts are difficult to find or maintain in an industry.
2. Human requires training and their skills take time to develop.

3. In some cases visual inspection tends to be tedious or difficult, even for the best trained experts.

4. Human is slower than the machines which means that inspection is a time consuming task.

5. Human inspectors fatigue over time (get tired quickly). Therefore, visual fabric inspection is extremely tiring task, and, after a while, the sight cannot be focused (the maximum period of concentration is 20-30 min). However, the operator inevitably misses small defects and sometimes even large ones with the number of meters of the inspected fabric.

6. Human inspectors have to deal with an extensive variety of defects (there are almost 50 different kinds of flaws) either due to mechanical malfunction of the loom, or due to low-quality fibers and spreads.

7. Human inspectors make mistakes because inspection is unreliable when the fabric of 1.6-2 meters width is unfolded at a speed of 20 m/min. It is difficult for humans to keep up with these hard conditions. Because their efficiency is based on experience and even in a well-run operation, the reproducibility of a visual inspection will rarely be over 50% while the maximum detection efficiency is about 70%-80%.

8. The inspector can hardly determine the level of faults that is acceptable, while comparing such a level between several inspectors is almost impossible.

9. It is a subjective method that difficult to reproduce result.

10. The grading process is slow and varies from mill to mill.

11. Usually, there is an absence of feedback to support processes for corrective measures.

12. The low quality control speed when compared to the production speed offers a major bottleneck in the high-speed production lines.

13. It is extremely difficult to achieve100% fabric inspection with this traditional method.

14. Labour-intensive and more floor space required i.e. there is an expense of manual inspection, which is essentially a non-value added activity.

15. Traditional visual fabric inspection is cost-intensive. Even, through the incidence of serious weaving faults can be reduced by the use of modern weaving technology, fault detection in many plants still continues to create considerable extra cost (which increases with the labour cost).

16. Moreover, the problem of the visual inspection does not correspond only to the undetected defects but also, it changes the mechanical properties of the fabric under inspection. For instance, the fabric dimensions (longitudinally and width-wise) usually

changed due to the applied tension on fabric roll during the inspection process. Both are not good for the customers because they pay for false materials.

Moreover, the shrinkage takes place after the spreading of the fabric in cutting departments increases the probability of producing second quality garment either due to poor assembling (sewing) quality or incorrect size.

Because of these vast drawbacks and in order to increase accuracy, attempts are being made to replace manual visual inspection by automated one that employs a camera and imaging routines to insure the best possibility of objective and consistent evaluation for fabric quality.

2. **Automated fabric inspection**

Automatic inspection systems are designed to increase the accuracy, consistency and speed of defect detection in fabric manufacturing process to reduce labour costs, improve product quality and increase manufacturing efficiency.

The operation of an automated visual inspection system can be broken down into a sequence of processing stages: image acquisition, feature extraction, comparison, and decision. It is important to note that the success of an automatic inspection system relies on the approach used.

3. **Online automated fabric inspection**

It is called also real-time fabric inspection where production and production control work together or in real time. The need for this vision system stems from the fact that fabric inspection with present methods (offline) is an inadequate task: thousands of off quality fabric meters will be produced before the problem is recognized. Thereby, the main object of this vision system is to detect the defects at an early manufacturing stage in order to prevent foreseeable fabric defects in mass production or at least to insure a corrective action during the process.

If the inspection system is agreed to be online, we have to explain why it should be automated. Beside the high cost, low accuracy and very slow performance of human visual inspection, the slow fabric manufacturing speed (0.3-0.5 meters per minute) is insufficient to keep a human inspector occupied and human inspection is therefore uneconomical. Also, the relatively hostile working environment near the weaving machines is not suitable for human inspection.

The output of the fault detection system may be simply an alarm signal that takes two values, high for defect and low for defect-free or, more sophisticatedly, knowledge of faults

such as location, spectrum or amplitude. Some researchers determined the essential requirements for an online automated inspection system to be reliable as follows:

1. The system must operate in real-time with good results,
2. It must reduce escape rates,
3. It must reduce false alarms,
4. It must be robust and flexible. Thus, it should adapt itself automatically and achieve consistently high performance despite irregularities in illumination, marking or background conditions and, accommodate uncertainties in angles, positions, etc.
5. It must be fast and cost efficient,
6. The system must be simple to operate and maintain.

Advantages of online automated fabric inspection

Therefore, an efficient online automated product inspection is a key factor for the increase of competitiveness of the textile and clothing industry. Let us mention now extra advantages of online automated visual inspection

1. The results of such a system are reliable, reproducible and free from the subjective deficiencies of the manual fabric inspection,
2. The system can increase the efficiency of production lines and improve quality of product as well,
3. A good system means lower labour cost (the labour of the machine also operates the inspection system),
4. Shorter production time,
5. Minimum floor space.

Assess the product against quality standard

Assess all the product quality if there is a deviation from the standard take action.

- Inspection and grading process
- Rolling and folding operations
- Packing operations

The main objective of inspection is the detection of defects and non-conformances 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. For inspection to be effective, the entire inspection loop as shown in Fig3.3.

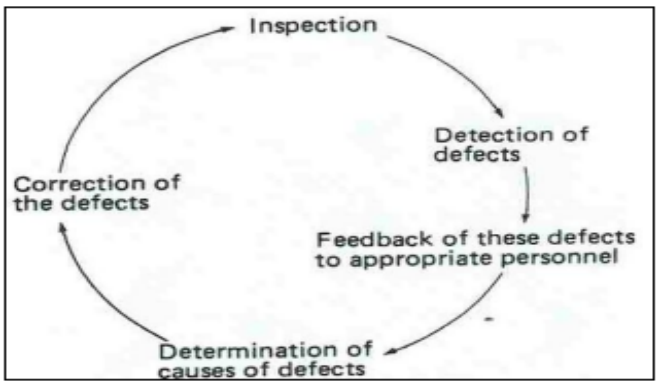

Figure3.3: inspection loop

Stages of measuring the Quality of the product on 4 steps:

1- Inspection of raw materials (fabrics & accessories)

2- Inspection of the fabrics after cutting

3- Inspection of the product during production

4- Inspection of the final product

3.2. Inspecting fabric and recording fault

Fabric inspection is usually done on fabric inspection machines. These machines are designed so that rolls of fabric can be mounted behind the inspection table under adequate light and rerolled as they leave the table. Defects in a fabric can be seen readily with these machines, as the inspector has a very good view of the fabric and the fabric does not need to be reversed to detect defects.

In trade relationships between sellers of fabrics and their customers, a system of defect analysis or defect grading must be agreed upon and in use. At the core of any grading system is simplicity and accuracy. The system must be clearly stated and easy to execute. Of various systems used worldwide, the "4-point and "10-point systems are the most common.

The actual method used in any relationship must be agreed upon by all parties as the standard. This discussion will cover these grading methods in a very fundamental manner, and these discussions should not be automatically adopted as a standard method. Various

world standards organizations such as ASTM should be referred to for an actual standard method.

Refers to inspection machine (that help the inspector to see clearly the fault or any defect on the fabric) folding and packing machine. Inspection of fabrics include:-

- Check machine is operated or process conducted properly
- Record inspection result and faults
- Inspected fabrics are graded according to the standard given
- Inspected fabric is folded and packed
- Work is assessed for compliance with quality

➢ The following aspects are assessed:

- Color
- Fabric faults
- Shading
- Length
- Usable width
- Fabric hand/handle
- Appearance
- Packaging
- Quantity

A Fabric Checker is a job-role in a Weaving department. The responsibility of a fabric checker is to check the fabrics produced so as to get quality output with minimum defects giving due importance to safety and environment aspects.

A Fabric Checker should have good eyesight, eye-hand coordination, motor skills and vision (including near vision, distance vision, color vision, peripheral vision, depth perception and ability to change focus).

3.3. Grading inspected fabrics

Fabric grading systems are used to provide the quantitative quality of fabric. Most commonly, there are two types of systems exist i.e. 4- point system and 10- point system. However, 2.5- point system and other grading system do exist as well. The 4- point grading system was designed by American Apparel Manufacturers Association (AAMA). Two types of faults are inspected in this grading system i.e. length wise faults and hole or opening. The grading points under 4- point system are provided in Table 1. Total defect points per 100 yard square are calculated using below equation. If fabric rolls contain less than 40 points

per 100 yard square are considered “A Grade” quality and as an acceptance criteria. If fabric rolls containing more than 40 points per 100 yards square are considered “B Grade”.

Table3.1: Defects point grading

Length of defect in fabric	Points
Up to 3 inch	1
Over 3 inch up to 6 inch	2
Over 6 inch up to 9 inch	3
Over 9 inch	4
Holes or opening	
1 or less	1
Over 1 inch	4

Example1: A fabric roll 120 yards long and 46 inch wide contains following defects.

Table3.2: Example of defect calculation given

Types of faults	Number of faults
Defects up to 3 inch	4
Defects from 3 to 6 inch length	3
Defects from 6 to 9 inch length	2
Defects over 9 inch length	1
Hole over 1 inch	1

Solution:

Calculate the number of fault points for each category.

Table3.3: Solution of calculation

Types of faults Number of faults Total points	Types of faults Number of faults Total points	Types of faults Number of faults Total points
Defects up to 3 inch length	4	4x1 points
Defects from 3 to 6 inch length	3	3x1 points
Defects from 6 to 9 inch length	2	2x1 points
Defect over 9 inch length	1	1x1 points
Hole over 1 inch	1	1x1 points

In the next step all the defect points are added to determine the total defect points.

Total defect points = 4 + 6 + 6 + 4 + 4

Total defect points = 24

Now, the Points/ 100 sq. yards are calculated as:

$$Points/\ 100\ sq.\ yards = \frac{defect\ points \times 3600}{Fabric\ length\ (yards) \times Width\ (inches)}$$

$$Points/\ 100\ sq.\ yards = \frac{24 \times 3600}{120 \times 46}$$

Points/ 100 sq. yards = 15.652 points

3.4. Packing inspected fabric

The main purpose of packing warehouses was the picking, checking, labeling and packing of goods for export fulfillment house and fulfillment center (in British English: fulfillment house and fulfillment center) are modern terms for a packing warehouse. The terms were coined in the middle of the 1990s, and "fulfillment center" is usually used about an in-house packing warehouse, while "fulfillment house" tends to be used about companies that specialize in warehousing and packing for others.

- Perform operation of packing machine according to the following procedure
- Start and stop machines; check machine maintenance records and clean as required
- Recognize, rectify and report faults or problems
- Recognize fault conditions
- Confirm compliance to operational specifications
- Maintain accurate records
- Sequence operations and meet specifications
- Carry out work according to OHS practices
- The importance of packaging
- The importance of packaging can be summarized as follows:
- Adequate packaging aids distribution.
- Rapid and reliable distribution helps reduce contamination
- allows the consumer more choice in the in textile products

Packaging and distribution reduce post-harvest losses; this together with a larger market allows producers to increase their income.

Functions of packaging

Packaging is a means of providing the correct environmental condition

A good package has to perform the following functions:

- It must keep the product clean and provide a barrier against dirt and other contaminants.
- It should prevent losses. Its design should provide protection and convenience in handling, during transport, distribution and marketing. In particular, the size, shape and weight of the packages must be considered.
- It must provide protection against physical and chemical damage (e.g. water and water vapor, oxidation, light) and insects and rodents.
- It must provide identification and instruction so that the product is used correctly and have sales fabric/apparel.

Benefits of packing:-

- Light and very strong
- High tear-resistant
- Moisture resistant
- Dirt and dust repellent
- Customized packaging textiles
- Variation in fabric construction or coating gives the opportunity

The reason for packing textiles is to protect it from damage. Similar ideas and methods apply when packing for storage or packing for shipping.

The kinds of damage you want to protect your pieces from suffering include: mechanical, dirt, fluids, light, chemical, molds, and insects. Mechanical damage of textiles involves cutting, creasing, tearing, snagging, and sagging.

Damage from dirt includes dust and any residues from body contact. Fluids are water, mostly, but also could be humidity and other liquids like oils and solvents. Light damage can be fading of dyes and fibre breakdown.

Chemical damage in this case results from contact with acid-bearing wood and paper products, as well as metal which can rust. Molds include mildew. Insect damage is a concern to all fibre lovers. There are a few general themes for packing textiles. Start clean and keep it clean. Prevent creasing. Keep it dark and dry. Don’t let it touch damaging surfaces. Watch for bugs and get rid of them. Put it in sturdy containers. Use breathable covers for long storage. Use water resistance covers for shipping.

Clean is pretty straightforward; clean it before packing and cover it from dust. This can also include keeping the textile dry and out of the light. Make sure it is completely dry before packing and store it in low humidity. For long term storage, covers and containers should be

breathable. Shipping involves other considerations and less permeable materials should be used.

Protection from damaging surfaces is less obvious. Wood and many paper products contain acids which, over time, can discolor and / or break down fibers in contact with them. Painting wood with water-base urethane or latex paint provides protection. Use acid-free paper products or use protective liners to prevent direct contact with the textile. Cloth covers should be washed unbleached cotton; old white cotton sheets work very well. Metal surfaces can rust or oxidize and stain textiles; again, use protective liners. Plastics are neutral inert surfaces.

There is lots of information on fiber-damaging insects and what to do about them. Isolate the infested or suspicious textile and kill the culprits by the method least harmful to the textile. Repeated deep freezing works pretty well. Mothballs are no longer considered to be very safe. Insecticides require a lot of caution. Inspect long term storage conditions regularly.

Containers for textiles need to protect from mechanical, chemical, and fluid damage. For shipping, sturdy cardboard boxes with plastic covers on the textile are fine. Plastic containers are very good for shipping. For longer storage of textiles, drawers that have been painted with urethane are best. Plastic containers can be used but textiles should be taken out and inspected and aired every so often. Cardboard containers must be lined with neutral materials.

Creasing results from folding textiles and can strain fibers causing them to weaken and eventually break. Keep small flat textiles (eg. runners, doilies) as flat as possible; if you need to fold them, pad the fold. Large or long flat textiles can be rolled and covered. Use a cloth covered rolling tube, and roll carefully without creases. Make sure the roll is large enough in both diameter and length. Tapestries and pile textiles are rolled face out, i.e with the back toward the roll. Textured textiles (e.g. beaded or embroidered) need padding between the layers whether folded or rolled.

Finished fabric/Garments require some special considerations. For long term storage, laying out flat puts little strain on seams and hanging parts, but folds must be padded to prevent creasing. Acid-free tissue paper rolls or fabric pads are best. Shipping a garment involves making it as compact as possible while keeping creasing to a minimum, and protecting it from mechanical and fluid damage. Plastic tote boxes, cotton cloth covers and pads, or zippered sweater bags in sturdy cardboard boxes are some methods. If your garment is

going to be unpacked and repacked, include specific and clear instructions with photos or diagrams to ensure it is done right.

Three-dimensional objects need special packing for shipping, especially if they are fragile. Framed pieces should be covered with bubble pack, then packed in a box large enough to include packing materials on all sides. Irregularly shaped pieces should be packed in such a way that extending bits are supported and the object cannot shift within the packing materials. Bubble pack envelopes are good for tiny objects. Styrofoam chips are good packing material, but if possible, contain them inside plastic bags.

3.5. Assessing work quality

The main Quality basics: 4 quality basics can be considered as below:

1- Quality is fulfilling Customer requirements
2- Quality is preventing defects & mistakes not only detecting defects
3- Quality is the methodology to reach Zero defect
4- Quality can be measured by reducing cost, which means the cost happened from defected products, & the cost of repairing these defected products to fulfill customer requirements

Economic quality

The quality can be measured by the quality cost, in some cases this cost reached 20% of sales products, & this cost considered a good chance for improvement if company management applied quality methodology in all production sectors to increase profitability, quality cost not only limited to production areas, but also includes all other areas, accounting, marketing, product designing, purchasing, & the factory management should put many efforts to control quality cost, quality cost can be classified as: correcting & preventing defects, internal failure, & external failure.

Quality in home textiles

Quality in simple definitions is fulfill customer requirements, & if the product fulfilled customer needs, then it can be considered high quality product, quality in textiles depends on the quality level of planning of the factory, control of the product in all production process form preliminary sample, planning, cutting, production, reaching final product, & inspection of the final product, quality of the final product can be anticipated form the quality of production processes, as there should be no defects in the final products if all production processed run on the proposed quality levels.

The meaning of production processes is all the processes which the product go through till reaching the final product with in the factory form fabric till final product through different kind of processes such as cutting, sewing, ironing & packaging.

- The new quality system classified as:

First: the quality of Design:

This is a revision that the designed products can fulfill customer requirements & client expectations form the product, this is the job of research & development departments & market research

Second: quality of product conformance:

This is the level of conformity of the final product to product design as per customer needs before production starts, that means the final product should fulfill all product specifications received from the customer

Third: Quality of performance:

This defines quality of designing, quality of product specifications, & classified as:

1- Online quality control which take care of production & product specification & Design& include production quality control & the quality of marker & Pattern

2- Off line quality control which include designing the product as per customer requirements & designing & developing production processes to achieve planned products characteristics

Stages of measuring the Quality of the product on 4 steps:

1- Inspection of raw materials (fabrics & accessories)

2- Inspection of the fabrics after cutting

3- Inspection of the product during production

4- Inspection of the final product

This inspection stages divided final inspection to 4 steps, which can find the defects at every stage & avoiding this defect in the final inspection stage, & thus the production become faster & better in its quality.

Estimated defects are as below:

First: Inspection of raw materials (fabrics & accessories)

In this stage we inspect the following items:

- Color Degree in the raw materials
- Selvage alignments & selvages defects
- Holes & cuts in the main Fabrics
- Yellowish of white Fabrics & accessories

- Number of defects in Fabric & accessories
- Weaving defects in fabrics
- Dying defects (leveling & uneven defects)
- Fabrics skewness or Spirality
- Any other defects in the fabric & accessories

Second: inspection of raw material after Cutting process:

In this stage we inspect the following items:

- Color Degree of fabric after cutting
- Selvage alignments & selvages defects after cutting
- Yellowish of white Fabrics & accessories
- Number of defects in Fabric & accessories
- Weaving defects & cutting defect of the fabrics
- Fabrics Spirality after cutting, & affecting of cutting on Spirality
- Cutting defects of fabric after cutting
- Foreign materials or oils after cutting
- Any other cutting defects

Third: product inspection after sewing:

In this stage we inspect the following items:

I. Human defects:

- Uneven stitching
- Double stitching
- Wavy stitching
- Irregular stitching, or Unmatched join stitching
- Loose stitching
- Over stitching
- Bar tack defects
- Missing stitch
- Uneven seam length

I. Fabrics defects:

- Weaving faults-(Neps)
- Weaving faults-(Slub)
- Weaving faults- Broken yarn- Missed yarn
- Weaving faults- Thick place - Thin places
- Weaving defects double yarns

3- Third: inspection of product after sewing - Human defects:

- Wavy stitching
- Double stitch
- Uneven stitch
- Loose stitch
- Irregular stitch
- Rejected stitching
- Unmatched join stitch - Spinning & Weaving defects
- Weaving faults broken yarn
- Weaving faults missing yarn
- Neps, thick places, thin places

Fourth: Final product

- Dirt & dust
- Oils & grease
- Product pollution form uncleaned floors
- Untrimmed threads
- Rust (from different sources)
- Product do matching planned design
- Wrong size
- Wrong measurements

Fifth: Final product after packaging

- Wrong barcode
- Wrong product size inside the carton
- Wrong product inside the carton
- Bad Packaging (defected carton)

- Wrong product distribution inside the carton

Examination of fabric should only occur after testing, as products that fail tests will need to be rejected or reprocessed before they are inspected. Examination should be carried out at a speed that is slow enough to enable examiners to highlight faults:

- Running at speeds too high for correct inspection will lead to more fabric being rejected by the customer.
- Examiners require frequent breaks to allow their eyes to rest, as overworked examiners often make mistakes and release poor fabric.

In general it is best to have the fabric examination tables with standard lighting and a back light. It is recommended that swatches are taken from each fabric roll for assessment of colour.

Fault labeling is very helpful for garment makers and there are some automatic systems that create an electronic ‘fault map’ and produce cutting plans with minimal wastage.

The examination and testing departments are crucial to continuous improvement programmes, and record keeping and data analysis is very important.

For Textile dyed and laundered garments samples should be examined and records kept to ensure continuity of colour and appearance.

Automatic examination systems are available that use cameras and image analyzers to detect faults. They must be trained to identify faults so are suitable for very long runs of the same fabric quality.

Self-check-3:

Instruction1: fill the answer for the given blank. You have given 1 Minute for each question. Each question carries 2 Points.

1. ---------- is the determination process of the location, type and size of the defects found on the fabric surface.
2. ---------- **is** fulfill customer requirements, & if the product fulfilled customer needs

Instruction2: write the answer for the given question. You are provided 5 minute for each question and each point has 4 Points.

1. List and discuss main Quality basics.
2. Describe new quality system by their classification.
3. Discuss Stages of measuring the Quality of the product.
4. Describe benefits of packing.

Note: Satisfactory rating – above 20% Unsatisfactory - below 20%

You can ask you teacher for the copy of the correct answers

Unit Four: Dispatch completed work

This unit to provide you the necessary information regarding the following content coverage and topics:

- Checking packed textile / garment products
- Recording and reporting faults
- Directing completed products
- Completing work documentation

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Check textile / garment packed products against specifications and labels
- Record and report any identified faults
- Direct completed products for dispatch
- Complete work documentation as required

4.1. Checking packed textile fabric/ garment products

- Recognize non-conformances
- Maintain quality requirements for each
- Stage of the process

4.2. Recording and reporting faults

Product fault should be identified, recorded properly maintain accurate records and should be reported to the concerned body.

To avoid the defects found in the final product & to detect these defects at the time & place of occurring some forms for inspection in all factory in different production departments to control & register different kind of defects which affecting the final products 4 forms to control products defects:

- Receiving of raw materials
- Inspection of the material before cutting
- Inspection of the Fabric after cutting
- Inspection after sewing & production
- Inspection of final product after Packaging

4.3. Directing completed products

✍ The simple steps involved in making quality inspection reports

- Design quality inspection format(s)
- Record quality inspection data while inspecting goods - online or off the line
- Analyse data and make a summary of the reports

Making an Inspection Report:

First, define what is the purpose of making a quality inspection report in your factory. Then according to the information required you have to design inspection format. For your information, common quality measures are Percentage Defective of fabric in a production lot.

1. Do you like to know how much defective fabric/garments are made in the last production day? Use the simple method -1.

Simple Method - 1:

To measure percentage defectives of a fabric/garment lot you need to follow the below procedure. A sample format is shown in the following for data collection.

Your objective of fabric/garment inspection might be one of the followings. Method of making inspection report explained accordingly.

- Employ one quality checker at the end of the line (at the end of the process).
- Checker needs to check 100% textiles coming out from the line.
- Record total number of pieces checked by the checker during the day
- Record total defective (including rejected fabric) garments kept aside while checking fabric/ garment

  Calculate percentage defective fabric in the production lot.

  Defective Percentage = Number of defective garments X 100

  Number of total garments checked)

If fabric is cut without being inspected, complete responsibility will be on fabric quality inspection department as it is a violation of a critical aspect. Reports are submitted to buyers & the relevant merchandiser.

Fabric Inspection Report

Purpose: To decide acceptance or rejections of fabric roll (For Woven). Fabric inspection is done using 4-point system. Inspection procedure has been explained in the following.

Activity

Requirement

1. Select rolls: Roll to be chosen at random
2. Check the roll as per 4 points system.
3. Give penalty points for defects
4. Calculate index for each individual roll.

Points / 100 sq. yd. = (Total points in roll * 36 * 100)

(Total length in yards * width in inches)

5. Calculate final average index for the total no. of rolls inspected.
6. Decide acceptance or reject of the fabric

Penalty Point Evaluation

Defects in both the warp and weft directions for woven and course/wale directions for knits are assigned point using the following criteria:

Points Inches (”) (mm)

Defects	Points in inches (”) (mm)
up to 3 inches (Up to 75mm)	1
> 3 inches < 6 inches (75mm< 150mm)	2
> 6 inches < 9 inches (> 150mm< 230mm)	3
> 9 inches (> 230mm)	4

✍ Other important parameters to be considered during fabric inspection are -

I. Length of the faults is to be measured in the warp or weft direction and the direction in which the fault is longest is the fault direction. However when the warp and weft length are same and when the penalty of the shorter direction is heavier, take the fault of the direction in which the penalty is heavier.

II. When the fault in the warp direction is over 1yd, the part which is over 1yd is deemed as fault of the same kind of others.

III. When two or more faults overlap, apply only the faults which penalty is the heavier.

IV. When there are two or more faults within the length of 1yd and the penalty points come over 4 points, the points over 4 points are not added.

V. The inspector needs to be at a distance of 3 feet away from the inspection table and the linear speed of inspection not to be less than 0.1 meters per second when inspection is done on fabric inspection machine.

Standards for Passing Fabric

- Average index for inspected rolls not to exceed 28 points / 100yd²
- Maximum index for any roll not to exceed 40 points / 100yd²

4.4. Completing work documentation

General information

1. Manufacturer’s details

Name of manufacturer: ……..

Corporate address of manufacturer: …….

Inspected site: ……

To complete the document of inspection the following activities primarily completed:

- Finished product is packaged, protected and stored, in accordance with workplace procedures
- Workplace documentation is completed in accordance with procedures
- Waste and scrap are collected for disposal/recycling in accordance with workplace procedures
- Tools and equipment used are cleaned, inspected for serviceability and stored in accordance with workplace procedures
- Equipment is maintained and work area is cleaned in accordance with workplace procedures

Folding and Inspection

Faults Following are the faults normally inspected during folding:

- **Miss pick:** This is caused when weft stop motion does not work
- **Miss end:** These faults occurs when warp stop motion does not work
- **Double pick:** When the faulty pick is not removed and worker restarts the machine then this happen.
- **Half pick**: When the pick is broken and not removed by the worker and machine is started.
- **Reed marks**: If the dent of the reed is not properly aligned then reed will leave mark during beating up.
- **Sizing spot:** These are the brown spots which cannot be removed
- **Loose selvedges:** These are caused due to tension variation.

There is a proper folding department who is responsible for folding and inspection. The fabric from the loom directly brings in this department. The fabric overlapped on rollers then it is checked properly and divided into 3 classes. Inspection process consists of points system:

A grade: defects points from 72 yards - so on

B grade: defects points from 36 -72 yards

Cut piece: defects points from 1-9 yards

After performing any activity of packing we have to keep our record and documentation .Finally it is important to report the recorded data to the concerned body or supervisor.

Self-check-4

Instruction1: give short answer for each given questions. You have given 1 Minute for each question. Each question carries 2 Point.

1. Miss pick
2. Miss end
3. Double pick
4. Half pick
5. Reed marks
6. Sizing spot

7. Loose selvedges
8. Cut piece

Instruction2: Write short answer for the given question. You are provided 5 minute for each question and each point has 5 Points.

1. Describe checking packed textile fabric/ garment products.
2. Describe activities primarily completed to complete the document of inspection.
3. What are the simple steps involved in making quality inspection reports?
4. Explain method of making inspection report.

Note: Satisfactory rating – above 30% Unsatisfactory - below 30%

You can ask you teacher for the copy of the correct answers

Operation sheet-1

Operation Title: inspection of fabric defect

Purpose: To decide acceptance or rejections of fabric roll (For Woven). Fabric inspection is done using 4-point system

Instruction: perform inspection in the given steps to evaluate the defects of the finished fabric.

Equipment, Tools &Fabric:

Fabric, Cutting tools, meter, safety tools like eye glass, counter instrument

Operation procedures:

1. Select rolls: Roll to be chosen at random
2. Check the roll as per 4 points system.
3. Give penalty points for defects

4. Calculate index for each individual roll.
5. Calculate final average index for the total no. of rolls inspected.
6. Decide acceptance or reject of the fabric

Penalty Point Evaluation:

Defects in both the warp and weft directions for woven and course/wale directions for knits are assigned point using the following criteria:

Defects	**Points in inches (”) (mm)**
up to 3 inches (Up to 75mm)	1
> 3 inches < 6 inches (75mm< 150mm)	2
> 6 inches < 9 inches (> 150mm< 230mm)	3
> 9 inches (> 230mm)	4

LAP Test-1

1. Evaluate the defect according to the standard.
2. Decide acceptance or rejections of fabric roll For woven or knitted fabric.

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3. Abdel Salam MALEK, Online Fabric Inspection by Image Processing Technology
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