TRAINING MODULE OF GARMENT IN-LINE CHECKER AND SEWING MACHINE OPERATOR

A dissertation submitted in partial Fulfillment of
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Submitted By

ANIRBAN SIKDER
RASIKA IYER

Under the Guidance of

MR TS PRAKASH
MR NITIN SALVE

Department of Fashion Technology
National Institute of Fashion Technology,
(Mumbai)
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Introduction:

The Textiles and apparel Sector has the second largest industry of India.The domestic textile and apparel industry in India is estimated to reach USD 100 Billion by 2016-17 from USD 67 Billion in 2013-14.Exports in textiles and apparel from India are expected to increase to USD 65 Billion by 2016-17 from USD 40 Billion in 2013-14. (Make in India , INVESTOR FACILITATION CELL)

It has the second largest share of employment after agriculture.Abundant availability of raw materials such as cotton, wool, silk and jute as well as cheap workforce have made the country a sourcing hub.With over 45 Million people, employed directly and indirectly, the industry is one of the largest sources of employment generation in the country. With technological modernization being the key to high industrial growth, labour intensive industries like textiles and apparel require not only skilled workforce, but also massive vocational training for skill upgradation of the workers engaged in the organized as well as unorganized sectors.

Despite the large pool of labor force in India, the country needs to work hard to meet the rising global demands. This is because as much there is availability of labor force, that much there is also a deficit of 'skilled labor'. Indian textile industry is facing a crippling shortage of skilled employees which is a threat to the economic growth of the country.

The number of skilled workers comprises approximately around 5% of the total work force. Moreover, many of them are without any professional skills. This is because; the general education system of the country is not oriented towards vocational skills.

The major drawback of India's work force is that, more than 70% of the labors are either illiterate, or educated below primary level. (Fibre2fashion.com, 2012)Due to this, they are not able to explore their job opportunities, or, are unaware of ways to improve their existing skills.

To overcome these problems and complete with countries like China, Bangladesh, Pakistan, Vietnam etc who's labor rate is less than India ;India needs to develop an structured and certified training system to develop the manpower resources to skilled manpower resources.

Providing appropriate education for everyone, and fostering of vocational education and training would nurture skilled manpower. Skilled labors generated out of the training program will enable the textile industry to improve its efficiency, quality and ultimately increase its output. Training the local inhabitants in textile manufacturing would also help to generate employment opportunities in the rural areas.

Developing a training program with new advanced technology and IT facilities will boost the way of typical training process which would have been followed till date.

A multimedia and online training system will be shorter in time and structured than the conventional system. These will also allow they trainee to go through the content in its audio visual form again and again from any accessible place. Moreover it will serve as an effective tool to fill in the need and supply gap and thus will achieve the two fold objectives of providing skilled labor to textile and garment industry as well as gainful employment to rural youth and hence, transforming the economic and socio-cultural livelihood of the trainees.

Need of the Project:

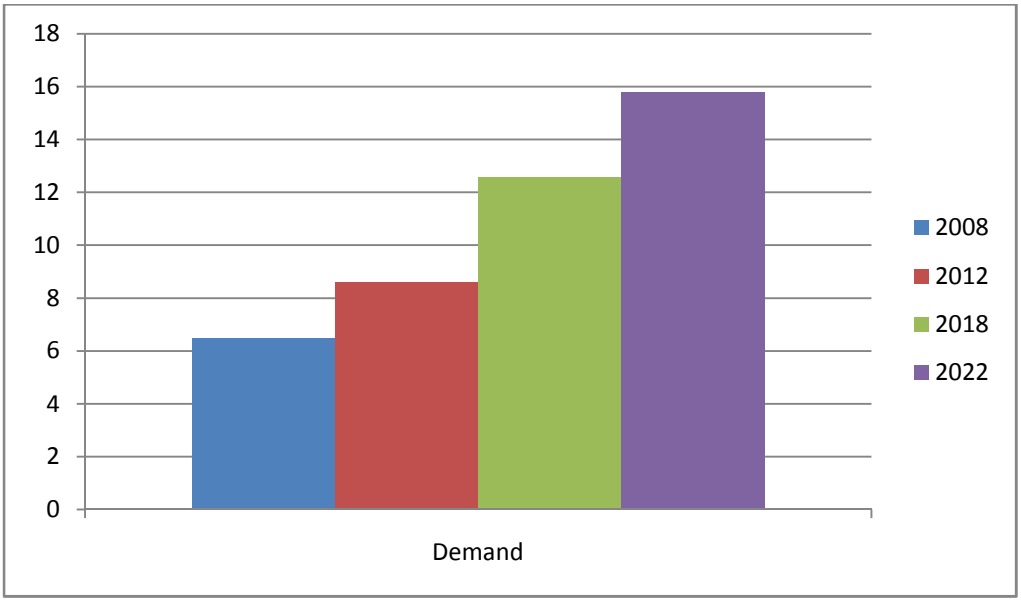
Training for skills learning and enhancement provides an opportunity and broad structure forthe development of human resources, technical and behavioral skills in an organization. Foran Apparel Industry, training and learning skills helps to compete in the global market and inincreasing productivity of the employees that will help further to achieve its long-term goal.

As per the NSDC report, the overall employment in the sector would increase from about 33 to 35 million in 2008 to about 60 to 62 million by 2022. This would translate to an incremental human resource requirement of about 25 million persons. Of this the Mainstream T&C sector has the potential to employ about 17 million persons incrementally till 2022.

Around 39% of India's Textile Export is shared by Ready made garment Sector.Alok industries has estimated that the potential size of Indian textile Industry in 2020 will be approx US $200 Billion.

Big companies around the world are export/setting up their factories in India because of available resource and cheap labor. In fact India shares 11% of world's total manpower in Textile and Apparel Sector. Though the quality never have been up to the mark. Companies prefer fresher operators for less labor charge, but the lack of training and skill causes the quality to degrade.

According to the study done by National Skill Development Corporation along with IMaCS , there is a requirement of 15.8 million workforce in Garment Sector by 2022,among which 7.48 million labor/workforce required for production,in quality/garment checking department is around 0.37 million. (NSDC India, 2013). This huge requirement can only be fulfilled by a fresh workforce with proper training.



The major centers in India where this employment generation would take place are Tamil Nadu, West Bengal, Karnataka, Maharashtra, and Gujarat. The state of Tamil Nadu will account for around 30% of the employment in the textile sector. (NSDC India, 2013)

So this huge number of workforce is required to be trained according to the QP NOS structured by NSDC to fulfill the skill gap in different sector.

To fill up this gap a proper training module with latest development and according to the criteria given by QP NOS is need to be developed. An Audio/Video interaction will be more of an assistance to train the workforce in more advanced way.

Estimated Benefits of The Project

1. To the industry-
   - More skilled workers
   - More productivity
   - Less cost of quality
2. To the end user
   - Government certification
   - More employment opportunities
   - Higher salaries
3. To IL&FS
   - More credibility of courses

Title of the Project:

Training Module of Sewing Machine Operator and Garment In-line Checker withits online Implementation.

Objective of the Project:

- To modify and develop a training module for In-line Garment Checker and Sewing Machine Operator.
    - Develop it according NSDC- QP NOS
    - To develop a Audio Video Training Module
    - Implementing the training module in Online training portal
    - Making an offline version of the same

Review of Literature:

History of Training:

With the onset of the Industrial Age, the training of the unskilled underwent a dramatic transformation in which vocational education and training emerged to replace the traditional apprentice system. The division of labor in an industrial factory resulted in specific job tasks that required equally specific training in a much shorter time span. As training activities grew more methodical and focused, the first recognizable modern training methods began to develop during the 19th and early 20th centuries: gaming simulations became an important tool in the Prussian military during the early 1800s and psychodrama and role playing were developed by Dr. J. L. Moreno of Vienna, Austria, in 1910.

The early 20th century witnessed the emergence of training and development as a profession, resulting in the creation of training associations and societies, the advent of the assembly line requiring greater specificity in training, and the dramatic training requirements of the world wars. Important groups forming during this period include the American Management Association in 1923 (which began as the National Association of Corporation Schools in 1913), and the National Management Association in 1956 (which began as the National Association of Foremenin 1925).

The enormous production needs of the World War I and II created a heavy influx of new workers with little or no industrial education or skills to the workplace, thereby necessitating massive training efforts that were at once fast and effective. Heavy demands were placed on foremen and supervisors, and the training within industry (TWI) service was formed to train supervisors as instructors. Job instruction training (JIT) was employed to train defense-plant supervisors in instructing new employees in necessary job skills as quickly as possible. Other programs included job relations training (JRT), job methods training (JMT), and job safety training (JST). During this time, the American Society for Training and Development (ASTD) was formed.

The 1960s witnessed an explosion of training methods as the number of corporations using assessment centers increased from one to 100 by the end of the decade. Government programs to train young men for industrial jobs, such as the Job Development Program 1965 and the Job Corps, were initiated to improve the conditions of the economically disadvantaged. By the 1970s a new sense of professionalism emerged in the training community. Training programs grew dramatically, and the ASTD produced the Professional Development Manual for Trainers.

In India vocational courses/ Training was started in 1976-77 under the program of Vocationalisation of Higher Secondary Education in general education institutions. The National Working Group on Vocationalisation of Education (Kulandaiswamy Committee, 1985) reviewed the Vocational Education Program in the country and developed guidelines for the expansion of the program.

Training & It's Benefits:

The availability of technical growth in the industry which still lacks the support in the form of skilled man power. Training in readymade garment industry must be practical and directly related to the needs of the enterprise. It must be flexible and must result in a change of behaviour so that job is better performed. The benefits of training reflects in the figures on export sales and profitability, better motivated and skilled staff will provide a higher quality service to customers, develop existing markets. Training is a long term investment in human resources. Although there are direct effects on individual participants, the major impact of training is cumulative, and enterprises should not seek results over a short period. (Region, 2006)

Benefits of training:

1. It improves skills 2. It increases morale 3. It enhances better export performance 4. It increases reputation 5. It improves job applications 6. It provides possible financial support .

(Singh, 2002)stressed the fact that though garment manufacturing is a work of art and skill,the industry is full of unskilled and non – artistic workers and no n professionals. Thecommercialization of the occupation handed the art to unskilled people, but the industry isnot paying any attention to this.

(Jatinder, 2009)Currently, there is a massive gap between the availability of skilledmanpower and the requirements of the industry, particularly in the weaving, dying,processing and garment segments. To bridge this gap requires massive expansion andmodernization of training institutes/polytechnics across the country.

(Dr. Rajesh Bheda and Vinod Shanbhag, 1999)Conducted a study on technological upgradation needs of readymade garment industry for the increase in production andimprovement in work culture. The study focused on adaptation of technology in domesticmarket apparel manufacturing factories to the export apparel manufacturing Industry. Thissupports the need of training for improvement.

(Sripiraba B, Sridevi K , 2010)Revealed that the training practices were effective anddemonstrated how training could be made effective. New methods could be adoptedconsidering the trainees feedback and innovative methods could be launched. A theoreticalmodel was proposed that explored the relationship between training design, trainingimplementation and training evaluation.Analysis comprised of descriptive statistics, oneway analysis of variance, and correlation analysis and model validation.

Apparel industry is labour intensive employing labour from all classes of the society formanufacturing of various readymade garment products, which a work of skill. Textileeducation is imparted at various levels through more than 200 institutes or training centers inthe country (Neelam Agrawal Srivastava, Anandita Chatterjii, January 2014)

For an Apparel Industry, training and learning skills helps to compete in the global market and in increasing productivity of the employees that will help further to achieve its long-term goal. The first and immediate impact of training should be on the ability of participants to do their jobs (Hiba, JC, ILO, GENEVA, 1998).

Education System VS Training and Development:

Training and education are both different facets of learning.Training is not education. Education is generally measured by tenure: you spent a day in the seminar or four years in college. Training, on the other hand, is measured by what you can do when you've completed it.

Training is undertaken in the hopes of gaining a specific skill. Generally this skill will make one more employable.
Education is undertaken in the hopes of furthering one's individual knowledge and developing y intellect. While a highly educated person is often more employable, education is not about getting a job. Training is usually done through specialized courses and textbooks. The learning can often be done by rote and textbooks are very prescriptive. While independent thinking at a micro level is encouraged, revolutionary innovation is often looked down on. Training generally comes in a course; when the course is completed, the training is done.

Education is a lifelong process. Most educational learning is done through real books, rather than textbooks. The learner is encouraged to think and write about what he is reading. Any point is open to discussion and the only right answers are those that can be found in the text. Education focuses on creating lifelong independent thinkers whereas training focuses on skills sought after by employers. Training has its roots in the guild system while education's origins lie in universities. Training uses textbooks and prescriptive methods. In today's universities highly specialized areas of training are being passed off as education. Training requires drill, repetition, and constant feedback.

Different Types of education System:

1.Technology-Based Learning

The forms of training with technology are unlimited. A trainer also gets more of the learner''s involvement than in any other environment and trainees have the benefit of learning at their own pace.

2. Simulators

Simulators are used to imitate real work experiences.Most simulators are very expensive but for certain jobs, like learning to fly a 747, they are indispensable.

3. On-The-Job Training

Jumping right into work from day one can sometimes be the most effective type of training. On-the-job training gives employees motivation to start the job. Some reports indicate that people learn more efficiently if they learn hands-on, rather than listening to an instructor. However, this method might not be for everyone, as it could be very stressful.

4. Coaching/Mentoring

Coaching/mentoring gives employees a chance to receive training one-on-one from an experienced professional. This usually takes place after another more formal process has taken place to expand on what trainees have already learned.Coaching/mentoring gives trainees the chance to ask questions and receive thorough and honest answers - something they might not receive in a classroom with a group of people.

5. Lectures

Lectures usually take place in a classroom-format.It seems the only advantage to a lecture is the ability to get a huge amount of information to a lot of people in a short amount of time. It has been said to be the least effective of all training methods. In many cases, lectures contain no form of interaction from the trainer to the trainee and can be quite boring. Studies show that people only retain 20 percent of what they are taught in a lecture.

6. Group Discussions & Tutorials

These most likely take place in a classroom where a group of people discuss issues.A better form of training than lectures, it allows all trainees to discuss issues concerning the new program. It also enables every attendee to voice different ideas and bounce them off one another.

7. Role Playing

Role playing allows employees to act out issues that could occur in the workplace. Key skills often touched upon are negotiating and teamwork.A role play could take place between two people simulating an issue that could arise in the workplace. This could occur with a group of people split into pairs, or whereby two people role play in front of the classroom.Role playing can be effective in connecting theory and practice, but may not be popular with people who don´t feel comfortable performing in front of a group of people.

8. Management Games

Management games simulate real-life issues faced in the workplace. They attract all types of trainees including active, practical and reflective employees.

9. Outdoor Training

A nice break from regular classroom or computer-based training, the usual purpose of outdoor training is to develop teamwork skills.

Outgoing and active participants may get the most out of this form of training. One risk trainers might encounter is distraction, or people who don´t like outdoor activities.

10. Films & Videos

Films and videos can be used on their own or in conjunction with other training methods.

To be truly effective, training films and videos should be geared towards a specific objective. Only if they are produced effectively, will they keep the trainees attention. They are also effective in stimulating discussion on specific issues after the film or video is finished.

Films and videos are good training tools, but have some of the same disadvantages as a lecture - i.e., no interaction from the trainees.

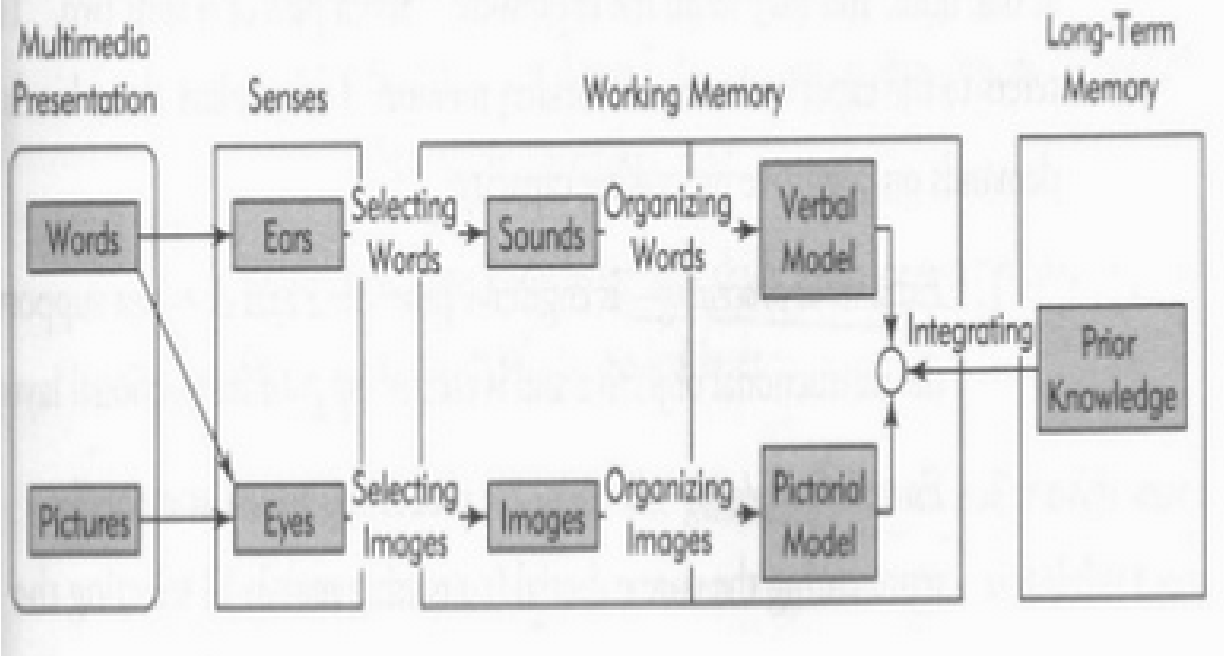
A few risks to think about - showing a film or video from an outside source may not touch on issues directly affecting a specific company. Trainees may find the information very interesting but irrelevant to their position in the company.

11. Case Studies

Case studies provide trainees with a chance to analyze and discuss real workplace issues. They develop analytical and problem-solving skills, and provide practical illustrations of principle or theory. They can also build a strong sense of teamwork as teams struggle together to make sense of a case.

Importance of video based training

- Video can be utilized to illustrate how something works
- Video is better at maintaining the attention of the students
- Video can show real live examples and simulations
- Videos can also be used to provide additional support to students
- Videos are easier to access
- It suits various types of content



5 Steps to make video content

- Rationale for using video
- Plan,strategize and design
- Develop and publish
- Technical aspects
- Evaluate and update

Importance of Skill development

Skills and knowledge are the driving forces of economic growth and social development of any country. The economy becomes more productive, innovative and competitive through

the existence of more skilled human potential. The level of employment, its composition and the growth in employment opportunities are the critical indicator of the process of development in any economy. Increasing pace of globalization and technological changes provide both challenges and growing opportunities for economic expansion and job creation. In taking advantage of these opportunities as well as in minimizing the social costs and dislocation, which the transition to a more open economy entails, the level and quality of skills that a nation possess are becoming critical factors. Countries with higher and better levels of skills adjust more effectively to the challenges and opportunities of globalization.

Despite the fact that India is a fast developing economy, difficulties have led the Government to conclude that far more needs to be done to engender more employment opportunities for the majority of Indians, to enable them to participate in the benefits of growth and to contribute to that growth. To do this they must have education and training that equips them for the labor market. One of the sources of the skilled workforce is the vocational education and training system. However, the government realizes that the system is not being able to appropriately respond to the needs of the labor market. On the one hand India faces the future with its changing realities, on the other hand it must deal with the nature of its established traditions and structures. In a globalized economy, a large pool of skilled workers is indispensable for attracting foreign direct investment. Developing skilled workers enhances the efficiency and flexibility of the labor market; skills bottlenecks are reduced, skilled workers are more easily absorbed into the economy, and their job mobility is improved.

The Labor Market Context and Supply of Skills

Largely because of the growth in factor productivity, India's economy has grown rapidly over the past decade. Continuing to raise labor productivity while at the same time generating enough jobs for a growing labor force is proving a massive challenge. This issue has come into sharp focus over the previous decade when economic growth accelerated but employment growth fell to less than half that of the 1980s, raising fears that India is witnessing jobless growth. Education and skill acquisition are important determinants of firm productivity. The wages of workers with qualifications beyond primary school have grown far more rapidly than those of workers with primary school or less; the greatest increases being for workers with tertiary qualifications. This movement in wages shows that

education and skill acquisition are important determinants of job prospects. (commission, 2006)

Skill Development based on Modular Employable Skills (MES)

The key features of the new frame work for skill development are: › Demand driven Short term training courses based on modular employable skills decided in consultation with Industry › Flexible delivery mechanism (part time, weekends, full time) › Different levels of programmes (Foundation level as well as skill upgradation) to meet demands of various target groups › Training to be provided by Vocational Training (VT) Providers under the Govt., Private Sector and Industrial establishments. › Optimum utilisation of existing infrastructure to make training cost effective. › Testing of skills of trainees by independent assessing bodies who would not be involved in conduct of the training programme, to ensure that it is done impartially. › Testing & certification of prior learning (skills of persons acquired informally) › The essence of the scheme is in the certification that will be nationally recognised by both the government agencies and industry/trade organisations. The Short Term courses would be based on 'Modular Employable Skills (MES)'.

Benefits of the MES For the Individuals

- Better employability & mobility
- Higher productivity, wages and less exploitation
- Identity, improved social status & Pride
- Easier to get loans for self-employment from various financial institutions For the Employers • Improved Quality & Productivity
- Less downtime
- Compliance with Quality Assurance systems like ISO
- Availability of skilled workforce helps in getting export orders For the Society & the country
- Reduction in poverty
- Social harmony & peace
- Higher GDP

Curriculum Development Process Following procedure is used for developing course curricula

• Identification of Employable Skills set in a sector based on division of work in the labour market.

• Development of training modules corresponding to skills set identified so as to provide training for specific & fit for purpose

• Organisation of modules into a Course Matrix indicating vertical and horizontal mobility. The course matrix depicts pictorially relation among various modules, prerequisites for higher level modules and how one can progress from one level to another.

• Development of detailed curriculum and vetting by a trade/ expert committee Report of the Working Group on Skill Development and Training set up for preparation

Duration of the Programmes Time taken to gain the qualification will vary according to the pathway taken and will be kept very flexible for persons with different background and experience. Normal duration statements may appear in training programmes which may be based on the content and requirements of a MES module.(commission, 2006)

The newest development by NSDC for SMO is the Qualification Pack which contains various NOS to be fulfilled. Each NOS contains PCs, Knowledge criteria and soft skills.

Designing Training Programs

The design of training programs covers the planning and creation of training and development programs. Instructional systems design includes the systematic design and development of instructional methods and materials to facilitate the process of training and development and ensure that training programs are necessary, valid, and effective. Although the instructional design process can take on variety of sequences, the process must include the collection of data on the tasks or skills to be learned or improved, the analysis of these skills and tasks, the development of methods and materials, delivery of the program, and finally the evaluation of the training's effectiveness.

Apparel Quality inspection Procedure In-line Checker:

Visual examination or review of raw materials, partially finished components of garments and completely finished garments in relation to some standards, specification or

requirements as well as measuring garments to check if they meet the required measurements.

To control quality of garments checking should be done:

- Fabric
- Sewing thread
- Button
- Stitch
- Zipper
- Cut panels
- Assembly
- Garment Size etc , according to the required standards and specification.

In process Inspection:

It is the inspection procedure done before,during and after the sewing of the garment.

- Before sewing: Inspection in
    - Marker Making
    - Fabric spreading
    - Fabric cutting
    - Sorting and bundling
- During Sewing:In line checking:
    - Fabric sewing
    - Seam defects

- Assembly Defects

- After Sewing:
  - Pressing defects
  - Finishing and Packaging Defects

AQL – Accepted quality level,the Random Sampling Inspection:

Acceptance Quality Level (AQL) refers to the maximum number of defective items that could be considered accepted during the random sampling of and inspection.The AQL random sampling inspection was derived from the mathematical theory of probability and is based on the sampling scheme defined in military standard 105D (MIL -STD - 105D). This method constitutes taking random sample from a lot of merchandise, inspecting them and depending on the quality of the sample inspected, determining whether the entire lot is acceptable or not. The MIL - STD - 105D (also BS 6001, ISO 2859, DIN 40080) provides the sampling plans; and these determine the number of samples of be inspected in lot size, in addition to indicating and the acceptable quality level (AQL) which represents the maximum number of defects per hundred units that, for the purpose of the sampling inspection can be considered satisfactory as a process average.

The defects that are found during inspection are classified into 3 categories:

1. Critical: Must be 1. There is no range.
2. Major: Normally 2.5
3. Minor: Normally 4

Sampling Method:

1. Single Sampling method:

   Normal inspection:

   Assurance an AQL of 2.5 % and a lot size of 1200 garments and the sample size is 80 garments. If the number of defective garments found is 5 the total lot is "Acceptable" suppose if the defective garments found is 6, the total lot is "Reject/ Re-Check".

2. Double Sampling method

   Normal Inspection:

   Assurance an AQL 4.0% and a lot size is 1200 garments and the sample size is 80 garments. If the Number of defective garments found is 7, the total lot is "Acceptable" suppose if the defective garments found is 8 the total lot is "Reject/ Re-Check".

(Raaz, 2013)

NSDC QP NOS Pack:

The National Skill Development Corporation India aims to promote skill development by catalyzing creation of large, quality, for-profit vocational institutions. Its mission is to Upgrade skills to international standards through significant industry involvement and develop necessary frameworks for standards, curriculum and quality assurance

NSDC seeks to fill the gap between the growing demand for, and the scarce supply of, skilled personnel across sectors by setting up Qualification Pack(QP) and National Occupational Standards (NOS).Each QP can have several NOS and each NOS has PC-Performance Criteria , K-Knowledge and Understanding, S- Skills

QP NOS For Garment In-Line Checker:

1. AMH/N0105 Carry out in-line checking activities

2. AMH/N0106 Maintain work area and tools

3. AMH/N0103 Maintain health, safety and security at workplace
4. AMH/N0104 Comply with industry, regulatory and organisational Requirements.

(NSDC QP NOS In_Line Checker, 2014)

Job Roles of SMO-Sewing Machine Operator:

A SMO operates sewing machines to perform garment sewing operations, such as joining, reinforcing, or decorating garments or garment parts.

TASKS:

1.Draws thread through guides, tensions, and needles and adjusts machine functions, according to fabric type.

2.Turns knobs, screws, and dials to adjust settings of machine, according to garment style and observation of operation.

3.Observes sewing machine operation to detect defects in stitching or machine malfunction, and notifies supervisor.

4.Attaches buttons or fasteners to fabric, using feeding hopper or clamp holder.

5.Selects supplies, such as fasteners and thread, according to specifications or characteristics of fabric.

6.Draws markings or pins applique on fabric to obtain variation in design and marks stitching errors with pins or tape.

7.Replaces sewing machine parts and performs basic maintenance, such as oiling machine.

KNOWLEDGE:

1.Production and Processing -Knowledge of inputs, outputs, raw materials, waste, quality control, costs, and techniques for maximizing the manufacture and distribution of goods
2.Mechanical -Knowledge of machines and tools, including their designs, uses, benefits, repair, and maintenance
3.Engineering and Technology -Knowledge of equipment, tools, mechanical devices, and their uses to produce motion, light, power, technology, and other applications
4.Clerical -Knowledge of administrative and clerical procedures and systems such as word

processing systems, filing and records management systems, stenography and transcription, forms design principles, and other office procedures and terminology
5.Building and Construction -Knowledge of materials, methods, and the appropriate tools to construct objects, structures, and buildings
6.Public Safety and Security -Knowledge of weaponry, public safety, and security operations, rules, regulations, precautions, prevention, and the protection of people, data, and property

SKILLS:

1.Product Inspection-Inspecting and evaluating the quality of products
2.Operation and Control-Controlling operations of equipment or systems
3.Equipment Selection-Determining the kind of tools and equipment needed to do a job

4.Operation Monitoring-Watching gauges, dials, or other indicators to make sure a machine is working properly
5.Equipment Maintenance-Performing routine maintenance and determining when and what kind of maintenance is needed
6.Problem Identification-Identifying the nature of problems
7.Reading Comprehension-Understanding written sentences and paragraphs in work related documents
8.Writing-Communicating effectively with others in writing as indicated by the needs of the audience
9.Troubleshooting-Determining what is causing an operating error and deciding what to do about it
10.Repairing-Repairing machines or systems using the needed tools
11.Speaking-Talking to others to effectively convey information
12.Installation-Installing equipment, machines, wiring, or programs to meet specifications
13.Coordination-Adjusting actions in relation to others' actions
14.Operations Analysis-Analyzing needs and product requirements to create a design
15.Instructing-Teaching others how to do something

QP NOS For Garment In-Line Checker:

1. AMH/N0301 Carryout Stitching activities using machine or by hand
2. AMH/N0302 Contribute to achieve product quality in stitching operations
3. AMH/N0303 Maintain work area, tools and machines
4. AMH/N0304 Maintain health, safety and security at workplace
5. AMH/N0305 Comply with industry and organizational requirements

Job Role of In-line Checker:

- Responsible for doing inline inspections on all operations / operators in a day.
- Responsible for generating all reports relating to inline inspection.
- Responsible for ensuring that during inline inspection standard quality specifications for each operation are being met at all the operation points.
- Responsible for communicating any quality discrepancy during inline inspection to the Quality Assurance Head and bringing the same to the immediate notice of the Line In charge.
- While Checking the Cut Parts of the garment should be properly maintain with the bundle number.If any busket is available the cut parts should be put in the busket and put forward.Make sure if any parts doesn’t fall apart or get soiled.Keep your hand clean or Wear the gloves .

Methodology:

1. Analysis NOS
    a) Creating NOS mapping
    b) Gap analysis of existing content by comparing with requirements.

2. Developments in training field.
    a) Evolution of vocational training(standards,delivery,effectiveness)
    b) Scenario(before,current,future)

3. Interact with industries to obtain information about

1. Definition of skill level of workers
2. Industry Requirement
5. Investments made for skill upgradation(time,cost,attrition impact)

4. Development of new content
   a) Based on NOS
   b) Based on industry requirements

5. Online training
   a) Develop and upload online content
   b) Attend present classroom session and assess the impact
   c) Analyze the advantages and disadvantages
   d) Take permission from industries for demo online training session
   e) Record and analyze impact
   f) Cost benefit analysis

6.Offline training
   a) Developing an offline version of the online module
   b) Cost Benefit analysis

Data Collection and Analysis

1) NOS Mapping

Refer Annexure 1 and 2 (QP-NOS) and mapping documents

QP NOS lists the PC,KA,KB,SA and SB required to be covered to complete the respective course.

PC are the performance criteria, KA and KB are the knowledge components, SA and SB are the skill components.

According to NSDC, PC and KB have to be covered in the training module for certification, whereas KA,SA and SB are optional.

The existing content was mapped with the QP NOS and gaps were identified.

2) Creation of new Syllabus and Session Plan

Depending on the content absent, new topics to be added were decided on. The PCs and KBs not present were grouped and made into sessions.A specific time was allotted on basis of the vastness and importance of the topics.

3) Industry feedback

Feedback from the garment industry was taken regarding the existing module for updating the content. Akriti Apparels Faridabad, Akriti Apparels Noida and Pee Empro Expo were visited for the feedback.The management, trainer and trainees were interviewed. The inputs of the feedback were compared with the NOS requirements and required additions were made.

4) Gathering content for Participants Handbook

First stage of information was collected by interacting with the SME(Subject Matter Expert). Some other information was collected from NIMI books and the internet. All the content was put together and formatted according to the syllabus and session plan.

5) Audio Visual content

Audio Video(Multimedia) content of the course was development with the help of ILFS Education team comparing the gap with the old multimedia.

6) Online Implementation

An online Course portal has been set up, rights to ILFS education. The overall training module has been updated in online with Audio Video and Assessment.

7) Offline Implementation

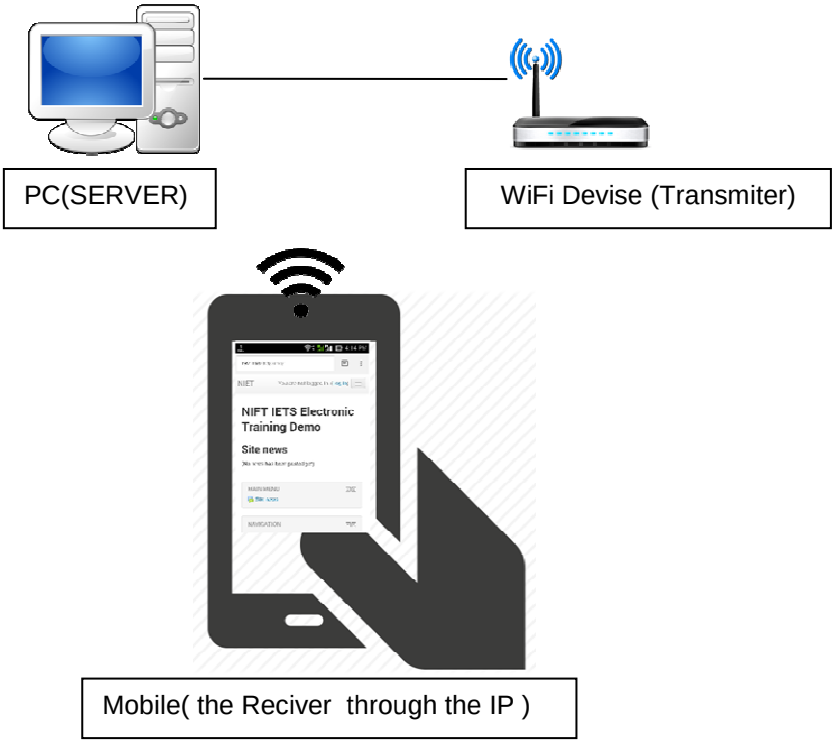
This is the concept of using mobile phone or tablets as a medium of teaching rather than using the textbook.For this process the requirement are:

1)A Personal Computer or Laptop (the content upload in it)

2)A Wifi Router

3)Mobile phone or Tablet

4)WAMP and Moodle software



Benefit of offline Module:

1) No more printing cost will be there for each batch.

2) One time investment on Tablet,PC and Wifi router

3) Constant Upgradation of course

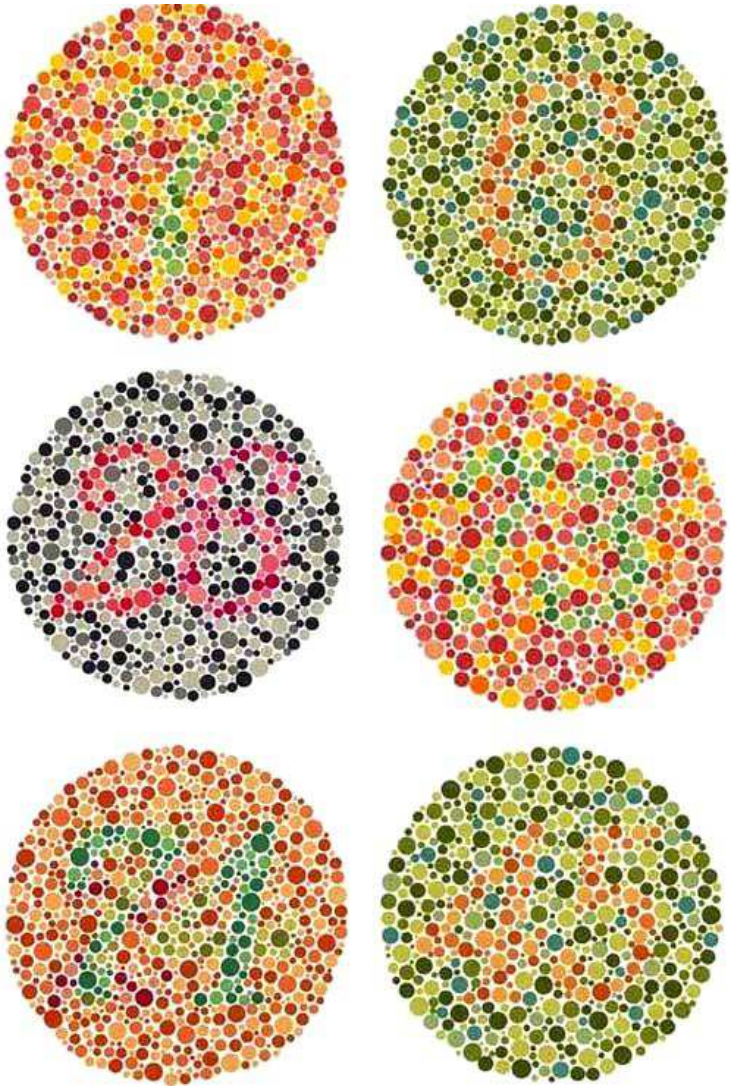
4) Anytime access to the multimedia content in training room

Implementation of Training

IL&FS partners with the companies for recruitment and training of freshers. According to the required intake, candidates are chosen for training after passing the entry gate assessment. The minimum qualification for intake of SMO is 5^{th} grade and in-line checker is 10^{th} grade. The candidates who fulfill this criteria and pass the entry test are given classroom training for a month followed by on job training in the company.

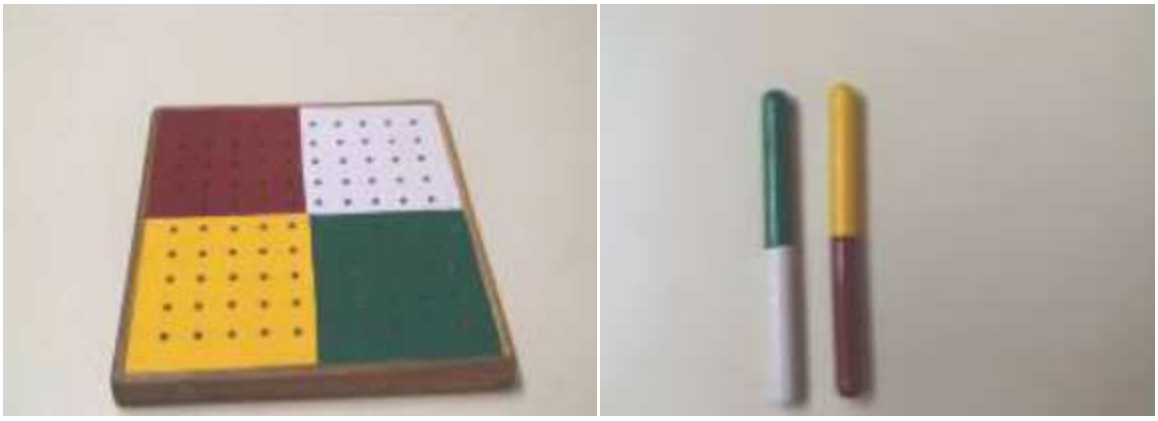
Tests And Selection Criteria For Trainees

Test for colour blindness Colour Blindness is a condition in which certain colours cannot be distinguished due to inherited condition. Red/ Green colour blindness is by far the most common form (about 99%) and this causes problems in distinguishing reds and greens. The test for colour blindness has to be carried out as per the instructions given in the Ishihara book, to test colour blindness. It is advisable to take some advice from a doctor on how to carry out the test for colour blindness.
In short the test for colour blindness includes some figures or diagrams in various different colours, which a colour-blind person will not read or perceive the colour. **Colour-blind people are not eligible for admission to the quality checkers course.**



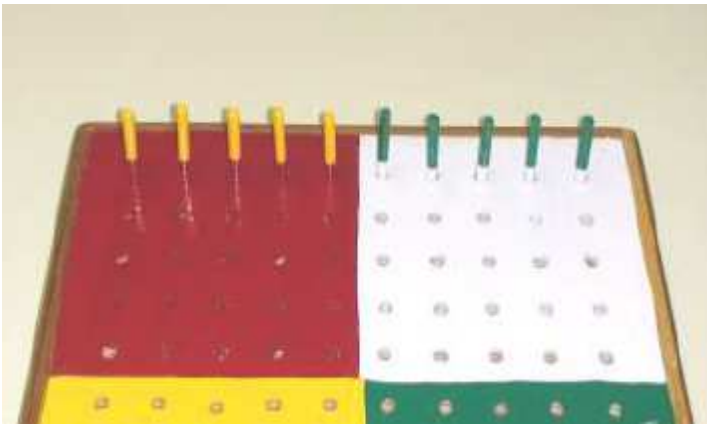
After the completion of color blindness test, a set of Dexterity Tests should be done. Before carrying out the dexterity test the candidate should be informed that the test is to judge the basic level of coordination and it is not any examination of sorts. The candidate should be putat ease and should not panic or feel stressed. The way of doing the test should be explained properly; if needed a demonstration should be carried out on how the test is to be performed; it should be made sure that the candidates have correctly understood the way of doing the tests. However do not give it as a practice before conducting the actual test because it may change some observations; please remember that the candidates have to be put under the same set of constraints. There are 4 tests for ascertaining the basic dexterity, which is aimed at checking the hand eye coordination.

Peg Board Test



A pegboard is a square board, divided equally into 4 square coloured zones: each having space for 25 holes, there are in all 100 holes. There are 100 pegs, which are bi coloured. 50 pegs are with 2 colours (Red & Yellow) and the balance 50 with 2 colours (Green & White).

The coloured part of the peg inserted into the respective color zone a straight-line pattern is followed that means if there is a peg which has red and green colour the red coloured part will go into the red part of the peg board.
The insertions of the peg have to be one line wise; there has to be a line wise order and are not supposed to be put randomly. The total time given for this test is 100 seconds and the total number of pegs inserted is counted. Scoring is done and each peg is given a weight age of 0.3 marks



Marble and tube Test

The Marble and tube test consists of an apparatus, which has a box with 2 compartments and a circular opening over the box.

A tube is fitted to the box such that the opening of the box and the tube is in a straight line.

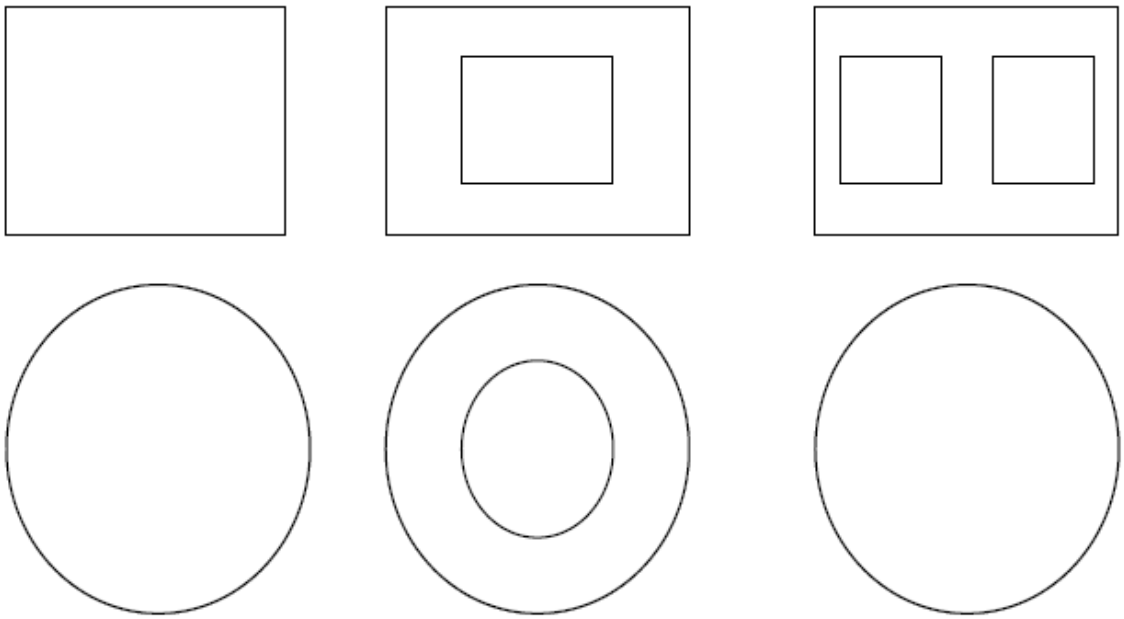
There are 2 sections in the box for the marbles. Marbles are placed in one section picked up and are inserted in the tube with one hand and guided to the opening of the box with the other hand such that the marbles should go into hole on the top of the box and fall into the box. There are 30 marble and 60 permissible cycles so the slider of the box has to be moved after one cycle of 30 marbles. There are 60 possible cycles and each carries a weight age of 0.5, the scoring is done as per the tabular columns.

Sr. No	Test Name	Second Cycle	Total Possible Cycle	Total Time Allotted	Marks/ Right Cycle	Max Marks
	Peg Board	1	100	100	0.3	30
	Marble and Tube	1	60	60	0.5	30
Total Marks						60

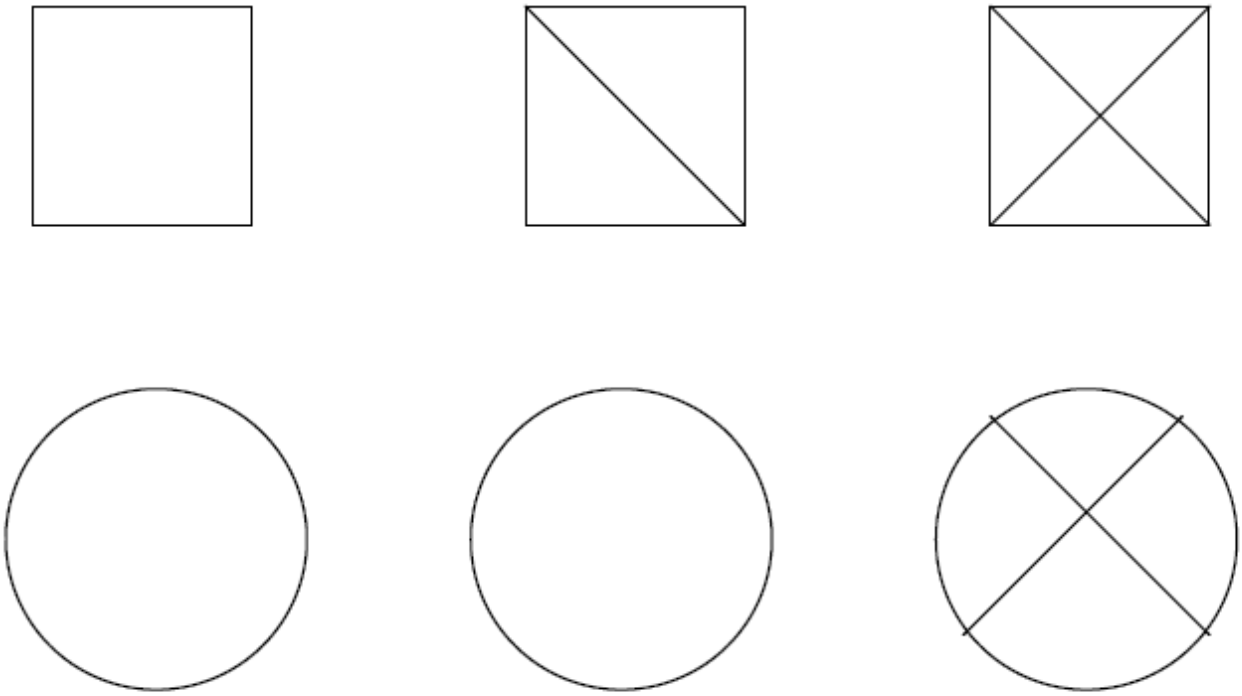
After dexterity test, we need to conduct test on reasoning and intelligence. Basic mathematical calculation & reasoning is required for a good quality checker.

Questionnaire for Operators - (Maximum Marks-40)
 Complete the Figures:

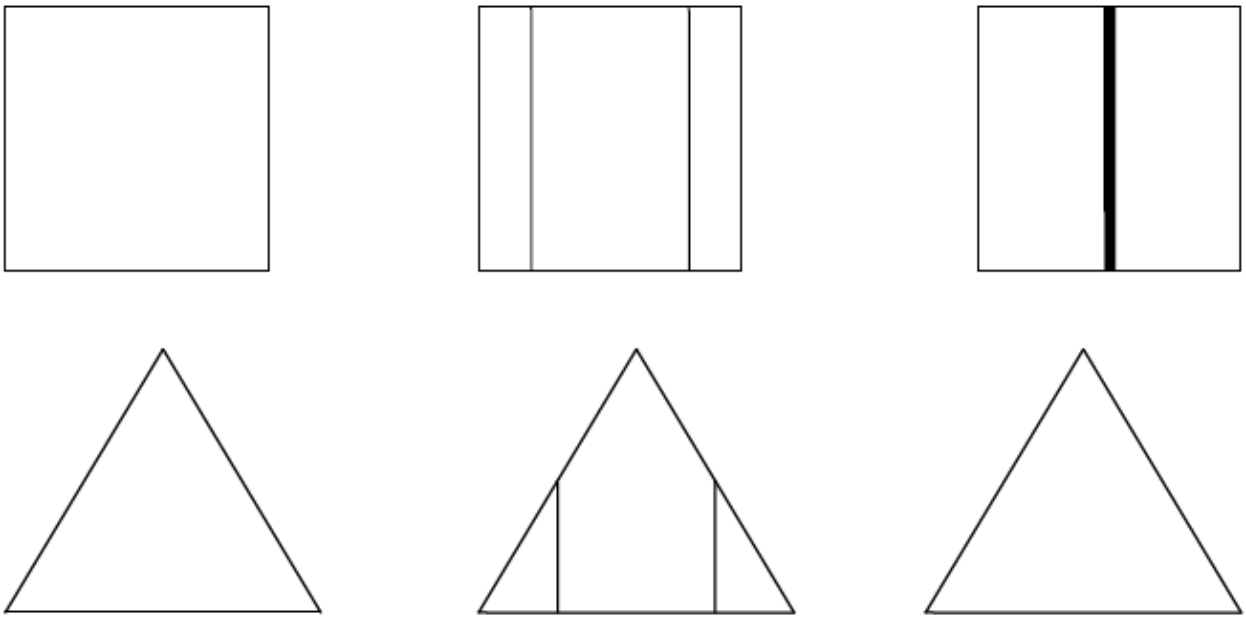
1. Follow the rectangles and complete the circles similarly. (4Marks)



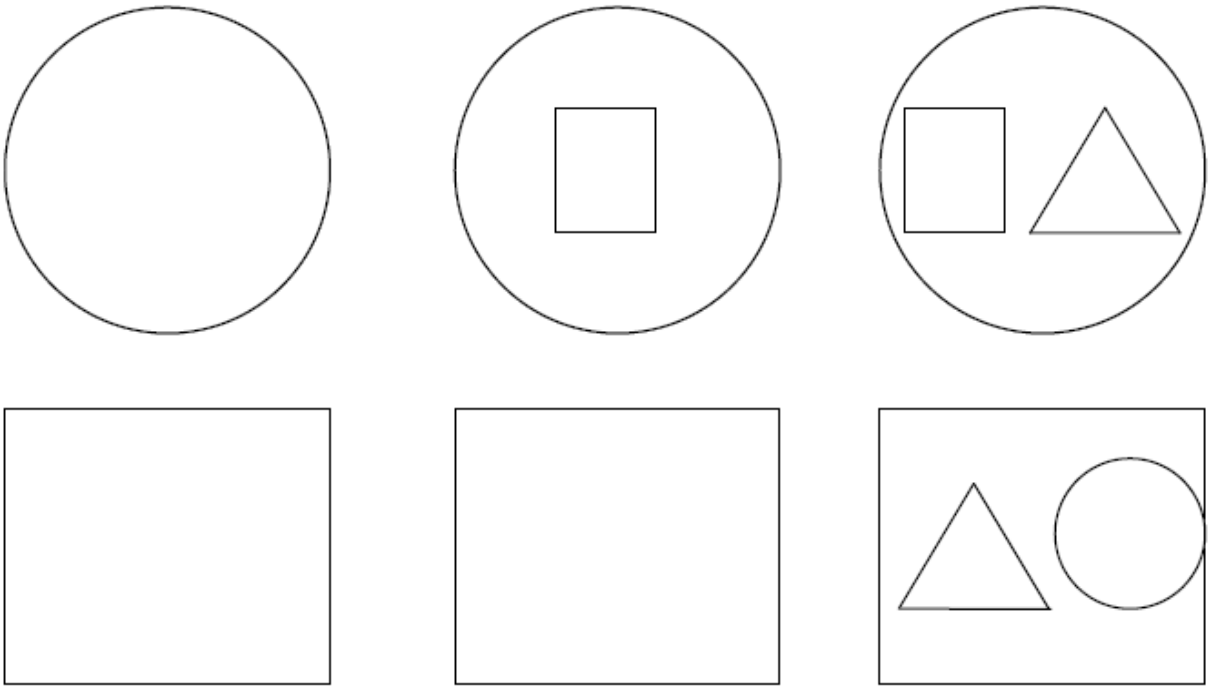
2. Follow the rectangles and complete the circles similarly. (4 marks)



3. Follow the rectangles and complete the Triangles similarly. (4 Marks)



4. Follow the circles and complete the rectangles. (4 Marks)



Sewing Machine Operator

Participant Handbook

Sewing Machine Operator

Contents

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Introduction to Job Role

At the end of this session you will be able to:
Understand the job roles and responsibilities
Interpret work instructions

Session Plan	
1	Sewing Machine Operator Duties and Responsibilities
2	Job Card

Sewing Machine Operator Duties and Responsibilities

Sewing machine operators operate and tend sewing machines in order to perform garment sewing operations. This includes joining, reinforcing and decorating garments or parts of garments. Sewing machine operators handle work on a large scale as they are required to operate and tend to industrial machineries. They mount attachments such as needles and pattern blades and adjust machines according to the specifications provided to them.

Sewing machine operators also adjust machine controls and regulate stitching speeds for every sewing project that they work on. It is important for sewing machine operators to possess in depth knowledge of sewing machinery and the garments industry. They also need to have sound hand-eye coordination and be able to cope with moderate physical effort.

Duties and Responsibilities:

- Refer to batch number for sewing garments parts.
- Ensure that all materials and auxiliary supplies are available prior to beginning work
- Start sewing machinery at the beginning of a shift and test it for proper functionality
- Draw threads through needles and adjust machine functions to meet the requirements of the sewing project
- Address any discrepancies or problems faced during initial stage
- Position materials under needles to sew them together or make patterns
- Replace and rethread needles for a subsequent project or in case of the existing one needing more thread
- Sew missing stitches or replacement parts in accordance to repair instructions provided
- Observe operations to detect any faults or defects in stitching
- Notify supervisors of any problems or discrepancies during the sewing process
- Attach elastic or tape to garments as specified in the work order
- Ensure that excess material or threads are cut away from the finished product
- Trim finished garments using scissors and cutters
- Perform general and preventative maintenance tasks on sewing machines to ensure their longevity
- Examine finished garments for compliance and ensure that appropriate tags are sewed on them

Job Card

Job Card is a record card relating to a job and giving details of the time taken to do a piece of work and the materials used. This is used to allocate direct labour and materials costs
The supervisor uses the job card to assign work to the operator and keep track of the progress. The operator refers the job card for knowing what work is assigned to him/her for the day and keeps updating it as the work progresses.

Needles and Threads

At the end of this session you will be able to:
Understand the different types of thread

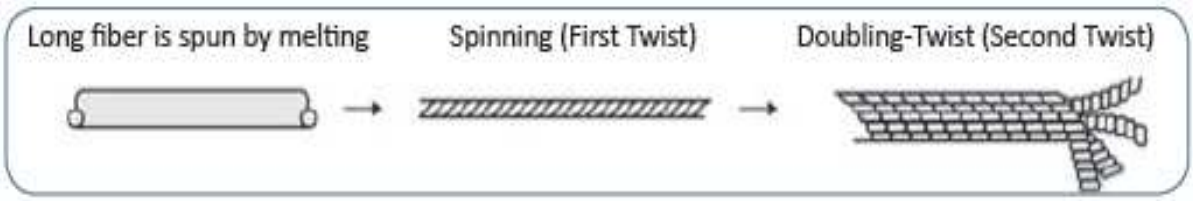
- Identify the thread thickness based on the numbering
- Describe the types of industrial needle
- Describe the parts of a needle

Session Plan	
1	Types of threads
2	Types of Needles

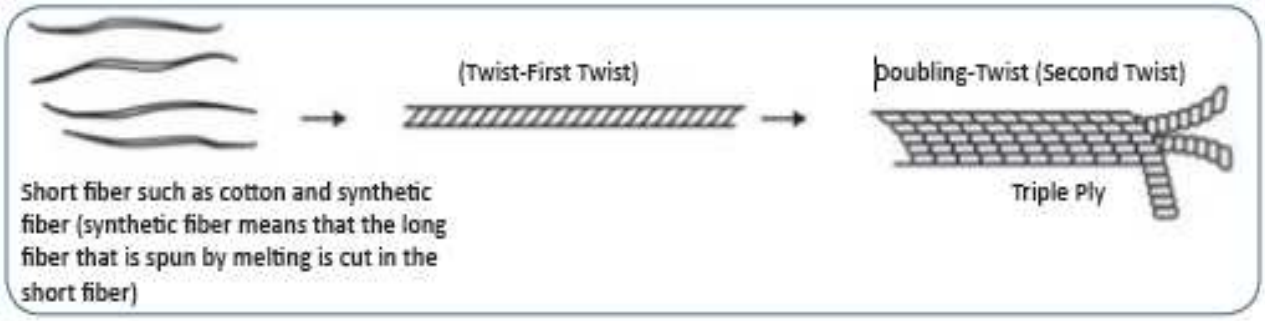
Types of Threads

Sewing Thread
A small diameter yarn or twisted strand, usually treated with a surface coating or lubricant or both, intended to be used to stitch one or more pieces of material or an object to a material are referred to as sewing threads.

Knowledge of sewing thread
Construction and manufacturing process of the sewing thread, natural textile products such as cotton thread, silk thread, etc. have been used as sewing thread before. Nowadays, however, chemical fiber products such as polyester thread, nylon thread, etc. are largely used in accordance with materials or applications. These threads are different from one another in construction and manufacturing.



Spun thread (Cotton thread, Synthetic spun thread) Short staple fibers produced by a series of twist applied to the staple (Short fiber) is known as spun thread.



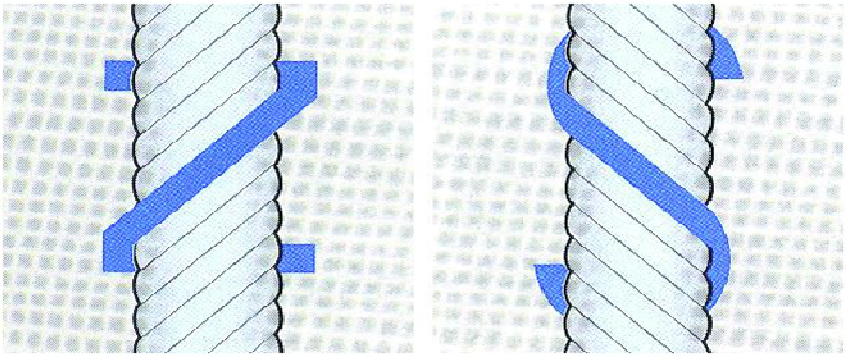
Mono filament thread this thread is just the same as long fibre that is spun by melting and a long yarn without twist.

Types of Thread:

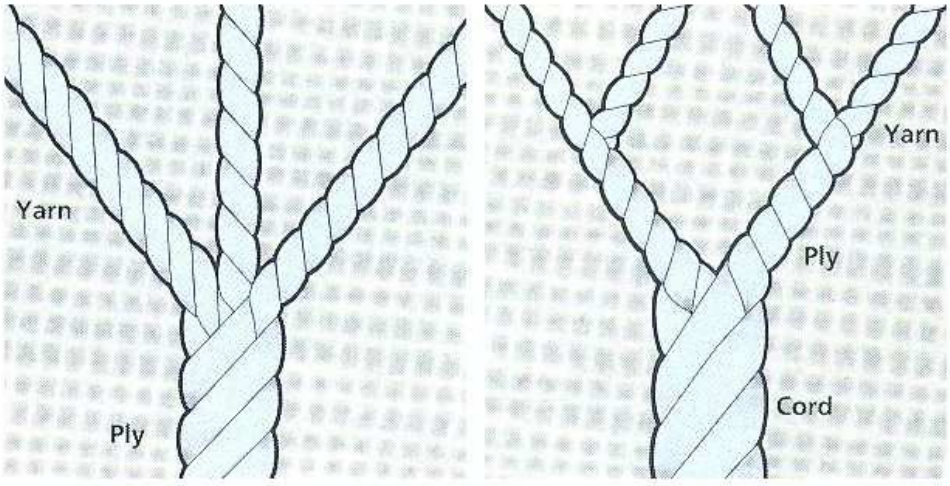
1. **Rayon**: This is currently the most popular thread used in embroidery machines. It has very goodsheen and is often used as a lower cost alternative to silk threads. Stitches sewn with Rayon threads are very smooth, leading to a higher quality embroidery work. However, the disadvantage of this thread is that it deteriorates over time and needs to be maintained well.
2. **Polyester**: This type of thread is synthetically produced from polymer resins. It can be made with a matte finish to look like cotton or have high sheen finish like silk. It is a strong and economical thread. The advantage of polyester is that it won't fade or shrink when washed. It has a medium lustre and can be suitable for any type of sewing. Due to its strength and colour fastness, it is becoming one of the most popular embroidery threads available.
3. **Nylon:** This is another synthetically produced thread with good strength. However the disadvantages are many, like, not being heat resistant, not colourfast (becomes yellow over time) and also become brittle through laundering and exposurePlaceholder text for bullet point.
4. **Cotton:** This is the only 100% natural fibre thread made for high speed machines. These threads perform beautifully in machines and have a soft sheen. Embroidery floss is made up of 6 strands that can either be separated or kept together. This is usually used for cross-stitch. The advantages of cotton threads are that they are soft, durable, easily adjust to fabric for shrinkage, it is an easy care thread and is available in various thread weights. However, cotton threads aren't as strong as polyester and do not have a distinct sheen.
5. **Wool:** Wool is an animal fibre which has a soft look when stitched, and does not reflect a lot of light. It has a soft texture. It is used for a 'homespun' effect.

Basics of thread construction

All conventional sewing threads begin their production cycle as simple yarns. These basic yarns are produced by twisting together relatively short fibers or fine continuous filaments.
Some terms used in the context of thread construction are:
Twist – The 'twist' of a thread refers to the number of turns per unit length required to hold the fibers / plies together to give the yarn / thread substance the required strength and flexibility. A thread with an excessive twist is also likely to give trouble while sewing due to 'twist liveliness', which can cause snarling, loops, knots and possible spillage that prohibit stitch formation.
Twist direction – Direction of twist is identified as 'S' for left twist and 'Z' for right twist. Most single needle lock stitch and other machines are designed for 'Z' twist threads. 'S' twist thread untwists during stitch formation.



Ply and cord – Yarns with many components are twisted together to form ply thread. Most commonly used are 2, 3 or 4 ply threads. Threads are twisted together to give corded thread. Most commonly used are 4, 6 or 9 cord



Sewing Thread Numbering

The thickness of sewing threads is defined by Tex. or Tkt. (Ticket). And these two thread numbering terms are widely used. A same thickness of thread will have two different figures in these two systems.

Tex Numbering : Tex is a metric system of textile yarn and thread numbering. Tex is defined as weight of 1000 meters thread in grams. For example, Tex 50 means a length of 1000 meters of thread will gives 40 grams of weight.

Ticket (Tkt.) Numbering: Ticket numbers are the manufacturer's reference numbers for the size of a given thread. The Metric Count and Cotton Count systems use ticket numbering system to give an easy approximation of the specific size of the finished thread.

In Metric Ticket system, the figure quoted for thread size is the length that would weigh 3 grams. The thread could be made from a single yarn or multiple yarns. For example, a thread of Tex 40 is Tkt. 75 and Nm 80/2 is Tkt. 120

For cotton sewing thread Cotton Tkt. number is used and in Cotton Tkt system it is the number of 840 yard hanks that weigh 3 lbs.

Conversion from Tex to Tkt. (Metric Ticket System):

Formula used to convert Tex into Tkt

Tkt. = (1000/Tex No.) X 3 or

Tkt. = Nm X 3

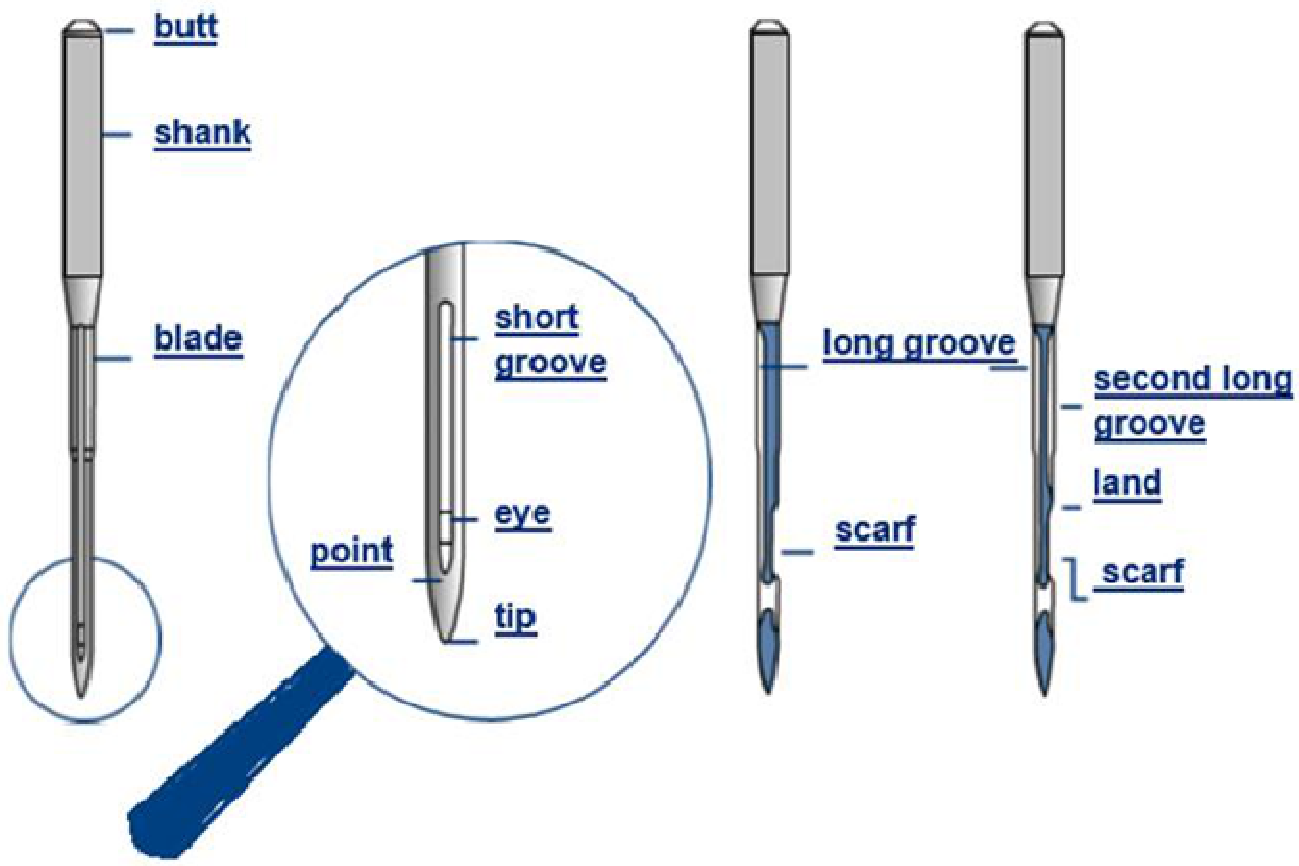
A ticket number in one type of thread will not be the same as in another. For example, Ticket 40 Cotton is not the same as Ticket 40 Core spun thread.

Note: Ticket numbers resemble the fixed weight system. They can simply denote: Higher the ticket number, finer the thread. Lower the ticket number, thicker the thread. A thread of Tkt. 60 is twice as coarse as Tkt. 120.

Types of Needles

Anatomy of a needle

The key features of a standard machine needle are mentioned below.



Shank

Top of needle that inserts into machine; most often has round front and flat back, which seats needle in right position.

Shaft

Body of needle below shank. Shaft thickness determines needle size.

Front groove

Slit above needle eye, should be large enough to “cradle” thread for smooth stitches.

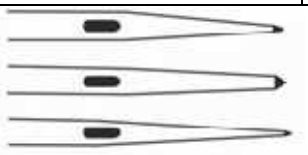
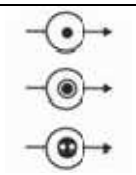
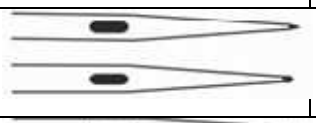
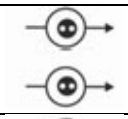
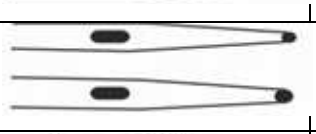
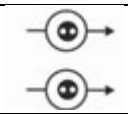
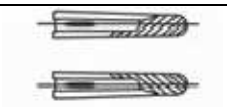
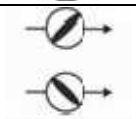
Point

Needle tip that penetrates fabric to pass thread to bobbin-hook and form stitch. Shape of point varies among needle types.

Scarf

Indentation at back of needle. A long scarf helps eliminate skipped stitches by allowing bobbin hook to loop thread more easily.

Eye Hole in end of needle through which thread passes. Needle size and type determine size and shape of eye.

Tip point	Symbol	Shape of the needle tip	Shape of point	Application and feature
Sharp and slim type point	Spi			Light -weight fabrics, light-weight leather
Regular type point Butt type point Slim point	R But S			General fabrics Mainly for button sewing Slim shape and J point at needle tip, for high gauge knit
J ball point B ball point	J B			For general knit, suitable for standard material as well
U ball point Y ball point	U Y			For relatively coarse knit, ball is Ø 1/3 trunk For elastic materials ball is Ø ½ of trunk
Flat tip shape	LL LR			45° twisted type knife needle mainly for leather goods 45° reversely twisted type knife needle mainly for leather goods

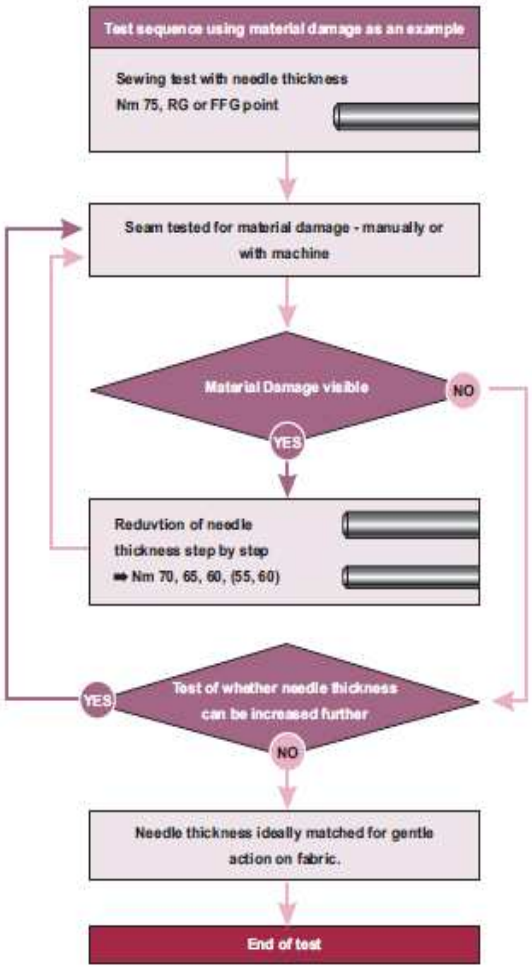
Selection of needles

When we select the needle for a specific fabric, we have to decide on two things,

- Needle thickness
- Point shape

Choice of Needle Thickness

We sew some rough cloth using different needles and check the seams. If the needle is not right, we can see the damage to the cloth by pulling it slightly.

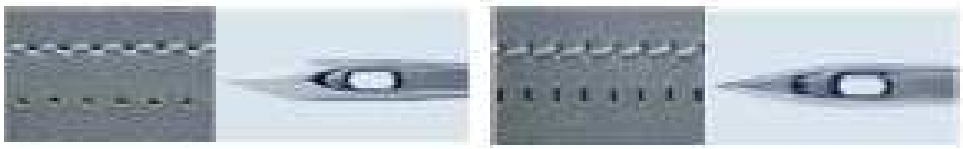


Stitches in the knitting are damaged—test is continued with the next size down of needle thickness

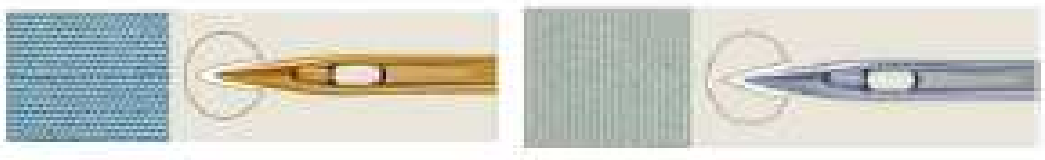
No more material damage visible—correct needle thickness has been found

Choice of Needle Point
The needle points are of 2 types—cut points and cloth points.

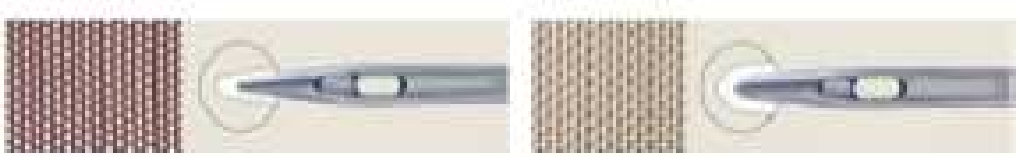
1. **Cut points**: These points have a sharp tip to cut through the cloth. These are used for stitching leather products and clothes.

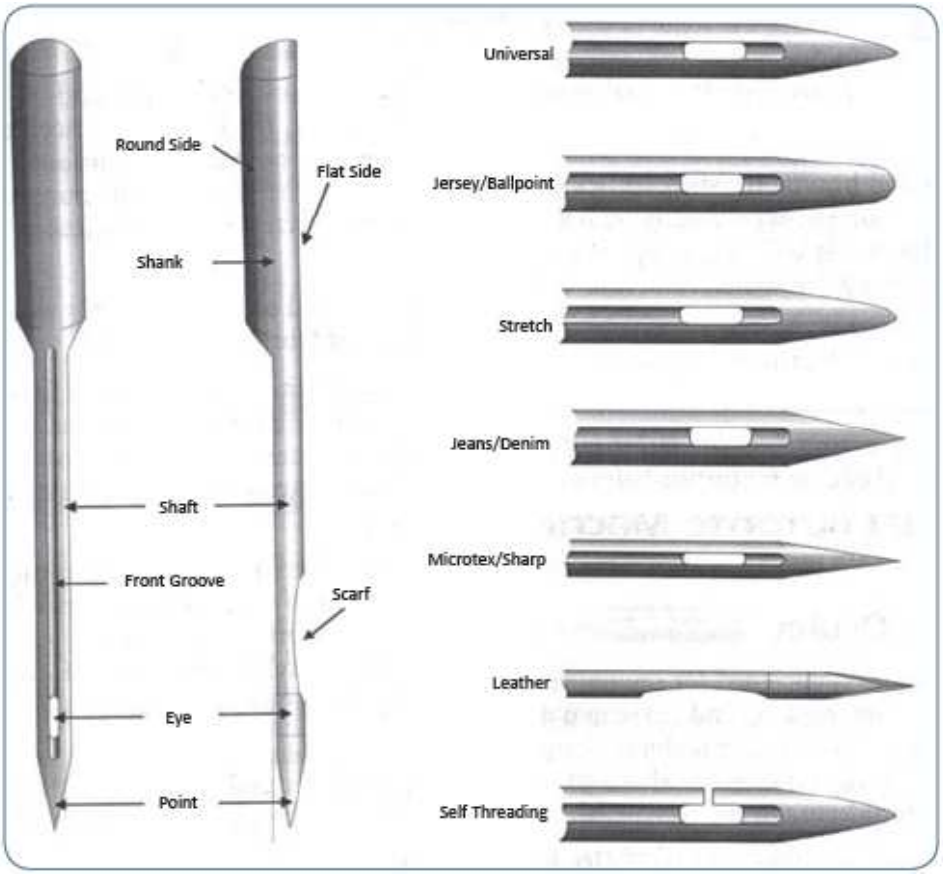


2. **Cloth points**: These have a slightly rounded tip and can cut through the cloth without damaging it. These are used on cloth. The cloth points can be round or ball points.
a. **Round points**: These are rounded at tip but are thin and sharp. Such points are used for woven fabrics so that the needle can get through the fibers inside the weaves.



b. **Ball points**: Used for knitted fabrics, these points are thicker and more rounded at the tip. They shift the yarns and pass through, avoiding holes and fabric damages.





Needle Numbering System

There are two number systems associated with sewing machine needles:

1. European labelling system: European sizes range from 60 to 120, 60 being a fine needle and 120 being a thick heavy needle.

2. American labeling system: The American system uses 8 to 19, 8 being a fine needle and 19 being a thick heavy needle.

Sewing Machine Needle Sizes	
American	European
8	60
9	65
10	70
11	75
12	80
14	90
16	100
18	110
19	120

Suitability of Needle and Thread

Needle	*Suitable spun thread*	*Suitable filament thread*	*Cloth material*
No. 5	No. 120	No. 100	Glossy silk, synthetic ultra light-weight cloth (satin, etc.)
No. 7 to No. 8	No. 100	No. 80 to No. 100	Glossy silk, synthetic light-weight cloth (satin, crepe de chine, etc.)
No. 9 to No. 10	No. 80	No. 60 to No. 80	Light-weight silk, satin, crepe de chine, georgette, voile, knit 20G to 26G (single/double)
No. 11 to No. 12	No. 60	No. 50 to No. 60	Light-weight calico, broadcloth, light-weight wool, knit/double 16G to 20G
No. 13 to No. 14	No. 40 to No. 50	No. 50	Normal broadcloth, wool cloth, general fabric
No. 16	No. 30 to No. 40	No. 40	General heavy-weight fabric (overcoat, etc.) water-proof cloth
No. 18	No. 20 to No. 30	No. 20 to No. 30	Bed-clothes, bags, vinyl shoes
No. 19	No. 10 to No. 20	No. 10 to No. 20	Leather shoes, sheets
No. 20 to No. 21	No. 10	No. 8 to No. 10	Leather shoes, tents
No. 23 to No. 24	No. 8	No. 8	Extra heavy-weight materials, tent, sheet

Knowing the Sewing Machine

At the end of this session you will be able to:

- Explain the different types of industrial sewing machines.
- Set up the machine
- Operate the machine safely
- Explain the different parts of the sewing machine
- Explain the attachments used
- List the Do's and Dont's of using the machine

Session Plan	
1	Types of Sewing Machines
2	Setting up the machine
3	Parts of the Sewing Machine
4	Attachments used on the M/C
5	Dos and Dont's of Operating the Machine

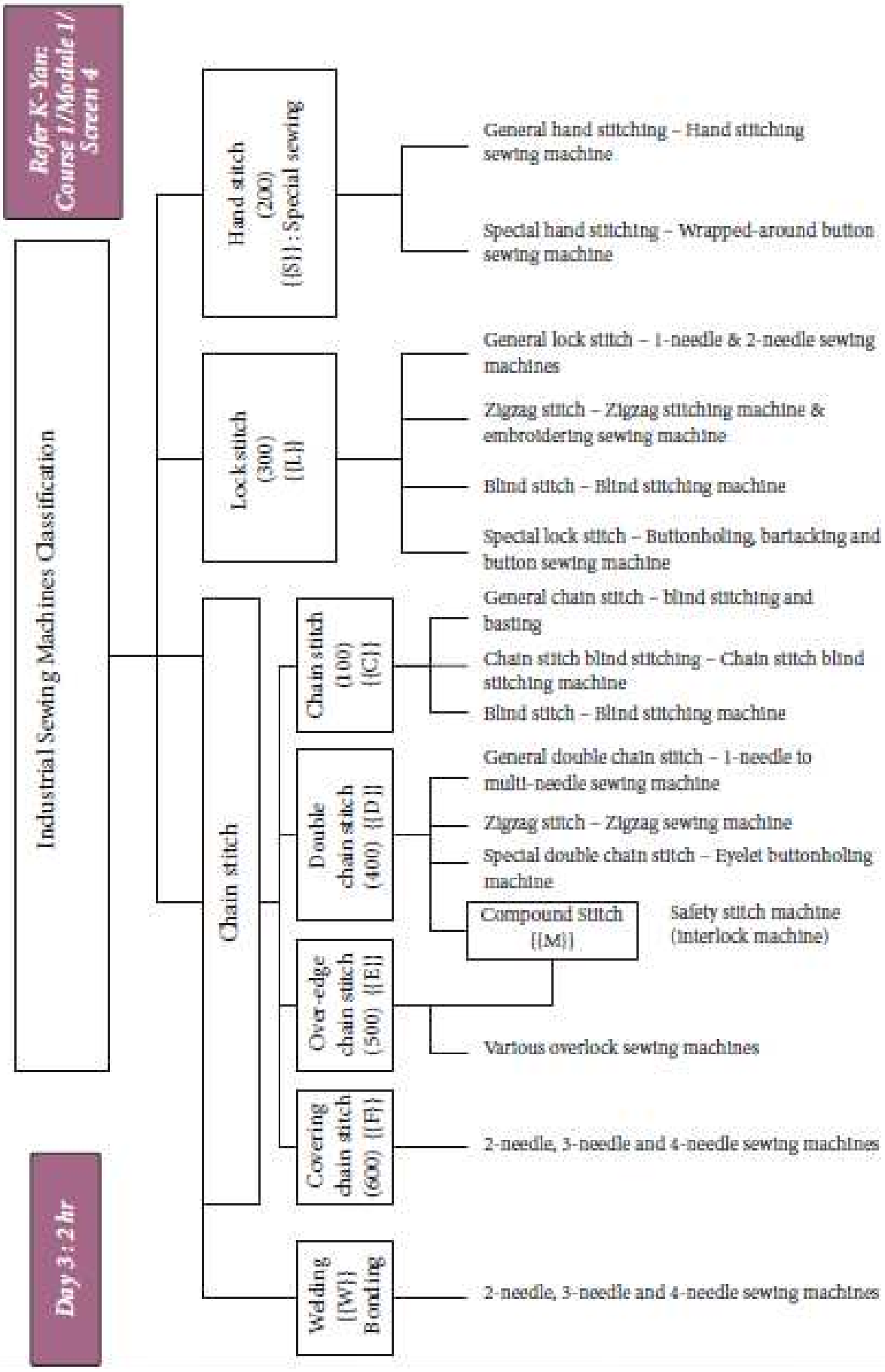
Types of Sewing Machines

Domestic Sewing Machines

1. These are used in houses and tailor shops.
2. They are less efficient than industrial sewing machines.
3. The quality of sewing machines is not as good as of industrial machines.
4. Their speed is low (800 stitches per minute).
5. They usually do not have motors or oil tank.
6. They have to be operated manually.
7. Companies like Usha, Singer, and Merit make such machines.

Industrial Sewing Machines

1. These are used in factories that make clothes.
2. They are more efficient than domestic sewing machines.
3. The quality of industrial machines work is very good.
4. Their speed is very high (5500 stitches per minute).
5. They have motors and oil tank to cool and lubricate machine parts.
6. They are operated by electric motors.
7. Companies like Juki, Pegasus, Brother, and Pfaff make such machines.


Refer K-Yan: Course 1/Module 1/ Screen 4
Industrial Sewing Machines Classification
Hand stitch (200) {(S)} : Special sewing
General hand stitching – Hand stitching sewing machine
Special hand stitching – Wrapped-around button sewing machine
Lock stitch (300) {(L)}
General lock stitch – 1-needle & 2-needle sewing machines
Zigzag stitch – Zigzag stitching machine & embroidering sewing machine
Blind stitch – Blind stitching machine
Special lock stitch – Buttonholing, bartacking and button sewing machine
Chain stitch
Chain stitch (100) {(C)}
General chain stitch – blind stitching and basting
Chain stitch blind stitching – Chain stitch blind stitching machine
Blind stitch – Blind stitching machine
Double chain stitch (400) {(D)}
General double chain stitch – 1-needle to multi-needle sewing machine
Zigzag stitch – Zigzag sewing machine
Special double chain stitch – Eyelet buttonholing machine
Compound Stitch {(M)}
Safety stitch machine (interlock machine)
Over-edge chain stitch (500) {(E)}
Various overlock sewing machines
Covering chain stitch (600) {(F)}
2-needle, 3-needle and 4-needle sewing machines
Welding {(W)} Bonding
2-needle, 3-needle and 4-needle sewing machines
Day 3 : 2 hr

Type of Sewing Machines Based On Control Mechanism

Manually controlled machines

Manually controlled machines are the most versatile machines, which require the operator to control both the machine and the materials. Control of sewing machine includes start, stop stitch placement and stitching pattern. Control of material includes positioning, guiding, repositioning, removing and stacking the sewn parts. However, they are not always the most effective for a specific, operation, they are often less efficient, less automated and require more direct labour. Some of the most important manual controlled machines are single needle lockstitch, double needle lockstitch, single needle chain stitch, double needle chain stitch, over lock machines. (We are referring to motorized machines).

Semi-Automatic Machines

Semi-automatic machines perform a cycle or an operation automatically such as buttonhole, button-attach, bar tacking. These are the machines in which the sewing phase of the operation is controlled automatically after the operator activates the machine. The operator places the material, activates the machine and the machine completes the cycle. Operators are required to position parts and start each cycle. These machines are also called “stop motion machines”. They may use clamps, sewing guides or templates to control the fabric for stitching. Cams or templates that mechanically guide the material through the sewing cycle may control stitch patterns. There are two sub-classes of semi-automatic machines:

1. The operator picks up, positions initially, extracts and discards manually.

2. Initially the operator picks up and positions manually but the machine extracts and discards automatically as soon as the sewing phase is completed.

Automatic Machines

Automatic machine performs the entire process. The operator merely loads the hopper in the machine with the stack of garment parts and the machine automatically picks up, positions, sews, extracts and discards the sewn pieces. With fully automatic equipment, an operator may supervise the operation of several machines. Automated operations make it possible to maintain consistent production and match the standard quality levels over an extended period of time.

Robotic Machines

Robotic machines are the most advanced form of automation. They are computerized, re programmable, multifunctional, manipulator designed to move materials, parts, tools or specialized devices through variable programs, motions for the performance of a variety of tasks. Flexible reprogram ability is one of the hallmarks of robotic automations.

Bed Types

Based on the shape of the garments, modifications are made to facilitate the construction of garments, making it easier and faster. These variations primarily affect the shape of the bed of the machine i.e. the part on which the fabric rests. The classification of sewing machine bed type is based on the manner in which the fabric travels with respect to the bed while being sewn, and the frame of the machine is constructed for the mounting the machine. There are five types of horizontal beds namely:

1. Flat Bed

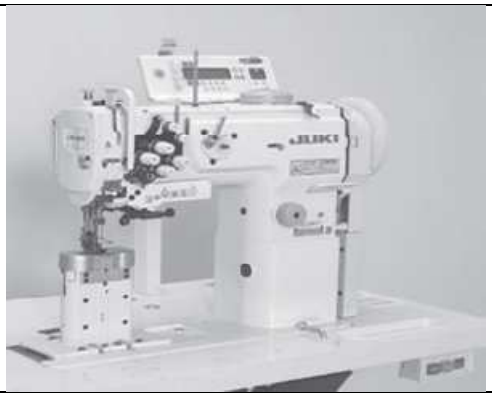
A flat bed is a sewing machine frame is constructed in a manner to permit the frame of the machine to be supported by the underside of the machine bed. The working surfaces of many flat and raised beds are exactly alike. This basic type of bed is used for all kinds of flat sewing works.

2. Raised Bed

The bed plate is in the form of a plinth. It facilitates the assembly of pre-sewn parts and is especially suitable for the fitting of the accessories and special attachments. This is the basic form for various specialized machines.

3. Post Bed

A post bed is a sewing machine frame in which the machine bed is the top of a post, which is set vertically on the lower arm of the machine directly beneath the needle of the machine. Such a bed type permits one to sew concave or convex curve sections like shoes, brassiere or bags with ease, it also works on specific garment areas which has tight curves and corners, e.g. sew in sleeves.



4. Cylinder Bed

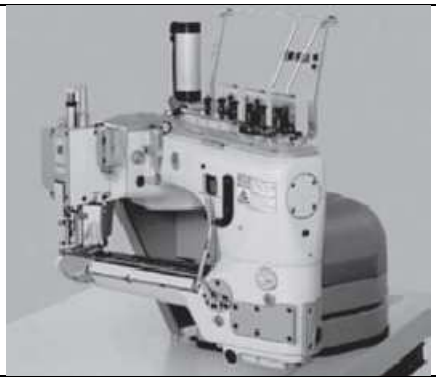
A Cylinder bed is a sewing machine frame, which permits one to sew cylindrically shaped items such as Cuffs, Sleeves, Trouser legs etc. It is also used for Button sewing and bar tacking. It is used extensively in knitted fabrics. Cylinder bed is of two types: Length and Perimeter

Length Cylinder Bed: With this bed type the cylindrical item is sewed on a line parallel to its cylinder length. As the cylindrical item is sewed, it travels onto the bed part of the machine and encompasses the bed.

Perimeter Cylinder Bed: The Cylinder item is sewed parallel to the circumference of the item. The perimeter of the item travels around the perimeter of the bed arm.

5. Feed off the arm

These machines have a cylindrical bed suited for sewing goods in the tubular form. The cylindrical bed is in the form of an arm used for sewing of tubular goods like closing of sleeves, side seams, legs etc



Lockstitch Machine

The Single Needle Lock Stitch machine is the most popular and versatile sewing machine in the industry. It is designed to produce consistent results in sample and production rooms. The Lockstitch forms precise and secured straight stitches on the top and the underside of the fabric as the needle thread and the bobbin thread lock each other each time the needle passes through the fabric. The Lock stitch machine has a single needle and bobbin thread, it resembles a home

Advantages

❄The lockstitch machine produces the tightest and the most secured stitch

❄It has same appearance on both sides

❄A complete garment can be sewn on a lockstitch machine

Disadvantages

❄Lockstitch machine usually has more down time since they operate with a limited thread supply from bobbin that has to be replaced as they run out.

❄Lockstitch machines are slower than other classes of industrial machines. Its speed ranges from 3000-5000 rpm while some other machines can operate at 7000 rpm.

ZigZag Stitch

This is the traditional zigzag stitch that is used to sew appliqués, attach lace on lingerie and produce faggoting. Faggoting is a decoration stitching used to connect two pieces but allowing space (width of the stitch) between the pieces.

Blind Stitch Type

This provides a lockstitch blind stitch. This is more than the traditional. This type is used primarily by men's shirt's manufacturers for attaching linings and the inside components of waistbands for men's dress slacks.

Multineedle Chain Stitch Machine

Chain Stitch Industrial Sewing machine is without bobbins and has loopers to form a chain crochet like stitches. This stitch is formed on a machine that has needle threads, but no bobbin threads. Thread from a needle passes through the fabric that is under the presser foot forming stitches on the top of the fabric and "locked" loops on the underside. It cannot stitch in reverse.

Advantages

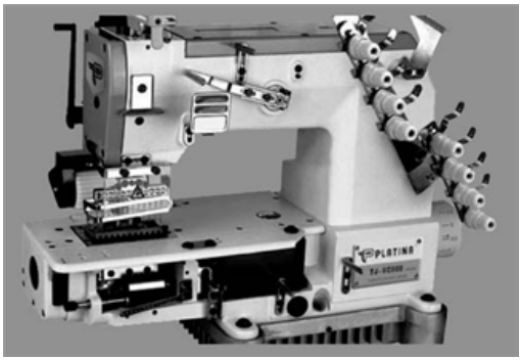
❄It has the ability to produce longer seams without interruptions because the looper and the needle threads are run from large packages on top of the machine so there is no problem of bobbin running out.

❄As the Chain stitch uses more thread, almost twice or more the thread in the Lock stitch, it provides more extensibility. This also facilitates the use of finer threads.

❄The stitch is formed underneath the fabric, so there is no interlocking within the fabric, and is, less likely to cause puckering.

Disadvantages

❄The major disadvantage of a chain stitch is that it tends to unravel from the ends. This can also happen when the stitch is missed. This problem can be avoided by over stitching or bar tacking the seam ends.



❄The thread used is almost twice as much as a lockstitch.

❄A major disadvantage is that this stitch uses almost twice as much thread as in lockstitch, which makes the seam very bulky so it cannot be used in the shoulder seams, sleeve seam because then it gives a very prominent and bulky effect which is undesirable on these areas.

❄Chain stitch has an appearance of lockstitch on the front and chain stitch at the back so it cannot be used on collars.

Overlock Machine

An overlock / overedge machine is a high speed sewing machine. This is the quickest performing machine for today's sewer. Its speed far exceeds that of other sewing machine plus it adds a non fraying finish and sews seams at the same time. It can be made with two, three, four or five threads depending on the number of needles and loopers and the manner in which they interlace. The three and four thread produces only an overlock stitch whereas five thread serger produces an over locked edge accompanied by a chain stitch.

Advantage

❄It is a high speed sewing machine, therefore reduces production time and thereby increases production.

❄Any overedge seam formed of several threads by an overlock machine shows high extensibility.

Disadvantage

❄Overlock machines are high thread consumers,

❄Span of operations is limited as compared to a lockstitch orchainstitch machine

❄These machines create some amount of noise and vibration, which create disturbance in the working environment

Overlock Stitch Application in Knit Garments

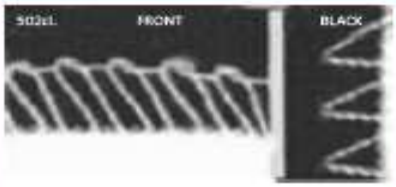
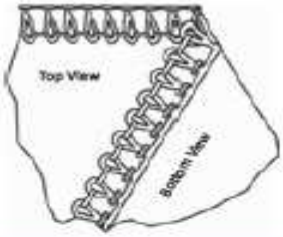
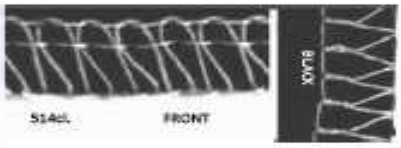
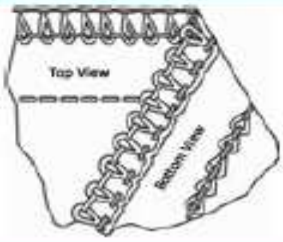
They require more thread in the stitch formation, but they also have more stretch. Overlock stitch used for knits are highly extensible and therefore makes an excellent seam for knit garments.

Four Thread Overlock Stitches

Are sometimes called “mock safety stitches”. They are 4 thread overedge stitches that are formed with two needle threads and two looper threads. Some Mo k Safety stitches are stronger and more elastic and can be used for seaming knits and woven.

Five Thread Overlock Safety Stitch

Are the “Safety Stitches”. These are combination of an overedge stitch and chain stitch. Chain stitch is used for closing the seam and is backed by another row of “tight” overedge stitches. This type of stitching is widely used by manufacturers of shirts, jackets, blouses and jeans.

Two thread over lock stitches		
Three thread over lock stitches		
Four thread over lock stitches		
Five thread over lock stitches		

Flatlock Machine

Flatlock machines are specialized, high-speed machines. These machines are extremely fast and efficient. In this machine the stitch is formed by two or more needle threads passing through the material, inter looping on the underside and interlocking on the upper side. These machines are mainly used for knits.

Advantages

It is high speed, and make seams stretchy, flat and smooth

Provides extensibility and flexibility to the seams, with low bulk

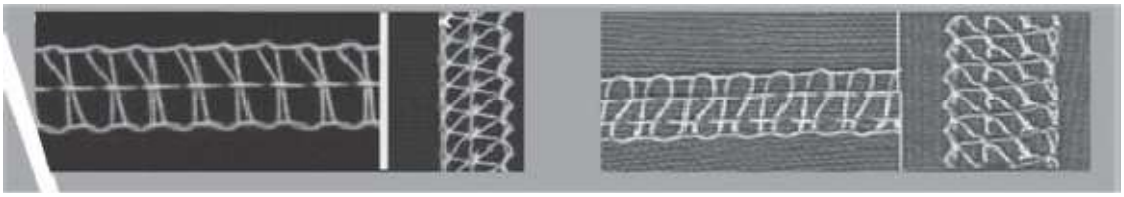
that can be worn comfortably against the skin.

Disadvantages

Span of operation is limited

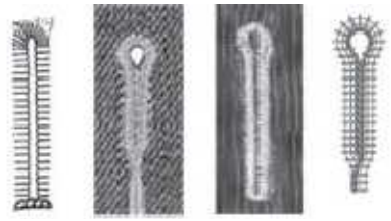
Thread consumption is very high. Produces noise and high vibration

Applications and Seam Appearances



(Coverstitch) Often called a flat lock or flat seam stitch is used primarily on knits and lingerie. These stitches are referred to as top and bottom cover stitches and are commonly used to cover both sides of the seam.

Buttonholes
Straight Button Hole, Eyelet Button Hole



Button Attach Machine

Clothes are held together by buttons, a button is one of the most basic elements of fashion. Button sewing work requires a machine, which provides flexibility (in terms of button design, fabric variation, thread thickness etc.) as well as a consistently good sewing performance.

Advantages

This machine sews on buttons at high speeds, with accuracy

thus saving time and fatigue

It can be used for attaching neck wraps and labels as well.

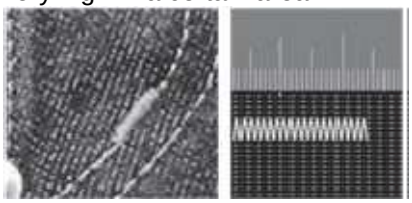
Disadvantages

Since this is a highly specialized machine, it can only be used for specific operations

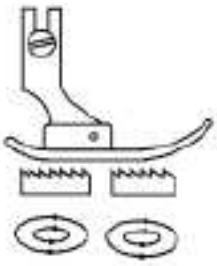
A chain stitch button sewer can be used for a cleaner appearance but it is less secure than a lock stitch. (a) Sewing metallic buttons, b) Attaching neck wraps, c) Attaching labels)

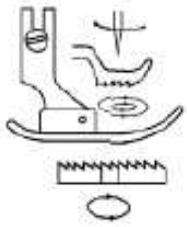
Bartacking

Bartacking is a special type of lock stitch, which is used to reinforce certain areas; the stitch density is very high in a certain area.



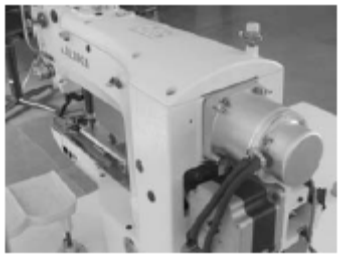
Based on feed

Bottom Feed It feeds material with the lower feed dog only. This is the standard feed mechanism used in most machines. Sometimes, uneven material feeding may occur in bottom feed. However, using bottom feed sharp curve stitching can be easily performed. Further, material handling is easy in this mechanism.	
Needle Feed (Bottom Feed + Needle Feed) In this needle bar moves synchronously with the bottom feed. Feeding force is strong, and this mechanism can feed material more precisely than the bottom feed mechanism. Uneven material feeding is reduced. However, stitch shrinking due to thread tightness may occur sometimes.	
Differential Feed (Front Bottom Feed + Rear Bottom Feed) This is a bottom feed mechanism, but feed dog is divided into front feed dog and rear feed dog. With this feed mechanism it is possible to intentionally stretch material or gather material by changing the feed amount of front feed dog and rear feed dog. This mechanism is suitable for sewing elastic knit. Differential feed ratios overlock sewing machine) are, a. Gathering 1: 2 (Max. 1: 4) b. Stretching 1: 0.7 (Max. 1: 0.6)	

Bottom and Variable Top Feed (Bottom Feed + Top Differential Feed) In this feed mechanism, there is a feed dog above the presser foot. With the help of this top feed dog, top feed amount can be adjusted simultaneously with the adjustment of the material fed from the under side. In this feed mechanism it is possible to prevent sewing slippage, and to perform edging, contracting or gathering.	
Differential Bottom Feed and Variable Top Feed (Differential Feed + Top Differential Feed) In this mechanism, the bottom feed is a differential feed. With the help of this feed mechanism, the top feed amount can be adjusted simultaneously with an adjustment (stretching and gathering) of the material fed on the lower side. This mechanism can give most suitable feed amounts to the upper and lower materials.	
Unison Feed (Bottom Feed + Top Feed + Needle Feed) The feed force of this mechanism is superior to other feed mechanisms. This feed mechanism is mostly used for extra heavy-weight materials.	

Based on motor

Clutch Motor This type of motor has a clutch and brake system. The motor consumes power even when the sewing machine is not running. Power is transferred to the sewing machine when the clutch pedal is pressed. In this machine, the needle bar position cannot be controlled. The examples of a clutch motor include single needle lock stitch machine, double needle lock stitch machine, overlock machine and feed off arm machine.	
Electro Motor This motor help us control the needle bar with the help of a small electronic board fixed to the motor. This works like a clutch motor. Electro motor uses a magnetic contracting system. An example of an electric motor is the single needle computerized machine	

Servo Motor In this motor, power is consumed only when pedal is pressed. So, it saves up to 30% power compared with other motors. A servo motor runs on a magnetic sensing system and is used in computerized machines where needle bar position can be controlled. An example of a servo motor is the single needle computerized machine	
Direct Drive Motors Unlike the clutch motor, this motor is directly connected to the main shaft . It works with the help of a control box. Direct drive motors are used in computerized machines.	
Induction Motor An induction motor runs on the magnetic field created by a 3-phase power supply. This motor works in complete cycles. Once the pedal is pressed, it completes a full operational cycle and stops the machine. The examples of an induction motor include the buttonholing machine, the button attach machine and the bartack machine.	

Based on belts

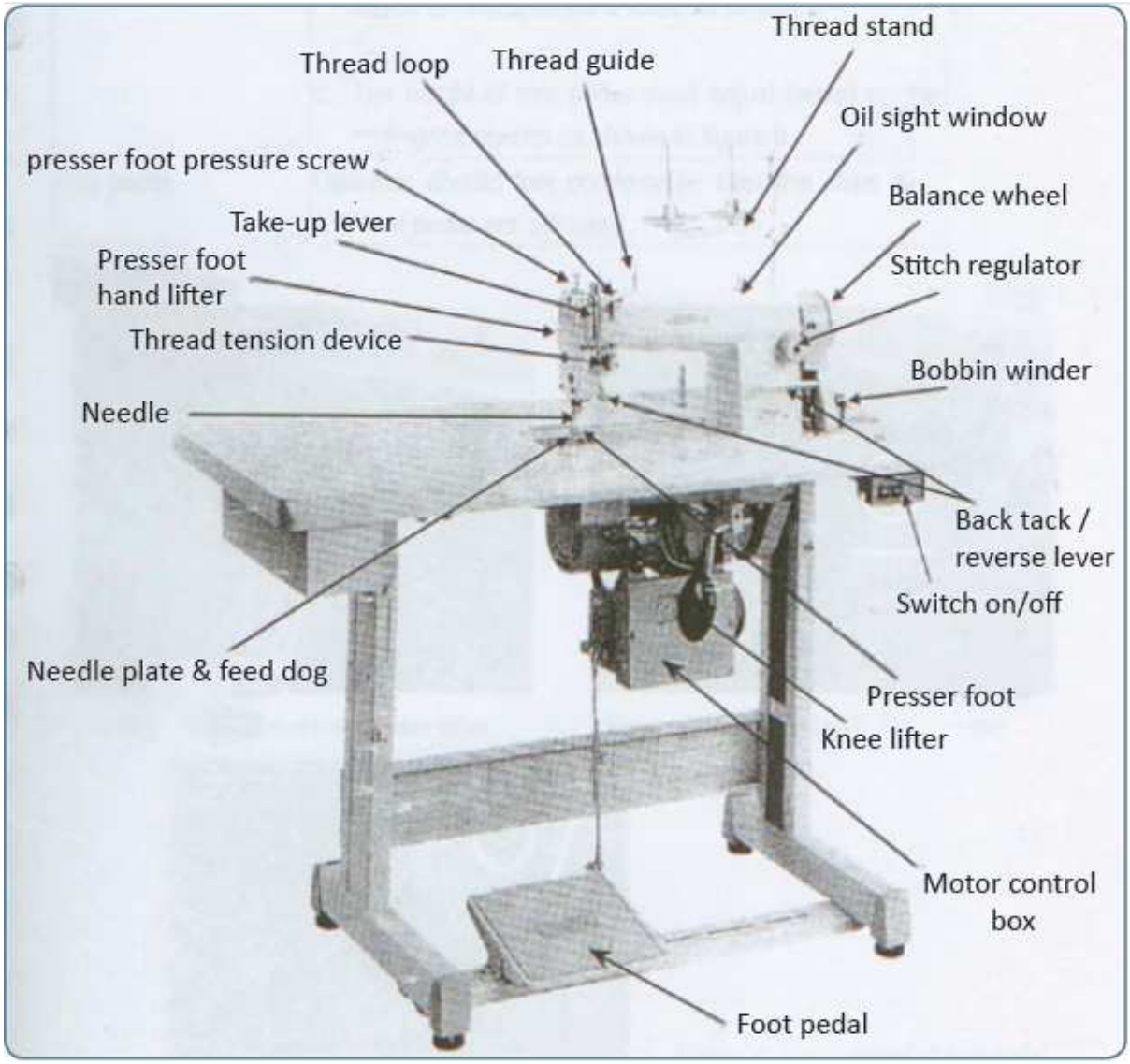
Round Belts Round belts have a circular cross-section. They are used in domestic and button attach machines.	
V Belts V belts have a triangular cross section. V belts are used in single needle lock stitch, double needle lock stitch and overlock machines.	

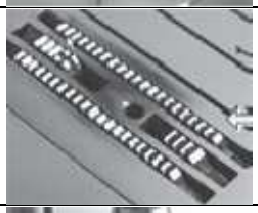
Flat Belts Flat belts are fl at and are similar in cross section to the belts we use. Flat belts are used in buttonholing machines.	

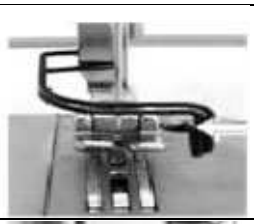
Setting up a Sewing Machine

The manufacturer's Guide (provided with every machine) list the steps to set up the machine.
It consists of the safety instructions, technical data, operations, optional equipment and maintenance procedures.
It differs on the basis of machine type and the manufacturer.
The operator should refer to the manual carefully and follow the instructions for setting up the machine and also the maintenance procedure.

Parts of the Sewing Machine



	**Needle:** is one of the most important part of the machine, it carries thread through the fabric to the bobbin and completes stitch formation.
	**Hook:** set is a devise in which bobbin and bobbin case can be fitted
	**Bobbin Case:** holds the bobbin and controls the thread tension
	**Bobbin:** holds the lower thread or the bobbin thread
	**Throat plate:** or needle plate forms a smooth surface over which fabric can move, it has a hole and sometimes also a markings to guide the seam allowance
	**Feed dog:** moves the fabric through a predetermined distance
	**Presser foot:** holds the fabric firmly against throat plate, and teeth of the feed dog , it prevents the fabric from rising and falling with the needle.
	**Reverse feed lever:** is used for backtack or back tacking.

	**Finger guard:** is a safety device that prevents an operator's finger getting trapped or hurt by the needle.
	**Presser Bar:** holds the presser foot
	**Tension post:** provides correct tension to the needle thread
	**Presser foot regulator:** is used to adjust the pressure depending on the type of the fabric
	**Thread take up lever:** gives tension to the thread
	**Oil sight window:** indicates the presence of lubricating oil
	**Stitch length regulator:** is used to set the number of stitches per inch (SPI)
	**Thread stand:** used for supporting the thread package like spool bobbin etc

	**Knee Lifter:** is used to lift the presser foot with the use of knee
	**Hand Lifter:** is used to lift the presser foot.
	**Bobbin Winder:** is used to wind thread in empty bobbin. It may be located differently in different types of machines
	**On Off Switch:** these are two switches, which are used to on and off the machines. The RED button is for switching the machine OFF and the BLACK/ GREEN button is for switching the machine ON.
	**Pedal:** The machine does not start unless the pedal is depressed, it is majorly used for controlling the speed of the machine.

Attachments used on sewing machines

Some common attachments used while sewing are:

THE SEAM GUIDE - Instead of putting layers of tape on the bed of your machine, use the SEAM GUIDE with its thumb screw. It was designed to as a guide for straight stitching when making wide hems, deep tucks or seam widths which are greater than presser feet allows.

THE ADJUSTABLE CORDING FOOT - This practical foot is used to allow a heavy or bulky substance (such as a zipper) to ride close to a stitching without the danger of needle placing into a cord or into the link of a zipper, bending or breaking the needle. This attachment can be placed either to right or left of machine needle by loosening its screw and moving it to the right or left.

THE GATHERING FOOT - This is an attachment to obtain professional gathers on a single thickness of material by controlling the length of stitch and tension. It is a boon to the sewer wherever gathers are being used on a single thickness of material or as a trimming. Substitute the gathering foot in place of regular sewing foot.

THE QUILTING GUIDE - Quilting guides can be attached along the regular stitching foot, some others can be inserted in a slot fitted on the presser foot shank. Set forked holder at the desired angle, so that the quilter may not rest too heavily on material to be quilted

THE BINDER - This attachment is used to make bound edges with tapes, etc. To use the binder, replace regular presser foot with it. To make bound edges with ordinary binding, insert it to the mouth of the binder until it reaches point directly beneath the needle. Next, insert material to be bound likewise. Lower presser bar and proceed to sew.

THE EDGE STITCHER - Edge stitchers can be attached to the machine like any other feet. They can be snapped in place in the case of a multi-attachment shank, or individually with the presser foot thumb screw. Slots and holes usually numbered from 1 to 5 are used to joint fabric, lace, tape, together.

THE ADJUSTABLE HEMMER - This attachment can save time and will create wide hems. Install on machine by replacing the regular presser foot.

THE RUFFLER - The ruffler makes possible ruffling and plaiting in uniform fullness. With simple adjustment, it can vary fullness of ruffle and group plaits or gathers without removing the ruffler from the machine. To attach ruffler to the machine, raise needle to the highest position then remove presser foot and attach rufflerfoot in its place, with fork arm astride the needle clamp screw. Tighten

screw firmly. Make sure needle passes through the center of the hole in the foot of ruffler by turning hand wheel slowly.

Advantages of using attachments:

1) By using attachments we can mainly get high quality of operation.
2) We can easily fold the fabric and feed the fabric.
3) Reduces manpower.
4) Maintains quality

Do's and Dont's while sewing

1. Oiling and threading should be ensured.

2. Bobbins should be accurately wound.

3. Align all notches while sewing.

4. Before starting stitching place threads under the presser foot to prevent balloon stitch.

5. Test a small sample before start of sewing.

6. Start and stop the machine with thread take up lever at the highest position.

7. Before start and stop of sewing do few reverse stitches.

8. Always keep machine covered when not in use to prevent dust and lint After Oiling of the machine, stitch some waste fabric to remove excess oil Keep a piece of fabric under the presser feet to avoid impression of feed dog.

9. The piece of fabric also helps to absorb oil leakage from the needle bar Wind bobbin only up to the guideline marked up to the edge of the bobbin Avoid forcing the fabric underneath the needle.

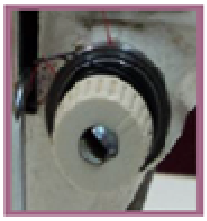
10. Always switch off the machine before leaving. Keep your hand way from the needle while sewing and ensure sufficient light.

Check threading before stitching.

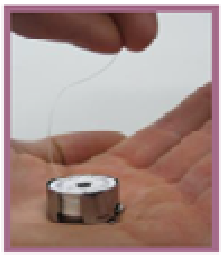
Check SPI before stitching

Check threads quantity in bobbin and on Cone before stitching

Be sure to keep your eye on the needle while sewing. Do not touch the balance wheel, thread take-up, needle, or other moving parts.

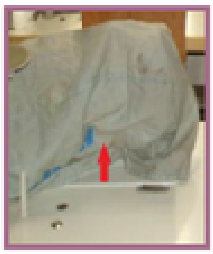


Check Bobbin and Thread Tension before stitching

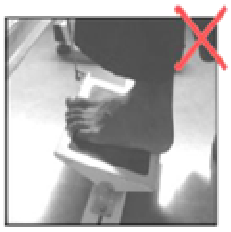


Keep fabric under pressure foot before leaving your seat

Cover the machine before leaving

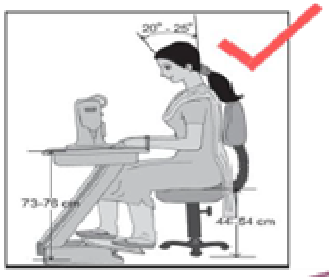


Don't operate the machine without foot wear.



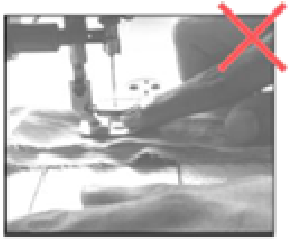
Remember to turn off the power switch when:

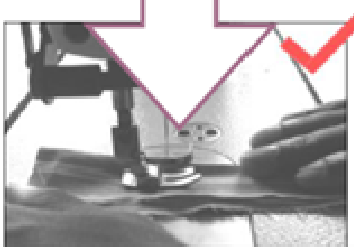
- Operation is completed
- Replacing or removing the needle or any other parts
- A power failure occurs during use
- Maintaining the machine
- Leaving the machine unattended.



Do not bend on machine and sit comfortably and straight.
Do not re-tie or comb your hair near the machine area.

While sewing keep the finger away from needle, take up lever area.





Sewing Operation

At the end of this session you will be able to:

- Set up and adjust controls
- Perform machine checks
- Attach needle, bobbin and thread
- Adjust needle thread tension
- Understand stitch formation
- Perform straight and curve stitching
- Understand the stitching faults
- Rectify stitching faults
- Check readiness of machine and material.

Perform sewing

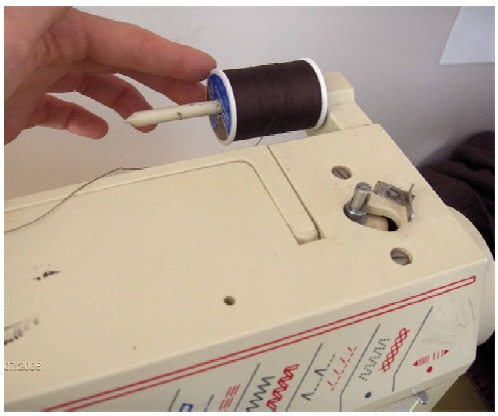
Session Plan	
1	Adjusting the machine
2	Factors affecting stitching
3	Pre-sewing activities
4	Practical

Adjusting the Machine

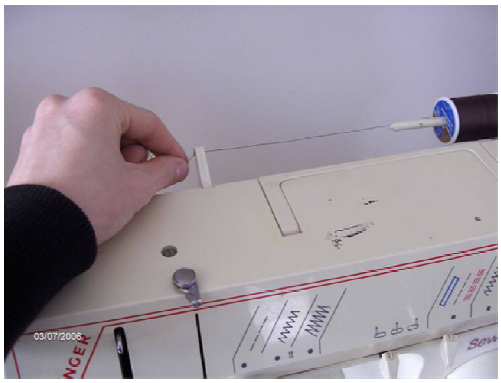
Threading

Step 1

This is where the thread goes. If you have a cap or stopper put it on after you put the thread on. Also put the side of the thread with the little cut (for holding the end on the thread) to the back or bottom. This will prevent hang ups.



Step 2
Allow the string to unwind and put it through this hoop. Mine can also snap in from the back but usually with older machines this is a hoop.



Step 3
This can also be a loop but mine slides in through the back.

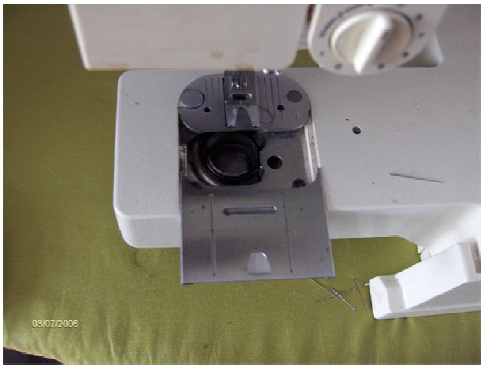
Step 4
From the tension bring the thread up and from right to left put it through the hole here. Mine can also slide in from the back.

Step 5
Then bring it down from the take up lever into the coiled thread guide.

Step 6
Then into the next thread guide.

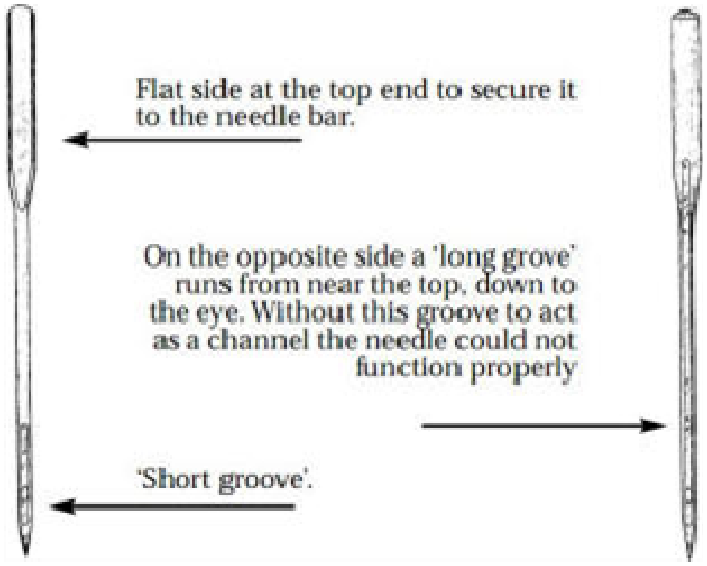
Step 7
Then thread the needle front to back or right to left depending on your machine. Pull enough thread through so that it does not pull out when the needle moves 5-10 inches.

Step 8
For inserting the bobbin.

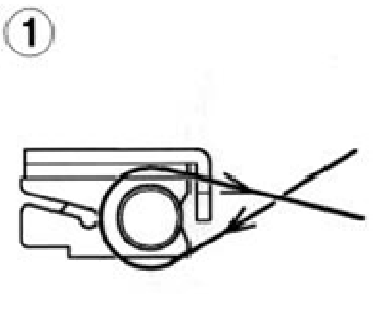


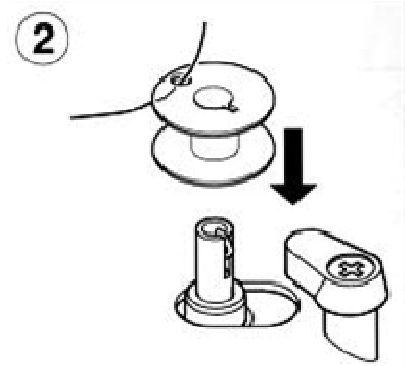
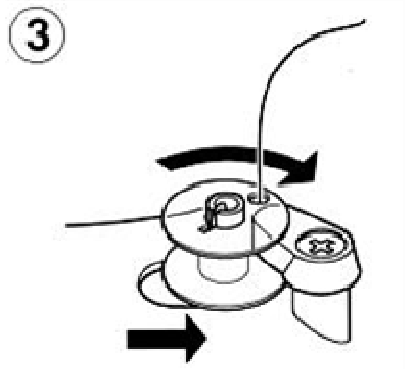
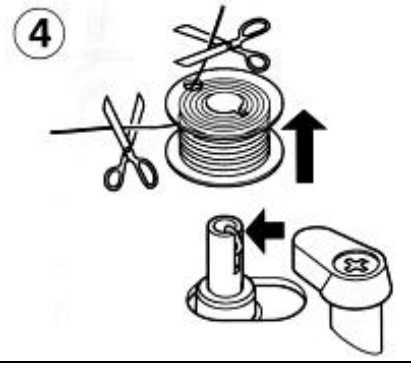
Step 9
Pull the string out tight and set the bobbin into the tray. Insert the thread into the metal notch and pull back.

Attaching the needle



Using the Bobbin winder

	1. Place spool of thread on spool pin. 2. Slide spool pin holder/cap firmly over rim of spool to prevent thread from tangling. 3. Push bobbin winder pin to far left if it is not already there. 4. Pass the thread from spool through thread guide . .

	1. Pass thread end, from inside, through small hole in rim of bobbin
	1. Place bobbin onto pin. 2. Push bobbin winder pin to the. This will stop the needle from moving.
	1. Holding thread end, step on speed controller to run machine until desired amount of thread is wound. (Winding stops automatically once bobbin is full.) 2.Cut thread; push bobbin to the left and remove it from bobbin winder pin.

Treadles

A treadle is a part of a machine which is operated by the foot to produce reciprocating or rotary motion in a machine such as a weaving loom (reciprocating) or grinder (rotary). Many of the early sewing machines were powered by a treadle mechanism. The treadle was operated by pressing down on it with a foot, or both feet, to cause a rocking movement. This movement spins a large wheel on the treadle frame, connected by a thin leather belt to a smaller driving wheels on the sewing machine.

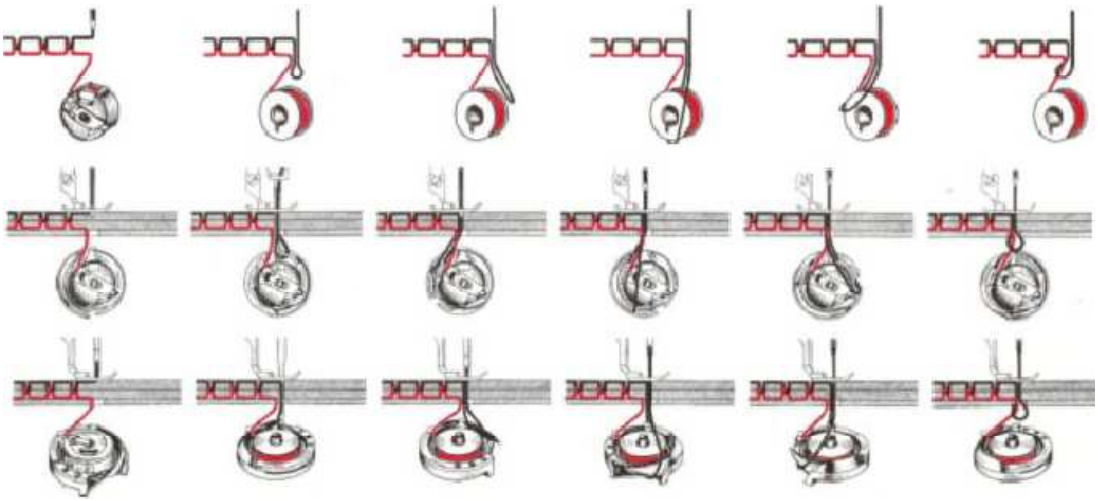
Tension adjustment

To make a basic adjustment, adjust the bobbin spring; tighter if the bobbin thread shows on

the upper layer, and looser if the needle thread shows on the under layer.

Stitch Formation

The lockstitch uses two threads, an upper and a lower. Lockstitch is so named because the two threads, upper and lower, lock together in the hole in the fabric which they pass through. The upper thread runs from a spool kept on a spindle on top of or next to the machine, through a tension mechanism, through the take-up arm, and finally through the hole in the needle. Meanwhile the lower thread is wound onto a bobbin, which is inserted into a case in the lower section of the machine below the material.



To make one stitch, the machine lowers the threaded needle through the cloth into the bobbin area, where a rotating hook (or other hooking mechanism) catches the upper thread at the point just after it goes through the needle. The hook mechanism carries the upper thread entirely around the bobbin case, so that it has made one wrap of the bobbin thread. Then the take-up arm pulls the excess upper thread (from the bobbin area) back to the top, forming the lockstitch. Then the feed dogs pull the material along one stitch length, and the cycle repeats.

Factors affecting stitching

Fault	Causes	Remedies
Sewing machine stops during sewing	Sewing machine has been run at a low speed for an extended period of time. To prevent overheating, motor power is automatically turned off.	Turn power off and wait about 20 minutes. Safety device will reset, and machine will be ready to operate.
Needle will not move	Upper thread has run out. Presser foot is up. Bobbin winder shaft in winding position. Buttonhole lever was not lowered when machine was in buttonhole mode.	Replace empty spool and thread machine. Lower presser foot. Move bobbin winder shaft back fully to left. Lower buttonhole lever.
Upper Thread breaks	Threading is not correct. Thread has a knot in it. Thread tension is too tight. Needle is bent or blunt or has a sharp eye. Needle is wrong size. Needle has been inserted wrong. Needle and thread does not match.	Correctly thread machine. Remove knot. Correct thread tension. Replace needle. Replace needle with correct size. Properly insert needle. Start machine at a medium speed. Check threading order.
Bobbin thread breaks	Bobbin has not been fully inserted in bobbin case. Bobbin has been incorrectly threaded. Lint in bobbin case	Securely install bobbin into bobbin case. Correctly thread bobbin case. Clean bobbin case and shuttle.
Needle breaking	Inconect size of needle for thread and fabric. Needle bent. Pulling of material while stitching. Pressor foot incorrectly set. Crossing a thick seam using a too small needle.	Set the presser foot properly. Select appropriate needle and thread to match the fabric. Fabric should not be pulled out while stitching.
Material not feeding correctly	Stitch Regulator set too close to 'O' point. Dirt under needle plate near feed dog. Incorrect presser foot pressure. Bent pressure foot.	Stitch regulator should be set to a correct number to match the fabric. Clean the feed dog and the lower side of the needle plate. Check the presser

		foot and its pressure.
Machine runs heavily	Lack of oil. Thread wound around the wheel or treadle bearings. Belt too tight. Bobbin winder pressed down. Thread jammed in shuttle race. Gummed oil or dirt on bearings	Stitch regulator should be set to a correct number to match the fabric. Clean the feed dog and the lower side of the needle plate. Check the presser foot and

Pre-sewing activities

Before sewing a garment, the sewing machine operator should

- Check that equipment is safe and set up in readiness for use
  Perform a machine, needle and spool check. Do a sample run to check thread tension.
- Check that the materials to be used are free from faults
  Go through all the material required for constructing the garment. Do fabric, thread and trims checking before sewing.
- Ensure the materials used meet the specification matching

Go to through the spec sheet and make sure the materials meet the specifications provided by the buyer

Practical

1) Practice Threading the machine and adjusting tension
2) Practice back stitch

3) Practice stitching in Straight lines

4) Practice stitching curved lines

5)Practice zigzag lines

Stitch and Seam Types

At the end of this session you will be able to:

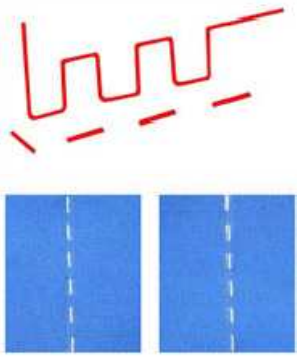
- Different types of stitches
- Different types of Seams

Session Plan	
1	Stitch types
2	Seam types

Stitch Types

Hand Stitch/ Saddle Stitch

This type of stitch is formed with one thread. It is a machine made version of traditional hand stitching sometimes referred to as Saddle Stitch.



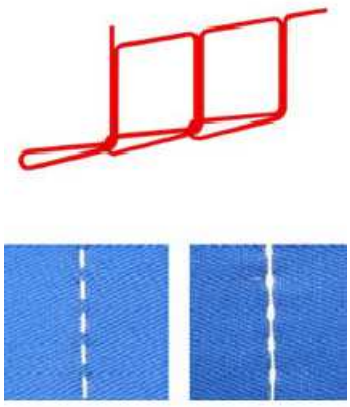
Chain Stitch

Chain Stitch was used by early sewing machines and has two major drawbacks:

The stitch is not self-locking, and if t he thread breaks at any point or is not tied at both ends, the whole length of stitching comes out. It is also easily ripped out.

The direction of sewing cannot be changed much from one stitch to the next, or the stitching process fails.

A better stitch was found in the lockstitch. The chainstitch is still used today in clothing manufacture, though due to its major drawback it is generally paired with an overlock stitch along the same seam.



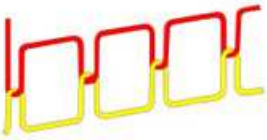
Multi-thread Chain Stitch

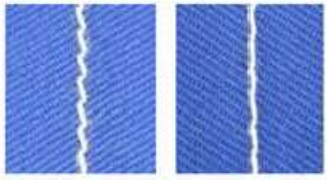
This type of stitch is formed with one thread and a curved needle which passes from left to right, entering and exiting from the same side of the material carrying a needle thread which is intercepted by a blind looper. The thread interloops with itself on the top surface. Particular care is required to prevent runback from the last stitch.

Lockstitch

Lockstitch is the familiar stitch performed by most household sewing machines and most industrial "single needle" sewing machines from two threads, one passed through a needle and one coming from a bobbin or shuttle. Each thread stays on the same side of the material being sewn, interlacing with the other thread at each needle hole by means of a bobbin driver. As a result, a lockstitch can be formed anywhere on the material being sewn; it does not need to be near an edge. Stitch making: The drive shaft has a vertical crank attached to it, going down under the base plate. Again, by a series of levers, this connects to a hook ring. The hook ring picks up

the upper thread and guides it round the bobbin holding the lower thread. Using the up and down movement of the needle and the rotation of the hook ring the two threads are looped together to form the stitch.

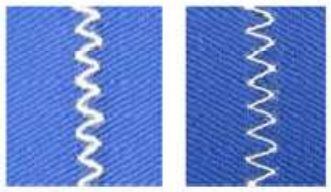




Zigzag Stitch

A zigzag stitch is variant geometry of the lockstitch. It is a back-and-forth stitch used where a straight stitch will not suffice, such as in preventing raveling of a fabric, in stitching stretchable fabrics, and in temporarily joining two work pieces edge-to-edge.

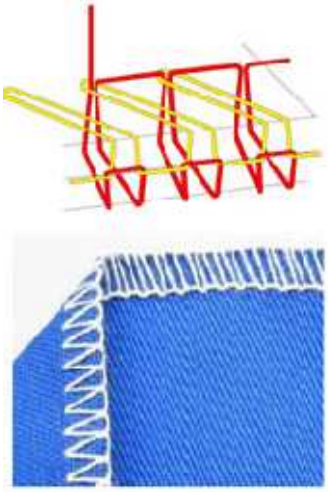
When creating a zigzag stitch, the back-and-forth motion of the sewing machine's needle is controlled by a cam. As the cam rotates, a fingerlike follower, connected to the needle bar, rides along the cam and tracks its indentations. As the follower moves in and out, the needle bar is moved from side to side. Very old sewing machines lack this hardware and so cannot natively produce a zigzag stitch, but there are often shank-driven attachments available which enable them to do so.



Overlock/ Over Edge Stitch

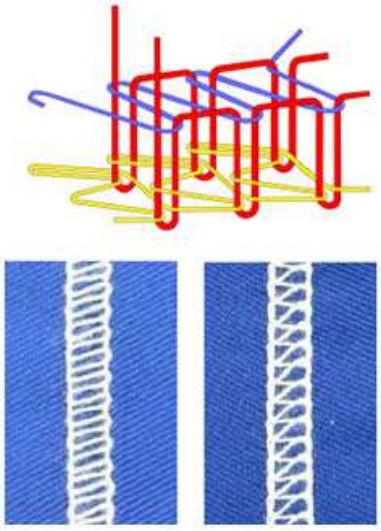
Overlock, also known as “serging” or “serger stitch”, can be formed with one to four threads, one or two needles, and one or two loopers. Overlock sewing machines are usually equipped with knives that trim or create the edge immediately in front of the stitch formation.

Household and industrial overlock machines are commonly used for garment seams in knit or stretchy fabrics, for garment seams where the fabric is light enough that the seam does not need to be pressed open, and for protecting edges against raveling. Machines using two to four threads are most common, and frequently one machine can be configured for several varieties of overlock stitch. Overlock machines with five or more threads usually make both a chainstitch with one needle and one looper, and an overlock stitch with the remaining needles and loopers. This combination is known as a “safety stitch”. Household overlock machines are widely used.

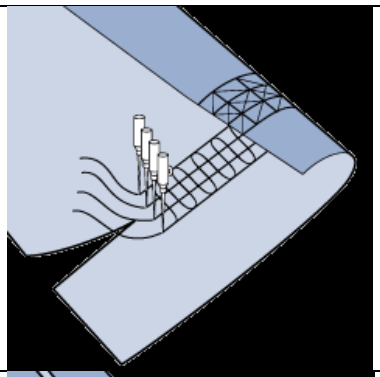
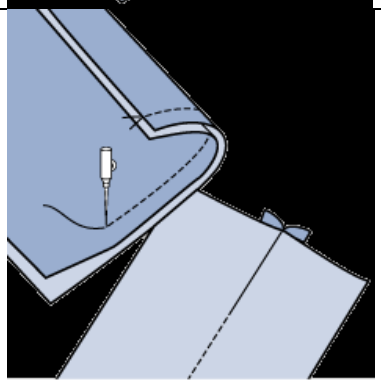
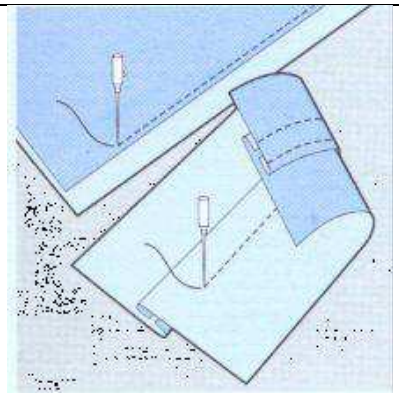


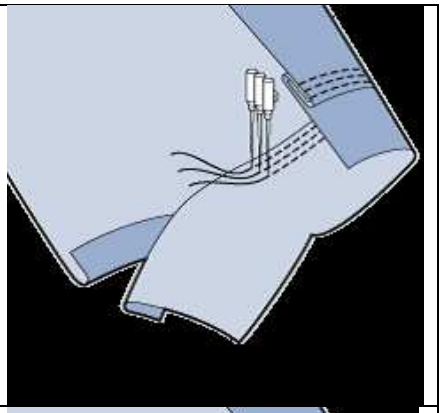
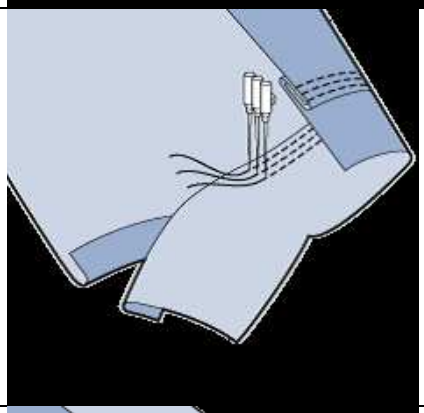
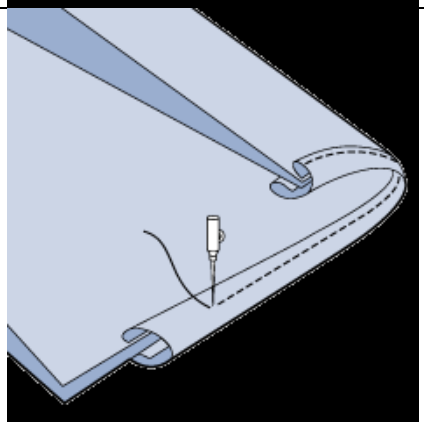
Coverstitch

Coverstitch is formed by two or more needles and one or two loopers. Like lockstitch and chainstitch, coverstitch can be formed anywhere on the material being sewn. One looper manipulates a thread below the material being sewn, forming a bottom cover stitch against the needle threads. An additional looper above the material can form a top cover stitch simultaneously. The needle threads form parallel rows, while the looper threads cross back and forth all the needle rows. Coverstitch is so-called because the grid of crossing needle and looper threads covers raw seam edges, much as the overlock stitch does. It is widely used in garment construction, particularly for attaching trims and flat seaming where the raw edges can be finished in the same operation as forming the seam.



Seam Types

Flat Seams	In these seams, sometimes called Butt Seams, two fabric edges, flat or folded, are brought together and over sewn with a zig-zag lockstitch, chainstitch or covering stitch (Class 600).	The purpose is to produce a join where no extra thickness of fabric can be tolerated at the seam, as in under wear or in foundation garments.	
Superimposed Seams	These generally start with two or more pieces of material superimposed over each other and joined near an edge, with one or more rows of stitches. There are various types of seams within the SS class. A superimposed seam can be sewn with a stitch 301 or 401 to create a simple seam. The same seam type can also be sewn with stitch class 500 (Overedge stitch) or Combination stitches (i.e. stitch class 516).	The purpose is to create neat load bearing seams for lingerie, shirts, etc.	
French Seam	French seaming involves 2 stitching operations with an intervening folding operation - a flat, folded seam with only one row of stitching visible on the top surface	French seaming involves 2 stitching operations with an intervening folding operation - a flat, folded seam with only one row of stitching visible on the top surface	

Lap Felled Seam	The Lap Felled type, involves only one stitching operation - a strong seam with fabric edges protected from fraying.	Commonly used for making up jeans or similar garments.	
Lap Felled Seam	The Lap Felled type, involves only one stitching operation - a strong seam with fabric edges protected from fraying.	Commonly used for making up jeans or similar garments.	
Bound Seams	These are formed by folding a binding strip over the edge of the plies of material and joining both edges of the binding to the material with one or more rows of stitching. This produces a neat edge on a seam exposed to view or to wear.		

Sewing Defects

At the end of this session you will be able to:

- Stitch components in right sequence
- Report defects to rectify

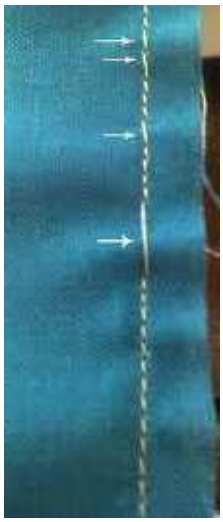
Session Plan	
1	How to avoid Stitching in the wrong sequence
2	Reporting defects

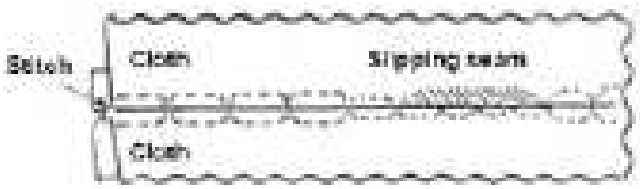
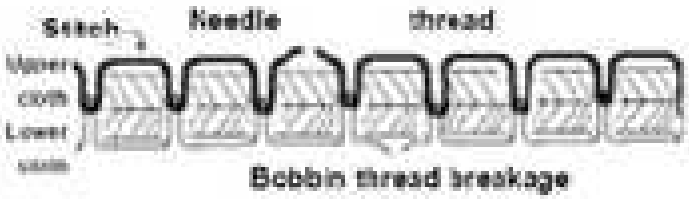
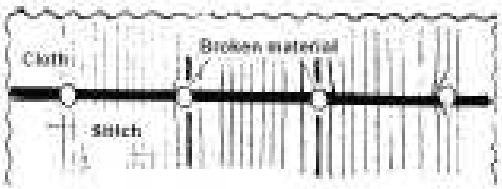
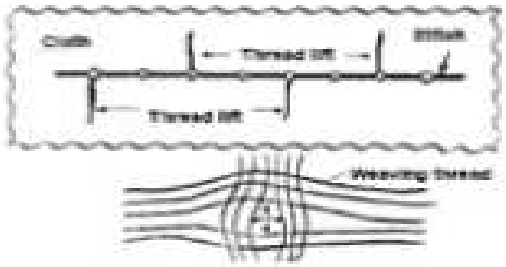
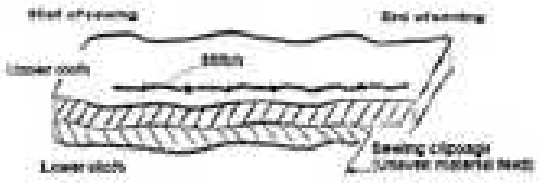
How to avoid stitching in the wrong sequence

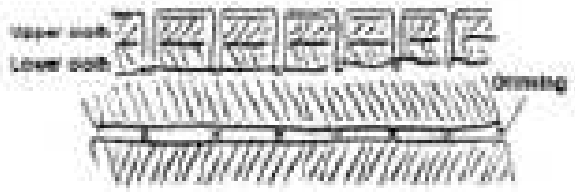
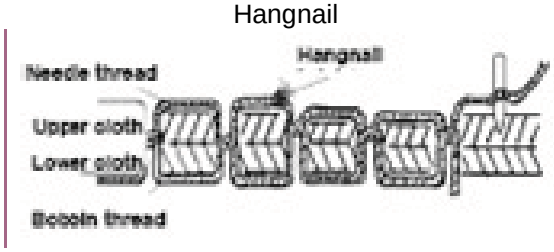
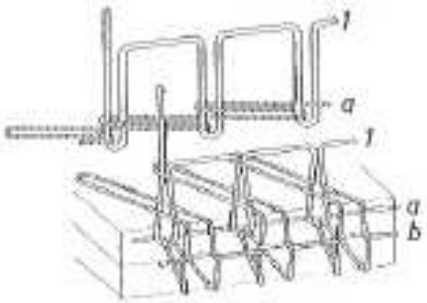
Stitching components of a garment is the right sequence is very important. The operation can use a flowchart to sew the components in right order
For example the sequence to sew a shirt
Make ready components (collar,collar band, packet, cuff)
Placket making
Shoulder joining
Sleeve preparation
Joining sleeve
Side seam
Pocket attachment
Collar attachment
Bottom hem

Reporting Defects

There are various types of sewing defects

Defect	Cause	Remedy
Skipped stitches 	Thread tension is too tight. Needle is bent or blunt. Needle is wrong size. Needle and thread does not match. Thread take-up lever has not been threaded. Light pressure on presser foot. Incorrect setting of needle.	Correct thread tension. Replace needle. Replace needle with correct size. Use proper thread or needle. Check threading order. Increase pressure on presser foot. Reset needle.
Irregular stitch 	Incorrect size needle. Improper threading. Loose upper thread tension. Light pressure on presser foot. Less pressure on the presser foot.	Choose correct size needle for thread and fabric. Rethread machine. Tighten upper thread tension. Increase pressure on presser foot.
Fabric puckering 	One or both tensions too tight. Stitches too long for material being sewn. Blunt needle.	Select the correct needle. Check for both tensions Fix the stitch length accurate to the fabric.

Slipping seam 	When the force is applied to stitch, the constituent thread of the part moves and stitch opens or slips.	Adjust the thread tension properly
Thread Breakage 	When the force is applied to stitch, sewing thread is cut.	Adjust the thread tension properly Follow the correct path for threading of the machine
Broken Material 	Constituent threads of cloth are cut by sewing machine needle at the time of sewing.	Use proper needle system and size Use needle point according to the type of fabric(woven, knits ect.)
Weaving thread lift 	The state that defective gloss or defective pattern occurs when a part of weaving threads is shift ed by stitch, sewing machine needle, awl, etc.	Use proper needle size and needle point
Sewing slippage 	Upper and lower cloths slip each other in the feeding Direction.	Adjust proper feed Timing. Adjust proper presser foot pressure and feed dog height. Use top and bottom feed mechanism. Adjust proper feeding ratio proportional

		to puller feed ratio
Seam Grinning 	Stitch opens since tension of sewing thread is insuffi cient.	Adjust the thread tension properly
Clogged Stitch 	A certain resistance force is applied to the sewing product and stitch pitch becomes irregular.	Don’t apply extra force to feed the fabric into the machine
Seam bray 	Sewing thread gets loose and the state of stitch skipping occurs.	Put back tack at start and end
Hangnail 	Th e state that several pieces of yarn of sewing thread are cut during sewing.	Use proper needle system and size Use needle point according to the type of fabric(woven, knits etc.)
Idle stitching 	Knotting point of thread is formed without sewing product.	Adjust proper tensions (decrease) at tension posts and bobbin or looper
Needle breakage defect	Scratch on sewing product made by needle tip when several stitches are	Adjust the needle thread tension

	performed in the state that needle is broken during sewing.	
Needle mark 	Trace of hole of sewing machine needle due to resewing, basting, etc.	Aviod seam ripping
Staggered stitches	Too little pressure on presser foot. Take-up spring weak, broken or missing.	Check the pressure on the presser foot and also for the take up spring.

These faults have to reported immediately to the supervisor .In case of not reporting, the defects will not be rectified and result is rework

Sewing Procedures

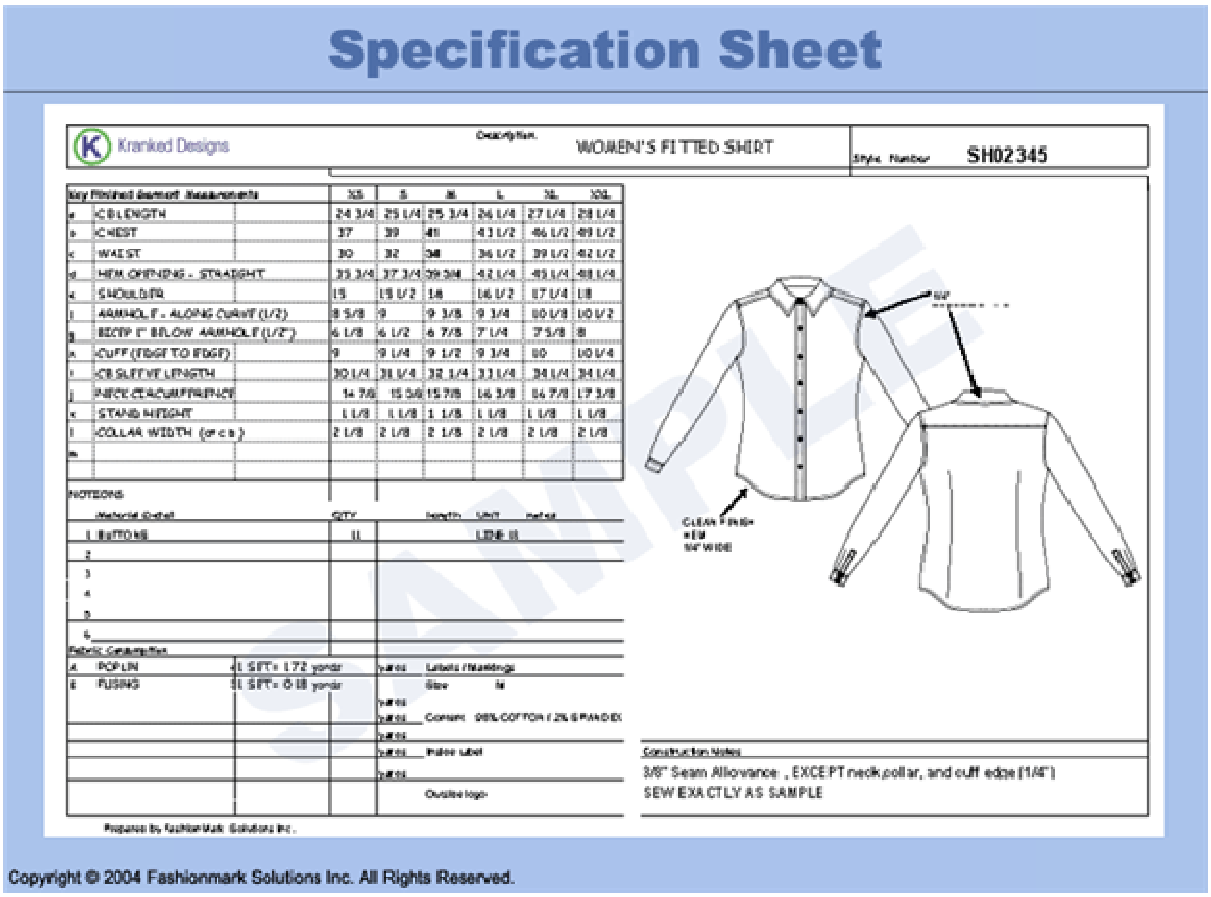
At the end of this session you will be able to:

- Use Specification sheets
- Make adjustments according to the specification sheet
- Follow proper inspection process and rectify faults
- Importance of keeping stitches parts separately

Session Plan	
1	Specification sheet
2	Rectifying Faults

Specification sheet

A Specification sheet a document provided by the buyer which gives information about the garment. The Spec sheet provides details regarding the Style number, style details, Fabric details, Size chart, order quantity, care instructions, etc.
The sewing machine operator should know to read the spec sheet and follow the exact measurements while sewing the garment.



Rectifying faults

The in-line checker checks the garments after sewing and compares it with the measurement of the spec sheet.
The sewing machine operator, in case of faults should rip of the faulty part and sew it again without hampering the fabric.
The operator should store the sewn parts of the garment carefully so that it does not get soiled due to dust or oil stains. These defects can cause rejections.

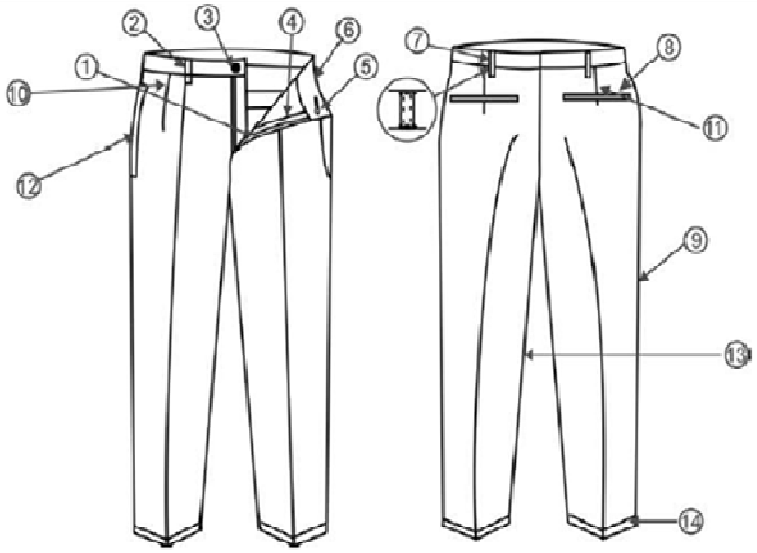
In case of such faults the operator should immediately report to the supervisor

Construction of garments	
	At the end of this session you will be able to: • Construct a trouser • Construct a Shirt

Session Plan	
1	Trouser construction
2	Shirt construction

Trouser construction

Parts of a trouser



S. No	Part name
1	Fly opening
2	Belt loop
3	Button
4	Zipper
5	Button hole
6	Belt
7	Bar tack on belt loop

S. No	Part name
8	Welt pocket
9	Out seam
10	Pleat
11	Dart
12	Front pocket
13	Inseam
14	Bottom

STEPS TO CONSTRUCT A MEN'S FORMAL TROUSER

Preparation of Pocket Bag (front)

Step 1: Take both the upper facing pieces and put overlock stitch on the longer straight sides. Make sure the

face side of the pieces is on top.

Step 1

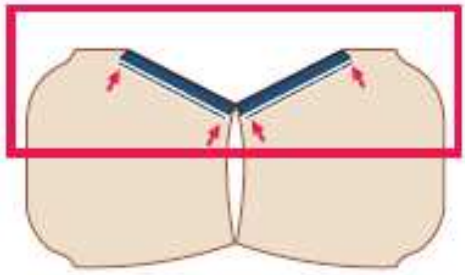
Step 2: Take both the lower facing pieces and put overlock stitch on the curved sides. Again, make sure that
the face side of the pieces are on the top.
(i) Note the notch martks on the lower facing pieces.
(ii) Note that the overlock stitch is on the curved side.

Step 2

Step 3: Take both of the pocket bag pieces and both upper facing pieces. Keep the upper facing piece over the pocket bag in such a way that the overlock part is facing inside and the stitch is facing upwards.

Step 3

Step 4: Put lockstitch at the edge of the overlock stitch.



Step 4

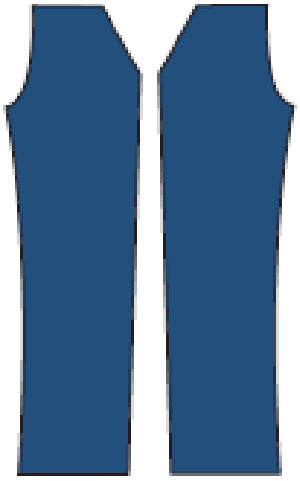
Step 5: Take both the lower facing pieces and keep them over the other side of the pocket bag. Make sure
theoverlock part is facing inside and the stitch is facing upwards.

Step 5

Step 6: Put the lockstitch at the edge of the overlock curved stitch.

Step 5

Pocket Attaching (front)
Step 1: Take the two front pieces and keep them on the sewing table with the face side up.



Step 1

Step 2: Take the pocket bag and place it over the left front piece aligning with the mouth of the pocket.

Step 2

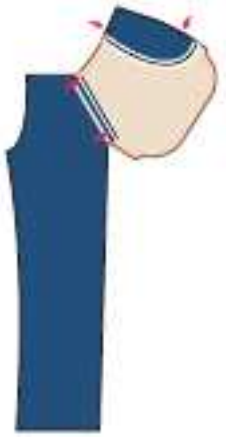
Step 3: Put 6 mm stitch taking ¼ line on throat plate as guide, starting from the top to bottom.

Step 3

Step 4: Turn the piece and put 4 mm stitch at the mouth of the pocket.

Step 4

Step 5: Match the lower facing and upper facing at thenotch marks.



Step 5

Step 6: Put 2 mm stitch starting from the waistline to the outer side of the left front piece.

Step 6

Step 7: Put 5 thread overlock stitches on the curved portion of the pocket bag.

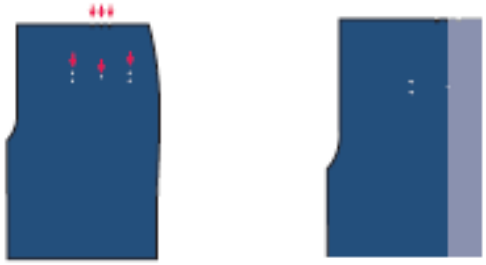
Step 8: Take the other pocket bag and place it over the right front piece aligning with the pocket bag (face to face).

Step 8

Step 9: Repeat steps 3-7 for the right hand side pocket.

Back Pocket Making

Step 1: Take a note of the notch marks and the pocket marking on the back piece.

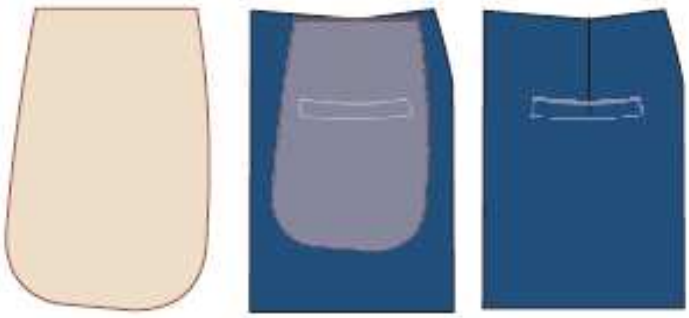


Step 1

Step 2: Fold the fabric at the centre notch mark and make a dart by starting to stitch on the notch mark till the centre marking

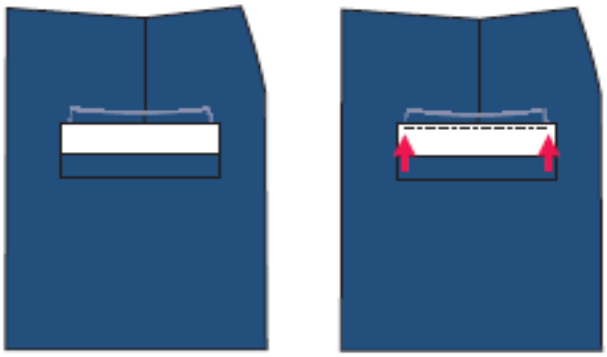
Step 2

Step 3: Take one of the back pocket bags. Place it belowthe back piece in such a way that the top end of the
back piece and the pocket bag are perfectly aligned. Make sure that pocket bag is aligned centrally to the dart.



Step 3

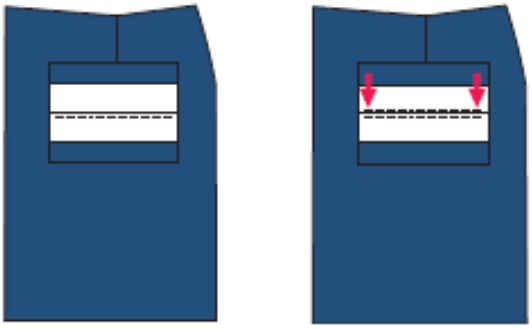
Step 4: Take one of the fused bone pieces and place it over the pocket markings in such a way that the top marks are visible and the bottom marks are covered by the bone pieces and are at equal distance from both sides.



Step 4 Step 5

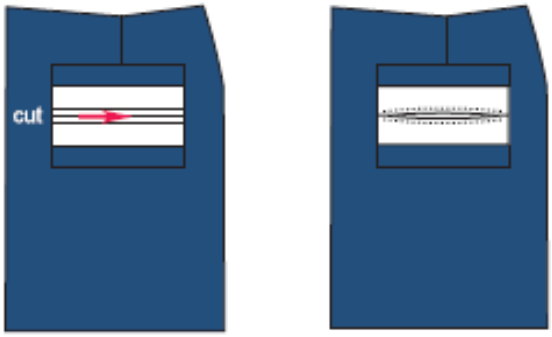
Step 5: Now put a 6 mm stitch starting from back rise side towards the side seam side. The first stitch should be at the notch mark side. Put back tack, both at the beginning and end of the stitch.

Step 6: Take the second fused bone piece and place it next to the stitched bone piece on the waist side.



Step 6 Step 7

Step 7: Put 6 mm stitch starting from the side-seam side towards the back rise side.



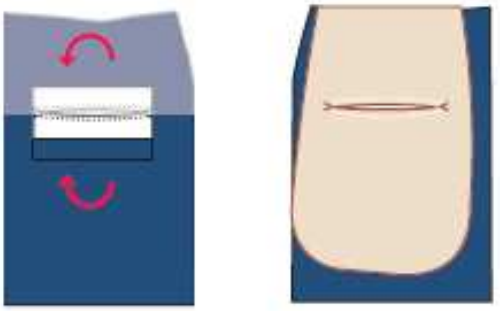
Step 8

Step 8: Cut the fabric between the two bones leaving 10–12 mm on both sides

.

Step 9: Make a v-cut till the end of the stitch on both the sides.

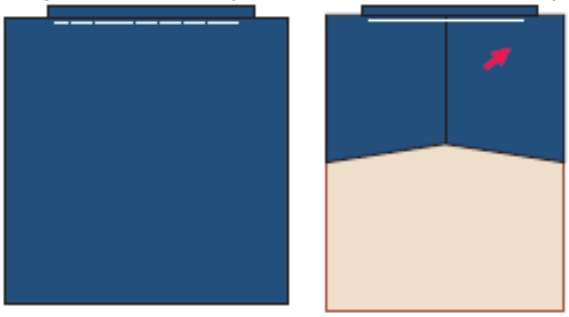
Step 9



Step 10

Step 10: Turn the bone piece inside, leaving the margin inside and 6 mm fabric outside.

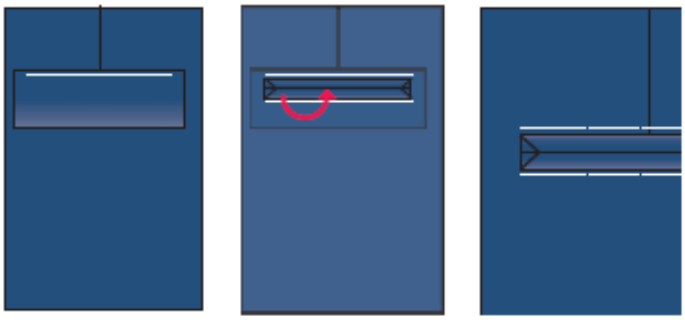
Step 11: Put a stitch on the edge of the folded portion next to the stitched portion.



Step 11 Step 12

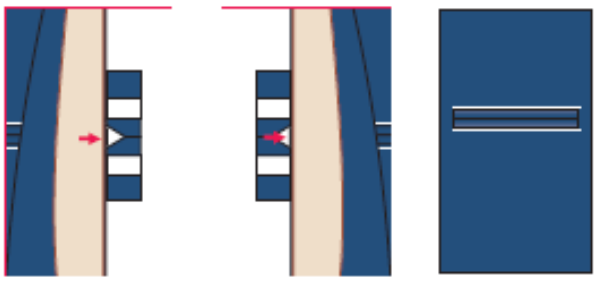
Step 12: Repeat steps 10 and 11 for the other bone.

Step 13: Push the balance fabric inside.



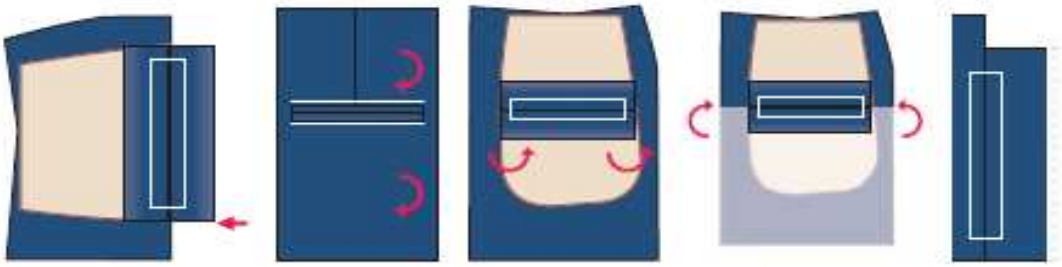
Step 13

Step 14: Put a stitch at the end of the cut portion.



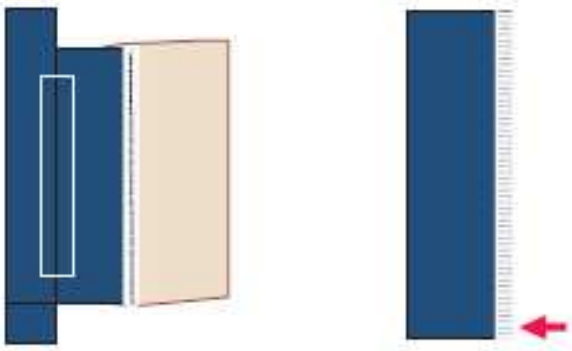
Step 14

Step 15: Put overlock stitch at the loose end of the bottom bone piece.



Step 15

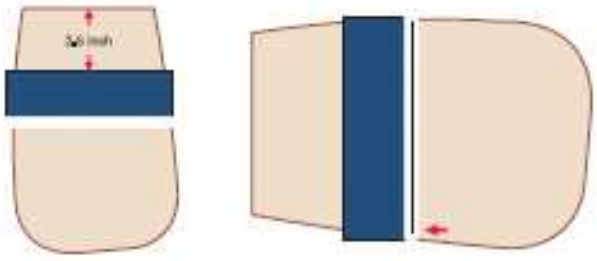
Step 16: Attach bone piece with the pocket bag using lockstitch.



Step 16 Step 17

Step 17: Put overlock stitch on the back pocket facing.

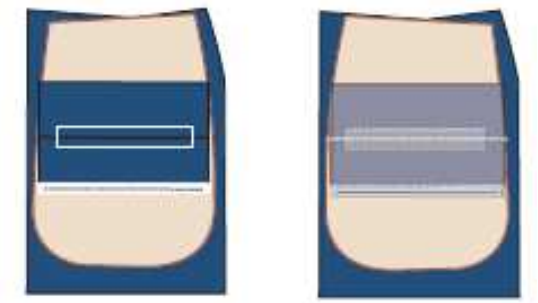
Step 18: Take the other piece of the pocket bag. Place the back pocket facing on top of the pocket bag at a distance of 2½ inches from top of the pocket bag.



Step 18 Step 19

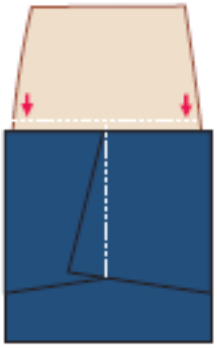
Step 19: Put a lockstitch over the overlock portion.
Step 20: Take the fi rst pocket bag, which is already sewn to the back piece. Place the other pocket bag over it.

Both the bags should match perfectly.



Step 20

Step 21: Now put a stitch at the inner side to join the two pocket bags together.



Step 21

Step 22: Put 5-thread overlock stitches starting from right (back rise side) to the left side.

Step 22

Step 23: Put 3 mm lockstitch at the waistline, starting from the left towards the right, to stitch the loose top end of the pocket bag with the fabric.

Step 23

FLY MAKING, ATTACHING

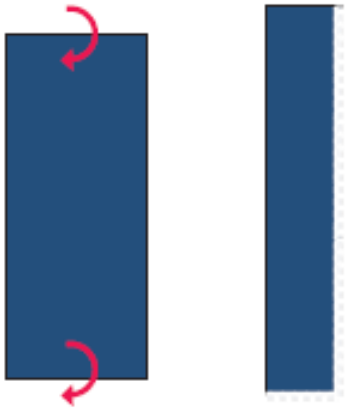
Fly Making and Attaching

Step 1: Take the fused J-fly piece and put overlock stitch on the face side of the fabric starting from bottom of the curved side till the top.

Step 1

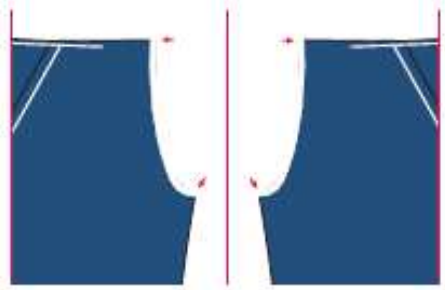
Step 2: Take the fl y supportive part. Fold it into two equal parts and put over lock stitch on the long open side

and one on the short open sides.



Step 2

Step 3: Put overlock stitches on both front risen separately.



Step 3

Step 4: Take the left front piece and place the J-fl y piece over the left front piece. Align the straight end of
the J-fl y with the front rise along with the backside of the J-fl y facing up.

Step 5: Put a 6 mm lockstitch starting from the bottom to the top (waist line).

Step 4 Step 5 Step 6

Step 6: Turn the J-fl y piece and put an edge stitch on top of the fl y from bottom to top. Make sure that the raw edges are facing towards the fl y.

ZIPPER–ATTACHING

Zipper Attaching

Step 1: Take the zipper, open it and bring the slider down.

Step 1

Step 2: Place the zipper with slider facing down over the fly piece at 8 mm from the straight edge at the top
and 6 mm at the bottom. Align the bottom edge ofthe zipper with the curved portion of the fly piece.

Step 2

Step 3: Put an edge stitch on the left side of the zipper from top to bottom.

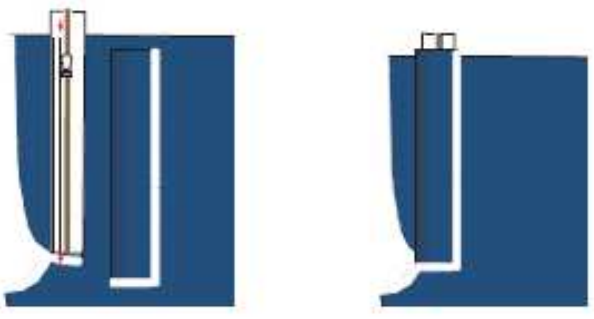
Step 3

Step 4: Close the zipper and turn the piece 180o clockwise.

Step 5: Now put a 4 mm stitch starting from bottom to top.

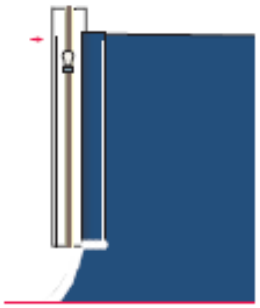
Step 5

Step 6: Take the fl y supportive part. Place the zipper with slider facing up on the fly supportive part. Properly
align the zipper end and the overlock side of the fly supportive part.



Step 6

Step 7: Turn the fabric and put edge stitch on the zipper starting from bottom to top.



Step 7

Step 8: Take the right front piece and place the front rise side over the zipper. Make sure that the waistlines

of both the left and right front pieces match.

Step 8

Step 9: Put 6 mm stitch starting from bottom to the top.

Step 9

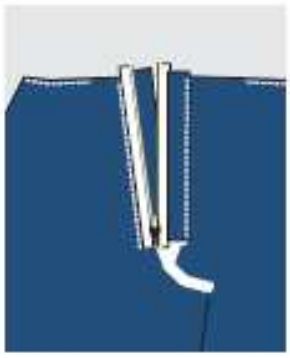
Step 10: Turn the stitched panels and bring the face side up.

Step 10

Step 11: Leave a gap of 1 mm between the zipper teeth and the edge of the fabric and put top-stitch.

Step 11

Step 12: Open the zipper.



Step 12

Step 13: Turn the left side front piece from the zipper side at the point of stitch.

Step 11

Step 14: Place the ready pattern of J-fl y over the left front piece on the front rise side.

Step 14

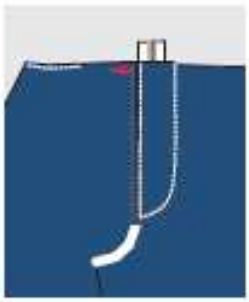
Step 15: Put lockstitch along the ready pattern starting from top to the bottom.

Step 15

Step 16: Close the zipper and complete the J-stitch along the J-pattern.

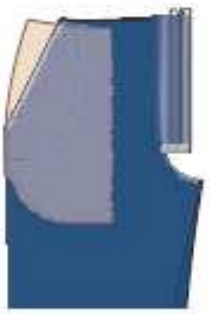
Step 16

Step 17: Put a top-stitch on the edge of the fi nished J-piece starting from bottom to top.



Step 17

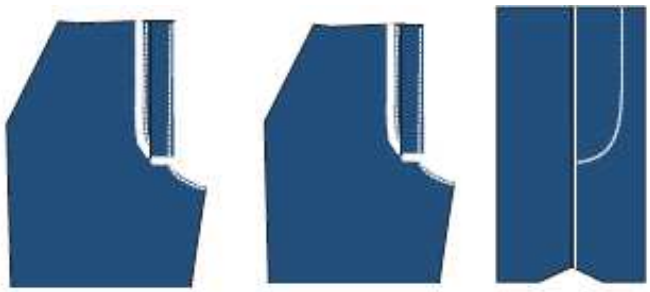
Step 18: Reverse the fabric and put 6 mm stitch on the curved portion of the front rise.



Step 18

Step 19: Turn the piece so that the front side of the fabric is facing up. Put an edge stitch on front rise starting

from bottom till the end of J-stitch.



Step 19

BACK RISE–ATTACHING

Back Rise Attaching
Step 1: Take both the left and right back pieces. Match them face-to-face.

Step 1

Step 2: Put 1 cm stitch at the back rise starting from top to bottom with back tack at both the top and bottom.

Step 2

Step 3: Now put overlock stitches at the back rise starting from top to bottom.

Step 3

Step 4: Turn the raw edges towards the left side and put top-stitch at the edge of the back rise.

Step 4

ATTACHING FRONT BACK PIECES

Front and Back Piece Attaching

Step 1: Place front and back pieces in such a way that the face sides of both pieces face each other.

Step 1

Step 2: Put 1 cm stitch throughout the right side starting from top to bottom.

Step 3

Step 5: Turn the raw edges towards the back. Put topstitches at the edge starting from top to bottom for the right side and bottom to top for the left side.

Step 5

Step 6: Align the back and front rise seams and the open sides of the front and back.

Step 6

Step 7: Put 5-thread overlock stitches starting from bottom to finish at other bottom side.

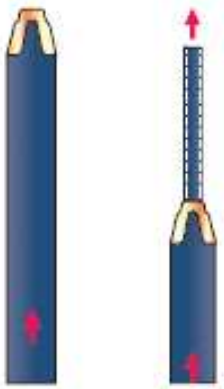
Step 7

BELT AND LOOP–MAKING AND ATTACHING

Belt Loop Making
Step 1: Take a long strap, 2.5 mm wide, of the fabric used in body.

Step 1

Step 2: Feed the fabric into the groove of the folder attached to a 2 needle–3 thread fl at lock machine.

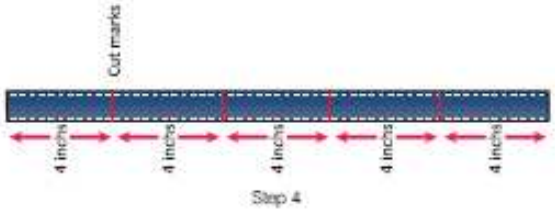


Step 2

Step 3: Start sewing and feeding the fabric properly.

Step 3

Step 4: Put the marking on the strap for the required length.

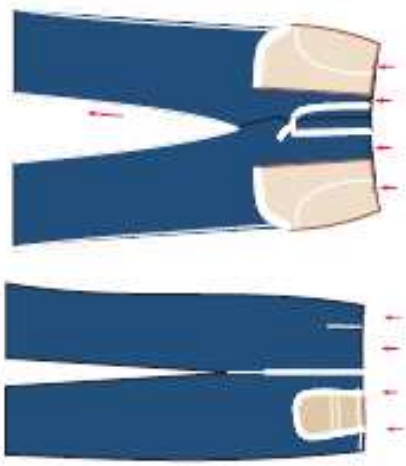


Step 4

Step 5: Cut the strap of desired length.

Step 5

Belt Loop Attaching
Step 1: Mark the positions on the waistline where the loops are to be attached.



Step 1

Step 2: Place the belt piece, with the folded side up on the backside of the right front. Belt band should be

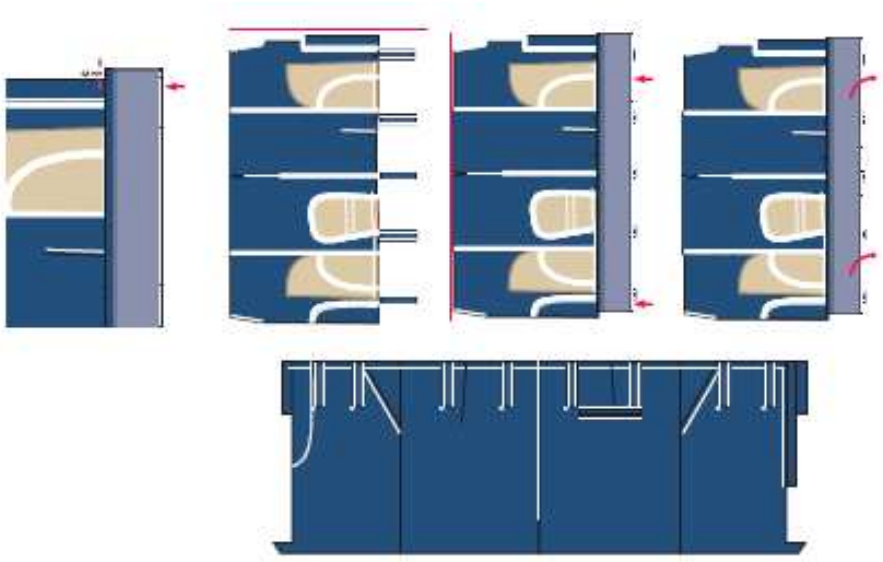
extended by ½ inch.

Step 2

Step 3: Put a lockstitch adjacent to the folded part of the belt piece.

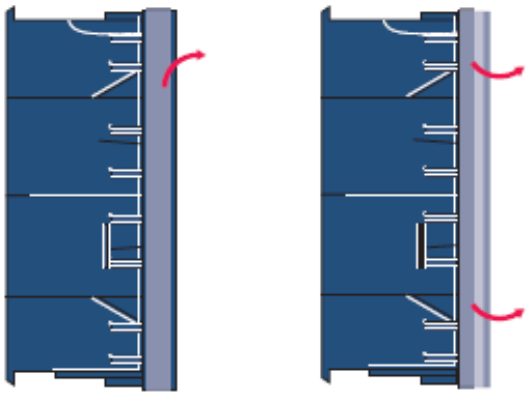
Step 4: Place the loop with the side facing the fabric and continue to stitch till the end by placing other loops

at required positions.



Step 4

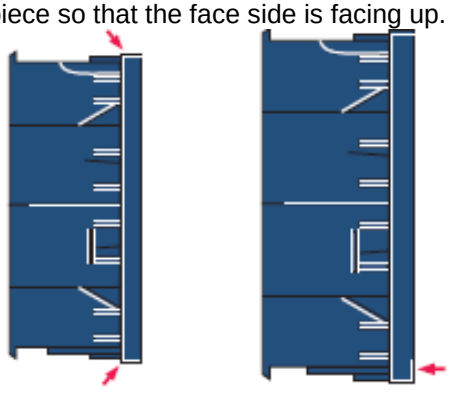
Step 5: Turn the belt piece in such a way that the fused side is up.



Step 5

Step 6: Stitch the open vertical end on both sides starting with back tack.

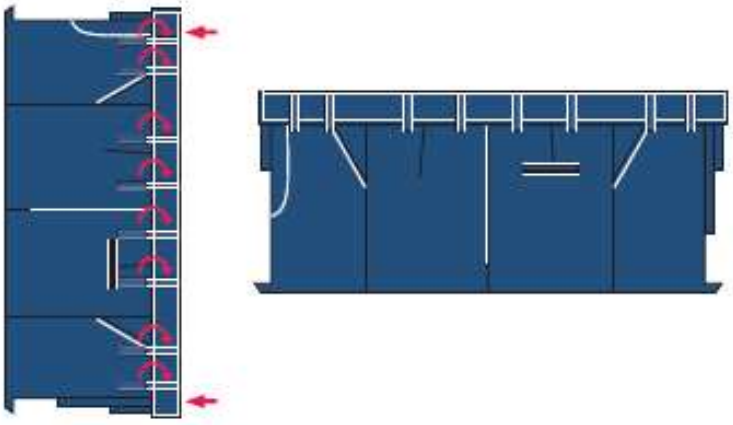
Step 7: Now again turn the belt piece so that the face side is facing up.



Step 7 Step 8

Step 8: Now put edge stitches throughout the length of the belt on the bottom side.

Step 9: Finally put edge stitches throughout the top side of the belt and stitch the loops at appropriate positions.

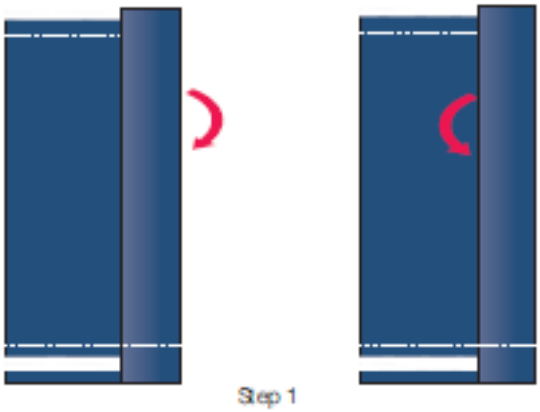


Step 9

BOTTOM HEMMING

Bottom Hemming

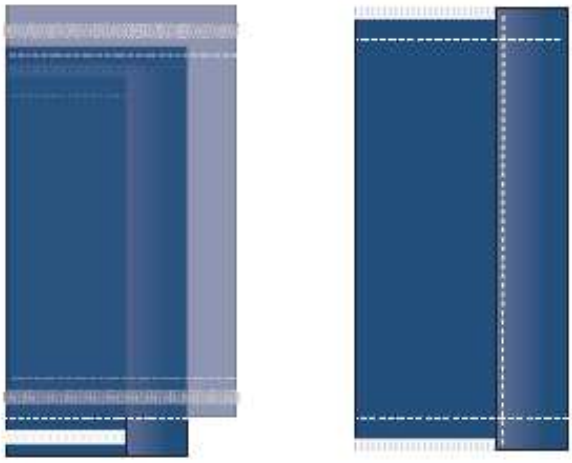
Step 1: Fold the fabric as per the design requirement.



Step 1

Step 2: Start putting the edge stitch from the inseam and fi nish at inseam.

Step 3: Repeat steps 1 and 2 for the other leg.



Step 2

Bottom Hemming Using Folder

Step 1: Fold the bottom of right trouser leg 1 cm inside.Again fold the fabric to the required width and put 2 or 3 stitches.

Step 2: Place the attachment in such a way that the folded portion is fi tted into the groove of the folder and then start stitching. Feed the fabric properly.

Step 3: Repeat steps 1 and 2 for the other leg.

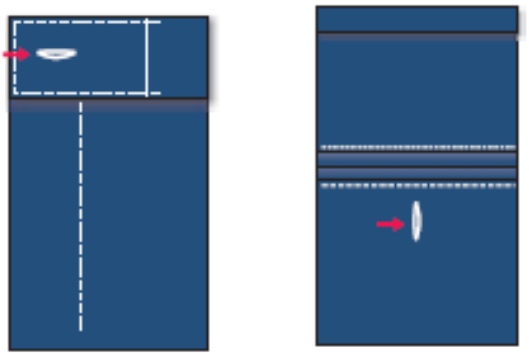
BUTTONS–HOLING, ATTACHING

Button Holing and Attaching

Button Holing

Step 1: Make the buttonhole on the left hand side belt as per design requirement. Make another buttonhole

on the back pocket.

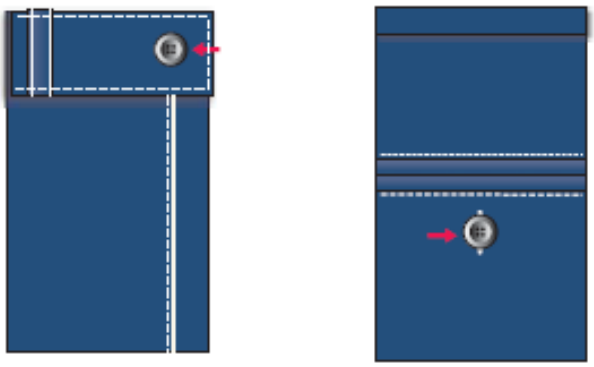


Step 1

Button Attaching

Step 1: Sew the button on the right hand side belt as per the design requirement and sew one button at the

back pocket.

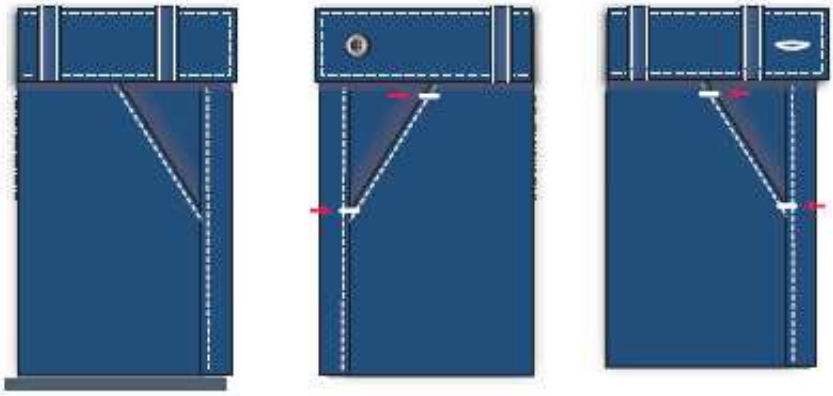


Step 1

BARTACKING

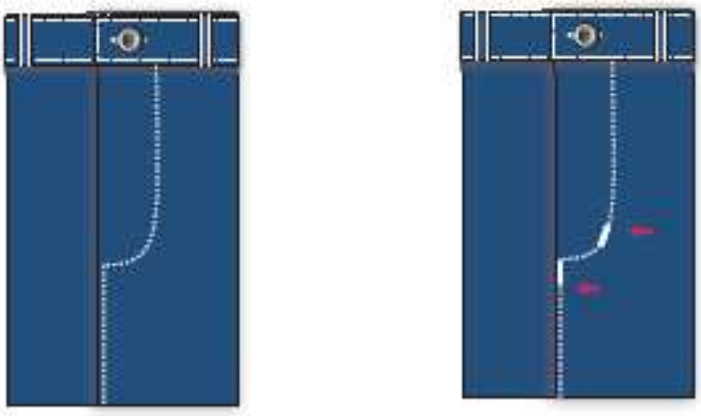
Bartacking

Step 1: Put bartack as per design requirement. Normally bartacks are put at both ends of left and right front pocket mouth and at the end of the front and back pocket joints.



Step 1

Step 2: Put the bartack at the end of the J-fl y and at the curve of the J-fl y.

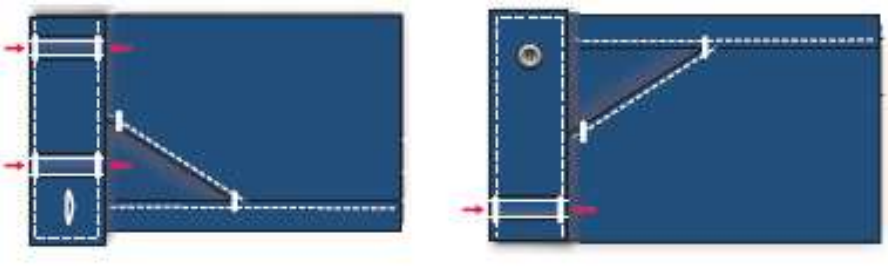


Step 2

Step 3: Put the bartack at the joining of front and back rise.

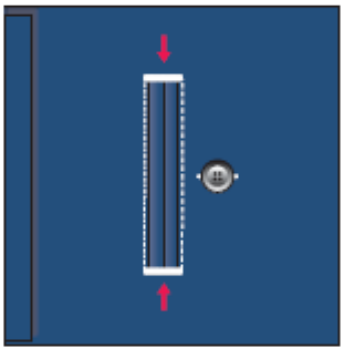
Step 3

Step 4: Put the bartack at the top and bottom of each belt loop.



Step 4

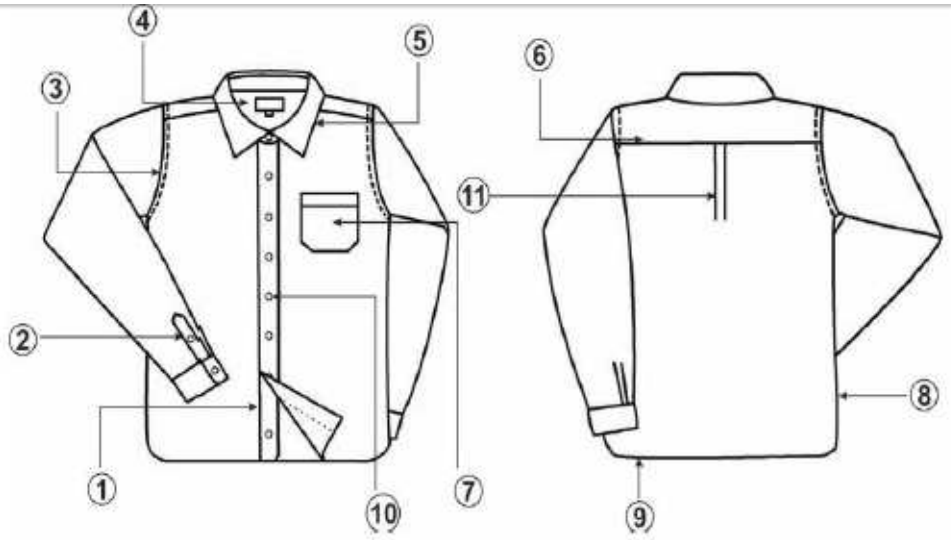
Step 5: Put the bartack at both ends of the back pocket.



Step 5

Shirt construction

Parts of a shirt

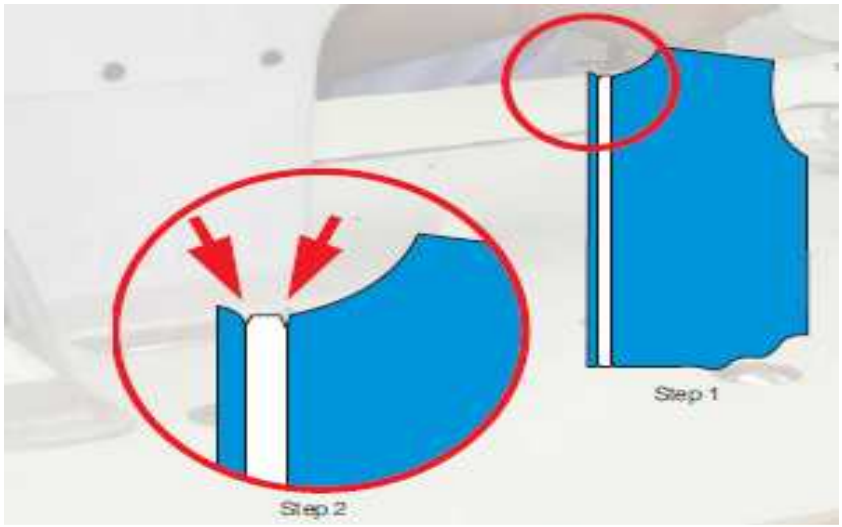


S. No	Part name
1	Front placket
2	Sleeve placket
3	Arm hole
4	Main label and size label
5	Collar
6	Yoke (shoulder/back)
7	Front pocket

S. No	Part name
8	Side seam
9	Bottom hem/bottom sweep
10	Button hole & buttons

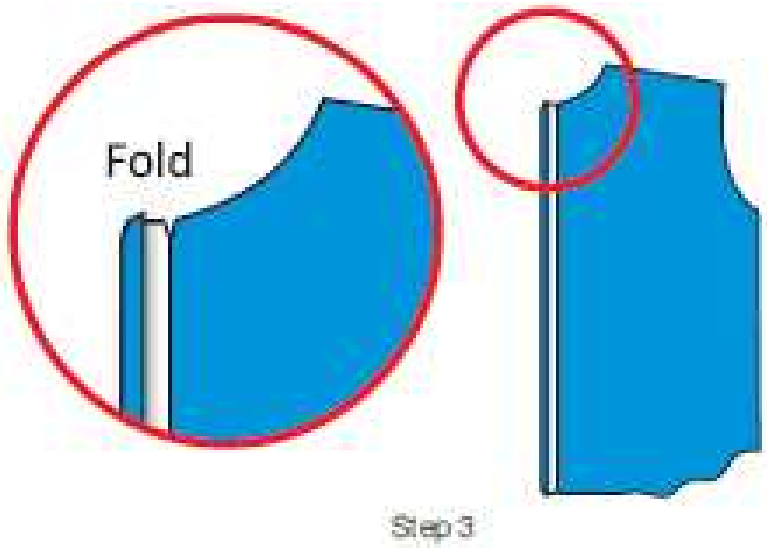
STEPS TO CONSTRUCT A MEN'S FORMAL SHIRT

Left Hand Side Placket
Step 1: Take the fused left hand side placket.

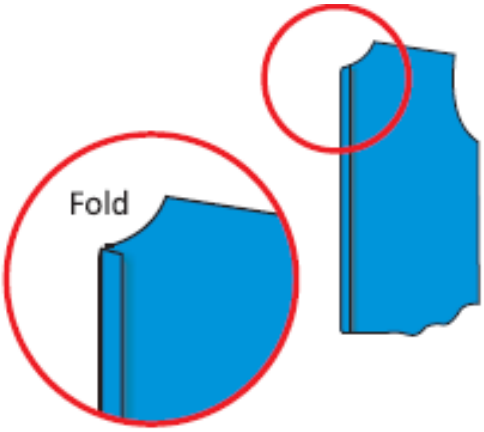


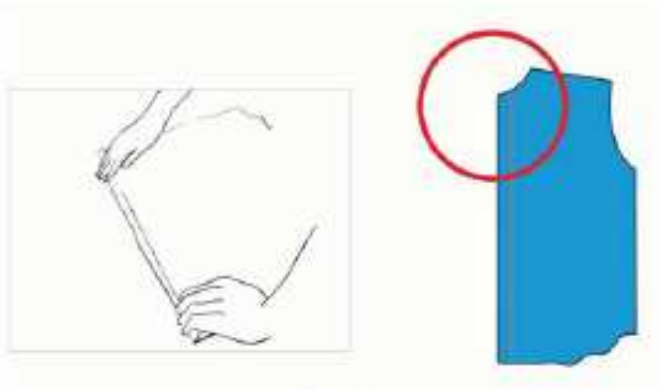
Step 2: Locate the two notch marks. There is one at 1.5 cm and the other at 5.5 cm from the edge.

Step 3: Now, fold the fabric 1.5 cm till the first notch mark and press the folded part with an iron.



Step 4: Now, fold the fabric 4 cm to the second notch mark. Th e placket should be 4 cm wide.





Step 4

Step 5: Now, crease the folded part again with an iron.

Step 5

Step 6: Start from the bottom and stitch the inner side of the placket using edge stitch.

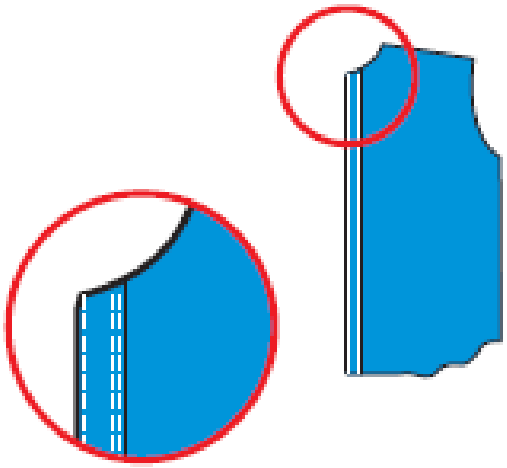
Step 6

Step 7

Step 7: Again from the bottom, stitch the outer side of the placket using edge stitch.

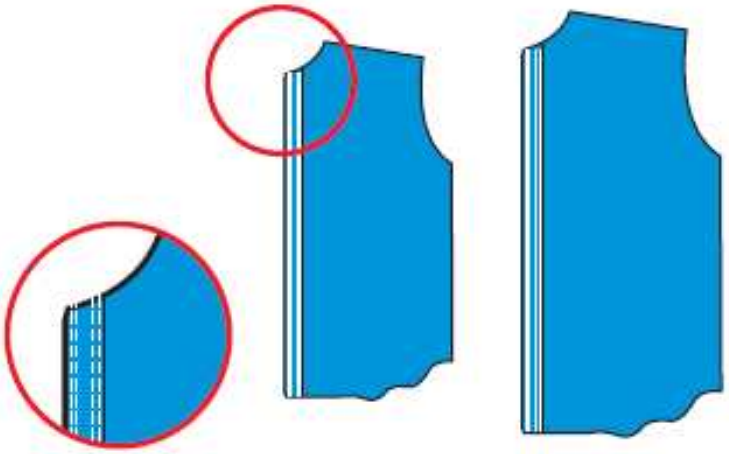
Step 8: Identify the reference mark on the throat plate and use it as a guide for the following step.

Step 9: Put a 4 mm stitch on the outer side of the placket from the bottom.



Step 9

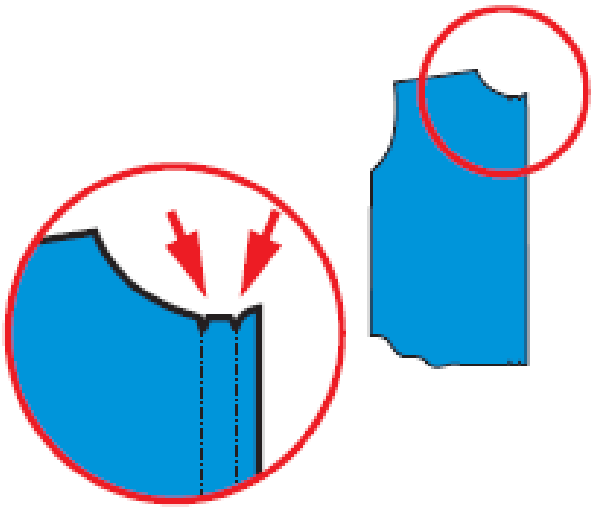
Step 10: Put a 4 mm stitch on the inner side of the placket from the top.



Step 10

Right Hand Side Placket

Step 1: Identify the notch marks on the back side of the fabric.

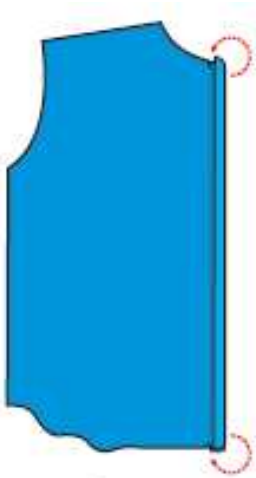


Step 1

Step 2: Fold the fabric 1cm towards the notch mark or the neck, on the back of the fabric.

Step 3: Crease folded part.

Step 4: Now, fold the fabric 2.5 cm till the second notch mark.

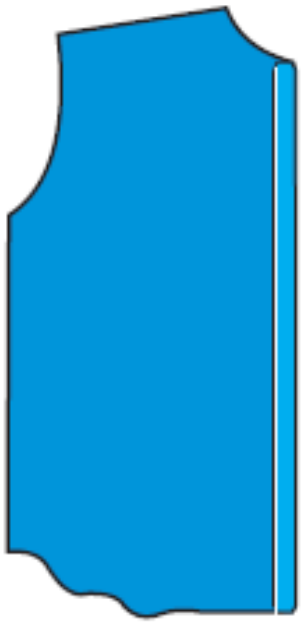


Step 4

Step 5

Step 5: Crease the fold with an iron again like in Step 3.

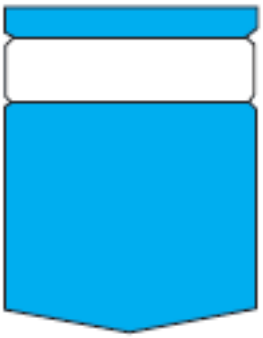
Step 6: Start from the top and stitch the inner side of the placket using an edge stitch.



Step 6

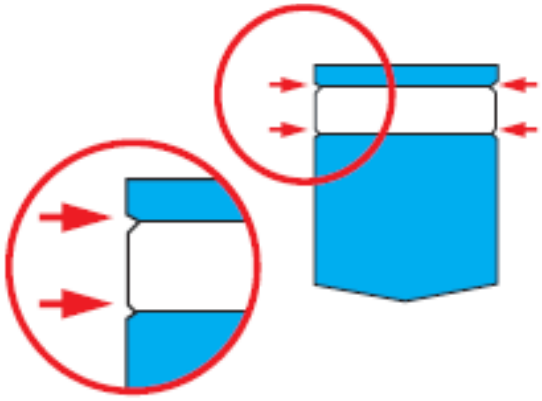
POCKET MAKING AND STITCHING

Step 1: Take the fused pocket piece.



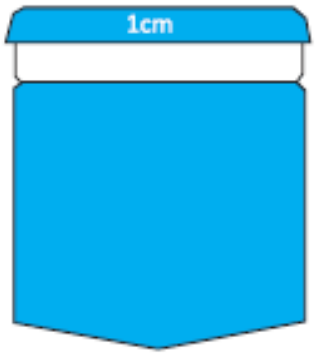
Step 1

Step 2: Locate the notch marks.



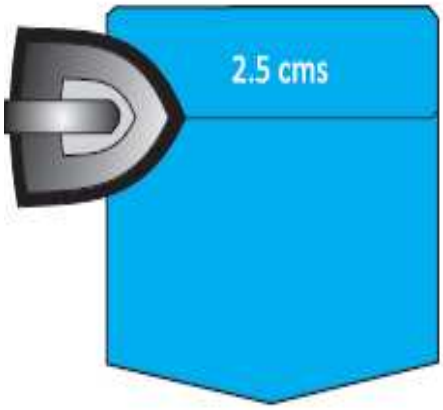
Step 2

Step 3: Now, fold the top part of the fabric 1cm till the first notch mark and press the folded part with an iron.



Step 3

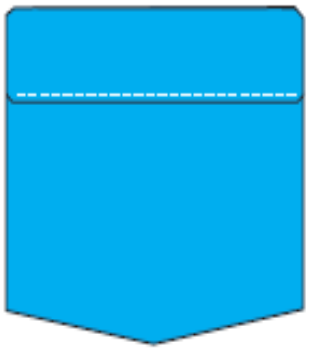
Step 4: Now, fold the fabric 2.5 cm to the second notch mark.



Step 4 & 5

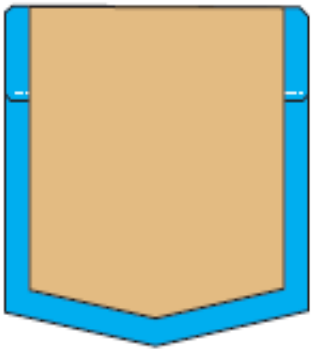
Step 5: Now, crease the folded part again with an iron.

Step 6: Stitch the inner side of the pocket mouth using edge stitch.



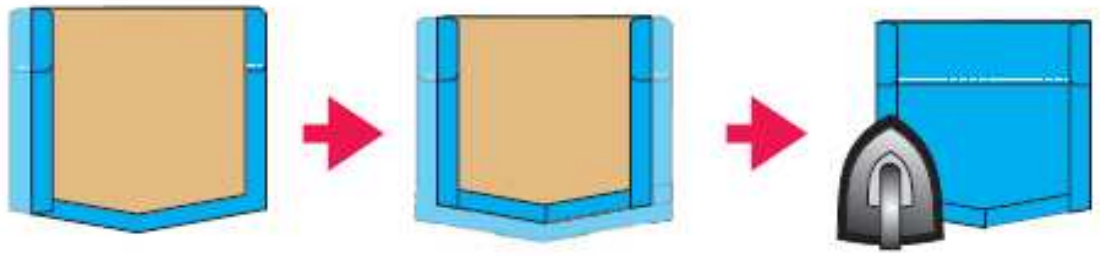
Step 6

Step 7: Take the ready pattern given and place it over thepocket.



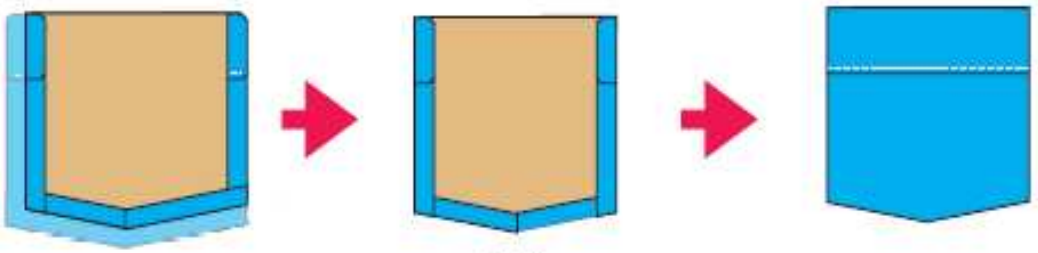
Step 7

Step 8: Now, fold the three sides 1 cm each and crease them as you fold.



Step 8

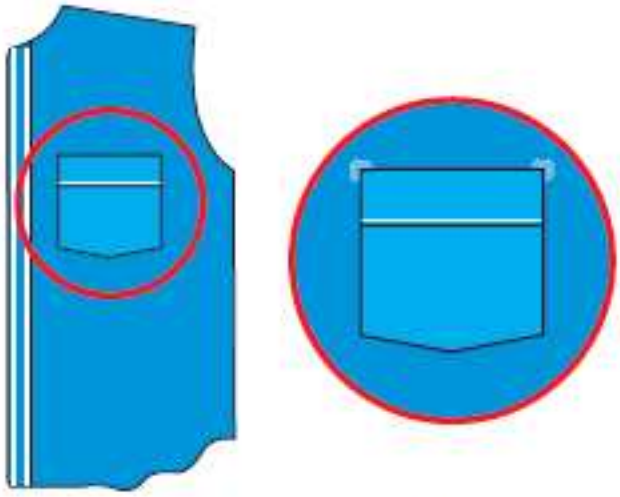
Step 9: The pocket is now ready to be attached.



Step 9

Attaching the Pocket

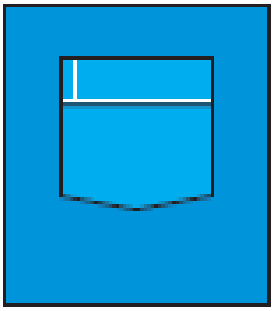
Step 1: Place the pocket piece on the left half of the shirt front.



Step 1 Step 2

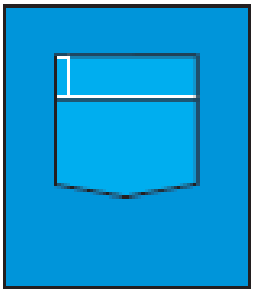
Step 2: Match the right side of the pocket with the markings on the front of the fabric.

Step 3: Sew the pocket from the placket side. Put 4 stitchesfollowed by a back tack.



Step 3

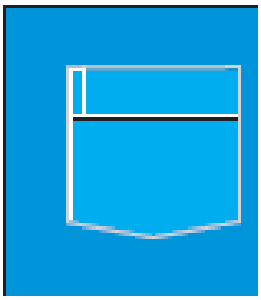
Step 4: Now, sew till the top using 4 mm stitch.



Step 4

Step 5: Turn the fabric in a clockwise direction. Keep the needle in the fabric.

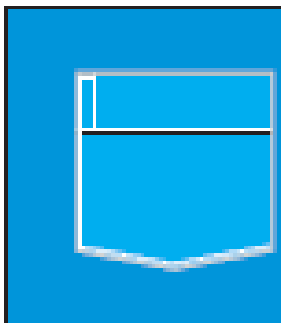
Step 6: Stitch at the edge of the pocket till the end.



Step 6

Step 7: Again, turn the fabric clockwise.

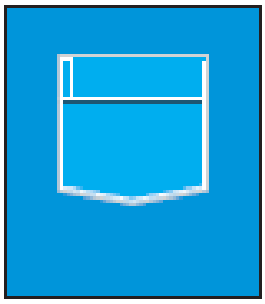
Step 8: Put the stitch at the edge till the end.



Step 8

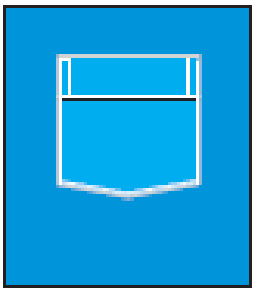
Step 9: Again, turn the fabric clockwise. Stitch the edge ofthe bottom part of the pocket.

Step 10: Turn the fabric clockwise and stitch the edge of the other side of the pocket.



Step 10

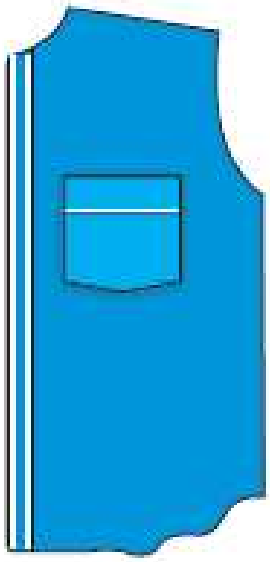
Step 11: Again, turn the fabric clockwise and stitch up to 4 mm.



Step 12

Step 12: Turn the fabric. Stitch up to the pocket mouth and put a back tack.

Step 13: Now, the pocket is fully attached.



Step 13

ATTACHING YOKE

Step 1: First, check for the following notches:

i. One notch at the centre of the back piece of the shirt.

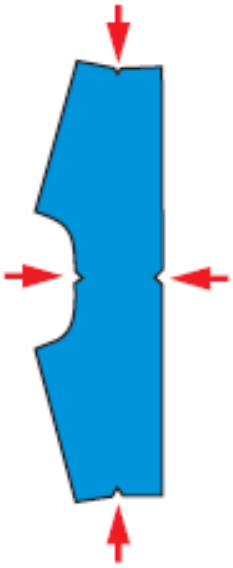
ii. 4 notches in the yoke piece:

One at the centre of the reverse side of the yoke piece.

One at the centre of the neckline.

One at the centre of the left armhole.

One at the centre of the right armhole.



Step 1

Step 2: Keep one piece of the yoke on the sewing table.

Step 2

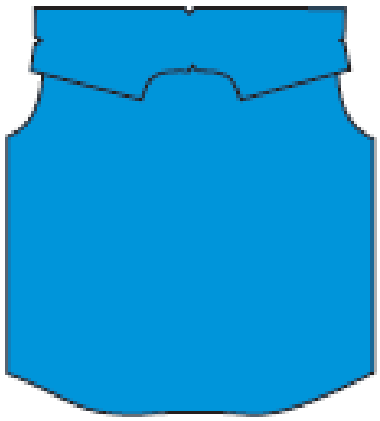
Step 3: Place the back piece of the shirt on top of the yoke in alignment with the two notches.

Step 3

Step 4: The right side of the inner yoke piece should face the reverse side of the back piece of the shirt.

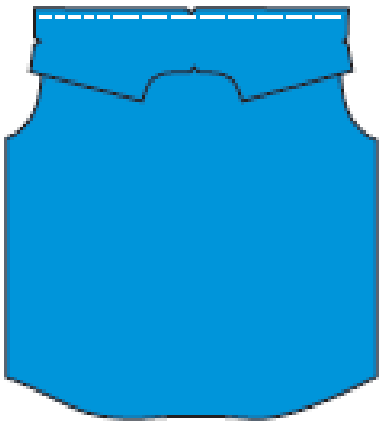
Step 5

Step 5: Take the other yoke piece and place it on top of the back piece of the shirt and align with the notch.



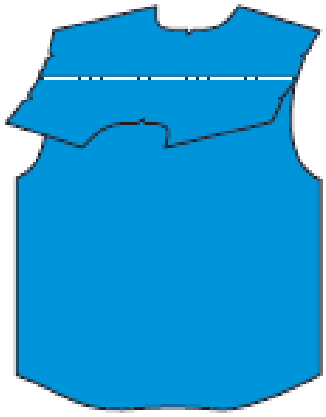
Step 6

Step 6: The alignment should be such that the right side of the outer yoke piece faces the right side of the back
piece of the shirt.



Step 7

Step 7: Put a stitch of 1cm on the edge of the 3 pieces—2 yoke pieces and the back piece of the shirt.

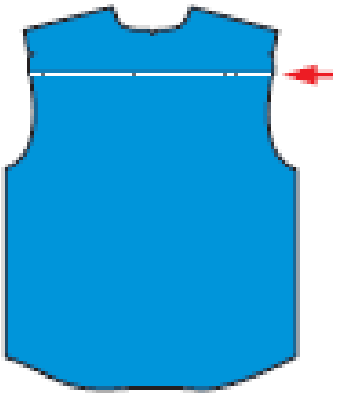


Step 8

Step 8: Turn the yoke and crease it with your fi ngers.

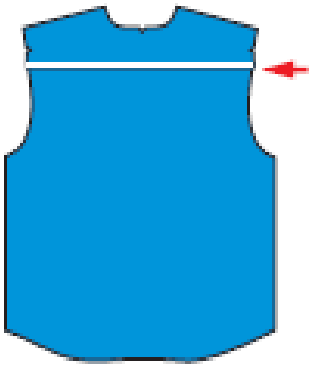
Step 8

Step 9: Now, put a top-stitch at the edge fi rst.



Step 9

Step 10: Finally, put a 4 mm stitch from the edge.



Step 10

Attaching the Yoke to the Front

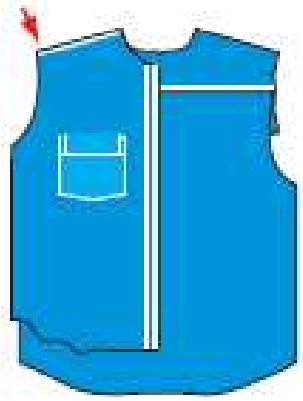
Step 1: Keep the front side of the back piece of the shirt on the top.

Step 1

Step 2: Take the left front piece and place it over the left side of the back piece matching the yoke edges.
Ensure that the placet is towards the centre

Step 2

Step 3: The pieces are stitched at a distance of 1 cm from the edge leaving the bottom-most ply of the yoke.



Step 3

Step 4: The right side of the front and the right side of the back piece of the shirt are placed together by matching the yoke. The placket should be towards the centre.

Step 4

Step 5: Repeat Step 3 for right side.

Step 6: Hold the edge of the yoke from the armhole side in one hand and the unstitched yoke piece in the other hand.

Step 6

Step 7: Turn and match the unstitched yoke piece to the stitched yoke piece.

Step 7

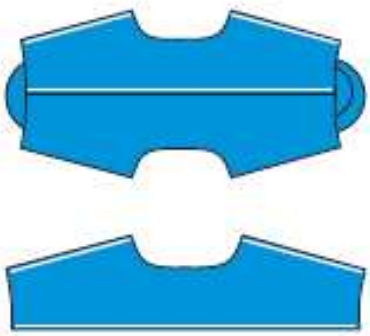
Step 8: Roll the body fabrics and insert it between the two yoke pieces.

Step 8

Step 9: Put a 1 cm stitch throughout.

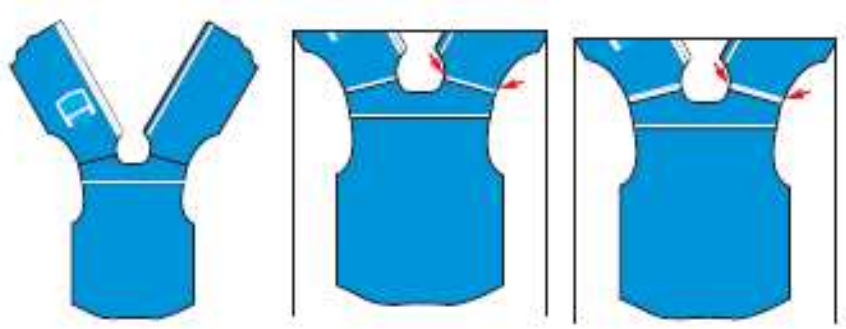
Step 9

Step 10: Hold the front and the back pieces and stretch them.



Step 10

Step 11: Put a top-stitch at the edge on both sides.



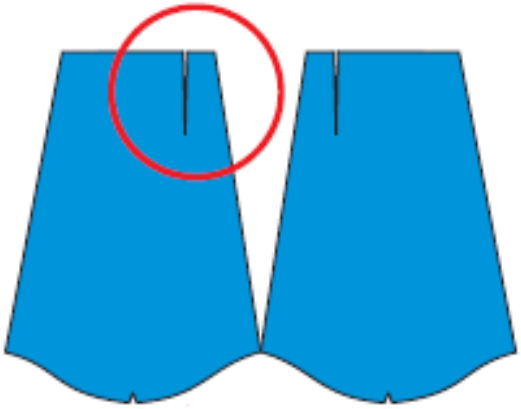
Step 11 Step 12

Step 12: Finally, put a 4 mm stitch on both sides.

SLEEVE PLACKET—MAKING AND ATTACHING

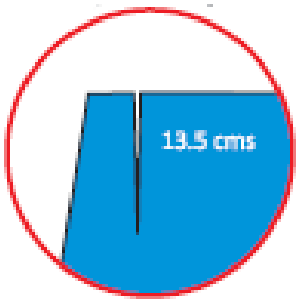
Upper Sleeve Placket Preparation

Step 1: Take the two sleeve pieces and identify the notch marks on the armhole side in each one of them.



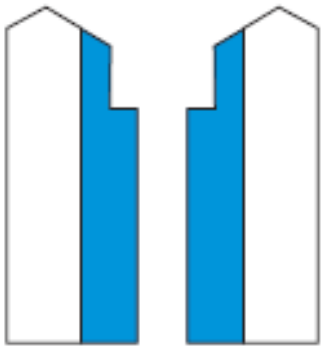
Step 1

Step 2: Look at the reverse side of the sleeve and ensure that there is a cut of 13 cms or 5 inches at the bottom.



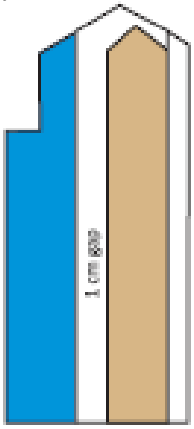
Step 2

Step 3: Keep the two sleeve plackets with their straight sides facing each other.



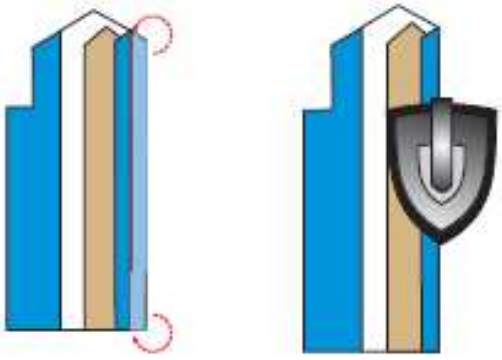
Step 3

Step 4: Take the ready pattern. Leave a gap of 1 cm and place it over the longer side of the placket.



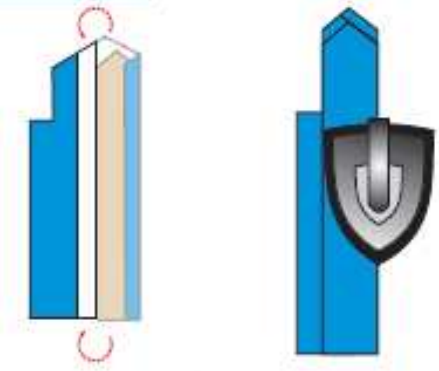
Step 4

Step 5: Use the pattern and fold the longer side of theplacket 1 cm and iron it.



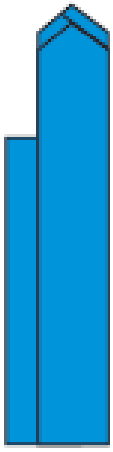
Step 5

Step 6: Again, using the pattern, fold the longer side 3.5 cm and iron it.



Step 5

Step 7: Use the pattern and fold the upper portion of the placket in a V-shape. Iron it well to form crease.



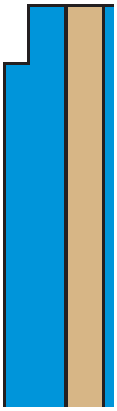
Step 7

Step 8: Use the pattern and fold the upper portion of the placket in a V-shape. Iron it well to form crease.

Lower Sleeve Placket Preparation

Step 1: Keep both the lower sleeve plackets on the table.
They are unfused and shorten in length than upper sleeve plackets.

Step 1



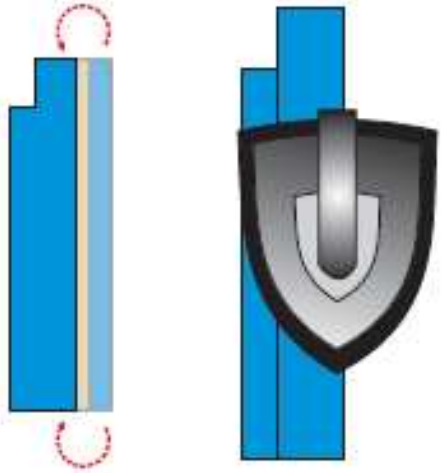
Step 2

Step 2: Place the ready pattern on the placket.

Step 3: Use the pattern and fold 1 cm. Use the iron to crease it.

Step 3

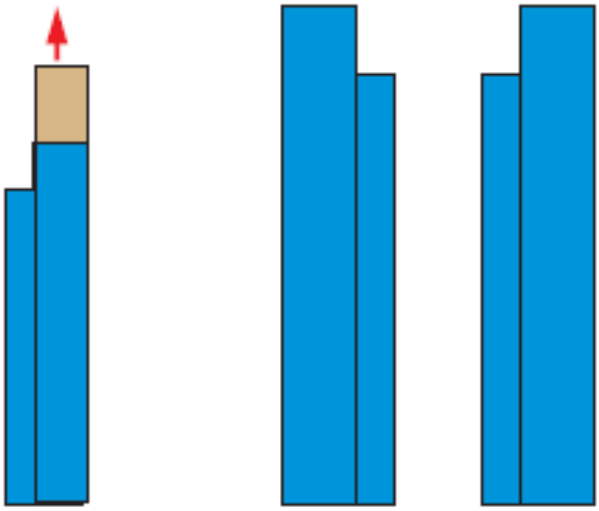
Step 4: Again, use the pattern and fold 2 cm. Use the ironto crease it.



Step 4

Step 4: Remove the ready pattern.

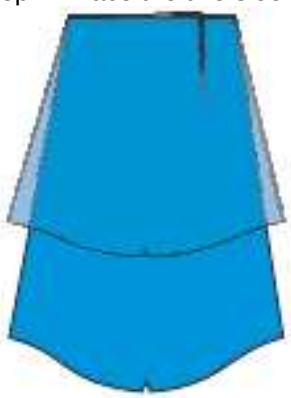
Step 4: Repeat Steps 2 to 5 for the other placket.



Step 5 Step 6

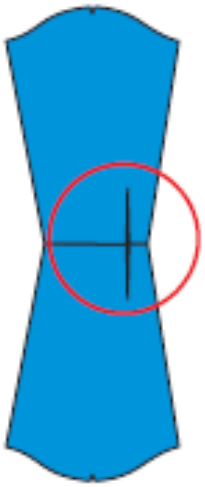
Attaching Plackets to the Sleeve

Step 1: Place the two sleeves on top of each other and align the cut sides.



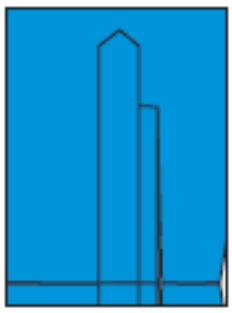
Step 1

Step 2: Take the two upper sleeve plackets and place them on the longer cut side of the sleeves. Ensure that
the folded side is on top.



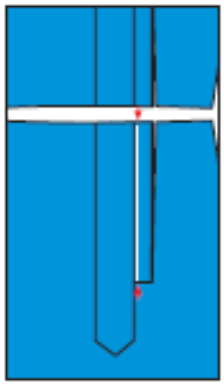
Step 2

Step 3: Take a set of sleeve placket and sleeve. Align the edges of the sleeve placket with the longer cut part
of the sleeve.



Step 3

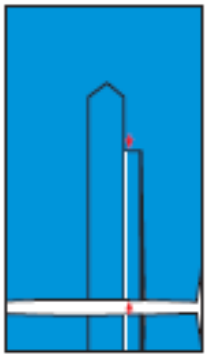
Step 4: Stitch the placket edge.



Step 4

Step 5: Take the other set of sleeve and sleeve placket. Stitch the placket edge.

Step 6: Turn the fabric such that the cut part of it faces you.



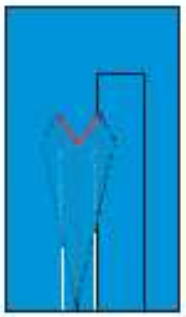
Step 6

Step 7: Now, place the lower placket on the shorter cut part of the fabric and stitch the edge along the length.

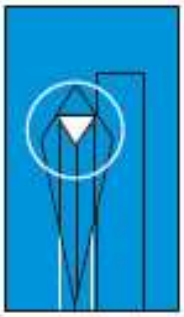
Step 7

Step 8: Repeat Step 3 and Step 7 for the other set of sleeve plackets and sleeves.

Step 9: Make two v-shape cuts on the top part of the placket-stitch.



Step 9



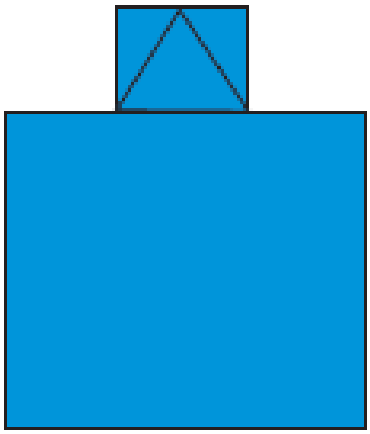
Step 10

Step 10: Smoothen the lower placket and turn it to the reverse side.

Step 11: Stitch the edged side of the lower placket till the end.

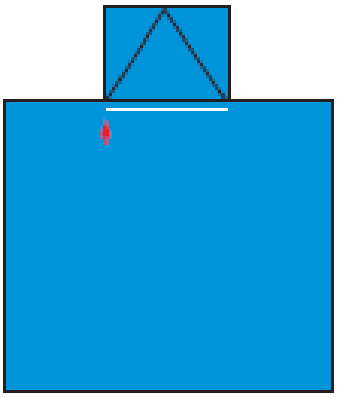
Step 12: Turn the v-shaped cut to the upper side.

Step 13: Place the placket on top of the v-shaped cut.

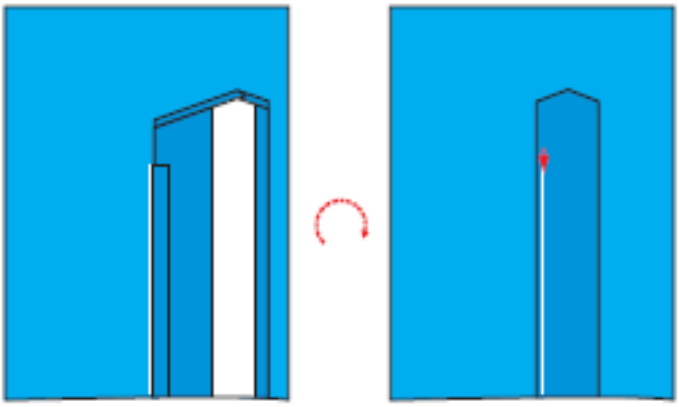


Step 13

Step 14: Hold the placket and the cut, together and put a stitch at the bottom of the cut.



Step 14

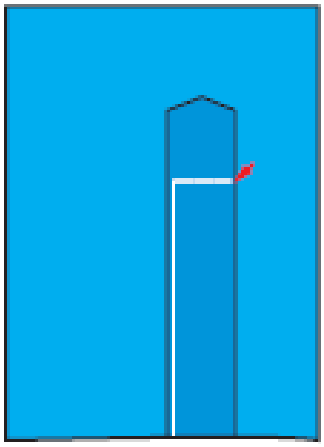


Step 15

Step 15: Turn the upper placket over and put an edged stitch till the end.

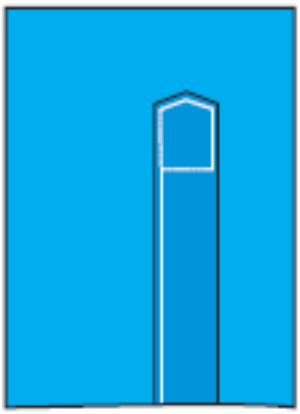
Step 16: Turn the fabric clockwise. Align the upper and lower plackets.

Step 17: Stitch till the end of the plackets.



Step 17

Step 18: Turn the fabric counter-clockwise. Put an edgestitch on all the edges of the box of the placket.



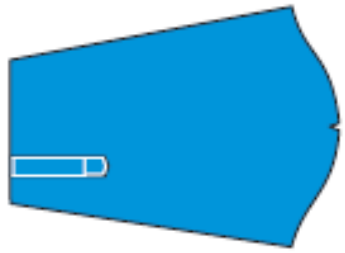
Step 18

Step 19: Repeat Step 9 to Step 18 for the other sleeve plackets.

ATTACHING SLEEVE AND MAKING SIDE SEAM

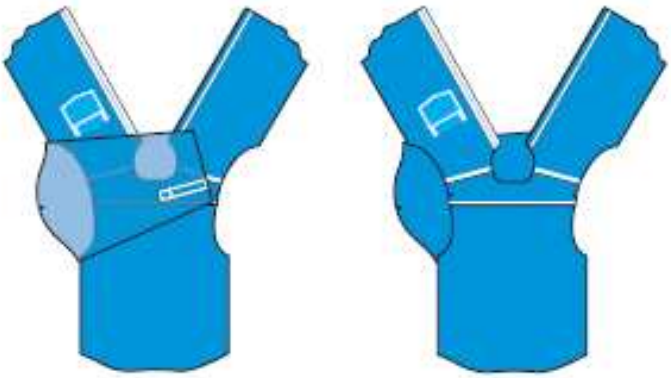
Attaching the Sleeve

Step 1: Take the sleeve piece. Ensure the armhole faces you. Also, the longer cut edge should be on the
right hand side.
(i) The sleeve should be attached to the left hand side armhole.



Step 1

Step 2: Match the left front piece with the armhole. Placethe shirt front above and the sleeve piece below.



Step 2

Step 3: Attach the left front with the left sleeve with a 1 cm stitch.
(i) Note that the notch marks on the sleeve and the yoke coincide.

Step 3

Step 4: Take the right sleeve and place it on the machine.
(i) Ensure that the longer cut portion is to the left and facing away from you. Th e side without the pocket is the right front panel of the shirt.

Step 4

Step 5: Match the notch marks and attach the sleeve armhole with the body armhole by putting a 1 cm stitch.

Step 5

Step 6: Put an over-lock stitch at both the armholes.
(i) If top-stitch is required on the armhole, the sleeve should be kept up and the body part of the shirt should be kept down while putting the over-lock stitch.
(ii) In case top-stitch is not required, the body part of the shirt should be kept up and the sleeve down.

Step 6

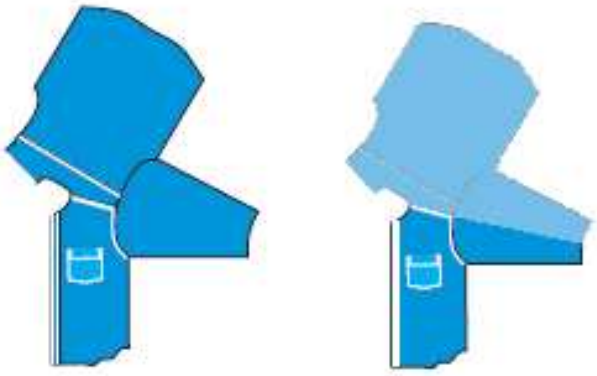
Step 7: While putting top-stitch, keep the margin towards the body. Put an edge stitch followed by a 4 mm
top-stitch.

Step 8: Repeat the above steps for the other sleeve piece.

Step 8

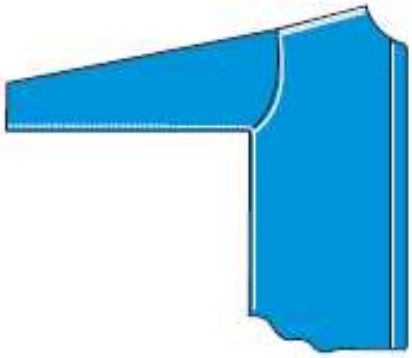
Side Seam

Step 1: Match the armhole and align the loose ends.



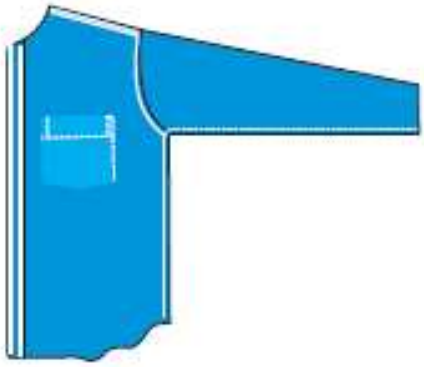
Step 1

Step 2: Take the right hand sleeve. Stitch 1 cm from thesleeve bottom and continue till side bottom.



Step 2

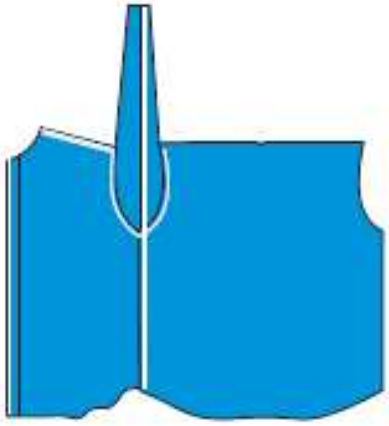
Step 3: Take the left hand sleeve. Stitch 1 cm from the sidebottom up to the sleeve bottom.



Step 3

Step 4: Put the overlock stitch on both sides, keeping the front part on the top.

Step 5: Turn the fabric margin towards back side and sew the top-stitch by first sewing edge stitch and then 4
mm stitches on both the sides.



Step 5

Seam Closing and Side Seam Attach
Step 1: Take the right sleeve.

Step 2: Identify the bottom side of the smaller cut portion of the sleeve panel.

Step 3: Feed this into the lower groove of the folder from the left side. Keep the fabric facing upwards.

Step 4: Now, identify the bottom side of the larger cut portion of the sleeve panel.

Step 5: Feed this into the upper groove of the folder from the right side. Keep the fabric facing upwards.

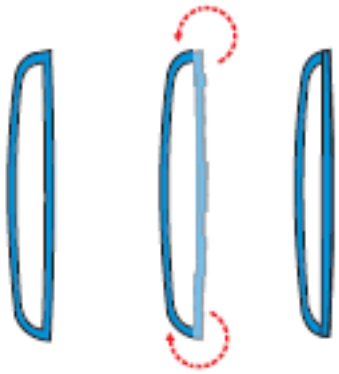
Step 6: Start sewing and feed the fabrics carefully.

Step 7: Repeat Steps 2 to 6 for the other sleeve.

MAKING AND ATTACHING NECKBAND AND COLLAR

Collar and Neckband Preparation

Step 1: Take the fused neckband piece. Turn the bottomend of the piece with your hand.

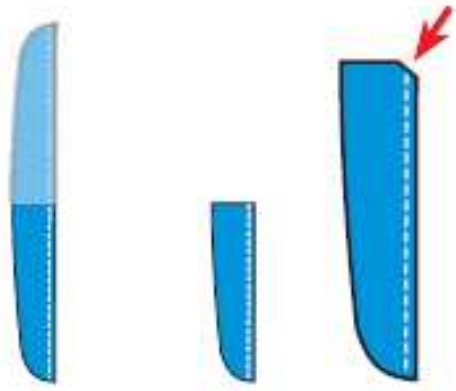


Step 1

Step 2: Turn the fusing side down. Put a 4 mm stitch at the top.

Step 2

Step 3: Fold the neckband and cut a notch at the centre of the upper side.

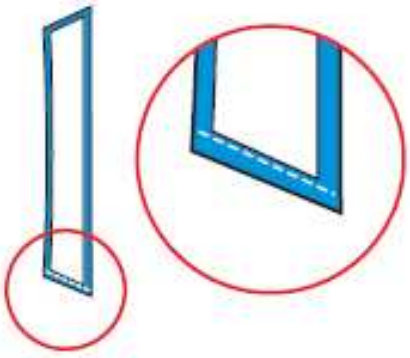


Step 3

Step 4: Take the fused collar piece and place it on the collar piece that is not fused.
(i) The right side of the fused collar should face the right side of the unfused collar.

Step 4

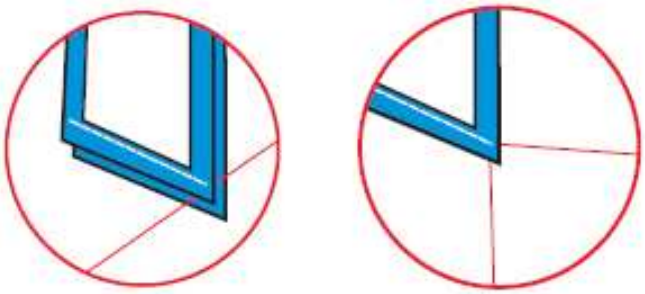
Step 5: Start stitching at a gap of 1 mm from the fusing material from the collar base side.



Step 5

Step 6: Stop the sewing machine one stitch before the collar point with the needle down.

Step 7: Insert an extra thread between the two fabric layers touching the needle.



Step 7

Step 8: Put one stitch and stop the sewing machine with the needle down. The thread will be at the back of the needle side.

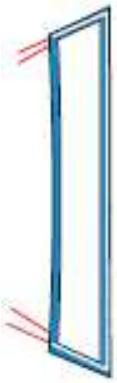
Step 9: Hold both ends of the thread and bring it towards the other side of the collar.

Step 10: Put stitches at a distance of 1mm from the fused material on the remaining collar.

Step 11: Repeat steps 6, 7, 8, and 9.

Step 10

Step 12: Now, put stitches at a distance of 1 mm from the fused material.

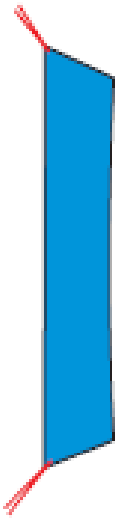


Step 12

Step 13: Put back tack stitch at both the ends.

Step 14: Cut both the collar points and turn the collar.

Step 15: Stretch the threads to give proper shape to the collar.



Step 15

Step 16: Put a 4 mm stitch on all three sides of the collar. Keep the lower fabric stretched to avoid wrinkles.

Step 16

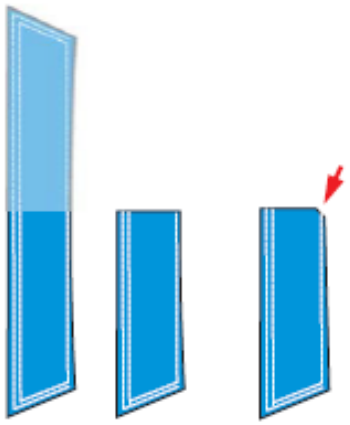
Step 17: Put a 2 mm stitch on the open side of the collar.

Step 17

Step 18: Put edge stitch on the three sides of the collar.

Step 18

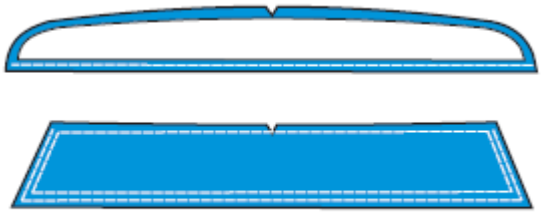
Step 19: Fold the collar and put a notch mark at the centre.



Step 19

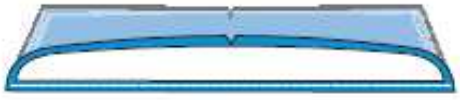
Collar and Neckband Attachment

Step 1: Place the neckband and collar face to face.



Step 1

Step 2: Align the notch and the band of the collar.



Step 2

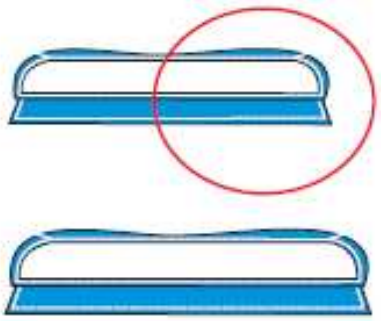
Step 3: Start stitching from the notch point leaving a gap of 1 mm. Repeat this stitch from the notch point to
both ends.

Step 3

Step 4: Take the other neckband piece without fusing. Place it below the ready neckband collar piece.

Step 4

Step 5: Now, start stitching from the neckband bottom portion, till the other end.

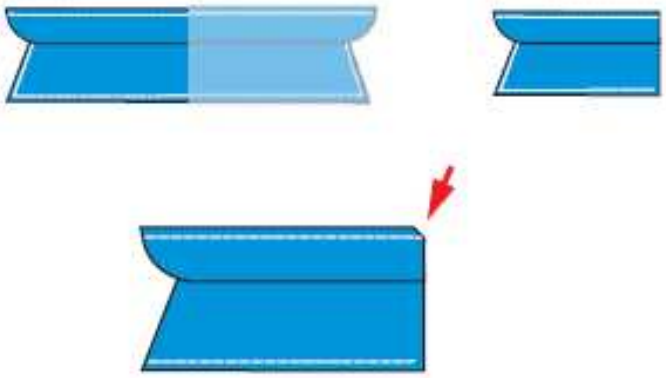


Step 5

Step 6: Turn the neckband piece.

Step 6

Step 7: Fold the piece and put a notch at the centre.

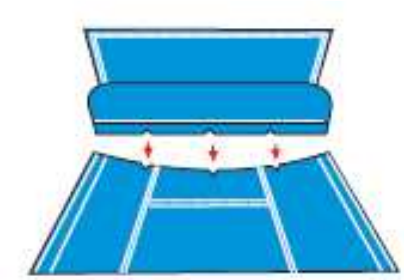


Step 7

Step 8: The folded part is now refolded and another notch is put.

Collar Attachment to Body

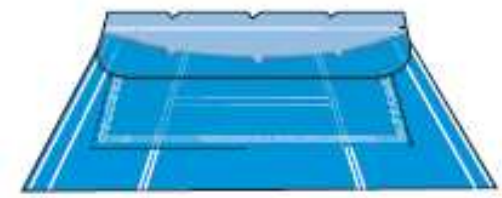
Step 1: Match the three notches on the neckband with the two shoulder seams of the body and the centre
notch.



Step 1

Step 2: Keep the left hand side with face up on the table.

Step 3: Match the edge of the front placket with the edge of the collar band.



Step 3

Step 4: Put the stitch just below the fused portion of the band till the end.

Step 4

Step 5: Starting from the neckband's centre, put edge stitch towards the right side.

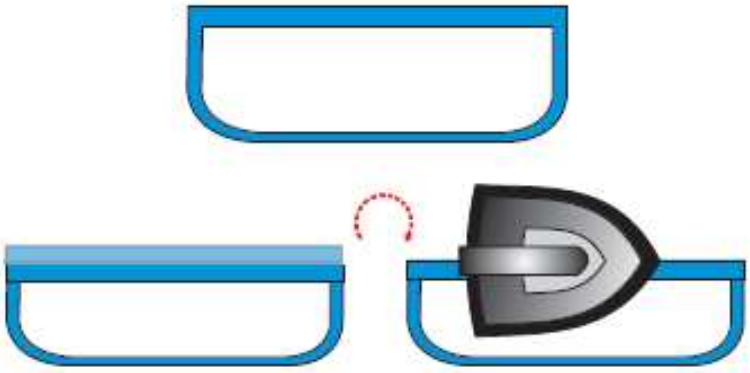
Step 5

Step 6: Turn and continue to put edge stitch till the other end.

Step 6

Cuff Preparation

Step 1 Fold the fabric edges on the straight side of the cuff and iron it.



Step 1

Step 2: Put a 4 mm top-stitch.

Step 3: Take the unfused piece of the cuff and place it below the fused cuff .

Step 2 Step 3

Step 4: Stitch the two curved and one straight side by leaving a 1 mm gap.

Step 5: Turn the cuff .

Step 4 Step 5

Step 6: Th e unfused cuff fabric should be 1 mm extra.

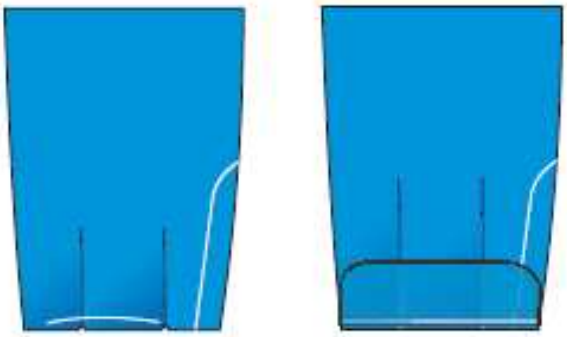
Step 6

Cuff Attachment to Sleeve

Step 1: First, check that there are 4 notches for sleeve pleatsand one notch at the centre of sleeve bottom.

Step 1

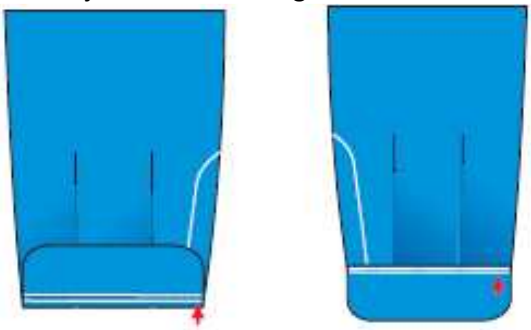
Step 2: Make sleeve pleats by overlapping the notches and stitching it in such a way that the pleats remain
open from the edges.



Step 2

Step 3: Place the cuff with fused side up on the inner side of the sleeve.

Step 4: Stitch just below the edge of the cuff .



Step 4 Step 5

Step 5: Straighten the cuff . Put the excess fabric inside thecuff and put stitches at the edge.

Step 6

Step 6: Now put the edge stitch throughout the cuff .

Step 7: Now put 4 mm stitch throughout the cuff .

Step 5

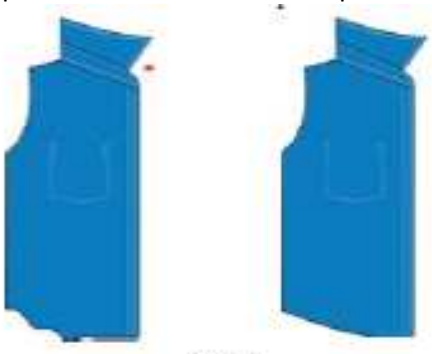
Step 8: Repeat Steps 1 to 7 for the second cuff

.

HEMMING, BUTTON-HOLING, AND ATTACHING

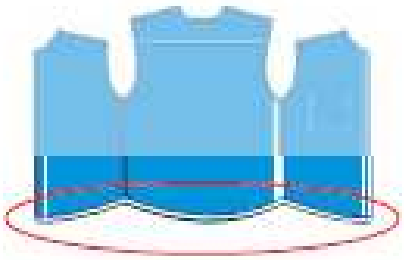
Bottom Hemming

Step 1: Match the collar band tip to bottom.



Step 1

Step 2: Fold the bottom (as per requirement) and put edge stitch from the left front side to the right side.



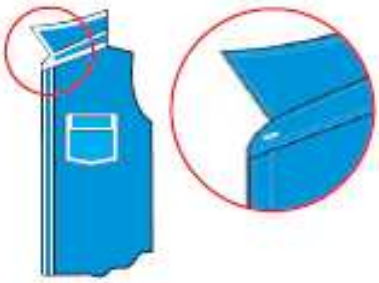
Step 2

Step 3: Close the two ends.

Button-holing

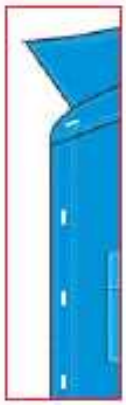
Step 1: Take the left hand side placket.

Step 2: Make one button hole on collar band parallel to theband at the centre and about 1 cm from the edge.



Step 2

Step 3: Along the centre of the placket width, mark the button holes at a distance of 9 cm from each other
from the collar band button hole.

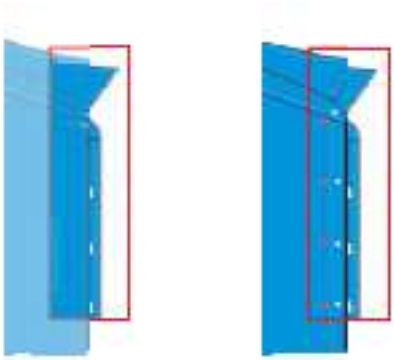


Step 3

Step 4: In case of cuff , mark button hole at the centre of the cuff on upper placket side.
Step 5: Make button holes using buttonhole machine. Themarking should come in the middle of the buttonhole.

Button Attaching

Step 1: Keep the left hand and right hand plackets on top of each other. Th ey should be properly aligned.



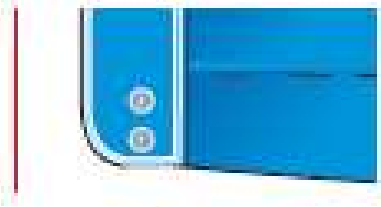
Step 1

Step 2: Put a mark at the centre of the button-hole using a chalk.

Step 3

Step 3: Attach buttons at the marked positions using the button sew machine.

Step 4: Repeat the same procedure for the cuff .



Step 4

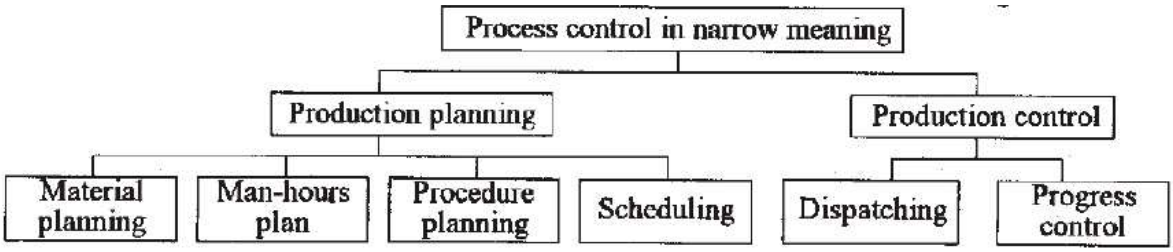
Concepts of Production

At the end of this session you will be able to:

- Carry out work and maintain material flow
- Examine work in progress
- Characteristics of materials

Session Plan	
1	Production control process
2	Materials
3	Industrial Engineering

Production control process



Scheduling

1) Scheduling based on number of products
   It provides the list of dates on which production should be started and finished in each division.
2) Scheduling based on the division
   It shows the actual status of production of certain number of products based on the division.

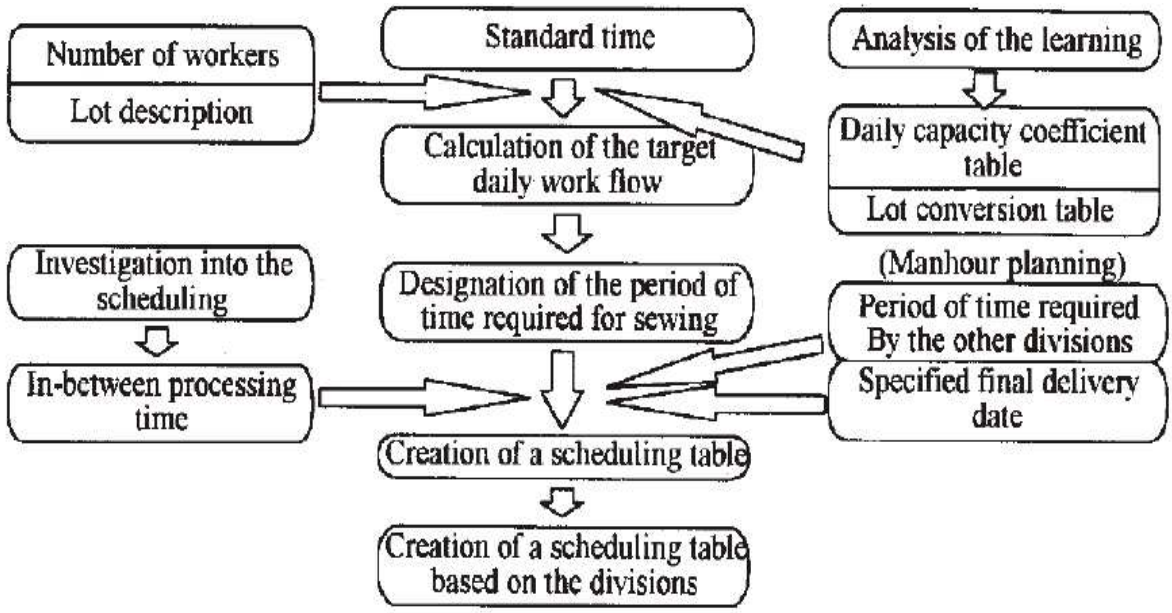
Chart G-1 Scheduling table based on the number of products

Day / Division	1	2	3	4
Cutting				
Fuse the fusible interlining				
Sewing				
Sub-contracting				
Finishing				

Chart G -2 Scheduling table based on the division (Sewin g division)

Day / Number of products	1	2	3	4
A1012				
A1013				
A1011				
A1012				

Planning flow



Planned Daily Workflow

$$\text{Planned daily work flow} = \frac{\text{Daily work hours} \times \text{Number of workers}}{\text{Standard total processing time}} \times \text{Organization efficiency}$$

This planned workflow is used to enhance the efficiency of the employees.

Daily work flow in terms of the operator

When the product is changed, attention needs to be paid to reduce the start-up loss. The learning rate should be considered when making the schedule.

Progress control

Progress control is to control progress of work with regard to the elapse of time in accordance with the plans of scheduling.

WIP

Material that has entered the production process but is not yet a finished product. Work in progress (WIP) therefore refers to all materials and partly finished products that are at various stages of the production process. WIP excludes inventory of raw materials at the start of the production cycle and finished products inventory at the end of the production cycle.

Industrial Engineering

Industrial Engineering (IE) is a branch of engineering that links up design, improvements and installation of operators (men and women), materials and equipment. It correlates the special knowledge and skills of mathematical, physical and social sciences with engineering analysis and design. There are two key questions asked in IE,
1. What is the best way to do a job?
2. What is a fair time the job should take?
By answering these questions for every job on the shop floor we can forecast and evaluate (against forecast) the results from set systems and processes. This can help the industry to improve efficiency and productivity. These IE systems and principles are also beneficial for operators, supervisors and trainers.
_ These provide systems and processes that are most efficient.
_ The systems and processes improve the efficiency of the worker.
_ Th ey help in monitoring and grading of the output.
_They improve the quality of the output.
_ They reduce worker fatigue. By getting trained to be machine operators in companies that are manufacturing garments, we become part of the industry. By learning some of the principles and concepts of IE we will be able contribute to the growth of the industry.

MOTION STUDY
Motion
Broadly, speed of work is referred to as motion. Sewing involves manual work, dependent on machine operators (manpower). The speed (motion levels) of operators decides the time taken to complete a task. The output depends on the following:
a. Amount of wasted time: It is the time when an operator is not running the sewing machine or completing a task. This could be because of many reasons, such as the operator wasting time, sewing machine break-down or maintenance, power failure etc.
b. Work speed: The number of tasks completed within a fixed time period is called work speed.
c. Degree of consistency: It is the ability of an operator to maintain the work speed over a long period of time. It is necessary to improve motion (speed of work) to improve productivity.
Purpose of Motion Study
The purpose of the study of motion is provided below:
a. Optimum work speed: To find out how much work can be completed in a fi xed time.
b. o develop a list of procedures that will be followed by everyone.
c. Training: To tell new operators how to improve their work speed.
d. Manage: To manage the overall output efficiently.
How is Motion Study Conducted?
The commonly used method of motion study is *inspection by listening*. In this method, the actions of operators are inspectedand noted down by listening to the detailed opinions ofoperators, foremen and supervisors regarding the work. Thismethod is used to:
a. record the outline of work prior to making the observations,
b. support any insufficient points of observation, and
c. inspect special work or irregular work, such as lot work.

TIME STUDY
Time
Every process requires tasks and motion. These tasks and motion consume time. The total time consumption (net processing time) is defined by the process and the number of work components. The time study begins by measuring the number of seconds required to “lift , sew and place” a part of a garment. Then the time taken is improved upon (reduced) based on the time values of work components. Finally, it provides the variations in the time values of the operators.
Purpose of Time Study
The purpose of time study is: to understand the production capacity of the factory;
b. to draw up plans for:
i. an appropriate target output,
ii. a suitable range of divided labour, and

iii. optimum production (scheduling, personnel planning or equipment planning).
c. to monitor the level of skills in an individual;
d. to determine the time value for each work component under the motion study;
e. to get a standard measure to evaluate operations;
f. to support standardization;
g. to improve efficiency;
h. to make estimates for a change of product;
i. to plan for the construction of a new factory or adding capacity;
j. to obtain an evaluation standard for order receiving and planning;
k. to get a cost estimate and develop control measures;
l. to introduce a production control system;
m. to determine unit cost of manufacture;
n. to fi x the wage rate.

PRINCIPLE OF MOTION ECONOMICS
Principles of the Moving Parts of the Human Body
Both a. the hands should start and stop moving simultaneously.
b. Neither hand should be allowed to remain idle. If this is not possible, then both hands should not remain idle at the same time.
c. Both hands should move simultaneously and symmetrically.
d. While moving both the hands, we must limit them to the least level in the movement.
e. The movements should be designed in such a way that inertia is used.
f. Movements that are both continuous and curved are better than linear movements, which cause an abrupt change of direction.
g. A movement with a ballistic curve is quicker, easier and more accurate than an excessively controlled movement.
h. The order of the movements should be arranged in such a way that a natural rhythm and automation are given to the work components.
i. Any task, which can be performed using a foot or another part of the human body, should not be performed using the hand.
j. The number of times the work is stared at should be minimized.
k. If the movements of the eyes and hands need to be adjusted in order to simultaneously and symmetrically use both hands for a certain item of work, the point where the work is performed should be as close to the eyes and hands as possible.

Materials

Blends are a general description of fabrics made of two or more fibres. The idea is to incorporate the distinct characteristics of the separate fibres into one textile.

Chiffon is a very sheer, light fabric made out of silk, cotton or synthetic fibres. The twist in the fibres gives it a somewhat rough feel, and the mesh-like weave contributes to its see through properties.

Corduroy is a strong, durable fabric with a surface of rounded cord or rib and the back has a plain or twill weave. It can be made from several textiles including cotton.

Cotton is derived from the fibre of the tropical cotton plant. When the cotton flowers bloom and die, a boll remains which ripens and splits open to reveal a white, fluffy interior with seeds – this is the raw cotton. Cotton is the most widely used fabric and is the basis of over 30 types of textiles.

Denim is a type of cotton fabric woven in such a way that the threads produce that distinctive diagonal ribbing on the underside of the fabric. Traditionally it was dyed blue and the first denim trousers were made in Genoa, Italy. Both the words 'denim' and 'jeans' are of French origin.

Georgette is a type of silk fabric, although today synthetic georgettes are also produced. It's light, crinkly, slightly rough feel is what it's known for, plus the range of colours it is dyed in.

Hemp is made from the stems of the same plant that makes marijuana, but does not contain any narcotic elements. Hemp has a linen-like texture, has high water tolerance but wrinkles very easily.

Jute is made from the cellulose-rich fibres of the jute plant which is native to Asia. It is typically used for making mats, burlap and gunny bags.

Linen is derived from the fibres flax plant and is highly valued for it's fresh, cool feel especially during hot weather. Some fabrics of cotton or hemp when woven in a linen-like weave are referred to as linen.

Polyester is a man-made fabric made from by-products of petroleum and coal, mixed with air and water. Like nylon, it has low water absorbency and is quite flammable.

Silk is one of the oldest and most luxurious fabrics known to man. This protein fibre is obtained from the cocoons of the mulberry moth and was first produced in China as far back as 3,000 BC.

Rayon is a regenerated cellulose fibre which is almost pure cellulose. Other names for rayon are viscose and art silk.

Velvet is a woven, tufted fabric, originally made purely of silk but commonly composed of silk and rayon these days. The short, dense piles of cut threads are evening distributed to give velvet its distinctive feel.

Wool is a natural protein fibre derived from the hair and fur of different animals including sheep and goats. The fibres are shorter than those of silk and generally form a looser weave.

The difference in thickness, texture, lustre, etc. of the materials necessitates the need for changing needle and thread size while sewing these materials. The tension also needs to be changed for some materials.

Maintenance of sewing machines	
	At the end of this session you will be able to: • Follow and carry out maintenance procedure • Importance of regular maintenance

Session Plan	
1	Maintenance

Maintenance

TYPES OF MAINTENANCE METHODS

1. Break down maintenance
2. Preventive maintenance

a. We must carry out the following activities during working hours:

- Check needle point.
- Check the stitch quality.
- Check for any oil leakage.
- Clean the hook area.
- Check the oil level.
- Remove the dust from oil reservoir.
- Check the needle.
- Check the feed dog, throat plate, presserfoot and hook point.
- Check the thread and the bobbin winder.
- Make sure there is no thread between themotor pulley and the hand wheel.
- Check the electric plug socket position.
- Check the pedal position and needle lifter.
- Check the thread stand position.
- Check the loose screws.
- Keep small piece of fabric under presserfoot.

3. Routine maintenance

a. Daily maintenance

- Clean the machine and machine area.
- Check up the threading of the machine.
- Check up the oil quality and quantity.
- Keep the fabric at the bottom of the presserfoot at the end of the day.
- Switch off of the machines after operation.
- Check the needle tip and needle bend.
- Check up the needle system and size usedfor fabric and machine.

b. Weekly maintenance

- Check up the oil level and oil colour.
- Remove the presser foot, throat plate andfeed dog and clean properly.

- Remove the belt guard, and the motor coverand clean.
- Adjust the hook timing and clearance.
- Use emery stone to smoothen the face plate,feed dog, presser foot and hook shuttle, andremove the scratches.

c. Monthly maintenance

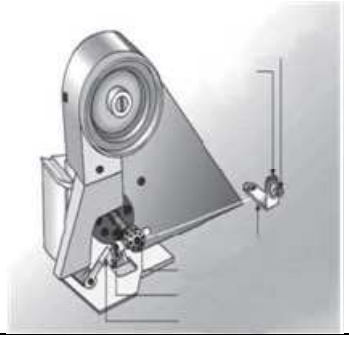
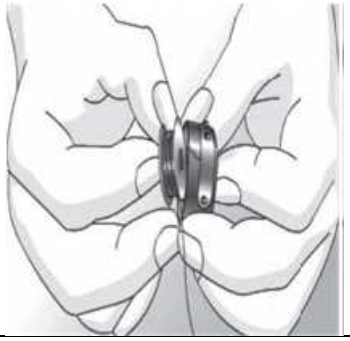
- Pour oil up to the maximum level.
- Checkup oil flow in the pipe and control.
- Tighten the screws and the nuts of themachine.
- Check the machine for free movement andapply grease.

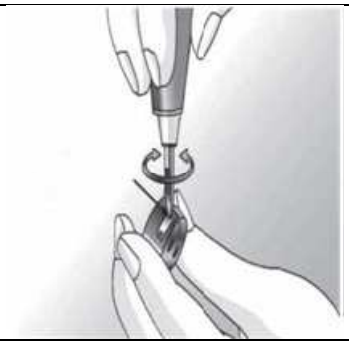
d Quarterly maintenance

- Change the oil if necessary.
- Tighten the screws and the nuts of themachine.
- Apply grease and oil to the gears and thecams.
- Tighten the stand screws and the nuts .

e. Half yearly maintenance

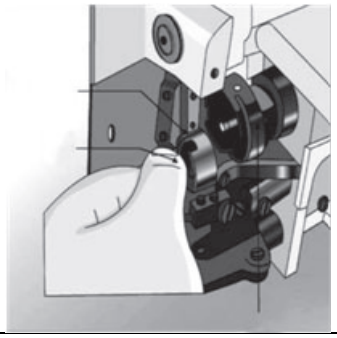
- Replace the oil filters and oil.
- Ensure that general servicing is done.

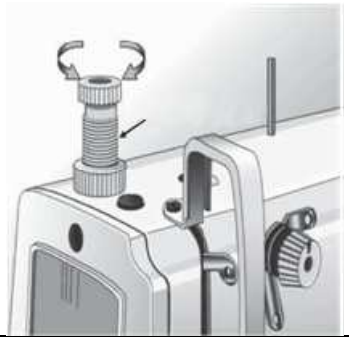
If attaching the needle is not correct, it may cause thread breakages, needle breakages or skip stitches so it is important to learn to attach the needle correctly.	
	Learning to wind the thread to the bobbin correctly is important because any imbalance in tension can cause improper stitches.
After having wound the bobbin correctly it is important to set the bobbin correctly into the bobbin case.	
	Adequate tension is to the extent that the thread is fed out of the bobbin by its weight itself, in



case if the tension is not adequate minor adjustment will have to be done in the thread tension screw of the bobbin.

Having learnt the winding, setting and adjusting the tension we need to set the bobbin case into the hook set.





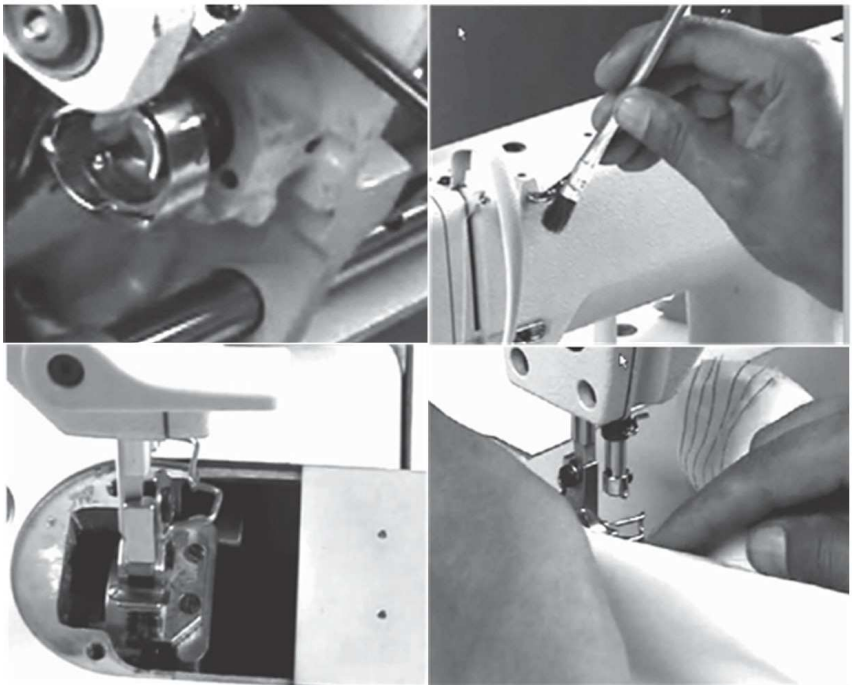
To avoid puckering and varying the pressure in case of different thickness of the material the pressure of the presser foot is adjusted using the regulator.

The thread tension nut can be used to balance tension of needle and bobbin thread thus avoiding problems like seam grinning.

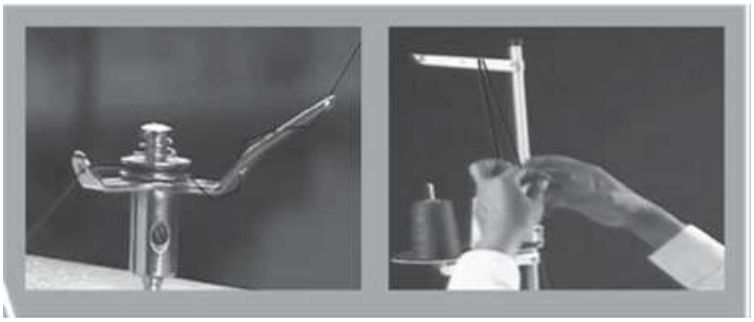
Stitch length adjustments can be done with feed adjusting dial and feed control lever.

The adjustment of feed dog is necessary to have a smooth flow of material and prevent puckering.

Cleaning a sewing Machine: Lint needs to be removed gently from all parts of the sewing machine, using lint brush. The exterior of the machine can be cleaned using a lint free cloth. Stubborn stains can be removed by rubbing gently with mild soap solution.



Correct threading: of the lock stitch machine is essential because it will lead to good quality of stitches, any mistake in threading sequence will lead to skip stitches, frequent thread breakages, balloon stitches etc. It is important to learn the correct sequence with reasonable speed.



Workplace Safety

At the end of this session you will be able to:

- Identify the hazards in the workplace
- Follow safety precautions while stitching

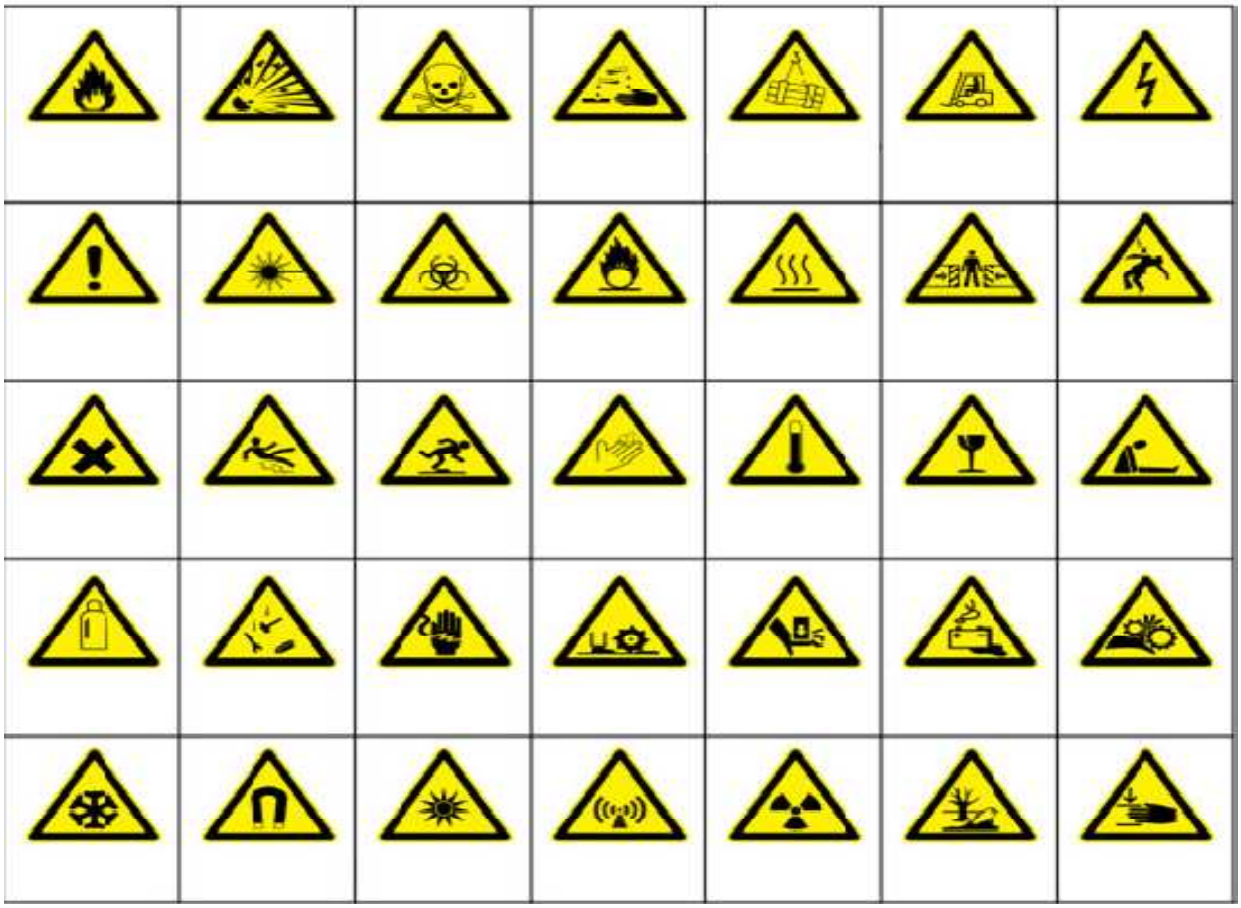
Session Plan	
1	Safety precautions at Workplace

Safety precautions at Workplace

Hazards

A hazard is a situation that poses a level of threat to life, health, property, or environment. Most hazards are dormant or potential, with only a theoretical risk of harm; however, once a hazard becomes “active”, it can create an emergency situation. A hazardous situation that has come to pass is called an incident. Hazard and possibility interact together to create risk.

Hazards & Safety Signs



Chemical Hazards

Chemical hazards are substances which, because of its characteristics and effects, may cause harm to human health and safety. Chemical hazards can be broken down to include exposure to; vapours, gasses, mists, dusts, fumes and smoke. Examples of chemical hazards include exposure to:

Chemical reactions

Chemical incompatibility

Chemical storage

Flammable Substances

Combustible substances

Corrosive substances

Pressurized containers

Physical hazards

Physical hazards cause injury to workers when an object, piece of equipment or material comes in contact with a worker. Physical hazards are often associated with an uncontrolled source of energy; kinetic, electrical, pneumatic, hydraulic, etc. Examples of situation associated with physical hazards are:

Exposure to unguarded or unprotected electrical equipment

Working with high voltage equipment

Incorrect wiring

Loose surface conditions

Wet surface conditions

Objects on the floor

Poor design or lay-out of work area

Vibration

Poor lighting conditions

Temperature extremes

Sharp edges

Safety Precautions

Personal Protective Equipments (PPE):

Personal protective equipments refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter. Protective equipment may be worn for job-related occupational safety and health purposes.

Safety rules

- Keep your hair tied for safety
- Avoid loose clothing that could get caught up in machinery
- Footwear must always be worn in the training room/factory.
- Don't touch the v-belt for machine
- In case of needle gets pierced in hand, rush to first-aid box, apply bandage and please refer the doctor
- Beware of electric shocks.

Emergency Action Plan (EAP)

Types of emergencies:

Medical Emergency:

- Do not move victim unless absolutely necessary.
- Call the following personnel trained in CPR and First Aid to provide the required assistance prior to the arrival of the professional medical help.
- If personnel trained in First Aid are not available, as a minimum, attempt to provide the following assistance:
  - Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids).
  - Clear the air passages in case of choking.

  Attempt first aid ONLY if trained and qualified.

Fire

- Fight the fire ONLY if:
  - The Fire Department has not been notified.
  - The fire is small and is not spreading to other areas.
  - Escaping the area is possible by backing up to the nearest exit.
  - The fire extinguisher is in working condition and personnel are trained to use it.
- Upon being notified about the fire emergency, occupants must:
  - Leave the building using the designated escape routes/ nearest exit.
  - Assemble in the designated area.

Soft Skills	
	At the end of this session you will be able to: • Work effectively within a team. • Manage job related stress effectively • Understand the importance of punctuality • Understand the causes of AIDS • Know prevention methods for AIDS • Importance of health and hygiene • Ill effects of alcohol and tobacco

Session Plan	
1	Team Work
2	Stress Management
3	Punctuality
4	AIDS awareness
5	Health and Hygiene

Team Work

Teamwork is like many things in life. It will grow naturally if the conditions are there. At the heart of effective teamwork in the workplace is the sense of camaraderie and valuing of each other, which means when people come together they deliver more than they would separately, and they are empowered to do it!

Effective teamwork in the workplace happens when three things are in place:

1. Individuals flourish as they use their Strengths
2. People come together building relationships that often become friendships resulting in effective Teamwork
3. Together everyone achieves more as performance flows and Results are achieved

Teamwork in the workplace involves cooperation among workers. This cooperation is usually for the sake of a common goal that the entire team is working toward -- such as a sales quota or some other measurable outcome. In some cases, however, the common goal may be something more nebulous, such as the well-being of the company. Teamwork requires that all workers contribute their fair share to the workload so that the company can accomplish its goals in a timely and satisfactory manner.

Elements of Team Work
Collaboration
Collaboration is an important element to any team. According to Penn State University, teamwork allows projects to get done that one person alone is not able to complete. Members of the team bring in their own experiences and level of expertise to a project to help create an effective finished product. To collaborate effectively the team must be able to communicate and share ideas, and there also needs to be a feeling of respect in place for each team member's contribution.

Conflict Resolution
After a team has started working together there can be conflict, according to the online Reference for Business. Some people feel their ideas are not being heard, and others feel that their ideas should always be part of the team's solution. There could also be a struggle for leadership of the group that can threaten to diminish the group's effectiveness. The element of conflict resolution within a team means leaving room for everyone's contributions, developing the ability to listen to all ideas and creating a method of consensus that is used to develop a solution the team can agree on.

Related Reading: How to Make the Workplace Environment Become Less Stressful & Increase Feelings of Teamwork

Roles and Responsibilities
A team is only effective when the members understand their roles and responsibilities within the group, and endeavour to execute them effectively. According to the Missouri Small Business and Technology Development Centres, a task given to a group is completed more effectively when the responsibilities are distributed fairly among the group members. Each member is assigned a part of the task based on his role within the group and his level of expertise.

Differing Points of View

One of the strengths of teamwork within an organization is the ability to bring together differing points of view to create a solution to an issue. According to Penn State University, an effective team creates solutions that are manufactured from the many different perspectives of the individual group members. This helps to see a situation from several different angles, and can create a solution that no one individual could create on his own.

Fundamental Techniques in Handling people

1) Do not criticize, condemn or complain.
2) Give honest and sincere appreciation.

Six ways to make people like you

1) Be genuinely interested in other people.
2) Smile
3) Remember to address by the person's name.
4) Be a good listener.
5) Talk in the terms of other person's interest.
6) Make the other person feel important.

Win people to your way of thinking

1) Avoid arguments
2) Show respect for other people's opinion
3) Admit your mistake
4) Be friendly
5) Let other people express their ideas
6) Dramatize your ideas
7) Throw down a challenge

Be a leader

A leader's job often includes changing people's attitude and behaviour.

1) Call attention to mistakes indirectly
2) Ask questions instead of giving direct orders
3) Praise improvement
4) Give a person a fine reputation to live up to
5) Encourage hard work
6) Make the person happy about accomplishing work

Stress Management

Stress management refers to the wide spectrum of techniques and psychotherapies aimed at controlling a person's levels of **stress**, especially chronic **stress**, usually for the purpose of improving everyday functioning.
It is a predetermined strategy for coping with psychological or emotional turmoil. As part of a health benefits package, a company may offer stress management therapy to improve job performance.

Negative effects of stress

1) Physical
    a) Weight gain/loss
    b) Unexpected hair loss
    c) Heart palpitations
    d) High blood pressure
2) Emotional
    a) Mood swings
    b) Anxiety
    c) Can lead to depression
    d) Can also lead to unhealthy coping strategies (i.e. alcohol, drugs, etc)

Basic techniques to analyse stress

1) Get the facts.

2)After analysing the facts come to a decision.
3)Once a decision is reached, act on it.

Tips to prevent stress

- Changing perceptions and expectations
- Break jobs/tasks into manageable parts
- Set reasonable/realistic goals
- Avoid procrastination
- Set boundaries
- Don’t compromise your values/beliefs
- Schedule “me” time

How to fight stress?

1) Be busy to keep stress out of your mind.
2) Do not fuss about trifles.
3) Co-operate with the inevitable
4) Do not think about the past and concentrate on the present.

Cultivating a mental attitude to stay happy

1) Fill your mind with thoughts of peace,courage and health.
2) Never try to get even with your enemies.
3) Do not worry about ingratitude.
4) Believe in the joy of giving.
5) Count your blessings and not your troubles.
6) Be yourself
7) Try to make the best of everything you get.

How to keep from worrying about criticism

1) Unjust criticism is disguised compliment.
2) Do your best
3) Criticise yourself and do not repeat mistakes.

Ways to prevent fatigue

1) Rest before you get tired.
2) Relax at work.
3) Keep your desk clear.
4) Do things in the order of importance.
5) Be organized and reduce rework.
6) Have enough amount of sleep daily.

Benefits of stress management

Physical health gets better

-more energy and stamina

Emotions stabilized

-positive attitude

-hopeful/happier

Ability to focus improved

-able to learn and achieve

Punctuality

Importance of punctuality

1. Respect: Punctuality speaks of a person's respect of others. In giving respect to others we can earn in turn.

2. Credibility: An employee who is punctual is considered as credible in the eyes of his/her employer.

3. Organised: A punctual person usually organises his/her work well, thinks ahead of time, prioritizes the given tasks and is overall successful.

4. Networking: Much of the networking in a company happens just before a meeting when the board members are waiting for everybody to gather. Being early can give you a chance to talk to the company leaders and create a network of alliances for you.

5. Ready: Being a couple of minutes early to a meeting or work, gives you time to relax, collect your thoughts and prioritise your day's activities. This will help you sail through the day with no major glitches.

6. Productivity: An employee who isn't stressed about reaching late or has come in early enough to give him minutes to settle in before the day's work begins, has got better chances to get more accomplished than a late comer who feels more pressurized.

7. Promotion: All of the above points help an employee become a strong contender for a promotion (of course, given the fact that he/she is good at the job).

AIDS Awareness

Causes

The virus can be found in the blood, semen, vaginal fluid, and breast milk of infected people. HIV is also found in saliva, sweat, and tears, though not in high enough amounts to transmit the virus to another person. There are no known cases of anyone catching HIV through sneezing, shaking hands, or from toilet seats or mosquito bites.

The two most common ways to be infected with HIV are through unprotected sex and sharing needles. HIV may be transmitted through unprotected heterosexual or homosexual, vaginal, anal, or oral sex. Although the risk of infection is lower with oral sex, it is still important to use protection during oral sex.HIV can also be passed on through *perinatal infection*, where mothers who have HIV are at risk of giving the disease to the baby during birth. The risk of perinatal infection is declining with new treatments. Breast-feeding by an infected mother can also transmit HIV.

Once HIV enters the bloodstream, it takes over cells vital to the immune response, known as *CD4+ lymphocytes*. The virus then inserts its own genes into the cell, turning it into a miniature factory that produces more copies of the virus. Slowly, the amount of virus in the blood goes up and the number of healthy CD4+ cells goes down. The destruction of CD4+ cells interferes with the body's ability to fight off infections and other diseases.

Prevention

- Do not share razors
- Dispose needles after use
- Have protected sex

Health and Hygiene

Hygiene

Poor hygiene can lead to poor health. If you have cut yourself, the wound should be cleaned and dressed suitably, this can help reduced the risk of infection and pain.

Conditions such as head lice, athlete's foot etc. should be treated immediately to prevent further infections and spread to others.

Hand washing cannot be emphasised enough as this simple action can prevent a plethora of illnesses and disorders developing. Many people 'forget' to wash their hands after using the toilet or before handling foods; this can cause a great deal of illness and even death.

1. Hair

Dirty head hair does not actually cause many health problems

Greasy hair - There's really only one solution to greasy hair and that is to wash it

Dandruff - If you suffer from dandruff, try the various shampoos available. If it's serious there are some medical treatments available that are not harmful to the skin

Head lice - Head lice are highly contagious. If left unattended, the lice grow large enough that you can actually see them moving and the white eggs are also sometimes visible. Read more about head and hair hygiene here

2. Teeth and Mouth

Teeth - A beautiful smile can make a person's day - but if teeth are grubby or breath is smelly, it has an entirely different result. Brush your teeth twice daily with a decent.

Smelly breath - Sometimes, despite good brushing a tooth will succumb to decay - if left untreated this can spread and infect your gums. Bad breath can be the sign of a gum infection. Make sure you visit your dentist regularly to keep a check on it.

3. Areas Prone to Odour and Fungal Infection

Unpleasant smells and fungal infections are most commonly experienced in areas of the body that are warm and not often exposed to fresh air: the feet; the genitals and some of our sweat glands.

Smelly Feet - The feet contain lots of sweat glands. If feet are confined in socks and shoes the sweat has nowhere to 'evaporate' and the skin bacteria will in effect attack to, causing that pungent'cheesy' aroma.

Here are some measures you can take to minimise smelly feet:

- Wash regularly and dry thoroughly with a soft towel and an anti-bacterial foot powder or a baby talc
- Allow feet to air when feasible and wear open shoes as much as possible
- Change socks more than once a day if needed and make sure they are cotton or other breathable fabric

Ill effects of tobacco

Tobacco is the greatest cause of preventable death globally. Tobacco use leads most commonly to diseases affecting the heart, liver and lungs. Smoking is a major risk factor for heart attacks, strokes, chronic obstructive pulmonary disease (COPD) (including emphysema and chronic bronchitis), and cancer (particularly lung cancer,cancers of the larynx and mouth, and pancreatic cancer). It also causes peripheral vascular disease and hypertension. The effects depend on the number of years that a person smokes and on how much the person smokes. Starting smoking earlier in life and smoking cigarettes higher in tar increases the risk of these diseases. Also, environmental tobacco smoke, or secondhand smoke, has been shown to cause adverse health effects in people of all ages.

Ill effects of alcohol

Brain:
Alcohol interferes with the brain's communication pathways, and can affect the way the brain looks and works. These disruptions can change mood and behaviour, and make it harder to think clearly and move with coordination.

Heart:
Drinking a lot over a long time or too much on a single occasion can damage the heart, causing problems including:

1. Cardiomyopathy – Stretching and drooping of heart muscle
2. Arrhythmias – Irregular heart beat
3. Stroke
4. High blood pressure

Liver:
Heavy drinking takes a toll on the liver, and can lead to a variety of problems and liver inflammations including:

- Steatosis, or fatty liver
- Alcoholic hepatitis
- Fibrosis
- Cirrhosis

Pancreas:
Alcohol causes the pancreas to produce toxic substances that can eventually lead to pancreatitis, a dangerous inflammation and swelling of the blood vessels in the pancreas that prevents proper digestion.

Immune System:
Drinking too much can weaken your immune system, making your body a much easier target for disease. Chronic drinkers are more liable to contract diseases like pneumonia and tuberculosis than people who do not drink too much. Drinking a lot on a single occasion slows your body's ability to ward off infections – even up to 24 hours after getting drunk.

Work Area Maintenance	
	At the end of this session you will be able to: Minimize waste Keep work area organized and clean

Session Plan	
1	5 S

5 S

5S is the name of a workplace organization method that uses a list of five Japanese words: seiri, seiton, seiso, seiketsu, and shitsuke. Transliterated or translated into English, they all start with the letter "S". The list describes how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. The decision-making process usually comes from a dialogue about standardization, which builds understanding among employees of how they should do the work.

There are five primary 5S phases:

1.Sorting (Seiri)

Eliminate all unnecessary tools, parts. Go through all tools, materials, and so forth in the plant and work area. Keep only essential items and eliminate what is not required, prioritizing things per requirements and keeping them in easily-accessible places. Everything else is stored or discarded.

2.**Straightening or Setting in Order to Flow or Streamlining (Seiton)**

Arrange the work, workers, equipment, parts, and instructions in such a way that the work flows free of waste through the value added tasks with a division of labour necessary to meet demand. This is by far the most misunderstood and incorrectly applied S and has been responsible for many lean transformations failing to produce the benefits expected. When applied correctly with flow established this step eliminates the majority of the non-value-added time and allows the rest of the zero defect philosophy to be enabled. Put simply, until you have an orderly flow, you cannot have an orderly flow of problems to solve and the notion of zero defects is impossible.

3.**Shining (Seiso)**

Clean the workspace and all equipment, and keep it clean, tidy and organized. At the end of each shift, clean the work area and be sure everything is restored to its place. This step ensures that the workstation is ready for the next user and that order is sustained.

4.**Standardize (Seiketsu)**

Ensure uniform procedures and setups throughout the operation to promote interchangeability.

5.**Sustain (Shitsuke)**

Make it a way of life. This means commitment. Ensure disciplined adherence to rules and procedures of 5 S to prevent backsliding.

Ergonomics	
	At the end of this session you will be able to: Work in a comfortable posture

Session Plan	
1	Ergonomics

Ergonomics

Ergonomic injuries include strains, sprains, and other problems. These injuries can be caused by performing the same motion over and over again, using physical force (lifting heavy objects); or being in an awkward position (twisting your body to reach for any component or tool).

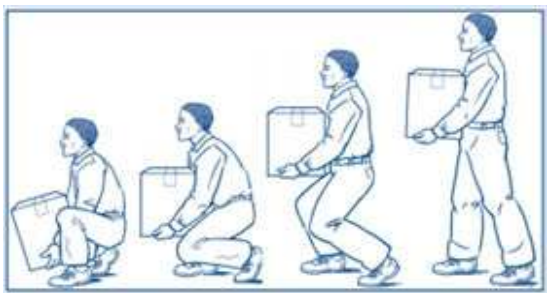
Lifting Procedure

1. Planning your lift: Get help when possible. Use a dolly or cart. Don't carry too much.

2. Lifting: Get close to the load. Lift with your legs, not your back. Bend your knees.

3. Moving the load: Keep the load close to your body. Don't twist your body.

4. Lowering: Let your leg muscles carry it down. Be sure fingers and toes are clear.



Working Postures

Posture is the position of your body while standing, sitting, and performing daily tasks. When your body is properly aligned, it is well-balanced, with minimum stress and strain on supporting structures such as bones, ligaments, and muscles.

Good posture also provides appropriate positioning for your inner organs. Keeping your body straight gives your lungs the space they need for full expansion, and keeping your abdominal muscles tight provides support for intestinal and pelvic organs. Posture affects breathing and arm and neck movements. It even affects how your jaw works and the way you chew.

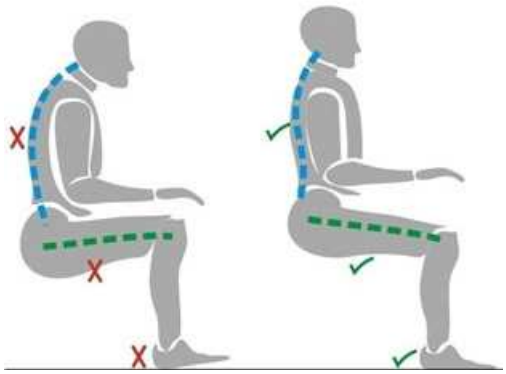
Symmetry is an important aspect of good posture. Your body should be aligned equally side-to-side and back-to-front. When your body is in balance, it requires less work to stay erect. If your body is asymmetrical, some areas have to work more than others in order for you to maintain an upright

position. Habitual, prolonged, unequal alignment results in more wear and tear on your body as you age.

Sitting Posture

When sitting, it's important to keep the back straight, knees bent, and head centered over the shoulders. Slouching forward may be comfortable and allow the spinal muscles to relax but gradually overstretches spinal ligaments, leading to back and neck pain among other problems.

Sit all the way back in the chair; knees should be slightly lower than hips with the seat tilted forward if possible; avoid twisting the neck and back; do not cross legs or shift weight to one side. Entire sole should rest comfortably on the floor or foot rest of the machine (if any).



Garment In-Line Checker

Participant Handbook

Garment In-Line Checker

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INTRODUCTION TO GARMENTS

At the end of this session you will be able to understand:

- The difference between garments based on age, gender and function.
- Identify the end use of different type of garments

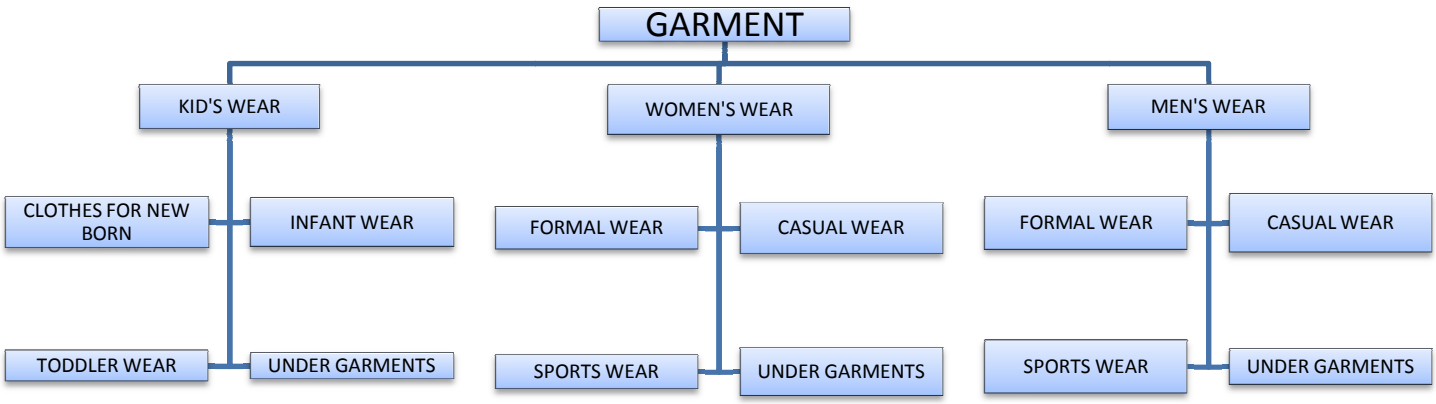
Session Plan

1	Introduction to Garments
2	Classification of Garments

Introduction to Garments

Garments are one of the basic needs of the human beings apart from food and shelter. Garments are also known as dress, cloth, attire, or apparel. People wear clothing for functional as well as for social reasons. Clothing protects the vulnerable human body from the extremes of weather, other features of our environment. Every article of clothing also carries a socio economic message.

Classification of Garments

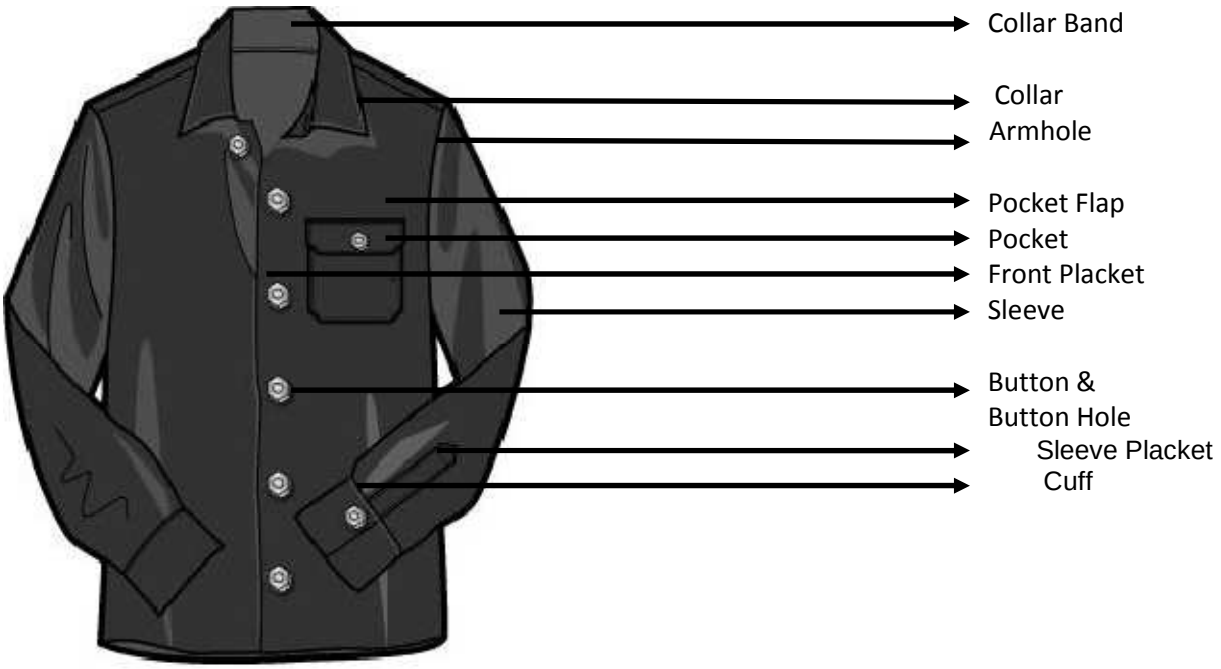


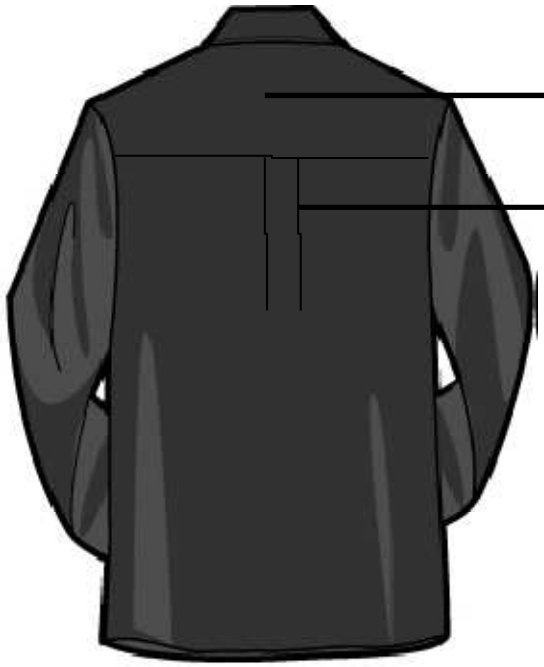
GARMENT PARTS RECOGNITION

	At the end of this session you will be able to understand: Different Garment,Pattern,Accessories Parts

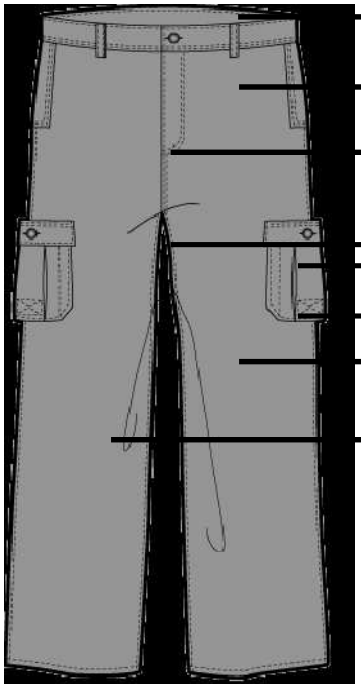
Session Plan	
1	Parts of a Men's Formal shirt
2	Parts of a Cargo Pant
3	Parts of a basic 5-pocket Jeans
4	Parts of a Formal Trouser
5	Parts of a Polo T-Shirt
6	Parts of an Under Wear

Parts of a Men's Formal shirt

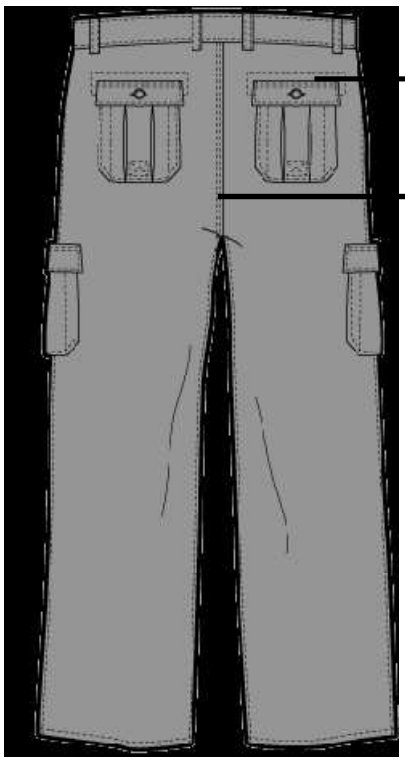




Parts of a Men's Cargo Pant

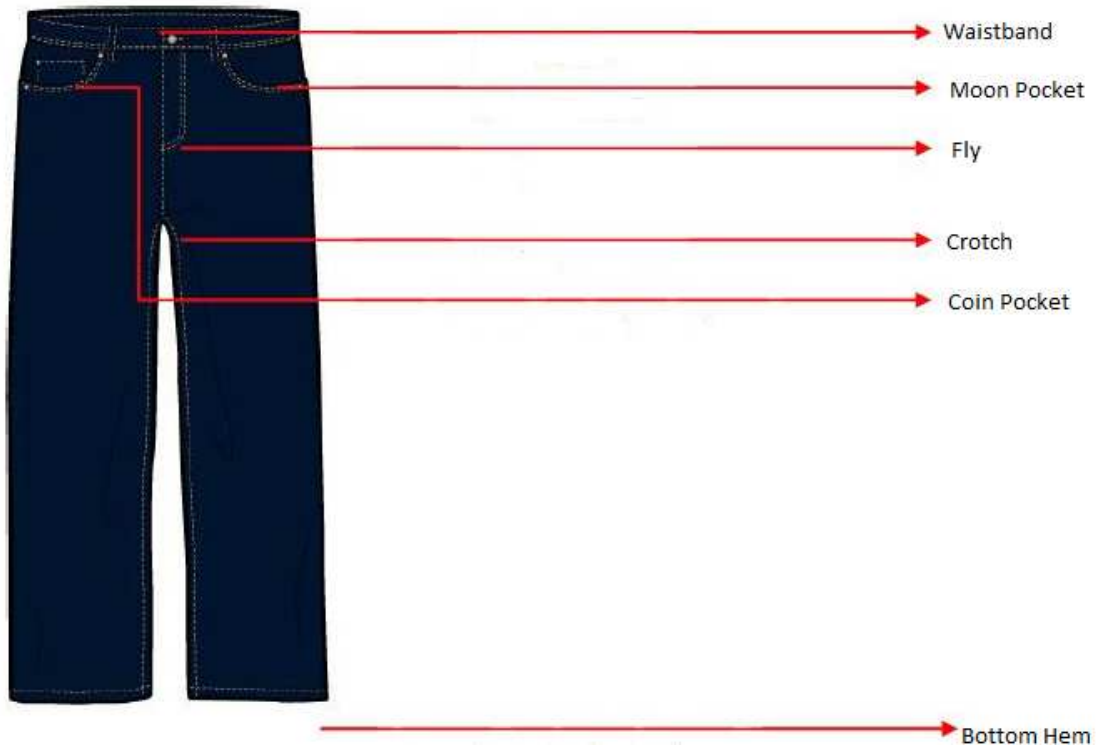


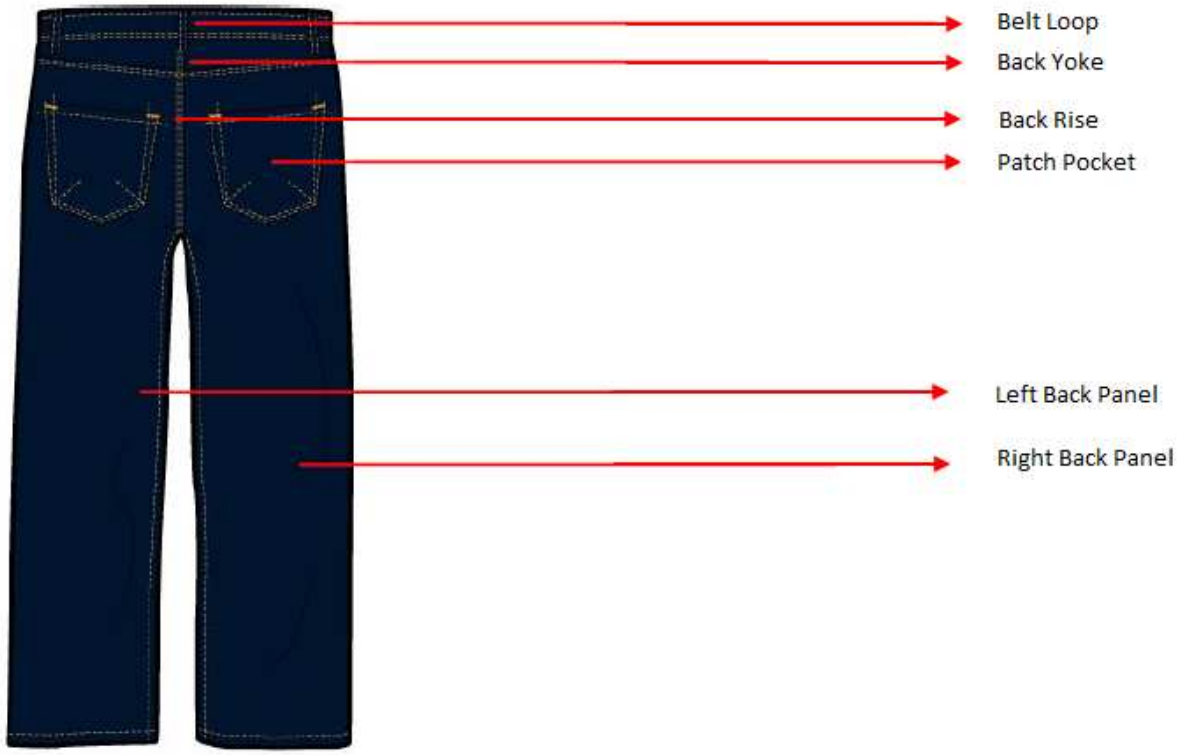
Front View



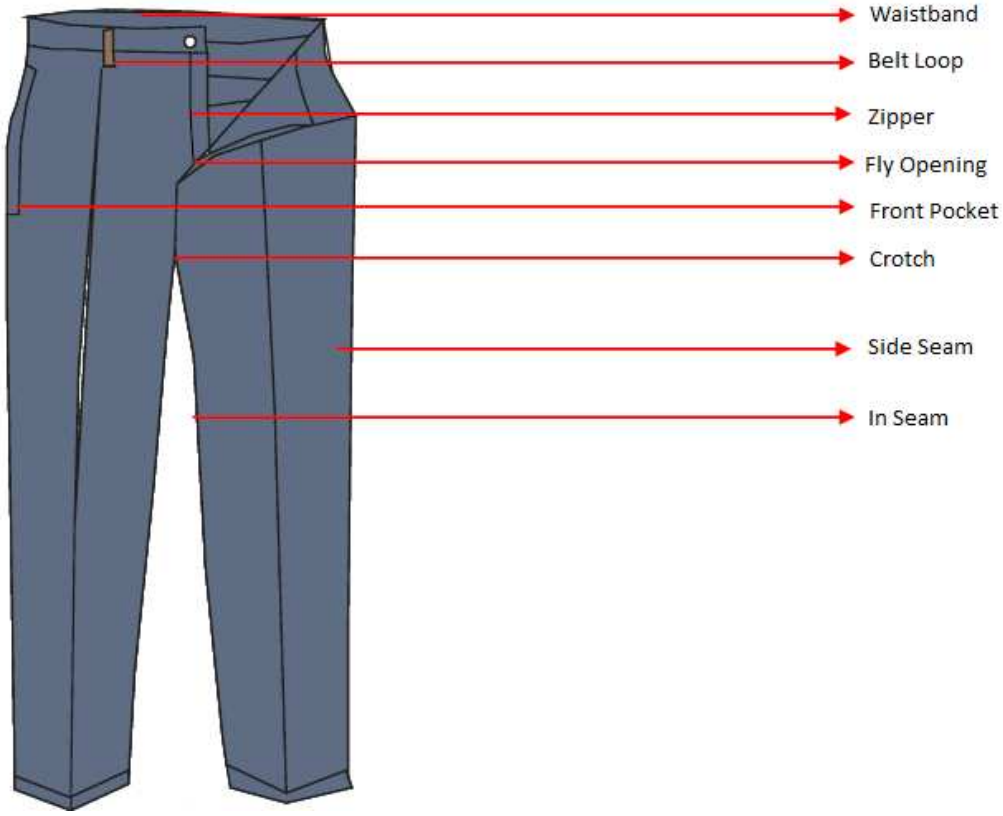
Back View

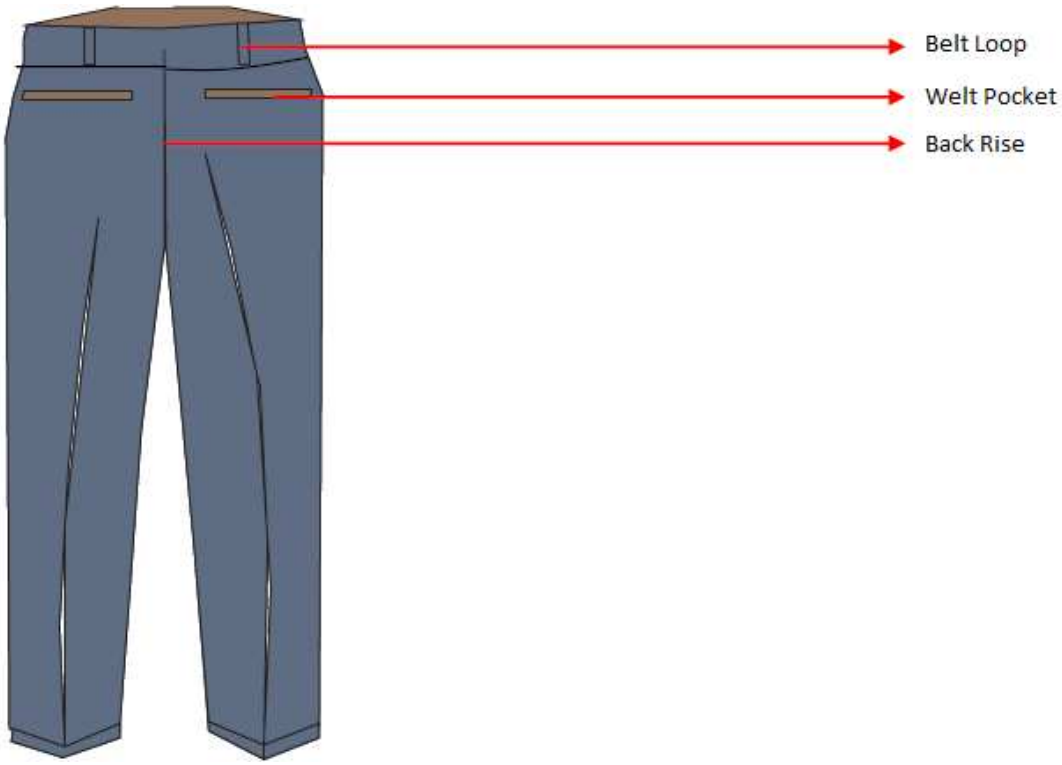
Parts of a Basic 5-Pocket Jeans



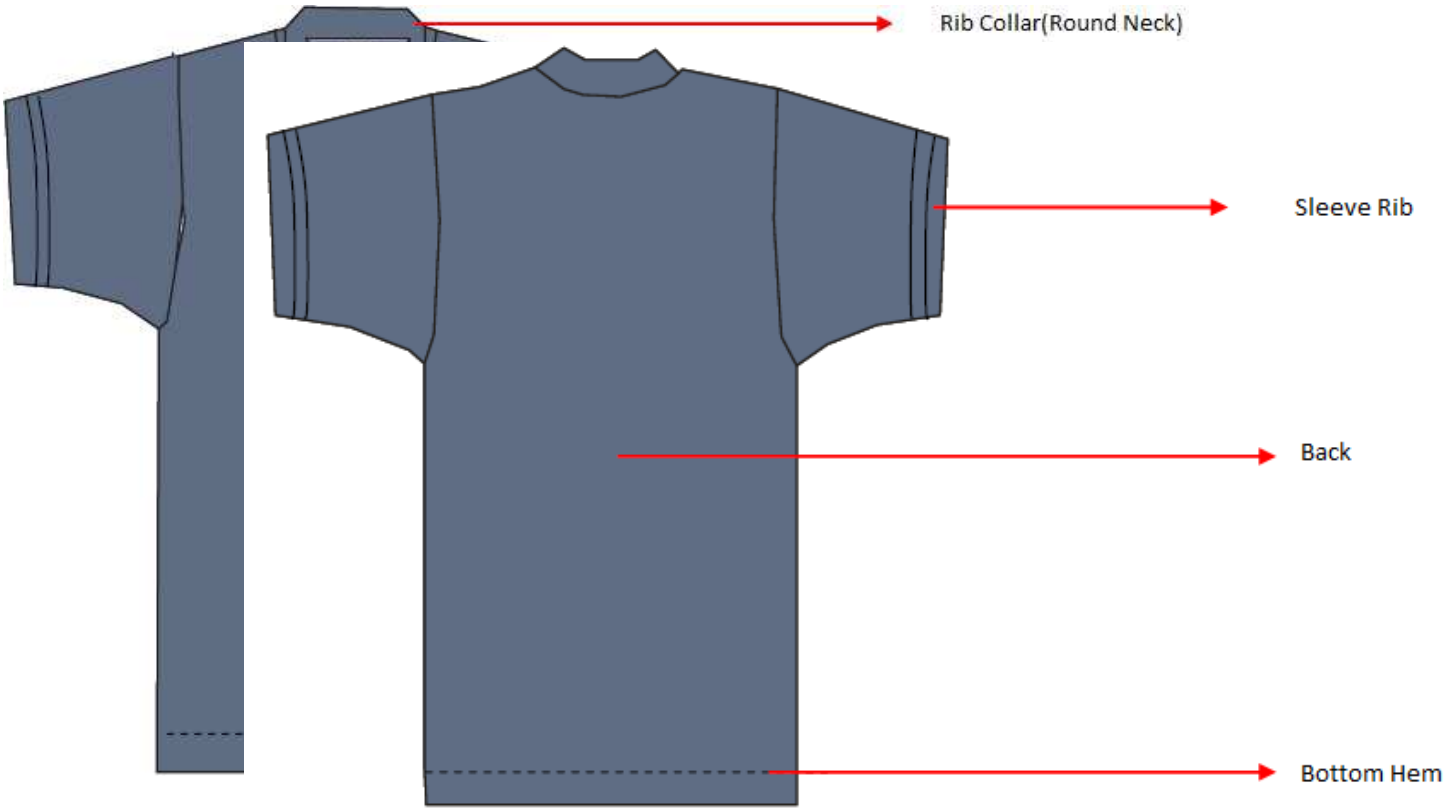


Parts of a Formal Trouser

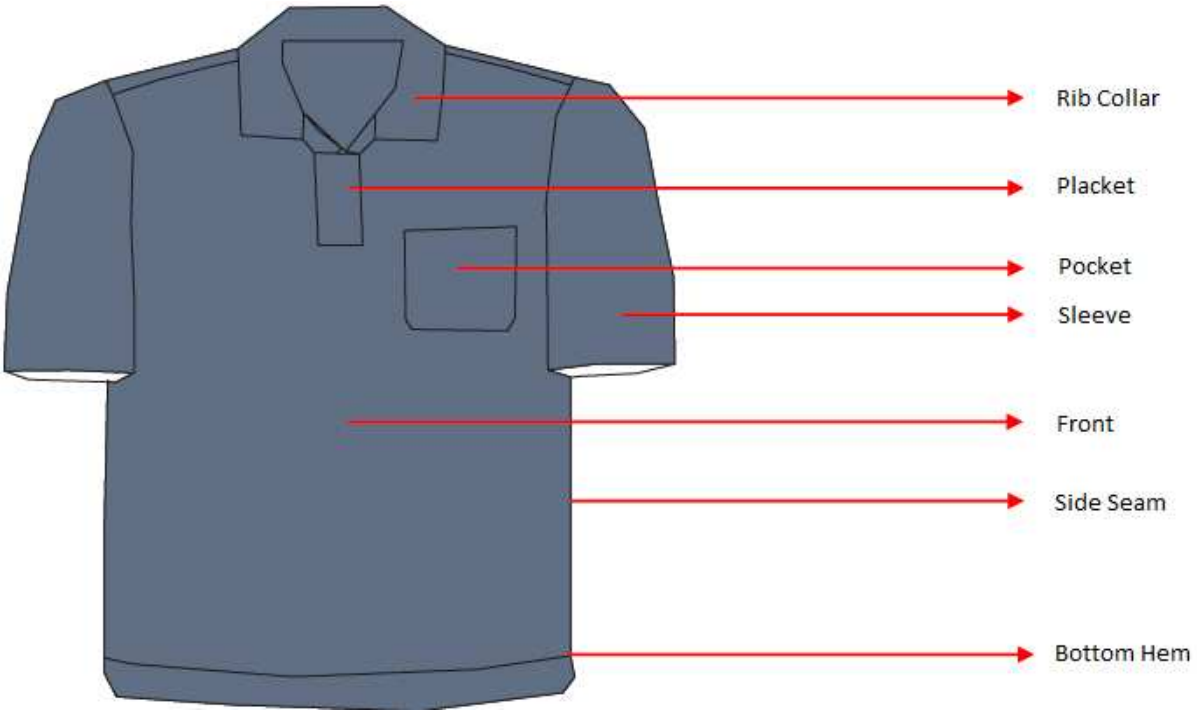


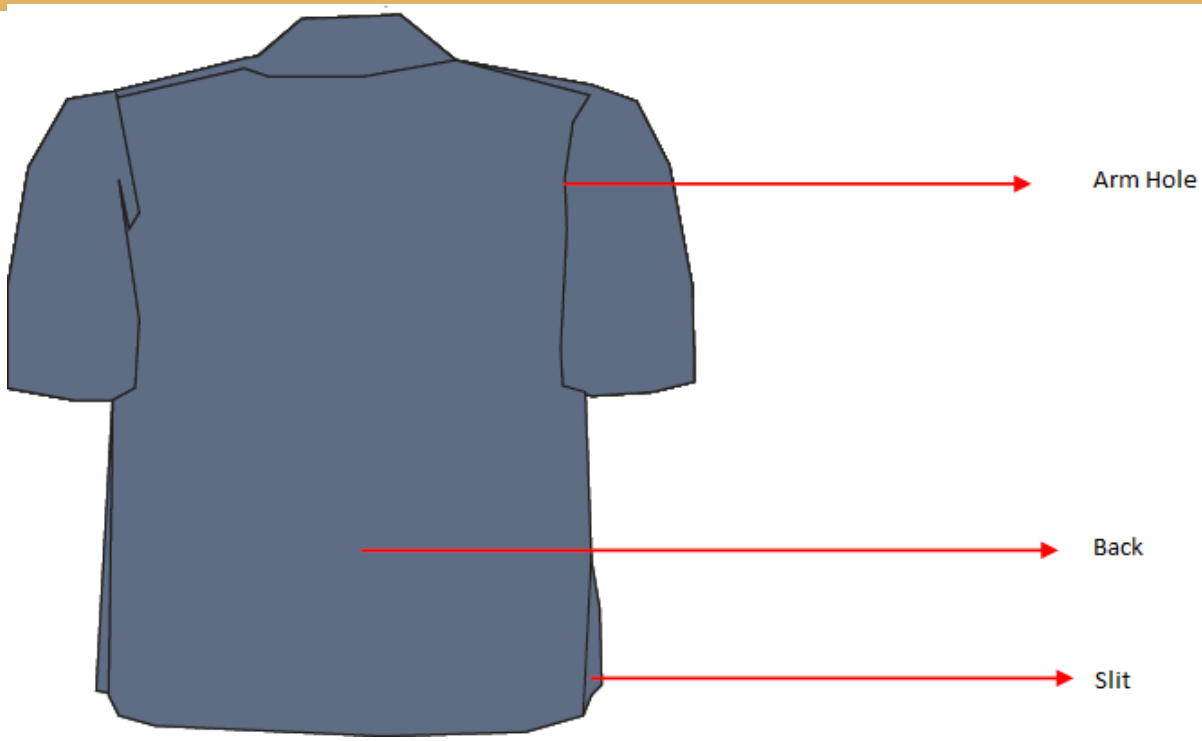


Parts of a T-shirt



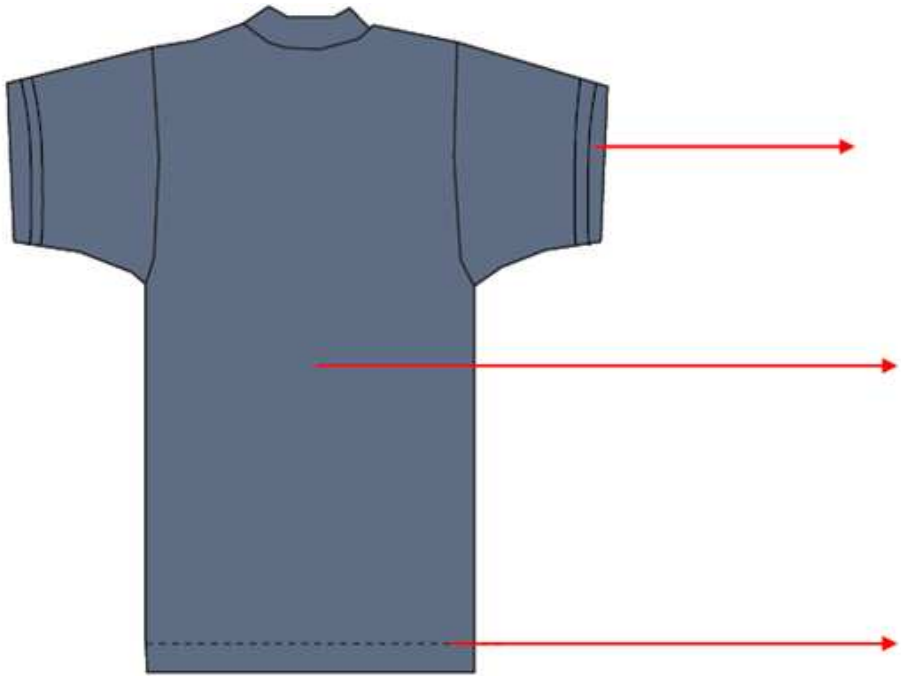
Parts of a Polo T-shirt

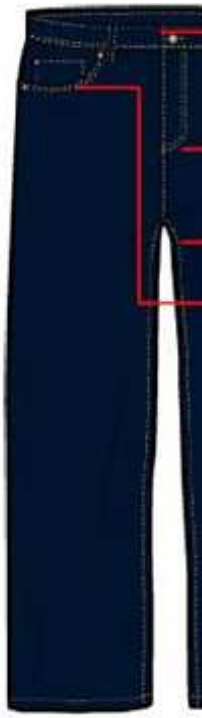



Arm Hole
Back
Slit

EXERCISE

1. Name the Parts





BASIC GARMENT TRIMS/ACCESSORIES

	At the end of this session you will be able To Understand: Basic Garment Trims/Accessories

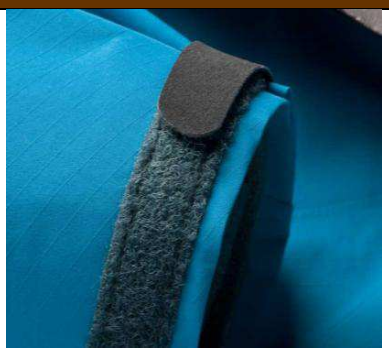
Session Plan	
1	Different Garment Trims

Trims are materials, which are used to decorate or enhance garments. In simple words anything used in a garment other than fabric is known as trims. Trims are also known as accessories or sundries. Trims are also of functional importance to garment as they are integral part of garment construction. Some of the trims used in the manufacturing process are mentioned as under

Table Heading	Table Heading	Photograph
Thread	Special kind of yarns that are engineered and designed to pass through a sewing machine rapidly, form stitches efficiently, and function in a sewn product without breaking or becoming distorted for at least useful life of the product.	
Lining	Lining is a material that increases look and performance by supporting and/or enclosing the interiors of the garment or garment part.	

Table Heading	Table Heading	Photograph
Zipper	A zipper is a popular device for temporarily joining two edges of fabric. It is used in clothing (e.g. jackets and jeans), luggage and other bags, sporting goods, camping gear (e.g., tents and sleeping bags), and other daily use items. Zippers may be used for 1.Increasing the size of an opening to allow the passage of objects, as in the fly of trousers or in a pocket 2. Joining or separate two ends or sides of a single garment, as in the front of a jacket, dress or skirt. 3. Attaching or detach a separable part of the garment to or from another.	
Hang tag	Items for retail display not permanently attached to garment; convey brand name(s), trade mark(s), and product information to customers. Give the participants some samples and ask them to dot down what information Hang Tags contain.	
Piping	It is used to stabilize seams, outline components and absorb wear and abrasion that would affect the seam.	
Rib Trims	It is used to complete necklines and lower sleeve edges of T-Shirts.	

Table Heading	Table Heading	Photograph
Appliqués	These are emblems or cut-out fabric shapes, figures or motifs that are superimposed and sewn or fused to garment component.	
Lace	Lace is an ornamental openwork fabric or trim made into variety of designs by intricate manipulation of fiber or yarn.	
Labels	Labels provide information for both the garment manufacturer and the consumers who select and use them. Labels provide: Product information Construction features Size information Fiber content Wash care instructions Brand name & RN number	
Buttons	Buttons are used for temporarily joining two edges of fabric. They are used in manufacturing of Shirts, Tops, Trousers, Jackets etc. The measuring unit for buttons is ligne.	
Snap Fasteners	Snap Fasteners are used for temporarily joining two edges of fabric. It is used in Shirts, Tops, Trousers and Jackets.	

Table Heading	Table Heading	Photograph
Velcro	Velcro is used for temporarily joining two edges of fabric. It is used in Shirts, Tops, Trousers, and Jackets.	
Elastic	A band capable of resuming original shape after stretching or compression	

PATTERN AND GARMENT TERMINOLOGY

	At the end of this session you will be able to understand: Basic Pattern and Garment Parts

Session Plan	
1	Pattern Terminology
2	Pattern Part Recognition Of A Shirt
3	Pattern Part Recognition Of A Polo T-shirt
4	Pattern Part Recognition Of A Polo Trouser

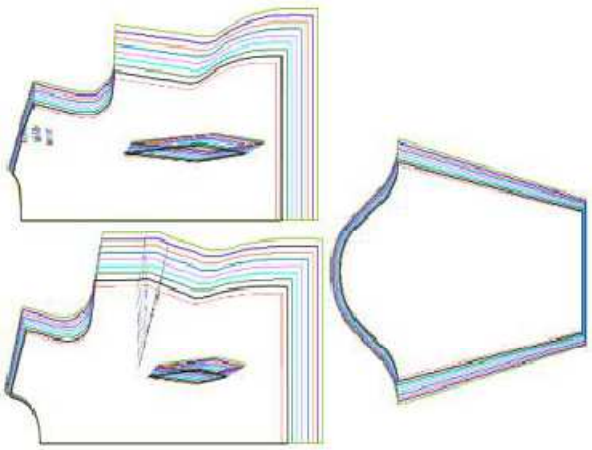
PATTERN TERMINOLOGY

Pattern

A pattern is a reference object for creating garment parts in a manner such that there is minimum amount of material wastage, least amount of seam and stitching operations to facilitate mass production with increased speed of fabrication.

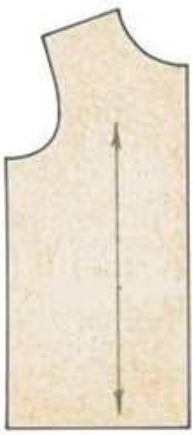
Pattern Grading

The process of increasing or decreasing the dimension of the pattern at specific points according to certain grade rules of proportional change.



Grain line

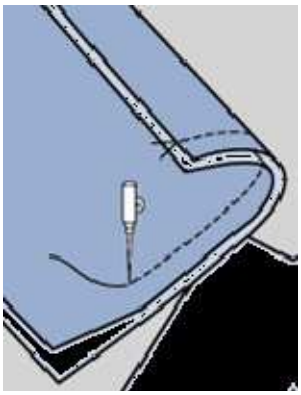
Grain line is a marking on a pattern piece used for alignment with warp yarns or wale lines in piece goods and positioning pattern in markers.



Seam allowance

Seam allowance is the area between the edge and the stitching line on two (or more) pieces of material being stitched together. Seam allowances can range from 1/4 inch wide (6.35 mm) to as much as several inch. Commercial patterns for home sewers have seam allowances ranging from 1/4 inch to 5/8 inch.

Sewing industry seam allowances range from 1/4 inch for curved areas (e.g. neck line, arm scye) or hidden seams (e.g. facing seams), to one inch or more for areas that require extra fabric for final fitting to the wearer (e.g. center back).



Selvedge

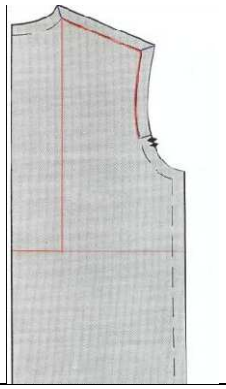
The selvedge refers to the edge of fabric as it comes off the loom. The selvedge is the edge of the fabric, which has manufacturer information. This area of the fabric is usually a bound edge that does not fray. The selvedge of the fabric may also have color dots which show the colors used in the fabric and lines to indicate the repeat of a print on the fabric.

Style

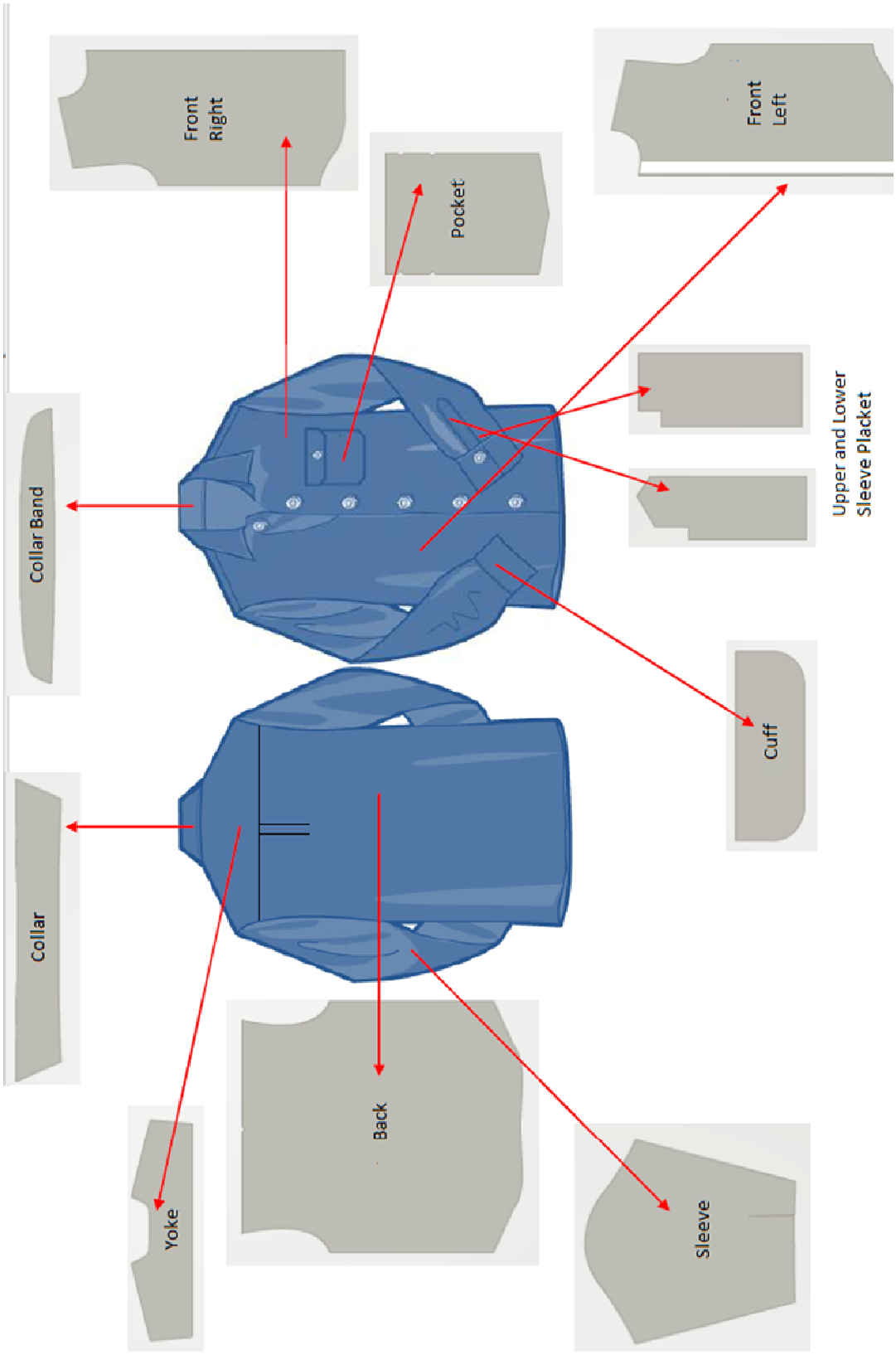
Style is the characteristic or distinctive appearance of an item, unique piece of merchandise in a product line identified by style number.

Notch

Notches are used to line up two or more pieces of fabric. Larger notches always refer to the backside of the garment, which help keep fronts and backs straight to prevent mistakes. Notches can be cut into the seam allowance.

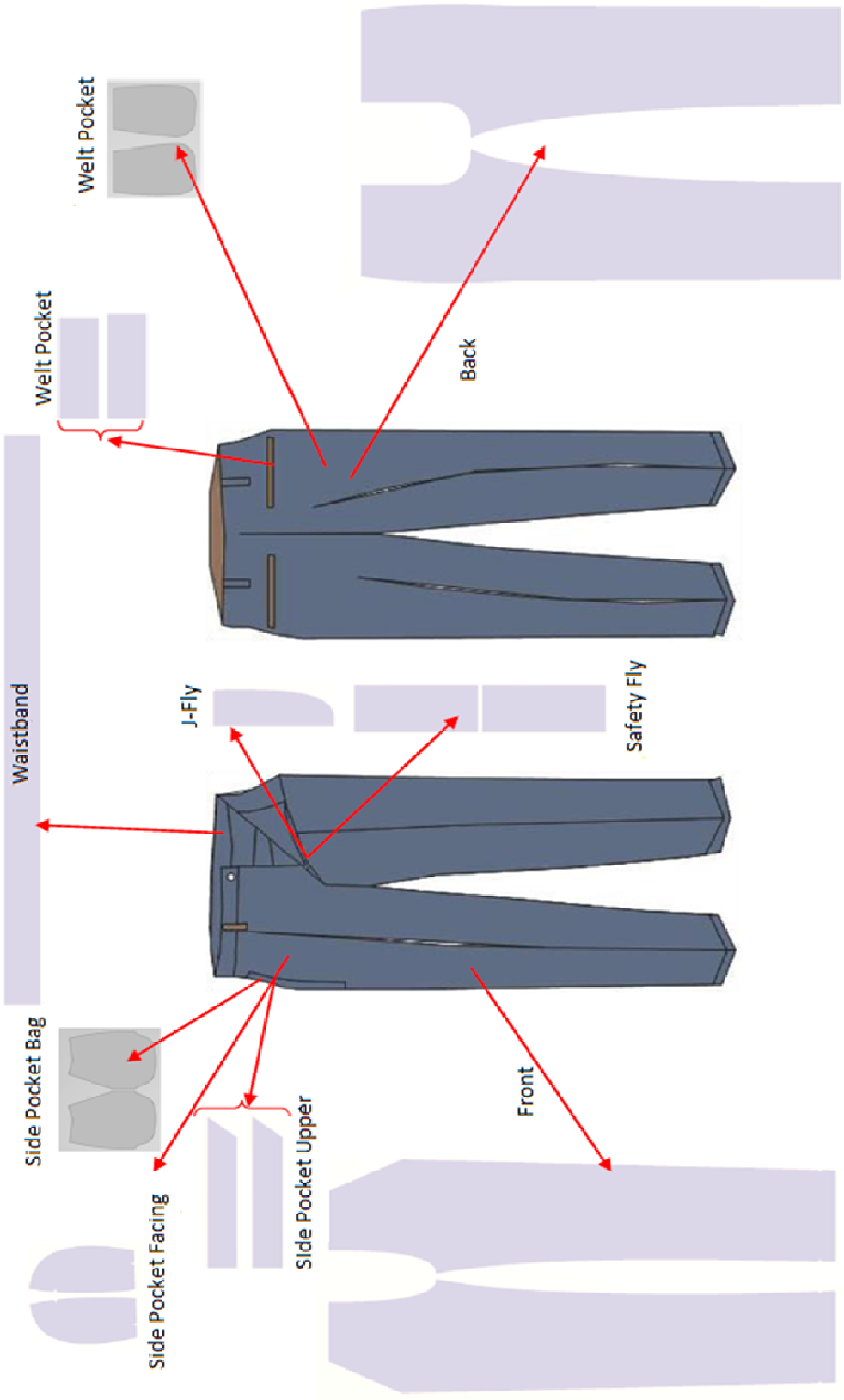


Pattern Part Recognition Of A Shirt

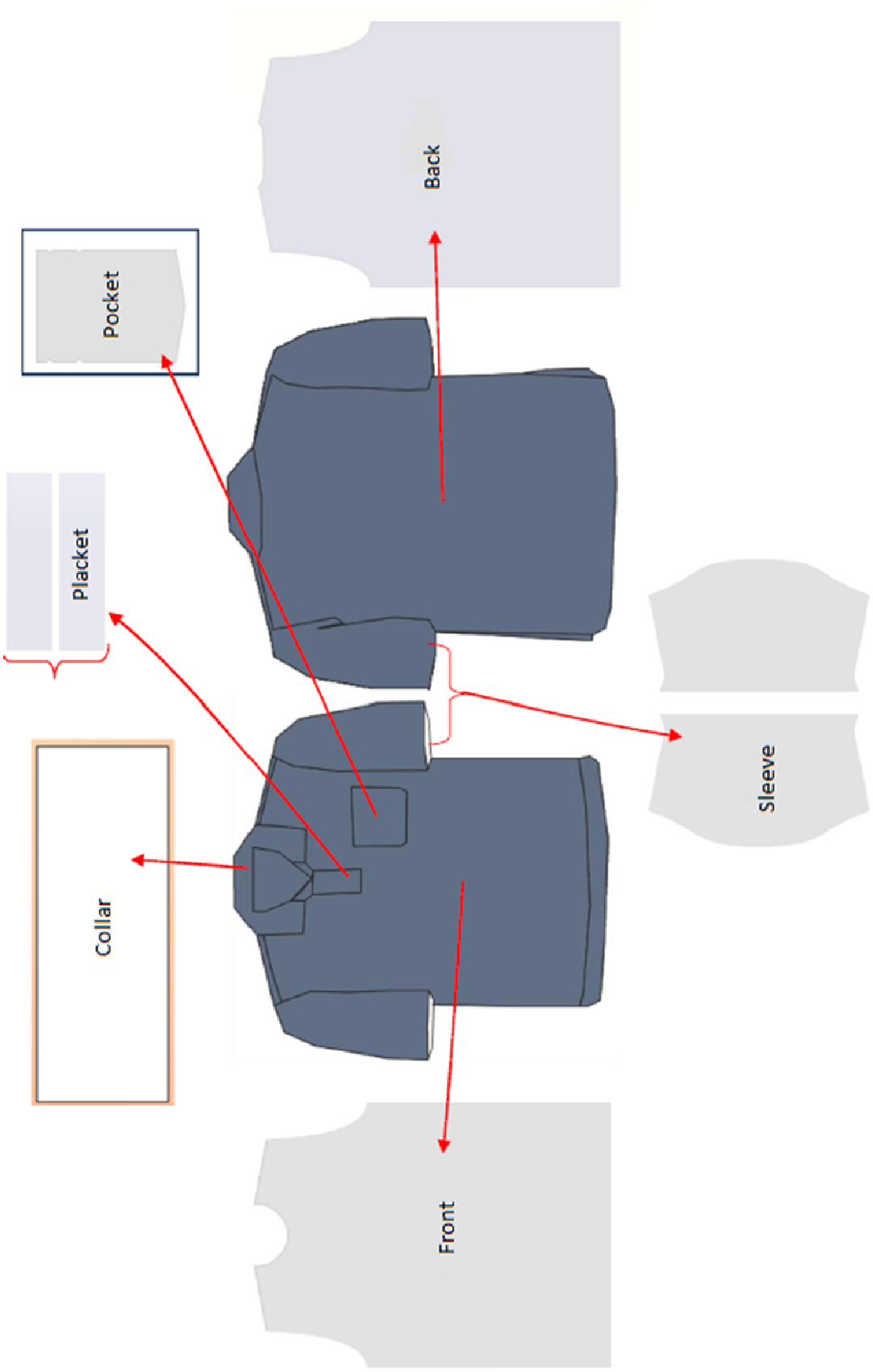


PATTERN PARTS OF A SHIRT

Pattern Part Recognition Of A Trouser

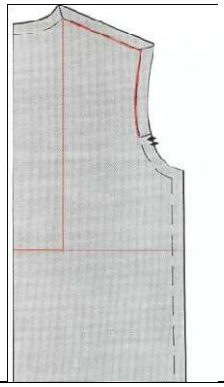
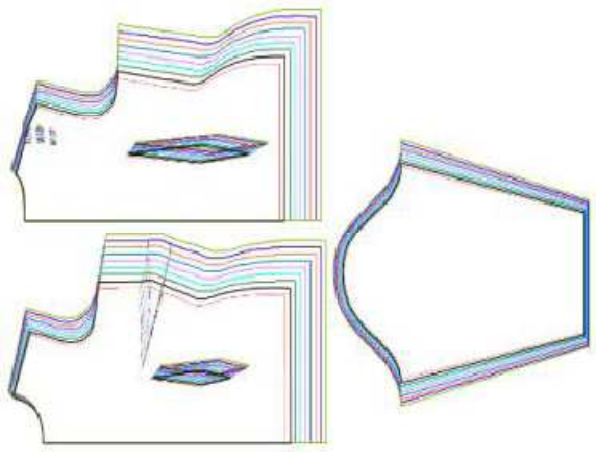
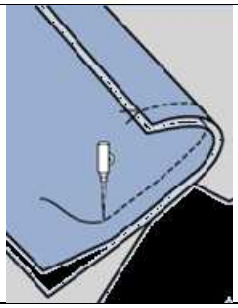


Pattern Part Recognition Of A Polo T-shirt



Different Types of Fabric

Match the following:

	Selvadge
	Pattern
	Seam
	Notch

FABRIC AND YARN TYPE

	At the end of this session you will be able to understand: Different Types of Fabric and Yran

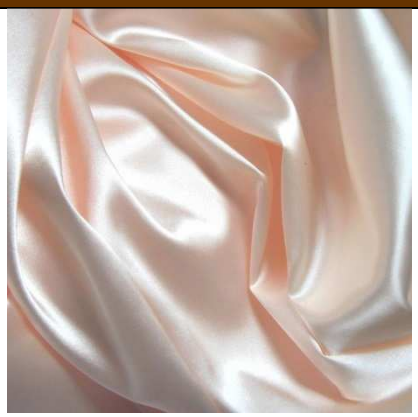
Session Plan	
1	
2	

Different Types of Fabric

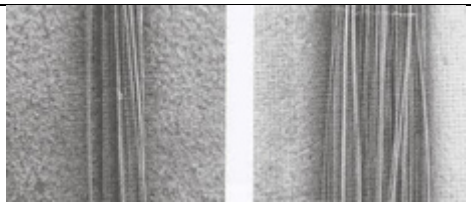
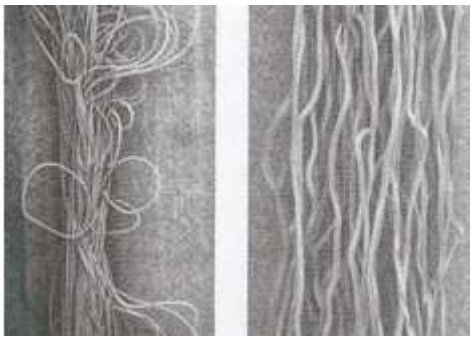
Fabric Name and Description	Photograph
Cambric This is a very fine lawn weave fabric that is mostly used in shirts and blouses. Batiste is usually made of cotton or cotton mix, but also linen and wool are used. This fabric is soft and light, but very stable, which makes it easy to maneuver.	
Velvet is a tufted woven fabric with a smooth pile effect on the right side. Velvet is often made of cotton or polyester, and it can be inelastic or stretchy. Thick inelastic velvet is suitable for evening and outer wear, and it's quite simple to handle. Elastic velvet can be used in tops and t-shirts, same way as tricot or jersey. Stretchy velvet is a relatively simple fabric, and it can be sewn with an overlocker.	
Corduroy is similar to velvet, only with a striped pile effect. Corduroy is	

Fabric Name and Description	Photograph
used in blazers and trousers, and it's quite simple to sew. Choose a corduroy with 2-5 % of elastan for very slim-fit trousers. Avoid making decorative topstitchings on corduroy, as the result is usually quite messy.	
Chiffon is a light and translucent, very well draping and flowing fabric. Chiffon is usually made of silk or polyester or other synthetic materials, and it's often used in lighter and finer shirts, blouses and dresses. Chiffon is quite a challenging material to sew, as it is very light and thin. The thinner the chiffon, the harder it is to maneuver. When using translucent fabrics, make French seams instead of regular plain seams for neater and more durable result.	
Crepe is a plain weave fabric with a rough, crispy surface. The structured texture is created by using 'curled' spun yarn either for weft or warp, or for both. Almost any fiber can be used for crepe, but most common materials are cotton, wool, silk, viscose (rayon) and polyester. Depending on the material, crepe is suitable for a variety of different garments; outerwear, shirts and blouses, trousers, skirts and dresses. Thick and medium weight wool or cotton crepe is relatively easy to use, whereas thinner and more flowing silk and viscose crepes are more challenging.	
Denim is a strong and hard-wearing twill weave fabric. Denim is mostly cotton, usually with some elastan for stretch. The classic denim is blue, with white weft yarns. Denim is most commonly used in jeans – for very tight and slim-fit jeans it is wise to choose a denim with 2-5 % elastan. However, always go for a good quality, thick or medium weight denim, as very thin fabrics aren't durable enough for the rough every day wear that a good pair of jeans should be able to take. It's recommended to use a special denim needle for sewing this thick fabric.	
Flannell is a brushed lawn or twill weave fabric, with a soft texture on	

Fabric Name and Description	Photograph
one or both sides. It is usually made of cotton, but also wool and synthetic fibers are used. Cotton flannels are most commonly used in shirts, and wool flannel in outerwear. Flannel is a very simple material to use.	
Fleece is a soft polyester or polyamide knit with a deep pile texture. It is mostly used for sports and outerwear. Fleece is easy to sew, and the garment pieces can be sewn together with an overlocker.	
Jersey is a fine and smooth knit with different right and wrong side. Cotton and viscose are very common materials. Jersey is used in a variety of different garments that require stretch, such as blouses, t-shirts, tops and casual dresses. It is simple ti sew, but be careful not to stretch the fabric when being sewn. If necessary, you can sew a transparent elastic into some seams (for example shoulders), to avoid the seam from stretching out of shape.	
Organza is a translucent, stiff fabric with plain weave. It is usually made of either silk or polyester. Organza is used for evening clothing and fine shirts and blouses. It is moderately challenging to sew, as it is very light. When using translucent fabrics, make French seams instead of regular plain seams for nicer and more durable result.	
Satin is actually a type of weave. It has a glossy right side, and it's quite slippery and well draping. Satin is usually made of silk or	

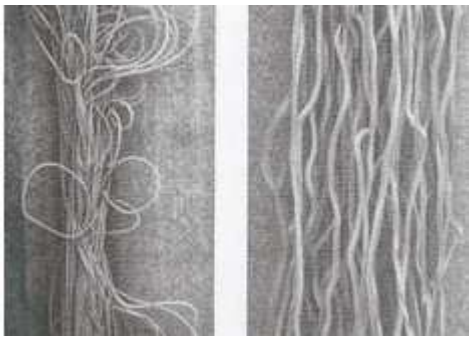
Fabric Name and Description	Photograph
polyester, but also wool and cotton are used. Light and shiny silk or polyester satins are used in evening gowns and lingerie, thicker wool satin is used for coats, trousers and other outerwear. Depending on the raw material, satin is usually quite a challenging fabric to cut and sew, as it is very slippery and tends to lose its original shape.	
Taffeta is a stiff and shiny, plain weave material made of silk or polyester. Taffeta is a firm and crisp fabric that is commonly used for evening and wedding gowns. It's a stable and relatively simple material to handle.	
Voile is a translucent, soft and light plain weave fabric, usually made of 100% cotton, but also viscose is used. It is suitable for shirts, blouses and dresses, and it is quite a simple fabric to sew.	
Worsted wool Fabric Is a Worsted cloth, archaically also known as stuff, is lightweight and has a coarse texture. The weave is usually twill or plain. Twilled fabrics such as whipcord, gabardine and serge are often made from worsted yarn. Worsted fabric made from wool has a natural recovery, meaning that it is resilient and quickly returns to its natural shape, but non-glossy worsted will shine with use or abrasion.	

Different Types of Yarn

Yarn Type and Description	Photograph
Ring Spun Yarn: These are produced on the ring and traveler system from a wide variety of fiber types.	
Rotor spun Yarn These yarns consist of fibers bound together by twist. Rotor spun yarns are generally produced from short staple fibers.	
Flat continuous filament yarn Man- made continuous filament yarns may be produced in either monofilament or multifilament form.	
Textured continuous filament yarn These are man-made continuous filament yarns that have been modified by subsequent processing to introduce durable crimps , coils , loops or other distortions into the filaments.	

EXERCISE

Identify the following fabric :

Fille in the Blanks

_____ are man-made continuous filament yarns that have been modified by subsequent processing to introduce durable crimps , coils , loops or other distortions into the filaments.
_____ is a plain weave fabric with a rough, crispy surface.
_____ is a light and translucent, very well draping and flowing fabric.
_____ is a strong and hard-wearing twill weave fabric.

EQUIPMENTS & TOOLS USED IN CUTTING & SEWING

	At the end of this session you will be able to understand: Basic Equipment and tools used in cutting Sewing

Session Plan	
1	
2	
3	Needle Point

EQUIPMENTS & TOOLS USED IN CUTTING

Machines Types	Machine Name and Description	Photograph
Cutting& Spreading Machines	Spreading Machines These machines are used for automatically laying the fabric.	
	Straight Knife These machines are used for cutting thick lays of fabric. These are fitted with automatic sharpening tools which are to be pressed regularly to sharpen the edges of the knife.	
	Circular knife These machines are used for	

Machines Types	Machine Name and Description	Photograph
	cutting relatively thin lays of fabric. These knives are good at cutting sharp corners and curves	
	Band Knife These machines are used for cutting sharp corners and curves and are fitted on special kind of table with small holes, which suck in air to provide grip for the handling operator.	
	End Cutter These machines are used for cutting end bits of lays.	
	Fusing Machine	

Machines Types	Machine Name and Description	Photograph
	These machines are used for attaching fusible interlining machines to the various parts of the garment.	

EQUIPMENTS & TOOLS USED IN SEWING

Type of Sewing Machines Based on Control Mechanism

Sewing quality is controlled by the integration of elements from these five areas:
1. Sewing machine
2. Thread
3. Fabric
4. Operator
5. Product design

An understanding for identification and classification of sewing machine is important for making proper selection of the machine, for choosing stitch or seam types, with respect to the final product

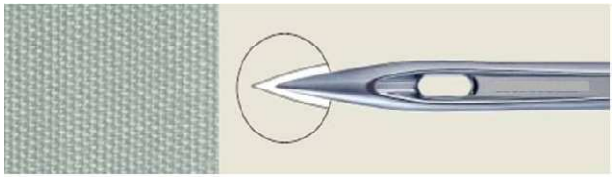
Machine Name and Description	Photograph
Lockstitch Machine The Single Needle Lock Stitch Machine is the most popular and versatile sewing machine in the industry. It is designed to produce consistent results in sample and production rooms. The Lockstitch forms precise and secured straight stitches on the top and the underside of the fabric as the needle thread and the bobbin thread lock each other each time the needle passes through the fabric.	
Multineedle Chain Stitch Machine Chain Stitch industrial sewing machine is without bobbins and has loopers to form a chain crochet like stitches.	
Overlock Machine An overlock / overedge machine is a high speed sewing machine. This is the quickest performing machine for giving Overedge stitches.	
Button sewing Machine This is a high-speed buttonholing machine, which is used for sewing buttonholes in the garment.	
Buttonholing Machine This machine is used for sewing buttons in the	

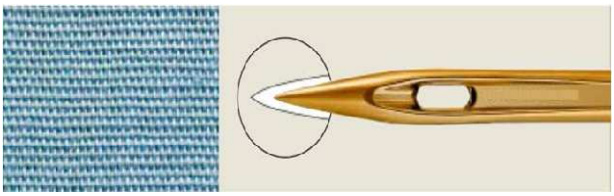
Machine Name and Description	Photograph
garment	
Feed-Off-The-Arm, 2-Needle Double Chain stitch Machine This machine is largely used for attaching sleeves and for making complex circular stitches while attaching different parts of the garment.	
Computer-Controlled High-Speed Bartacking Machine This machine is used for giving secure Bartack stitches.	

Needle Point

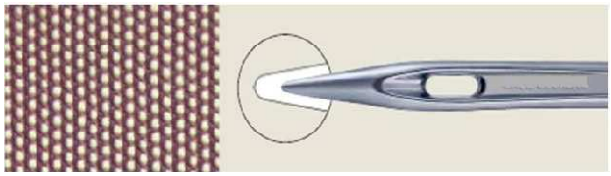
The needle points are categorized into 2 types:
1. Cloth points: These have slight rounded tip and are designed to penetrate through the material without cutting it. These are used on fabrics. These are further divided into:

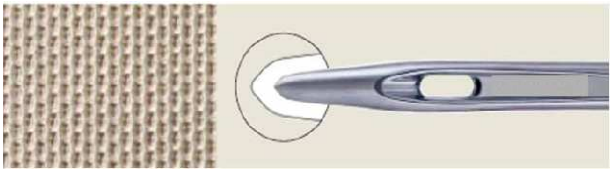
Round points: These are rounded at tip but are thin and sharp. Such points are used for woven fabrics where if required needle has to penetrate through the fibres in the weave.



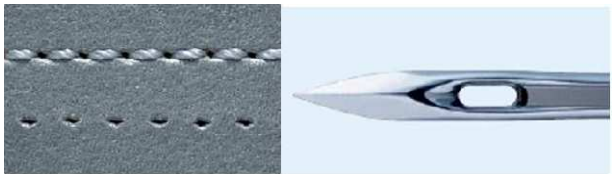


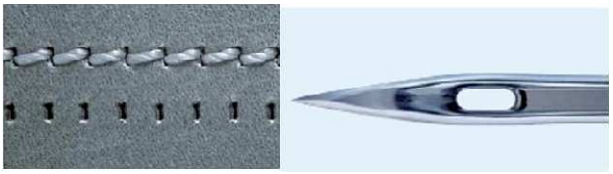
Ball points: These are slightly thicker and rounder at the tip and designed for knitted fabrics. They shift the yarns and pass through, avoiding holes and fabric damages.





2. Cut points: The points have sharp tip in order to cut through the material. These are used for stitching leather products and apparels.





Exercise

What are types of needle points?

2)Describe feed-off the Arm Machine?

3) What Factors control sewing quality?

FLOW PROCESS CHART OF GARMENT MANUFACTURING

At the end of this session you will be able to understand:
Flow Process Chart Of Garment Manufacturing

Session Plan	
1	Flow Process Chart Of Garment Manufacturing

FLOW PROCESS CHART OF GARMENT MANUFACTURING

Based on present apparel industry, garment manufacturing processes are categorized as
Pre-Production Processes –

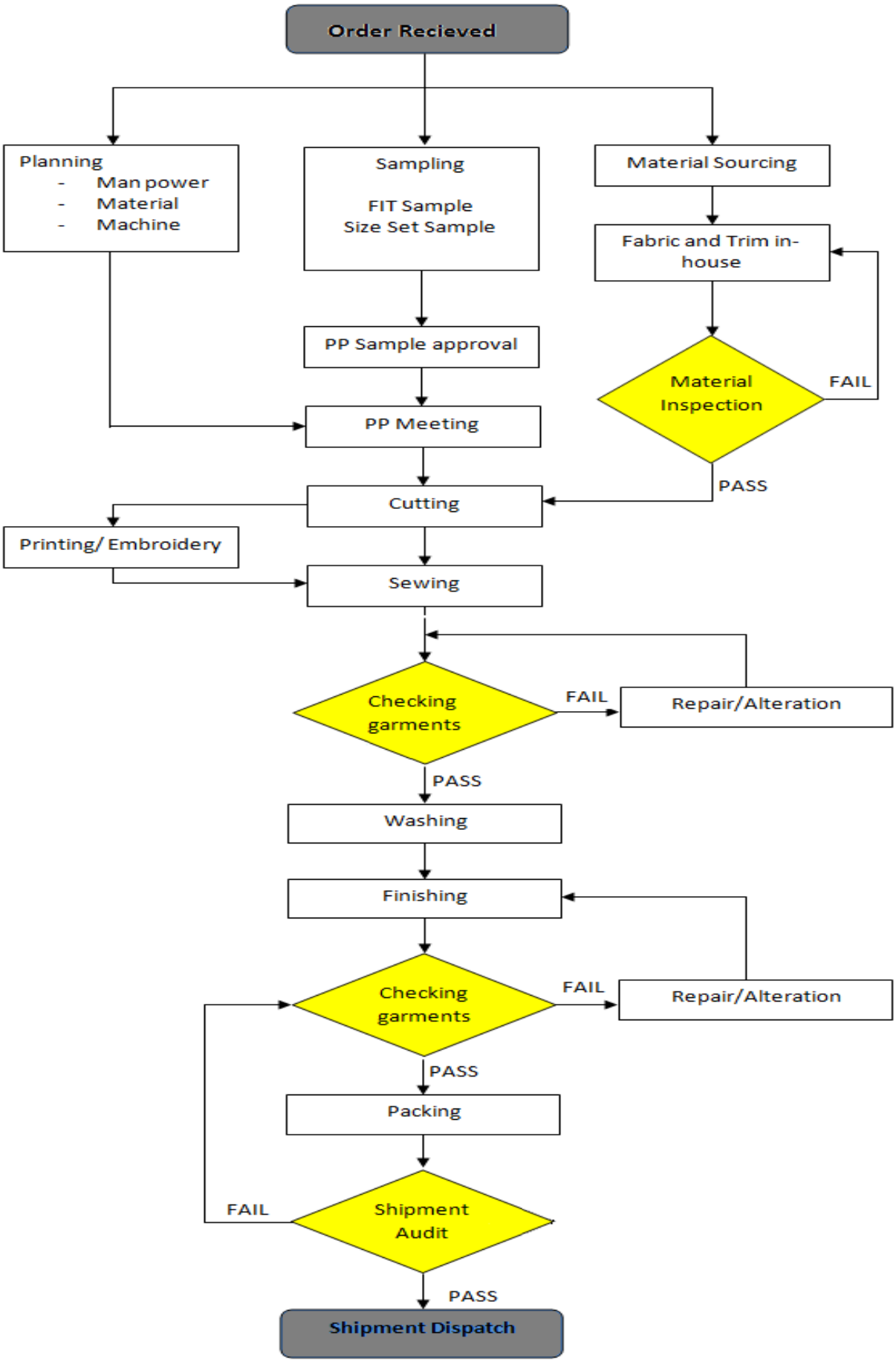
- Meeting with buyers
- Development of initial samples for the buyer
- Development of fabric sample, bit loom, print and embroidery artwork
- Costing of garment (complete cost as well as manufacturing cost)
- Pattern making, correction of pattern, pattern grading
- Fit sample, size set sample making and approval from buyer
- Correction of fit samples according to buyer comments
  Approval of fabric swatches, print colors, embroidery design, bead works
- Production planning, Material planning and line planning
- Placing order for fabrics, trims, accessories and packing materials
- Testing of fabrics and other raw materials
- Study of approved sample
- Pre-production meeting

Production processes –

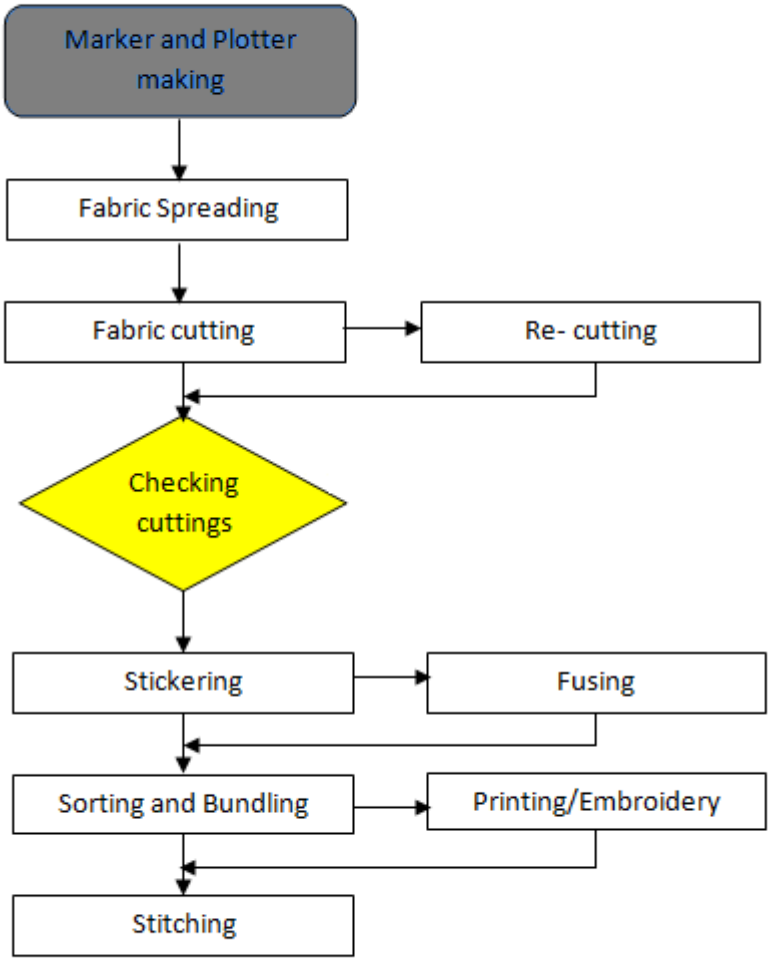
- Marker Making
- Spreading
- Fabric Cutting
- Sorting/ Bundling
- Sewing or Assembling
  Inspection

Post production processes -

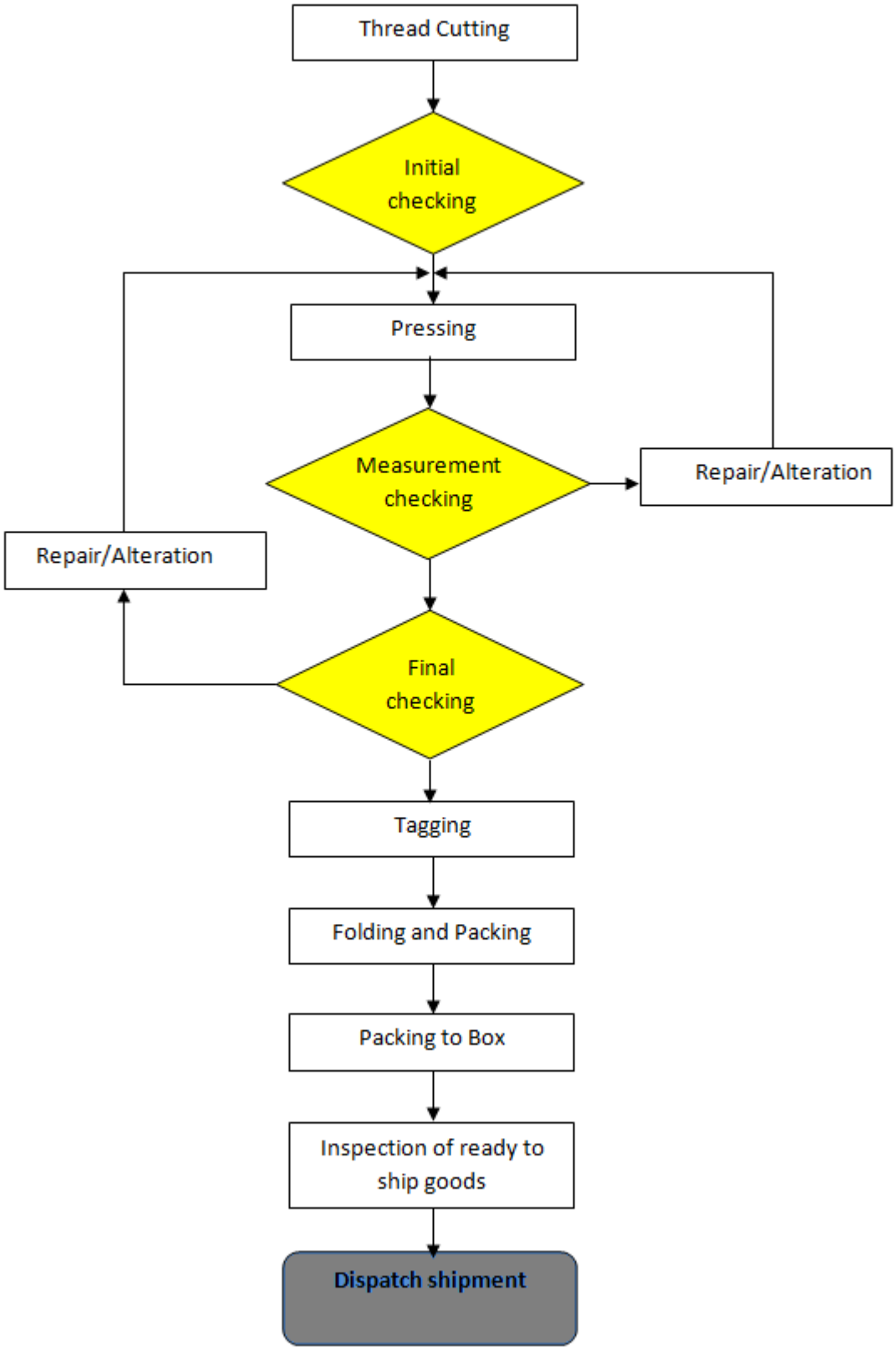
- Pressing/ Finishing/Triming
- Final Inspection
- Packing
- Dispatch


Order Recieved
Planning
- Man power
- Material
- Machine
Sampling
FIT Sample
Size Set Sample
Material Sourcing
Fabric and Trim in-house
PP Sample approval
Material Inspection
FAIL
PASS
PP Meeting
Cutting
Printing/ Embroidery
Sewing
Checking garments
FAIL
Repair/Alteration
PASS
Washing
Finishing
Checking garments
FAIL
Repair/Alteration
PASS
Packing
Shipment Audit
FAIL
PASS
Shipment Dispatch

Cutting Room Process Flow Chart



Garment Finishing Process Flow Chart



AN INTRODUCTION TO QUALITY

At the end of this session you will be able to understand:
Quality , Skills and Knowledge for a Garment Checker

Session Plan	
1	Brief of Quality and its Characteristics
2	Skills & Knowledge Requirement for A Garment Checkers

QUALITY

Quality can be defined as-
 Fulfilling needs which are defined for the product
 Fitness for purpose
The word quality has multiple meanings. Two of those meanings are most critical “product performance” and “freedom from defects”.
••Product performance: - Product Satisfaction

Quality refers to how good the product works. Such features are decisive as to product performance and as to product satisfaction.
•Freedom from defects: - Product Dissatisfaction

Quality also refers to freedom from defects. Some defects come from production and from processes, which had been overlooked. The long-range goal is perfection.

Finally, with the above in mind, we can define quality as a summary of the following characteristics: -

•Quality is prevention:
Avoid doing things in a wrong way.

• Quality is customer satisfaction:
Think that you are going to use the product, and work towards making the product useful and satisfying for you.

• Quality is flexibility:
The willingness to change to meet demands.

• Quality is efficiency:
Doing things quickly and correctly.

• Quality is meeting:
A schedule being on time.

•Quality is a process:
Of ongoing improvement. Improve by practice.

•Quality is an investment:
The better products you make will give you better pay as you can finish work faster without repetition.

SKILLS & KNOWLEDGE REQUIREMENT FOR A GARMENT CHECKERS

Good Eye
Good vision is the prerequisite for becoming a good quality checker. The checker should not be suffering from defects of vision like near sightedness or long sightedness and should have a 6/6 vision in both right and left eyes.

Good colour perception
The checker should not be suffering from colour blindness and should be able to identify various colours. The checker should be able to identify shade variation and discolouring caused to manhandling of garment.

Ability to understand and classify defects
The checkers job is to identify the non-conformities arising in the garment; that is non-conformance with the standards given in the specification sheet. Once the guideline is given he should be able to identify and classify defects without any supervision. An important point to note here is that once the checker passes the garment it is assumed to be perfect and defect free. So it is very important that the checker takes outmost care in checking a garment in a way such that no defect escapes his eyes.

Stick to what he or she says is right despite possible objections from production personnel
It is the duty of the checker to stick to guidelines given in the specification sheet. He should not comply with any irregularities whatsoever is the condition sighted by the production personnel. It is advisable that checker should report any such conflicts to higher authorities and should not allow any non-conformity to pass through his jurisdiction without approval.

Ability to get along with others
It is the outmost requirement in any organization that its employees work in teams to attain the best. That is why a checker should always be a team player and should get along with others, share his/her experience and should be a good listener and observer.

Common Sense The checker should use his common sense/logical abilities to identify and specify defects and non-conformities arising in the garments.

Reasonable knowledge of math (Add, Subtract, Multiply, Divide) He should be good at mathematics and logical abilities to point out defects quantify the occurrence of defects and classify the defects into their respective classes.

Exercise

Mention the skills needed by a In-Line checker?

QUALITY& GARMENT

	At the end of this session you will be able to understand: Different Characteristics for Garment Quality

Session Plan	
1	Different Characteristics for Garment Quality

CHARACTERISTICS OF QUALITY GARMENT

In simpler terms a Quality Garment is having or should have characteristics mentioned below.
Look good: - A garment which is stitched uniformly, no shade variation, ironed and folded properly. We like to buy shirts packed in printed paper boxes and pay more for them.

Feel good: - A garment whose fabric is of good quality, has been given a good wash, texture of the fabric is attractive. Example: Cotton shirts are most comfortable to wear in summer as it absorbs sweat while silk shirts are comfortable in winter.

	
Cotton shirt for summer	Twill fabric shirt for winter

Use good: - The garment has size consistency, comfort, falls properly; fits to the body shape, and can be still worn after certain number of washes or lifecycles. Example: for miners, denim was developed as it suited their rough work conditions.

	
Cargos used byArmy	Denim Cargo

IMPORTANCE OF QUALITY

Quality is ultimately a question of customer satisfaction.
Good Quality increases- The value of a product or service, establishes brand name, and builds up good reputation for the garment exporting company.

All these results to-
1. Buyer satisfaction-
The buyer is the most important person as he pays for the products. He needs to be happy.

2. Job security-
If the company continues to satisfy the buyer, it will keep getting orders regularly and the workers' jobs will be secure.

3. High sales-
Good products sell out fast and profits can be earned.

QUALITY CONTROL

Quality Control is the effort applied to assure that end products meet the requirement and achieve customer satisfaction. A very effective control system is required to ensure that the whole process is meeting specification, with only a little exception. It can be achieved through:
In-process sampling
In process sampling is the way of quality inspection making a random sample size and inspecting it at different stage of the production.
It helps to rectify the defects or mistakes while the production is going on.
100% Inspection
100% inspection is done normally at the end of the production line
Quality Audit
Quality Audit is done at specific interval to check it the quality has been maintained. It is also useful to change and set new quality levels.

Exercise

1) _____ is the effort applied to assure that end products meet the requirement and achieve customer satisfaction.
2) _____ is the way of quality inspection making a random sample size and inspecting it at different stage of the production..
3)_____ is done at specific interval to check it the quality has been maintained. It is also useful to change and set new quality levels.

QUANTIFYING QUALITY

At the end of this session you will be able to understand:
Measuring Tools
Measuring Technique
How to Measure

Session Plan	
1	Understanding Measuring tools
2	Measuring Unit
3	How to measure a Shirt
4	How To Take Measurement of Basic Garment

Measuring tools and units

The main aspect of garment quality, which is actually measurable and quantifiable, is the measurement of various parts of the garment. This is because ultimately the measurements in the garment is for a good fit and better comfort which are the basic requirements in a garment.

Measuring Tape

A tape measure or measuring tape is a flexible form of ruler. It consists of a ribbon of cloth, plastic, fibre glass, or metal strip with linear-measurement markings. It is a common measuring tool. Its flexibility allows for a measure of great length to be easily carried in pocket or toolkit and permits one to measure around curves or corners. For taking measurements in garments, generally fibre made measuring tapes are used which have inch marks on one side and inch as well centimetre marks on the other side.

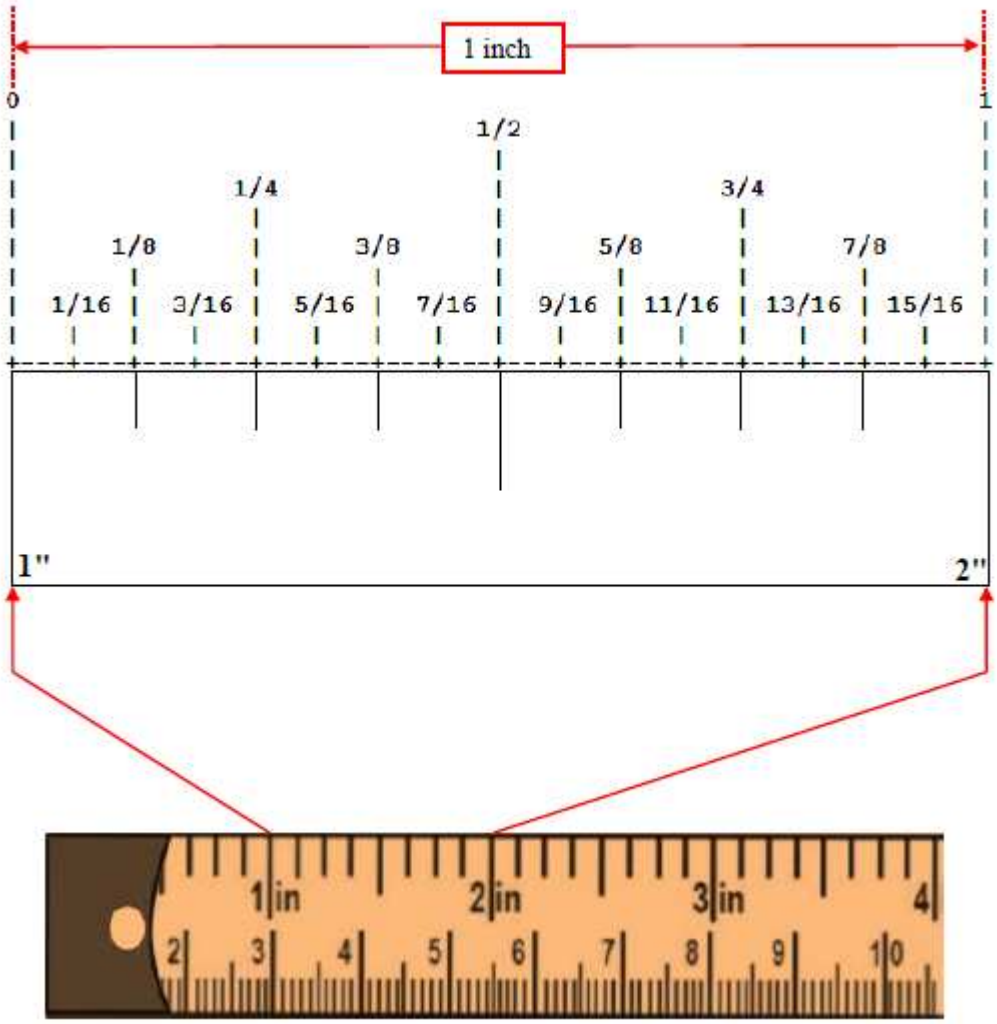
For taking measurements in garments, generally fibre made measuring tapes are used which have inch marks on one side and inch as well centimetre marks on the other side.

What inches are? Inches are the long lines that cross either half of, or all of the 1" width of the tape. They usually are preceded or followed by numbers	The distance between each mark with a red dot. 

1/2 of an inch is half of 1 inch.	The distance between each measurement with a red dot. 
1/4 of an inch is every four marks on the measuring tape	The distance between each measurement with a red dot 
1/8 of an inch is twice as big as the 1/16 of an inch. It is every other mark	The distance between each measurement with a red dot 
1/16 of an inch is usually the smallest measurement on a tape measure. The distance between every line on the tape measure is 1/16 of an inch	The distance between each measurement that has a red dot above it. 
1/32 of an inch is even more smaller which only certain measuring tapes indicate. The distance between every line on the tape measure is 1/32 of an inch	The distance between each measurement that has been shown by the red lines above it. 

Understanding Fractions

A number of fractions namely; 1/16, 1/8, 1/4, 1/2 etc. are used in garment measurements. These fractions are basically various divisions of the measuring tape in inches. We can understand fractions by observing the figure below. The figure indicates the various fractions of an inch of measurement



Section of a Measuring Tape

Conversion Table

How do we use the conversion table:
Step 1: Look down the left hand column to find the units you are converting FROM
Step 2: Then work across the table to your right to find the units that you are converting TO
X This means multiply by the conversion factor.
÷ This means divide by the conversion factor.

Converting inches to centimetres or vice versa:

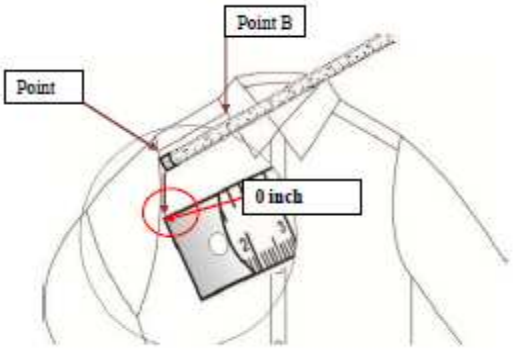
Now let's convert 3 inches to centimetre

Step 1: - Write 3 in the 4th row of 2nd column from left
Step 2: - Multiply with the conversion factor i.e. – 2.54
So, 3 inch = 3 X 2.54= 7.62 cm

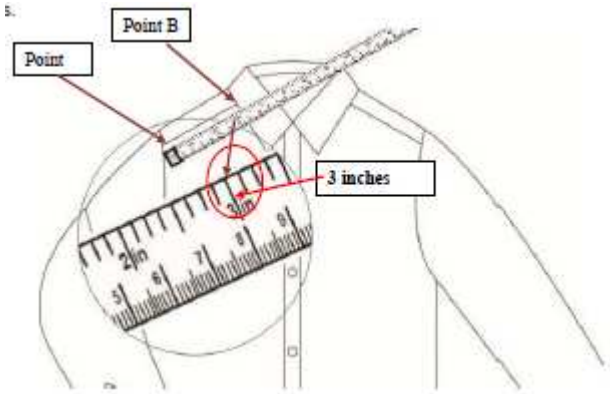
To: / From:	mm	cm	m	inch	yd
mm		÷ 10	÷1000	÷ 25.4	÷ 914.4
cm	x 10		÷ 100	÷ 2.54	÷ 91.44
m	x 1000	x 100		x 39.3701	x 1.09361
inch	x 25.4	3 x 2.54	÷39.3701		÷ 36
yd	x 914.4	x 91.44	÷ 1.09361	x 36	

How to Measure A Shirt

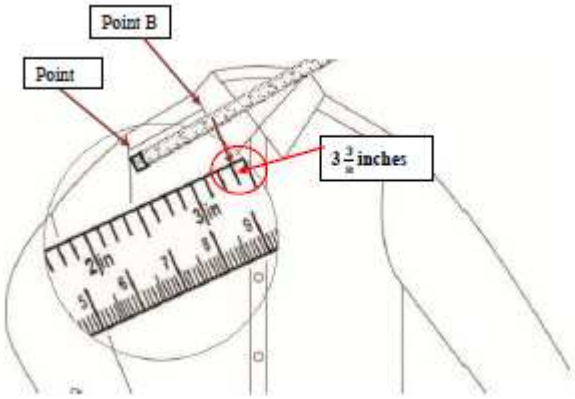
Hold the front of the tape at the point you wish to start the measurement from, and extend it to the point where you want to stop.



Read the first large number before your stop point - this will tell you the number of inches.

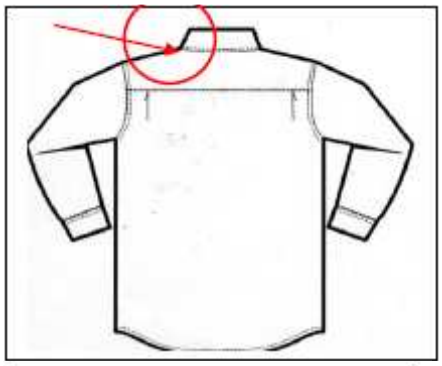
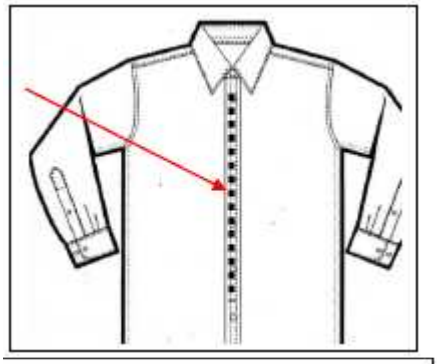
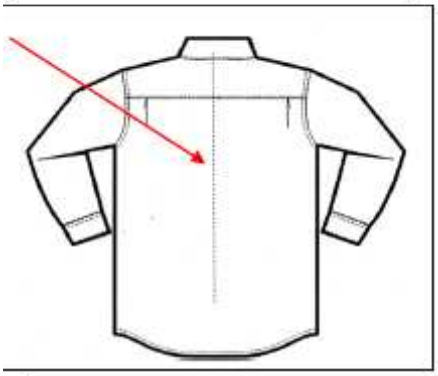
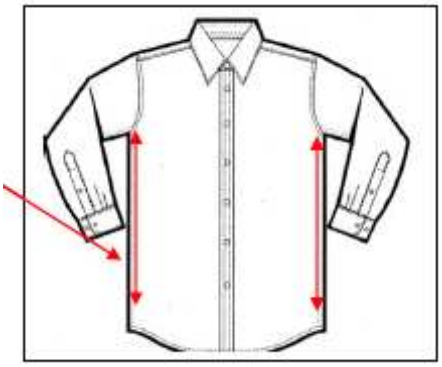


Read
The smaller lines of various size (remembering what the various sizes mean) up until your stop point. This will tell you your fraction of an inch.



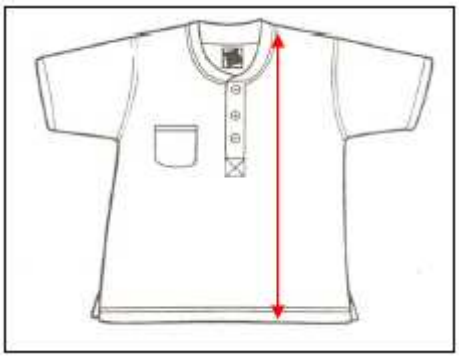
So, the measurement here from point A to point B is 3 **3**/**8**inches

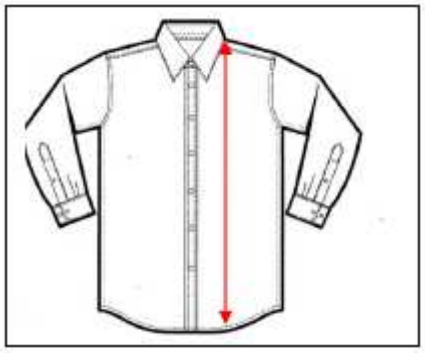
HOW TO TAKE MEASUREMENT OF BASIC GARMENT

HPS (High Point Shoulder)	A main reference point located at the highest point of the shoulder, where the shoulder seam meets the neckline. Many measurements are given in relation to the HPS.	
Center Front (CF)	Not to be confused with placket edges, the center front is an invisible line running vertically down the exact center of the front of a garment.	
Center Back (CB)	An invisible line running vertically down the exact center of the back of a garment.	
Side Seam (SS)	Seams on the left and right sides of a garment from the bottom of the armhole down to the bottom hem.	

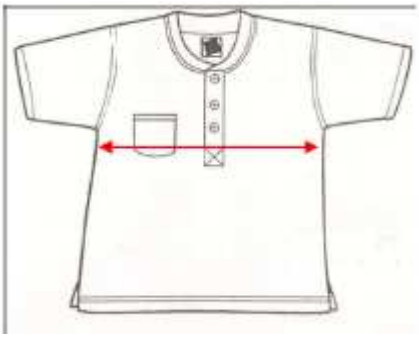
Specific Points of Measure: Shirt & T-shirt

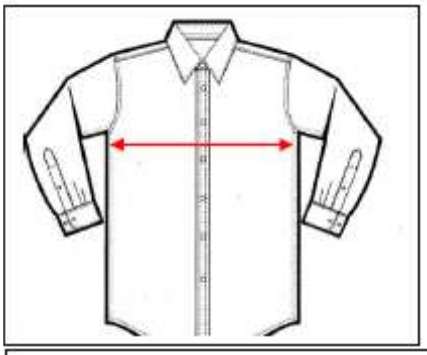
Body Length
Length of the garment from HPS to the Bottom Sweep.



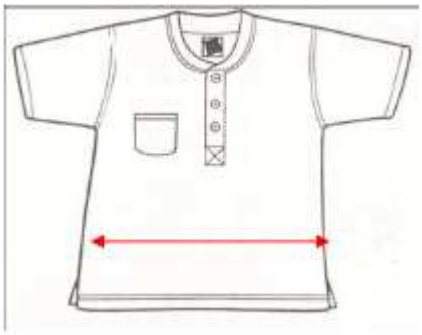


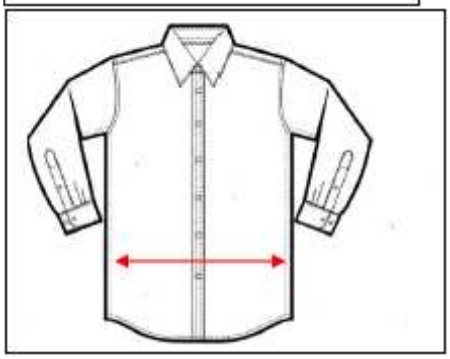
Across Chest
Usually measured 1" below armhole horizontally from edge to edge.



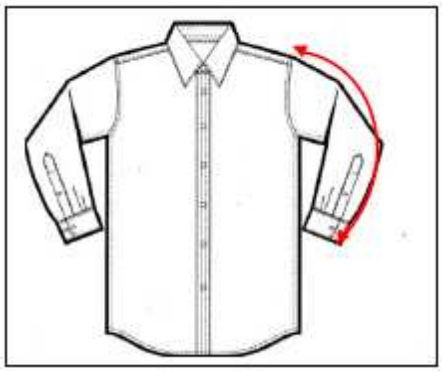


Waist
Measured horizontally from edge to edge at a specific distance below HPS, which will vary depending on sample size and company standards

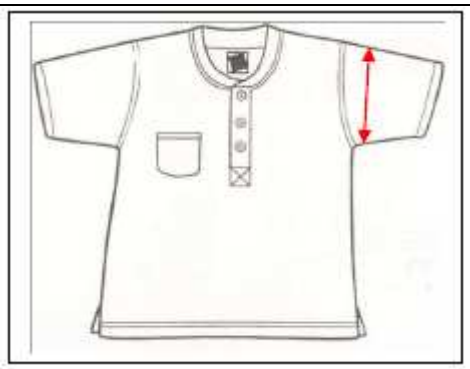


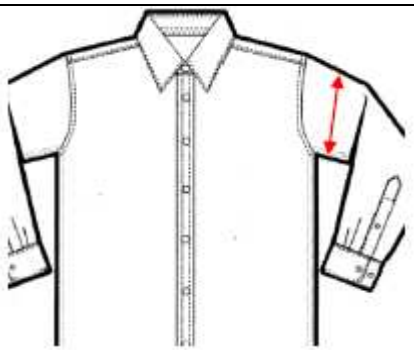


Sleeve Length:
Distance from the top of the sleeve at the shoulder seam, to the sleeve opening.

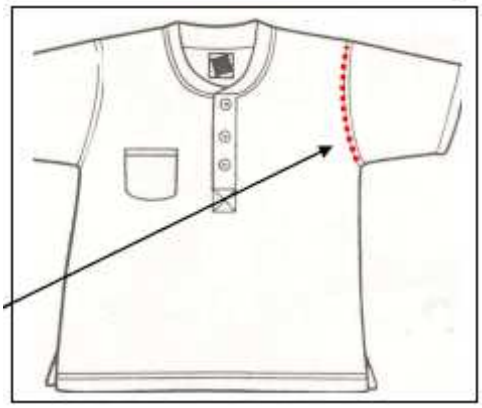


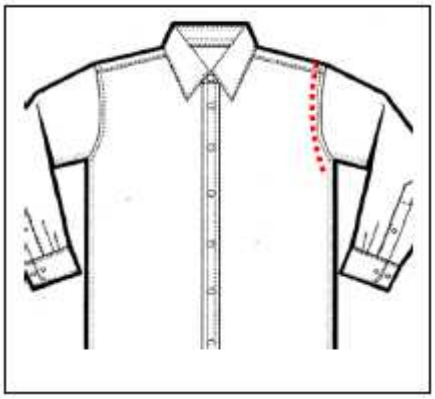
Bicep
Measured 1" below the armhole, perpendicular to the length of the sleeve.



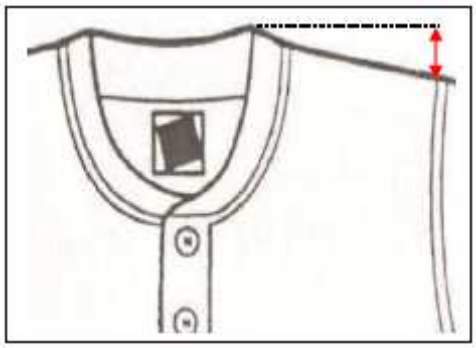


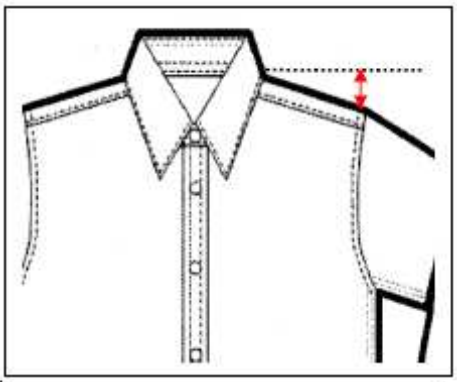
Armhole (Curved)
Measured along the curve of the armhole seam where the bottom armhole meets the side seam, to where the top of the armhole meets the shoulder seam.



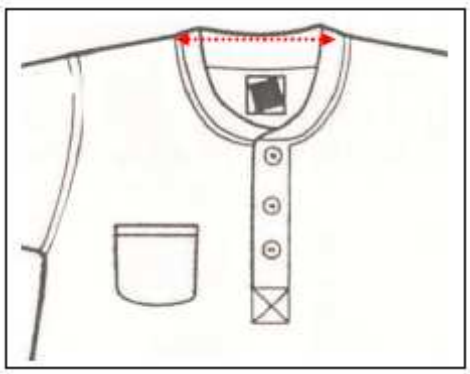


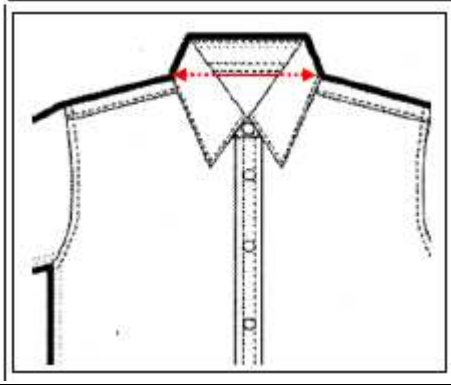
Shoulder Drop:
From HPS to the shoulder seam at armhole.





Neck Opening:
Measured from neck seam to neck seam at HPS.

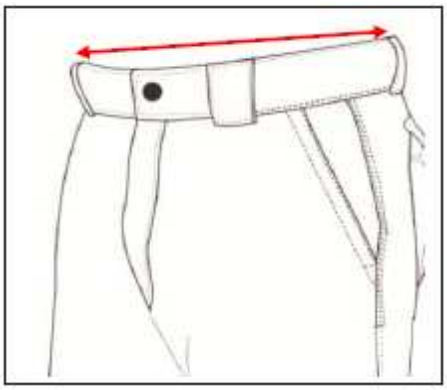




Specific Points of Measure: Bottoms

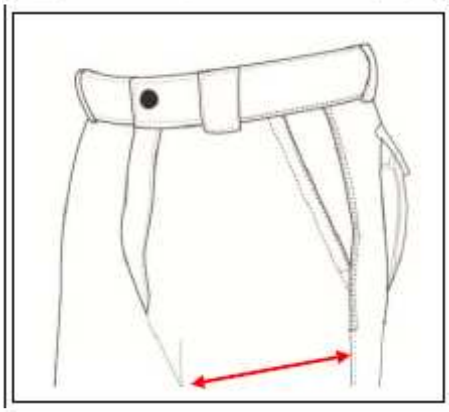
Upper Waist

Usually measured by aligning the front and back waistbands and measuring straight across the top of the waistband from edge to edge.



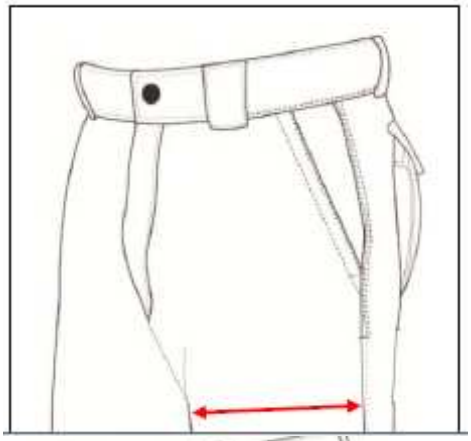
Lower Hip:

The lower hip spec is given through the 3 point method using three points of measure marked at a certain distance below the top waist at the sides and CF.



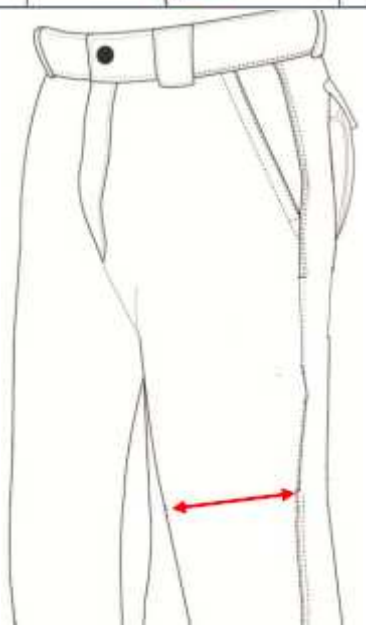
Thigh:

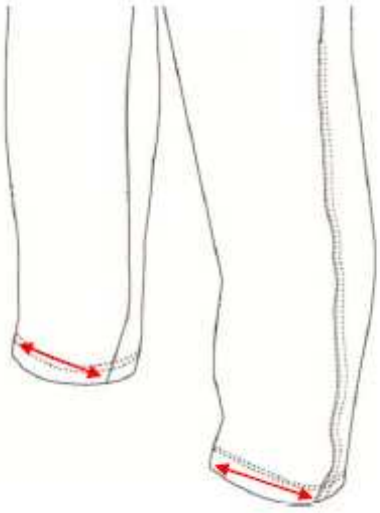
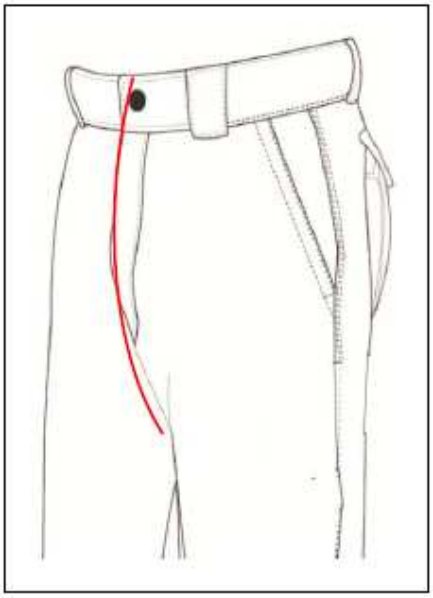
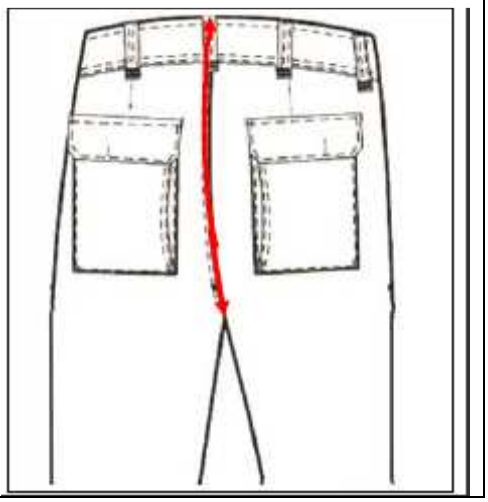
Typically measured 1" below the crotch seam, perpendicular to the pant leg from side to side.

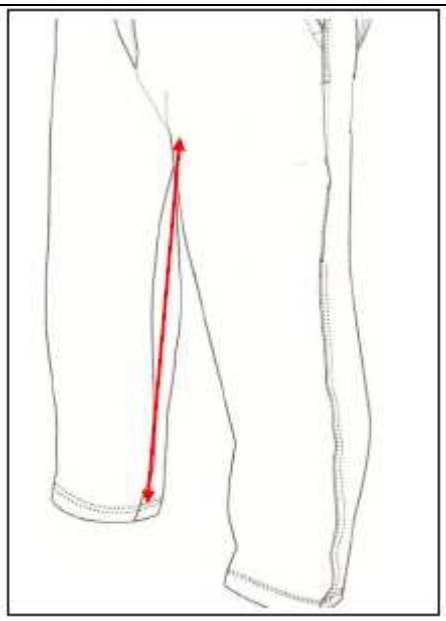


Knee Opening:

Measured at a certain distance below the crotch seam perpendicular to the pant leg from side to side.



Leg Opening	Measured horizontally across the bottom edge of the leg opening.	
Front Rise:	The center front seam from the crotch seam to the top of the front waistband.	
Back Rise	The center back seam from the crotch to the top of the back waistband.	

Inseam	The inner leg seam from the crotch seam to the leg opening.	

Exercise

1) _____ on the left and right sides of a garment from the bottom of the armhole down to the bottom hem.
2)_____ is measured horizontally across the bottom edge of the leg opening.
3)_____ is the the center front seam from the crotch seam to the top of the front waistband.
4)_____ is the inner leg seam from the crotch seam to the leg opening.
5)_____ is measured 1″ below the armhole, perpendicular to the length of the sleeve.

SIZE CHART

	At the end of this session you will be able to understand: Size Chart

Session Plan	
1	Reading a Size Chart
2	Terms used in a Size Chart
3	Garment Specification Sheet

Size charts are numeric tables depicting the different measurements in a garment. All the various measurements required for constructing a garment of a particular size and fit are clearly denoted in a table. Size charts vary with different countries or regions and buyers.

Terms Used in Size Chart:

1.Size column

			
XXS (Double extra small)	XS (Extra small)	S (Small)	M (Medium)

		
L (Large)	XL (Extra Large)	XXL (Double extra large)

2.Numeric column – it indicates the size in number format. It is just the size number

3.Regular /Petite / Tall columns – these indicates the kind of body of the wearer

4.Chest column – it indicates the measurement of the chest of the wearer of that particular body size

5.Sleeve – length of the sleeves

6.Hip – it indicates the measurement of the hip

7.Waist - it indicates the measurement of the waste round

Example of a size chart

Women's Top		Regular Fit		Slim Fit		Tall Fit	
Size	Numeric	Chest	Sleeve	Chest	Sleeve	Chest	Sleeve
XXS	0	31 ½ "	28"	31"	26"	--	--
XS	1	32 ½ "	29"	32"	27"	--	--
	2	33 ½ "	29 ½"	33"	27 ½ "	34"	31½ "
S	4	34½ "	30"	34"	28½ "	35"	32"
	6	35½ "	30½ "	35"	28½ "	36"	32½ "
M	8	36½ "	31"	36"	29"	37"	33"
	10	37½ "	31½ "	37"	29½ "	38"	33½ "
L	12	39"	31½ "	38½ "	29	39½ "	33½ "
	14	40½ "	32 ¼ "	40"	30 ¼ "	41"	34 ¼ "
XL	16	42"	32½ "	41½ "	30½ "	42½ "	34½ "
	18	44"	32 ¾ "	--	--	--	--
XXL	20	46"	33"	--	--	--	--
	22	47½ "	33½ "	--	--	--	--

It can be read from the above table that a Slim Fit Women's Top will have a chest measuring 32 inch and a sleeve which will be 27 inch long in extra small (XS) size.

GARMENT SPECIFICATIONS SHEET

A Specification sheet a document provided by the buyer which gives information about the garment. The Spec sheet provides details regarding the Style number, style details, Fabric details, Size chart, order quantity, care instructions, etc.The sewing machine operator should know to read the spec sheet and follow the exact measurements while sewing the garment.

Below we can study an example of a specification sheet for a women‘s Woven Romper

Fabric & Trim - Woven Romper

Date:	31-May-2010	Revised Date:	
Style #	SLSH002	Season:	Summer 2011
Size Range:	2-10	Classification:	Women's
Label:	SOPHOMORE	Group Name:	The Dog Days of Brooklyr
Description:	Chambray sleeveless romper with collar and lace up back.		

FABRIC INFORMATION	
Main Fabric:	Chambray
Mill & Ref#:	Pacific Garment Manufacturing Group/PGMGSLSH02
Content:	100% Cotton
Wash/Finish:	None
Fabric 2:	
Mill & Ref#:	
Content:	
Wash/Finish:	

TRIM INFORMATION			
Trim A:	4- Hole plastic button	Trim B:	Cotton Drawcord
Item:		Item:	
Reference #:	PGMGSLSHT02	Reference #:	PGMGSLSHT01
Location:		Location:	
Trim C:	Eyelets	Trim D:	
Item:		Item:	
Reference #:	PGMGSLSHT03	Reference #:	
Location:		Location:	

COLOR COMBINATIONS				
COLOR:	COMBO 1	COMBO 2	COMBO 3	
Combo Name	**Buggin'**			
Main Fabric	Chambray			
Fabric 2				
Trim A				
Trim B				
Trim C				
Trim D				

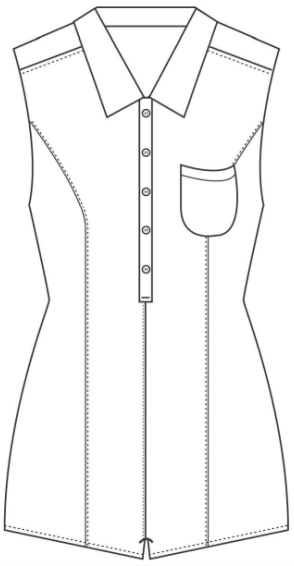
Spec Sheet - Woven Romper

Date:	31-May-2010	Revised Date:	
Style #	SLSH002	Season:	Summer 2011
Size Range:	2-10	Classification:	Women's
Label:	SOPHOMORE	Group Name:	
Description:	Chambray sleeveless romper with collar and lace up back.		

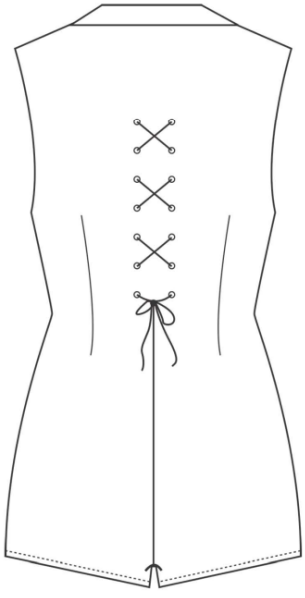
Sample Size: 4

DATE:		
POINT OF MEASURE:	TOL	ORIGINAL
width measurements are half/flat	+/-	REQ
1. Front Length (from HPS)	1/2	31
2. CF Length (from neck seam)	1/2	25 1/2
3. CB Length (from neck seam)	1/2	32 1/4
4. Side Length (from armhole seam to hem 2 point	3/8	21 1/2
9. Chest Width Circumference (1" below Armhole)	3/8	34
13. Across Shoulder (seam to seam)	3/8	13 3/4
14. Placket Length	1/4	7
15. Across Chest (5" from HPS)	3/8	13
16. Across Back (4" from CB neck seam)	3/8	14
26. Sweep (2 pt)	3/8	24
25. Bottom Hem Depth	1/8	3/8
48. Curved Armhole width Circumference	1/4	20
50. Hip Width 21" from HPS Circumference	1/4	28
52. Drawcord Length (top eyelet to bottom eyelet)	1/4	13
57. Collar Height	1/4	1 1/2
61. Front Neck Drop (HPS to seam)	1/8	6
62. Back Neck Drop (HPS to seam)	1/8	2
63. Pocket Width	1/8	4
64 Pocket Height at Center	1/8	4
65 Distance from pocket to HPS	1/4	6 1/2
66 Shoulder (From HPS)	1/8	6

Front Sketch



Back Sketch



QUALITY STANDARD

	At the end of this session you will be able to understand: Specification Sheet, Trim Card , Swatch Card, Measurement Chart

Session Plan	
1	Quality Standard Guideline

Standards are a set of characteristics or procedures that provide a basis for decisions.
The standards guide product development, selection of materials, production methods and finishing techniques. These standards are established from the Specification sheet, buying sample etc.

For a quality checker, following quality standards means that he or she has to follow the guidelines and training given to him or her regarding a certain style. He has to follow the various sheets given to him which includes

1. Specification sheets

A Specification sheet contains the details of the garment. Specifications are brief written descriptions of materials, procedures, dimensions and performance for a particular style.
The similar example has been given in the chapter GARMENT SPECIFICATIONS SHEET

2. Trim cards

Trim Cards consists of the sample of the trips used in the garment, like Zipper, Buttons, Laces etc. It helps to check the quality of the garment trims with sample trims.

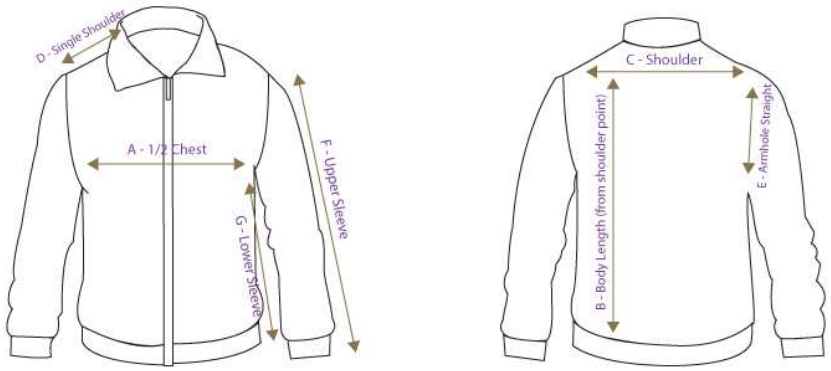
Swatch cards

Fabric Swatch card are required to check the quality of the fabric. Sometimes it is also used to differentiate similar looking fabric designs

Swatch Card

4. Measurement chart

Measurement chart is the details of the measurement of different size of the garment.It also consists the tolerance level.



(cm)	5XS	4XS	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL	5XL	6XL
A. 1/2 Cross Chest (2.5cm from armpit)	44	45	46	47	49	53	55	57	59	61	63	65	67	69
B. Body Length (from shoulder point)	53	55	57	60	63	65	67	69	71	73	75	77	79	81
C. Shoulder	32	34	36	38	40	42	44	46	48	50	52	54	56	58
D. Single Shoulder	7	8	9	10	11	12	13	14	15	16	17	18	19	20
E. Armhole Straight	17	18	19	20	21	23	24	25	26	27	28	29	30	31
F. Upper Sleeve Length	53	55	58	59	60	61	62	63	64	65	66	67	68	69
G. Lower Sleeve Length	43	44	46	47	48	51	52	53	54	55	56	57	58	59

Sample Measurement of a Jacket

TOLERANCE

At the end of this session you will be able to understand:
Tolerance in Inspection

Session Plan

1	Action Derived from Tolerances

Action Derived from Tolerances

Qualities in garments have a tolerance. Tolerances allow variations from the specified value in the specifications. If we fix limits within which we will accept a product as satisfactory, then clearly on each side of the average we set limits, or tolerances. The greater will be the proportion of production that we will accept.

If the tolerances are set too close, then we cannot get it all —**RIGHT FIRST TIME"** but if they are too wide, then we will get everything right. For example, garments which will not fit even though manufactured to specification.

Action Derived from Tolerances

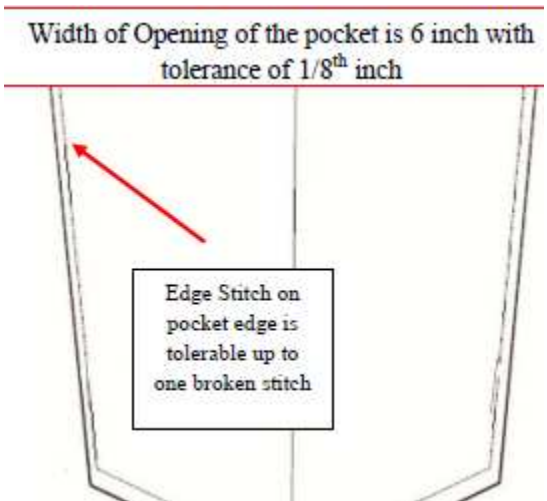
Tolerances, once agreed upon, can be used to decide courses of action.

1. If work is within tolerances
    a. No action

2. If the work in checking is out of tolerance:-
    a. Repeat check.
    b. If now within - no action.
    c. If still out, adjust causing factors like machine by an amount expected to bring work just within tolerance
    d. Continue checks until work is within tolerance.

3. This avoids over-correction.

4. If work on regular checking is consistently within tolerance, but near one of the limits:-
    a. Adjust by an amount expected to bring the average back to the specified figure
    b. Continue regular checking



Before making any actual adjustment it is well worth checking that no obvious fault has occurred, say yarn path dislodged, dirt, lint etc. If it has, rectify the situation and then recheck. If tolerance is still out, the appropriate adjustment needs to make.

Exercise

1) If the work in checking is out of tolerance:-
   a. _____
   b. _____
   c. _____
   d. _____

2) _____ allow variations from the specified value in the specifications.

DEFECTS AT PRE-PRODUCTION STAGE

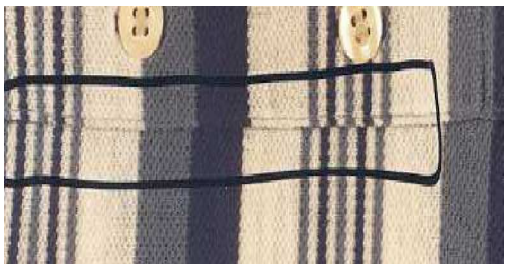
At the end of this session you will be able to understand:
Defects Occurring at Pre-Production Stage

Session Plan	
1	Marker Making Defects
2	Common Spreading Defects
3	Bundling and Ticketing Defects
4	Common Problems of Fusing

Processes involved in garment production can be broadly classified as:
1. Pre Production Processes (Pre Sewing)
2. Production (Sewing)
3. Post Production Processes (Post Sewing)

Pre Production Processes
•Pattern Making & Grading
•Marker making
•Spreading
•Marking
•Cutting
•Bundling & Ticketing
•Fusing

Marker Making Defects
•Size Mixing. Components not correctly labelled in marker.
•Patterns facing incorrect direction on napped fabrics.
•Patterns facing in different direction (either way) on a one-way fabric.
•Garment Components omitted during marker making
•Patterns misaligned with respect to the fabric grain.
•Line definition poor (e.g., too thick chalk, indistinctly printed line) leading to inaccurate cutting.
•Mismatched checks and stripes.



Common Spreading Defects

Plies misaligned
•Incorrect tension of plies
•Fabric spread too tight or too loose, causing parts not to fit in sewing and finished garments not to meet size tolerances.
• Spread distorted by the attraction or repulsion of plies caused by excessive static electricity.
•Plies not all facing in correct direction (whether —one way as
with nap, or —one way either way as with some check
designs)
•Unacceptable damages situated in garment parts

Common Cutting Problems

•Inaccurate cutting - Distorted garment parts. Top and bottom plies of different size
•Notches- Misplaced, too deep, or omitted
•Drill marks- Misplaced not perpendicular through the spread
•Frayed edges, fused edges- Caused by a faulty knife not sharp enough, or rotating at too high a speed
•Marker incorrectly positioned on top of spread
•Slits opened inaccurately or omitted
•Mixed plies resulting in Shaded Garment parts when assembled
•Mixed Size parts resulting in uneven appearance
•Inconsistent Grain and Surface of the Skin

Bundling and Ticketing

Numbering or Pasting of a number sticker on all the components of all the garments. The number acts as the identification of the component and the lot from which the component is cut.

Bundling: Assembling the cut components in small batches of pre-defined number as per the requirements of production system.

Ticketing:

The process of attaching a ticket to all the bundles that provides basic information about the bundle and the components in the bundle.

•Important Points

•Numbering should be done on wrong side of fabric only.

•Number stickers should be checked for glue

•Numbering of a ply twice or skipping of a ply should not occur

•The information on bundle tickets must be accurate

•Care must be taken to avoid mixing of components of different sizes in a bundle

•Sewn on shade marking tickets falling off, damaging fabric, omitted, misplaced or wrongly numbered

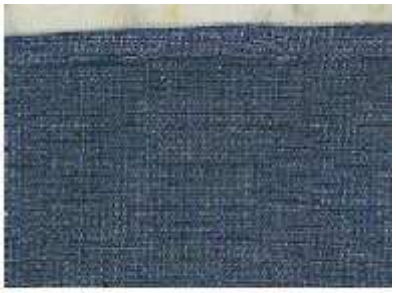
•Adhesive shade marking tickets falling off or sticking too hard , omitted, misplaced, wrongly numbered

•Bundles or boxes not stacked in box, or rolled in correct order in bundles or rolled or folded too tightly causing creases

•Work tickets, coupon payment tickets or progress tickets omitted , misplaced or mixed makes both quality and quality control difficult

•Wrong Size , Wrong Shade, wrong type of trimmings put in Bundle

Unmatched Trimmings



Matched Trimmings

Common Problems of Fusing

Discoloration after fusing - The temporary or permanent change in shade, color of a fabric caused by the action of heat on certain dyes during fusing

Strike through

Strike through means that the adhesive resin appears on the outer face of the fabric being fused

Ideal fusing in fabric

Strike through in a fabric

Interlining shrinking more than the shell fabric

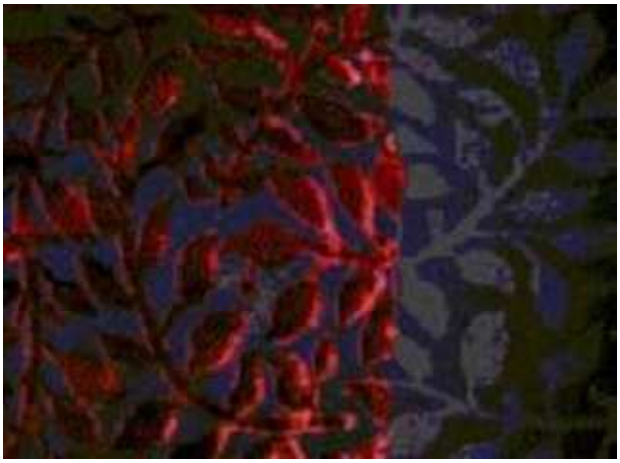
Strike Back

Ideal fusing

Strike Back

Shine / Glazing and Discoloration

The temporary or permanent change in shade, colour of a fabric caused by the action of heat on certain dyes during fusing.



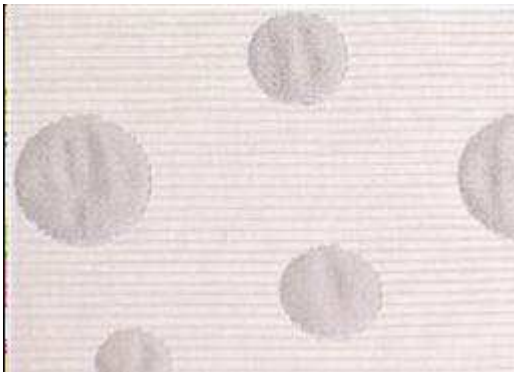
Fusing distortion

Fusing distortion means garment panels are distorted during the fusing process. This problem should be prevented as distorted garment panel after fusing cannot be corrected other than discarded as waste.

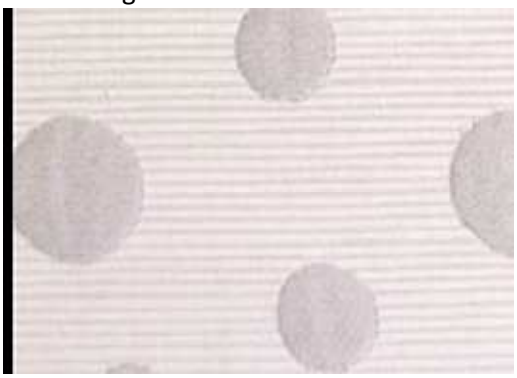
Fusing delamination

Fusing delamination, sometimes appear as bubbling or rippling is the complete breakdown of bond between fusible interlining and fabric surface. It is normally found after the garment has been dry cleaned or washed.

Fusing delamination

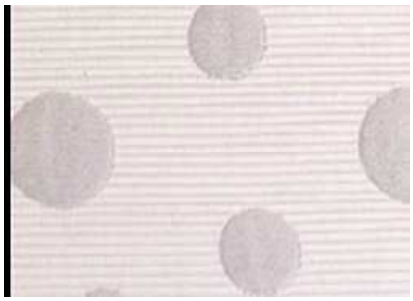
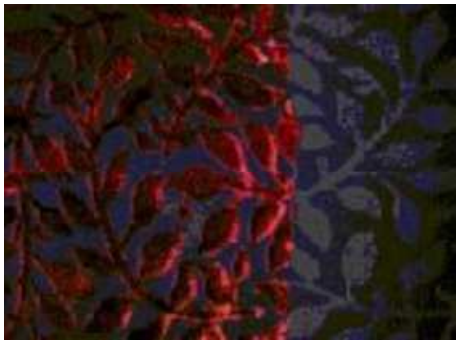


Ideal fusing



Exercise

Match the following:

	Marker Making Defects
	Ideal fusing
	Shine / Glazing and Discoloration
	Interlining shrinking more than the shell fabric

SPI MEASUREMENT & SEAM ALLOWANCE

	At the end of this session you will be able to understand: Importance of Stitch Per Inch & Seam Allowance

Session Plan	
1	SPI- Stitches per inch of the stitch
2	Seam Allowance

SPI- Stitches Per Inch of The Stitch

Stitch properties related to performance and looks are mainly size, balance and consistency. Stitch size has three dimensions: length, width and depth. These affect the appearance, durability and cost of the garment. Stitch length is specified by the SPI – Stitches per Inch and is an indicator of quality, strength and durability. It is also referred to as the stitch density. It is determined by the amount of fabric that goes under the needle between penetrations. High SPI means short stitches, low SPI means long stitches. High SPI are considered low quality as they are weaker in resistance to abrasion and lets the fabric spread when stress is applied to the seam.

The SPI is one of the basic machines'settings for stitching a garment. Defects like puckering are caused by incorrect SPI setting if the SPI is not set as per fabric and stitch requirement. The SPI can be set and modified by use of the stitch regulator present on the sewing machine.

As shown in the figure above, the circled round regulator on the sewing machine head is the regulator Stitch regulator. There are numbers indicated on the which is proportionate to the SPI of the machine. Rotating the regulator anti-clockwise increases the value of the regulator thereby increasing the SPI of the stitch formed by the machine and vice versa.

How to Measure the Stitch Length or Stitches Per Inch

The stitch length is measured by measuring the number of lengths of thread found within one inch. Stitch counter/Template can be used that make this measurement easier; however, one can place a ruler next to the seam and perform the same task.

Stitch Counter Measuring SPI

SPI is measured by counting the number of lengths of thread found within one inch. As you can see here, there are approximately 9 SPI sewn in this seam

SPI Recommendations for Woven& Knits

Below is a list of garments and the typical number of Stitches Per Inch recommended for each of them?

KNIT GARMENTS

Garments	SPI	Comments	Garments	SPI	Comments
Jersey T-Shirts, Tops, Polos	**10 - 12**	Using more SPI increases the chance of needle cutting.	**Swimwear**	**12 - 16**	The more elastic the seam, the more SPI that should be used to minimize stitch cracking.
Underwear	**12 – 14**	The more elastic the seam, the more SPI that should be used to minimize stitch cracking.	**Dresses, Skirts**	**10 - 12**	The more elastic the seam, the more SPI that should be used to minimize stitch cracking.
Infantwear	**10 - 12**	The more elastic the seam, the more SPI that should be used to minimize stitch cracking.	**Intimates**	**12 – 16**	The more elastic the seam, the more SPI that should be used to minimize stitch cracking.
Fleece	**10 – 12**	More stitches per inch are required to provide the proper seam coverage on fleece.	**Stretch Knits (Lycra®, Spandex®, etc.)**	**14 - 18**	More stitches per inch are required to provide the proper seam elasticity.
Sweaters (Med. To Hvy.)	**8 - 10**	The more elastic the seam, the more SPI that should be used to minimize stitch cracking.	**Hosiery, Socks**	**35 – 50**	Usually sewn with very fine thread. More spi are required to minimize seam grinning and seam elasticity.

WOVEN GARMENTS

Garments	SPI	Comments	Garments	SPI	Comments
Denim Jeans, Jackets, Skirts	**7 – 8**	Fewer stitches per inch generally will give a more contrast stitch appearance.	**Childrenswear**	**8 - 10**	Usually 8 to 10 spi is adequate to provide adequate seam strength and at the same time allow for quicker cycle times .
Twill Pants or Shorts	**8 – 10**	More stitches per inch will help minimize seam grinning.	**Dresses, Skirts**	**10 - 12**	Due to many of the operations being lockstitch, usually 10 – 12 spi is required to provide adequate seam strength.
Trousers, Dress Pants, Slacks	**10 - 12**	On some operations like serge panels, it may be desirable to use a longer stitch length.	**Blindstitch Operations on Slacks, Dresses, Skirts, etc.**	**3 – 5**	A long stitch length is desirable to minimize the dimple or appearance of the needle penetration on the outside of the garment.
Dress Shirt or Blouse	**14 – 20**	Using more SPI allows the use of smaller diameter threads that will minimize seam puckering.	**Buttonsew (4 hole button)**	**16**	Buttonsew machines are cycle machines with a predetermined number of stitches per cycle.
Casual Shirts, Blouses, Tops	**10 - 14**	Using more SPI will give more of a tailored stitch appearance and better seam coverage when serging.	**Buttonhole (1/2" purl or whip stitch)**	**85 - 90**	Generally sewn vertically – approx. 85-90 stitches with a lockstitch buttonhole machine.

SEAM ALLOWANCE

It is the area between the edge and the stitching line on two (or more) layers of fabric being stitched together. Seam allowances can range from 1/4 inch wide (6.35 mm) to as much as several inch. In garment production, seam allowances range from 1/4 inch for curved areas (e.g. neck line) or hidden seams (e.g. facing seams), to one inch or more for areas that require extra fabric for final fitting to the wearer (e.g. center back)

The areas between the stitch line and the fabric edge as circled in the images above are the seam allowances.

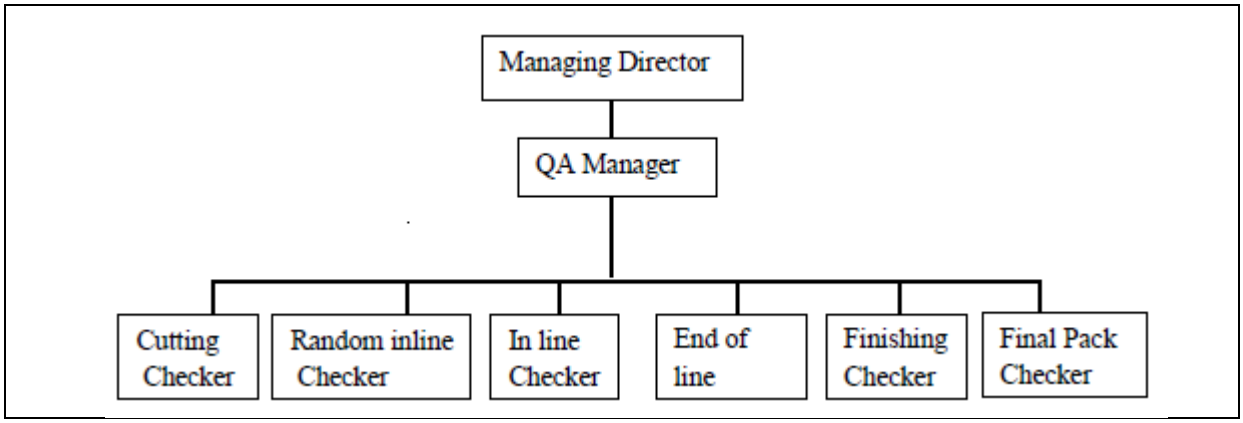
Requirement of Seam allowance:
The seam allowance is basically left out to give strength to the seam. It gives the stitch space to hold to the fabric. Sewing accurate seam allowances is an important key to having pattern pieces fit together

ROLES & RESPONSIBILITY OF PEOPLE IN QUALITY

At the end of this session you will be able to understand:
Organizational Structure of the Quality Assurance Department

Session Plan	
1	Organizational Structure of the Quality Assurance Department
2	Responsibility of different Roles
3	Flow Chart of Overall Inspection Procedures

Organizational Structure of the Quality Assurance Department



Responsibility of different Roles

Quality Assurance Manager

Responsible for the quality of merchandise of the entire factory.
Responsible for ensuring smooth and efficient working of the entire Quality Assurance department.
Monitoring Quality Assurance / Quality Control procedures on a daily basis and taking corrective action as and when required in case of deviations.
Responsible for bringing about any change required in the quality systems prevalent in the factory.
Ensuring daily quality reports are generated and the Quality Assurance heads and the findings for the day make audits discussed.
Responsible for the welfare of all the people in the Quality Assurance Department.

Cutting Checker

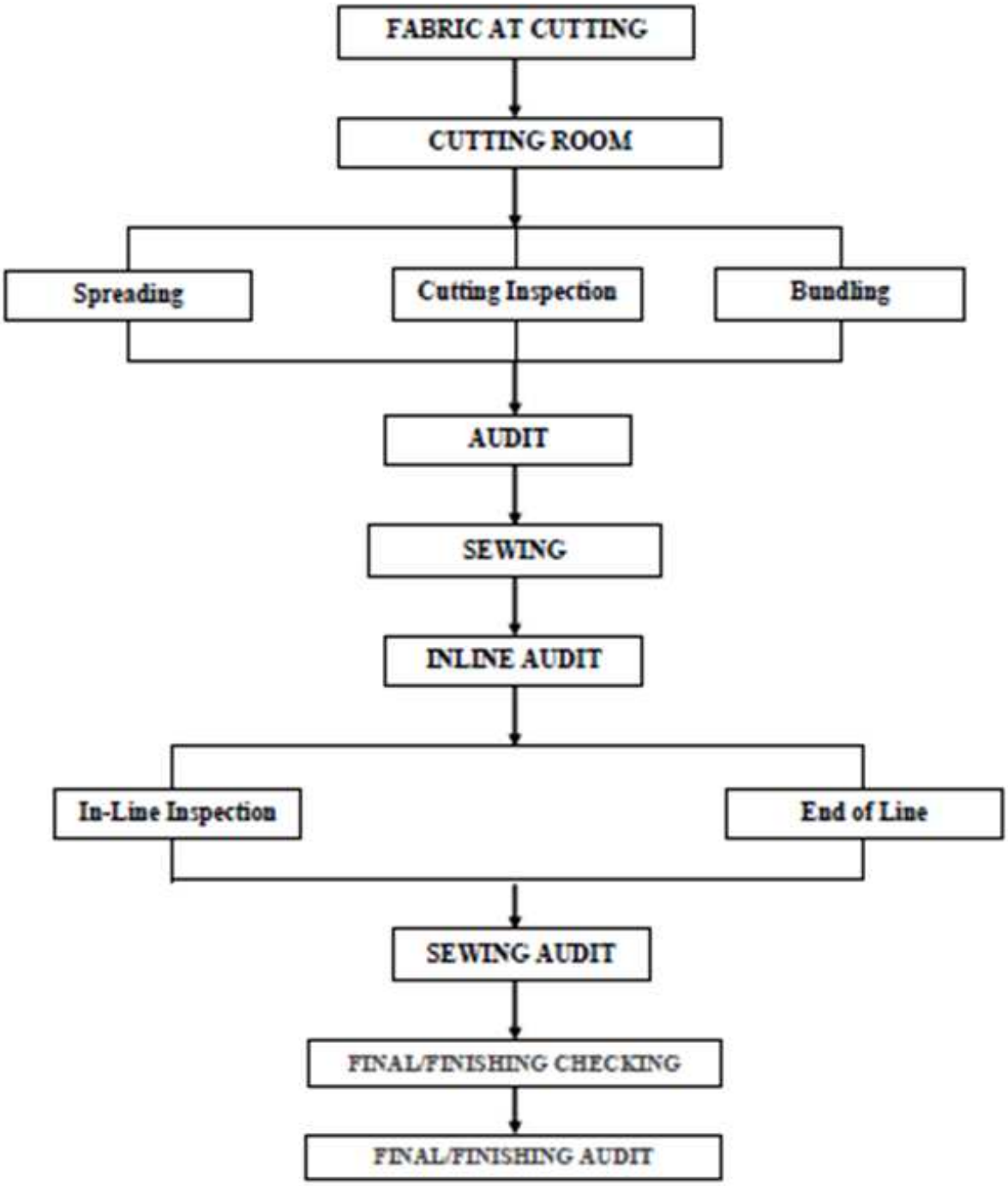
Responsible for spreading, cutting and bundling inspection of cut parts.
Responsible for checking cutting and generating Cutting Inspection Reports for the same.
Responsible for generating a summary of the Daily Cutting Inspection Report.
Responsible for ensuring that any problem relating to spreading, cutting and bundling is immediately brought to the notice of the Quality Assurance Head

Inline & Random inline Checker
Responsible for doing inline inspections on all operations / operators in a day.
Responsible for generating all reports relating to inline inspection.
Responsible for ensuring that during inline inspection standard quality specifications for each operation are being met at all the operation points. Also responsible for communicating any quality discrepancy during inline inspection to the Quality Assurance Head and bringing the same to the immediate notice of the Line In charge.

End of line checker

Responsible for doing final inspection on all end of line sewn garments.
Responsible for generating all reports relating to final inspection.
Responsible for ensuring that standard quality specifications are met for all sewn garments. Also responsible for communicating any quality discrepancy during final inspection to the Q.A. head and bringing the same to the immediate notice of the line in charge for taking corrective action.

Flow Chart Of Overall Inspection Procedures



TYPES OF STITCHES, SEAMS

At the end of this session you will be able to understand:

- The different types of Stitch, Seam and Defects
- Different Zones for defects

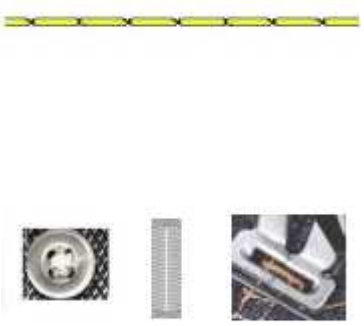
Session Plan	
1	Stitch Types And Stitch Diagrams
2	Seam Types And Seam Diagrams
3	Introduction To Garment Defects
4	Zone Wise Defects (Major/Minor) In Various

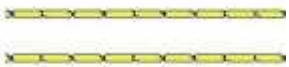
STITCH TYPES AND STITCH DIAGRAMS

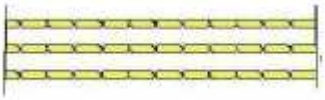
Stitch

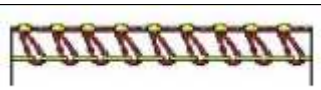
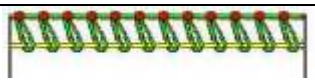
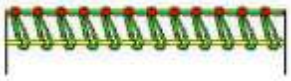
Stitch is one unit of conformation resulting from one or more strands or loops of thread intralooping or passing into or through material. A stitch may be formed

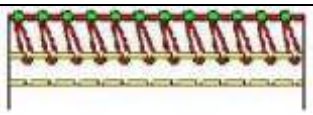
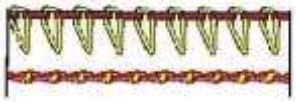
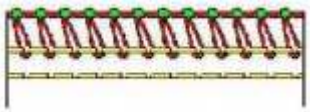
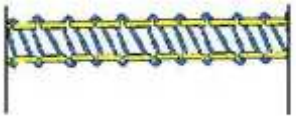
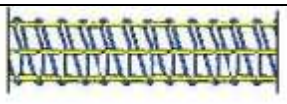
••Without material
••Inside material
••Through material
••On material

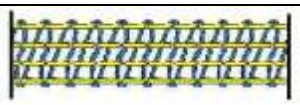
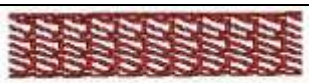
Stitch class 100 – CHAIN STITCHES				
ISO 4915 Number	**Stitch Description**	**Common Application**	**Top View As Sewn**	**Bottom View As Sewn**
101	Stitch formed by 1-needle thread passing through the material and interlooped with 1-looper thread and pulled up to the underside of the seam Single Thread Chainstitch or Lockstitch Buttonsew, Buttonhole or Bartack.	1.Buttonholing 2. Bartacking 3. Button sewing		
Stitch Class 300 – LOCK STITCHES				

301	Stitch formed by a needle thread passing through the material and interlocking with a bobbin thread with the threads meeting in the center of the seam. Stitch looks the same top & bottom.	Topstitching, Single Needle Stitching, Straight Stitching		
Stitch Class 400 – MULTITHREAD CHAINSTITCHES				
401	Single Needle Chain Stitch Stitch formed by 1-needle thread passing through the material and interlooped with 1-looper thread and pulled up to the underside of the seam.	Mainseams on Wovens		
404	Zig-Zag Stitch is formed with a needle and a looper that are set on the underside of the seam and form a symmetrical zig-zag pattern.	Zig-ZagChainstitch for Infantwear and Childrenswear: Binding, Topstitching, etc.		
406	2 Needle Bottom Coverstitch(3 thread Flat Lock) Stitch formed by 2-needle threads passing through the material and interlooping with 1-looper thread with the stitch set on the underside of the seam. Looper thread interlooped between needle threads providing seam coverage on the bottom side only.	1. Hemming, 2.Attaching elastic, 3. Binding 4.Cover seaming 5. Making Belt Loops		

407	**3 Needle Bottom Coverstitch (Four thread Overlock)** Stitch formed by 3-needle threads passing through the material and interlooping with 1-looper thread with the stitch set on the underside of the seam. Looper thread is interlooped between needle threads providing seam coverage on the bottom side only.			

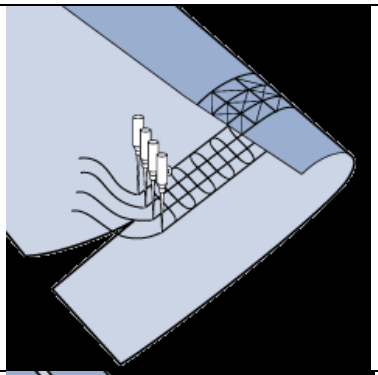
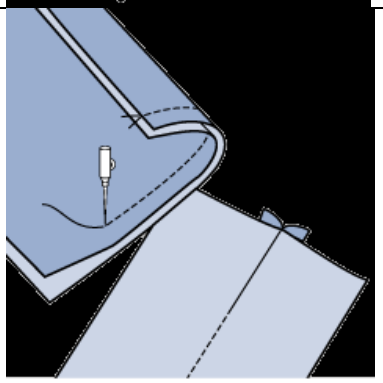
Stitch class 500 – OVEREDGE CHAIN STITCHES				
503	**2 Thread Overedge (Two thread overlock)** Stitch formed by 1-needle thread and 1-looper thread with purl on edge of seam for serging or blind hemming only.	Serging & Blindhemming		
504	**3 Thread Overedge (Three thread overlock)** Stitch formed with 1-needle thread and 2-looper threads with the looper threads forming a purl on the edge of the seam. For overedge seaming and serging.	Single Needle Overedge Seaming		
505	3 Thread Overedge Stitch formed with 1-needle thread and 2-looper threads with the looper threads forming a double purl on the edge of the seam for serging ONLY.	Serging with Double purl on Edge		 Double “purl” on Edge
512	**Mock Safety Stitch (Four thread overlock)** Stitch formed with 2-needle threads and 2 looperthreads with the looper threads forming a purl on the edge of the seam.	Seaming Stretch Knits, Woven Fabric		 2 needle overedge

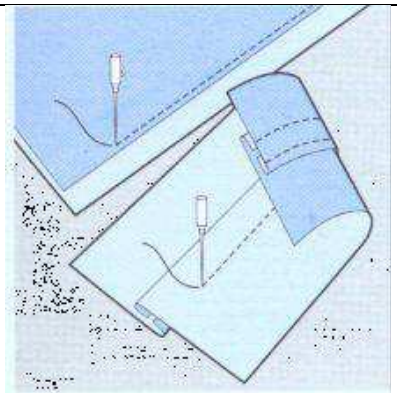
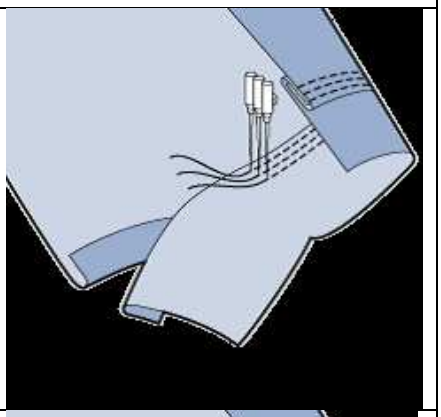
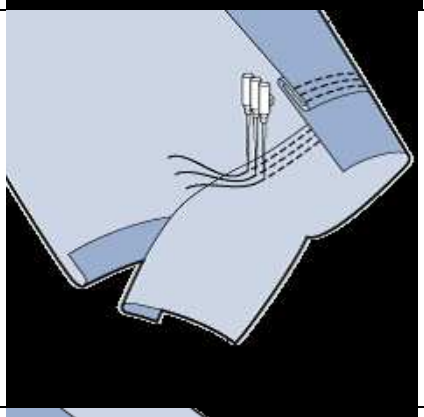
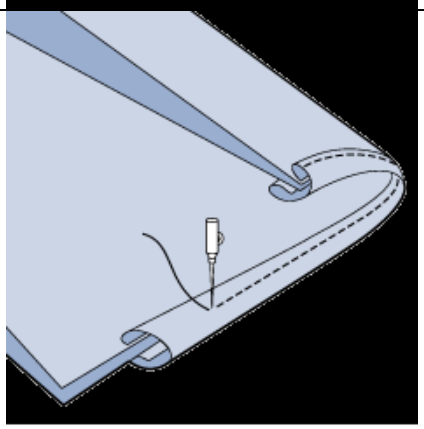
514	**2 Needle 4 Thread Overedge (Mock Safety Stitch)** Stitch formed with 2-needle threads and 2 looper threads with the looper threads forming a purl on the edge of the seam.	Seaming Stretch Knits, Woven Fabric		 2 needle overedge
515 (401+503)	4 Thread Safetystitch: Combination stitch consisting of a single-needle chainstitch (401) and a 2-thread Overedge stitch (503) that are formed simultaneously. Uses less thread than a 516 stitch; however, many manufacturers prefer a 516 stitch.	Safetystitch Seaming Wovens & Knits		
516 (401+504)	5 Thread Safetystitch Combination stitch consisting of a single-needle chainstitch (401) and a 3-thread Overedge stitch (504) that are formed simultaneously.	Safety Stitch Seaming Wovens& Knits		
602	2 Needle 4 Thread Coverstitch **Thread Coverstitch** Stitch formed with 2-needle threads, a top cover thread and a bottom looper thread.	Binding A Shirts, Infants Clothing, etc.		
605	3 Needle 5 Thread Coverstitch Stitch formed with 3-needle threads, a top cover thread and a bottom looper thread.	Lap Seaming, Coverseaming , Binding on Knits		

607	**6 Thread Coverstitch (Six thread flatseam)** Stitch formed with 4-needle threads, a top cover thread and a bottom looper thread. Preferred over 606 stitch because machines are easier to maintain.	Flat or Lap Seaming Knit Underwear, Fleece, etc.		

SEAM TYPES AND SEAM DIAGRAMS

Seam A seam is the application of a series of stitches or stitch types to one or several thickness of material. In other words, seams are the joints between fabric pieces.

Flat Seams	In these seams, sometimes called Butt Seams, two fabric edges, flat or folded, are brought together and over sewn with a zig-zag lockstitch, chainstitch or covering stitch (Class 600).	The purpose is to produce a join where no extra thickness of fabric can be tolerated at the seam, as in under wear or in foundation garments.	
Superimposed Seams	These generally start with two or more pieces of material superimposed over each other and joined near an edge, with one or more rows of stitches. There are various types of seams within the SS class. A superimposed seam can be sewn with a stitch 301 or 401 to create a simple seam. The same seam type can also be sewn with stitch class 500 (Overedge stitch) or Combination stitches (i.e. stitch class 516).	The purpose is to create neat load bearing seams for lingerie, shirts, etc.	

French Seam	French seaming involves 2 stitching operations with an intervening folding operation - a flat, folded seam with only one row of stitching visible on the top surface	French seaming involves 2 stitching operations with an intervening folding operation - a flat, folded seam with only one row of stitching visible on the top surface	
Lap Felled Seam	The Lap Felled type, involves only one stitching operation - a strong seam with fabric edges protected from fraying.	Commonly used for making up jeans or similar garments.	
Lap Felled Seam	The Lap Felled type, involves only one stitching operation - a strong seam with fabric edges protected from fraying.	Commonly used for making up jeans or similar garments.	
Bound Seams	These are formed by folding a binding strip over the edge of the plies of material and joining both edges of the binding to the material with one or more rows of stitching. This produces a neat edge on a seam exposed to view or to wear.		

TYPES OF DEFECTS

At the end of this session you will be able to understand:

- The different types of Stitch, Seam and Defects
- Different Zones for defects

Session Plan	
1	Introduction To Garment Defects
2	Zone Wise Defects (Major/Minor) In Various

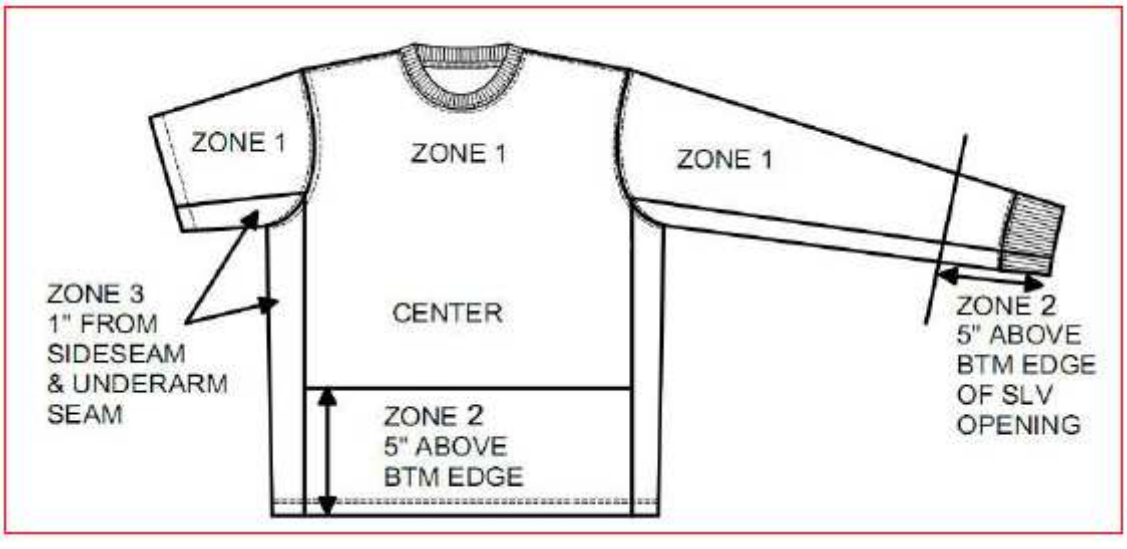
Defect rating zones

INTRODUCTION TO GARMENT DEFECTS

Product zones
Each Product has specific zones that are more important than others are, and guidelines are defined accordingly. Zones of the highest priority are those areas most likely to be viewed during face-to-face conversations with someone or those areas most likely to be seen when using the product.
Product zones that are more visible to a customer are more crucial in maintaining higher levels of quality. Acceptance or rejection of the defective product is prioritized by the area, zone, in which it occurs.

ZONE 1
Areas which are visibly dominant are considered to be in Zone 1.
ZONE 2
Areas which are not visibly dominant, but are visible in normal use are considered to be in Zone 2.
ZONE 3
Areas normally hidden in everyday use, but could be visible on occasion are considered to be in Zone 3.

Classification of Defects



The classification of defects is not all-inclusive but represents a majority of defects commonly found in coats. The quality auditors and suppliers are to use this defect list as a guide to help identify major, minor and critical defects in a garment.

- Critical Defect:

Critical Defect is a defect that can harm our customer or anyone in our customer‘s surrounding. If any critical defect is found any time through the auditing process, the garment is to be rejected and the Supplier is to make sure that all critical defects are removed before shipping.

- Major Defect:

Major Defect is any defect that will adversely affect the function of the garment over its expected life cycle and will cause the customer to not purchase the garment or return the garment.

- Minor Defect:

Minor Defect is a visual defect that will not cause the customer to reject the garment or return the garment, but does not meet the specifications or construction requirements.

Fabric Defect

The quality of a final garment depends on the quality of a fabric when it is received as a roll. Even the most outstanding manufacturing methods cannot compensate for defective materials. That is why when fabric rolls are received they are inspected. Following are the defects, which are encountered when inspecting a fabric.

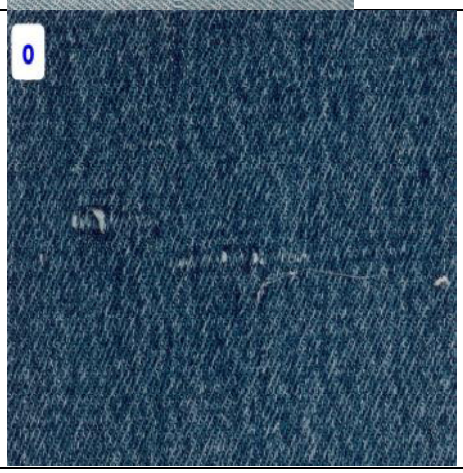
Major and Minor Defects

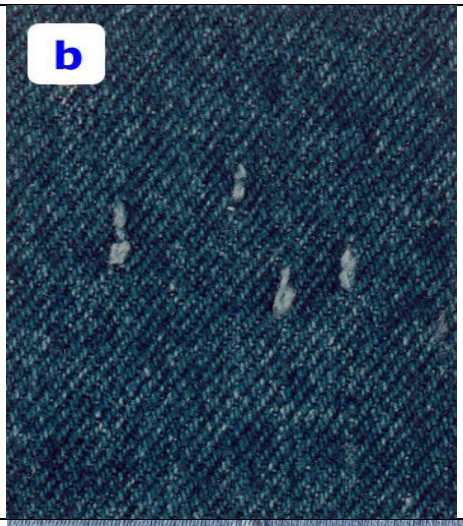
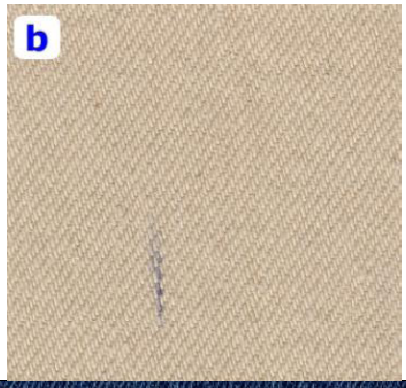
The following definitions are central to fabric inspection:

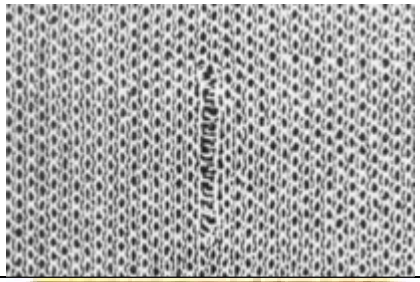
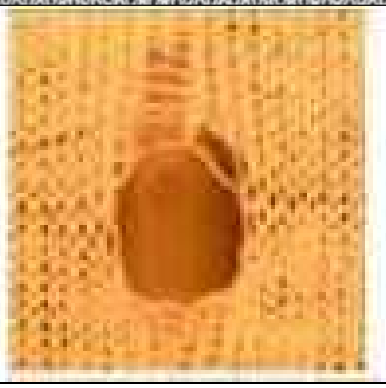
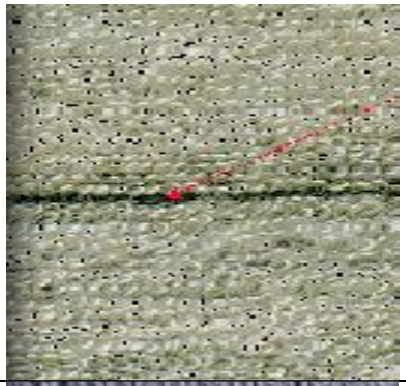
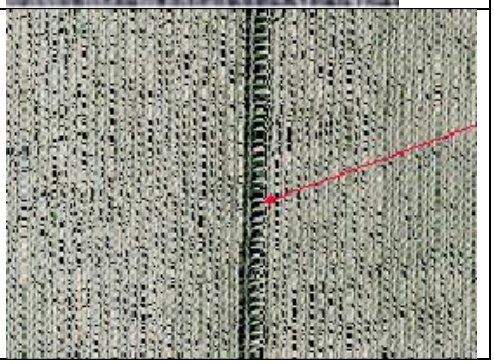
Major Defect - A defect that, if conspicuous on the finished product, would cause the item to be a rejected.

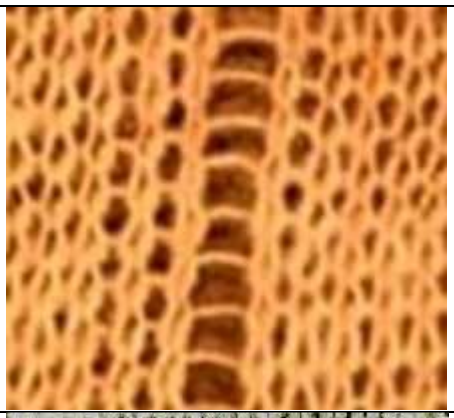
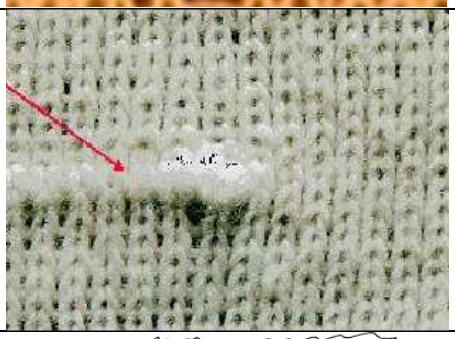
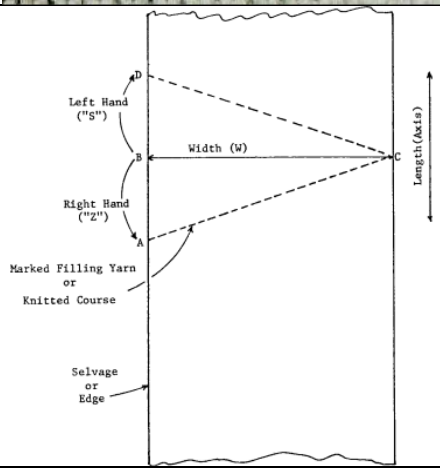
Minor Defects - A defect that would not cause the product to be termed rejected because of either severity or location. When inspecting piece goods prior to cutting, it is necessary to rate questionable defects as major, since the inspector will not know where the defect may occur on the item.

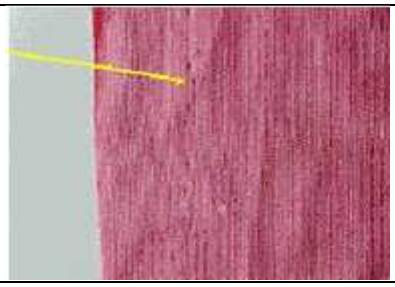
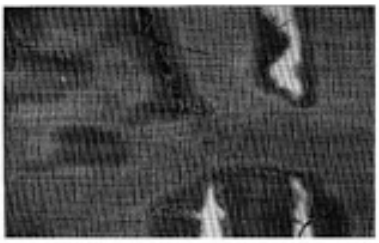
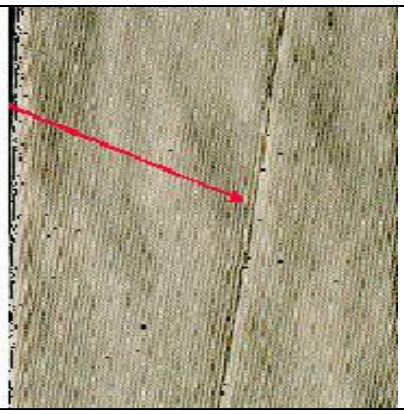
Defects of Woven and Knit Fabric

Defect	Explanation	Severity	Photograph
Defects of Woven Fabric			
Dropped Pick	Caused by the filling insertion mechanism on a shuttle less loom not holding the filling yarn, causing the filling yarn to be woven without tension. The filling yarn appears as "kinky."	Major	
End Out	Caused by yarn breaking and loom continuing to run with missing end.	Major	
Slub	Usually caused by an extra piece of yarn that is woven into fabric. It can also be caused by thick places in the yarn. Often is caused by fly waste being spun in yarn in the spinning process.	Major or Minor	

Knots	Caused by tying spools of yarn together	Usually Minor	
Mixed End (Yarn)	Yarn of a different fiber blend used on the wrap frame, resulting in a streak in the fabric.	Usually Major	
Mixed Filling	Caused by bobbin of lightweight yarn or different fiber blend used in filling. Will appear as a distinct shade change	Major	
Soiled Filling or End	Dirty, oil looking spots on the wrap or filling yarns, or on package-dyed yarn	Major	
Defects of Knitted Fabric			

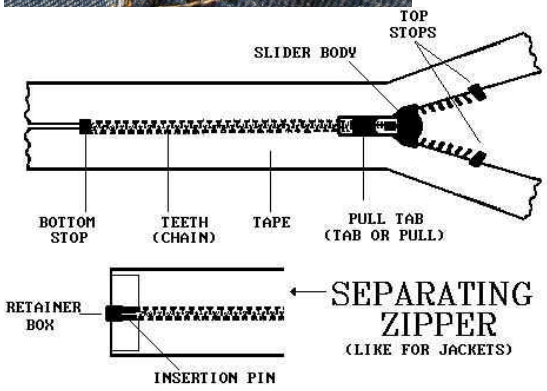
Drop Stitches	Results from malfunctioning needle or jack. Will appear as holes or missing stitches.	Major	
Hole	Caused by broken needle.	Major	
Missing Yarn	Occurs in circular knit. Caused by one end of yarn missing from feed and machine continuing to run.	Major	
Mixed Yarn	Occurs in wrap knit. Results from wrong fiber yarn (or wrong size yarn) placed on wrap. Fabric could appear as thick end or different color if fibers have different affinity for dye.	Major	
Needle Line	Caused by bent needle forming distorted stitches. Usually verticals line.	Major or Minor	

Press-Off	Results when all or some of the needles on circular knitting fail to function and fabric either falls off the machine or design is completely disrupted or destroyed. Many knitting needles are broken and have to be replaced when bad press-off occurs. Bad press-offs usually start a new roll of fabric.	Major	
Runner	Caused by broken needle. Will appear as vertical line. (Most machines have a stopping device to stop machine when a needle breaks.)	Major	
Slub	Usually caused by a thick or heavy place in yarn, or by lint getting onto yarn feeds.	Major or Minor	
Askewed or Bias	Condition where filling yarns are not square with wrap yarns on woven fabrics or where courses are not square with wale lines on knits.	Major or Minor	

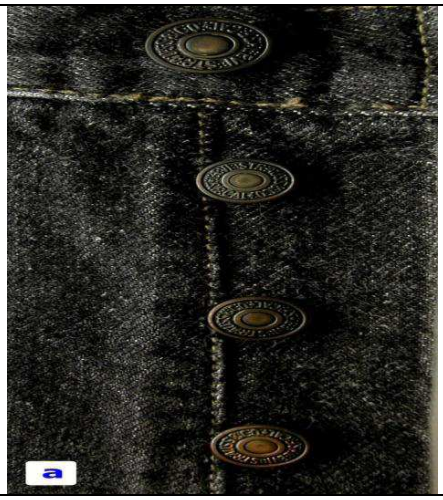
Pin holes	Holes along selvage caused by pins holding fabric while processes through stenter frame	Major if extents into body of fabric	
Straying End	Caused when an end of yarn breaks and loose end strays and is knit irregularly into another area.	Major	
Bowing	Usually caused by finishing in knits ,the course lines lie in an arc across width of goods.	Major on stripes or patterns Minor on Solid color	

Accessories Defect

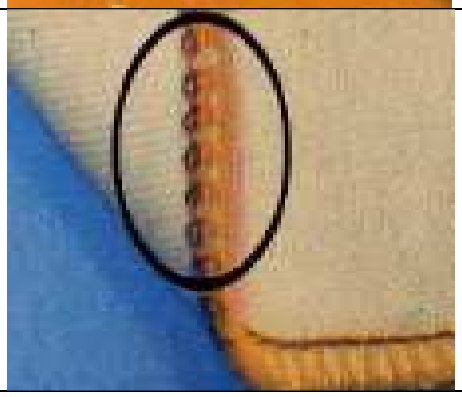
ZIPPERS		
Slider defect	**Won't Lock:** Not apparent without testing by placing Zipper slider in locked position and applying tension. **Faulty Dimension:** Not readily apparent. May cause either a hard or a loose operating zipper. Either condition may result in zipper failure before garment is worn out. **Crushed Slider:** May be due to improper garment pressing or due to padding or compensating springs in the presses not being in best condition. **Tarnished:** Does not generally interfere with operating qualities but is a matter of appearance only. Judging" this as a defect depending upon degree of tarnish. **Burn or Rough Spots** Not immediately apparent. Can cause snagging and early wear on the upper tape. **Lock Prong Interferes** Indicated by pull-tab not staying in locked position or slider not moving freely after being released from locked position. **Weak Slider Bodies:** Can best be determined with proper testing equipment. However, manifests itself by slider becoming compressed or crushed under minimum pressure or becoming distorted enough to create hard operation.	 

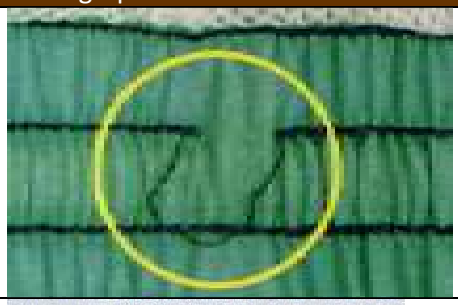
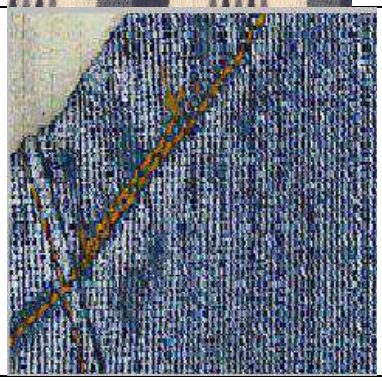
Chain or Teeth Defect	**Improper Dimensions:** Not always apparent unless slider works with great difficulty or operates too easily. Zipper' may give initial satisfactory operation but fail after only moderate use and especially after laundering or dry cleaning. **Miss meshed and Unmeshed Teeth:** Readily visible, particularly in large. Usually results in inoperable zipper. **Missing Teeth:** Readily visible, will result in early failure of the zipper. **Misplaced Teeth:** This refers to a tooth being out of position, and occasionally may involve two or three teeth. Seriousness ranges from trifling to almost as serious as a missing tooth depending upon the degree of misplacement and general design of zipper. **Off color:** This defect is quite apparent. Zipper manufacturers normally carry a complete range of tape colors. Due to similarity of different colors, one may be mistaken for another. It is also possible, because of color similarities or difference in dye lots that the two halves of the zipper will have two different shades of tape. **Humpy Chain:** Readily noticeable by its waviness. Causes difficulty at sewing operation and distorts finished garment's appearance. **Cord not Attached to Tape:** Due to skipped stitches during operation of sewing cord to tape. Not readily apparent but under strain, cord and teeth will rip away from tape and render zipper and garment unusable. **Length:** Improper zipper length for given opening.	 

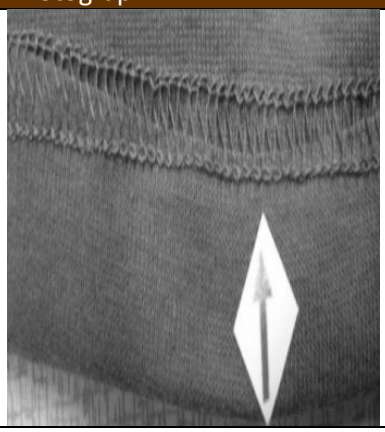
Top or Bottom Stop Defects	**Missing Top or Bottom Stop:** Readily apparent and will result in zipper failure. If facilities for attaching a top or bottom stop are not available, then the entire zipper should be replaced. In some instances, bottom stops are attached at garment plant. An improperly or poorly attached bottom stop may be result of carelessness on part of the operator or of improper functioning of the bottom stop machine.	
Snap Fasteners		
Hard Action:	In light-weight goods this may result in stud or socket pulling through the material. The snap fastener manufacturer can be of help in recommending proper tension of stud in socket for weight of garment material.	
Light Action:	Snap fastener does not stay closed because of lack of proper tensions. Same comment applies as for tight closure.	

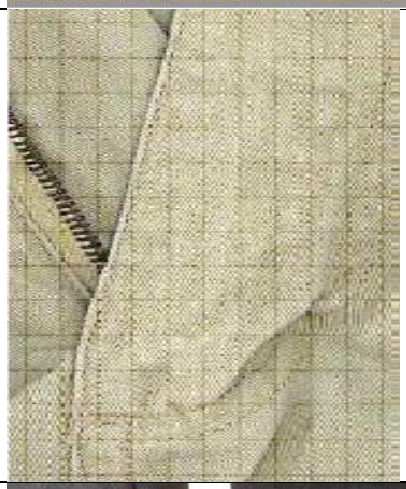
Hooks & Eyes	**Improperly Applied:** This is usually caused by a careless operator or improperly adjusted attaching equipment, and corrections are usually simple when apparent. **Improper Alignment:** Gauges are available for attaching equipment to assure proper alignment in positioning. This is a necessary if garment is to have a properly tailored look. If the top of the zipper is extended into the waistband of the trouser, than the hook and eye should be offset to prevent it from hitting the zipper material. **Poor Finish:** May be the result of improper finishing or pocking of the metal surface and, while this defect dose not interferes with the functional operation, it may not leave the desired finished appearance of the garment. **Tight/ Loose Closure:** Attaching equipment ill fitted with an adjustable feature permitting secure application of hook and eye to either light or heavyweight goods. If closures seem too tight, then one should immediately check the attach.ing equipment for proper adjustment.	
Buttons		
Rough or Dull Surfaces	This is not a serious fault except in cases of extreme roughness or poor surface appearance.	
Non-Uniform. Inaccurately Spaced Chipped or Blocked Sew Hole:	This type of defects cannot be noted during the garment manufacturing operation and can slip inspection unnoticed but it frequently causes needle breakage or cut thread.	

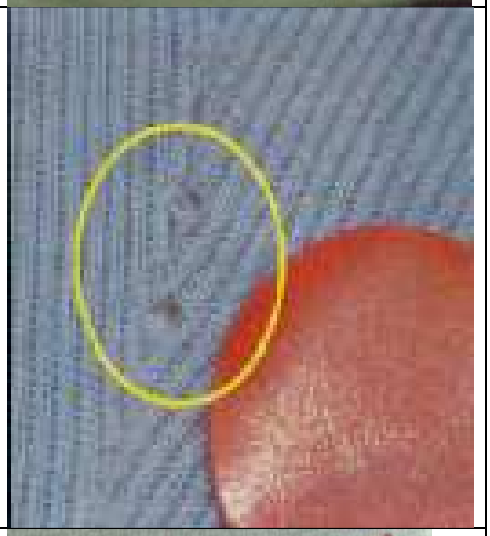
Stitch and Seam Defects

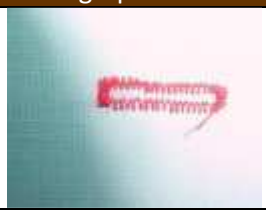
Type of Defects	Description	Photograph
Broken stitches	Caused due to 1. Too thick/ too thin a thread for the needle, 2. Needle heat, 3.Operator working non-rhythmically 4. Too tight tension.	
Skipped stitches	Caused due to 1. Hook irregularly failing to pick up the loop of thread from a needle‘s eye	
Seam Grinning	Caused due to 1. The Seam itself may open and produce a Gap between two pieces of fabric 2. Arising from too loose a tension or too large stitch length or use of a wrong stitch type.	
Unbalanced stitch	Caused due to 1. Arising from unbalanced tension of needle thread and bobbin/looper thread.	

Type of Defects	Description	Photograph
Improperly formed Stitches	Caused due to 1. Bad thread tension 2. Ill fitting machine components	
Irregular or incorrect shape of sewing line	Caused due to 1. Badly set guide, 2. Handling error	
Twisted seams	Caused due to 1. Improper alignment of fabric parts, 2. Mismatched notches, components off grain	
Sewing of Reversed Garment Parts	Caused due to 1. Whole garment has been assembled Inside out. 2. Operator's fault in handling the fabric parts during sewing	
Mismatched stripes or checks	Caused due to 1. Mishandling by operator 2. Incorrect cutting	
Insecure back stitching	Caused due to 1. Rows do not cover the first row of stitching-Manual error	

Type of Defects	Description	Photograph
Uneven width of inlay	Caused due to 1. Bad handling by operator 2. Incorrectly set guide, incorrectly set folder	
Linings too full, too tight.	Caused due to 1. Operator twisted or stretched extensively during Sewing	
Uneven Stitch Density	Caused due to 1. Operator causing the machine to snatch and does not allow the machine to control fabric feeding.	
Wrong Stitch density	Caused due to 1. Too high SPI give rise to jamming and rupture of fabric 2. Too low SPI give rise to weak seams and seam grinning	
Mismatched seams	Caused due to 1. Edges of the upper and lower fabric parts not matched during sewing, causing the seams to shift	
Loose Stitch	Caused due to 1. Unbalanced seam sewing thread tension not set properly	

Type of Defects	Description	Photograph
Extraneous part caught in the seam	Caused due to 1. Handling error	
Garment parts Cockling, Pleated, Twisted, Showing Bubbles-	Caused due to 1. Handling error 2. Usage of wrong interlining/fusing under improper conditions	
Components of features wrongly positioned or misaligned	Caused due to 1. Incorrect marking 2. Incorrect sewing not following the marker	
Seam Slippage	Caused due to 1. Insufficient thread tension 2. Low count, unbalanced weave and filament yarns.	

Type of Defects	Description	Photograph
Thread Breakage	Caused due to 1. Improper m/c settings 2. Incorrect threading 3. Excessive needle heat 4. Incompatible needle, thread and fabric, damaged machine parts	
Yarn Severance	Caused due to 1. Incorrect needle point 2. Damaged needle 3. High machine speed	
Puckering	Caused due to 1. Tension pucker 2. Feed pucker 3. Puckering due to differential shrinkage 4. Puckering due to structural jamming	
Ragged Edges	Caused due to 1. Knives on automatic sewing machine not dipping smoothly.	

Type of Defects	Description	Photograph
Uncut thread	Caused due to 1. Operators' negligence 2. Malfunctioning thread trimmer in automatic machines	
Oil stains	Caused due to 1. Malfunctioning machines	

Rectification of few defects

Stitching defects and its causes:

Improper Stitching	Incorrect threading Bent needle head
Improper feeding	Insufficient or too much pressure on pressure foot. Stitch length too short.
Skip stitching	Incorrect threading Damaged needle Larger needle hole Improper thread tension- too tight /thread streches when heated.
Skip stitching (overedge machine)	Loopers are incorrecctly set Needle to looper setting is incorrect Wrong thread type
Wavy Seam	Stitch length too short Pressure too heavy or light
Wavy Seams (overedge machine)	Different feed needs increasing
Piles Feed unevenly	Incorrect pressure on the pressure foot Piles lock or stitch together Feed dog at incorrect height Inappropriate pressure-foot Inappropriate needle plate
Unbalanced Tension	Different thread on needle and bobbin Thread slipped out of tension disc Incorrect threading Poor quality thread Bent,rustedor incorrect bobbin/improperly or unevenly would bobbin/bobbin has several layer of thread/bobbin thread out/bobbin case screw has worked out.
Unbalanced Tension (overedge Machine)	Loopwer tension needs adjustment
Uneven Stitches	Thread does not feed smoothly/thread has wrong twist/thread imcorrectly threaded between tension discs. Pressure tto tight
Cracked Seam	Lint between the tension discs,guides or eyelets

	Bobbin or looper thread tension too tight Needle too small or wrong point Threads not moving smoothly through guidesor eyelets.Threads are too thick for needle or machine has rough spots.
Thread Breakage	Poor quality thread Tension too tight Needle set improperly Needle needs replacement Pressure bar not down Rough needle eye, throat plate or thread spindle
Seam grin	Stitch length too short Thread not set into tension discs properly Tension on needle thread too loose
Machine Jam	Machine is incorrectly threaded Needle set incorrectly or damaged Static electricity pulls fabric into needle hole Bobbin inserted incorrectly
Unthreading of needle	Thread end too short Take-up lever is not at highest position
Needle Breakage	Needle needs replacment or set incorrectly Pressure foot too loose Bobbin or bobbin case incorrectly set Pulling fabric while stitching or without raising pressure foot. Fabric too thick
Bobbin Thread breakage	Improperly threaded machine Bobbin tension too tight Bobbin too full Bobbin pigtail caught in bobbin-case Bobbin screw not working properly

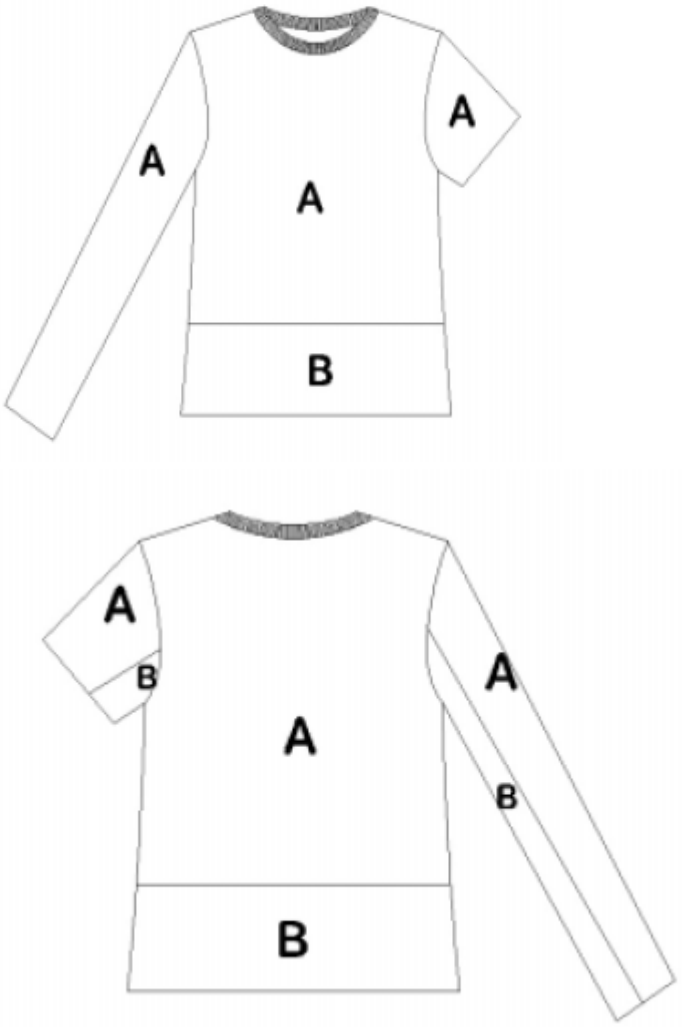
Processes to Rectify Few Defects

Restitched Seams / Broken Stitches	1)Using better quality sewing threads 2)Ensure proper machine maintenance
Open Seam – Seam Failure – Stitch	1)Better quality threads 2)Proper size thread for application 3)Proper tension
Seam Slippage	1)Change seam type if possible 2)Increase seam width 3)Optimize the stitches per inch.
Excessive seam Puckering	1)Correct thread type and size. 2)Sew with minimum sewing tensionto get a blalnced stitch 3)Machine needle, bobbin andthreads are set properly according to the fabric to be sewn.
Knits & Strech woven puckering	1)Set the machine properly according to the fabric 2)Minimum pressure foot pressure
Improper Stitch balance – 301 Locksstitch	1)Use quality thread

	2)Properly balance the stitch so that the needle and bobbin threads meet the middle of the seam.Always start by checking bobbin tension to make sure it is set correctly, so that minimum thread tension is required to get a balanced stitch.
Improper Stitch balance – 401 Chainstitch	1)Use quality thread 2)Properly balance the stitch so that when the looper thread is unravaled , the needle loop lays over half way to the next needle loop on the undeside of the seam
Improper Stitch balance – 504 Overedge Stitch	1)Use Quality thread 2) Properly balance the stitch so that when the looper thread is unravaled , the needle loop lays over half way to the next needle loop on the undeside of the seam
Raggeded/Inconsistent Edge	1)Make sure the sewing machine knife are sharpened and changed often 2)The knives should be adjusted properly in relationship to the “stitch tongue” on the needle plate to obtain the proper seam width.

Zone wise defects (Major/Minor) In Various Garments:

Zone Wise Defects of A Top/T-shirt

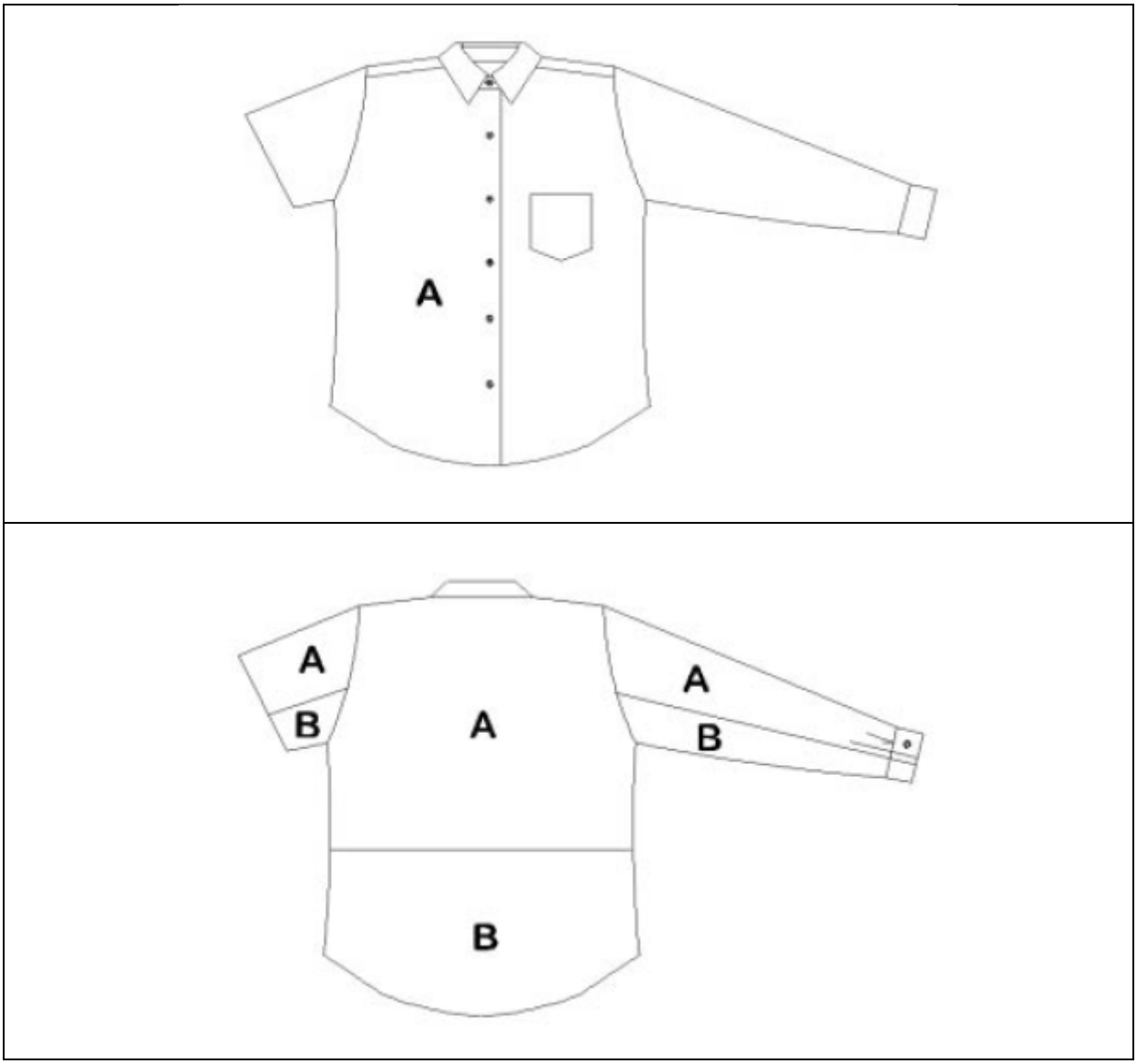


DEFECT	ZONE A	ZONE B
Uneven Dye , Dirt Spot	Major	Major
Dye Misprints, Dye Smear	Major	Major
Shaded Parts	Major	Major
Obvious Foreign or Color Yarn	Major	Major
Poor Matching of Color or Print Pattern	Major	Major
Texture Change	Major	Major
Shading between Garment Parts	Major	Major
Fabric(Defect by Zone)		

DEFECT	ZONE A	ZONE B
Slub and Misweave upto 1/8”	Major	Minor
Holes of any size repaired or not	Major	Major
Standards Wt/Dz Exceeds Tolerance	Majors	-
Drop Stitch ,Mend , Broken Stitch , End Down , Run Barr, Bent Needle . needle Line	Major	Major
Dye Discoloration Streaks Blotches, Print Out of Register	Major	Major
Bow or Bias Fabric Over 1” Side to Side	Major	Major
Sewing(Defects by Zone)		
Run off Stitches up to 1/8”	Major	Major
Run off Stitches Over 1/8”	Major	Major
One or More skip stitch on any Stitch Type	Major	Major
Incorrect Stitch Type	Major	Major
Any Exposed Stitch or Under Part	Major	Major
Blindstitch Bite Too Deep	-	Major
Stitching Margin Variation Needle to Edge Over 1/8”	Major	Major
Stitching Margin Over 1/8”	Major	Major
Stitchcount Variation Over +2 or -1 Per Inch	Major	Major
Tight stich Thread Tension	Major	Major
Raw Edge , Open Seam , Loose Seam or Fraying	Major	Major
Misaligned Front/Back Over 1/8”	Major	Major
Incorrect Placket width up to 1/8”	Major	Major
Incorrect Placket width over 1/8”	Major	Major
High/Low Pkts of Pkt Flaps 1/8” or More	Major	Major
Mismatch Pockets, 4 way Plaid Match Over 1/8”	Major	Major
Uneven Collar Points Over 1/8”	Major	-
Collar Overlap		
Uneven Hip Pkt Placement Over 1/8”	Major	-
Lips or Creases on Pocket	Major	-
Exposed Pocket Bag	Major	-
Not Mitred Inner Fly	Major	-
Zipper , Incorrect Size/ColorMalfunctioning,Improper Set	Major	Major
Uneven Yoke Seam Under 1/8”	Minor	-
Uneven Yoke Seam Over 1/8”	Major	-
Misaligned Fell Seams Over Width of Topstitch	Major	Major
Uneven Pleating , Shirring or Poorly Sewn Seams	Major	Major
Pleats in Seam	Major	Major
Mismatch Plaids or Stripes up to 1/8”	Major	Major
Mismatch Plaids or stripes over 1/8”	Major	Major
Uneven or Misplaced Darts over 1/8”	Major	-
High/Low Waist Band > 1/8”	Major	-
Uneven Waistband > 1/8”	Major	-
Uneven Belt Loop Placement > 1/8”	Major	-
Beltloop Missing or Slanting > 1/8”	Major	-
Uneven Hem > 1/2" Each side	Major	-
Incorrect or Missing Bartack	Major	Major
Incorrect Size Buttonhole	Major	Major
Incorrect Button	Major	Major
Buttonholes Broken or Unrepairable Threads	Major	Major
Misplaced Button, Buttonhole or Hook and Eye Over 1/8”	Major	Major
For Hole Button Sewn in Two Holes or Upside Down	Major	Major
Missing Button	Major	Major

DEFECT	ZONE A	ZONE B
Missing or Misplaced Rivet Over 1/8”	Major	Major
Severe Puckering and Badly Roped Hems	Major	Major
Improper Interlining, Excessive Fullness of Parts	Major	Major
Interlining or Garment Part Twisted	Major	Major
Crow Feet	Major	Major
Needle Chews up to 1 Per Inch	Major	Minor
Insecure Setting of Component Part	Major	Major
Pressing (Defects by Zone)		
Poor Press	Major	Major
Permanent Crease	Major	Major
Burn Marks , Scroch Marks , Pressure Marks	Major	Major
Cleanliness(Defect by Zone)		
Attached Threads Over 1/4"	Major	Major
Attached Threads up to 1/4”	Major	Minor
Attached Threads over 1/2" inside of Garment	Major	Major
Sewn in Waste or Thread on Outside	Major	Major
Stail,Soil oil to 1/8”	Major	Major
Ring From Cleaning Gun or Rub Spot Over 1/4”	Major	Major
Improper Tidy or Fraying of Band Finish	Major	-
Visible Drill Hole or Notches or Pencil Mark	Major	Major
Needle Chews or Feed_dog Abrasion Frays	Major	Major
Mildew or Heavily Odored Garments	Major	Major
Nap Up/Down , Shaded Parts	Major	Major
Pile Direction Not as Specified	Major	Major
Insecure Setting of Part	Major	Major
Incorrect Trim Misplaced Label, Ticket or Wrong Ticket	Major	Major
Missing Or Incorrect Labels	Major	-
Incorrect Folding	Major	Major
Aasymetric Garment More Than 1”	Major	Major
Uneven Elastification (If present)	Major	Major
Kid-Loose Components	Critical	Critical
Kid_Stones in Garments	Critical	Critical
Kid_Drawstrings at Head & Neck	Critical	Critical

Zone Wise Defects of A Shirt

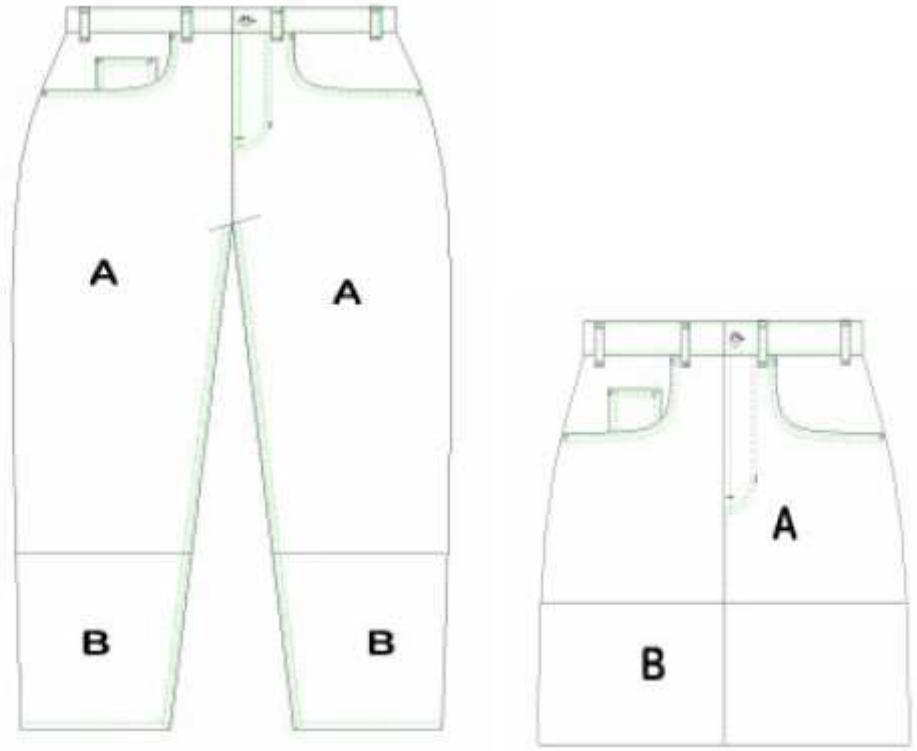


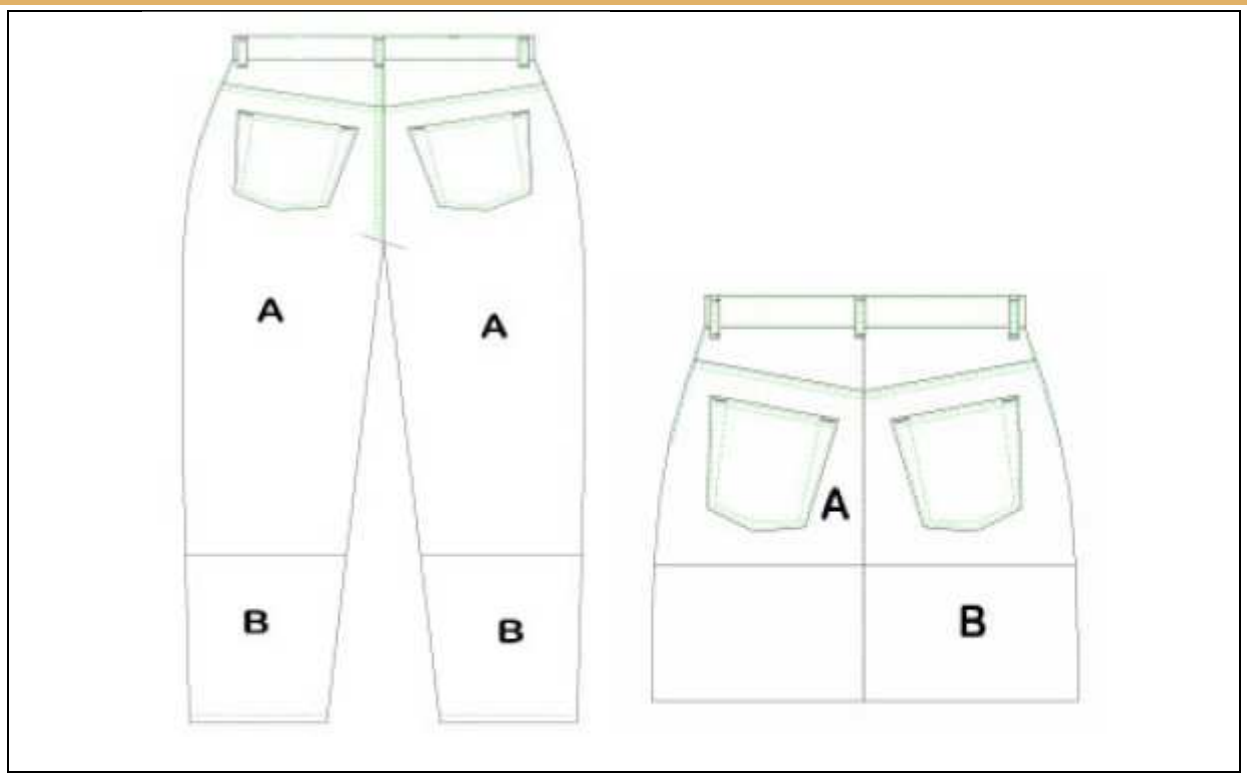
DEFECT	ZONE A	ZONE B
Uneven Dye , Dirt Spot	Major	Major
Dye Misprints, Dye Smear	Major	Major
Shaded Parts	Major	Major
Obvious Foreign or Color Yarn	Major	Major
Poor Matching of Color or Print Pattern	Major	Major
Texture Change	Major	Major
Shading between Garment Parts	Major	Major
Fabric(Defect by Zone)		
Misweaveupto 1/4”	Major	Minor
Misweave over 1/4”	Major	Major
Holes of any size repaired or not	Major	Major
Fabric Not as Specified	Major	Major
Non-Characteristic Slubs	Major	Minor

DEFECT	ZONE A	ZONE B
Sewing(Defects by Zone)		
Run off Stitches up to 1/8”	Major	Major
Run off Stitches Over 1/8”	Major	Major
One or More skip stitch on Chain Stitch	Major	Major
One or More than 1 skip stitch on Lock Stitch	Major	Major
Incorrect Stitch Type	Major	Major
Stitching Margin Variation Needle or Edge Over 1/16”	Major	Major
Any Exposed Stitch or Under Part	Major	Major
Blindstitch Bite Too Deep	-	Major
Uneven Front Placket > 1/8” at Bottom	Major	-
Incorrect Placket Width 1/8” or less	Major	Minor
Incorrect Placket Width over 1/8”	Major	Major
Tight stich Thread Tension	Major	Major
Raw Edge , Open Seam , Loose Seam or Fraying	Major	Major
Uneven High-Low Pockets (2 Pocket Shirt) or Pocket Flaps more than ¼” in Relation to each other	Major	Major
Incorrect Placket width up to 1/8”	Major	Major
Incorrect Placket width over 1/8”	Major	Major
Mismatch Pockets, 4 way Plaid Match Over 1/8”	Major	-
Uneven Collar Points Over 1/8”	Major	-
Collar Overlap even Buttoned	Major	-
Incorrect Button Size	Major	Major
Buttonholes Nonrepairable, Anchored Threads or Broken Stitch	Major	Major
Incorrect Button	Major	Major
Missing Button	Major	Major
Button Out of Line on Top Center 1/8” Tolerance	Major	-
Four Hole Button Sewn in Two Eyes or Upside Down	Major	Major
Sewn in Pleats outside	Major	Major
Uneven Pleating , Shirring or Poorly Sewn Seams	Major	Major
Pleats in Seam	Major	Major
Mismatch Plaids or Stripes up to 1/8”	Major	Major
Mismatch Plaids or stripes over 1/8”	Major	Major
Uneven or Misplaced Darts over 1/8”	Major	-
Improper Interlining , Excessive Fullness of Parts	Major	Minor
Interling Twisted or Garment Part Twisted	Major	Major
Needle Chews up to 1 Per Inch	Major	Minor
Insecure Setting of Component Part	Major	Major
Pressing (Defects by Zone)		
Poor Press	Major	Major
Permanent Crease	Major	Major
Burn Marks , Scroch Marks , Pressure Marks	Major	Major
Cleanliness(Defect by Zone)		
Attached Threads Over 1/4"	Major	Major
Attached Threads up to 1/4”	Major	Minor
Attached Threads over 1/2" inside of Garment	Major	Major
Sewn in Waste or Thread on Outside	Major	Major
Stail,Soil oil to 1/8”	Major	Major
Ring From Cleaning Gun or Rub Spot Over 1/4”	Major	Major
Improper Tidy or Fraying of Band Finish	Major	-
Visible Drill Hole or Notches or Pencil Mark	Major	Major
Needle Chews or Feed_dog Abrasion Frays	Major	Major

DEFECT	ZONE A	ZONE B
Mildew or Heavily Odored Garments	Major	Major
Incorrect Trim Misplaced Label, Ticket or Wrong Ticket	Major	Major
Missing Or Incorrect Labels	Major	-
Incorrect Folding	Major	Major
Aasymetric Garment More Than 1”	Major	Major
Kid-Loose Components	Critical	Critical
Kid_Stones in Garments	Critical	Critical
Kid_Drawstrings at Head & Neck	Critical	Critical

Zone Wise Defects of Bottoms (Trouser & Skirt)





DEFECT	ZONE A	ZONE B
Uneven Dye , Dirt Spot	Major	Major
Dye Misprints, Dye Smear	Major	Major
Shaded Parts	Major	Major
Foreign or Color Yarn < or = 1/2”	Minor	-
Foreign Color Yarn > 1/2”	Major	Minor
Poor Matching of Color or Pattern	Major	Major
Texture Change	Major	Major
Bleach Spot	Major	Major
Shading Between Garment Parts	Major	Major
Fabric(Defect by Zone)		
Misweave> 1/4”	Major	Major
Misweave< 1/4”	Major	Minor
Holes of any size repaired or not	Major	Major
Fabric Not as Specified	Major	Major
Non-Characteristic Slubs	Major	Minor
Sewing(Defects by Zone)		
Run off Stitches up to 1/8” on Outside	Major	Minor
Run off Stitches Over 1/8” on Outside	Major	Major
Run off Stitches Upto 1/8” on Inside	Major	Minor
Run off Stitches Over 1/8” on Inside	Major	Major
One or More skip stitch on Chain Stitch	Major	Major
One or More than 1 skip stitch on Lock Stitch	Major	Major
Incorrect Stitch Type	Major	Major
Stitching Margin Variation Needle or Edge Over 1/8”	Major	Major
Stitching Margin Over 1/8”	Major	Major
Stitch Variation over +2 or -1 Per Inch	Major	Major

DEFECT	ZONE A	ZONE B
Tight stitch Thread Tension	Major	Major
Raw Edge , Open Seam , Loose Seam or Fraying	Major	Major
High/Low Hip PktPlmt> + or – 1/8”	Major	Major
Lips or Crease on Front Pocket	Major	-
Exposed White Pocket Bag	Major	-
Wavy or Malfunction Zipper	Major	Major
Uneven Yoke Seam (Felled Back Seam) < or = ¼”	Minor	-
Uneven Yoke Seam (Felled Back Seam) > ¼”	Major	-
Uneven Yoke Seam (Safety yoke seam) < or = 1/8”	Minor	-
Uneven Yoke Seam (Safety yoke seam) > 1/8”	Major	-
Uneven or Misplaced Darts over 1/8”	Major	-
High/Low Waist Band > 1/8”	Major	-
Uneven Waistband > 1/8”	Major	-
Uneven Belt Loop Placement > 1/8”	Major	-
Beltloop Missing or Slanting > 1/8”	Major	-
Uneven Hem > 1/2" Each side	Major	-
Incorrect or Missing Bartack	Major	Major
Pleats in Seam	Major	Major
Mismatch Plaids or Stripes up to 1/8”	Major	Major
Mismatch Plaids or stripes over 1/8”	Major	Major
Uneven or Misplaced Darts over 1/8”	Major	-
Improper Interlining , Excessive Fullness of Parts	Major	Minor
Interling Twisted or Garment Part Twisted	Major	Major
Needle Chews up to 1 Per Inch	Major	Minor
Insecure Setting of Component Part	Major	Major
Pressing (Defects by Zone)		
Poor Press	Major	Major
Permanent Crease	Major	Major
Burn Marks , Scroch Marks , Pressure Marks	Major	Major
Cleanliness(Defect by Zone)		
Attached Threads Over 1/4"	Major	Major
Attached Threads up to 1/4”	Major	Minor
Attached Threads over 1/2" inside of Garment	Major	Major
Sewn in Waste or Thread on Outside	Major	Major
Stail,Soil oil to 1/8”	Major	Major
Ring From Cleaning Gun or Rub Spot Over 1/4”	Major	Major
Improper Tidy or Fraying of Band Finish	Major	-
Visible Drill Hole or Notches or Pencil Mark	Major	Major
Needle Chews or Feed_dog Abrasion Frays	Major	Major
Mildew or Heavily Odored Garments	Major	Major
Incorrect Trim Misplaced Label, Ticket or Wrong Ticket	Major	Major
Missing Or Incorrect Labels	Major	-
Incorrect Folding	Major	Major
Twisted Legs Over 1”	Major	Major
Kid-Loose Components	Critical	Critical
Kid_Stones in Garments	Critical	Critical
Kid_Drawstrings at Head & Neck	Critical	Critical

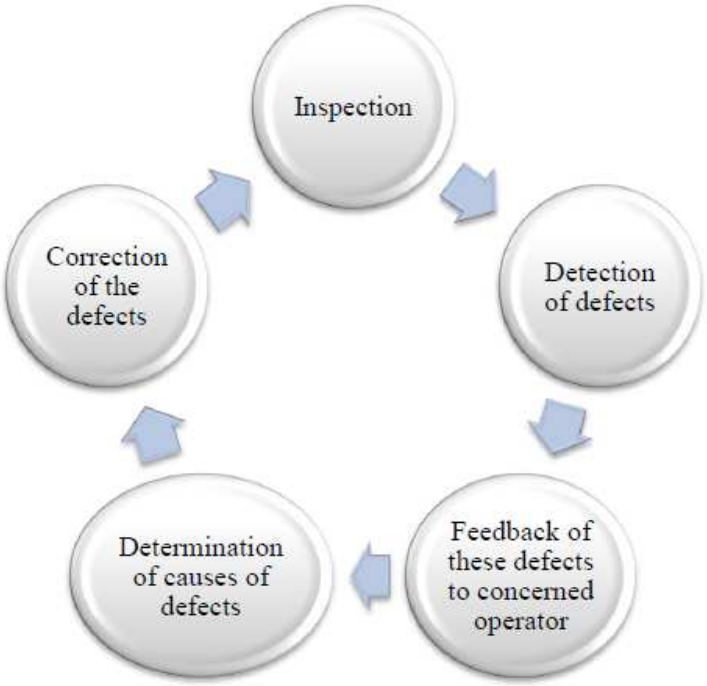
	At the end of this session you will be able to understand: Types of Garment Inspection In-line Inspection

Session Plan	
1	Types of Inspection
2	In-Line Inspection
3	Roles and Responsibility of an In-line Checker

Types of Garment Inspection

Inspection is the visual examination of partially finished components of the garments and completely finished garments to determine if they meet required standards and specifications. The purpose of inspection is to make judgment on the disposition of a material to product, whether to accept or reject it.

Objective: The main objective of inspection is the early detection of defects, feedback of this information to the appropriate people, and determination of the cause, ultimately resulting in the correction of the problem.



In a sewing floor, the inspection process is further divided as:
••In- Line Inspection
••End-Line Inspection
••Quality Audits

In-Line Inspection

In-Line Inspection means the inspection of parts before they are assembled into a complete product.

Purpose of In-Line Inspection
1. The main purpose is to stop defect generation at source. Early detective of defective garment can save time and money for repair work. If a defect is not detected when it made and further processes are done on that defective piece, defect may become more critical. This makes more difficult to open the seam again the repair the garment. Thus repair cost would be high.

2. Early feedback to cutting department: If garments are checked inline, defects related to cutting can be detected at the initial 2 to 3 operations. Sewing floor can inform cutting department about the cutting issues if it exists. Based on the feedback from sewing line cutting department take action quickly and cut following lays accordingly.

3. Reduce workload of the end-of-line checker.

For styles with complex operations and having many numbers of operations, inline inspection must be followed by factories.

The idea behind In-Line Inspection is to inspect or check the quality of garment part(sub assembly) as close to manufacturing as possible & there by identify the source of quality problems if any as early in the manufacturing process as possible. This will minimize the need for later repairs & rework. In sewing, the decision on where to place inspection stations is influenced by various factors such as:
•Importance of Operation
•Controlling troublesome or key operations

To place an inspection point in the line:
•A complete operation breakdown is prepared.
•Generally, after the completion of Back or Front part of a garment, an inspection point is kept.

Procedure & Responsibility

Step	Task	Responsibility	Reference
1	Determine the no. of checkpoints to be installed within the line and include them as normal workstations.	Supervisor	Operation Sequence
2	Check the finished garment for workmanship (stitching) and measurement quality at each checkpoint.	Checker	Quality specification sheet

Step	Task	Responsibility	Reference
3	Pass the garment if no defects.	Checker	
4	Reject the garment if defects are found.	Checker	
5	Mark the defects found on the garment with clearly visible stickers. Record the defects.	Checker	100% Inspection Record
6	Give the repairs to the concerned section supervisor to complete. Enter the defects onto the repair list. Also enter the bundle number and the time when it was collected.	Operator	Repair record sheet.
7	Return the repairs to the operator.	Supervisor	
8	Check the repair number on the repair list. Fill out the time when the pieces were returned.	Operator	Repair list
9	Recheck the garment.	Checker	Quality specification sheet
10	Select or reject as in step II or III.	Checker	

Roles and Responsibilities of In-Line Checkers

Responsible for doing inline inspections on all operations / operators in a day.

•Responsible for generating all reports relating to inline inspection.

•Responsible for ensuring that during inline inspection standard quality specifications for each operation are being met at all the operation points.

•Responsible for communicating any quality discrepancy during inline inspection to the Quality Assurance Head and bringing the same to the immediate notice of the Line In charge.

•While Checking the Cut Parts of the garment should be properly maintain with the bundle number.If any busket is available the cut parts should be put in the busket and put forward.Make sure if any parts doesn’t fall apart or get soiled.Keep your hand clean or Wear the gloves .

INSPECTION PROCEDURE

At the end of this session you will be able to understand:
BASIC of Inspection Procedure
Inspection of Different types of Garment

Session Plan	
1	Steps of Inspection Procedure
2	Inspection of a T-shirt
3	Inspection of a Shirt
4	Inspection of a Trouser

Steps of Inspection Procedure – In-line

Inline checking is suppsoed to be done after every critical operation. Whereas the company can also determine the checkpoints. Few standard crictical points are mentioned with their checking criteria.

Shirt:

Front
Placket
100% inspection to be done for the front fused placket,- Check for Shape, width of the placket. Check if there is any fusing bubble present and can be seen prominently.Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Pocket
Check for theplacement of the pocket with ready pattern. Check if the mitering is done properly.
Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Back
Yoke attached to back, check for mitering. Check for srtike through, strike back, puckuring , lose stitch , broken stitch. In case of dart, check for dart length width and placement.

Collar prepartion:
Check the fused collar for bubbles. Check for the Up and down of collar points.Check for the shape of collar band. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Shoulder Join
After the front and back shoulders are attached check for mitering. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Sleeve:
Sleeve Preparation:
After the cuff placket is attched to the sleeve, the fused placket for bubbles. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Join sleeve to the bodice:
Check for pleates or gathering at the the shoulder point.Check for the length of both sleeve.
Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Side Seam:
Check for Check for srtike through, strike back, puckuring , lose stitch , broken stitch and twisting. Check for the underarm points, if they are matching.

Cuff attaching:
After the cuffs are attched, check for the sizeof the cuff with ready pattern. Check for placment of pleates and check for mitering. Check for srtike through, strike back, puckuring , lose stitch , broken stitch and twisting.

Collar attach
Check for collar pont and up and down.Collar band up and down. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Hem,
Check for the width. Check for srtike through, strike back, puckuring , lose stitch , broken stitch and twisting.

T-shirt Polo:

Front Placket:
Check for the width and length of the placket and its uniformility . Check the box at the end of the placket, check if its uniform.

Sleeve:
Check if the underarm sleeve points are matching. Check if slevve length are matching.

Slit:
Check for the slit length . Check for puckuring , lose stitch , broken stitch, and twisting.

Hem:
Check for the width.Check for puckuring , lose stitch , broken stitch and twisting.

Trouser:
Front:
Check and mark side seam position.Check pleat and pocket opening.Check zipper attaching and fly.Check pocket construction and pocket bag.Macth number of all parts.Clean over lock finishing.Check waist with pattern. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Back:
Align back with waist.Check dart position and construction.Check button hole , button placement and bar tack.Check pocket bag and labels. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.
Side Seam:
Match front and back.Check side seam and pocket attaching at side seam.Side press should be flat. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

Waistband :
Check crotch joint and zip attach should have two stitch lines.Check loops quality and placement.Check waistband attach, width of waistband,notch to notch match.Check belt closing and extention,hook and eye alignment.Check fly and both fly top stitch.Check back sean,gripper , waist meassurment and size labels. Check for srtike through, strike back, puckuring , lose stitch , broken stitch.

ROVING QUALITY CHECK

At the end of this session you will be able to understand:
Roving Quality Checking,Purpose and Methods of Roving Check

Session Plan	
1	Purpose of Roving Check
2	Methods of Roving Check

Roving Quality Control is the method of determining the percentage of faulty garments that occur in production. It uses RANDOM observations and STATISTICAL sampling.

A quality checker may be appointed to check garments at all workstations in a sewing line randomly. The inline checker goes to every workstation and randomly picks bundles and checks few pieces. He concentrates only one operation at which he checking. Checking workstation is not provided at each workstation in the line, so this checker checks stitch quality of the garment by standing

This means that a small "sample" (usually 10%) of the garment operations is inspected. The percentage of faults found from this inspection represents the percentage of defective/faulty work produced by the factory.

Roving comes from the word —ROVE‖ which means to move from place to place in changing directions.

Purpose of Roving Check

Reduce the time spent on repairing work by the operator.

•Repairs only after the operator who made the fault and not operators after him/her.

•Reduces the number of fault that may be found at the end of the line thus repair time and the overall costs are minimized.

•Minimize time delays in delivery of goods to customers.

••Minimize "Bundle" waiting time at End-line Examining.

•Faster response time by supervisors and mechanics to problems which affect production.

•Provides information that may be used to measure and improve the quality of work produced in the factory.
•Provides information that can be used to compare with other factories (using similar systems)

Methods of Roving Check

•The Roving Quality Controller moves in the line along with a document and picks up any 5 garments from each operator and inspects that operator's work and record the garments checked and faults found in the appropriate square in the document.

•If the number of faults found during the inspection is one, the Roving QC will inform the operator and sometimes make suggestions on what should be done to correct the fault.

•If the number of faults found is two or greater on any operation, then the Roving QC will inspect a further 5 garments that were completed by the worker previously. This must be done immediately. Should there be no faults on these then the checker brings this to the attention of the worker for correction.

•If more garments are found to be faulty, then this MUST be brought to the Line supervisor's attention. The supervisor is expected to provide a solution and sign the Roving Quality report to acknowledge that he/she is aware of the problem and is taking steps to correct this.

•Where all garments checked are faulty, then production should be stopped immediately and the Line supervisor and Quality supervisor should get involved to solve the crisis.

It is important that the Roving Checker carry out the checks on the operators in a random manner. This is to prevent a "routine" from developing in which the operators anticipate the arrival of the checker and are therefore more careful with their work immediately before the roving checker arrives and relax their awareness as soon the roving checker leaves. At the end of the day the total faults and total operations checked are calculated for each operator and for the entire section/line. These are converted into a percentage. The total percentage for the line represents the percentage of faulty work that passes through the line to the end-line checker. The Roving Control Report is supplied to the Line/Section Supervisor for authorization before being handed to Quality Control Supervisor. The final daily percentages form each line is accumulated onto a factory summary report and a percentage is calculated for the factory.

END LINE INSPECTION

	At the end of this session you will be able to understand: Purpose and Procedure of End-line inspection

Session Plan	
1	Purpose of End Line Inspection
2	Procedure of End Line Inspection
3	Roles and Responsibility of End Line Inspector

End-Line Inspection means inspecting finished goods from the customer point of view. End- Line Inspection may occur before or after garments are packed in poly bags & boxes. If it is done after garments are packed, then proper size & style markings on the package can also be checked.

Purpose of End Line Inspection

Purpose of End-Line Inspection

The purpose of the End-Line Inspection to check the quality of the final stitched garments for the following:

- Labelling
- Style
- Material
- Colour
- Accessories
- Workmanship
- Defects
- Size measurement etc.

Job Role in End Line Inspection

Step	Task	Responsibility	Reference
1	Lay the garment flat on the table. Check the finished garment for overall stitch quality and material defects.	Quality Checker	Quality specification sheet
2	Check each part of the garment in a sequence. Flatten the seams.	Quality Checker	
3	Turn the garment inside out and check for the stitching inside. Send for repair if defects are found.	Quality Checker	
4	Mark the defects found on the garment with clearly visible stickers.	Quality Checker	Record the defects

Step	Task	Responsibility	Reference
5	Check the garment for measurements, which should be within the tolerance limit.	Quality Checker	Tolerance sheet.
6	Give the bundle to the concerned section supervisor to carry out repairs. Enter the defects onto the repair list. Also enter the bundle number and the time when it was collected.	Operator	Repair record sheet.
7	Return the repairs to the operator.	Supervisor	
8	Return the repair bundles to the original checker. Fill out the time when the pieces were returned.	Operator	Repair list
9	Recheck the bundle.	Quality Checker	Quality specification sheet
10	Select or reject as in step II or III.	Quality Checker	

Roles and Responsibilities of Final/ End of line Checkers

- Responsible for doing final inspection on all end of line sewn garments.
- Responsible for generating all reports relating to final inspection.
- Responsible for ensuring that standard quality specifications are met for all sewn garments.
- Responsible for communicating any quality discrepancy during final inspection to the Q.A. head and bringing the same to the immediate notice of the line in charge for taking corrective action.

Steps of Inspection Procedure - End line

A garment is inspected for any defects or flaws that might have remained or that have formed while it was stitched. A process of inspecting a garment can be broken down into a number of small steps which are very important to produce good quality garments.

The Inspection Procedure can be started in following way:

1. The inspection table should have even surface and with required flat/slant surface and good lighting.

2. At least 2 beans should be kept to keep good and defective garments separately.

3. The fit sample, spec sheets, trim cards etc. should be ready for reference

4. Accessories like measuring tape, Audit forms, pencil etc. should be carried.

5. Lay Garment on Table, Front-Up.

6. Flip Garment over to back

7. Turn Garment inside out and check the wrong side

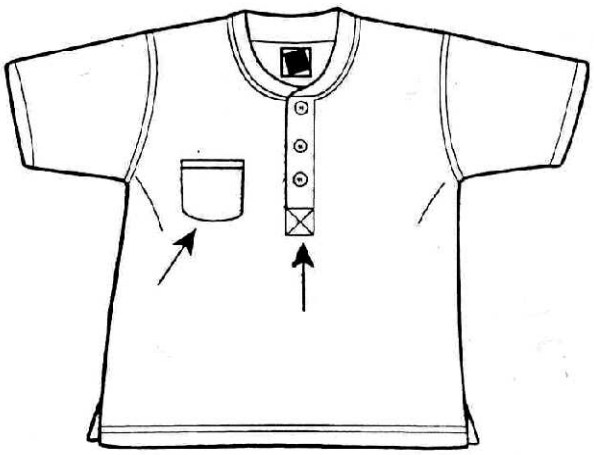
Most important of all the steps- Do not worsen the defect

Inspection of A T-shirt

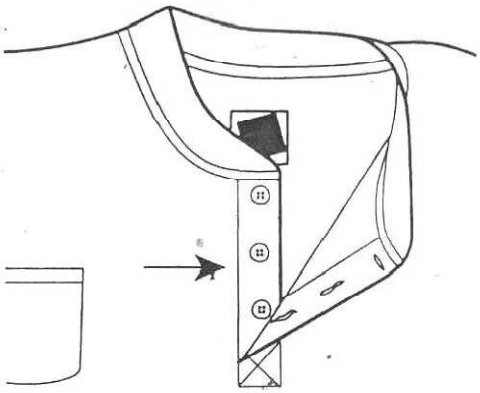
We can start as per the following steps after we are done with the steps written above

1. Hold the garment by the shoulders

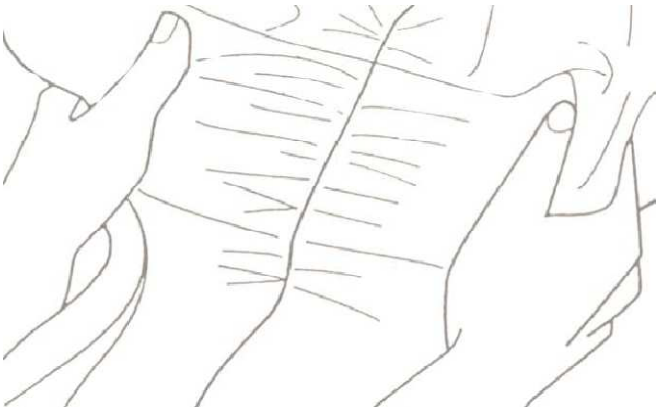
2. Lay it flat on the table; examine the styling details as indicated by the arrows



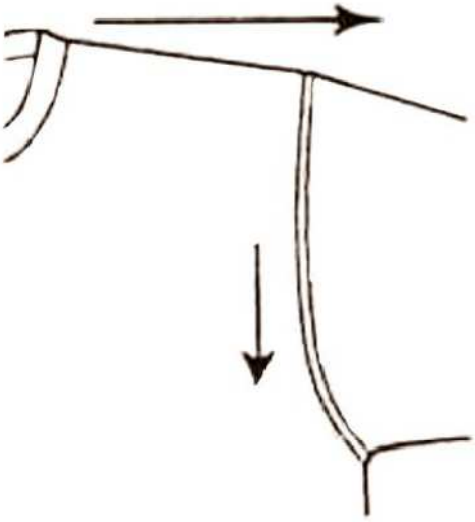
3. Check the seam quality, no threads, check labels



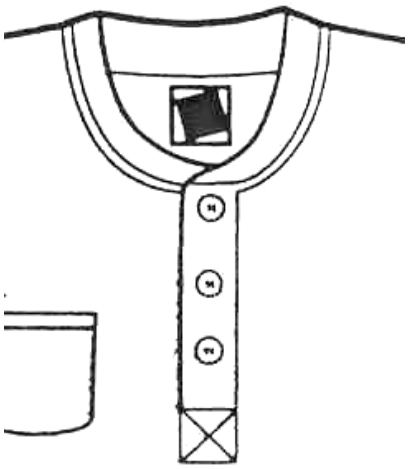
4. Check neckline or collar



5. Check both shoulder seams are of the same length

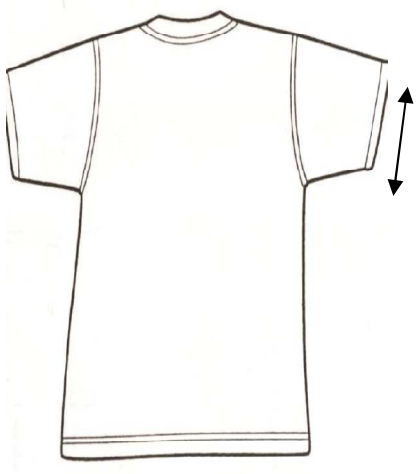


6. Check buttons, buttonholes

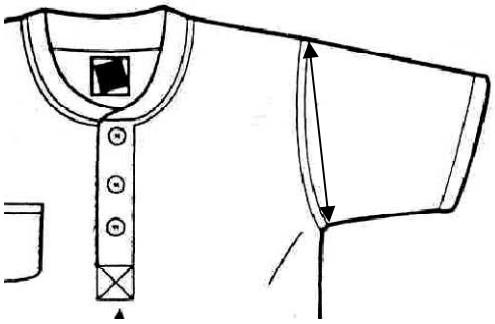


7. Check length

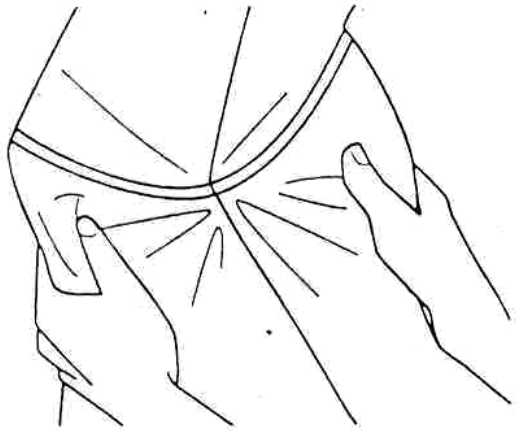
8. Check sleeve length and sleeve hem



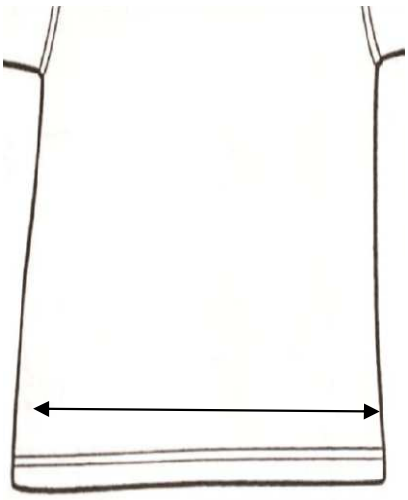
9. Armhole width



10. Check if side seams are both the same length, check for puckering



11. Check bottom hem whether it is smooth, has no puckering, and whether width is even



Inspection of A Shirt

Lay Garment on Table, Front-Up.

1. Check for the shape of the collar and also the balancing of button-down collars (if present). Especially check for any puckering of the shirtfront when the collar is buttoned down. Check for any bubbles apparent due to incorrect fusing. Inspect collar and collar band, inside and outside for open seams, raw edges, pleats, stitch margin and excessive fullness or tightness.
a. Inspect collar and collar band inside and outside for open seams, raw edges, pleats, stitch margins, seam tensions, and shape.
b. Check for uneven collar points, collar peak shape, quarter the collar by putting inside shoulder seam together and check for the crooked collar. Crooked collar, when quartered, will also adversely affect appearance when buttoned.
c. Inspect collar band for bulky or poorly shaped band ends, not even with edge of front and whether seam is rolled to front (will vary with heavier fabrics).

2. Check for high-low pockets or pocket‘s unequal distance from the center of the shirt and also the shape of the pocket as given in the specs. In case of stripes and plaids look out for the matching of lines both horizontal and vertical sides as to match the front panel as specified.
a. Flap should be over pocket with edges of pocket not extending beyond flap. Edge of the flap should be even and not rolled to front. Pencil slot and brand label, if required, should be properly located.
b. Inspect pockets for correct stitch margins and uniformity in width (top to bottom). Check placement of tacks (if any). Look inside pocket at hem for any open or broken seams, run fingers around pockets for any raw edges/open seams.
c. Check if the snap/button is secured and is in line with buttonhole, its size and the finishing should be neat and check the thread used, should be as per instructions given.

3. Examine stitching on centred front for irregular stitching, open seams and then run fingers along seams for raw edges, check for uneven fronts and alignment of designs in case of plaids or stripe. Look out for evenness in case of placement of darts at front panels if any,
a. Check the front placket for its width and the type of operation, run fingers along seam for any open seam due to uneven seam margin.
b. Fusing quality to be checked on the placket, (check for any bubbles or wrinkles that are not acceptable).
c. Check action of snaps/buttons, examine alignment of snaps or buttons, look for cracked, broken, missing or insecure fasteners, buttonholes should be checked for completion, skipped or cut stitches, edges to be locked.

Openings should be free from uncut threads and raw edges. Buttonhole placket should cover the edge stitch of the button placket.

4. Run fingers along yoke seams; check for raw edges, open seams, margin and irregular stitching. Inspect yoke points for poorly formed points, pleats or tucks. Check for unbalanced or mis-aligned yoke points.

5. Labels should be centred in neck, check permanent care instructions to see that printing is clearly readable and correct.

6. If set sleeves and/or side seams are felled, run fingers along seam for raw edges, skipped, cut or raveled stitches. See that seams are matched at underarms.
7. Sleeve plackets should be examined for irregular length. Run fingers along seam, check for any hidden raw edges, open, skipped or ravelled stitches, check to see that sleeve has been caught securely, check for tacks if specified, check for shape of the guard or the base of the placket.

8. Check both cuffs (inside and outside) for any skipped, broken, open seams or any irregular stitching. Run fingers along seam for hidden raw edges. Gently tug on cuff to see that cuff is securely attached to sleeve, look out for the seam tensions and evenness in seam stitching.

9. Check action of snaps/buttons, examine alignment of snaps or buttons, look for cracked, broken, missing or insecure fasteners, buttonholes should be checked for completion, skipped or cut stitches, edges to be locked, openings should be free from uncut threads and raw edges

Flip Garment over to back
1. Run fingers along yoke seem to have checking for raw edges, open seams, margin and irregular stitching.

2. Yoke point(s) should be balanced on back. Look out for straightness of yoke at attaching point.

Turn Garment inside.

1. Start with buttonhole or cap side, run fingers along center front for raw-edges and open seams.

2. Rotate garment to first side seam and check from cuff to bottom hem for skipped stitches, all plies not caught and open seams, also check around set sleeve for the same things if safety stitched. Look at both sides of safety stitched seam.

3. Turn and check inside back, especially at yoke stitching.

4. Go to other side seam and set sleeve operation and check for the same defects.

5. Rotate and inspect other side of centre front running fingers along seam.

6. Inspect all bottom hems for uneven or irregular hemming.

7. On serged bottom hems, check for —bunching should protect ravel back from ends, stitching or tack on center pleat.

8. Run fingers along double turned hem for open seams and raw edges. Also check for back tack if specified.

9. Blind stitch bottom hems should be checked for open seams, puckering or twisting.

10. With garment right side out, look at garment front and back for material defects, oil, soil, shading and mismatched plaids (if applicable), quarter collar with outside shoulder seams together and set sleeve seams matched, check for uneven sleeve lengths.

11. If garments have been pressed, examine for wrinkles or scorching.

12. Button or snap front of garment and fold in required position.

NOTE: All seams are to be checked for raw edges. For all felled seams, yoke seams, cuffs, collar bands and bottom hems, fingers should be run along seams, also check for skipped stitches, correct SPI, wide margins, open seams, run-off stitching, irregular stitching and poor quality re - sews.

Exercise

1.Assesories needle for checking are needle, bobin. False/True.
2.On _____, check for —bunching should protect ravel back from ends, stitching or tack on center pleat.
3._____ should be balanced on back. Look out for straightness of yoke at attaching point.
4._____ should be centred in neck, check permanent care instructions to see that printing is clearly readable and correct.

QUALITY AUDITS

At the end of this session you will be able to understand:
Types of Audits and its Procedure

Session Plan	
1	Internal Audit
2	External Audit
3	Audit Procedure

Inspection of a selected sample of goods; used to determine the defect level of the output of a particular plant; prevents defective goods from entering the distribution system. Quality Audits are carried out to check the quality of the checker's passed and rejected goods. This is carried out when the order is 50% complete. The auditor will be familiar with the standards required by the customer and will check the garments accordingly. Audits are carried out in two ways:

Internal Audits: These are carried out by internal team of the company on Passed and Rejected garments. Passed garments affect the company reputation and the rejected garments cost money.

External Audits: These are carried out by an auditor sent by the customer to supplier's company to check the quality of an order before it is dispatched and delivered.

Procedure of Quality Audit

Step	Task	Responsibility	References
1	Pre-define the no. of garments to be inspected. This could be a no. from 5-7 for a style/colour or could be based on AQL standards for a style/colour to be followed. For example, select 5 garments at random from the end of the line and bring them to clean, clear and well-illuminated table.	Auditor.	
2	Check the garments one by one for visual and measurements and record nature and number of defects classified under	Auditor	Quality audit form.

Step	Task	Responsibility	References
	categories. 1. A – critical 2. B – major 3. C- minor		
3	Record the defects found.	Auditor	Quality audit form.
4	Discuss the quality issues specifically with the QA manager, Production manager who take appropriate action.		

SAMPLING PLAN

At the end of this session you will be able to understand:
Sampling plan for inspection

Session Plan	
1	Types of Sampling Plan

Planning the samples to inspect helps in determining how much should be inspected.
Sample: A sample consists of one or more units of a product drawn from a lot or a batch. The number of units of a product in the sample is the sample size.
Lot or Batch Size: The lot or batch size is the number of units of a product in a lot or batch. **Requirement of Sampling Plan** Sampling Plan is required to solve the following fundamental questions:
•How much should be inspected?
•The entire shipment or lot?
•Only a part of it?
•If so, how big or small a part?
•How many pieces out of a shipment?

Types of Sampling Plan

100% Inspection
•Accept/reject decision is made for each unit individually, but not for the entire lot or shipment.
•Generally 100% inspection will not guarantee detection of all defects, especially when Inspection is done by human checker.
•Direct cost of 100 % Inspection is high.
•Leads to the mishandling of the pieces increasing the number of stains.

Single-Sampling Plan:
• The single-sampling plan is used to accept or reject a lot based on the results of one random sample from the lot.
•The procedure is to take a random sample of size (n) of a lot and inspect each item. If the number of defects does not exceed a specified acceptance number (c), the lot is accepted.
•Any defects found in the sample are either repaired or returned. If the number of defects in the sample is greater than c, the entire lot is subjected to 100 percent inspection or rejects the entire lot and returns it to the producer.

Double-Sampling Plan
•In a double-sampling plan, management specifies two sample sizes (n_1 & n_2) and two acceptance numbers (c_1 & c_2).
•If the quality of the lot is very good or very bad, a decision can be made to accept or reject the lot on the basis of the first sample, which is smaller than in the single-sampling plan.
•To use the plan, a random sample of size is taken . If the number of defects is less than or equal to , the lot is accepted. If the number of defects is greater than , the lot is rejected.
•If the number of defects is between , a second sample of size is taken.

• If the combined number of defects in the two samples is less than or equal to , the consumer accepts the lot. Otherwise, it is rejected.

Arbitrary Sampling

•A certain percent of shipment is inspected.
•Accept/reject decision regarding that shipment is made, based on the inspection results of that certain percent of shipment.
•Most common percent of shipment inspected is 10 percent thus it is also called 10% sampling.
•For large order quantity 10% is too small and for small order quantity 10% is too large.

Statistical Sampling

•This is also known as Acceptance Sampling.
•Risk of making a wrong decision is known & controllable.
•This is most practical & economical means for determining Product quality.
•Flexibility with regards to the amount of inspection to be performed at any given time.
•Sampling plan is made with reference to the laws of Probability.

AQL- ACCEPTABLE QUALITY LEVEL

	At the end of this session you will be able to understand: Acceptable Quality Level

Session Plan	
1	What is AQL?
2	How to ensure success at AQL based inspections?
3	What is not AQL?

What is AQL?

Acceptable Quality Level is the quality level, which, for purposes of sampling inspection, is the limit of a satisfactory manufacturing process. The AQL is the maximum per cent defective that for the purpose of sampling inspection can be considered satisfactory as a process average. AQL is one of the most frequently used terms when it comes to quality in the apparel export industry. Everyone in the industry uses this term quite liberally, assuming that they know what AQL signifies. Though inspection is important and it gives us an idea about the acceptance level of a product, it may not be possible to carry out 100% inspection of all the units in a particular shipment or a lot. This is mainly due to following reasons: It is costly,100% inspection is seldom 100% accurate and dependable and It may be impractical and not desirable as it leads to excessive handling of goods which results in goods losing their freshness.

The apparel industry mainly uses single sampling plans for the acceptance decisions. However, a few buyers also use double sampling procedure. In single sample based on AQL table you randomly draw a sample consisting of specified number of garments from a lot. The sample plan also provides the number maximum allowed defective pieces. If the defective pieces are less than allowed number the lot is accepted and if the number of defective pieces is greater than allowed the lot is rejected. One may say that as the acceptance sampling is scientific, ideally speaking, it must lead to 100% reliable results. In other words, it must always lead to acceptance of lots containing lower defective level than AQL and must reject all the lots that contain more defective products than AQL. But this is not possible, as the acceptance decision is made only on the basis of small sample drawn from the lot and it carries a risk of making a wrong judgment.
The acceptance decisions based on AQL based inspections contain two kinds of risks as detailed below:
1. Producer's risk: The chance of rejecting a good lot that contains equal or less percent defective than AQL.
2. The Customer's risk: The chance of accepting a bad lot that contains more defective than the largest proportion of defects that a consumer is willing to accept a very small percentage of the time.

A.Q.L. standards when appraising a vendor's manufacturing process during shipment audits are as follows:
· 0.1 for appraising Critical Visual Defects
· 0.25 for OCR/Ticket Defects
· 4.0 or 2.5 for appraising Major Visual Defects (varies by division)
· 6.5 for appraising Minor Visual Defects
· 6.5 for appraising Major Measurement Defects

Lot Or Batch Size			Sample Size code Letter	Sample Size	Acceptable Quality Level					
					2.5		4.0		6.5	
					Ac	Re	Ac	Re	Ac	Re
2	to	8	A	2	0	1	0	1	0	1
9	to	15	B	3	0	1	0	1	0	1
16	to	25	C	5	0	1	0	1	0	1
26	to	50	D	8	0	1	1	2	1	2
51	to	90	E	13	1	2	1	2	2	3
91	to	150	F	20	1	2	2	3	3	4
151	to	280	G	32	2	3	3	4	5	6
281	to	500	H	50	3	4	5	6	7	8
501	to	1200	J	80	5	6	7	8	10	11
1201	to	3200	K	125	7	8	10	11	14	15
3201	to	10000	L	200	10	11	14	15	21	22
10001	to	35000	M	315	14	15	21	22	21	22

If a Visual Defect is found during an audit, the audit automatically fails and requires the entire lot to be inspected. All Critical Visual Defects must be removed before the lot can be submitted for a second audit.
The AQL for appraising Critical Measurement Defects is 0.1. If a critical measurement defect is found during an audit, the audit automatically fails and requires the entire lot to be inspected. All critical measurements must be removed before the lot can be submitted for a second audit.

In-Process Inspection
Purpose
The purpose of an In-Process inspection is to check the following: raw materials, marker layout, spreading, cutting, sewing,wet processing, screen printing, pressing and other embellishments. Sampling plan should not be used at this stage since a lot size is a bundle. For woven and knit production, the first In-Process inspection begins when knitting/weaving commences.
While inspecting semi-finished goods and batches during work-in-process, records need be kept on defects found for discussion and communication with the manufacturer/GIS production representatives.
The number of defects found during a cutting, measurement or visual inspection should be noted on the various In-Processes reports. It is not the purpose of the In-Process inspection to try and measure percent defective, but to identify potential problems. These In-Process reports will be the basis for data collection and evaluation.
In-Process Inspection Forms

At relevant stages of the In-Process Inspection use the following forms:
· In-Process Inspection Report
· In-Process Audit Worksheet

Trim & Sewing Inspection Procedures
The following are QA procedures when performing an In-Process inspection:
· All fabric/components/trims/labels should be checked against production approved standards, and must reflect correct country of origin and fiber/component content. Review and record all required fabric/component/product test reports.
· Verify needle control and safety procedures are being followed.
· Check to be sure that all components/trims/labels are available so production schedules can be met.

· Perform random check in sewing lines/finishing. Verify factory is checking at least six pieces of each operator's semi-finished goods to check for workmanship defects. Record finding on the appropriate

In-process inspection report

· Check color against approved standards. If standards are not available, send the merchandiser/production Representative examples of fabric colors and range of shades.
· Measure placement and size of pattern pieces against specification sheet.
· Check seam construction, thread color and size against specification sheet.
· Check that all small parts are securely attached.
· Record and indicate any problems in the space provided in the In-Process Visual Inspection Worksheet
· Discuss the problems found and recommend solutions to factory management.
· If the factory cannot correct the problem, the merchandiser/production representative should be contacted for corrective action.
· If questions regarding construction, measurements, fabric standard, color, etc. arise, the merchandiser/production representative should be contacted for answers.
· All measurement points listed in the measurement box of the specification sheet are to be measured on at least one product of each size and color during the In-Process inspection (i.e. on unwashed or rigid garment).
This is to be done using pattern yield measurements, which are to be provided by the Vendor. Any discrepancies are to be noted on the In-Process Visual Inspection Report and brought to the attention of the Vendor and merchandiser/production representative.

While sewing panels, inspection must be conducted at the intervals listed below depending on the size of a program:
a) Up to 5,000 pieces. At least one in-Process audit must be conducted when the sewing of 20% of the panels completed.
b) 5,001 to 10,000 pieces. At least two In-Process audits must be conducted when the sewing of 20% and 50% completed.
c) Above 10,000 pieces. At least three In-Process audits must be conducted when the sewing of 20%, 50%, and 80% completed.
· When products are transferred from one location to another, a visual and measurement inspection report must be performed using the same criteria as the shipment Inspection procedures. Any discrepancies are to be noted on the Visual and Measurements Inspection report and brought to the attention of the Vendor and merchandiser/production representative.

How to ensure success at AQL based inspections?
It should be ensured that the average percent defective level is below the AQL prescribed by the buyer. It means the true percent defective level of the lots submitted for AQL based inspection must be less than the AQL. For this purpose an organization has to measure its current average percent defective level (process average). This can be achieved by conducting sampling inspections of the lots before the inspection by the customer. In such case, all the pieces in a sample drawn from the lot are inspected to arrive at percent defective level of respective lots. If an organization does this for about 300 consecutive lots and calculates the average of the per cent defective of all lots inspected, it would give a good idea of the 'process average'. Assuming your process average is lower than the AQL level, and then there can a very minimal chance (generally less than 5-10%) of your shipment getting rejected. If your process average is greater than AQL level, you need to work towards, if not eliminating, reducing the generation of defect level at source so that the process average becomes lower than the AQL level. In case process coverage remains higher than the AQL level the chances of your shipments failing to pass AQL based inspection are higher depending on the process average. The best way to reduce the process average could be to analyse the kind of defects noticed in the inspection and their occurrence (frequency). A Pareto analysis as shown in graph 2 can be very useful. Once you know which are the most frequently occurring defects, it's possible to go to the source of these defects and concentrate on the elimination of these defects through cause and effect analysis and implementing remedial actions.

What is not AQL?
It is equally important to know, as indicated below, what AQL is not:
1) A permit to ship defective goods to the tune of agreed AQL level: AQL 4.0 does not mean that supplier has a right to send up to 4% defective merchandise to customer /buyer.
2) A guarantee that all shipments passed as per AQL plan will definitely contain lower percent defective than the specified AQL. There is also no guarantee that lots with higher percentage defective will not pass on AQL based inspection.
3) An indicator of the quality level achieved by a manufacturer. Let us assume that the average rate of defective garments in a manufacturer's shipment is 6%, but the AQL used by buyer for final inspection is 2.5. It is possible

that the manufacturer may resort to 100% inspection of the merchandise to weed out the defective garments so that the shipment can pass the final inspection by the buyer at AQL 2.5.

HOW TO CONTROL QUALITY

	At the end of this session you will be able to understand: Process Of Quality Control Care Labels Pilot Run

Session Plan	
1	Process Of Quality Control
2	Care Labels
3	Pilot Run

There are two separate areas of dealing with quality that a checker is involved in:

- Handling repairs
- Getting repairs corrected and work back into the production flow.
- Preventing repairs
- Working with operators to prevent repairs (correct at the source)

Process of Quality Control

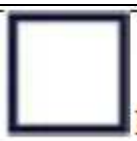
To control the quality of products of a factory, a checker should follow the following approaches:

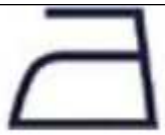
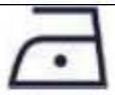
1. Have the proper approach toward operators.
   - Approach operator with defective garment.
   - Ask operator kindly to stop the work and pay attention.
   - Explain defect found and ask if she understands why garment is defective.
   - Make sure operator understands why it is defective.
   - Try to find out why the defect was created or why it was not detected at the workstation.
   - Restate the company‘s commitment to quality.
   - Ask operator to inspect the current bundle for more defective parts and then repair all parts that are out of tolerance including the one found by the inspector. This should be done immediately.

2. Train operators to sew with good quality from the beginning.
3. Know quality specifications and tolerances.
   - Be sure to understand what constitutes good and poor quality.
4. Be consistent in the decisions toward quality.
5. Comment on both good and bad quality.
6. Be sure to check each operator's work daily. The amount of defects found should govern the amount of inspections performed. Vary inspection times and inspection sequence. Check into middle of bundle. Do not always look at only the top garments.

CARE LABELS

A label attached to a garment or fabric giving the manufacturer's instructions for its care and cleaning. The various care label instructions are given below:

 Washing Instruction	 Machine Wash COLD  Machine Wash COLD Permanent Press  Machine Wash COLD Gentle Cycle  Hand Wash  Machine Wash WARM  Machine Wash WARM Permanent Press  Machine Wash WARM Gentle Cycle  Do Not Wash  Machine Wash HOT  Machine Wash HOT Permanent Press  Machine Wash HOT Gentle Cycle
 Bleaching Instructions	 Bleach as Needed  Non-chlorine Bleach as Needed  Do Not Bleach
 Drying Instructions	 Tumble Dry NO HEAT  Tumble Dry NO HEAT Permanent Press

	 Tumble Dry NO HEAT Gentle Cycle  Do Not Tumble Dry  Tumble Dry LOW HEAT  Tumble Dry LOW HEAT Permanent Press  Tumble Dry LOW HEAT Gentle Cycle  Line Dry  Tumble Dry MEDIUM  Tumble Dry MEDIUM Permanent Press  Tumble Dry MEDIUM Gentle Cycle  Drip Dry  Tumble Dry HIGH  Dry Flat
 Ironing Instructions	 Iron Steam or Dry LOW HEAT  Iron Steam or Dry MEDIUM HEAT  Iron Steam or Dry HIGH HEAT  Do Not Iron with Steam  Do Not Iron
 Drycleaning Instructions	 Drycleaning  Do Not Dryclean

PILOT RUN

Pilot Run comprises once an order is into production and no more than the first 30 pieces have come out of the line. There is no statistical quality inspection procedure applicable at this stage. This is done to identify the initial problems in the garment manufacture and solve them at initial stage.

Step Wise Procedure

Step	Task	Responsibility	Reference
I	All fabric, lining, trims and accessories must be checked for quantities to ensure production schedules are met standards against the approved sample.	Quality Checker	Sealing Sample Vendor's P.O for trims and accessories Work-In-Process Report
II	Check each sewing operation for defects (random pieces) and suggest any attachments, folders that may benefit the operation.	Quality Checker	
III	Check for proper follow up of the recommended QA process and relevant forms such as: In-Process Inspection End Line Inspection Quality Audit	Quality Checker	QA Manual
IV	Check for the inspection points within the line and suggest additions/ improvements wherever necessary.	Quality Checker	
V	Inquire for any specific problems.	Quality Checkers, Supervisor	Pilot Run Inspection Form
VI	Advise and discuss the nature and magnitude of the problems and try and correct the problem along with the Supervisor.	Quality Checkers, Supervisor	
VII	Record findings.	Quality Checkers	Pilot Run Inspection Form

QUALITY CONCEPTS AND TOOLS

At the end of this session you will be able to understand:
Cost of Quality,Quality Tools and Standards

Session Plan	
1	Cost of Quality
2	Seven Tools of Quality
3	Testing
4	Quality Standards
5	8 Principles of Quality Management

COST OF QUALITY

A garment manufacturer can stay prosperous in business as long as his product quality satisfies his customers at the price they are willing to pay. For maintaining a certain level of quality and its consistency in product, a considerable amount is spent. Moreover, this amount, i.e. the costs of quality, most of the times, companies are taking as labour cost/manufacturing costs or wherever they like to be. Cost of quality is a financial measure of the quality performance of an organisation and this helps to optimize the various costs to achieve the best quality achievable at a more reasonable price. Hence, we can illustrate the cost of quality as:

- Cost of not meeting customers requirement
- Cost of doing things wrong
- Cost of not doing thing right first time
- Cost incurred on external assurance

The cost of quality are a significant part of overall product cost, and so its identification, measurement, analysis and assessment become very important or in other terms all-out efforts should be made to control and to reduce it, which ultimately will reduce the cost of product itself. On the other hand, it is a tool for bringing continuous improvement in the organization.
Classification of Cost of Quality in Apparel Sector Prevention Costs It is amount spent to ensure that the things are right first time or in simple words costs of efforts to prevent failures. It ensures that the design is right before anything is made. It also includes the costs involved in various other activities, few of which are given as follows:

Examples of Prevention Costs:

- Preparing quality manuals, procedures, different specific plan etc.
- Reviewing the quality specification of new products
- Evaluation of subcontractors (vendors), survey etc.
- Market research and studies to identify customers‘ requirements
- Developing, conducting and maintaining training programmes
- Studying process capabilities and developing process control devices •Formal quality improvement programs
- Auditing of quality system
- Maintenance of inspection and test equipment

Appraisal Costs It is the costs associated with measuring, evaluating apparel merchandise or auditing related production factory to assure conformance to quality standards and performance requirements.

Examples of Appraisal Costs:

- Inspection and testing of quality of purchased products
- Inspection and testing of in-process products
- Inspection and testing of finished products
- Material consumed or destroyed during inspection and testing
- Evaluation of stocks for its degradation

Internal Failure Costs It is the failure costs, which arise before a garment company supplies its product to the customer i.e. prior to delivery or shipment of the merchandise. These are due to deficiencies discovered before delivery and are associated with the failure to meet the needs of customers. If internal quality failures of defective merchandise are identified before shipping then optimistically there may be no external failure costs.

Examples of Internal Failure Costs:

- Scrap, rework, repair and reprocessing
- Re-inspection and retest to verify the quality requirement after rework/reprocessing
- Failure analysis
- Losses and concessions
- Downgrading of products
- Downtime, i.e. idle facilities due to quality failures

External Failure Costs These are typically due to errors found by customers. Failure costs that arise after a garment unit supplies the product to the customer, such as cost of returned merchandise, cost of quality claims, cost of transportation for the defective merchandise, personnel costs associated with these activities. These costs can be much higher than internal failure costs, because the stakes are much higher.

Examples of External Failure Costs:

- Setting customer complaint due to poor quality
- Product rejected/returned
- Marketing errors, loss of sales and warranty claims
- Product recalls and product replacement
- Allowances i.e. cost of concessions made to customers due to poor quality.

SEVEN TOOLS OF QUALITY

The field of Total Quality Control uses a number of quantitative methods and tools to identify problems and suggest avenues for continuous improvement. It is realized that most quality related problems could be solved with seven basic quantitative tools, which then became known as the traditional "Seven Tools of Quality . These are:

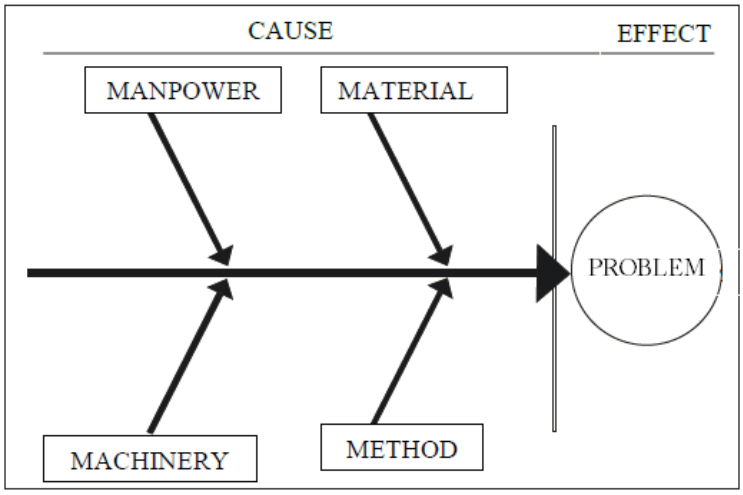
- Cause & Effect diagram
- Check sheet
- Control chart
- Flowchart
- Histogram
- Pareto chart
- Scatter diagram

These tools have been widely used in quality management organizations.

Cause & Effect Diagram

Cause & Effect Diagrams are diagrams that show the causes of a certain event. Each cause or reason for imperfection is a source of variation. Causes are usually grouped into major categories to identify these sources of variation. Area of Application:

- ••When identifying possible causes for a problem.



Check Sheet

A check sheet is a structured, prepared form for collecting and analyzing data. This generic tool can be adapted for a wide variety of purposes.

Areas of Application

••When data can be observed and collected repeatedly by the same person or at the same location.

••When collecting data on the frequency or patterns of events, problems, defects, defect location, defect causes, etc.

••When collecting data from a production process.

Reason	Polo T-Shirt Styles				
	Style 1	Style 2	Style 3	Style 4	Total
Uneven Hem	𝍸	||	|	𝍸	13
Armhole Mismatch	||	𝍸||	||	|	13
Neck Puckering	𝍸	|||	𝍸|	|||	16
Others	||	𝍸	|||	|	11
Total	14	17	12	10	53

Control Chart

The control chart is a graph used to study how a process changes over time. Data are plotted in time order.

Areas of Application

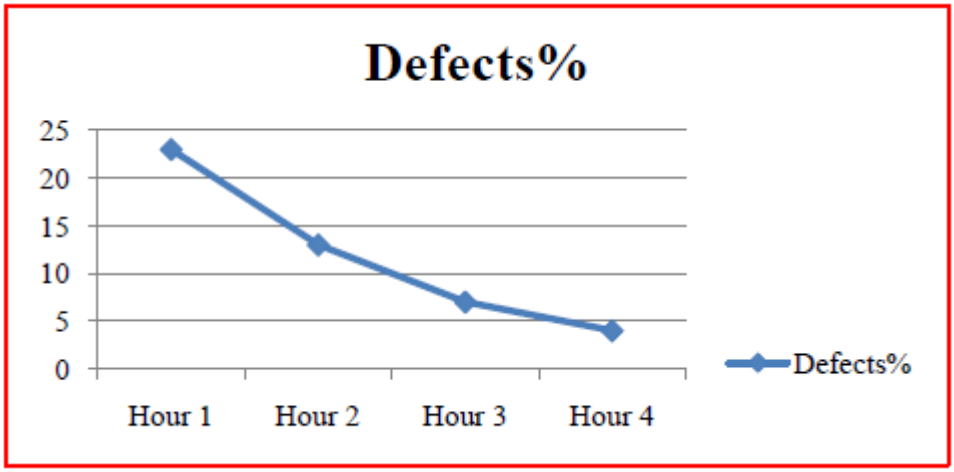
••When controlling ongoing processes by finding and correcting problems as they occur.

••When predicting the expected range of outcomes from a process.

••When determining whether a process is stable (in statistical control).

••When analyzing patterns of process variation from special causes (non-routine events) or common causes (built into the process).

••When determining whether your quality improvement project should aim to prevent specific problems or to make fundamental changes to the process.



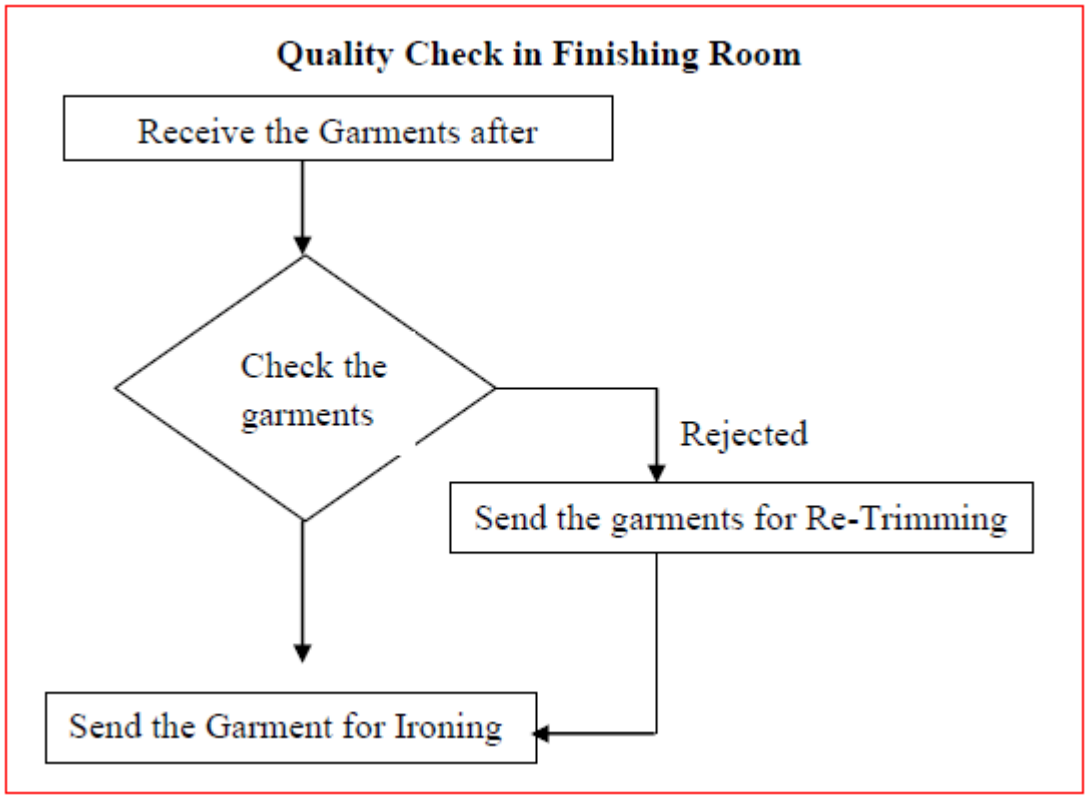
Flow Chart

A flowchart is a common type of diagram, which represents an algorithm or process showing the steps as boxes of various kinds, and their order by connecting these with arrows.

Flowcharts are used in analyzing, designing, documenting or managing a process or program in various fields.

Areas of Application

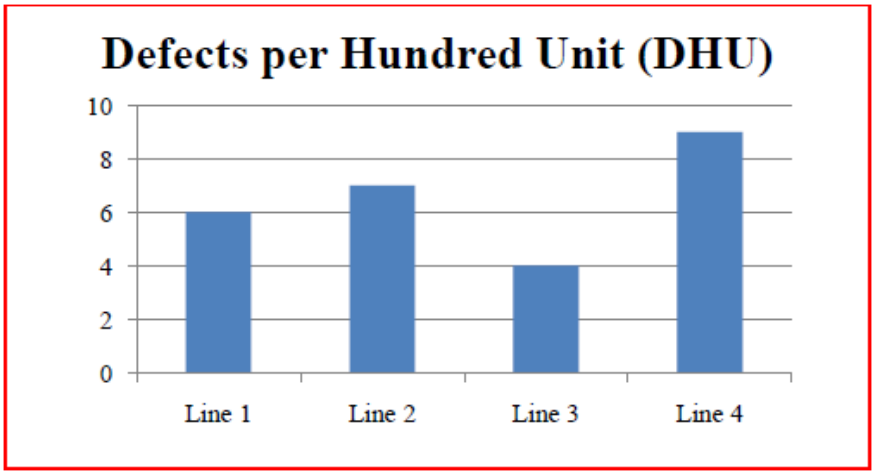
••It can be used for any process, which involves actions or decision-making.



Histogram

A frequency distribution shows how often each different value in a set of data occurs. A histogram is the most commonly used graph to show frequency distributions. **Areas of Application**

••When the data are numerical
••When analyzing whether a process can meet the customer‘s requirements
••When analyzing what the output from a supplier‘s process looks like
••When seeing whether a process change has occurred from one time period to another
••When determining whether the outputs of two or more processes are different
••When you wish to communicate the distribution of data quickly and easily to others



Pareto Chart

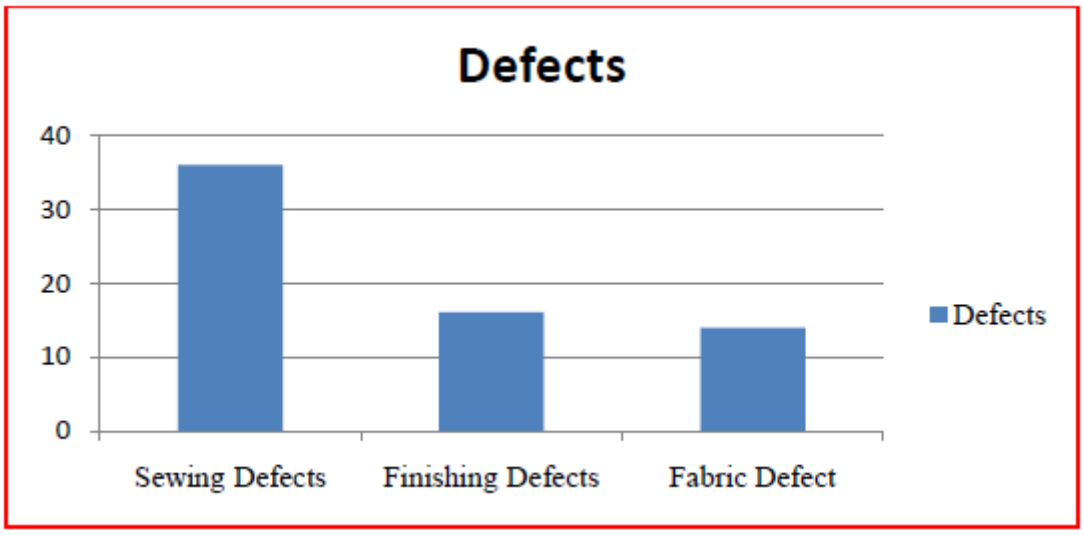
A Pareto chart is a bar graph. The lengths of the bars represent frequency or cost (time or money), and are arranged with longest bars on the left and the shortest to the right. In this way the chart visually depicts which situations are more significant. **Areas of Application**

••When analyzing data about the frequency of problems or causes in a process.

••When there are many problems or causes and you want to focus on the most significant.

••When analyzing broad causes by looking at their specific components

••When communicating with others about your data



Scatter Diagram

The data is displayed as a collection of points, each having the value of one variable determining the position on the horizontal axis and the value of the other variable determining the position on the vertical axis. A scatter plot is also called a *scatter chart*, *scatter diagram* and *scatter graph*.

Areas of Application

••When you have paired numerical data

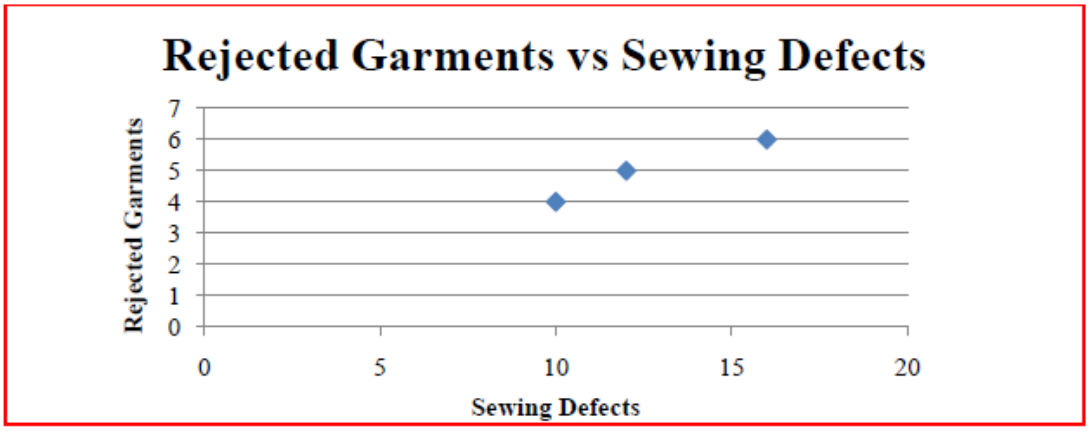
••When your dependent variable may have multiple values for each value of your independent variable

••When trying to determine whether the two variables are related, such as

When trying to identify potential root causes of problems

When determining whether two effects that appears to be related both, occur with the same cause

••When testing for autocorrelation before constructing a control chart



TESTING

Testing can be defined as a means of determining the capability of an item to meet specified requirement by subjecting the item to a set of physical, chemical, environmental or operating actions and condition
Testing is conducted so that apparel manufacturers, clothing retailers, and fashion wholesalers can evaluate the quality of the garments that they sell. This issue is important to members of the fashion industry as well as consumers of fashion. The apparel industry wants to make sure that the garments that they manufacturer and sell meet international quality standards. Testing standards are set and the testing methods are in place to monitor that the standards developed are maintained. Testing can be performed to both improve product quality and achieve compliance to international, regional, or retailer specific standards.
It is important for the fashion industry to learn about testing methods in order to stay compliant about quality. In addition to knowing about testing methods, it is important to also understand the specific testing result requirements set forth by retailers. If a clothing company does not know the retailers testing standard requirements, that company may run into problems such as receiving a charge back or returned merchandise.

Few important tests are explained below:

Garment Tests

•Colorfastness Test:

Colorfastness is the property of a dye or print that enables it to retain its depth and shade throughout the wear life of a product. In the colorfastness evaluation of fabrics or apparel, a change in original colour (shade) and/or staining or colour transfer on the standard test fabric is evaluated by visually comparing the test specimen to the AATCC Standard grey scale for the colour change and staining and chromatic transfer scale.

•Shrinkage Test

Consumers consider the dimensional change in a garment to be a critical performance characteristic. The excessive shrinkage or growth can make garment unwearable.

•Abrasion Resistance:

Abrasion or wear is wearing-away of any part of a material by rubbing against another surface. It is essential for consumer acceptance and satisfaction.

•Wear Testing:

Wear testing is performed to evaluate the interaction of wear, laundering & dry-cleaning, daily stress-strain, environmental element etc on the fabric, dye and finish of the garment. Similarly, there are Fabric & Trims Tests, which are performed to check the quality of raw material. Fabric Tests are such as Shrinkage Test, Colour-Shade Variation Test, Fibre Analysis, Colorfastness, Stretch & Recovery, Tear resistance, Tensile and Seam Strength, Seam performance, Water resistance and repellency, Bursting strength, Pilling resistance, Fabric construction, Flammability. Similarly, we have some Trims Tests such as Colorfastness Test, Zipper Performance, Button Attachment Strength etc.

QUALITY STANDARDS

A standard can be defined as:

- Something that is established by authority, custom or general consent as a model or example to be followed
- Something established for use as a rule or basis of comparison in measuring or judging capacity, quantity, content, extent, value, quality etc.
- The type, model or example commonly or generally accepted; criteria set for usage or practice
- A level of excellence, attainment etc regarded as a measure of adequacy

According to ISO, standards are documented agreements containing technical specification or other precise criteria to be used consistently as rules, guidelines or definition of characteristics, to ensure that material, products, processes and services are fit for their purpose

Benefits

- Standards facilitate communication and prevent misunderstanding.
- Standards make parts interchangeability possible as a result, mass production is possible
- Standards can be used in marketing strategy to promote purchase of products that meet nationally recognized requirement specially, when conformance is backed by certificate program
- Standard reduce cost and save money

Standardization Organizations

ASTM

ASTM International (ASTM), originally known as the American Society for Testing and Materials, is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.

AATCC

The American Association of Textile Chemists and Colorists (AATCC) is a not-for-profit association that provides test method development, quality control materials and professional networking for textile professionals throughout the world.

ANSI

The American National Standards Institute or ANSI is a private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems and personnel in the United States. The organization also coordinates U.S. Standards with international standards so that American products can be used worldwide.

BIS

Bureau of Indian Standards (BIS) is the national standards organization of India under the aegis of Ministry of Consumer Affairs, Food & Public Distribution, Govt. of India.

ISO

The International Organization for Standardization, widely known as ISO, is an international-standard-setting body composed of representatives from various national standards organizations. ISO promote worldwide proprietary industrial and commercial standards.

FIRST AID

	At the end of this session you will be able to understand: Basics of First Aid

Session Plan	
1	Undertake first aid
2	Fire-fighting
3	Emergency response training

UNDERTAKING FIRST AID

First-aid in the workplace includes the provision of first-aid facilities, services and personnel required for the initial treatment of persons suffering from injury or illness at a workplace. It is the immediate treatment or care given to a victim of an accident or sudden illness before qualified health personnel attend to provide treatment.
The aims of first aid are to:
• Preserve life;
• Prevent illness or injury from becoming worse;
• Reduce pain;
• Promote recovery; and
• Care of unconscious.

First-aid facilities includes
• first-aid box;
• first-aid room; and
• first-aid equipment, e.g. oxygen tanks and stretchers

Roles and Responsibilities of a First Aider:
Management of Casualty
In the management of an injured worker or ill worker, first-aiders should:
• give immediate first-aid treatment, keeping in mind that a casualty may have more serious injuries and illness; and
• arrange without delay for the injured worker(s) to be sent to a doctor, hospital or home, according to the seriousness of this condition.
• Apply the principle of Universal Precautions while delivering the responsibility to protect the first-aiders from acquiring blood borne pathogen e.g. Hepatitis B and HIV. This first-aider's responsibility ends when the casualties are handed over to the care of health care personnel.

Basic First Aid Procedures:

Following are some basic first aid procedures for treating shock, bleeding and wounds, burns, choking, electric shock, eye injury, fainting, heat stroke, hypothermia, and unconsciousness. These techniques can be used in the workplace or at home and being prepared will help make the most of a serious situation.

Shock

Shock can be life threatening. Symptoms include cold sweat, weakness, irregular breathing, chills, pale or bluish lips and fingernails, rapid weak pulse and nausea.

- Call emergency number or seek medical help immediately.
- Do not give the victim anything to eat or drink.
- Lay the victim on his/her back, but do not move him/her if there's a back or neck injury. If the victim is unconscious, vomiting or has severe injury to the lower face or jaw, lay him/her on his/her side and be sure the victim is getting adequate air.
- Keep the victim warm (not hot) by use of blankets or clothes.
- Raise the victim's feet and legs with a pillow. (Only do this if it does not cause the victim any pain.)

Bleeding and Wounds

- Place a clean cloth or gauze and gloved hand over the wound; apply firm, steady pressure for at least 5 minutes.
- Call emergency number or other emergency personnel if bleeding is severe.
- Elevate an injured arm or leg above the level of the victim's heart if practical.
- When bleeding stops, secure the cloth with a bandage. Do Not lift the cloth from the wound to check if bleeding has stopped. Be sure the bandage is not too tight—it may cut off circulation.
- Check the victim for shock.

Burns

1. Chemical or Compressed Gas Burns

- Use a drench hose, emergency shower or eyewash for at least 15 minutes to rinse away all traces of chemicals while removing any contaminated clothing from the victim.
- Cover the burn loosely with a clean, dry cloth or special burn dressing.
- Check the victim for shock.
- Call emergency number or seek medical attention as soon as possible.

2. Heat or Electrical Burns

- If necessary, use water to stop actual burning of skin.
- If the skin is not broken, submerse the burned area under cool running water, or gently apply a cool compress until pain is relieved. Bandage with a clean, dry cloth.
- Do not break a blister if one forms.
- Do not apply ointments or creams.

- If skin is broken, or if burns are severe:
  - Call emergency number or other emergency personnel.
  - Do not clean the wound or remove embedded clothing.
  - Cover the burn loosely with a clean, dry cloth.
  - Expect shock and treat accordingly.

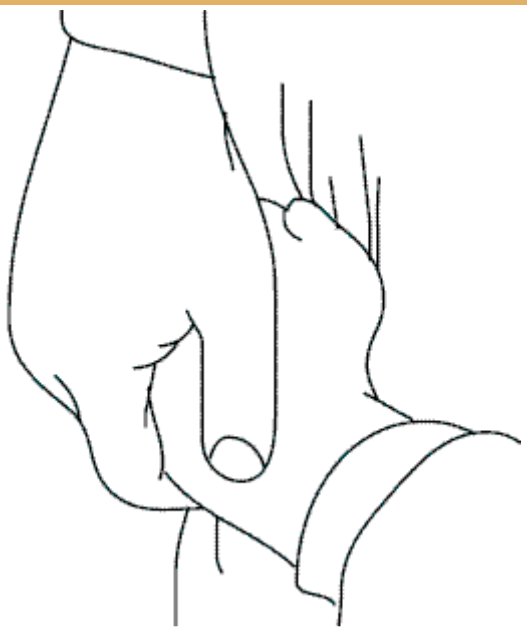
Choking

Note: These instructions are for choking victims over one year of age. There are specific guidelines for treatment of infant choking that are not outlined in this document.

If the victim can speak or cough forcibly and is getting sufficient air, do not interfere with his/her attempts to cough the obstruction from the throat. If the victim cannot speak or is not getting sufficient air, have someone call emergency number while you perform abdominal thrusts.

1. Stand directly behind the victim and wrap your arms around the stomach.

2. Make a fist with one hand and place that fist just above the navel and well below the ribs, with the thumb and forefinger side toward you.



3. Grasp this fist with the other hand and pull it quickly toward you with an inward and slightly upward thrust. Repeat if necessary.

f the victim becomes unconscious:

1. Lay the victim on their back.
2. If the object that is blocking the airway is visible, reach a finger into the victim's mouth (along the inside of the cheek) and try to sweep the obstruction out of the victim's throat, being careful not to push the object deeper into the victim’s airway.
3. Even if this is not successful, attempt rescue breathing.
4. If the victim is still not breathing or moving, begin chest compressions (CPR).

Electric Shock

1. Do not touch the victim until electrical contact is broken.
2. If possible, unplug or switch off the source of electricity.
3. If victim is not breathing and has no pulse, call emergency number or seek medical attention immediately.

Eye Injury

1. Chemical

I. Hold the eyelids apart and flush the eyeball with lukewarm water for at least 15-30 minutes. Be careful not to let runoff water flow into the other eye.

II. Place a gauze pad or cloth over both eyes and secure it with a bandage.

III. Get to an eye specialist or emergency room immediately.

2. Cut, Scratch or Embedded Object

I. Place a gauze pad or cloth over both eyes and secure it with a bandage.

II. Do not try to remove an embedded object.

III. Get to an eye specialist or emergency room immediately.

Fainting

Note: Fainting victims regain consciousness almost immediately. If this does not happen, the victim could be in serious danger and you should call emergency number as soon as possible.

1. Lay the victim down on their back and make sure they have plenty of fresh air.
2. Reassure the victim and apply a cold compress to the forehead.
3. If the victim vomits, roll the victim on his/her side and keep the windpipe clear.
4. Report the fainting incident to the victim's doctor.

Heat Stroke

Heat stroke can be life threatening. Symptoms can include a body temperature of 105°F or higher; dry, hot, flushed skin; rapid pulse; unconsciousness; and lack of perspiration.

1. Get the victim out of the heat and into a cooler place.
2. Place the victim in the shock position, lying on the back with feet up.
3. Remove or loosen the victim's clothing.
4. Cool the victim by fanning and applying cloth-wrapped cold packs or wet towels.
5. Treat for shock.

Hypothermia (Prolonged exposure to the cold)

Hypothermia can be life threatening. Symptoms include lower than normal body temperature, shivering, apathy, disorientation, drowsiness, and eventually, unconsciousness.

1. Immediately move the victim into the best available nearby shelter.
2. Get the victim out of wet clothes and replace with dry clothes, sleeping bag or blankets.
3. Have the victim drink a warm, sweet, non-alcoholic beverage if possible.
4. Seek medical help.

Unconsciousness

1. Determine responsiveness by gently tapping the victim's shoulder and asking, "Are you okay?"
2. If there is no response, shout "Help!" and look for a medical alert tag on the victim's neck or wrist.
3. If victim is not breathing and has no pulse, begin CPR.
4. Call emergency number or seek medical aid as soon as possible.

http://www.grainger.com/content/qt-safety-basic-first-aid-procedures-207

FIRE FIGHTING

Fire can be caused by any of the three elements – Fuel , Oxygen and Heat. **A fire will burn until one or more of the elements is removed.**

There are 4 classes of fire:

Class A
Ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber, and some plastics.
Class B
Flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane.
Class C
Energized electrical equipment, such as appliances, switches, panel boxes and power tools.
Class D
Certain combustible metals, such as magnesium, titanium, potassium, and sodium.

To Prevent Fires:

Class A ⇨ Ordinary Combustibles:
Keep storage and working areas free of trash.
Place oily rags in covered containers.

Class B ⇨ Flammable liquids or gases:
Don't refuel gasoline-powered equipment in a confined space, in the presence of an open flame, or while the equipment is hot.
Keep flammable liquids stored in a tightly closed container and away from spark producing sources.
Use flammable liquids only in well ventilated areas.

Class C ⇨ Electrical Equipment:
Never install a fuse rated higher than specified for the circuit.
Investigate any appliance or electrical equipment that smells strange. Unusual odors can be the first sign of a potential fire.
Utility lights should always have some type of wire guard over them.

Class D ⇨ Flammable metals:
Knowledge of the properties of the metals and using good judgment and common sense will assist you in controlling or avoiding potential fires/reactions.

Be prepared for a fire emergency

- Check the location of fire alarms and know how they work.
- Learn your building evacuation plan.
- Know where your two nearest exits are located.
  Learn how doors swing and where stairs lead.
- Make sure nothing blocks fire pulls, extinguishers and emergency exits.
- Learn the sound of your building fire alarm.
- Post emergency numbers (including security and first aid) near your telephone.
- Make sure you know what to do if the fire alarm sounds. Plan your escape.

When there is a fire:
Pull the nearest fire alarm
Stay calm
Leave at once, taking direction from the emergency warden.
Do not delay yourself by gathering personal items. Your safety always comes first.
Before you open any door, feel the door with the back of your hand. If the door is cold, slowly open it a crack.
If there is no smoke in hallways or stairwells, follow your building's evacuation plan. Get out quickly using designated fire exits.
Close doors behind you, however do NOT lock the door. Locking the door hinders the fire department's search and rescue efforts.
The stairway will be your primary escape route. **Never, never use elevators under any circumstances**.
Once in the stairway, proceed down to the first floor and out of the building. Never go up.
EVACUATE !

If someone is trapped in smoke or heat:
Before you open any door, feel the door with the back of your hand. If the door is warm to the touch, DO NOT attempt to open the door.
Stuff the cracks around doors with towels, rags, clothing or tape, and cover vents to keep out smoke.
Stay low to the floor, and if possible, cover your mouth and nose with a damp cloth or dust mask to help you breathe.

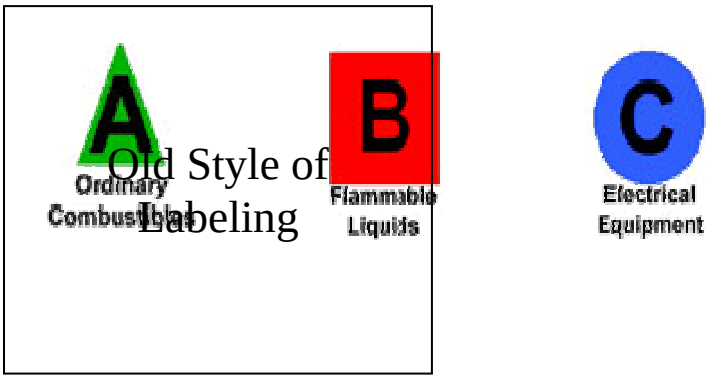
If there is a phone in the room where you are trapped, call the fire department to tell them exactly where you are located. Do this even if you see fire apparatus on the street below.
Wait at a window and signal for help. Do not panic or jump.
If possible, open the window at the topor bottom, but do not break it, you may need to close the window if smoke rushes in.
Be patient. Rescuing all the occupantsof a building can take several hours.

After a Fire Emergency :
Once you are out of the building, STAY OUT!
Do not go back inside for any reason.
Report to your warden for roll call at your designated assembly point.
Tell the fire department via your warden if you know of anyone trapped inside the building.
Only re-enter if and when the fire department tells you it is safe to do so.

Don't for Fire Fighting :
The fire is spreading beyond the immediate area in which it started, or if it is already a large fire.
The fire could block your escape route.
You are unsure of the proper operation of the extinguisher.
You doubt that the extinguisher you are holding is designed for the type of fire at hand or is large enough to fight the fire.

Multi-Class Ratings:
Many extinguishers available today can be used on different types of fires and will be labeled with more than one designator, e.g. A-B, B-C, or A-B-C. This label shows that this extinguisher
can be used on ordinary combustibles (A) or flammable liquids (B). The red slash through the last symbol tells you that the extinguisher cannot be used on electrical fires (C).

New Style of Labeling



Old Style of Labeling

Tips on How and When to Use a Fire Extinguisher
Most fires start small. Except for explosions, fires can usually be brought under control if they are attacked correctly with the right type and size of extinguisher within the first 2 minutes!
A fire extinguisher should be "listed and labeled" by an independent testing laboratory. The higher the rating number on an A or B extinguisher, the more fire it can put out. Be careful, high-rated units are often heavier models. Make sure you can hold and operate the model you are using.
The operator must know how to use the extinguisher quickly without taking time to read directions during an emergency. Remember that the extinguishers need care and must be recharged after every use.
PULL... the pin. Some extinguishers require releasing a lock latch, pressing a puncture lever or other motion.
AIM... low, pointing the extinguisher nozzle (or it's horn or hose) at the base of the fire.
SQUEEZE... the handle. This releases the extinguishing agent.
SWEEP... from side to side at the base
of the fire until it appears to be out. Watch the fire area in case fire breaks out again, and repeat use of extinguisher if necessary.
Read and follow the directions on your extinguisher. If you have the slightest doubt about whether or not to fight a fire – DON'T! Get out and close the door behind you.

Emergency Response Training

Types of emergencies:

Medical Emergency:

- Do not move victim unless absolutely necessary.
- Call the following personnel trained in CPR and First Aid to provide the required assistance prior to the arrival of the professional medical help.
- If personnel trained in First Aid are not available, as a minimum, attempt to provide the following assistance:
    - Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids).
    - Clear the air passages in case of choking.

    Attempt first aid ONLY if trained and qualified.

Fire

- Fight the fire ONLY if:
    - The Fire Department has not been notified.
    - The fire is small and is not spreading to other areas.
    - Escaping the area is possible by backing up to the nearest exit.
    - The fire extinguisher is in working condition and personnel are trained to use it.
- Upon being notified about the fire emergency, occupants must:
    - Leave the building using the designated escape routes/ nearest exit.
    - Assemble in the designated area.

GOOD HEALTH PRACTISE

	At the end of this session you will be able to understand: Ill-effects of alcohol, tobacco and drugs, physical fitness

Session Plan	
1	Ill-effects of alcohol, tobacco and drugs
2	Awareness about HIV-AIDS
3	Personal hygiene and good habits

Ill-Effects Of Alcohol, Tobacco And Drugs

Ill effects of tobacco

Tobacco is the greatest cause of preventable death globally. Tobacco use leads most commonly to diseases affecting the heart, liver and lungs. Smoking is a major risk factor for heart attacks, strokes, chronic obstructive pulmonary disease (COPD) (including emphysema and chronic bronchitis), and cancer (particularly lung cancer,cancers of the larynx and mouth, and pancreatic cancer). It also causes peripheral vascular disease and hypertension. The effects depend on the number of years that a person smokes and on how much the person smokes. Starting smoking earlier in life and smoking cigarettes higher in tar increases the risk of these diseases. Also, environmental tobacco smoke, or secondhand smoke, has been shown to cause adverse health effects in people of all ages.

Ill effects of alcohol

Brain:
Alcohol interferes with the brain's communication pathways, and can affect the way the brain looks and works. These disruptions can change mood and behaviour, and make it harder to think clearly and move with coordination.

Heart:
Drinking a lot over a long time or too much on a single occasion can damage the heart, causing problems including:

5. Cardiomyopathy – Stretching and drooping of heart muscle
6. Arrhythmias – Irregular heart beat
7. Stroke
8. High blood pressure

Liver:
Heavy drinking takes a toll on the liver, and can lead to a variety of problems and liver inflammations including:

- Steatosis, or fatty liver
- Alcoholic hepatitis
- Fibrosis
- Cirrhosis

Pancreas:
Alcohol causes the pancreas to produce toxic substances that can eventually lead to pancreatitis, a dangerous inflammation and swelling of the blood vessels in the pancreas that prevents proper digestion.
Immune System:
Drinking too much can weaken your immune system, making your body a much easier target for disease. Chronic drinkers are more liable to contract diseases like pneumonia and tuberculosis than people who do not drink too much. Drinking a lot on a single occasion slows your body's ability to ward off infections – even up to 24 hours after getting drunk.

Awareness about HIV-AIDS

Causes

The virus can be found in the blood, semen, vaginal fluid, and breast milk of infected people. HIV is also found in saliva, sweat, and tears, though not in high enough amounts to transmit the virus to another person. There are no known cases of anyone catching HIV through sneezing, shaking hands, or from toilet seats or mosquito bites.

The two most common ways to be infected with HIV are through unprotected sex and sharing needles. HIV may be transmitted through unprotected heterosexual or homosexual, vaginal, anal, or oral sex. Although the risk of infection is lower with oral sex, it is still important to use protection during oral sex.HIV can also be passed on through perinatal *infection*, where mothers who have HIV are at risk of giving the disease to the baby during birth. The risk of perinatal infection is declining with new treatments. Breast-feeding by an infected mother can also transmit HIV.

Once HIV enters the bloodstream, it takes over cells vital to the immune response, known as *CD4+ lymphocytes*. The virus then inserts its own genes into the cell, turning it into a miniature factory that produces more copies of the virus. Slowly, the amount of virus in the blood goes up and the number of healthy CD4+ cells goes down. The destruction of CD4+ cells interferes with the body's ability to fight off infections and other diseases.

Prevention

- Do not share razors
- Dispose needles after use
- Have protected sex

Personal Health & Hygiene

Hygiene

Poor hygiene can lead to poor health. If you have cut yourself, the wound should be cleaned and dressed suitably, this can help reduced the risk of infection and pain.
Conditions such as head lice, athlete's foot etc. should be treated immediately to prevent further infections and spread to others.
Hand washing cannot be emphasised enough as this simple action can prevent a plethora of illnesses and disorders developing. Many people 'forget' to wash their hands after using the toilet or before handling foods; this can cause a great deal of illness and even death.

1. **Hair**

Dirty head hair does not actually cause many health problems

Greasy hair - There's really only one solution to greasy hair and that is to wash it

Dandruff - If you suffer from dandruff, try the various shampoos available. If it's serious there are some medical treatments available that are not harmful to the skin

Head lice - Head lice are highly contagious. If left unattended, the lice grow large enough that you can actually see them moving and the white eggs are also sometimes visible Read more about head and hair hygiene here

2. **Teeth and Mouth**

Teeth - A beautiful smile can make a person's day - but if teeth are grubby or breath is smelly, it has an entirely different result. Brush your teeth twice daily with a decent.

Smelly breath - Sometimes, despite good brushing a tooth will succumb to decay - if left untreated this can spread and infect your gums. Bad breath can be the sign of a gum infection. Make sure you visit your dentist regularly to keep a check on it.

3. **Areas Prone to Odour and Fungal Infection**

Unpleasant smells and fungal infections are most commonly experienced in areas of the body that are warm and not often exposed to fresh air: the feet; the genitals and some of our sweat glands.

Smelly Feet - The feet contain lots of sweat glands. If feet are confined in socks and shoes the sweat has nowhere to 'evaporate' and the skin bacteria will in effect attack to, causing that pungent' cheesy' aroma.

Here are some measures you can take to minimise smelly feet:

- Wash regularly and dry thoroughly with a soft towel and an anti-bacterial foot powder or a baby talc
- Allow feet to air when feasible and wear open shoes as much as possible
- Change socks more than once a day if needed and make sure they are cotton or other breathable fabric

SAFETY

	At the end of this session you will be able to understand: Safety at Workplace and Ergonomics

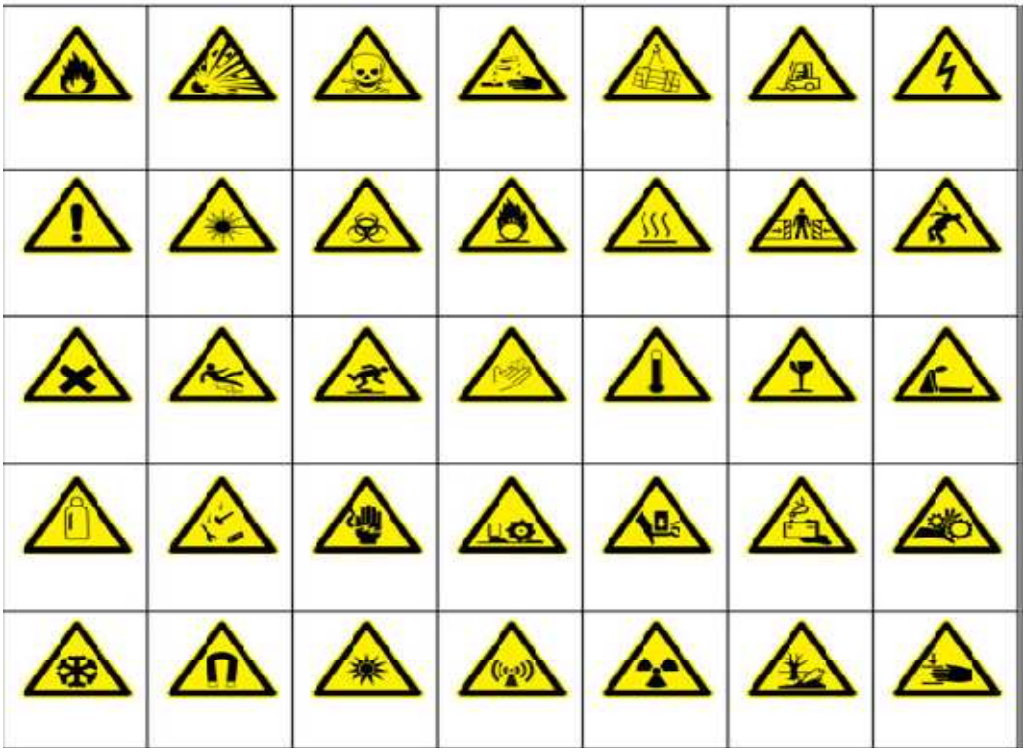
Session Plan	
1	Workplace Safety
2	Hazards

Workplace Safety &Hazards

Hazards

A hazard is a situation that poses a level of threat to life, health, property, or environment. Most hazards are dormant or potential, with only a theoretical risk of harm; however, once a hazard becomes “active”, it can create an emergency situation. A hazardous situation that has come to pass is called an incident. Hazard and possibility interact together to create risk.

Hazards & Safety Signs



Chemical Hazards

Chemical hazards are substances which, because of its characteristics and effects, may cause harm to human health and safety. Chemical hazards can be broken down to include exposure to; vapours, gasses, mists, dusts, fumes and smoke. Examples of chemical hazards include exposure to:

Chemical reactions

Chemical incompatibility

Chemical storage

Flammable Substances

Combustible substances

Corrosive substances

Pressurized containers

Physical hazards

Physical hazards cause injury to workers when an object, piece of equipment or material comes in contact with a worker. Physical hazards are often associated with an uncontrolled source of energy; kinetic, electrical, pneumatic, hydraulic, etc. Examples of situation associated with physical hazards are:

Exposure to unguarded or unprotected electrical equipment

Working with high voltage equipment

Incorrect wiring

Loose surface conditions

Wet surface conditions

Objects on the floor

Poor design or lay-out of work area

Vibration

Poor lighting conditions

Temperature extremes

Sharp edges

Safety Precautions

Personal Protective Equipment's (PPE):

Personal protective equipments refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter. Protective equipment may be worn for job-related occupational safety and health purposes.




Safety rules

- Keep your hair tied for safety
- Avoid loose clothing that could get caught up in machinery
- Footwear must always be worn in the training room/factory.
- Don’t touch the v-belt for machine
- In case of needle gets pierced in hand, rush to first-aid box, apply bandage and please refer the doctor
- Beware of electric shocks.

ERGONOMICS

	At the end of this session you will be able to understand: Ergonomics

Session Plan	
1	Ergonomics

Ergonomics

The place you will work in and the way you should work

• Inspection of garments is a standing operation. Inspection tables are generally designed to comfort as per the average height of the person.

• Workplace should fit workers' shapes and sizes and provide support where possible.

• The task of inspection is a precision work and needs concentration.

• Precision work like inspection needs a table, which is at least - 5 cm above elbow height and elbow support is needed.

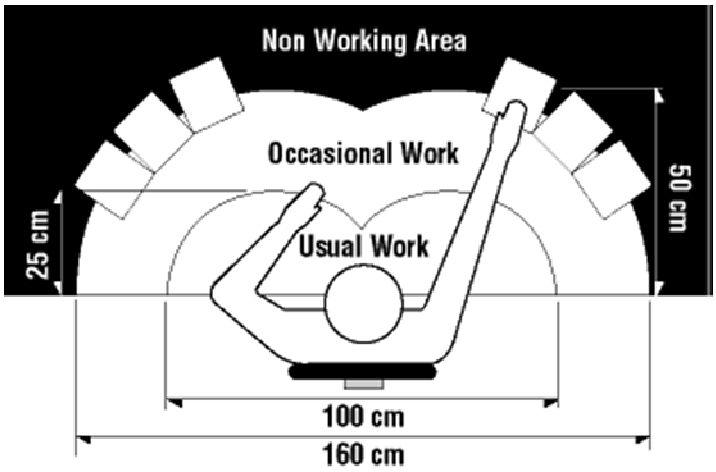
What can we do to reduce the discomfort of working in a standing position?

• Adjust the height of the work according to body, using elbow height as a guide.
• Organize the work so that the usual operations are within easy reach.
• Keep body close to the work.
• Change working position and seat in between.

In simple terms, take rest in between work to increase efficiency and reduce fatigue.

What should the quality checkers avoid?

- Avoid reaching behind the shoulder line.
- Shift your feet to face the object.
- Avoid overreaching.
- Avoid reaching above shoulder.



Some do's and don'ts regarding footwear

- The checkers‘ feet should be comfortable.
- Therefore, checkers should wear shoes that are well fitting and that do not stress the feet.

WORK AREA MAINTENANCE

At the end of this session you will be able to understand:
Minimize waste
Keep work area organized and clean

Session Plan	
1	5 S-Sort, Straightening,Shining,Standardize,Sustain
2	Basic Maintenance

5 S-Sort, Straightening,Shining,Standardize,Sustain

5S is the name of a workplace organization method that uses a list of five Japanese words: seiri, seiton, seiso, seiketsu, and shitsuke. Transliterated or translated into English, they all start with the letter "S". The list describes how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. There are five primary 5S phases:

1.Sorting (Seiri)

Eliminate all unnecessary tools, parts. Go through all tools, materials, and so forth in the plant and work area. Keep only essential items and eliminate what is not required, prioritizing things per requirements and keeping them in easily-accessible places. Everything else is stored or discarded.

This will teach to sort out the garment according to size to designated box or baskets and also to put equipment in right places.

2.**Straightening or Setting in Order to Flow or Streamlining (Seiton)**

Arrange the work, workers, equipment, parts, and instructions in such a way that the work flows free of waste through the value added tasks with a division of labour necessary to meet demand. This is by far the most misunderstood and incorrectly applied S and has been responsible for many lean transformations failing to produce the benefits expected. When applied correctly with flow established this step eliminates the majority of the non-value-added time and allows the rest of the zero defect philosophy to be enabled. Put simply, until you have an orderly flow, you cannot have an orderly flow of problems to solve and the notion of zero defects is impossible.

3.**Shining (Seiso)**

Clean the workspace and all equipment, and keep it clean, tidy and organized. At the end of each shift, clean the work area and be sure everything is restored to its place. This step ensures that the workstation is ready for the next user and that order is sustained.

4.**Standardize (Seiketsu)**

Ensure uniform procedures and setups throughout the operation to promote interchangeability.

5.**Sustain (Shitsuke)**

Make it a way of life. This means commitment. Ensure disciplined adherence to rules and procedures of 5 S to prevent backsliding.

Basic Maintenance

Basic maintainence should be known by the workforce in garment industry.
The In-Line checker can help out the operator for maintenance of the machine by letting him know which defect is occuring for machine maintenance fault and how it should be rectified.

Basic Peventive maintenace
The machines should be cleaned at regular interval.
The Machine Oil should be checked and changed after regular interval.
Should check for if any machine pat specially the small parts are missing.

SOFT SKILLS

	At the end of this session you will be able to understand: Work effectively within a team., Manage job related stress effectively ,Understand the importance of punctuality

Session Plan	
1	Team Work
2	Stress Management
3	Punctuality

Team Work

Teamwork is like many things in life. It will grow naturally if the conditions are there. At the heart of effective teamwork in the workplace is the sense of camaraderie and valuing of each other, which means when people come together they deliver more than they would separately, and they are empowered to do it!

Effective teamwork in the workplace happens when three things are in place:

1. Individuals flourish as they use their Strengths
2. People come together building relationships that often become friendships resulting in effective Teamwork
3. Together everyone achieves more as performance flows and Results are achieved

Teamwork in the workplace involves cooperation among workers. This cooperation is usually for the sake of a common goal that the entire team is working toward -- such as a sales quota or some other measurable outcome. In some cases, however, the common goal may be something more nebulous, such as the well-being of the company. Teamwork requires that all workers contribute their fair share to the workload so that the company can accomplish its goals in a timely and satisfactory manner.

Element of Team Work

Collaboration

Collaboration is an important element to any team. According to Penn State University, teamwork allows projects to get done that one person alone is not able to complete. Members of the team bring in their own experiences and level of expertise to a project to help create an effective finished product. To collaborate effectively the team must be able to communicate and share ideas, and there also needs to be a feeling of respect in place for each team member's contribution.

Conflict Resolution

After a team has started working together there can be conflict, according to the online Reference for Business.

Some people feel their ideas are not being heard, and others feel that their ideas should always be part of the team's solution. There could also be a struggle for leadership of the group that can threaten to diminish the group's effectiveness. The element of conflict resolution within a team means leaving room for everyone's contributions, developing the ability to listen to all ideas and creating a method of consensus that is used to develop a solution the team can agree on.

Related Reading: How to Make the Workplace Environment Become Less Stressful & Increase Feelings of Teamwork

Roles and Responsibilities

A team is only effective when the members understand their roles and responsibilities within the group, and endeavour to execute them effectively. According to the Missouri Small Business and Technology Development Centres, a task given to a group is completed more effectively when the responsibilities are distributed fairly among the group members. Each member is assigned a part of the task based on his role within the group and his level of expertise.

Differing Points of View

One of the strengths of teamwork within an organization is the ability to bring together differing points of view to create a solution to an issue. According to Penn State University, an effective team creates solutions that are manufactured from the many different perspectives of the individual group members. This helps to see a situation from several different angles, and can create a solution that no one individual could create on his own.

Stress Reduction

Basic techniques to analyse stress
1) Get the facts.
2)After analysing the facts come to a decision.
3)Once a decision is reached, act on it.

How to fight stress?

5) Be busy to keep stress out of your mind.
6) Do not fuss about trifles.
7) Co-operate with the inevitable
8) Do not think about the past and concentrate on the present.

Cultivating a mental attitude to stay happy

8) Fill your mind with thoughts of peace,courage and health.
9) Never try to get even with your enemies.
10) Do not worry about ingratitude.
11) Believe in the joy of giving.
12) Count your blessings and not your troubles.
13) Be yourself
14) Try to make the best of everything you get.

How to keep from worrying about criticism

4) Unjust criticism is disguised compliment.
5) Do your best
6) Criticise yourself and do not repeat mistakes.

Ways to prevent fatigue

7) Rest before you get tired.
8) Relax at work.
9) Keep your desk clear.
10) Do things in the order of importance.
11) Be organized and reduce rework.
12) Have enough amount of sleep daily.

Punctuality

Importance of punctuality

1. **Respect**: Punctuality speaks of a person's respect of others. In giving respect to others we can earn in turn.

2. **Credibility**: An employee who is punctual is considered as credible in the eyes of his/her employer.

3. **Organised**: A punctual person usually organises his/her work well, thinks ahead of time, prioritizes the given tasks and is overall successful.

4. **Networking**: Much of the networking in a company happens just before a meeting when the board members are waiting for everybody to gather. Being early can give you a chance to talk to the company leaders and create a network of alliances for you.

5. **Ready**: Being a couple of minutes early to a meeting or work, gives you time to relax, collect your thoughts and prioritise your day's activities. This will help you sail through the day with no major glitches.

6. Productivity: An employee who isn't stressed about reaching late or has come in early enough to give him minutes to settle in before the day's work begins, has got better chances to get more accomplished than a late comer who feels more pressurized.

7. Promotion: All of the above points help an employee become a strong contender for a promotion (of course, given the fact that he/she is good at the job).

Cleaning and Waste Disposal

Garment waste cleaning is needed to done to have to keep the workplace neat and clean , environmental friendly and also for peace of mind.
Systematic Cleaning or the need to keep the workplace clean is very necessary for each organization. At the end of each shift, the work area is cleaned up and everything is restored to its place. This makes it easy to know what goes where and have confidence that everything is where it should be. The key point is that maintaining cleanliness should be part of the daily work - not an occasional activity initiated when things get too messy. Remember the Responsibility of cleanliness of a factory is not of one individual or team but of every employee. Keep the following thing in your mind:

- Keep Lights Clean
- No Garment on the Floor
- No Stickers on the Table & Floor
- Keep your Workspace Clean

Online and Offline implementation of training module

The entire course of both module – Garment In-Line Checker and Sewing Machine operator has been updated to IL&FS and NSDC Joint site. This implementation would give access to the all the training center, trainer and trainee all over India.

This is a proposed medium of training- Using tablets rather than using printed books and using Projector for Multimedia content.

Limitation to the Project:

Due to time constraint the implementation of the project wasn't possible.
Audio Video content of only Sewing machine operator has been made and Garment In-Line checker is pending.
The course Garment In-Line checker has not been run by IL&FS for last 2 years because of less demand, so feedback about previous version of these course wasn't available.

Future scope:

As the AV making takes up a lot of cost, due to outsourcing the shooting. We propose that these videos could be made in collaboration with institutions, which will reduce cost and also improve quality. This will also validate the content of the video.

Conclusion

Both the training modules have been completed according to the NSDC QP NOS guidelines.
The Online and Offline version have been proposed as the new model of training.
The new updated training module is less trainer dependent as complete details of every session has been updated. So in case of change of trainer the trainee will not face any change in the direction of course.
As the training module will be available in regional languages, a well-educated trainer will not be a requirement. A trainer with good technical knowledge can teach the trainee.
Standardized methods of training:
As both coursed are matched with all the standard criteria fixed by NSDC keeping in mind the different regional requirement in these two Job role no alteration to the course will be required. This will provide a uniformity of training and all the essential parts will be taught.

Benefits of online and offline implementation

- Standards compliant
- No books inventory (environment friendly)
- Greater shelf life
- Cost benefit
- Content can upgrade quickly
- Reutilizing same devices
- Certification (Recording results+Auditable)
- Attendance proofing

Cost Benefit Analysis

Factors to be considered in classroom training (2 courses, 5 rounds)
Infrastructure cost
1 machine- 10,000 approx
25 machines- 2,50,000

Running costs – 500 per day approx
30 days- 15000
2 courses 5 rounds-150000

Printing costs- 300
25 sets- 7500
2 courses 5 rounds- 75000

Trainer cost – 350/day
30 days- 10500
2 courses 5 rounds- 105000

Therefore total cost- 5,80,000 approx

Factors to be considered in online training (2 courses, 5 rounds)
Infrastructure cost- 2,50,000

Running cost (25 days)- 1,25,000

Tablet cost- 2000
25 tablets- 50000

Trainer cost (25 days)- 87500

Therefore total cost- 5, 12,500 approx

This shows that the cost reduces almost by 10% for just 5 rounds of training. When continued for more rounds because of the one time investment and auto- updates the cost will decrease drastically.

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Annexures