

Garment Production

Level-II

Based on March 2022, Curriculum Version I



Module Title: - Produce cut panels with Delicate Fabrics

Module code: IND GAP2 M04 0322

Nominal duration: 50Hour

Prepared by: Ministry of Labour and Skill

AUGUST, 2022

Addis Ababa, Ethiopia

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Acknowledgment

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

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Acronym

TVET-----Technical Vocational and Education Training

TTLM-----Teaching, Training and Learning Materials

OHS-----Occupational Health and Safety

SOP-----Standard Operating Procedure

RPM-----Revolution Per Minute

CAD-----Computer Aided Design

QC-----Quality Control

PP-----Pre Production

BOM-----Bill Of Material

WIP-----Work In Process

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Introduction to the Module

In garment production field, **Produce cut panels with Delicate Fabrics module helps** to mark, lay-up and cut delicate fabrics and lays as part of the garment production process. It can be applied to situations where multiple garments and layers of fabric are to be laid up and cut according to a marker, and may include two way markers and step layers.

This module is designed to meet the industry requirement under the Garment Production occupational standard, particularly for the unit of competency: **Produce cut panels with Delicate Fabrics** .

This module covers the units :

- workstation
- Draft lay marker
- Lay-up fabric and Positioning marker
- Cut work
- Complete work

Learning Objective of the Module

- Prepare workstation
- Apply lay marker
- Perform Lay-up fabric and Positioning marker
- Apply Cut work
- Check Complete work

Module Instruction

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

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

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Unit one: workstation

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

- ◆ OHS practices
- ◆ set up and check Equipment
- ◆ Routene maintenance of equipment
- ◆ Set up cutting table and seating

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- ◆ Set up work area according to OHS practices
- ◆ Check and set up equipment
- ◆ take routen equipment maintenance
- ◆ Set up cutting table and seating accordingto lay length

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1.1.Occupational Health and Safety (OHS) practices

What is OHS

Occupational Health and Safety, is a multidisciplinary practice dealing with all aspects of health and safety in the workplace, with a strong focus on preventing workplace hazards. It is one of the most important aspects of human concern. It aims an adaptation of working environment to workers for the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupations.

1.1.1.manual handling techniques

Manual handling techniques: it includes all the techniques to be applied for proper manual handling of materials used in fabric spreading and cutting. i.e. Cutting tools, fabrics, interlinings etc.

1.1.2.standard operating procedures

Standard Operating Procedure (SOP) is a procedure specific to your operation that describes the activities necessary to complete tasks in accordance with industry regulations.

A standard operating procedure is a set of step-by-step instructions compiled by an organization to help workers carry out routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations.

1.1.3.personal protective equipment

proper use of equipments that are used to protect the person who is working in spreading or cutting operations. E.g. Metal gloves in cutting, mask



Fig1.1. personal protective equipment

1.1.4.safe materials handling

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Safe materials handling and safe storage of equipment: it includes safe handling of materials used in fabric spearing, marking and cutting. i.e. scissor, fabrics and other materials used in cutting and also proper storage of all tools and equipments used in marking and cutting.

Material Handling Safety Procedures

- Maintain the correct posture: avoid bending over and keep lifts close to the body.
- Lift in a careful, deliberate manner and avoid any sudden lift movements.
- Never lift materials from a sitting position, or twist to pick up a heavy object.



Fig1.2.material handling

1.1.5.taking of rest breaks

Taking of rest breaks: in order to be effective in work for better quality and output taking sufficient rest breaks is very essential.

Rest breaks allow employees to tend to their personal needs and recover from the physical and mental demands of their work tasks.

1.1.6.ergonomic arrangement of workplaces

Ergonomics is defined as the study of work and is based on the principle that the job should be adapted to fit the person, rather than forcing the person to fit the job. Ergonomics focuses

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on the work environment, such as its design and function, and items such as design and function of workstations, controls, displays, safety devices, tools, and lighting to fit the employees' physical requirements and to ensure their health and well being. Ergonomics includes restructuring or changing workplace conditions to make the job easier and reducing stressors that cause cumulative trauma disorders and repetitive motion injuries. In the area of materials handling and storing, ergonomic principles may require controls such as reducing the size or weight of the objects lifted, installing a mechanical lifting aid, or changing the height of a pallet or shelf. Although no approach has been found for totally eliminating back injuries resulting from lifting materials, a substantial number of lifting injuries can be prevented by implementing an effective ergonomics program and by training employees in appropriate lifting

1.1.7.following marked walkways

Floor *marking* is used to identify *walkways*, aisles or other spaces in a facility. Using the right floor tape can enhance safety and improve organizational ...

Mark the floor around door swing area to prevent accidents, and connect it to the aisle *marking* to continue the pedestrian *walkway*. More information.

1.1.8.safe storage of equipment

Working on the principle of “a place for everything, and everything in its place”, you can adapt this idea to suit the equipment you already have or can easily obtain

1.1.8.Housekeeping

Housekeeping: it has an impact in initiating the workers toward their work and also helps producing quality outputs.

Housekeeping is includes keeping work areas neat and orderly, maintaining halls and floors free of slip and trip hazards, and removing of waste materials (e.g., paper, cardboard) and other fire hazards from work areas.

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1.1.9.reporting accidents and incidents

Reporting accidents and incidents: when accidents or incidents are happened in the workplace informing/reporting to the concerned body will help to find immediate solution & to control the problem on its earliest stage.

1.1.10.environmental practices

Environmental safety is the practice of policies and procedures that ensure that a surrounding environment, including work areas, laboratories or facilities, is free of dangers that could cause harm to a person working in those areas. A safe place to work is the key element of environmental safety.

1.2. Equipment

1.2.1.Lay-up equipment:

➤ Weights

Pattern weights can be whatever you like. Rocks, metal rings or little bean bags, it doesn't matter. They just have to be heavy enough to hold the pattern pieces steady while you cut them out. This is not an idea that I have dreamt up myself.

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Fig1.3.weight

➤ **Clamps**



Fig1.4.clamp

➤ **spreading table**

Spreading tables are used to assist in the unwinding of large rolls of fabric. When using industrial machines and tools to produce garments, the fabric is often ordered in giant rolls and a spreading table is often used in order to evenly roll out and spread the fabric so that it can be cut for each garment piece.

Spreading typically requires a spreading table because it's a flat, smooth surface that is perfect for the job. The spreading table is often a couple of inches wider than the fabric itself and it often has rails on top of the spreading table to guide the spreader as it moves across the table. There are also different kinds of spreading table that are used for certain types of fabric. For instance, some spreading tables utilize a row of pins that can help ensure the fabric is in a stable and accurate position.



Fig1.5- Spreading and cutting table

1.2.2.Cutting equipments

Fabric cutting is the most important step in garment manufacturing. This term, fabric cutting is only applicable for garments manufacturing technology. Garment quality depends on accurate fabric cutting. Besides, fabric wastage also depends on accurate fabric cutting. For fabric cutting process, various types of fabric cutting machines are used.

Fabric cutting machines are classified mainly in two classes. The names of the machines of both classes are listed below:

A. Manual method or manual fabric cutting machines:

Hand operated scissor

Round knife

Straight knife

Band knife

Die cutting

Notcher

Drill

1. Hand operated scissor:

This is the first of all and the most ancient method of cutting of fabric. Scissors are generally used for cutting of one or two plies of fabrics. After good practice fabric can be cut perfectly

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and accurately. There are separate scissors for handling the scissors with right hands or with left hands. It is possible to cut almost all types of fabrics with scissors. It takes much time to cut fabrics with scissors and the fabric cutting cost for each garment comes higher. For this reason, the use of scissors is very much limited in the garments industry. But in tailoring shops or in houses only the scissors are used mostly for cutting of fabrics.



Fig1.6iscissor

2. Round Knife Cutting Machine:

It is a knife like a round circle. The end of this knife is very sharp and it is operated at very high speed with the help of motor and electrical power. The round knife is operated at a speed of 1000 to 3500 RPM. The diameter of the blade may be from 6cm to 30cm.

Round knife is used to cut and separate the bigger parts of the garments and for cutting and separate the blocks of the fabrics from the fabric lay of comparatively low height.

main parts of this machine are

- A.An electric motor
- B.A handle for the cutter to direct the blade
- C.Round blade
- D.A base plate: usually on rollers for ease of movement,
- E.blade guard
- F.A sharpening/ grinding stone

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Fig1.7-round knife cutting machine

3. Straight Knife Cutting Machine:

Among all fabric cutting machines, straight knife is widely used knife in the garments industry is meant to be the straight knife. The main parts of this machine are a base plate at the bottom of which there are small wheels attached, with the help of which this machine can be moved on the cutting table easily. With the help of stand on the base plate an electric motor is set on the stand. There is handle with the motor with the help of which the machine can be operated in various directions. The straight knife is set inside the stand or the upright. There is a knife guard in the front of the knife. There is a grinding wheel at the side of the straight knife with the help of which time to time the knife is sharpen during the cutting of the fabric.

The height of the blade is generally from 10cm to 33cm. The greater the speed the blade, the greater the amount the fabric cutting will be done.

Features of Straight Knife Cutting M/C:

Here, the knife is driven by using electric power.

Straight edge is mostly used in the straight knife.

During cutting, the grinding wheel helps to sharpen the cutting knife. This type of knife can cut heavy fabric i.e. canvas and **denim fabric**.

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Figure 8: Straight knife cutting machine



Fig1.8-straight knife cutting machine

4. Band Knife Cutting Machine:

This machine resembles much with the wood cutting machine but it is smaller in size. The endless loop shaped with thin steel blade is set with the help of a few pulley. Then the endless knife is operated with the help of a motor. Through the specific slot on the cutting table of the band knife the cutting blade continuous to round at the specific speed and at the same direction. The cutter man places the block of the fabric lay along the blades and cuts the parts of the garments through moving. The blade of the band knife cut the fabric lay at 90 degree angle. For the cutting small parts accurately, this machine is used in many garments factories. The templates are used often for cutting accurately.

Features of Band Knife Cutting M/C:

This type of knife consists of a series of three or more pulleys that are powered by an electric motor.

The band knife blade is normally narrower than the straight knife.

Here, the cutting knife is endless in shape and also flexible.

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Fig1.9-band knife cutting machine

Advantages:

- Fabrics are cut more accurately and perfectly.
- Suitable for cutting the small parts of garments accurately.
- It is easy to cut the fabrics in any angles or in angular shapes.
- Due to the facility of using template, accurate and consistent cuttings are much easier.
- Less risky of accident than straight knife or round knife.

Disadvantages:

- As fabric blocks are required, the fabric wastage is higher.
- As the machine remains static and the cutting job is through moving the fabric block, the work load is higher.
- This method is not suitable for cutting comparatively the bigger parts of the garments.

5.Die Cutting Machine:

Die cutting machines are mainly of two types. Such as: clickers and presses. The main parts in all types of die cutting machines are: cutting blade, ram head, die, motor, the method of ram operation and the controlling system and ram’s height. The method of ram operation is the main difference between the die cutting machines.

The die is made with metal strip as per the shape around the pattern. Steel strip or forged die is used as the metal strip. One end of this strip is sharpen and a tie bar is set on the other end. Placing the die on the block of fabric lay, pressure is exerted with the help of ram head. As a result, the sharp end of the bar goes inside the fabric lay cutting the fabric. This way, as per

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the shape of the die, the pattern of exact dimension is cut from the fabric lay. For very accurate and perfect cutting of small parts, die cutting is a very good and widely used method. For obtaining good cutting in die cutting method, the die needs to be accurate, the cutting blade is to be accurate, the ram surface, cutting blade, fabric lay and die are to be controlled in parallel conditions and pressure has to be exerted as per the needs. If the pressure is high the die blade may be damaged on the contrary cutting may not be properly done, if the pressure is low.

During setting of die on the fabric lay, a gap of 2 to 4 mm is kept from one die to the other, otherwise cutting problem may happen. Die cutting comparatively takes lesser time but it takes time to make the die. The picture of a die cutting machine is shown in figure-5.

Features of Die Cutting M/C:

Pressers and clickers are mainly two types of die cuttings are available.

To cut sharp and small parts it is mostly used in the apparel industry.

Important parts of these fabric cutting machines are blade, motor, ram head, etc.

Die is made by metallic strip.

Advantages:

Very much suitable for accurately cutting the small parts of a garments.

Suitable for cutting in any shape or in any angle.

Can be cut comparatively in a lesser time.

This method is the best for the knitted fabrics.

Disadvantages:

As blocks of fabric lay is required, there happens much fabric wastage.

Labor cost is high.

Frequent changing of styles is inconvenient because for making new die both time and money are required in bigger amount.

Inconvenient to cut the big parts of the garments.

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Fig1.10-die cutting machine

6.Notcher Cutting Machine:

This is a special type of cutting machine and its use remains limited within a specific field. It requires to cut notches in the edges of some parts of garments. As a result, during **sewing** it becomes easier to join the parts matching with the certain places. This job for making notches can be done by ordinary straight knife or by the other cutting machines, but consistent notching depends on the skill of the cutter man. Notcher machine has been invented only for making notches and a special guide helps making consistent notchings. Notches can be made in “U” shaper or in “V” shape.

There are systems for applying heat in some notcher machines. During making notches, cutting knife is heated. As a result, the tendency of fraying of threads along the cut notches are prevented. But it may be inconvenient to use heated notcher in the cutting of those fabrics whose naps are fused in heat. Notcher machine can be used only for making the notches but it cannot be used for any other purposes.

Features of Notcher Cutting M/C:

It is a special type of cutting machine.

It is used in special cases.

The notch can be made in V-shape or U-shape.

It is used to cut a notch in the edge of some important components.

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Fig1.11-notcher cutting machine

7. Drill Cutting Machine:

Sometimes it is required to mark on some places in various parts of garments, specially for the reason of placing the pockets, making the darts etc. Drill machine is used to mark except the edges of the garments this means for marking in the inside places. There are a motor, a base plate, drill and spirit level in this machine. With the help of spirit level, the movement of the drill in the fabric lay is ensured at 90 degree angle. The hole made with drill in tightly woven fabric lasts long but the drill made in loosely woven fabric may not last long. Sometimes heated drill is used, which helps the holes to remain stable. With the use of hypodermic drill, light colors are thrown along the holes resulting in more easier to finding out the holes. Threads may also be inserted through the holes so that the holes are not closed. In whatever ways the holes are made with drills, it has to be ensured that the holes will not be visible after making of the garments. **Features of Drill Cutting M/C:**

The main components of these fabric cutting machines are motor, base plate, drill, and spirit level.

In a hypodermic drill, some color is sprayed along with the hole. So that it can easy to find the market place.

In the case of tightly **woven fabric**, the drill is permanent for a long to make the hole.

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Fig1.12: Drill cutting machine

B. Computerized method or computer controlled fabric cutting machines:

Computer Controlled Knife Cutting Machine:

- water jet
- Laser cutting
- Plasma torch cutting

Computer controlled cutting machine has brought revolutionary changes in fabric cutting machines. With the help of computer, fabric lay also can be cut guiding the cutting knife in the pre-set path or by guiding along the line. In this method fabric is cut very accurately and very quickly.

The surface of a cutting table is different from that of a general table. The table surface is covered by the bed of a nylon filament, on which fabric lay is placed. The bed of nylon filament is capable of bearing the weight of the fabric lay and it helps to get the cutting knife into it and its movement in various directions. As a result, it ensures cutting of every ply of fabric in the fabric lay by the knife. In addition to that, it helps to holding the lay tightly with the cutting table by making vacuum by sucking the air through the filament.

Along the width on the cutting table, there is a beam which runs along the length of the table. The cutting head is set on the beam, which runs along the length of the beam. The cutting head can move to any point or to any direction in the lay with the help of three servomotor. There is a cutting knife in the cutting head and there is arrangement for sharpening the cutting knife automatically and there is arrangement for rotating the knife at any directions along its

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center point. A polythene sheet is spread on the fabric lay which helps in making vacuum. The cutting knife is operated by necessary signals from the computer cabinet attached by the side of the cutting table.

Receiving the instruction through computer, the cutting knife starts cutting from a reference point in the marker. Notches in the specific place of the parts of the garments are also made by the same cutting knife, but for making drills, there is separate drill in the cutting head, which makes drill marking in specific places of specific parts. The speed of fabric cutting depends on the height of the fabric lay. For example, the per minute speed of the cutting knife for a fabric lay of 7.5 cm high is 7.5 meter.

Marker is not required for computer controlled cutting. Because, the cutting knife cuts the fabric as per the instructions of the computer memory. But sometimes markers are placed on the fabric lay for easy identification and separation of the cut bundles.

Features of Computer Controlled Knife Cutting M/C:

- ✓ The computer-controlled knife cutting method provides the most accurate possible cutting at high speed.
- ✓ Here, the cutting knife is very hard and oval-shaped.
- ✓ During cutting, the marker is not needed to put over the fabric lay.
- ✓ A cutting blade is made of stainless steel.
- ✓ The sharpness of the knife is also high here.
- ✓ This type of fabric cutting machine followed the CAD (computer-aided design) system.
- ✓ The cutting knife itself moves according to the direction of the computer program.

Advantages:

- ◆ Fabric can be cut very rapidly.
- ◆ Fabric can be cut very accurately.
- ◆ The speed of fabric cutting can be controlled.
- ◆ The cutting knife can be moved and operated in any directions.
- ◆ Suitable for production on a large scale.
- ◆ Can be attached to computer controlled marker making.
- ◆ The fabric lay is compressed which helps cutting of the fabric.
- ◆ During cutting of fabric, the fault are comparatively lower than the other methods.
- ◆ There is arrangement for sharpening of the blade.
- ◆ The possibility of accident is less.
- ◆ Marker is not required for cutting of the fabric.
- ◆ Labor cost is less.

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- ◆ Fabric can be cut 6 to 8 times faster than the manual methods.

Disadvantages:

- ✓ The initial capital investment is high.
- ✓ The maintenance cost is high.

1.3. Routine maintenance of equipment

Machine maintenance is the work that keeps mechanical assets running with minimal downtime. Equipment maintenance can include regularly scheduled service, routine checks, and both scheduled and emergency repairs. It also includes replacement or realignment of parts that are worn, damaged, or misaligned.

Maintenance can be of different types. But following types are important in this aspect.

Routine maintenance: Lubrication and regular inspection are the constituents of routine maintenance. Lubrication ensures long life and safe working of all the equipment. Inspection tries to detect fault in equipment so that repairs and replacement may be undertaken at right time.

Scheduled maintenance: This type of maintenance provides for inspection, overhaul lubrication and servicing of the machine at predetermined dates. Overhauling of machine, cleaning of all components is normally done in this manner. It involves opening of the machine into its smallest components and carry out lubrication.

1.4. Set up cutting table and seating

There is no standard length for a fabric cutting table in mass garment production. Technically, the cutting table length depends on the marker length. Minimum length of the cutting table must be longer than the single size marker. In mass production, a longer marker length (with multiple markers) is preferred for a better fabric utilization and reduced fabric waste (end loss).

Table length

For your guidance - you can keep the minimum length you can keep 12 feet. If you have space in the cutting section, you can increase the cutting table length. 36 feet long. Even more. In a long table, you can lay multiple lay side by side.

Table width

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Fabrics are available in various width - single width and double width. Normally, the single width fabrics are 36-44 inches where double-width fabrics come in 58-60 inches. Normally, a cutting table is made of 6 feet (72 inches) wide.

Self-Check -1.1	Written Test
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Instruction I: Matchng

- | | |
|---------------------------------------|--|
| <u>“A ”</u> | <u>“ B ”</u> |
| ___ 1.Computer controlled cutting m/c | A.Lay-up equipment |
| ___ 2.Drill Cutting Machine | B.personal protective equipment |
| ___ 3.Weights | C.used for cutting of one or two plies of fabrics. |
| ___ 4.Metal gloves in cutting | D.used to mark pocket places |
| ___ 5.scissor | E.initial capital investment is high |

Instruction II: explain in detail the following questions.

- 1.List down and explain Occupational Health and Safety (OHS) practices should be applied in garment manufacturing
- 2.What is the diference between Routine maintenance and schedule maintenance

Note: Satisfactory rating – above 60%

Unsatisfactory - below 60%

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Unit two: Draft lay marker

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

- ◆ *Marker requirements*
- ◆ pattern pieces
- ◆ Manipulate and position pattern pieces
- ◆ pattern grain
- ◆ lay marker
- ◆ laying up instructions
- ◆ Check marker and copy

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- ◆ Identify *Marker requirements*
- ◆ *Collect and check pattern pieces manually or by computer*
- ◆ Manipulate and position pattern pieces for most efficient use of fabric
- ◆ Check pattern grain against grain of material
- ◆ Draw lay marker according to pattern requirements.
- ◆ Prepare laying up instructions according to requirements.
- ◆ Check marker against order requirements and copy

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2.1. Marker requirements

2.1.1. Fabric Types

Delicate fabrics include silk, wool, linen, chiffon, lace, and other fabrics with embroidery or embellishments. While cotton isn't usually considered a delicate fabric, very thin cotton clothing can warrant delicate treatment. Delicates tend to be sensitive to heat and excessive spinning, along with harsh detergent

A. woven such as:

- denim
- wool suiting
- Corduroy
- satins
- chiffon
- rayons

B. knits such as:

- polar fleece
- double knits
- single knits
- tricot

C. directional and checked patterned fabrics

A fabric has a directional print, sometimes referred to as a “one-way” print, when there is a clear up or down to the pattern on the fabric. Here are a couple of examples of that. As you can see above, the pattern goes in one direction. It's especially evident in the fabric on the left.

if the fabric contains horizontal and vertical lines design , it may be called as checked or plaid design fabric.

Marker requirements process is affected by the fabric design very much. This is because that the design of the fabric may be uni-directional or bi-directional.

The following are the different types of fabric used in the mass production.

Generally woven design fabrics may be classified in to three types.

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- a) Stripe(even or uneven stripes)
- b) Checks and
- c) Other design

plain fabric: This type of fabrics contains solid or only one color i.e., white or other color, and there is not any design in this fabric.

2.1.2.fabric width

Fabric width (i.e., the usable width for which the cutting-marker is planned) should be determined in detail prior to planning the cutting-marker. The maximum width of the cutting-marker is constrained by the usable width of the fabric. The usable width is the width of the narrowest place minus the width of any unusable selvedge (i.e., considered to be the fabric's width with selvedge excluded—the net fabric width). Where the waves are dissipated towards the centre of the fabric width, usable width is smaller than net width, generally by the width of the deformation, which could seriously harm the clothing's appearance if included in the cutting-marker.

2.1.3.product quantity

This is the amount charged for a product by the seller, and it includes both the cost to make the product and the mark-up cost added by the .

The more large patterns and less small patterns for a particular style of garments reduce efficiency and vice versa.

Fabric consumption depends greatly on the number of garments on a marker because the more the number of garment patterns on a marker the better is the marker efficiency. So a 6 way marker will have better marker efficiency than a 4 way marker which means that fabric consumption will be lesser for higher way markers. Therefore, standardizing the number of ways is very important because only then we will be able to control the fabric consumption.

It is important to strike the balance between the number of plies and the number of garments in marker. If we are not able to utilize the maximum number of plies we should not be making higher way markers.

For a small order Quantity we will not be able to lay the maximum number of plies that can be laid if the number of garments on the marker is more. For example: 100 plies of 2 way marker(S,M) will become 50 plies of 4 way marker(2S,2M) if we increase the number of

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ways. Which will increase the number of cuts in that marker and increase the work in cutting. It is therefore clear that if the order qty is less the number of ways on marker will also be less.

2.1.4.garment sizes

During marker if garments with different sizes mixed wastage of the fabric can be decreased and high product efficiency can be come

The cutting master plans the number of markers they need to prepare, the size combination to be set for each marker and the number of plies to be laid in each marker.

Size of garments: If more sizes of garments can be included e.g. S, M, L, XL, XXL for a particular style in the marker, then more will be the efficiency.

2.1.5.wastage allowances

This type of wastage can be reduced by observing and controlling carefully the necessary allowance of the marker according to the types of fabric.

Each fabric has two selvages which are avoided during placing marker on the fabric. Thus approximately 3% fabrics are wastage along width. This loss is less for higher fabric width. If the fabric is dimensionally stable, we can save some fabric by wasting 2% along width.

Marker Planning: Marker planning is a conceptualizing, initiative, open and creative process, in contrast to making up a jig-saw puzzle, which is an analytical, step by step and closed process. There is no final planning solution to a marker.

2.2.pattern pieces

Templates are a shaped piece of rigid material used as an outline for processes such as cutting out, shaping, or drilling. Patterns are a template used in sewing, from which the parts of a garment are traced onto fabric before being cut out and then put together; they are usually made of paper.

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Pattern can be one of two things. It is either the decorative design that repeats over and over a fabric, or it is a flat template, made of paper or card, that is used as the key instruction guide for cutting the separate pieces of a garment. Pattern pieces are traced to allow for size, seam allowance and fit.

2.3. Manipulate and position pattern pieces

Marker efficiency can also be increased by changing or alternating the patterns' position in the marker.

Pattern Manipulation: The process in which you change and reshape pattern blocks to adjust the fit or incorporate a new design.

Pattern Manipulation is when you either slash and spread/close or pivot a pattern piece to alter it from its original shape.

Decide on the best way to fold the fabric and lay out the pattern pieces. Then glue or tape the pieces in place. Attach your results to a sheet of paper.

Manipulated and Positioned include manually onto paper or directly onto the fabric using appropriate computer software

Overlapping, folding or shrinkage of marker papers may cause faulty copies.

2.4. pattern grain

What is the Grain Line?

The direction that a pattern piece should be aligned with the fabric before cutting is shown on the pattern as a *grain line*. This is usually just a big arrow, either single or double ended. This shows the direction of the strong *warp* grain - the one parallel to the selvage (also called the *lengthwise grain*). So, again, you'll usually see the grain line aligns with the top-to-bottom direction of the pattern piece on the body. If no grain line is shown, then the grain should be aligned with the fold line. If you correctly align your pieces with the grain, you'll ensure that the strength & stretch of the fabric is in the right places.

2.4.1. The Straight Grain

The straight grain is the grain used most often in garments. The straight grain generally runs up the centre front and centre back of garments and up through the centre of sleeves and pant

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legs. In situations where a garment is cut slightly off grain, this may cause sleeves or pant legs to twist around the body. You often see this as a problem in cheap t-shirts because the fabric weave does not hold a solid grid pattern, making the fabric hard to cut correctly and causing the garment to be made up of pieces which are off grain.

On areas such as waistbands which hold tension, you want the strongest thread to run around the body so you would cut your waistband patterns following the straight grain, ie parallel to the selvedge. The selvedge is the band of more tightly woven fabric that runs up either side of the fabric meterage. If you imagine the fabric being woven on a loom then these are the edges where the thread turns back on itself to begin weaving the next row.

2.4.2, Crosswise Grain (Weft)

The line of the fabric at right angles to the Selvedge. This the cut edge of the fabric when it comes off the bolt.

The crosswise grain of woven fabric has more stretch, and therefore the cross-wise grain usually goes around the body, and the lengthwise grain goes up/down the body.

2.4.3. The Bias Grain

In contrast to the straight grain, you can also design garments which use the grain on a 45-degree angle, this is called bias cut. This effectively means that of that tiny weave of fabric you are going diagonally across the squares and making the fabric much more unstable. But while unstable sounds like a negative it can sometimes be what you need for a garment. It creates the ideal flexibility for creating bias cut dresses where you need the fabric to mould better to the body and will probably allow for less darts.

You always need to be careful of how different grain lines affect each other when they meet at seams though, as sometimes seams can stretch when cut at a strange angle or on different grains to each other and this can cause puckering.

On patterns, the grain line (or grainline) is usually marked with a line with arrows on it, shown below in red.

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Fig2.1:Grain lines

2.5.laying up instructions

Lay: In bulk cutting, a number of fabric plies are laid on the cutting table. The whole number of fabric plies that is spread on the table and cut at a time is called as **lay**.

A unique number is given to each lay. A lay can be made by any number of fabric layers. It may be a single layer or 20 layers or 100 plus layers. On the top of the marker is made using paper pattern in case manual marker making.



Fig2.2:alay on cutting table

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Layer:In the lay, each fabric ply is called as a layer.

Lay length: The length of the fabric ply in lay is called lay length. The lay length is planned according to the marker length.

Lay height:After complete spreading of the fabric, we got a certain height of the lay. Lay height is maintained while fabrics are spread on the table to allow the cutting machine to cut the fabric. Lay height may vary depending on the cutting machines. Secondly, the number of fabric plies on a lay depends on the fabric thickness.

2.6.Check marker and copy

Following points should be considered before marker making.

- check allowances at the beginning and end of a layer;
- check marker length + end allowances;
- check allowance at the fabric edge;

After making a marker, the quality personnel should check the marker against the requirements. Here, the quality personnel should have the marking check list that consist the following points:

- ✓ Are all parts of the garment marked?
- ✓ Number of marking of each pattern pieces,
- ✓ Are all pattern pieces marked according to the given grain line,
- ✓ Is marking done resulting minimum fabric consumption
- ✓ Are marked pattern pieces correctly labeled?
- ✓ Is the marking gives freedom of knife movement for the cutter?

COPY MARKER:After the marking is checked and all necessary amendments are taken, Marker is copied either manually or by computer either as master or documentation purpose or to use another time whenever a demand of the same order.

Self-Check -2.1	Written Test
------------------------	---------------------

1. _____ is the process in which you change and reshape pattern blocks to adjust the fit or incorporate a new design.

Cross grain is parallel to the selvedge.

A. True B.false

2.What is grain line and list grain line types

Note: Satisfactory rating – above 60%

Unsatisfactory - below 60%

Operation Sheet-2.1	CONTENT-1
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Techniques for undertaking Draft lay marker:

Step1-identify marker requirements

Step2-collect and check pattern peices

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Step3-manipulate and position pattern pieces for most efficient use of *fabrics*

Step4-draw up lay marker according to pattern requirements.

Step5-check marker against order requirements.

LAP Test-2.1

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 45 minutes.

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Task 1. identify marker requirements

Task 2. collect and check pattern peices

Task 3. manipulate and position pattern pieces for most efficient use of *fabrics*

Task 4. draw up lay marker according to pattern requirements.

Task 5. check marker against order requirements.

Unit three: Lay-up fabric and Positioning marker

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

- ✓ *Lay-up instructions*
- ✓ *Collect and check Fabric*
- ✓ Spread fabric
- ✓ Lay up aids

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✓ Marker

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- ◆ Interpret lay-up *instructions*
- ◆ **Collect and Check fabric a** according to OHS practices
- ◆ Check fabric width and quality against lay-up instructions
- ◆ Lay up fabric, adjust spread and tension to suit fabric performance.
- ◆ Check fabric faults and take required action
- ◆ Check lay height and position fabric according to cutting equipment and work specifications.
- ◆ Use aids to assist lay up
- ◆ Place marker on lay
- ◆ Check marker and lay alignment

3.1.Lay-up instructions

Fabric laying up instruction is given from production manager based on type of garment to be produced and total quantity of the product.

3.1.1.Job cards

A job card is a detailed description of work that is performed for a work order. You use the Job Cards application to create and manage job cards.

When you create a job card, you specify planning and scheduling information that can be used by the Task Cards and Work Order Tracking applications. You can specify the maintenance review board number, capability, class, and category for the job card. You can also specify the operation number, work station, phase, and customer for the job card.

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3.1.2. Cutting orders

Cut order planning is the problem of planning the fabric cut for a set of apparel orders. A specified set of garments is ordered by the customer to be produced by a given date.

Affiliated with this order is a set of garment sizes, and patterns for cutting each size. The fabric for cutting the order must be arranged on the cutting table in such a way as to minimize the cost of cutting the order. This plan must incorporate a partition of the pattern pieces to be arranged on top of the fabric layout.

3.1.3. Customer order breakdown

The flow begins with a customer order which composes of important data. Firstly, order detail are colors of the desired product and sizes. Numbers of demand for each size and color. Secondly, bill of material (BOM), this data tells planner what parts and how many of each part are needed to assemble to the desired product. In some products, bill of material is very complex and is drawn in the form of hierarchy which each level represents intermediate products or work in process (WIP), e.g. shirt, overcoat. Thirdly, assembly chart, this data shows how to assemble cut parts into the desired product. It also gives detail of operation sequence and production lead time.

3.1.4. Marker

What is Marker?

Marker is a long thin paper which contains all necessary pattern pieces for different sizes for a particular style of garments. There are different methods of marker drawing and duplicating.

The marker, or cutting lay, is the arrangement of patterns on the spread fabrics.

The thin and transparent paper on which all necessary different pattern pieces for all size for a particular style of garment are placed to collect their replica for smooth cutting of fabric is called marker. This is done in such a way that fabric wastage would be least. marker width should be equal or less than fabric width. Its length depends on the number of pattern pieces that will be packed on it.

A marker is a diagram of a precise arrangement of pattern pieces for sizes of a specific style that are to be cut from in one spread.

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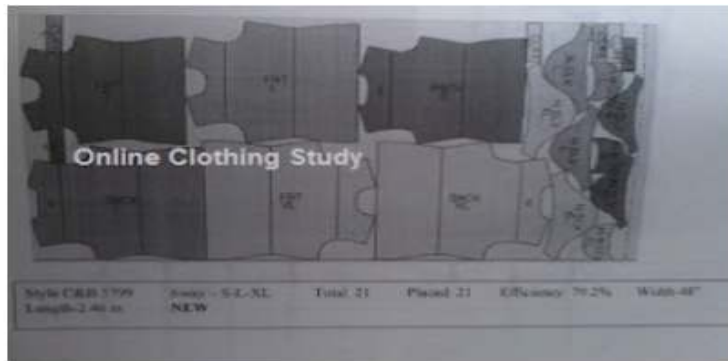


Fig2.3. marker

A marker is a combination of parts arranged on a rectangular shape block which is later used as a cutting guideline or cutting pattern in a cutting process. Marker is defined as garment pattern pieces of different sizes and styles that are laid out on a sheet of paper with fixed width and arbitrary length in order to achieve the highest marker efficiency. In each marker, many parts are arranged so as to achieve the desired objective. After parts were completely arranged, fabric area used, waste area and remaining area are calculated. The fabric area used is equal to total area of parts assigned to that marker plus waste area. The waste area which can be divided into two types with respect to its causes of occurrence. One is occurred from a shape of parts that are not rectangular. The other one is occurred from a cutting restriction. Finally, the remaining area is equal to a maximum allowable area subtract by total area of parts assigned to that marker.

3.2. Collect and check Fabric

Garment factories receive fabric from overseas textile manufacturers in large bolts with cardboard or plastic center tubes or in piles or bags. Garment factories often have a warehouse or dedicated area to store fabric between arrival and manufacturing.

Many garment manufacturers will also integrate quality assurance into this process to ensure that the quality of the fabric meets customer standards. This step is performed by manually spot-checking each bolt of fabric using a backlit surface to identify manufacturing defects such as color inconsistency or flaws in the material. Fabrics that fail to meet customer standards are returned to the textile manufacturer.

A check sheet includes general details, details of fabric lot, fabric defects according their sizes, summary of fabric defects, quantity inspected and total penalty points and result of the fabric lot after inspection.

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3.3.Fabric spreading/layering

To cut numerous articles of clothing at the same time, texture is spread in layers one over on a long table. This procedure is called spreading or laying.

Fabric spreading can be defined as the smooth laying out the fabric of a specific length and width. The marker is laid on the topmost layer of the fabric. The cutting operation is done after completing fabric spreading.

Plies: Fabric is spread in layers one over the other and each layer is known as a ply. Number of plies that can be laid is chosen in light of the tallness of the blade, thickness of texture and kind of cutting technique being taken after.

Lay: End result of spreading/laying is a lay which is only wanted number of employs laid. before you start laying-out fabric make sure you have the pattern ready, as well as cutting tools which is (scissors, pins, marker,), fabric and patterns must be 100% flat on a flat table, and make sure you have plenty of space to work. A large table is best, because it is at a height that is ergonomic.



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Fig2.4: fabric spreading



fig2.5: lay and ply

Types of Fabric Lay

1. Straight lay:

In straight lay each ply of fabric is spread according to marker length, i.e. all plies can have the same length. In that case one marker is used.

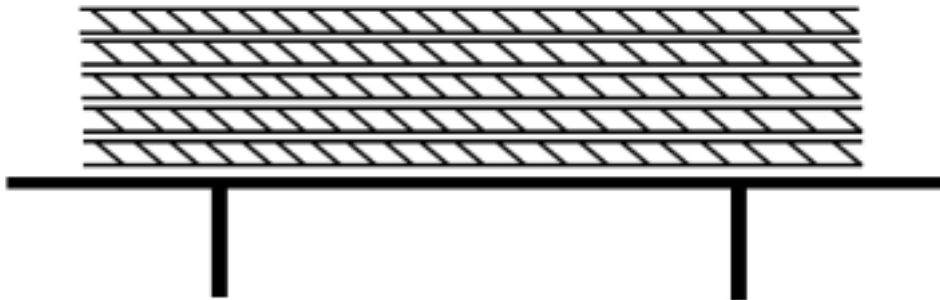


Fig2.6: straight lay fabric

2. Stepped lay:

Ply of fabric lay is not spread according to marker length, i.e. when the plies are laid up in different lengths- a step can be formed. Different types of marker are essential for different steps. Its use is very much less because of fabric wastage's and lay making if difficult as well.

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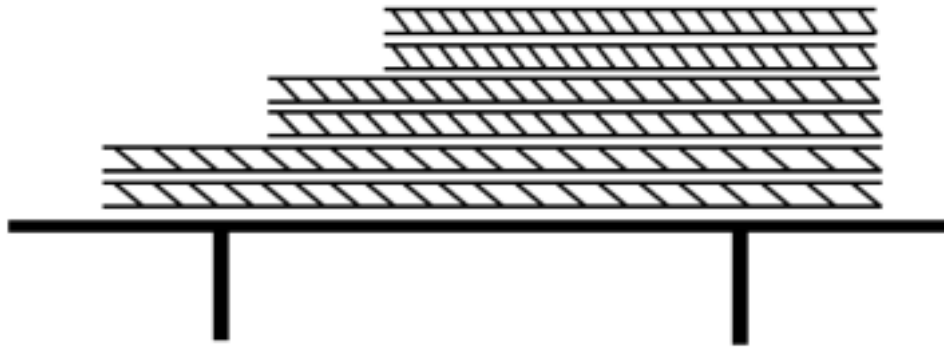


Fig2.7:Stepped lay fabric

Requirements of fabric spreading

Following are the requirements of fabric spreading

Alignment of plies:during spreading all plies must be spread according to the marker dimension(length and width wise)

Correct ply tension:during spreading,plies must be spread at uniform tension

Correct ply direction:during spreading,all plies must be spread at same direction and from one end of the table.

Fabric must be flat:during spreading,all plies must be spread in flat form.that is,fabric must be fold free or wrinkles free.

Avoidance of fusion of plies

In case of thermoplastic fibre fabrics may fuse together during cutting if the cutting knife becomes hot. We can prevent fabric from fusion by –

- a) Using anti-fusion paper,
- b) Using silicon lubricants on the knife blade.
- c) Reducing ply height.

Factors Considered for ply Height Determination

The Thickness of the Fabric

When the thickness of the fabric is more than the no of ply will be less and if the thickness of the fabric is less than the no of ply will be more.

Cutting Knife Length

Lay height will be 70% of the length of cutting knife.

Volume of production

If it is bulk production then no of ply is more end hence the height of lay is more.

Nature of fabric

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Ply height will not be the same for both cotton and synthetic fabric or any other types of fabrics. In case of the same no of ply, cotton can be cut but synthetic fabric cannot be cut.

3.4.Lay up aids

During fabric cutting, the friction between the fabric and the blade produces temperature in the blade; the temperature may be up to 300°C. If the fabric contains synthetic fibers, e.g. nylon, polyester, acrylic or their blends, then fused edge may result in the fabric. As because most of those fibers melt at around 250°C. Therefore, sticking of cut edge of fabric will increase the fabric wastage Moreover, the fused edge after cooling will form hard bid, which will be problem of irritation during use of garments.

To avoid the problem of fused edge formation, the following steps may be taken

- ✓ Reduce the height of the lay;
- ✓ Reduce the cutting speed;
- ✓ Use anti-fusion paper in the lay at regular interval;
- ✓ Lubricate the knife during cutting.

Surface of the cutting table depends on methods of fabric cutting. The table surface should be capable to support the lay as well as to ensure that all the plies are cut at a time during fabric cutting.

Whatever the cutting method is used for fabric lay cutting, it should be ensured that the shape of the cut components from top to bottom lay are of exact size and shape, otherwise the garments produced will be defective.

3.5.Fabric fault and take action

Fabric faults can be eliminated or minimized by avoiding the fault and splicing (overlap joining) or other appropriate techniques

What is Splicing and Splice Mark in Fabric Spreading?

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3.5.1.Splicing

Splicing is a process of cutting fabric across its width and overlapping layers in between the two ends of a lay. Splicing of lay is required some times to avoid faults found in the fabric into the garment components. After splicing cut end is pulled back to overlap plies as far back as the next splicing mark. The overlapping length depends on splicing mark to cover complete garment components.

Splicing process is also used when one fabric roll ends in the middle of the marker and end bit length is enough to cover at least one complete garment components. Spreading of the next roll starts from the splice mark.

Splice Marks:

Splice marks are marked on the edge of cutting table before spreading using reference of the marker. Splice marks are reference points from where overlapping of fabric is done after splicing of fabric. Splicing marks are shown in the following diagram.

In the following diagram, A lay is shown. The lay is planned for three ways marker. On the spreading table there are marks like splice mark 1 and splice mark 2 which denote that from one of those marks they have to start overlapping the layer, if spreaders need to splice or cut out any layer.

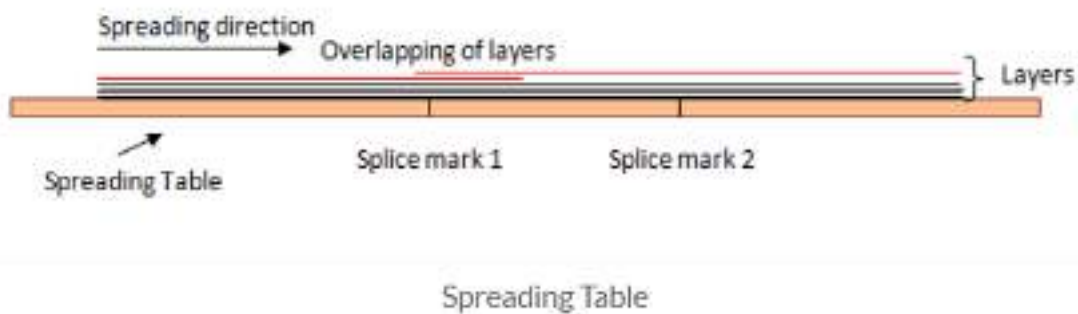


Fig3.1: splice

3.6.Marker Making/pattern layout

What is Marker Making?

For industrial garments preparation, marker making is a very important chapter for highest usage of fabric and for lowest wastage of fabric. This is a process which is performed to draw the pattern pieces on the fabric before cutting. This may be done by drawing the pattern

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pieces on the fabric directly or by drawing the pattern pieces on a thin marker paper and then placement the paper onto the fabric lay. Marker is a thin paper which contains all necessary pattern pieces for all sizes for a particular style of garments in such a way that, fabric wastage would be least. The representation or drawing of the arrangement of identified garment pattern relevant to the cutting of a batch material. The marker is placed on the material and provides guideline for cutting. Marker may be on fabric or held in computer data files. Marker width is equal to the minimum fabric width and its length depends on the no of pattern sizes that will be drawn.

Marker making is the process of determining a most efficient layout of pattern pieces for a style, fabric and distribution of sizes (source: Apparel Manufacturing, Glock and Kunz). Factories those don't have a CAD system perform this process manually. In manual marker making to make an efficient marker one need time, skill and concentration. Now-a-day Marker making is mostly done by CAD systems which give accuracy, increase control over variables and reduces the time required in making markers.

Marking refers to the process of placing pattern pieces to maximize the number of patterns that can be cut out of a given piece of fabric in order to make garments.

Preparations of Marker Making:

Before the marker making, some preparatory processes would be followed.

Marking Grain Line: Before marker making, the grain line of pattern and fabric must be marked.

Fabric Measurement: Before marker planning, the fabric must be measured carefully. Because, marker width is relevant to the minimum fabric width.

Fabric Faults: Fabric faults would be also under consideration. In a fabric roll, where any faults found, that points must be avoided for quality production and to least the fabric wastage.

Cutting Table: Marker planner should consider the cutting table length before making marker. Marker length must be less than the cutting table length.

3.6.1. Methods of Marker Making

After making patterns of any garments (all the required sizes) marker is made. At the very beginning of marker making, the marker width is determined. The minimum width of the fabric with which garments will be made is taken as the width of the marker. Generally

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marker is made on white paper or newsprint paper. First the big patterns are placed and then the small patterns are placed in the gaps of the big patterns. As a result, the marker efficiency is increased. The marker making is a very skilled and technical job.

Marker making can be classified into two types. These are:

- Manual method.
- Computer method.

Manual method:

Marking by Hand on Paper

This method is much used method of marker drawing of both old and modern times. The pattern piece is placed on the paper as per the marker planning. Then with the help of fine pencil or ball pen, marking around the pattern, the exact image of the pattern is made on the paper. Then removing the pattern from the paper, the size code is written on that image of the pattern.



Fig3.2:manual marker making

- ✓ Suitable for small amount of production.
- ✓ Marker efficiency is lower.
- ✓ Initial investment is not high.
- ✓ Marker can not be prepared quickly.
- ✓ High production cost.
- ✓ Highest wastage of fabric.

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Computerized method

Computerized Marking on Paper

When the marker planning is finished on the computer screen, then that marker is stored in the computer memory. As a result, that marker can be displayed on the screen any time. The printout of the marker can be obtained from the plotter attached to the computer. The markers that are drawn or copied with the help of computer, they are very beautiful and accurate. With the help of a beam and a pen in computer plotter, the image of each pattern is drawn by their combined movement. If there is big plotter, then full size pattern is obtained and if there small plotter, mini size marker can be drawn. Generally a computer is given instructions at night for multiple copies. As a result the computer and the plotter themselves copy the marker whole night without presence or assistance of anybody. The required papers for marker are kept store in rolls at one side of the table from where paper is supplied continuously. For shrinkable fabrics, the pattern larger than requirement, for example 1% longer patterns also can be drawn with the help of computer. Computer aided marker drawing and copying is the best and accurate method, but its initial investment cost is very high.

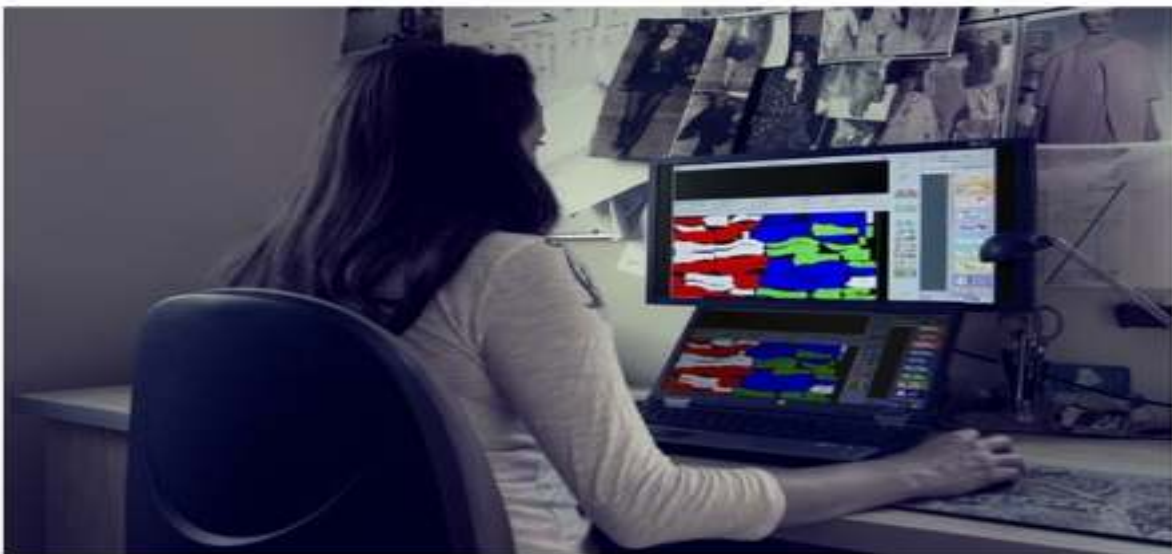


Fig3.3: Computerized marker making

- Suitable for large scale of production.
- Marker efficiency is higher.
- Initial investment is high.
- Marker can be prepared very quickly.
- Low production cost.

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➤ Low wastage of fabric.

Importance of marker making in garments technology: The importance of marker making is given below,

- ✓ Optimizing fabric materials utilization through marker making.
- ✓ Proper marker planning and making is the heart of garments manufacturing.
- ✓ Without proper marker making it is almost impossible to ensure proper spreading and cutting.
- ✓ It helps a lot to reduce fabric waste.
- ✓ And the most important thing is to save money.

The placement of pattern on the fabric, in an economical manner, that is without wasting fabric is known as pattern layout. All the patterns should be arranged properly following grain of the fabric. Example the bodice centre front will be in straight (lengthwise direction) grain.

The main points to be considered while laying patterns are:

- Press the fabric without any wrinkles before laying the patterns.
- Place the fabric on a large or a hard flat surface, which is easy for work.
- Place the larger patterns first. Place similar pattern together, with same length. Example placement of bodice front and bodices back next to each other, such that the side seams are close to each other.
- Place the smaller patterns in gaps in between the larger pattern.
- If pattern is to be cut in more number, example two sleeve patterns, place them on fold. This concept is not possible when the fabric has a one way design or when the patterns have different front and back patterns.
- Keep weight, pencil, pins ready in hand, to draw, or pin or place weights on patterns, so that it remain in correct position.

What is a marker efficiency?

Marker efficiency is defined as a ratio of area of marker used in a garment and area of total marker.

How to calculate Marker Efficiency?

The calculation method of marker efficiency has been explained below with formula.

Formula#1

Marker efficiency% = (Area of marker used for garments / Area of total marker) * 100

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Area of marker used for garments: In case of CAD marker, CAD system automatically calculates the total area of garment pattern pieces placed in a marker. So you get the area of marker that is consumed by garments from a CAD system.

Total Marker Area: To calculate the total marker area simply multiply marker length by marker width.

In a manual marker, it is difficult to measure the surface area of garments patterns in a marker.

Another method can be practiced to calculate marker efficiency when you don't have CAD system or Panimeter. Calculate ratio of weight of fabric consumed by pattern pieces and total weight fabric under total marker area. So a separate formula is used to find marker efficiency.

Formula#2

Marker efficiency% = (Weight of fabric consumed by patterns pieces in a marker / Total weight of fabric under the marker area)*100

Weight of garment parts:To calculate the weight of garment parts cut one layer of fabric according to markers and weigh all garment parts that are included in a marker.

Weight of marker total area:Measure the weight of fabric (one layer) of total marker area.

Folding the Fabric

Fabric can be folded in a variety of ways before pattern pieces are positioned for cutting.

The type of fold used depends on:

- the number of pattern pieces that must be placed on a folded edge
- the fold that results in the most economic use of the fabric
- the width of the fabric
- the pattern size Pattern companies have already taken these factors into consideration for you. Therefore, you should fold your fabric as shown in the diagram found on your pattern instruction sheet.

Lengthwise fold.

Most fabric is folded length- wise on the bolt. Pattern instructions generally show a length wise fold with fabric folded in half length wise so that selvages match. However, lengthwise folds can also be partial folds leaving some of the fabric extended as a single layer.

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Fig3.4:Lengthwise fold fabric

Crosswise fold.

For a cross wise fold, fabric is usually folded so the cut ends match.

However, a crosswise fold can also be a partial fold. A crosswise fold is often used when pattern pieces are too wide to fit on fabric folded lengthwise.

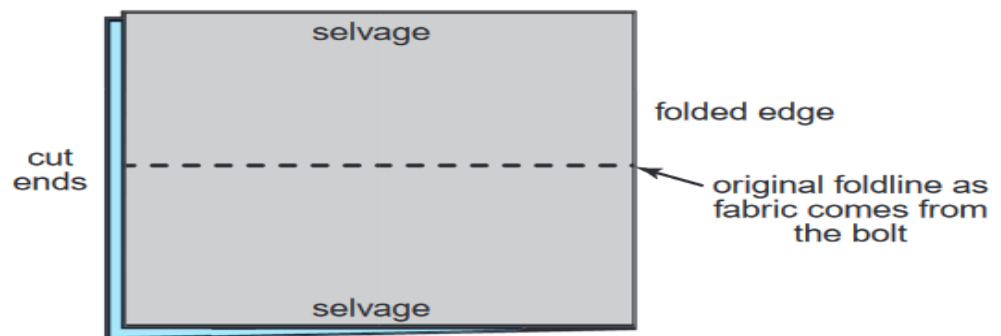


Fig3.5: Crosswise fold

Double fold.

When making a double fold, be sure the full length of each folded side is the same width.

Measure as shown. This will ensure that the folded edges are straight with the grain.

You may use a double fold when you cannot press the original foldline out of the fabric. You may also use it when several pattern pieces are to be cut on a fold.

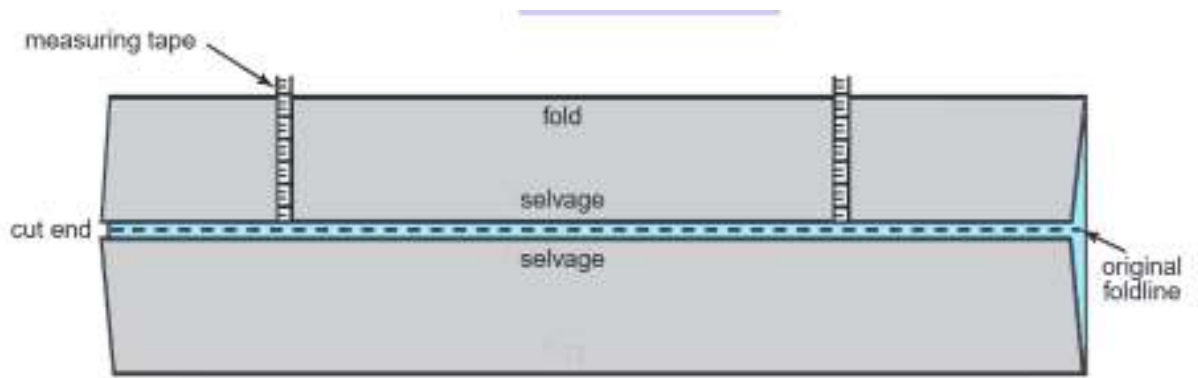
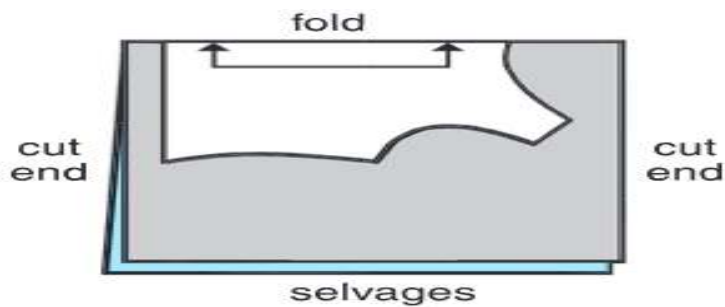


Fig3.6: Double fold.

Placing Pieces on the Fold

Check for pattern pieces that must be placed on the fabric fold. When cutting out these pieces, never cut along the folded edge.



Placing Pieces On-Grain

Accurate measuring will help you make sure your pattern pieces are cut out on-grain. Follow these steps:

- ✓ Place each pattern piece so the grainline arrow runs lengthwise on the fabric. Grainline arrows should run parallel to the selvage edges regardless of the way the fabric has been folded.
- ✓ Pin one end of the grainline arrow to hold it in place.
- ✓ Measure from the pinned end of the arrow to the fabric selvage edge.
- ✓ Now measure from the other end of the grainline arrow to the fabric selvage edge. Make sure it is the same distance from the selvage as the end you have already pinned in place. Adjust the distance if necessary and then pin the arrow in place.
- ✓ Pin the edges of the pattern piece in place.

Pinning Pattern Pieces

Use the following guide lines when pinning your pattern pieces to your fabric:

- Pin with care to prevent inaccurate cutting.
A cutting error of $\frac{1}{8}$ inch on each side of a pattern piece can result in a $\frac{1}{2}$ inch difference in the final garment.
- Use only enough pins to hold down the pattern securely. Depending on the fabric and the size of the pattern piece, placing pins about six inches apart is usually enough.
- Place pins completely inside the cutting line.
- Place pins diagonally in corners.
- Use pattern weights instead of pins to hold the pattern in position, if desired. However, be sure to pin grain lines in place first. Position weights, inside the cutting lines, on one pattern piece at a time.

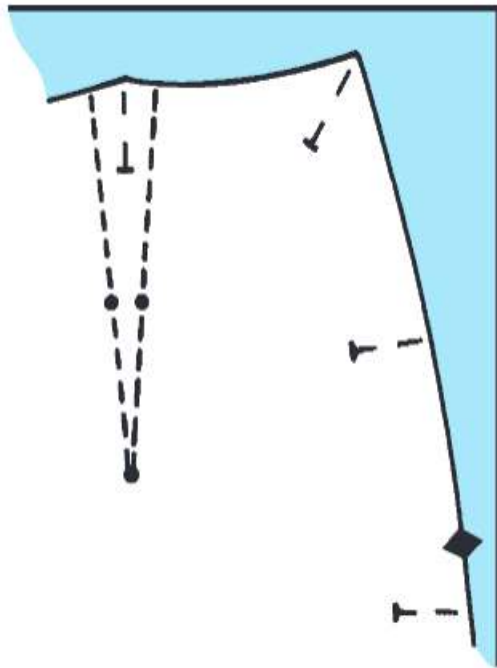


Fig3.7:pinning

Self-Check -3.1

Written Test

1. _____ is a long thin paper which contains all necessary **pattern** pieces for different sizes for a particular style of garments.
2. _____ is the process in which you change and reshape pattern blocks to adjust the fit or incorporate a new design.

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3. Cross grain is parallel to the selvedge.

B. True B. false

4. What is grain line and list grain line types

Note: Satisfactory rating – above 60%

Unsatisfactory - below 60%

Operation Sheet-3.1	CONTENT-3
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Techniques for Lay-up fabric and Positioning marker

Step1-Collect and check Fabric

Step2-Spread fabric

Step3-apply lay up aids for spreading

Step4-marker

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LAP Test-3.1

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 30 minutes.

Task 1. *Collect and check Fabric*

Task 2. Spread fabric

Task 3. apply lay up aids for spreading

Task 4. marker

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Unit four: Cut work

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

- ◆ Cut fabric
- ◆ Inspect cut fabric
- ◆ Record defective pieces
- ◆ Cutting equipment

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

- ❖ Cut fabric according to lay and cutting equipment requirements for operation.
- ❖ Inspect cut fabric, identify any faults and take appropriate action to ensure cut pieces meet required quality standards.
- ❖ Take and record Preventative action to avoid any recurrence of defective pieces
- ❖ Check Performance of cutting equipment is regularly

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4.1.Cut fabric

The fabric is first cut using the first pattern to make any garment. To complete the garment, the fabric is cut into several parts, then these cut parts are sent to the sewing department for stitching, where the whole garment is made by adding these parts.

The cutting room has a huge contribution in the garment industry. The first step in the garment manufacturing process is cutting after the buyer has confirmed the order, this cutting done in bulk is possible only by the cutting department. The spreading and cutting department receives this order from the production manager. If the fabric is not cut properly according to the design, it ruins the entire order. In other words, the cutting department is the fundamental foundation of any garment industry

After fabric spreading, the cutting master systematically spreads the pattern on the top most surface of the fabric. First the large parts of the pattern are spread, and later the smaller parts are spread. Now these stretched patterns are traced over the fabric with the help of chalk and after marking all the parts of these patterns are removed.

Cutting parameters:

Precision in cutting: To ensure the cutting of fabric - accurately according to the line drawn of the marker plan.

Clean edge: By avoiding the fraying out of yarn from the fabric edge. Cutting edge must be smooth and clean. Knives must be sharp for smooth or clean edges.

Consistency in cutting: All the sizing safe of the cutting parts should be the same as if the knife should be operated from the right angle of the fabric lay.

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Fig4.1.cut fabric

4.2.Inspect cut fabric

Cut panel inspection is done to identify any types of fabric defect if any defective panel found or if there any discrepancy, a correction will be immediate

Cutting quality plays an important role to make the best quality garments. The cutting section makes the raw shape of garments. If the quality of the cutting section is poor, the defects and rejects of the sewing section will high.

Cut Panel Inspection: Generally, cut panel inspection includes recutting, color shading checking, replacing rejected panels with good and acceptable panels, stain removing etc.

At that point QC controller will check each cut board precisely. In view of layer report or past deformity rate, manager can choose to issue floor by irregular examination or 100% physical assessment to discover imperfection thing.

Cutting Quality Check Points

Quality checkpoints of cutting section may divide by 5 category-

➤ Fabric Quality Inspection

After receiving fabric from the store by cutting section, cutting quality inspector check the following fabric information. If all information is correct, then proceed to the next step. The information are-

- ◆ Roll to roll fabric shade group check
- ◆ Fabric GSM and diameter check

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➤ Marker Quality Inspection

If all information about fabric is correct, the marker quality inspection is run. Marker inspection may run a parallel way for saving time. Generally, the subjects of marker quality inspection checking points are-

- Marker length and width
- Marker efficiency and consumption
- Marker type
- Lay quantity
- Marker ratio
- All individual parts of garments are marked in marker

➤ Spreading Quality Inspection

If all information of the marker is correct, the spreading quality inspection is started. The subjects of spreading quality inspection checking points are-

- ✓ Checking the number of lay as it should not exceed the standards.
- ✓ Lay ends check
- ✓ Lay tension check
- ✓ Lay height check
- ✓ Lay length check
- ✓ Check as the marker is best fitted to lay

➤ Cutting quality Control

After spreading activity cutting is started if there is no relaxation issue. If fabric needs to relax, cutting activity is started after relaxing the fabric. The main checking points during cutting is-

- ✓ Checking cut panel accuracy with pattern
- ✓ Rightly cutting of lay edge checking.
- ✓ Checking size mixing

➤ Cut Panel Quality Inspection

After cutting the lay, need to check the cut panel before final bundling and sending to cutting rack. The most important quality checkpoints for the cut panel are-

- ✓ Pattern check
- ✓ Shade check

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- ✓ Size wise ratio check
- ✓ Fabric check (Spot, Hole, Knot, Slab, Contamination, Lycra out etc.)
- ✓ If fabric is stripe, checking the strip mismatch
- ✓ Bundle check

Common cutting mistakes are

Wrong patterns: Pattern modification is not done based on fabric shrinkage report or FIT comments is not incorporated in production patterns. This kind of mistake majorly happens where there is no standard procedure of pattern marking and pattern handover to cutting department. This kind of mistakes can also happen due to carelessness cutting workers or having little knowledge about patterns and its effects in production.

Cutting a wrong size ratio: it might be a result of carelessness of the workers.

Fabric received without prior quality check and approval based on test report: Again this is a result of not following standard procedure of fabric issue to cutting department. Not making shade band for fabrics with shade variation.

Missing notch mark: Notch mark is not given at desired position of the pattern or there is notch mark in patterns but cutter miss to cut notches in fabric lay. This may be a result of carelessness of employees.

Numbering mistakes: Workers are not trained for the work or they are carelessness.

Following wrong cutting plan: Cutting plan sometimes doesn't match with the requirement of sewing department when cutting department doesn't work according to daily cutting plan. Or change of production plan might not be communicated to cutting in-charge.

How to deal with cutting problems?

The smart answer of this question is

- Study the frequency of mistake occurrences.
- Pick top 3 major mistakes first.
- Find root causes of the mistakes.
- Work on removing the root cause from the process.
- Reduced mistakes in the subsequent orders

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Possible Solutions:

Following are the possible solution of above mistakes

1. Dealing with pattern related mistakes

Keep a check point for checking garment patterns before issuing pattern to cutting department. You can develop couple of samples prior to bulk cutting based on production pattern. I mean cut fabric with patterns --> sew garments --> finish garments and check the quality. If you found variation in finished garments then correct it prior to bulk cutting.

If you religiously make pre-production (PP) samples and check the samples according to buyer specifications, you would not get surprise things like - measurement issues and fit problems in bulk production.

Sometimes, problem doesn't lie with patterns but cutting department use wrong pattern/old pattern. Set a standard procedure that pattern master need to seal each final pattern and approve the same. Style number (article number) and component name should be written on pattern. Cutting depart should not be allowed to use any other pattern than approved one for a particular style and season. Other precaution should be taken related to patterns are

Numbering of pattern pieces should be done (like pattern piece number 2 of 6 or number 3 of 6).

Clearly mention on patterns whether fabric to be cut in folded form or in open width.

How many components to be cut for single pieces from a single pattern piece. Like for shirt cuff patterns, four component needs to be cut where cutting department get one pattern piece for cuff.

2. Dealing with complete cutting process

Pilot production run is the solution. You might do Pilot Run prior to bulk cutting. If you do this process then all problems exist in cutting process, whether it is fabric issue or pattern issue would come out in the pilot run pieces. You might loss some fabric in this process but not the whole fabric.

3. Cutting defects or mistakes

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All cutting defects can be taken care of by setting quality check point for layers and cut components. Also check shorting and bundling activities. Like size mixing and ply mixing possibilities.

4. Following Cut Plan

Companies follow different procedures for cut planning. In most companies, cutting department gets weekly cutting schedules and if there are changes on existing plan, cutting department gets updated plan. Still there may be some communication gap between cutting department and production department. This kind of issues can be controlled by having daily morning meeting between core production departments in a factory.

4.3. Record defective pieces

To maintain the cutting quality, standard cutting components are checked randomly by quality checkers. If defective components are found, they replace those defective parts. Fabric inspection reveals countless defects ranging from drop stitches to color shading variation. The scale of defects makes it clear the garment manufacturer will have to cut around the issues to use the fabric, wasting material in the process.

In checking, quality checker detects *defects* in garments and separate *defective* garments from good *pieces*. Where there is established quality

Self-Check -4.1	Written Test
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Instruction I: MATCHING

- | | |
|--------------------------------|---------------------------------|
| ___ 1. Cut Panel Inspection | A. Spreading Quality Inspection |
| ___ 2. Marker length and width | B. Clean edge |
| ___ 3. Cutting parameters | C. color shading checking |
| ___ 4. Lay length check | D. Marker Quality Inspection |

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Note: Satisfactory rating – above 60%

Unsatisfactory - below 60%

Operation Sheet-4.1	CONTENT-4
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Techniques for fabric cutting:

Step 1- Wear personal protective equipments

Step 2- check the cutting machine

Step 3- start cutting by following lines marked on

Step 4-check the cut components is free from faults

Step 5- Take corrective action if faults happened

LAP Test-4.1

Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary marker, tools and materials you are required to perform the following tasks within 1:00hour.

Task 1. Wear personal protective equipments

Task 2. check the cutting machine

Task 3. start cutting by following lines marked on

Task 4. check the cut components is free from faults

Task 5. Take corrective action if faults happened

Unit five: Complete work

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

- ✓ Bundle pieces
- ✓ Direct cut work
- ✓ Store master copy of lay marker

This unit will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to

- ❖ Bundle cut fabric according to job card
- ❖ Direct cut work to next operation and clean work area for next job
- ❖ Store master copy of lay marker in filing drawer or computer

5.1.Bundle pieces

Shorting:

After cutting the fabric, all these parts should not be mixed together. For this, different sizes and colors are shortened.

Bundling:

After shorting the cut fabric parts or components, the cut parts are made into separate bundles size wise and colour wise. So that it does not mix with other parts, colour or size.

After cutting the fabric lay and tagging the sticker, all the garments components in stack form is shorted out as per size and color. To avoid mistake in sorting, it is better to use code number on each pattern.

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Bundling is a process of desisting the number of layers of the cut panel in to small for the purpose of better handling and WIP controlling in the line. Bundling is a sub-process of fabric cutting in garment manufacturing.

Bundling is the process of arranging garment components from the cut stacks after layer cutting and making a bundle with a number of garment pieces. Normally, using a rope or a fabric stripe (cuttings of fabric wastage) number of garment parts are tied together to form a bundle.

Bundling is a common term used in the cutting room process. It is the way of counting pieces cut in the cutting room.

Bundling is a manual process. The bundling process is done after sorting components and ply numbering. Depending on the production system, a factory defines its bundle size (number units to tie together). A bundle can be made of 2 pieces, 5 pieces, 10 pieces, or any suitable number. A bundle may contain all the components of a single garment piece.

Let's say a t-shirt making factory cuts t-shirt parts from knits fabrics. Here parts are the t-shirt front panel, back panel, two sleeves, and neck piping. So, when the cutting room workers make a bundle for t-shirts, let's say a bundle of 20 pieces, they will take each component for making 20 t-shirts and make a bundle. That means 20 pieces of the front panel, back panel, and neck piping, and 40 sleeves will make a bundle.

It is not that all the time garment parts need to tie for making a bundle. When a factory uses other means of transporting garment cuttings like plastic trays/baskets, polybags, or trolleys, cuttings can be placed in bundles form without physically tying.

Numbering of garment plies (Parts)/Ticketing:

After the bundle is created, the numbering on the layers starts. After bundling all the separated parts, stickers are numbered on each layer of the bundle. And now all these bundles are placed on the inventory table before sending them to the next operation.

Ticketing/Layer numbering:

It's a process in which each cut piece of fabric is given a unique number so that the cut pieces of different sorts/shades do not get mixed and sewn together resulting in a defective/rejected garment.

Layer numbering is one of the cutting room processes which is taken place after cutting a marker. In this process, each garment component is marked with a serial number of the layer in the cut. Normally the numbering code contains garment size (e.g. Small, Medium, Large), Marker number and layer sequence. The worker can set the numbering format for each style and marker as desired.

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The Purpose of Layer Numbering:

To identify the right garment components of a garment (size, color, and shade) when operators stitch the garment.

In case, sewing operator stitches a garment taking components from different layers, there might a chance of shade variation in the finished garment. This process helps factory to reduce quality issue related to shade variation.

Most of the times, more than one sizes of the garment is loaded in the production line. When bundles are open and move on the machines, there might be a chance of taking garment parts from different bundles of garment sizes. This layer number helps an operator to identify correct size of the component.

5.2.Direct cut work

After bundling and ticketing cut work or bundled material is directed or transported to sewing section and the room should be cleaned for the next activity.

Bundling helps the cutting department to handle cuttings and to store cutting inventory. They send cut parts to the sewing section as per the requisition received from the sewing floor.

In bulk cutting, from a single lay more than 100 fabric layers are cut together. secondly, multiple garments (of the same or different sizes and colors) are cut from a single lay.

Without sorting and bundling garment parts of the same size, same color, and from the same fabric layer, cuttings can't be sent directly to the stitching operator. If someone does there would be a mess. A factory can't make a garment as per standards. So cutting room needs to follow the proper bundling of cut parts.

Position marking: Egg- pocket positions, tucks, pocket positions etc

Shade marking: each component is marked with a unique no. printed on a small ticket stuck on the component.

Bundle making: according to size, color, quantity

Bundle tickets: to identify each bundle to size, lot, style and color wise.

Fusing parameters: There are different types of fusings depending upon the end use and type of fabric.

5.3.Store master copy of lay marker

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Cut work is directed to next operation after Ticketing and Bundling the cut fabric. Finally master copy of lay marker is stored properly, work area is cleaned and prepared for next job.

Storing Master copy of lay marker will help:

- ✓ To re-use it when important
- ✓ To save marking time
- ✓ To save resource

Self-Check -5.1	Written Test
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INSTRUCTION I:

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1. _____ is the process of arranging garment components from the cut stacks after layer cutting and making a bundle with a number of garment pieces.
2. What are the Purpose of Layer Numbering

Note: Satisfactory rating – above 60%

Unsatisfactory - below 60%

Operation Sheet-5.1	CONTENT-5
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Techniques for bundling:

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Step 1- Ticketing

Step 2- Bundling (noting cut fabric together)

Step 3- Dispatching

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LAP Test- 5.1	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 30 minute.

Task 1. Check ticketing

Task 2. Bundling

Task 3. Dispatching

Operation Sheet-for uc	CONTENT-5
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Final Operation sheet

Techniques for Produce cut panels with Delicate Fabrics

step1.Draft lay marker

Step2.Lay-up fabric and Positioning marker

Step3.Cut work

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Step4.ticketing and bundling

LAP Test- for UC	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1:30minute.

Task 1. Draft lay marker

Task 2. Lay-up fabric and Positioning marker

Task 3. Cut work

Task 4. ticketing and bundling