

TABLE OF CONTENTS

S.No.	Contents	Page No.
1.	Basic Textiles terms	1
2.	Stitching	1
3.	Identification of parts of sewing machine	3
4.	Different types of Sewing machines with technical details	8
5.	Different types of sewing machine beds	24
6.	Different types of sewing machine belts	28
7.	Various types of Needles used for sewing different fabrics	32
8.	Different categories of Stitches	34
9.	Lubrication and Maintenance Systems	38
10.	Different Types of Feed Mechanisms	43
11.	Introduction to Motors	48
12.	Attachments in Sewing Machines	52
13.	Stitching Defects	55
14.	Safety Measures	64

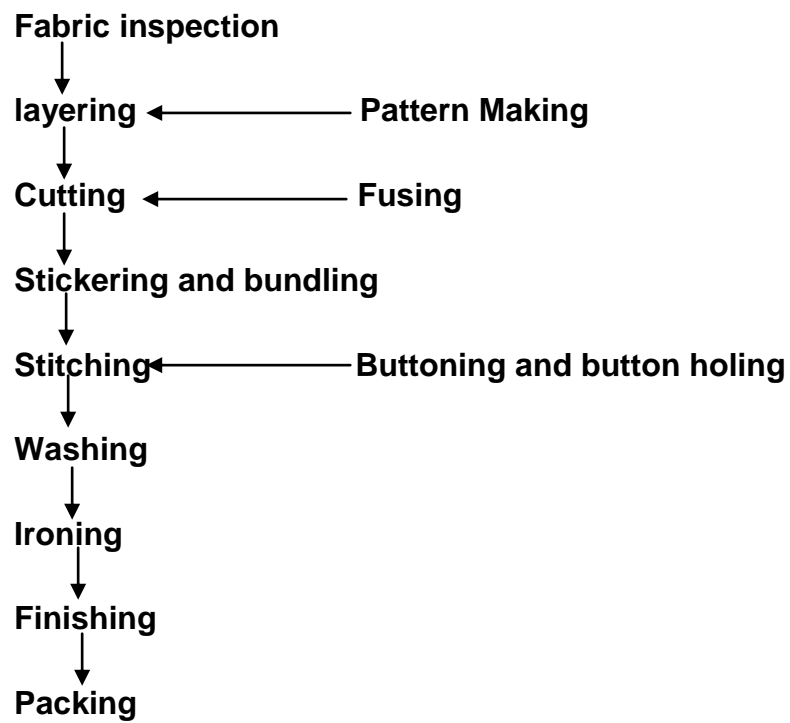
1. Basic Textiles terms

Yarn	Basic raw material for weaving/Knitting
Type of yarn	Single ply, double ply and multiply
Yarn count	Defines thickness of yarn. Higher the count, finer the yarn
Warp	Lengthwise yarn in the fabric.
Weft (filling)	Width wise yarn in the fabric.
Selvedge	Edges of the fabric running lengthwise
Woven Fabric	Woven fabrics are made by using two or more sets of yarn interlaced at right angles to each other.
Knitted Fabric	Knitted fabrics are formed by series of interlocking loops (example: knit wears)
Sewing Thread	Sewing Thread is a type of yarn used for sewing.

2. STITCHING

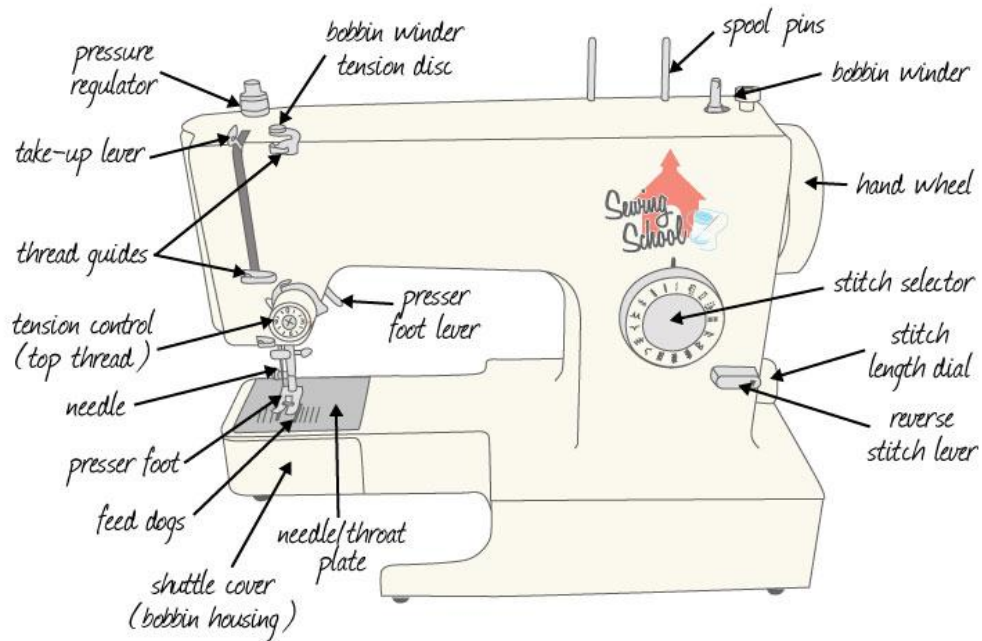
- Stitching is the process of producing garments by joining various components of fabric, either woven or knitted
- This is being done in **stitching machines**.






➤ **Sequence of Operations In Garment production**



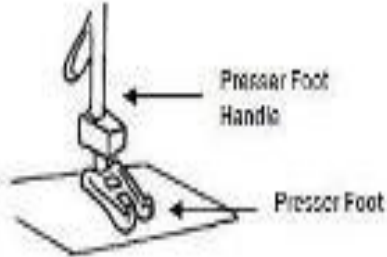








3. IDENTIFICATION OF PARTS OF SEWING MACHINE


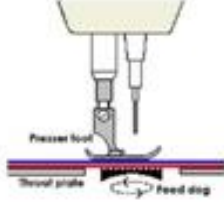



Anatomy of a Sewing Machine



1	<p>Hand wheel: Turn this wheel to adjust needle height. Always turn the hand wheel toward you.</p>	
2	<p>Spool pin: The spool pin keeps the spool in place while the thread feeds through the machine. Some machines have both horizontal and vertical spool pins</p>	
3	<p>Spool cap: The spool cap slips onto the end of the spool pin and holds the spool in place.</p>	
4	<p>Bobbin pin/winder: Built-in bobbin winders may be found on the top, front, or side of a sewing machine. Most winders consist of a bobbin pin to hold the bobbin while the thread is being wound, thread guides for maintaining tension, and a start/stop lever. Some bobbin winders have built-in thread cutters.</p>	
5	<p>Thread guide: Thread guides may be hoops, discs, or flat metal shapes that pinch or direct the thread to feed it through the machine without tangling and at the correct tension.</p>	

6	<p>Take-up lever: The take-up lever is a metal finger with a thread guide that moves up and down, pulling thread from the spool and feeding it through the machine.</p>	
7	<p>Stitch selector: Use the stitch selector to choose which stitch you'd like to use. Many machines feature a number of built-in stitches: straight stitch, zigzag, buttonhole, blind hem, etc.</p>	
8	<p>Presser foot: The presser foot works with the feed dog to move fabric evenly through the machine. When the presser foot is lowered, it engages the tension discs and presses the fabric beneath the foot against the feed dog. The upper part of the foot, called the ankle, is usually screwed onto the machine securely; the lower part may include a quick-release mechanism for changing presser feet.</p>	
9	<p>Presser foot pressure control: This control adjusts the amount of pressure the presser foot applies to fabric as it feeds beneath the needle. Increase pressure when sewing heavy fabric and decrease pressure when sewing lightweight or thin fabric</p>	

10	<p>Presser foot lifter: This lever, located above the presser foot at the back or side of the machine, raises and lowers the presser foot. When the presser foot is lifted, the tension discs are disengaged, and the fabric will not feed through the machine.</p>	
11	<p>Needle: The needle carries the upper thread through the fabric to create a stitch. Specialty needles are available for specific stitching needs.</p>	
12	<p>Needle threader: Some machines have built-in needle threaders. Threaders have a tiny hook that swings through the needle eye catches the thread, and pulls it back through the eye when the threader is released.</p>	
13	<p>Thread cutter: Some machines have a built-in thread cutter near the needle area. To use the cutter, raise the presser foot and remove the stitched piece from the machine. Pull both the threads over the cutter's shielded blade to cut them.</p>	
14	<p>Needle clamp screw: Tighten and loosen this screw to release or secure the needle in place.</p>	

15	<p>Stitch plate: The stitch plate, also called a needle or throat plate, is a flat metal piece below the presser foot. Slots in the plate allow the feed dog to push the fabric along. A hole or slot admits the needle carrying the top thread through the fabric.</p>	
16	<p>Feed dog: The feed dog is a toothed metal piece below the stitch plate that moves up and down to push the fabric along, beneath the needle. Stitch length is controlled by how much fabric the feed dog moves.</p>	<p style="text-align: center;">DROP FEED MECHANISM</p> 
17	<p>Throat: The throat of a machine refers to the open space between the needle and the machine housing. A large throat is helpful when sewing bulky fabrics and large projects like quilts.</p>	
18	<p>Bobbin cover: The bobbin cover is a plate or hinged door that protects the bobbin mechanism. Open the bobbin cover to replace the bobbin and clean the bobbin area or case.</p>	
19	<p>Foot control: Like the gas pedal in a car, the foot control regulates the machine speed.</p>	

4. DIFFERENT TYPES OF SEWING MACHINES WITH TECHNICAL DETAILS

MACHINE INTRODUCTION

Following is the list of Sewing machines which will be introduced in the next pages.
(It is advised to the trainers to demonstrate the concepts in the machine room only.)

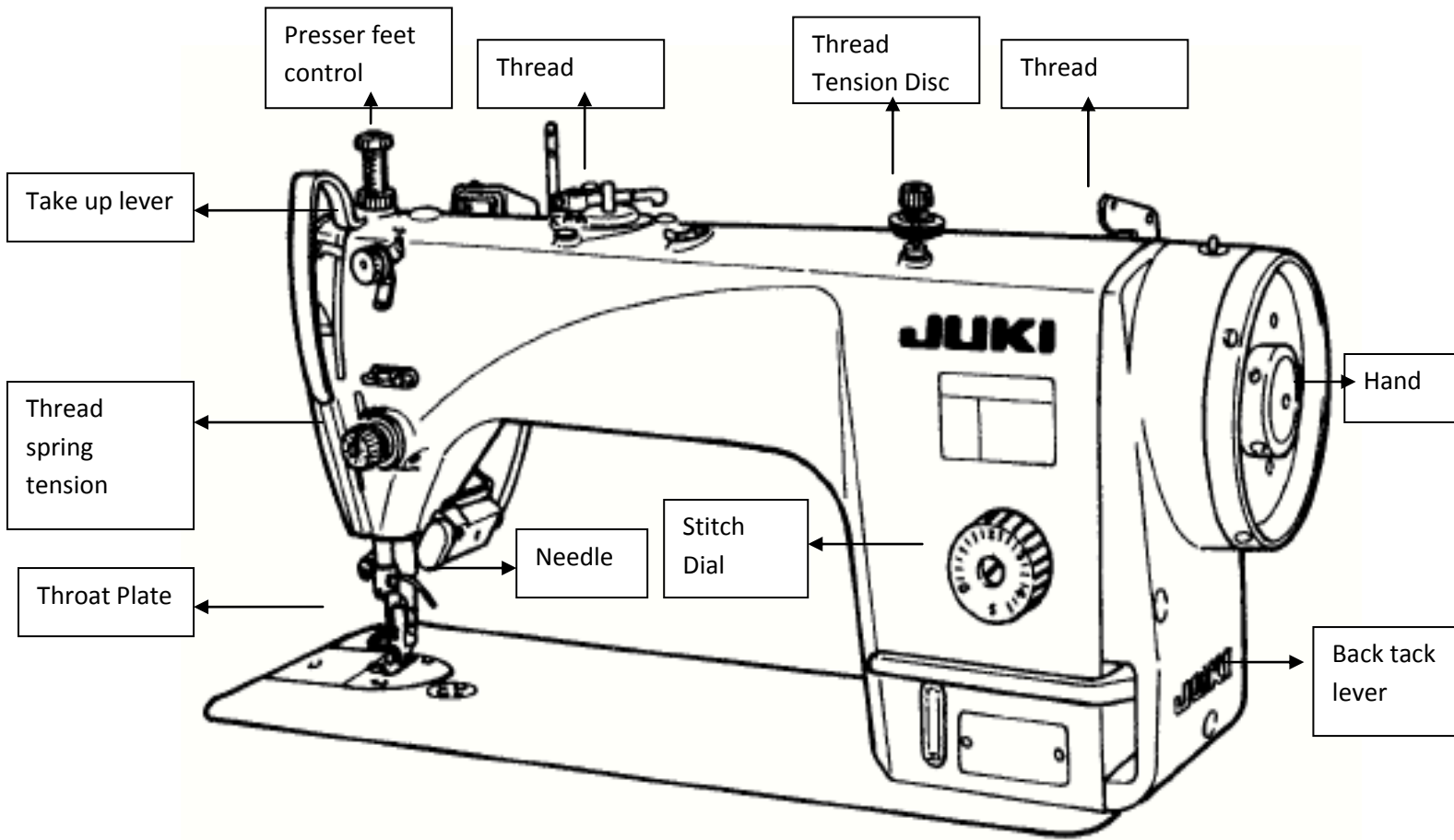
1	SNLS machine
2	Over lock (all type)
3	Flat lock machine
4	Feed of the arm machine
5	Bartack machine
6	Button stitch machine
7	Button hole machine

SINGLE NEEDLE LOCK STITCH MACHINE (SNLS)

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).



Industrial SNLS Sewing Machine
SEWING MACHINE AND ITS PARTS



10. TECHNICAL ADJUSTMENT OF SNLS MACHINE

Technical adjustments which are to be taught while dealing with SNLS machines are given below. Trainers should keep the following points in mind during the session of SNLS machine.

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.

Technical adjustments of SNLS machine

1. Basic Machine Practice (Loop Exercise)
2. Technical Specification
3. Installation of needle
4. Needle bar Height adjustment
5. Hook Set Timing
6. Feed Dog adjustment and alignment
7. Feed Dog Eccentric cam Adjustment
8. Pressure foot to Pressure adjustment

11. TECHNICAL ADJUSTMENT OF DNLS MACHINE

Technical adjustments which are to be taught while dealing with DNLS machines are given below. Trainers should keep the following points in mind during the session of DNLS machine

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.

Technical adjustments of DNLS machine

1. Basic Machine Practice (Loop Exercise)
2. Technical Specification
3. Installation of needle

4. Needle bar Height adjustment
5. Hook Set Timing
6. Feed timing Cam adjustment
7. Sprocket belt adjustment and change
8. Feed Dog adjustment and
9. Feed Dog alignment
10. Thread adjustment

OVERLOCK MACHINE

An over lock / over edge machine is a high speed sewing machine. This is the quickest performing machine for giving over edge stitches. Over lock Machines Are available in following Specifications-

- 2 T Over lock machine
- 3 T Over lock Machine
- 4 T Over lock Machine
- 5 T Over lock Machine
- 6 T Over lock Machine



Sr.No.	Machine Name	No. Of Threads	
1	2 T Overlock Machine	1	1
2	3 T Overlock Machine	1	2
3	4 T Overlock Machine	2	2
4	5 T Overlock Machine	2	3
5	6 T Overlock Machine	3	3

12. TECHNICAL ADJUSTMENT OF OVERLOCK MACHINE

Technical adjustments which are to be taught while dealing with OVERLOCK machines are given below. Trainers should keep the following points in mind during the session of OVERLOCK machine

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.
4. Practice of sewing on machine is also necessary.

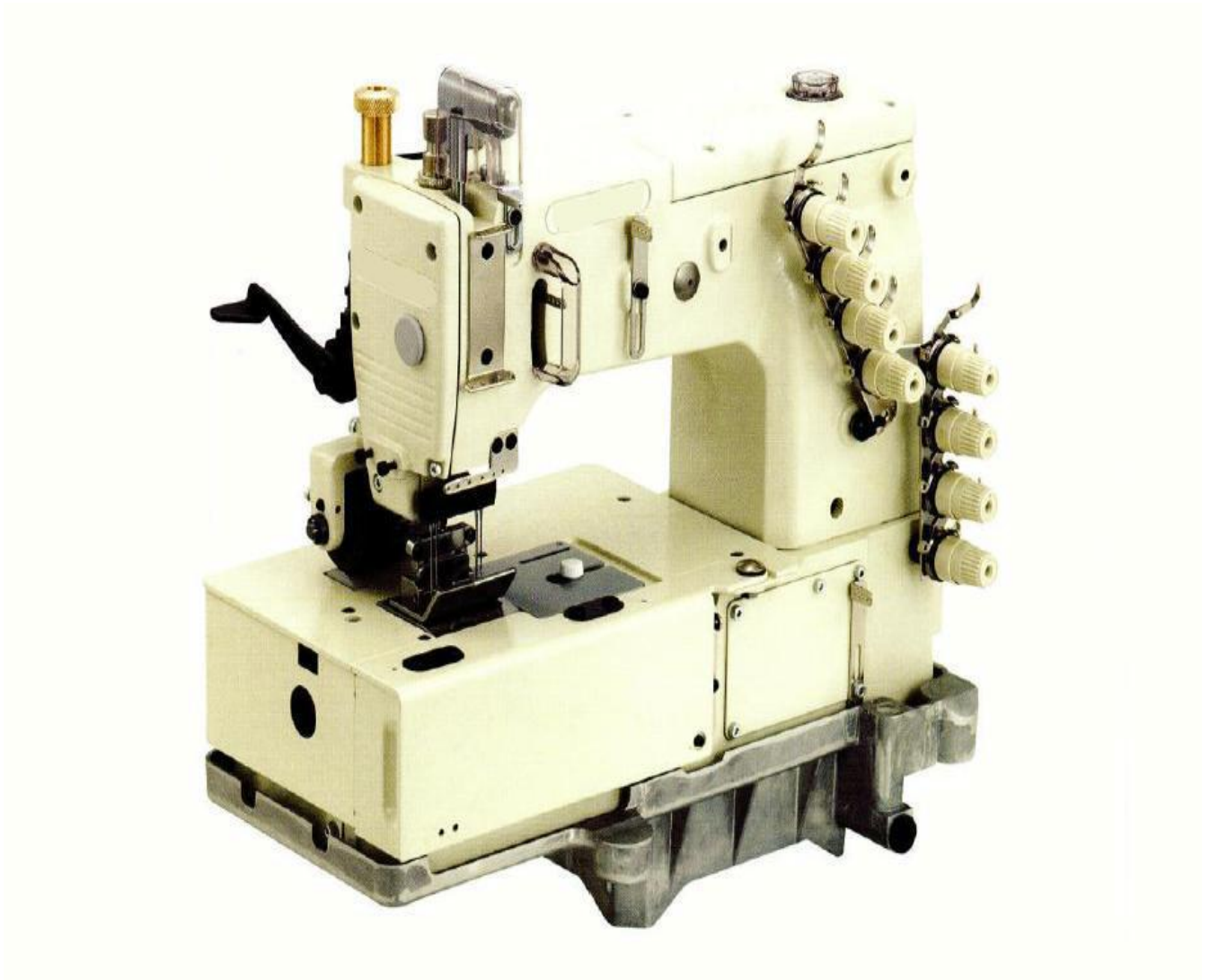
Technical adjustments of OVERLOCK machine

1. Basic Machine Practice
2. Technical Specification
3. Installation of needle
4. Needle bar Height adjustment
5. Needle to lower looper timing
6. Upper Looper Timing
7. Chain looper timing (Safety Stitch)
8. Upper Knife Adjustment
9. Lower Knife adjustment
10. Feed Dog Height adjustment
11. Cam Timing
12. Thread Adjustment

FLATLOCK MACHINE

Flat lock 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.

PARTS OF MACHINE



13. TECHNICAL ADJUSTMENT OF FLATLOCK MACHINE

Technical adjustments which are to be taught while dealing with FLATLOCK machines are given below. Trainers should keep the following points in mind during the session of FLATLOCK machine.

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.
4. Practice of sewing on machine is also necessary.

Technical adjustments of Flatlock machine

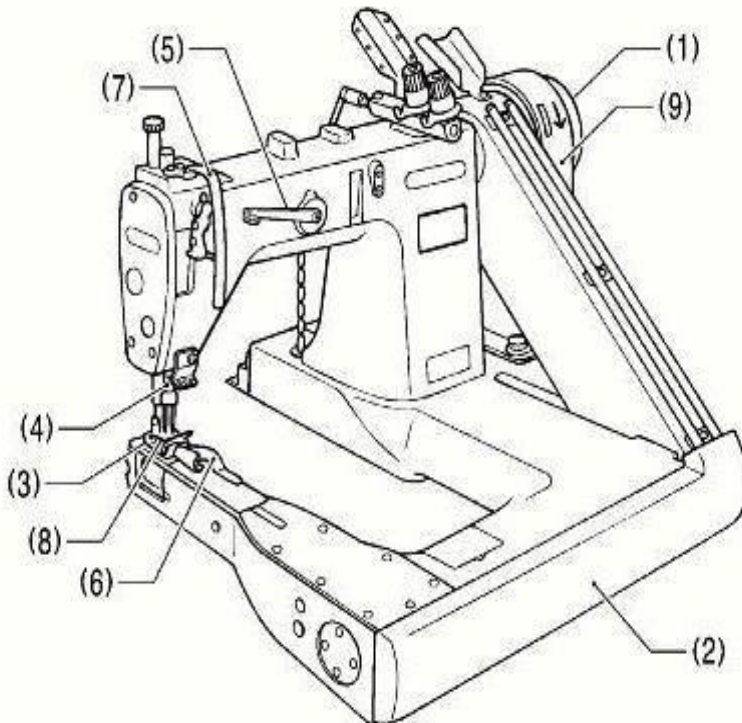
1. Basic Machine Practice
2. Technical Specification
3. Installation of needle
4. Needle bar Height adjustment
5. Main looper timing
6. Spreader Looper Adjustment
7. Stitch Length Adjustment
8. Feed Dog Height adjustment
9. Cam Timing (Thread)
10. Needle and looper guard adjustment

FEED OF THE ARM MACHINE:

This machine is largely used for attaching sleeves and for making complex circular stitches while attaching different parts of the garment



PARTS OF MACHINE



PARTS NAME –

1. Machine pulley
- 2 Front cover
- 3 Presser foot
4. Needle bar
5. Upper thread guide
6. Lapper

SAFETY DEVICE –

1. Thread Take up cover
2. Finger guard
3. Pulley Cover

14. TECHNICAL ADJUSTMENT OF FEED OF THE ARM MACHINE

Technical adjustments which are to be taught while dealing with Feed of Arm machines are given below. Trainers should keep the following points in mind during the session of Feed of arm machine

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.
4. Practice of sewing on machine is also necessary.

Technical adjustments of Feed of arm machine machine –

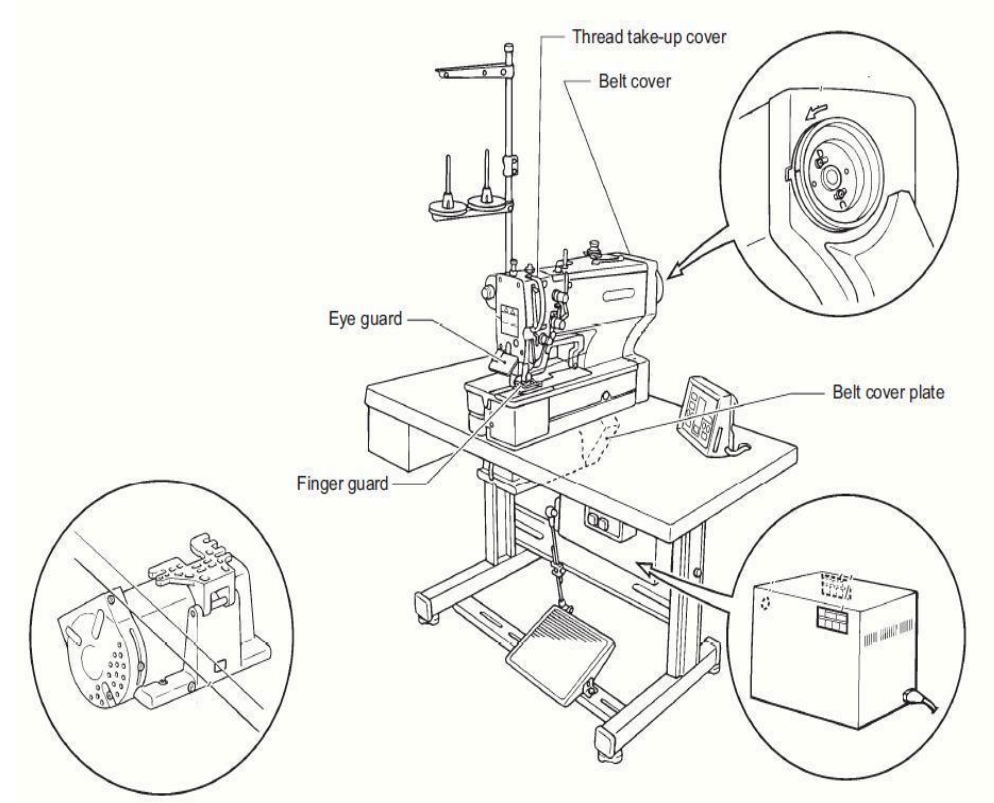
1. Basic Machine Practice
2. Technical Specification
3. Installation of needle
4. Needle bar Height adjustment
5. Main looper timing
6. Puller adjustment
7. Needle Guard Adjustment
8. Looper Guard adjustment
9. Feed Dog height adjustment
10. Stitch Length Adjustment (Threading adjustment)

BUTTON HOLE MACHINE

This machine is used for sewing buttons in the garment.



PARTS OF MACHINE



17. TECHNICAL ADJUSTMENT OF BUTTON HOLE MACHINE

Technical adjustments which are to be taught while dealing with Button Hole machines are given below. Trainers should keep the following points in mind during the session of Button Hole machine

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.
4. Practice of sewing on machine is also necessary.

Technical adjustments of Button Hole machine -

1. Basic Machine Practice
2. Technical Specification
3. Installation of needle
4. Needle Bar height adjustment
5. Hook Set Timing clearance
6. Thread trimming or scissors timing adjustment
7. Knife Adjustment and change
8. Panel Programming

18. TECHNICAL ADJUSTMENT OF BLIND HEM MACHINE

Technical adjustments which are to be taught while dealing with Blind Hem machines are given below. Trainers should keep the following points in mind during the session of Blind Hem machine.

1. First Demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.
4. Practice of sewing on machine is also necessary.

Technical adjustments of Blind Hem machine –

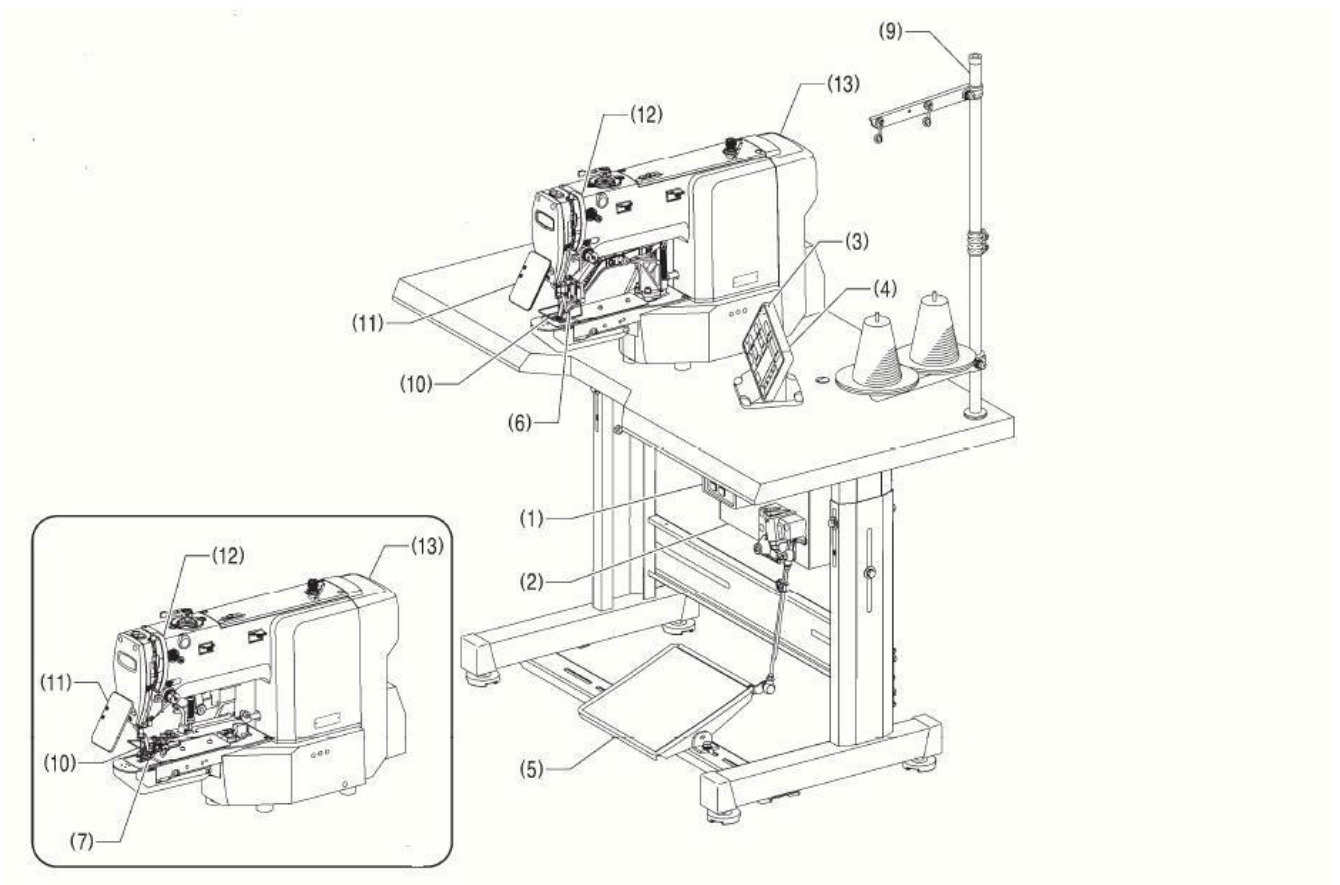
1. Basic Machine Practice
2. Technical Specifications
3. Looper timing adjustment
4. Stitch Length Adjustment

BUTTON ATTACH MACHINE

This is a high-speed buttonholing machine, which is used for sewing buttonholes in the garment.



PARTS OF MACHINE



Name of the various parts

1. Power Switch
2. Control box
3. SD card Slot
4. Operation Panel
5. Foot Switch
6. Work Clamp
7. Button Clamp
8. Pulley
9. Cotton Stand

SAFETY DEVICES

1. Finger Guard
2. Eye Guard
3. Threads take Up Cover
4. Rear Cover
5. Side Cover
6. DT Solenoid Cover

16. TECHNICAL ADJUSTMENT OF BUTTON ATTACH MACHINE

Technical adjustments which are to be taught while dealing with Button Stitch machines are given below. Trainers should keep the following points in mind during the session of Button Stitch machine.

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.
4. Practice of sewing on machine is also necessary.

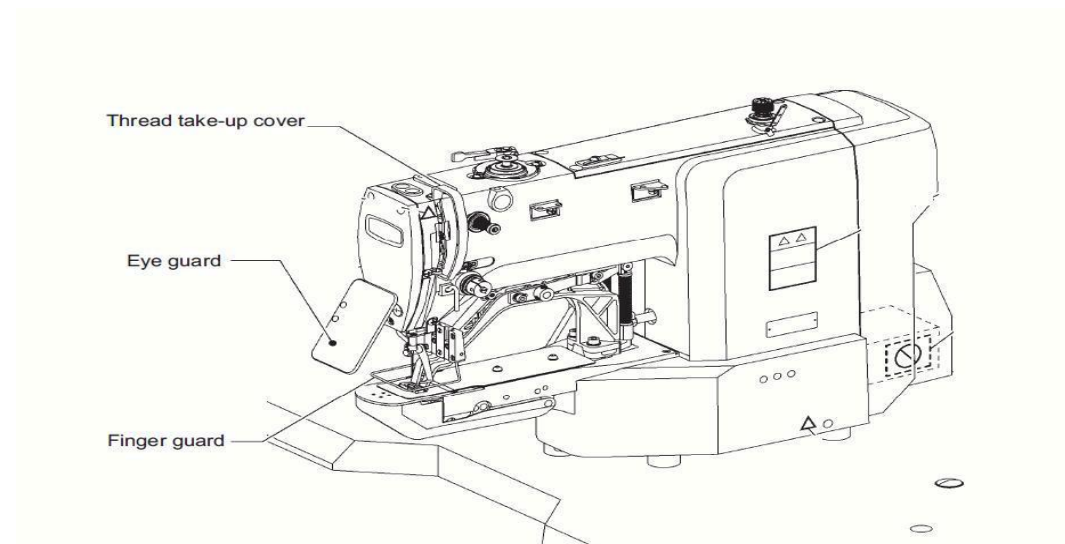
Technical adjustments of Button Attach machine –

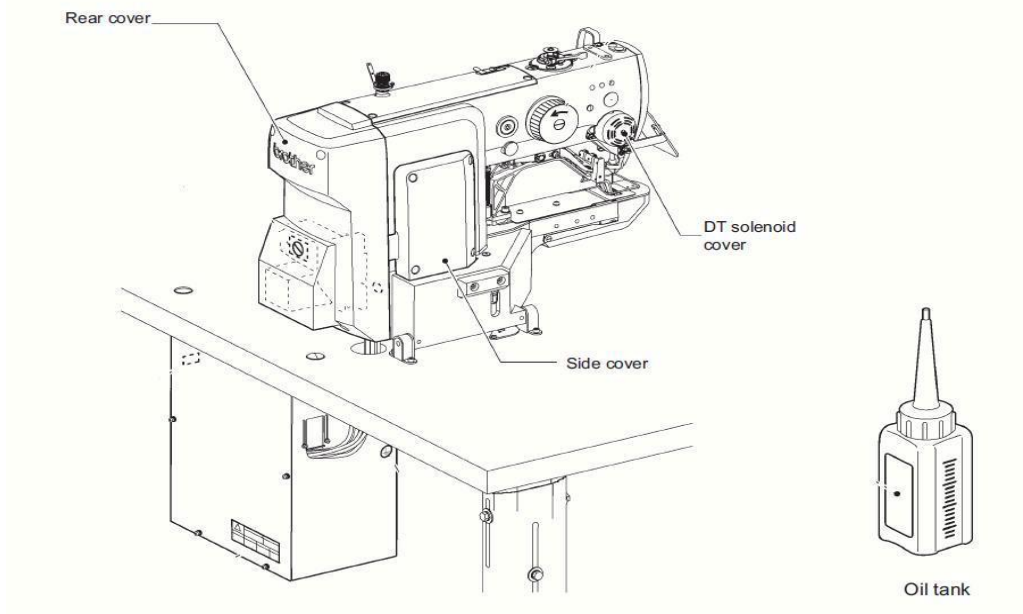
1. Basic Machine Practice
2. Technical Specification
3. Installation of needle
4. Button centre adjustment
5. Work Clamp adjustment
6. Needle Bar height adjustment
7. Hook Set Timing
8. Thread trimming (By moving and fix knife) Adjustment
9. Panel Programming

BARTACK MACHINE –

This machine is used for giving secure Bartack stitches.

PARTS OF BARTACK MACHINE





15. TECHNICAL ADJUSTMENT OF BARTACK MACHINE

Technical adjustments which are to be taught while dealing with Bartack machines are given below. Trainers should keep the following points in mind during the session of Bartack machine.

1. First demonstrate the adjustment then ask trainee to practice on the machine.
2. Use the Instructional manual given by the machinery supplier during Session
3. Make sure, all the trainees are able to understand the Instructional manual.
4. Practice of sewing on machine is also necessary.

Technical adjustments of Bartack machine

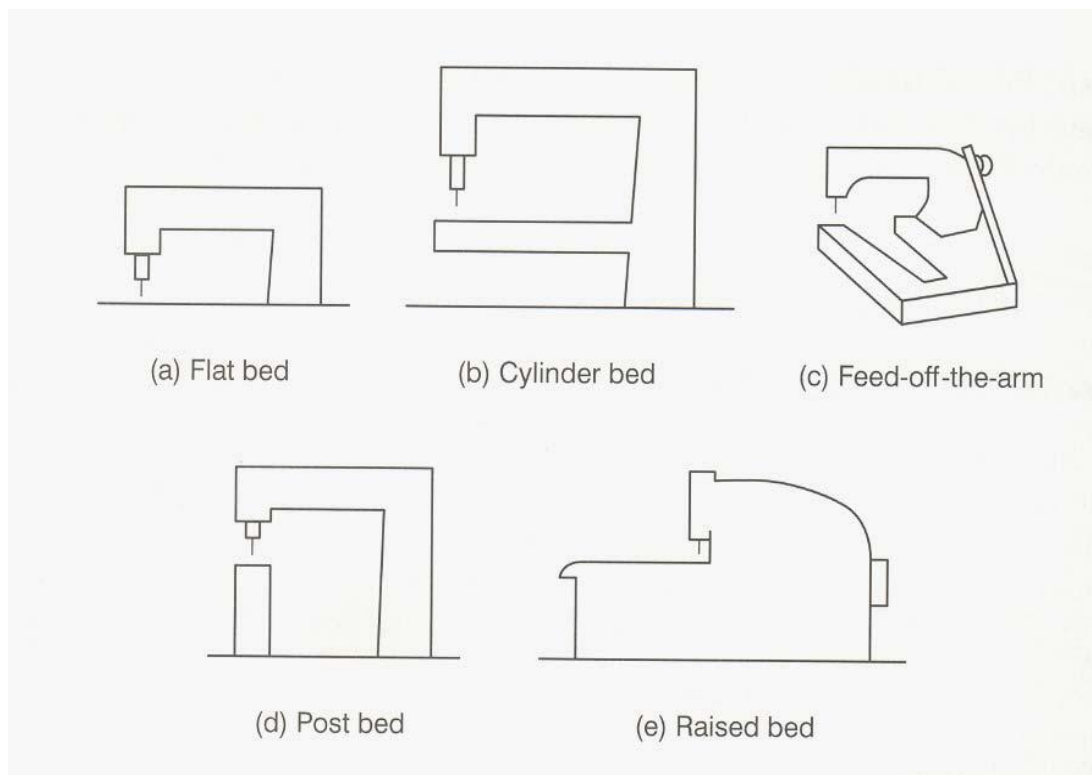
1. Basic Machine Practice
2. Technical Specification
3. Installation of needle
4. Needle Bar height adjustment
5. Stitch length adjustment
6. Hook Set Timing
7. Thread trimming (By moving and fix knife) Adjustment
8. Panel Programming

5. DIFFERENT TYPES OF SEWING MACHINE BEDS

CLASS ROOM CONCEPTS

In fashion manufacture the machines are still predominantly used in their basic forms but, for more specialized garments and those made in higher volume, variations in machine shape are available which enables easier movement of the materials around the machine. These variations primarily affects the shape of the bed of the machine, i.e. the part on which material rest. The best known version is the flat bed and the main alternatives are cylinder bed, Post bed and feed – off- the arm. The blind felling machine is also a special shape, as are the Over edge machines which have no fabric space to the right of the needle.

Following is the classification of different bed type used in machinery.



1. FLAT BED

The flat bed is used in the majority of sewing where a large and open garment part can easily be handled past the needle. It provides a suitable surface for all flat sewing and also facilitates the use of markers to control the position of the garment parts. For example, a patch pocket on a shirt front.

2. CYLINDRICAL BED

These beds are basically used where the parts to be sewn are small, curved or otherwise awkward in shape.

3. POST BED

It has the same applications as cylindrical Bed.

4. FEED OF THE ARM

The feed-off-the-arm machine is used where a lapped seam has to be closed in such a way that the garment part becomes a tube. They are common in jeans production where the outside leg seam is normally the type known as lap-felled and it is joined after the inside leg seam in the sequence of construction. The operator wraps the part to be sewn around the machine bed and it is fed away from the operator, off the end of the bed, as the operator sews.



5. BLIND STITCH

This machine also consist a different type of machine bed which is shown in the given picture. Example of Blind machine's use is in the bottom hem of trousers and sometimes on closing the curtains etc.



6. OVERLOCK M/C bed

Over edge machine also have a different type of machine bed (See picture) which have no fabric space to the right of the needle.



Types of Sewing Machine	Stitch Type	Features and Uses
Flat bed machine (basis type)	Lockstitch, Chain stitch	The large working area allows a wide range of application; the material can easily be guided around the needle and the presser foot. This basic type is used for all kinds of flat sewing work.
Raised bed machine	Lockstitch, Chain stitch	The bedplate is in the form of a plinth. It facilitates the assembly of pre-sewn parts and is especially suitable for the fitting of accessories and special attachments. This is the basic form for various specialized machines such as buttonholers.
Post bed machine	Lockstitch, Chain stitch	This type has an increased working height Special applications are found in the working of three-dimensional products. e.g. shoes and bags. The post bed makes it easier to work on tight curves and corners, to sew in sleeves and to complete large, half-assembled products.
Cylinder bed machine	Lockstitch, Chain stitch	This type has an increased working height and a bed in the shape of a horizontal arm. It is especially suitable for working on tubular parts, such as cuffs, sleeves, and trouser legs, and also for button sewing and bar tacking. It is used extensively in the making of clothing from knitted fabrics.
Side bed machine	Chain stitch, Over-edge	Machines which are specialized for sewing at edges need only a small working area

6. DIFFERENT TYPES OF SEWING MACHINE BELTS

CLASS ROOM CONCEPTS

A belt is a loop of flexible material used to link two or more rotating shafts mechanically. Belts may be used as a source of motion, to power efficiently, or to track relative movement. Belts are looped over pulleys. In a two pulley system, the belt can either drive the pulleys in the same direction, or the belt may be crossed, so that the direction of the shafts is opposite. As a source of motion, a conveyor belt is one application where the belt is adapted to continually carry a load between two points

Belts are the cheapest utility for power transmission between shafts that may not be axially aligned. Power transmission is achieved by specially designed belts and pulleys.

Pros and cons

Belt drive, moreover, is simple, inexpensive, and does not require axially aligned shafts. It helps protect the machinery from overload and jam, and it isolates noise and vibration. Load fluctuations are shock-absorbed (cushioned). They need no lubrication and require minimal maintenance. They have high efficiency (90-98%, usually 95%), high tolerance for misalignment, and are inexpensive if the shafts are far apart. Clutch action is activated by releasing belt tension. Different speeds can be obtained by step or tapered pulleys.

The angular-velocity ratio may not be constant or equal to that of the pulley diameters, due to slip and stretch. However, this problem has been largely solved by the use of toothed belts. Adjustment of center distance or addition of an idler pulley is crucial to compensate for wear and stretch.

Following are the various types of Belts which are widely used

1. FLAT BELT :

The drive belt: used to transfer power from the engine's flywheel. Here shown driving a threshing machine.

Flat belts were used early in line shafting to transmit power in factories. It is a simple system of power transmission that was well suited for its day. It delivered high power for high speeds (500 hp for 10,000 ft/min), in cases of wide belts and large pulleys. These drives are bulky, requiring high tension leading to high loads, so **vee belts have mainly replaced the flatbelts except when high speed is needed over power.**



ROUND BELTS –

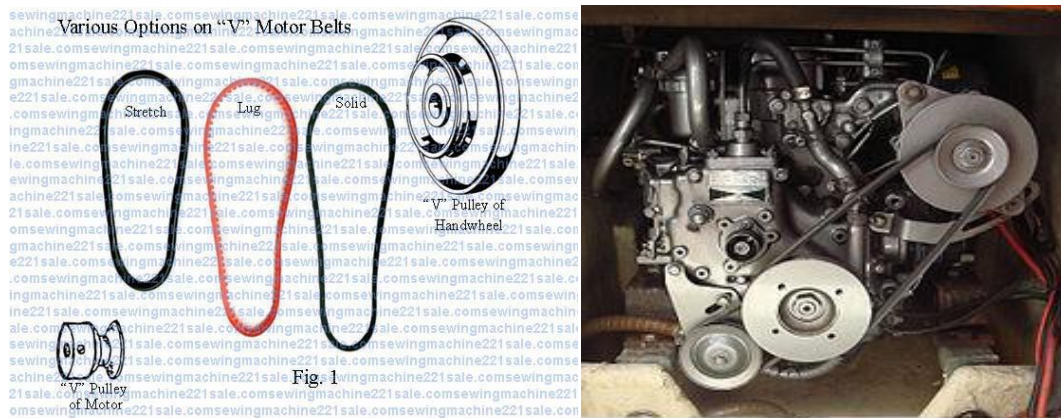
Round belts are a circular cross section belt designed to run in a pulley with a circular (or near circular) groove. They are for use in low torque situations and may be purchased in various lengths or cut to length and joined, either by a staple, gluing or welding (in few case).

Early sewing machines utilized a leather belt, joined either by a metal staple or glued, to a great effect.

VEE BELTS –

Vee belts (also known as V-belt or wedge rope) solved the slippage and alignment problem. **It is now the basic belt for power transmission.** They provide the best combination of traction, speed of movement, load of the bearings, and long service life. They are generally endless, and their general cross-section shape is trapezoidal. The "V" shape of the belt tracks in a mating groove in the pulley (or sheave), with the result that the belt cannot slip off. The belt also tends to wedge into the groove as the load increases — the greater the load, the greater the wedging action — improving torque transmission and making the V-belt an effective solution, needing less width and tension than flat belts. V-belts need larger pulleys for their larger thickness than flat belts. They can be supplied at various fixed lengths or as a segmented section, where the segments are linked (spliced) to form a belt of the

required length. For high -power requirements, two or more vee belts can be joined side-by-side in an arrangement called a multi-V, running on matching multi-groove sheaves. This is known as a multiple-V-belt drive (or sometimes a "classical V-belt drive").



MULTI-GROOVE BELTS –

A multi-groove or Poly groove belt is made up of usually 5 or 6 "V" shapes alongside each other. This gives a thinner belt for the same drive surface, thus is more flexible, although often wider. The added flexibility offers an improved efficiency, as less energy is wasted in the internal friction of continually bending the belt. In practice this gain of efficiency is overshadowed by the reduced heating effect on the belt, as a cooler-running belt lasts longer in service. A further advantage of the poly groove belt, and the reason they have become so popular, stems from the ability to be run over pulleys on the un grooved back of the belt. Although this is sometimes done with vee belts and a single idler pulley for tensioning, a poly groove belt may be wrapped around a pulley on its back tightly enough to change its direction, or even to provide a light driving force.

TIMING BELT

Timing belts are a positive transfer belt and can track relative movement. These belts have teeth that fit into a matching toothed-V pulley. When correctly tensioned, they have no slippage, run at constant speed, and are often used to transfer direct motion for indexing or timing purposes (hence their name). They are often used in lieu of chains or gears, so there is less noise and a lubrication bath is not necessary.

Camshafts of automobiles, miniature timing systems, and stepper motors often utilize these belts.

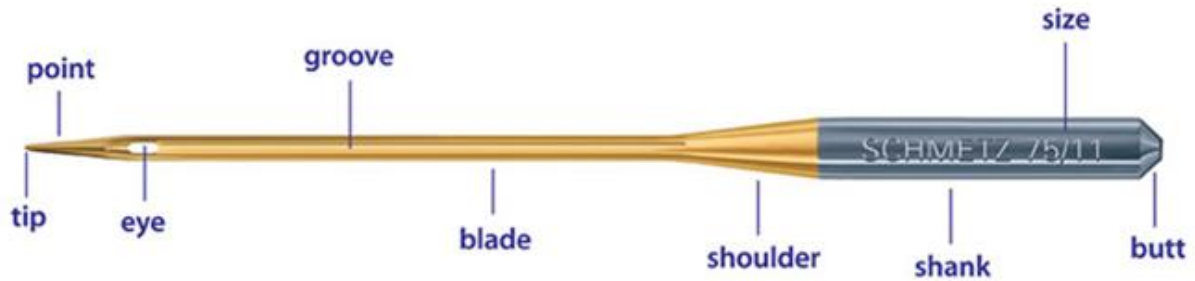
Timing belts need the least tension of all belts, and are among the most efficient. They can bear up to 200 hp (150 kW) at speeds of 16,000 ft/min. Timing belts with a helical offset tooth design are available. The helical offset tooth design forms a chevron pattern and causes the teeth to engage progressively. The chevron pattern design is self aligning. The chevron pattern design does not make the noise that some timing belts make at idiosyncratic speeds, and is more efficient at transferring power (up to 98%).

Disadvantages include a relatively high purchase cost, the need for specially fabricated toothed pulleys, less protection from overloading and jamming, and the lack of clutch action.

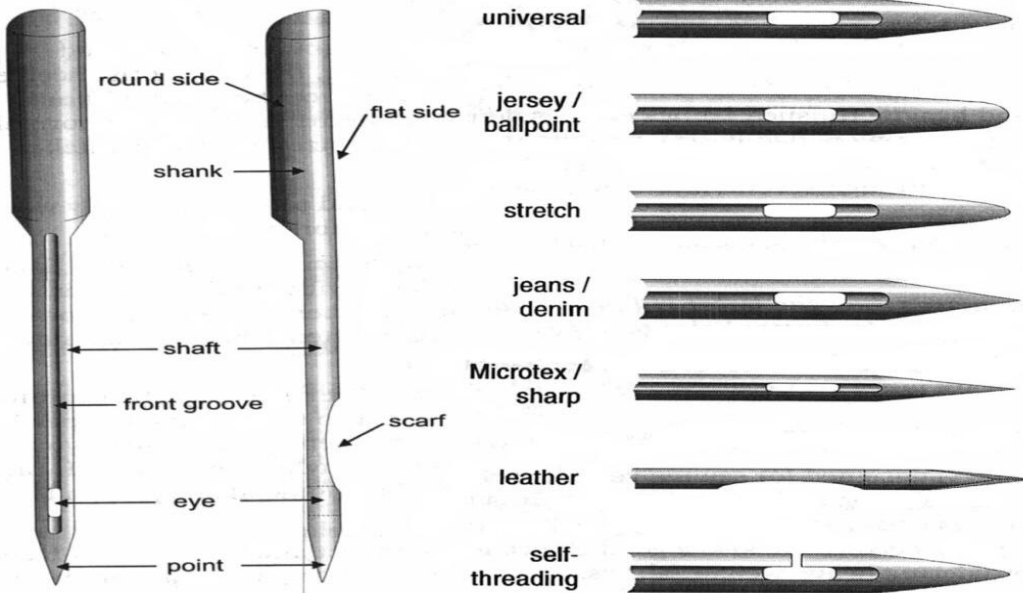


7. VARIOUS TYPES OF NEEDLES USED FOR SEWING DIFFERENT FABRICS

Select the type of needle based on the textile construction (i.e knit vs woven), and the needle size is determined by the thickness of the thread and the weight of the fabric used for sewing.



There are two needle sizing system :American and European. American Needle sizes range from 8 to 19, and European sizes range from 60 to 120. Larger the number, the larger the blade of the needle.



Commonly used needles and their uses as below:-

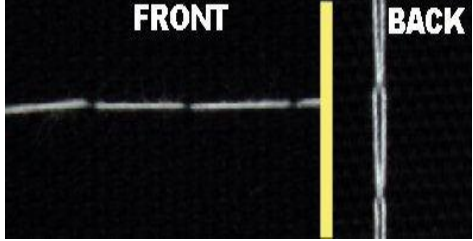


Needle	Fabric Uses	Sizes	Description
Ball-point	Knits	70/10 – 100/16	This needle has a medium tip that is a slightly more rounded than a universal needle and passes between the fabric threads instead of piercing them. Ball-point needles ensure more even stitches on coarse and heavy knits and won't damage spandex, interlocks and other knits that snag or run easily.
Sharp/ Microtex	Finely woven fabrics	60/8 – 90/14	These needles feature a narrow shaft and sharper point to pierce the threads of woven fabrics. Use for stitching smooth, finely woven fabrics, such as silk, chintz, lightweight faux suede and microfiber fabrics. Because these needles enable perfectly straight stitching, they're also ideal for heirloom stitching, topstitching, pintucks and edge stitching.
Universal	Knits or woven	60/8 – 120/19	Point is very slightly rounded for use on knits, but sharp enough to pierce woven fabrics. These needles are available in the widest size range. Use when stitching Synthetic or natural woven and knits.
Denim/ Jeans	Heavy wovens and denims	70/10 – 110/18	These needles have a thick, strong shaft and a very sharp point. They are used for stitching denim, canvas, duck and other heavy, tightly woven fabrics. They are also ideal for stitching through multiple fabric layers without breaking.

8. DIFFERENT CATEGORIES OF STITCHES

Stitches can be divided into the following categories:


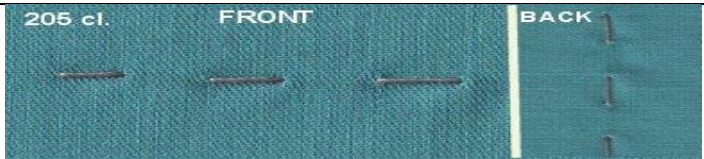
100 Class Stitches

Single Thread Chain stitches Using One Needle Thread and One Blind Loper

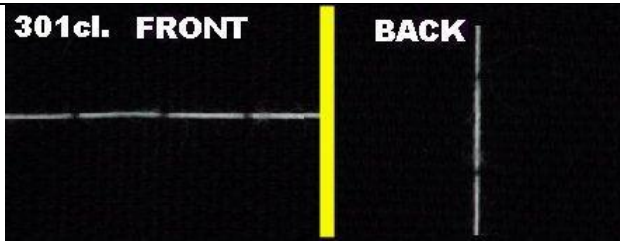
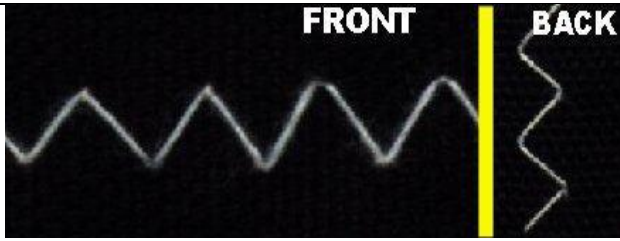

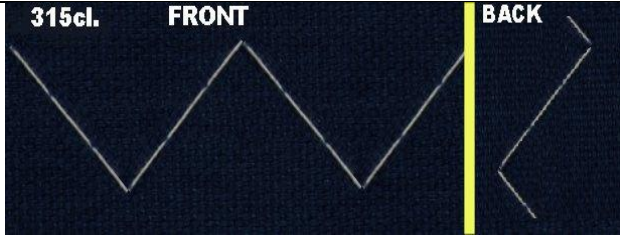
Diagram	Stitch Class	Thread count	Typical Uses
	101 Class	One Thread	Basting, or light Construction
	103 Class	One Thread	Blindstitch for Hemming
	104 Class	One Thread	Saddle Stitch

200 Class Stitches

Single Thread Hand Sewn Stitches Using One Needle Thread

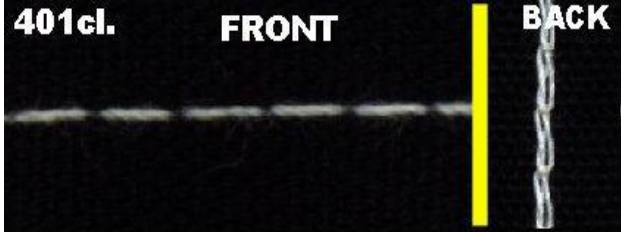
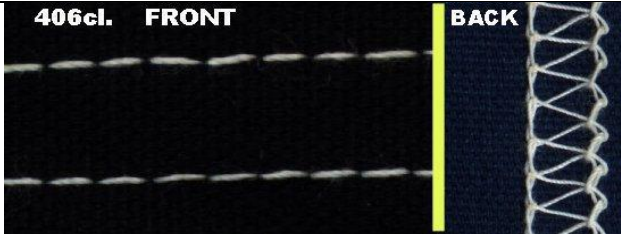
Diagram	Stitch Class	Thread count	Typical Uses
	202 Class	One Thread	Basting, Tacking or Repairs
	205 Class	One Thread	Pick Stitch-Topstitching

300 Class Stitches

Diagram	Stitch Class	Thread count	Typical Uses
 <p>301cl. FRONT BACK</p>	301 Class	Two Thread	Seaming Multiple Plies
 <p>FRONT BACK</p>	304 Class	Two Thread	Zig-Zag Stitch; A Stretch Lockstitch
 <p>306cl. FRONT BACK</p>	306 Class	Two Thread	Blind Stitch
 <p>315cl. FRONT BACK</p>	315 Class	Two Thread	"Three Step Zig-Zag; stretch lockstitch with more Stretch


400 Class Stitches

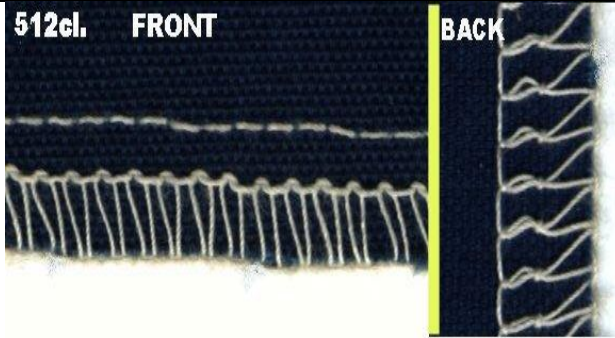
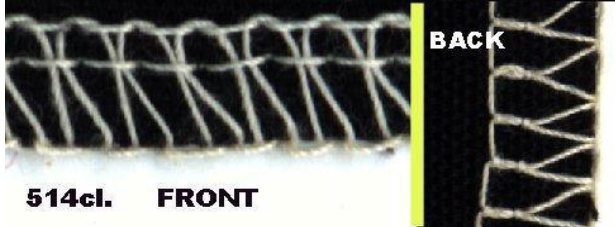
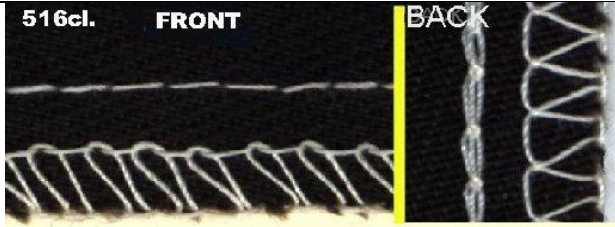
Multi-Thread Chain Stitches Using One or More Needle Threads and One or More Loper Threads

	Stitch Class	Thread count	Typical Uses
 <p>401cl. FRONT BACK</p>	401 Class	Two Thread	Seaming Multiple Plies with moderate stretch
 <p>406cl. FRONT BACK</p>	406 Class	Three Thread	"Bottom Cover Stitch; a (greater) stretch Chainstitch

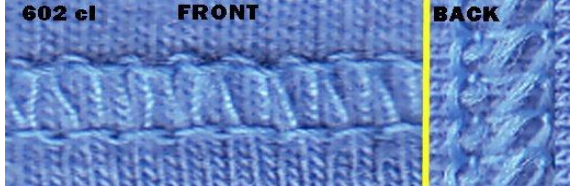
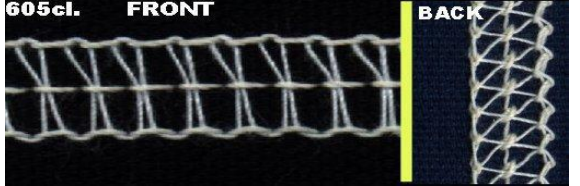

500 Class Stitches

Multi-Thread Over Edge Chain stitches Using Needle Thread(s) and Loper Thread(s)

	Stitch Class	Thread count	Typical Uses
 <p>504cl. FRONT BACK</p>	504 Class	Three Thread	Over edge stitch for Serging and Light Seaming

 <p>512cl. FRONT</p> <p>BACK</p>	<p>512 Class</p>	<p>Four Thread</p>	<p>Mock Safety Stitch for Seaming with wide bite and Greater Stretch for Knits</p>
 <p>514cl. FRONT</p> <p>BACK</p>	<p>514 Class</p>	<p>Four Thread</p>	<p>Overedge Stitch for Seaming with wide bite and Greater Stretch for Knits</p>
 <p>516cl. FRONT</p> <p>BACK</p>	<p>516 Class</p>	<p>Five Thread</p>	<p>True Safety Stitch for Seaming with Good Stretch for Wovens and Knits</p>

600 Class Stitches
Multi-Thread Cover stitches

	Stitch Class	Thread count	Typical Uses
 <p>602 cl. FRONT</p> <p>BACK</p>	<p>602 Class</p>	<p>Four Thread</p>	<p>Cover Stitch or Seaming Knits</p>
 <p>605cl. FRONT</p> <p>BACK</p>	<p>605 Class</p>	<p>Five Thread</p>	<p>Cover Stitch or Butt-Seams</p>
 <p>607 cl. top</p>	<p>607 Class</p>	<p>Six Thread</p>	<p>Wide Cover Stitch or Butt- Seams</p>

9. LUBRICATION AND MAINTENANCE SYSTEMS

CLASS ROOM CONCEPTS

OILING SYSTEMS

A. **Manual oiling system** it requires the operator to oil each point individually, and on a regular (preferred 4-hour) basis.

B. **Automatic oiling system** it can supply all points of lubrication or can be combined with manual oiling. The oil in automatic systems can be distributed:

1. Through gravity,
2. Through splash,
3. Through wicking (such as cotton cord), or
4. Through pressure supplied by a pump.

All automatic oiling systems require the reservoir to be filled to a certain level with oil. Wick fed systems range from small reservoirs (the wicking itself may serve as reservoir) to more substantial cavities. The smaller the reservoir, the more often oil will need to be added. Larger oil reservoirs of any system type may have marked indicator levels, so that the operator can verify that enough oil is available in the reservoir.

Pressure lubrication systems may have sight windows or bubbles. A flow or splash of oil seen through these windows or bubbles will indicate that there is likely a good pressure of oil in the system. Pressure systems may also have adjustment needles or valves to control the flow of oil to critical points such as the hook race.

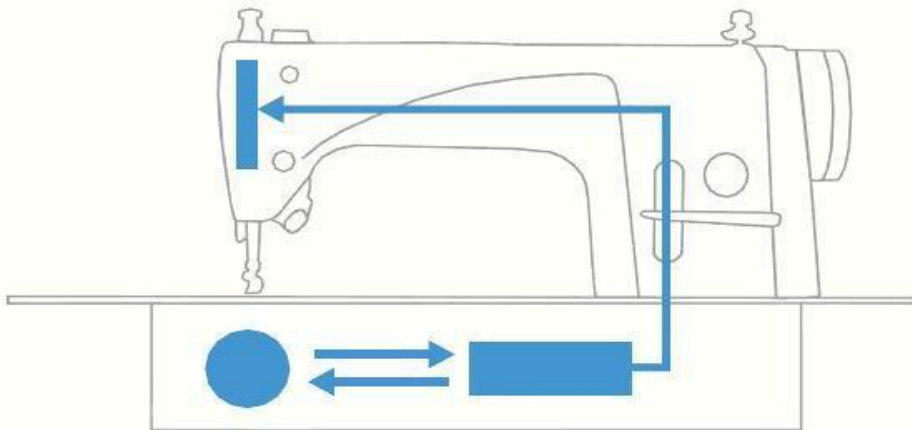
Any system can have an oil return mechanism to recirculate oil and to prevent build-up of oil in pockets from which it may leak or overflow. The oil return mechanisms can be gravity flow, wicking, or both. Pressure systems may also incorporate a suction return, operated by the same pump that supplies oil pressure.

Lubrication is necessary for the sewing machine maintenance but at the same time lubrication may be the cause of oil stains in a garment.

To prevent the oil stains in a garment, an advance technology is used .On the basis of that technology, we can divide the sewing machines into the following categories:-

1. Sewing Machine with Lubrication
2. Semi Dry head Sewing Machine
3. Dry Head Sewing Machine

SEWING MACHINE (SNLS) WITH LUBRICATION:

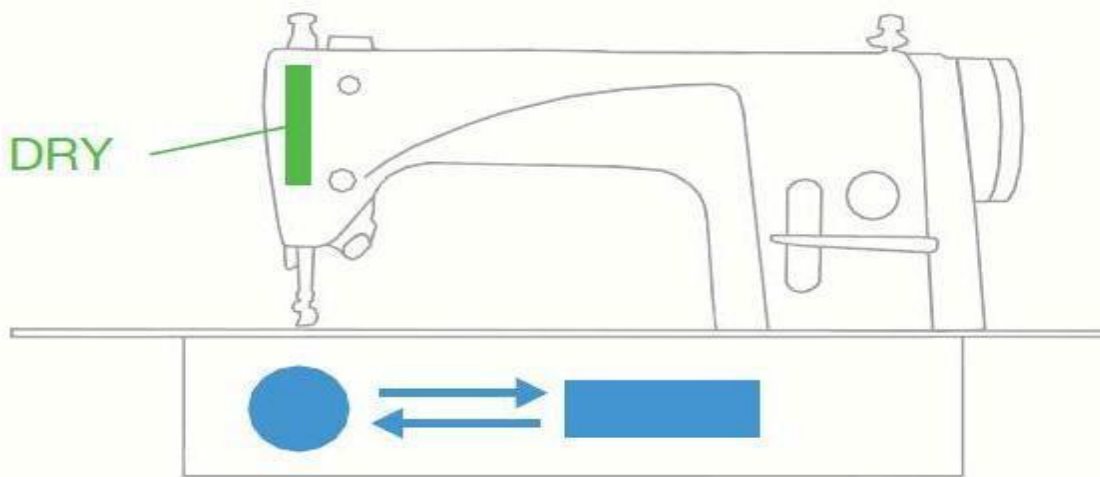


The needle bar and thread take-up components are lubricated with the minimum required quantity of oil.

For the hook section, the standard method of lubrication is employed.

SEMI DRY HEAD SEWING MACHINE

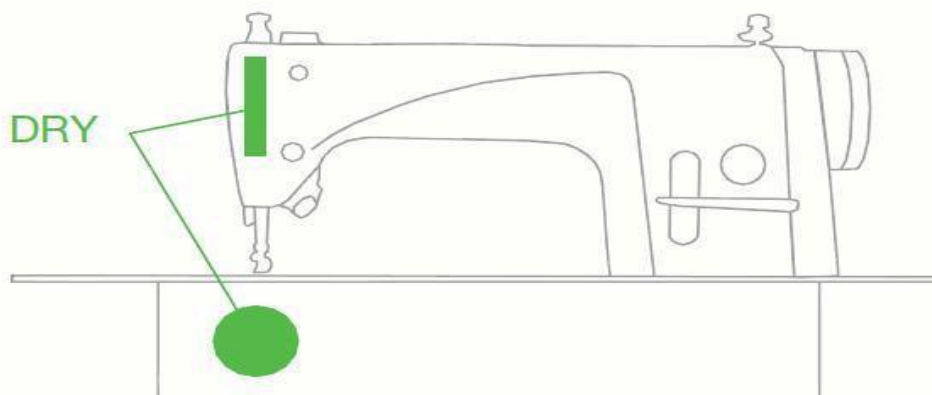
With the advanced dry technology of enabling operation without being lubricated, a frame which does not need lubrication has been developed. It is provided with not only a high-speed sewing capability, but also a safety feature for preventing oil stains.



- The needle bar and thread take-up components are not lubricated.
- For the hook section, the standard method of lubrication is employed.

DRY HEAD SEWING MACHINE

As its designation indicates, the dry-head type machine ensures convenience of use by totally preventing the oil from staining the material being sewn. The machine wholly contributes to the improved quality of finished products.



The section around the needle bar, the thread take-up lever and the hook are not lubricated.

MAINTENANCE

Maintenance is an Activity involved in maintaining something in “good working order”. Widely it can be divided into two categories.

1. Corrective Maintenance
2. Preventive Maintenance

Corrective maintenance can be defined as the maintenance which is required when an item has failed or worn out and to bring it back to working order. Corrective maintenance is the most commonly used maintenance approach, but it has its limitations. When an equipment fails, it often leads to downtime in production, and sometimes damages other parts. In most cases, this is expensive also, if the equipment needs to be replaced, the cost of replacing alone can be substantial. Reliability of systems maintained by this type of maintenance is unknown and cannot be measured. Therefore, corrective maintenance is carried out on all items where the consequences of failure or wearing out are not significant (less important items) and the cost of this maintenance is not greater than preventive maintenance.

Preventive Maintenance

Preventive maintenance is conducted to keep equipments working and/or extend the life of the equipments. The primary goal of maintenance is to avoid or mitigate the consequences of failure of equipment. Preventive Based Maintenance help to prevent the failure before it actually occurs. It is designed to preserve and restore equipments reliability by replacing worn components before they actually fail. Preventive maintenance activities include partial or complete overhauls at specified periods, oil changes, lubrication and so on. In addition, workers can record equipment deterioration so they know when to replace or repair worn parts before they cause system failure. The ideal preventive maintenance program would prevent all equipment failure before it occurs. Following are the two examples of Preventive maintenance Schedule which are commonly used in garment industry –

1st Plan talks about the, activities which have to be carried out on monthly basis and 2nd Plan talks about the quarterly (3 Months) basis.

1. PREVENTATIVE MAINTENANCE SERVICES PLAN
MONTHLY CHECK

1.	Thread stand clean & tight
2.	Bobbin winder proper check
3.	Feed dog check
4.	Pressure foot check
5.	Needle plate check
6.	Needle screw check
7.	V-belt check
8.	Belt cover clean & tight
9.	Pully & pully cover check
10.	Hook set check
11.	Oil level check properly & clean
12.	Needle guard check
13.	Moving knife check
14.	Fix knife check
15.	Foot rest check
16.	Head rest pin check
17.	Knee pad check
18.	Padle mat check
19.	Ubt machine proper working & check
20.	Stand shoe check
21.	Fabric guide check
22.	Pedal chain check
23.	Looper check
24.	Waste tube check
25.	Lower knife check
26.	Upper knife check
27.	Eye glass check
28.	Table top condition check

29.	Machine condition check
30.	Gauge set check
31.	Top feed dog check
32.	Gear bearing check
33.	Pressure bar / regulator check
34.	Bobin case check
35.	Oil lubrication system check ing

	2.PREVENTATIVE MAINTENANCE SERVICES PLAN QUARTERLY CHECK
1.	Oil change
2.	Moto & control box clean by air pressure
3.	All moving parts checking / replacement
4.	Gear and bearing checking / replacement

10. DIFFERENT TYPES FEED MECHANISMS

CLASS ROOM CONCEPTS

DEFINITION

Besides the basic motion of needles, loppers and bobbins, the material being sewn must move, so that each cycle of needle motion involves a different part of the material. This motion is known as feed, and sewing machines have almost as many ways of feeding material as they do of forming stitches. For general categories, we have: drop feed, needle feed, walking foot, puller, and manual. Often, multiple types of feed are used on the same machine. Besides these general categories, there are also uncommon feed mechanisms used in specific applications like edge joining fur, making seams on caps, and blind stitching.

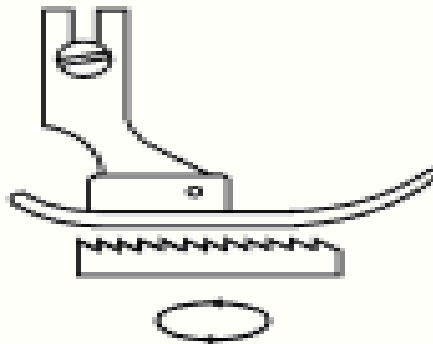
Functions of Feed dog

- Makes the sewing product move per stitch.
- Can change amount to move and forms stitches suitable for the sewing product.
- Stretch stitching or gathering stitching can be performed by means of feed mechanism, and prevention of puckering, gathering, etc. can be performed.

DIFFERENT TYPES OF FEED

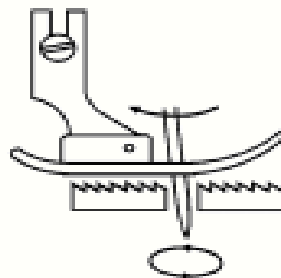
BOTTOM FEED

This is the most standard feed mechanism, which feeds material with a lower feed dog only. Uneven material feeding is likely to occur because of bottom feed only. However, sharp curve stitching can be easily performed and material handling is easy.



NEEDLE FEED (BOTTOM FEED + NEEDLE FEED)

This is the feed mechanism in which needle bar moves in synchronization with bottom feed. Feeding force is strong, and this type can feed material more precisely than the aforementioned bottom feed type sewing machine. Uneven material feeding is reduced, but, stitch shrinking due to thread tightness is likely to occur.



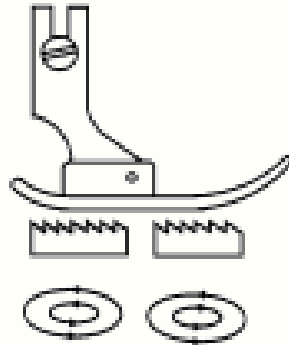
DIFFERENTIAL FEED (FRONT BOTTOM FEED + REAR BOTTOM FEED)

This is the bottom feed mechanism, but feed dog is divided into front and rear. This is the feed mechanism which is possible to intentionally stretch material or gather material by changing feed amount of front feed dog and rear feed dog. This is suitable for sewing elastic knit.

Differential feed ratio (e.g. JUKI over lock sewing machine, MO Series)

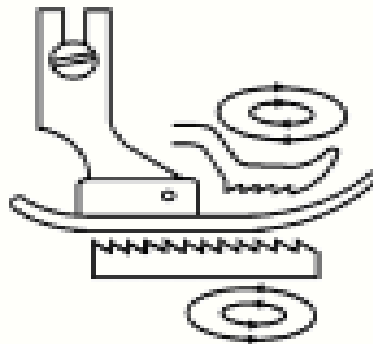
Gathering 1: 2 (Max. 1: 4)

Stretching 1: 0.7 (Max. 1: 0.6)



BOTTOM AND VARIABLE TOP FEED (BOTTOM FEED + TOP DIFFERENTIAL FEED)

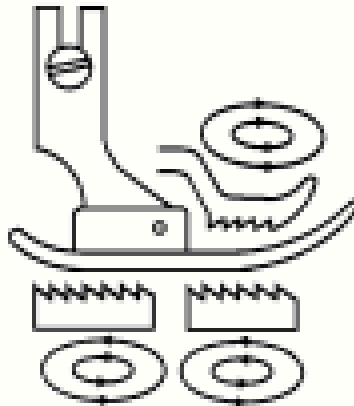
There is a feed dog on the top side in terms of bottom feed, and top feed amount can be adjusted simultaneously together with adjustment of material feed from the bottom side. Accordingly, this is the feed mechanism which is possible to prevent sewing slippage, and to perform edging contracting or gathering.



DIFFERENTIAL BOTTOM FEED AND VARIABLE TOP FEED

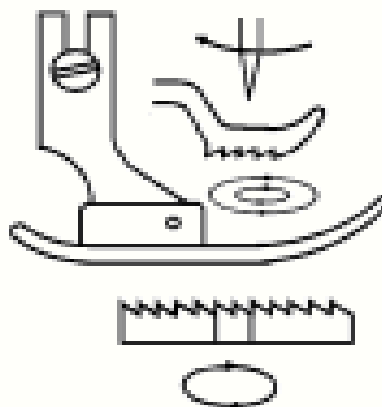
(Differential Feed + Top Differential Feed)

Bottom feed is differential feed, and top feed amount can be adjusted simultaneously together with adjustment (stretching and gathering) of material feed from the bottom side. Accordingly, this is the suitable mechanism which can give most suitable feed amount to the upper and lower materials.



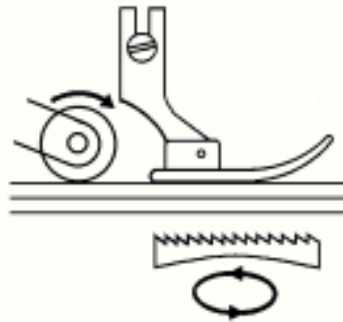
UNISON FEED (BOTTOM FEED + TOP FEED + NEEDLE FEED)

Feed force of this mechanism is most superior and this feed mechanism is largely used for extra heavy-weight materials or the like.



FEED WITH CLOTH PULLING ROLLER

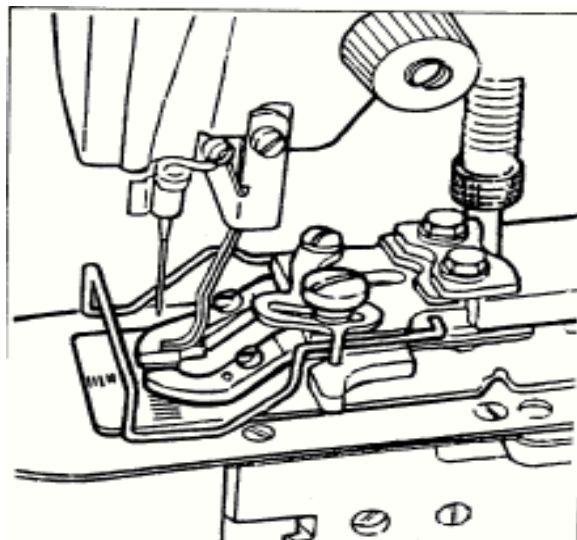
Roller located in the rear of presser foot pulls materials and sewing is performed. Uneven material feeding is reduced and working property is improved.



FIXED FEED

This is the feed mechanism to feed materials in a fixed state by holding materials between lower plate and upper plate.

(Example: cycle machine and automatic machine)



11. INTRODUCTION TO MOTORS

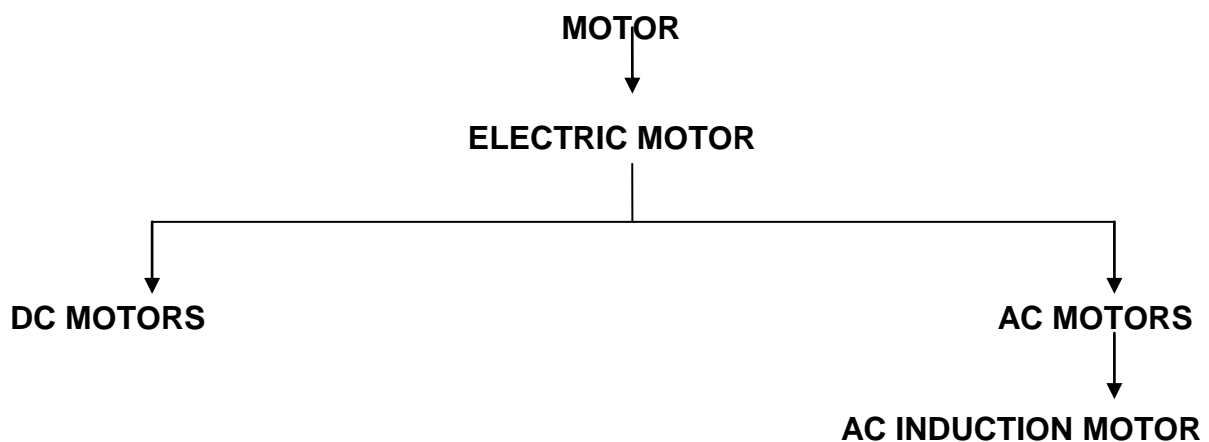
CLASS ROOM CONCEPTS

A motor is a machine designed to convert energy into useful mechanical motion. Various types of motors are available in the market, but Sewing industry mostly uses the electric motor. An electric motor uses electrical energy to produce mechanical energy, usually through the interaction of magnetic fields and current-carrying conductors.

Electric Motors can be classified into two categories:

- 1) AC Motors
- 2) DC Motors

AC motors are mostly used for the industrial Machinery. AC motors are also available in various categories. AC induction motor is the most common technology used in the Garment industry.



And AC MOTOR is used with the following drives to operate the sewing machine

- Clutch (For clutch Motor)
- SERVO (For Servo Motor)
- Direct Drive

We shall discuss about the motors which are used vitally in the Sewing machines.

1. Clutch Motor –

A clutch is a mechanical device which provides for the transmission of power from one component (the driving member) to another (the driven member). Clutches are useful in devices that have two rotating shafts. In these devices, one of the shafts is typically driven by a motor or pulley, and the other shaft drives another device. The clutch connects the two shafts so that they can be locked together and spins at the same speed. Same Principle is used in the industrial sewing machine also.



2. Servo motor –

Servo is an automatic device that uses error sensing negative feedback to correct the performance of a mechanism. The term correctly applies only to systems where the feedback or error-correction signals help control mechanical position or other parameters. Servo motor control system will replace the traditional electronic sewing machine motor control and drive system to become a mainstream technology. More and more extensive use of servo motor control system by garment processing enterprises leads to cost saving, maintenance-free, low noise, and replaces the traditional electronic motor control system. It becomes a sewing machine drive system of the mainstream.



Main Features of Servo Motor

- Low noise, low vibration and low power consumption.
- Linkable to PC.
- Multi- Positioning mode.
- Switching power supply system (160V ~ 280V.AC).
- Powerful parameter system, easy adjustment and upgradeable.

Servo motor advantages

1. Energy saving & environmental protection
2. Saving more than 80%
3. Saving manpower by 20%
4. Small size, simple operation, easy maintenance, beautiful appearance
5. Long life
6. Starts, braking action smooth, little vibration

COMAPARISON OF SERVO AND CLUTCH MOTOR

NO	More features	Energy-saving servo motor	Clutch Motor
1.	Exterior	Excellent, full of mechatronic design concepts	Decentralized structure, large pet
2.	Labor intensity	Low. Operation simple and convenient, intelligent, operator fatigue is not easy	High
3.	Efficiency	High. Output increase, the	Low

		corresponding reduction product processing fees	
4.	Vibration	Low. Longer machine life, improve the quality of work improving the environment	Large
5.	Noise	Low. Longer machine life, improve the working Environment	Large
6.	Service	Low. Brushless servo motor, maintenance-free	Clutch replacement
7.	Energy	Once every province, electricity (98% of non-running Power, running power 26%)	Full operation
8.	Network configuration	Small. Start current, low total power consumption	Large
9.	saving	Saving can be recovered within a year, consolidated return on investment for 6 months	High cost

3. Direct Drive –

A Direct drive mechanism is one that takes the power from a motor without any reductions (such as a gearbox, chain and belt).

Advantages:

1. Increased efficiency: The power is not wasted in friction (from the belt, chain, etc, and especially, gearboxes).
2. Reduced noise: Being a simpler device, a direct-drive mechanism has fewer parts which could vibrate, and the overall noise emission of the system is usually lower.
3. Longer lifetime: Having fewer moving parts also means having fewer parts prone to failure. Failures in other systems are usually produced by aging of the component (such as a stretched belt), or stress.
4. No maintenance required for lubrication.

12. ATTACHMENTS IN SEWING MACHINES (WORK AIDS)

Work aids are devices which are built into machines, added to them afterwards, attached alongside or made use of in whatever ways a resourceful engineer can devise to improve productivity, improve or maintain quality standards, reduce training time and minimize fatigue for the operator.

Work Aids can be divided into the following categories –

1. Folder –

Folders are used, as their name implies, in situations where fabric must be folded prior to sewing .They vary from the simple fold (which could be achieved by an operator alone, though only slowly and perhaps untidily) to extremely complex combinations of folders (which enable some to be achieved in a fraction of the number of stages that it would take without the folders) and indeed enable some to be achieved that would not be otherwise be possible at all.

Folders are frequently used on machines having more than one needle

(Note – Choose the folders for the “product” which are being manufactured in the nearby Industry of the centre.)

2. Binder –

Many folders are available which add further items of self-fabric or other material to a garment and of these, many come into the category are known as Binder. Fabric Edges are frequently bound, either as a means of edge neatening or to create a decorative effect or both.



(Note -Use 28mm Piping folder for practice session

3. Hemmer –

Folders which operate on a garment part without any additional material are known as Hemmer.



(Note -Use Shirt Bottom Hemming folder for practice session)

4. Presser Foot and

Presser feet can be used as specialized work aids, in addition to their normal function of holding the materials against the feed dog, when the scale of the situation is within the small size of foot. The function of edge guiding can be performed in some circumstances by a special presser foot called compensating presser foot.



5. Guides etc.

Guides are used where sewing must take place in a certain position on a garment. In their simplest form they are edge guides, forming some kind of physical barrier to the edges of the fabric being joined together



Note -Use Variation of Straight and curved guide for practice session)

13. STITCHING DEFECTS

Sewing defect can be classified as three groups:

- Problems of stitch formation.
- Problem of pucker.
- Damage of fabric on seam line.



Problems of stitch formation:

Slipped stitch: Stitches in the seam line are present in a regular manner. If the interloping or interlacing between top & bottom thread of stitch does not take place or missed is known as slipped stitch or skipped stitch. This is serious defect in case of chain stitch than lock stitch. The followings are the causes & remedies of slipped stitch formation.

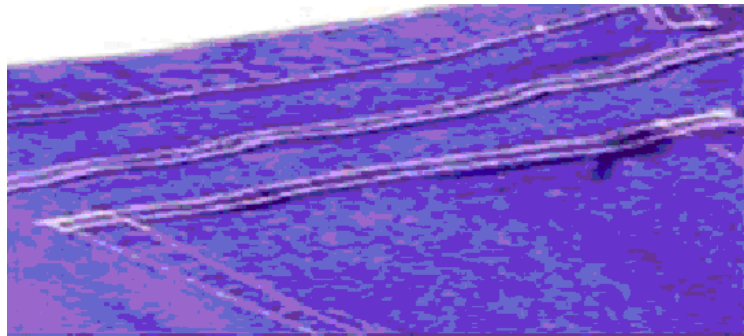
No.	Causes	Remedies
01	If hook or looper & needle are not inserted in loop of thread in time.	Examine the setting & timing between needle & hook or looper. Placing the needle properly. More secure needle should be used.
02	Irregular thread tension on upper or lower loop.	The tension of the thread should again be adjusted.
03	Needle deflection.	Needle to be changed.
04	If needle thread loop size is too small.	Needle size & thread size must be adjusted.
05	Flagging of fabrics during sewing.	The pressure of pressure foot must be adjusted accurately. The hole of throat plate & needle size must be adjusted.
06	If the sewing thread is not capable to form loop.	Thread to be changed

Staggered stitch:

If the stitches produced by needle are not parallel or become curvy to sewing line is known as staggered stitch.

No.	Causes	Remedies
01	Needle deflection.	Increase the needle size Tapered needle should be used.
02	Due to wrong blunt needle point.	Needle to be changed.
03	Wrong adjustment of needle & thread size.	Needle size & thread size to be changed.
04	Deflected motion of feed dog.	Motion of feed dog to be adjusted.
05	If fabrics are not controlled properly in the feed mechanism.	The pressure of pressure foot must be adjusted accurately. Feed mechanism to be changed.

Unbalance stitch: This type of defect is found in lock stitch machine. If the interlacement of threads do not take place in the middle (i.e. if the interlacement is taken place in the upper or lower position from the middle) of two layers of fabrics then it is known as unbalance stitch.



No.	Causes	Remedies
01	Wrong tension of sewing thread.	Setting of proper tension to the sewing thread. Proper care to the twisting of the thread during sewing.
02	Used wrong thread path	Use of right thread path.
03	Wrong adjustment of needle thread path.	Use of right thread path.
04	Snagging of needle with bobbin case & positioning finger.	Bobbin case to be smooth. The positioning finger to be set again.
05	If the thread are not lubricated.	Better qualities of thread must be used. Thread must be lubricated.

Variable stitch density: Stitches per unit length should be uniform, If it is not then it is called variable stitch density. The main cause of variable stitch density is irregular feed of fabric due to insufficient pressure of pressure foot. The following are the cause & remedies of variable stitch density formation

No.	Causes	Remedies
01	Improper unwinding of thread from package during sewing.	The position of thread guide must be 2.5 times higher than the position of thread package. Also proper care should be kept to the thread package not to tiling
02	Twisting of needle thread in the bottom of the thread package.	Foam pad must be used to the bottom of the thread package.
03	Snarling of thread before tension disk.	Winding of more threads in the thread guide & to keep less tension to the tensioning disk.
04	Twisting of thread in the thread guide.	Proper threading of sewing thread during sewing.
05	More tension to the thread.	The tension of thread should be less or use high strength threads.
06	Use of broken check spring.	Check spring to be changed.



07	If the edge of the throat plate, hook point, needle guard, bobbin case, needle groove, needle eye & so on	The edges must be smooth & needle must be changed as needed.
----	---	--



	are sharpened.	
08	Fraying of thread in the needle.	Fine thread must be used or use heavy needle.
09	Thread gets heated more	High quality needle must be used. Needle lubricant must be used. Needle cooler must be used.
10	Hook gets heated more	Lubricant must be available. Examine the distance between the needles & hook.
11	Use of low quality threads.	Thread to be changed.

Frequent thread breakage: Frequent breakage of thread especially, when there needs to open out the sewing to solve the problem. The following are the causes & remedies of frequent thread breakage.

No.	Causes	Remedies
01	Wrong winding of threads on to the bobbin.	Proper winding of threads on to the bobbin. Pre-wound bobbin may be used.
02	More tension to the bobbin threads or more rotating of bobbin.	The tension must be adjusted to the bobbin threads. Use of washer to prevent more rotation of bobbin.
03	If the edges bobbin case, looper eye & so on are more sharpened.	The edges to be smooth.
04	Wrong fitting of bobbin case.	Examine the size & type of bobbin. Examine the damaging of bobbin case.

Broken Stitches: When stitches are broken during sewing is called broken stitch.

Cause: Where the thread is being broken where one seam crosses another seam (ex: bar tacks on top of waistband stitching, seat seam on top of riser seam.)



Remedies:

- Where the thread is being cut, use a large diameter thread on operations.
- Make sure the proper stitch balance is being used.
- Use needles with appropriate needle point.
- At regular intervals on operations, change the needles where they occur frequently.

Problems of pucker:

Puckering is a wrinkle appearance along a seam line in a smooth fabric. It is one of the frequently occurring defects. Puckering shows that as if there is too much fabric & not enough thread in the seam & as if the thread is drawing the seam in. This is

the reason why sewing thread is often blamed for causing puckering though there are other factors as well as for promotion of puckering. They are given below:

1) Fabric structure. 2) Seam construction. 3) Needle size. 4) Material feeding problem. 5) Wrong thread tension & 6) Unsuitable thread.

Reasons of Puckering

Fabric dimensional instability. Extension of sewing thread. Sewing threads shrinkage. Structural jamming of fabric. Mismatched patterns.

Variable or uneven stretch on fabric plies:

Causes:

There is a great possibility of occurring seam pucker in case of more plied of fabrics when sewing together.

Due to variable stitch on fabric plies they will not feed equally to sewing m/c & create seam pucker.

This type of pucker is seen for limitation of feed mechanism.

Remedies:

- Taking proper care during sewing.
- Using proper feed mechanism.

Fabric dimensional instability:

Causes:

If the shrinkage of sewn fabric plies are not same or equal then Seam pucker will create after washing.

If the shrinkage percentage of area of two pieces of fabrics is more than 2, then seam pucker will occur after sewing the fabric together.

Remedies:

- Use suitable feed mechanism, Maintain shrinkage and take extra care during sewing.

Extension of sewing thread:

Causes:

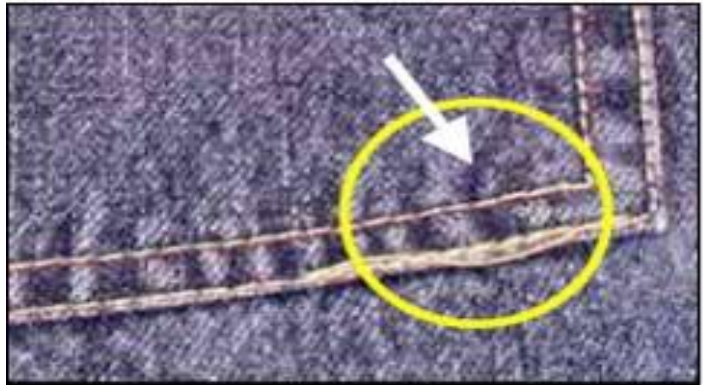
If the tension on needle thread is higher than the under thread, then seam pucker will be produced or relaxed.

Due to tension, the length of thread is extended slightly. When the fabric is displaced or descend from the machine after sewing, shrinkage of thread & fabric occurs due to their tendency of coming to original position.

If the shrinkage percentage of thread is higher than the fabric seam pucker happens.

Remedies:

- To give sufficient thread tension.
- To maintain shrinkage.



Unraveling Seams:

Cause: Generally occurs on 401 chain stitch seams where either the stitch has been broken or a skipped stitch has occurred. Unless the seam is re-stitched, this will cause seam failure.

Remedies:

- Ensuring Proper machine maintenance and machine adjustments.
- Sewing operators to follow correct material handling techniques.

Re-stitched Seams: Where there is a "splice" on the stitch line. The seam does not appear to be 1st quality merchandise, if this occurs on topstitching.

Causes:

Thread breaks or thread run-out during sewing. Cut or broken stitches during a subsequent treatment of the finished product (i.e., stone washing).

Remedies:

- Use a better quality sewing thread and minimize sewing interruptions
- Use higher performance thread specifically designed for that purpose.
- Ensure sewing machine adjustments and proper machine maintenance.
- Observe sewing operators for correct material handling techniques.



Damage of fabric on seam line:

A garment can be rejected due to damage of fabrics or yarn of fabrics in the seam line. This happens due to wrong needle selection or needle damage. The fabrics are damaged due to defective needle. But it may happen in case of new or fine needles. There are two types of fabric damaging are available given below:-

1) **Mechanical damage:** Damaging of fibres or yarns in the fabrics by needle is the entire defects of mechanical damage. The followings are the steps to be taken to keep the fabrics free from this type of defect:

By using perfect size & shape of the needle & needle point without any defect.

By reducing the speed of sewing machine.

By using lubricant.

By testing sewability before sewing fabrics.

2) **Needle heating damage:** The damage of fabric due to friction occurring between the needle & fabrics. The resulting temperature due to friction in the needle is very high. The fabric can get damaged in that temperature. There is less damage in case of fabrics made from natural fibres. The following are the steps to be taken to keep the fabrics free from this type of defect:

By reducing sewing speed, generation of heat to the needle will be less. But it affects production speed and does not suit for large production.

By changing needle Size & shape so that there is less generation of heat to the needle.

By sewing smaller length at higher speed.

By blowing cool air on the needle during sewing so that the temperature can be controlled.

By using lubricant to the needle.

By using Teflon coated needle.

Defects occurring due to handling, for instance spoilage, staining etc.

Defects occurring due to oil mark.

Defects occurring due to dirty spot.

Size Measurement Faults: During manufacturing of garments size of some parts are measured as per requirement. After assembling full garments also dimensions are measured to ensure that the dimension of garments is as per specifications. Faults occurring at this stage is can be reduced very much. During size measurement the parts which are measured are – 1) Chest 2) Waist 3) Shoulder 4)

Sleeve length 5) Sleeve opening 6) Body length 7) Neck width 8) Front neck drop 9) Back neck drop 10) Collar Height 11) Arm hole 12) Placket length 13) Pocket length 14) Pocket width 15) Bottom part and 16) Hem opening etc.,

Garment Twist A rotation, usually lateral, between different panels of a garment resulting from the release of latent stresses during laundering of the woven or knitted fabric forming the garment. Torque or spirality may also be used to refer twist.

Sewing thread shrinkage:

Causes:

Due to variable shrinkage % of sewing thread & fabric, Seam pucker will create after washing or ironing.

Cotton threads develop puckering when wet or after wash.

Remedies:

- To use synthetic thread.
- It is good to know about the shrinkage % of fabric & thread before selection to sew.

Structural jamming of fabric:

Causes:

When sewing is done by needle to densely woven fabrics or in which no. of warp & weft yarns are more in one inch, seam pucker happens due to shrinkage of fabric.

Remedies:

- By using finer thread & needle.
- By minimising stitch density.
- By cutting & sewing on bias angle.
- By using chain stitch instead of lock stitch.
- To change fabric (if necessary).

Mismatched patterns:

Causes:

Seam pucker will create when two different size of patterns are sewn together.

The designer is responsible for this. It can also occur due to wrong selection of patterns.

Remedies:

Experienced pattern designer is needed.
Change or rectify the pattern.

14. SAFETY MEASURES:

The machine Mechanic working in factories, must follow the following points and adopt safe working practices.

- Disconnect the sewing machine by pulling out the plug from the wall outlet, not by jerking the cord. Jerking the cord can cause the cord to become worn or frayed.
- Disconnect the plug from the wall outlet first then the plug from the machine. Otherwise, electricity continues going through the cord and you could receive an electrical shock.
- Always unplug the machine from the electrical outlet when removing covers, lubricating, or when making any other user servicing adjustments
- Place pins, needles and tools in a container when not using them. Do not leave them loosely on the table or on the floor.
- Pins and needles should never be placed in your mouth.
- When not in use, pointed tools should be left closed.
- Handle sharp tools with the handle first.
- When in doubt, ask the instructor.
- Report any injuries or accidents immediately to the instructor. Also, Report a breakage to a tool or m/c to the instructor.
- Wipe up any oil spillage on the floor immediately to prevent anyone from slipping. Keep aisles clear at all times.
- Operate only the machines you have been trained to operate
- Make only adjustments you have been trained to perform
- When on duty wear low shoes & close-fitting clothing. Avoid loose fitting sleeves, sweaters, jewellery, ties, and ribbons when operating the machine. If your hair is long, tie it back.
- Always practice proper posture to reduce fatigue, help prevent accidents and increase efficiency.
- Use both hands to raise & lower the machine head.