



Stitching technology : I (KIoT)



Target group: 3rd year leather engineering
(footwear stream)

Prepared BY: Mr. Wendwosen F.

Introduction to closing



What is closing?

- **Closing** : is the title given to the *preparation, fitting together and finishing off* the cut components to produce an upper ready for lasting.

- **Sewing:** is a method of joining two or more pieces of materials together by a row of stitching.
- It is a result of successive number of stitch on the component having specific stitch & number of stitch per unit.
- At the end and start of the stitch min two & max three stitch should be overlap /**locking**/.



Stitch formation

- **Stitch:** is a method of securing thread into materials(leather, fabric...).
- **Seam** is defined as a row of stitch thread or line over which two or more materials **joined** together.
- It is how an interlacing threads move over and between the two or more fabric joined together.

There are three type(methods) of stitch formation:

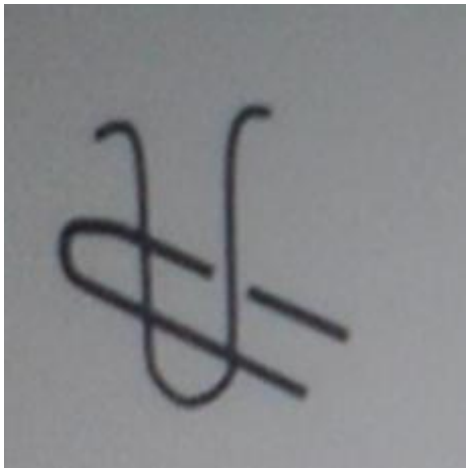
- i. *Inter-looping*
- ii. *Intra- looping*
- iii. *Interlocking*

Conti.

Methods of stitch formation

Inter - looping

Loop of one thread passes through the loop of another thread.



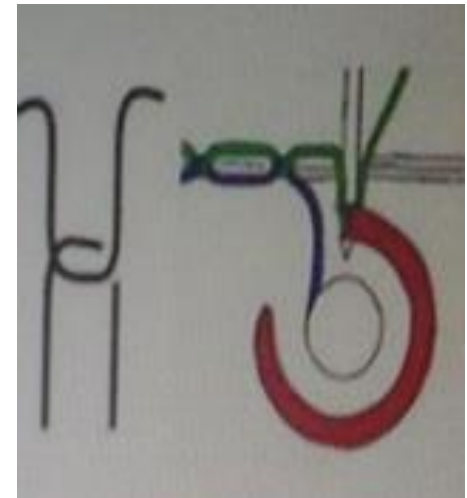
Intra - looping

Loop of one thread passes through loop of the same thread.



Inter - locking

Loop of one thread passes over loop of another thread



Conti...

There are two types of stitch(purposely):-

- **Functional stitch:** is carried out for the joining and strengthens purpose.
- **Decoration stitch:** is carried out to enhance the appearance of the upper.
- Each stitch should able to with stand all kind exerted **pressure** during **lasting** pulls and wear.
- Needle and thread are selected according to the *material, operation & customer specifications* .

- **Stitching operation:** is performed by combination of operator, material to be stitched and stitching machine.

(operator + material(leather, thread...) + machine)= stitch

- ✓ **Operator:** is the person which changes the raw material to finished goods or is a person which operates the stitching machine.(high skilled, skilled, semi-skilled and un-skilled)
- ✓ **Material :** is substances from which product(footwear) is made.
- All inputs for manufacturing **footwear** is known as material. Like direct material (leather, textile or synthetic.) & other input
- ✓ **Stitching Machine :** light, medium and heavy-duty based on the type of operation and material being used.

- **Machine Controlling skill:** is the basic necessity to conduct effective stitching operation.
- Operator should learn to stitch at various machine speeds and able to manipulate different curves and edges.

Abilities required for sewing machine operators

- **Manual Dexterity** : The ability to quickly & repeated movements of hand/ arm to grasp, manipulate and assemble components and leg to control the machine.
- **Finger Dexterity:** The ability to make precisely coordinated movements of the fingers to grasp, manipulate, or assemble very small components.
- **Arm-Hand Steadiness:** The ability to keep your hand and arm steady while moving or holding in one position.
- **Visualization:** The ability to imagine how something will look after any value addition work or rearrangement.

Conti.

- **Leg steadiness:** ability to keep the leg steady ,to keep the same momentum while stitching.
- **Near Vision:** The ability to see details at close range.
- **Control Precision:** The ability to quickly and repeatedly adjust the controls of a machine to exact positions.
- **Visual Color Discrimination:** The ability to match or detect differences between colors, including shades of color and brightness.
- **Problem Sensitivity:** The ability to recognize when something is wrong or likely to be wrong.

Good working habits

1. Work place should be properly cleaned.
2. Switch of the machine when there is no work.
3. Regularly oil the machine.
4. Machine should be cover after the work is finished.
5. Release the power of the machine after finish the work.
6. Put piece of material under the pressure roller after finish the work.
7. Pay full concentration on the work to avoid accident.
8. Before start the work, ensure proper thread & needle insertion has been done.
9. All tools should be properly placed.
10. Use both hand to handle/pick the components.

Safety points to wards operator

1. Wear approved footwear & closing in workshop.
2. Wear hair band for long hair.
3. Set squarely on the chair with the reach of material & machine.
4. Your hand should be parallel to the floor while setting.
5. Keep your finger away the moving part of the machine.
6. One operator should work **at a time** on the machine.
7. In case of accident report to supervisor.
8. Know your fire drill.
9. Don't try to make your own electrical repair.
10. Don't push the work to the machine, let the machine feed the work.

Safety points to wards the machine

1. Proper oiling and cleaning of machine.
2. After finished the work cover the m/c properly.
3. Operational Instruction of the machine should be strictly followed.
4. Put piece of material(leather) under the pressure foot of the machine.
5. lift up the pressure roller while winding the bobbin.
6. Remove the thread from the needle while winding the bobbin.
7. Ensure proper threading and needle insertion.

Bench layout

Basic operation skill(BOS) :

- ✓ Top (needle)threadi
- ✓ Bottom threading
- ✓ Bobbin winding
- ✓ Needle changing



Top threading(needle threading)

- Place spool of thread on spool pin.
- Turn hand wheel toward you to raise take-up lever to its highest position.
- Lead thread through the top-threading guide just above the thread spool on the thread stand. The distance between the thread guide and thread spool must be at least twice the length of the spool, from the top of the spool being used.
- Now lead the thread through the threads guides from top to bottom on the machine head.
- Press the knee press and pass the thread through the tension assembly and over the check spring.
- Lead the thread through the take up lever from right to left.
- Pass the thread from top to bottom through the thread guides near faceplate.
- Press knee press and lift the pressure roller out towards left side.
- Then pass the thread through the thread guide on needle bar.
- Thread through the needle eye from left to right.
- Draw about 3 inches of thread through the needle.
- Press knee press and pull the pressure roller down to original position.

Bottom Threading(bobbin threading):

- Ensure machine is switched off.
- Take a full bobbin and insert it in bobbin case as far as it will go.
- Make sure thread comes out of the bobbin in clockwise direction.
- Pull the thread through the case and under the tension spring on the case.
- Allow about 3 inches of thread to hang free from bobbin case.
- Place the bobbin case into the machine with the bar of the case in the slot of the shuttle.
- Press on the bobbin case until you hear or feel it click into position.
- Hold top thread in left hand.
- Now turn the balance wheel towards yourself by right hand, until bottom thread loop comes out through throat plate.
- Now grip the loop and` pull the bottom thread through throat plate.
- Pull about 10 cm of thread and place it on machine bed.

BOBBIN THREADS REWINDING:

- Normally, the thread must be taken out of the needle in order to wind the bobbin.
- The thread runs from the spool through a sequence of guides that are specific to the type of machine.
- Place empty bobbin on bobbin-winder spindle.
- Press bobbin winder down against motor belt.
- Place spool of thread on spool pin. Thread bobbin winder and bobbin.
- Hold thread end and start the machine.
- When bobbin is full, stop the machine then Cut thread.
- Lift bobbin winder away from belt and remove bobbin.
- After the bobbin is winded, the machine is re-thread, the needle is engaged and the bobbin is placed in its area under the throat plate.
- Once the bobbin is in place and the machine is threaded, gently turn the wheel of the machine while holding the needle thread off to the side (it should go from the needle under the pressure foot and off to the side). This will bring down the needle.
- The needle will pass down through the throat plate and the needle thread will catch the bobbin thread and pull it up through the throat plate when it comes back up again.

NEEDLE CHANGING:

- While inserting a new needle: Raise the needle bar to its highest position.
- Hold the needle with the clearance cut side facing towards the hook.
- Loosen the needle clamp screw sufficiently to allow the new needle to be fully inserted.
- Insert the shank of the needle as far as it could go and tighten the needle clamp screw.
- Before sewing, check the needle by turning the hand wheel one complete rotation and to make sure the needle is securely in place and does not hit against anything.
- This is particularly true when using and selecting a stitch for twin needles.

Sewing ergonomics consideration

- **Ergonomics:** is the study of the relationship between workers and their env't especially the equipment intended to maximize productivity by reducing operator **fatigue** and **discomfort**.
- It is a study of capabilities and limitations of mental and physical work in different setting, it applies anatomical, physiological, and psychological knowledge to work and work env't in order to reduce or eliminate factors that cause **pain & discomfort**.

Conti.

- Sitting for long hours on uncomfortable chair with no back support could bend the **neck** and the **back** & pulling materials with one hand and pressing pedal with feet all day long could cause pressure/stress on the shoulder and back of the leg.
- Employees encounter several risk factors at sewing workstations, such as: **awkward arm, neck, trunk and leg postures.**
- These postures are influenced by the size of the worker and the design of the workstation.
- The potential hazards encountered at the workstation & a general proper workstation design has described below.

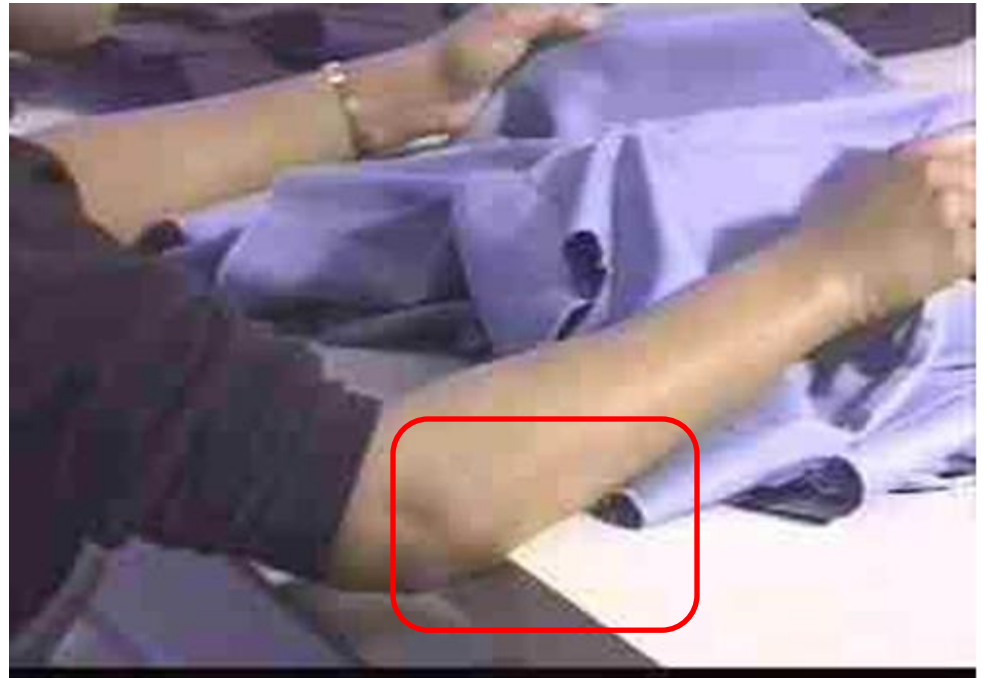
Conti.

**Chair , table and
Treadle/Pedal**



Conti.

- Workers often maintain awkward shoulder, elbow, and wrist postures. while sewing because of improper chair height or position.
- *Employees must sit or stand for long periods in the same position, resulting in soreness of the back and neck, and/or buttocks, and reduced circulation to the leg.*
- *Employees resting forearms or wrists on sharp edges may cut off blood circulation, pinch nerves, and cause injury to the arms or hands*



The table

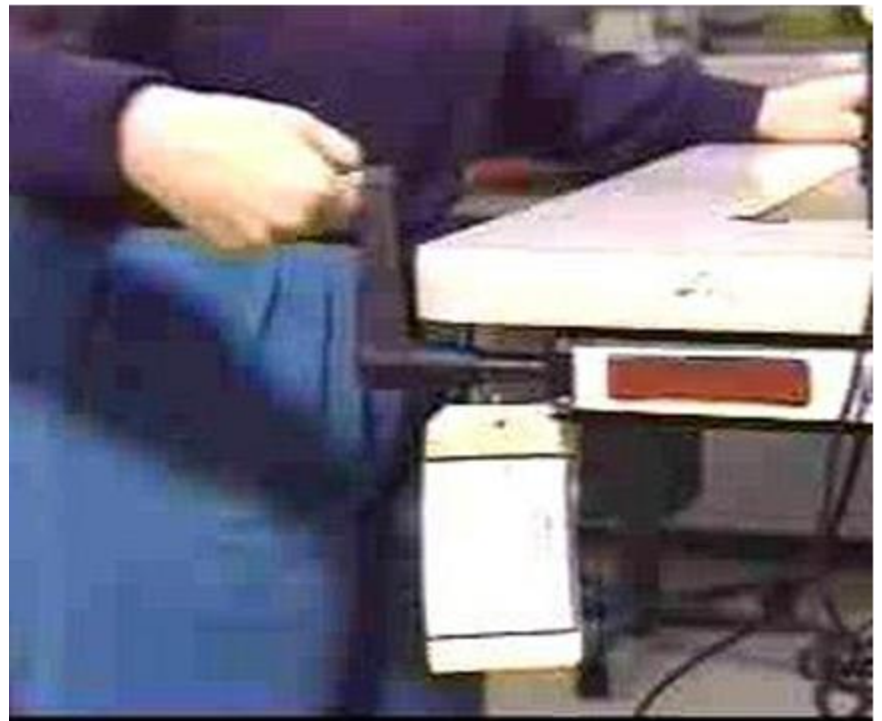
- sewing machine table should keep your work at elbow height and your wrists straight.
- If the table is too low, it will cause you to hunch forward, straining your back, neck and shoulders.
- **If the table is too high**, you'll have to raise your shoulders to work, which will tire your neck, shoulders and upper back . and may result in muscle pain.
- The work surface should be large enough to comfortably fit your machine, as well as any task lighting you need.
- The table should also have enough room over your thighs for you to comfortably work the foot pedal without the table pressing on your legs. Since everyone's elbow height is a bit different, it's a great idea to have your sewing tables custom-made. This is especially true if you are particularly tall or short.

Conti.

- Provide both height- and tilt-adjustable tables. which can help employees access their work without using awkward postures.
- Tables may be tilted slightly toward workers, to enable them to see the work more easily and to reduce awkward wrist postures.
- When sewing heavy fabric, the table may be tilted away from the worker, which may help pull the fabric through the machine and lessen manual force applied by the worker

Conti.

- For sit-down work, the table should also be high enough to allow room underneath for the worker's legs.
- The table top should not press on the worker's **thighs**.
- Workers who use a treadle need more room than those who don't so they can move their legs more easily.
- Edges of work surfaces should be padded or rounded, so workers can rest their arms against them.



The chair

- ✓ **Use easily adjustable chairs** . to minimize awkward postures, and provide training on how to properly use them.
- ✓ Chairs should have: **easily adjustable height, seat tilt, and backrest position**; padded back rest with rounded edges that supports worker's lower back; no wheels, or wheels that lock; a gently sloped or "waterfall" front edge to help prevent the chair's edge from pressing into the back of the legs; and **a cushioned/contoured** seat, which distributes the worker's weight so no body part gets all the pressure.

Conti.

- To choose a proper chair, consider the amount of movement the task requires, and the size of the worker.
- For tasks that require a lot of twisting, Chairs should be placed at an appropriate distance from the workstation, so workers can perform tasks without pulling their elbows away from the body.



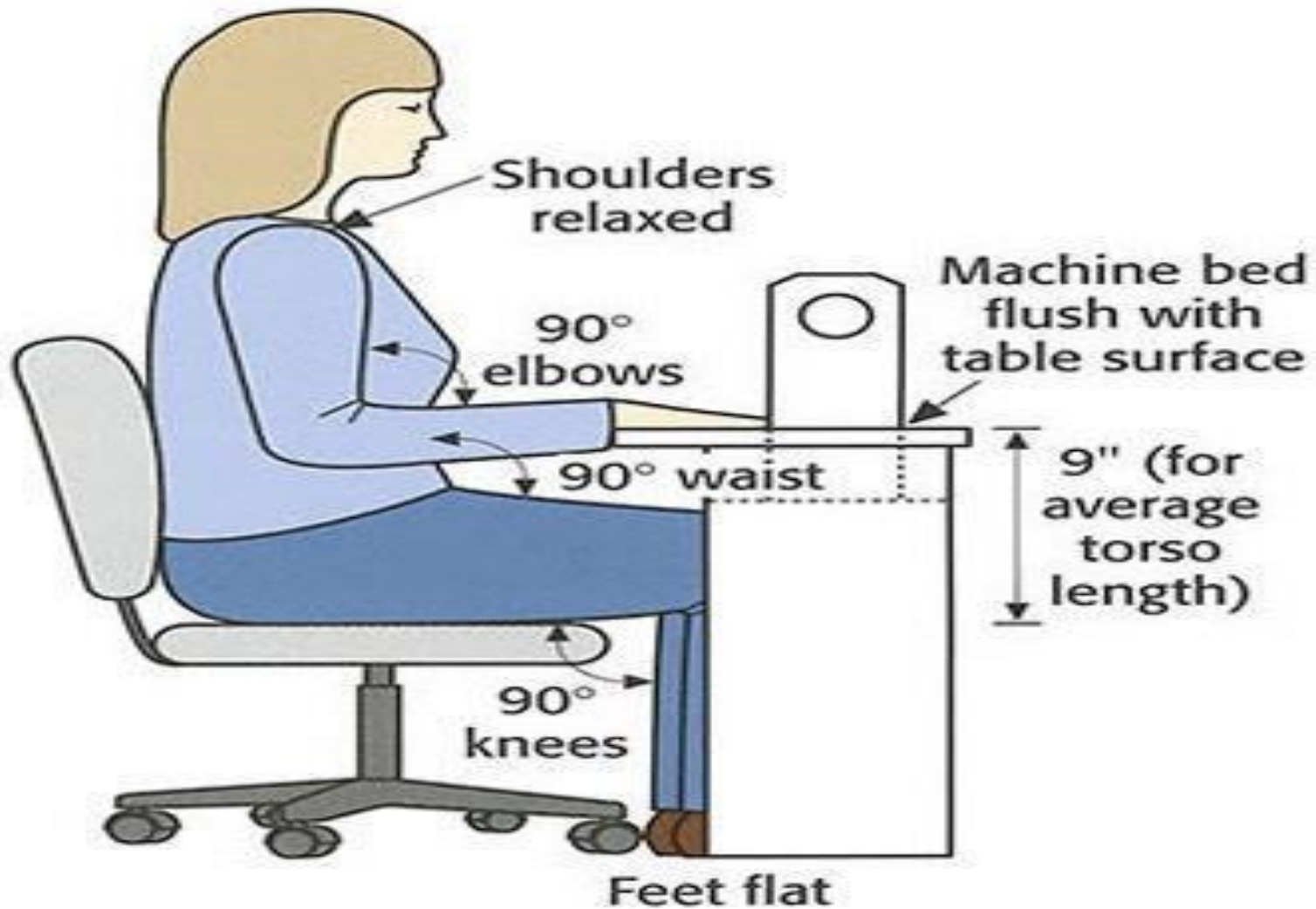
Recommendations for the design of new sewing workstations:

- ✓ The table surface form and size is appropriate for the work piece.
- ✓ Sewing table / frame can be adjusted in height and tilt.
- ✓ Adjustment mechanisms are easy to use and comfortable to reach .
- ✓ There is good visibility to the needle area.
- ✓ The foot mechanism is easy to operate.
- ✓ There is an appropriate swivel chair to work on.
- ✓ There is appropriate amount of room for movement while sitting and standing.
- ✓ Move the mounting of the treadle.
- ✓ Supplement accessories (e g lighting or attachments).

Dimensional adjustment of sewing machine work station

Table height (above elbow height)	10cm
Desk slope	10°
Pedal position (pedal axis behind the needle)	-4 cm to +6 cm

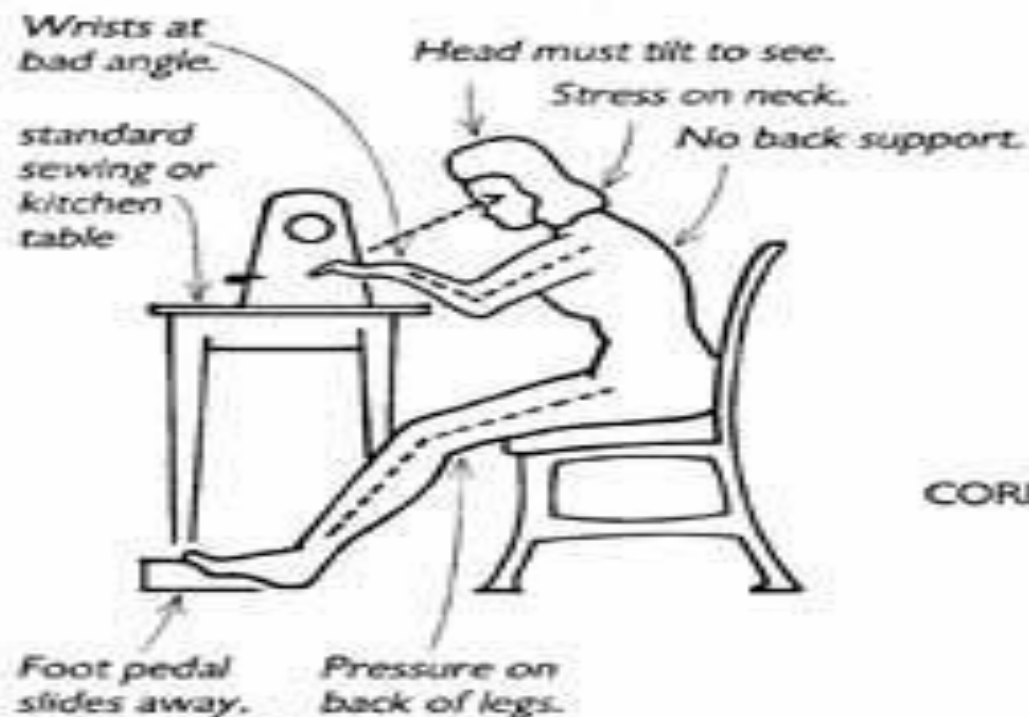
- ✓ Elbow height of average people is 61 cm so the height of sewing machine table should be adjusted at a distance of 71cm.
- ✓ pedal position could be taken as 4 cm to the operator's side of the needle tip or 6cm to the opposite side of the needles tips.



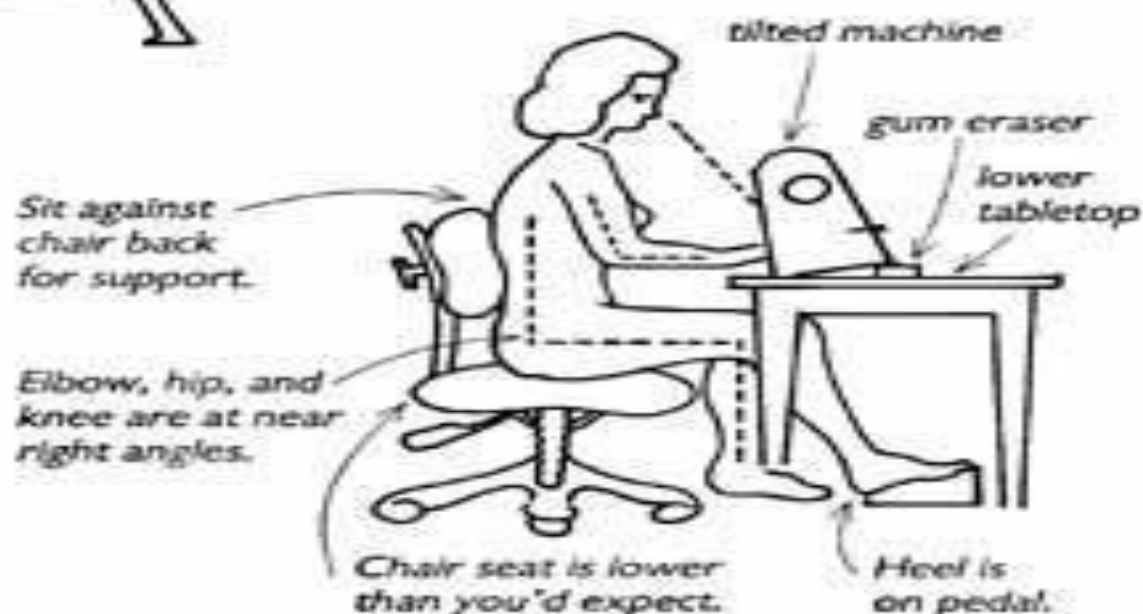
Ergonomics of machine sewing



INCORRECT POSTURE



CORRECT POSTURE



Sewing Machine classification



SEWING MACHINES

- Sewing machines used in the footwear industry may be **light**, **medium** and **heavy** duty according to the operation need and material being used in the **shoe** making.
- The terms light, medium and heavy duty is mostly related with the **machine mechanism**, **motor**, **balance wheel** and **feeding system** of sewing machine.

Conti.

- Stitching machines are classified based on...
 - a. Machine head/bed
 - b. Number of needles
 - c. Type of stitch
 - d. Needle bar movement/direction
 - e. Type of construction

conti

Based on Machine head/bed

- i. Flat bed sewing machine
- ii. Post bed sewing machine
- iii. Cylindrical bed sewing machine(bar tacking m/c)
- iv. Raised bed sewing machine
- v. side bed sewing machine

Based on Number of needles

- i. Single needle machine
- ii. Double needle machine
- iii. Triple needle machine
etc...

Based on Type of stitch

- i. lock stitch
- ii. chain stitch

Conti.

Based on needle bar movement

- ✓ In general needles or needle bars moves in vertical direction.
- ✓ In some machines needle bar moves in other direction also.
- ✓ For example, in zig-zag stitching the needle bar is moves in vertical as well as horizontal.

Based on type of construction

Depending on type of materials and specific demand, the sewing machines are :-

- Light duty sewing machine
- Medium duty sewing machine
- Heavy duty sewing machine

Lock and chain stitch

Closing section machine classification

1. Basic sewing machine
2. Ancillary sewing machine
3. Ancillary operation machine

Closing section machine classification

1. **BASIC SEWING M/C**: are those used to perform the basic stitching operation.
 - **FBSN m/c** : it use for straight & curved stitch on the flat surface.
 - **PBSN m/c**: it used for straight & curved stitch on the flat & curved surface using vertical post.
 - **Cylindrical arm binding m/c**: for binding and decorative on flat & curved surface using horizontal post



FBSN m/c



PBSN m/c



Cylindrical arm binding m/c

2. **ANCILLARY SEWING M/C**: used to increase productivity, quality of the work and to perform special types of stitching(butted seam, decorative, strobel, derby lock, moccasin etc..).

- Zig zag m/c
- FBDN m/c
- PBDN m/c
- Embroidery m/c
- Strobel m/c
- Bartacker m/c
- Moccasin m/c
- Cording m/c

Double needle machine(both flat & post bed)

- is more useful for the better work:-
 - It gives quality stitching as compared to the single needle stitching machine.
 - It improves quality and productivity.
 - It makes double row stitching very neat and clean.



ZIG-ZAG sewing machine

- This machine is mainly used for ZIG-ZAG seam. With the help of this machine we can join the components *without any allowance*.
- This machine is also *used for **decorative** purpose*.
- The stitch length & width is selected according to the type of material and stitching required.
- This machine has the facility of stitch length and width regulator.
- Normally stitch width is 6mm for leather, 8mm for synthetic, and 10mm for fabrics.
- It is *not a strong seam* and must be reinforced.

Conti.



ZIG-ZAG stitching machine



ZIG-ZAG seam

Cording machine

- This machine is used for *decorating* the shoe upper by providing the *bold look on shoe uppers* during cording.
- This machine has **two needles** and only **single hook** assembly or bobbin case.
- Hook picks up the top thread from the both of the needles and makes a lock into the center of the material. On the top side of the material twin needle stitch the component by set distance and below a cord , there is a zigzag kind of seam.

The main feathers of this machine are:-

- *It has two pressure roller.*
- *It has two needles and one hook assembly.*
- *This machine produce a lock stitch formation.*
- *This machine has a small tube on the throat plate, which act as a guide for cord.*

Conti



BAR TAKER MACHINE

- This type of sewing machine is used for stitching complicated operations like *derby lock* and for *logo stitching* on shoe upper components.

The main features of this machine are:-

- This is multi directional stitching machine.
- This machine produces lock stitch formation.
- The length of the arm is approximately about 30-35CM depending upon the mechanism of the machine.



STROBBEL MACHINE

- This machine produces the *chain stitch* and *only one thread* is used during stitching.
- This machine is used to stitch socks with the upper at the lasting margin edge for forced lasting.
- Strobbeling is used during injection and direct vulcanization shoe constructions, where strobbel upper is force lasted into the last and sole is attached by injected or vulcanized.



3. ANCILLARY OPERATION M/C: machine used for *supportive and decorative extra operation other than stitching in the production process of the upper making.*

- Like :- Skiving, splitting, thermo folding, stamping, trimming, seam rubbing & taping , eyeleting, adhesive spring m/c, vamp crimping, toe puff attaching.

According to m/c speed

1. **Low speed:** -1400 - 1500 stitches per minute and below.
2. **Medium speed:** 1500 to 2800 stitches per minutes and
3. **High speed machine:** 2800 stitches per minute and above.

According to types of construction and duty:.

1. **Light duty: having** light mechanism and feeding system in order to feed soft, thin and delicate material
 - It is mostly used in soft leather (goat, glace kid and sheep). It use for both functional and decoration stitch.
1. **Medium duty: medium** kind of material to be feed, grip and stitched properly while stitching. It used to perform functional and decoration stitching.
2. **Heavy duty:** have strong mechanism and feeding system in order to feed heavy and thick material while stitching. This type of machine is mainly used for decoration purpose.

Parts & functions of sewing machine

Parts of sewing machine

In general, a sewing machine consists of:

- ✓ sewing head
- ✓ machine bed
- ✓ drive motor;
- ✓ machine stand;
- ✓ treadle.

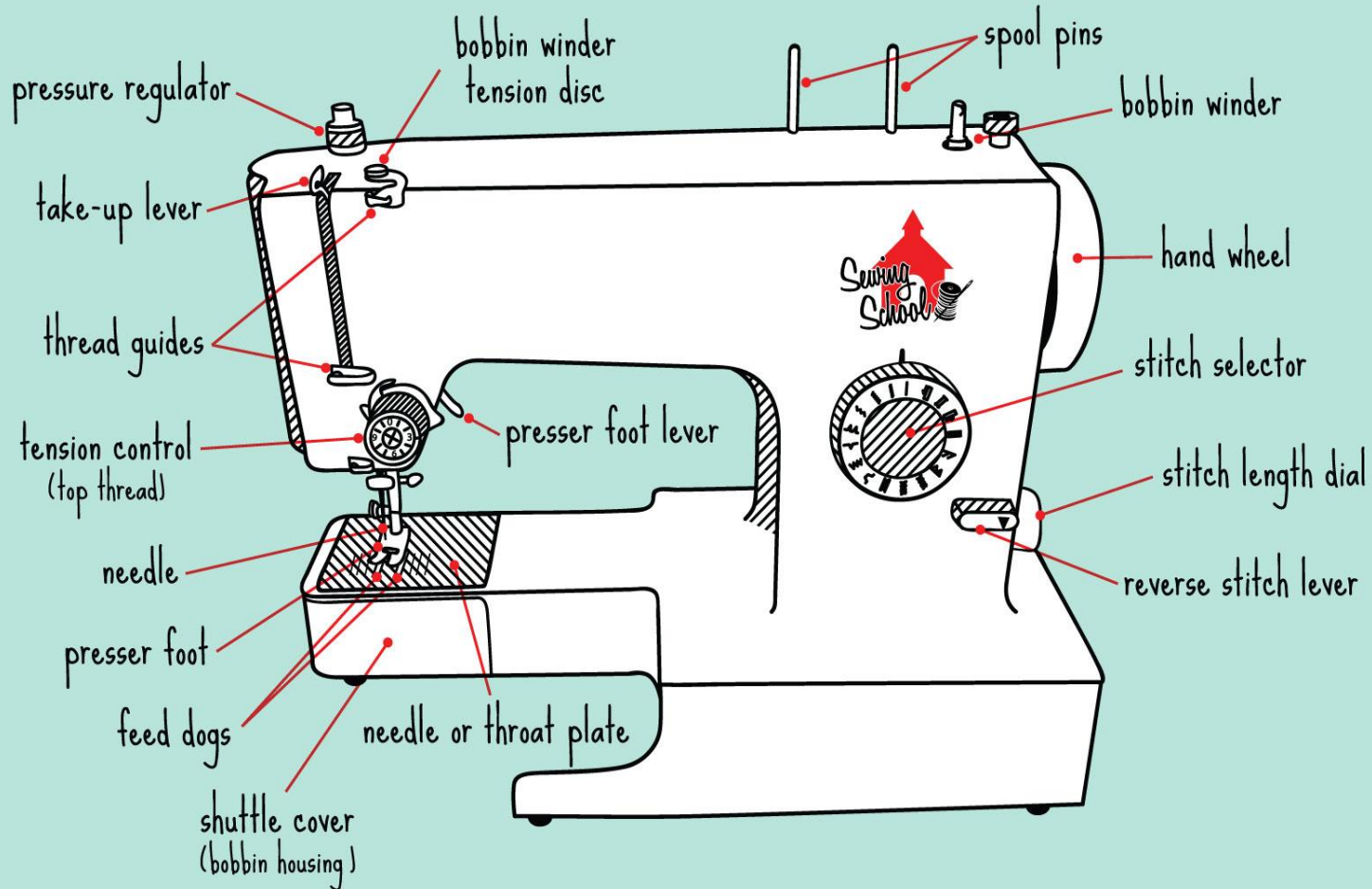


So the parts of sewing machine can be grouped in to two:

- i. Parts above the bed (sewing head)
- ii. Parts below the bed (drive motor, machine stand & treadle)

Parts above the bed (Sewing head)

THE SEWING MACHINE



Functions of Sewing Machine Parts:

1. **Spool pin**: The main function of spool pin is to hold the spool of thread.
2. **Bobbin binder spindle**: During winding, bobbin is placed here.
3. **Bobbin winder stopper**: When bobbin reaches its optimum capacity then bobbin winder stopper stops the bobbin winding.
4. **Stitch width dial**: the main object of stitch width dial is to control the zigzag stitch.
5. **Pattern selector dial**: is to set the symbol of the desired stitch pattern.
6. **Balance (Hand) wheel**: Hand wheel is used to raise and lower the needle, which is situated in the right side of the sewing machine.

7. **Stitch length dial:** Stitch length dial is used to control the length of the stitch.
8. **Reverse stitch lever:** The machine will sew in the reverse while the lever is pushed.
9. **Power switch:** Power switch means the off-on office of the sewing machine. Normally power switch is located at the right side of the machine.
10. **Bobbin winder thread guide:** These types of thread guide are used during bobbin winding.
11. **Thread tension dial:** Thread tension dial is used to control the tension on the top thread.

Conti.

- 12. Thread take-up lever:** During sewing the top thread passes through the thread take-up lever. Thread take-up lever moves up and down with the needle
- 13. Needle clamp screw:** Needle clamp screw holds the needle in its actual place.
- 14. Presser foot:** Presser foot holds the fabric in its definite place.
- 15. Bobbin cover:** During sewing bobbin cover protects and covers the bobbin holder.
- 16. Bobbin cover release button:** This type of button is used to release the cover for entrance to the bobbin.

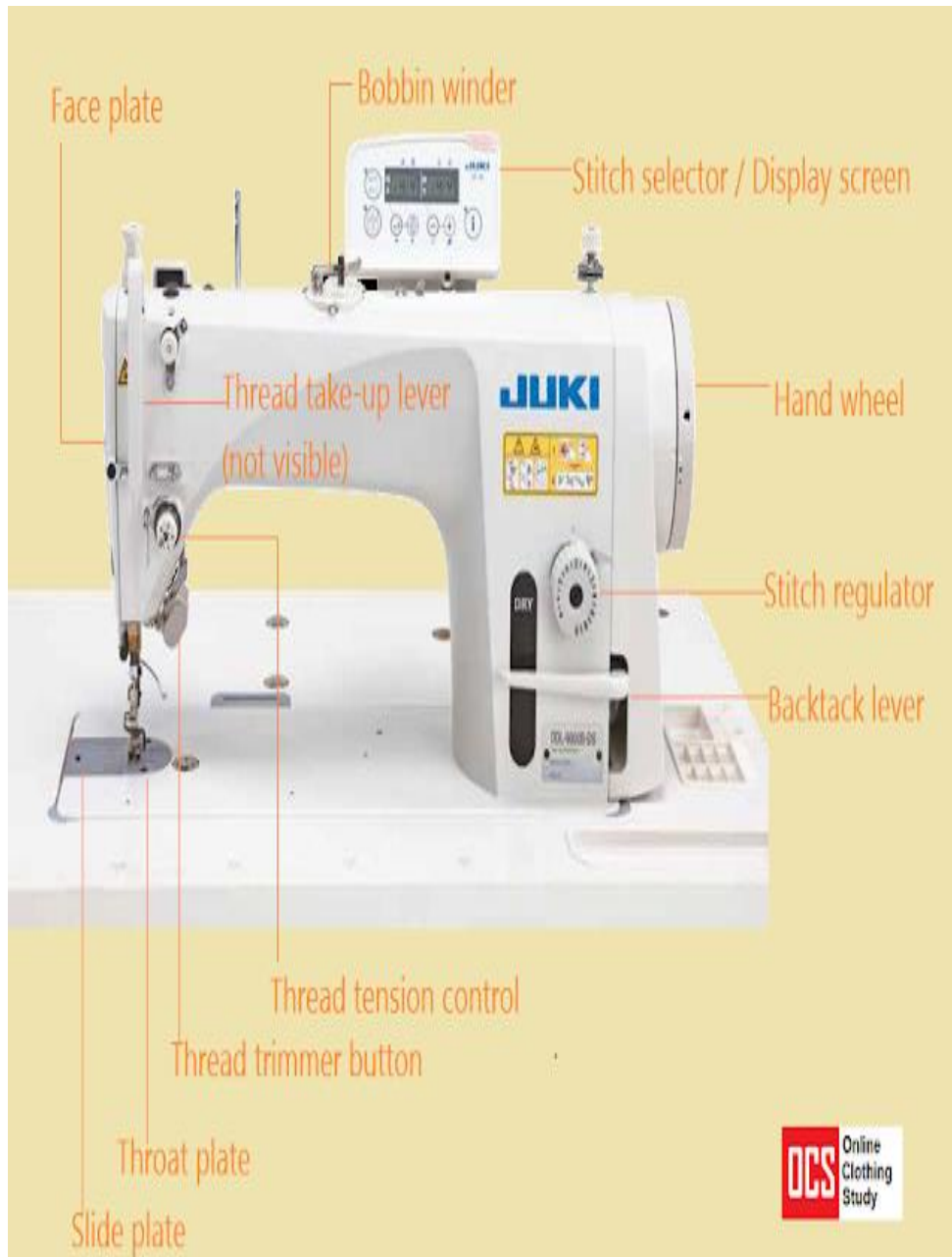
17. **Feed dog:** During sewing, feed dog pulls the fabric/leather in forward.
18. **Needle:** it is used to form a stitch in the garments/footwear.
19. **Needle/throat plate:** Needle plate is a metal plate which is situated under the needle and presser foot. It helps to move the fabric forward during sewing
20. **Shuttle/ Hook:** It picks up the top thread from the needle with the help of the hook point and enlarges it which helps in making the lock.

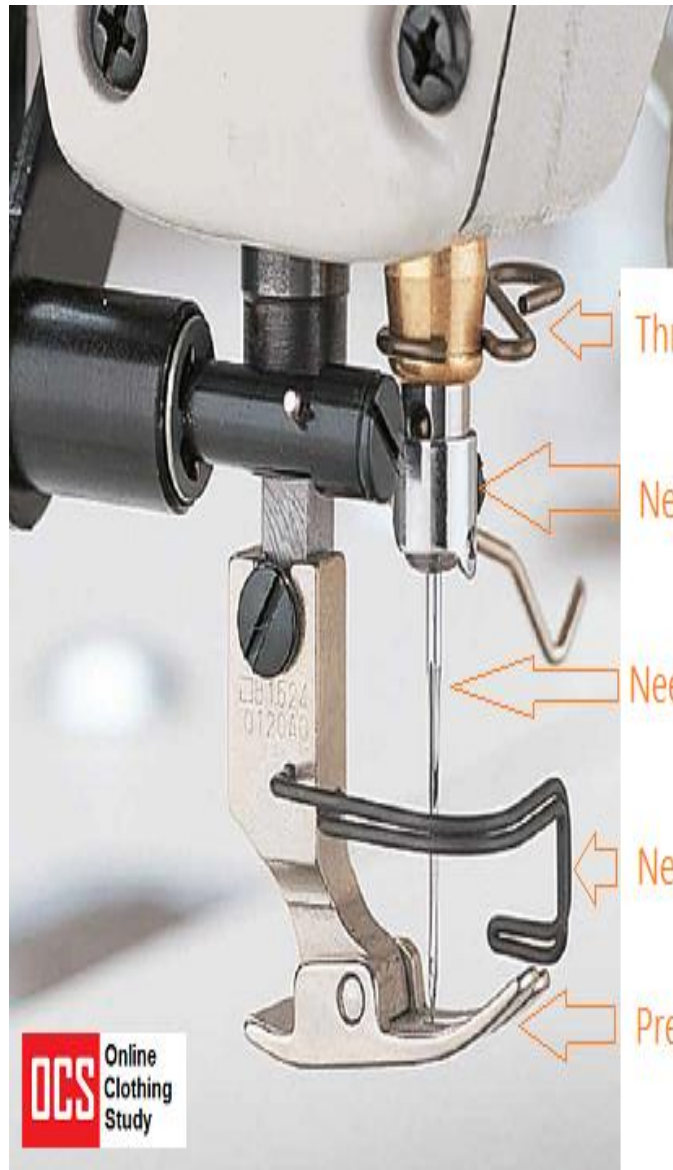
Parts under the table/bed:

- 1. on/ off switch:** It helps to connect and disconnect the power from main channel to motor.
- 2. Treadle/ Paddle:** It works, as an accelerator, by applying push front part of the treadle, it will start the work and when we press the back part will stop the m/c.
- 3. Leg/ Stand:** Holds the m/c in vertical position & allows height adjustment accordingly.
- 4. Motor:** It generates the required power according to the m/c capacity & adjusted speed.

Conti

5. **Pulley/ Transmission belt:** Transfers the power to balance wheel via V- belt.
6. **Pitman rod:** Connects the treadle with the clutch. (or chain)
7. **Knee press:** It releases tension disc and raises pressure roller.
8. **Drip tray:** It collects excess oil, dust & scrap materials (leather, thread, etc.).





Thread guide

Needle bar

Needle

Needle guard

Presser foot



Thread Tension disc

Thread tension spring



Needle

Feed dog



Empty bobbins

Bobbin case



Shuttle hook case

Set up & adjustment of sewing machines

If the needle is TOO small for the thread

- Thread will not pass freely through the eye.
- Thread will not fit properly into the long groove.
- Thread will suffer from excessive abrasion.
- Can lead to costly thread breakages in production.

If the needle is TOO large for the thread

- There will be poor control of the loop formation which may cause slip stitches.
- It will create holes in the fabric which are too big for the stitch and give an unattractive seam appearance.
- Tends to give rise to damaged fabric/ leather along the stitch line, and closely woven fabrics, pucker along the seam line due to fabric distortion.

Balancing needle thread tension

- The thread tension should be adjusted depending on the sewing material (leather), layer of fabric and sewing method.
- To adjust the thread tension turn the tension dial.

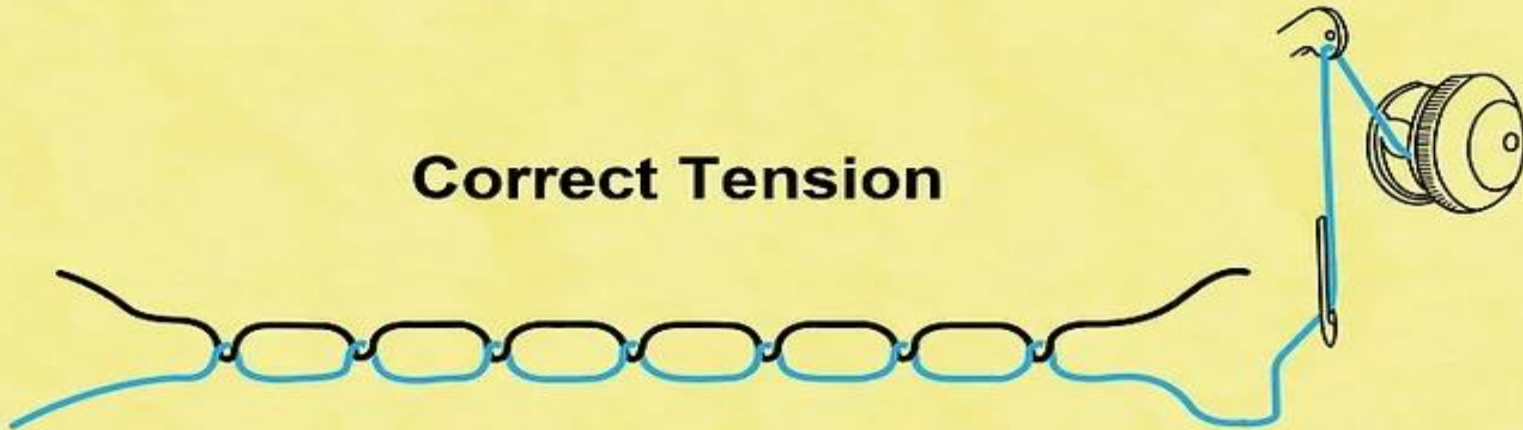
Needle thread tension is too tight:

- The bobbin thread(bottom thread) will appear on the right side (top side) of the leather /fabric.
- Loosen the needle thread tension by moving the dial to a lower number.

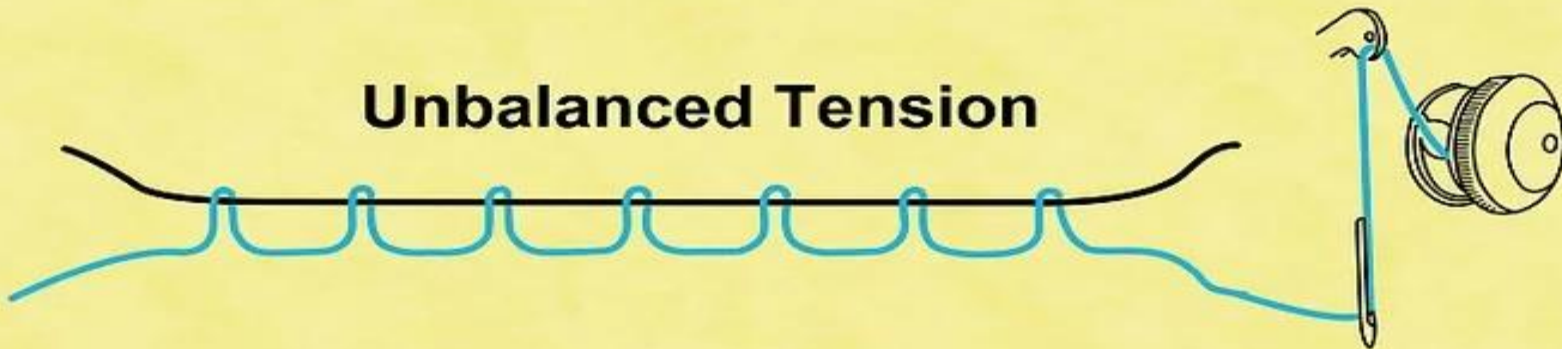
Needle thread tension is too loose:

- The needle thread(top thread) will form loop on the wrong side (bottom side) of the leather/ fabric.
- Tighten the needle thread tension by moving the dial to a higher number.

Correct Tension



Unbalanced Tension



Needle changing

to Change a Sewing Machine Needle:

Most sewing machine manuals come with instructions for replacing the needle, but here are the basics:

1. Loosen the needle set screw.
2. Pull the needle downwards and out of the needle bar.
3. Insert a new needle. Push upwards until the butt of the needle hits the stop.
4. If using an industrial sewing machine, turn the needle so the scarf is on the same side as the hook assembly on the machine.
5. Tighten the needle set screw.

Parts and function of needle

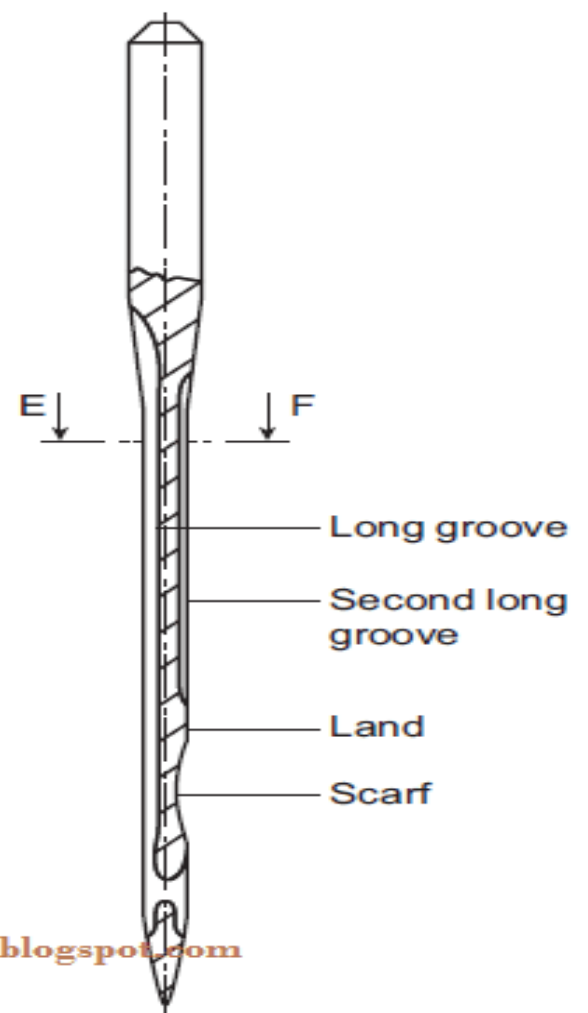
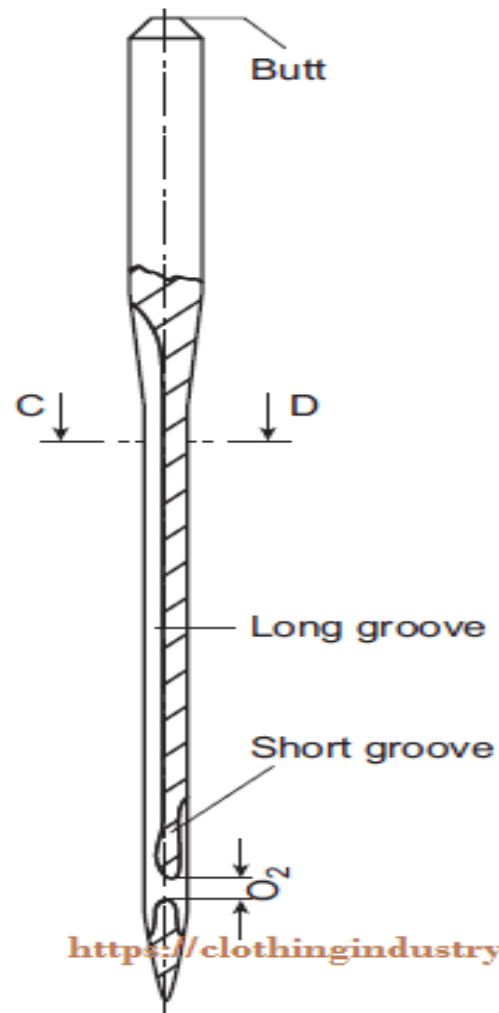
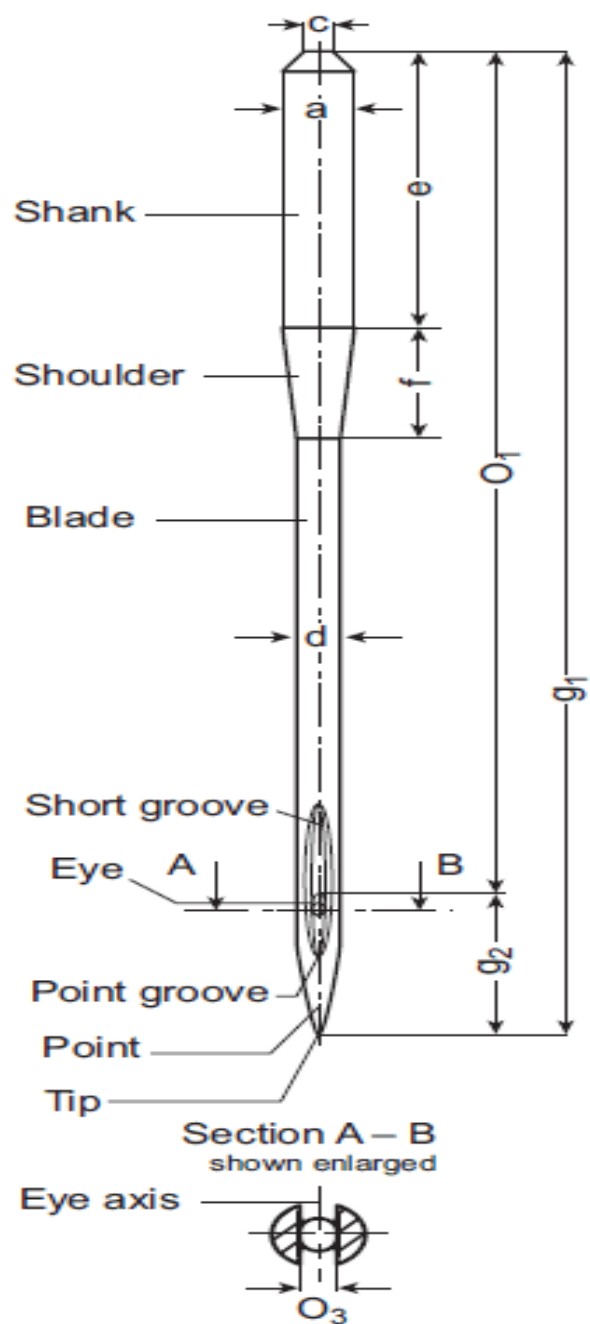


Function of needle

- To produce hole in the material.
- To carry the needle thread (top thread) through the material and there form loop.
- To pass the needle thread through the loop.

Parts of sewing machine needle

- ✓ Butt,
- ✓ Shank,
- ✓ Shoulder,
- ✓ Blade,
- ✓ Long groove,
- ✓ Short groove,
- ✓ Needle eye,
- ✓ Scarf,
- ✓ Point,
- ✓ Tip.



<https://clothingindustry.blogspot.com>

Measurement description of needle parts

Legend	Description
a	Shank diameter
d	Blade diameter
c	Butt diameter
e	Length of shank
f	Length of shoulder
g1	Length of needle
g2	Length of point
m3	Remaining thickness of blade
m4	Width of long groove
O1	Butt to eye length
O2	Length of eye
O3	Width of eye

Parts of sewing machine

Butt:

- the starting part of bottom edge of needle which can be made by predetermined shape.
- Butt helps for easily attaching of needle with the needle bar or clamp of the sewing machine.

Shank:

- Shank is the bottom part of sewing machine needle which is tied in the needle bar.
- It may be flat or cylindrical on one side.
- Shank is wider than the remaining parts of needle and works as a support of needle.

Conti.

Shoulder(shaft):

- It is the part between shank and blade of sewing machine needle.
- When the needle penetrates through the leather/fabric to reach its lowest position then the shoulder also penetrates through the fabric.
- As a result it reduces the **friction** between fabric and needle by producing a wider hole on fabric.

Blade:

- Blade is the part from needle eye to shoulder.
- It is the longest part of the needle and **maximum** friction with fabric/leather take place in this area.
- Blade is gradually tapered to tip.

Conti.

Long groove:

- It is a long and thin groove in blade from shoulder to needle eye.
- Sewing thread take place in this groove during up and down of sewing machine needle through the fabric in sewing time, thus reduce the friction between needle, fabric and sewing thread.
- It reduces or lower possibility of damaging thread due to friction.

Short groove:

- Short groove is placed in the side of needle where the hook or looper is placed.
- It is a small groove between tip and needle eye.
- Short groove helps the sewing thread to create loop.

Conti.

Needle eye:

- the hole which is situated in the front of the needle is called eye.
- It is a small slot between long and short groove of needle.
- Needle eye holds the needle thread and helps to create loop.

Scarf:

- Scarf is a curved slot at near above the eye.
- It helps to close setting between the looper and needle.
- As a result, it is easy to catch the needle loop by the hook or looper.

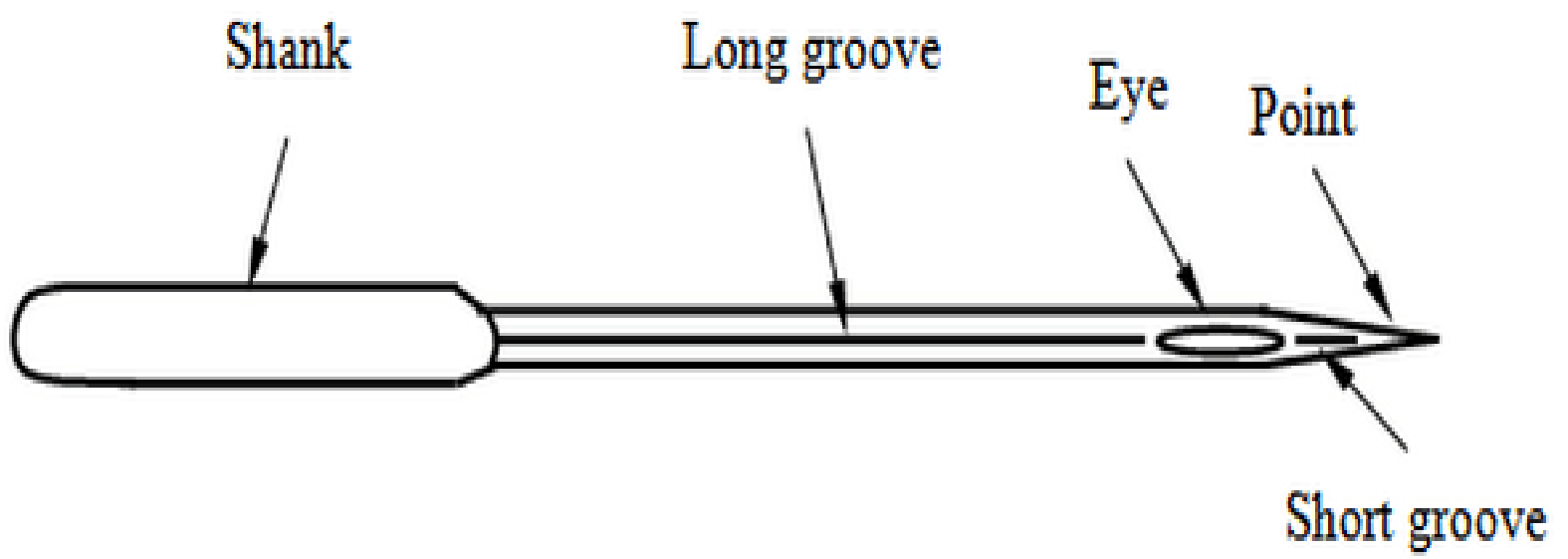
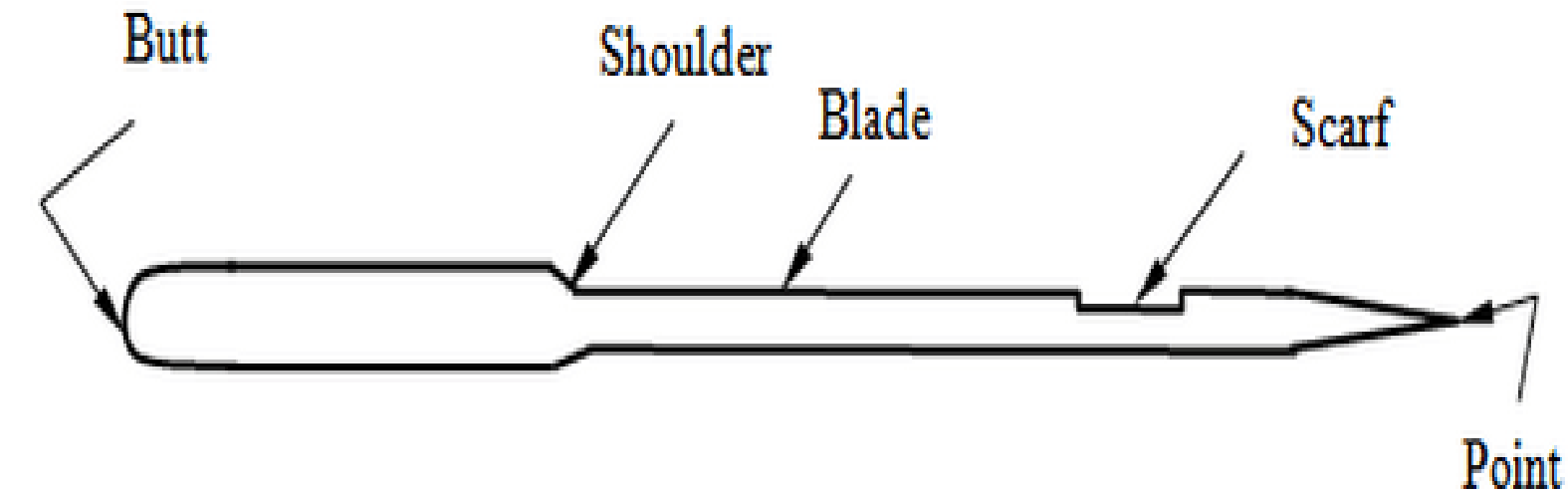
Conti.

Point:

- Point is the part from the needle eye to the tip.
- It helps to penetrate the needle into fabric/leather without any damages.
- Also, the proper care should be taken to select the needle point appropriately for the fabrics.

Tip:

- The ending edge of needle is called tip.
- Tip helps to penetrate the needle into fabric without any damages.
- It helps to create hole in the fabric during sewing the apparel



Types of needle

Needle classification (identification)

Needle can be classified on the following basis:

- ✓ Needle system
- ✓ Needle point
- ✓ Needle size

Needle system

- It refers to the fitting measurements of the needle in to the sewing machine.
- which enables it to be suited for a particular model/type of machine.
- The measurements, which are taken into account while constituting a needle system, are: Shank length, shank diameter, blade length, needle length, thread grooves and clearance cut.
- 134 is the basic needle system and all the other systems are studied in comparison to 134 system.

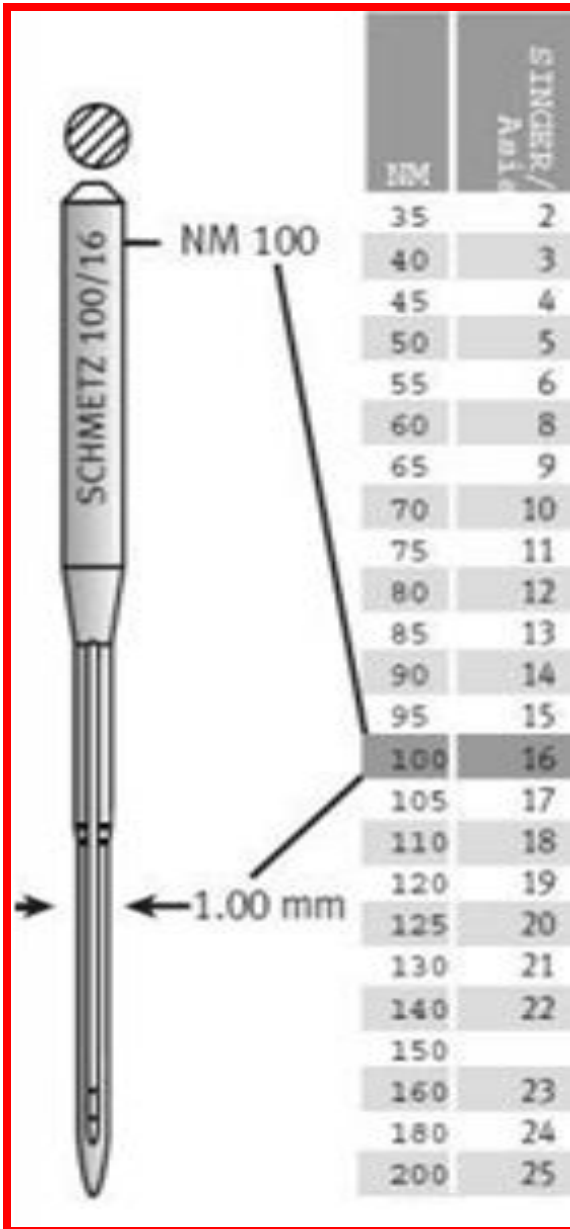
Types of needle system

1. **134 system**: needle length = 38.5mm; shank diameter = 2mm (used for flat & post bed m/c).
 2. **134-35 system**: needle length = 42.0mm; shank diameter = 2mm (used for cylindrical bed m/c).
 3. **34 system**: needle length = 38.5mm; shank diameter = 1.6mm (used for bartacker & multi dimensional m/c) .
 4. **134kk system**: needle length and shank diameter remain same as 134 system but the shank length gets reduced and blade length is increased. It is applicable for heavy duty m/c ,in case of materials thicker than 1.2-1.5mm., kk should not be used on high speed machines as due to longer blade and shorter shank, strength of the blade is reduced.
-
1. **438 system**: needle length and shank diameter same to the 134 system but clearance cut is long.(zig zag machine)

Needle size

- It refers to the ***diameter of the needle blade*** just above the needle eye.
- The choice of needle size depends up on **type and size of thread & penetration force required.**
- Needle size could be indicated by :**Number metric (N.M) (American system) system and Singer /Simon system(European system).**
- *In case of N.M system, thickness is indicated in 100th of a mm. for e.g. If blade diameter = 1mm then needle size = $1*100 = 100$.*

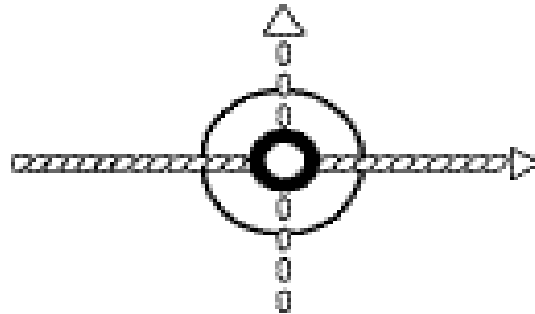
Needle size



American	European	Fabric types
8	60	Very fine fabrics (silk, chiffon, organza, voile, lace)
9	65	
10	70	
11	75	Light weight fabrics (cotton, heavier silks, synthetics, spandex, lycra)
12	80	
14	90	Medium weight fabrics (velvet, fine corduroy, linen, muslin, tricot, knits, fleece)
16	100	Heavy weight fabrics (denim, leather, canvas, suiting)
18	110	Very heavy weight fabrics (heavy denim, upholstery fabric, faux fur)
19	120	
20	125	Extra heavy fabrics
21	130	

Needle point

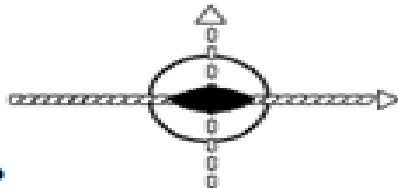
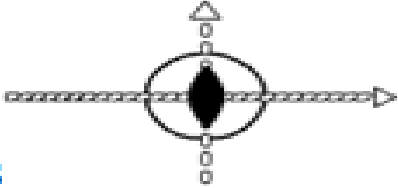
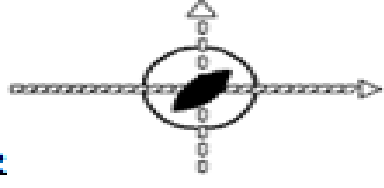
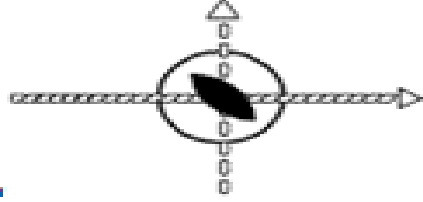
- The purpose of needle point is to *perforate the material either by pushing(round point) aside the fibers or by cutting(cutting point) through the material* in order to make way for the top thread to down for the stitch formation.
- **Round point** : Incase of synthetics/fabrics: needle should perforate the material by pushing aside the fibers so that the fibers are not cut and damaged. So we use round(R) point needle for synthetics/fabrics.

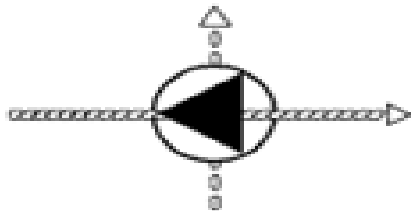


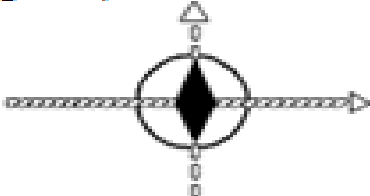
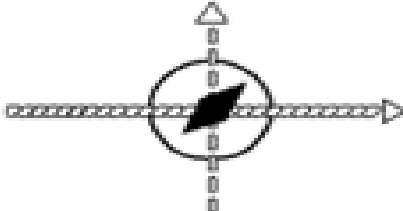
R (R) SET Normal Round Point

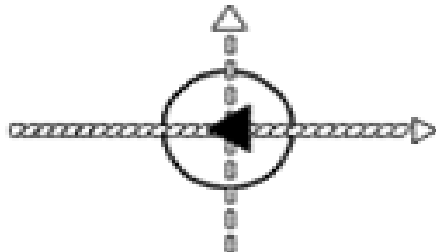
Conti.

- **Cutting point:** In case of leather and hard material, due to the hardness and thickness of material needle couldn't perforate the material by pushing aside the fiber network, unless material is cut through. So, we use cutting point needles for leather/hard material. when cutting point cut the material, a hole will be formed of a particular shape.
- The cutting points needles are classified according to *the shape and position of the cutting edge* : there are **two, three and four cutting edge needle points**

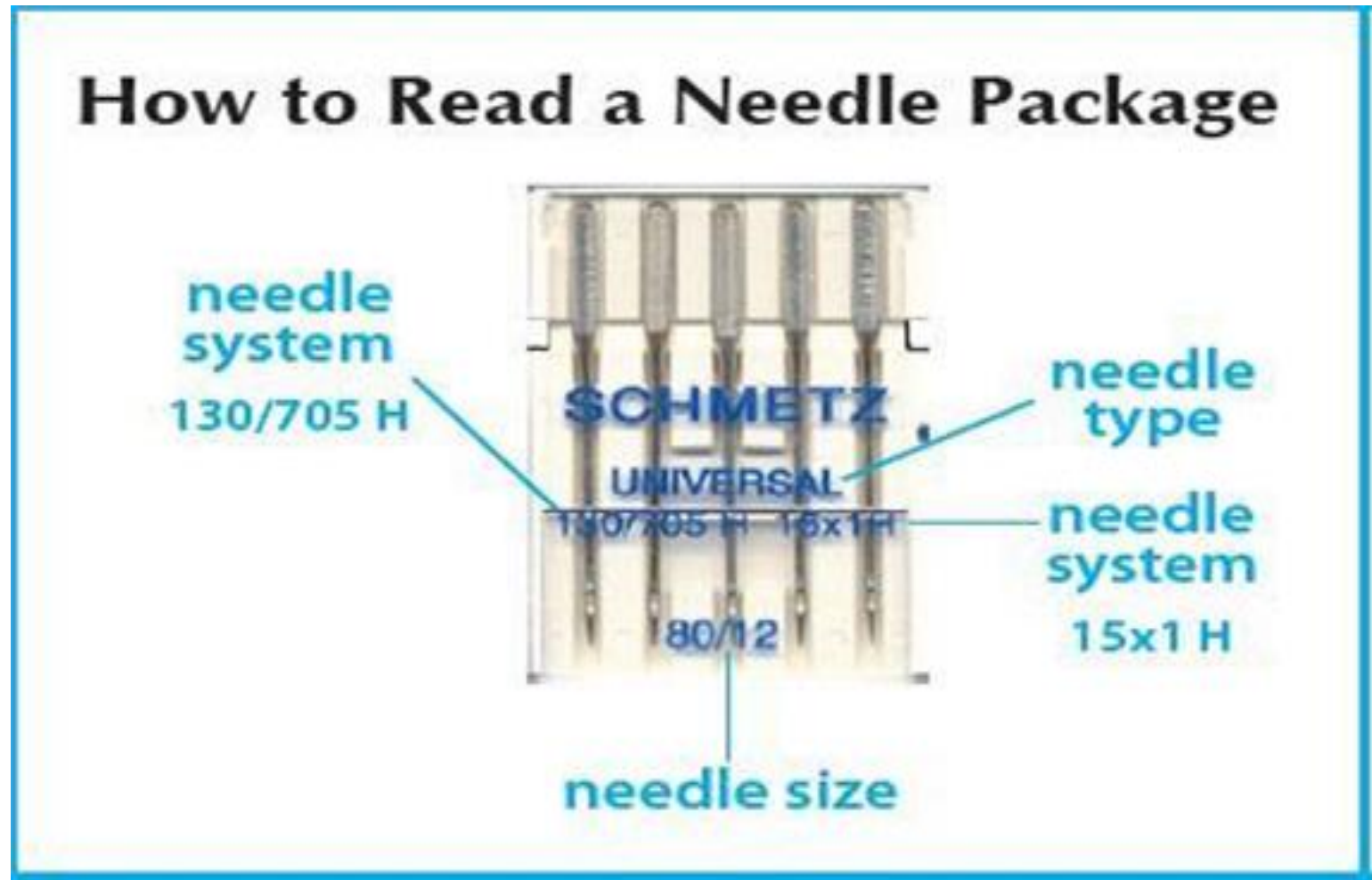
With 2 cutting edges (As the min. cutting edges are two, we get a lens shaped cross-section)				
P/ Wedge point- P family includes P, Ps, Pss, PCL, PCR, etc.	P 	Result: A very strong seam. Distance between stitches: 6 to 8 stitches/cm	PCL (cut to left)	PCR (cut to right)
S/ Cross point	S 	Result: A very straight seam. Distance between stitches: 3 to 4 stitches/cm		
LR/ Reverse twist point	LR 	Result: A slightly recessed, straight seam. Distance between stitches: 5 to 6 stitches/cm		
LL/ twist point	LL 	Result: A slightly recessed, straight seam. Distance between stitches: 5 to 6 stitches/cm		

With 3 cutting edges (For hard, dry leathers)	TRI/ D (triangular point) 
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With 4 cutting edges (for extra hard & dry leathers)	Spear point	DI/ DIA (diamond point) 	VR- R TW SP (reverse twist spear point) 	VL- TW SP (twist spear point)
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Combination point of round & cutting point (SD1 is basically a round point needle with a triangular tip, the cutting edges being very short).	SD1 (TRI TIP) triangular tipped round point 	The small triangular tip cuts approx. 10% of the stitch hole, with the remaining 90% being displaced by the conical round point (R point). Result: A straight seam. Distance between stitches: 6 to 8 stitches/cm
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Needle identification



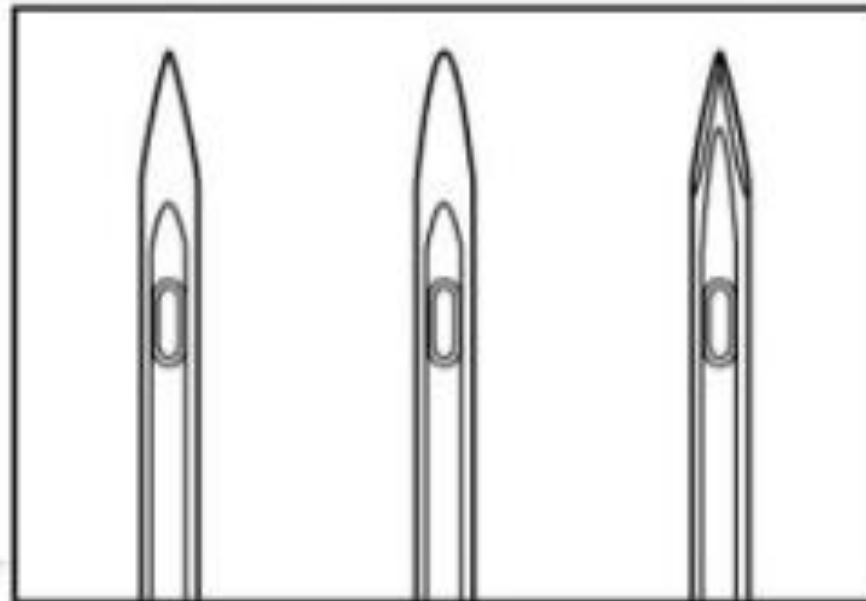
Needle point

Most machine needles will look similar but they will differ in their tips:

Set/Spear point - These are used for most woven fabrics.

Ball point - These have a rounded tip and are used for knitted fabrics. The rounded end allows the needle to separate the yarns without cutting them, which reduces the chance of the fabric laddering.

Wedge point - These are designed to cut a hole as they penetrate the fabric. They are used for machining leather and plastic materials.



Spear point

Ball point

Wedge point

Spear needle point



SLIM SET POINT



SET POINT



HEAVY SET POINT



Slim set point also referred to as acute round point(SPI)

- This point is used for dense woven fabrics as it causes less damage, helps set a straighter stitch and minimizes seam pucker.
- Commonly used for microfibre and densely woven, coated materials, topstitching of collars and cuffs in shirts.



Set cloth point also referred to as normal round point(R)

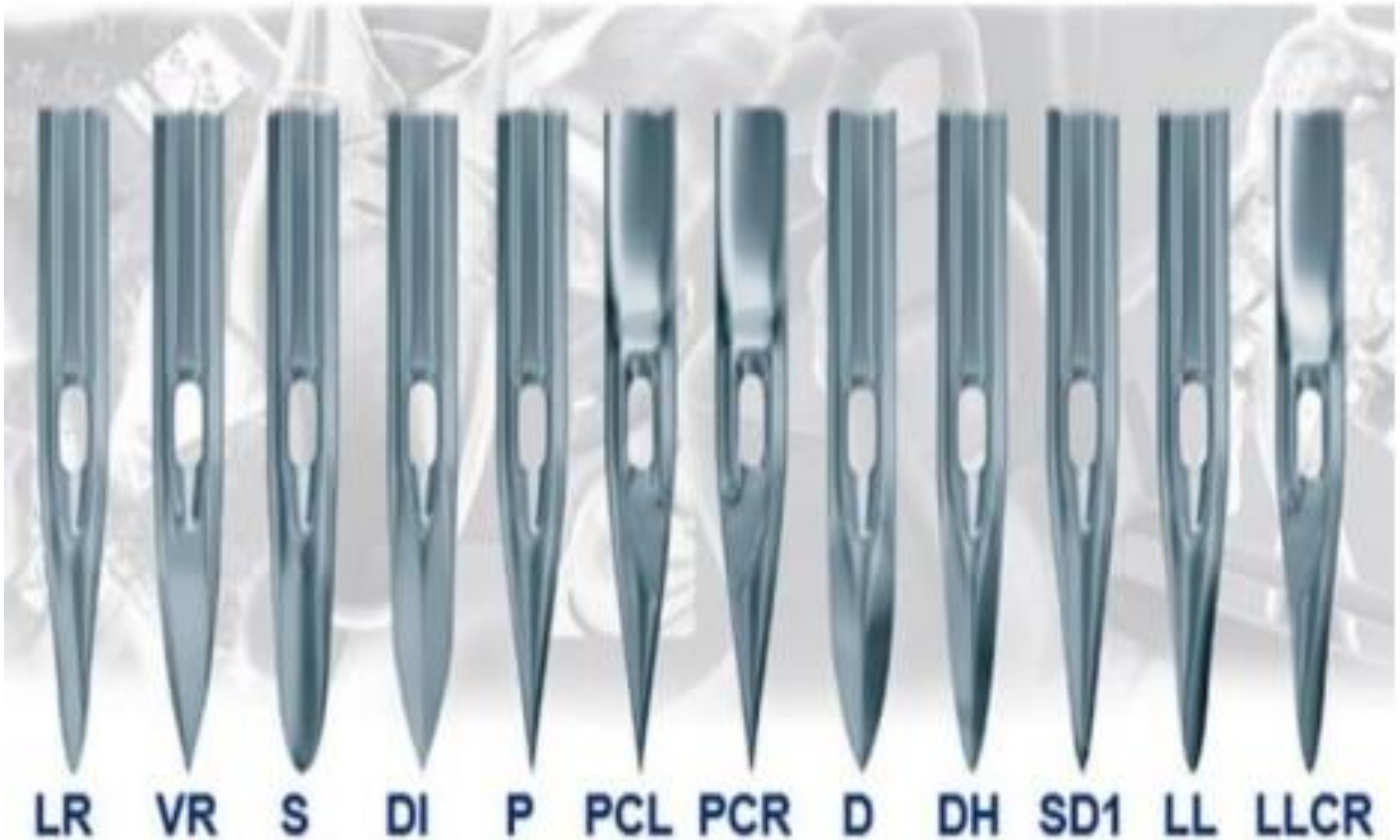
- this point is used for normal fabrics with standard seams as it pushes the yarn to the side.

Light ball pint(SES)

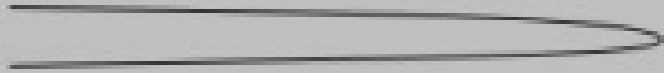
- This point is used for sewing light weight knitted fabric



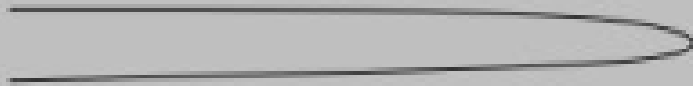
Cutting point overview



Ball point needle types



LIGHT BALL POINT

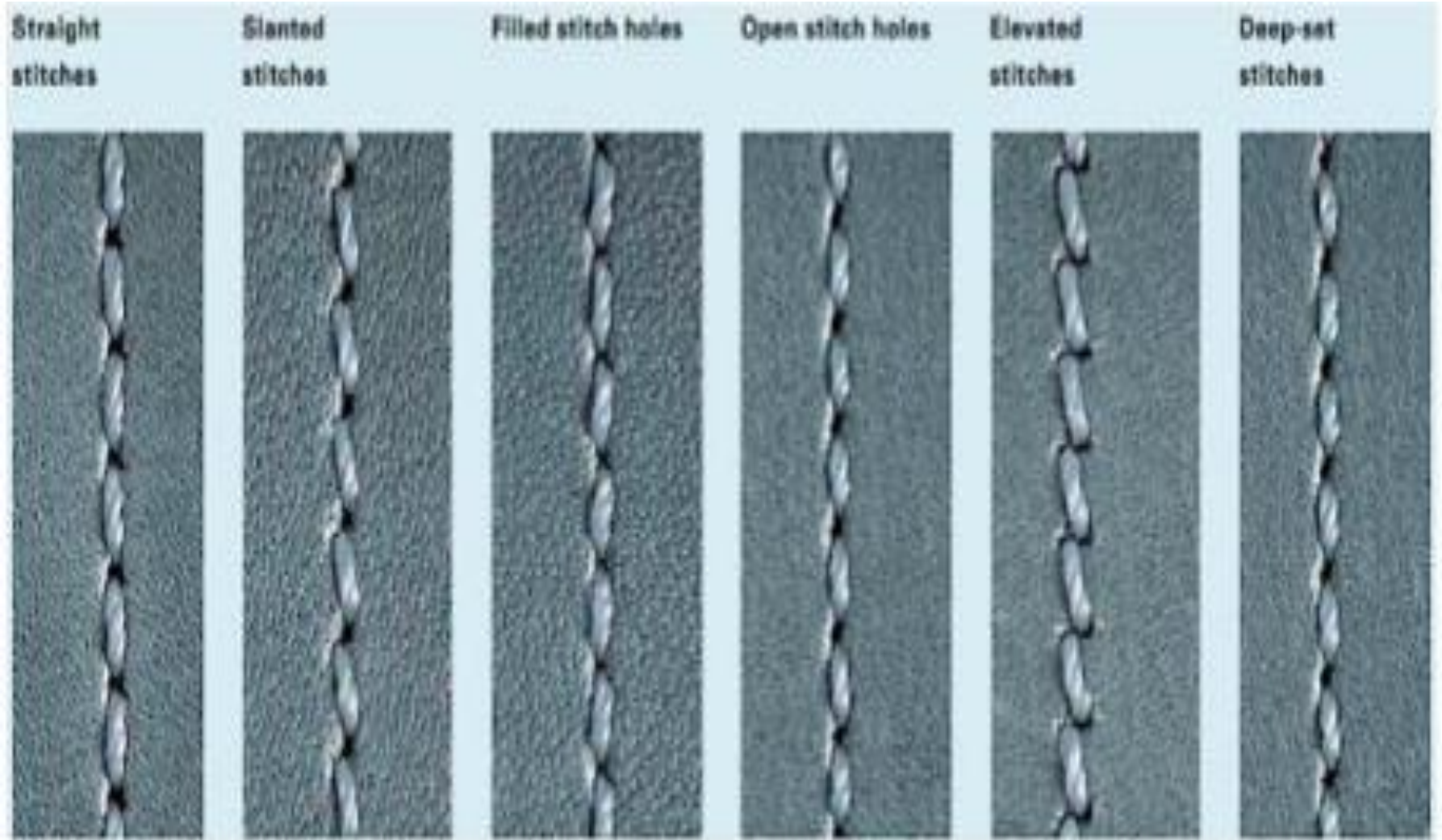


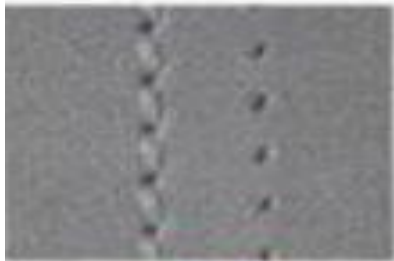
MEDIUM BALL POINT



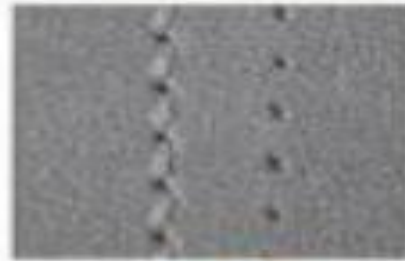
HEAVY BALL POINT

Effect of different needle points





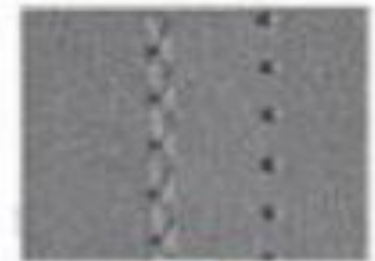
VR



VL



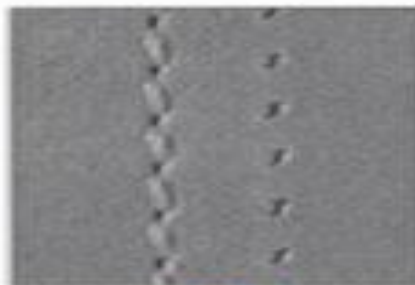
DI



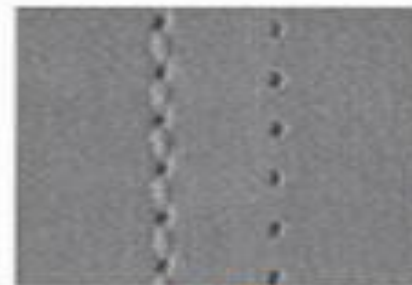
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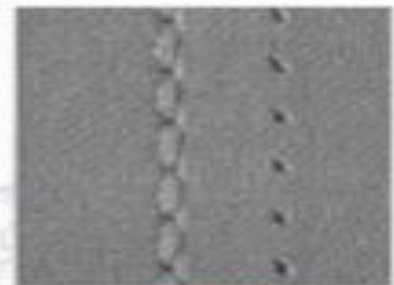
P



LR



S



LL