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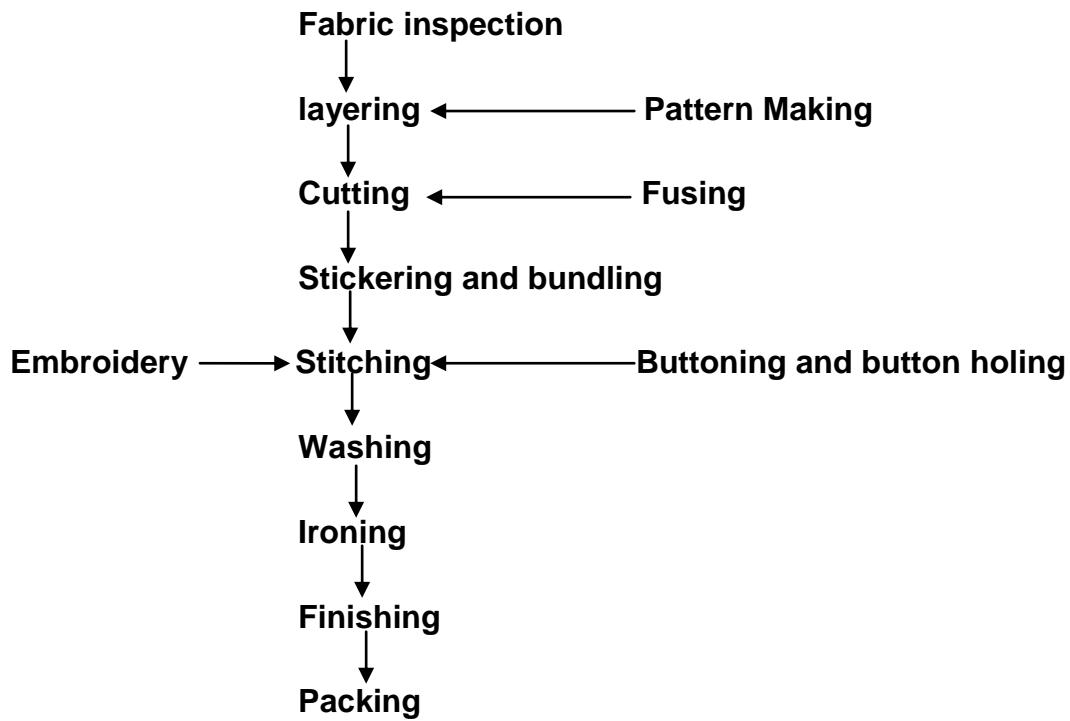
1. Basic Textiles terms

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. Computer Embroidery

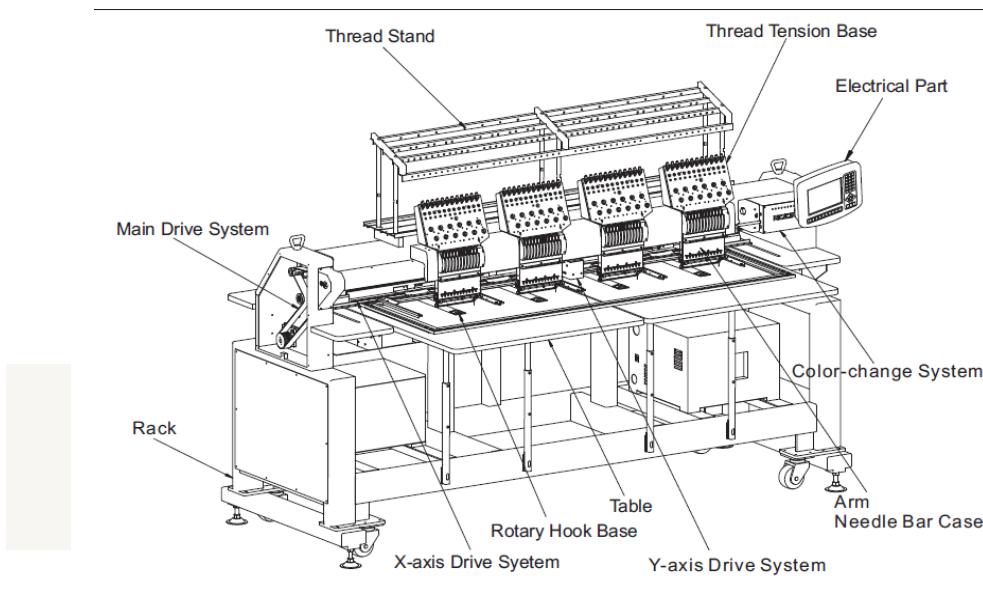
- Embroidery is a craft by using a needle, thread or yarn is sewn on to a base material or fabric to create a pattern.
- This is done by computer operated machine, it involves the use of special threads available in many colors that help to produce various beautiful patterns.
- There are two types of Computer embroidery machine as
Single head needle machine
Multi Head needle Machine

➤ Sequence of Operations In Garment production



3. IDENTIFICATION OF PARTS OF COMPUTER EMBROIDERY MACHINE

Operating Process for Muti Head Computer Embroidery machine



The computerised embroidery process can be broken down into six functional activities:

1. Interpret artwork and digitise the design using specialised software
2. Save the design as a stitch file that can be understood by the embroidery machine
3. Read the stitch data file into the embroidery machine
4. Teach the machine how to embroider the design
5. Frame or hoop the fabric you wish to embroider on and slot into the machine arms.
6. Start the machine stitching and run until embroidery design is complete and finished.

1. Interpret artwork and digitise the design using specialised software

- Artwork may exist as a printed document or in a digital form. The design would be either scanned or opened into the specialised digitizing software and displayed on screen.
- Older systems require the artwork to be enlarged and plotted on a tablet, but modern systems use 'on screen' digitizing methods. The operator can zoom in and use the pointer of the mouse to define the design in stitches.

2. Save the design as a stitch file that can be understood by the embroidery machine.

- Once the embroidery design is complete the design is saved in the internal file format of the specialist embroidery software.
- This is important if the design needs to be changed or edited later as working with a native file makes this easier.



3. Read the stitch data file into the embroidery machine

- The file needs to be transferred into the memory of the embroidery machine, this might be done via a cable from the PC running specialist software, or via a flash card or USB stick.

4. Teach the machine how to embroider the design.

- Once the design is in the memory of the embroidery machine the machine operator needs to teach the machine how to sew the design i.e. which needles and what orientation to use.
- The needles are numbered and each needle is threaded with a different colour.
- The embroidery design software provides the operator with a schedule of which colour is to be used in each stage of the design and the stages are numbered in sequence.
- To teach the machine the operator assigns the relevant needle number (colour) to each stage. Each threaded needle will stitch its colour block or blocks until a colour change is required.
- It will then tie off its thread and park and the next relevant needle will move into position to begin sewing.



5. Frame or hoop the fabric you wish to embroider on and slot into the machine arms.

- The frame or hoop is based on a traditional embroidery ring; the fabric to be embroidered is secured in the frame rather like the skin on a drum.
- The purpose of this is to secure the fabric in a mechanism that can be slotted onto the embroidery machine so that it can be moved about accurately by the embroidery machine pantograph.
- Framing also serves to stabilise the fabric, to avoid the movement of the design whilst being stitched as described above.
- Further support is added by applying backing to the fabric which is a paper-like product inserted under the fabric and is often also framed with it.

6. Start the machine stitching, run until embroidery design is complete and finished.

- Embroidery machines use the conventional 'lock stitch' mechanism, using a top thread and a bottom 'bobbin' thread to create a stitch.
- The bobbin, located beneath the material being stitched, catches the thread of the penetrating needle and carries it in a circular direction creating a loop through which the bobbin thread passes locking the stitch to the back of the material.

- Unlike a conventional sewing machine the computerised embroidery machine is driven automatically moving in any direction within a specified field, changing needles (colour), trimming thread and stitching at speeds of up to 1200 stitches per minute.
- It also has a more complex tension mechanism which can be key to the productivity of the machine and the finished quality of the embroidery.
- A well maintained embroidery machine, using good quality threads and stitching a professionally digitised design can complete an embroidery design independently without stopping and without requiring operator intervention.

4. Running process of computerized embroidery machine

1. Monitoring the machine embroidery process

- Make sure the work area is free from hazards
- Check the equipment prior to starting the machine, including correct controls, correct attachments, correct needle & thread
- Monitor the embroidery process once the machine has been started
- Rectify any errors or make required adjustments if the embroidery does not meet the quality standards
- Use the correct tools and equipments
- Check needles and threads regularly

2. Rectifying any error/ breakdown during the machine embroidery process

- Replace needle/thread if required during the embroidery process
- Report faults in the materials
- Follow company reporting procedures about defective tools and machines which affect /problems to the relevant person promptly and accurately
- Report any damaged work to the responsible person
- Carry out the finishing operations related to computerized machine embroidery

3. Carry out the finishing operations related to computerized machine embroidery

- Follow the instructions &design specifications given for the embroidery to be done
- Remove the frame from the machine after embroidery is completed
- Take out the embroidered panels
- Remove stabilizer if any
- Trim the extra thread
- Leave work area safe and secure when work is complete
- Work on embroidery machines safely and in accordance with guidelines

- Inspect embroidered products against specifications
- Sort and work to assist the next stage of production and minimise the risk of damage

5. Different Types of Embroidery Threads:

- Different types of Embroidery threads in use are
- Rayon Threads,
- Polyester Threads,
- Nylon threads,
- Cotton Threads,
- Cotton-wrapped polyester,
- Metallic Threads,
- Laminate or Flat Threads and Silk Threads:

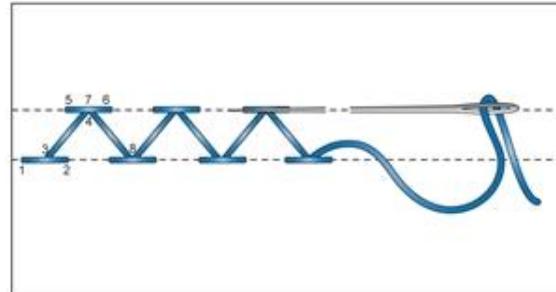
➤ Frame Fitting Practices

1. Place the piece of fabric using a short stitch length, if the fabric is thin fuse a layer of light weight interfacing on the patch wrong side after piecing.
2. Hoop the base fabric with the help of stabilizer.
3. Place the hoop on Embroidery Machine and select the design to embroider.
4. The first segment is the intersection lines for the pieced appliqué placement.
5. Place the seamlines of the patch work inline with the stitching on the base fabric. Stitch the outline.
6. Remove the hoop from the machine.
7. Trim the excess fabric from around the outline.
8. Return the hoop to the machine and complete the remaining design.

6. Embroider Stitches:

The stitches are grouped into four types, each offering different effects and uses for embroidery:

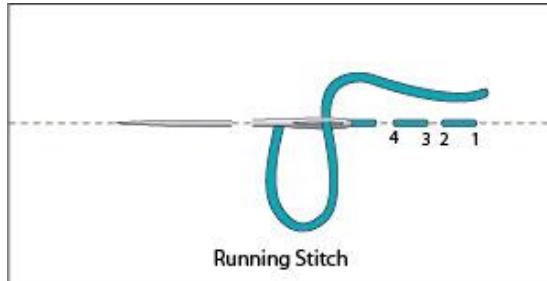
- **Outline** – Used for outlining the elements of your design
- **Border** – Used to secure edges and to add textural dimension to your design
- **Detached** – Used to create decorative details or in mass to fill in open areas of the design
- **Filling** – Used to create shading or to solidly fill in a design area



Running Stitch

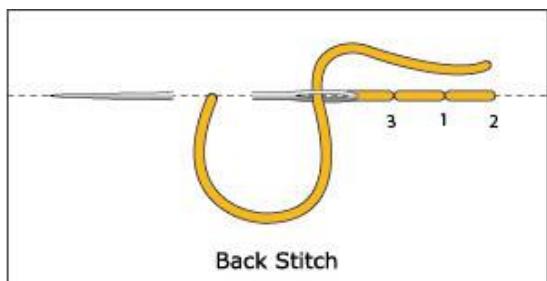
Uses: outlining, straight and curved lines.

- Work from right to left.
- Bring thread up at 1 then down at 2, up at 3 and down at 4 and continue.
- The spaces between the stitches can be the same length as the stitches or shorter for a different look.



Back Stitch

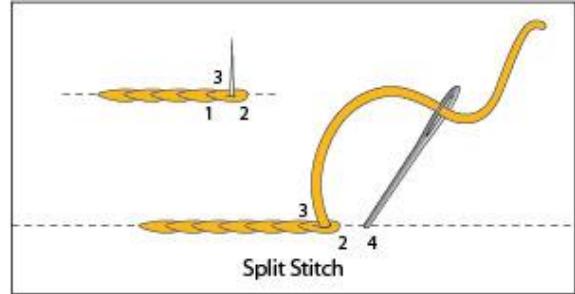
Uses: outlining, straight and curved lines



- Work from right to left.
- Bring needle up at 1 and back down at 2.
- Move left and bring needle up at 3, then back down at 1. Continue stitching.

Split Stitch Uses: Outlining, straight and curved lines, filling a shape by working rows closely together.

- Work from left to right.
- Bring needle up at 1 and down at 2.
- Bring needle back up at 3, splitting the center of the previous stitch.
- Take needle down at 4 and then back up at 2.
- Continue stitching.



Stem Stitch

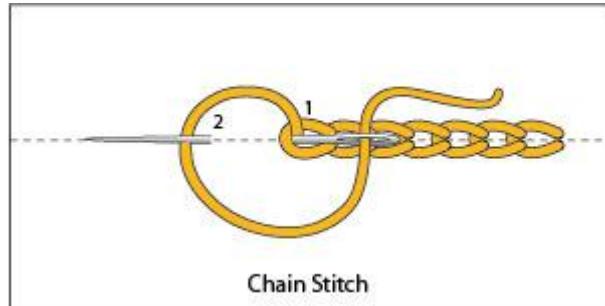
Uses: Outlining, straight and curved lines, stems for plants, filling if rows are stitched closely together. Creates a rope like appearance.

- Work from left to right.
- Bring needle up at 1 and down at 2.
- Bring needle back up halfway between 1 and 2 at 3, just slightly above the first stitch.
- Be sure to keep thread below the needle.
- Continue stitching

Chain Stitch

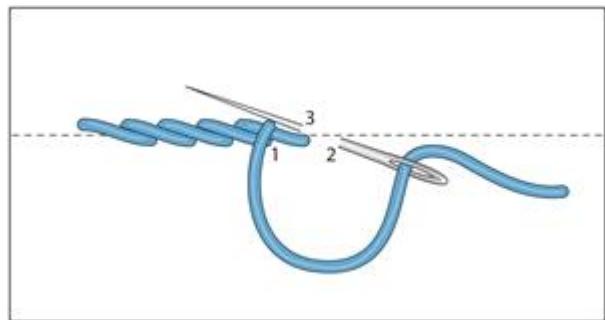
Uses: Outlining, straight and curved lines, filling if rows are stitched closely together.

- Work from top to bottom.
- Bring needle up at 1 and then reinsert needle in same hole, forming a loop.
- Bring needle up at 2 and pull thread to tighten loop until desired shape is achieved.
- Repeat multiple stitches to create a chain.
- To end the row make a small stitch over the last loop to hold it in place to secure thread on backside.



Couching

Uses: Outlining shapes, straight and curvy lines, spirals, bold dimensional accents, decorative borders.



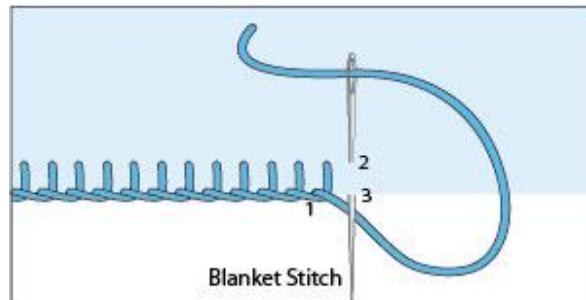
This stitch involves two threads: a thicker foundation thread, (also called the laid thread) and a thinner thread (called the couching thread).

- Bring foundation thread onto the front and place along the design line.
- Bring the couching thread up under the foundation thread and make a tiny stitch over the thread, going back into or very close to the entry hole.
- Continue making evenly spaced stitches over the foundation thread to anchor the foundation thread in place.
- To finish couching, bring the foundation thread onto the backside and secure it.
- Secure couching thread on backside.

Blanket Stitch

Uses: Straight and gently curved lines, borders and finishing edges.

- Work from left to right.
- Bring needle up at 1, down at 2 and up at 3, keeping the thread looped under the needle.
- Pull thread through and shape stitch as desired.
- Repeat multiple stitches until complete.



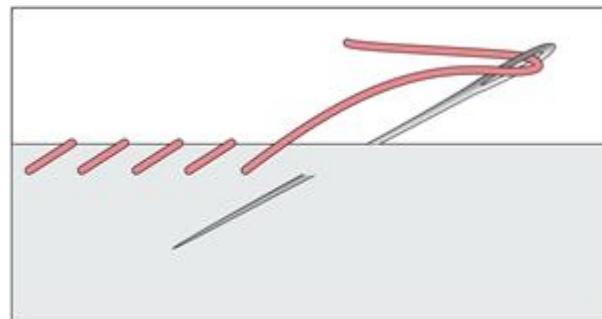
Whip Stitch

Uses: is used for seaming fabrics, either right or wrong sides together. The stitches should be about 1/16" apart, and only as deep as necessary to create a firm seam.

- Bring needle up at 1 and down at 2 making sure to pierce both pieces of fabric to bind together.
- Bring needle back up at 3 and down 4, continue stitching the seam.

Ladder Stitch

Uses: Applique, bind two seams together.

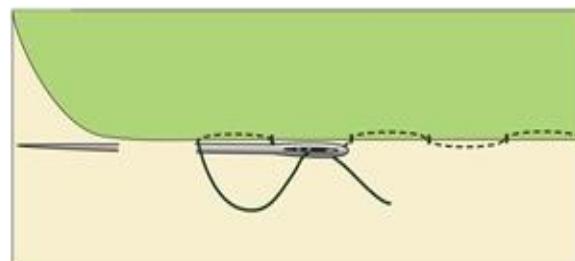
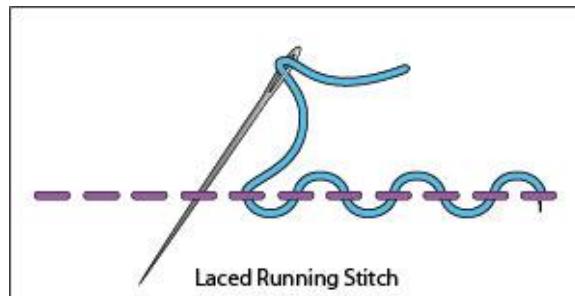


- Bring needle up at 1 and through the fabric a short distance to 2, keeping the thread hidden under the fabric (dashed lines).
- Bring needle over to 3 and repeat.
- Only the vertical stitches should show on the front of the fabric. Stitches indicated by dashed lines will be hidden in the base fabric, or in the folds of the appliqué.
- Continue stitching.

Laced Running Stitch

Uses: Borders, decorative outlining.

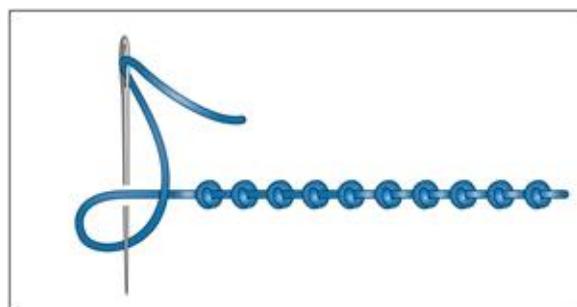
- Stitch a line of Running Stitches.
- Bring the lacing thread up at 1 and lace it under the next running stitch.
- Continue lacing the thread up and down through the running stitches keeping the loops even.
- To finish the lacing, bring the lacing thread onto the backside under the center of the last stitch.



Coral Stitch

Uses: Decorative borders, foliage, plant stems

- Working from right to left, hold the working thread to the left of the starting point (or the last stitch). Insert the needle into the fabric above the working thread and bring the tip of the needle out just under the thread. Wrap the thread around the needle from left to right and pull the needle through the resulting loop.

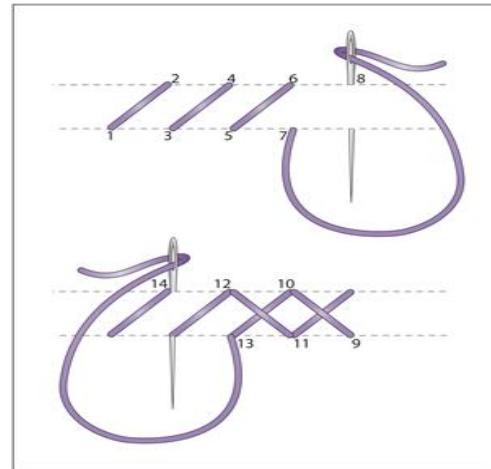


Cross Stitch

Uses: Borders and filling if worked in adjacent rows.

To stitch a line:

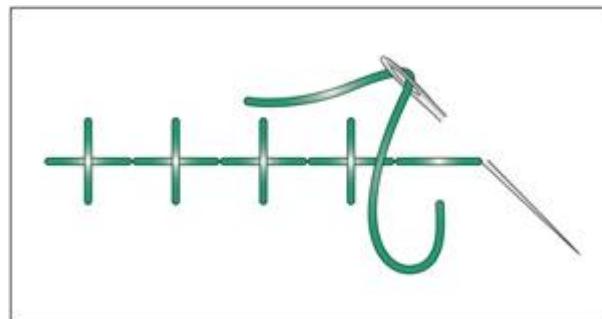
- Stitching from left to right, bring needle up at 1, down at 2, then up at 3 and down at 4.
- Continue stitching across to end of line.
- Start back stitching from right to left, make crosses by bringing the needle up at 5 and down at 6. Continue until all crosses have been stitched.



Upright Cross Stitch

Uses: Borders, fillings, decorative.

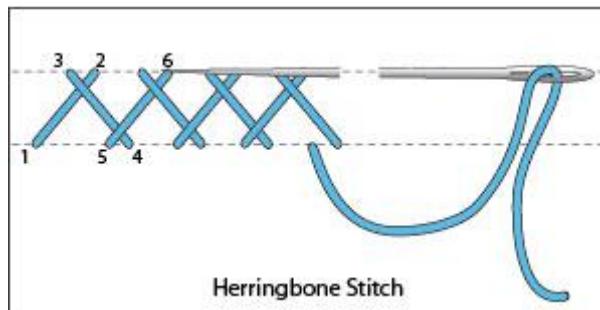
- Work left to right.
- Create a horizontal stitch by bringing needle up at 1 and down at 2.
- Create a vertical stitch by bringing your needle up at 3 and down at 4.
- To create the next upright cross stitch bring your needle up at 5 and down at 6.
- Bring your needle back up at 7 and down at 8.
- Continue stitching.



Herringbone Stitch

Uses: Border, edging, can be stitched over a ribbon or braid to hold it down.

- Work from left to right.
- Bring needle up at 1, and down at 2.

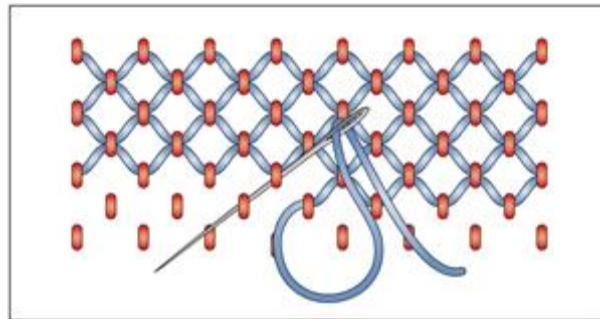


- Bring needle up at 3 and down at 4 to create an elongated cross stitch.
- Bring needle up at 5 and continue.
- Mark two parallel lines with Water Soluble Pens to keep stitch height uniform.

Chevron Stitch

Uses: Border, edging, can be stitched over a ribbon or braid to hold it down.

- Work from left to right.
- Bring needle up at 1, down at 2.
- Bring the tip of the needle back through the fabric halfway between 1 and 2 at point 3.
- Bring the needle up to 4 and make a backstitch by bringing your needle up from 5 down at 6.
- Bring the tip of your needle back through the fabric halfway between 5 and 6 at point 7.
- Bring your needle down at 8 and repeat the stitching sequence.



Cloud Filling Stitch

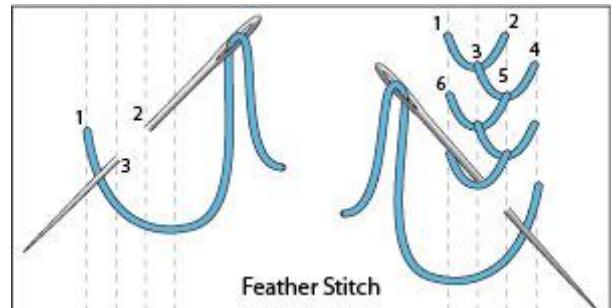
Uses: Filling in spaces

- Lay a groundwork of small, evenly spaced vertical stitches, alternating the placement of the stitches as shown in the diagram.
- Weave your thicker secondary thread through the network of stitches in rows.
- When starting from the right, thread the needle under the first vertical stitch, then bring your needle through the vertical stitch to the lower right. Next, thread your needle under the next vertical stitch to the upper right. Continue stitching in a zig-zag motion to the end of the row.
- Work the next row in the opposite direction.

Feather Stitch

Uses: Decorative border edges, seam embellishment, foliage and stems.

- Work vertically, from top to bottom.
- Bring needle up at 1 and back down to right at 2, leaving a loop on the front.
- Bring the needle back up at 3 and pull thread to shape loop as desired.
- Insert the needle to the right of 4 at 5, leaving a loop of thread on the front.
- Bring needle up at 6 and pull thread to shape loop.
- Take next stitch to the left and continue stitching.
- To finish, take a small stitch over the last loop.



Lazy Daisy Stitch (Detached Chain Stitch)

Uses: Stitch in a circle to create flowers, single stitches can be leaves.

Similar to the chain stitch, but the loops are “detached” instead of connecting.

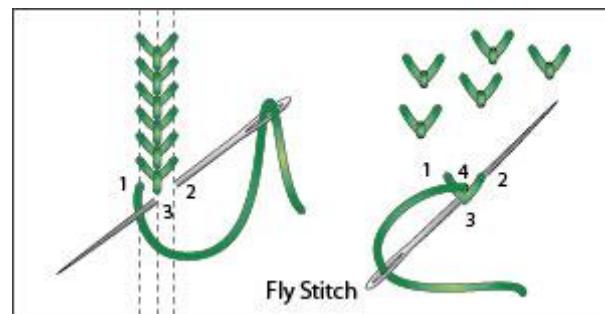
- Come up at 1 and back down in the same hole or right next to point 1, forming a loop on the front side.
- Bring needle up at 2 and pull thread to shape loop into desired shape. Pulling tighter creates a straighter looking stitch, while a looser thread creates a more rounded loop.



Fly Stitch

Uses: Stitch in rows for edging or singly for accents, plants and foliage, decorative lines, interesting filling.

- Bring needle up at 1 and down at 2, leaving a loop.



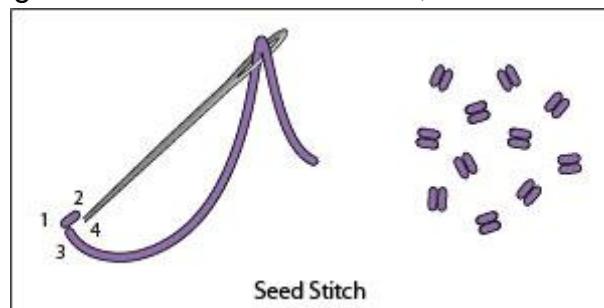
- Come up at 3 and with the needle over the loop, pull the thread to shape a V.
- Go down at 4 to anchor the V shape.

Seed Stitch

Uses: Filling spaces, flower centers, background textures like leaves, snow and sand.

Two small straight stitches side by side and randomly placed to fill an area.

- Come up at 1 and down at 2.
- Come up at 3 and down at 4.
- Continue grouping stitches together randomly and at different angles to look like they are scattered like seeds.

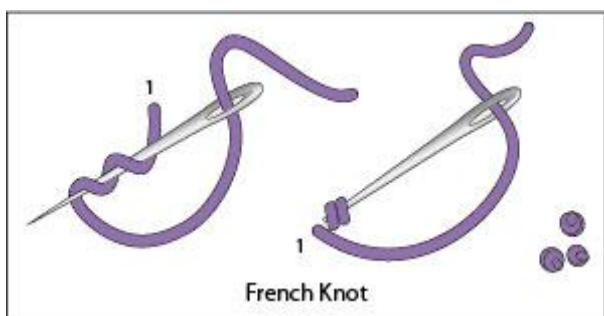


French Knot

Uses: Decorative dots, filling flower centers, leaves, plants, eyes.

- Bring needle up at 1.
- Hold thread taut with other hand and wrap the thread twice around end of the needle.
- Gently pull the thread so that the wrapped threads tighten and while holding it taut, insert the needle next to 1.

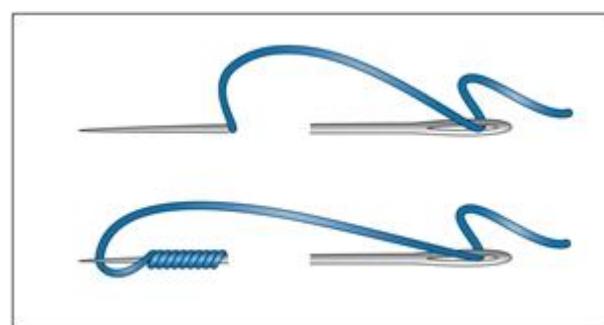
Pull thread through onto the backside until the knot is formed and lies securely on the surface.



Bullion Knot

Uses: Decorative dots, leaves, plants

The Bullion Knot is very similar to the French Knot, but you loop the thread around the needle more times, producing



a worm of a knot that is inserted a slight distance from the needle's original entry point.

- Make a back stitch, the length of the bullion knot required.
- Bring the needle out at 1, but do not bring it out all the way.
- Twist the thread around the needle point, as many times as is necessary to equal the length of the back stitch.
- Holding the left thumb on the coiled thread, turn the needle back to 1 and insert it in the same place. Pull the thread through until the bullion knot lies flat.

Colonial Knot

Uses: Use alone as decorative accents, or stitch close together to form lines and/or fill in shapes.

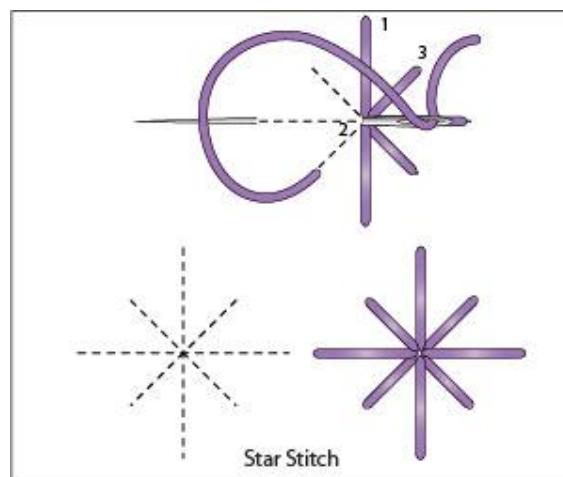
- Bring need up through fabric and wrap the thread up, over and behind the needle forming a figure 8 around the needle.
- Insert the tip of the needle back through the fabric, close to where it first came up, but not in the same hole. Pull the thread carefully until a knot is formed, then push the needle to the back and pull the thread through.



Star Stitch

Uses: Decorative accents, stars, flowers, in a row for a border, disperse randomly for loose filling or stitch close together for denser filling.

- Starting at the top, bring the needle up at 1 and down to the center at 2.
- Bring the needle up at 3 and down to center at 2.
- Continue stitching in a clockwise direction

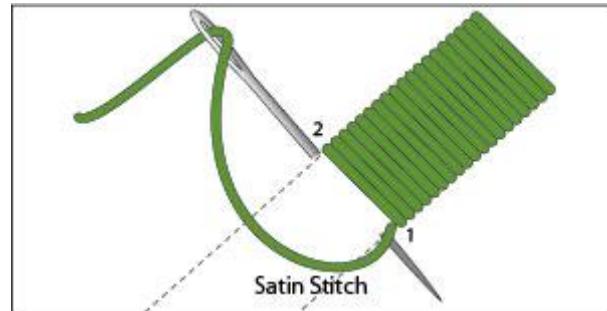


until you have 8 evenly placed stitches to create a star.

Satin Stitch

Uses: Solid filling for shapes, great for monograms

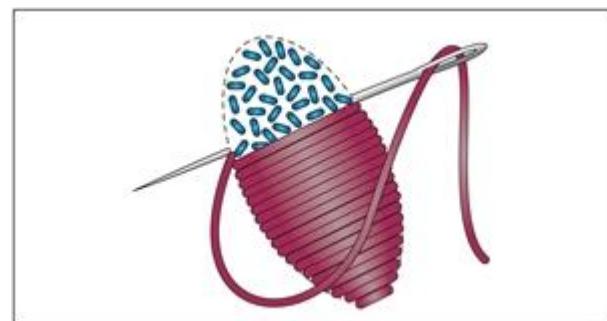
- Bring needle up at 1, down at 2, then back up right next to 1 and down right next to 2.
- Place stitches closely together to fill in area.
- Be sure the thread lays flat and without any twisting to produce a smooth look.



Padded Satin Stitch

Uses: Solid filling for shapes.

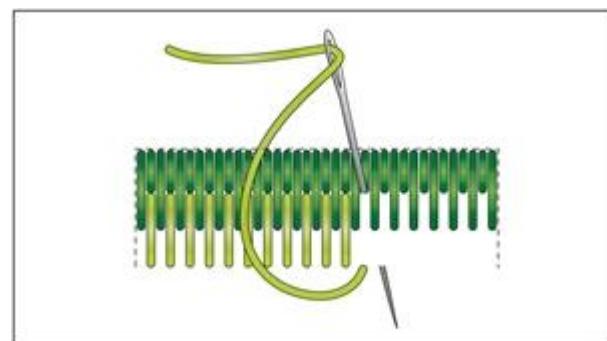
- Stitch a cluster of seed stitches.
- Stitch the satin stitch over to create a beautiful raised look.



Long and Short Stitch

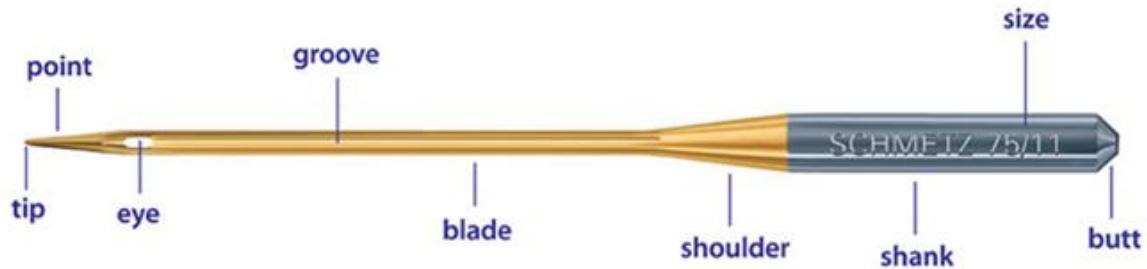
Uses: Filling of larger shapes especially when color shading is desired.

- First work a row of alternating long and short Satin Stitches. Keep the upper edge of the design line even.
- Next work a second row of long even length stitches into the short stitches of the first row, passing the needle through the tip of the stitch above.
- Continue stitching rows until the shape is nearly filled and the last row of long stitches are worked along the bottom of the design line.
- Stitch the last row with short stitches to fill in the open area along the bottom.

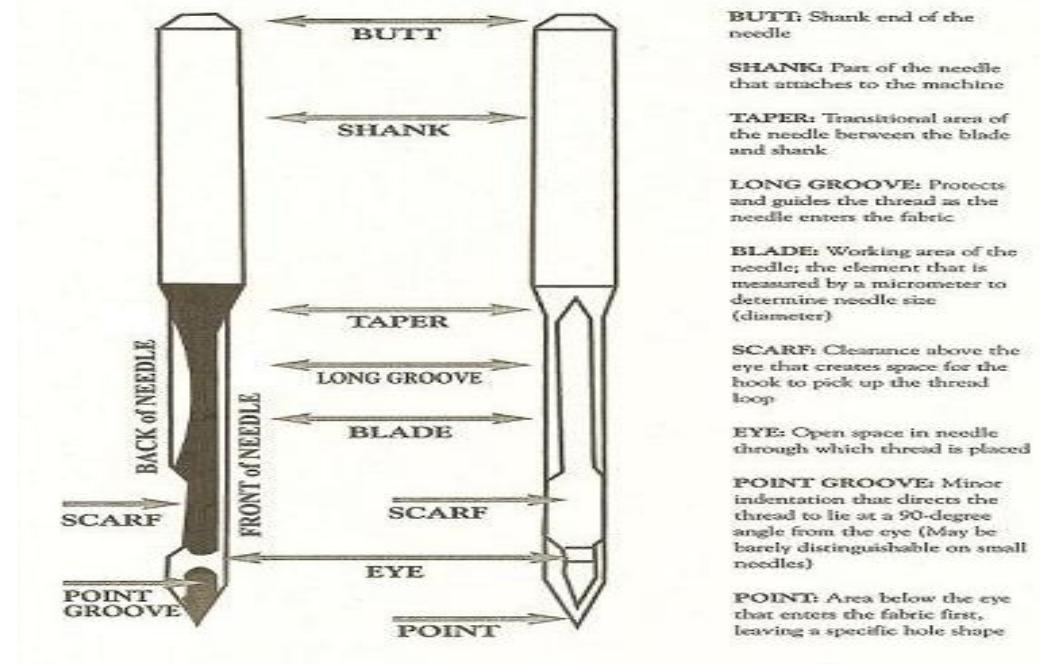


Types of Needle used to swing Different fabrics

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 swing.



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. Higher the number, larger the blade of the needle.



Commonly used needles for Embroidery and their uses as below:-

Needle	Fabric Uses	Sizes	Description
Machine Embroidery	For embroidery	70/10 – 90/14	Machine embroidery needles have a larger eye and specially designed scarf that protects the thread against breaking or shredding, even when stitching dense designs. Use for machine embroidery with rayon, acrylic or specialty threads.
Metallic	For use with metallic threads	80/12	Metallic needles are designed especially for use with metallic threads. This needle features an even larger eye than the embroidery needle, a fine shaft and a sharp point to prevent thread breakage and shredding. It has a special, large-groove scarf designed to protect the thread and to prevent skipped stitches. It's also ideal for use with monofilament thread.

Determining the Right Needle for a Thread

Here's a quick way to determine if the thread and the sewing machine needles are compatible:

1. Take half a metre of the thread being used on the machine and thread it through the eye of a loose needle.
2. Hold the thread vertically with the needle at the top.
 - If the needle is too big, it will drop to the bottom of the thread
 - If the needle is too small, it will stick at the top of the thread
 - If the needle is the right size, it will slowly spiral to the bottom of the thread

However, a larger-than-normal needle may have to be used to penetrate thicker fabric, or stitch over the top of pronounced or bulky seams.

Embroidery Defects

Poor Registration

DESCRIPTION: Where the stitches and design elements do not line up correctly. The embroidery sewing process sews different colors at different times. If the fabric shifts while one color is being sewn, then poor registration will occur when the next color is sewn. Sometimes it is difficult to tell the difference between poor registration, poor digitizing, and fabric "grin-through" or "gapping" due to thread "pull".

SOLUTIONS: Generally can be corrected by: 1) Digitizing properly (using appropriate underlay stitches); and 2) Hooping properly (using correct backing to prevent excessive material flagging).



Fabric Grin Through or Gapping

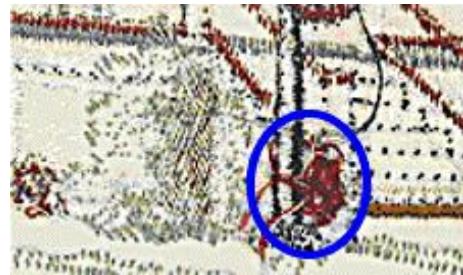
DESCRIPTION: Where the fabric is seen through the embroidery design either in the middle of the pattern or on the edge.

SUGGESTED SOLUTIONS: Generally, can be corrected by: 1) Digitizing properly (Using appropriate underlay stitches, increasing stitch density, using different fill stitch pattern or direction, or compensating for "Pull" of thread by overlapping fill and satin border stitches); and 2) Using appropriate topping.



Missed Trim

DESCRIPTION: Where threads are left on the embroidery pattern between images or lettering. Thread trims are digitized when changing colors and when moving from one location to another using “jump” stitches.



SOLUTIONS: Generally, can be corrected by: 1) Digitizing properly (Using appropriate number of trims, using appropriate tie off stitches, or replacing trimming knives when necessary); and 2) Hand trimming the missed trims using trimming snips.

Bunching at Corners

DESCRIPTION: Where the corners of lettering or shapes are not sharp and crisp but are bunched up or distorted. Usually caused by too much thread in the corners due to poor digitizing. This includes: 1) Not using appropriate stitch selection , 2) Not using “Short” stitches in corner, and 3) Poor stitch balance – thread too loose.



SOLUTIONS: Generally, can be corrected by digitizing properly: 1) Using appropriate stitch selection, and 2) Using “short” stitch cornering, and 3) Correcting stitch balance. American & Efird, Inc. 2002.

Poor Stitch Balance

DESCRIPTION: where white bobbin thread shows on the topside of the embroidery. Ideally, the needle thread should be held on the underside of the seam, and not ever be pulled up to the topside. Proper stitch balance can be checked on the underneath or backing side of the embroidery by looking for 2/3 needle thread to 1/3 bobbin thread on Satin stitches.



SUGGESTED SOLUTIONS: Generally, can be corrected by: 1) Using quality embroidery needle thread, 2) Using quality pre-wound bobbins, and 3) Setting machine thread tensions correctly.

Fabric Damage –

Needle Holes

DESCRIPTION: Where the fabric is damaged around the corners of the embroidery. Caused by: 1) Not using the correct type and size of needle; 2) Putting too many stitches in the same location; and 3) Not tearing of backing properly, allowing the fabric to be damaged as the stitches are pulled out.

SOLUTIONS: Generally, can be corrected by: 1) Digitizing properly; 2) Reducing the stitch count in the corners; 3) Using the correct type and size of needle; and 3) Using a ball point needle as small as possible.

Embroidery Too Thick

DESCRIPTION: Where the embroidery is too thick and uncomfortable which can be caused by too high of a stitch density or not using the correct backing for the application.

SUGGESTED SOLUTIONS: Generally, can be corrected by: 1) Digitizing properly (Using appropriate stitch selection, using fewer stitches, and using “short” stitches on corners); 2) Making sure stitch is balanced properly; 3) Using smaller thread size; and 4) Using the correct backing (Using correct type and weight).

Poor Coverage – Poor Stitch Density

DESCRIPTION: Where the stitch density is not thick enough and you can see through the embroidery stitching.

SOLUTIONS: Generally, can be corrected by: 1) Digitizing properly (Using appropriate stitch selection, using more stitches, and using underlay stitches); and 2) Using appropriate backing & topping.

Poor Hooping

DESCRIPTION: Where the fabric around the embroidery looks distorted and does not lay flat.

SOLUTIONS: Generally, can be corrected by: 1) Using appropriate backing & topping, 2) Making sure sewing operators hoop the garment properly without stretching the fabric too much prior to putting it in the hoop, and 3) Pressing or steaming hoop marks.



➤ Maintenance of Embroidery machines

- Handle materials, machinery, equipment and tools safely and correctly
- Use correct lifting and handling procedures
- Use materials to minimize waste
- Maintain a clean and hazard free working area
- Maintain tools and equipment
- Carry out running maintenance within agreed schedules
- Carry out maintenance and/or cleaning within one's responsibility
- Report unsafe equipment and other dangerous occurrences
- Ensure that the correct machine guards are in place
- Work in a comfortable position with the correct posture
- Use cleaning equipment and methods appropriate for the work to be carried out.
- Dispose of waste safely in the designated location
- Store cleaning equipment safely after use
- Carry out cleaning according to schedules and limits of responsibility

➤ **Safety Measures**

- When in doubt, ask the instructor.
- Report any injuries or accidents immediately to the instructor. Also, Report any breakage to a tool or m/c to the instructor. If the equipment does not operate properly, notify the supervisor immediately.
- Wipe up any oil spilled 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 and when the instructor or supervisor/ assistant is present.
- Operate machines only with permission.
- Always inspect the m/c before starting to work. Be sure it is clean and threaded correctly, with no loose threads on the pulley belt and all guards in place.
- Make only adjustments you have been trained to perform
- When sewing on a power m/c, 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. If possible, adjust the chair height so that your feet rest flat on the floor.
- Do not pull your chair forward or toward while operating the machine.
- Use both hands to raise & lower the machine head.
- Always keep your head above the table.
- Keep your feet off the treadle when you are setting or threading the needle.
- Turn off and unplug the machine when you are away from it for more than few minutes.