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# 7 Steps to Perfect Embroidery

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## Select the correct thread

Electronic industrial embroidery machines are designed around the thread made specifically for these machines. As machines are made to run faster, the thread manufacturers are having to adjust design specifications of the thread to allow for these new speeds.

The embroidery thread is produced to a specific weight or *denier* and there are various weights that can be used on the machines. In South Africa the standard and practically only type that is available is the #40 or 120 denier. Thicker threads, #30 are very convenient where fine details are not required and the big advantage would be to reduce thread count with same coverage. The thinner weight, #50 is particularly advantageous for finer details like small lettering. However, the standard middle of the range #40 is quite satisfactory for the majority of work requirements.

There are two basic types of embroidery thread. The rayon was traditionally the thread for embroidery as it was available with a high sheen or lustre, and it was produced in a range of colours required by the industry. Previously, machines were not fitted with automatic thread trimmers and so the very weak tensile strength of the rayon allowed the operator to easily pull the thread and cause it to break off when a trim was required. This weakness, however, also resulted in frequent thread breaks unless the machine and its tensions were very well set. In more recent years the thread manufacturers have managed to produce a stronger polyester based embroidery thread with all the properties of the high sheen rayon but with a much higher tensile strength. The polyester threads are made to the same thickness and therefore are completely acceptable as a stronger alternative with less need for more accurate tension settings as required for rayon. Both these thread types are made with two basic strands that are twisted in a 'left' direction to prevent unravelling in the formation of the stitch.

Other threads used in the process of embroidery are the woollen or cotton look that is without the normal sheen and is mostly used where the sheen is not wanted, for example in the more natural look linen embroidery. The metallic or *lurex* thread is made from a metal foil and is used in fashion and badge embroidery. These other thread types are all the same weights and with the same specifications as the more common polyester and rayon threads.

The bobbin threads are usually purchased as a pre – wound disposable bobbin in either white or black colours. The thread should be a poly – cotton blend.

## TENSION 2

### Balance bobbin and needle tensions.

Correct tension settings of the bobbin thread and the upper needle thread is vital for perfect embroidery. There is a need to have a balance between these two threads and usually it is best to set the bobbin tension first as this can be set very simply and thereafter any alteration to the tensions can be made to the upper needle thread tensions.

Use of pre-wound bobbins in the bobbin case will allow tensions as set on the bobbin case to remain without need for constant checking and adjustments. They also hold a larger amount of thread than a manually wound metal bobbin resulting in more efficient productivity. To set the tension first load a full bobbin and then before placing the thread end into the final pig tail guide, hold the end of the thread and let the bobbin case jerk in a downward direction. The bobbin thread should lengthen in your hand by about 3 to 5cm and then stop. If the thread continues to unwind out the bobbin case causing a longer increase in length then the tension is too loose and should be tightened. If the thread unwinds by a lesser amount or not at all, then the tension is too tight and should be loosened.

The upper needle tension can then be balanced with the bobbin case tension by doing a simple stitch out of a satin stitch column. Check the appearance on the underside of the column after completion. Ideally, when proper tension is achieved, it will be possible to see roughly one third of the column as bobbin thread and the outer thirds on each side of the bobbin width should be the needle thread.

Practise pulling the bobbin and needle threads to feel the correct tension settings and in time it is possible to achieve correct settings without the need for testing. Gauges are available for setting tensions but it is far easier to learn the correct *feel* for the tension setting.

Equally important is to be completely familiar with the correct threading procedure for the machine. With incorrect threading of the bobbin case or upper needle thread, it is impossible to obtain correct tension settings.

## NEEDLES 3

### Correct style, size, fitting

There are many different makes and qualities of embroidery machine needles. An important point to remember is that it would usually be more cost effective to use a more expensive higher quality needle to prevent more constant needle changes, needle

breakages and possible damage to fabric being embroidered. If the needle can bend without breaking then it is made of poor quality steel or not treated for hardness correctly.

Industrial embroidery machine needles are made to similar specifications as the needles for straight sewing industrial lock stitch machines. The differences are basically that for embroidery the needle point is shorter and the needle eye is larger and more polished for obvious reasons.

There are both different thicknesses and different points available that allow selection to suite the specific type of embroidery being produced.

Finer fabrics and finer embroidery would generally require thinner needles.

The rule of thumb is to use sharp point needles on woven fabrics and ballpoint needles on knitted fabrics. However, this is not a rule never to be broken and in most cases a standard sharp point can be used for all applications.

The upper shank of the needle is round, unlike the domestic machine needle, which has a flat to fix the location when it is being fitted. Therefore it is critical to fit the industrial machine needle with the eye facing directly to the front and the *scarf* or scooped out section behind the eye must always be directly to the back or rear side.

Equally critical is that the new needle must be inserted into the needle bar right up to the stop position – until it cannot be pushed up any further.

## FRAMES 4

### Frames or Hoops

The frame or hoop is the carrier of the piece being embroidered. The fabric, usually with backing underneath, should move in unison with the pantograph, controlled by the machines electronics. The frame moves and stops perfectly accurately with each stitch, stopping just in time for the needle to penetrate the fabric while it is in a stopped position. Incorrect framing or frame attachment to the machine will severely affect the quality of the embroidery. Always choose the correct frame suited to the type and size of embroidery. The frame should be of a size that will support the fabric being embroidered and for best support the frame should be only slightly larger than the embroidery size. Of course it is vital to check that the needle and presser foot will not move too close to the frame to cause any contact between frame and moving needle/needle bar parts. Remember the back of the presser foot needs more space than the front so either move the starting point forward or allow at least 12 mm between design and frame inner surface. The tracing mode is ideal for checking the location of the starting point in relation to the frame size.

There are many embroidery applications that can be produced on the machine without individual framing. The one popular method for attaching a panel (e.g. jeans pocket) is to

use double-sided tape on a larger border frame that is holding a heavy backing only. The panel, pocket etc. is simply pressed down onto the tape in a position that is predetermined and marked on the heavy backing, resulting in perfect design location. The same marked backing with the adhesive tape, is reused for many applications.

Remember that you can have every other detail of the design and the machine set perfectly, but if the framing/hooping of the item to be embroidered is not correct then it will not be possible to obtain perfect embroidery.

## Stabiliser 5

### Backing and Topping

If the item being embroidered had no stretch, like a piece of cardboard, then the design would stitch as perfect as it is seen on the computer screen. However, fabric does have stretch and so we need to attempt to convert it into a more stable material that will not move around while being stitched. After each stitch the fabric is pushed and pulled at extremely high speeds, moving and then stopping just in time for the needle to penetrate without being deflected. To achieve a more stable work piece it is necessary to stabilise the fabric. This is usually achieved by adding a non-stretch base to the fabric. This stabiliser or 'backing' can be any material that has no stretch and will not interfere or affect the end result. Usually it is made from a non-woven polyester material and can be obtained in various thicknesses and textures. The backing can be framed as a separate piece under the fabric, it can be fused onto the fabric prior to framing or it can be attached by adhesive. Use the special 'spray adhesive' that does not leave glue residue on the needle, for this purpose. For best results the backing should be held in the frame together with the fabric and not simply left loose under the frame.

There are two main categories of backing and these are 'cut-away' and 'tear-away'. As the names imply, they simply relate to whether the backing can be pulled or torn off the back of the embroidery after completion ( tear away ), or if the texture of the backing does not allow tearing then it must be cut away after completion. The rule is that if the fabric has stretch as in knitted material, then there should be cut-away backing. If the fabric is a heavy woven type with little stretch then the tear away is perfect. Normal woven fabric can also be used as a stabiliser.

Topping is used as a stabiliser on top of the fabric being embroidered. This is usually a clear plastic or 'polythene' that sits on top of the fabric while embroidery is in progress. This keeps the high pile or loops of the fabric from protruding through the stitches of the embroidery. It also prevents the embroidery from sinking into the fabric as with thick knit fabrics. The topping can be made of a special water-soluble material or a simple clear thin plastic – even from old plastic bags. The most common application for topping is when doing embroidery on towels.

## SPEED 6

### Adjust for different fabrics

Embroidery machines are capable of running at different speeds. There is no specific speed that is right for each machine but it is from experience and careful observation that the correct speed can be set. New technology allows industrial machines to embroider at over 1000 stitches per minute (SPM) or revolutions per minute (RPM). SWF machines can go as fast as 1200spm and more. Ideally, there should be consideration for fabric movement within the frame as it is being thrown around in all 4 directions during each stitch movement. Machines have a built in speed adjuster that looks ahead in the design and when long stitch lengths are detected then the speed is reduced for these long stitches. Shorter stitch lengths are stitched at the speed set by the operator. Some threads are prone to more thread breaks at higher speeds and so it can be found that at lower speeds with less thread breaks, there can be more efficient productivity. Generally it can be presumed that polyester embroidery thread can run at higher speeds than the rayon thread. Firm, woven fabrics like denim can be run at faster speeds than lighter weight and knit fabrics if the same quality is to be expected.

For maximum productivity the machine should be set to the highest speed that will not cause thread breaks and will not result in a distorted design. Speeds between 900spm and 1000spm are possible for most stable fabrics whilst dropping the max speed to between 700spm and 800spm is preferable for knits and cap embroidery.

## Digitizing 7

### Convert graphic artwork to stitch artwork

Although digitizing software has advanced to amazing levels in recent years there is still no fully automatic digitizing program that can produce a design of high quality and elaborate embroidery. If the same artwork is given to 10 different digitizers – all using latest level software – the end result will be 10 designs of varying qualities. This is to illustrate that this procedure still needs experience and some artistic flair if high quality embroidery is required. Pulse software is regarded as the worlds # 1 digitizing software and this is supplied in various configurations allowing various specialised automatic techniques. This type of software allows many different parameters to be used for the creation of a design, starting with setting the type of fabric the design will be stitched onto. Different density and stitch length settings, sequencing and lock stitch with auto trim functions are all very easily adjusted. The user can set automatic functions and after completion and stitch off testing it is very simple to make necessary adjustments.