WILCOM

EMBROIDERY STUDIO 2026

Schiffli Supplement

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Chapter 1

Introduction to Schiffli Embroidery

The craft of Schiffli-embroidery is practiced all over the world and involves a vast number of techniques, stitches, threads, base fabrics, and embellishments. Lace itself is a delicate fabric made of yarn or thread in an open web-like pattern. Historically, it was made by hand or with the aid of bobbins. With industrialization, the versatility and precision of the Schiffli shuttle embroidery machine has given it an important role in the textile industry for over 150 years. Its use continues to evolve with advancing technology.

Schiffli machines are specialized for the creation of intricate embroidery designs on a variety of fabrics. First invented in the 19th century by Swiss engineer Isaak Groebli, these machines have been closely tied to the history of embroidery itself.

With Schiffli machines, the fabric is secured on a vertical loom while needles move back and forth through it. As on a sewing machine, needle thread (front side) and bobbin thread (underside) are twisted together to form a lock stitch. For decades the 14 yard, 2 story machine was the industry standard. This type of machine is equipped with 1024 needles, 512 in each row. Schiffli machines can now be over 30 meters long, equipped with 2,000+ needles.

Shuttle embroidery machines

In Swiss German, the word 'schiffli' means 'little boat'. Schiffli machines get their name from the boat-shaped shuttle, one per needle, which carries the bobbin thread.

The concept of the shuttle (also used in weaving machines) was very important in the evolution of embroidery machine technology. Shuttle technology is different to the 'bobbin-rotary-hook' used in sewing and

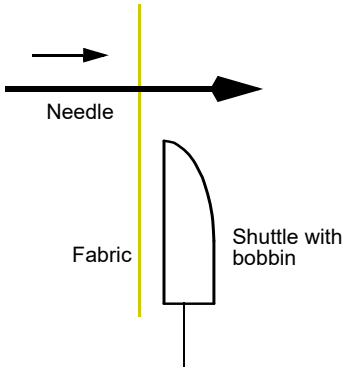
embroidery machines. This is why they are referred to generically as 'shuttle embroidery machines'.

Basic principle

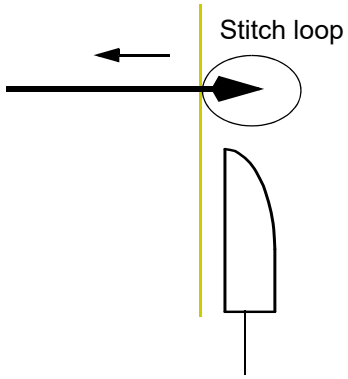
As on a sewing machine, Schiffli needle thread is twisted with bobbin thread to form a lock stitch. The upper thread is fed through a series of tensioners and guides to ensure that stitches are formed correctly.

To create a single schiffli stitch...

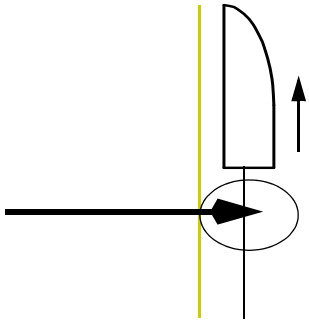
1 The top thread is driven through the fabric when the needle penetrates.



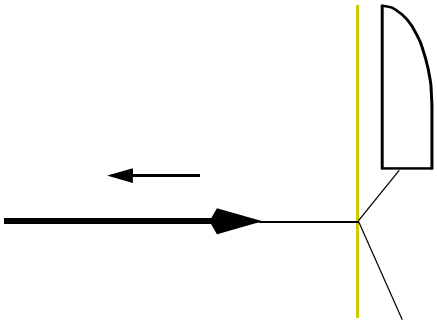
2 The top thread forms a loop when the needle starts moving back.



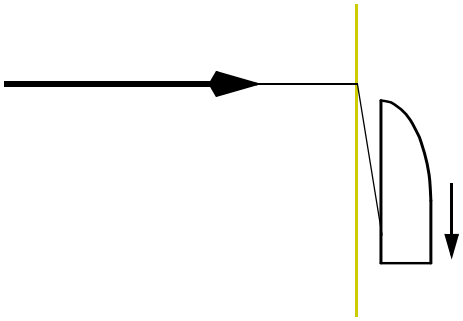
3 The bottom thread is driven through the loop by the shuttle.



4 The top thread is tightened by the retracting needle.

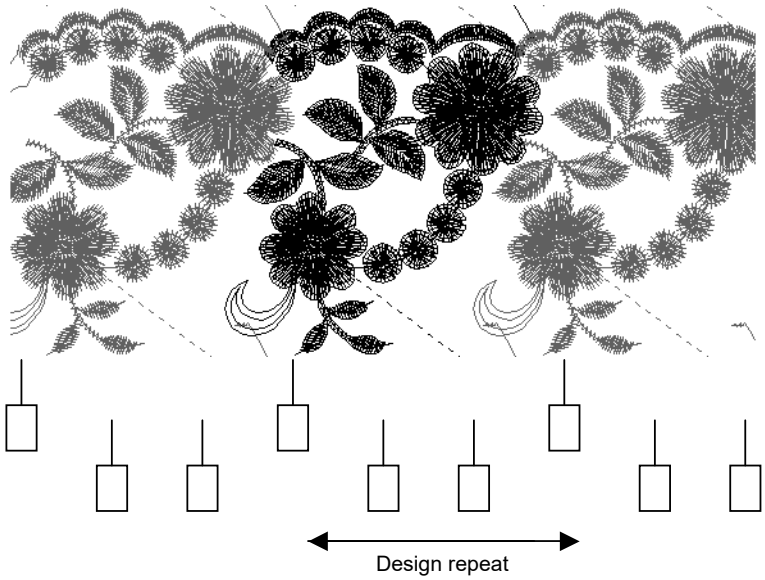


5 The shuttle returns to start position.



Design repeats

Historically, needle spacing or 'rapport' was measured as one French inch – 1.08 of the English inch – usually 27.07 mm. Standard spacing was known as '4/4 rapport'. With larger designs, needles could be selectively disengaged, thereby increasing needle spacing to 2, 3, 4, and more French inches. See Design repeats for details.



Schiffli design

Schiffli-embroidery involves a vast number of techniques, stitches, threads, base fabrics, and embellishments. Lace is made of yarn or thread in an open web-like pattern. It comes in many varieties with names like...

- Machine-made lace
- Bobbinet lace
- Knitted lace
  - Raschel lace
  - Crochet Galloon lace
- Machine-made bobbin lace
- Machine-made Swiss embroidery
  - Embroidered tulle
  - Burnt-out lace
  - Bohrspitze
  - Cut embroidery lace
  - Combination lace – e.g. lace appliqué ‘tulle with air’, ‘air on air’, etc

Schiffli styles & variants

There are many varieties of Schiffli embroidery. Thread type, color, pattern, fabric, and intended application all play a role. Some products combine numbers of techniques. The main ones include:

Allover embroidery

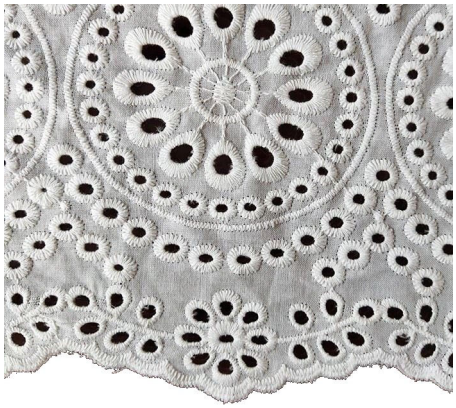
Allover embroidery involves continuous stitching on a base fabric which remains in the final product. A single pattern is stitched from one side to the other. Separate patterns may be applied to the beginning and end.

Embroidery on net

This type of Schiffli embroidery makes use of a net-like base fabric. A water-soluble fabric is lapped over top. This is later dissolved, leaving the embroidered stitching on the net.

Borer embroidery

In addition to needles, this type of Schiffli embroidery employs a boring device. Borer holes are small perforations in the backing fabric, commonly known as ‘eyelets’. The complete effect is achieved when cover stitches, using normal or metallic threads, are added around the edges.



Freestanding embroidery

Freestanding embroidery employs a water-soluble base material or 'sacrificial fabric' which is later dissolved, leaving only embroidered stitching in the final product. Sometimes a chemical bath is used. This type of embroidery is known as 'chemical lace'.

Multi-color embroidery

Multi-color embroidery may employ multi-colored threads or differently colored threads. The latter requires a 'Color Change Machine' which enables needles with different threads to work in combination.

Embroidery with appliqué

With this type of Schiffli embroidery, a second layer of fabric is added to the base. This is rolled up and secured on the upper roller of the loom while the base is being embroidered. The front yarn is then cut, the appliqué fabric spread out, and the embroidery continued.

Embroidery with metallic thread

With this type of Schiffli embroidery, metallic threads are used to add sheen and shimmer to the lace. These threads are strong, durable, and available in a variety of colors and lustrous hues.

Border embroidery

As the name suggests, border embroidery is used to embellish the edges or borders of garments and articles.

End products

Today, Schiffli shuttle embroidery machines are used by a variety of industries, including fashion, home decor, and automotive manufacturing. Here are just a few examples of how Schiffli embroidery is used in the textile industry...

Industrial

Firstly, Schiffli embroidery is used in the production of netting, tulle, and other specialized fabrics. These are often used for clothing, medical supplies, and other products.

Automotive

Schiffli embroidery is also used on automotive upholstery and other interior components to add elegance to luxury vehicles.

Home decor

Schiffli embroidery is used on a variety of home decor products such as bedding, curtains, tablecloths, and decorated pillowcases and cushion covers.

Fashion

Schiffli embroidery is used on a wide range of fashion products, including dresses, blouses, jackets, and other clothing items to create texture and dimension.

Traditional dress

Schiffli embroidery is often seen on modern variants of traditional dress worn by women and sometimes men in South and Central Asia. They have many names and styles. Tribal and religious garments worn in the Indian subcontinent and Muslim countries in Africa and the Middle-East used to be hand-made but are now mass-produced. Schiffli machines have been used extensively in their production though wide-frame multihead machines are taking over.

Background

Embroidery has long been practiced as a handcraft in many parts of the world. The French word 'broderie' means 'embellishment'. 'Embroidery' then is the art of embellishing fabric with needle and thread. Archaeological finds reveal fossilized remains of hand decorated clothing dating back 30,000 years. Ancient Egyptians, Babylonians, Phoenicians and Hebrews all used embroidery to decorate their robes. The Moors too decorated their clothing with embroidery. The Moorish style spread to countries like Spain and Sicily and later to other European cultures.

Origins of lace

The Latin word 'laceum' from which 'lace' is derived means 'noose'. It applies to any type of open fabric resulting from looping, plaiting, twisting, or knotting threads by hand or machine. Some experts say lace making began in Italy. Bobbin and needle lace were both made there in the early 1400s. In Venice, by the early 1500s lace production had

become a paid activity performed by girls working in noble houses and in convents. Lace was a popular Venetian export in the 1500s and 1600s.

Portrait of an unknown lady, Florentine School, 1571

Before the advent of Schiffli machines, embroiderers made use of several bobbins to vertically wrap thread and create a net on a loom by moving the bobbins back and forth. Originally linen, silk, gold, or silver threads were used. Now lace is made with cotton or synthetic threads, although linen and silk are still in use.

Bobbitnet netting

Machine embroidery came into existence with the Industrial Revolution. The first machine lace or netting was made toward the end of the eighteenth century (1700s). 'Bobbinet' (bobbin-net) came into vogue in the early 1800s as the first net fabric that would not unravel if torn. Until then, this type of net was made with the aid of a hand bobbin. Mechanization increased fabric width and made it faster to produce. It could then be used for everything from wedding veils to drapery.

During the same period, sewing machines came into existence. Created first by Thomas Saint but later made famous by Isaac Singer in 1851.

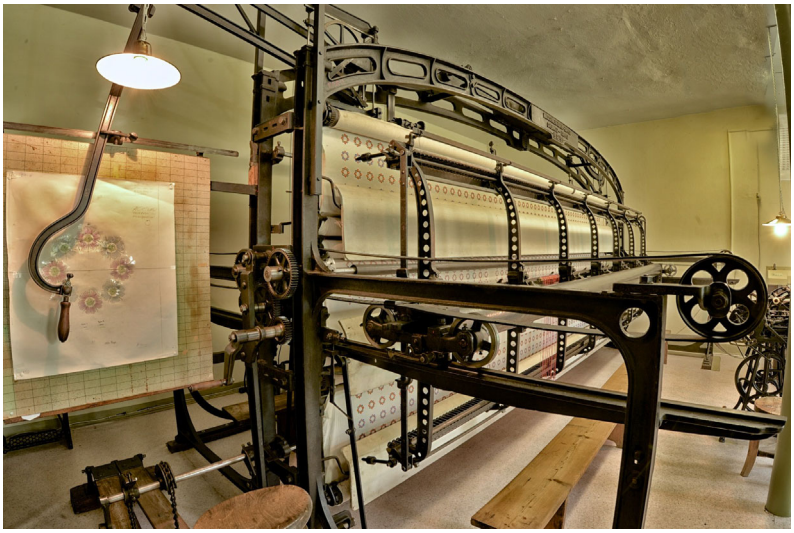
Subsequently, bobbinet became the base for Schiffli embroidery. Today netting is available in cotton, polyester, nylon, and silk. Silk net is the finest 'tulle' – light, airy and delicate. Of course, it is now made on CNC (Computer Numerical Control) machines, but the weave and basic process remain the same.

Machine evolution

The original Schiffli shuttle embroidery machine was a hand-cranked device invented by Swiss engineer Isaak Groebli in 1863. Groebli's machine was based on the sewing machine, but it employed a shuttle containing bobbin thread and many needles working together to create loops on fabric.

Early machines

The full potential of the new technology was not realized until the early 1870s when other Swiss and German machine manufacturers entered the market. These machines could produce various types of lace and other delicate fabrics. They first found use in the textile industries of Switzerland, Germany, Britain and the United States.



German machine manufacture was based in Plauen which gave its name to the Plauen type of Schiffli machine. The smallest movement on these machines was 1/6 mm, a result of the way the 'Automat' worked. (The Automat is the Schiffli card decoder that converts X-Y coordinate codes into frame movements.) Saurer machines were later developed in Switzerland and their Automat allowed movements of 1/10 mm, the same as modern multihead machines.

The early Schiffli embroidery machines were operated by steam power and had a limited number of needles. With the introduction of electricity in the early 20th century, Schiffli machines could be used for a wider variety of fabrics and embroidery designs. By this time they were 10 to 15 meters in width, with more than 600 needles. During the 1920s and 1930s, Schiffli machines further increased in popularity as they enabled the mass production of high-quality lace.

Left-hand vs right-hand machines

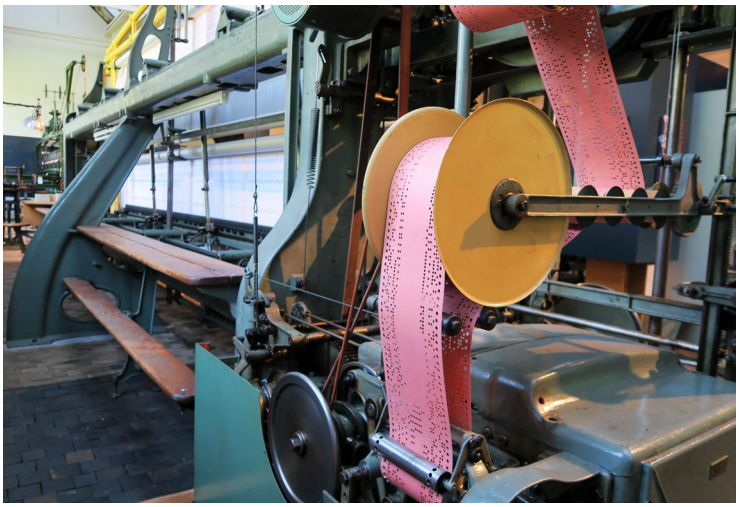
From the evolution of Schiffli machines, there emerged two broad categories – Saurer left-hand machines (LH) and Plauen right-hand machines (RH).

System	Direction
Saurer	Yarn passes the eye of the needle from right-to-left and shuttles move from top-left to bottom-right.
Plauen	Yarn passes the eye of the needle from left-to-right and shuttles move from top-right to bottom-left.

Note: Needles and shuttles for each system are proprietary and therefore not interchangeable.

Electromechanical Schiffli machines

Electromechanical Schiffli machines read designs from Jacquard cards or paper tapes while the Automat decodes them. When changing repeats on these machines, all needles, borers, and shuttles must be manually set. Some are equipped with MTC (Manual Tool Change) technology, introduced by Laesser. This allows needles and borers to be switched on or off, leaving only thread rollers and shuttles to be manually removed.



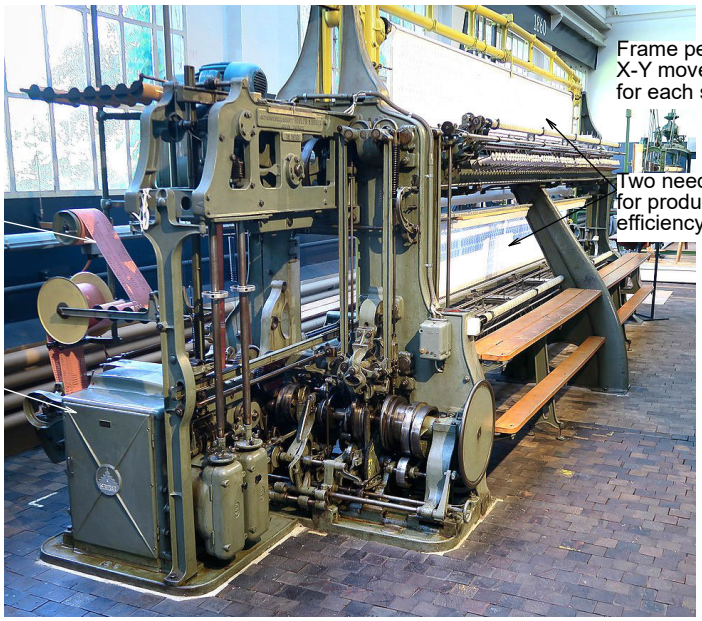
Schiffli electromechanical machine with paper tape reader

Repeat Color Change (RCC) is a mechanism available on some Plauen and Saurer type machines to push a group of needles – every needle, every 2nd, every 3rd, every 4th, etc – forward or backward. Each pattern is called a 'station'. Individual stations exist for each combination – 4/4, 8/4-1, 8/4-2, 12/4-1, 12/4-2, 12/4-3, etc. Non-Hiraoka RCC Schiffli

machines are usually capable of accessing 10-12 different needle patterns by using a physical 'template' on the machine.

Card image simulators

While mechanical Schiffli machines were built to last for a hundred years, it became costly and time consuming to have Jacquard cards punched for each design. Schiffli companies would also require a large area to store their many Jacquard cards. Added to which, Jacquard cards would wear out through repeated use.

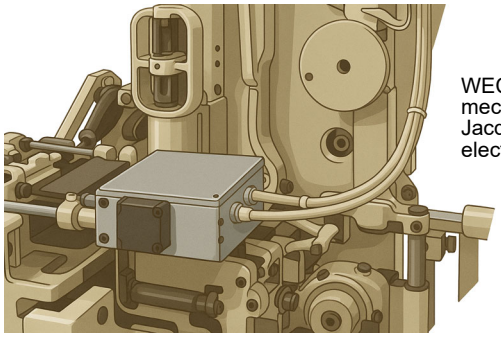


In 1982 Wilcom developed and installed the world's first ElectroCard System. This 'card image simulator' eliminated the need for Jacquard cards and meant that data could be stored on a floppy disk.

```
<start of pattern>
    1 --- --- --- ---- --- --- --- X=   0 Y=   0
    2 --- --- --- OOO- --- --- --- X=   0 Y=   0 Feston
    3 --- --- --- O--- --- --- --- X=   0 Y=   0 Boring-
    4 --- --- --- -O-O --- --- --- X=   0 Y=   0 Ch. Spd
    5 --- --- --- OO-- --- --- --- X=   0 Y=   0 Boring+
    6 --- --- --- O--- --- --- --- X=   0 Y=   0 Boring-
    7 --- --- --- OOO- --- --- --- X=   0 Y=   0 Feston
    8 --- --- --- ---- --- --- --- X=   0 Y=   0
    9 --- --- --- --OO --- --- --- X=   0 Y=   0 Stupfel
   10 --- --- --- ---- --- --- --- X=   0 Y=   0
   11 --- --- --- ---- --- --- --- X=   0 Y=   0
   12 --- --- --- ---- --- --- --- X=   0 Y=   0
   13 --- --- --- --OO --- --- --- X=   0 Y=   0 Stupfel
   14 --- --- --- ---- --- --- --- X=   0 Y=   0
   15 --- --- --- ---- --- --- --- X=   0 Y=   0
   16 --- --- --- ---- --- --- --- X=   0 Y=   0
   17 --- --O O-- ---- OO- -OO --- X=  70 Y= -70
   18 O-- O-- --- ---- OO- O-- -O- X=   8 Y= -26
   19 O-- --- --- ---- --O --O -O- X=   1 Y=  58
   20 -O- --- --- ---- --- --- -O- X=   2 Y=   2
   21 --- --- --- ---O --- --- --- X=   0 Y=   0 Needles
```

Encoding interpreted by Wilcom FIXPAT program in format X=, Y=, M/c function

In 2005, Wilcom issued a version of WECS with advanced piezo electric technology for high reliability and maximum commercial benefit from the replacement of Schiffli Jacquard cards.



WECS replaced mechanical Schiffli Jacquard cards with electronic operation

Later, Wilcom developed the WESS (Wilcom Electronic Servo System) to completely replace the Automat. Frame movements, speed and thread tension changes, borer control, and more became completely electronically driven via servo motors and pneumatic valves. This allowed increased machine speeds of 15-20%. Even so, given the size and weight of the frames, these machines could not run faster than 150 stitches per minute.

Electronic Schiffli machines

With the advent of electronic machines (ATC or ‘Pentamat’ in Saurer), each needle has its own driver. These machines use digital programming, computerized controls, and advanced stitching technologies to further improve production speed, accuracy, and efficiency. Repeats can be programmed from the operating console, as well as color changes within those repeats. Needles, borers, rollers, and shuttles can be switched on or off automatically by setting repeats in the design file. This makes for

more efficient production without time-consuming needle, borer, and thread changes. All modern Schiffli machines are in this category.

Modern Schiffli machines can be over 30 meters long. However, rather than having needles placed in horizontal rows, one above the other, most machines are now equipped with a single-needle row. There are several reasons for this:

- The 'two story' Schiffli machines are very heavy and require a large concrete footing.
- In addition, the frame is very high and requires a high-ceiling factory to accommodate it.
- Even then it must extend below ground level. Thus, the concrete footing requires a trench almost one meter deep.
- Climbing to the second story is time-consuming and can be accident-prone.

Both Laesser and Saurer now prefer to build single-needle-row machines, usually facing each other so that one operator can handle two machines at once. These machines are generally not much more than 3m in height.

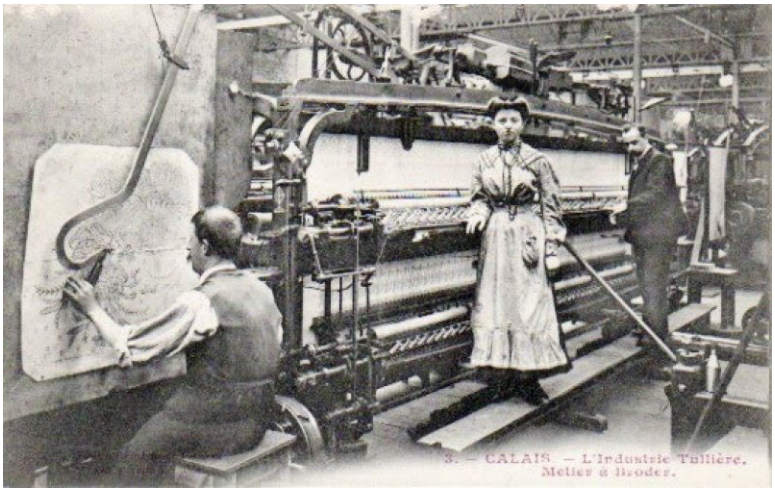
Machine programming

The original Schiffli shuttle embroidery machine was a hand-cranked device invented by Isaak Groebli. Though the first manually operated embroidery machines were in use in the early 1860s, they soon gave way to the steam-powered Schiffli shuttle embroidery machine.

Pantograph machine programming

The first 'programmable' Schiffli machines employed a manually operated 'pantograph' to trace a pattern and map each stitch. The crew comprised 2-3 people, including a 'Schiffli Master' who drafted and traced the

pattern to be sewn out. Watchers would walk the catwalk in front of the machine, tending bobbins and needles.



The Schiffli machine was complicated, but it signaled the start of automation. The Schiffli Master moved a long lever over the pattern with designated stopping points where he would press a handle. This triggered the machine to stitch one or more stitches. The pattern was duplicated and repeated by the needles, an average of 650-700 for a 10 ft wide piece of fabric. He worked the pattern with his left hand and with his right, could engage and disengage needles and move the base fabric.

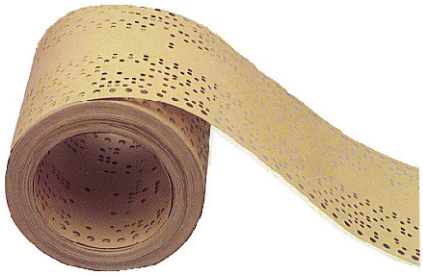
These early mechanical machines had no electronic controller so all machine functions – speed changes, thread tensioning, inserting borers, etc – had to be manually added at a given stitch. This gave the machine mechanism time to make the necessary adjustment while continuing to stitch. The Schiffli Master had to be intimately familiar with the mechanics of the machine.

To be considered a Schiffli Master, a junior had to work under a master for at least 10 years. A Schiffli operator had to learn how to control things like density, underlay, stitch types, and much more. These would all need to be finely adjusted based on the weight/type of thread and blend of fabric being used. With no 'undo' button, a single mistake could ruin the production run.

Electromechanical Schiffli machine programming

With the introduction of electromechanical Schiffli machines, Jacquard 'punch cards' or paper tapes were used to encode design data. There were two types – Saurer and Plauen. The card was fed into a reader much like a piano roll and 'read' like braille by 'feelers' in the Automat. This is where the mechanical decoding happened. The Automat could interpret X-Y frame movements, Borer In/Out, large tension changes

(Stepp/Blatt), as well as small tension changes (Fadenleiter 1-to-6) on Saurer machines.

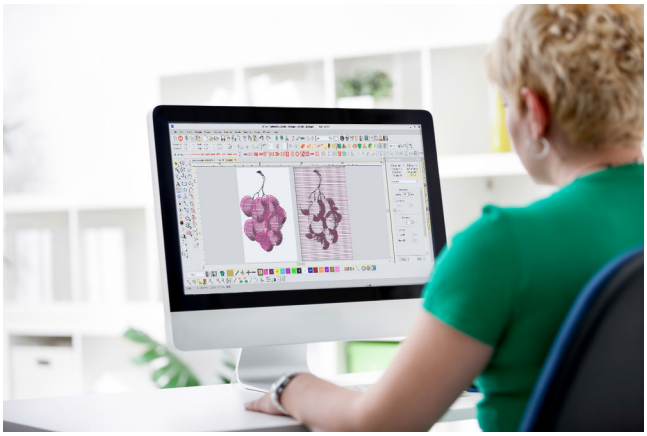


The idea of the card or paper tape was not new. It was first applied in Jacquard looms of the early 1800s. The Jacquard card was invented by French inventor Joseph Marie Jacquard for weaving patterns. The same concept was used in Schiffli machines until computerization took over.

Digitizing for mechanical Schiffli machines was something of a 'black art'. The digitizer had to control many devices and parameters stitch-by-stitch. With thousands of needles, a poorly designed move could result in expensive breakages. Just breaking a thread on thousand needles could take hours to re-thread. Thread tension had to be adjusted carefully based on stitch length.

CNC machine programming

Electromechanical machines have no machine memory to store designs. Each time a design is run, it must be re-read. The preparation of the card was known as 'punching'. This has since given way to CNC (Computer Numerical Control) machines and the art of 'embroidery digitizing'.



Schiffli embroidery production

Modern Schiffli embroidery machines use a combination of mechanical and electronic processes to create intricate embroidery designs on a variety of fabrics. Here is an overview of the process:

Fabric preparation

The fabric is stretched taut on a frame, similar to a quilting hoop, to provide a stable surface for embroidery.

Pattern preparation

The embroidery design is first created in a CAD (Computer Aided Design) program. It is then transferred to machine memory, memory stick, or punched onto cards that are read by the machine.

Thread preparation

The machine is threaded with spools of thread held on creels. The number of spools varies with the complexity of the design and number of colors used.

Stitching process

The fabric is moved back and forth under the needle while the needle moves up and down to create stitches in the fabric. The needle is controlled by a cam or digital signal which determines the stitch pattern. The thread is fed through the needle and shuttle. The shuttle creates loops of thread on the underside of the fabric while the needle creates stitches on top.

Repeat process

Schiffli designs are usually constructed so that stitching starts at the top and gradually advances towards the floor. This means the frame starts at the lowest position and is gradually lifted. When stitching completes, this is called a 'row'. At this point, there are two possibilities:

- If the design is repeating as a continuous pattern, it recommences where the previous row finished.
- If it is not a continuous but intended for use as, say, a border in another fabric or garment, the frame is raised before continuing to create a gap for fabric cutting after removal from the machine.

Sources

This material has been gathered from the following sources:

- Acme

- EMDIGITIZER
- EMdigitizing
- Etsy
- GLC Charan Lace
- Indiamart
- Lace – Wikipedia
- MESA Supplies
- Schiffli embroidery machine – Wikipedia
- Super Cheap Fabrics
- Textile School
- The Deer's Embroidery Legacy
- Utsavpedia

PART I
SCHIFFLI EMBROIDERY

The craft of Schiffli-embroidery is practiced all over the world and involves a vast number of techniques, stitches, threads, base fabrics, and embellishments. Lace itself is a delicate fabric made of yarn or thread in an open web-like pattern. Historically, it was made by hand or with the aid of bobbins. With industrialization, the versatility and precision of the Schiffli machine has given it an important role in the textile industry for over 150 years. Its use continues to evolve with advancing technology.

Note: ES Schiffli is an add-on cost option for most levels of EmbroideryStudio. You must have the ES Schiffli option activated in your software to use it.

Schiffli basics

This section provides an overview of the Schiffli terms and concepts associated with Wilcom ES Schiffli software. It explains the basic issues to do with handling and programming Schiffli machines as they relate to ES Schiffli. See Schiffli Basics for details.

Design repeats

This section describes how to prepare artwork for your design, set up design repeats and pattern arrangements for lace and emblem designs. See Design Repeats for details.

Machine functions

This section deals with supported Schiffli machine functions as well as the insertion and display of machine functions. See Machine Functions for details.

Chapter 2

Schiffli Basics

Welcome to ES Schiffli. This EmbroideryStudio option has been developed to support a wide range of Schiffli work. It provides support for:

- Design repeats
- Pattern arrangements
- Thread Tension and Speed Change functions
- Borer operations
- All Plauen (T10) and Saurer (T15) functions
- Direct reading/writing Hiraoka DAT and Saurer SAS formats
- RCC designs
- Direct reading/writing of high resolution ESS format, accessible to DesignWorkflow.

You should first become familiar with general EmbroideryStudio usage before studying the Schiffli-specific usage. EmbroideryStudio has a certain philosophy but once you understand the logic of the software, similarities between individual functions become obvious. For an essential introduction to EmbroideryStudio software concepts, refer to the Reference Manual.

Note: ES Schiffli also integrates with other Wilcom Schiffli products including the WESS (Wilcom Electronic Servo System) electronic machine controller.

This section provides an overview of the Schiffli terms and concepts associated with ES Schiffli. It explains the basic issues to do with handling and programming Schiffli machines as they relate to ES Schiffli.

Schiffli terms & concepts

In contrast to multihead machines, Schiffli machines are large and the majority are mechanical. They have some unique characteristics:

- The fabric is stretched on a vertical frame.
- A machine can have 1000+ needles.
- Needles move horizontally and are in one or two rows spaced one 'French inch' apart.

While it is important for all embroiderers to be familiar with the various threads and fabrics used in the manufacture of their designs, specific machine knowledge is essential to the Schiffli puncher or 'digitizer'.

Schiffli designs

Schiffli artwork must satisfy strict technical requirements. Typically artwork for Schiffli embroidery is designed like a tiled pattern. It represents a narrow 'slice' of the overall pattern which is repeated all along the fabric. This pattern has to be designed accurately so that the repeat joins on both sides and its width is a multiple of the needle spacing.

Lacework

Lacework involves the use of threads to produce overall embroidery of full-length fabrics. Some lacework is designed to be 'self holding'. Such designs are stitched on a soluble backing which is washed or steamed off after manufacture. Thus, stitches have to be so placed that they interlock at the edges so that the lacework does not unravel.

Lacework is the most widely used application for Schiffli machines. Such work typically uses boring. Some machines require fine adjustments of tension and speed for this sort of work. ES Schiffli supports this. Designs made with ES Schiffli are not limited in stitch length because tension changes can be inserted directly. See also Design repeats.

Emblem work

Many Schiffli embroidery machines are also used for stitching emblems or logos as they provide a very productive way to do this. Emblem work, however, uses only a small subset of the Schiffli machine's available functions. Typically, for example, such work does not contain the bored holes or long Satin stitches which occur in lace designs.

Stitch types & density

Schiffli designs usually have fewer and longer, carefully placed stitches. This is because:

- Schiffli yarn is thicker.
- Schiffli fills do not need to provide as much coverage as in multihead designs.
- Schiffli stitching is typically softer and lighter than multihead.

Generally, few stitch types and effects are used in Schiffli embroidery. Large areas of Schiffli designs are digitized with 'manual' stitches, meaning that each needle penetration is defined by the digitizer individually. Run stitching, stipple, satin, and fills, both plain parallel and Geflecht, are the most frequently used stitch types.

Related topics...

- Digitizing Methods (Reference Manual)
- Stitch Types (Reference Manual)

Machine units

The 'machine unit' is the smallest frame movement an embroidery machine can perform. This in turn determines the closest distance between stitches. For multihead machines this is 0.1mm and, as all machines use the same unit value, most users take it for granted. With Schiffli machines, however, there are two types of machine unit:

- 1/6mm (0.1667mm) for Plauen type machines
- 0.1mm for Saurer type machines.

ES Schiffli supports both formats. This has several advantages for the design system:

- Accurate output – final stitches do not differ from the digitized design.
- Saurer and Plauen designs are inter-convertible.

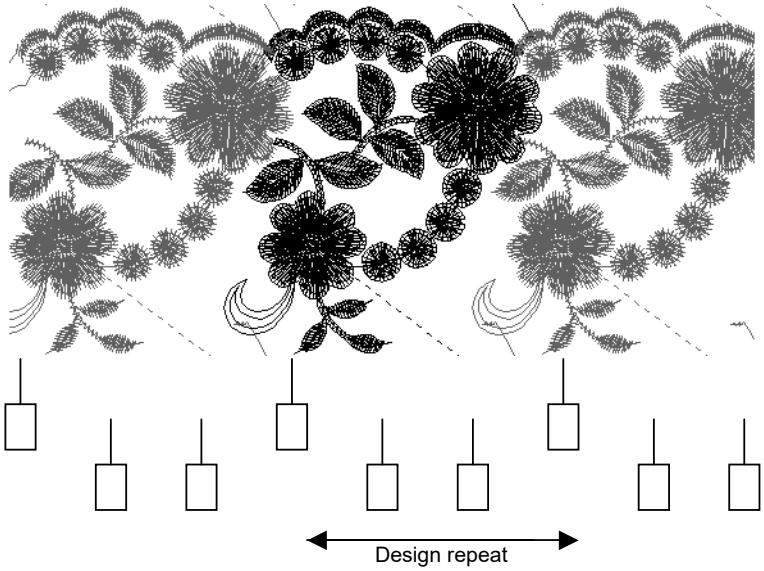
High resolution format for WESS

Wilcom Electronic Servo System (WESS) is a servo system which can drive the frame of a Schiffli machine with very high accuracy, thereby

enabling very high quality embroidery. However, if the Schiffli design is stored in the traditional formats which are based on the resolution of the Jacquard card, the smallest step is constrained by the 'machine unit' – 0.17mm for Plauen and 0.1mm for Saurer. Wilcom has overcome this problem by introducing a high resolution format for use directly between ES Schiffli and WESS. This means that fine details in the ES Schiffli design can be transferred to the Schiffli machine without loss of resolution. ES Schiffli users simply save designs to the new ESS file format which supports high resolution.

Design repeats

Needle spacing is the distance between adjacent needles on the Schiffli machine. Historically, needle spacing or 'rapport' was measured as one French inch – 1.08 of the English inch – usually 27.07 mm. Standard spacing was known as '4/4 rapport'.



With Schiffli design, the distance between active needles is known as the 'design repeat' which is always a multiple of needle spacing. Repeats are thus known as 4/4, 8/4, 12/4, or 16/4 rapport. A Schiffli design can be repeated horizontally as many times as can fit across the frame. With larger designs, needles can be selectively disengaged, thereby increasing the needle spacing to 2, 3, 4, etc, inches.

Summary

If a repeat is a single French inch wide (4/4 rapport), all needles are engaged and work in unison. If two French inches wide, every second needle is active. And so on. Thus, the repeat determines design size. The repeat must be designed accurately so that both sides join seamlessly.

Repeat	Needles on	Needles off	Design size
4/4	All		~27 mm
8/4	1	1	~54 mm
12/4	1	2	~81 mm
16/4	1	3	~108 mm
20/4	1	4	~135 mm

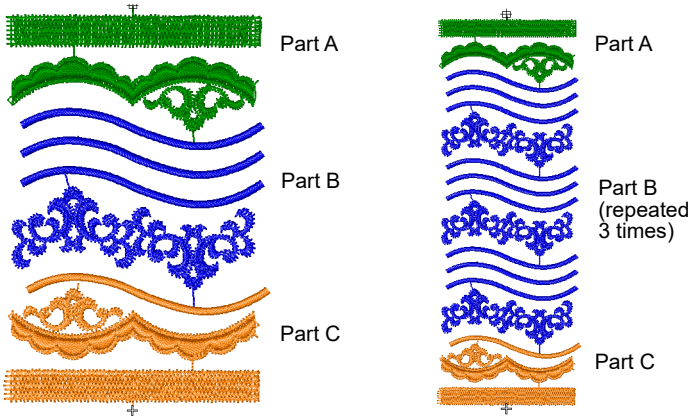
ES Schiffli provides control over design repeats and caters for various types of machine. You can view any number of full or part repeats to see how they inter-connect. A **Print Repeats** function for the approval worksheet is also available so customers don't need to wait for design samples.

Related topics...

- Needle spacing
- Setting up design repeats

Pattern arrangements (ABC)

Some Schiffli embroidery machines can read designs where repeated parts are stored only once in the design file and only the repeat instructions are given to the machine. EmbroideryStudio provides tools to define pattern arrangements and output to specific formats which support the feature.



Pattern arrangements are used by digitizers to save digitizing time. Lacework especially is made up of a few patterns which are repeated many times. Pattern arrangements mean that only the design elements to be repeated are digitized. The design file contains only the information needed to show how the design is to be repeated or mirrored.

Historically, the technique was used with mechanical machines reading Jacquard cards. For example, to secure the edge of the fabric, Part A might be used for every design. A dedicated roll of card was thus used for Part A. Once finished, the roll was removed from the Automat and substituted with Part B. This may have been repeated for many rows. To secure the other edge of the fabric, Part C would be used.

Related topics...

Pattern arrangements

Schiffli vs multihead production issues

Compared to multihead embroidery production, tension and speed control are even more critical issues for Schiffli. This is because pulling thread from the cone to create the tension necessary to form a lockstitch, all happens on a single device. The long rods which move needles back and forth pass through the entire machine. Thus considerable forces are generated and a single error can break thread on all needles simultaneously. Or break the needles themselves.

By contrast, thread tension on multihead machines only applies to individual heads. During production, the operator rarely needs to fix thread breaks on more than one head at a time. That is, provided the design is tested properly for possible digitizing errors.

Another main difference is frame weight. On Schiffli machines, this is much heavier than on multihead machines. This in turn allows multihead machines to run faster. Mechanical Schiffli machines can run at a maximum of 120-140 stitches per minute. Modern, smaller and lighter machines can do 400-500. By contrast, the theoretical maximum stitch speed for single-needle lockstitch sewing machines is about 2,700 stitches per minute.

The problem is that the higher the speed, the higher the thread tension on the fabric. Because of this, multihead machines slow down automatically on longer stitches. This can be adjusted on the control panel. The objective is always to maintain production speed while maintaining embroidery softness with minimal distortion.

A related issue for multihead embroidery production is that higher speeds compromise use of cotton thread. This thread has traditionally produced the finest embroidery. Today, producers typically use rayon or polyester.

Schiffli machine functions

Because different machines have different values and function-sequences, ES Schiffli helps digitizers to apply machine functions without having to know what the function does on the machine. In so doing, ES Schiffli makes a distinction between 'logical' and 'physical'

machine functions. The logical function is what you, the digitizer, want to perform – e.g. start or stop boring. In order to achieve this, the Schiffli machine may have to do several things. The following shows a simplified encoding of the typical physical functions required to start and stop boring. See also Logical vs physical borer depth.

Start boring	Stop boring
• Slow • Needles Out • Borers In • Fast	• Slow • Borers Out • Needles In • Fast

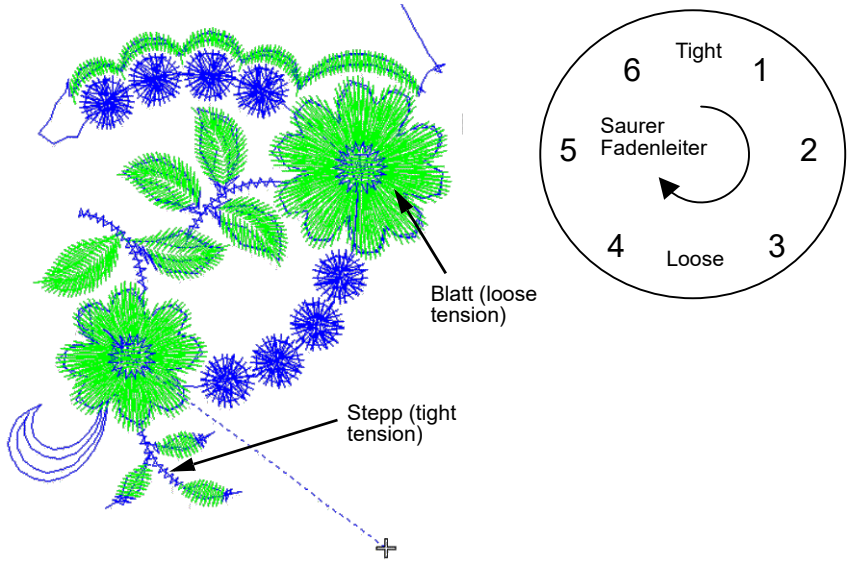
When creating Schiffli designs with ES Schiffli, you may use logical functions which are common to all Plauen and Saurer type machines. Or you may insert functions that are unique to a restricted range of machines. See also Schiffli machine functions.

Logical functions are saved as 'object properties' in the native EMB design file. This file can then be output for stitching on a particular machine. ES Schiffli automatically generates the required machine code by interpreting the logical functions. This concept may be new to Schiffli designers who are used to working on a stitch-by-stitch basis. See Reading & Outputting Designs for details.

Note: If your machine uses a WESS (Wilcom Electronic Servo System) controller, you need only output a single ESS file.

Tension control

With Schiffli designs, it is important that stitching remain loose and not pull or push the fabric. Lacework has to be soft. This means that thread tension must be correct. Larger movements pull more thread and increase tension. If there is too much, the fabric distorts and needles may break.



Schiffli machines have special devices for tension control. The thread goes through the tensioning mechanism which allows for subtle variations. The mechanism can be controlled by the software. Special functions – Stepp (tight) and Blatt (loose) – are provided and the necessary codes added to the output file.

Blatt functions trigger more feeding of the upper thread, while Stepp returns to normal tension. For longer stitches, more upper thread is needed to accommodate the greater distance between needle points. Otherwise, the fabric will be pulled and stretched by the upper thread.

In addition to the Blatt function, some machines use Fadenleiter for even finer tension adjustment. ES Schiffli supports both.

Tip: 'Overshooting' is a technique sometimes used by Schiffli digitizers to feed more thread from the cone and reduce thread tension. This can be done in ES Schiffli by means of **Manual** stitches.

Related topics...

- Frequently used machine functions
- Machine-specific functions

Speed control

Schiffli machine frames are heavy. Longer stitches and hence large frame movements need more time. Changes from needles to borers also need time. Speed in Schiffli machines, like tension, is controllable from within

ES Schiffli. Special functions – ‘Fast’ and ‘Slow’ – are provided and the necessary codes added to the output file.

Normal operating speed in Schiffli machines is ‘Fast’. This generally translates as follows:

- Saurer 1S/2S: 105–125 RPM (Revolutions Per Minute).
- Hiraoka 15 yard: 135–145 RPM.

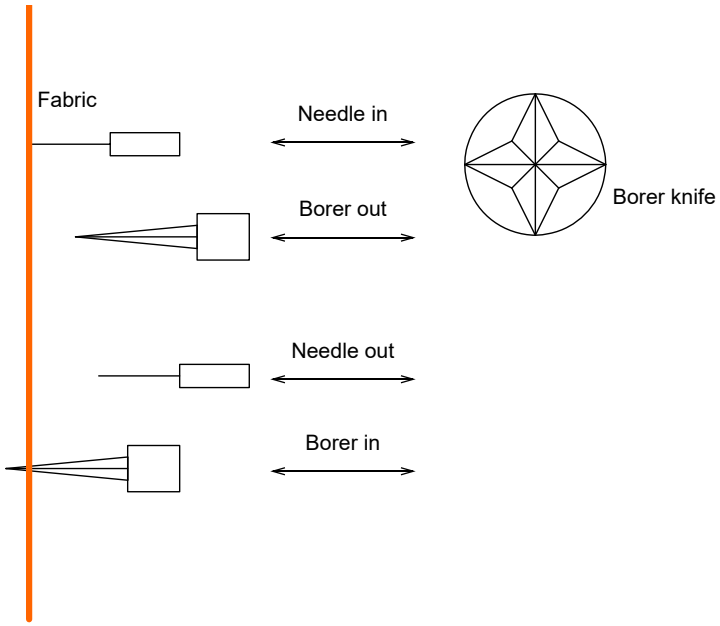
Some machines use further fine speed adjustment like Saurer ±5 RPM increments. ES Schiffli supports these.

Related topics...

- Other machine functions
- Machine-specific functions

Borer control

Schiffli machines have built-in borer knives under the needle line which can cut different sized holes in fabric. The Schiffli borer knife has four tapering edges which can cut holes of varying size. This depends on how far they penetrate the fabric – larger cuts for faster operation, smaller cuts near the edges. In principle, the borer knife can penetrate in 13 step increments (1-13 for Plauen and 0-12 for Saurer).



The borer line is under the needle line. When borers are used, needles must first be disengaged (pulled out). The frame must be moved down

and borers engaged. When the borer operation is complete the same must be done in reverse order.

ES Schiffli controls Borer In/Out by means of 'object properties'. With Borer In selected, each needle penetration point becomes a borer hole, regardless of the selected stitch type. Borer depth is relevant only to designs digitized using ES Schiffli. You can control borer depth by entering the specific depth value. The depth, and hence the size of the hole being cut, can be controlled by up to 13 increments.

Related topics...

- Borer depth default
- Schiffli machine functions
- Schiffli boring
- Multihead boring (Reference Manual)

Color change control

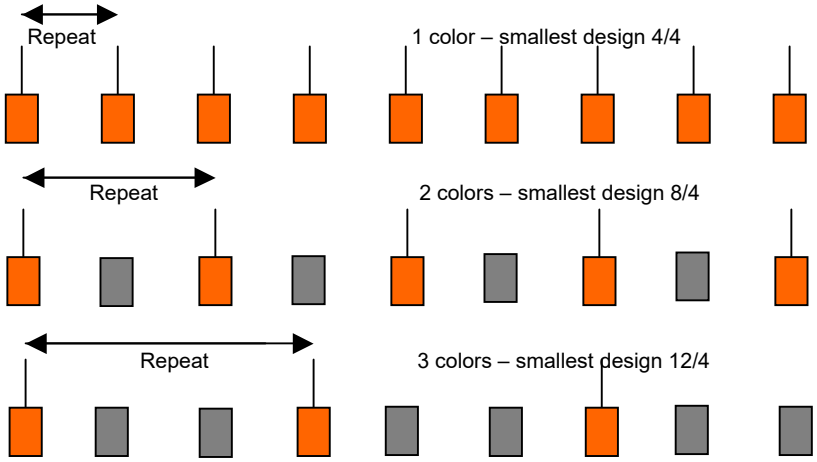
Earlier generations of mechanical Schiffli machines did not support automatic color change. That is, there was no mechanism to activate individual needles or even groups of needles. Thus multi-colored designs were expensive to produce because operators needed to manually engage and disengage needles, trim threads, and re-thread needles. For this reason, most designs used a single color.

Newer Schiffli machines, however, have automatic color change capabilities. The earlier solution was to retrofit mechanical machines by installing devices that could retract and engage groups of needles. For example, in an 8/4 repeat, first and second needles can be alternatively engaged to allow a two-color design. These are called Repeat Color Change (RCC) mechanisms.

Modern Schiffli machines with electronic controllers can address individual needles. Thus any combination can be programmed. These are called and Individual Needle Control systems (Pentamat). Thus designs stitched on these machines can employ more colors. ES Schiffli provides support for color changes. See also Digitizing for RCC Designs.

RCC color change control

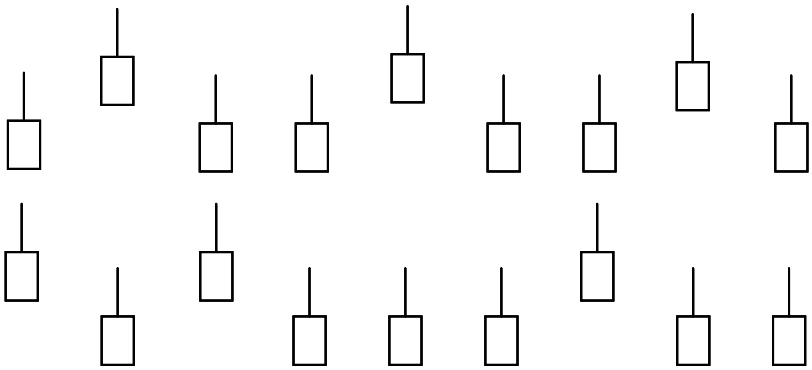
Repeat Color Change (RCC) is a mechanism available on some Plauen and Saurer type machines to push a group of needles – every needle, every 2nd, every 3rd, every 4th, etc – forward or backward. Color variation is given by the design width. For example, a 12/4 design repeat can have three differently colored (threaded) needles as shown in the diagram.



Each pattern is called a 'station'. Individual stations exist for each combination – 4/4, 8/4-1, 8/4-2, 12/4-1, 12/4-2, 12/4-3, etc. Non-Hiraoka RCC Schiffli machines are usually capable of accessing 10-12 different needle patterns by using a physical 'template' on the machine.

INC color change control

Individual Needle Control (INC) was a mechanism originally developed for Saurer Pentamat machines whereby each needle position across the whole machine could be activated or de-activated individually, either under program or manual control. Hiraoka and Laesser have developed their own implementations of individual needle control, sometimes called Single Needle Control (SNC). INC type machines can handle user-defined stations with any number of needles each of which may be in or out.



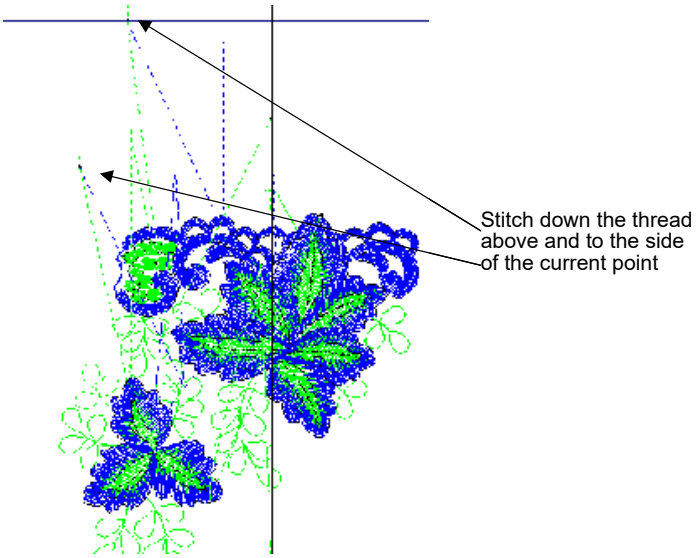
Note: INC type machines can handle the standard design repeat stations used by RCC machines. ES Schiffli allows you to define RCC type stations only.

Related topics...

- Digitizing for RCC Designs

Trimming control

Mechanical Schiffli machines have no thread trimming mechanism. Nor do trimming codes appear in the Jacquard card. Long stitches are usually trimmed manually. During production, connecting threads hang loosely over the fabric. Also when changing colors (RCC machines only), the thread of the previous color remains connected between the fabric and the previous needle. Digitizers must anticipate where the threads will be to avoid overstitching them. Typically tacking is used to lock threads above and to the side of the current point. Schiffli designers frequently avoid the need for trimming by designing fancy connecting lines between main stitched areas.



Note: In ES Schiffli, objects need to be connected by manually digitized travel stitches or manual trims of long stitches with tacking. Automatic connectors do not provide the type of object-to-object connection normally used in Schiffli designs.

ES Schiffli provides an explicit Trim function. This has two main uses – for trimming threads on Schiffli machines equipped with trimmers, and for viewing TrueView™ samples of the final embroidery.

Related topics...

- Other machine functions

- Trim function encoding

Schiffli machine formats

Before using ES Schiffli, you need to give the software some further details about its intended application. There are two ways to do this:

- Create a new format based on the default, and make it available to all designs. See Create custom formats for different machines for details.
- Create a custom format for use with a specific design. See Customize machine formats for specific designs for details.

There are various reasons why you may want to do this. For example, if the maximum stitch length supported by your machine is 12mm, you can define a custom Schiffli machine format and adjust the maximum stitch length accordingly. When starting a new design, choose the particular machine you need.

Tip: The values you set do not affect the availability or otherwise of the machine functions provided in ES Schiffli. This means that you, the digitizer, need to be aware of the functions supported by your particular machine. See also Schiffli machine functions.

This section explains how to customize machine formats to meet your machine's specific requirements.

Generic Schiffli machine

Multihead machine users are not usually as familiar with the settings of their embroidery machines as Schiffli users who often have years of operating experience. With EmbroideryStudio, multihead machine digitizers simply choose the type of embroidery machine they are designing for or outputting to. Supported machines use preset values.

There are many types of Schiffli machine, each with its own capabilities and modes of operation. Some of these are common to all Schiffli machines, some may be peculiar to a particular class of machine. To deal with this situation, ES Schiffli uses the concept of the 'generic Schiffli machine'. This machine format supports functions required for a wide range of machine types, including:

- Plauen type machines – e.g. Plauen standard, Hiraoka, Zangs and others.
- Saurer type machines – e.g. 1S, 2S-55, 1040, etc.
- Electronic Schiffli machines – e.g. Wilcom-Wei Gang, Saurer Pentamat (SHC code), Laesser, Hiraoka VE, etc.

If you are using the SCHIFFLI template, the machine format will default to Schiffli. You may need to change machine settings if the presets do not

correspond exactly to your machine specifications. You can even customize the machine format for a particular design.

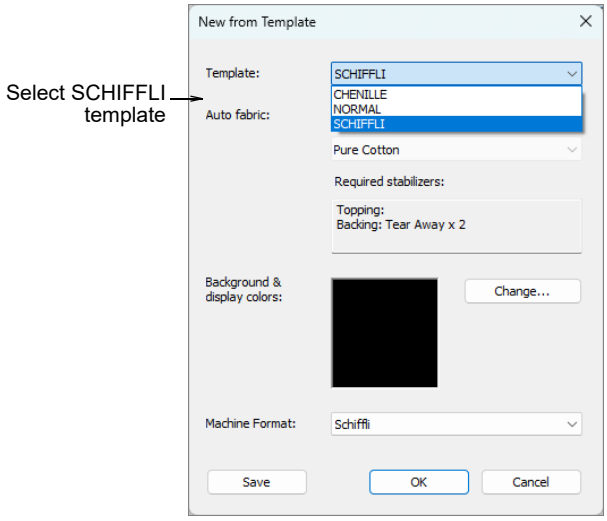
This means that you can digitize designs for practically any Schiffli machine or, for emblem work, any supported multihead machine. Of course designs created for a specific machine type are only guaranteed to stitch out perfectly on that machine. With ES Schiffli, however, you can convert designs for stitching on potentially any machine type that supports the 'logical' machine functions included in the design. See also Supported Schiffli file formats (Supplement).

Create custom formats for different machines

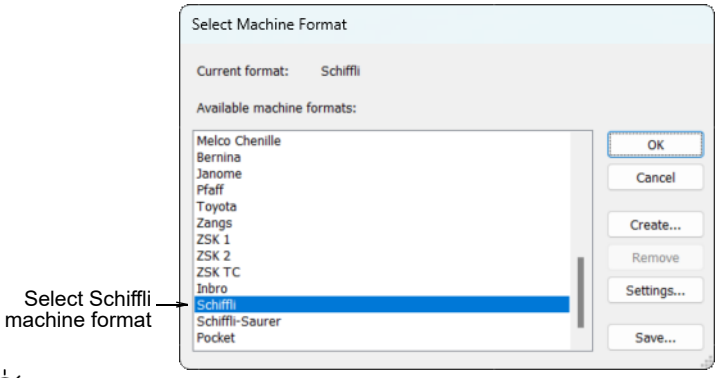
EmbroideryStudio provides a generic Schiffli format for all machines. However, if you need to prepare designs for different machines, it is possible to create as many separate formats, based on the generic ES Schiffli machine, as you like. Modifiable values include stitch and jump length, trim functions, borer functions, and needle spacing.

To create custom formats for different machines...

1 Select **File > New from Template** and open a new design using the SCHIFFLI template.



2 Select **Design > Select Machine Format**. The **Select Machine Format** dialog opens. The generic Schiffli machine format is selected by default.

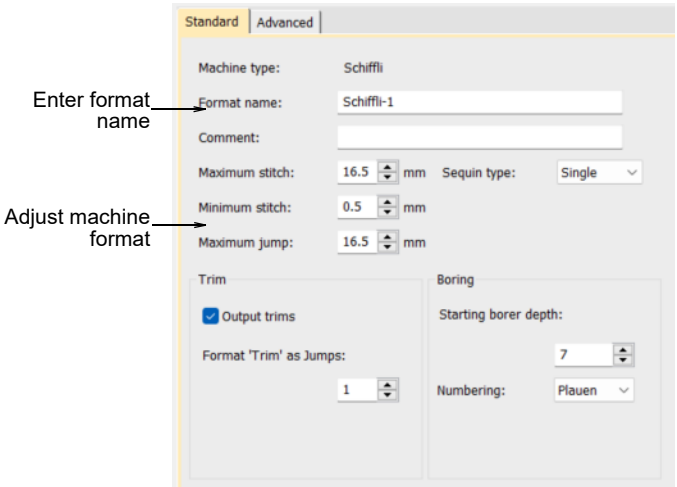


Tip: The generic ES Schiffli machine provides a single set of 'machine format values' which are common to all Schiffli machines. Laesser machine digitizers can adjust these values as necessary to suit particular machine characteristics. Typical modifiable values include stitch and jump length, trim functions and color change functions.

3 Choose how you want to customize the format:

- To create a new format based on the current one, click **Create**.
- To modify a selected format, click **Settings**.

The **Machine Format Settings > Standard** tab opens.



Note: If necessary, you can update the standard Schiffli machine format itself. However, you should only do this if the default values are no longer of use.

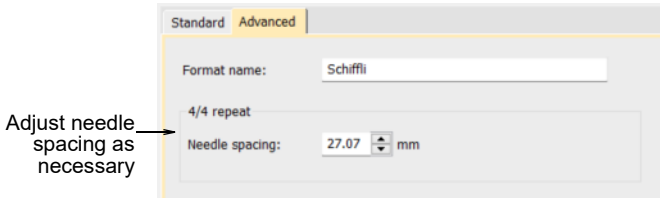
4 In the **Format Name** field, enter a new name for the format as required. If you are creating a new format, the name of the base format plus number appear as the default – i.e. **Schiffli-1**.

5 In the **Comment** field, enter any information that will help you identify the machine format – e.g. **Plauen** or **Saurer**.

6 Adjust settings as required:

Settings	Details
Stitch and jump length values	With some machines you can set the maximum frame movement, minimum stitch length to recognize, or automatic jump length. See Stitch & jump length settings for details.
Trim function encoding	Some Schiffli machines are equipped with trimmers. You can specify the number of Jump codes to be interpreted as a Trim. See Trim function encoding for details.
Borer depth default	Schiffli machines have built-in borer knives located beneath the needle line. Set the default Borer Depth value to match the settings on your machine. See Borer depth default for details.
Needle spacing	ES Schiffli uses the exact needle spacing in order to display or print design repeats correctly. See Needle spacing for details.

7 Click the **Advanced** tab to access the needle spacing setting.



Different machines use slightly different needle spacings, a result of slight variations of the French inch. For example, 27.04 mm (Saurer), 27.07 mm (Plauen & Zangs), 27.08 mm (Hiraoka). This is an important value. When designing for freestanding embroidery, design repeats must link up precisely. Otherwise the lace will fall apart.

8 Click **Save**. If you have entered a new name, the new format appears in the **Available Machine Formats** list.

9 Click **OK**.

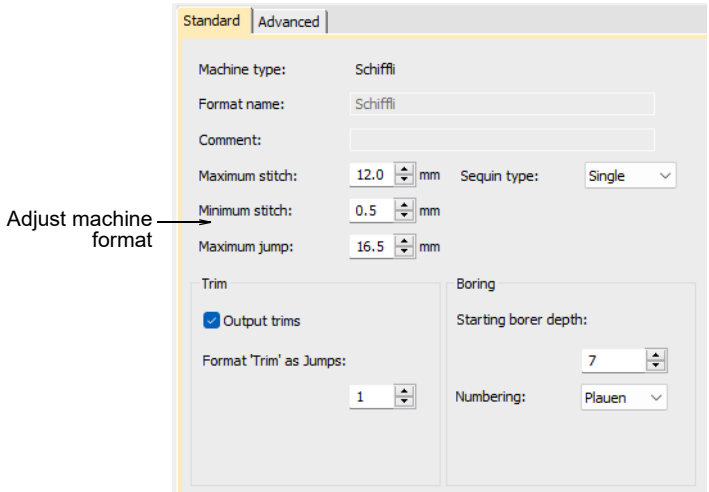
Customize machine formats for specific designs

You can modify machine settings for the current design. Use this feature if you need to modify machine format values for a design without changing the original format.

To customize machine formats for a specific design...

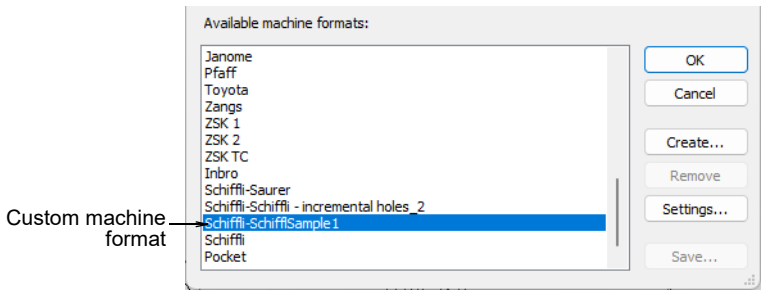
1 Open the design whose machine format you want to modify.

2 Select **Design > Machine Format Settings**. The **Machine Format Settings > Standard** tab opens. You cannot change the **Name** or **Comment** fields.



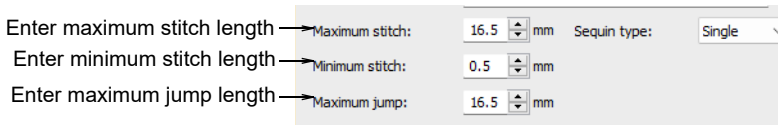
3 Adjust the machine format settings as required. See Create custom formats for different machines for details.

4 Click **OK**. A new machine format is created for the design. It appears in the **Select Machine Format** dialog and is saved with the design.



Stitch & jump length settings

With some machines you can set the maximum frame movement, minimum stitch length to recognize, or automatic jump length.



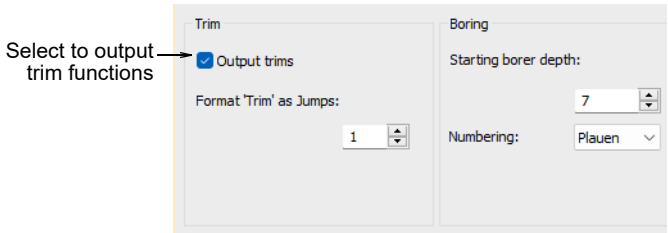
Settings include:

Setting	Details
Maximum stitch	The value you enter depends on the tape code used by your machine. The default maximum stitch length value for Schiffli is 16.5mm.
Minimum stitch	Enter the smallest stitch to allow when outputting to the selected machine format. Generally minimum stitch length is increased for dense materials, thick threads, or older machines in order to prevent thread breakage or inaccurate stitching. This value sets the default 'Small Stitches' value. See Eliminating small stitches (Reference Manual).
Maximum jump	In the Maximum Jump field, enter the maximum length of jumps. This sets the default Auto Jump value. See Preserve long stitches (Reference Manual).

Tip: Shorter jump values generally improve stitch quality and reduce wear on the machine but may increase stitch-out time.

Trim function encoding

Some Schiffli machines are equipped with trimmers. They may understand specific 'Trim' codes but generally these are encoded as 'Jumps'. As part of the machine format, you can specify the number to be interpreted as a Trim.



With **Output Trims** selected, Trim functions are interpreted in the design as the specified number of Jumps. The default value is one (1). Adjust the number of consecutive Jumps as required. If you change the number of Jumps triggering a Trim on the machine, make sure you also change it in the software.

Mechanical Schiffli machines have no trimmers. Thus the thread remains connected to the last stitch during the boring phase. If you deselect the **Output trims** checkbox, the Trim functions are not removed from the EMB design but simply ignored for the selected machine format. However, Jumps may be removed.

Tip: In ES Schiffli, jump stitches are assumed to be present only for stitches that will be trimmed. To hide them in TrueView™ display, they must be encoded as Trims. Thus, if you want a realistic view of the design as it would appear after manual trimming, **Output Trims** must be selected and the number of Jumps set to one.

Related topics...

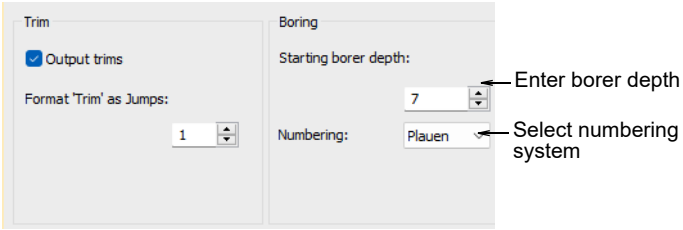
- Trimming control
- Other machine functions

Borer depth default

Use Function > Borers to activate the boring function.

Schiffli machines have built-in borer knives located beneath the needle line. With **Borers** activated, each needle penetration becomes a borer hole, regardless of selected stitch type. Schiffli borer knives have four tapering edges. These can cut holes of varying size, depending on how far they penetrate the fabric. In principle, the cut is as large as the borer knife diameter at any given depth.

Borer depth is relevant only to designs digitized using ES Schiffli. You can control the default depth as part of the machine format definition.



The depth, and hence the size of cut hole, is determined by up to 13 increments. Borer depth is specified slightly differently for Plauen (1-13) and Saurer (0-12). Set the default value to match the settings on your machine. The **Starting borer depth** field defaults to:

- Plauen default = seven (7)
- Saurer default = six (6).

Adjust the starting borer depth as preferred.

Related topics...

- Schiffli boring
- Schiffli machine functions
- Frequently used machine functions
- Create custom formats for different machines
- Multihead boring (Reference Manual)
- Digitize boring holes (Reference Manual)

Needle spacing

Needle spacing is the distance between adjacent needles on the Schiffli machine. Different machines use different spacings, a result of slight variations of the French inch. Needle spacing is therefore characteristic to the machine and is part of the machine format values.

ES Schiffli lets you adjust this value to suit the type of machine which will stitch the design:

- 27.04mm (Saurer)
- 27.07mm (Plauen & Zangs) – the ES Schiffli default
- 27.08mm (Hiraoka)

This is an important number because when designing for continuous fabric or freestanding embroidery (chemical lace), design repeats must adjoin each other precisely. Otherwise, once the substrate is washed away or steamed out, the lace will fall apart. In EmbroideryStudio, the repeat setting must be accurate down to fractions of a millimeter.

Related topics...

- Design repeats
- Setting up design repeats

Setting up Schiffli templates

Use Standard > New to start a new design with the NORMAL template or with a predefined template.

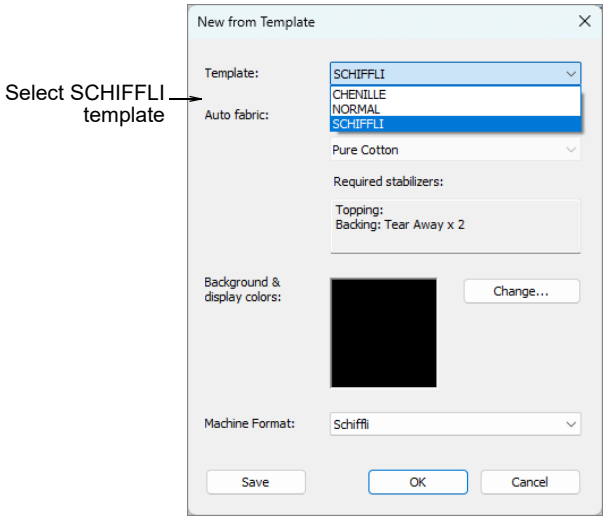
For Schiffli work in EmbroideryStudio, you first select the supplied SCHIFFLI template. This template is optimized for work with Schiffli machines. For instance, it sets the machine format to 'Schiffli'. It also turns off automatic start and end points as well as auto fabrics. Also, sequin drop direction defaults to 'From South' while the multihead 'NORMAL' template defaults to 'From North'.

The template also turns off automatic connectors. Schiffli objects need to be connected by manually digitized travel stitches or manual trims. The software does, however, provide an explicit Trim function for Schiffli machines equipped with trimmers.

While automatic connectors, start and end points, and auto fabrics are turned off, the template does not change other stitch settings. Schiffli digitizers generally want to set their own to suit their machine characteristics.

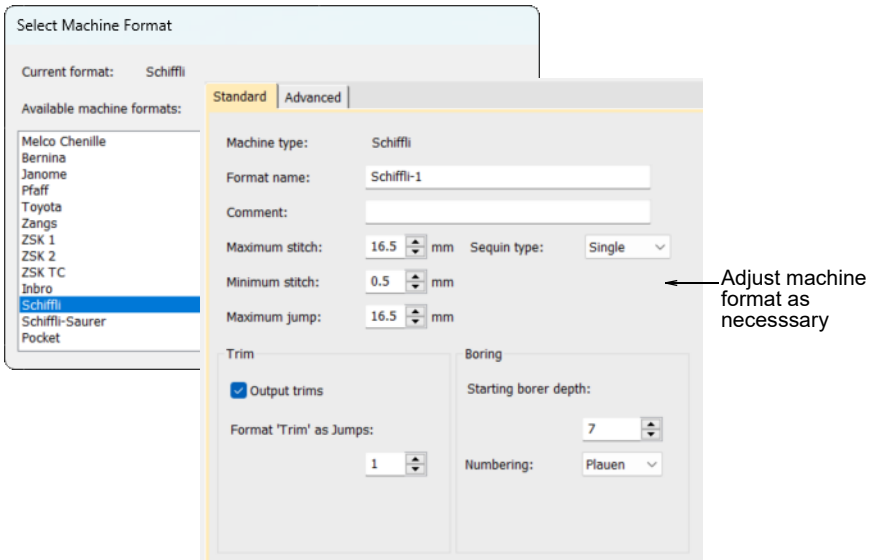
To set up the Schiffli template...

1 Select **File > New from Template** and open a new design using the SCHIFFLI template.

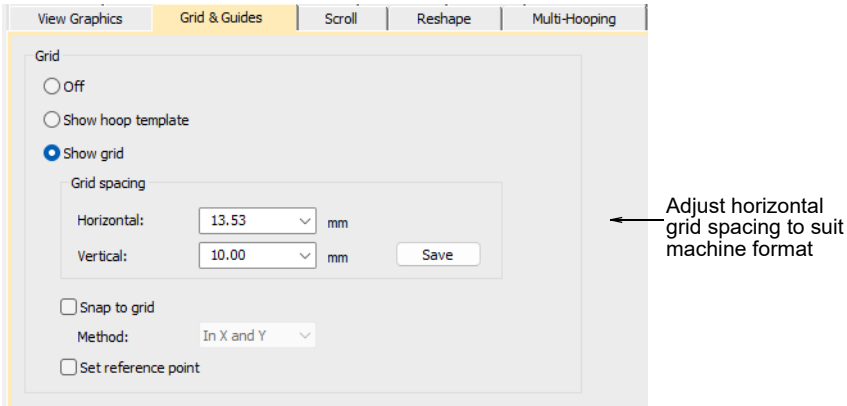


2 Select the SCHIFFLI template from the list and click **OK**. A blank design opens in the design window based on the selected template.

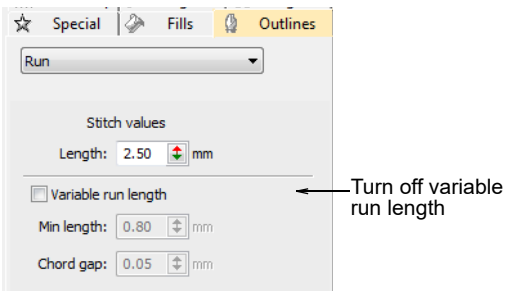
3 Access the generic Schiffli machine format and adjust settings to suit your machine. For example, if the maximum stitch length supported by your machine is 12mm, you can define a custom Schiffli machine format and adjust the value accordingly.



4 If you are changing needle spacing, you should also change the horizontal grid spacing. Access **Options > Grid & Guides** to set this value. For instance, you may set it to 27.07 for Plauen or 27.04 for Saurer. Or half those values for two grid cells per needle spacing – i.e. 13.53 (default) or 13.52.

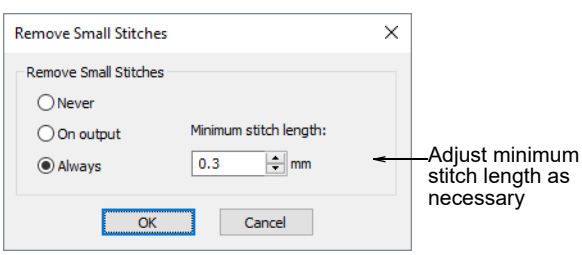


5 Adjust property settings, styles, and effects as required. The first goal is to keep overall stitch count as low as possible. Unnecessary small stitches are avoided. Thus automatic settings are often turned off as these create smaller stitches.

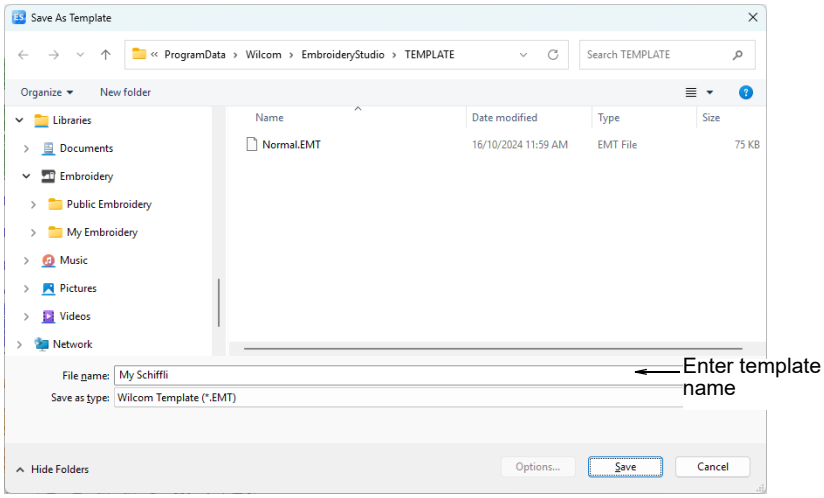


Relatively few stitch types and effects are used in Schiffli embroidery. You may need to preset Run, Stipple, Satin, Jagged Satin, and Tatami settings. For instance, Satin cover stitching may employ fixed spacings over anywhere between 0.5mm and 1.2mm. An indicative spacing for Run stitching is 3.0 to 3.5mm.

6 It's a good idea to turn off the small stitch filter or set it to eliminate problem short stitches – e.g. 1.5mm.



7 Once you have adjusted your machine and any other settings to your requirements, select **File > Save as Template** to save the template for future use.



8 Select **Design Templates (EMT)** from **Save as type** list.

EmbroideryStudio automatically opens the **..\Template** folder. Design templates must be saved here or they will not appear in the template list when you start a new design.

9 Enter a name for the template in the **File name** field and click **Save**.

If you intend to use your setup for dedicated Schiffli work, save the SCHIFFLI template as 'NORMAL'.

Caution: Make sure you back up the supplied NORMAL template if you want to return to multihead embroidery work at a later stage.

Related topics...

- Schiffli machine formats
- Eliminating small stitches
- Grid, ruler, & guide display options (Reference Manual)
- Working with design templates (Reference Manual)

Schiffli storage media

Traditionally Schiffli designs are stored on Jacquard cards of which there are two types – Plauen and Saurer. Named after Joseph M Jacquard, inventor of the Jacquard loom, Jacquard cards contain a stitch-by-stitch interpretation of the design together with machine functions, exactly as the embroidery machine will read it, encoded as a series of holes. The Schiffli machine uses a mechanical controller or 'Automat' to decode the pattern of holes into frame movements and functions – tension, speed changes, borer actions, etc.

More recently, the embroidery industry has used paper tape as a recording media. Thus Jacquard card electronic encoding produces a 'tape file' which is essentially an electronic image of the card. ES Schiffli outputs two tape file formats – T10 (for Plauen) and T15 (for Saurer). As some Schiffli machines can read floppy disks, there are various Schiffli machine floppy disk formats. You therefore need to convert the basic tape file to the required disk format.

Experienced Schiffli digitizers can read the Plauen or Saurer type tapes and even make modifications to them.

Saurer card format

Saurer cards have the following characteristics:

- 22 holes in all.
- The center four holes encode M/c functions.
- The sides – 9-9 holes – encode X/Y coordinates.
- Transport holes (larger) are on the edge of the card.

Some function holes are a toggle, counting from the start of design:

- even number = initial state (slow).
- odd number = opposite state (fast).

The meaning of the encoding is interpreted by the Wilcom FIXPAT program in the format **X=**, **Y=**, **M/c function** as shown below.

```
<start of pattern>
    1 --- --- --- ---- --- --- --- X=   0 Y=   0
    2 --- --- --- OOO- --- --- --- X=   0 Y=   0 Feston
    3 --- --- --- O--- --- --- --- X=   0 Y=   0 Boring-
    4 --- --- --- -O-O --- --- --- X=   0 Y=   0 Ch. Spd
    5 --- --- --- OO-- --- --- --- X=   0 Y=   0 Boring+
    6 --- --- --- O--- --- --- --- X=   0 Y=   0 Boring-
    7 --- --- --- OOO- --- --- --- X=   0 Y=   0 Feston
    8 --- --- --- ---- --- --- --- X=   0 Y=   0
    9 --- --- --- --OO --- --- --- X=   0 Y=   0 Stupfel
   10 --- --- --- ---- --- --- --- X=   0 Y=   0
   11 --- --- --- ---- --- --- --- X=   0 Y=   0
   12 --- --- --- ---- --- --- --- X=   0 Y=   0
   13 --- --- --- --OO --- --- --- X=   0 Y=   0 Stupfel
   14 --- --- --- ---- --- --- --- X=   0 Y=   0
   15 --- --- --- ---- --- --- --- X=   0 Y=   0
   16 --- --- --- ---- --- --- --- X=   0 Y=   0
   17 --- --O O-- ---- OO- -OO --- X=  70 Y= -70
   18 O-- O-- --- ---- OO- O-- -O- X=   8 Y= -26
   19 O-- --- --- ---- --O --O -O- X=   1 Y=  58
   20 -O- --- --- ---- --- --- -O- X=   2 Y=   2
   21 --- --- --- ---O --- --- --- X=   0 Y=   0 Needles
```

M/c function holes

X/Y coordinates

Card transport holes

Related topics...

- Checking stitches & machine functions on Jacquard cards

Plauen card format

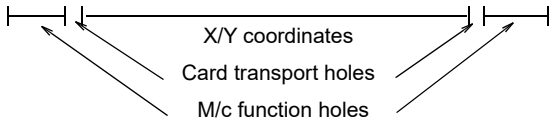
Plauen cards have the following characteristics:

- 46 holes in all.
- The center 36 holes encode X/Y coordinates.
- The sides – 5-5 holes – encode M/c functions and sign of coordinates.
- M/W phase toggle.
- Transport holes (larger) separate coordinates and functions.

Functions are toggled according whether they are set for M or W phase. The example shows the meaning of the coordinates and functions as interpreted by the Wilcom FIXPAT program in the format **X=, Y=, M or W phase, M/c function**.

```
20 ----- ------------------------------------ -----M Y=  0 X=  0
21 -----.-----O----------O--O----------O-----.--OO-W Y=-42 X= 42 Bdp-

21 -----.-----O----------O--O----------O-----.--OO-W Y=-42 X= 42 Bdp-
22 ----- --------O---O---------O------------- --O--M Y=-16 X=  5
23 --O--.------O------O----------------------.-----W Y= 35 X=  0
24 --O-- -----------------O-O---------------- --O--M Y=  1 X=  2
25 -----.-------------------------------------.-----W Y=  0 X=  0
26 ----O ------------------------------------- -----M Y=  0 X=  0 Nin
27 --O--.--------------O-----O---------------.--O--W Y=  4 X=  3
28 ----- ----------O-----------O------------- O----M Y= -8 X= -5 Fast
29 --O--.--------O---------------------------.-----W Y= 10 X=  0
30 ----- ---------O------------O------------- --O--M Y= -9 X=  5
31 --O--.-------------O------------O---------.-----W Y=  5 X= -9
32 --O-- ------------O-------O--------------- --O--M Y=  6 X=  3
33 --O--.-----------------O----O----O--------.--O--W Y=  1 X= 15
34 ----- ----------------------O----O-------- --O--M Y=  0 X= 15
35 -----.-----------------O--------OO--------.--O--W Y= -1 X= 19
36 ----- ---------------O----------OO-------- --O--M Y= -3 X= 19
37 -----.---------------O----------OO--------.--O--W Y= -3 X= 19
38 ----- -----------O------O---------O------- --O--M Y= -7 X= 21
39 -----.---------O---------------O-O--------.--O--W Y= -9 X= 18
40 ----- --------O-----------------OO-------- --O--M Y=-10 X= 19
41 -----.--------O-------------O----O--------.--O--W Y=-10 X= 15
```



Related topics...

- Checking stitches & machine functions on Jacquard cards

Supported Schiffli file formats

Schiffli designs can be opened in EmbroideryStudio, edited and saved in EMB file format, as well as ESS and ESL, ES Schiffli machine file formats. Designs can also be read and written in many other machine-specific formats.

Note: ESL is used for RCC designs only. ESS is the primary machine file format for Wilcom-developed Schiffli servo control systems. When the

ESS file is read directly by a Wilcom Electronic Servo System (WESS), high resolution and stitch accuracy is possible.

Schiffli disks

Newer Schiffli machines can read floppy disks. All Schiffli disks are DOS/Windows readable and do not require special hardware. There are several Schiffli machine floppy disk formats, including:

- SLC (Saurer Low Level Code)
- SHC (Saurer High Level Code)
- Hiraoka
- Laesser
- Heinzle

You need to convert the basic machine file into the specific disk format required. For the most part, this can be done directly through EmbroideryStudio, or indirectly by means of the **Schiffli Disk Converter**.

Note: EmbroideryStudio currently supports Saurer SAS format (SLC) but cannot export SHC format. Users need a third-party converter. This is because the Wilcom software platform is 64 bit based and the earlier converter system is based on 32 bit code. The **Schiffli Disk Converter** which offered such functionality was discontinued from the e4.5 version.

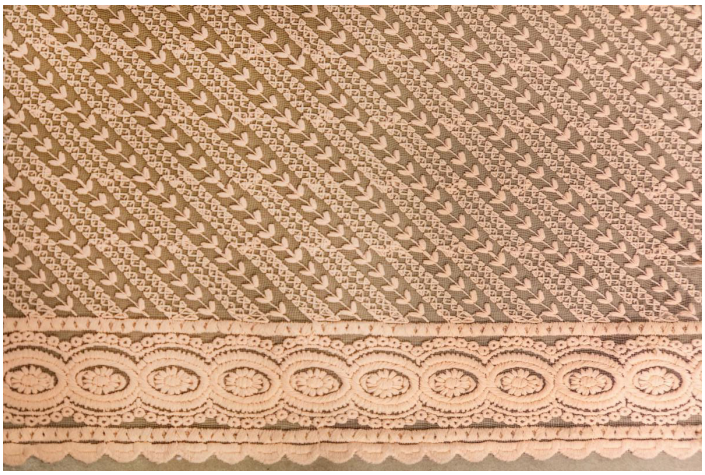
Related topics...

- Supported Schiffli file formats

Chapter 3

Design Repeats

A Schiffli design can be repeated horizontally as many times as can fit across the frame. With larger designs, needles can be selectively disengaged, thereby increasing the needle spacing to 2, 3, 4, etc, inches. This is called a 'design repeat'.



A related technique, pattern arrangements, is used by digitizers to save digitizing time. Lacework especially is made up of a few patterns which are repeated many times. Pattern arrangements mean that only the design elements to be repeated are digitized. The design file contains only the information needed to show how the design is to be repeated or mirrored.

This section describes how to prepare artwork for your design, set up design repeats and pattern arrangements for lace and emblem designs.

Artwork for Schiffli

There are two sources of artwork for use with ES Schiffli:

- Enlargement drawings (used with a digitizing tablet)
- Scanned images or graphics files from third-party software (used for on-screen digitizing).

Schiffli enlargement drawings are usually in 6:1 scale for accuracy and ease of use. As Schiffli designs need to conform with the repeat requirements, it is important that the artwork you use is properly sized and in the correct horizontal position. Always check the position of your artwork before starting to digitize.

ES Schiffli allows you to use scanned images or graphics files – e.g. from floppy disk or emailed – to digitize the design on-screen. The same considerations apply as for checking the enlargement drawing. However, while with enlargement drawings you adjust the drawing scale, with electronic images, you adjust the on-screen image size and rotation.

Note: If you are new to on-screen digitizing, note that the on-screen image is always the original size – i.e. 1:1. If you want greater accuracy, you can zoom in – e.g. 6:1 scale – but this just means a closer view, not a change in design size.

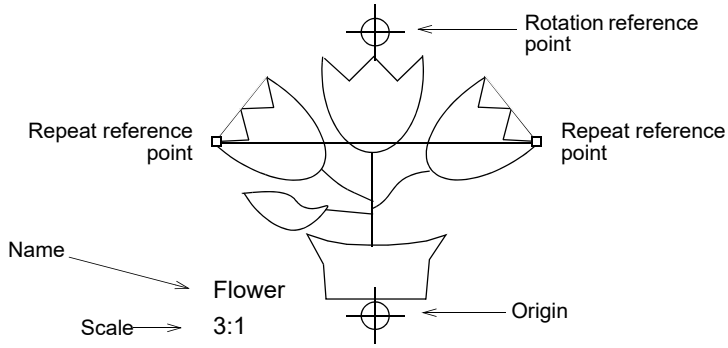
Check enlargement drawing rotation & size

When checking the design, small errors are usually acceptable. Usually 0.3mm in real size is the smallest error the human eye can discern. Most old Schiffli machines cannot accurately make stitches smaller than 0.5-0.8mm in any case.

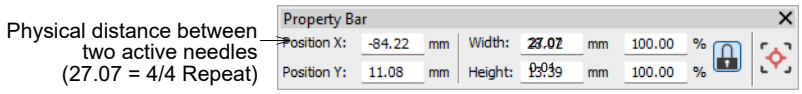
Tip: If, by mistake, the design is incorrectly sized or rotated, it is possible to change these parameters at a later stage. When scaling or rotating the design, all offsets will be properly placed in the final design. See Transforming Objects (Reference Manual).

To check enlargement drawing rotation and size...

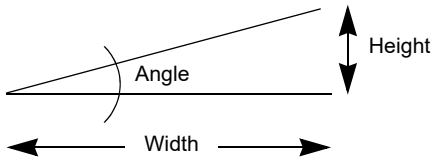
1. Digitize two drawing reference points. See Digitizing Methods (Reference Manual).
2. Digitize a horizontal stitch run between two repeat points. Make sure you digitize them accurately.



3 Select the Run stitch object and check the dimensions in the **Property Bar**.



4 Check the **Height** field to see that the value is equal to zero (0).



If the height value is not zero, then your design may not be positioned horizontally. There are three possible reasons:

- You may have digitized the stitch run incorrectly. Delete the Run stitch object and try again.
- You may have digitized the drawing reference points incorrectly. Re-define them and check again.
- You may have marked the drawing reference lines incorrectly on your drawing. You need to check that the vertical line formed by the two reference points is really vertical compared to the rest of your design.

5 Check the **Width** field to see that value is a multiple factor of your repeat in millimeters.

6 To check or adjust the repeat size, select **Design > Machine Format Settings > Advanced**. See Needle spacing for details.

7 Compare the **Needle Spacing** setting in millimeters with the width of your Run stitch object. If these settings are not the same:

- you may have digitized your stitch run inaccurately
- you may have entered your drawing scale incorrectly

- your enlargement drawing may not have the proper enlargement scale – e.g. instead of 6:1 it may be 5.95:1.

8 If you eliminate the first two reasons and you find that the drawing scale is the source of the difference, you can re-enter the drawing scale in the **Digitizing Tablet** dialog to match the real drawing scale. You can calculate this easily as:

New Drawing Scale = Old Drawing Scale × (X size of Run Stitch object ÷ mm value of Design Repeat)

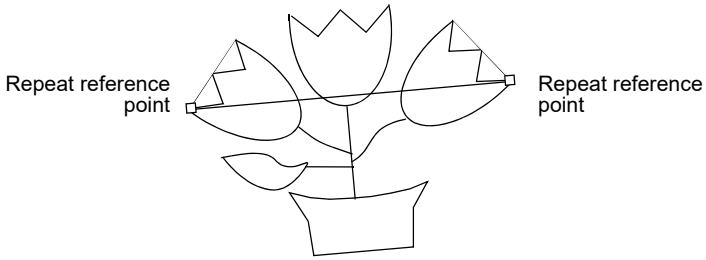
Adjust image for repeat

To adjust an image for repeat, you need to measure the distance between two repeat points. You will need to choose clearly identifiable points on the design which are easy to click.

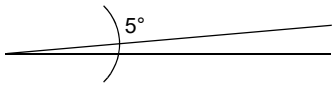
To adjust an image for repeat...

1 Select **View > Measure**.

2 Click the first (left) repeat reference point, then place the cursor over the second point.



3 Check the **X** and **Y** values and the angle.



If the angle is not zero the image may need to be rotated. You need to decide the acceptable tolerance.

4 If you need to rotate it, select the image and enter the exact rotation setting in the **Transform** toolbar.

Tip: Rotating the image can reduce definition and resolution. For better quality, it is sometimes easier just to rotate the paper in the scanner and re-scan the image.

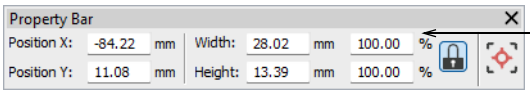
5 Once the rotation is fixed, measure the two points again and compare the **X** value, **Design Repeat** value, and digitizer tablet adjustment.

Again you need to decide what tolerance is acceptable. First you need to calculate the necessary scale factor, which is:

Scale Factor = (Measured Repeat (X) ÷ Design Repeat) × 100%

If the image needs to be enlarged by 10%, you will get 110% or a similar value. If it needs to be reduced by 5%, you will get 95% or similar.

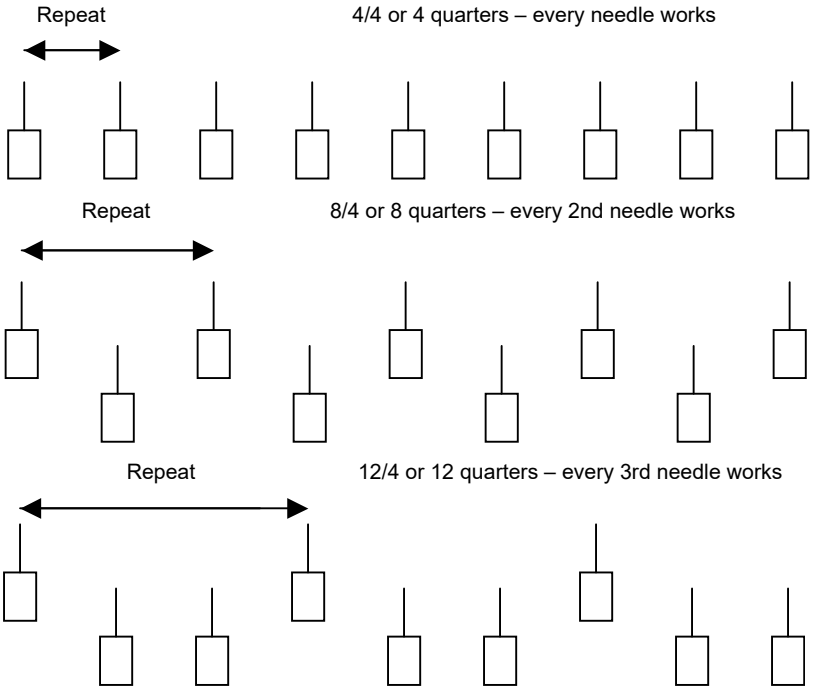
6 If necessary, adjust the dimensions by percentage by means of the **Property Bar**. Press **Enter** to apply. Press **Esc** to discard changes.



Adjust position and size settings. Press Enter to apply.

Setting up design repeats

A Schiffli design can be repeated horizontally as many times as can fit across the frame. Repeats are measured in 'quarters' as shown in the diagram below.



A design can be stitched by every needle (Repeat=4/4), every second needle (Repeat=8/4), or every third needle (Repeat=12/4), and so on. Repeat values increment in multiples of 4 up to a maximum of 96. The

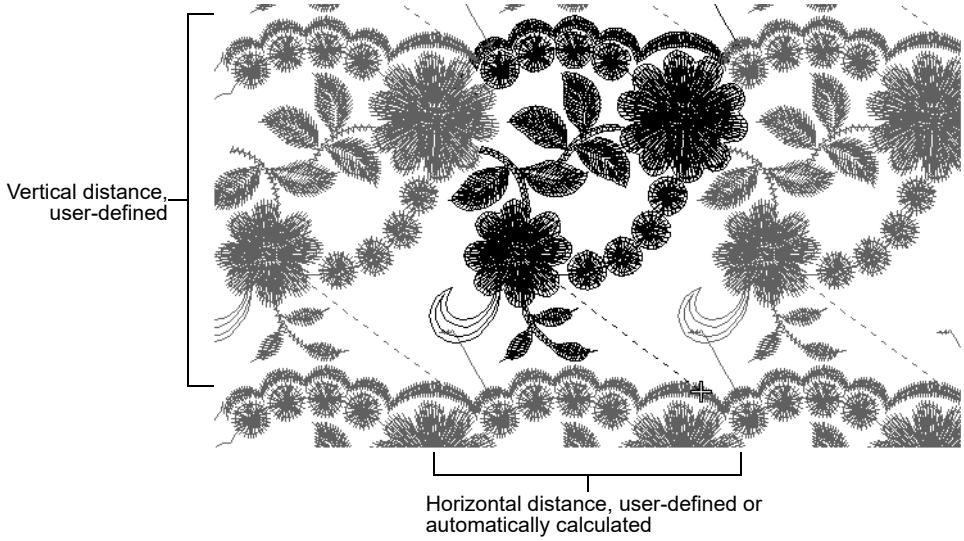
design repeat is characteristic to the design and in ES Schiffli is therefore part of the 'design properties'. The repeat value can be viewed in the **Information** dialog and also printed on the production worksheet. See Printing Schiffli production worksheets for details.

The physical distance between two repeating needles is not essential to the Schiffli design. However, this value is provided to assist you in checking the accurate size of the artwork (image or enlargement drawing).

When creating new designs, ES Schiffli provides control over design repeats and caters for various machine types. You can view any number of full or part repeats to see how they interconnect. A **Print Repeats** option for the production worksheet is also available so you can see the design without having to wait for design samples.

Number of design repeats

When digitizing or opening a design, you can view it with any number of repeats. The number can be a real number and larger than 1 – e.g. 1, 2, 3, etc.



The repeats are balanced around the original design which means that whole designs are displayed only for odd integer (1, 3, 5) numbers of repeats.

If the number of repeats is...	Then...
1.0	the original design only is displayed.

If the number of repeats is...	Then...
1.2	• the original design is displayed, plus • 0.1 of the design to either side of the original.
2.0	• the original design is displayed, plus • 0.5 of the design to either side of the original. The repeat pattern looks like this:][][.
2.9	• the original design is displayed, plus • 0.95 of the design to either side of the original.
3.0	• the original design is displayed, plus • a complete copy of the design to either side of the original. The repeat pattern looks like this: [][][].

Define design repeats

When working with Schiffli designs ensure that the:

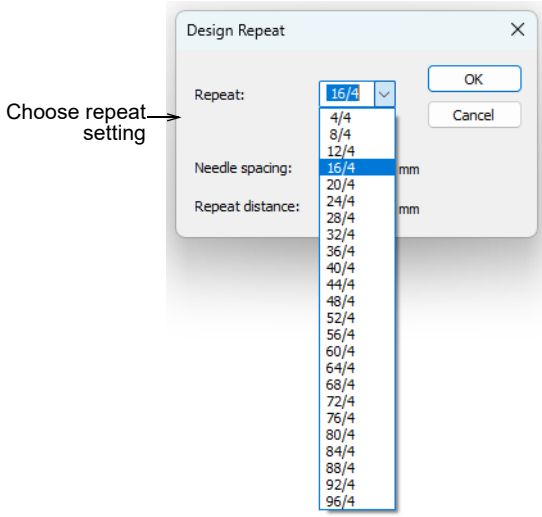
- Design repeat is well defined
- Image/enlargement drawing is the right size, and
- Vertical/horizontal lines are correct.

EmbroideryStudio provides view and print functions to display the design in repeated form. It is only necessary to define design repeats so that the software can display and print/plot multiple repeats. In other words, you need only define the repeat value if you want to **view** the repeats.

Note: You can save grid settings in the template. It is a good idea to set up your Schiffli templates with grids sized for Schiffli work. When checking the design repeat, the grid can be used as reference for adjustments.

To define the design repeat...

1. If you are using the Schiffli template, the machine type will already be set to Schiffli. Settings can be adjusted via the **Machine Format Settings** dialog.
2. Select **Design > Design Repeat**. The **Design Repeat** dialog opens.



3 From the **Repeat** dropdown list, select the repeat setting you require. A design can be stitched by:

- Repeat=4/4: every needle
- Repeat=8/4: every second needle
- Repeat=8/4: every third needle
- and so on.

Repeat values increment in multiples of 4 up to a maximum of 96.

Tip: To check or adjust the repeat size, select **Design > Machine Format Settings > Advanced**.

4 Click **OK**. The selected design repeat will be saved as the new default preference.

Tip: The repeat is displayed in the **File > Information > Design Information** tab on the same line as the file version.

Related topics...

- Schiffli machine formats
- Needle spacing
- System Settings (Reference Manual)

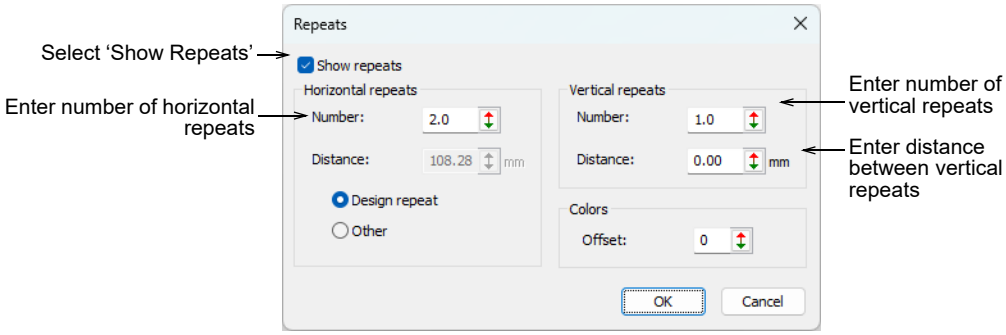
View design repeats on screen

Use View > Show Repeats to view Schiffli designs with any number of repeats. Right-click to adjust settings.

When digitizing or opening an existing image, you can view your design with any number of repeats.

To view design repeats on screen...

1 Press the keyboard shortcut **W** to access the **Repeats** dialog.



2 Select the **Show Repeats** checkbox to activate the feature.

3 Enter the required number of horizontal and vertical repeats in the **Number** fields.

4 Select from the available options:

Option	Purpose
Horizontal repeats > Design repeat	If 'Design Repeat' is selected, the physical distance of the repeat is automatically calculated. The repeat distance is typically a multiple factor of the needle distance – 4/4 - 27,07mm, 8/4 - 54.14, etc. Make sure that you have already selected the design repeat.
Horizontal repeats > Other	If 'Other' is selected, you need to set the distance in mm. This facility is provided for users who are doing continuous design work on multihead systems.
Vertical repeats	This setting is not pre-defined like the design repeat. You need to specify vertical repeat distance as well as number of repeats.
Colors	To help you distinguish on screen the original design from the repeat patterns, the facility exists to display the repeats in different colors. Here you can enter a color offset to indicate the start of the repetition. Let's say you have a 4-color design using palette colors 1, 2, 3, 4. If you set Offset to 5, repeating colors will display as 5, 6, 7, 8.

5 Click **OK.**

Note: Design repeats will not display while TrueView™ is activated.

Related topics...

- Number of design repeats
- Define design repeats

View design repeats using a digitizing tablet

To switch on repeats, click the Show Repeat icon on the Menu Chart with Button 1 of the puck.

When digitizing or opening an existing image, you can view your design with any number of repeats. You can control the display of repeats using your digitizing tablet.

To view design repeats using a digitizing tablet...

- To switch on repeats, click the **Show Repeat** icon on the **Menu Chart** with Button **1** of the puck.

  This sets **Show Repeats** on and displays the **Repeats** dialog.
- To switch off repeats, click the **Show Repeat** icon again with Button **1**.

  This sets **Show Repeats** off and redraws the design without repeats.

Related topics...

- View design repeats on screen

Pattern arrangements

Pattern arrangements are used by digitizers to save digitizing time. Lacework especially is made up of a few patterns which are repeated many times. Pattern arrangements mean that only the design elements to be repeated are digitized. EmbroideryStudio provides tools to define pattern arrangements and output to specific formats which support the feature.

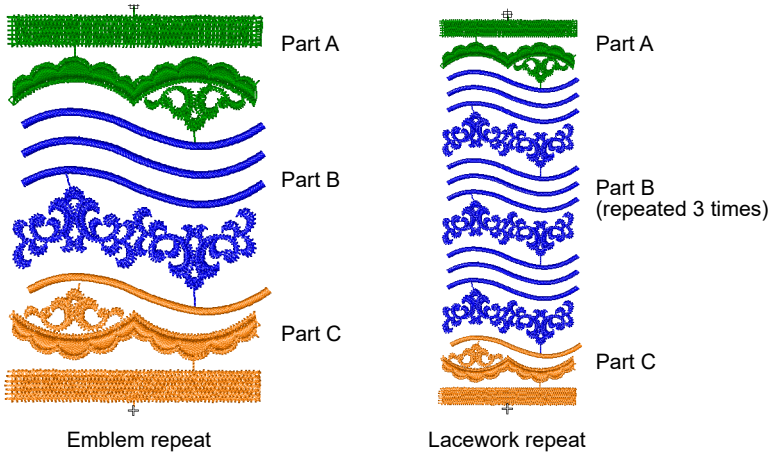
Designs can be saved to certain formats with design elements stored only once, together with repeat instructions – e.g. Hiraoka VEP, Wilcom EMB or ESS. Some Schiffli embroidery machines or controllers can read these formats directly. Designs can also be saved with the arrangements 'expanded' as pure stitch data – e.g. DAT file format. As the term suggests, these files are much larger than 'non-expanded' (original) design formats. See also Save pattern arrangements.

Tip: When using pattern arrangements, it's a good idea to turn on the 'cumulative stitch count'. This gives a cumulative count for the whole design, not each part separately. To turn it on, select **Options > General > Cumulative stitch count**. See Other general options (Reference Manual).

Apply pattern arrangements

Use Schiffli > Schiffli Arrangement to split designs into color blocks arranged into logical parts.

Pattern arrangements can be applied to new EMB designs or added to existing designs. Pattern arrangements in EmbroideryStudio split the design into color blocks which are then arranged into logical parts, Part A is usually one color block, Part B a second color block, and Part C a third color block. Normally, for both lacework and emblems, Color 1 is Part A, Color 2 is Part B, and so on, for each part of the design. However, it is possible to group several color blocks into one part if this is required for RCC designs.



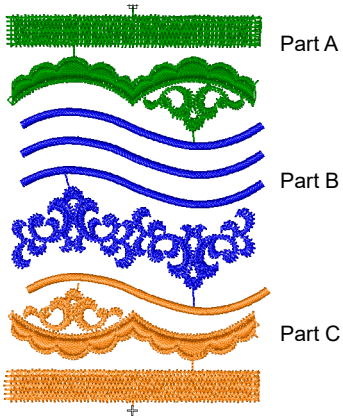
For lacework, the number of rows is normally one for A and C, with multiple rows for B. For emblems, the number of rows is usually the same for each part.

Caution: Only set up the pattern arrangement **after** the design elements have been finalized. Otherwise the pattern arrangement can become 'out-of-sync' with its design. If the arrangement is out-of-sync, ES Schiffli reverts to a default arrangement. This means that each color block is defined as a separate part with each repetition separated by a Pause

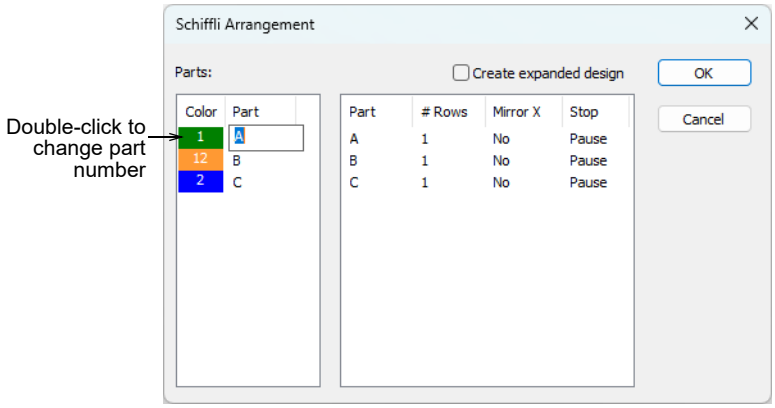
function. The default arrangement displays the whole design in one color and has minimal effect on the design data.

To apply pattern arrangements to a new design...

1 Digitize all parts of the new design as a single EMB file, applying a different color to each part.



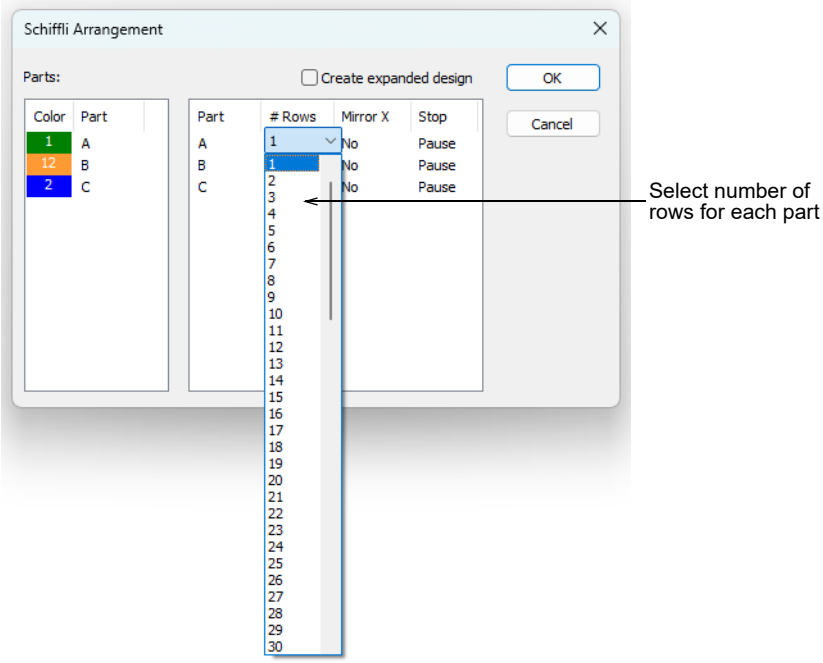
2 Click the **Schiffli Arrangement** icon on the **Schiffli** toolbar. The **Schiffli Arrangement** dialog opens showing colors as they occur in the design.



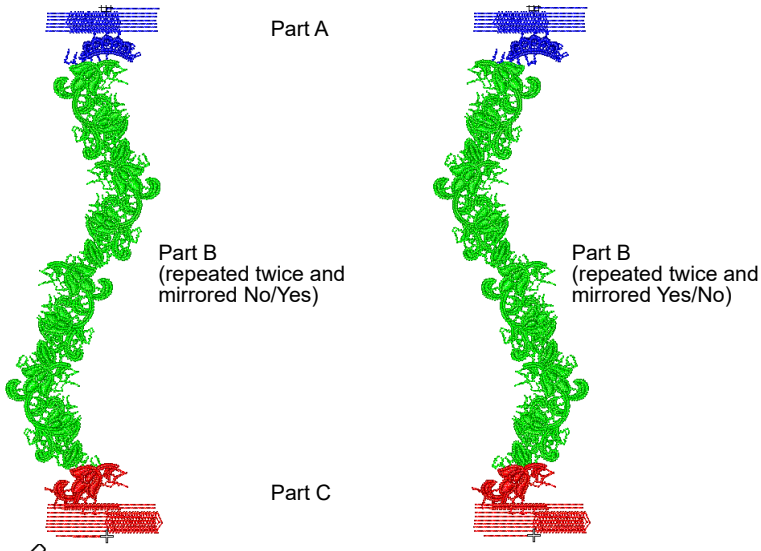
3 In the **Parts** panel, assign new part numbers as required. Double-click to enable cursor.

Tip: A color block can only be in one part of the arrangement. To re-use it later, duplicate it as a separate color block. For RCC designs, you can allocate more than one color to a part.

4 In the arrangement parameters panel, **# Rows** column, select the number of times you want to stitch this part of the design.



5 In the arrangement parameters panel, **Mirror X** column, select how you want to mirror this part of the design.



Note: Each arrangement part, or row within a part, is attached to the end point of the previous one. If a part's end point does not finish directly below its start point, the repeat patterns will shift over multiple rows (unless you mirror them alternately).

6 In the arrangement parameters panel, **Stop** column, select the required machine function for the last row of each part. For example:

Function	Purpose
Stop	The machine will stop when it finishes the last row.
Pause	The machine will stop conditionally when it finishes the last row. This means that the machine will stop only if the machine operator has enabled Stop on Pause.
No	The machine will automatically continue stitching between rows.

7 Select the **Create expanded design** checkbox if you are going to save the design as a machine format that does not read pattern arrangement files – e.g. DAT.

8 Save the design.

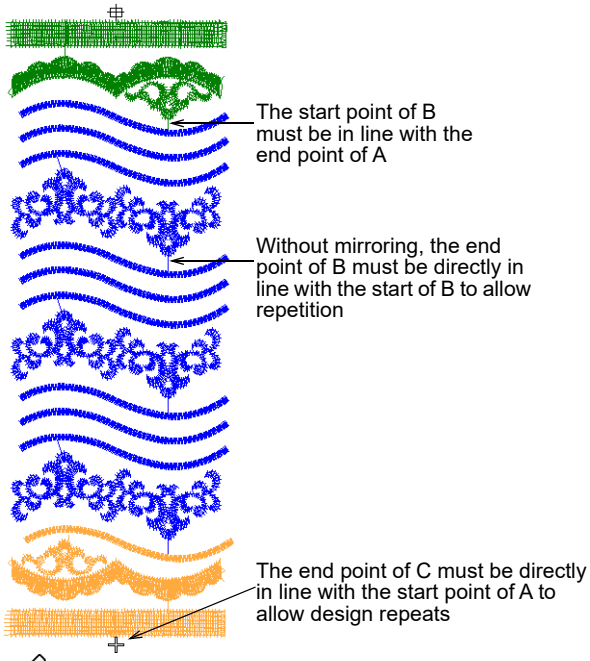
Tip: You can also manually select the parts and save them as separate files.

Related topics...

- Align parts in machine files
- View pattern arrangements in expanded designs
- Save pattern arrangements

Align parts in machine files

When creating the machine file it is important that the start and end points for each part are correctly aligned. The parts must be carefully designed so the start and end points of each color match up correctly or the design registration will not be correct. The first stitch in a row of an arrangement should start at the XY location of the last stitch of the previous row.



Note: If you want to mirror Part B, the start point should be at the top-center and the end point should be at the bottom-center.

Combine split designs into a single file

Use Standard > Options to access application options for design view, grid & guides, and other settings.

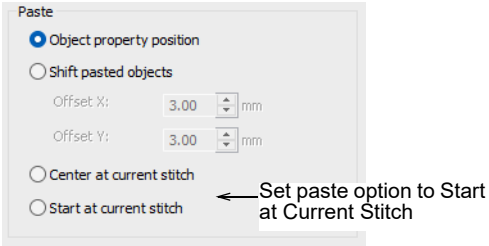
Click Standard > Import Embroidery to import embroidery design file into current design.

Use Schiffli > Schiffli Arrangement to split designs into color blocks arranged into logical parts.

If you open a design which has been split into separate files for each ABC part, you can combine it into one EMB file using pattern arrangements.

To combine split designs into a single file...

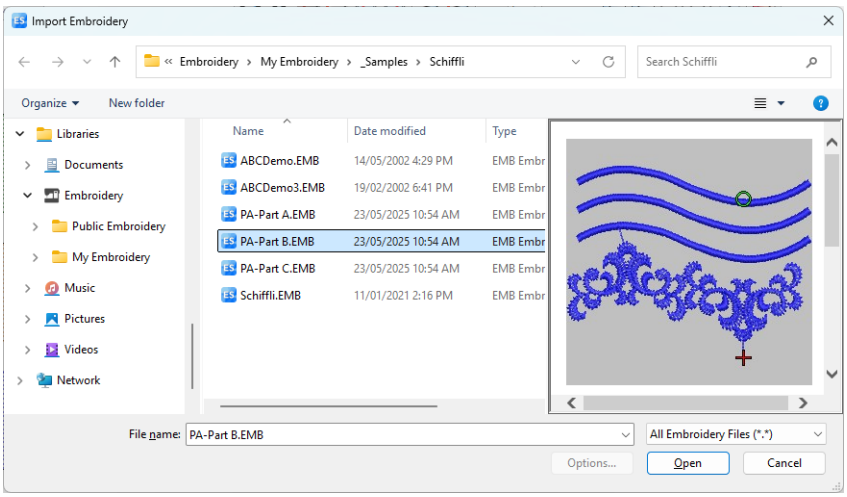
1 Click the **Options** icon on the **Standard** toolbar. Select the **Options > Edit** tab.



2 Select **Start at current stitch** in the **Paste** panel. This means inserted components are pasted at the current stitch.

3 Open the design file you want to comprise Part A.

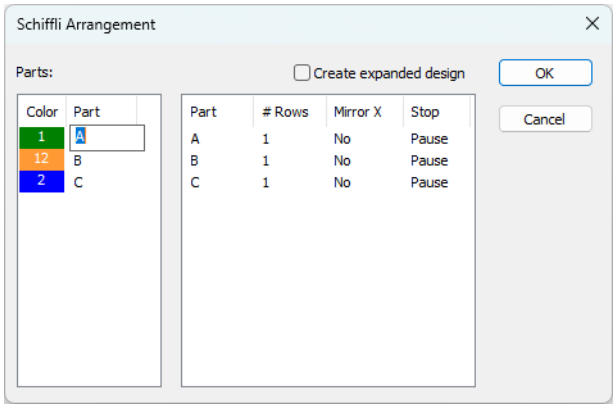
4 Click the **Import Embroidery** icon on the **Standard** toolbar. The **Import Embroidery** dialog opens.



5 Open the design file you want to comprise Part B. The second design file will be inserted at the last stitch of Part A. Change the color as required.

6 Repeat for Part C.

7 Click the **Schiffli Arrangement** icon on the **Schiffli** toolbar. The **Schiffli Arrangement** dialog opens showing colors as they occur in the design.



8 Assign the parts of the combined design.
9 Save the combined design as an EMB file.

Related topics...

- Apply pattern arrangements

Save pattern arrangements

Pattern arrangements can be saved as EMB, ESS or Hiraoka VEP file format. Save expanded designs independently as an EMB, ESS, DAT, SAS or other machine format file.

Note: Expanded designs can also be saved in an EMB template file with its own default values.

To save pattern arrangements...

1 Open a design or designs with separate pattern arrangement files.
2 Assign the pattern arrangements to the design.
3 Select **File > Save As**.
   - Save non-expanded designs as EMB, ESS or VEP.
   - Save expanded files as EMB, DAT or SAS.

   Note: Save as ESS file to transfer the design to machine via WESS.

Related topics...

- Functions, Files & Disk Types
- Apply pattern arrangements
- Combine split designs into a single file

View pattern arrangements in expanded designs

Use Schiffli > Schiffli Arrangement to split designs into color blocks arranged into logical parts.

Normally the pattern arrangements in your design are not shown on screen. If you need to see them, create an expanded design. This displays the design in a separate window where all parts are shown. You can use this expanded design as a preview of the expanded arrangement and then delete it or save it as required. The design can also be viewed in design repeats or printed with pattern arrangements on.

Note: The arrangement parameters are not saved in the expanded design but are saved with the original design.

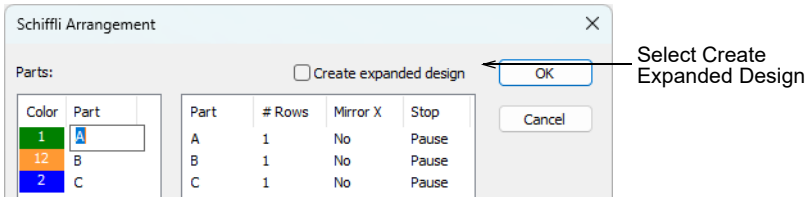
To view pattern arrangements in an expanded design...

1 Open a design or designs with separate arrangement files.

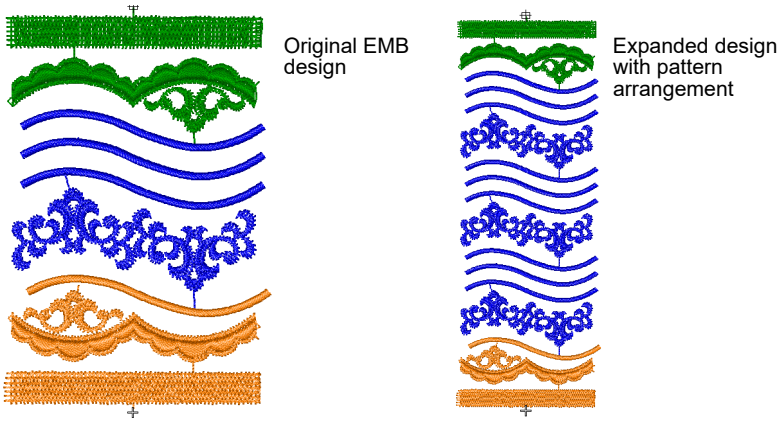
2 Click the **Schiffli Arrangement** icon on the **Schiffli** toolbar. The **Schiffli Arrangement** dialog opens showing colors as they occur in the design.

3 Assign the pattern arrangements to the design.

4 Select the **Create expanded design** checkbox.



5 Click **OK**.

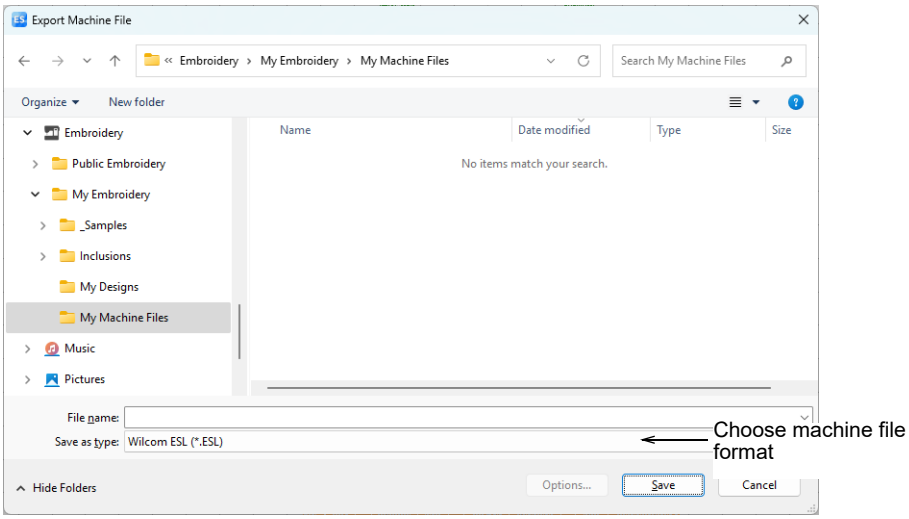


The expanded design opens in another window. For each part, the stitches are copied to the new design as a single manual object with rows, mirroring and stops indicated.

Note: If an arrangement is expanded, the color change/stop between rows is removed in EMB and ESS files.

6 Save the original design as the master copy.

7 Export the expanded design as ESL, DAT, SAS or other machine format file.



Related topics...

- View pattern arrangements with repeats
- Apply pattern arrangements

View pattern arrangements with repeats

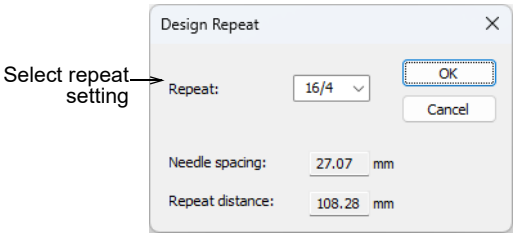
Use View > Show Repeats to view Schiffli designs with any number of repeats. Right-click to adjust settings.

Designs with pattern arrangements can be viewed together with design repeats.

To view pattern arrangements with repeats...

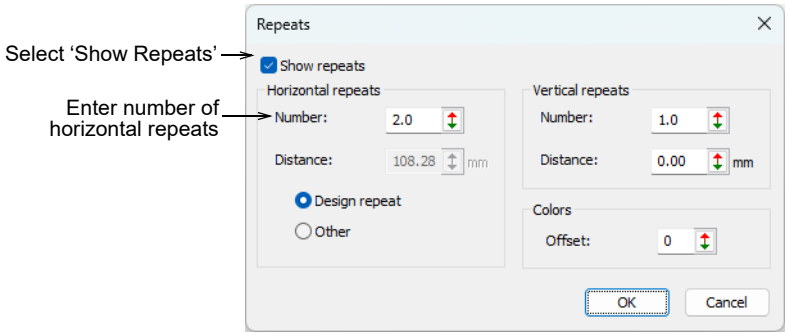
1 Open an expanded design.

2 Select **Design > Design Repeat**. The **Design Repeat** dialog opens.



3 Define the repeat options as required.

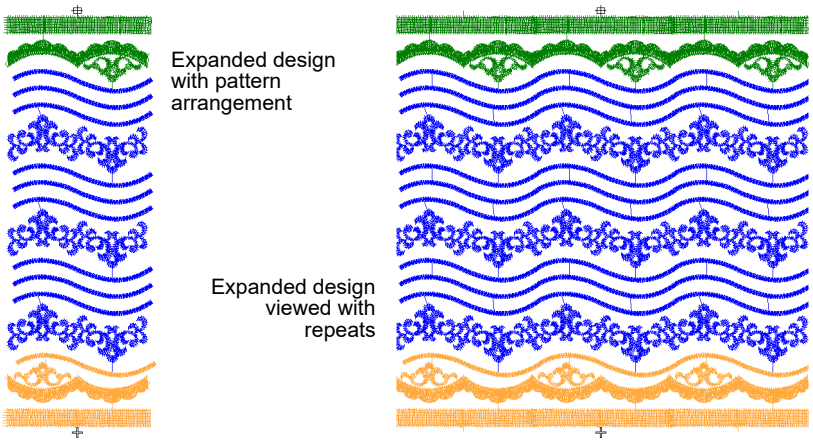
4 Press the keyboard shortcut **W** to access the **Repeats** dialog.



5 Select the **Show Repeats** checkbox to activate the feature.

6 Enter the required number of repeats in the **Number** field.

7 Click **OK**.



Related topics...

- Number of design repeats
- Define design repeats
- View design repeats on screen

Rename thread code labels for printing

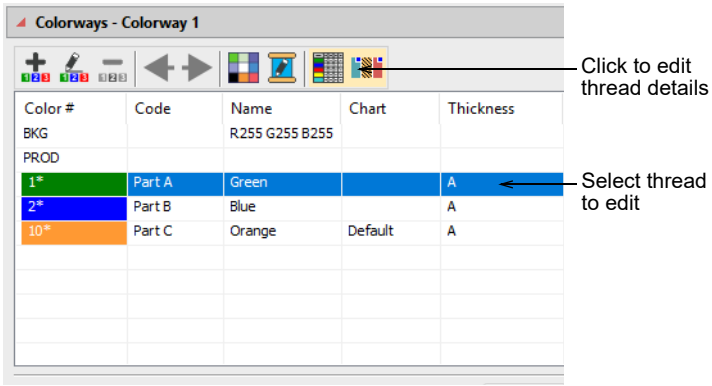
Use Color > Colorway Editor to modify threads in existing charts.

Use Color > My Threads to modify thread information about the palette color currently selected in the colorway list.

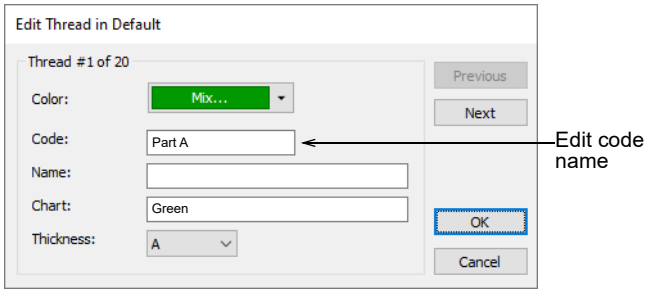
You can change the text labels of the thread colors to Parts A, B and C to reflect the pattern arrangements when printing. These labels appear on the production worksheet both in the stop sequence, and color film printout which shows the different color blocks of the original design.

To rename thread code labels for printing...

1 Click the **Colorway Editor** icon. The **Colorway Editor** docker opens.

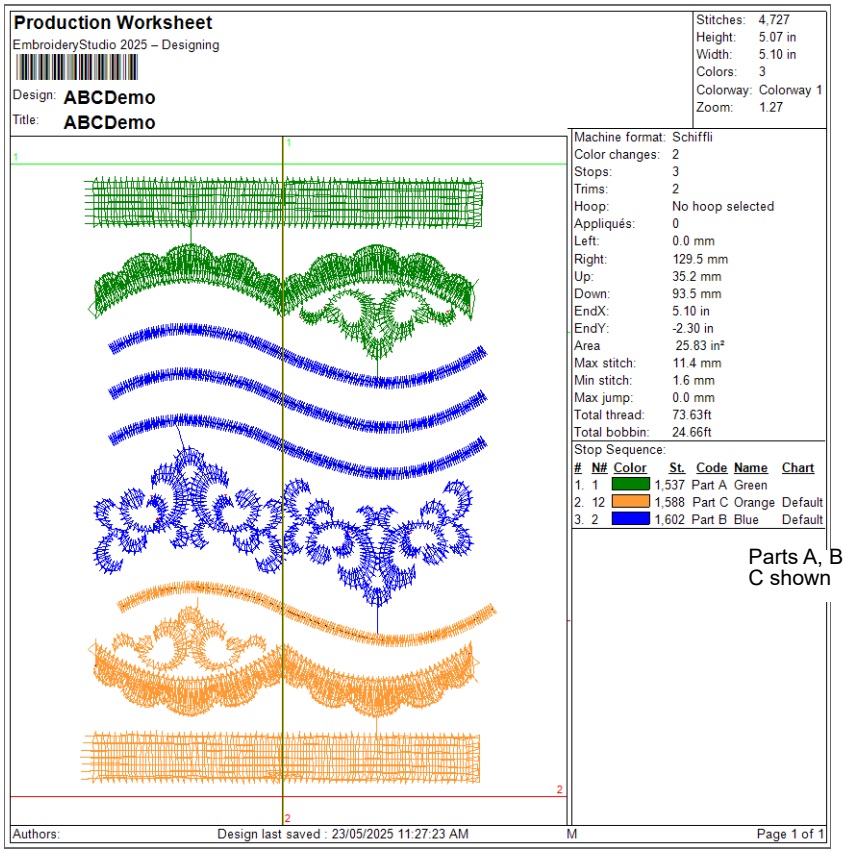


2 Select and double-click a code name. The **Edit Thread** dialog opens.



3 Edit the **Code** field as required.

4 Click **OK**. Thread codes display as Parts A, B and C.



Production Worksheet

EmbroideryStudio 2025 – Designing

Design: **ABCDemo**

Title: **ABCDemo**

Stitches:	4,727
Height:	5.07 in
Width:	5.10 in
Colors:	3
Colorway:	Colorway 1
Zoom:	1.27

Machine format:	Schiffli
Color changes:	2
Stops:	3
Trims:	2
Hoop:	No hoop selected
Appliqués:	0
Left:	0.0 mm
Right:	129.5 mm
Up:	35.2 mm
Down:	93.5 mm
EndX:	5.10 in
EndY:	-2.30 in
Area	25.83 in²
Max stitch:	11.4 mm
Min stitch:	1.6 mm
Max jump:	0.0 mm
Total thread:	73.63ft
Total bobbin:	24.66ft

Stop Sequence:

#	N#	Color	St.	Code	Name	Chart
1.	1		1,537	Part A	Green	
2.	12		1,588	Part C	Orange	Default
3.	2		1,602	Part B	Blue	Default

Parts A, B and C shown

Authors: Design last saved : 23/05/2025 11:27:23 AM M Page 1 of 1

Chapter 4

Machine Functions

Like stitches, many logical machine functions are inserted automatically whenever you select commands or specify object properties. They are stored with the embroidery object in the native EMB design file and updated whenever the object is modified. You can edit individual stitches as required. EmbroideryStudio also lets you manually insert machine functions and modify them. This flexibility allows you to adapt designs to almost any machine requirement. See Stitches & Machine Functions (Reference Manual).

Schiffli designs created in EmbroideryStudio can be edited freely. You can insert or delete parts of the design and move or rotate objects as you can for multihead designs. Logical functions preserve their correct positions. Offsets are also handled independently. For example, rotating an object with borer functions will not affect the frame offset. After encoding, it will still stay vertical. Of course you would need to consider if such rotation is feasible from the Schiffli design point of view as in most cases such a move would require a different stitching sequence as well. See Embroidery Digitizing (Reference Manual).

Note: Ex-Wilcom CED users will find the use of EmbroideryStudio functions very similar. However, the logic of the software is very different at a foundation level. EmbroideryStudio software is a lot more automated

and you need to learn to focus not on individual stitches but on the design as a whole. Editing too is a lot easier than in earlier versions.

This section deals with supported Schiffli machine functions as well as the insertion and display of machine functions.

Schiffli machine functions

ES Schiffli makes a distinction between 'logical' and 'physical' machine functions. The logical machine function is what you, the digitizer, want to perform – for example, color change, or start/stop boring. This concept may be new to Schiffli designers who are used to working on a stitch-by-stitch basis.

Logical functions are saved as 'object properties' in the native EMB design file. EMB files can be output in a wide variety of Schiffli formats. ES Schiffli automatically generates the required physical functions by interpreting the logical functions. When outputting the final machine code for Plauen or Saurer type machines, ES Schiffli makes sure that the physical functions occur on the right stitch and in the right phase (for Plauen), based on preset values (defaults). You can change these defaults to suit your particular needs when outputting the design. See Outputting Schiffli design files for details.

Users with sufficient experience can check the physical machine functions one-by-one in the final machine file by using the ES Schiffli **FIXPAT** utility. This allows you to check the stitching sequence and insert any unsupported or non-standard functions. See also Checking stitches & machine functions on Jacquard cards (Supplement).

Note: Some functions may appear as both 'logical' and 'physical' depending on the particular machine. For example, 'Borer In/Out' may be an actual physical function on one machine but may need to be encoded as a number of physical functions on another.

Frequently used machine functions

Frequently used user-selectable functions supported by ES Schiffli include:

- Stepp/Blatt
- Begin Jump/End Jump
- Fast/Slow
- Borer In/Out
- Borer Depth
- Drop Sequin

Stepp/Blatt functions

	Use Schiffli > Stepp to increase thread tension.
	Use Schiffli > Blatt to reduce thread tension.

Tension control depends on stitch length. It also depends on the machine, fabric, and even stitch direction, but generally the threshold value between Stepp and Blatt functions is around 2.3 – 2.6mm. Thus when you digitize stitches smaller than this threshold value, you need to be in normal tension mode (Stepp). If the stitch becomes longer than this, you need to switch to loose tension by inserting a Blatt function in order to avoid thread or needle breakage. Conversely, if you are digitizing in Blatt mode and stitches become smaller than the threshold value, you must insert a Stepp function to avoid stitch puckering or looping. In EmbroideryStudio, Stepp/Blatt functions can be displayed in two colors.

In addition to the Blatt function, some machines use Fadenleiter for even finer tension adjustment. ES Schiffli provides support for this. See Machine-specific functions for details.

Note: SPES users should note that EmbroideryStudio does not currently insert the tension and speed changes automatically based on the stitch length.

Begin/End Jump function

	Use Schiffli > Begin Jump to insert a command which causes the active tool (needle or borer) to be pulled out.
	Use Schiffli > End Jump to insert a command which causes the active tool (needle or borer) to be pushed in, thereby penetrating the fabric.
	Use Function > Penetrations to activate needle or borer penetrations.
	Use Function > Borers in conjunction with Penetrations to activate borers.

ES Schiffli automatically handles needle or borer penetrations as part of 'object properties'. You control Begin and End Jumps by means of the **Penetrations** tool. This means that:

- for normal stitching, Penetrations must be active
- for boring, Penetrations and Borers must be active
- for jumps, Penetrations must be inactive.

Begin/End Jump functions instruct the current tool (needle or borer) to stop or start penetrating. If you need additional Begin/End Jump functions, you can insert them manually. Begin Jump applies both to stitching and boring and enables traveling to a point in the design without penetrations. Remember to insert an End Jump function to instruct the machine to resume normal stitching.

Note: In ES Schiffli, Begin/End Jump functions were previously called Needle Out/In. Depending on the selected penetrating device, they may be encoded on output as either Needle Out/In or Borer Out/In physical functions. Schiffli machines do not have a **Jump Stitch** mechanism – the frame moves with neither borers nor needles active.

Fast/Slow functions

	Use Schiffli > Fast to insert a command to increase machine speed.
	Use Schiffli > Slow to insert a command to decrease machine speed.

In principle, Schiffli designs will be stitched in fast speed to achieve maximum production. ES Schiffli always sets the initial speed to 'fast'. You only need to insert Slow functions for particular stitch effects, stitching on delicate fabrics, or when using special devices such as sequins. Like Needle In/Out, ES Schiffli automatically inserts Slow/Fast speed functions in design locations required by the target machine (as specified in the conversion settings). Any difference in machine starting speeds is automatically handled on output. See Outputting Schiffli design files for details.

Borer In/Out functions

	Use Schiffli > Borer In to insert a command to cause the borer attachment to be lowered so that it penetrates the fabric.
	Use Schiffli > Borer Out to insert a command which causes the borer attachment to be raised.

Borer In/Out functions are available for embroidery machines equipped with a borer. They instruct the machine when to use the boring knife or tool instead of a needle. You can insert these functions using the Borers tool. It is common to use sequences of empty stitches with functions like fast and slow and borer depth separated from each other only by these empty stitches. After Borer Out, the Needle will return to the last stitch position before the Borer In.

Note: ES Schiffli shows stitching, not frame movements, so EmbroideryStudio will not show borer offset. You can only edit/view the borer-offset compensation stitches in a separate editor such as FIXPAT. See also Edit stitches with FIXPAT (Supplement).

Borer Depth function

Use Schiffli > Borer Depth to set the depth of the borer attachment which controls how large a hole the borer makes. Valid Borer Depths are 1 through 13 for Plauen and 0 to 12 for Saurer.

Borer depth is relevant only to designs digitized using ES Schiffli. The Borer Depth function is selected and defined as an absolute value. On the machine, the depth is changed by increments from the current position. The increments necessary to achieve the required borer depth are automatically calculated by ES Schiffli and distributed on stitches before the required point. See Schiffli boring for details.

Drop Sequin function

Use Schiffli > Drop Sequin to insert a command which causes a sequin to be dropped.

A **Drop Sequin** function is available for embroidery machines equipped with a sequin dispenser. This function instructs the machine to drop a sequin on the fabric for stitching. See also **Sequins and Boring** in the Reference Manual.

When outputting Schiffli machine files, ES Schiffli provides the three most frequently used physical functions to activate the sequin device:

- Borer Depth (BR)
- Fadenleiter (TNS)
- Schnur(Cord) (SCH).

When reading Schiffli designs, if the sequin function is set to something other than **None**, all instances of the selected physical function are converted to the ES Schiffli **Drop Sequin** function. See also Reading & Outputting Designs.

Other machine functions

Other user-selectable functions supported by ES Schiffli include:

- Stop
- Color Change
- Jump(M)

- Empty/Empty Jump
- Trim.

Stop function

The software automatically inserts a **Stop** code at the end of an object if accompanied by a color change. It is generally not explicitly inserted otherwise the Schiffli **Arrangement** feature will not work. However, if you want the embroidery machine to stop for any special reason during stitching, you can manually insert a **Stop** function in the stitching sequence. If you normally select **Stop** functions to change colors, refer to Color Change function.

Tip: Because a **Stop** function may be inserted for various reasons, you should record its purpose on the production worksheet to assist the machine operator.

Color Change function

Schiffli machines with automatic color changes have specific mechanisms and color change procedures which are different to multihead machines. Color Change functions tell the Schiffli machine to move the frame under the next selected needle. They are automatically inserted when you select a new color from the color palette. You only need to insert manual color change functions if you cannot recolor using the standard method. Color change should be used for both manual re-threading of color change and machines with automatic (RCC) color change. See also Digitizing for RCC Designs.

Jump(M) function

Jump(M) functions cause frame movements without needle penetrations and are used to move smoothly from one part of a design to another. Insert Jump(M) functions manually in order to digitize individual jumps or create jump connectors. When digitizing with the **Manual** input method, you can create jumps manually by right-clicking as you digitize. See Digitize stitches (Reference Manual).

Note: There are also Begin Jump and End Jump functions as the closest EmbroideryStudio equivalents to the Schiffli Needles In and Needles Out functions. See Begin/End Jump function for details.

Empty Stitch/Jump function

Empty stitch is a tight (zero length) lockstitch used together with, or as an alternative to, tie-in and tie-off stitches. In Schiffli designs, empty stitches are often used in boring to make multiple penetrations. The

Empty Jump function instructs the machine to make a single zero-length stitch without needle penetration (jump). This may be used as a marker in the machine file. The **Travel by Function** tool recognizes and stops on Empty Stitch/Jump functions. See Machine functions (Reference Manual).

Tip: The Jump function can be inserted on an Empty Stitch as well as a normal stitch. As an alternative, multiple Empty Jumps can be inserted directly, without having to insert an Empty Stitch first.

Trim function

The ES Schiffli **Trim** function has two main uses – trimming threads on Schiffli machines equipped with trimmers, and for viewing TrueView™ samples of the final embroidery. In ES Schiffli, jump stitches are assumed to be present only for stitches that will be trimmed. To hide them in TrueView™ display, they must be encoded as Trims. By so doing, you obtain a realistic view of the design as it would appear after manual trimming. If the output format does not include a Trim code, the function is ignored.

Note: Saurer machines, some of which have trimmers, are supported indirectly via SHC (*.PAT). Any movements without stitching can be trimmed according to the user settings on the machine.

Related topics...

- Trimming control
- Trim function encoding

Machine-specific functions

ES Schiffli supports fine tension and speed changes, as well as special devices like Cord and Sequin for specific machines. These functions can be output to disk or tape, and are preserved when read into EmbroideryStudio. Machine-specific functions directly supported by ES Schiffli include:

- Fadenleiter Plus/Minus
- Thread Brake Plus/Minus
- Boring Tension Start/End
- Pause
- RPM Plus/Minus
- Stuepfel In/Out

- Cord In/Out
- Festoon In/Out

Note: For details of the machine types to which each function relates, see the table Machine-specific functions.

Fadenleiter functions

	Use Schiffli > Fadenleiter Plus to instruct the machine to increase the Fadenleiter stroke one increment.
	Use Schiffli > Fadenleiter Minus to instruct the machine to decrease the Fadenleiter stroke one increment.

Fadenleiter Plus/Minus functions instruct the machine to increase or decrease the Fadenleiter stroke one increment. This means increasing or decreasing thread feed where sections become wider or narrower.

Thread Brake functions

	Use Schiffli > Thread Brake Plus to insert a command to increase the application of the thread brake.
	Use Schiffli > Thread Brake Minus to insert a command to decrease the application of the thread brake.

Thread Brake Plus/Minus functions instruct the machine when to increase or decrease tension one increment by Thread Brake.

Boring Tension functions

Start /End Boring Tension functions instruct servo thread machines to feed less thread for stitching in boring holes. For Hiraoka TNS Ein, it overrides/restores Stepp/Blatt tension.

Pause function

The Pause function is usually a conditional Stop on Empty. It is interpreted by the machine according to the machine operator preferences.

RPM functions

	Use Schiffli > RPM Plus to insert a command to increase the turning speed of the machine.
	Use Schiffli > RPM Minus to insert a command to decrease the turning speed of the machine.

RPM Plus/Minus functions instruct the machine to increase or decrease machine speed in increments from current or normal.

Stuepfel functions

Stuepfel In/Out functions instruct the machine when to switch to the Stuepfel device from the borer. Borer In engages both the borer and the Stuepfel.

Cord functions

Cord In/Out functions tell the machine to engage or disengage the cord device.

Festoon functions

Festoon In/Out functions instruct the machine to engage or disengage the festoon device.

Thread Roller functions

Thread Roller Plus/Minus functions instruct the machine when to increase or decrease tension one increment by Thread Roller Feed (2S-55 RCC). Currently this function is not output by ES Schiffli.

Indirectly supported functions

ES Schiffli indirectly supports Saurer Clutch In/Out (when used with Borers). An indirectly supported function means that, although you cannot select the function in EmbroideryStudio, the software automatically inserts it as part of a logical function.

Inserting machine functions

Machine functions can be inserted via commands or object properties. They can also be inserted manually via the **Schiffli** toolbar or **Insert Function** dialog or by means of shortcut keys. Machine functions are stored with their corresponding embroidery object and updated whenever the object is modified. A major difference between multihead and Schiffli digitizing is that, in various parts of Schiffli objects, you need to manually insert Tension and sometimes Speed Change codes based on stitch length.

Caution: Stitches or machine functions which are manually inserted into non-manual objects – e.g. Column A, Complex Fill, etc – need to be maintained manually. If an object's stitches are regenerated for any reason, stitch edits are lost. Machine functions may be moved to another

point in the stitch sequence. With manual objects, this is not a problem – function and stitch edits are always preserved.

Because of the 'all-in-one' file structure of EmbroideryStudio, digitizing and editing can be combined at any time during the digitizing process. You can therefore choose to digitize without stopping to insert machine functions. When finishing a larger part or even the whole design, you can then quickly browse through and insert the necessary functions. All machine functions can be inserted the old way – i.e. digitize, insert function, digitize, insert function – but you will find that, compared to the recommended method, this is much slower.

Function states in ES Schiffli

To correctly insert or delete functions appropriate to the stitching effect, you need to be aware of the machine state at the insertion point.
ES Schiffli only checks commonly used functions. For example, it does not check for possible user errors such as inserting multiple Slow functions one after the other, or **not** inserting the required number of Fadenleiter functions.

Note: When outputting designs to specific Schiffli file formats, however, ES Schiffli performs some checks, for example, to prevent functions like Stepp/Blatt being output in Plauen format when the needles are out.

Insert common functions via the toolbar

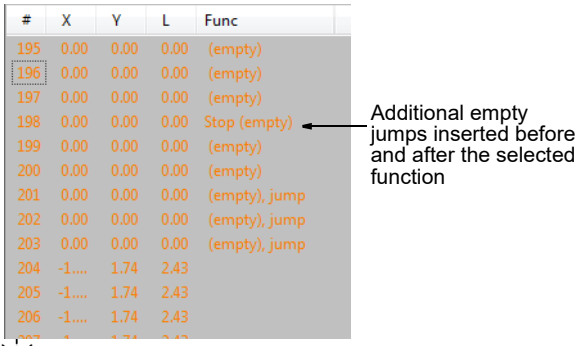
Use Function > Clear Function to remove all functions at the current stitch position.

Insert commonly used machine functions manually via the **Schiffli** toolbar or by means of shortcut keys. The tools can be used for stitch-by-stitch digitizing and for placing fine-tuning functions after digitizing. They are often more convenient than changing object properties when editing 'imported stitches' type designs with unrecognized manual objects. See also Machine function selection method summary.

To insert common functions via the toolbar...

1 Travel to the position in the design where you want to insert the machine function.

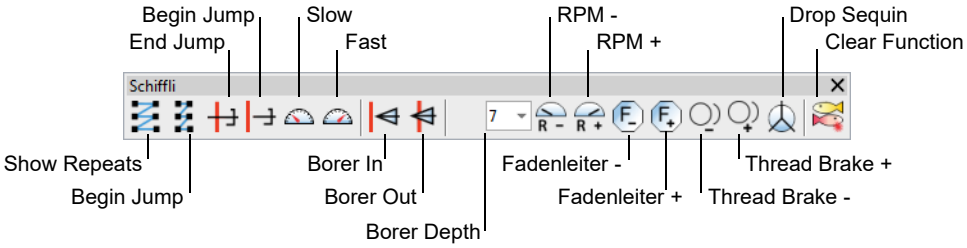
Tip: Use the **Stitch List** to view stitch position coordinates and function information – e.g. whether the stitch is a Jump. It also shows the length of every stitch in the design.



#	X	Y	L	Func
195	0.00	0.00	0.00	(empty)
196	0.00	0.00	0.00	(empty)
197	0.00	0.00	0.00	(empty)
198	0.00	0.00	0.00	Stop (empty)
199	0.00	0.00	0.00	(empty)
200	0.00	0.00	0.00	(empty)
201	0.00	0.00	0.00	(empty), jump
202	0.00	0.00	0.00	(empty), jump
203	0.00	0.00	0.00	(empty), jump
204	-1....	1.74	2.43	
205	-1....	1.74	2.43	
206	-1....	1.74	2.43	

Tip: The **Stitch List** provides an alternative means for inserting machine functions manually. See Insert machine functions with Stitch List for details.

2 Travel to the position in the design where you want to insert the machine function.



3 From the **Schiffli** toolbar, select the function you want to insert. See Schiffli machine functions for details.

With some functions you can choose whether to insert on the current stitch or on an empty stitch.

4 To insert additional Empty Stitches or Jumps, use the **Empty Function** tool on the **Pointer** toolbar. See Machine functions (Reference Manual).

5 To clear a function, select it and click the **Clear Function** icon.

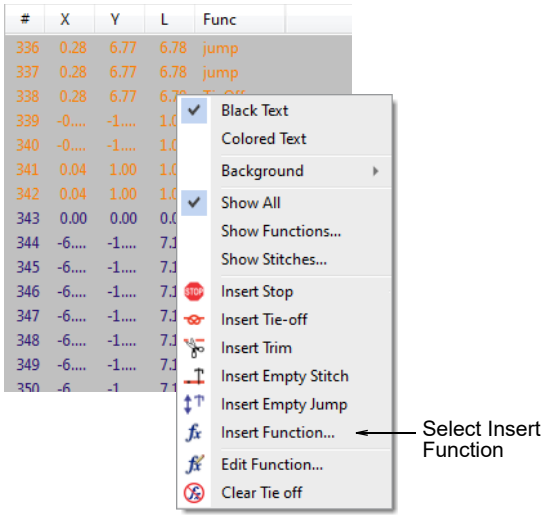
Insert machine functions via the dialog

Insert machine functions manually via the **Insert Function** dialog. Depending on your machine's requirements, you will either add the function to the current stitch, or insert it on an empty stitch or empty jump. For some machines you will also need to add empty stitches or empty jumps on either side of some functions. See your machine manual for details.

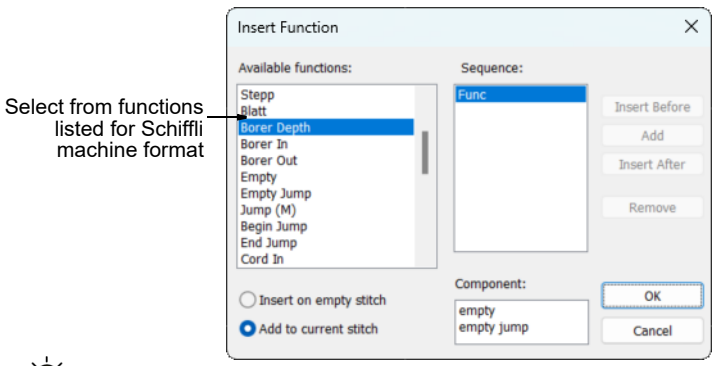
Note: For Schiffli work, you need to use the ES Schiffli template. This template sets the machine format to Schiffli and also turns off all the automatic connector settings. See Schiffli Basics for details.

To insert machine functions via the dialog...

1 Open the **Stitch List** and locate the position in the stitching sequence where you want to insert the machine function. Alternatively, use the travel functions to locate the insertion point. The function name appears in the **Prompt Bar**.



2 Right-click the stitch and select **Insert Function** from the popup menu. Alternatively, click the **Insert Function** icon or select **Function > Insert Function**.



Tip: It is faster to digitize individual jumps – Jump(M) – by right-clicking with the **Manual** input method selected. If you want the whole object to consist of jumps, deselect the **Penetrations** icon.

3 From the **Available Functions** list, select the function you want to insert. With some functions you can choose whether to insert on the current stitch or on an empty stitch.

4 If available, choose the insertion method:

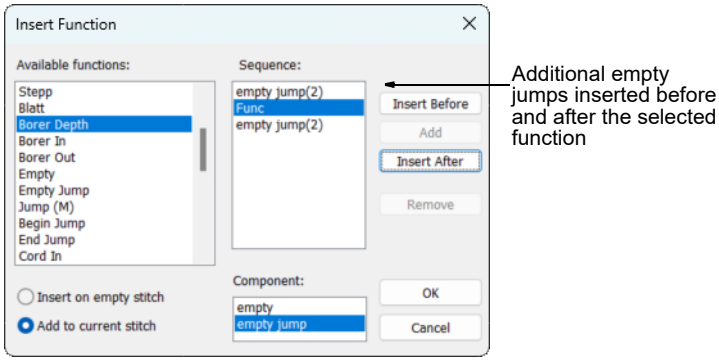
Function	Purpose
Insert on empty stitch	Inserts the selected function on an empty stitch.
Add to current stitch	Inserts the selected function on the current stitch.

Depending on your machine, you may need to insert additional empty stitches or empty jumps before or after the selected function. For example, before a particular Stop function, you may want to insert a number of empty jumps. See your machine manual for details.

5 To insert additional empty stitches or empty jumps, select one or other in the **Component** field.

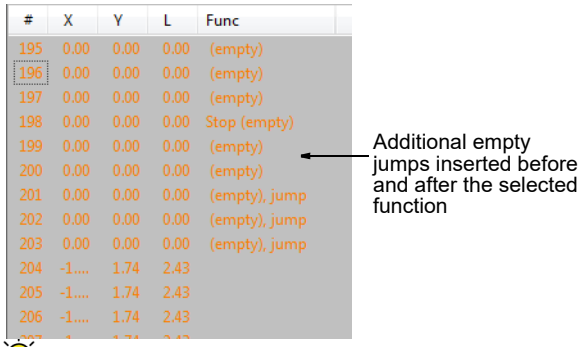
- Select **Insert Before** if you want the empty stitch/jump to precede the selected function.
- Select **Insert After** if you want the empty stitch/jump to follow the selected function.

To insert multiple empty stitches or jumps, click **Add**.



The selected function, together with any additional empty stitches or jumps, appears in the **Sequence** panel.

6 Click **OK**. The selected function, together with any additional empty stitches or jumps, is added at the current needle position.



#	X	Y	L	Func
195	0.00	0.00	0.00	(empty)
196	0.00	0.00	0.00	(empty)
197	0.00	0.00	0.00	(empty)
198	0.00	0.00	0.00	Stop (empty)
199	0.00	0.00	0.00	(empty)
200	0.00	0.00	0.00	(empty)
201	0.00	0.00	0.00	(empty), jump
202	0.00	0.00	0.00	(empty), jump
203	0.00	0.00	0.00	(empty), jump
204	-1....	1.74	2.43	
205	-1....	1.74	2.43	
206	-1....	1.74	2.43	

Tip: The Stitch List provides an alternative means for inserting machine functions manually. See Insert machine functions with Stitch List for details.

Insert machine functions with Stitch List

Use Docker > Stitch List to insert machine functions directly into the stitching sequence.

You can use the Stitch List to access the **Insert Function** dialog. This provides a convenient means for inserting machine functions manually into the stitching sequence.

To insert machine functions with Stitch List...

1. Open the **Stitch List**.
2. Locate the position in the stitching sequence where you want to insert the machine function.
3. Right-click the stitch in the Stitch List and select **Insert Function** from the popup menu.
4. From the **Available Functions** list, select the function you want to insert.

   See Insert machine functions via the dialog for details.
5. Click **OK**. The name of the inserted function appears in the **Prompt Bar**.

Machine function selection method summary

The table below summarizes the general functions that **ES Schiffli** supports together with the available selection methods.

Function	Hotkey	Tool	Menu	Tablet	Button
Stepp (normal tension)	]		Function > Insert Function		1
Blatt (loose tension)	[		Function > Insert Function		1
Jump (M)	Right-click in Manual mode		Function > Insert Function		
Borer In			Function > Insert Function		1
Borer Out			Function > Insert Function		4
Borer Depth	;	7	Function > Insert Function		2
Stop			Function > Insert Function	Stop	1
Begin Jump			Function > Insert Function		4
End Jump			Function > Insert Function		1
Fast			Function > Insert Function		1
Slow			Function > Insert Function		1
Empty Stitch			Function > Insert Function		
Empty Jump			Function > Insert Function		
Drop Sequin			Select Sequin, then right-click in Manual.	Drop Sequin	
Color Change			Function > Insert Function		1
Trim (optional output)			Function > Insert Function		

Machine-specific function selection method summary

Schiffli machine-specific functions have a direct mapping to the actual functions of the selected machine type, for example Fadenleiter. The table below summarizes the machine-specific functions that the **ES Schiffli** supports together with available selection methods.

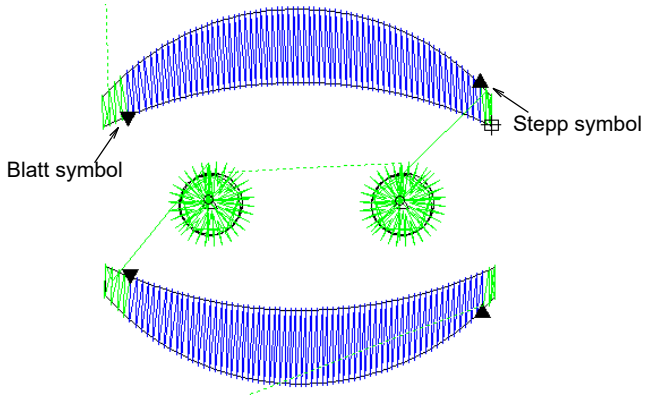
Schiffli function	Hotkey	Toolbar	Menu
Fadenleiter Plus	>		Function > Insert Function
Fadenleiter Minus	<		Function > Insert Function
Thread Brake Plus			Function > Insert Function
Thread Brake Minus			Function > Insert Function
Boring Tension Start/End	/ \		Function > Insert Function
Pause			Function > Insert Function
RPM Plus	:		Function > Insert Function
RPM Minus	"		Function > Insert Function
Stuepfel In/Out			Function > Insert Function
Cord In/Out			Function > Insert Function
Festoon In/Out			Function > Insert Function

Displaying machine functions

The **View** menu includes a **View by Machine Functions** option. This option enables **Stepp/Blatt** and **Schiffli Needle In/Out**.

Display Stepp/Blatt functions

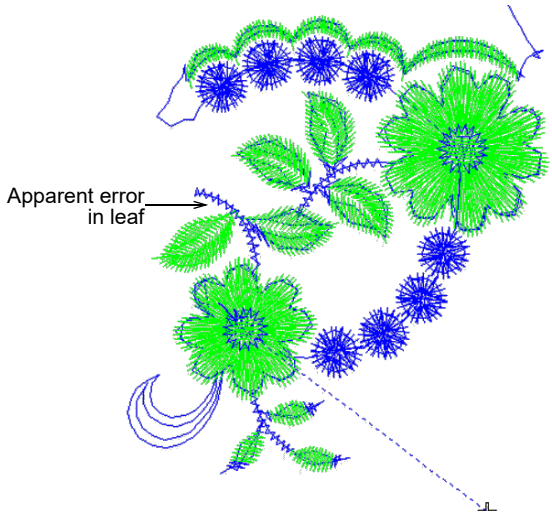
The old CED symbols are used in EmbroideryStudio for Stepp and Blatt functions so that they are easier to recognize. To distinguish them from the Trim symbol (a hollow triangle), the Stepp and Blatt triangles are solid black. In addition to function symbols, tension changes are highlighted by showing stitches in different colors.



Each of these solutions has different advantages. The triangles can be printed on the worksheet, whereas the color coding of the stitches makes it easy to check and edit the design on the screen.

Check for Stepp/Blatt digitizing errors

The Stepp/Blatt display helps you locate digitizing errors quickly. On standard machines, Stepp and Blatt are possible only with Penetrations On stitching, so Penetrations Off stitches are shown as a dotted line. The sample design below, for example, appears to have an error in the leaf (left center).



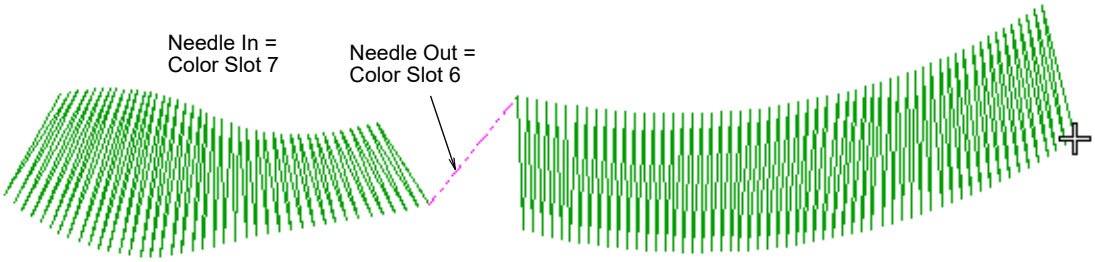
To check for Stepp/Blatt digitizing errors...

- Press Shift + [to activate the Stepp/Blatt display.

  To allow for fine tension display, Stepp (normal tension) is displayed in Color Slot 1 and Blatt (loose tension) in Color Slot 2.

Display Needle In/Out functions

Like Stepp and Blatt, the Schiffli Needle In/Out status is displayed in different colors, and uses a dashed line style.



Most Schiffli machines have no thread trimmers. So when needles are out, the thread is dragged across the fabric to the next penetration point.

PART II
SCHIFFLI DIGITIZING

Digitizing Schiffli designs in EmbroideryStudio is very similar to digitizing multihead designs. The major differences are:

- Handling of design repeats
- Handling pattern arrangements
- Handling of start and end jumps
- Inserting Tension and Speed Changes in the middle of stitching sequences
- Handling of borer operations
- Stitching elaborate sequences for certain fills.

Digitizing for Schiffli

This section covers the key issues for Schiffli digitizers. It also covers Schiffli boring techniques as well as the creation of Schiffli split stitch effects. See Digitizing for Schiffli Designs for details.

Digitizing for RCC design

ES Schiffli resolves three crucial issues for Schiffli digitizers working with RCC type designs: inserting commands in the right place for needle changes, moving the frame sideways under the new active needles automatically, displaying design colors where they will be on the fabric and not where they are relative to the frame – i.e. 1, 2, 3 etc, French inches apart. See Digitizing for RCC Designs for details.

Digitizing for Laesser Schiffli head

This section deals with setting up Schiffli templates for work with Laesser Schiffli-Head machines. It also covers selecting Schiffli machine format and setting up designs for Schiffli-Head embroidery. Sequin work with Schiffli-Head machines is also outlined. The section also covers saving designs for Schiffli-Head machine. See Digitizing for Laesser Designs for details.

Chapter 5

Digitizing for Schiffli Designs

Digitizing Schiffli designs in EmbroideryStudio is very similar to digitizing multihead designs. The major differences are:

- Handling of design repeats
- Handling pattern arrangements
- Handling of start and end jumps
- Inserting Tension and Speed Changes in the middle of stitching sequences
- Handling of borer operations
- Stitching elaborate sequences for certain fills.

You should first become familiar with general EmbroideryStudio usage before studying the Schiffli-specific usage. EmbroideryStudio has a certain philosophy but once you understand the logic of the software, similarities between individual functions become obvious. For an essential introduction to EmbroideryStudio software concepts, refer to the Reference Manual.

This section covers the key issues for Schiffli digitizers. It also covers Schiffli boring techniques as well as the creation of Schiffli split stitch effects.

Key issues for Schiffli digitizers

The key issues for Schiffli digitizers are as follows:

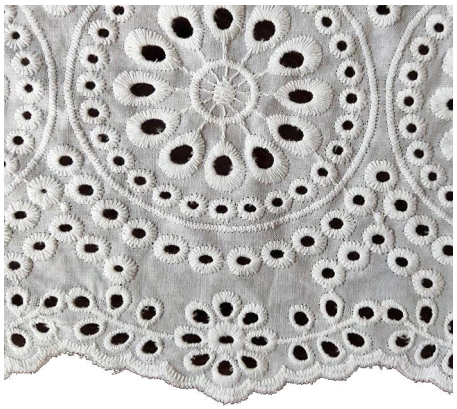
- Schiffli machines are large, the frame has a mass, which in turn implies a speed limit on their operations.
- Lacework is soft, the thread tension has to be low. This is controlled by speed limits on older machines, thread 'pushing' techniques on newer machines.
- Over 1000 needles can be engaged at a time. This creates a pulling force for larger stitches or movements which has implications for tension and speed limit control.
- Mechanical Schiffli machines have no memory – the digitizer must think ahead to control speed and tension.
- There are no trimmers on older machines – the digitizer must take account of thread hanging off the fabric. The main rule is that stitching starts from the top, gradually moving down the design so that hanging threads are not over-stitched.
- Needles cannot generally be engaged automatically so color changes are time-consuming and typically avoided.

When you activate ES Schiffli, the default design template may or may not be automatically replaced by a Schiffli-specific one. For Schiffli work, you need to use this template. The Schiffli template sets the machine format to Schiffli and also turns off all the automatic connector settings.

Note: The design template does not change the stitch settings as you will want to set your own values. See Setting up Schiffli templates for details.

Schiffli boring

In addition to needles, Schiffli machines have built-in borer knives under the needle line. Borer holes are small perforations in the backing fabric, commonly known as 'eyelets'. The complete effect is achieved when cover stitches, using normal or metallic threads, are added around the edges.



In EmbroideryStudio, a **Borers** function is available to turn needle penetrations into boring holes. Borer depth can be controlled from within the design or on the machine itself. The smaller the value, the smaller the borer depth, and hence the smaller the hole.

Schiffli borer considerations

While digitizing borer holes for multihead or Schiffli is essentially the same, there are differences which may affect digitizing technique...

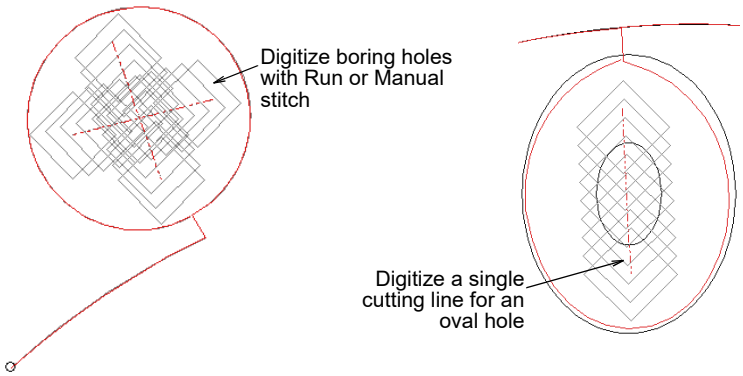
- Multihead machines do not have borer depth adjustment, so the borer cut is always the same size.
- The multihead borer needle pushes the fabric against the base-plate which forms a small frame. This means the fabric is easily cut. In the Schiffli machine, the fabric is not backed by anything which means there is a little play back-and-forth. So the cut may not be as large as the borer knife diameter at any given depth.
- Traditional Schiffli CAMS are set in such way that every borer cut moves in and out twice.
- Mechanical Schiffli machines have no trimmers. Therefore the thread remains connected to the last stitch during the boring phase. Thus the last stitch always has to be in the '12 o'clock' position. This is where stitching must resume. By contrast, on multihead machines, the thread is always trimmed before boring commences.
- On mechanical Schiffli machines, there are certain low-level machine functions that must be performed – Slow, Needles Out, Lower Frame, Borers In, Fast. And after boring – Slow, Borers Out, Lift Frame, Needles In, Fast. The software inserts these functions automatically.

Note: The ES Schiffli borer operation includes full support for various machines, including borer depth control and the automatic creation of the appropriate machine control sequence (fast/slow, needles in/out, etc). These functions are also supported with digitizing tablet functionality so that users with traditional enlargement drawings also can utilize them.

Digitizing for boring

Use Function > Borers to activate the boring function.

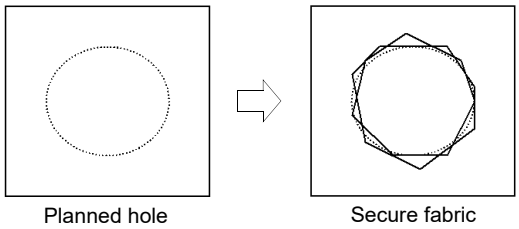
In terms of digitizing technique, there is little practical difference between borer holes for multihead or for Schiffli machines.



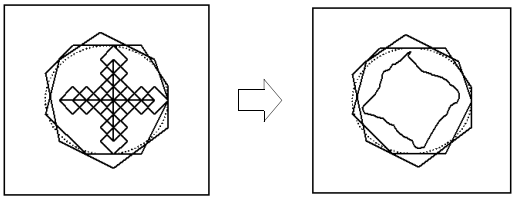
The basic sequence remains the same...

The boring sequence...

1 Secure the fabric with stitching around the planned hole.

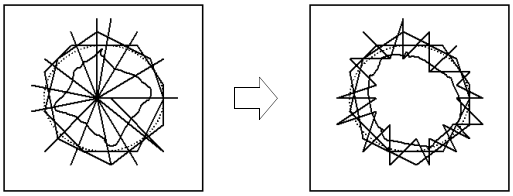


2 Cut the fabric – one or more lines, small movements (1.2–1.5 mm).



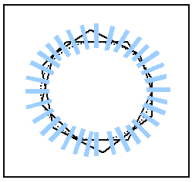
Cut fabric Result of cut

3 Pull out the loose fabric with manual or zigzag stitches.



Pull out fabric Result of pull

4 Finish the edges with satin.



Satin finish

Related topics...

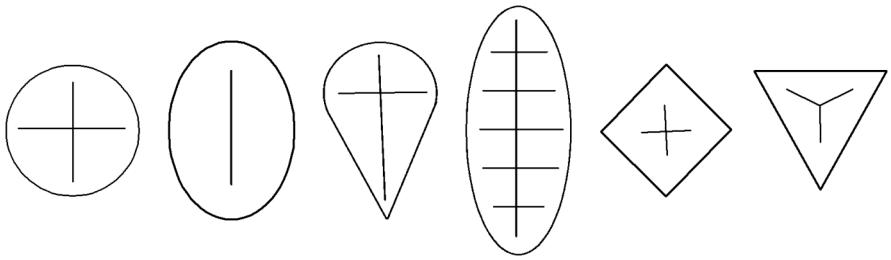
- Multihead boring (Reference Manual)
- Digitize boring holes (Reference Manual)

Borer cut design

How many borer cuts do you need for various fabrics? Only practice can tell. Cutting cotton is relatively easy. Modern fabrics with plastic yarn content may require more cuts closer together.

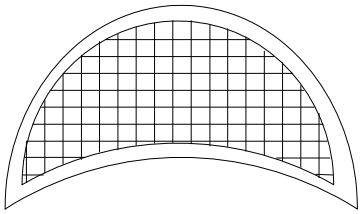
Cutting patterns

Typical cutting patterns used for borer holes are...

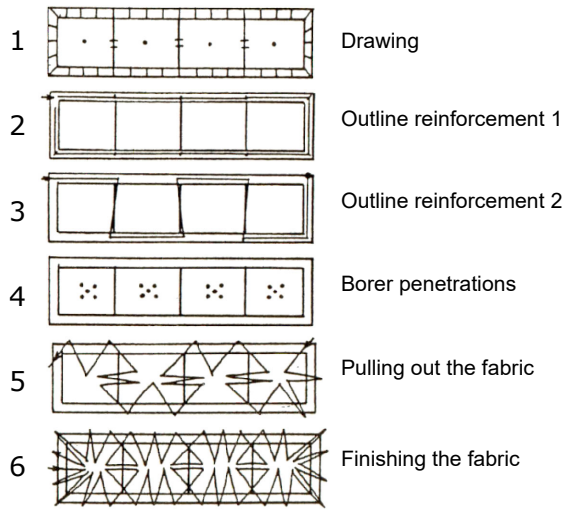


Steffel design

Steffel design – also known as Grid, Lattice, Checkerboard – uses a special technique. Sequence is important to avoid movement or distortion of the fabric.



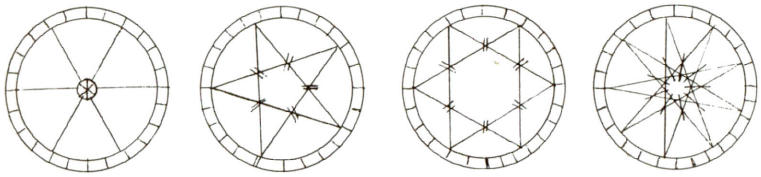
Lattice shapes can vary but the key issue is to progressively cut and secure small parts at a time to avoid distortion. Below is a traditional drawing showing the correct sequence. Each stitch is shown. Borer penetrations are marked by a point or a line.



Mokha design

Mokha or Mocca is a name of Arabic origin that refers to the Yemeni old port Mokha, known for exporting Yemeni coffee. Mokha embroidery uses

lines of thread to form patterns inside a bored hole. The shape can be a circle or other. Again we see a traditional drawing showing every stitch.



Related topics...

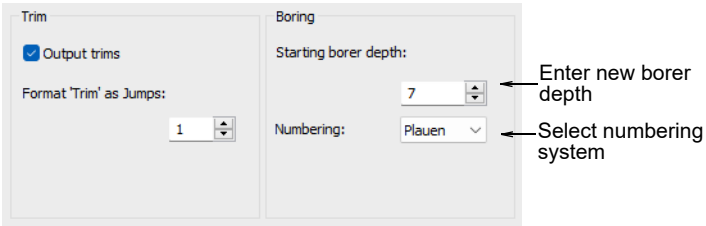
- Multihead boring (Reference Manual)
- Digitize boring holes (Reference Manual)

Set borer depth

Borer depth is relevant only to designs digitized for Schiffli work. You don't have to manually change it before boring unless you want a different size to the default. You can, if preferred, change the default borer depth for use with a specific design and/or make it available to all designs as a custom machine format.

To set a single borer depth...

- Default borer depth is linked to the selected machine format. You can change the default value for a given machine or job type.
- The default starting borer depth value is 6 for Saurer and 7 for Plauen machines. If you want to use a single borer depth at variance with the default, simply set a new default.



- Optionally, save to the template for future use. You may want to create a new template specific to the type of work you are doing.

Related topics...

- Schiffli machine formats
- Customize machine formats for specific designs
- Setting up Schiffli templates

Change borer depth

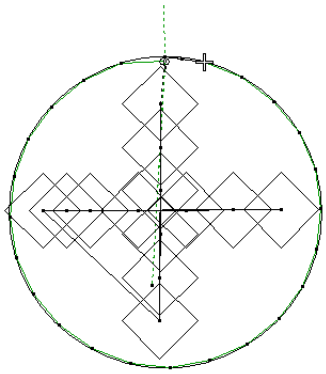
Use Docker > Stitch List to toggle Stitch List display on/off. Use it to insert machine functions directly into the stitching sequence.

Use Travel > Travel by Function to move the stitch cursor to the next/previous machine function. Left/right click.

Depending on the type of work you are doing, you may choose to use a single borer depth for the entire design, or you may want to vary borer depths for different sized holes. The smaller the value, the smaller the borer depth, and hence the smaller the hole.

To change borer depth...

1 Open the **Stitch List** and locate the point in the stitch sequence where you want to insert the **Borer Depth** function. Alternatively, use the travel functions to locate the insertion point. Choose a stitch anywhere before the **Borer In** function.



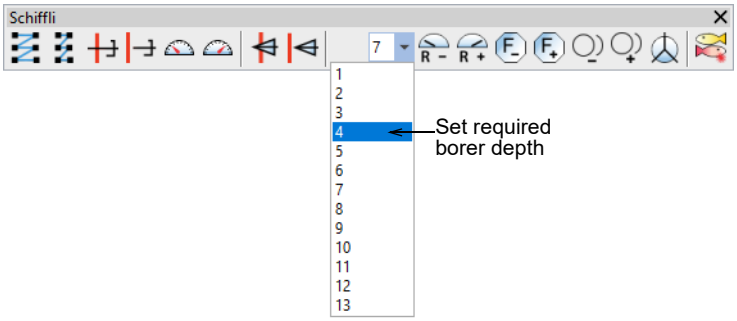
#	X	Y	L	Func
29	-1.12	0.46	1.21	
30	-1.19	0.15	1.19	TieOff
31	0.49	-0.06	0.49	(used)
32	-0.49	0.06	0.49	(used)
33	-0.14	-1.41	1.42	(offset), jump
34	0.00	0.00	0.00	Borer In
35	0.00	-1.31	1.31	
36	-0.01	-1.31	1.31	
37	0.00	-1.31	1.31	
38	-0.01	-1.31	1.31	
39	0.00	-1.31	1.31	
40	-3.52	3.33	4.84	
41	0.72	0.00	0.72	
42	0.72	0.00	0.72	
43	-0.72	0.00	0.72	
44	-0.72	0.00	0.72	
45	1.43	0.00	1.43	
46	1.43	0.01	1.43	
47	1.43	0.00	1.43	
48	1.43	0.01	1.43	
49	1.43	0.00	1.43	
50	0.00	0.00	0.00	Borer Out (empty)
51	1.37	0.03	1.37	

Insertion point

Borer In

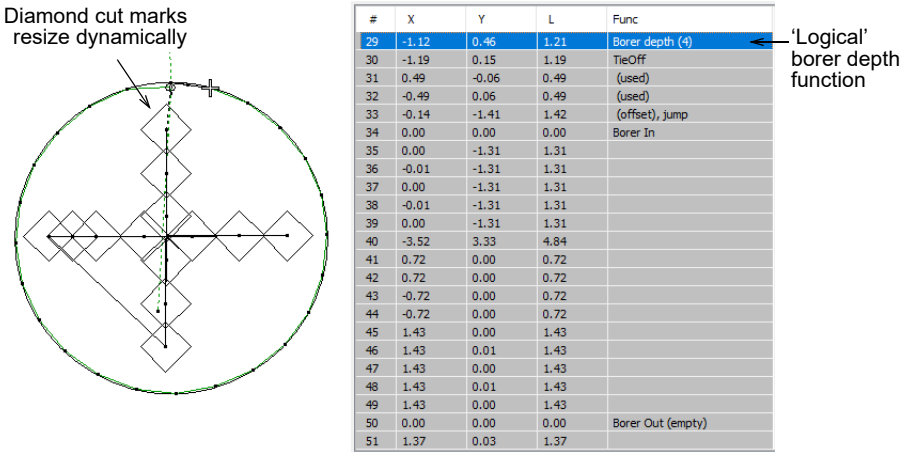
Tip: Although EmbroideryStudio automatically handles physical Borer Minus and Borer Plus functions at final encoding, it is good practice to insert Borer Depth changes a few stitches before or after Borer In/Out functions. See Logical vs physical borer depth for details.

2 Select the required value from the **Borer Depth** droplist on the **Schiffli** toolbar. This will be interpreted as 1-13 for Plauen and 0-12 for Saurer.



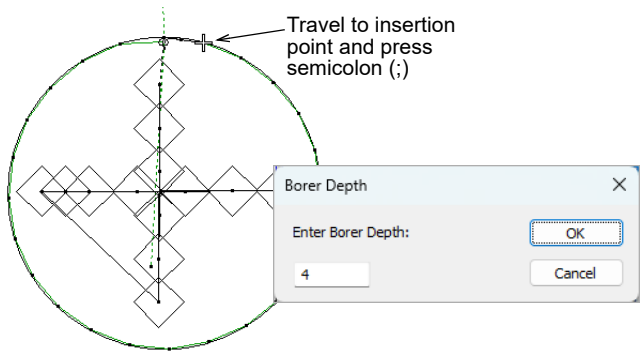
Note: A zero value for Saurer cannot be entered. If you use it, you will need to change the starting borer depth of the machine values.

The new value appears in the **Stitch List** as a Borer Depth 'logical' function...

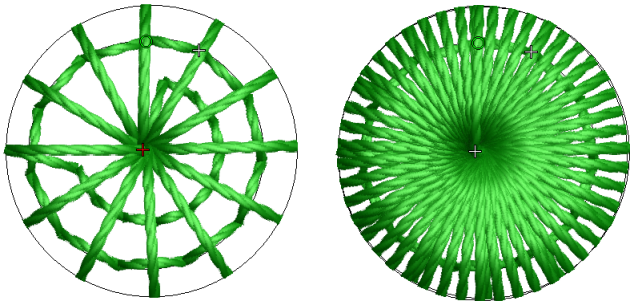


#	X	Y	L	Func
29	-1.12	0.46	1.21	Borer depth (4)
30	-1.19	0.15	1.19	TieOff
31	0.49	-0.06	0.49	(used)
32	-0.49	0.06	0.49	(used)
33	-0.14	-1.41	1.42	(offset), jump
34	0.00	0.00	0.00	Borer In
35	0.00	-1.31	1.31	
36	-0.01	-1.31	1.31	
37	0.00	-1.31	1.31	
38	-0.01	-1.31	1.31	
39	0.00	-1.31	1.31	
40	-3.52	3.33	4.84	
41	0.72	0.00	0.72	
42	0.72	0.00	0.72	
43	-0.72	0.00	0.72	
44	-0.72	0.00	0.72	
45	1.43	0.00	1.43	
46	1.43	0.01	1.43	
47	1.43	0.00	1.43	
48	1.43	0.01	1.43	
49	1.43	0.00	1.43	
50	0.00	0.00	0.00	Borer Out (empty)
51	1.37	0.03	1.37	

Tip: Another method to insert borer depth changes is to travel to the insertion point and press the hot key ; (semicolon) to open the **Borer Depth** dialog.



Tip: Stitch shortening should be turned off for both Zigzag and covering Satin.



Related topics...

- Logical vs physical borer depth
- Machine functions (Reference Manual)
- Multihead boring (Reference Manual)
- Digitize boring holes (Reference Manual)
- Travel through designs (Reference Manual)
- Reducing stitch bunching (Reference Manual)

Make incremental borer depth adjustments

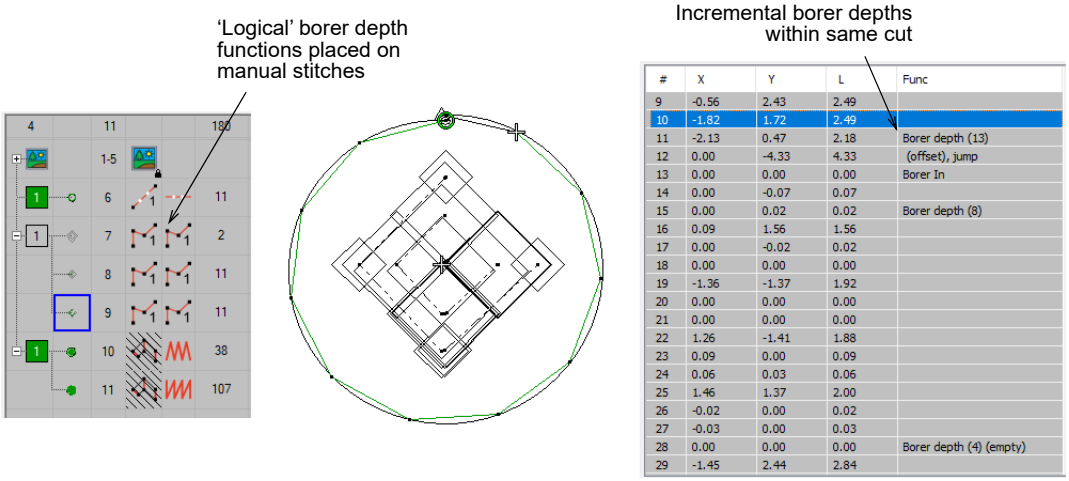
Use Docker > Stitch List to toggle Stitch List display on/off. Use it to insert machine functions directly into the stitching sequence.

Click Schiffli > Borer In to insert Borer In function at current stitch cursor position to engage borer.

Click Schiffli > Borer Out to insert Borer Out function at current stitch cursor position to disengage borer.

Use Traditional Digitizing > Manual to digitize individual 'manual' stitches.

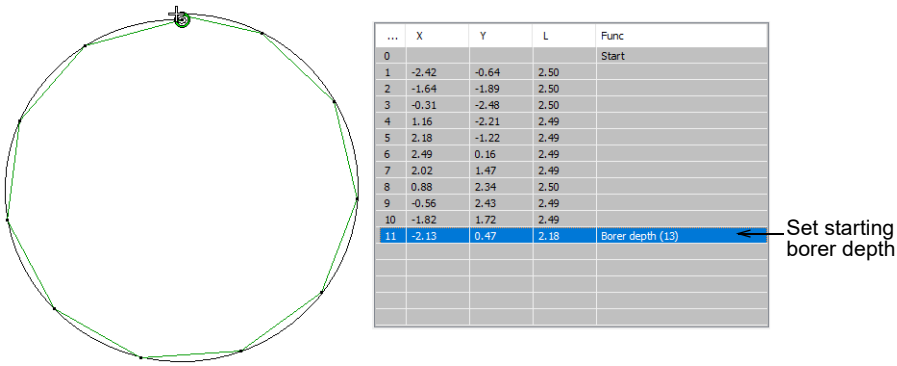
Sometimes you may want to change borer depth during boring operations. For instance, you may want a shallower depth at the corners for a better-quality edge to the bored hole. In the middle of a borer hole, cuts may be larger (higher Borer Depth) but towards the edges or corners, the borer may need to be pulled out further so that cuts can be made closer to the edge.



#	X	Y	L	Func
9	-0.56	2.43	2.49	
10	-1.82	1.72	2.49	
11	-2.13	0.47	2.18	Borer depth (13)
12	0.00	-4.33	4.33	(offset), jump
13	0.00	0.00	0.00	Borer In
14	0.00	-0.07	0.07	
15	0.00	0.02	0.02	Borer depth (8)
16	0.09	1.56	1.56	
17	0.00	-0.02	0.02	
18	0.00	0.00	0.00	
19	-1.36	-1.37	1.92	
20	0.00	0.00	0.00	
21	0.00	0.00	0.00	
22	1.26	-1.41	1.88	
23	0.09	0.00	0.09	
24	0.06	0.03	0.06	
25	1.46	1.37	2.00	
26	-0.02	0.00	0.02	
27	-0.03	0.00	0.03	
28	0.00	0.00	0.00	Borer depth (4) (empty)
29	-1.45	2.44	2.84	

To make incremental borer depth adjustments...

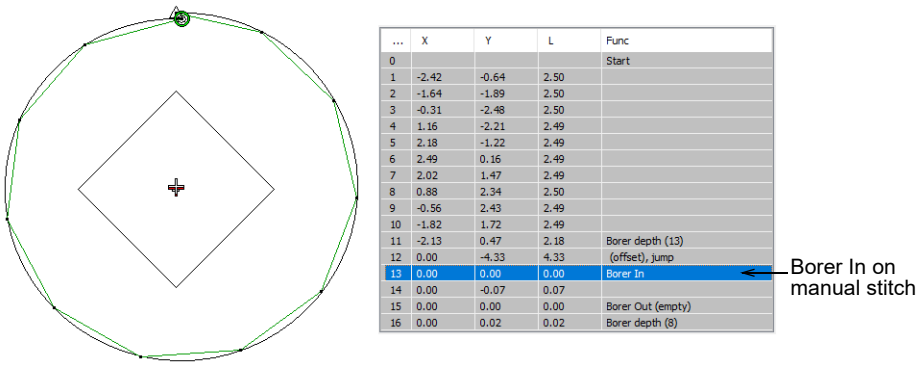
1 Create the borer outline run. Set the starting borer depth from the **Borer Depth** droplist on the **Schiffli** toolbar – e.g. 13.



...	X	Y	L	Func
0				Start
1	-2.42	-0.64	2.50	
2	-1.64	-1.89	2.50	
3	-0.31	-2.48	2.50	
4	1.16	-2.21	2.49	
5	2.18	-1.22	2.49	
6	2.49	0.16	2.49	
7	2.02	1.47	2.49	
8	0.88	2.34	2.50	
9	-0.56	2.43	2.49	
10	-1.82	1.72	2.49	
11	-2.13	0.47	2.18	Borer depth (13)

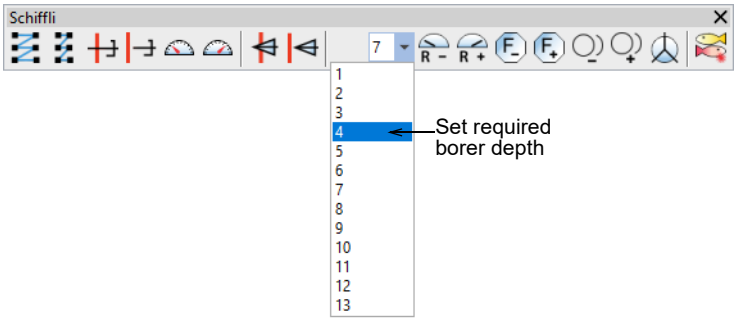
2 Click **Borer In**.

3 Select **Manual** input method and click the insertion point – e.g. center of the circle – three (3) times and press **Enter**.

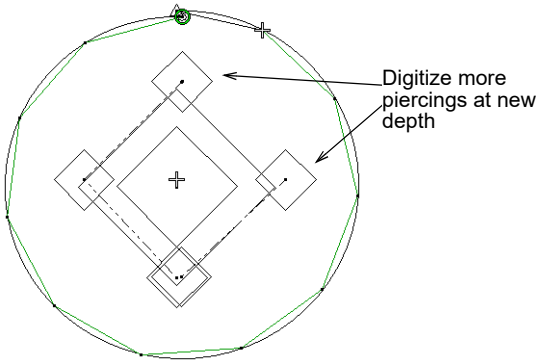


...	X	Y	L	Func
0				Start
1	-2.42	-0.64	2.50	
2	-1.64	-1.89	2.50	
3	-0.31	-2.48	2.50	
4	1.16	-2.21	2.49	
5	2.18	-1.22	2.49	
6	2.49	0.16	2.49	
7	2.02	1.47	2.49	
8	0.88	2.34	2.50	
9	-0.56	2.43	2.49	
10	-1.82	1.72	2.49	
11	-2.13	0.47	2.18	Borer depth (13)
12	0.00	-4.33	4.33	(offset), jump
13	0.00	0.00	0.00	Borer In
14	0.00	-0.07	0.07	
15	0.00	0.00	0.00	Borer Out (empty)
16	0.00	0.02	0.02	Borer depth (8)

4 Select the next borer depth from the **Borer Depth** droplist on the **Schiffli** toolbar.



5 Apply the same method to digitize other piercings at the new depth. Again, click the insertion point three (3) times and press **Enter**.



6 Select another depth and continue with another round of borer piercings as required.

Related topics...

- Schiffli machine functions
- Multihead boring (Reference Manual)
- Digitize stitches (Reference Manual)

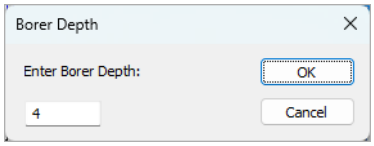
Adjust borer depth via digitizing tablet

Click Borer icon on the Menu Chart with Button 2 to adjust borer depth.

You can control borer depth by entering the specific depth value with a digitizing tablet.

To adjust borer depth via digitizing tablet...

1 Click the **Borer** icon on the Menu Chart with Button 2. The **Borer Depth** dialog opens.

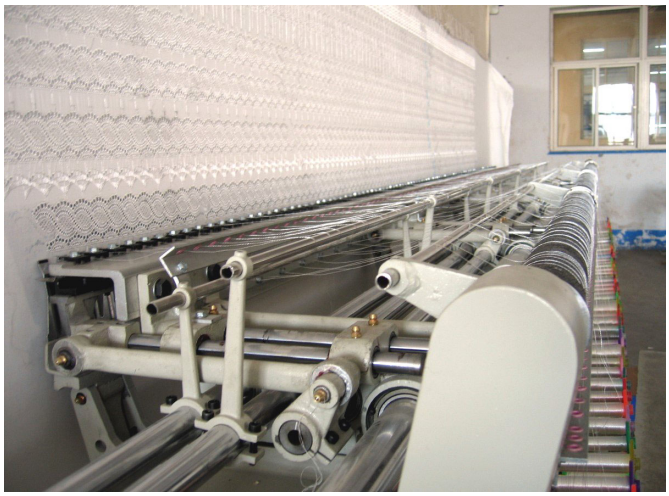


2 Enter the required absolute borer depth and click **OK**. Use the keyboard or menu chart keypad.

Note: Different size borer symbols are displayed for different borer depths.

Logical vs physical borer depth

On a mechanical Schiffli machine everything is activated by the rotation of the main shaft. Borer depth moves forward or back by one notch each rotation. So if it needs to move five positions, it requires five full turns of the main shaft.



Remember that what you see in the **Stitch List** is the 'logical' borer depth and not the 'physical' Borer Plus and Borer Minus functions interpreted on the machine. These are inserted by ES Schiffli during final encoding.

Let's say the default Borer Depth is 6. The digitizer wants to make a very small hole and change Borer Depth to 1. However, with mechanical machines, the borer can be moved only by one unit per revolution/stitch. This means it will take 5 revolutions for the machine to move borer depth

from 6 to 1. ES Schiffli therefore starts adding -1 Borer Depth commands 5 stitches before the Borer Depth 1 point.

Encoding of incremental borer depth adjustments

These incremental borer depth adjustments are automatically calculated and added to the machine file. If there are no actual stitches before the insertion point, they are automatically added as empty stitches. When exported as a Saurer SLC (SAS) file, this is how it gets encoded...

#	X	Y	L	Func
0				Start
1	-2.40	-0.60	2.47	
2	-1.70	-1.90	2.54	
3	-0.30	-2.50	2.52	
4	1.20	-2.20	2.51	
5	2.20	-1.20	2.51	
6	2.50	0.10	2.50	Borer depth (7)
7	2.00	1.50	2.50	Borer depth (8)
8	0.90	2.30	2.47	Borer depth (9)
9	-0.60	2.50	2.57	Borer depth (10)
10	-1.80	1.70	2.47	Borer depth (11)
11	-2.10	0.40	2.13	Borer depth (12)
12	0.00	-4.30	4.30	Jump(M)
13	0.00	0.00	0.00	Borer In
14	0.00	-0.10	0.10	
15	0.00	0.10	0.10	Borer depth (7)
16	0.10	1.50	1.50	

'Physical' borer depth codes calculated and added to machine file

Since the digitizer does not know the status of the Borer Depth on the machine, ES Schiffli returns to the default Borer Depth value at the end of any borer hole sequence. Since no more stitches are left at this point, ES Schiffli inserts enough empty stitches to hold the necessary Borer Depth commands.

Note: For electronic machines, these steps are not necessary because boring devices are controlled by servo motors independent of the main motor.

Logical functions for Saurer and Plauen

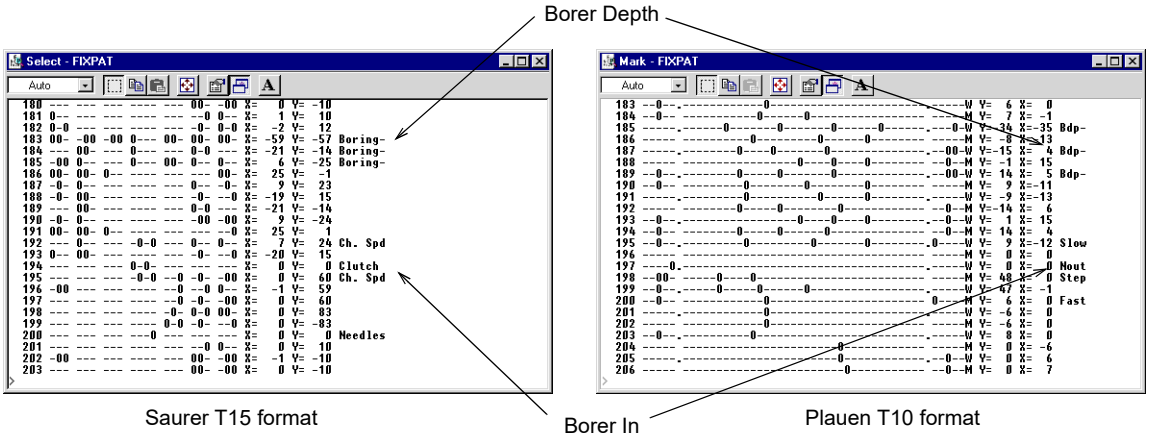
Logical functions in EmbroideryStudio are translated to the following physical functions in the Plauen (T10) and Saurer (T15) machine files.

Logical function	Physical functions Plauen	Physical functions Saurer
Borer In	• Slow • Needle Out • Frame Shift to move borer to the first borer hole • Borer In (Stepp) • Fast	• Slow • Clutch • Fast • Frame shift to move borer to first borer hole • Borer/Needle Roller in

Logical function	Physical functions Plauen	Physical functions Saurer
Borer Out	• Slow • Borer Out (Stepp) • Frame shift to return to last stitch position • Needle In • Fast	• Borer/Needle Roller Out • Slow • Frame shift to move back to last stitch position • Clutch • Fast

Check stitches & machine functions with FIXPAT

If you are concerned about the function sequence, you can check the software output in the Plauen or Saurer files using the FIXPAT utility.



Saurer T15 format

Plauen T10 format

Related topics...

- Checking stitches & machine functions on Jacquard cards

Creating Schiffli split stitch effects

Schiffli designers (like multihead ones) try to avoid long stitches. In Satin areas in particular, they use various 'split stitch' techniques and effects. Because Schiffli embroidery employs thicker yarn than multihead, it is important that needle penetration points in the split are not too close together, not too visible, and not too close to the edge.

Stations software (SPES) includes several split stitch types specifically designed to address Schiffli style work. While the same stitch types are not explicitly defined in EmbroideryStudio, the examples below show you how to produce similar results. Using these techniques it is possible to satisfy most of the particular Schiffli style requirements.

Tip: If you plan to reshape an object's boundaries, you may also want to reshape the **User Defined Split** lines. To allow this, you need to create the **User Defined Split** lines as drawing objects, separate from the embroidery object, then use **Make User Defined Split**. Then to edit them, select the drawing objects and re-shape them, and **Make User Defined Split** again.

Create split stitch effects with Satin or Zigzag

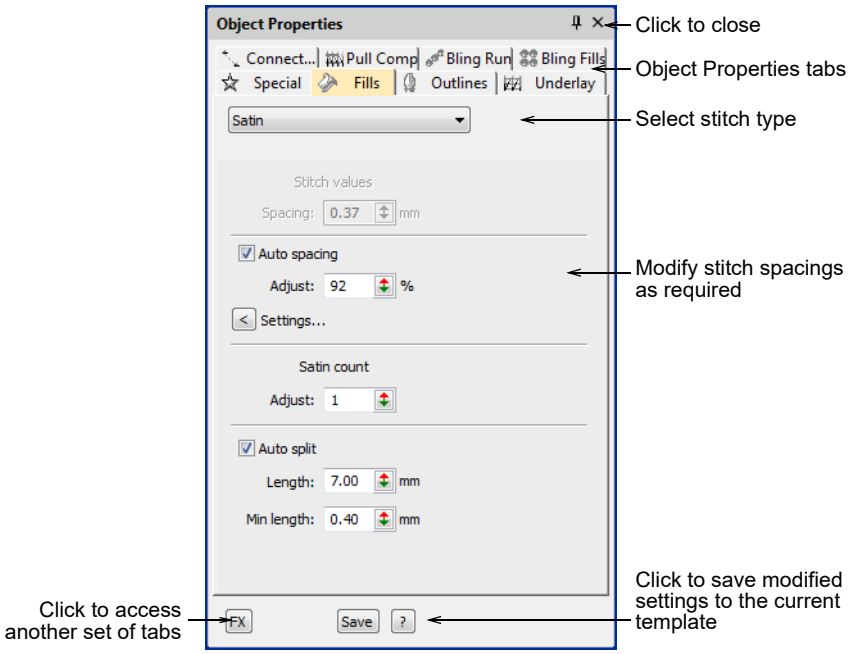
Use Docker > Object Properties to toggle the Object Properties docker on/off. Use it to set properties for the current design.

Use Stitch Effects > User Defined Split to create your own split line effects. Right-click to adjust settings.

Certain Schiffli split stitch effects are possible using Satin and Zigzag stitch types.

To create split stitches with Satin or Zigzag...

1 Click the **Object Properties** icon.

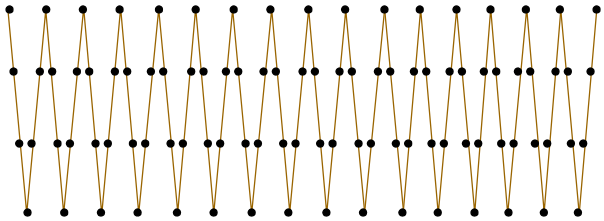


2 Select **Satin** or **Zigzag** stitch type.

3 Select a stitch spacing of your choice and click **OK**.

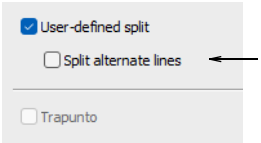
4 Digitize the object you want.

5 Using the **User Defined Split** tool, digitize the exact split lines you want – one, two or multiple. See Patterned Stitching (Reference Manual).



Zigzag + User Defined Split

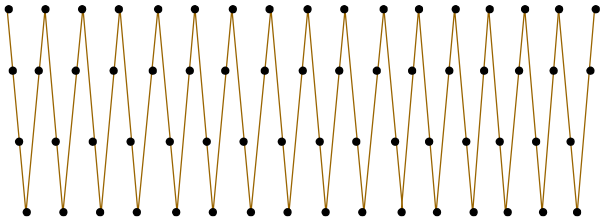
6 To soften the split line effect, select the object and right-click the **User Defined Split** icon. The **Object Properties > Decorative** dialog opens.



Select to soften split line

7 Select the **Split Alternate Stitch Lines** checkbox.

8 Press **Enter** or click **Apply**. Split lines are softened.



Alternate Split Lines applied

Create alternate Split Stitch and Geflecht Stitch effects

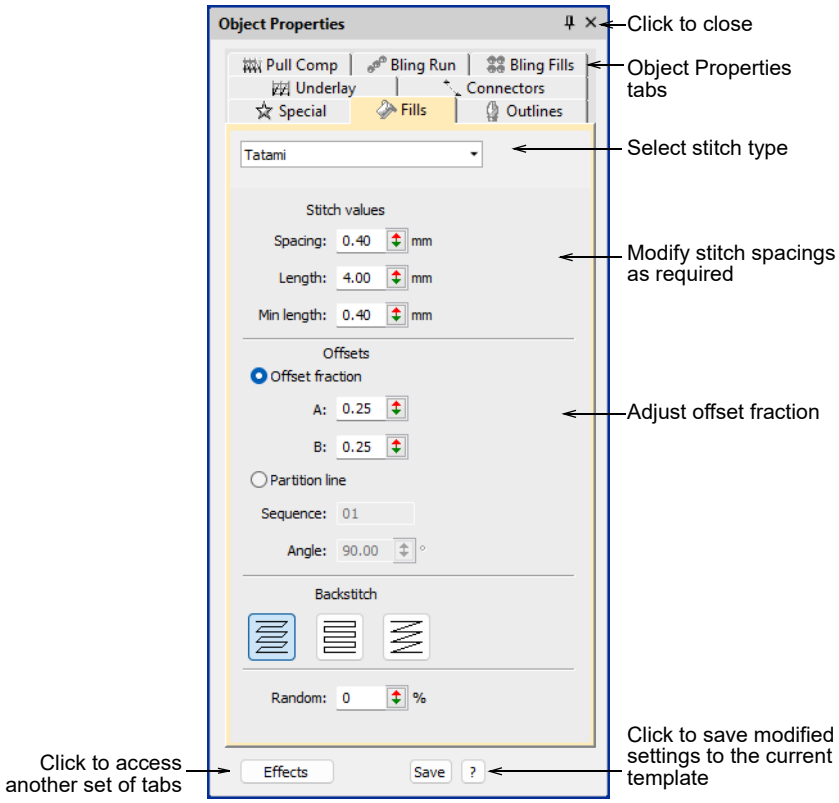
Use Docker > Object Properties to toggle the Object Properties docker on/off. Use it to set properties for the current design.

Use Stitch Effects > User Defined Split to create your own split line effects. Right-click to adjust settings.

If you do not have the **Split Alternate Stitch Lines** option enabled, you can use Tatami and vary the parameters to achieve different alternate split stitch effects.

To create alternate split stitches with Tatami...

1 Click the **Object Properties** icon.



2 Select **Tatami** stitch type.

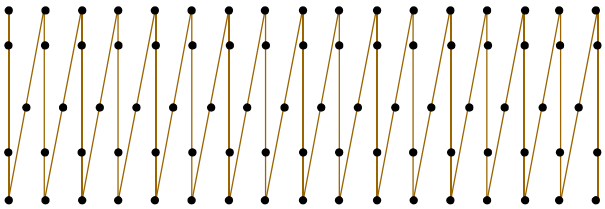
3 Select a stitch spacing of your choice – e.g. 0.5.

4 Adjust the **Stitch Length** setting. This needs to be a large value in the order of 10.0mm or so, depending on the width of the shape you are covering and the effect you want to achieve.

5 Adjust the **Minimum Stitch Length** setting. This should be a larger value than normal to keep the needle penetrations away from the edge of the shape (e.g. 2.0 to 4.0mm).

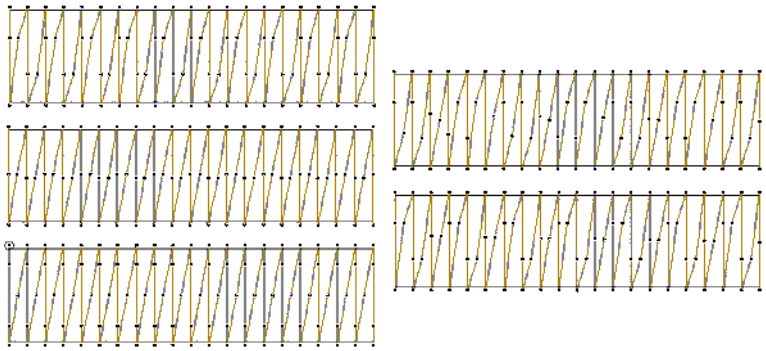
6 Adjust the **Offset Fraction** (typically 0.5 for both A and B). Try other values for other effects.

7 Using the **User Defined Split** tool, digitize the exact split lines you want – one, two or multiple. See Patterned Stitching (Reference Manual).



Tatami + User Defined Split

Variations of **Double Split Alternate** are shown below. Many more are possible.



Note: These are only valid for shapes of relatively constant width.

Chapter 6

Digitizing for RCC Designs

ES Schiffli resolves three crucial issues for Schiffli digitizers working with RCC type designs:

- Inserting commands in the right place for needle changes.
- Moving the frame sideways under the new active needles automatically.
- Displaying design colors where they will be on the fabric and not where they are relative to the frame – i.e. 1, 2, 3 etc, French inches apart.

ES Schiffli takes care of station changes and frame movements. Furthermore, for designs created in EmbroideryStudio, the position of each color is correct.

RCC is available on both Plauen and Saurer machines. Hiraoka, Saurer Pentamat and Laesser have the more advanced Individual Needle Control (INC). For both RCC and INC, a needle pattern is known as a 'station' – i.e. a pattern of needles, either regular as in RCC, or irregular as in INC.

Note: INC type machines can handle the standard repeat stations used by RCC machines. ES Schiffli allows you to define RCC type stations only and it supports only Saurer Pentamat INC type designs.

RCC stations

The original Schiffli machines lacked automation in two areas:

- Changing design repeats – i.e. changing the distance between the active needles, and
- Changing thread colors – i.e. maintaining the distance but changing the active needles.

Technically both issues meant changing the active needle groups in some way. In the main, this has meant by hand. The key problems with changing manually are:

- Downtime (loss of production) on the machine, and
- Labor cost of doing the needle changes one-by-one.

Thus multicolored designs are expensive to produce because operators need to manually trim the threads and re-thread the needles. For this reason, many Schiffli designs still use a single color.

Schiffli automatic color change machine types

Over time two solutions were developed, first RCC then INC (Individual Needle Control).

RCC color change control

Repeat Color Change (RCC) is a mechanism available on some Plauen and Saurer type machines to push a group of needles – every needle, every 2nd, every 3rd, every 4th, etc – forward or backward. Each pattern is called a 'station'. Individual stations exist for each combination – 4/4, 8/4-1, 8/4-2, 12/4-1, 12/4-2, 12/4-3, etc. Non-Hiraoka RCC Schiffli machines are usually capable of accessing 10-12 different needle patterns by using a physical 'template' on the machine. An example explains this:

Station	Design repeat	Needles working	Needles in use
1	4/4	all	all
2	8/4-1	every second	1,3,5, etc
3	8/4-2	every second	2,4,6, etc
4	12/4-1	every third	1,4,7, etc
5	12/4-2	every third	2,5,8, etc
6	12/4-3	every third	3,6,9, etc
7	16/4-1	every fourth	1,5,9, etc
8	16/4-2	every fourth	2,6,10, etc
9	16/4-3	every fourth	3,7,11, etc

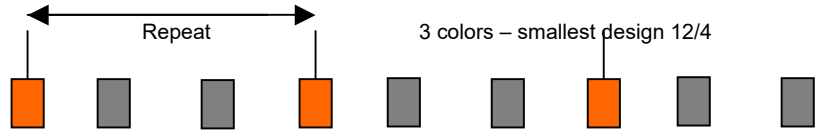
Station	Design repeat	Needles working	Needles in use
10	16/4-4	every fourth	4,8,12, etc

As the example shows, a station defines two things:

- Repeat pattern
- Active needle

The limitation of RCC stations is that most solutions allow only a limited number (10-12) of combinations in one design. Replacing the whole RCC mechanism with another 10 combinations is also time-consuming and causes downtime. Some machines have fixed sets which cannot be replaced in any case. Therefore users are limited to a given set of design sizes and number of colors.

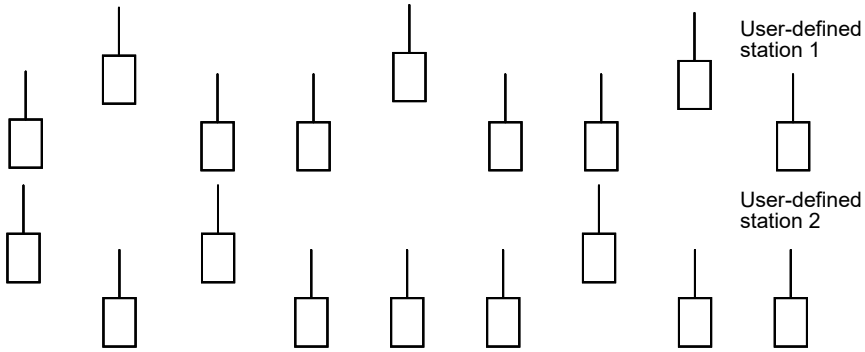
Color variation is given by the design width. For example, generally speaking a 12/4 design repeat can have three differently colored (threaded) needles as shown in the diagram.



Tip: There is a special Schiffli embroiderer's technique which involves 'borrowing' a color from the next design repeat in order to employ more colors. This technique is supported in EmbroideryStudio.

INC color change control

Individual Needle Control (INC) was a mechanism originally developed for Saurer Pentamat machines whereby each needle position across the whole machine could be activated or de-activated individually, either under program or manual control. Hiraoka and Laesser have developed their own implementations of individual needle control, sometimes called Single Needle Control (SNC). INC type machines can handle user-defined stations with any number of needles each of which may be in or out.



Individual needle control in Pentamat machines was originally promoted as the ability to activate and de-activate multiple needle sets inside the one design – e.g. to make tablecloths and the like. But the real benefit of INC type machines has proved to be the ease with which you can change from one standard design repeat, e.g. 8/4, to another standard repeat, e.g. 12/4. This greatly increases the flexibility for factory production scheduling among machines. A second significant benefit of INC has been the ease it offers in creating RCC type multicolored designs.

In effect, RCC is a subset of INC. In fact, typical use of INC is similar to RCC. You select the repeat – e.g. 12/4 – and the active needle – e.g. #2. Non-typical use is in a non-cyclic pattern – e.g. select needles 1,3,7,30, etc. Unlike RCC type machines, however, INC is not limited to 10-12 templates. INC type machines can have pre-programmed RCC style stations from 4/4 up to 96/4. This means there is no limit to the number of design repeats in the same design.

RCC machine types

Currently there are effectively three types of machine in the field:

- purely mechanical machines requiring manual needle changes and re-threading
- mechanical machines with an RCC mechanism added
- electronic machines with Pentamat-style individual needle control.

Note: Whether handling RCC or INC type designs, EmbroideryStudio assumes that the design repeat is the same for the whole design – i.e. the colors may change as 12/4 Needle 1, 12/4 Needle 3, etc, but the design repeat remains 12/4 in the whole design. In other words, it assumes that INC type designs will also conform to an RCC style.

Instructing the machine to change repeat/needles

The Schiffli machine function set is traditionally programmed into punched cards. These cards were designed a hundred years ago at which time the developers did not foresee RCC and INC. Therefore the code set did not contain any of these commands.

For mechanical machines reading Jacquards, manufacturers had two choices:

- Insert a Stop function in the design where they wanted to change needles. The operator then set the new combination/needle pattern manually.
- Borrow an existing command, such as the Cord function, and use it to control the needle changes.

For electronic controllers it was easy – introduce a new electronic format with extended capabilities.

Assigning color sequence to RCC and INC stations

With ES Schiffli you can nominate each Stop and Color Change and assign them to a station number. The program then works out the necessary codes to select the appropriate station number.

Encoding station numbers

RCC machines can only access each station in a cyclic manner, for example:

- from Station 1 go to Station 2, 3, 4, 5 to reach Station 6
- from Station 9 go to Station 10, 1, 2, 3 to reach Station 4.

ES Schiffli supports encoding of this functionality.

Note: With RCC machines, usually only the needles change automatically while the Borer is installed in one design repeat only.

RCC templates

Different machine manufacturers make different templates. In this sense, a 'template' means a proprietary definition of station numbers and repeat patterns as shown by the table below.

Design repeat	Needle	Zangs (T11) station	Comerio (T13) station	Saurer RCC (T18) station
4/4	1	0	1	5
8/4	1	1	2	6
8/4	2	2	3	7

Design repeat	Needle	Zangs (T11) station	Comerio (T13) station	Saurer RCC (T18) station
12/4	1	3	4	8
12/4	2	4	5	9
12/4	3	5	6	10
16/4	1	6	7	1
16/4	2	7	8	2
16/4	3	8	9	3
16/4	4	9	10	4

Hiraoka supports design repeats 4/4 through 16/4 with addition of 24/4 and 48/4. Pentamat machines support any design repeat up to 96/4. ES Schiffli provides easy and validated selection of the design repeats available in the standard templates.

Note: It is possible to make special user-defined templates for Schiffi machines. User-defined templates are currently not supported by ES Schiffli.

Digitizing RCC designs

Designing for RCC is not much different to normal Schiffli digitizing. However, you need to set the design repeat to the largest used in the design. To visualize which needle is stitching at a particular point in the design, you should use only as many colors as there are needles in the design repeat. To change the design repeat without changing needles – e.g. 8/4 ndl 1 to 16/4 ndl 1 – you should insert a Stop function. See also .

Note: If you are working with an older machine without thread trimming, you still need to consider the basic rules of tacking the thread before and after color changes.

Handling frame movements

When the Schiffli machine selects another needle, the frame does not move automatically under it. This can either be done manually during digitizing or left to be calculated by ES Schiffli itself. The software is capable of calculating the automatic frame movements in a similar way to Borer offset. For instance, to change from 12/4-1 to 12/4-2 means a horizontal frame movement by a positive 27.07mm. This is usually broken down into several Needles Out movements of around 7mm.

Displaying RCC patterns

From the digitizer's point of view, changing colors for RCC is the same as for multihead machines. However, displaying RCC machine files using the FIXPAT Show Design function will display a design shift on-screen. This is because the frame movement looks to the software like a jump movement to the right. The next color will thus be displayed 27.07mm to the right of the previous color. This is only a visual limitation. EmbroideryStudio will output the colors correctly on the production worksheet with a station label configured by the user.

Changing design repeats within the same design

In most Schiffli designs, the design borders are usually in 4/4, changing to 8/4, 12/4 or 16/4 for the main body of the design. Another border may then be made in 4/4, upside down. Explicit design repeat changes in the design are not supported in EmbroideryStudio. Currently the design can have only one design repeat value which is saved with the design. You can, however, output a Stop or a Color Change which you can then assign to any of the stations using the **Schiffli Disk Converter**.

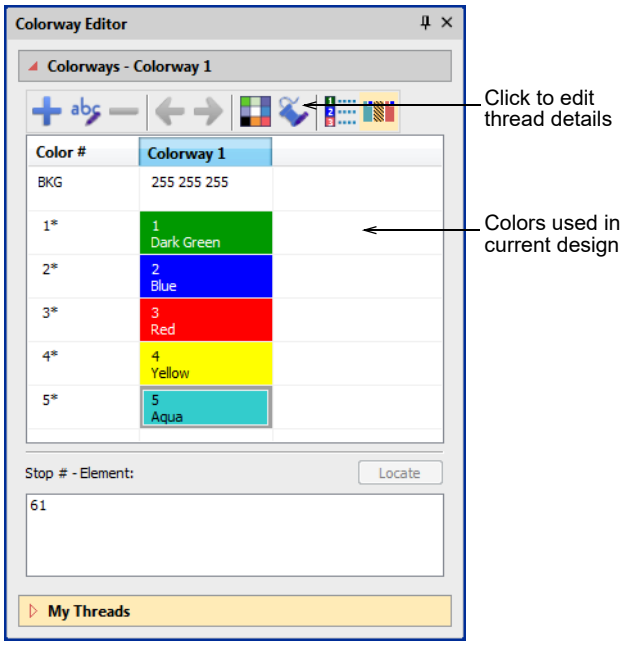
Printing production worksheets with station information

Use Color > Colorway Editor to modify threads in existing charts.

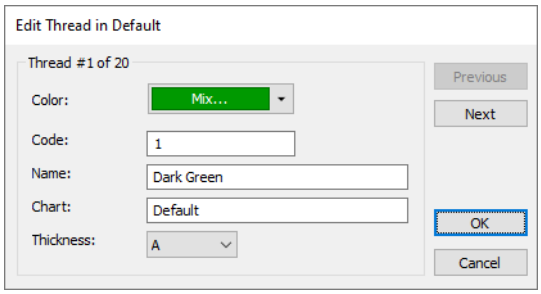
There is no specific field for RCC information. However, you can utilize the **Code** field in the **Edit Thread** dialog to record and print the station information.

To print a production worksheet with station information...

1 Click the **Colorway Editor** icon.



2 Select a thread and click **Edit Thread**.



3 In the **Code** field, type the station information you require.

For example, you might enter **Station 5**. Alternatively, **12/4-2** may be more flexible as it is independent of the particular embroidery machine setup. This information is stored with the design. By using this field, the thread information – brand and color code of thread – can also be printed and preserved in the EMB file.

Chapter 7

Digitizing for Laesser Designs

When creating designs for Laesser Schiffli-Head machines, EmbroideryStudio provides control over design repeats and caters for the range of Laesser Schiffli-Head machines. You can view any number of full or part repeats to see how they inter-connect. A dedicated Schiffli template provides optimized settings for work with Schiffli-Head machines with sequin capabilities. Machine formats can be customized for particular machine models.

Designs digitized in EmbroideryStudio are saved in native EMB format. For use in Laesser Schiffli-Head machines, designs are output to Laesser MST format. These files can then be read into Laesser's own LEdit software where final adjustments can be made before sending to machine. The MST file format which EmbroideryStudio outputs supports:

- Twin sequins for twin-sequin capable Laesser Schiffli-Head machines
- Automatic Thread Cutting (ATC) machine needle addressing.

This section deals with setting up Schiffli templates for work with Laesser Schiffli-Head machines. It also covers selecting Schiffli machine format and setting up designs for Schiffli-Head embroidery. Sequin work with

Schiffli-Head machines is also outlined. The section also covers saving designs for Schiffli-Head machine.

Setting up designs for Laesser Schiffli-Head

A Schiffli design can be repeated horizontally as many times as can fit across the frame. With larger designs, needles can be selectively disengaged. This is called a 'design repeat'. When creating designs for Laesser Schiffli-Head machines, you need to instruct the software on the following parameters:

- Number of needles per head
- Head distance on machine
- Number of colors in the design
- Needles in use.

Also we need to be mindful of the thread colors we're using when digitizing Schiffli designs, otherwise objects in designs may appear shifted when saved and re-opened. Use the steps below as a general guide to setting up designs for Schiffli-Head work.

To set up a design for Schiffli-Head embroidery...

1. Ascertain head distance of your machine – e.g. 165mm, 240mm, or 330mm.
2. Ascertain the number of needles per head on the machine – e.g. 5, 6, or 8.
3. Calculate the nominal repeat on the basis of the needle count - e.g.
   - 5 needles equates to a 20/4 repeat
   - 6 needles equates to a 24/4 repeat
   - 8 needles equates to a 32/4 repeat
4. Ascertain the number of colors to be used in the design.
5. Ascertain which color slots to use with reference to the ATC **Standard Needle Pattern** table.

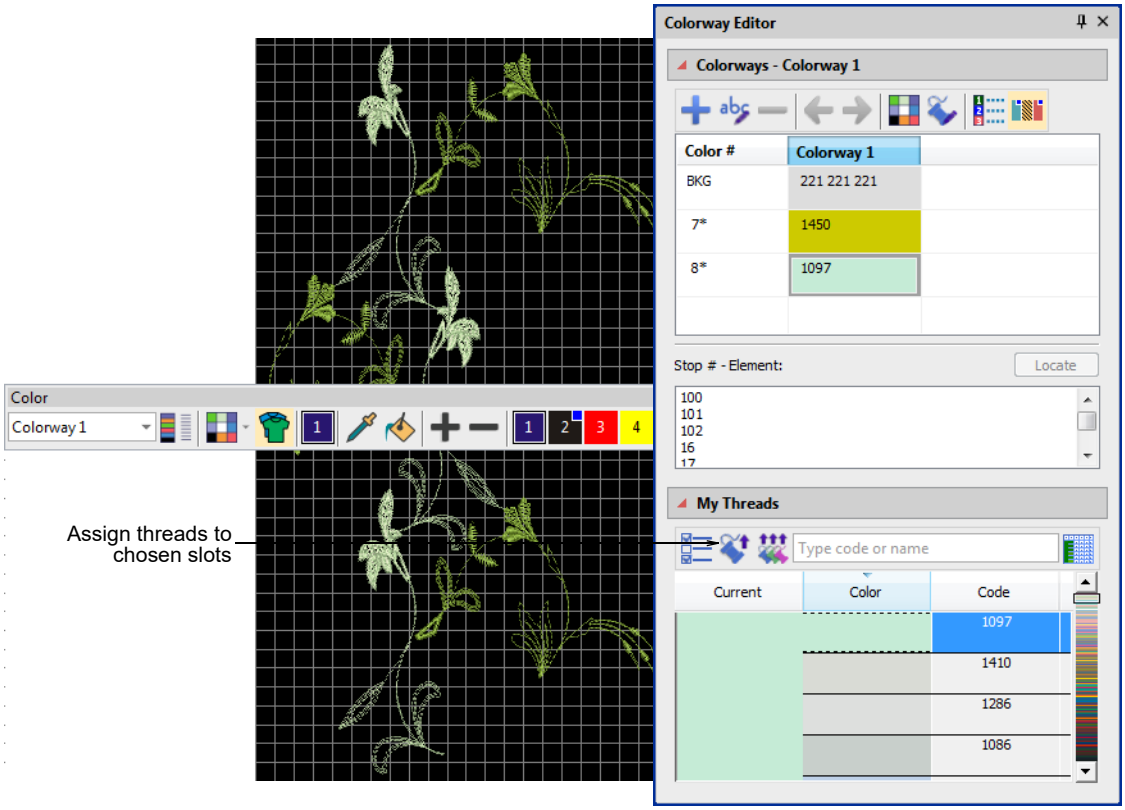
Ascertain color slots

10	16/4	4.Needle	43	36/4	7.Needle
11	20/4	1.Needle	44	36/4	8.Needle
12	20/4	2.Needle	45	36/4	9.Needle
13	20/4	3.Needle	46	40/4	1.Needle
14	20/4	4.Needle	47	40/4	2.Needle
15	20/4	5.Needle	48	40/4	3.Needle
16	24/4	1.Needle	49	40/4	4.Needle
17	24/4	2.Needle	50	40/4	5.Needle
18	24/4	3.Needle	51	40/4	6.Needle
19	24/4	4.Needle	52	40/4	7.Needle

For example, depending on the number of needles on the machine, and the number of design colors:

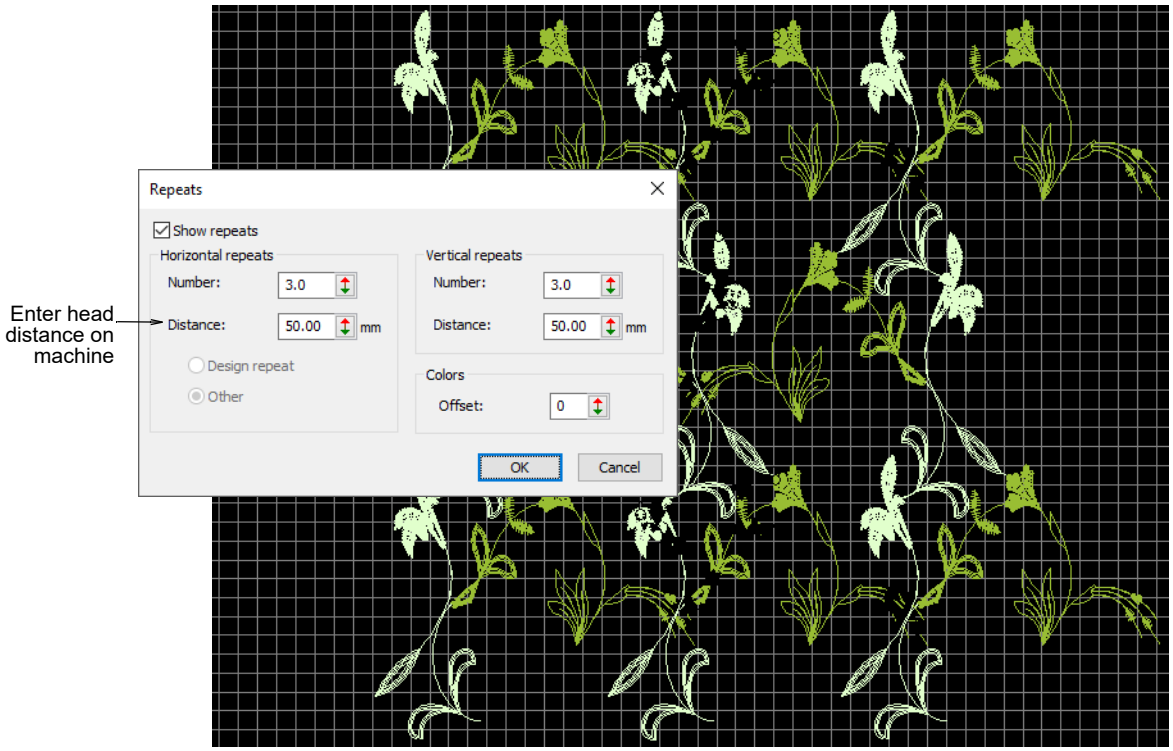
Needles	Repeat	Colors	Color slots
5	20/4	2	11 & 12
5	20/4	3	11, 12, & 13
6	24/4	2	16, 17
6	24/4	3	16, 17, & 18

6 In EmbroideryStudio, assign actual threads to the color slots you intend to use – e.g. slots 11 & 12.



Caution: Do not compact your color palette or you will lose the correct slot assignment.

7 To visualize your design repeats, select **View > Repeats**.



8 Select **Show Repeats** and enter a nominal number of repeats – e.g. 3.

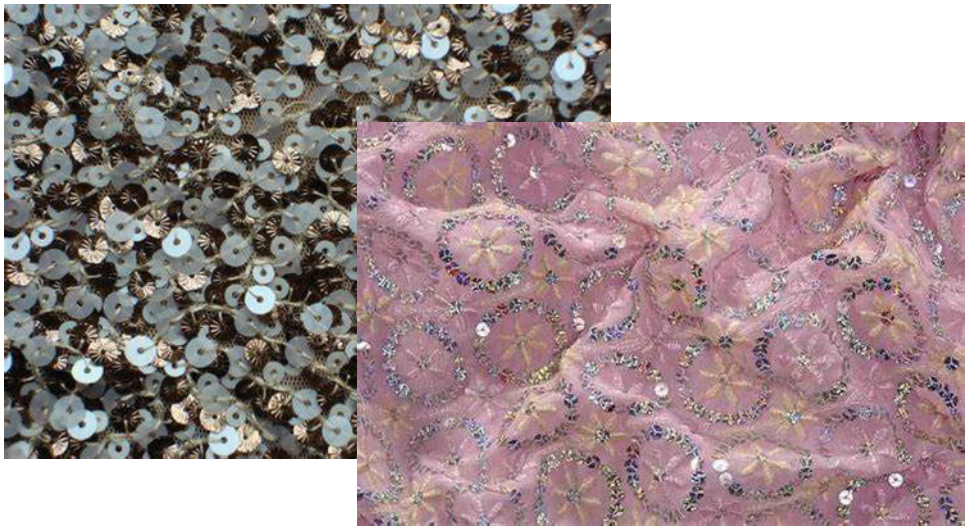
9 Select **Other** and enter the head distance on the machine in the **Distance** field – e.g. 165mm, 240mm, or 330mm.

10 Click **OK** to visualize the design repeats.

Note: Design repeats only display in normal stitch view. They will not appear if you switch to TrueView™.

Laesser sequin capability

The Lässer attachments for sequin, cord, laser and thermocut enable the implementation of a wide range of creative possibilities for Schiffli digitizing. These attachments enable flexible work, optionally with sequin, cord thermocut or laser. The different applications can also be combined. According to Lässer's publicity, more than 600 sequin attachments are in service in India every day, whether in 4/4 or 8/4 repeat, and mostly on 20-meter machines. EmbroideryStudio supports reading and writing of both single and twin sequins.

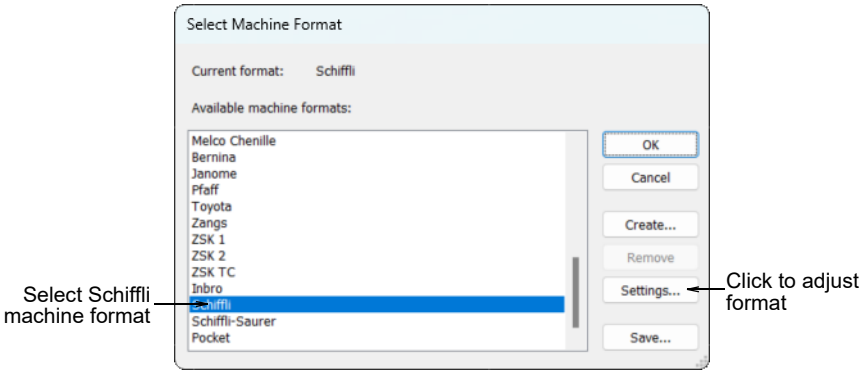


Specify sequin capability

Sequin mode is supported in Schiffli machine format. Before you can use **Sequin** mode, you must select the Schiffli machine format via the **Select Machine Format** dialog. Laesser MST files can be saved and loaded with twin sequin information. See also Sequin Embroidery (Reference Manual).

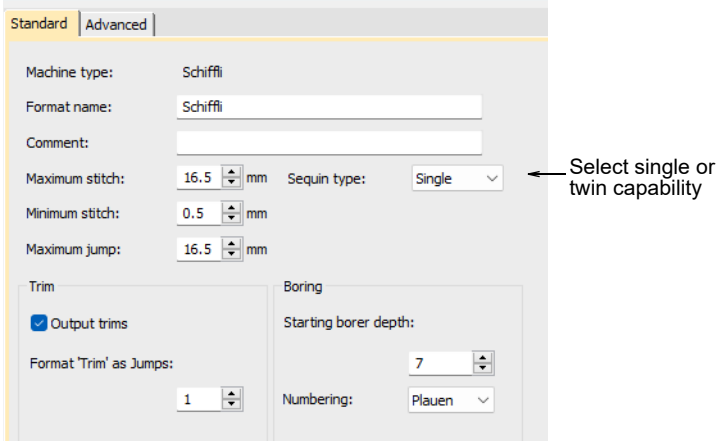
To specify the sequin capability...

1 Select **Design > Select Machine Format**. The **Select Machine Format** dialog opens. If you are using the Schiffli template, the generic Schiffli machine format is selected by default.



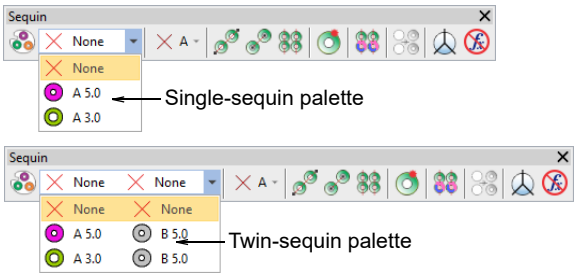
2 From the **Available Machine Formats** list, select 'Schiffli' machine format if not already selected.

3 Click **Settings** to view the presets for the Schiffli machine.

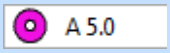


4 From the **Sequin type** droplist, select single or twin, depending on your machine's capabilities. In older Schiffli machines, sequin behavior is restored if you change sequin type to 'Single'.

5 Click **Save**. Sequin shapes are now available for selection from the **Sequin Palette**. If you have selected twin-sequin capability, sequin shapes and sizes are displayed in pairs. Otherwise you have access to single sequins only.



Set up sequin palettes



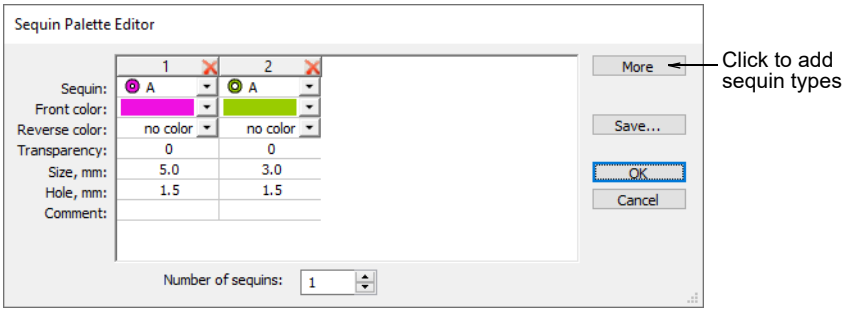
Use Sequin > Sequin Palette to select from a user-defined palette of sequin shapes for the current design.

Use Sequin > Sequin Palette Editor to select shapes from a sequin library.

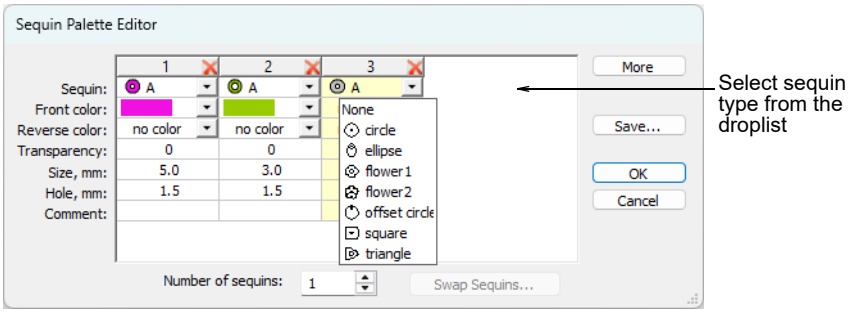
The **Sequin Palette Editor** lets you prepare a palette of sequins to use in your design. Set color and size for each sequin, as well as sequin hole size. Once set up, the palette is available for use from the **Sequin Palette** droplist.

To set up a sequin palette...

1 Click the **Sequin Palette Editor** icon. Fields are arranged in tabular form so that parameters for each sequin type can be viewed at once.



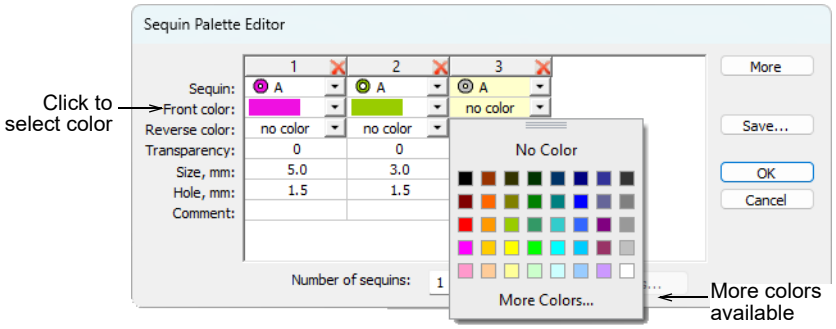
2 Click the **More** button to create a new entry. Depending on the selected machine type – single or twin – a single or double column will be added to the **Sequin Palette Editor**.



Tip: Click the **X** in the column header to remove any unwanted sequins.

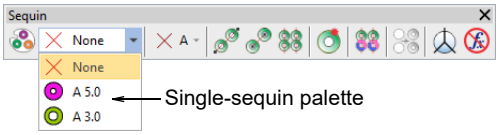
3 Select a sequin type from the **Sequin** droplist.

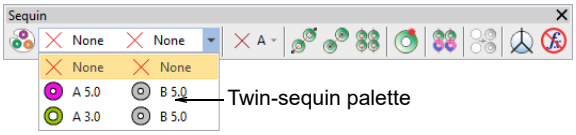
4 Edit sequin colors and sizes as required. **Size**, **Hole** and **Comment** fields are all editable.



5 Repeat as many times as required and click **OK**.

Sequin shapes are now available for selection from the **Sequin Palette**. If you have selected a twin-sequin-capable machine, sequin shapes and sizes are displayed in pairs.

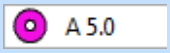




Related topics...

- Sequin Embroidery (Reference Manual)
- Set up sequin palette (Reference Manual)

Digitize sequins for Schiffli-Head machine



Use Sequin > Sequin Palette to select from a user-defined palette of sequin shapes for the current design.

Use Sequin > Sequin Fill to digitize and fill large, irregular shapes with sequins.

Use Sequin > Sequin Run Auto to create a string of sequins along a digitized line according to current settings.

Use Sequin > Sequin Run Manual to manually digitize sequin-drops along a digitized line.

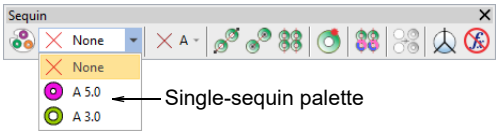
Use Sequin > Manual Sequin to digitize individual sequins.

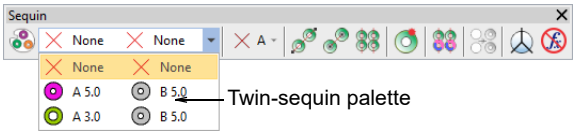
The Reference Manual provides procedures for using the full range of sequin digitizing tools in EmbroideryStudio. However, there are a number of things to be aware of when digitizing sequins for Schiffli work. Typically, you will use the **Sequin Run** input method to create a string of sequins along a digitized line. You have the option of digitizing individual sequin drops with the manual method, or letting the system automatically generate drops according to current settings. Fixing stitches are generated automatically according to current settings.

To digitize a sequin run...

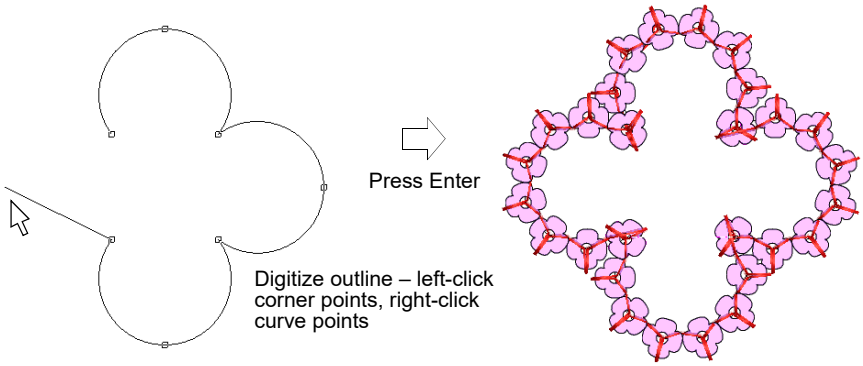
- Select the sequin type you want to use from the **Sequin Palette**.

Default sequins appear in the sequin palette. It is ready to be configured. If you have selected a twin-sequin-capable machine, sequins are displayed in pairs.

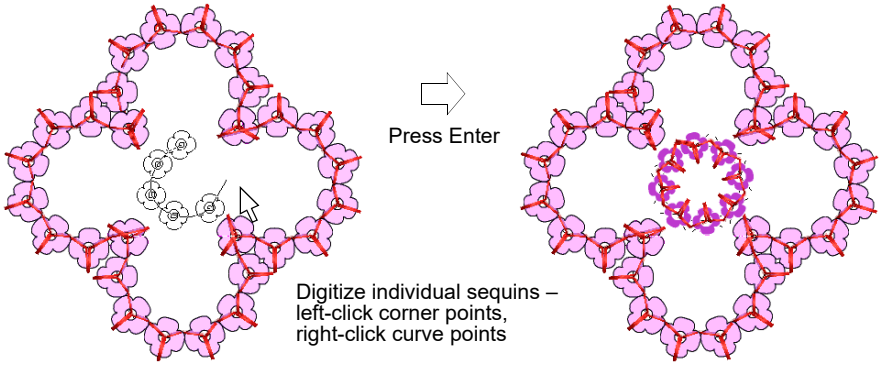




- Use the **Sequin Run Auto** tool to digitize sequin runs by entering reference points – left-click for corner points, right-click for curve points.

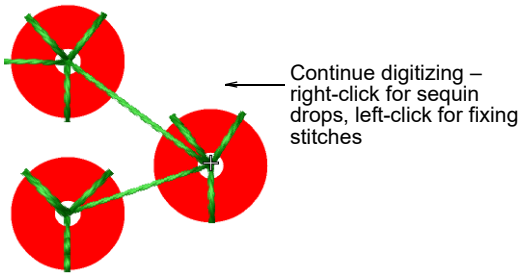


- To add details or create special spacings, use the **Sequin Run Manual** tool to digitize specific sequin drops – again, left-click for corner points, right-click for curve points.



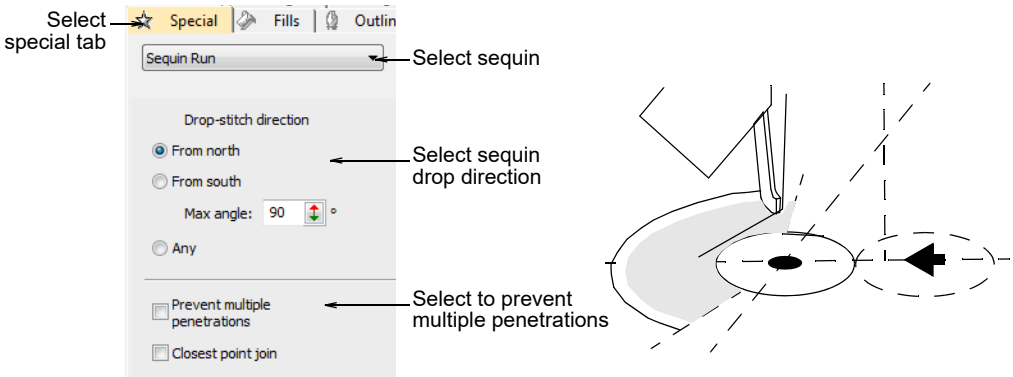
- Use the **Manual Sequin** tool to digitize individual sequin drops with manual fixing stitches:
  - Right-click to drop a sequin.

- Left-click to digitize fixing stitches around the sequin to secure it.

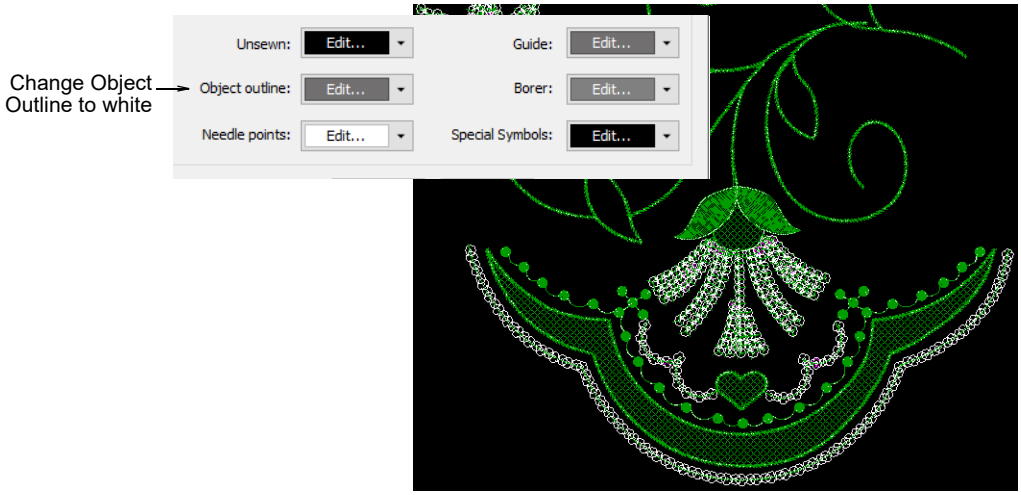


- To check sequin drop direction, select **Special > Sequin** in **Object Properties**.

  In multihead machines, sequins are fed from the front or 'south' which means that the initial fixing stitch should be placed on the 'north' side. In Schiffli machines, the opposite is the case. The **Drop Stitch Direction** in the Schiffli template is set to **From South** by default. See Reference Manual for more details.



Tip: Because Schiffli work is usually done on a black screen, you may need to change **Object Outlines** in the **Display Options** to dialog to white in order to view sequins clearly in normal view.



Related topics...

- Sequin Embroidery (Reference Manual)
- Creating sequin runs (Reference Manual)

Saving designs for Schiffli-Head machine

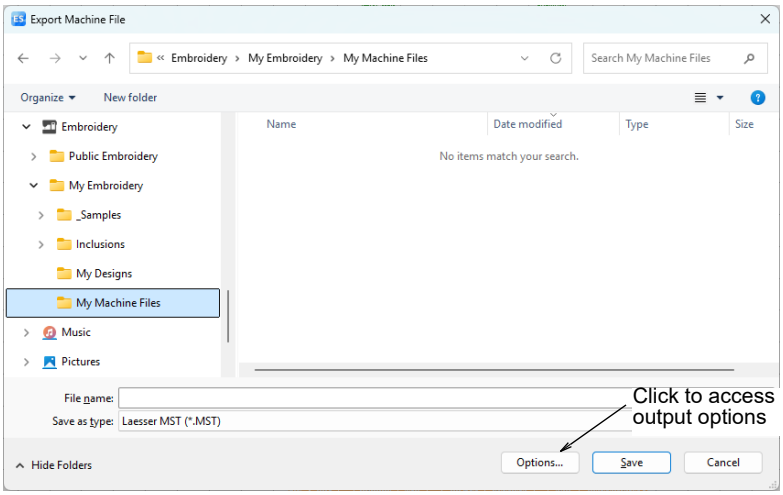
Different embroidery machines understand different languages. Each has its own control commands for the various machine functions. Before you can stitch a Schiffli design created in EmbroideryStudio, it must be in a format which can be interpreted by the machine. In the case of Laesser Schiffli-Head machines, you need to save the design in MST format. MST format provides a number of output options which can be accessed while saving.

Save designs to MST format

The MST output options allow you to adjust conversion details for your particular machine. In most cases, the default settings are suitable. It also provides options for mapping the EmbroideryStudio sequin palette to your **LEdit Pro** sequin 'paillette'.

To save designs to MST format...

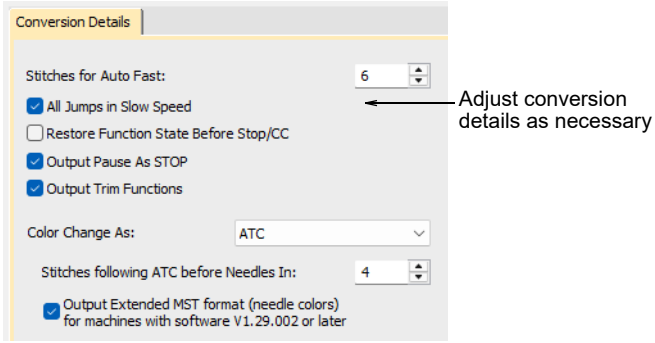
1 Select **File > Export Machine File**.



2 Select **MST** from the **Files of Type** list.

3 In the **File name** field, enter a name for the design.

4 Click **Options**. The **Export Options** dialog opens.



5 Adjust **Conversion Details** as required. In most cases, the default settings will be suitable.

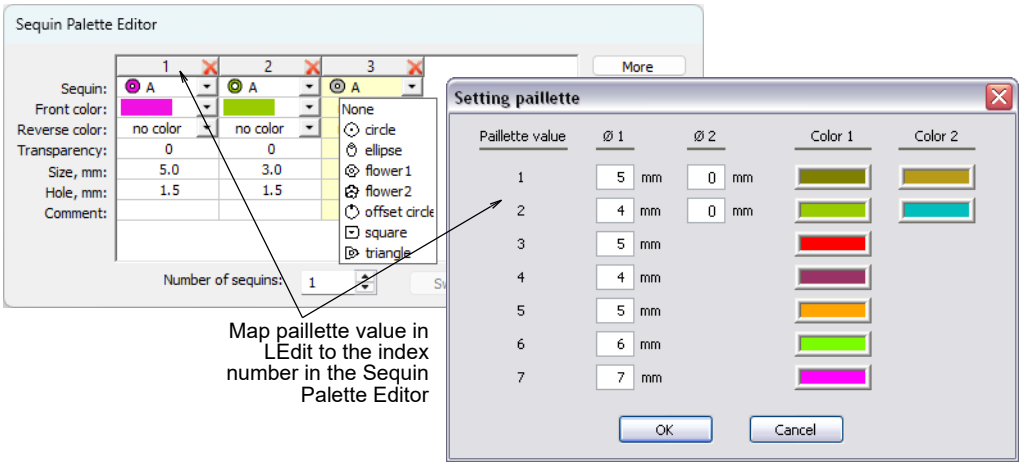
Setting	Description
Stitches for Auto Fast	This value determines the minimum number of consecutive stitches/borer penetrations/needle-out movements required before a speed change is possible. For example, if the value is 5 and there are 3 needle penetrations, they will all be done in slow speed.
All Jumps in Slow Speed	If you want to automatically have jumps in a design performed at slow speed (together with small numbers of boring penetrations), this option should be ticked.
Restore function state before Stop/CC	If enabled, all necessary functions are automatically inserted in the output file before the Stop code to return the machine to the same state it was at the start of the design.

Setting	Description
Output Pause as Stop	A Pause function generally indicates a ‘conditional stop’. This means that the machine will stop only if the machine operator has enabled Stop on Pause. This option will output all Pauses as Stops.
Output Trim functions	Machines without an automatic trimmer may not know how to interpret Trim functions. For these machines you need to deselect the checkbox so that Trim functions are ignored.
Color Change as	For machines that support automatic needle changes, such as Laesser ATC or Schiffli-Head machines, Color Changes may be output as Needle Pattern changes by selecting ‘ATC’. The Needle Pattern is determined by the color palette number. Please refer to the Laesser Standard Needle Pattern table. Alternatively, if ‘Stop’ is selected, the machine will stop at every color change. This allows the machine operator to manually adjust machine settings as required.
Stitches following ATC before Needles In	This is only applicable if ‘Color Change As’ is set to ATC. Every ATC function (Needle Pattern change) requires an offset to position the design under the next needle. For example, when changing from ATC 7 (needle 1) to ATC 10 (needle 4), the design must be offset by 3 x 27.07 = 81.21mm before the machine can continue stitching. This number determines the minimum number of jump stitches used to create the offset. Normally this value should be left unchanged.
Output extended MST format...	This is used to save palette colors (RGB values) from the design to the MST file. It is ‘on’ by default. However, some older machines or software may interpret the extended format incorrectly. Turn this option off if the machine or third-party software has problems reading the MST file. If turned off, the palette is not stored in the MST file, and the software reading the design will assign default colors.

6 Click **OK** and then **Save**.

Save single sequins to MST format

If you are doing single-sequin work, it’s advisable to set up the EmbroideryStudio sequin palette to map to your **LEdit Pro** sequin ‘paillette’. This setup can then be saved with the Schiffli template for repeated use.

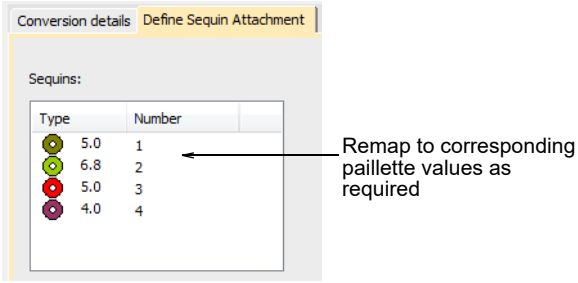


If the **Sequin Palette Editor** is not set up to map directly to the **LEdit Pro** sequin 'paillette', then you have two choices:

- Either reconfigure the **LEdit Pro** sequin 'paillette' to be the same as EmbroideryStudio, or
- Reconfigure the mapping during output to MST file format.

To save single sequins to MST format...

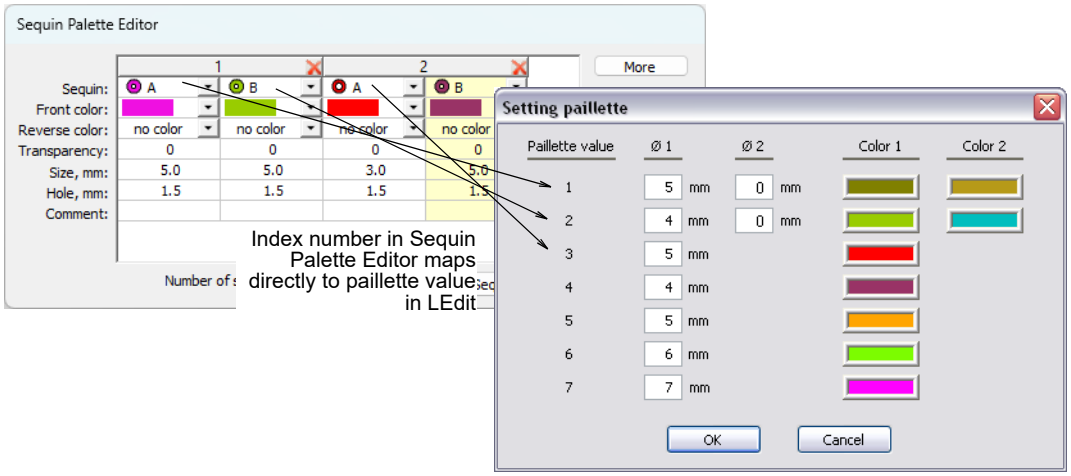
1. Select **File > Export Machine File** and select **MST** from the **Files of Type** list.
2. Click **Options** and select the **Define Sequin Attachment** tab.



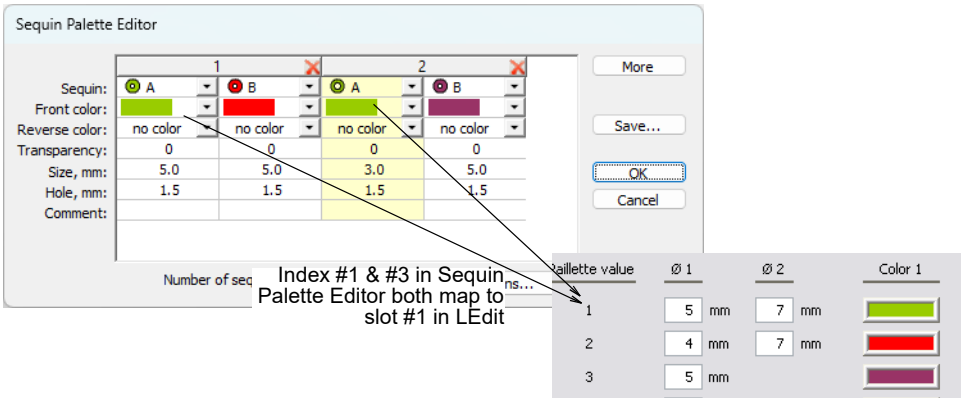
3. Edit the index number as necessary to achieve a one-to-one correspondence with the **Paillette Value** in the **LEdit Pro** editor.

Save twin sequins to MST format

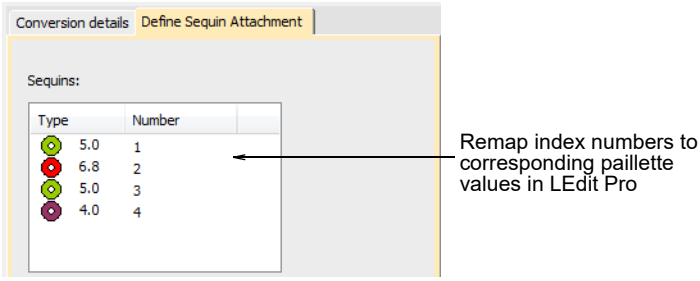
If you are doing twin-sequin work, you may be able to set up the EmbroideryStudio sequin palette to map to your **LEdit Pro** sequin 'paillette'. However, you can only really do this if you are using twin-patterns exactly as set up in the EmbroideryStudio **Sequin Palette Editor**.



A problem arises when you want to use the same sequin in different pairs. In this case, the index number in the EmbroideryStudio **Sequin Palette Editor** will not remain in sync with the **LEdit Pro** sequin 'paillette'.



Your only option in this case is to use the save **Options > Define Sequin Attachment** tab to assign the index numbers correctly.



PART III
SCHIFFLI OUTPUT

ES Schiffli makes a distinction between 'logical' and 'physical' machine functions. Logical functions are saved as 'object properties' in the native EMB design file. This concept may be new to Schiffli designers who are used to working on a stitch-by-stitch basis.

Reading & outputting designs

This section covers the reading and outputting of Schiffli machine files. It also covers printing Schiffli production worksheets. See Reading & Outputting Designs for details.

Utility programs

EmbroideryStudio provides a number of external utility programs which can be used to modify, convert, or punch designs, especially those in older tape formats. See Utility Programs for details.

Functions, files & disk types

This section provides details of the machine, file and disk types supported by ES Schiffli. Tables show how various features are converted when the file type is changed. Use this section when converting designs to different formats, or digitizing for a specific format other than EMB. See Functions, Files & Disk Types for details.

Chapter 8

Reading & Outputting Designs

ES Schiffli makes a distinction between 'logical' and 'physical' machine functions. Logical functions are saved as 'object properties' in the native EMB design file. This concept may be new to Schiffli designers who are used to working on a stitch-by-stitch basis.

EMB files can be output to a wide variety of Schiffli formats. When outputting the final machine code – e.g. for Plauen or Saurer type machines – ES Schiffli ensures that the physical functions occur on the right stitch and in the right phase (for Plauen), based on preset values (defaults). In other words, it generates the necessary physical functions by interpreting the logical functions. See also Supported Schiffli file formats (Supplement).

This section covers the reading and outputting of Schiffli machine files. It also covers printing Schiffli production worksheets.

Reading Schiffli machine files

Schiffli designs in EmbroideryStudio can be opened, edited and saved in EMB file format, as well as Schiffli machine file formats, ESS and ESL. Designs can also be read and written in many other machine-specific formats. See also Supported Schiffli file formats (Supplement).

Note: Users with sufficient experience can check the physical machine functions one-by-one in the final machine file. See also Punching machine files to Wilcom Jacquard Punch (Supplement).

Machine files

Machine files are generally not suited to scaling because stitches are not regenerated. However, EmbroideryStudio can interpret object outlines, stitch types and spacing from stitch data with some success. In this way, you can re-constitute old tape format files and other machine file formats for modification in EmbroideryStudio. These 'recognized' designs can be scaled with stitches recalculated for the new outlines. Alternatively, object recognition can be applied to selected stitching after the design has been opened and edited.

Stitch processing generally is more effective for multihead machine files than Schiffli. With Schiffli designs, overall object recognition works best on emblem-style full-coverage stitching with minimal functions. Processing is normally used, however, on selected stitching, if at all. In short, it is better not to perform overall object recognition when opening Schiffli designs. This means deliberately turning it off prior to opening.

Tip: Before proceeding, you are advised to read the Processing Design Files chapter in the Reference Manual to become well acquainted with the handling of machine files and design files in EmbroideryStudio.

Recognition limitations

If a stitch type is not recognized accurately, the settings in the **Object Properties** dialog will not match the stitches. The stitches will remain the same as in the original design until you make changes and regenerate them. If you change the design, stitches will be regenerated according to the object properties. Designs converted from tape format files and expanded designs which have non-standard stitch types may require editing in EmbroideryStudio to ensure that the object outlines, stitch types, stitch density and colors are correct.

Note: Stitch editing is affected by object recognition in two main ways: connecter stitches cannot be edited except by moving the end points, and only manual stitch can preserve stitches edits after stitch generation from objects.

Open Schiffli design files

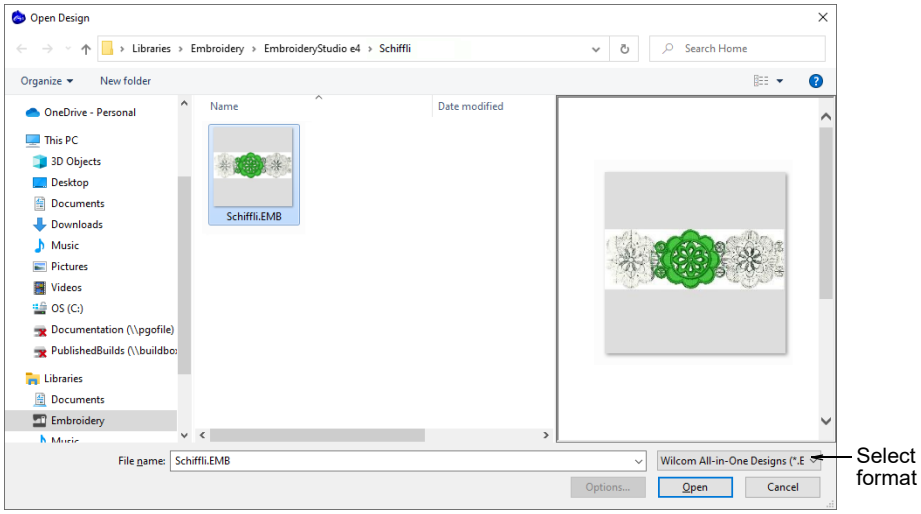
Use Standard > Open Design to open an existing design.

When you open Schiffli machine files, you can set decoding options to determine how to read the design. A set of **Standard** decoding options are the same for all formats. The **Conversion Details** decoding options are specific to the file type being opened – Plauen or Saurer. See also Schiffli encoding & decoding settings (Supplement).

Note: Opening RCC type designs in EmbroideryStudio is not covered here.

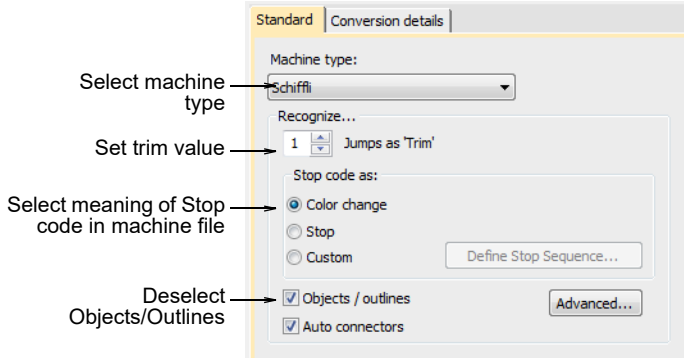
To open Schiffli design files...

1 Open the file from your hard disk, or read it from tape or embroidery disk.



2 Select a Schiffli file format from the **Files of Type** list and select the file to open.

3 Click **Options**. The **Open Options** dialog opens at the **Standard** tab.



Caution: Decoding options should reflect how the design was originally digitized, not how you want it now. Experiment with the settings to get the best results.

4 Select Schiffli as the machine format from the **Machine Type** list if not already selected.

5 Enter the number of jumps to recognize as trims. The specified number of consecutive jumps will be converted to a trim function.

Caution: If this value is different from the original design, trim functions will be not be inserted correctly.

6 Use the **Stop Code** panel to define the meaning of stop codes in the original machine file.

Function	Purpose
Color Change	Stop codes are interpreted as Next Color commands. The next color is selected from the default color palette.
Stops	Stop codes are interpreted as Explicit Stops. The machine stops stitching.
Custom	Lets you map thread colors to every Stop code in the file. This means you can color code machine files which do not contain needle addressing information before opening the file. See Reassigning colors to machine files (Reference Manual).

7 Select or deselect the **Objects/Outlines** checkbox as required.

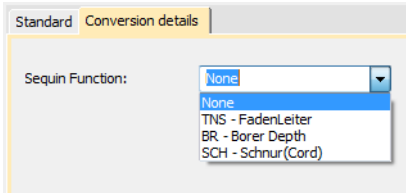
- Open **without** object/outline recognition for 'stitch editing' or 'block editing' of manual stitch objects. This is the default.
- Open **with** object/outline recognition for re-shaping, or stitch density or pull compensation adjustments of supported stitch types, particularly Satin and Run stitch. With this option, designs are more likely to be emblem than lace. If you select this option, the **Advanced** button becomes available. See Advanced recognition settings (Reference Manual).

Tip: For lace designs, Tatami recognition should be turned off in the advanced options. If only a few objects need to be reshaped, it may be better to recognize only selected stitches inside EmbroideryStudio after opening.

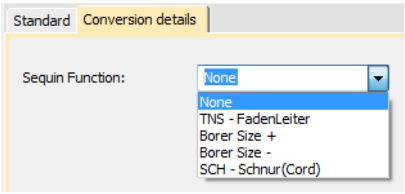
8 Select or deselect the **Auto Connectors** checkbox as required.

- Deselect to open designs with connectors recognized as Manual objects. This avoids stitch editing problems caused by automatic connectors. This is recommended for lace designs.
- Select to open appropriate designs with automatic connectors **without** having to use object/outline recognition. This option is more applicable to emblem style designs than lace.

9 Select the **Conversion Details** tab for further machine-specific options.



Plauen options



Saurer options

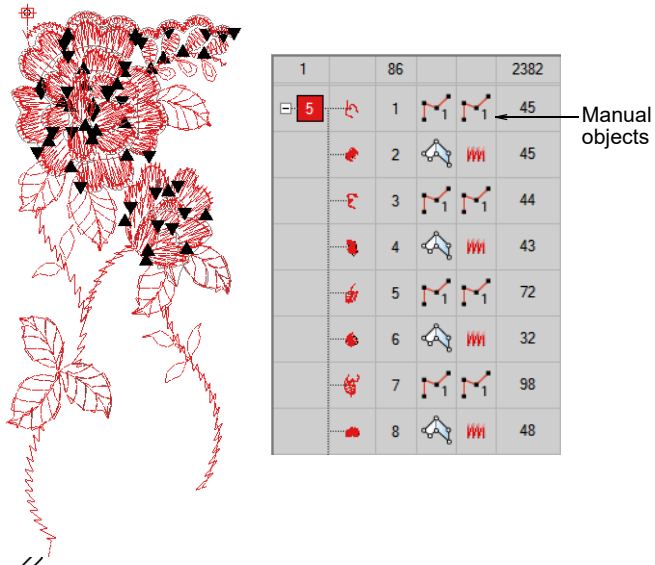
10 Select the **Sequin Function** you require.

If the sequin function is set to something other than **None**, all instances of the selected physical function are converted to the ES Schiffli **Drop Sequin** function. See also Other machine functions.

Tip: In order to select the correct physical function, you have to know what function was used in the original design file to drive the sequin mechanism on the target machine. If you don't know, experiment with different settings until you get the right one.

11 Click **OK**.

12 Click **Open**. If you use the default settings, the design opens as a collection of Manual objects with only general and connector properties.



Note: ES Schiffli adds the missing information to the file but does not change the stitches. See also **Adjusting stitch density** in the Reference Manual.

Outputting Schiffli design files

Schiffli designs in EmbroideryStudio can be opened, edited and saved in Wilcom EMB file format, as well as ESS and ESL, Wilcom's Schiffli machine file formats. Designs can also be read and written in many other machine-specific formats. See also Supported Schiffli file formats (Supplement).

Note: ESS is the primary machine file format for Wilcom-developed Schiffli servo control systems. When the ESS file is read directly by a Wilcom Electronic Servo System (WESS), high data resolution and stitch accuracy are possible.

Encoding options

When outputting machine files, you need to adjust the encoding options for Schiffli format designs to stitch correctly on the target machine. Options vary with the selected file type – i.e. whether based on Plauen or Saurer formats. The default values are specific to the file type.

The defaults are **not** suitable for all machines, particularly those with mechanical automats. In particular, the **Stitches for Auto Fast** field applies to Needles Out or Jump stitches as well as needle or borer penetration stitches. If you want to automatically have jumps in a design

performed at slow speed (together with small numbers of boring penetrations), you need to set the number of stitches to a value which is above the largest (expected) number of stitches for Schiffli design Jumps. In practical terms, this can be calculated as follows:

- Largest Jump Distance: 300mm
- Safe Jump Length: 6mm
- Number of Jump Stitches: 50

Thus, you need to set the **Stitches for Auto Fast** field to 50. If outputting to a Saurer machine, the **Auto Slow/Fast for Needles In/Out** option must also be selected. See the procedure below.

Related topics...

- Customize machine formats for specific designs
- Modifying Schiffli default settings
- Converting designs with the Schiffli Disk Converter

Machine starting status

ES Schiffli requires that when a new embroidery design is about to start stitching, the Schiffli machine will have a starting status and all the devices on the machine will be correspondingly set. ES Schiffli monitors and records any change in device status during the encoding process. Examples of starting statuses include:

- Needles: Out
- Speed: Slow (or Fast for Saurer)
- Thread Tension: Stepp
- Borers: Out
- Borer Position: Middle (6 or 7, depending if Plauen or Saurer).

At the end of the design, ES Schiffli can restore the starting status of each device with the **Restore Function State Before Stop** setting. The setting is also necessary when parts of the design are repeated on the machine. For example, if the borer depth was left at +1 (8) at the Stop function that ends the B part of an ABC type design, then after each repeat of the B part, the borer depth would increment by 1 each time to 9, 10, etc. Furthermore, the controller of electro-mechanical Plauen Hiraoka machines requires that the DAT design state is restored at every Stop before the design is loaded for stitching. State restoration is optional for cases where designs are split into pieces and then punched onto several cards for mechanical machines.

Output Schiffli files for production

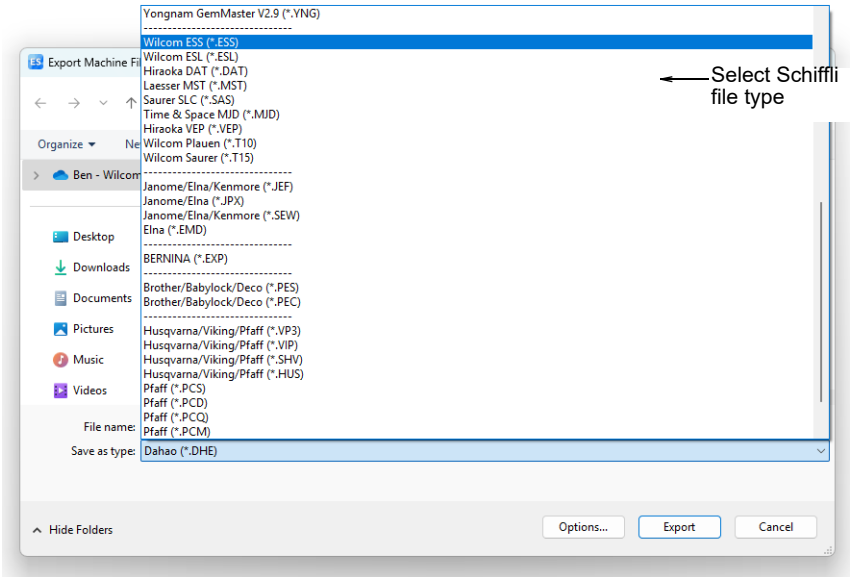
Your designs should always be saved in Wilcom EMB file format as this preserves all the design settings, including object properties. When you want to stitch it out, however, you need to output it to the appropriate machine file as shown in the table. If a selected machine format does not support a particular function in the design – either automatically or manually inserted – it is simply ignored.

Machine	Output file format
Hiraoka	DAT
Plauen	T10
Saurer	T15
Saurer SLC	SAS
WESS	ESS
RCC	ESL

To output Schiffli design files...

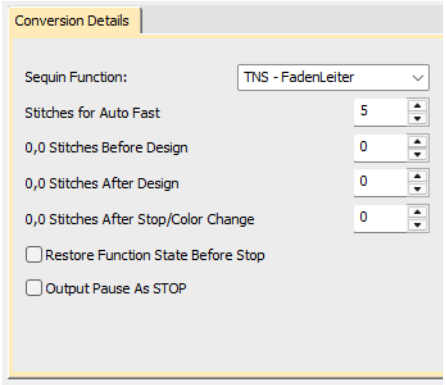
1 Open the file from your hard disk, or read it from tape or embroidery disk and edit as required.

2 Select **File > Export Machine File**.

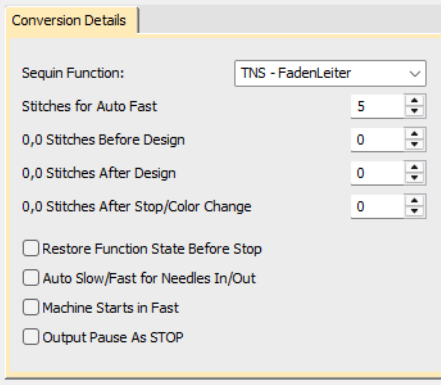


3 Select a Schiffli file type from the **Save as type** droplist.

4 Click **Options**. The **Export Options** dialog opens. The **Conversion Details** encoding options depend on the file type – Plauen or Saurer.



Plauen options



Saurer options

5 Select the **Sequin Function** you require if different from the default.

If the **Sequin Function** field is set to something other than **None**, all instances of the ES Schiffli **Drop Sequin** function are converted to that physical function. Otherwise, the function is ignored. See also Other machine functions.

6 Adjust stitch encoding as necessary:

Function	Purpose
Stitches for Auto Fast	This value determines the minimum number of consecutive stitches/borer penetrations/needle-out movements required before a speed change is possible. For example, if the value is 5 and there are 3 needle penetrations, they will all be done in slow speed. For Saurer designs, Auto Slow/Fast for Needles In/Out must also be enabled.
Empty stitches before design	Usually non-zero for punched cards.
Empty stitches after design	Usually non-zero for punched cards.
Empty stitches after Stop/Color Change	Usually non-zero for punched cards.

Tip: Punched cards generally require a certain amount of blank space before and after the design in order to wind it on the spool. 200 empty stitches translates to about 1 meter of card. You may also want to insert empty stitches after color changes for easy identification.

7 Toggle remaining options as necessary:

Function	Purpose
Restore function state before Stop	If enabled, all necessary functions are automatically inserted in the output file before the Stop code. The machine returns to its state at design start.
Auto Slow/Fast for Needles In/Out	Only optional for Saurer designs. If enabled, a Slow function will be inserted before a needle change. The Fast function will be inserted according to the value set in the Stitches for Auto Fast field.
Machine starts in Fast	If enabled, EmbroideryStudio assumes that the machine is already running in fast speed at design start. For Saurer format files, it is essential that this option be specified correctly or the speed change commands will be encoded back-to-front.

8 Select **Output Pause as Stop** as required. Encoding depends on the selected file type:

File type	Description
T10	If enabled, Pause commands are output as normal Plauen Stop function, otherwise they are not output at all.
DAT	If enabled, Pause commands are output as DAT Stop function, otherwise they are output as DAT Pause function.
SAS	If enabled, Pause commands are output as a Stop(13), otherwise they are not output at all.
Other	If enabled, Pause commands are output as a generic Stop for T15 and others, otherwise they are not output at all.

9 Click **OK**.

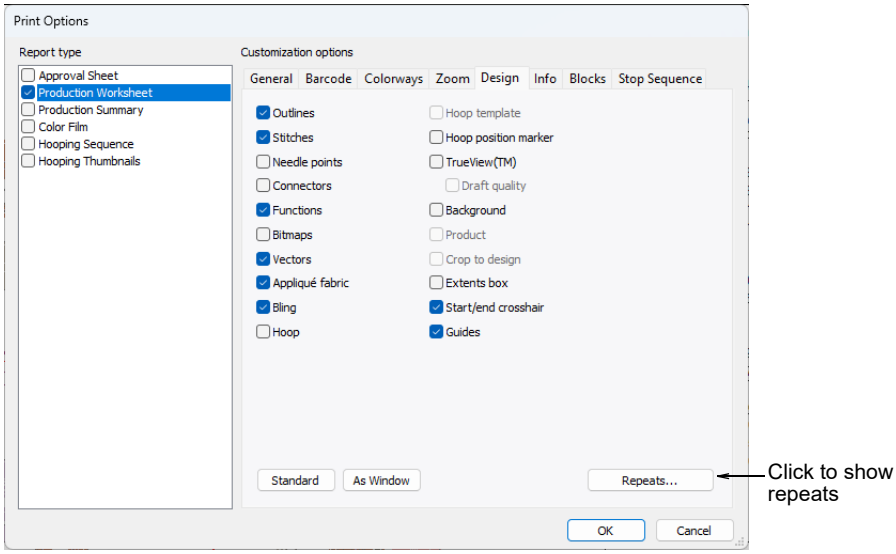
Printing Schiffli production worksheets

Printing a Schiffli production worksheet is similar to printing one for multihead work. The only difference with Schiffli designs is that you can show several repeats in both horizontal and vertical directions. See also Printing production worksheets with station information.

To print a Schiffli production worksheet...

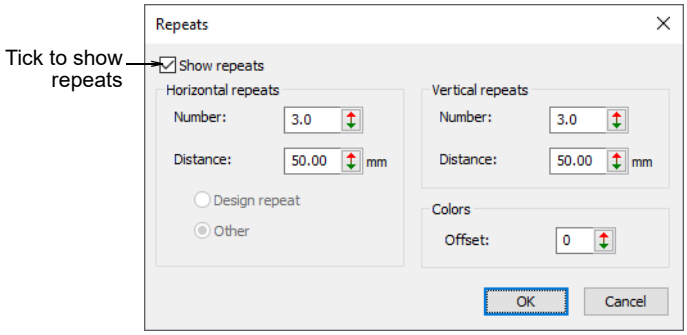
1 Select **File > Print** or press **Ctrl**+**P**. The **Print** dialog opens.

2 Click **Options**. The **Print Options** dialog opens.



3 Select to display pattern arrangements if required.

4 In the **Design** tab, click the **Repeats** button.



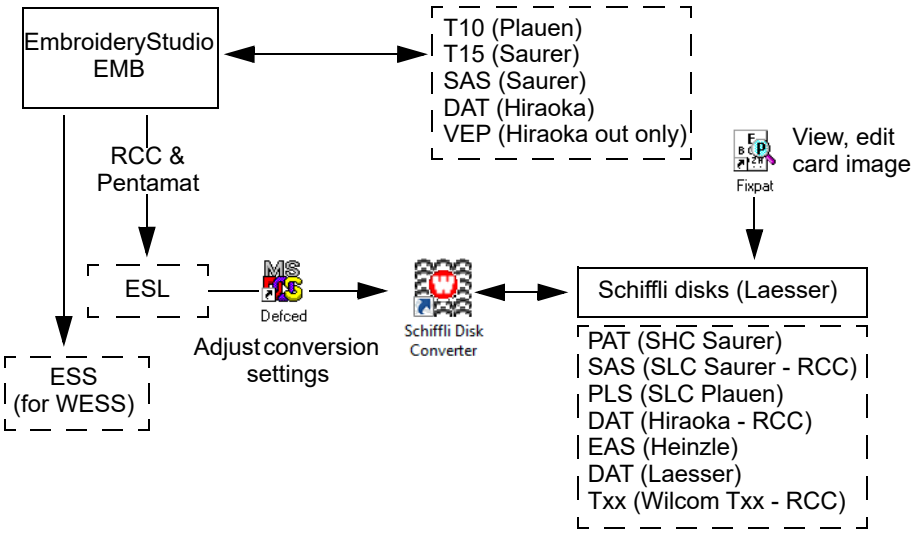
5 Select the **Show Repeats** checkbox and select from the available options. See Setting up design repeats for details.

6 Click **OK**.

Chapter 9

Utility Programs

EmbroideryStudio provides a number of external utility programs which can be used to modify, convert, or punch designs, especially those in older tape formats.



Specifically these utilities are used to:

- Check stitches and machine functions on Jacquard cards:

  The ES Schiffli **FIXPAT** (Fix Pattern) utility is used for safety-checking designs and can be useful as a fast editor for known problem patterns as well as direct function editing. The program also provides search capabilities to find and change machine functions or insert new ones.

- Convert designs to new Schiffli machines formats:

  The **Schiffli Disk Converter** is used to convert older designs to and from the formats required for newer Schiffli machines. Some formats, notably RCC, cannot be directly converted in EmbroideryStudio, but can be converted using the Schiffli Disk Converter.

- Modify Schiffli default values:

  Occasionally you may need to customize the Schiffli default settings according to your own requirements, notably when converting to RCC format using the Schiffli Disk Converter. The default settings are

stored on your local hard drive and you can use the ES Schiffli **DEFCED** utility to change them.

- Punch machine files to **Wilcom Jacquard Punch**:

  The Schiffli Punch utility for Windows sends a machine file from your PC to a Wilcom Jacquard Punch (the predecessor of the ElectroPunch).

Checking stitches & machine functions on Jacquard cards

Experienced Schiffli digitizers can read the Plauen or Saurer type Jacquard cards and even make modifications to the card. The ES Schiffli **FIXPAT** utility which comes with ES Schiffli provides the same functionality. It is a conventional Schiffli editing program which displays the machine file in the Jacquard card format as the punched holes would appear. Some stitches, such as borer-offset compensation stitches, can only be edited or viewed in FIXPAT. Use FIXPAT to edit designs such as those with extensions T10 to T39. See Supported Schiffli file formats for details.

Note: Most RCC and INC (Individual Needle Control) designs are shown 'shifted' on screen.

In ES Schiffli only the stitches and borer cuts are displayed, not the frame movements. Thus boring is always generic with the borer offset added outside ES Schiffli. You can only edit/view the borer-offset compensation stitches in FIXPAT.

Edit stitches with FIXPAT

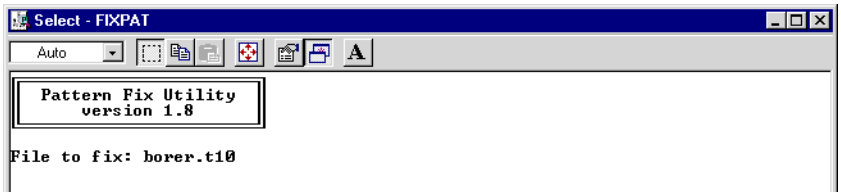
Use FIXPAT (Windows desktop) to check and edit known problem patterns.

You can use the ES Schiffli FIXPAT utility as a fast editor for known problem patterns in Schiffli machine files.

Caution: The loading of Schiffli machine files is mainly for checking of EmbroideryStudio-created designs, not for editing designs created on other systems.

To edit stitches with FIXPAT...

1. Double-click the **FIXPAT** icon on the Windows desktop.



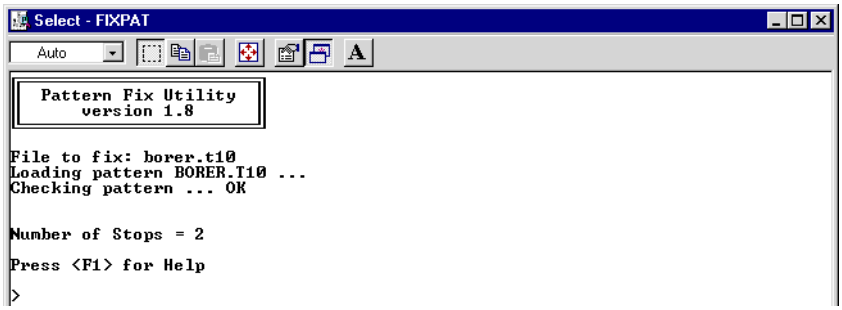
FIXPAT prompts you for the file name of the file you want to edit. This must be 8 characters or less.

Note: The program assumes that the file is located in the **C:\design** folder.

2 Type the name of the design together with the file extension.

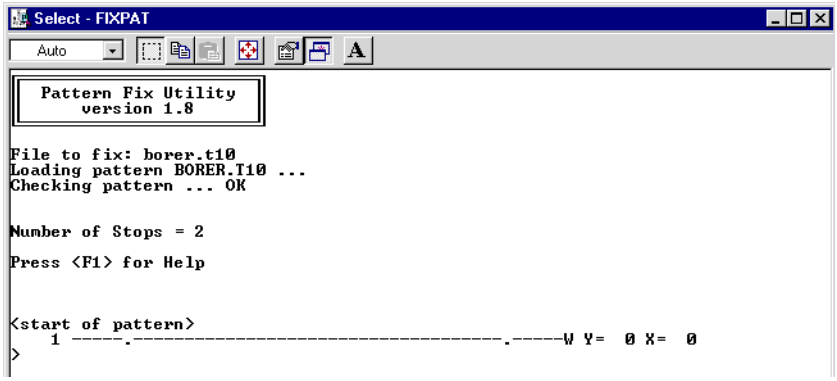
Tip: An alternative way to load the file into FIXPAT is to use Windows drag and drop functionality by 'dragging' the file from Explorer and 'dropping' it onto the FIXPAT desktop icon.

If the loaded pattern has no illegal data, the following message will be displayed.



If the program finds any bad pattern data, you will be prompted to clear it.

3 Press Enter↵.

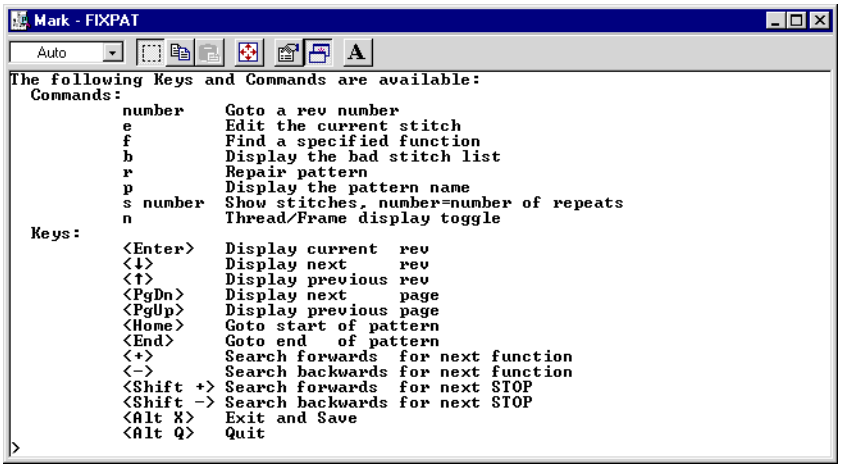


The pattern is now displayed as on a Schiffli card. For each stitch, the display shows:

- the stitch (or rev) number
- the hole pattern for that stitch
- an M/W phase indicator (Plauen)
- the X,Y coordinates of the stitch
- any function on the stitch (two can be shown for Plauen).

If the sequence of stitches on the card display is broken, a blank line is displayed between the stitches to indicate that they are not consecutive. Bad data on a stitch is highlighted.

4 Press F1 to bring up the complete command listing.



All options listed under **Commands** must be followed by Enter↵. The options under **Keys** are invoked by pressing the required key.

5 To go to a particular stitch in the pattern, type the rev number at the prompt and press Enter↵.

```
            <Alt Q>   Quit
>100
  100 --O-- ------O-------O-----O--------------- --O--M Y= 34 X=  3
>
```

6 To edit the current stitch, type **E** at the prompt and press Enter↵.

```
Editing:
   23 --O--.------O---------O-----O---------O---.--O--W Y= 32 X= 65
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
```

Note: If the stitch contains bad data you will be prompted to fix it. Type **Y** at the prompt and press Enter↵ to fix any bad stitches.

7 To change **X**, for example, press X and you will be prompted to enter a new value.

```
Editing:
  100 --O-- ------O-------O-----O--------------- --O--M Y= 34 X=  3
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
New X:
```

8 Enter the new **X** data – e.g. 10 – and press Enter↵.

The display will reflect the changed value.

```
Editing:
  100 --O-- ------O-------O-----O--------------- --O--M Y= 34 X=  3
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
New X: 10

Editing:
  100 --O-- ------O-------O------------O-------- --O--M Y= 34 X= 10
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
```

9 If you change your mind, press **Esc** to abort the edit.

```
Editing:
  100 --O-- ------O-------O------------O-------- --O--M Y= 34 X= 10
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn

Edit Aborted
>
```

Note: Changing **Y** data is similar to changing **X** data. You can continue to change the **X, Y** data in any order in the same way described.

Insert & delete functions on stitches

As well as stitch editing, You can use FIXPAT for direct function editing. See also To edit stitches with FIXPAT....

To insert and delete functions on a stitch...

1 While in edit mode, press **I**.

```
Editing:
   23 --O--.------O---------O-----O---------O---.--O--W Y= 32 X= 65
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
Inserting function:
       1)  Nout
       2)  Slow
       3)  Bdp-
       4)  Tns-
       5)  Cin
       6)  StfI
       7)  Blat
       8)  STOP
     <Esc> to escape

Enter the Number:
```

A function list is displayed and the program waits for your selection. You can escape from changing the function data by pressing Esc at any time.

2 Type the item number of the function you want to insert and press Enter↵.

```
Enter the Number: 2

Editing:
   23 --O--.------O---------O-----O---------O---.O-O--W Y= 32 X= 65 Slow
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
```

The display will reflect the change.

3 To delete a function, press D and the function list will display.

```
Editing:
   23 --O--.------O---------O-----O---------O---.O-O--W Y= 32 X= 65 Slow
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
Deleting function:
       1)  Nout
       2)  Slow
       3)  Bdp-
       4)  Tns-
       5)  Cin
       6)  StfI
       7)  Blat
       8)  STOP
     <Esc> to escape

Enter the Number:
```

4 Type the item number of the function you want to delete and press Enter↵.

```
Enter the Number: 2

Editing:
   23 --O--.------O---------O-----O---------O---.--O--W Y= 32 X= 65
<Esc>=abort,<F10>=accept,<X>=change X,<Y>=change Y,<I>=insert fn,<D>=delete fn
```

The display will reflect the change.

Note: You can continue to change the function data in any order in the same way described.

5 When the new data is correct, press F10 to accept the changes and return to the prompt.

Pressing Esc will abort any changes.

Find functions

You can use FIXPAT to find specified machine functions. See also To edit stitches with FIXPAT....

To find a function...

1 Type **F** at the prompt and press Enter↵.

```
>f
Functions:
        1)  Nout/Nin
        2)  Slow/Fast
        3)  Bdp-/Bdp+
        4)  Tns-/Tns+
        5)  Cin/Cout
        6)  StfI/StfO
        7)  Blat/Step
        8)  STOP
  <Enter>  repeat last search
    <Esc>  to escape

Enter the Number:
```

The search starts from the current rev and proceeds to the end of the pattern.

Tip: To search the whole pattern, use the Home key to go to the start of the pattern before using the **F** command.

2 Type the number of the function you are looking for and press Enter↵.

```
Enter the Number: 2

   32 ----- -------O------O----O---------------- O-O--M Y=-24 X=  2 Fast
>
```

If the function is found, the rev will be displayed. Otherwise the message 'Function not found' will appear.

3 To repeat a search, type **F** at the prompt and press Enter↵.

Check for bad stitches

If bad data was found and repaired when loading the pattern, you can list the rev numbers that were updated. See also To edit stitches with FIXPAT....

To check for bad stitches...

◀ Type **B** at the prompt and press Enter↵.

```
>b
Bad Stitch List:

    No errors found

>
```

The table summarizes the error conditions you may encounter and the actions the software will take to rectify them.

File type	Error	Condition	Action
Saurer (T15)	Nop function	Four hole function present	function replaced with blank
	Series X1	Three hole in X1 series	three holes replaced with blank
	Series X2	Three hole in X2 series	three holes replaced with blank
	Series X3	Three hole in X3 series	three holes replaced with blank
	Series Y1	Three hole in Y1 series	three holes replaced with blank
	Series Y2	Three hole in Y2 series	three holes replaced with blank
	Series Y3	Three hole in Y3 series	three holes replaced with blank
Plauen (T10, T12)	Illegal X	Illegal BCD X data in machine file	X data cleared
	Illegal Y	Illegal BCD Y data in machine file	Y data cleared

Repair stitch patterns

Bad data may be cleared manually with the **Repair Pattern** command. See also To edit stitches with FIXPAT....

To repair stitch patterns...

1 Type **R** at the prompt and press Enter↵.

```
>r
Checking pattern ... OK
>
```

2 If bad data is present, you will be prompted to clear it. Type **Y** at the prompt and press Enter↵.

3 If you want to leave it so that it may be examined later in detail, type **N** at the prompt and press Enter↵.

The message 'Bad data present' will appear.

Display pattern names

The name of the pattern you have loaded can be displayed with the **Display Pattern Name** command. See also To edit stitches with FIXPAT....

To display the pattern name...

◀ Type **P** at the prompt and press Enter↵.

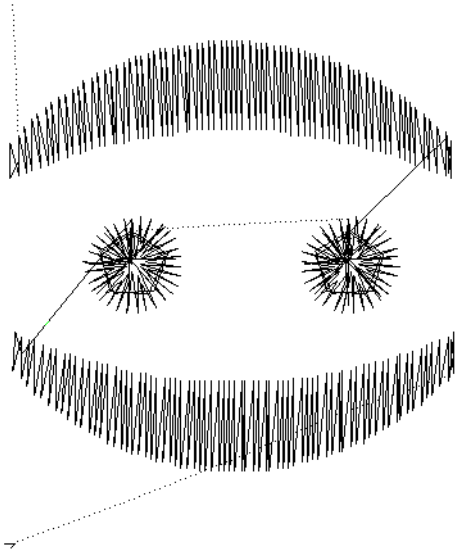
```
>p
Pattern: BORER.T10
>
```

Show stitches

You can use FIXPAT to repair faulty stitch patterns. The **Show Stitches** command displays the pattern and lets you locate shift errors. See also To edit stitches with FIXPAT....

To show stitches...

◀ Type **S** at the prompt and press Enter↵.



Display design repeats (not Plauen Hiraoka RCC)

You can use FIXPAT to display multiple repeats. This procedure works for all except Plauen Hiraoka RCC formats. See also To edit stitches with FIXPAT....

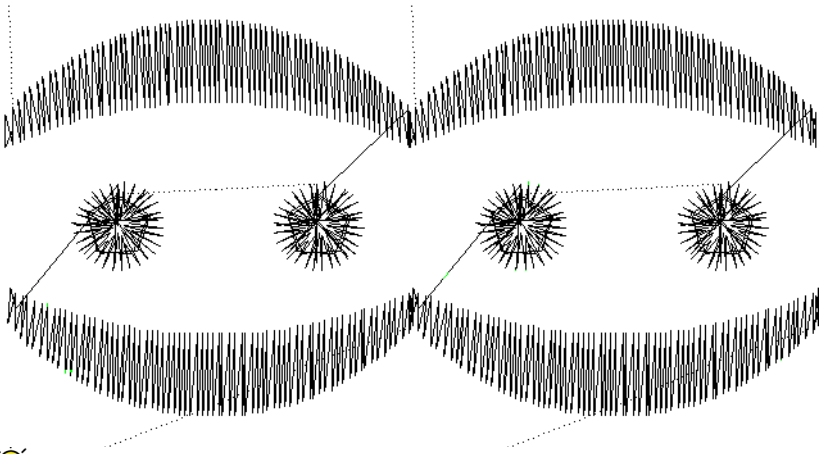
To display design repeats (not Plauen Hiraoka RCC)...

1 To display more than one repeat of a pattern, type a number after the **S** command and press Enter↵.

   The number entered becomes the default number of repeats.

```
>s2
Repeat [4/4]:
```

2 If the design repeats itself, for example, every second needle, enter the repeat as **8** and press Enter↵.



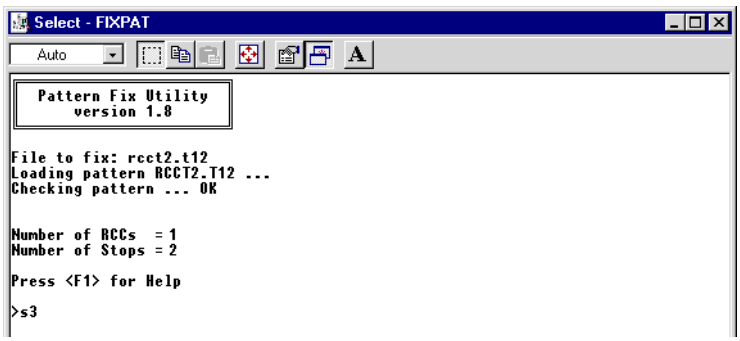
Tip: The number in the square brackets [4/4] is the last value that was entered for the repeat. To re-use the last value entered, press Enter↵ without typing a number.

Display design repeats (Plauen Hiraoka RCC)

You can use FIXPAT to display multiple repeats. This procedure works for Plauen Hiraoka RCC formats. See also To edit stitches with FIXPAT....

To display design repeats (Plauen Hiraoka RCC)...

1 To display more than one repeat of a pattern, type a number after the **S** command and press Enter↵. The number entered becomes the default number of repeats.



For Hiraoka RCC coding, at each Stop, the program assumes a change of repeat – e.g. from 4/4 to 12/4. The program will ask for the repeat and the start needle for each change of repeat. It will only ask for this information once unless the number of horizontal repeats is changed. Changes of needle within a repeat – e.g. from 12/4 needle 1 to 12/4 needle 2 – are automatically defined in the design at each RCC+ function and do not require any operator input.

2 The **Start Design in Repeat** command defaults to the last setting – e.g. 4/4. Press [Enter↵] to accept.

```
>s3
3 Changes of Repeat in the design
  Start design in Repeat [ 4/4]:
```

On a 4/4 Repeat, the Start needle defaults to 1.

3 Enter the **Change to Repeat** at the prompt – e.g. 8/4 – and press [Enter↵].

```
>s3
3 Changes of Repeat in the design
  Start design in Repeat [ 4/4]:
                    Start needle: 1

Repeat change 2 at stitch 159
  Change to repeat [ 4/4]: 8/4
```

4 Enter the **Start** needle for the second repeat – e.g. 1 – and press [Enter↵].

```
Repeat change 2 at stitch 159
  Change to repeat [ 4/4]: 8/4
        Start needle [ 1]: 1
```

You will be prompted for the total number of repeat changes. When you have entered all the required data, press [Enter↵] and the design will display showing multiple repeats.

Display threads or frame movements

Either thread paths or frame movements can be shown on the graphic display when showing stitches. You can set the mode at any time before you enter **S**. See also Edit stitches with FIXPAT.

When you choose 'Display Frame Movements', the stitch display will show the path of the active needles over the material including movements with 'Needles Out'. This is the default display. When you choose 'Display Threads Only', the stitch display will show the thread paths. This allows the path of the threads to be checked so that hanging threads are not sewn over.

To display threads or frame movements...

1 To change the display mode, type **N** at the prompt and press [Enter↵].

```
<start of pattern>
    1 --- --- --- ---- --- --- --- X=   0 Y=   0
>n
Display Threads Only
>
```

2 This is a toggle command and you can change modes by entering **N** again.

```
<start of pattern>
    1 --- --- --- ---- --- --- --- X=   0 Y=   0
>n
Display Threads Only
>n
Display Frame Movements
>
```

Exit FIXPAT

Use the command line to exit FIXPAT.

To exit FIXPAT...

1 To exit the program, press Alt + X.

```
  23 --O--.------O---------O-----O---------O---.O-O--W Y= 32 X= 65 Slow

Save the pattern to disk (y/n)? [y]
```

2 To exit the program without saving changes, press N.

3 To exit the program while saving changes, press Y.

```
Save the pattern to disk (y/n)? [y] y
Pattern Name (<Enter> to overwrite original) :
```

- If you want to replace the original pattern with the new, press Enter↵.
- If you want to create a new pattern based on the original, enter a new name. This will preserve the original pattern file in your designs folder and create a new pattern with the new file name.
- If you want to quit and ignore changes, press Alt + Q.

Converting designs with the Schiffli Disk Converter

Most Schiffli format designs can be saved directly from EMB file format to Schiffli machine file formats in EmbroideryStudio. Schiffli machine files are converted directly, and do not need to pass through an intermediate file format like T10 or T15 which are not able to store all known functions.

Conversion file formats

Some formats, notably RCC, cannot be directly converted in EmbroideryStudio, but can be converted using the Schiffli Disk Converter. This utility contains:

- Support for multiple file selection – you can convert multiple machine files from floppy disk.

- Preservation of input file names – input file names can be carried over to the output file names.

The Schiffli Disk Converter can be used to convert between the following formats:

Machine	Disk format	File format	Convert from
Plauen	Heinzle	EAS	T10 *
Saurer	Heinzle	EAS	T15 *
Saurer Pentamat	Saurer SHC	PAT	T15
Laesser	Laesser	DAT	T15
* These file types can be converted in both directions			

Note: The Schiffli Disk Converter also provides conversion for RCC and Pentamat codes.

Related topics...

- Digitizing for RCC Designs
- Edit stitches with FIXPAT

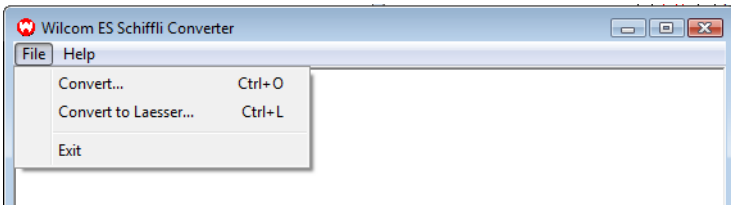
Convert machine files to Schiffli disk formats

Use the Schiffli Disk Converter (Windows desktop) to convert multiple machine files to floppy disk format.

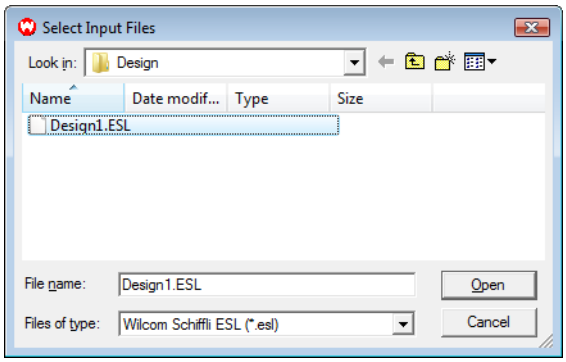
The **Schiffli Disk Converter** can be used to convert one or more machine files to another format.

To convert a machine file to a Schiffli disk format...

1 Double-click **Schiffli Disk Converter**. The **Wilcom Schiffli Converter** window opens. The file menu gives you two options: **Convert** and **Convert to Laesser**.



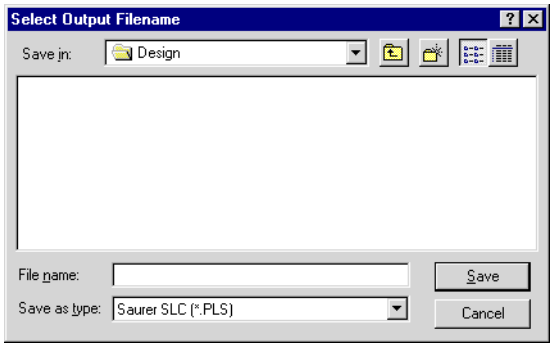
2 Select **File > Convert** or **Convert to Laesser**. The **Select Input Files** dialog opens.



3 Select the file you want to convert. Select multiple files of the same format for batch conversion using the Shift or Ctrl keys.

Note: Only ESL to RCC tape codes and **Laesser (DAT) – Output only** do not support multiple file selection and conversion.

4 Click **Open**. The **Select Output Filename** dialog opens.



The file name/s selected in the **Select Input Files** dialog appear in the **File Name** field.

Note: Three letter format extension is omitted.

5 Select the format you want to convert to from the **Files of Type** dropdown list.

6 Select a folder to save in, then click **Save**.

Note: When using the Laesser conversion, the following constraints apply:

- The conversion only works for Wilcom T15 to Laesser.

- The conversion is done using a program supplied by Laesser. This program only writes to floppy disk.
- The program writes a file called 'Stick_01.dat'. It does not check if there is an existing file of the same name.
- The program does not support multiple file selection.

Modifying Schiffli default settings

Occasionally you may need to customize the Schiffli default settings according to your own requirements, notably when converting to RCC format using the **Schiffli Disk Converter**. The default settings are stored on your local hard drive and you can use the **DEFCED** utility to change them permanently. It is also possible to save different versions of the default values to be loaded as required. The values you need to know are listed here.

Format of defaults

Refer to the table below for an explanation of the format of defaults.

Item #	Description	Range of values	Unit of value	Current defaults
186	SAURER BORING: Use overshoot before BORER IN	0 = no 1 = yes		= 1.00
187	SAURER BORING: borer overshoot in X direction		(6X mm)	= 0.00
190	SAURER STUEPFEL: overshoot in X direction		(6X mm)	= 0.00

Change default conversion settings

Use DEFCED (Windows desktop) to adjust default settings used by the Schiffli Disk Converter.

Default settings are preset values which help to support the specific requirements of various Schiffli machines and the Schiffli operation itself. For example, you can define the number of leading holes on the Jacquard card. To change the default values, you need to change the stored values in the table of defaults by means of the **DEFCED** utility. The program runs in a DOS Window.

Note: EmbroideryStudio does not itself require default settings. They are only required when ESL designs are output to their final machine file format by the **Schiffli Disk Converter**.

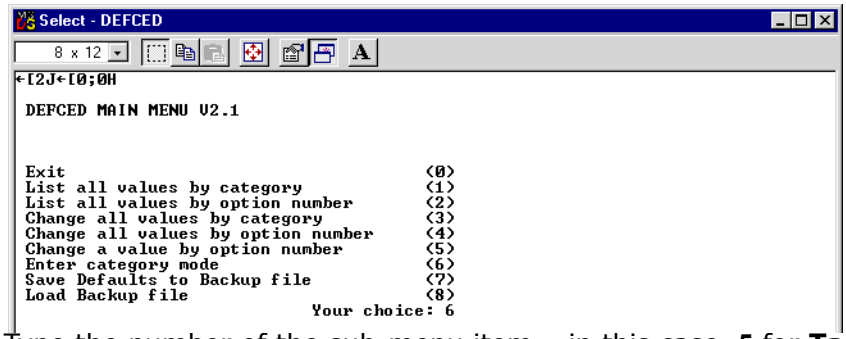
The settings you need to know are listed below. The DEFCED utility also contains values which are not used by the Schiffli Disk Converter. While you can change them, they will have no effect. See Default Schiffli settings by category for details.

To change default conversion settings...

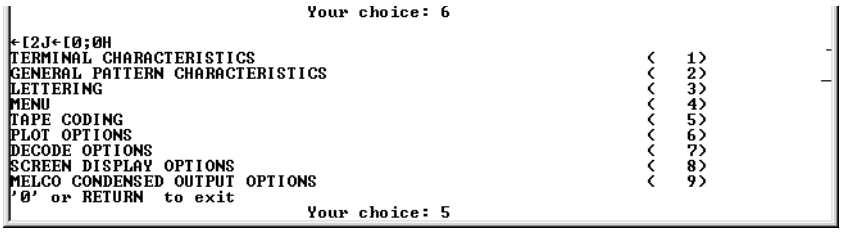
1 Double-click the **DEFCED** icon on the Windows desktop.

For example, we may want to manually control the overshoot after movements with Needles Out (Jumps). (Normally the program would do this automatically.) To do so, we need to change the **Jump Overshoot** default to zero.

2 Type the number of the main menu item – in this case, **6** for **Enter category mode** – and press Enter↵.



3 Type the number of the sub-menu item – in this case, **5** for **Tape Coding** – and press Enter↵.



4 Type the number of the next sub-menu item – in this case, **3** for **Schiffli** – and press Enter↵.

```
                              Your choice: 5

←[2J←[0;0H
GENERAL                                                    <   1>
MULTI HEAD                                                 <   2>
SCHIFFLI                                                   <   3>
'0' or RETURN  to exit
                              Your choice: 3
```

5 Again type the number of the next sub-menu item – in this case, **3** for **Jump Overshoot** – and press Enter↵.

```
                              Your choice: 3

←[2J←[0;0H
EMPTY REVS IN CARD                                         <   1>
STARTING BORER DEPTH                                       <   2>
JUMP OVERSHOOT                                             <   3>
SCHIFFLI TENSION                                           <   4>
SCHIFFLI SPEED                                             <   5>
VARIABLE XY PULL COMPENSATION                              <   6>
PLAUEN-SPECIFIC                                            <   7>
PLAUEN-RCC SPECIFIC                                        <   8>
PLAUEN JR SPECIFIC                                         <   9>
PLAUEN PENTAMAT                                            <  10>
SAURER-SPECIFIC                                            <  11>
SAURER-RCC/PENTAMAT SPECIFIC                               <  12>
SAURER AUTO TENSION                                        <  13>
SAURER AUTO RPM                                            <  14>
'0' or RETURN  to exit
                              Your choice: 3
```

6 The next screen provides you with a variety of modifiable settings. Again type the number of the item you require – in this case, **80** for **Automatic Overshoot** – and press Enter↵.

```
                              Your choice: 3

←[2J←[0;0H
AUTOMATIC OVERSHOOT                     0.0=NO, 1.0=YES      =   1.00 [080]
PROGRAMMED X OVERSHOOT (ie. non-automatic)      1X mm        =   0.00 [081]
PROGRAMMED Y OVERSHOOT (ie. non-automatic)      1X mm        =   0.00 [082]

Enter option number to change option
'A' to change all
'0' or RETURN  to exit
                              Your choice: 80
```

7 The Automatic Overshoot option provides you with two alternatives: 'no' and 'yes'. Again type the number of the option you require – in this case, **0** for **No** – and press Enter↵.

```
                              Your choice: 80

080 AUTOMATIC OVERSHOOT                     0.0=NO, 1.0=YES      =   1.00 = 0
```

8 Having made your selection, you are prompted to press Enter↵ to continue. This takes you back to the previous menu level.

```
                              Your choice: 80

080 AUTOMATIC OVERSHOOT                     0.0=NO, 1.0=YES      =   1.00 = 0

Press <ENTER> to continue
```

9 Press Enter↵ repeatedly to return to the main menu.

Note: If you choose not to save the changes to a backup file (Option 7 of the main menu), the default settings will be permanently

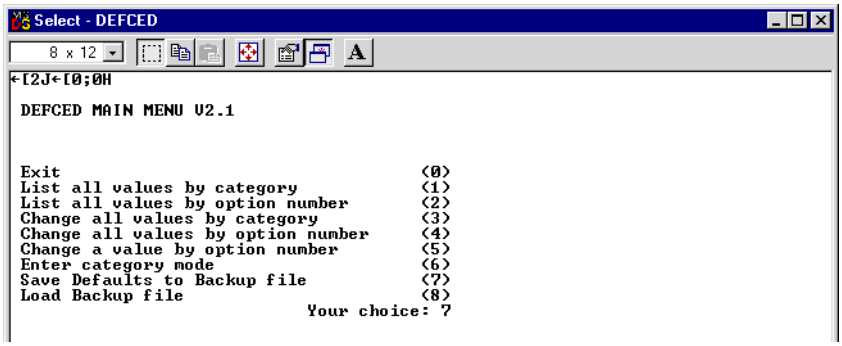
overwritten with the new settings. See Save default settings for details.

Save default settings

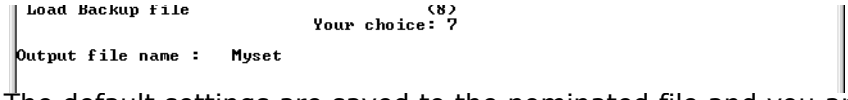
Any changes you make to the default settings will permanently overwrite any previous settings. To preserve existing settings you need to save them to a backup file. You may wish to save a number of different default settings to be loaded as required.

To save default settings...

1 At the main menu, type **7** and press Enter↵.



2 At the prompt, enter the file name for the default settings and press Enter↵.



The default settings are saved to the nominated file and you are returned to the main menu.

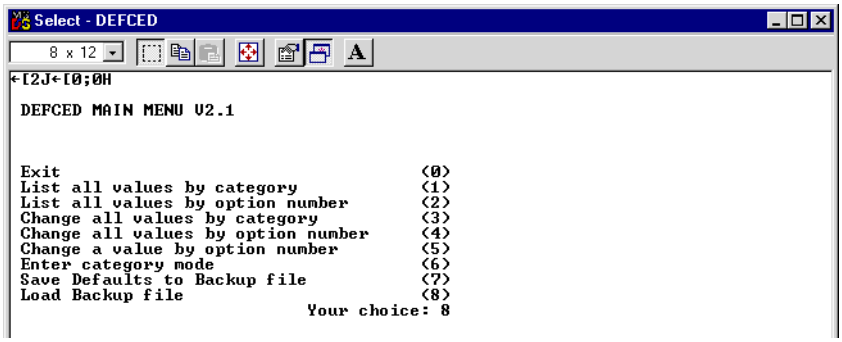
Note: Use no more than 8 characters (no spaces) for the backup file name. Keep a record of the default settings and the name of the file they were saved to. The file is stored in the C:\ESWin\bin directory.

Load default settings

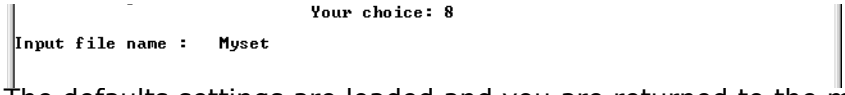
If at some stage you want to reinstate the default settings, you need to load the settings from the backup file you created.

To load default settings...

1 At the main menu, type **8** and press Enter↵.



2 At the prompt, enter the file name you used to save the default settings and press Enter↵.



The defaults settings are loaded and you are returned to the main menu.

Default Schiffli settings by category

The settings that can be changed by DEFCED fall into three categories – general Schiffli, Plauen-specific, and Saurer-specific.

```
***SCHIFFLI
**EMPTY REVS IN CARD
045 SCHIFFLI EMPTY REVS BEFORE STITCH DATA 1 REV = 4 BYTE = 20.00
046 SCHIFFLI EMPTY REVS AFTER STITCH DATA 1 REV = 4 BYTE = 20.00
048 SCHIFFLI BLANK CARD AFTER COLOR CHANGE. NO. OF REVS. = 8.00

**STARTING BORER DEPTH
195 SCHIFFLI BORING: borer depth at start of pattern = 6.00

**SCHIFFLI SPEED
090 SCHIFFLI AUTO FAST after NEEDLE OUT: 0=No change 1-4=Fast = 0.00
194 SCHIFFLI Machine Speed at Start of Pattern 0=Slow 1=Fast = 0.00

**PLAUEN-SPECIFIC
021 PLAUEN MAX STITCH            1X MM           = 16.50
022 PLAUEN MIN STITCH            1X MM           = 0.10
304 PLAUEN BORING: Number of points for Auto FAST (5.0 = Five) = 5.00

**PLAUEN-RCC SPECIFIC
271 ZAN-RCC Number of revs to divide a 4/4 frame shift 4.0 = 4 = 4.00
312 ZAN-RCC Start and end at station 0 (4/4) 1=YES 0=NO = 1.00
313 ZAN-RCC Return to start station at pattern end 1=YES 0=NO = 1.00
314 ZAN-HIR Zangs & Hiraoka RCC compatible tapecode 1=YES 0=NO = 0.00
272 HIR-RCC Number of revs to divide a 4/4 frame shift 4.0 = 4 = 4.00
273 HIR-RCC Number of revs after execution hole (min.) 8.0 = 8 = 8.00
```

```
274 HIR-RCC Return to start station at pattern end 1=YES 0=NO = 1.00
275 COM-RCC Number of revs to divide a 4/4 frame shift 4.0 = 4 = 6.00
276 COM-RCC Number of empty revs before execution hole 2.0 = 2 = 2.00
277 COM-RCC Number of revs after execution hole (min.) 8.0 = 8 = 4.00
278 COM-RCC Default machine type is     1.0=CCD1 2.0=CCD2 = 1.00
279 COM-RCC Output memorization holes for CCD1 0.0=NO 1.0=YES = 0.00
280 COM-RCC Start station is the first selected 1.0=YES 0.0=NO = 0.00
281 COM-RCC Return to start station at pattern end 1=YES 0=NO = 1.00

**PLAUEN PENTAMAT
307 PLAUEN PENTAMAT Max stitch       1X MM           = 16.50
308 PLAUEN PENTAMAT Min stitch       1X MM           = 0.10
309 Maximum number of programmable Pentamat stations (40 or 99) = 40.00
310 Pentamat: Number of delay revs at station change  12.0=12 = 8.00

**SAURER-SPECIFIC
024 SAURER MIN STITCH            1X MM           = 0.10
023 SAURER MAX STITCH            1X MM           = 17.10
042 SAURER automatic change to SLOW enabled 0.0=NO 1.0=YES = 1.00
049 SAURER  BLANK CARD AFTER NEEDLES OUT.  NO. OF REVS. = 0.00
186 SAURER BORING: Use overshoot before BORER IN ? 0.=no 1.=yes = 1.00
187 SAURER BORING: borer overshoot in X direction (6X mm) = 0.00
188 SAURER BORING: borer overshoot in Y direction (6X mm) = 50.00

**SAURER-RCC/PENTAMAT SPECIFIC
293 SAU-RCC Number of revs to divide a 4/4 frame shift 4.0 = 4 = 4.00
294 SAU-RCC Number of revs per station increment  4.0=4 6.0=6 = 4.00
295 SAU-RCC Return to start station at pattern end 0=NO 1=YES = 0.00
322 SAU-RCC: Default machine type is  1.0=RCC 2.0=RCC/PENTAMAT = 0.00
309 Maximum number of programmable Pentamat stations (40 or 99) = 40.00
310 Pentamat: Number of delay revs at station change 12.0=12 = 8.00
```

Punching machine files to Wilcom Jacquard Punch

Use Schiffli Punch (Windows desktop) to send a machine file from your PC to a Wilcom Jacquard Punch. Right-click to change the COM port.

The Schiffli Punch utility for Windows sends a machine file from your PC to a Wilcom Jacquard Punch (the predecessor of the ElectroPunch).

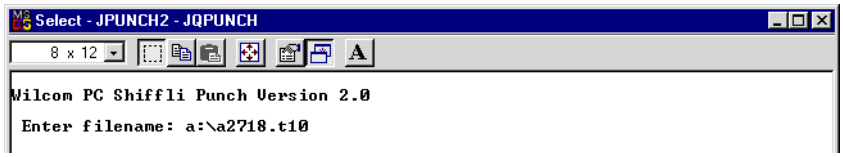
Note: The punch is slow and so can be run in a minimized (background) window if it is to be used on a digitizing PC.

Send machine files to a Jacquard Punch

Any Schiffli Tnn type file can be sent to a Jacquard Punch.

To send machine files to a Jacquard Punch...

1 Double-click the **Schiffli Punch** icon on the Windows desktop.



Schiffli Punch prompts you for the name of the file you want to punch. This must be a valid DOS 8.3 file name.

2 Type the full path and design name together with the file extension, and press Enter↵.

The program will first attempt to synchronize the punch and then send the design to the selected COM port (default = COM2). A message will show the pattern number being punched and indicate when the operation is completed.

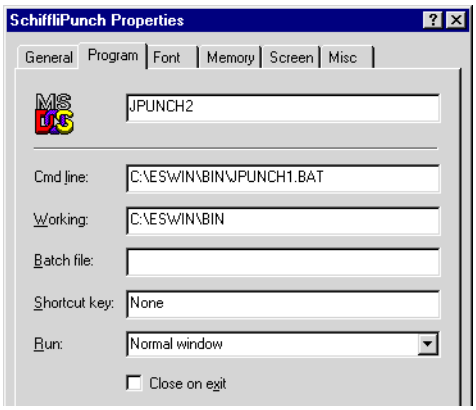
An error message – 'unable to synchronize Punch' – will tell you if your PC is unable to communicate with punch device. Check the COM port.

Change COM port of Schiffli Punch

The punch uses a communications protocol using small packets containing one stitch at a time. The COMs settings are preset for you. Only COM1 or COM2 are supported (default = COM2). Baud rate is usually 4800 with no handshaking.

To change COM port...

1 Right-click the **Schiffli Punch** icon on the Windows desktop.



2 In the **Properties** dialog, select the **Program** tab.

3 Edit the command line:
   - PUNCH1.BAT sends the file to COM1.
   - PUNCH2.BAT sends the file to COM2.
4 Click **OK** and run the program from the Windows desktop.

Chapter 10

Functions, Files & Disk Types

This section provides details of the machine, file and disk types supported by ES Schiffli. Tables show how various features are converted when the file type is changed. Use this section when converting designs to different formats, or digitizing for a specific format other than EMB.

Supported Schiffli machine functions

Schiffli machines are typically used to manufacture lace and emblems. They have particular machine functions which only apply to Schiffli designs. ES Schiffli makes a distinction between 'logical' and 'physical' machine functions. Both are encoded in the native EMB file. EMB does not preserve 'non-supported' machine functions. EMB files can be output in a wide variety of Schiffli formats. See Supported Schiffli file formats for details.

Note: Some functions appear as both 'logical' and 'physical' functions, depending on the particular machine. For example, 'Fast/Slow' may be an actual physical function on one machine, but may need to be decoded into a number of component functions on another.

Generic Schiffli machine functions

ES Schiffli supports the following user-selectable logical functions:

Logical function	Description
Stepp/Blatt	Instructs the machine when to use normal (Stepp) or loose (Blatt) tension.
Jump (M)	Cause frame movements without needle penetrations – used to move smoothly from one part of a design to another.
Borers In / Out	Instructs the machine when to use the boring knife or tool instead of a needle.
Borer Depth	Instructs the machine to use either Plauen or Saurer numbering system governing borer depth.
Stop	Instructs the machine to stop.
Begin / End Jump	Instructs the machine whether or not to use needle/borer penetrations.
Fast / Slow	Instructs the machine to stitch fast or slow.
Empty / Empty Jump	Empty function instructs the machine to stitch with needle penetrations. Empty Jump function instructs the machine to stitch without needle penetrations (Jump).
Drop Sequin	Instructs the machine when to drop a sequin on the fabric for stitching.
Color Change	Instructs the machine to use the next thread color in the design.
Trim	Instructs the machine to trim threads. (Only relevant to newer Schiffli machines with trimmers.)

Tip: For detailed descriptions of the supported logical functions in ES Schiffli, see Schiffli machine functions.

Machine-specific functions

ES Schiffli supports fine tension and speed changes, as well as special devices like Cord and Sequin for specific machines. These functions can be output to disk or tape, and are preserved when read into EmbroideryStudio. Machine-specific functions directly supported by ES Schiffli include:

Logical function	Saurer	Plauen	Hiraoka / WESS
Fadenleiter Plus/Minus	●	●	
† Previously known as Emery Roller ‡ Also known as Speed Data			

Logical function		Saurer	Plauen	Hiraoka / WESS
Thread Brake Plus/Minus	†	●		●
Boring Tension Start/End				●
Pause				●
RPM Plus/Minus	‡	●		●
Stuepfel In/Out		●	●	
Cord In/Out		●	●	
Festoon In/Out		●	●	
† Previously known as Emery Roller ‡ Also known as Speed Data				

Indirectly supported functions

ES Schiffli indirectly supports Saurer Clutch In/Out (when used in Borer). An indirectly supported function means that, although you cannot select the function in EmbroideryStudio, the software automatically inserts it as part of a logical function.

Related topics...

◀ Machine-specific functions

Supported Schiffli file formats

Schiffli designs in EmbroideryStudio can be opened, edited and saved in EMB file format as well as ESS and ESL, Wilcom's Schiffli machine file formats. Designs can also be read and written in many other machine-specific formats.

Note: ESL is used for RCC designs only. ESS is the primary machine file format for Wilcom-developed Schiffli servo control systems. When the ESS file is read directly by a Wilcom Electronic Servo System (WESS), high data resolution and stitch accuracy is possible.

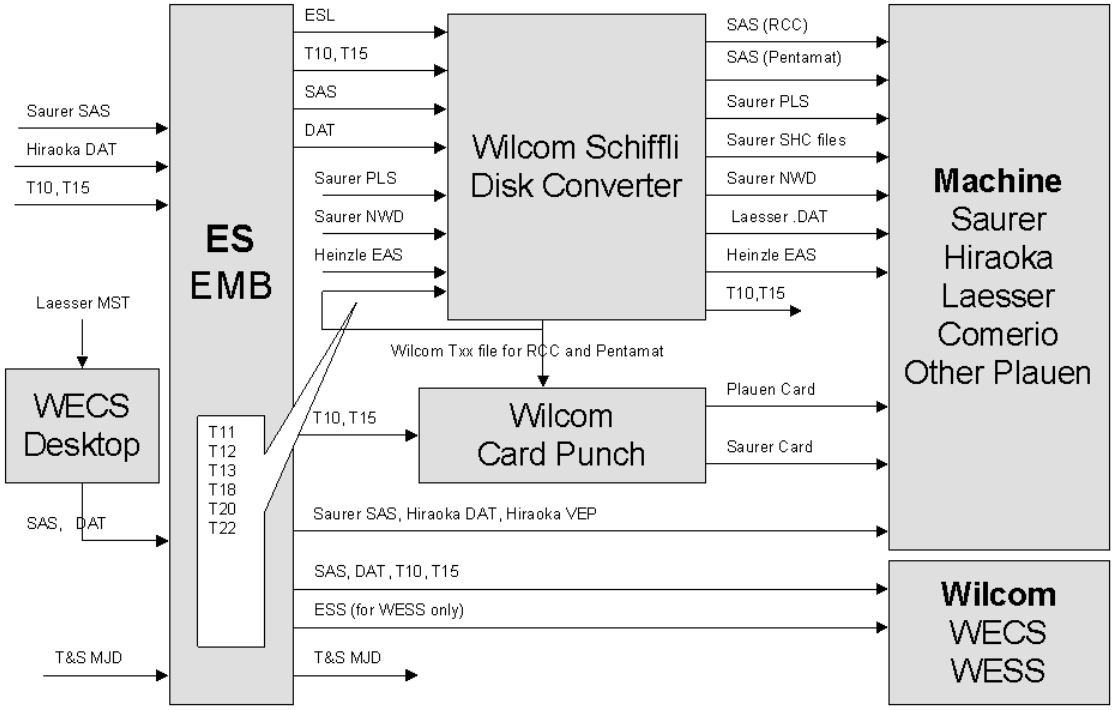
There are Schiffli file formats to suit specific Schiffli machines. Machine functions may differ between various machines. ES Schiffli supports the following Schiffli file formats either directly through EmbroideryStudio, or indirectly through the **Schiffli Disk Converter**.

File Type	Manufacturer	ES Read	ES Write	SDC Read	SDC Write
DAT	Hiraoka	●	●		●
DAT	Laesser				●

File Type	Manufacturer	ES Read	ES Write	SDC Read	SDC Write
EAS	Heinzle			●	●
EMB	Wilcom	●	●		
ESL	Wilcom Schiffli (RCC)	●	●		
ESS	Wilcom Schiffli	●	●		
INP	Stations (some loss of stitch types and functions)	●			
MJD	Time & Space (standard non-RCC)	●	●		
MST	Laesser	●	●		
NWD	Saurer			●	●
PAT	Saurer SHC (native Saurer)				●
PLS	Saurer SLC (Plauen data)	●	●		●
SAS	Saurer SLC (standard)	●	●	●	●
SAS	Saurer SLC RCC			●	●
SAS	Saurer SLC Pentamat			●	●
T10	Wilcom Plauen	●	●	●	●
T11	Wilcom Plauen RCC Zangs			●	●
T12	Wilcom Plauen - RCC Hiraoka			●	●
T13	Wilcom Plauen - RCC Comerio			●	●
T15	Wilcom Saurer	●	●	●	●
T18	Wilcom Saurer RCC			●	
T20	Wilcom Saurer Pentamat	●	●	●	
T22	Wilcom Plauen Pentamat			●	
VEP	Hiraoka		●		

Note: All Schiffli disks are DOS/Windows readable and do not require special hardware.

Format conversions summary



Reading Schiffli designs

- Hiraoka DAT and Saurer SLC can be read directly into ES Schiffli and have full editing capabilities.
- T10 and T15 machine files can be read with or without object recognition.
- INP type files may be read but with some loss of stitch types and functions.

Recognition limitations

If a stitch type is not recognized accurately, the settings in the **Object Properties** dialog will not match the stitches. The stitches will remain the same as in the original design until you make changes and regenerate them. If you change the design, stitches will be regenerated according to the object properties. Designs converted from stitch format files and expanded designs which have non-standard stitch types may require editing in EmbroideryStudio to ensure that the object outlines, stitch types, stitch density and colors are correct.

Tip: For lace designs, Tatami recognition should be turned off in the advanced options. If only a few objects need to be reshaped, it may be better to recognize only selected stitches inside EmbroideryStudio after opening.

Needle addressing in Laesser machines

Previously, saving to Laesser MST converts Color Changes to ATC by default. This is suitable for Laesser's ATC machines as well as the new 'Schiffli Head' machine.

Note: Users with older Schiffli MTC machine models may prefer to use Stops as ATC might not work. They will need to revert the **Color Change As** setting back to Stop.

Twin Sequin support for Laesser MST

EmbroideryStudio supports reading and writing of Twin Sequins in MST format. This enables twin sequin functionality in Schiffli machines to allow Laesser MST files to be saved and loaded with twin sequin information. In older Schiffli machines, sequin behavior is restored if you change the **Sequin Type** to 'Single' for Schiffli machine options.

Note: The MST format actually supports Tri-sequin and even multiple sequin dropping. EmbroideryStudio does not support multiple sequin drops at this time - there will be some data loss during conversion.

Other limitations

- Functions such as Stuepfel, which were not supported in the V6.0 Schiffli machine, will be lost on writing to ESL.
- Old Stations files are not supported in ES Schiffli. These include PEN, PNN, RCC, T16, T19, T21.
- VEP files store the names of Hiraoka DAT files which must be eight characters or less. To avoid error when saving designs in VEP format, choose a file name of seven characters or less.

Schiffli encoding & decoding settings

When you open or save Schiffli files, you can set decoding or encoding options to determine how to handle the design. Options vary with the selected file type – i.e. whether based on Plauen or Saurer formats.

Plauen formats

Plauen formats include DAT and Wilcom Plauen T10. They share the same Plauen-specific encoding and decoding options and values.

Tab	Options	Settings
Standard	Recognize Jumps as Trim	1
	Recognize Stop Code as	Color Change Stop Custom
	Recognize Object/Outlines	Yes/No
	Recognize Auto Connectors	Yes/No
Conversion Details	Sequin function	None TNS - Fadenleiter BR - Borer Depth SCH - Schnur(Cord)
	# stitches for Auto Fast	5
	# empty stitches before stitch data	0
	# empty stitches after stitch data	0
	# Empty stitches after Stop or Color Change	0
	Restore function state before Stop	Yes/No
	Output Pause as Stop	Yes/No

Saurer formats

Saurer formats include SAS and Wilcom Saurer T15. They share the same Saurer-specific encoding and decoding options and values.

Tab	Options	Settings
Standard	Recognize Jumps as Trim	1
	Recognize Stop Code as	Color Change Stop Custom
	Recognize Object/Outlines	Yes/No
	Recognize Auto Connectors	Yes/No

Tab	Options	Settings
Conversion Details	Sequin function	None TNS - FadenLeiter Borer Size +/- SCH - Schnur(Cord)
	# stitches for Auto Fast	5
	# empty stitches before stitch data	0
	# empty stitches after stitch data	0
	# Empty stitches after Stop or Color Change	0
	Restore function state before Stop	Yes/No
	Auto Slow/Fast for Needles In/Out	Yes/No
	Machine starts in Fast	Yes/No
	Output Pause as Stop	Yes/No

Supported Schiffli disk formats

Save your Schiffli designs to a Schiffli formatted disk. Schiffli machines with Floppy Disk Readers can then read the design. ES Schiffli supports the following Schiffli disk formats:

Format	Density	Read	Write
Saurer SLC – SAS (Saurer)	DS/HD	●	●
Saurer SLC – PLS (Plauen)	DS/HD	●	●
Saurer SHC – PAT	DS/HD	●	●
Saurer NWD – NWD	DS/HD	●	●
Laesser (DAT)	DS/HD		●
Hiraoka (DAT)	DS/HD	●	●
Heinzle EAS	DS/HD	●	●

Glossary

10O: Machine file format native to Toyota machines.

3D foam embroidery: This type of embroidery gets its three-dimensional appearance from foam that is placed over the area to be embroidered. As the design is stitched, the needle perforates the foam. Once completed, the unused foam is pulled away. Foam is available in a variety of colors and thicknesses.

3D Warp: 3D Warp is used with Motif Fill to create three dimensional effects. You can make shapes appear concave or convex using Globe In or Globe Out. You can also create distance effects using Perspective.

ABC Pattern Arrangements: See Pattern Arrangements (ABC).

Accordion spacing: Artistic stitch effect that gradually varies stitch spacing between dense and open fill along an embroidery object, producing shading and color effects which are difficult to achieve manually.

Acetate: A salt or ester of acetic acid of cellulose made into a synthetic filament, yarn, or fabric.

Active window: The active window is one to which the next command or action will apply. If a window is 'active', its title bar changes color to differentiate it visually from other open windows.

Aetze: The breaking down or dissolving of a base fabric on which a lace pattern has been stitched, leaving only the stitched threads. Or lace processing – 'wet aetze' involving a caustic soda bath or 'dry aetze' involving heat.

Aetzing: The process of eliminating the base fabric to make Schiffli laces, leaving only the threads remaining.

Allover: Continuous embroidery which covers all of the goods from selvage to selvage.

Anchor point: A fixed point used when rotating, scaling, skewing or mirroring a design.

Anti-aliasing: A software technique similar to dithering which is used to soften hard outlines where color blocks intersect. It produces smoother outlines by 'blurring' the pixels where colors join.

Appliqué: Decoration or trimming cut from one piece of fabric and stitched to another to add dimension and texture. Designs with appliqué can be more economical than embroidery alone, if appliqué occupies a significant amount of the design, thereby lowering stitch count. In Schiffli embroidery, appliqué refers to an embroidered motif, hand-cut or aetzed away from base fabric.

Appliqué cutter: A device that can cut fabric along a line, somewhat like old pen plotters. It requires a vector file as input. In MS Windows® they can be set up as a type of printer device.

ARQ: BERNINA Quilter format.

ART: BERNINA format.

Artwork: Bitmap image or vector graphic used as a digitizing template. See also Bitmap and Vector graphic.

Artwork preparation: See Image preparation.

Aufsatz: The last stitch of a design before it repeats itself.

ARX: ES Cross Stitch format.

Auto appliqué: Auto Appliqué is an embroidery object associated with an appliqué which provides automatic stitching to place it, tack it down, and cover its edges.

Auto center: Auto Center automatically centers the start and end points of a design.

Auto-digitizing: Toolset used to create embroidery designs by automatically digitizing blocks of color in electronic images, or converting vector outlines directly to embroidery objects. See also Smart Design.

Auto kerning: For lettering objects, auto-kerning involves looking up in a 'kerning table'. This specifies the spacing adjustments for each pairwise combination of letters so that whenever a predefined pair occurs, the letter spacing is automatically adjusted.

Auto scroll: The Auto Scroll feature automatically scrolls the screen while you are digitizing.

Auto spacing: Auto Spacing only affects Satin stitch. It adjusts stitch spacing according to column width.

Auto split: Auto Split only affects Satin stitch. When applied, it breaks any long Satin stitches into shorter ones. It also distributes needle penetrations in a random pattern so that they do not form a line in the middle of the shape. Used primarily to prevent long stitches in wide columns, it can also be used as an alternative to Tatami fill. Auto Split looks more Satin-like and works well with turning stitches, creating soft lines and a little more depth.

Auto start and end: Before stitching, some embroidery machines require you to position the starting needle exactly above the first needle penetration point. Use Auto Start and End to connect the first and last stitches in the design. This makes it easy to position the needle before stitching, and reduces the chance of the needle hitting the side of the frame.

Automat: The 'Automat' is the Schiffli card decoder that converts X-Y coordinate codes into frame movements. Saurer machines were later developed in Switzerland and their Automat allowed movements of 1/10 mm, the same as modern multihead machines. Wilcom developed the WESS (Wilcom Electronic Servo System) to replace the Automat.

Automatic color change: Ability of multi-needle embroidery machine to follow a command to change to a specified needle with a different thread color.

Automatic pull compensation: Embroidery stitches pull the fabric inwards where the needle penetrates. This can cause the fabric to pucker, and gaps to appear in the embroidery. Automatic pull compensation counters this effect

by 'overstitching' outlines of filled shapes on the sides where the needle penetrates. This means the design can be optimized for different fabrics. See also Pull compensation.

Automatic stitch shortening: Reduces stitch bunching at sharp corners. See also Stitch shortening.

Auto Trace: Auto Trace is used to convert bitmap images to vector drawings.

Back appliqué: A fabric piece used behind a design where the front fabric will be cut away to reveal the fabric beneath it.

Backdrop: An electronic image used as a guide for digitizing designs on screen. Two types are used – vector or bitmap. Insert them from various file sources, or copy and paste them via the MS Windows® clipboard.

Background: EmbroideryStudio lets you change the background color of the design window to match the color of your fabric. Or you can select a background fabric for more realistic previews and presentations. The background is saved with the colorway.

Backing: Also known as 'stabilizers', backings are woven or non-woven materials placed beneath the item or fabric being embroidered for stability and support. A backing can be hooped with the item or placed between the machine throat plate and hooped garment. The more stitches a design has, the heavier the backing required. Backings are available in various weights and types such as cut-away, tear-away and wash-away (soluble). Professional embroiderers use tear-away stabilizers for woven fabrics and cut-away stabilizers for knits. See also Topping.

Backstitch: Backstitch is an input method which can be used for delicate outlines. This stitch follows intricate curves well. It is also is the term used for every second row of stitches in a Tatami fill. See also Standard backstitch, Borderline backstitch, and Diagonal backstitch.

Backtrack: Use Backtrack and Repeat to reinforce outlines while specifying the direction of the stitching. Backtrack stitches in reverse direction to the original. It is typically used to make run stitch outlines thicker without creating unwanted connecting stitches. Repeat duplicates the original stitch direction and is typically used with closed shapes.

Backup: The copying of files onto floppy disk or other storage media in order to duplicate and secure data. Usually two copies are made and kept separately.

Batting: A layer of padded material between the front and back fabric to add thickness and substance.

Begin jump function: Begin Jump functions instruct the machine not to use needle penetrations. When encoded in an output file, it normally converts to a Needle In function. See also End Jump function.

Bézier curve: Vector shape produced according to principles invented by French engineer, Pierre Bézier. A Bézier curve consists of a series of segments with shapes generated by cubic functions. Each segment is bounded by nodes, and its curvature is affected by a control point associated with the node at each end. The displacement and direction of the control point from the node are parameters from which the cubic curve shape is derived.

Bitmap: Also known as raster images, bitmaps are electronic images made up of dots or 'pixels', in contrast to vector 'outlines'. Each pixel is mapped to a location in an image and has numerical color values. Typically created in paint programs, bitmaps have file extensions such as BMP, JPG, GIF, TIF and PCX. When enlarged or scaled down, vector drawings preserve image quality while bitmap images generally cause problems of pixelation and image degradation. See also Pixels.

Blackwork: Blackwork gets its name from the black silk thread traditionally used in this form of embroidery. It can be used to decorate articles such as hankies, table napkins, table clothes, and doilies.

Blatt stitch: Schiffli term meaning 'to feed the yarn', thereby producing a long zigzag stitch with threads lying close together. Adapted for Multihead use. See also Satin stitch.

Blending: See Color Blending.

Bling: Refers to decorative objects placed on a garment or template. They are supplied in various sizes, shapes, colors and materials. Often referred to as rhinestones.

Block: The basic unit of a quilt top.

BMP: MS Windows® bitmap image format. See also Bitmap.

Bobbin: Spool or reel that holds the bobbin thread, which helps form stitches on the underside of the fabric.

Bobbin thread length: This factor provides a simple mechanism for a more accurate bobbin thread length estimate. The default value (100%) is suitable for a design with a mixture of stitch types. If the design is all run stitches or all tatami, more bobbin thread will be used and the factor can be increased say to 125%. If the design is all satin stitch, the factor can be reduced to say 65%.

Bonding: Permanently joining two fabrics together with a bonding agent. Heat sealing.

Border: Single closed-curve object which can be optionally added to a monogram. Also, a strip of fabric that is joined to an inner quilt to enhance it.

Borderline backstitch: The rows are approximately parallel. With lower density fills, borderline backstitch creates a smooth, well-defined edge. Borderline backstitch is also called Trapunto style. See also Backstitch.

Borer: Borer is a sharp instrument attached to embroidery machines to puncture fabrics. Schiffli machines have built-in borer knives under the needle line which can cut different sized holes in fabric.

Borer depth: You can choose the numbering system for specifying Borer depth – Plauen where one is the base and seven (7) the normal middle position and Saurer where the base is zero and the normal middle position is six (6).

Borer depth function: The Borer Depth function controls the size of the boring hole. The deeper the borer cuts, the larger the hole. The borer depth on Schiffli machines is changed one value at a time. Thus a change in depth of three (3) units will be automatically distributed by Schiffli to three (3) stitches.

Borer functions: Borer In/Out functions are available for embroidery machines equipped with a borer. They instruct the machine when to use the boring knife or tool instead of a needle.

Boring: 'Open-work' incorporated into embroidered designs. A sharp-pointed instrument punctures, or bores, the fabric, and

stitches are made around the opening to enclose the raw edges.

Boring tension functions: Start/End Boring Tension functions instruct servo thread machines to feed less thread for stitching in boring holes. For Hiraoka TNS Ein, it overrides/restores Stepp/Blatt tension.

Bounding box: The dotted rectangle that appears when you select a range of items.

Branching: The Branching feature lets you digitize like objects – e.g. the fingers of a hand – without having to think about the most efficient stitching sequence and joins.

BRO: Bits & Volts file format.

Buckram: Coarse, woven fabric, stiffened with glue, used to stabilize fabric for stitching. Commonly used in caps to hold the front panel erect.

Candlewicking: A traditional white-on-white embroidery technique, usually done on white linen or cotton fabric with heavy cotton threads.

Card: A paper tape to control the frame. Various sizes for Schiffli machines, 7 channel for multihead. See also Jacquard card.

Cap Corner: A type of Smart Corner. Cap corners are used for very sharp corners as they produce fewer stitches.

Cap frames: Specialized embroidery frames (hoops) designed to hold finished caps for embroidering. Available in a variety of styles for various machines, with two basic styles being to sew the finished cap flattened out—for use on a flat machine—or sewing the finished cap—for use on a tubular machine—in its natural curve.

Cascade: A way of arranging open windows on the desktop so that they overlap each other, with the title bar of each window remaining visible.

CED: A data condensed file format.

Center at current stitch: The object will be placed with its center at the needle position marker.

Center run underlay: Center Run underlay places a row of stitches along the center of a column. It is used to stabilize narrow columns (e.g. 2-3 mm wide).

Chain stitch: Stitch that resembles a chain link, formed with one thread fed from the bottom side of the fabric. Done on a manual or computerized machine with a hook that functions like a needle.

Checkbox: A small square box that appears in a dialog box and that can be selected or cleared. When selected, a tick or a cross appears. A checkbox represents an option that you can set.

Chenille: Form of embroidery in which a loop (moss) stitch is formed on the top side of the fabric. Uses heavy yarns of wool, cotton or acrylic. Created by a chain stitch machine that has been adjusted to form this stitch type. Also known as 'loop piling'.

Click: Press and release the left mouse button. See also Right-click.

Click-and-drag: Click to select, hold down the left mouse button, move the cursor and release.

Clipboard: A temporary storage area in PC memory for what was last cut or copied. Images on the clipboard can be pasted into designs any number of times.

Close button: Used to close a window or an application. In MS Windows®, it appears as a small box with an 'X' in it at the top-right of the title bar.

CND: Melco Condensed (CND) is the native file format of the Melco embroidery digitizing software. CND files store only digitized outlines and stitch values.

Color blending: Digitizing technique which creates interesting perspective, shading and color effects by blending colored layers. Two colors are merged smoothly from one to another using a mixture of dense and open fill.

Color block: A color block or 'element' corresponds to a color change in the design. It may be comprised of one or more same-color objects. These may form a single group – e.g. 'ropes' – or more – e.g. 'ropes and birds'. Each color block, or element, can be given a descriptive name for easy identification. These then appear on the production worksheet. The operator generally uses them to ensure correct colors are used during production. The Color-Object List provides a sequential list of objects as digitized, grouped by 'color block'. This list shows a separate icon for all color blocks and objects used in the design. The Color Palette Editor also shows a list of color blocks.

Color-change function: Color-change functions tell the Schiffli machine to change thread color. In RCC/INC machines, the command also moves the frame under the next selected needle. They are automatically inserted when you select a new color from the color palette.

Color depth: Color depth, also called 'pixel depth', refers to the amount of color information available to each pixel in an image. An image with a color depth of 1-bit can display only two colors. As the color depth increases, more colors are available – 16 Colors (4 bit), 256 Colors (8 bit), High Color (16 bit), True Color (24 bit).

Color palette: The color palette contains a selection of thread colors tailored for each design. This color scheme, or 'colorway', represents the actual thread colors in which a design will be stitched. See also Thread chart.

Color Reduction: See Image Preparation.

Colorways: Colorways are multiple color schemes for the same design. They are made up of colors defined in 'color blocks' which may be created in EmbroideryStudio or similar design program, or may be selected from a patent color system such as Chromatone or Pantone.

Column: Narrow, long, curving shape.

Column A: An input method used to digitize columns of varying width and stitch angle. Digitized pairs of reference points define the outline, while lines connecting the pairs define the stitch angles.

Column B: An input method used to digitize shapes where one side is different to the other, especially where one side requires more reference points than the other. Stitches turn evenly throughout the entire shape. You can use any fill stitch type except Motif Fill.

Column C: An input method used to digitize columns of fixed width. It is typically used for digitizing borders and outlines of larger shapes. You can digitize columns to create thick lines or borders. Column C is typically used with Satin stitch.

COM port: A standard serial port used as a connection point for peripherals. Other ports may be present if the appropriate internal option cards have been installed. The computer must be informed

which port is being used by which peripheral – e.g. COM1, COM2, etc.

Combination split: Use of different combinations of Satin and Tatami stitches in Program Split to create various effects with the same pattern. There are three Combination Split options – Satin in Satin, Satin in Tatami and Tatami in Tatami.

Command: An instruction issued to the software in order to carry out an action. It may be as simple as 'paste an object' or as complex as 'regenerate stitches'. It is usually activated via a menu item, toolbar icon, or command button in a dialog.

Command button: A button in a dialog which executes or cancels the selected action. Two common command buttons are Cancel and OK.

Complex fill: Input method, used to digitize large and complex shapes. Allows holes to be designated at the same time the object outline is digitized. The object is thus digitized as one fill area, instead of being broken down into multiple sections. Objects so created are known as Complex Fill objects.

Complex turning: This is an input method used to digitize complex shapes with turning stitches. Many shapes can be digitized with this tool. Create objects using left and right clicks to mark reference points to form the boundary outlines. By digitizing boundaries within shapes, you can create filled objects with holes.

Condensed file: See Design file.

Configuration: The size and type of computer hardware. Can also be used to mean the options provided with your software.

Confirmation message: A message displayed by the software asking you if you are sure you want to proceed – e.g. when you want to delete a design.

Connection Manager: A software feature to allow the sending of files to shared folders.

Connector stitches: Connector stitches link objects in a design. They can be run stitches or jumps. You can use automatic settings to generate connectors, trims and tie-offs, or add them manually. However, automatic connectors are not recommended for Schiffli designs because machine functions cannot be placed on connector stitches (stitches in the Needle Out position).

Connectors: Hardware devices to connect cables to ports. If the connection is male, the port is female, and vice versa. The wiring configuration of each device is determined by its function.

Copy: To place a copy of a selection onto the clipboard. See also Duplicate.

Control panel: The panel on an embroidery machine by which the operator sets up the machine for embroidery production.

Control points: Control points are used to modify object shapes, stitch angles and entry and exit points. You can change the shape of an object by moving, adding or deleting control points on the outline. For most objects, you can also change control points from corner points to curves.

Contour stitch: Contour is a curved fill stitch type – stitches follow the contours of a shape, creating a curved, light and shade effect. It only works on columnar shapes. There are two types – Standard and Spiral – both of which can be applied to Column A, Column B, Column C or Ring objects. Standard Contour can also be applied to Circle objects.

Copyright: A right granted by the government or by international agreement giving the owner the exclusive privilege to publish and sell artistic work during the life of the creator plus 50 years.

Cord functions: Cord In/Out functions tell the machine to engage or disengage the cord device.

Cording: Cording is a technique which employs a single decorative cord laid on fabric and attached with transparent zigzag stitches. It forms relatively simple, low-stitch-count designs featuring lots of swirls and curves. Raised cording is achieved by sewing the garment around the cord from the wrong side. The result is a self-fabric raised effect. Different widths of cording are available to provide a wide range of looks. A special attachment is required for the embroidery machine.

Cord-in-lay: A special apparatus to automatically lay on cord or ribbons on a Schiffli machine.

Cover stitch: Cover stitch is the border around an appliqué shape. You can control various settings including cover stitch type – Satin or E Stitch – width, stitch spacing, as well as the offset.

Conversion software: Programs that read information, other than from a card, and translate it from one sewing machine format to another.

Converter box: A converter box acts like a translator from one memory card format to another, via computer. Various companies offer this technology under names like the Magic Box™ from Oklahoma Embroidery. They translate designs from memory cards in other formats or from a hard drive, disk, or CD and write the design to a blank card.

Crest: An embroidered motif like an emblem, an insignia or a Coat of Arms.

Crystals: See Bling.

CPU: Central Processing Unit.

CSD: POEM/Singer/Huskygram file format

Current settings: Current property settings override the template defaults. Unless you deliberately change them, these take the default values. You generally change them to save time when digitizing. For example, you may preset Tatami stitch spacing to use a specific density for all new Tatami objects you create. See also Object properties.

Custom: Lets you map thread colors to every stop code in the file. This means you can color-code machine files which do not contain needle addressing information, before opening the file.

Custom fonts: Custom fonts are made up of letters, numbers or symbols you digitize.

Custom designs: Designs created by digitizing artwork or manipulating existing patterns.

Cut: An editing function. To remove a selection from a design. The cut selection is stored in memory (on the 'clipboard') and can be pasted into the same or different design.

Cut appliqué: See Back appliqué.

Cutter: See Appliqué cutter.

Cutting lines: A second line of run stitches that forms a guide when trimming the fabric of an appliqué patch.

DAT: DAT is the machine file extension used with Hiraoka, Laesser, and Wilcom SPES formats.

Default object properties: See Default values.

Default values: predefined settings which determine object properties such as stitch spacing, as well as certain system settings. These are stored in the design template. They are automatically applied to any newly created objects. They remain 'current' unless you override them with new settings. See also Current property settings.

Defects: See Stitching defects.

Denier: Unit or weight used to measure the fineness of thread. Equal to the weight in grams of 9,000 meters of thread. Deniers are represented by the weight of the strands of thread, a slash and the number of strands per thread—120/2Den. The low numbers represent the finer thread sizes and higher numbers, the heavier yarns.

Density: See Stitch density or Thread density.

Design: A 'design' is a file in the native embroidery format – e.g. EMB, JAN, ART – of embroidery digitizing software. The design source may be a stitch format design. The design contains stitching information such as fabric type in addition to stitched shapes.

Design card: Disk containing computerized embroidery designs read by the embroidery machine's computer.

Design elements: The decorative design components that make up a monogram (including ornaments and borders).

Design file: Design files, also known as 'all-in-one' or 'outline' files, are high-level formats which contain object outlines, object properties and stitch data. Examples include CND, GNC, INP and PCH. When you open a design file in EmbroideryStudio, corresponding stitch types, input methods and effects are applied. Design files can be scaled, transformed and reshaped without affecting stitch density or quality. See also Machine file.

Design object: See Objects.

Design information: Designs themselves have properties, some of which can be modified, others not. The most important design property is its source – Native Design, Imported Outlines, Processed Stitches, or Imported Stitches. Other properties include the software version number, stitch count, and so on. Colorways too are properties of the whole design.

Design repeat: A Schiffli design is repeated horizontally as many times as it fits across the frame. Repeat values increment in multiples of 4 to a maximum of 96. For example, the design can be stitched by every needle (Repeat=4/4), every second needle (Repeat=8/4), or every third needle (Repeat=12/4), and so on.

Design source: While embroidery files are broadly classified as 'design' (outline) or 'machine' (stitch), EmbroideryStudio internally tags files as belonging to one of four types–Native Design, Imported Outlines, Processed Stitches, or Imported Stitches. See also Design information.

Design template: See Template.

Design window: The design window is where designs are displayed for viewing and modification.

DW Administrator: It is the DW Administrator who is generally responsible for the high-level setup of DesignWorkflow databases. The DW Administrator determines who gets access to databases, what users can see and do, and who defines the categories under which information will be stored. The DW Administrator is generally the manager of the company's design section. This person has the necessary background knowledge and authority to control what goes into databases and how the information is to be used.

Desktop: MS Windows® terminology for the screen background on which program icons are displayed.

Destination folder: The folder (directory) where you intend to copy or move one or more files.

Detail: An outline, a border, a pickout run, or a small area of the design you want to be stitched out last when using Smart Design.

Diagonal backstitch: The backward rows are diagonal, directly connecting the forward rows. Diagonal backstitch is suitable for turning shapes, and gives good results with Jagged Edge. See also Backstitch.

Dialog: An onscreen box that either requests or provides information. Many dialogs present options to choose among before a command is carried out. Some dialogs present warnings or explain why a command cannot be completed.

Digitizer: Usually refers to the person punching or digitizing the design. Digitizer can also refer to the digitizing tablet used by the digitizer. See also Digitizing tablet.

Digitizing: Process of encoding a design. Artwork is converted into a series of 'embroidery objects' to be read and manipulated by a specialist CAD/CAM application. Before outputting to embroidery machine, it is converted into 'stitch data'. See also Punching.

Digitizing puck: With a digitizing tablet, you generally use a puck instead of a mouse to mark reference points and select commands from the menu chart.

Digitizing tablet: Design device used by digitizers to plot needle penetrations for embroidery designs. Sometimes used as an alternative to digitizing directly on-screen. Typically, a pencil drawing of the design is enlarged and then taped to this tablet. The digitizer then uses a device known as a puck to indicate stitch types, shapes, underlay and actual needle penetrations.

Digitizing tool: Digitizing tools, sometimes referred to as 'input methods', are similar to drawing tools except that the end result is an embroidery object rather than a vector object. Different digitizing tools are suited to creating different shapes or design elements.

Direct-to-garment printing: DTG is performed like most other printing from a PC. The print image is sent to the DTG printer through the MS Windows® print manager using a print driver. The image must have a transparent background for DTG printing. DTG printing requires heat fixing to make the images washable.

Disk: See Floppy disk.

Disk drive: Computers usually have three types of disk drive: a hard disk (or fixed disk) which usually supports the mass storage of information and applications, a floppy disk drive, and a CD ROM drive.

Display: A screen used to display the output of a computer. Also known as the monitor.

Dithering: A software technique which combines existing colors in a checkerboard arrangement of pixels. It is typically used to simulate colors that are missing from an image palette. A type of optical illusion created by placing two pixels of different color next to

each other. The human eye automatically resolves the two colors into a third color.

Docker: A dialog which, while open, allows the user to select objects freely. Controls in the dialog change to conform to the values of selected objects, or show relevant system information when no object is selected. Changes made to settings in the dialog may be applied while it remains open. Other dialogs and commands may be opened and used while the modeless dialog remains open.

Dongle: A security hardware device required to run protected software. Some are attached to a parallel port, others to a USB port.

Dots per inch (DPI): A measurement of screen or printer resolution – the number of dots in a line of 1".

Double split alternate: A variant of Tatami split. See User Defined Split.

Double-click: Click the left mouse button twice without moving the mouse. Double-clicking carries out actions such as opening a program from an icon.

Download: The process of transferring a copy of a file from a remote computer or the internet to a computer or other device such as an embroidery machine.

Drag: An operation of the mouse. Holding the (left) mouse button while moving the mouse. Typically used for moving something on the screen.

Drawing object: See Vector object.

Drawing package: Software application that creates or allows you to edit vector graphics made up of separate individual vector objects. Vector graphics can be scaled with no loss of sharpness. Examples of vector editing programs are Adobe Illustrator, MacroMedia Freehand and Corel Draw. See also Graphics application.

Droplist : A single-line dialog box control that opens to display a list of choices.

Drop sequin function: The Drop Sequin function is available for embroidery machines equipped with a sequin dispenser. It instructs the machine when to drop a sequin on the fabric for stitching.

DSB: Barudan file format. Basically the same as the T03 tape file but wit a 'header' in front so that it can be written to floppy disk – i.e. it is the floppy disk version of the T03 file.

DST: Machine file format native to Tajima machines.

DSZ: ZSK stitch or 'expanded' file format.

Duplicate: When an object is duplicated, it is not copied to the clipboard. This leaves the clipboard free for you to cut or copy other objects.

DXF: AutoCAD vector graphic format.

E Stitch: Widely used for tacking down appliqués as a decorative border. The stitches form a comb pattern.

Editing: Changing aspects of a design via a computerized editing program. Most programs allow you to scale designs up or down, edit stitch-by-stitch or block-by-block, merge lettering with the design, move aspects of the design around, combine designs and insert or edit machine commands.

Elastic lettering: Special effects applied to lettering objects to make them bulge, stretch or compress.

Electronic artwork: There are two broad categories of artwork file, both of which can be imported into EmbroideryStudio for use as digitizing backdrops – vector and bitmap. To create good quality embroidery, you need to choose or create suitable artwork of either format.

Element: An element, in software terms, is a color block consisting of sequential, same-color objects. You can assign names to elements which then appear on the production worksheet. The operator generally uses these to make sure colors are correct during production. See also Production worksheet.

EMB: Design file format native to Wilcom ES. EMB designs contain a complete set of design information in a single 'all-in-one' file – object outlines and properties, actual stitches and machine functions, thread colors, a picture icon, summary information, and more. Even the original design bitmap image can be included in EMB format. Only native EMB files provide 100% perfect scaling and transformation.

Emblem: Embroidered design with a finished edge, applied to a garment after stitching, commonly an insignia of identification. Also known as a 'crest' or 'patch'.

Emblem work: Many Schiffli machines are used for creating emblems or logos. This work, however, uses only a small subset of the available functions of the Schiffli machine. Typically, for example, emblem work does not contain the bored holes or long Satin stitches which occur in lace designs. Emblem work is also stitched on Multihead machines.

Embroidery: Decorative stitching on fabric. Generally involves non-lettering designs, but can also include lettering and/or monograms. Evidence of embroidery exists during the reign on Egyptian pharaohs, in the writings of Homer and from the Crusaders of the 12th century. Has evolved from hand-work to manual sewing machines and from hand-looms and Schiffli machines with hundreds of needles to high-speed, computerized multihead machines.

EmbroideryConnect device: Wilcom-supplied device to enable connection of USB-enabled embroidery machines to an EmbroideryConnect machine network via a WiFi router.

Embroidery disk: Embroidery disks are specially formatted floppy disks used to transfer designs from computer to embroidery machine. You can format embroidery disks and save designs to them from within EmbroideryStudio. The format you use will depend on the selected embroidery machine. You can also open designs from embroidery disk directly into EmbroideryStudio.

Embroidery objects: In embroidery design, you build designs from basic shapes or 'embroidery objects'. They are called 'objects' because they are discrete entities which can be selected and manipulated independently of each other. They are like ordinary vector objects in that they have certain characteristics or 'properties' such as color, size, position, and so on. They also have properties unique to embroidery such as stitch type and density. See also Vector objects.

Embroidery thread: See Thread.

Emery roller: The Schiffli roller on which threads are twisted and tensioned.

Empty function: An 'empty stitch', or non-data stitch, is an industry term for any stitch with a zero movement (0, 0). However, EmbroideryStudio distinguishes

between intentional empty stitches related to the machine functioning, and unintentional empty stitches, which can occur in small or pointed parts of shapes. An empty function is an empty stitch that the system processes as a machine function. It is not removed by the small stitch filter and is preserved when stitches are regenerated or the design is resized. See also Empty stitch.

Empty jump: You create empty jumps (0,0) manually in EmbroideryStudio by digitizing with Penetrations Out. This prevents the needle from penetrating the fabric, forcing the machine to move across the design in a series of jumps. Also, use empty stitches or empty jumps when required by the selected machine format. See also Empty stitch.

End Jump function: End Jump functions instruct the machine to use needle penetrations. When encoded in an output file, it normally converts to a Needle In function. See also Begin Jump function.

Empty stitch: Empty stitch is a tight (zero length) lockstitch, used together with, or as an alternative to, tie-in and tie-off stitches, particularly in objects filled with light density stitching where standard tie-ins and tie-offs may be visible. Also, use empty stitches or empty jumps when required by the selected machine format. See also Empty jump and Empty function.

EMX: Wilcom cross stitch file format.

End X/Y: The coordinates of the last stitch.

Enlargement drawing: The technical drawing, usually six times larger than the original design, indicating the stitches to be digitized. When you digitize with a tablet, you use an enlargement drawing to trace the shapes and outlines of the design in the same way you use backdrops on-screen. Before you start, you need to prepare the enlargement drawing. See also Digitizing tablet.

Enlarger: The draftsman or designer who draws the technical drawing for the puncher to follow.

Entry point: The entry point is the point where the thread enters the embroidery object. This should coincide with the exit point of the preceding object.

Envelope: Special effect which makes objects bulge or arch, stretch or compress. Envelope is typically applied to lettering objects, but can also be applied to other types of embroidery object.

EPS (Encapsulated PostScript): A standard file format for importing and exporting PostScript language files among applications in a variety of environments. An ESP file is a PostScript file which describes a single page, usually an illustration. In general, the purpose of the EPS file is to be included (encapsulated) in another PostScript file and can contain any combination of text, graphics and images. EPS files normally include a small, low-resolution TIFF, or vector-based MS Windows® metafile image preview, as it will appear on a printed page.

ESD: Native DOS format of Wilcom DOS ES – contains stitch data, like stitch types and densities, which permits better processing. ESD in later versions contains lettering objects with outlines.

ESL: ESL is a file used to produce any Wilcom Schiffli Tnn file from EmbroideryStudio. It is read but not written by the Schiffli Converter to produce RCC Tnn files.

ESS: ESS is the primary machine file format for Wilcom-developed Schiffli servo control systems. When the ESS file is read directly by a Wilcom Electronic Servo System (WESS), high data resolution and stitch accuracy are possible.

Exit: To leave a current window or application.

Exit point: The exit point is the point where thread leaves the embroidery object. This should coincide with the entry point of the next object.

EXP: Stitch or 'expanded' file format native to Melco machines.

Expanded file format: See Machine file.

Expanded tape: An expanded tape which has every stitch of the design punched.

Extension: See File extension.

Eyelet: A hole bored into a fabric with reinforced stitching around its edges.

Fabrics: Fabrics have many properties, the main one being elasticity or 'fabric stretch'. Surface texture, if present, is another property that requires different underlay types. When you choose a fabric for use with a particular design, the system pre-loads settings optimized for that fabric. These can be overridden on an object-by-object basis. See also Fabric settings.

Fabric settings: predefined fabric settings include settings for all full-coverage stitch types. For each stitch type, spacing is preset. Additionally, the quality effects of pull compensation and underlay are also preset for each stitch type. Push, warping, and shearing are reduced by suitable underlay for the stitch type and fabric. Decorative effects such as Motif Fill are not affected when fabric settings are changed.

Fabric stretch: Embroidery stitches pull the fabric inwards where the needle penetrates. This can cause the fabric to pucker, and gaps to appear in the embroidery. Use automatic pull compensation to counter this effect by 'overstitching' outlines of filled shapes.

Facing: See Topping.

Factory settings: These are the initial system settings as installed. They are a standard known setting that you can return to. Some customers want to create custom settings tailored to the exact fabric they are using most frequently. The 'My Fabric' settings are those retained in the design and can be saved to the template file.

Fadenleiter: Fadenleiter is a mechanism on some Schiffli machines for controlling the feed and tension of yarns. Fadenleiter +/- functions instruct the machine to increase or decrease Fadenleiter stroke one increment. This means increasing or decreasing thread feed because the section is getting wider/narrower.

FDR: An embroidery disk format native to Barudan machines.

Festoon: Festoon is a mechanism on some Schiffli machines for reinforcing edges on scallops, etc, for a strong cutting edge. It is also the name of a stitch type. Festoon In/Out functions instruct the machine to engage or disengage the festoon device.

File: A named collection of specifically related information stored on a disk. Designs that have been saved are stored as files.

File extension: The dot and three letters at the end of a filename such as '.BMP'. The extension identifies the file as a certain type, readable by certain applications.

Filename: The name of a file, including the extension, e.g. Cat.BMP.

Fill stitch: Series of running stitches commonly used to cover large areas. Different fill patterns can be created by altering the angle, length and repeat sequence of the stitches. Also known as Geflect stitch.

Finishing: Processes done after embroidery is completed. Includes trimming loose threads, cutting or tearing away excess backing, removing facing or topping, cleaning any stains, pressing or steaming to remove wrinkles or hoop marks and packaging for sale or shipment.

FIXPAT: The FIXPAT (Fix Pattern) utility is a conventional Schiffli visual-editing program which displays the tape file in the Jacquard card format with holes. The program is good for safety-checking designs and can be useful as a fast editor for known problem patterns as well as direct function editing.

Flagging: Up and down motion of fabric under action of the needle, so named because of its resemblance to a waving flag. Often caused by improper framing of goods. Flagging may result in poor registration, unsatisfactory stitch formation and birdnesting.

Float: Longer-than-normal Satin stitches that lay on top of a design, or the stitches made when the needle is disconnecting from the design, later removed.

Floppy disk: A flexible disk permanently sealed in a square plastic jacket – e.g. HD/DD 3.5" floppy disk. Used for information storage 'off-line' for security and/or infrequently used data. Also used for transferring punched embroidery design (machine file) data from computer to embroidery machine.

Florentine effect: With Florentine Effect you can curve Complex Fill along a digitized line to create flowing stitch effects. The stitches follow the digitized line but maintain uniform density and needle penetration patterns.

FMC: An embroidery disk format native to Barudan machines.

Folder: A collection of files and subfolders that are stored together on a disk. Part of structure for organizing files on a disk.

Font: A set of characters, including letters, numbers and other typographic symbols, of the same design and style. Sometimes called 'alphabet', even if it includes non-letter characters. See also Lettering.

Following: The directions drawn on the enlargement by the designer as a guide for the puncher's advancement and sequence in punching.

Fox test: Method of testing thread tension and soundness of timing. Sew the word FOX in one-inch Satin stitch block letters with each needle bar, then examine the reverse side for skipped stitches and correctly balanced ratio of top thread to bobbin thread. The correct balance is generally considered to be a one-third ratio of bobbin thread to two-thirds top thread. These letters are used because they require the movement of the pantograph in all directions, increasing the likelihood that the beginnings of timing irregularities will be discovered.

Fractional spacing: Fractional spacing is used to place stitches more evenly in curved shapes, producing better quality embroidery with fewer stitches. Fractional spacing is particularly useful for columns of Satin stitches with sharp turns.

Frame: Holding device to secure fabric under an embroidery head for stitching. May employ a number of means to maintain stability during the embroidery process, including clamps, vacuum devices, magnets, or springs. See also Hoop.

Frame-out position: When you stitch out appliqué objects, you can set a frame-out position. This shifts the hoop out from under the needle, making it easier to place and trim the appliqué shapes. The frame out settings determine the distance and direction of the hoop movement.

Free Line baseline: Free Line is the only type of baseline which does not have a fixed or pre-determined length. When you choose Free Line, the baseline will extend as long as you keep adding letters. You only need to mark its start point. See also Baseline.

French inch: The French inch is a measurement used for spacing needles on the Schiffli machines (c. 27mm). See also Needle spacing.

Fringe: Threads that are cut and hang loosely from the edge of a design.

Function: See Machine Function.

Geflect stitch: Geflect refers to light or heavy stitching used to fill in an area of a design with run stitches. It is also known as Ceeding or Tatami. See also Fill stitch.

Generic Shiffli machine format: Because there are many types of Schiffli machine, individual settings can be quite different even though the capabilities are the same. To deal with this, Schiffli uses the concept of the 'Generic Schiffli Machine'. The Schiffli generic machine format supports functions required for a wide range of machine types.

Glitz: See Bling.

Graphics application: Software application that creates or allows you to edit bitmap images and/or vector graphics. See also Paint package and Drawing package.

CorelDRAW Graphics: An operating mode in which the CorelDRAW® Graphics Suite application is active.

Gradient fill: An artistic stitch effect that gradually varies stitch spacing between dense and open fill along an embroidery object, producing shading and color effects which are difficult to achieve manually.

Grayscale: A grayscale picture is made up of 254 different shades of gray, plus solid black and solid white for a total of 256 different tones. Black and white photographs are grayscale.

Grid: Grid lines provide visual cues to help you accurately place a design. When you start the software for the first time, grid lines appear by default.

Guide runs: Series of stitches used to align embroideries in multi-hooping situations or to assist in fabric placement for appliqué. It is the first appliqué layer stitched and is used to position the pre-cut appliqué patches on the background material. See also Appliqué.

Hard disk: A device for mass information storage. Usually the disk is fixed inside the system unit, and a second hard disk can be added. When you store information on the hard disk it will remain there until you delete it. As it has a finite capacity, file management is required.

Hardware: Computer componentry, including monitor, keyboard, digitizing tablet, printer, scanner, sewing machine, etc.

Heat transfer printing: A process which is sometimes used in the production of a printed design for commercial use employs heat transfer paper to which graphics are printed. This is then heat-fixed to a

garment using an iron or heat-press. The process falls into the same category as printing. Printers that support heat transfer media in most cases provide an automatic mirror function in the printer driver as the image must be printed in reverse in order to be heat-transferred to a garment. See also Direct-to-garment printing.

Heinzle: Heinzle is a Schiffli disk format.

Heirloom embroidery:

Embroidered goods designed to be passed down from generation to generation.

Hiraoka DAT: Hiraoka DAT is a Schiffli disk version of the Plauen card format for Hiraoka machine.

Hoop: Device made from wood, plastic or steel used to tightly grip fabric and stabilizer between an inner and outer ring. Designed to hold fabric taut against the machine bed for embroidering, it attaches to machine's frame.

Hooping: The process of placing the fabric and/or stabilizer into the embroidery hoop. One of the most common reasons for a poorly stitched design is improper hooping.

I-beam: One shape taken by the PC pointer, it indicates that text can be input at the point selected. The shape is like the capital letter 'I'.

Icon: Miniature picture used in the screen display instead of, or as well as, text. The file list can be displayed as icons with the filenames beneath. The toolboxes which appear in the left of the screen are composed of icons.

Image editing program: See Graphics application.

Image preparation: Cleaning up scanned images as input to embroidery digitizing. This may involve any one or a combination of the following techniques: reducing the number of colors, adding or emphasizing outlines, removing noise, dithering or anti-aliasing, eliminating unnecessary detail, cropping sections or eliminating backgrounds.

Imported outlines: Designs read from non-EMB outline – CND or PCH – where stitches have been generated in EmbroideryStudio (or equivalent) from original outlines and stitching data.

Imported stitches: Designs read from stitch or 'expanded' files, with or without outline recognition, but stitches have not been regenerated through stitch processing. Note that if you change a stitch design – e.g. add a lettering object – the status changes to 'Processed Stitches' even though the imported stitches may not have been regenerated.

INC: Individual Needle Control (INC) was a mechanism originally developed for Saurer Pentamat machines whereby each needle/borer position across the whole machine could be activated or de-activated individually, either under program or manual control.

INP: Wilcom condensed file format.

Input method: See Digitizing tool.

Jacquard card: Historically Schiffli designs were stored on Jacquard cards of which there are two types – Plauen and Saurer. Named after Joseph M Jacquard, inventor of the Jacquard loom, Jacquard cards contain a stitch-by-stitch interpretation of the design together with machine functions, exactly as the embroidery machine will read it, encoded as a series of holes. Later applied to 68 mm tape used to program automated embroidery machines. See also Tape code.

Jagged edge: Technique for creating rough edges, to create shading effects, or to imitate fur or other fluffy textures in your design.

JPG: JPEG file interchange bitmap image format.

Jump: A frame or hoop movement without a needle penetration, commonly used to get from one point in a design to another. In Schiffli terms a Jump stitch means a frame movement in Needle Out mode.

Jump function: Jump(M) functions cause frame movements without needle penetrations and are used to move smoothly from one part of a design to another.

Justification: The position of lettering on the embroidery baseline.

Lacework: Lacework involves the use of threads to produce overall embroidery of full-length fabrics. Most often used to embellish women's apparel and home fashions. Such work typically uses boring. It is the most widely used application for Schiffli machines.

LAN: Local Area Network – a wired network of interconnected PCs and other network enabled devices such as printers.

Letter spacing: The space between adjacent letters.

Length calculation: On some machines the maximum stitch is measured as the distance between two consecutive needle penetrations. Other machines are limited to a maximum X (horizontal) and Y (vertical) movement.

Letters: Initials or name making up a monogram. Letters of a font.

Lettering: Embroidery using letters or words. Lettering commonly called 'keyboard lettering' may be created from predefined font styles or fonts, allowing variance of size, height, spacing, density and other characteristics.

Line art: A drawing with only two colors – usually black and white.

List box: A single-line dialog that opens to display a list of choices.

Lockstitch: Commonly referred to as a lock-down or tack-down stitch, a lockstitch is formed by three or four consecutive stitches of at least a 10-point movement. It should be used at the end of all columns, fills and at the end of any element in your design where jump stitches will follow, such as color changes or the end of a design. May be stitched in a triangle, star or in a straight line. Lock stitch is also the name of the type of stitch formed by the hook and needle of home sewing machines, as well as computerized embroidery machines.

Lockstitch machines: Both Schiffli and Multihead machines are lockstitch machines, forming stitches in the same way as a home sewing machine. Lockstitch operations involve two threads – top and bottom. The top thread is driven by a needle, the bottom by a shuttle. The bottom thread 'locks' the top thread in place, hence the name 'lockstitch'. See also Multihead lockstitch machine.

Logical machine functions: Schiffli makes a distinction between 'logical' and 'physical' machine functions. The logical machine function is what you, the digitizer, want to perform – for example, start or stop boring. Logical functions are saved as 'object properties' in the native Wilcom EMB design file.

Logo: Name, symbol or trademark of a company or organization. Short for logotype.

Looms: See Schiffli.

Loom run: The stitching of one complete pattern in one row on a Schiffli machine.

Looping: Loops on the surface of embroidery generally caused by poor top tension or tension problems. Typically occurs when polyester top thread has been improperly tensioned.

Machine file: Machine or 'stitch' files are low-level formats for direct use by embroidery machines. They contain only stitch coordinates and machine functions. Machine files are generally not suited to scaling because stitches are not regenerated during rescaling. See also Design file.

Machine format: Different embroidery machines understand different languages. They have their own control commands for the various machine functions. Before you can stitch a design, it must be in a format which can be understood by the target machine. Common formats include Barudan, Brother, Fortran, Happy, Marco, Meistergram, Melco, Pfaff, Stellar, Tajima, Toyota, Ultramatic and ZSK.

Machine function: Machine functions are commands for a specific embroidery machine. These include color changes, thread trims, jumps, machine stops, needles in/out, and boring begin/end. Schiffli makes a distinction between 'logical' and 'physical' machine functions. See also Logical machine functions and Physical machine functions.

Machine unit: The 'machine unit' is the smallest frame movement which the embroidery machine can perform. In Schiffli machines there are three types – Plauen (1/6 mm or 0.1667mm), Saurer (0.1mm), and hi-resolution WESS.

Machine setup: Before you can send designs for stitching, you must configure the machine in EmbroideryStudio. You can add machines, change settings for machines already set up, or delete machines that are no longer required.

Magic wand: Technique for creating embroidery designs by automatically digitizing color blocks in electronic images.

Manual object: When you open a stitch format file without outline recognition, it becomes a single 'manual' object. This object consists of individual needle penetration points and has only general and connector properties. When you transform (scale, rotate, mirror) a manual object, the original stitch density does not change.

Max/min stitch length: The minimum and maximum stitch lengths allowable in a design determine the outside limits as measured between needle penetration points. They are governed by the minimum and maximum frame movements that the machine can make.

Maximize button: For windows, the small box in the center of the group of three at the right of the title bar. Click the Maximize button to enlarge a window to its maximum size.

Memory: The place in the computer's system unit that stores information while you are working with it. If you exit without saving information in memory, it will be lost.

Menu bar: The menu bar contains dropdown menus of commands. Some of the same commands are available on the toolbar.

Menu chart: The menu chart provided with the software lets you select commands directly from the digitizing tablet using the puck. You need to 'register' it before use.

Minimize button: For windows, the small box to the left of the group of three at the right of the title bar. Click the Minimize button to reduce a window to its minimum size.

Minimum stitch length: The minimum movement of the hoop. It is measured between needle penetration points. See also Max/Min stitch.

Mirror: Duplication of an object in the Y and/or X axis. The location and orientation of the mirrored stitches are determined by location and angle of the axis of reflection relative to the position of the original stitches.

Mirror-merge: Mirror-Merge Array can create multiple copies of designs, such as badges, spaced in rows and columns for faster stitchouts. Mirror-Merge Reflect can duplicate and mirror designs simultaneously. You can use it to quickly create borders or merge duplicates into a symmetrical object such as a heart. Mirror-Merge Wreath can duplicate objects around a center point. The Kaleidoscope tool works like Wreath but mirrors objects as well.

Mitre corner: A type of Smart Corner. Mitre Corners create a sharp line at the intersection of the two columns. They are designed primarily for corners between 75° and 90°. See also Smart Corners.

Mocca: Spider web stitching over an eyelet.

Modal dialog: A dialog which, while open, prevents the user from selecting any control or object outside it. Changes made to settings inside the dialog are not effective until it is closed.

Modem: Unit to telegraphically send computer information from one computer to another.

Monitor: In computer terms, a device that accepts video signals from a computer and displays information. Monitors generally employ cathode-ray tubes or flat-panel displays to project images. In practice, the terms monitor and display are used interchangably. In digitizing terms, the monitor is where digitizing or stitching progress can be followed, stitch-by-stitch.

Monogram: Embroidered design composed of one or more letters, usually the initials of a name. Can also consist of borders or designs to mark ownership of items such as clothing, caps, handkerchiefs, etc.

Moss stitch: Chenille-type stitch. See Chenille.

Motif: predefined design elements, such as hearts, leaves or border patterns, that can be quickly inserted into a design. Motifs generally consist of one or more simple objects, and are stored in a special motif set.

Motif fill: Motif Fill is a decorative fill stitch with which you can fill larger shapes. Depending on your software's capabilities, you can also create special or three dimensional effects.

Motif run: Motifs which are linked together along a digitized line. You can create decorative outlines using any motif from the list.

Motif set: Motifs are stored in 'motif sets' similar to fonts. There are two predefined motif sets. One contains single motifs for fills which use the same pattern in both forward and backward rows. The other set is intended for use with two-part motifs which use complementary patterns for forward and backward rows. You can also define your own 'motif sets' to organize and classify motifs of your own creation.

Mouse: A device, equipped with control buttons and designed to roll about on the table next to the keyboard. As the mouse moves, its

circuits relay signals that move a pointer on the screen.

MST: MST is a Laesser file type. It includes same stitch data as Laesser DAT. (Not supported in Schiffli EmbroideryStudio 2026.)

Multicolored designs: Multicolored designs contain more than one color. Most Schiffli machines do not support automatic color change. That is, there is no mechanism to activate individual or groups of needles. Thus multicolored designs are expensive to produce because operators need to manually trim the threads and re-thread the needles.

Multihead lockstitch machine: Multihead lockstitch machines have a horizontal frame. The needles are vertical, and are grouped in heads. They are mainly used for stitching individual items – e.g. badges, garments, which are stretched in separate hoops attached to the frame under each head. A multihead machine can have up to 24 heads, and each head can have up to 20 or more needles. Thread change and trims can be done automatically. See also Lockstitch machine.

Multi-appliqué: A type of appliqué object composed of more than one piece of fabric and bordered by various types of embroidery objects.

Nap: A fuzzy or downy surface of fabric covering either one side or both, produced by brushing loosely twisted yarns.

Native designs: Native designs refer to designs created in EmbroideryStudio software (or equivalent).

Native file format: A design saved in the original format of the application you are working with is said to be the 'native' file format. It can also refer to the machine file format required by a specific embroidery machine. When saved to another format, it is known as a non-native format.

Needle: Small, slender piece of steel with a hole for thread and a point for piercing fabric. A machine needle differs from a handwork needle – the machine needle's eye is found at its pointed end. Machine embroidery needles may come with a) sharp points for piercing heavy, tightly woven fabric, b) ball points which glide between fibers of knit, or c) a variety of specialty points, such as wedge points, which are used for leather.

Needle addressing: Some machines support 'needle addressing'. Needle numbers correspond to slots in the color palette. Each color in the design corresponds to a needle number. Older multi-needle machines simply move to the next needle whenever a color-change function is encountered. In either case, the machine must have the correct thread colors loaded for each needle to stitch out correctly.

Needle bar: Bar which holds the needle and regulates the distance to which the needle is driven into bobbin assembly.

Needle in/needle out functions: The Needle In and Needle Out functions instruct the machine whether or not to use needle penetrations. You can enter these functions automatically using the Penetrations tool.

Needle points: You can view needle points in a design to check density or, for instance, to select stitches for editing.

Needle spacing: Needle spacing is the distance between adjacent needles of a Schiffli embroidery machine. Typical values are 27.07 mm and 27.04mm. The software lets you set up and adjust this value to suit the type of machine which will stitch the design.

Nesting: Nesting lets you create or insert an object at an exact point of the stitching sequence. You can 'nest' an object in the middle of another object's stitching sequence to prevent long connectors being generated.

Network: To link embroidery machines via a central computer and disk-drive system, usually via a modem or network card. A group of machines linked via a central computer.

Network folder location: The logical location of a folder on a network. Contains the PC name together with the folder name – e.g. \\My PC\EmbroideryMachine1.

Noise filtering: Noise filtering means restoring the solid color blocks of original artwork in scanned images. This is achieved by merging different shades into one solid color. Noise filtering is important for automatic digitizing because it makes it easier for the software to identify solid color blocks which become embroidery objects in the resulting design. It also cleans up blurred or mottled areas of color.

NORMAL template: The NORMAL template is the default template supplied with the software. It contains current property settings as well as a selection of preset styles. These styles include variations on the current property settings. For example, <PRESET_SATIN_1> contains different stitch spacing settings for Satin stitches. You can view and modify the settings for these styles at any time. See also Templates.

Objects: In computer science, 'objects' are regarded as any discrete item that can be selected and manipulated, such as an onscreen graphic. In object-oriented programming, objects include data and the procedures necessary to operate on that data. See also Embroidery objects.

Object properties: All embroidery objects in EmbroideryStudio contain defining settings or 'values'. The values stored with an object become its 'properties'. All objects have certain properties in common such as size and position. There are other, more specific properties of objects which depend on the object type. The most important property of all embroidery objects is stitch type.

Object recognition: See Outline recognition.

Object type: An object has a type, shape, thread type and color, stitching settings and a position in the stitching order. The object type may or may not determine the intended final appearance of the stitching.

Offset object: Software function used to create new outlines from the outlines of selected objects.

Ornament: A grouped embroidery design which may consist of one or more objects of any type and one or more colors. Ornaments may be placed in up to eight positions around letters, or centered behind letters.

Options: Options provide software with extra functionality that can be purchased by registered owners of the product.

Outline file: See Design file.

Outline recognition: When you convert a machine file to outline format, EmbroideryStudio reads the data stitch-by-stitch according to the needle penetration points. The software then 'recognizes' stitch types, spacing and length values,

stitch effects, and can determine object outlines.

Outline stitch: Stitch such as Run or Satin used to outline an embroidery object.

Overall embroidery: Overall embroidery is embroidery which covers the entire fabric. This includes lacework where the backing fabric is actually removed after manufacture. Overall embroidery is typical of Schiffli manufacture, less common with Multihead.

Overshoot: Overshooting is a technique used by Schiffli punchers to reduce distortion of fabric by pulling more thread from the cone and reducing the pulling force of the thread.

Overview window: Use the Overview window to view a thumbnail of the design. The window is updated whenever you make a change, and can be used to zoom in or pan across the design window.

Paint package: Software application that creates or allows you to edit image files. You can create lines and filled areas as well as edit the image pixel-by-pixel using paintbrushes, erasers and spraypaint tools. Examples of image editing programs are Adobe Photoshop, Jasc PaintShop Pro and Corel PHOTO-PAINT®. See also Graphics application.

Pan: Use Pan to view parts of a design which are not currently visible in the design window.

Paper tape: Traditional recording media used in the embroidery industry is the paper tape. The tape coding process produces the final design in stitch format – a stitch-by-stitch interpretation of the design – exactly as the embroidery machine will read it. Now largely replaced by floppy disk, tapes are still used by older machines. More specifically, stitch data paper tapes are eight-channel paper tapes which, in effect, are hard copies of 8 bit binary code.

Parallel port: A connection on a computer, usually LPT1, where you plug in the cable for a parallel printer and/or a dongle. Parallel ports are used to connect some embroidery machines. They are named LPT1, LPT2, etc. When you set up a parallel machine connection, select the parallel port and the required protocol, and complete the machine setup procedure.

Partial appliqué: Technique to create appliqué objects with partial cover stitching to create an overlapping effect without doubling-up borders.

Partition lines: Partition Lines is a method for offsetting needle penetrations in Tatami fills, used, like Tatami Offset Fractions, to create needle penetration patterns or textures in stitched embroidery.

Paste: To insert an object, which has previously been placed on the clipboard by cutting or copying selected objects, into a design. You can paste from the clipboard as many times as you like.

PAT: PAT is a Saurer SHC file type.

Patch: The fabric piece use in appliqué.

Pattern: The design, card, punching, tape, disc, or enlargement.

PCH: Gunold design or 'outline' file format.

PCX: PC Paintbrush bitmap image format.

PDF: Portable Document Format. Used to view the Online Manual in Acrobat Reader.

Patchwork: The composite of pieces sewn together to form a large piece, such as a quilt.

Patchwork block: A collection of patches sewn together, usually forming a regular shape such as a rectangle. These are then sewn together to make a quilt.

Pattern Arrangement (ABC): Some Schiffli embroidery machines can read designs in which repeated parts are stored only once in the design file and only the repeat instructions are given to the machine. EmbroideryStudio provides tools to define pattern arrangements and output to specific formats which support the feature.

Pattern outline: See Motif Run.

Pause function: The Pause function is a conditional Stop, always on an empty stitch. It is interpreted by the machine according to the machine operator preferences.

PEN: PEN is a Saurer Pentamat Station file type. (Not supported in Schiffli e3.0.)

Pencil rub: Low-cost way of producing an embroidery design sample. Consists literally of a piece of tracing paper placed over a stitchout and rubbed lightly with a pencil to produce an impression of the embroidery.

Penetrations: The Needle In and Needle Out functions instruct the machine whether or not to use needle penetrations. You can enter these functions automatically using the Penetrations tool.

Pentamat: An advanced Schiffli individual needle and borer switching system available on Saurer and Laesser Machines.

Peripheral: Any device connected to a computer which is to some degree controlled by the computer – e.g. an embroidery machine or printer.

Physical machine functions: When outputting designs, Schiffli translates design data into stitches and machine functions that the target machine will understand. The functions that the machine understands are called 'physical' machine functions.

Piecing: The business of sewing patches together into patchwork blocks.

Pixel: A dot. For example, dots of light that make up the image on a computer screen. The more pixels in a given area – that is, the smaller and closer together they are – the higher the resolution.

Pixelation: An effect which occurs when a bitmap image is enlarged so that the individual pixels are obvious to the eye.

Placement lines: See Guide runs.

Plauen: Plauen is the area in Germany where Schiffli machines originated. It now identifies a type of Schiffli machine and Jacquard punched card encoding. It is also known by the names of other manufacturers such as Hiraoka, Comerio, Zangs, etc, who copied and modified the original design. The Plauen machine requires the hook to be held in the right hand for threading.

PLS: PLS is a Saurer SLC file type.

PMU: PMU is a Proel stitch or 'expanded' file format.

PNG: Portable Network Graphics vector graphic format.

PNN: PNN is a Plot file used in SPES. (Not supported in Schiffli e3.0.)

Pointer: A part of the screen display, the pointer can take various shapes. It is moved by moving the mouse and can be used to point to anything on the screen to make selections and indicate points for input. It also indicates when the

computer is working and no input is possible.

Point: Unit of measurement, with 10 points equal to 1 mm.

Port: A connection on a computer where you plug in the cable that carries data to another device. Ports which are used to attach peripherals have names like COM1 or LPT1 so that you can specify where the peripherals are attached.

Position: The Position indicator shows position of the design (X, Y) in the design window.

Print preview: Use to preview design and design information before printing a Production Worksheet. The design is displayed as it will be printed.

Process: The Process feature lets you adjust the density of one or more stitch types across the whole or selected parts of a design. Change stitch density in order to stitch on a different fabric or with a different thread. Alternatively, you may want to make production cheaper by reducing the overall stitch count. Processing a machine file is similar to converting it to a design file when opening except that you can process only selected objects or stitches.

Processed stitches: Designs read from machine or 'stitch' files where stitches have been regenerated by processing.

Production worksheet: The production worksheet is the link between the designer and the embroidery machine operator. It contains a design preview as well as essential production information, including the design size, the color sequence and any special instructions.

Program: A computer program or 'application' is generally used for a particular kind of work, such as word processing or database management.

Program split: A decorative fill stitch which can be applied to various object types where needle penetrations form a tiled pattern. Different preset patterns are available for use.

Properties: See Object properties.

Protocol: The communications protocol depends on the connection type between the computer and the embroidery machine. This will be one of: standard serial, parallel, serial to parallel converted (DCi), or interface card.

PS: Postscript vector format.

Puck: See Digitizing puck.

Puckering: Result of the fabric being gathered by the stitches. Many possible causes include incorrect density, loose hooping, lack of backing, incorrect tension or dull needle.

Pull compensation: Digitizing technique that takes into account the distortion of a design that will occur because of the interaction of thread with fabric. 'Push and pull' will cause a circle digitized perfectly round to sew with the sides pushed out, resulting in an egg shape. Generally, it is necessary to extend horizontal elements and reduce vertical elements. See also Automatic pull compensation.

Punching: Conversion of artwork into a series of commands to be read by an embroidery machine's computer or controller. The term refers to an earlier method of machine embroidery whereby designs are 'punched' to paper tape. A part of the machine, called an automat, reads the paper tape or Jacquards punched with holes representing stitches, pantograph movements and other commands. While still capable of producing paper tape, many digitizing systems now store this information on disk formats. See also Digitizing.

Push-pull: When any stitch is sewn into fabric, the tension in the thread between needle penetrations can build up and result in a 'push-pull' effect. This can cause distortions in your sewn designs, poor stitch registration and even the bunching of the fabric. The degree of distortion can be affected by the following factors: stitch density, fabric type, underlay, backing type, thread type and garment orientation. See also Stitch-Pull.

Quilting: In general, the process of making a quilt. Specifically, the stitching of patterns into the quilt layers to add strength and decoration to a quilt. Stitching includes top, batting, and backing, to form decorative patterns on the quilt surface and hold the layers together.

RAM: Random Access Memory, computer chip maintaining memory.

Random factor: You can eliminate unwanted patterns and distribute stitches evenly within a shape using a random factor. Apply random factors to Tatami Partition lines or Program Splits. You can use this effect to imitate different textures such as fur, grass, leaves, etc.

Raster image: See Bitmap.

Read: To open a design which has been written on a design card or to an embroidery machine.

Reader/writer: A device that allows you to download/upload designs to and from a design card. Cards can be purchased from your dealer or from designers on the net. Cards can have designs on them or are blank for you to read/write from/to. The cards are inserted into the embroidery module attached to a sewing machine. The R/W will allow you to have the PC and sewing machine quite separate from one another.

Recognition: See Outline recognition.

Redraw: The screen display is refreshed. This is useful when parts of the display have become obscured in the course of editing. See also Slow Redraw.

Reduce colors: See Image preparation.

Reference point: A point that can be aligned with the grid. For example, you can set the grid reference point to the design center. This is easier and faster than moving the whole design.

Refresh: See Redraw.

Registration: Correct registration is achieved when all stitches and design elements line up correctly.

Relative pointer setting: This setting shows the pointer position as an absolute value from the first needle point of the design. Useful for checking that the design fits a given area.

Relative: The distance the pointer is from a previously marked point, or from the previous stitch point.

Repeat: Layout used for making emblems or designs on a fabric span that are repeated at regular intervals. The design repeat is defined by the distance between needles – the point at which the design repeats itself.

Repeat color change (RCC): A Repeat Color Change (RCC) is a mechanism on some Schiffli machines to change the pattern of active needles in order to modify the repeat pattern and/or thread color.

Repeat sequence: If you select fewer colors than the design requires, the selected colors are repeated. For example, if your

design requires four colors and you've only selected two in the Building Stop Sequence list, colors 3 and 4 will be the same as original colors 1 and 2.

Resequence: You can change the position of a selected object by cutting it, then pasting it somewhere else in the stitching sequence, or by using the Resequence command. You can also resequence objects by color or using the Color-Object List.

Resizing: See Scaling.

Resolution: Resolution determines the number of dots per inch (dpi) used to create an image. The higher the value, the clearer the image, but the more storage space required. A resolution of 75 dpi generally produces good results.

RGB: RGB stands for red, green, and blue. It is the system used by computer monitors to create color.

Rhinestones: See Bling.

Rhinestone template: This is the design layout on which rhinestones are initially placed for creation of a 'rhinestone transfer'. This is what is created from the cutters or engravers.

Rhinestone transfer: This is the rhinestone design ready for heat transfer to the final product – e.g. a T-shirt.

RPM functions: RPM +/- functions instruct the machine to increase or decrease machine speed in increments from current or normal.

Right-click: To press and release the right mouse button. See also Click.

Rollover: The point at which the fabric is shifted – loosened and reset – vertically to continue stitching. Common on long fabric Schiffli machines.

Rotation handles: When you select an object, selection handles display at its extremities. If you click the object again, rotation and skew handles appear around the object. Rotation handles appear at the corners of the object and an anchor point displays at the object's center. Skew handles are diamond-shaped and appear at the center-top and bottom of the object. See also Selection handles.

Run stitch: Run stitch, also known as 'Walk stitch', places a single row of stitches along a digitized line. The needle penetrations are placed in consecutive order. Run is generally used for stitching outlines and connector stitches. Run stitch length can be set to automatically vary in order to follow tight curves.

SAS: SAS is a Saurer SLC, Saurer SLC RCC, Saurer SLC Standard or Saurer Pentamat file format.

Sash: A fabric strip that separates blocks in a setting, framing them and making the quilt larger.

Satin stitch: Type of fill stitch. Formed by closely arranged zigzag stitches, it can be stitched at any angle and with varying lengths. The thread is laid across a shape with a zigzag sewing action where two stitches form a column. Hence it is only suitable for small or narrow shapes. As the stitches are almost parallel, Satin provides good coverage. It is often used for lettering, outlining, and details. Because there are generally no needle penetrations breaking up the fill, Satin stitch creates a glossy effect.

Saurer: Saurer is a Schiffli machine brand and type as well as a Jacquard card encoding format. The format has three variants with support added for more modern RCC and Pentamat machines. Sometimes it is referred to as the 'left hand machine' because the threading requires the hook to be held in the left hand.

Saurer SHC: SHC is a high level code format which is designed to be machine independent in order to control both Saurer and Plauen type mechanisms. The format supports thread trimming.

Saurer SLC: SLC is a Saurer low level code format for Schiffli designs.

Save: To store (design) information in a file. Each time you save a design, you replace the previous version using the filename. You should save your design frequently.

Scalability: Ability to enlarge or reduce a design. In machine file format, most scaling is limited to 10 to 20%, because the stitch count remains constant despite final design size. In design file formats, on the other hand, scale changes may be more dramatic, because stitch count and density may be varied.

Scale factor: This option allows you to automatically scale CND designs as you load them. For example, to scale the imported design to 120% of the original, you would enter a scale factor of 1.2.

Scaling: Ability to enlarge or reduce a design in size. In stitch or 'expanded' format, most scaling is limited to ±5% because the stitch count remains constant despite final design size. In design or 'outline' formats, scale changes may be more dramatic because stitch count and density are recalculated.

Scanner: A device that converts physical images into digital form so that they can be stored and manipulated by computer. Scanning allows you to take scanned images as a basis for embroidery design.

Scanning resolution: Most scanners require you to enter scanning resolution information. Resolution determines the number of dots per inch (dpi) used to create a drawing. The higher the value, the clearer the image but larger the file. For digitizing purposes, use a maximum resolution of 300 dpi (dots per inch). A resolution of 72 dpi (screen resolution) will usually be sufficient. Generally speaking, the smaller the source image and/or more detail it contains, the higher the resolution needs to be.

Schiffli card: Plauen or Saurer type Jacquard card.

Schiffli card image: Jacquard card electronic encoding produces a 'tape file' which is essentially an electronic 'image' of the card. Schiffli outputs two tape file formats – T10 (for Plauen) and T15 (for Saurer). See also Tape code.

Schiffli disk: Schiffli disks include Saurer SLC/SHC, Heinzle, Hiraoka, and Laesser.

Schiffli machine: Commercial embroidery machine that utilizes the combination of needle and shuttle to form a stitch. Massive in size. Some schiffli machines – also known as looms – weigh 10 tons and have up to 1024 needles. Most Schiffli machines do not have automatic thread trim or automatic color change. Excellent for emblem production, the creation of lace, embroidery production on oversized items and production orders of very large quantities.

Screen calibration: You need to calibrate your monitor so that designs at 1:1 scale appear at real size. Do this when you first install EmbroideryStudio, whenever you change your monitor, or adjust your monitor's horizontal or vertical controls.

Screen printing: Screen printing is a more complex process than direct-to-garment, requiring the creation of a screen for each of the spot colors (Pantone) that make up the design. There may be multiple screens for each spot color,

depending on how the design is layered. See also Direct-to-garment printing.

Screen resolution: See Pixels.

Scroll bar: The bar at the bottom and right edge of a window whose contents are not entirely visible. Each scroll bar contains a small box, called a scroll box, and two scroll arrows to allow different types of scrolling.

Security code: Options in EmbroideryStudio are controlled by a security device installed on the computer. Security access codes entered into the software are sent to this security device. Each security device has a unique serial number and identity code.

Security device: See Dongle.

Segments: Filled embroidery objects are generally built as several discrete 'segments'. Travel runs are typically used to connect them. All segments, however, form part of the same object. Where they meet, the push-pull effect on the fabric during stitchout may cause gaps to appear.

Select: To highlight an object or group of objects for the purpose of editing. Only selected items can be edited.

Selection handles: Eight small squares that appear symmetrically at the corners and edges of a selected object. Use them to position and resize objects. See also Rotation handles.

Selection marquee: The dotted rectangle that appears when you select a range of items. See also Bounding box.

Sequence: See Stitching Sequence.

Sequins: Sequins are small plastic disks with a hole usually in the center. They are stored on reels joined one-to-another by a weak link. They are stitched onto fabric by mechanical placement in the path of the sewing needle.

Sequin attachment: Sequin attachments are computerized or manual machine devices which apply sequins by stitching, glue or heat.

Sequin mode: Sequin mode enables quick digitizing of Drop Sequin functions. See also Drop Sequin functions.

Serial port: A connection point on a computer where you plug a serial communications device such as a modem. PC serial COM ports are male connectors, and can be either 9-pin or 25-pin. They are named COM1, COM2, COM3, etc. The number of available ports limits the number of devices you can connect. If additional ports are required, you can add them. Multi-port serial cards can also be used.

Serial port setup: Here you can adjust Baud, Data Bits, Stop Bits, Parity values. These settings must be identical to those of the embroidery machine. The type of handshaking must match the type of cable you are using.

Serif: In typography, serifs are semi-structural elements on the ends of strokes that make up letters and symbols. A typeface that has serifs is called a serif typeface. A typeface without serifs is called sans-serif.

Sharpen edges: Tool used to prepare outlined images for automatic digitizing. Sharpen Edges automatically sharpens outlines and reduces noise. Areas enclosed by a black outline are reduced to a single color. Outline sharpening makes it easier for the software to recognize distinct areas in the artwork. These areas then become the embroidery objects of the finished design. Use it particularly if the outlines are blurry, fuzzy or indistinct.

Short stitch: Digitizing technique that places shorter stitches in curves and corners to avoid an unnecessarily bulky build-up of stitches.

Shortcut key: A key stroke or a series of keystrokes you can use to perform a task instead of using the mouse. For example, Ctrl+C actions the Copy command.

Side movement: The distance the frame can move horizontally on a Schiffli machine, measured in quarters.

Side stick: Adjustable bars with pins on each end of the Schiffli frame to hang or pin the ends of the goods being spanned.

Sizing handles: See Selection handles.

Skew handles: See Rotation handles.

Slow Redraw: Use to redraw your design slowly. Slow Redraw lets you view the stitching and color sequence of a design in slow motion.

Small stitches: Use the Small Stitch Filter to remove unwanted small stitches from a design automatically.

Smart corners: Sharp points in a shape may cause a bunching of stitches and needle penetrations which can create a hard spot in the embroidery and may damage the fabric or needle. Smart Corners helps you control sharp corners in Column A and Column C objects. See also Mitre Corner and Cap Corner.

Smart design: Toolset used to create embroidery designs by automatically digitizing electronic images. Smart Design automatically converts bitmap images to fully digitized embroidery with little or no intervention. See also Auto-Digitizing.

Software: Programs, such as MS Windows® and EmbroideryStudio, which run your computer.

Span: The prepared goods ready to load the Schiffli machine. It may contain many yards of goods.

Span cloth: Fabric attached permanently to the roller of the Schiffli machine with pins onto which the fabrics are attached.

Spangles: See Sequins.

Spanning: The loading of the goods on the frame, placing it under tension preparatory for embroidery.

Specialty fill: A fill stitch capability that produces a fill with a 'relief' or motif design within the fill-stitch area, e.g. Pattern Fill.

Specialty threads: Threads designed for effects such as shine, glitter, iridescence or thickness. The threads often are made from synthetic materials including rayon, mercerized cotton, metallics and textured nylon.

Spiral contour: Spiral Contour creates a single, continuous line of stitching that spirals around to fill the shape. Typically, it is used for rings and borders, but it is also suitable for other closed shapes. See also Contour stitch.

Split alternate: Split Alternate is a variation of Tatami split. See also User Defined Split.

Split object: You can split embroidery objects that were created with the Column A, Column B, and Column C tools, if Satin or Tatami, or Program Split is the selected stitch type.

SPI: Stitches per inch – system for measuring density or the number of Satin stitches in an inch of embroidery.

SPM: Stitches per minute – system for measuring the running speed of an embroidery machine.

Spray adhesive: The most common use for spray adhesive is for appliqué. If you have a paper, cardboard or even a plastic pattern for your applique, you can use spray adhesive to keep your pattern secure to the fabric during cutting and placing. This allows you to spray the adhesive on the back of the pattern and place it on the right side of your fabric. You can also use a double sided fusing such as Vliesofix. Spray adhesive can also be used to position garments or items that cannot be hooped. These can include caps, purses, bags, small items that are smaller than your smallest hoop.

SR/SD: Melco Star format. 'Star' and 'Superstar' are types of Melco machine (quite old now).

Stabilizer: See Backing.

Standard backstitch: The rows are approximately parallel, with every backstitch row slightly shorter than the forward row. Because the rows are different lengths, there are fewer small stitches at the edge of the shape, reducing possible damage to the fabric. Standard backstitch is suitable for high density fills. See also Backstitch.

Standard contour: Standard Contour creates rows of stitches across the shape, perpendicular to the digitized stitch angle. The number of stitch lines is constant, so the stitching is denser where the shape is narrower, and more open where the shape is wider. See also Contour stitch.

Start/End Boring Tension functions: See Boring Tension functions.

Station: See Repeat Color Change (RCC).

Status bar: Provides information about the whole design: number of stitches, position of the design (X, Y), number of colors (C), number of stops (S), etc.

STC: Gunold stitch or 'expanded' file format.

Stemstitch: A detail stitch that can be used to outline items or fill in areas. It is used for stems and vines with other decorative stitches, or as an outline for Satin or Motif fills.

Step stitch: Series of parallel stitches commonly used to cover large areas. Different step patterns can be created by altering the angle, the length and repeat sequence of the stitches.

Stippling: A method of creating a fill made of run stitches which meander around within a border. Often used in quilting.

Stitch: A stitch is one needle penetration. May also refer to the thread spanning one needle penetration and the next.

Stitch angle: The stitch angle is the angle the overall stitching follows within a shape. The shape may have a fixed stitch angle – e.g. 45° to the horizontal – or multiple stitch angles.

Stitch bunching: Standard stitch spacing is calculated at the outside edge of a shape. With sharp curves, spacing which provides adequate coverage on the outside edge may cause bunching along the inside edge. This may cause thread breakage when stitching out.

Stitch count: Stitch count refers to the number of stitches in a design. In EmbroideryStudio one stitch is considered one machine revolution. See also Design information.

Stitch density: The number of stitches per given area (or stitch lines per distance in a fill).

Stitch editing: Digitizing feature that allows one or more stitches in a pattern to be deleted or altered.

Stitch file: See Machine file.

Stitch length: The distance between two needle penetration points. For maximum stitch length, the length is measured according to the X and Y co-ordinates, whichever is greater. Run stitch length can be set to automatically vary in order to follow tight curves. See also Max/Min stitch length.

Stitch list: The Stitch List displays stitch number, stitch coordinates, stitch length, stitch function, stitch color. When you select a stitch in the list, it is simultaneously selected in your design.

Stitch processing: The calculation of stitch information by means of specialized software, allowing scaling of expanded format designs with density compensation.

Stitch processor: A patented software feature developed by Wilcom International P/L. Stitch Processor is a function of the software which interprets 'raw' stitch data and converts it into objects that the software can recognize.

Stitch-pull: See Push-Pull.

Stitch type: Three basic stitch types are available with lockstitch machines – Run, Satin and Tatami (Weave). EmbroideryStudio provides many variants of these.

Stitch rate: Price paid for 1000 stitches.

Stitch shortening: When a shape takes a sharp turn, the spacing of stitches on the inside of the shape decreases rapidly. This results in bunching on the inside and gaps on the outside of the shape. The longer the stitch, the worse the problem. Automatic Stitch Shortening solves this problem by eliminating thread bunching. The embroidery has smooth, even stitch spacing throughout. It also reduces thread breakages during production.

Stitch spacing: Spacing between two consecutive needle penetrations on the same side of a column. The smaller the value, the greater the stitch density. For more open stitching, use larger values.

Stitching defects: Stitching defects may appear in the form of gaps between filled areas, fabric show-through and thread breaks. These are often caused by incorrect stitching settings – e.g. setting pull compensation too small for the fabric stretchiness.

Stitch-to-machine: The software lets you send a design directly to the embroidery machine for stitching if it is connected to your computer.

Stitching direction: Stitching direction can affect embroidery quality because of the Push-Pull effect. Only closed embroidery objects can be reversed.

Stitching sequence: The embroidery objects in a design form a stitching sequence. Initially, objects are stitched in the order in which they were created or the design assembled. You can change the position of a selected object by cutting it, then pasting it somewhere else in the sequence, or by using the Resequence command. You can also resequence objects by color or with the Color-Object List.

Stock designs: Embroidery designs readily available on disk or proprietary embroidery card. Digitized embroidery designs that are commercially available for general use by embroiderers.

Stop code: Stop codes are interpreted as 'explicit stops'. The machine stops stitching.

Stop function: If you want the embroidery machine to stop for any special reason while stitching a design, you need to insert a Stop function in the stitching sequence. If there are Stops in a design, these can be read into EmbroideryStudio as either a Color-change function or a Stop function.

Straight stitch machine: Machine, which features needles that move up and down in one spot. The pantograph pushes the design along. The majority of commercial embroidery machines use this type of needle movement.

STX: Datastitch stitch or 'expanded' file format.

Stump Work: Embroidery filled with cotton etc. full three-dimensional work with added wood, mirrors, semi-precious stoned, usually hand-made. An extension of Trapunto.

Stuepfel: Stuepfel is a Schiffli machine attachment for cleaning out holes after boring. Stuepfel In/Out functions instruct the machine when to switch to the Stuepfel device from the borer. Borer In engages both the borer and the Stuepfel.

Styles: A style is a group of property settings stored under a unique name. You can save any combination of settings to a style. This makes it easy to apply these settings to selected embroidery and lettering objects. When you apply a style to an object, the style settings replace its current properties. Any properties not specified in the style, retain their current settings.

Sublimation: Sublimation printing is similar to DTG printing but the process uses solid inks which give a more even gradation of color rather than the liquid inks in DTG printing. With sublimation printing, inks are printed onto a release paper and then transferred onto a fabric or other surface. The transfer is effected using high heat (205°C) and pressure, thus guaranteeing that the image penetrates and becomes an integral part of the substrate.

Supported machine type: A machine is 'supported' by the software either via a direct implementation in the software for a specific machine or via the MS Windows® operating system – e.g. a MS Windows® supported printer or MS Windows® supported cutter.

Swiss embroidery: Satin stitch embroidery. Also recalls the origins of automated embroidery in Switzerland, where the Schiffli embroidery machine was developed in the 1800s by Isaak Groebli. Embroidery remains a government-supported industry in Switzerland today.

System administrator: The System Administrator is responsible for the entire Enterprise Network and security. In smaller enterprises, the System Administrator is also usually responsible for database administrations.

System requirements: What your computer's hardware and software, operating together, can support. System requirements are printed on software packages, design disk cards and packs, CDs and other computer accessories. You need to know what your system can and cannot support, as sometimes a system is not capable of handling new software without adding memory or disk space.

T03: T03 is an old paper tape version of Barudan file.

T10: T10 is a Wilcom Plauen Schiffli format used to punch cards or as input to Electrocard or converted to floppy disk formats.

T11: T11 is a Wilcom Plauen RCC Zangs Schiffli format.

T12: T12 is a Wilcom Plauen - RCC Hiraoka Schiffli format.

T13: T13 is a Wilcom Plauen - RCC Comerio Schiffli format.

T15: T15 is a Wilcom Saurer Schiffli format used to punch cards or as input to Electrocard or converted to floppy disk formats.

T16: T16 is a Saurer B Schiffli format.

T18: T18 is a Wilcom Saurer RCC Schiffli format.

T19: T19 is a Wilcom Saurer B - RCC Schiffli format.

T20: T20 is a Wilcom Saurer Pentamat Schiffli format.

T21: T21 is a Wilcom Saurer B Pentamat Schiffli format.

T22: T22 is a Wilcom Plauen Pentamat Schiffli format.

Tablet: See Digitizing tablet.

Tackdown: Zigzag stitch, placed after placement and cutting lines, and used to fix appliqué patches to the background fabric before cover stitching is applied.

Tape: See Paper tape.

Tape code: Traditional recording media used in the embroidery industry has been the paper tape. Jacquard card electronic encoding produces a 'tape file' which is essentially an electronic 'image' of the card. Schiffli outputs two tape file formats – T10 (for Plauen) and T15 (for Saurer). As newer Schiffli machines can read floppy disks, there are various Schiffli machine floppy disk formats. You therefore need to convert the basic tape file to the required disk format.

Tatami stitch: Series of run stitches, commonly used to cover large, irregular shapes. Stitches are laid in rows traversing back and forth across the shape. These can be parallel or slightly turning. Different fill patterns can be created by varying the stitch length, angle or sequence. Also known as Weave stitch.

Tatami offset fractions: With Tatami fills you can specify how each row is offset in order to create patterns formed by needle penetrations. You do this by adjusting either offset fractions or partition lines. By adjusting offset fractions, you can create textured fills where the stitch penetrations are more clearly visible.

Tatami partition lines: With Tatami fills you can specify how each row is offset in order to create patterns formed by needle penetrations. Partition lines, with up to eight offsets, can create more patterns.

Tatami underlay: Tatami underlay is used to stabilize large, filled shapes. It resembles an extremely open Tatami fill stitch, where rows of stitches are placed across the object to create the underlay.

Team Names: The Team Names feature lets you create designs with multiple names. For example, you can use the same logo with different names for sports teams or corporate uniforms without having to create multiple copies of the same design.

Templates: Templates are special files used for storing styles and default property settings. The NORMAL template packaged with the software provides a selection of preset styles. You can modify these as required and save them back to the NORMAL template or to your own custom templates. Use these when digitizing frequently-used design types to save time re-adjusting the current property settings. For example, a custom template may include standard

objects and sample lettering. It may simply have preferred stitch settings, lettering font and size, and colors set as current settings. Or it may have special density, pull compensation or underlay settings to suit different fabrics.

Tension: Tautness of thread when forming stitches. Top thread tension, as well as bobbin thread tension, need to be correctly set. Proper thread tension is achieved when about one third of the thread showing on the underside of the fabric on a column stitch is bobbin thread.

Tensioner: Device used to adjust the tautness of thread when forming stitches.

Textured edge: Use Textured Edge to create rough edges, to create shading effects, or to imitate fur or other fluffy textures in your design.

Thread: Fine cord or natural or synthetic material made from two or more filaments twisted together and used for stitching. Machine embroidery threads come in rayon (high sheen), cotton (duller finish), polyester (strong and colorfast), metallics (synthetic core wrapped with metal foil or thin slivers of metal foil) and acrylic (sheen similar to rayon).

Thread Brake functions: Thread Brake +/- functions instruct the machine when to increase or decrease tension one increment by Thread Brake.

Thread chart: Thread charts are lists of predefined thread colors. They may be based on commercially available thread charts, or charts you define yourself. You can copy colors between different thread charts to create your own charts from existing colors. See also Color palette.

Thread code: Code is the identification number of a thread color in a brand.

Thread roller functions: Thread Roller +/- functions instruct the machine when to increase or decrease tension one increment by Thread Roller Feed (2S-55 RCC).

Thread cutting: The removal of 'floats', by hand or by machine.

Thread density: Different thread density systems are used by different thread manufacturers. Density A is normal embroidery thread (density 120/2, or 40). Density B is thicker, Density C is finer, and Density D is very fine.

Thread thickness: See Thread density.

Thread type: Embroidery thread varies in thickness. Types are A, B, C and D. Stitch density should be set according to the thread type. See also Thread thickness.

Tie-ins: Tie-in stitches are inserted at the start of objects to prevent stitches from unraveling. They are inserted inside the shape on the second stitch. You generally use them when the previous connector is trimmed.

Tie-offs: Tie-offs are generally placed before trims to prevent stitches from unraveling. You can adjust connector settings to automatically add tie-offs under certain conditions, or add them manually. You can also include trim functions so machines with trimmers cut the thread automatically.

Title bar: The horizontal bar located at the top of a window and containing the title of the window. On many windows, the title bar also contains the Control menu box and Maximize and Minimize buttons.

Toolbar: Toolbars provide quick and easy access to EmbroideryStudio commands. Click a toolbar button to activate a command or, where applicable, right-click to view and adjust its settings.

Topping: Material hooped or placed on top of fabrics that have definable nap or surface texture, such as corduroy and terry cloth, prior to embroidery. The topping compacts the wale or nap and holds the stitches above it. It includes a variety of substances, such as plastic wrap, water-soluble plastic 'foil' and open-weave fabric that has been chemically treated to disintegrate with the application of heat. Also known as 'facing'. See also Stabilizer.

Trapunto: Trapunto is a general term for open fill stitching, often used as a background or for filling large shapes. In EmbroideryStudio, Trapunto effect forces travel runs to the edges of objects so they do not show through open or loose stitching.

Travel runs: Travel runs are typically used to connect segments of complex shapes. They can also connect adjacent objects. Because runs are not trimmed, they may be visible in the final embroidery. For this reason, they are less commonly used as connectors between objects than jumps. If objects are adjacent and connectors will be hidden, they can be used.

Traveling: You generally check a design's stitching sequence by 'traveling' through it by stitches, segments, functions or objects.

Trim function: If you are using a machine with an automatic trimmer, the trim code causes the thread to be cut after a tie-off. In the software, trims are represented by a triangle with a small circle at the point where stitching starts again. The trimmed connector appears as a dotted line. You can adjust connector settings to automatically add trims, or add them yourself.

Trimmers: Devices built into an embroidery machine to automatically trim or cut remaining thread when the design jumps from one area to another or performs a color change.

Trimming: Action of cutting loose thread, removing backing, etc, from the final embroidered product.

Triple Run stitch: Triple Run repeats each Run stitch three (or more) times for a thick line. Typically used to add borders and pickout runs to designs.

Triple Satin: Triple Satin is often used for folk designs to mimic handmade embroidery that uses thicker thread. If you require thicker stitches, set the Satin stitch to repeat itself multiple times.

TrueType font: Digital font technology designed by Apple Computer and now used by both Apple and Microsoft in their operating systems.

TrueView™: TrueView™ provides you with a preview of how your embroidery will look when stitched out. It gives the screen image a three dimensional look.

Tulle: Thin, fine net of acetate, nylon, or silk, for millinery, dress goods, or the embroidery of imitation laces.

Turning stitches: Embroidery objects can be filled with parallel or turning stitching. Turning stitches are columns of stitches which turn to follow the path defined by the object outline. By contrast, parallel stitching traverses the shape in one direction only – e.g. at 90° to the horizontal, 45°, or whatever is set. Objects can be created with turning stitching already applying, or multiple stitch angles can be added later. Turning stitches are best used with designs containing complicated, turning shapes such as

trees, animals, or large filled areas. Turns generally occur at points where a shape changes significantly in direction or width.

TWAIN: Industry standard which allows devices (such as scanners) to communicate directly with design and layout programs. Both device and program must be TWAIN-compliant. This lets you use any TWAIN-compliant scanner with your software.

U?? Machine file format native to Barudan machines.

UDL file: DesignWorkflow uses the Microsoft Data Link (UDL) format to link to its databases. UDL files are similar to MS Windows® shortcuts, but they contain more information about where the actual database and all of its attendant files are located. Copies of UDL files can be shared, renamed and relocated so that many people can use the information. In effect, every user with DesignWorkflow can have their own UDL link to the same database.

Underlay: Stitches sewn before other design elements to help stabilize fabrics. The stitching action that will attach the backing to the fabric being embroidered. It also supports the top embroidery for a more lofty, dimensional look. Underlay stitches are made up of a series of single run stitches, usually with a very short stitch length, and are digitized manually or placed automatically under the column (satin) or fill stitch areas of your embroidery design.

Underlay margin: The distance between an object outline and the edge of the underlay. Increase this margin to prevent underlay stitches from extending outside the cover stitches.

USB-capable embroidery machine: An embroidery machine which has a standard USB port built into the machine or machine control panel.

USB converter: A device which converts a standard serial connection port to a USB type A connection.

USB memory stick: Standard USB memory stick or simply 'USB stick' used for storing and transporting files.

USB port: Universal Serial Bus Connector – a connection on a computer where you plug in the dongle.

User-defined split: User-defined splits add details to filled objects via digitized lines of needle penetrations called 'split lines'. Split lines are stored as object properties. They are preserved when stitches are regenerated even if you apply a different stitch type.

Values: The actual settings – letters and numbers – that you enter into dialogs. See also Object Properties.

Variable sizing: Ability to scale a design to different sizes.

Variable stitch length: The software can automatically calculate the best length for each stitch with the Variable Run Length option. A chord gap value controls how closely the stitches follow the digitized lines.

Variegated: The dying of yarns with three or more colors in one spool.

VDT: VDT is a Hiraoka Schiffli format.

Vector graphic: Unlike raster images, vector graphics contain vector data. This is a collection of geometric shapes and lines that combine to make an image. Rather than pixels, such data is recorded as a set of mathematical formulas defining shapes such as rectangles, ellipses, curves, polygon stars, etc. These are created using vector graphics programs such as CorelDRAW® Graphics Suite. Vector graphics are scalable without distortion, and are usually much smaller than bitmap images. See also Bitmap.

Vector object: Vector objects are derived from vector graphics and can be created in EmbroideryStudio or imported. In EmbroideryStudio they can be converted to and from embroidery objects. You can set general properties such as size and position, and arrange and transform them in the same way as other objects. See also Vector graphics.

Vector text: A text object created using the CorelDRAW® Graphics Suite Text tool.

VEP: Hiraoka VEP file format is used extensively for Pattern Arrangements (ABC) on existing machines. VEP uses a small arrangement file which splits the different design parts – A is one file, B is a second file, C is a third file.

Watcher: The operator of the Schiffli machine who sets the pattern, twists the yarns, maintains the shuttles, loads and unloads the machines, performs the rollovers and watches for thread and needle breakage. The machine operator.

Wave Effect: With Wave Effect you can curve Closed Fill stitches along a digitized line to create flowing stitch effects. The stitches follow the digitized line but maintain uniform density and needle penetration patterns.

Weave stitch: See Tatami stitch.

WECS: WECS (Wilcom ElectroCard System) eliminates the need for Jacquard cards. WECS reads Wilcom machine files T10 and T15 and runs the Schiffli Automat directly. You therefore only need to save the design as a machine file to floppy disk.

Weight: When referring to T-shirts, the three standard weight divisions are mid-weight/value, heavyweight/premium, and super heavyweight.

WESS: WESS (Wilcom Electronic Servo System) replaces the Schiffli Automat and controls the frame movements directly by servo motors. It requires Wilcom ESS, Hiraoka DAT, Saurer SAS, T10 or T15 files on floppy disk as input and its method of operation is similar to WECS.

WIA: Windows Image Acquisition (WIA) is the still image acquisition platform in the Windows family of operating systems starting with Windows Millennium Edition (Windows Me) and Windows XP.

WiFi device: Device capable of connecting to a WiFi Router or wireless access point.

WiFi network name (SSID): Service Set Identifier (SSID) – the unique identifier attached to the information which is sent over a wireless local area network.

WiFi password (key): Password, passphrase or key (depending on the WiFi security type) that allows connection to the WiFi router or access point.

WiFi router: Device that provides basic network infrastructure for a home or small office network. Provides a wireless access point for many wireless devices to connect to each other for access to the Internet as well as for file sharing and printing. Sometimes referred to simply as a Wireless Router.

WiFi USB machine network: A network of wirelessly connected, USB enabled embroidery machines and PCs.

Windows domain: A network of Windows PCs, also known as 'network domain', in which computers rely on a centralized

authentication database. Users log into the domain and the access privileges are served from the central database which is controlled by a network administrator.

Windows workgroup: 'Workgroup' is Microsoft's term for a peer-to-peer local area network. Computers running Microsoft operating systems in the same workgroup may share files, printers, or Internet connection.

Wireless Access Point (WAP): A wireless access point or 'WAP' is a hardware device on a local area network (LAN) that allows wireless capable devices and wired networks to connect.

WLAN: Wireless Local Area Network or WiFi network.

WMF: MS Windows® Metafile vector format.

Write: To send design information to an embroidery disk, design card or embroidery machine for immediate stitchout or storage.

X/Y coordinates: The horizontal (X) and vertical (Y) distances on a graph or computer screen. Use X values to measure width, and Y values to measure height.

XXX: Compucon stitch or 'expanded' file format in the professional market.

Zigzag stitch: Zigzag stitch is similar to Satin but is generally used where fewer stitches are required. The needle penetrates each side of the column, laying the thread across in an open zigzag pattern. The density is determined by the stitch spacing setting. The settings for Zigzag fill stitches are stored separately from Zigzag and Double Zigzag underlay settings.

Zigzag underlay: Zigzag and Double Zigzag underlay stitching is used to support wide columns.

Zoom factor: The scale at which the design is currently displayed.

ZSK: ZSK1 format is for older ZSK machines, generally those older than 1991. ZSK2 is for newer ZSK machines, those characterized by a single top thread trimmer. The trim is the most significant differentiating factor between the two types.

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