Stitch Era Liberty
Version 11.41

<u>Using Underlay</u>

What is Underlay? Underlay is the term commonly used for the group of stitches that would normally sew before the top stitches of any section in an embroidery design.

The main purpose of Underlay is to sew the fabric to the backing to stabilize it and also prepare the area before the main fill of that section sews, providing a flatter surface for the top coverage, which in turn results in less fabric movement while the design is sewn.

Another purpose is to prevent fabric from showing through on the garment once the embroidery is finished, particularly on large areas sewn with fill patterns, or on most areas sewn on stretchy fabrics (i.e. knits). Sometimes, underlay simply serves the purpose of raising the overall texture of embroidery.

Whichever the purpose, underlay stitches get covered by the top stitches of the section they are in, so they should not show in the final embroidered design.

On this document you will find information on the different types of underlay that Stitch Era can generate for your sections automatically (depending on level of software), and a guideline on how and when to use them.

NO UNDERLAY

UNDERLAY
(shown in blue)
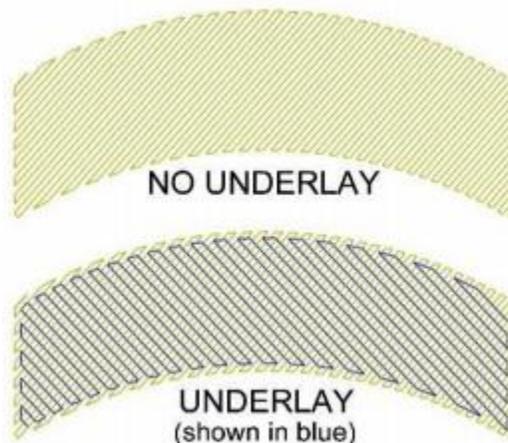
<u>CENTER WALK</u>

The most basic type of underlay, a Center Walk will create passes of Running Stitches that will follow a path along the center of the section.

Stitch Length (SL) defines the length of the Running Stitches that sew the actual passes of Center Walk underlay, with a default usually set at 2 mm (20 pts). Although there is no written rule as to what the Stitch Length should be, a range of 1.5 to 3.5 mm (15 to 35 pts) is recommended. On certain

applications, such as small lettering, it may actually need to be decreased a little more, for instance to 1.2 mm or 12 pts.

Passes are the number of times the Running Stitches will sew, and it usually defaults to two (2). Unless you specifically want more, two passes should be sufficient for most applications. Keep in mind that if the main fill of a section goes from left to right, and you want to have Center Walk underlay in it, at least two passes of Running Stitches are recommended for continuous stitching: one to sew to the opposite end of the section, and one to return to where the main fill begins. This will avoid unnecessary and possibly long jumps on the machine at the time of sewing.

Center Walk underlay is normally used on sections where the satin stitch columns are not wide enough to accept other types of underlay, such as Edge Walk. It can also be used on designs that sew on very stable material, where "saw-tooth" edges are not an issue.
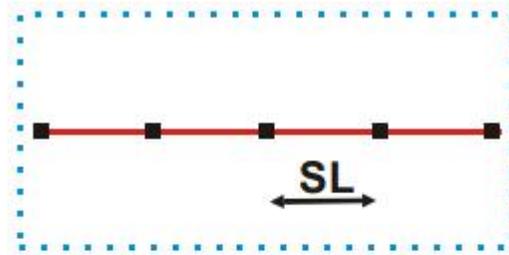
Center Walk
SL: 2.00 mm
Passes: 2
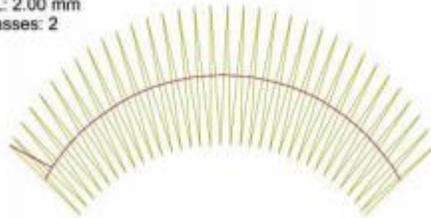
EDGE WALK

Another common type of underlay is Edge Walk, which basically creates one or more passes of Running Stitches, following the perimeter of the area to be stitched, along the inside, placed at a certain distance from the edges of such area.

Stitch Length (SL) and Passes indicate the same settings as explained in the Center Walk section. Although the default for passes on Edge Walk is two (2), on some applications you may find that just one pass will be sufficient. With Edge Walk underlay there is no need to worry about the extra machine

jumps mentioned in the Center Walk underlay section, because Edge Walk generates a "closed" shape (continuous stitching).

Margin (M) indicates the distance from the edge at which the underlay stitching will be placed. What setting you should use for this margin will depend largely on what you are trying to accomplish, and the area of the design it's being applied to.

A common occurrence on satin columns is what is known as "saw-tooth" edges. This happens when the edges of your stitched areas or columns don't create a crisp look, but rather a rough or jagged look. Although many times this could be a simple density issue, at other times you may find that the density seems good enough, but the edges still have the jagged or saw-tooth look.

Edge Walk underlay placed at the proper distance from the edge can help avoid this look. But, how close to the edge should you place the underlay?

As close to the edge as possible without having underlay stitches "stick out" in the embroidered design. The closer to the edge the underlay is, the less of a saw tooth look you will have. This margin setting may be as low as the allowed minimum, which is 0.2 mm or 2 pts.
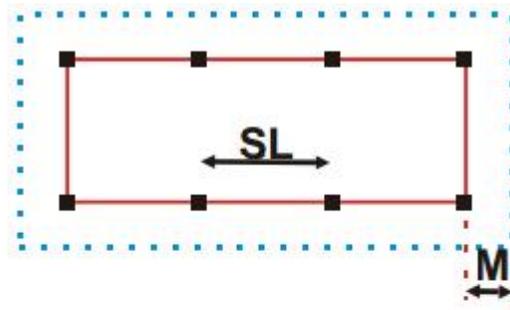
Edge Walk
SL: 2.00 mm
M: 1.00 mm
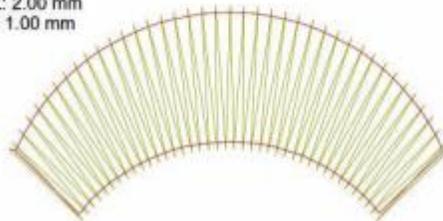
TIP: it's not uncommon for underlay stitches to show outside the main fill of an area, particularly cutting off on tight inside corners. Even though setting a higher margin number would eventually fix this, you would also lose the benefits provided by close-to-edge underlay. Instead of changing the margin

number, try reducing the stitch length of your underlay. This may fix the problem as well, while still maintaining the benefits of the closer margin.

Besides avoiding saw-tooth edges, Edge Walk underlay is also used on satin columns or most areas that are wide enough to accept stitching along the inside edge; sometimes Edge Walk can also be used in combination with other types of underlay (see further below).

SL: 3.50 mm   SL: 1.50 mm
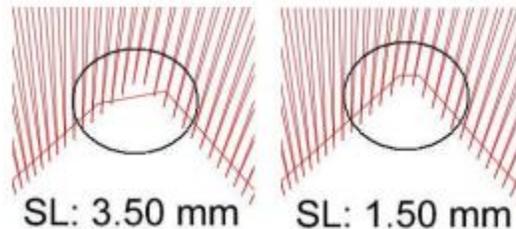
ZIGZAG / DOUBLE ZIGZAG

Zigzag underlay generates stitches that are similar to Satin Stitches. There are however a few differences between Zigzag underlay stitches and Satin Stitches. The first one is that regular Satin Stitches usually sew from one edge of a column to the opposite edge, with no additional needle penetrations between edges (Split Stitches would be the exception to this rule, but that's subject for a different article). Zigzag underlay stitches instead, can and will have additional needle penetrations between edges, depending on the settings being applied.

Maximum Stitch Length (MSL) is the setting that defines additional needle penetrations. If the MSL is set to a number equal to or higher than the width of the Zigzag underlay column, then there will be no additional needle penetrations between edges. If the MSL is set to a lower number than this width however, then there will be as many additional needle penetrations as will fit between edges.

For instance, if the width of a Zigzag underlay column is 4 mm, setting the MSL to less than 4 mm would generate additional needle penetrations between edges. But, if the MSL is set to 4 mm or higher, there would only be room for 1 edge-to-edge stitch, with no additional needle penetrations in between.

To determine the width of a Zigzag underlay column, you can simply use the Grid for visual reference.

Or, if you know the width of your main section, subtract the Margin (M) from this width (refer to the Edge Walk section for the Margin setting). For instance, a 7-mm width for the main column with a 1-mm margin setting on the underlay, will result in a 5-mm underlay column (7mm – 2mm).

Another difference between Zigzag underlay and regular Satin Stitches is the density. While Satin Stitches usually have regular density, underlay stitches tend to have much less density. This Density (D) or Spacing (SP) setting will also affect the stitch count of your underlay. While Density measures lines

per mm (how many rows of thread are in 1 mm), Spacing (SP) calculates the points between needle penetrations. A higher Density number means a lower Spacing number, therefore more stitches, whereas a lower Density number means a higher Spacing number, therefore less stitches.

When using Zigzag underlay, the software automatically creates a Running Stitch pass to sew to the opposite end from where the main section starts, to come back sewing the Zigzag underlay. When using Double Zigzag underlay, the software generates the first zigzag pass to the opposite end, to zigzag its way back on what becomes the second pass.

Both types of underlay can be used to provide thorough underlay, or where raising satin stitch columns is needed to prevent the Satin Stitches from "sinking" (terry cloth, fleece, etc).

Zigzag
MSL: 4.00 mm
D: 1.25 l/mm
M: 1.00 mm

Double Zigzag
MSL: 4.00 mm
D: 0.60 l/mm
M: 1.00 mm
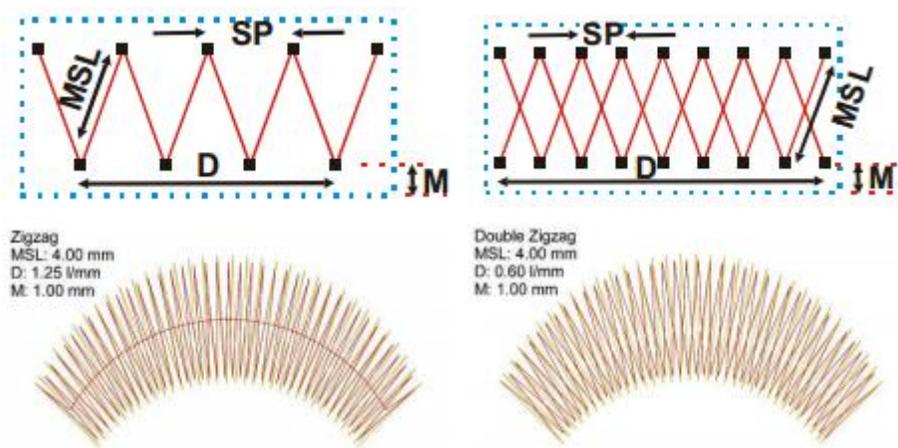
PARALLEL

Parallel stitches are basically rows of Running Stitches placed next to each other.

Depending what Digitizing tool was used to create the main section, the Parallel underlay stitches may be generated in 2 different ways: either following reference angles or placed at a fixed angle.

The first of the two examples shown here was created with the Column tool. Whenever you digitize objects with the Column tool, not only are you defining the area to be stitched, but also the angle those stitches will follow. These angles (reference angles) are what the Parallel underlay stitches will follow.

The second example shown here was created with the Area tool. Whenever you digitize sections with the Area tool, the nodes you enter define the area to be stitched. By entering a Direction line, you are also dictating the angle those stitches will follow.

If the Object Inspector shows Angle as one of the parameters to set, then you do have the option to place Parallel underlay stitches at a fixed angle, based on the angle (Direction) of the main section.

A 0º angle will generate Parallel underlay stitches in the same direction as the stitches of the main section; whereas a 90º angle will generate Parallel underlay stitches that are completely perpendicular to them. A 45º angle or a 135º angle will generate Parallel underlay stitches diagonally from the stitches of the main section.

Summarizing, Parallel underlay stitches will follow the reference angles of the main section when such section was created with the Column tool. This is also true for areas created with the Stehl Stitch tool (Satin Path). On the other hand, when the main section is created with the Area tool, the Angle setting is what defines the direction of the Parallel underlay stitches.

Additional settings for this type of underlay are Maximum Stitch Length (MSL), Density (D) or Spacing (SP) and Margin (M). They all behave in the same way as explained previously with other types of underlay.

Mostly used in complex Fill areas, usually with angles either diagonal or perpendicular to the direction of the stitches in the main section, Parallel underlay provides the means to properly stabilize stitch-intense areas, particularly large fill areas.
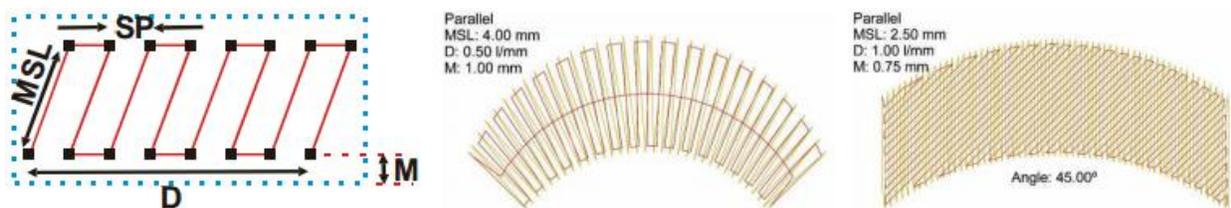
EDGE WALK & DOUBLE ZIGZAG

Just like the name suggests, this type of underlay is nothing else than the result of combining Edge Walk underlay and Double Zigzag underlay on the same section.

For the settings available for this type of underlay, refer to the sections that describe Edge Walk underlay and Double Zigzag underlay separately.

Keep in mind that whenever you see a Stitch Length (SL) setting and a Maximum Stitch Length (MSL) setting, the former refers to the stitch length of the Edge Walk whereas the latter refers to the stitch length of the Double Zigzag.

Combining the benefits provided by Edge Walk underlay and by Double Zigzag underlay, this type of underlay can be used to provide additional support for satin stitch columns, so as to prevent them from "sinking" in terry cloth, fleece, etc. It can also be used to raise stitches, so as to give them added texture, even if "sinking" stitches were not an issue.

The Edge Walk portion of this underlay also helps avoid "saw-tooth" edges, as described before. And because the pass or passes along the inside edge of a section will sew before the Double Zigzag portion, this type of underlay helps stabilize large areas or stitch-intense areas before the zigzag stitches (and later the stitches of the main section) are sewn.
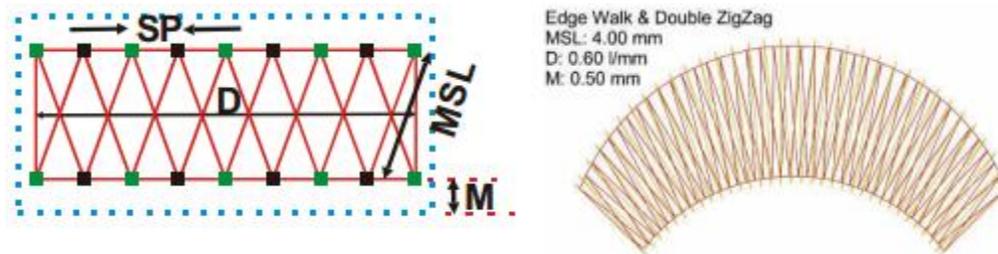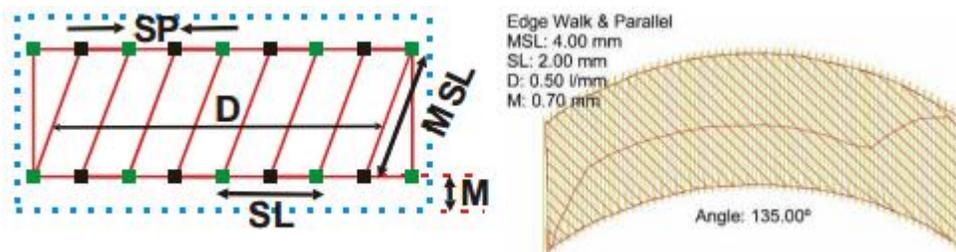

EDGE WALK & PARALLEL

Much like described on the previous section, this type of underlay is also the result of combining two other types of underlay on the same section, in this case Edge Walk underlay and Parallel underlay.

For the settings applicable to this type of underlay, refer to the sections that describe Edge Walk underlay and Parallel underlay separately, again keeping in mind that Stitch Length (SL) refers to the Edge Walk portion of the underlay, while Maximum Stitch Length (MSL) refers to the Parallel portion.

Refer to the Parallel underlay section to understand the difference between parallel stitches placed at a fixed angle (shown) or following reference angles.

Besides providing the benefits of stabilizing large areas (particularly fill areas) as described on the Parallel underlay section, this type of underlay also offers the means to avoid "saw-tooth" edges, as described on the Edge Walk underlay section, making it a desirable type of underlay for single layer fill areas on knits and other stretchy fabrics.

MANUAL UNDERLAY

Does your level of Stitch Era software not offer automatic underlay? This doesn't mean that you can't digitize underlay for your designs.

The pictures below show two examples of how you can create underlay for your designs, without spending excessive amounts of time.

Of course, automatic underlay will save you time, but here are some tips for "manually" replacing the different types of underlay explained in the previous sections of this document.

CENTER / EDGE WALK: use Running Stitches, placed accordingly in the center of columns, or along the inside perimeter of areas.

ZIGZAG / DOUBLE ZIGZAG: use low-density Column sections for this type of underlay. When doing standard Zigzag underlay, it is recommended to generate one pass of Running Stitches to the opposite end, and come back sewing the zigzag underlay, for stitching continuity. You can achieve this by placing the Start and End points of your manual Column underlay on the same end (see picture). You can usually define Entry / Exit points from the right-click menu, before you generate stitches.

PARALLEL: A low-density standard Fill Pattern, such as most Uniform or Math Patterns found in Stitch Era, will provide a good replacement for Parallel underlay. Turn the "Edge bordering" option to YES, so stitches square off at the end of each row, instead of generating angled stitches along the edges, as normally seen on fill patterns.

COMBINATION: To create a replacement for combined types of underlay (Edge Walk & Parallel or Edge Walk & Double Zigzag), simply generate the Running Stitch passes along the edges first, and then generate the Column (for Double Zigzag) or complex Fill (for Parallel) areas as needed.

Zigzag Vector (as Underlay)
Density: 0.50 l/mm

Start and End point of "underlay" Vector

Complex Fill (as Underlay)
Density: 1.25 l/mm

Edge Bordering: YES

Fill Direction is opposite than main fill