

# Digitizing Tools Sfumato Stitch

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# **Embird Studio**

- Digitizing Tools (optional part)
- Sfumato Stitch (optional part)

### **Optional Parts**

Embird Studio is an additional plug-in for Embird, available in a separate installation file. It allows user to digitize her/his own, custom designs. Studio contains two parts: **Sfumato Stitch** and **Digitizing Tools**. Both Sfumato and Digitizing Tools parts are optional, which means that it is not necessary to purchase them both.



**Digitizing Tools** serve to fancy designs, **<u>lettering</u>** and company <u>**logos digitizing**</u>. Design is digitized so that user creates <u>**outline (vector) objects**</u> either on a blank background or on an image used as a template. Vector objects are then filled with stitches. Vector objects are created manually <u>**node-by-node**</u>, with <u>**free-hand**</u> or <u>**trace tool**</u> and from <u>**vector graphic files**</u> (EMF, WMF, CMX). All these approaches can be combined one with another.



**Sfumato Stitch** allows user to create photo-realistic designs from digital images. It can be combined with Digitizing Tools to add lettering, borders, etc. Sfumato uses similar vector objects like the Digitizing Tools, but they are filled with different type of stitches. Sfumato stitches form meanders of variable density to approximate the underlying picture while leaving the fabric show through.

### **Basic Concept - Vector Objects**

While basic Embird program works mostly with stitch files, Studio uses vector objects for easier creation of design. Therefore, Studio uses other tools than the basic Embird program. Stitch files are the end product of embroidery software, because stitch files are used by embroidery machines as a list of commands to produce embroidery. Stitch files contain coordinates of each stitch and some color and trim commands. However, creation of design with stitch-by-stitch method would be very tedious and time consuming process.



Vector object (left) filled with stitches (right). Vector objects can be easily resized, because stitches can be re-generated.

Fortunately, most objects in design can be filled with more or sufficient to draw vector outlines of the object and fill it with a color in a graphic program. **Tools** available in Studio are very programs. There is a big difference between embroidery design difference is that order of objects and their overlapping is mu graphics. Moreover, objects in embroidery design should be  $\underline{c}$  low number of trims as possible.

Vector files generated by Studio are kind of "source files". Wr produc e stitch files ready for saving in appropriate file format

Please read <u>"Get Started" chapter</u>. There are also special <u>t</u> menu/ Help.

# **Get Started**

Designs (patterns) are digitized in Studio as outline (vector) objects with stitches layout based on the object type and **parameters**. The finished design is compiled and put into **Embird Editor** for final adjustment and save in appropriate embroidery format. Compilation involves generation of stitches for all vector objects, including those that were not filled with stitches by user.



### **General Rules of Embroidery Digitizing**

# To make embroidery design that looks good and sews out smoothly, follow these general rules:

- Create objects so that jumps occur only where you want to have them. Remember to use connections to **connect objects with running stitch paths**.
- The order of objects in an embroidery design is very important to minimize number of jumps and color changes. Good designs have as few color changes and trims as possible.
- When making design composed of several neighboring areas, it is useful to make zig-zag underlay under whole design first, to stabilize the fabric. Use **Fill object without cover stitches** for this purpose.
- Thread tension always causes the real stitches to be a little bit shorter than how they look on the screen. Use pull compensation to prolong the stitches. Design for elastic fabric needs more pull compensation.
- When doing complex design, digitize it from center out if possible, to prevent fabric puckering.
- Edge underlay for broad objects and center-walk underlay for thin objects helps to avoid edge distortion on elastic fabric. Zig-Zag underlay adds 3D effect. Underlay should be used only for objects that are large enough to hide the underlay stitches.
- Neighboring areas should overlap one another slightly to prevent gaps caused by pull effect of thread.

### Specific Rules of Digitizing with Embird Studio

#### There are also some rules specific for the Embird Studio:

- Do all resizing of designs digitized in Studio directly in Studio, not in Embird Editor. While in Studio, design is in outline format that resizes with much higher quality than stitch files in Editor.
- Studio allows to put image into background of work area and digitize objects on it. If you do not scale image to fit into hoop, Studio displays images so that 100 pixels corresponds to 1 centimeter of design size

(254 pixels corresponds to 1 inch). It is useful to make an empty border around your image, so that you will not have to work near the edge of image.

#### **Basic Tutorials (recommended order)**

To get started, please read the **tutorials** included in this help file. They are accessible from the left panel of this window. Tutorials are sorted in a recommended order of reading. Also, this help file contains other chapters like description of a main menu items and object parameters. Please refer to the index at the left side of this window for a specific topic.

### **Technical Notes**

#### Understanding the stitch files and vector files

Embird works with embroidery designs stored in two types of files: **1. stitch files**, which can be loaded to embroidery machine but they are hard to edit and scale, **2. outline files**, which are easy to edit and scale but they cannot be loaded directly into embroidery machine.

Difference between stitch and outline files can be compared to difference between raster (pixel) pictures, which cannot be enlarged very much because of decreasing quality, and vector graphic, which can be easily resized and edited.

Outline files are used to create and edit design. Then these outline files are converted (compiled) into stitch files for use with embroidery machine. There are many stitch file formats (with various file extensions) supported by Embird, because many embroidery machines use their own, native stitch file format. Basic Embird works mostly with the stitch files. Outline files are created and edited mostly in Embird Studio. These files have \*.eof extension.

**1. Stitch files** contain list of individual stitches and optional commands like trims and color changes. These files are actual input data for all embroidery machines. However, designs in such format are hard to edit and resize, because only individual stitches are available and there is no information about what objects they form. If such design is displayed on a screen, the human brain easily identifies the parts of design like outlines, fills, etc. However, it is not so easy to identify these objects automatically with use of software program. Therefore, many editing functions and resizing may not work with 100% reliability on stitch files. Although the stitch file is the end product of embroidery software, designs are not created directly in this format.

**2. Outline files** are easy to edit and resize, because design in this format contains outlines of all objects with information for the software program how to generate stitches for each object. Design in this format does not necessarily contain stitches. The most important part are the outlines and parameters for filling the objects with stitches.

#### Understanding the thread flow

Embroidery designs should be created so that number of thread trims is minimal. To achieve this when working with vector objects, user must keep 3 basic rules on her/his mind:

1. Create objects in proper order (to allow their connection).

2. <u>Add connections between objects</u> whenever possible (where they are hidden under other objects or where they do not spoil the look of design).

3. Define start and end points of objects properly (to allow continuous flow of the thread).



There are 2 objects in above example. The first one (left) is column. The second one (right) is plain fill object. They are connected by connection, which is in fact an object too, and must be inserted between the column and the fill (see below list of objects from the object inspector window).

Column has start point **A**. Each column ends on the opposite side, which is point **B**, in this case. To avoid thread trim, connection was added from point **B** to **C** - the start point of the fill. End point of the plain fill can be defined anywhere on the fill boundary, even in hole (if the fill has any). It is point **D**, in this case.



When stitches are generated for above objects, thread fills continuously all objects. It starts in point **1**. Then it fills whole column with zig-zags and ends in point **2**. Then it fills connection with series of running stitches (**3**) until it reaches point **4**, which is start point of the plain fill objects. To cover complete area of the object, the thread must start filling in point **6**, in this case. Therefore, connection (**5**) is automatically generated from point **4** to **6**. After filling the whole object, thread stops in the end point **7**.

#### **Running and jump stitches**

Running stitches are 'normal' stitches embroidered by machine. They form continuous series of stitches, usually  $0.5 \text{ mm} \sim 5 \text{ mm}$  long. Some objects in design are separate and machine must move needle to a new position. To define such move (without stitching), the jump 'stitch' is used.

The jump can be regarded as a very long and loose stitch. Although it is just move of the needle, we call it 'stitch', because needle penetrates the fabric at the end of previous running stitch, i.e. at beginning of the jump, and at beginning of the next running stitch, i.e. at the end of the jump. From this point of view, the jump is the same stitch like the 'normal' stitches, but usually much longer. This fact is used for embroidering very broad satin stitches (see below).

#### Longest stitch

Most embroidery machines have 12.7 mm limit for longest possible running stitch. Some machines have even shorter limit  $\sim 12.1$  mm. It is possible to use satin stitches longer than this limit. Such stitches Embird codes as series of short starting running stitch and single or multiple jump stitches. Please note that such stitches look queer on the screen, because of the jump stitches in the middle (displayed with dashed line). However, stitches on the actual sew-out are all right.

Embroidered design with long satin stitches (longer than 8~10 mm) may be easily damaged by washing because

of the loose stitches. We recommend to use pattern (texture), which splits long stitches into shorter ones.



Blue arrow marks the normal running stitch, i.e. running stitch shorter than limit.

Longer stitches are automatically divided into short running stitch (green arrow) and series of jump stitches (red arrow). When embroidered on a fabric, all stitches look the same. There are no needle points in the series of jump stitches.



#### Smallest needle step

The shortest possible move of needle on most embroidery machines is 0.1 mm in both axes. Stitches in stitch files are coded with use of 0.1 mm grid. Therefore, if you open stitch file in Embird Editor and zoom-in the stitches sufficiently, you will discover very small steps on edges which seemed to be smooth at a small zoom. These little steps are caused by 0.1 mm grid.



#### Stitch density

The stitch density in Embird is defined as distance between needle points in above mentioned 0.1 mm grid. Density 4.0 means four steps of 0.1 mm, i.e. 0.4 mm. The commonly used density of satin and fill stitches is approximately 3.0 - 4.0, according to weight of thread used for actual embroidering. 0.1 mm step cannot be further divided into smaller steps. Therefore, density 3.5 does not mean that distance of all needle point pairs is 0.35 mm. It means that some pairs have 0.3 mm distance and some pairs have 0.4 mm distance. The average distance is 0.35 mm.

Studio uses the same density definition as basic Embird, but the 0.1 mm grid affects only exported stitch files. Outline file format allows to put stitches anywhere, not just to 0.1 mm grid. However, when you compile outline file into stitch file in Embird Editor, above mentioned effects appear. It is not an error. This is the way how it is supposed to work.

# **Object Types**

Digitizing in Embird Studio means drawing of objects, which are filled with stitches according to parameters set individually for each object. This approach was chosen because embroidery design usually contains areas of the same type of stitches - plain fill (2), satin stitches (3), outline (1), etc. Such areas can be digitized as a separate objects of respective type and color. Program fills them with appropriate stitch type and user does not need to care about each individual stitch.



Stitches order within object is controlled by program, with a single exception: object's beginning and end point, which are defined by user. Stitching starts at beginning point and stops at the end point of the object. Definition of these points is important for correct connection to previous and next object.

Objects are listed in **<u>Object Inspector</u>** list (right side picture). They are listed in the actual sewing order from top to bottom.

Objects have vector (curve or straight line) edges, which means that they can be resized without loss of quality. Edges are defined by points called nodes. Straight line edge has two nodes - start and end node. Curves in Studio have three nodes - start, middle and end point. Node in the middle of curve defines arch of the curve.



Straight line (left) is defined by 2 points. Curve (right) is defined by 3 points.

Object usually contains several line and/or curve elements.

Studio uses these types of objects:

- Fill
- Sfumato
- Column
- Column with Pattern
- Connection
- Manual Stitch

- Outline
- Appliqué

Each type has specific stitches layout (described below) and adjustable parameters like density, angle, etc. (see Parameters chapter).

### **Fill Object**

The edge of a fill object is composed of lines and curves. Small rectangles are end points of lines and curves. Small circles are middle points of curves. The cross at the top is beginning of the edge. Diagonal lines at the bottom indicates the place of last fill stitch and angles of cover stitches (longest line) and zig-zag underlays (short and medium length line). Small cross in the object is the 'Focus point' for effects like Circular fill.

Studio automatically generates edge underlay and two zig-zag underlays as well as overlays and connections. Fill object can contain openings. User can adjust various parameters of Fill object, including stitch density at beginning and end of object and effects like the wave, contour or circular fill. Fill objects may be filled also with automatic column (satin) stitch.





Fill object may be followed with Carving object.

Plain fill (left) and automatic column fill (right)



Fill object with opening (left) and carving lines (right). Single fill object can have multiple openings and/or carvings



Fill witch circular stitches and gradient, contour fill with gradient



Fill witch circular stitches and gradient, contour fill with gradient

Direction of stitches in automatic column fill can be controlled to some degree with direction lines.

**Most common error message:** "Compilation Failed. The sequence is probably not correct. Adjust sequence outlines."

#### Solutions:

1. Do not use too many nodes. The curves allow you to create smooth edges even with small number of nodes.

2. Make sure that all edge element are correctly drawn and that middle points of curves are placed correctly. No edge element should cross other elements.

### **Sfumato Object**



Sfumato objects are used for creation of photo-like embroidery designs. Sfumato object is drawn exactly like the Fill object, but the stitches inside of object are generated in other way. Thread creates meanders of various size to approximate the picture/photo under object.

Sfumato is an optional part of the Studio. It is included in the installation file of the Studio (no separate download needed), but it must be purchased and registered separately.

### **Column Object**

Satin stitch object is called column in the Studio. Column is composed of two edges. Each edge can have different number of parts (lines and curves). Dashed line indicated the End of Segment inserted by user. Segments ends define direction of stitches. Beginning and end of Column are automatically Segment Ends. Program generates small gap at beginning and end of Column to prevent stitches bulging.



Too long cover stitches are replaced by jump stitches ended with short running stitch. Program generates center walk, edge and zig-zag underlays and it also automatically shorts stitches in curved parts. Too sharp corners of Column object are automatically replaced by roof, folded or split corner.



Column object may be followed with Carving object.

**Most common error message:** "Unable to compile so twisted object. Please insert some segment end into object or adjust edges." **Solution:** 

1. Do not use too many nodes. The curves allow you to create smooth edges even with small number of nodes.

2. Make sure that two sides of column do not cross each other.

3. Use Segment Ends inside of column now and then to define direction of stitches. When making circle or rectangle border with column object, there should be about 4 or more segments inside of column.

### **Column with Pattern Object**

Column with Pattern is the same object as Column, but user can define also the pattern, according to which stitches are split. User can define also her/his own patterns.



Column with Pattern object may be followed with Carving object.

### **Connection Object**



Objects that do not touch each other are automatically connected by jump stitches, when compiling the finished design. If you do not want jump stitch between objects, use Connection Object to make running stitches path between objects.

### **Manual Stitches Object**

Manual Stitches are composed of series of lines. Use them to produce fine details.



### **Outline Object**

Outline is composed of one edge that may or may not be closed. User can use various stitch samples for the outline. Typically, this object is used for running stitch outlines added on top of fill or column. Outline may be turned to sketch, satin stitches, border or to appliqué and vice versa.



### Appliqué Object

Appliqué Object is similar to Column object, but it must be closed. It serves for stitching down the piece of fabric instead of filling the area with stitches. Appliqué Object automatically generates marking, tack-down and cover stitches. Tack-down stitches have separate color in order to stop machine and allow user to cut off the fabric.





Appliqué can also have openings, which are another appliqué objects inside. Marking stitches, tack-down and cover stitches of main appliqué and its openings are automatically arranged so that they sew all at once: all marking stitches first, all tack-down stitches next, and all cover stitches at end.

If you need to work with individual layers of Appliqué object, use **main menu > Convert > Split Appliqué into Layers** command. Result is separate marking stitches (outline), tack-down (column) and cover stitches (column) objects.

# **Main Window**



### Controls

- Hoop (Work Area). When starting a new design, the work area is blank. User can import image into background of work area. Default colors of work area and grid lines are specified and can be changed in <u>Edit/Preferences</u>.
- 2. **Rulers**. Press left button on vertical or horizontal ruler and drag mouse to Work Area to create a **<u>Guide</u>** <u>Line</u>.
- Status Bar. The mouse cursor coordinates, zoom and tool hint or other information are displayed here. When an object is selected, the status bar displays its size and number of stitches. If editing/creating <u>Fill</u> <u>object</u>, the status bar displays angles of cover stitches and underlays.
- 4. **Transform, Edit, Zoom** and **Pan** <u>tools</u>. Use Transform tool to move, rotate, or change parameters of an object. Use Edit tool to switch an existing object to edit mode.
- Creation tools. From top to bottom: Fill, Sfumato, Opening, Carving, Column, Column with Pattern, Outline, Manual Stitches, Connection, Appliqué, Appliqué Opening. Use these tools to create new objects. Read more about available objects here. Parameters of objects are described in a separate Parameters help file (Help/Parameters).
- 6. Main menu. Read about main menu here.

- 7. Palette of Colors. Click right mouse button on any color to adjust this color. To change color of an existing object, press left mouse button on color and drag and drop it on the object icon in Objects Inspector window (see 11 below). To set color that will be used for newly created objects click left mouse button on any color.
- 8. Active Color. The Color that will be used for new objects is outlined in black and white.
- 9. Button bar. The most used functions from main menu and pop-up menus are accessible through these buttons.
- 10. **Object Inspector window.** All objects created on work area are displayed here in order of creation. It shows order of objects, their type, visibility and whether they are connected to previous object by jump or not.

When composing complex design with many objects, it is sometimes difficult to isolate desired object in the work area. Use Object Inspector in this case. To change order of objects, select them with right mouse button, drag them to their new position, and release mouse button. To Hide/Show object click the eye icon to the left of each object.

To access menu to duplicate, delete, or change parameters, click right mouse button on selected objects in **Object Inspector** window.

A red scissors icon left to the object type icon indicates that there will be jump before this object, because it does not touch the previous object.

To change color of object in **Object Inspector**, press left mouse button on any color in Palette (7) and drag it to this object. Then release the button. Another way is to double click the object icon to access the color dialog box, or use the Color command from the pop-up menu.

Color can be dragged and dropped from object in the list onto the palette.

To select non-contiguous subset of objects, depress the Ctrl key and left click on each object. In the editing mode the Object Inspector and Part Inspector windows (11) are replaced with basic parameters of the object.



11. Part Inspector window. Openings (holes) of fill objects are displayed here as well as parts of joined and grouped objects. This window serves to select holes and parts for further manipulation, because they cannot be selected in work area and in Objects Inspector.

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12. Magnifying window. This window displays enlarged area around mouse cursor. It aids precise

placement of nodes, allowing user to maintain view of design in the Work Area. To hide this window, use View/Zoom Window; this will enlarge the Parts Inspector window. When cursor moves over Object Inspector, this window displays enlarged object icon.

- 13. Work area scroll bar.
- 14. **Display mode tabs**. Click <u>here</u> to read mode about the display modes. Please note the Sim tab. Clicking on this tab starts the <u>sew simulator</u>.
- 15. Button for sending the finished design to **Embird Editor**.
- 16. **Splitter** for adjustment of Object Inspector / Parts Inspector size.
- 17. **Splitter** for adjustment of size of the right panel.
- 18. Buttons for **browsing in Object Inspector (10)**. Buttons with arrow icons serve to skip objects of the same color or connected by connection. They help to browse the objects list faster when you need to find and select next or previous group of objects.

Check box at the left side allows to use **'refined search'** for browsing, which means that selection moves not only to items containing a jump stitch or change in the object color, but also to items containing a change in the object type.

### **Options and Parameters**

- 20. <sup>3</sup>/<sub>4</sub> 9,0 m Width of column object created with C column mode. When starting a new object with C method, this parameter is automatically set according to distance between first two point placed by user. User can adjust this parameter at any time.
- 21. **Column Mode** combo box choose method of column type objects creation: A each side separately, B alternate sides, C- both sides at once (constant width).
- 22. Edge Mode combo box choose line or curve edge as default when creating new objects.
- 23. **Middle Point First** check box if checked, new curve element is created so that on first click, line is created. On a second click line turns to a curve using the previous point (end of line) as middle point of curve. If it is not checked, the curve is created on a first click, but the middle point must be dragged to proper position.
- 24. Curvature of the rectangle with rounded corners.
- 25. Check boxes for **snapping of nodes** options (snap to nodes, snap to Work Area edges, snap to guide lines). Same options can be accessed in editing/creation mode via **main menu > Nodes**.
- 26. Basic **parameters** of the newly created object. More parameters can be accessed with use of Objects/Parameters menu after finishing the object.

# Tools

Basic tools for creation and editing of vector objects in Studio are located on a left-side panel. The tools in the top section of the panel serve to manipulate the finished objects and to control the work area (zoom and pan). The next section contains tools for creation of new objects. The last one is a Measurement Tool.

- × × 9 2 7 8
- 1. Select and Transform Tool
- 2. Edit Edges Tool
- 3. Zoom Tool
- 4. Zoom 1:1 Tool
- 5. Lasso Selection Tool
- 6. Pan Tool



- 7. Create Fill Object Tool
- 8. Create Sfumato Object Tool. Sfumato is an optional part of the Studio.
- 9. Create Opening Tool
- 10. Create Carving Tool
- 11. Create Column Object Tool
- 12. Create Column with Pattern Tool
- 13. Create Outline Object Tool
- 14. Create Manual Stitches Tool
- 15. Create Connection Object Tool
- 16. Create Appliqué Object Tool
- 17. Create Appliqué Opening Tool

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- 18. Freehand Tool
- 19. <u>Trace Tool</u>
- 20. Measurement Tool

Use **zoom tool** to zoom in (left mouse button click) or zoom out (right mouse button click). If you want to zoom in a specific area, depress the left mouse button and drag mouse to make selection. Then release the mouse button and selected area will be enlarged so that it fits on the screen.



Create Opening can be used only after Create Fill or Sfumato object or previous Opening object. It does not appear in Object Inspector window as a separate object and cannot be selected directly on the Work Area. To select the Opening object for transformation, use the Part Inspector window. The same thing applies for Appliqué Opening object.

To add Opening to Fill or Sfumato, the Fill or Sfumato must be either selected or it must be the last object in the Object Inspector list.

Create Carving has effect only if used after the Fill, Sfumato, Column, Column with Pattern or Opening object.

The Fill, Sfumato, Opening, Carving, Outline, Connection and Manual Stitches objects have just one side (edge). Fill, Sfumato and Opening edge must form a closed loop, which means that their last point must be placed on top of their first point.

The Column Object, Column with Pattern and Appliqué Object always have two sides (edges). If Finish Object or editing functions are not available (grayed out) more than likely the second side of object has not been drawn.

When Appliqué Opening object is used after main Appliqué object, program generates stitches this way: 1. marking stitches of both main object and hole, 2. tack-down stitches of both main object and hole, 3. cover stitches of both main object and the hole. If there would be another Appliqué object instead of Appliqué Opening object, program would generate all three layers for first object and then all three layers for second object. The opening would be covered by fabric.

Measurement Tool measures distances and angles in design. It allows to create one or two measuring lines. If there are two lines, tool measures also the angle between the two lines. Measured parameters are displayed on panel at right side of the screen.



#### **Button Bar**

From left to right:



- 1. Compile design and put it into Embird Editor
- 2. Text tool (pre-digitized Alphabets)
- 3. Text tool (Font Engine text from TrueType and OpenType fonts)
- 4. Edit Text (object with text must be selected in the work area or object inspector)
- 5. New design
- 6. Open design
- 7. Merge design
- 8. Import image into background
- 9. Import vector file
- 10. Save design



- 1. Select all objects
- 2. Deselect
- Zoom to selected object(s). Useful when you select object(s) in object inspector. Scrolls and zooms object(s) to center of the screen.
- 4. Zoom to selected object(s) and switch to editing mode
- 5. Delete selected object(s)
- 6. Duplicate selected object(s)

- 7. Copy selected objects to clipboard
- 8. Paste from clipboard
- 9. Undo changes
- 10. Redo changes

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- 1. Edit selected object
- 2. Access parameters of selected objects
- 3. Apply pre-defined style to selected object(s)
- 4. Pick color from background image and apply it to selected object(s)
- 5. Select color from thread catalogs and apply it to selected object(s)
- 6. Generate stitches for selected objects
- 7. Erase stitches in selected objects. It is sometimes useful to erase or 'un-generate' stitches if these stitches hide objects beneath them, which you need to edit.
- 8. Display transformations window

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- 1. Set hoop size and color
- 2. Show / hide jump stitches
- 3. Show / hide fabric in 3D preview. Background image is displayed if it is imported and fabric is disabled.
- 4. Create connection from selected object to previous object to avoid jump (trim)
- 5. Create backward path (second layer) to outlines
- 6. Arrange outline parts
- 7. Arrange outline parts (no Connections)
- 8. Envelope
- 9. Auto Outliner
- 10. Auto-repeat tool

## **Node-by-Node Vectorization**

Embroidery design in Studio consists of objects in a vector form. Studio allows to create vector objects manually node-by-node, or semi-automatically with <u>Freehand Tool</u>, <u>Trace Tool</u> and import them from a <u>graphic</u> <u>vector files</u>. This chapter deals **with node-by-node manual digitizing** (vectorization) of objects.

### **Object with 1 edge (Fill, Outline, Connection)**

The simpliest object in Studio contains just one edge, which is series of straight line or curve elements. Some object types require "closed" edge, which means that its first point and its last point must have identical position. To create object with one edge (like Outline, for example), follow these steps:





Now you can click the right mouse button to invoke the pop-up menu for finishing object and/or generating stitches. We have created an Outline object, which does not need to be closed. Objects like Fill, Opening or Sfumato must be closed. To close object, use **Close Edges** command from the pop-up menu.

The pop-up menu contains also commands for insertion/deleting of nodes, conversion of elements to straight lines or curves and several other commands specific for created object. Most of these functions are also accessible with buttons in the horizontal button bar the top of the screen.

Another functions are accessible via main menu>Nodes. These functions include reversing the nodes order and options to snap nodes to grid lines, guide lines, other nodes, work area edges and other object edges.

### Object with 2 edges (Column, Column with Pattern, Appliqué)

Objects with 2 edges are filled with stitches running from one edge to the other at variable angle. This type of objects is used for satin stitch and appliqué. To create object with 2 edges, follow these steps:



Click on the **Column Tool** button in the tool bar at the left side of the screen. This will switch Studio into creation/editing mode.

Click on the work area to place the first node of the object. The first node is marked by a hairline cross.

Click on another place to create a base of the column object. Note that focused node is displayed with thick border. The base is displayed as a dashed line. Both edges will start in this base and end in another base at the opposite end of the column. Basis are always straight lines and they define angle of stitches at beginning and end of the column. Angle of stitches in between is interpolated from these two basis.

Create a new node by clicking on the work area. This is the first element of the edge. Arrow indicates the orientation of nodes.



Create several other nodes of the first edge.

Now select the node at the other side of the base. This is an important step, because program now knows that the next nodes will be added to the second side.

Repeated clicking on the work area will create nodes belonging to the second edge.

Both edges are composed of the straight lines elements. Middle nodes of curves (which are straight now) are displayed as a small circles.

Select and move middle nodes to make both edges smooth. Hold left mouse button depressed and move node to a new position. This method can be used for adjustment of any node position, not just the middle node.

Thread will start filling the column on a place where the first node (with cross) is located. The sewing will end at the last node on the second side. If you need to change sides of the column, use **main menu>Nodes>Swap Edges** command.

Click right mouse button anywhere on the work area to invoke the pop-up menu. Select **Generate Stitches** from this menu. This will finish the creation/editing mode and fill new object with stitches. If you do not want to fill it with stitches now, use the **Finish Object** command instead.



Finished column object has stitches running in a zigzag way from the start base to the end base, which define range of angles of the stitches. Basis may be not sufficient to define angle of stitches of a more complex column. In such a case, use **End of Segment** command from the pop-up menu to define angle inside of column. This command will connect selected node with a nearest node on the other side and thus define a stitch angle in this part of column.

**Digitizing of Appliqué** object is identical to that of column object, with only exception that Appliqué must form a closed figure. Image at the left side depicts Appliqué before closing edges. There is a gap between start and end base.

Appliqué object with closed edges. To ensure precise alignment of start and end base, use pop-up menu from the step 10. and select **Close Edges** command.

### **Adding New Nodes**

Pop-up menu mentioned in above examples can be used to insert (or delete) new nodes on the vector edge. If you need to add multiple nodes quickly, please use **Fast Node Insertion Mode.** 

# Connections

Embroidery design should contain as little thread trims as possible. Trims are time consuming and decrease the quality of embroidery because of potential thread loosening. Therefore, use connections between objects whenever possible to reduce the trims number. Connection is series of running stitches whose only purpose is to draw thread from one spot to another. Otherwise, there would be a trim. Studio has special tool (button on the left-side picture) for creation of connections. This tool is located in the tool bar at the left side of the Studio window.

Connections should be used between objects of the same color on places where they are not visible or where they do not affect too much the overall looking of design. They are often placed beneath other objects or along the outlines. In case of small lettering (or other small objects laying one near another) the connections are visible (because there are no objects to hide them), but they are made as short as possible. This type of connecting objects is called a 'nearest point' connection.

You should always select such sewing order of objects in design that there is a minimum number of trims required. In this case, we can sew both objects of the blue color first and then the yellow object on top of them. To avoid trimming between the blue objects, we will connect them with stitches. Connection can be hidden beneath the yellow object.



Define start and end point of each blue object so that inserted connection does not interrupt continuity of sewing. The first blue object (the left one) should end on a spot where connection begins. The second blue object should begin on a spot where connection ends.

There are two ways of how to create connection: 1. use connection tool to digitize connection node-by node. 2. select second blue object and use right mouse button click to invoke a pop-up menu. Then select 'Create Connection' from this pop-up menu. This will create a straight-line connection which can be edited node-by-node. The same command is available from the **main menu > Transform**.



**Please note:** to adjust straight-line connection by adding multiple nodes quickly, please use <u>Fast Node</u> <u>Insertion Mode</u>.

In our example connection has 3 elements - straight line, curve and one more straight line. The curve element has little circular node in the middle. The start point of connection is marked by cross.



Shape of connection was chosen so that connection runs mostly deep inside of the yellow object which will be sewn on the top. This helps to prevent showing of connection on the sew-out in case of little displacement of yellow stitches, which often happens as result of loose hooping of fabric or pull effect of the thread. If upper object is large enough, place connection at least 2~3 mm inside of the upper object. If it is small, place connection into the middle.

Connection ensures that the thread path is continuous from beginning of the first object (1) to end of the second object (4).



Please note that the first object is sewn from bottom up to point (2) and then from top down to point (2). This type of stitching is caused by location of the start point (1) and the end point (2). It is not possible to fill object with a single draw while preserving the start and end point and the fill type. However, program automatically inserts connection stitches inside of this object. User has to create connections only between separate objects, not within objects themselves where program makes all stitching automatically. This approach allows user to define overall stitch order without having to care about each individual stitch.

Connections have adjustable <u>Minimum and Maximum Stitch</u> length. Maximum-length stitches are used on straight-line connection segments. Curved segments are stitched with shorter stitches to form smooth curves. **Minimum Stitch** defines the shortest allowed connection stitch.

On places where running stitches between objects are not desired, connection object allows to create **<u>'controlled jump stitch'</u>** for easier trimming.

## **Fast Node Insertion Mode**

While working in **nodes creation/editing** mode, you can only add new nodes after the last node on the edge. It is possible to use Insert command from pop-up menu, or button with the same function to add nodes anywhere, but it can be very cumbersome in case of multiple nodes insertion. Adding new node near existing node may interfere with selection of that node instead of creation of a new one. The fast node insertion mode allows to bypass these two problems. It is activated by depressing the "a" key on keyboard while clicking the left mouse button. This mode has two main advantages:

- 1. Allows to add new nodes after any selected node, not just the last one.
- 2. Does not check if you click on existing node, so you can put new node on top or near existing node.

Inserting new nodes is especially useful when adjusting automatically created connection between objects or for creation and editing of special shading effects with manual stitches. If large number of manual stitches is created, it is also helps to avoid selection of existing node instead of making a new node.

Below example illustrates insertion of new nodes. Polyline ends with point (1). We want to insert some nodes after the node (2). Select point (2) by clicking it.



Now depress the **"a"** button on the keyboard and hold it down. Move cursor to places where you want to create new nodes and click left mouse button. Create new nodes **(3)**,**(4)**,**(5)** and **(6)**. Then release **"a"** button. Please note that these new nodes were inserted into the middle of the nodes sequence, after node 2. Light gray line on below illustration indicates previous stage of the polyline.



**Please note:** while **"a"** key is depressed, you cannot select existing nodes. To do so, release the **"a"** key (exit the fast node insertion mode).

# **Basic Shapes**

Basic shapes like rectangle, ellipse. etc. are available from **main menu > Shape**. Items in this menu are normally disabled, because shapes are accessible only in the creation/editing mode, when object's nodes are editable. This mode allows to use shapes for any type of object and to combine several shapes (like ellipses) into a single object.

### Example 1 - Star

Let's start with a simple example - a star shape used as a fill object.



Click on the **Fill Tool** button in the tool bar at the left side of the screen. This will start the creation/editing mode.





Click on the work area to create the first node. Note that there is a spider leg control on this node. This control indicates angles of underlay and cover stitches of the fill.



Use main menu >Shape >Star (5 points) to select the star shape.



Click on the work area and draw shape with dragging cursor on the work area with left mouse button depressed. Release the button. Shape is not finished yet. Its size and position is only approximate.



Adjust the shape position and size with use of the red nodes.

Shape is converted into the series of elements and nodes. The series begins and end on a spot nearest to the first node created in step 2.

Click right mouse button anywhere on the work area to open the pop-up



Click right mouse button anywhere on the work area again. Select **Generate Stitches** command from the pop-up menu that appears on the screen. Finished object is plain fill object with shape of a 5 point star.

### **Example 2 - Satin Stitch Ellipse**

In creation/editing mode it is easy to combine several shapes into a single object. The most common case is drawing of satin stitch ellipse.

menu. Select to Elements option.





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Click on the **Column Tool** button in the tool bar at the left side of the screen. This will switch Studio into creation/editing mode.

Click on the work area to place the first node of the object. The first node is marked by a hairline cross.

Click on another place to create a base of the column object. Note that focused node is displayed with thick border. The base is displayed as a dashed line. Both edges will start in this base and end in another base at the opposite end of the column. Basis are always straight lines and they define angle of stitches at beginning and end of the column. Angle of stitches in between is interpolated from these two basis.



Draw ellipse close to the focused point. Use red nodes to adjust ellipse size and position accurately.

Click right mouse button anywhere on the work area and select **to Elements** command from the pop-up menu.

The first side of column is finished.











Click right mouse button anywhere on the work area again. Select **Generate Stitches** command from the pop-up menu that appears on the screen. Finished object is plain column object with shape of ellipse.

### **Example 3 - Rounded Rectangle**

The principle of rounded rectangle creation is the same as in previous examples. There is only one exception - this shape uses additional controls for curvature of the corners. These controls are located in the top-right corner of the screen and they look like this:

:

Use the first control to adjust the horizontal curvature of the rectangle corners. Second control affects the vertical curvature. Adjustment of controls of this type is explained in the **Parameters** chapter.



Rounded rectangles with different amount of curvature.

# **Object Inspector**

The main features of Object Inspector **(1)** are described in <u>Main Window</u> <u>chapter</u>.

Right click on selected object or objects in Object Inspector to access a pop-up menu for operations with selected objects.

#### For meaning of **Group** and **Ungroup** commands please see <u>Main</u> <u>Menu / Objects chapter</u>.

To select and manipulate joined and grouped objects, use the Part Inspector window **(2)** beneath the Object Inspector window. It is not possible to select these parts directly on the Work Area.

To change sewing order of objects in Object Inspector, select an object with a right click and drag it to its new position in the list. Then release the right button and, from the menu that appears, choose whether the selection should be placed **Before** or **After the item.** You can also choose the **Set Identical Parameters** to copy parameters from one object to another, or **Set Identical Color** to copy color one object to another.



The meaning of other controls associated with object inspector is:

(3) **Magnifying window**. This window displays enlarged area around mouse cursor. It aids precise placement of nodes, allowing user to maintain view of design in the Work Area. To hide this window, use View/Zoom Window; this will enlarge the Parts Inspector window. When cursor moves over Object Inspector, this window displays enlarged object icon.

(4) **Splitter** for adjustment of size of the right panel. Useful when you need to enlarge the right panel to see text labels, for example.

(5) Splitter for adjustment of Object Inspector / Parts Inspector size.

(6) Buttons for **browsing in Object Inspector**. Buttons with arrow icons serve to skip objects of the same color or connected by connection. They help to browse the objects list faster when you need to find and select next or previous group of objects. Check box at the left side allows to use '**refined search**' for browsing, which means that selection moves not only to items containing a jump stitch or change in the object color, but also to items containing a change in the object type.

The meaning of icons in below table is as follows: 1. Icon for showing/hiding object, 2. Small picture of object, 3. Indicator of jump stitch and/or color change before object. 4. Type of object, 5. Indicator of jumps and/or color changes inside of joined. grouped or clustered objects, 6. Number of object, 7. Number of color.



Red scissors indicate that there is a jump stitch before object. Color tube indicates that object is of other color than previous object..

Object is **Fill**.

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Object is **<u>Sfumato</u>**. Sfumato is an optional part of the Digitizing Studio.

Object is **Carving**.

Object is **Column**.

Object is **Column with Pattern**. It is similar object like Column, but its cover stitches are divided according to some **pattern**. This allows to use wider columns and to add texture to the cover stitches.

Object is **Connection**.

Object is **Manual Stitches** sequence.

Object is Outline and there exists backward path object to this object. This means that there are two layers of stitches on this place.

Object is Outline and there is no backward path created to it. This icon helps to identify parts of outline that have only one layer of stitches.

Outline object that is a backward path for some previous outline object.

Object is **<u>Appliqué</u>**.

Object is composed of several other objects that are joined (small black lock), grouped (medium size blue lock) or clustered (large magenta lock).

Small horizontal scissors indicate that there are jump stitches inside of joined, grouped or clustered object. Small horizontal color tube indicates that there are color changes inside of **joined**, **grouped or clustered** object.

Object number. Left click on text label (which includes also color number) to access the **Parameters window**. To copy parameters or color into other objects, select item, depress right mouse button and drag and drop on the other object.

Color number. Colors are numbered in order of appearance. This number helps to identify objects with the same color, which is useful especially in a case of very similar colors.

IabelCurrent version displays labels for objects belonging to<br/>lettering created with Alphabets or with Font Engine.<br/>Label contains first line of respective text and 'Alphabets<br/>Text' or 'Font Engine Text' attribute. If you want to edit<br/>lettering object, use right mouse click to open pop-up<br/>menu and select Edit Text command.

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# **Display Mode**

Studio provides several ways of how to display embroidery design during creation or editing. They help to create design from raster image in the work area background and view all parts of design in either vector or 3D mode.

Display mode is set with use of the **Display mode tabs** at the bottom left part of the Studio window.

Normal Image	Vectors	🛛 3D	🔘 3D 🛛 FI	at 🛛 Ø 1:1	l 🔘 1:1	1:1	Sim	D. Map	X-Ray
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Single click on the tab switches the display mode.

Double click opens **<u>Preferences window</u>** and allows to edit parameters of 3D modes (thread width, background).

In **Normal** mode, all objects (background image and digitized vector objects) are displayed. In **Image** mode only the background image is displayed. In **Vector** mode only the digitized objects are displayed.

In **3D** and **3D Matte** modes design is displayed with use of realistic three dimensional simulation. In the **3D Matte** mode a lusterless thread is used as opposed to the **3D** mode, in which design is displayed in glittering thread colors.

In **Flat** mode design is displayed with plain colors (without shading and glittering), but preserving the thread width. This mode is useful when working on detailed parts of design where thread shading and glittering may be confusing. User can create and edit design even in the 3D, 3D Matte and Flat mode, which is not possible in the 1:1 modes.



Another view modes are **1:1** mode, **1:1 Matte** mode and **1:1 Flat** mode. These modes display design on the screen in a real size, taking into account screen calibration from the Embird Manager. Design cannot be edited in these three view modes.



Switching to **Sim** mode starts a sew simulator in the work area of Studio. <u>Click here</u> to read more about this function.

The next two display modes help to improve design quality by allowing to check the stitch density, underlay layout, etc.

**D. Map (Density Map)** displays design in a false color scale, with colors gradient from blue through green and yellow to red. Intense red color indicates areas of critical stitch density. This display mode is useful when **converting graphic file (like CMX, EMF or WMF) to embroidery design**. Graphic files do often have number of hidden or overlapped layers, which must be removed when used for embroidery. Density Map allows to discover places with too many layers (and consequently, high stitch density).



**X-Ray** mode displays stitches as semi-transparent, allowing to see through the cover stitches and check the underlay, the tie-up stitches and overlays. This mode helps to check all layers of design at once and to identify areas of high stitch density.



Fill object in x-ray mode:

1 - tie-up stitches, 2 - connection path, 3 - edge underlay, 4 - overlay of fill sections, 5 - pattern of cover stitches

There are also other options that affect displaying of design. They are accessible via **main menu > View**.

#### Zoom levels in Studio

Zooming system in Studio uses basic unit equal to minimal possible movement of the needle, which is 0.1mm for most embroidery machines.

In zoom 1, 10 screen pixels=1 mm of the needle movement. However, this does not mean that 10 pixels = 1 mm on the computer screen, because screen pixel is usually much larger than 0.1 mm. Therefore, what you see on the screen with zoom 1, is not a real size of embroidery design. To see design in a real size, Studio provides special 1:1 viewing mode (1:1, 1:1 matte and 1:1 flat tabs). These viewing modes use screen calibration from Embird to display designs in a 1:1 real size;

For common 17" screen with 1280x800 pixels resolution, zoom 2 in Studio displays approximately 5 x real size of design.

# How to Digitize a Logo

We will learn how to digitize a company logo in this lesson. It is intended for beginners and all steps are commented.

Studio fills vector objects drawn by user or imported from vector file with stitches and finished design is uploaded into Embird Editor for final adjustments and save in desired format. When doing a real digitizing job, please note that if you do already have logo vectorized in some graphic program and saved in EMF, WMF, CMX or other format compatible with Studio, you can use the **main menu/ design/ <u>Import vector file</u>** function to convert vector graphics into design and avoid manual redrawing of objects. However, we will use manual digitizing in this lesson to learn how to do it in Studio, because lot of digitizing work must be done manually to achieve best result.

When digitizing design in Studio, user can import scanned picture or photo into the background of the work area to use it as a template for digitizing. Digitizing itself is drawing of vector objects on top of the image and filling them with stitches. To make vector objects more visible on the background, imported image can be brightened, darkened or otherwise filtered.

The first step in digitizing logo or other design is usually import of the scanned image. Scan is usually rotated, deformed or otherwise distorted.

### Chapter 1 - Adjustment of the Image

Use the **main menu/ Image/ Import** command to load image into the background of the work area. Image 'Embird.JPG' used for this lesson can be found in the **PATTERNS** subfolder of the Studio. When importing image, Studio asks you whether you want to resize image so that it fits the current size of Hoop (Work Area) or not. Select **No** in this case. We will set the image size later.



Studio can import image up to 3000 pixels width and height.

Fig.1. Import of Image.

This image needs to be rotated to a horizontal position. Use the **main menu/ Image/ <u>Edit Image Window</u>** command to open window with image adjustment controls. There is a **Rotate Image** control on the first tab. Use it to rotate image to desired position. You can adjust angle in a several ways:

- Left button click on the angle value (number) to increase the angle.
- Right button click on the angle value (number) to decrease the angle.
- Left button click on the clock face to set the angle directly.
- Right button click on the clock face to open window with slider for angle adjustment.

When adjusting the angle, wait a moment for Studio to rotate the image. Change the angle until image is rotated to desired position.

Do not click click **Apply** button yet. We will make more operations before closing this window.



Fig. 2. Rotated image.

Now we will crop the image and set required size of the image (which means also required size of embroidery design).

Move the crop lines close to edges of the logo. Crop lines have square handle in the middle to allow user to seize and move the crop line. You can use **Transform and Zoom tools** as well as the work area scroll bars to zoom in or out, and to scroll the work area in order place the crop lines precisely. Area that will be cut off is grayed.

Select the second tab (image size) and set required size of the image. The third tab allows you to set width of empty area border that will be added to the image after cropping and resizing. This empty border is useful for digitizing, because user does not have to work too close to work area edges.



Fig. 3. Logo bounded by crop lines.

Click **Apply** button. Image is rotated, cropped and resized. If you have skewed or otherwise deformed image, use **<u>Straighten Image</u>** tool from the **main menu/ Image**. We will not use it now as it is not needed in this case.

To make digitizing easier, we will brighten the image. All necessary image details will remain visible, but there will be higher contrast between digitized vector objects and background image. Use the **main menu/ Image/ Background Filters** to open the window for change of image brightness and color. Move the Brightness slider to 44%, approximately. Then click Apply button.

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and the second	Gamma 0.0	% 🔇	000)	>	
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-	Yellow-Blue	0 <	(111)	>	
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Fig. 4. Background Filters window and effect of increased brightness on the image.

### **Chapter 2 - Digitizing of Filled Areas**

Now we can start the actual digitizing. We will use the **Fill objects** for color areas like letters and nuts and we will add thin black outline (**Outline objects**) later. Fill objects are filled with long parallel stitches (if basic '**plain fill**' is used ) that are split into shorter stitches to avoid too thread being too loose. Because of these split stitches and their constant angle, fill objects used for digitizing of large objects. They are not proper for digitizing of small lettering or narrow objects. If you use fill objects for lettering, it should be at least 1cm (1/2 inch) high to sew well.

Good embroidery design should have as low number of trims (jump stitches) as necessary, in order to speed-up the sewing process and to make embroidery nicer. If there are no trims or color changes, design is sewn in a single 'draft'. Sometimes it is not possible to avoid trim, but digitizer should minimize their number in the design. To avoid too many trims, it is necessary to place start and end point of areas which are close one to the other so that they could be connected with **Connection objects**. There should be minimum distance between end point of one object and start point of the other, so that connection is as short as possible ('**nearest point connection**).



Fig. 5. Nearest point connection between two fill objects.

**Note:** it is not necessary to use always only the nearest point connections. The gap between connected objects can be covered by object of another color. In such a case, connection should be hidden beneath this object, even if it is not a nearest point connection.

Click on the red color in the palette (top right corner of the screen) to select red color for objects that we are going to create.
Select the **Fill tool**  $\clubsuit$  and place the first node on a place of letter **E** that is nearest to the letter **m**. Now the Studio is in a 'creation/editing' mode. Letter E will have start point and fill end point on the same place, because it is a first letter in the word. Digitize whole letter by placing nodes around the letter. Rectangular node is end of the curve. Circular node is middle point of the curve. Move the middle points to the side to adjust the curves.



Fig. 6. Creation of letter E. This is an animated picture. You should view it on the computer screen.

To place the last node on top of the first, you have to create it a little bit aside and then move it on top of the first node. Otherwise, you will select the first node instead of creating a new node.

When whole object is drawn, click the right mouse button to invoke the pop-up menu. Choose **Generate Stitches** to end the digitizing of the letter. Notice other commands in this menu that allows you to convert curves to straight lines and vice versa, insert or delete elements and also change position of start and end point of the fill. Program fills the Fill object with thread beginning in the start point and finishing in the end point. Correct placement of these two points are very important if you want to connect several objects together and avoid trims.



Finish Object
Generate Stitches
Close Edges
Insert
Delete
to Curve
to Line
Place Fill End Point Here
Place Start Point Here
Place Effect Focus Here
Snap to Nearest Node
Cancel

Fig. 7. Draw curves along the contour of letter E, starting at the right side.

Then Click right mouse button to invoke the pop-up menu and select **Generate Stitches**. 3 lines sticking at various angles from the first node are indicators of zig-zag underlay 1, zig-zag underlay 2 and cover stitches angles.

Finished letter is filled with stitches all going at the same angle (0°, in this case). Studio automatically generates also the underlay stitches around the contour of the letter to prevent the cover stitches pull, and zig-zag underlay stitches to strengthen the fabric before sewing of the cover stitches. The outer red outline is only object boundary displayed on the screen, it is not stitches. Notice the tiny white dots on the horizontal stitches. They mark needle points - places where long horizontal stitches are split into smaller stitches. Needle points are arranged according to **pattern**. User can choose any of the predefined fill patterns from the **parameters window** or **define her/his own patterns**.

Notice that all finished objects are displayed in the **<u>object inspector</u>** (picture at right side).



Fig. 8. Finished letter **E** filled with underlay and cover stitches (left picture). Icon in the **Object Inspector** list (right picture).

Please note that character 'E' was digitized with plan fill tool. If you need to create satin stitch lettering, please read <u>"Manual digitizing of lettering" tutorial</u>.

Digitize all letters in the same way as the first letter E. Please note that start point of letter **m** is at the left size (picture below) and fill end point is at the right side. To achieve this, place the nodes around the letter starting and ending at the left side. Then select node at the right side, click right mouse button and choose **Place Fill End Point Here** command. Start and end points are placed this way because we want to create connection



Fig. 9. Digitized letter **m**. Start point is at the left side. Though the last point of the object

is also at the left side (as the object is closed), the stitching will end on the right side of the letter, because **Fill End Point** has been assigned to the right-most node.

Letters b and d must be created in a little bit different way, because they have opening. Create the outer contour like on the previous letters (with fill tool) and then create opening with the O **Opening tool**. Notice that opening is not displayed in the object inspector window. It is displayed in the parts inspector window where the parts of complex objects are displayed.



Fig. 10. Finished letter **b**. Opening is displayed in the Parts Inspector list.

Digitize the blue part of one of the nuts with the fill tool. We will create the rest of objects with duplicating and rotation. Select the object and click the **main menu/ Transform/ <u>Transformations Window</u>**.



Fig. 11. First object is digitized manually.

Set 120° to angle control on the **Rotation Tab**. Click two times on **Apply to Duplicate** button to create 2 new objects, each of them rotated 120° from the previous object. Click **Close** button to hide the window. Select new

objects and move them to their position. Then select them all 3 objects by clicking on them while holding the shift key depressed. Click right mouse button to open a pop-up menu and select **Generate Stitches** command.



Fig. 12. Rest of the objects are duplicated, rotated and placed to their position.

Now all blue parts of the image are digitized and filled with red thread. We have used red thread because it is well visible on the background.

We will change color of all red objects to blue. Select all objects with use of any of the following methods:

- You can use **main menu/ Edit/ Select All** command.
- Or you can select objects directly in the work area by dragging the **marquee box** around the object.
- Or you can select objects in the **Object Inspector** list.



Fig. 13. All blue areas on image are filled with red thread.

Depress left mouse button on the blue color cell in the palette and drag cursor to selected items in the Object Inspector list or to the selection box in the work area. Then release the left button to drop color on selected objects. Color of selected objects will change to blue.



Fig. 14. Color was changed from red to blue.

Now we will digitize the yellow parts of nuts. In fact, we should have done this before digitizing of the blue areas, because the yellow parts would look more natural if they are beneath of the blue areas.

Anyway, we can digitize the yellow areas now and change order of objects so that they will sew first. Select some color from the palette (orange, for example). Use the Fill tool to digitize yellow area of the first nut. There must be an overlay between yellow and blue area to prevent the fabric showing through the stitches, because tension in thread could pull edges of objects away and cause the gap between the objects.



Fig. 15. Yellow area should be digitized with slight overlay into the blue area.

We area going to swap the areas sewing order. The blue area will be on the top.

Generate stitches for the new object and then use the **main menu/ Transform/ Transformations Window** to create 2 duplicates of the object, rotated 120° (or -120°) each. Then close the Transformations window and move new objects to their place.



Fig. 16. Apply to Duplicate button used to duplicate and rotate objects.

The orange objects are still on top of the blue objects. To change order of objects, use the **Object Inspector**. Select the 3 orange objects in the Object Inspector list. Depress the **right** mouse button on the selection and drag cursor to the first object in the list (letter E). Then release the right mouse button and choose **Insert Before** command from the pop-up menu. The 3 orange objects will be moved to the top of the list, which means that they will be sewn before the blue objects.

۰ 👔	Insert Before	ی 🐌 🍋 👁	1
	Insert After	کې 🍐 🕲	2
۲	Set Identical Parameters	کې 💧 🐲	3
۲	X 🗭 4	🗬 🏅 🥵 👁	4
۲	X 🗭 5	🗬 🗶 👝 🎕	5
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۲	X 🗭 7	ی 🖉 👗 👁	7
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Fig. 17. Use drag-and-drop operation with right mouse button to change sewing order of objects.

Picture at the right side shows the new order of objects.

We will change the angle of stitches in the orange objects, because they have the same angle as the blue objects. If two adjacent fill objects have same angle of stitches, stitches may interleave and the edge between the objects may be distorted.

Select the 3 orange objects, click right mouse button on the selection and choose **Parameters** command from the pop-up menu. When **<u>Parameters window</u>** appears, change the fill angle to 90°. Then click **OK** button to close the parameters window.



Fig. 18. Change of fill stitches angle.

As you may have noticed in fig. 17, there is a small red scissors icon displayed in the Object Inspector list next to each object that we have created so far. This means that object is not connected to the previous object by thread and the embroidery machine will insert trim on this place (it depends on the type of machine). On many places, the trims (or jump stitches) are not desirable. As the letters in the **Embird** logo are close one to the other, we could connect them with running stitch connections to avoid trims.



Fig. 19. Logo with all fill objects.

Select letters **m b i r** and **d** in the Object Inspector window. Do not select letter **E**, because we do not want to connect it to previous object. Click right mouse button on the selection and use the **Create Connection** command from the pop-up menu. Connection is created from each selected object to its preceding objects.



Fig. 20. Creation of connection for selected objects.

Program creates connection stitches between the objects. Notice tiny connections marked by orange arrows on the below picture. If you you get long stitches going through the objects, it means that you have not placed the start and end points of the fill objects correctly.

Connections created automatically by Studio are straight lines. In some cases, you may need to edit shape of connection by inserting new nodes.



Fig. 21. Nearest point connections between the letters.

#### **Chapter 3 - Digitizing of Outlines**

For overview of outline methods click here.

Now we will add thin running stitch outlines to the logo. We will create outline that has two layers of stitches. We will draw the first layer and then use Studio functions to create the second layer of stitches automatically. Studio allows to use many creative types of outlines, but the simple thin running stitch outline is probably the most useful for the digitizing of company logos, because other types of outline (**sample, border, sketch**, etc.) require larger size to sew well.

Another type of outline that is frequently used is satin stitch outline. However, we do not need it for this logo.

Select the black color from the palette. Use the  $\bigcirc$  Outline tool to create first part of the nut outline. We will draw outline part by part, because we will use **main menu/ Transform/ <u>Arrange Outline Parts</u>** function to reorder outlines and add second layer of stitches (backward paths) automatically. This function requires the outline to be drawn by parts. Each part should have start and/or end point near to the start or end point of other part, so that program knows which parts to join together and where.

Notice that new outline object is displayed with red arrow icon in the Object Inspector list. This means that the outline object does not have the backward path (second layer of stitches).



Fig. 22. First part of the nut outline.

When creating the outline parts, we can use the **main menu/ Nodes/ <u>Snap to Nodes</u>** option. When moving the newly created nodes, they snap to existing nodes of blue and orange objects beneath. This way we can easily create outline running exactly around the fill objects.

Create the second outline part as a separate object. Place the start point on top or near the end point of previous outline object.



Fig. 23. Digitizing of second part of outline. Snap to Nodes option is on to simplify the nodes placement.

Now we have 2 separate outline parts and we will join them together and create the second layer of stitches. Select the 2 outline objects and use **main menu/ Transform/ <u>Arrange Outline Parts</u>** command. Notice that Studio creates object composed of 2 original parts and it adds 2 identical parts with reverse order of nodes (see the Parts Inspector). They are so called '**backward paths**'. Studio automatically reorders all outline parts so that they are sewn in a single draft. Sewing starts in the start point of the first part and it ends in the same point. Program automatically creates path along all outline parts and back to the start point.

Arranged parts are joined into single item in the Object Inspector list (see the object no. 18 in fig. 24).



Fig. 24. Complete outline of nut composed of 2 original parts and 2 automatically created parts.

Select the whole nut outline and duplicate and rotate it for the rest of the nuts. Use the **main menu/ Transform/**<u>**Transformations Window**</u> to accomplish this task. Then move rotated outlines to their position.



Fig. 25. Outlines on all 3 nuts.

Now we will create outlines for the lettering. As letters are close one to the other, the easiest way is to draw outline around whole word and then create backward path for it. The first picture shows outline drawn to the

half of the lettering contour. The second picture shows the whole outline.



Fig. 26. Creation of outline around lettering.

Select the outline and use the **main menu/ Transform/ Create Backward Path** command to create object that is identical to the first outline, but it has reverse order of nodes. Notice that new object is displayed in the Object Inspector list with black arrow in the icon, which means that it is a backward path.

۵ 🦄 🕷	9 16	^
🛎 🌾 🐰 🕯	<b>)</b> 17	
* B 🗱 🕯	i) 18	
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ء 🎝 🚱	ji 20	
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¢ 🛥 🗞	₱ 22	
		V

Fig. 27. Second layer of stitches (backward path) on lettering outline.

#### Note:

While there is only single layer of stitches on all letters in the original outline, there are already two layers on the short connections between the letters. When we create the backward path, there will be two layers on letters and four layers on connections. It should not harm the design, but if you want to create outline that has really only two layers of stitches on all parts, you should use other, little bit more complicated approach: draw the outline as many separate parts and then **Arrange Outline Parts**. Below picture illustrates how to draw separate outline parts in this case. There are gaps between the parts in order to show the separate parts. The parts should touch each other, in fact.



Fig. 28. Example of how to draw outline parts to use the **Arrange Outline Parts** function

It is also possible to create above outlines automatically. Click here to learn how.

Design is almost finished. However, we need to create outlines also for openings in letters **b** and **d**. Draw outline for opening in letter **b** (objects no. 23 in the Object Inspector) and then create the backward path for it (object no. 24). Do the create for



letter **d**. Notice there is are trims between lettering outline and openings outlines, because there is no way of how to make connections between them so that they would be not visible.



Fig. 29. Digitized logo with fills and outlines.

Objects will be sewn in the order shown in the picture at the right side. There are 3 colors in this design and 13 trims. We could spare 6 trims if we create connections between parts of nuts that are of the same color.

،	6	11
۴ 💕	$\diamond$	12
<u>ب چ</u>	C	13
۵ ک	0	14
، 🐳	*0	15
، ج	X 🔿	16
ی ک	*0	17
* 3	1X 🗿	18
۵\$	X 📾	19
۵.	X 🖬	20
<b>کھ ک</b>	XO	21
۱۹ میں ک	Ð	22
۰D	XO	23
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•0	<b>%</b> 〇	25
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#### **Chapter 4 - Additional Improvements**

Design will look better if we convert some fill areas to zig-zag areas. This will add design relief and more interesting look. Select the blue part of the nut, click right mouse button on selection and choose **Parameters** from the pop-up menu. Select Auto Column option in the **Fill tab** of the **Parameters window**. Then click **OK** button to close the window. Generate stitches for selected object anew. Object is now filled with stitches as if it was digitized as several Column objects connected with connections.



Fig. 30. Change of the **plain fill** to the **Auto Column** fill.

The fill of the orange area on the nut has default predefined pattern. You can choose other pattern, define **your <u>own pattern</u>** and/or add **Carving objects** on top of the fill object, which will cause additional needle points in

the pattern and add texture to the fill. Select the orange fill object and use 7 **Carving Tool** to add curves like in the below example.



Fig. 31. Adding **Carving** objects to enhance the texture of the fill.

## **Manual Digitizing of Lettering**

Studio includes **<u>lettering tool</u>** for quick and easy creation of <u>**text**</u> labels, but it requires Alphabet or font file containing the lettering style you want to use. Users who digitize company logos may often encounter situation when no font matches the logo and lettering must be digitized manually.

This tutorial deals with manual digitizing of small satin stitch lettering. If you need to digitize plain filled lettering (with outline), please read **"How to digitize a logo" tutorial**.

The principle of lettering digitizing is explained on a case of simple character **"A"**. Two approaches are presented here: 1. manual digitizing with columns and connection. 2. digitizing with auto-column. The second approach is not fully manual, in fact, and can use trace tool to vectorize character. Both approaches assume that user has graphic template (image) of logo with text to digitize. **Text.JPG** image used in this tutorial can be found in folder **Embird32>EDStudio>Patterns**.

# A

#### Approach 1 - full control of stitches direction

In this case all objects will be drawn manually node-by-node in a specific order. Digitizing of satin stitch lettering requires use of two tools: column (satin stitch) tool and connection tool. Each character contains one or more columns. In case of multiple columns, connection must be used to ensure continuous sewing without jumps or trims. Connections are often included between respective characters too, for the same reason.

Character **"A"** cannot be digitized with a single column object. Therefore, we will use several columns and connections.

Select Column tool or Column with Pattern tool of, which is the same as previous, but uses texture on wide parts. Create first object by placing the first node (blue arrow), second node and then both edges of the **column object**. Green arrows mark the center nodes of the curves. Black arrow marks the end point of the object. Thread will fill the column object from start point to the end point. Please note that column object overlaps areas at left and right side to avoid gaps in stitching caused be pull effect of the fabric.



Select Generate Stitches command from the pop-up menu that appears on the right mouse button click. After

generation of stitches the column object will look like this:



Note that this object is listed in the **Object Inspector list** at the right side of the screen. This list helps to select and manage objects in the design.



Now we need to start a new column at the bottom part of **"A"**, but we need to get thread to this point to avoid jump. Select connection tool and create <u>connection</u> path to the new start point. Use **Generate Stitches** or **Finish** command from the pop-up menu to finish the object.



Now create second column object. The corner at top part of **"A"** is too sharp for a single continuous column object. Therefore, stop column at the top of **"A"**:



We will start a new column here. However, it is necessary to insert connection from the previous column object. To hide connection under cover stitches of the next column, make connection of the **"V"** shape as illustrated below:



Now create the last column. Finished character contains 3 columns and 2 connections. These connections are marked by blue arrows. The order of objects creation (and also sewing, therefore) was chosen so that connections are hidden under the cover stitches of columns.



Please note that the end point of last column (and whole character) is in the bottom left corner of the last column (green arrow), because start point is in the top right corner. Such location of the end point does not matter when thread between respective characters is trimmed, but it is wrong in case of nearest point connection between characters. In such a case, start last column on the other side (left). This will place the end point at the right side.

**Object Inspector** now contains all 5 objects from which character **"A"** is composed. Objects are listed in order of sewing from top to bottom.



It is possible to select them all and **join** them into a single item in the list, for easier manipulations like moving, scaling, etc.



#### Approach 2 - faster, but with less control

In this case we will use automatic generation of stitches order (auto-column), which creates stitches in required order automatically. This means that character does not need to be digitized as so many small parts in a specific order and connected each to the other. However, user has less control over the stitches order.

Digitize outer side of letter with a plain fill tool . Start point is marked by small cross (bottom-left side). The end point is marked by spider legs (bottom-right) side.



Then digitize the hole with the fill opening tool . In case of character with multiple holes (like **"B"**, for example), use this tool for each hole separately.



If underlying graphic template is clear and sharp enough, you can use **trace tool** to vectorize character edges instead of manual digitizing.

Now select <u>"Auto-Column"</u> option in the parameters window and generate the stitches. Program automatically fills object with column stitches and connections. User cannot affect the order of sewing within character, except definition of start and end point.



## **Colors, Color Picker and Thread Catalog**

Control of colors in embroidery design is a crucial task not only to make design look good on the screen, but in the first place to optimize number of thread changes and trims. Number and order of colors affect the quality and production time of the final embroidery. Therefore, Studio provides tools to display the color layout and to edit respective colors.

### **Colors in Object Inspector**



List of objects in the Object Inspector contains information about color of individual objects.

All vector objects in the design have the color property, but for some object types like **<u>carvings and openings</u>** (holes) the color property is not applicable.

Small **rectangular box** in each row is a color sample from the object. If this row contains grouped objects, the box displays color of the first object in the group.

The **number marked with arrow** indicates order number of color. Colors in this list are numbered in order of appearance. In this example, the list contains 4 different colors. Objects #2,#3 and #4 have identical color. Sequence of colors allows to optimize thread changes on embroidery machine.

### **Color Palette**

The basic tool for work with colors in Studio is **Palette in the top-right <u>corner</u>** of the screen. Newly created objects take their color from the **highlighted cell** (yellow, in this example).

Palette also allows the following operations:

- Left button click highlight cell in the palette.
- **Right button click** invoke color picker menu (see below).
- Double click invoke color mixer window to define a new color.
- Drag-and-drop from one cell to another copy color to the another cell.
- Drag-and-drop from cell to object(s) in the work area or <u>Object Inspector</u> list change color of target object(s)

Moreover, it is possible to store or load palette with use of **main menu > Design >Load and Save Palette** commands.

## Thread Catalog



Many users want to digitize with real thread colors to get best possible preview of embroidery and to speed-up creation of color sheet (documentation) in basic Embird program. Studio provides a **Thread Catalog** tool that allows to select from pre-defined colors close the thread

colors.



Thread Catalog tool is accessible from **horizontal button bar** or from the **pop-up menu** at left side picture. This pop-up menu appears upon right button click on selected objects in the work area or in the Object Inspector list.

By default, the Thread Catalog takes color of the first selected object as a reference color. Threads that are closest to this color are displayed on top of the list.

The meaning of controls in the Thread Catalog window is as follows:

- 1. Row with thread data: color sample, thread number, thread name, selection.
- 2. **Catalog filter** allows to display all catalogs or only the chosen one.
- Criteria of thread order color match, thread number, name (alphabetical order)
- Option to display marked (selected) threads only. Useful if you want to use only the threads that you actually have.
- 5. Cells to place **selection mark** if you want to use previous option.
- Tabs to change color preview mode: normal, 3D, 3D matte.
- 7. Search box that allows to type-in the thread name or number
- 8. Buttons to find **next** or **previous** match. They are used with search box.

#### **Color Picker**

Above **pop-up menu** can be also used to access the color picker to pick color from the underlying raster picture. Use of the **3x3** pixels or **5x5** pixels average sample may help in case of the noisy picture.

Color	Number	Name	Mark	-
	1122	Dark Green		-
	1306	Ash Rose		
	1168	Sea Foam	F	
	1234	Flamingo Pink	5	
	1043	Golden Poppy 1	-	
	1214	Dapple Gray		
	1120	Sharp Green		
	1221	Tamarack		

## **Outlines - Overview**

This chapter is an overview of various methods of creation of thin hairline outlines. These methods are described in more detail in respective tutorials.





Thin outlines like shown on above picture are used very often for lettering, logos and cartoon-like motives. One of the key rules in embroidery is to make lowest possible number of trims. Therefore, the best way of how to make such outlines is to digitize it as a single, continuous path of stitches. To avoid trims, some parts have to be stitched two times: there (forward path) and back (backward path). In fact, the whole outline, regardless of it complexity, can be created so that each of its parts (elements) is stitched two times. The end point of outline is identical with the start point. Such outline is called a double-layered outline in Studio.

Complete outline in vector form (no stitches yet).



Stitches (animation). Each element has two layers of stitches to get there and back. Backward paths are drawn in red color for clarity.

Outline elements in Object Inspector. Backward Paths In are marked with arrows. Sewing is continuous, there are no trims.

#### **Double-Layered Outline**

There are several ways of how to create double-layered outline in Studio. They differ in amount of automation used in each approach. Some digitizers prefer one particular way of outlining. The most convenient approach is

to use fully automatic outlines. In some cases, however, it is necessary to use manual or semi-automatic approach. For example, when you want to combine thin outline with column (an eye with outline), it is necessary to use manual digitizing.

#### Method 1

Manual digitizing of all elements, including backward paths in proper order. Proper order is necessary to ensu continuous sewing. This method is not recommended and is mentioned here only for sake of completeness.



Order of elements 1-4. Purple and red color denote current element. Purple element is first layer of stitching. Red element is second layer.



Order of elements 5-8. Please note that end point of element 8 is identical to start point of element 1.

## Method 2

Manual digitizing with use of **main menu > Transform > Create Backward Path** command. Backward path elements are identical with forward path, they are only sewn in reversed order. Therefore, they can be easily generated by program. The proper order of elements is still necessary in this approach. Use this method if yc need to create small outlines combined with other objects.



Semi-automatic method: manual digitizing of forward elements in any order and their automatic arrangemen with use of **main menu > Transform > Arrange Outline Parts** command. Elements can intersect one another. Elements can be digitizing in any order. For best accuracy, pay attention to places where elements connect one to another. Program splits and sorts elements to achieve proper order and creates all the backw paths. The start point of the first element remains the start point of the whole outline. As outline is double-layered, it is also the end point of the outline. If some elements so that complete outline is a single objec you want to preserve separate objects, use **Arrange Outline Parts (no Connections)** command instead.



Elements 1-4. Order of elements is not significant in this case. Start and and end point of the outline is identical with first node of the first element (green circle). It is important to avoid duplicate edges and to align end points of individual edges.



Arranged elements are combined into larger segments to optimize stitches layout. If you want to preserve original elements for easie editing, switch off this feature in **Parameters window > Whole Design > Main tab**.

When compared to method 1, there is about 50% less elements to digitize (no backward paths). Order of elements is not significant and there is no need to remember which part already has second layer of stitching.

Above illustrations depict the order and layout of outline elements The actual elements are created with **<u>curves</u>**, **lines and nodes** like shown on the left side picture.

Use this semi-automatic method for complex outlines when you cannot use automatic method 4.

## Method 4 🗗

Automatic creation of outlines from fill and column objects. All that user has to do is to select objects to be outlined and use the **main menu > Transform > Auto Outliner** command. This approach is recommende use whenever possible.

If there are fill or column objects with identical edges (adjoining areas without overlay), the automatic outlini can fail. This case typically occurs when working with vector objects imported from graphic files (EMF, WMF, CMX). In such a case, edit adjoining edges (move one edge to create an overlay) or use another method of outlining.

The most commonly used methods are 3 and 4.

**Please note:** forward and backward paths are marked with special icons  $\bigcirc$  and  $\bigcirc$  in the **object inspector**. These icons help to identify respective elements for selection and editing. Also, there is a special command in **main menu > Select > Outlines > Backward Paths** to select backward paths quickly. Then it is possible to set satin stitches to these elements or make whatever editing is needed.

## **Guide Lines**



Guide Lines are horizontal, vertical, or slanted lines that can be placed anywhere in the work area window to aid in object placement and nodes alignment.

To create a new guide line, position cursor on either vertical or horizontal ruler, depress the left mouse button and drag cursor to the work area.

Guide lines can be used for **objects splitting**. Place the guide line on the object. Select object and then select the guide line. Click right mouse button on the guide line to access pop-up menu. Choose **Slice Selected Objects** command.



If you need to cut object with curved shape, please read Working with mask in Studio tutorial.

Use **main menu > Edit** to lock or erase guide lines or to switch on/off snapping of objects to the guide lines. Use **main menu > Nodes** to switch on/off snapping of nodes to the guide lines.

## Use of the Mask to Split Vector Objects



Mask concept allows to adjust one object with use of another object that serves as a mask. The mask defines which parts of original object will remain and which parts will be deleted. In the current version of Studio, the mask effect can be achieved by using the 'Shaping' operations Intersection and Difference. We

Imagine that we want to create circle with multi-color segments as illustrated on the left side picture. Instead of digitizing each segment manually, we will create the whole circle first and then we will split it with use of another object.

The first step is to create the large circle. We will use fill object with opening (hole) in this example. Please note: shaping commands do not work with linear objects like outline, connection or manual

The next step is to draw object that will serve as a mask for splitting. The yellow circle will be sliced on places where mask run on top of the yellow circle (highlighted with red lines). Therefore, the mask edges must be drawn carefully on the intersection with yellow circle. On other places, you can draw it with lower accuracy.

In this example we use fill object as a mask. Mask can be any object (sfumato, column) except lines (outline, connection, manual stitches). The mask will have no stitches, it is only temporary object. Therefore, it does not matter where is its start and end point or how its parameters are set. Mask can even have one or several openings

Select both objects (yellow circle and the blue mask object). Use the main menu > Transform > Shaping > Difference command to create new objects that are yellow circle minus blue area.



#### 4.

Resulting yellow objects are shown on the left-side picture. Now we are going to create complementary objects to fill the empty areas. We will use another shaping command to produce these objects.

#### 5.

Before doing so, we need to enlarge mask to make new objects larger and overlapping the previously created yellow objects. This step is very important because if there is no overlay between objects, the pull effect of thread will cause gaps in the actual sew out.

Select the mask object and use the **main menu > Transform > Expand Objects** command.

#### 6.

Now select the original circle and new, larger mask. Use the <u>main menu ></u> <u>Transform > Shaping > Intersection</u> command to create areas common to both yellow circle and the mask.

You should achieve objects that are complementary to above yellow objects. Change their color to red by dragging the red color from palette to selected objects. Now you should erase the original circle and mask objects, because they are still in the background. They were only temporary objects and we do not need them anymore.



#### 7.

Complete result looks like shown on the left-side picture. Respective segments are separate objects and it is useful to connect some objects (not shown in this example) with **<u>connection tool</u>** to reduce thread trimming. As the yellow color is sewn first in this case, connections between yellow objects can be hidden beneath red objects.



**8.** Wire-frame view mode reveals the overlays between the yellow and read areas.

Please note: objects in Studio can be sliced also with **<u>guide lines</u>**. However, this approach produces only straight-line cut.

## **Measurement Tool**

Use the measurement tool ist to measure distance or angle between objects in design.

Place first point anywhere in the work area. Then place the second point. Points can be selected and moved in the same way as nodes in the creation/editing mode.



Panel at the right side of the screen displays measured distance and angles. (1) is distance between the points.	1	3.469 cm	1
(2) is horizontal part of the distance (distance along the horizontal axis).	1	2.020 cm	2
(3) is vertical part of the distance (distance along the vertical axis).			
(4) is same as (1), (2) and (3), but measurements are in inches instead of centimeters.	17 //	1.366 " 1.110 "	4
(5) is angle between the line connecting points and horizontal axis.	ţ∕_	0.795 "	
	$\land$	35.6°	5
	$\heartsuit$		6



Measurement tool can use three points (two lines) as well. Place the 3rd point on the work area in the same way as previous points. Three points are use ful for measuring angle between objects. In such a case, **(6)** is this angle.

Values (1)-(5) refer to the highlighted line. (6) always refers to angle between the two lines

## **Integrated Sew Simulator**

Sew Simulator in Studio helps to analyze the stitches order of design. Stitch simulation is animation of stitching process. Use it to analyze small and hardly visible stitches like tie-up stitches, for example. Sew Simulator is often used to find unnecessary trims between objects.

Sew Simulator in Studio can be accessed via **<u>tab</u> 'Sim'** at bottom part of the Studio screen. If no objects are selected, sewing of whole design is simulated. If some objects are selected, only sewing of these objects is simulated.

Meaning of controls is as follows:

- 1. Stop Simulation button. Simulation can be also cancelled by pressing ESC button or switching to other view mode (tabs at bottom part of the Studio main screen).
- 2. Buttons for change for view mode.
- 3. Buttons for change of sewing speed (in stitches per second).
- 4. Slider for continuous change of sewing speed.
- Pause/Run button. Stops simulation until you click the same button again. Use this button also to run simulation when it was paused on any condition 6~11.
- 6. Pause on jump stitch between objects.
- 7. Pause on jump stitch inside object (Sfumato, Appliqué, etc.)
- 8. Pause on color change.
- 9. Pause on outline backward path.
- 10. Pause on connection object.
- 11. Pause on shade change inside Sfumato object.

Please note that controls **3** and **4** allow to set negative speed, which means that stitches gradually disappear. Moving the slider **4** up and down allows to run simulation forward and backward. This control is intended for close look up on how certain parts of design are sewn.

Buttons **6~11** define conditions to pause simulation. If button is depressed, respective condition is active. For example, if you want to pause simulation whenever it runs to color change or connection object, depress button **8** and **10**. Condition **9** is useful when checking the double-layered outlines. Condition **7** is useful for Appliqué and Sfumato objects. When simulation stops on pause, you can run it by clicking on button **5**.

Some Studio controls like zoom, scroll bars and pan tool can be used during simulation to focus area of interest.



Color bar at top of the screen helps to 'rewind' simulation forward and backward. Colored rectangles depict respective stitches color and small black ticks mark end of respective objects. Place cursor on the color bar, depress left mouse button and move the slider to the left (backward) or to the right (forward) to rewind the simulation. Watch design in the work area to see effect of rewinding. Release mouse button to let simulation run further.





## Transformations



Object selected for transformation

Transformations like re-sizing, moving, rotation and skewing are very col can be done interactively (with tool described below), or with numeric cc **Transformation Window**.

To transform object(s) interactively in the work area, select object(s) and

- To change size proportionally, press left mouse button on any corr
- To change size non-proportionally, press left button on a middle s
- To rotate, press right button on any corner square and drag to dea Rotation to Fill Stitches option in the <u>main menu > Transfor</u> adjusted when object is rotated.
- To skew, press right button on any middle square and drag to des



Proportional scaling



Non-proportional scaling



Rotation



#### There are 2 ways of how to make selection of objects with marquee box:



- 1. Drag marquee box from left to right to select objects without completely enclosing them with a marquee box
- 2. Draw marquee box from right to left to select only those objects that lie completely within the marquee box.

## **Transformations Window**



The **Transformations window** is accessible through main menu under Transform / Transformations Window.

Controls on the first tab do operations that are available also in an interactive form in the work area or Object Inspector: **movement**, **rotation**, **skewing**, **resizing** and **change of objects orde**r. Rotation uses center (reference) point that can be moved in the work area with mouse cursor.

Please note: if **Apply Rotation to Fill Stitches** option in the <u>main menu ></u> <u>**Transform**</u> is checked, stitches angle is adjusted when object is rotated.

#### **Alignment Tab**

The second tab is objects **Alignment Tab**. Alignment works with two or more selected objects.







Three vertical controls align selected objects to top, center and bottom of the whole selection.

Three horizontal controls align selected objects to left  $\epsilon$  center and right side of the whole selection.



Objects from above example aligned to upper edge.

#### **Distribution Tab**

The third tab is **Distribution Tab**. Distribution works with three or more selected objects.







Three vertical controls distribute objects in vertical direction so that tops, centers or bottom of objects are equally spaced within selection.

Three horizontal controls distribute objects in horizontal direction so that left sides, centers or right sides of objects are equally spaced within selection.



Remaining two controls distribute objects in vertical and horizontal directions so that there are equal spaces between objects.



Objects from above example equally spaced with respect to the upper edge.

**Please note:** It is possible to combine various operations while Transformation window is open. For example, you can scale selected objects, align them according to upper edge and space them equally in the horizontal direction.

## Lasso

Lasso Tool allows to select objects in the work area with polygon. This tools is useful when there is a large number of objects in the work area, they are close one to another and it is not possible to use simple rectangular selection.



Click anywhere in the work area to place the first point. Then repeat clicking to create the polygon. It is not necessary to close the polygon. Connection from last node to the first node is created automatically. You can adjust the shape of polygon by clicking on existing node and dragging it to a new position. Arrow indicates orientation of the polygon and it is displayed on line segment after focused (highlighted) node.

It is possible to insert or delete nodes with + and - buttons from the horizontal button bar or with use of **INSERT** and **DEL** keys on the keyboard. Node is inserted on place where arrow is displayed. Deleting node erases the highlighted node. New nodes are also created by clicking on empty area (i.e. not on existing node). New node is created after the highlighted node, so that segment with arrow is split in two parts.

All changes to polygon are stored to memory. Therefore, it is possible to use **Undo/Redo** buttons or **CTRL+Z/CTRL+Y** shortcuts.

There are several options how to apply polygonal selection:

**1. Select.** Clicking on this option selects objects that are entirely or partially inside of polygon. If there was any previous selection made, it is discarded.

**2. Add.** Clicking on this option will add objects inside of polygon to existing selection.

**3. Subtract.** Clicking on this option will deselect objects inside of polygon from existing selection.

## Shaping

These commands work on objects selected with the Transform Tool (arrow) or in **Objects Inspector**. There is tutorial on how to use shaping commands as mask for splitting objects available **here**.

The **main menu > Transform > Shaping commands** allow to modify and combine selected objects with use of the Boolean operations like **Union**, **Intersection** and **Difference**. They work only with the solid objects of fill, sfumato and column type. These commands do not work with outlines, manual stitches and connections. To use these commands, select several objects.



Two selected objects - star and rectangle. Star has an opening.

**Union** - this command creates an object or objects that contain all selected objects merged together. Vertices inside of the filled areas are erased. If selected objects do not overlap one another, result of the union are copies of the original objects.

**Note:** this command can be used to create underlay (fill without cover stitches) under the whole design, for example. Select all objects and use the **Union** command to merge objects. Then open **Parameters window** and set underlay parameters. Uncheck the Make Cover Stitches box to eliminate the top stitches and leave underlay only.



Union of two objects.

**Intersection** - this command creates an object or several objects that are intersections of the selected objects. If selected objects do not overlap one another, this function does not produce any new object (as intersection does not exist).



Intersection of two objects.

**Difference** - this command subtracts selected objects from the object that is first in order of creation among the selected objects. It is necessary to arrange order of respective objects in the **<u>object inspector list</u>** before use of this function, to assure proper order of objects. Newly created object or objects contain only those areas of the first object that are not covered by the next objects.



Difference of two objects.

## **Edit Image Window**

The **Edit Image Window** is accessible through main menu under **Image / Edit Image Window**. Controls in this window allow user to rotate and resize image and add border to image for easier digitizing near edges of image. While Edit Image window is visible, four small rectangles appear in the work area to allow user to crop the image.

After import of image, go to Edit Image window and make adjustments in following order:

- 1. Rotate image
- Set crop lines by move of small rectangles in the work area. There should be no space left around image, because it would affect setting of image/design size. Empty space or border will be added later.
- 3. Set new size of image.
- 4. Set width of border. Border is an empty area around the image.



🔀 Image

Rotate image first. Usually, the scanned image is not perfectly horizontal or vertical. Press left or right mouse button on the red angle parameter or click the rotate icon to adjust the angle.



Second step is setting of crop lines. Press left mouse button on any of four small rectangles and drag them to a new position. Area outside of selection will be cropped. Do not leave empty space around the subject. Set the crop lines closely to the subject.

Third step is to set desired size of image and at the same time the size of design.



The fourth step is to set width of border (empty space for easier work near edges) around the image. You should not need to change this parameter.

After above four steps, click Apply to perform changes.

**Note:** use main <u>menu/Image</u> commands **Rotate to Vertical** and **Rotate to Horizontal** for precise rotation of images that contain straight vertical or horizontal lines.

## **Background Filters**

Background filters affect the way the background (hoop or imported image) is displayed behind the digitized design. Characteristics such as **Brightness**, **Contrast**, **Gamma**, colors **Saturation** and balance can be adjusted, as well as grid spacing, color and subdivisions.

In contrast to graphics programs where the main meaning of filters is to enhance the look of an image, filters in Studio are intended for dimming, darkening, brightening or other adjustment of image so that its colors do not interfere with stitches and objects drawn on top of the background image. All these parameters are saved with design into one file.

**Gamma** parameter changes brightness mostly of dark colors and it does not affect absolute black and white. It is useful for too dark or too bright scans and photos.

The **Cyan-Red**, **Magenta-Green** and **Yellow-Blue** controls affect the color balance of the background. Use them to change an image to a certain shade (blue, for example) to separate image from digitized objects. The resulting contrast makes it easier to distinguish between the background and digitized objects.
# Preferences

Studio allows access to multiple parameters that help user to customize work space and tools. These parameters can be divided into 3 categories, according to their storage and use.

Settings / Save to	Defaults File	Design File
1. Work Space	Optional	Yes
2. Tools	Yes	Yes
3. Switches		Yes

**Defaults file** stores pre-defined settings that are applied when new design is created. If same parameter is stored also in design file, it overrides pre-defined parameter during the work session. Studio manages location and content of Defaults file automatically.

- 1. **Work Space** settings that are applicable to multiple designs (projects) and are relatively seldom changed, therefore. An example of such parameter is color of guidelines and auto-save option. These settings are saved to defaults file (in Preferences window) and also to each design file. When design is loaded, its settings override default settings temporarily.
- 2. **Tool settings** like trace tool color 'Tolerance' are accessible via interface (window or panel) of respective tool. They are saved to defaults file with each change. They are not saved to design file.
- 3. **Switches** settings that change very often, like snap mode, for example. The frequency of their use depends on character of design. They are saved to design file, therefore. They are not saved to defaults file.

Tool Settings and Switches are stored to respective file automatically when they change. User should manage only the first group of settings - the work space settings, known as Preferences.

**Preferences** are accessible via main menu under Edit / Preferences. There is also a quick way to open this windows by double clicking the tabs on the bottom of the Studio window.

Choosing **Save to Default** means these parameters are stored to Defaults file and will be loaded automatically for each new design.

Choosing **Apply** means that these parameters are used with current design only and they are not stored to Defaults file.

Preferences window contains tabs with groups of controls:

#### **Edit Mode Tab**

Edit Mode Colors allow user to define colors of edges, nodes and segment ends used in edit mode.

If **Max. Contrast** is checked, pixels on edited objects are darkened or brightened according to brightness of their background. Max. Contrast can make edited objects more visible.

Show Parameters check box turns on/off displaying of panel with object parameters in nodes editing mode.

### Grid Tab

User can adjust the grid size, color and subdivisions. **Subdivisions** define a finer secondary grid, which is visible only when zoomed in.

Additional Grid allows to add diagonal or radial grid, which is useful when working on designs requiring

symmetry or specific layout of objects.

#### **Save Tab**

If Auto Save option is ON, design is automatically saved to disc every 5 minutes.

**Back-up Files** control allows to turn on/off automatic creation of back-up copy when saving file. Back-up copy is stored in the same folder as design file.

#### Hoop Tab

The color of the Work Area/Hoop can be changed on this tab.

**Hoop size** can be changed either by adjustment of hoop width and height or by selecting predefined hoop from the list (use the hoop button to access the list). Check the **round hoop** check box to change hoop shape from rectangular to elliptical.



#### **Guide Lines Tab**

Adjust colors of selected and un-selected guidelines.

#### **3D Preview Tab**

Select background fabric sample and adjust thread width (in pixels) for 3D preview rendering.

#### **Selection Tab**

If **Highlight Selected Objects** is checked, objects that are selected are outlined with chosen color (default is red). This helps to locate selected objects visually in the work area more easily, especially in case of thin outlines.

# **Import of Vector Graphics**

The **main menu > Import Vector File** function opens the vector graphic file and converts it into the embroidery design automatically. It is intended to avoid redrawing of design (logo or clipart) in Studio if it is already available in a vector file. This function is available only if user has registered **Font Engine plug-in**.

There are many graphic programs that produce various vector file formats and most of them can export vector graphics into WMF or EMF files. EMF is more advanced than WMF and it can store color palette and curve objects too. It is recommended to convert graphics to EMF format directly from the native vector format of the respective graphic program (Corel Draw CDR, Adobe Illustrator AI and so on). Conversion to WMF (older format) and then from WMF to EMF (new format) may cause the degradation of the graphics.

EMF file can contain various objects (raster bitmap, fonts, shapes, curves, polygons, etc.). However, Studio can import only the curves, all other objects are ignored. To achieve best results, please convert all objects like fonts and shapes to curves before attempting to import the EMF file into Studio.

If there is a bitmap picture in the file, Studio ignores it. It does not auto digitize the picture. Only the vector (curves) objects are transformed into embroidery objects.

**Note:** not all vector files can be converted into good quality embroidery designs. Some vector files may be autotraced from scanned pictures and resulting vector file can have thousands of tiny objects instead of low number of solid fills or smooth lines. Such vector files are not proper for conversion into embroidery designs.



Left-side picture is poor quality vector graphics composed of thousands of small objects auto-traced from scanned picture.

Right-side picture is good quality vector graphics with low number of large solid areas.

#### **Stitching Parameters**

Design imported from vector file usually needs some adjustments of stitching **parameters** and/or object **layout**.



Design imported from EMF vector files. Stitches are not generated yet.

After importing of design, select all objects and use **Generate Stitches** command. Studio analyzes the shape and size of individual objects and fills them appropriate fill type. However, it cannot identify the meaning of vector objects like human digitizer. For example, program cannot identify objects that belong to the lettering and it may fill each letter with other style, according to this letter size or width. Thin elongated objects are filled with auto-column (wider objects have pattern). Large objects use plain fill, either vertical or horizontal, according to their shape.



Design with generated stitches. All objects are filled with auto-column, but some have also a pattern texture. The pattern is applied to wider objects (magenta arrow) to split too long stitches. Green arrow marks the white fill of bird that would look better with plain fill instead of auto-column.

User may need to adjust the fill type **parameters**. In this case, the length of stitches is near the threshold that turns on the pattern. This is the reason why some letters have pattern and some do not. We should either turnon or turn-off the pattern for all letters. For later option, select the letters **E**, **m** and **r** and open the **Parameters window**.





🔽 Auto Select Column Underlay

Turning off the pattern option of auto-column fill in **Parameters window**.



Turning on the plain fill mode instead of auto-column mode for white fill of the bird.



### **Overlays in Vector Graphic and Embroidery**

It is important to pay attention to **layers and overlays** of objects imported from vector files. Unlike graphic, embroidery is very sensitive to use of layers. On places with multiple layers (overlays), the stitches are sewn on top of the previous stitches and may spoil the embroidery if density becomes to high.

You should visually check the overlapped areas for too many layers. The largest part of design should be single layer only. Where different objects overlap, try to keep 2 layers overlay on most places, or 3 layers overlay maximum if it is not possible to avoid it.

Layers in this case mean dense cover stitching, not underlays or connection paths. Underlay is loose stitching that helps to stabilize the design against thread pull and push effect, but it does not contribute to overall density very much. **Connections** are stitch paths (often hidden beneath the other objects) used to avoid trims between objects. Both underlays and connections can be regarded as layers, but they are usually not significant when investigating density of cover layers.



Illustration of overlays in imported design. Left: white fill (highlighted) sticks out under the black, orange and blue objects. Center: orange and blue objects (highlighted) overlap the white fill. Right: black objects (highlighted) overlap the white fill and on a very small area also the blue and orange objects.

Missing or very small overlay is an error just as the too heavy overlay. Pull of the thread causes gaps between objects on places with insufficient overlay.

If there are too many layers or too large overlays in the design, they should be removed or edited to achieve good sew-out of design. Studio provides a quick way to check the density of stitches. Use tabs at bottom of the Studio screen to switch to **D-map (density map) or X-ray view mode** to analyze the density layout. Stitches must be generated first, otherwise these view modes do not work.



The **<u>X-ray view mode</u>** allows to detect areas of critical (too high) density.

**Please note:** it is also possible to export design from Studio to graphic vector format to avoid redrawing of design in graphic software. Please use **main menu > Design > Export** command.

# **Direction Lines in Auto Column**

Auto Column uses advanced algorithms to fill object with satin stitches in a way as close to work of human digitizer as possible. However, user may still want to change direction of stitches on some places. This can be achieved by direction lines (marked by red arrow), which are lines drawn from any edge node across the filled area. If direction line does not cross the filled area, it has no effect on the stitches direction. Below example illustrates influence of direction line on the auto column stitches.



While in creation/editing mode, select node from which you want to draw direction line. This node will be the start point of the line. Then click right mouse button on a place where the end of the line should be. Right button click marks this spot and invokes the pop-up menu at the same time. Select **"Place Direction Node Here"** command to finish the direction line.

To delete direction line, simply delete the node at the end of this line.

# Styles

Studio provides predefined **styles** (sets of chosen parameters) for adjustment of designs for sewing on materials like jeans, satin, silk, towels and other. **Style** includes values of basic parameters like density, pull compensation and type of underlay. Table of styles is accessible via **main menu >objects >Styles >Edit**. User can modify predefined styles (except their names) and define her/his own new styles.

To use style, select objects to which you want to apply style, and then use **main menu> Objects> Styles> Apply Style** command.

# Trace Tool

Studio includes Trace Tool for conversion of raster image into vector embroidery design. This chapter describes the trace tool controls. Another chapter with **<u>Trace Tool tutorial</u>** is available further.

### **Main Features**

- Automatic vectorization from raster image
- Works in a similar way as selection tools in graphic programs (selection modes New, Add, Add Similar, Subtract, Intersect), based on maximum allowed color deviance (Tolerance) between selected and surrounding pixels
- Select object or several objects from raster image with a magic wand, convert them into vector objects and fill with stitches
- Creates outline, column, fill, sfumato and carving objects from raster image
- Vector simplicity/fidelity adjustment
- 'Ignore Openings' option for Fill objects, to create just outer boundary (without holes)
- Automatic color of new objects from the picture
- Option to select curve or straight line edges of new objects
- Undo/redo functions applicable to selection

**Trace tool** allows to convert bitmap image (raster image) to vector design without redrawing the image manually.

Trace tool works in a several steps: 1. selection of consistently colored area (pixels of raster image), 2. turning of selected raster areas into vector objects, 3. filling vector objects with stitches. User specifies the color "tolerance" for selection of raster pixels and "simplicity" of created vector object. High image resolution and low gradation of colors are required to create quality design with the trace tool. Result is an embroidery design that can include various embroidery styles like outlines, fills, columns and sfumato objects.

After conversion, traced objects can be edited as other vector objects in Studio (node by node). When creating embroidery design, the Trace tool can be combined with any other tool in the Studio.



Example of image suitable for digitizing with the Trace tool.

Like other creation tools in Studio, the Trace tool can be used with various <u>display modes</u> (Normal, Vector, **3D**, **3D** Matte, Flat) to display imported raster image behind the digitized design as a template for digitizing, or preview created design in **3D**.



Before you start selecting the area with the Trace tool, you should choose embroidery style you want to use. Click right mouse button the Trace icon (in the **Tool Bar**). Panel with Trace styles will appear (picture below). This panel can be invoked also by holding the left mouse button depressed about 1 second on the Trace icon.

Each style is represented by its icon. Hover the cursor over the icon to display the style name. Select desired Trace style and tool will be activated automatically. Studio will switch to raster selection mode.



Trace styles can be accessed by clicking right mouse button the Trace icon.

1. Outline, 2. Column, 3. Fill, 4. Sfumato, 5. Carving

Click left mouse button the Trace tool icon to start the Trace mode. First step is to select color areas (objects) from the raster image in the work area of Studio. Cursor with a little black cross and style icon appears in the work area. Click the left mouse button to select an object. **Selection options** allow to change the way of how the Trace tool behaves by each selection. It is possible to define whether to make **new** selection and discard any existing selection or **add** objects of different color to select or select non-contiguous areas of the same color at once (**add similar** option), **subtract** object from selection or **intersect** the object from selection.

When selection of raster object(s) is complete and all parameters and options are set, click **Apply** or **Generate Stitches** button from button bar at top side of the Studio screen, or click right mouse button on the work area to open a pop-up menu with the same options. Raster objects are converted to vector objects and optionally filled with stitches. **Carving** objects are created like outlines, but they must follow after the fill or sfumato object, as they serve to add texture to those objects. Carvings are not a stand-alone objects. The icon of Carving style (in Trace tool panel) is grayed out if there is no fill or sfumato object in the work area.

### **Common Options and Parameters**

When the Trace tool is active, parameters of respective style are displayed on panel at the right side of the Studio window. Most of options and parameters like color, tolerance, simplicity, edge type and **selection options** are common to all styles.



Auto Color - if the check box "Auto Color" is checked, the color of created vector object(s) is picked from the raster image automatically. Uncheck this option and click the color box to choose the color from palette or define your

Tolerance - defines the color similarity rate used for selection of pixels from the raster image. The value of tolerance is ranging from 0 to 100. Set a low value to select only pixels of a very similar color or set a higher value to select



Left side: selection made with lower color Tolerance. Right side: selection made with higher color Tolerance.

Simplicity - defines the complexity/fidelity ratio of object(s) created with the Trace tool. The value of simplicity is ranging from 0 to 15. Set a lower value to get object with high number of nodes and better accuracy. Such object, however, is harder to edit. For easier editing, set a higher value to obtain object with a lower accuracy and low number of nodes. Default value of simplicity is 7.



Left side: object vectorized with Simplicity=3.

Right side: object vectorized with Simplicity=12.

Edge Type - the edges of created vector object(s) can be composed either from lines or curves - depending on the "Edge Type" setting . Select the "curve" edge type to obtain curve elements, which have also the middle points allowing you to change their shape in Edit mode.

Ignore Openings - if the check box "Ignore Opening" is checked, openings (holes) are ignored in the created vector object(s). This option is useful to create overall vector object without holes, assuming that there will be another objects digitized on top of this one, instead of holes (see below example). Uncheck the option to retain openings in objects. (Option is available only for Fill, Sfumato and Column style).



#### Left side: raster image. Middle: overall fill object without openings (holes). Right side: column objects on top of the overall white fill.

Meaning of the **Selection** options is as follows:

- **New** make new selection and discard existing selection.
- Add add selected area to existing selection.
- Add Similar select all areas of the same color (including non-contiguous areas) at once.
- **Subtract** subtract area from selection.
- Intersect select subset of existing selection.

(Only one of above options can be active at once)

### **Outline Parameters**

Besides common parameters and options, outline objects have several specific parameters. They are identical to parameters accessible via **Parameters window**, but are duplicated here for easier access

- 1. **Minimum Length of Stitch** measured in millimeters, defines the shortest stitches generated when compiling Outline object into actual stitches.
- 2. **Maximum Length of Stitch** measured in millimeters, defines the longest stitches generated when compiling Outline object into actual stitches.
- 3. Width of the Outline Sample measured in millimeters, is the width of reference cells along the outline to which the stitches are projected. It is not necessarily the width of finished outline, because projected stitch sample can be wider or narrower than reference cells. Negative value of "Width of the Outline Sample" mirrors the sample. To adjust parameters 1-3, depress the left mouse button on respective value to increase it, or depress the right mouse button to decrease it. Another way is to click on respective icon to open window for setting the value with slider or keyboard.



4. **Outline Sample** - outline samples are stitch patterns repeated along the outline. It is possible to set the Single stitch, Triple stitch, Redwork outline or choose from several samples listed in combo box. User can even create and save with design up to five "User Defined" samples.

## **Other Parameters**

Other parameters of vector objects created with Trace tool, like density, angle of stitches, gradient, etc. can be accessed only after finishing the Trace mode, using the common **Parameters window**.

# **Trace Tool Tutorial**

This tutorial demonstrates the use of **trace tool** to produce embroidery design from a raster image. For good results, image must be sufficiently clean. Input image can be in any file format supported by Studio. The most important factor is that edges of color areas are smooth, i.e. not jagged, which may be result of enlarging raster image.

1. Import image. Do not scale image to fit into the hoop, because if image is enlarged, it becomes more pixelated and the auto-tracing will not work well. It is recommended to resize the finished vector design, instead. In contrast to rasters, resizing of vectors does not affect the quality.



2. Let's start to digitize the Smiley design. Large filled areas should be digitized first. Select the **Trace tool** (the magic wand icon) from the tool bat at the left side of the screen with right mouse button. Then select the **Fill** style.



3. Studio switches to trace mode. We are going to trace the large yellow area. The panel at the right side of the screen contains trace controls and selection options. As this is fairly simple object, set **Simplicity** to **10** to achieve lower number of nodes.

Each filled area with outline or neighboring area of other color should have some overlay to compensate gaps between the areas of different colors and also pull effect of the fabric. However, the yellow area of Smiley is somewhat specific because of the thin black lines on the eyes and mouth. While leaving holes for main parts of eyes and mouth, we will not leave holes under all thin black lines, because it would split the yellow circle into too many regions and complicate the sewing. Moreover, overlay would completely cover the holes under the thin lines anyway. Therefore, we will leave **Overlay=0** for now.

Selection is set to **New**. As we are going to select just one area now (yellow), it doesn't matter whether Selection is set to New or Add. Color **Tolerance** for selection is default 30.

4. Click anywhere on the yellow area. Selection is indicated by flashing dots.

#### folerance 30

Simplicity 10	(~
🔲 Ignore Openings	
Overlay <b>(),()</b> mm	
Selection	
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Click **Apply** button on the button bar at top of the screen to convert selected raster object into vector objects. 5 vector objects are created: main fill and 4 holes.

If **Ignore Openings** option is checked, program would create just the main fill. This option is useful for creation of overall filled area when small holes are not wanted or the fill is used as an overall underlay. Anyway, this is not our case, so this option is unchecked.

**5.** Parts Object Inspector (the one beneath the main Object Inspector) contains list of the 5 new vector objects.



Because of reasons mentioned above, we will eliminate some holes that are too thin. Select object no. 5 (the hole under the chin) and simply delete it. The holes under eyes and mouth are more complicated because they contain both thin and thick parts. We want to preserve thick parts and erase the thin ones.

6. Select mouth hole in **Parts Object Inspector** and use right mouse button click on the selected object to open a pop-up menu. Select **Edit** from the pop-up menu to switch into editing mode.

It is necessary to use **Parts Object Inspector** to select mouth objects, because openings (holes) cannot be selected directly in the work area.



7. Delete nodes on the thin parts of the mouth to simplify the object. Select respective nodes one-by-one and hit **DELETE** button on your keyboard for each of them.

You can also select multiple nodes at once by holding **SHIFT** key depressed and dragging selection box around the nodes.



Repeat steps 6 and 7 for eyes. When finished, all three holes should contain only the thick parts and all thin parts should be deleted.

8. Now trace all gray and white areas on the hat. Use the trace tool as in step 2 with few changes: set **Overlay** to 0.3 mm (for example) and Selection options to **Add**. Then select one-by-one all three gray areas and three white areas on the hat by clicking on them.



It doesn't matter that selected areas are of different colors because **Auto Color** options is set on. Therefore, each vector object will get proper color from the underlying raster.

If you happen to select wrong area, use **Undo/Redo** commands from the **main menu > Edit** or **CTRL+Z/CTRL+Y** shortcuts.

9. Use Apply button or Generate Stitches button to convert selected objects to vector objects.



All 6 new objects are simple objects and do not need any editing unless you want to change the stitches direction or pattern. In such case, use the Parameters window to set new parameters to the vector objects.

Notice overlay on all 6 objects that covers part of the black outline. It will help to embroider design without gaps between respective objects.

10. Next step is to trace the white and red areas on eyes and mouth. We have intentionally omitted white area on eyes in step 8, because they will look better as columns than fills. Click with right mouse button on the Trace tool icon. Then select the **Column** style



11. Select white areas on eyes and mouth. Then select also the red area on the mouth.



Use the **Add** selection option all the time to add respective areas to selection. Click **Generate Stitches** button to create vector objects and to fill them with stitches.

Notice that new objects are columns and they also have an overlay.

#### 12. Trace all black outlines at once.



Select **Add Similar** selection option to allow program select all areas of the same (similar) color at once. Then click anywhere on the black outline in the work area. Click **Generate Stitches** button to create vector objects. As the column style was selected in step 10, new objects are all of the column style. Actually, they are fill objects with **Autocolumn** option set on.

Thin outlines expanded with overlay may need little editing on some places. In this case, few nodes in the right corner of the mouth were edited to remove intersecting edges.

13. Design is finished. Notice the difference between the the plain yellow fill and the column-style of eyes and mouth. Previously made steps allowed us to create objects with an overlay and appropriate openings (holes) where needed.



One more thing that needs to be checked is **sewing order** of the objects to minimize the color changes. When making gray, white and red objects, it is possible that newly created vector objects are not sorted properly. Therefore, re-order these objects in the Object Inspector window to minimize the color changes, while leaving black outlines at the very top and yellow fill at the very bottom of the design.

As all objects in our design are separate areas, we do not need to insert connections between the objects. Trims are automatically added between all objects. In other cases, however, it might be suitable to insert connections between some objects (letters, for example) to reduce the trims.

# **Freehand Tool**

**Freehand tool** allows to create realistic fur or shading effects as well as sketch drawings with mouse or digitizing tablet within a few minutes. It works like a painting tool.



Result, however, is an embroidery design that can include various embroidery styles like fills, columns, sfumato objects and outlines as well as some new stitch styles like pressure-sensitive columns.



Unlike the other Studio tools, which are based on the precise manual placement of the nodes, curves and lines, Freehand tool allows to draw most of the Studio objects with a free hand. Strokes are automatically converted to chosen embroidery style. After conversion, strokes can be edited as other vector objects in Studio (node by node). When creating embroidery design, the Freehand tool can be combined with any other tools in the Studio.

Like other creation tools in Studio, Freehand tool can be used with various **display modes** (**Normal**, **Vector**, **3D**, **3D Matte**) to display imported raster image behind the digitized design as a template for digitizing, or preview created design in **3D**.



Animation - not visible on the print

Freehand tool can work with any Microsoft Windows compatible mouse or digitizing tablet\*. Its use is not restricted to any specific brand of tablet.

Before you start actual drawing with the Freehand tool, you should choose embroidery style you want to use. Click with right mouse button or corresponding tablet pen button depressed on the Freehand icon (in the **Tool Bar**). Panel with freehand styles will appear (picture below). This panel can be invoked also by holding the left mouse button or tablet pen tip depressed about 1 second on the Freehand icon.

Each style is represented by its icon. Hover the cursor over the icon to display the style name. Select desired freehand style and tool will be activated automatically. Studio will switch to creation/editing mode.

\*Tablet pen pressure can be used in Studio only if tablet uses Wintab32.dll driver and this driver must be located in the Windows\System32 folder.



Freehand styles can be accessed by clicking with right mouse button depressed on the freehand icon.

1. Manual Stitches, 2. Outline, 3. Column, 4. Fill, 5. Sfumato, 6. Connection, 7. Sketch Outline, 8. Pressuresensitive width Column, 9. Opening (hole), 10. Carving

Click left mouse button or tablet pen on the Freehand tool to start drawing. When the Freehand tool is active, parameters of respective style are displayed on panel at the right side of the Studio window. Some parameters like color and **After Stroke** options are common to all styles (picture below). **After Stroke** options allow to change the way of how the Freehand tool behaves after each stroke. It is possible to define whether to generate stitches of each stroke immediately or not, whether to finish freehand mode after single stroke or reactivate the tool, whether to create connection to the previous stroke or let jumps between the strokes.

## **Common Options**

Meaning of the After Stroke options is as follows:

- Finish Object converts stroke into nodes and finishes creation/editing immediately
- Generate Stitches same as Finish object, but it also generates stitches for the stroke object
- Edit converts stroke into nodes and switches to normal nodes editing mode



- **Another stroke** - converts stroke into nodes and allows to add another strokes. When finished, single vector object contains several strokes.

Only one of above options can be active at once. The rest of the **After Stroke** options include **Reactivate tool** and **Connect to previous object** check boxes.

If **Reactivate tool** is checked, Studio automatically activates Freehand tool when previous stroke is ended. This feature works only with **Finish object** and **Generate Stitches** options. To end strokes creation, hit **ESC** or **ENTER** (**RETURN**) key on the keyboard.

If **Connect to previous object** is checked, Studio automatically creates connection to previous object after the stroke. This feature works only with **Finish object** and **Generate Stitches** options.

Above options allow user to configure the Freehand tool behavior. Probably the most intuitive use of the Freehand tool can be achieved by combination of **Generate Stitches** and **Reactivate tool** options.

### **Manual Stitches**



- 4.0 mm

•• 0.7 mm

Manual Stitches are used to create realistic fur, shading or other texture. Parameters that are adjustable during the use of the Freehand tool are: **Color**, **Minimum Length of Stitch** and **Maximum Length of Stitch**.

There are several ways of how to change value of the stitch length controls (left/right click on the number or on the icon). They are used in the same way as those in the **Parameters window**.

**Please note**: When freehand drawing is finished, strokes are no longer available as a 'freehand objects'. They are automatically converted into respective vector objects like manual stitches, fill or column and their parameters are accessible via respective tabs in the **Parameters window**.



# **Outlines and Connection**



### Columns

Column-type styles include : Column and Pressure-sensitive width column.

Outline-type styles include : **Outline**, **Sketch Outline** and **Connection**.

Parameters that are adjustable during the use of the Freehand tool are: **Color**, **Minimum Length of Stitch**, **Maximum Length of Stitch**, **Width of the Outline** (not available for Connection) and **Outline Sample** (not available for Sketch Outline and Connection).

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Parameters that are adjustable during the use of the Freehand tool are: **Color**, **Minimum Width of Column**, **Maximum Width of Column**, **Tablet pressure** option to switch on/off tablet, and **Simulated Width** combo box.

If tablet is present, width of the pressure-sensitive column varies from minimum to maximum column width value, according to the real pen pressure. **Simulated width** combo box is disabled.

If tablet is not present (mouse is used for the drawing) or if tablet pen pressure is disabled by un-checking the **Tablet pressure** option, Width of the pressure-sensitive column is defined by selected stroke sample from the **Simulated Width** combo box (picture below).



## Fill and Sfumato



Fill-type styles include : Fill, Sfumato and Opening.

There is also **Carving** style, which is created like outline, but is serves to add texture lines to fill or sfumato objects. Both opening and carving objects must follow after fill or sfumato objects. They are not stand-alone objects.

The only parameter that is adjustable during the use of the Freehand tool is **Color**. The rest of parameters can be accessed only after finishing the freehand mode, using the common **<u>Parameters window</u>**.



# **Lettering - Text Tools**

Since version 5.0 Studio uses its own, integrated lettering system with interactive text insertion and editing. To

start creation of lettering, use command in <u>main menu > Text</u> submenu or click A or A button from horizontal button bar. The first button starts Alphabets lettering and the second starts Font Engine lettering. The same buttons can be used to select existing text and switch it to editing mode. Selection of existing text for editing works only with text created in Studio version 6.0, build 8.8 or later. It does not work with files from older versions of Studio.

### **Main features**

- Interactive lettering directly in the Studio work area
- Multiple lines text support
- Vertical text support
- Support of True Type, Open Type and pre-digitized Embird Alphabets
- Paragraph alignment
- Sewing from center out
- Node-by-node adjustment of text baseline
- Characters, words and lines spacing
- Unicode characters supported
- 'Place on the other side' function
- Possibility to edit previously created text
- Support of non-installed fonts and ZIP and RAR archives

Integrated lettering system in Studio allows to insert and edit text directly in the work area of Studio. Text can be created with Font Engine (True Type and Open Type fonts) or with pre-digitized Alphabets. Alphabets are manually pre-digitized scalable embroidery fonts. They are optional plug-in modules for Embird software. Most Embird alphabets are digitized with satin (column) stitches, the rest are in center outline (redwork type) form. Studio also allows to use Windows True Type and Open Type fonts. These fonts are automatically converted into vector format of Studio and can be filled with **plain fill, motif fill or auto-column** stitches and/or outlined with all types of **outlines** available in Studio. Support of True Type and Open Type fonts in Studio requires registered Font Engine, which is an optional plug-in for Embird software.



Left: predefined baselines combo box Right: radio buttons for switching the editing mode

Lettering system in Studio allows to work on top of the background image (template). Lettering supports multiline text and adjustable baselines. Predefined text baselines include circle, lines and spirals. All baselines can be transformed (moved, scaled, rotated and slanted) as well as edited node-by-node. Baseline scaling allows to create ellipse from circle. Baseline transformations can be done either with 'spider' control on the work area, or with controls on the panel at the right side of the screen. To switch between baseline and characters editing modes, use the pop-up menu accessible via right mouse button click or radio buttons (see above picture).





Mode 1: baseline transformations: move, scale, rotate, slant

Mode 2: baseline nodes editing





Multiline text

Mode 3: characters transformations: move, scale, rotate, slant and baseline offset of individual characters

## Mode 1 - Baseline Transformations

This mode allows to modify (especially move, scale and rotate) whole baseline at once. When moving the baseline, the text moves as well. Scaling baseline does not scale the text. This operation must be performed separately either via characters transformations or via controls on the right side panel. Baseline transformations are performed with spider control similar to the spider controls of individual characters (see Mode 3 below), with exception of missing slider 2.

## Mode 2 - Baseline Node-by-Node Editing

Baseline is composed from straight lines and bezier curves. User can add and delete baseline elements in a similar way as when digitizing objects in Studio. In case of multiline text, all text lines use the same shape of baseline which is copied from the top line

Shortcuts available in this mode:

- ALT + new node creates a new straight line on a baseline
- CTRL + new node creates a new straight line on a baseline, aligned to multiplication of 45 degrees
- CTRL + movement of the main node aligns this node to multiplication of 45 degrees with respect to
  previous node

# Mode 3 - Characters Transformations

Studio allows to transform individual characters or all characters at once (see below shortcuts). Transformations are accessible via nodes of the spider control. Spider control serves to transform characters in two axes (horizontal and vertical). As the text is placed on the baseline and baseline can be curved in any direction, below definitions refer to direction 'along' and 'perpendicular' to the baseline, rather than horizontal and vertical.

Nodes of the spider control are numbered 1-8. Moving of nodes transforms character in a following way:

- 1. Select character, move character (adjust spacing)
- Slider to shift character above (below) baseline (ALT+click=reset position to baseline)
- 3. Rotate (with CTRL depressed=change by 15 degrees, ALT+click=reset angle to 0 degrees)
- Scale along the baseline (with CTRL depressed=constrained proportions, ALT+click=reset character width)
- 5. Scale perpendicularly to the baseline (with CTRL depressed=constrained proportions, ALT+click=reset character height)
- Scale in both axis (with CTRL depressed=constrained proportions, ALT+click=reset character size)
- Slant along the baseline (CTRL+click=flip character horizontally, ALT+click=reset slanting)
- 8. Slant perpendicularly to the baseline (CTRL+click=flip character vertically, ALT+click=reset slanting)

### Shortcuts

Following shortcuts can be applied simultaneously with spider nodes movement:

- SHIFT + movement of spider leg adjusts the same spider legs on all characters at once
- CTRL + scale node (4,5 or 6) changes size of character proportionally
- SHIFT+CTRL can be combined

### Controls

Combo box in the top-right corner of the screen contains recently created/edited texts for easy return to its editing. Text sessions are also saved into the main design (eof) file so now it is possible to open design and edit text without use of .ltg files.

Please note: selection of previous text from the combo box and its editing creates a new text label on top of the old one. The old lettering must be deleted manually.







#### Character ‰







Panel at the right side of the screen contains main controls for lettering adjustment. These controls are organized into 3 groups (tabs): 1. Text controls

- 2. Size and Transformation controls
- 3. Optional paths to font folders (not available for alphabets)

Use icons on top (marked by red arrow) to switch between the tabs.

The first tab **Text Controls** contains following controls (from top to bottom): font combo box, character table, **Additional Spacing** controls, button for selection of next tab.

When you click on font combo box, the list of fonts will drop down. To get to required font faster, you can press key (on keyboard) representing the first letter of the font's name. List will scroll to section with font names beginning with selected letter.

Use double click on the **character table** to insert character that is difficult to type with keyboard to the text. Use Additional Spacing controls to adjust spaces between characters, whole words or lines, respectively.

# Second tab **Size and Transformations** contains **Lettering Size** controls and **Transformation controls**.

Transformations include: rotation, width, height, horizontal slant, vertical slant and distance from baseline. These controls allow to define transformation with exact numerical value in contrast to the 'spider' control, which is used for a freehand transformation.

Transformation controls are applicable only in mode 1 (baseline transformation) and mode 3 (characters transformation). If mode 1 is selected, all parameters refer to the baseline transformation. If mode 3 is selected, all parameters refer to selected characters transformation.

**Distance from baseline** and **"All"** option are available only for characters transformation (mode 3). When **"All"** option is selected, transformations are performed on all characters in the text. Below example shows rotation performed on all characters at once.



Optional paths to non-installed fonts:

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Third tab is available only for TrueType and OpenType fonts (i.e. not for pre-digitized alphabets). Controls on this tab allow to specify paths to folders with non-installed fonts.

Font Engine normally scans only fonts installed in Windows. If you have other fonts stored on the hard drive, specify paths to folders with these fonts and start font scanning (see below **Buttons** chapter). Scanning process will include specified folders.

Use **"Search for fonts also in ZIP and RAR archives"** option to include/exclude compressed archives from scanning process.

Search for fonts also in ZIP and RAR archives

### Buttons

The meaning of controls in the button bar is as follows. Please note that some controls (like "Scan installed fonts" button and "Unicode" check box) are available only for the Font Engine True Type and Open Type lettering and not for pre-digitized alphabets.



1. Cancel text mode, 2. Finish text mode and put text in outline form to work area, 3. Same as 2 and generate stitches.



Erase current text.

Q

Scan Windows for installed fonts. You can also include folders with non-installed fonts and fonts zipped in archives to the search. Use the tab at the right side of the screen to specify paths to these folders.



Text alignment in paragraph: 1. Left, 2. Center, 3. Right, 4. Justify. Only one option is active at the time.



Lettering type and layout: 1. Bold text, 2. Italic text, 3. Put text on the other side of baseline, 4. Vertical text. Depress any of these buttons to switch on respective option. When button is up, respective option is disabled.



Sewing order of text: 1. From left to right, 2. From center out, 3. From center out (without splitting words), 4. From right to left. Only one option is active at the time.



Lettering compilation: 1. Autocolumn fill (as opposite to plain fill), 2. Autocolumn + outline, 3 . Plain fill, 4. Plain fill + outline, 4. Center outline (double-layered center path).

Connection options: 1. Nearest point connections between all objects, 2. Nearest point connections only inside characters (example: between dot on "i" and main part of "i"),

but not between respective characters, 3. Separate objects (no connection).

0

🔝 Inicode

1. Help file, 2. Unicode character set



Vertical text.

Use button from the horizontal button bar to switch on the vertical text mode.

Embird mhird

Center outline lettering.

Use <sup>(A)</sup> option from the horizontal button bar to select this option.

**Please note:** current version of program does not work well if center outline style is used for a very thick font. We recommend to use it only for thin fonts. Center outline style can be combined with the 'Nearest Points' option.

# **Envelope Tool**

This tool allows to deform selected object(s) in the work area of Studio with use of adjustable boundary. It is especially suitable for adjustment of lettering and banners.

Select object(s) and click  $\bowtie$  icon on the button bar (top part of the Studio screen) to switch to the envelope mode. Options like predefined shape, type of horizontal and vertical edges and symmetry options are displayed on panel at the right side of the screen. Move respective envelope nodes to deform selected object(s) as needed.



Please note that straight-line elements of vector objects are not bend when applying the envelope. They remain straight and only their end nodes are moved. If you want to bend these elements, please enter the editing/creation mode first and convert straight-line elements to curves.

# **Auto Outliner**

The Auto Outliner commend allows to create double-layered outlines for single object or multiple objects (fig. 1.). Objects may overlap or intersect one another and program creates outlines only for the **visible** parts. It is useful for creation of outlines like shown on the right picture (fig. 2.).



Fig. 1. Overlapping objects to be outlined.



Select objects you want to outline and click the  $\frac{1}{100}$  button, or use **main menu > Transform > Auto Outliner** command. This will create a number of small outline elements like shown on below picture (fig. 3.). All outline elements have color of the first object (orange, in this case). Select new color from palette and draw it to selection to change color of the outline elements (fig. 4.).

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Fig. 3. Number of outline elements created by auto outliner.

Fig. 4. Outline elements with new color.

Use button or <u>main menu > Transform > Arrange Outline Parts</u> command to order and combine elements into continuous double layered outline (fig. 5). Note that this function will connect all elements into single object by inserting connections where it is necessary (fig. 6.). If you want free standing objects like outlines of holes to be left unconnected, use **main menu > Transform > Arrange Outline Parts (no Connections)** command instead.



Fig. 5. Complete outline created with 'Arrange Outline Parts' command.





Fig. 6. Outline of hole connected to the main outline.

Fig. 7. Hidden parts are not outlined.

On places where one object lays on top of the other, automatic outlines are created only for those parts that are on top of the others. Program automatically ignores hidden parts (fig. 7., marked by red arrows)

**Please note:** auto outliner can fail to work properly on places where edge of one object runs (almost) on top of edge of other object, i.e. parts of their edges are almost identical. On such places, outliner may generate large amount of small outlines, because nearly identical edges intersect each other on many places. Common designs have either separate or overlapped areas and such situation does not occur. In most cases the problem occurs when **vector graphics** (EMF, WMF or CMX files) is used, because graphic files are created in a different way (no overlays, many identical edges).

# **User's Patterns Tab**

**Layers** are used to create interleaved pattern. If there are 4 layers in the pattern, for example, each layer applies only to the each 4th line of stitches. Consequently, final pattern looks like if there are all 4 layers interleaved.



Pattern with 4 layers. Each column of pixels belongs to different layer. The layer that is currently edited is highlighted.



Pattern with 4 layers applied to rows of stitches. Needle points appear on places where stitches cross the pattern pixels. Each layer (column in this case) applies only to the each 4th line of stitches.



3D preview of stitches with pattern. The fill with interleaved pattern is flat.

Interleaved pattern produces flat fill. For patterns with more puffy texture use single layer of pixels (no interleaving).



To examine predefined Studio patterns **Open** any patterns from PATTERNS folder.

**Save**. Click this button to save pattern to disc. Patterns are automatically stored with design with which they were created, so you need to save pattern only if you want to use it in other design.

**Open**. Click this button to load some previously stored pattern into your design.

Clear. Click this button to reset selected pattern.

**Import image into background**. Click this button to open an image and use it as the template when drawing the pattern.

**Skew left** and **Skew right**. Click any of these buttons to modify the pattern. Sometimes a nice new pattern can be created from existing one by just clicking any of these buttons.

Move. Click any of these buttons to scroll pattern in the working area.

# **User's Samples Tab**

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-	

Samples are used to create fancy outlines. They are aligned along the outline in a contir Motifs are used in a similar way for fancy fills.

Both samples and motifs should be made so that they allow seamless, continuous conne contains built-in editor of outline samples and fill motifs that facilitates this task.

User can create up to five outline samples and up to five fill motifs that are saved with t

Preview table with user samples.



Sample aligned along the outline.

2 motifs used as fill.

Samples and motifs are small formations of stitches. They are made from single stitch by inserting nodes (needle points) between the first and last point and moving them on the work area. Initial form of sample is single stitch. Preserving of first (left) and last (right) points ensures seamless connection of samples.



New sample - initial stitch.

A node inserted between first and last point.





Continuous formation of samples projected along the line.

Another node inserted. Sample is finished.

Both samples and motifs are used by Studio so that they are projected into virtual windows along the outline or inside the fill. The size of these windows is defined by **Min. Length**, **Width** and **Height** parameters.

The width/height ratio of sample in the work area does not have to be identical to **Length/Width** ratio given by user. When Studio is projecting sample or motif into virtual window, the length of sample is adjusted to place the first and last point exactly onto the window beginning and end. User can decide which method will be used for adjustment:

**1. Deform** - whole sample/motif is deformed (stretched) to fit into window.

2. Add Jump - sample/motif is not deformed, but jump stitch is added to its end.

3. Add Stitch - sample/motif is not deformed, but running stitch is added to its end.

All fill motifs and most of outline samples use **Deform** method. Special outlines like "Candlewick" that should be composed of some not deformed objects connected by jumps or running stitches use **Add Jump** or **Add Stitch** methods.

To examine predefined Studio motifs and samples **Open** sample or motif from PATTERNS folder.



Adjustable gray area on top and bottom of work area allows user to change the width/height ratio of the work area. Stitches may stick into gray area. If they do so, it means that sample/motif will stick out of windows along the outline or inside of fill. Use this approach if you want motifs to overlap each other (picture at right).

Min. Length. applies only to outline samples. It defines the smallest window length in curves.

Shift applies only to fill motifs. If defines the mutual shift of motif rows when projected to a fill.

Length is length of sample or motif.

Width is width of sample or motif.

Simulate. Click this button to run slow simulation of how sample/motif stitches will be sewn.

Save. Click this button to save sample or motif to the disc in order to transfer it to other design.

**Open**. Click this button to load sample or motif saved previously from other design.

Clear. Click this button to reset selected sample or motif.

**Import image into background**. Click this button to open an image and use it as the template when drawing the sample or motif.

# How to make and use your own Borders

Border is an **<u>outline object</u>** composed of pre-digitized objects (border samples). It can have outlines of a separate color. There are several border samples available in Studio and user can define his/her own border samples. This tutorial will guide you through process of creation of your own border samples and their use in your embroidery designs.



Various borders: simple border with 1 column object, rope border with outline, complex leaf border with columns and connections.

## **Creation of User Border Samples**

Border elements (samples) are small designs, which are like any other designs created in Studio. Therefore, we will use Studio's main Work Area for creation of border samples and not some editor window as it is in case of fill pattern or motif creation. Border samples have some limitations, though, and some Studio controls are disabled during creation of border sample, therefore.

To start creation of a new border sample, click on main menu **Design/ Border/ New Border**. Special template for borders will appear in the Work Area and some Studio controls will be disabled. Please note that border sample can contain only **Column, Column with Pattern, Outline** and **Connection objects**. Tools for creation of other objects are disabled.

### **Example 1 - Single Column Object**

The first border example contains only one column object. Note that object fits into **Border Cell** window and it begins on left side and ends on right side of the cell. Parallel direction of stitches on beginning and end of sample ensures contiguous stitching of border and connections between border samples are not needed.



To set name and default width and height of border sample, select any object in the Work Area and then use right mouse click to access **Parameters Window**. Set **Comment**, **Reference Width** and **Reference Height** parameters on the **Whole Design Parameters** tab.

When creation of border sample is finished, use main menu **Design/ Border/ Save Border As** to save border to disc. Border is saved as a normal EOF file in compact format without image. If you want to edit border, use main menu **Design/ Border/ Open Border**. Do not use common **Design/ Open** command, because there will be no template for border drawing.

#### **Example 2 - Column Object with Outline**

This border sample contains column object and outline of another color. When compiling to stitches, Studio reorders border objects so that outlines are sewn after all columns and connections. Therefore, it is useful to draw border sample so that columns sew without a trim and outlines sew without a trim too. Of course, there will be a trim between columns and outlines, because outlines are of different color.



Column object is drawn so that it exceeds the boundaries of the cell on left and right side. This is because the elements of rope should overlap to prevent gaps in stitching. Because of the overlap, there must be connection object before column object to ensure contiguous stitching of columns. Place beginning of connection anywhere, Studio will align it to previous column when compiling all border samples. End of connection must be connected to column object.



Outline is drawn so that its beginning is aligned to end of previous border sample outline, if you imagine several border samples lined up one after another. See below picture how the the outline is drawn to make two or three layers of stitches and to position beginning and end properly.



### **Example 3 - Column Objects with Connections**

In this example the border sample contains columns and connections. The most important is placement of first and last connection, because they allow contiguous stitching of border. First connection begins on left side of the cell and last connection ends on the opposite side of the cell. The rest of connections serve only for normal connection of column objects within the sample.



**Use of Border Samples** 

To make user defined border samples available in **Parameters window** when digitizing design, you have to assign your border samples to empty items in the Border samples list. First 5 items in the Border samples list in Parameters window are reserved for user defined samples.

If Studio is still in creation of border sample mode, save border to disc and start a normal new design with use of main menu **Design/ New** or open any of your existing designs.

Use main menu **Objects/ User Editors** command and then switch to **Assign User Borders** tab. Double click on any of 5 user defined border samples and load your own sample from the disc. Click **OK** when finished.



Now your border samples are linked to design file and they are available in borders list of **Outline Parameters window**. You can use them for Outline objects in your design.
# **Short-cut Keys**

The most frequently used functions can be accessed with short-cut keys. Below list contains all short-cuts available in Studio.

CTRL	When depressed, forces new lines and curves to precise horizontal, vertical or diagonal direction in edit/create mode. If used with Shapes, creates precise circle instead of ellipse and square instead of rectangle. CTRL key has other meaning in <b>lettering mode</b> .					
CTRL+1	Zoom to selected object(s)					
CTRL+2	Zoom to selected object(s) and switch to the nodes editing mode.					
CTRL+A	Select all objects (in transformations mode)					
CTRL+Shift+A	Deselect (in transformations mode)					
CTRL+B	Create backward path to selected outline objects.					
CTRL+C	Copy selected objects into clipboard					
CTRL+D	Duplicates selected objects					
CTRL+E	Edit. Switch selected object(s) to the nodes editing mode.					
CTRL+F	Compile design and send it to the Embird Editor for further processing.					
CTRL+G	Generate stitches for selected objects.					
CTRL+I	Import image					
CTRL+M	Merge File					
CTRL+N	New file					
CTRL+P	Display parameters window					
CTRL+S	Save design					
CTRL+U	Text (Embird Alphabets)					
CTRL+V	Paste objects from clipboard					
CTRL+Y	Redo					
CTRL+Z	Undo					
CTRL+INSERT	Create connection to previous object					
CTRL+F1	Align beginning of object to end of previous object (in editing mode)					
CTRL+F2	Align end of object to beginning of next object (in editing mode)					
CTRL+F3	Align beginning of outline object to beginning of previous outline object (in editing mode)					
CTRL+ALT+B	Background Filters (Image colors)					

CTRL+ALT+C	"Bring to Center". Moves selected objects to center of the Work Area.			
CTRL+ALT+E	Delete second edge parallel to first edge (in editing mode)			
CTRL+ALT+I	Display Edit Image window			
CTRL+ALT+O	Convert fill to outline			
CTRL+ALT+T	Display Transformations window			
CTRL+ALT+U	User Editors			
CTRL+Shift+U	Insert text from Embird Font Engine. Inserts lettering converted from TrueType fonts embroidery design.			
2	Snap selected node to nearest node			
3	Place beginning of object to end of previous object			
4	Place second beginning point (for columns-type objects) to end of previous object			
b	When creating outline object, pressing this key performs these three operations at once: 1 outline object is finished, 2. backward path is created to the outline object, 3. outline object and its backward path are joined into single object.			
е	Add new line part to edge			
r	Add new line part to second edge (for columns- type objects)			
d	Add new curve part to edge			
f	Add new curve part to second edge (for columns- type objects)			
i	Changes first zigzag underlay angle of fill object in the edit/create mode.			
0	Changes second zigzag underlay angle of fill object in the edit/create mode.			
р	Changes cover stitches angle of fill object in the edit/create mode.			
X	Works like right mouse button. It is intended for use with tablet.			
space	Finish object creation/editing, if possible			
esc	Cancel object creation/editing			
arrow keys	Scrolls Working Area			
arrow keys +ALT	Moves selected objects in transform mode and selected node in edit/create mode.			
-	Zoom out			
+	Zoom in			
Page Up	Zoom out			
Page Down	Zoom in			
SHIFT+ Page Up	To Front (order of objects)			
SHIFT+ Page Down	To Back (order of objects)			
Delete	Deletes selected objects (in transformations mode). Deletes an element that ends with selected square (in edit/create mode).			

INSERT	Inserts a new element before selected square node in edit/create mode.					
END	Inserts a Segment End at selected square node in edit/create mode.					
ALT	Description of ALT key use in lettering mode is available in <b>Interactive Lettering</b> chapter.					
ALT+1	Normal View					
ALT+2	Enhanced View					
ALT + mouse cursor move	Pan work area without having to switch tools. Cursor must move near edges of the work area.					
ALT+B	Hide / Show boundaries of objects					
ALT+C	Snap node to nearest node (editing mode)					
ALT+D	Hide / Show grid					
ALT+F	Hide / Show fill objects					
ALT+G	Hide / Show guide lines					
ALT+J	Hide / Show jumps					
ALT+L	Hide / Show columns					
ALT+M	Hide / Show manual stitches					
ALT+N	Hide / Show columns with pattern					
ALT+O	Hide / Show outline objects					
ALT+Q	Hide / Show appliqués					
ALT+R	Hide / Show rulers					
ALT+S	Hide / Show stitches					
ALT+T	Hide / Show button bar					
ALT+U	Hide / Show sfumato objects					
ALT+V	Hide / Show carvings					
ALT+W	Hide / Show one-way outline objects					
ALT+X	Hide / Show connections					
ALT+Z	Hide / Show zoom window					
ALT+F1	Activate Transform tool					
ALT+F2	Activate Edit tool					
ALT+F3	Activate Zoom tool					
ALT+F4	Activate Pan tool					
F1	Opens help files					
F2	Create Fill object					
F3	Create Sfumato object					
F4	Create Opening object					
F5	Create Carving objects					

F6	Create Column object					
F7	Create Column with Pattern object					
F8	Create Outline object					
F9	Create Manual Stitch object					
F10	Create Connection object					
F11	Create Appliqué object					
F12	Create Appliqué Opening object					
Double click on Working Area	Starts creation of new object without need to select any tool. The new object is of the same type as the previous object. This short-cut helps to create series of object of the same type faster.					
Right mouse button depressed + dragging cursor over Work Area	This action temporarily switches on the pan tool instead of actual working mode. When button is released, program returns to previous mode. This helps to scroll the work area quickly, without using any control (scroll bars) or tool (Pan Tool button)					
Double click on Object Inspector window	If double clicked on object icon, stitches are generated for this object					
HOME	In nodes creation/editing mode - selects first node on the edge. Helps to locate first node on complex edge with many nodes.					
END	In nodes creation/editing mode - selects last node on the edge. Helps to locate last node on complex edge with many nodes.					
a + left mouse click	In nodes creation/editing mode - activates <b>Fast Node Insertion mode</b> to allow insertion of new nodes after any selected node, not just the last one. Helps to speed-up nodes insertion and helps to avoid undesired selection of existing nodes.					
ТАВ	When creating new object, TAB key can be used to quick adjustment of the curve elements. Create new curve element with TAB key instead of left mouse button. Then move the mouse with TAB key depressed to adjust the curve. Then release the TAB key. <b>Please note:</b> to use the TAB key for curves adjustment, the edge mode must be set to 'curve'.					

## Main Menu

- <u>Design</u>
- Edit
- <u>Image</u>
- <u>Text</u>
- <u>Nodes</u>
- <u>Shape</u>
- Objects
- <u>Transform</u>
- <u>Convert</u>
- <u>Select</u>
- <u>View</u>
- Help

## Main Menu - Design

The first command, **Compile and Put into Embird Editor**, compiles a design digitized in Studio and places it into Editor so the design can be saved in desired embroidery format.

The next 6 commands are **New, Open, Open Recent, Save, Save As, Merge.** In all cases, the format is EOF. EOF is native file format of the Embird Studio. It stores all design objects, lettering and background image in a single file.

Merge adds selected design to the one already opened in Studio.

**Export** command allows to convert vector design from Studio to other file formats. Current version supports Scalable Vector Graphics \*.SVG format and Embird Text Baseline \*.ETB format. Use export to SVG format if you need to transfer design from Studio to graphic programs like Corel Draw.

**Save in Compact Format (for internet)** stores design in a scalable outline file without image and stitches to achieve small file size. It is intended for internet delivery of embroidery files. Receiver of such design can open it with Embird 2003 or later and resize it without loss of quality. Compact file has an EOF extension just as normal design file, but it is much smaller in size. Digitizer should save her/his design also in normal EOF format (Save, Save As) for further editing, if any. Compact format does not include background image, guide lines and other data that are unnecessary for end user.

Save Selected As works like Save As, but only the selected objects are stored into the file.

The **Import Vector File** function opens the vector graphic file and converts it into the embroidery design. **Read more about this function here**.

Border opens sub-menu with commands for creation and editing of user defined Border Samples.

Parameters command opens the window with design and objects properties.

The last command is **Exit**, which follows the usual Windows convention prompting user to name the design and choose a location.

**Load Color Palette** and **Save Color Palette** allow to copy customized color palette from one design file to another. Colors are loaded to palette in the top-right corner of the Studio window. They serve to select color for vector objects in design.

## Main Menu - Edit

There are following commands in the Edit menu: **Undo** and **Redo**; **Copy** and **Paste**; **Select All** and **Deselect**; **Delete** and **Duplicate**; **Snap to Guide Lines**, **Lock Guide Lines**, **Erase Guide Lines** and **Preferences**. Use the <u>**Preferences**</u> command to set the size and color of the Hoop/Work Area. The guide lines color, grid's size and line color can also be changed under Preferences.

**Snap Objects to Grid** snaps selected objects to nearest grid line when user moves objects in the Transformation mode. Objects are snapped only if they are near to the grid line. This function allows user to align objects with use of the grid lines. It works with whole objects (not just edited nodes as snap options under **main menu > Nodes**).

**Snap Objects to Guide Lines** snaps selected objects to nearest guide line when user moves objects in the Transformation mode. Objects are snapped only if they are near to the guide line. This function allows user to align objects with use of the guide lines. It works with whole objects (not just edited nodes as snap options under **main menu > Nodes**).

**Lock Guide Lines** disables editing of guide lines and adding of new guide lines. Locking of guide lines prevents unwanted seizure of guide lines when working with digitized objects in the Work Area.

Erase Guide Lines deletes all guide lines in the Work Area.

Clipboard operations **Copy** and **Paste** can be used for moving objects between separate designs.

#### Main Menu - Image

**Import** is used to bring an image into the background as a template for digitizing; Studio can import an image in JPG, GIF, BMP, PNG and TIFF formats.

Studio ignores the DPI, resolution, or size set by the graphics program which generated the imported image, instead using this scheme: 100 pixels = 1 cm of design size; 254 pixels = 1 inch. User may also select 'Scale image to fit current hoop' option to scale image to hoop size while importing image.

Studio can import images up to 3000 x 3000 pixels.

Click on **Background Filters** or **Edit Image Window** to find out more about these command.

**Rotate to Vertical** and **Rotate to Horizontal** are tools for rotation of image. They are intended for precise rotation of images that contain either vertical or horizontal objects or lines. Place rotation marks on the object (line) in the image and then click right mouse button on 'arrows' symbol near the rotation mark. Select 'Rotate Image' from the pop-up menu. Image will be rotated so that marked object is vertical or horizontal, respectively. **Please note**: use **Edit Image Window** for rotation of image with angle parameter.

**Crop** is tool for precise placement of crop marks and cropping of the image. Place crop marks on the image and then click right mouse button on the 'scissors' symbol near the crop mark. **Please note**: **<u>Edit Image Window</u>** can be used for cropping of image too.

**Straighten** is tool for compensation of the scanned image distortion. If deformed image has edges that are supposed to be orthogonal, set the red marks on these deformed lines. Then click the right mouse button on the work area and select **Straighten Image** command from the pop-up menu. Image will be transformed so that selected shape becomes a rectangle.

**Acquire (Scan)** ... command launches the image scanning software. This command work with scanners that support TWAIN. Scanned image is transferred into background of the work area as if it was loaded with **Import** command.

**Delete Image** command removes background raster image from the project. This command allows to shrink the file size of design in eof file format for e-mail transfer, for example.

**Please note:** it is also possible to transfer image to Studio with use of Copy (CTRL+C) and Paste (CTRL+V) commands. Use CTRL+C in any graphic program to store raster image into clipboard. Then open Studio and use CTRL+V to load image from the clipboard.

## Main Menu - Text

Following 4 commands switch Studio to the **<u>lettering mode</u>**. There are two ways of how to create lettering in Studio: 1. pre-digitized Alphabets, 2. Font Engine text. Both methods use very similar user interface, but they work with different source of lettering.

**Text** inserts lettering from **Embird Alphabets**. Alphabets are pre-digitized Embird fonts that must be purchased separately. Click anywhere on the work area to define the start point of text. If you click on existing text, it will switch into editing mode. Otherwise, a new text creation begins. Program opens window for alphabet selection and parameters and layout settings. Finished lettering is placed into Work Area of Studio. Unlike lettering in Embird Editor, which is in plain stitches, lettering placed directly into Studio is in outlines and it is resizable, therefore.

**Please note:** Selection of existing text for editing works only with text created in Studio version 6.0, build 8.8 or later. It does not work with files from older versions of Studio.

**Font Engine Text** inserts text from Embird Font Engine. Font Engine converts TrueType and OpenType fonts into embroidery designs automatically. Click anywhere on the work area to define the start point of text. If you click on existing text, it will switch into editing mode. Otherwise, a new text creation begins. Finished lettering is placed into Work Area in outlines and it is resizable, therefore. Font Engine can be run also from Embird Editor, but result is lettering in stitches. Font Engine is included in Embird 2003 or later, but its registration password must be purchased separately.

The difference between Font Engine and Alphabets is that Alphabets are pre-digitized fonts and Font Engine converts any True Type or Open Type font automatically. Although Font Engine uses advanced techniques when filling letters with satin stitches (auto column), result may be different to human digitizer approach, sometimes.

Above commands allow to create multi-line lettering by typing in the characters and automatic conversion to outlines and stitches. If you digitize logo and there is no similar Alphabet or font available, you may need to digitize lettering manually with use of columns and connections. In such case, please read this tutorial on **how to do lettering manually**.

**Text with Selected Object as Baseline** - same as **Text** command, but uses selected object in work area as a custom baseline. This allows to use existing object (fill, column or outline, for example) as a baseline for lettering. This command is useful when you want to draw baseline with freehand tool, or if you want to place text parallel to edge of existing object.

Font Engine Text with Selected Object as Baseline - same as Font Engine Text, but uses selected object in work area as a custom baseline.

**Edit Text** - access to editing of existing text. Select any part of existing text (letter or object) in work area or object inspector and use this command. It will switch Studio to lettering mode and open respective text for editing. When editing is finished, original text is replaced by the new one. If you have previously made some editing of text objects on node-by-node level, these changes are lost.

**Convert Text to Normal Objects** - objects like fills, columns and connections belonging to some text label are linked to this text label and marked by 'text label' Alphabets Text or 'text label' Font Engine Text in the **object inspector** window. If you do not want to edit text on lettering level anymore, you can convert it to normal objects with this command. Link to text is removed and it is possible to edit objects on node-by-node level.

**Import Baseline** command allows to import baseline in Embird Text Baseline \*.etb file format. This command is intended for use with old baseline files created in Studio. New lettering system allows to store lettering sessions (including baseline) in the main design file, in a separate lettering file and to transfer lettering between designs with copy and paste commands. Therefore, this command is provided only for backward compatibility.

## Main Menu - Nodes

The Nodes Menu is accessible only in creation/editing mode. The first command, **Align Beginning to Previous Object**, moves the beginning of an edited object to the end of previous object. Use this command to assure there will be no jump stitch between the two objects.

The next command, **Align End to Next Object**, causes the end of the object being edited to the beginning of the object to be created next.

**Align Outline Beginning to beginning of Previous**. When doing a complex outline, some outline parts start not on end of previous part, but on its beginning, instead. Use this function to place beginning of the new part exactly on beginning of previous part. Although 'Arrange Outline Parts' function allows some deviation in parts placement, the use of this function may help to reduce 'Parts are not close enough' problems.

**Swap Edges** is the next command; it is intended for columns and other objects that have two sides. Swap Edges is used to change the sides in in order to end stitching of that object on other side.

**Reverse Nodes Order** comes next; it changes the order of nodes. This is another method to change which stitch will be last.

Use **Delete Whole Edge** command to erase whole edge and start its creation anew.

**Create Second Edge** command works on columns and objects with two sides. Create one edge and the first point of the second edge, then use this command. The second edge will be parallel to the first and the segment end will be placed after each element of edges.

Snap nodes to Work Area Edges, Snap to Guide Lines, Snap to Nodes, Snap to Grid, Snap to Object **Edges** are options for alignment of nodes during editing or creation of object. Nodes are snapped only if they are near to the Work Area edges, **guide lines**, other nodes, grid lines or edges of other objects, respectively.

**Please note:** there are also other snap option under the <u>main menu > Edit</u>. However, these options serve to snap whole objects (not just edited nodes).

**Snap to Nearest Node** command moves selected node on top of nearest node which belongs to other object. It means that it does not snap selected node to nodes of actually edited object, only to nodes of other objects. This command helps to align nodes precisely.

**Select First Node**, **Select Last Node** commands select respective node on the vector edge. These commands help to locate first and last node on complex edges with large number of nodes.

**Duplicate and Mirror** command help to create symmetrical objects. Draw first part of the object and then use Duplicate and Mirror command to create second part of the object, which is symmetrical to the first part about the axis passing through the first and last node.



**Duplicate and Mirror Horizontally** and **Duplicate and Mirror Vertically** work in a similar way, but the axis of the symmetry is vertical and horizontal straight line passing through the first node.

Creation of object symmetrical about both horizontal and vertical axes is explained on the following example:

- 1. Create one quarter of the object.
- 2. Use Duplicate and Mirror Vertically command.
- 3. Use Duplicate and Mirror Horizontally command.



**Edit All Nodes** enables/disables possibility to select and move nodes in editing mode. When disabled, user can edit only last 2 nodes on each edge. This option is useful when nodes are near one to another and cursor selects existing node instead of creating a new one. This option allows to 'lock' most of the nodes so that they do not interfere with new nodes.

## Main Menu - Shape

There are two types of shapes available from this menu. The first type are basic shapes like ellipse, rectangle, etc. These shapes can be used only in the node editing mode.

To use any of these shapes, place at least one node in the Work Area, then select one of the shapes and draw it in the Work Area. Right mouse click and select **To Elements** from the small pop-up menu. Studio will move the last node to the nearest point on the shape just created and the shape will be started from that point. This means the shape can be started from any point.



Basic shape - star. Red nodes define the size of the star. Black nodes defines chosen start point of the shape.

There are 3 types of ellipse available in the Shape menu: ellipse with 4, 8 and 16 elements. Ellipses with low number of elements are not perfectly elliptical and they should be used only for a small objects. For a large object, use the 16 elements ellipse.

Detailed description of how to work with these shapes can be found in "Basic Shapes" chapter.

Second type of shapes are pre-digitized objects like banners, scrolls, etc. These shapes are accessible in a normal working mode, i.e. not in the node editing mode.

**From Library** command allows user to merge pre-digitized shapes to design. Pre-digitized shapes are stored in **Library** folder. Any design saved in compact format may be stored in the Library folder and used as a shape.



Shape from library - 2 color design.

## Main Menu - Objects

Edit switches selected object to editing mode.

**Generate Stitches** computes stitches for selected objects. The same effect can be achieved with double click on object icon in Object Inspector window.

**Parameters** displays window with parameters tab for selected objects. The user defined patterns and stitch samples can be created in this window.

User Editors displays window for creation of <u>fill patterns</u>, <u>motifs and outline samples</u> and for assignment of <u>user defined border samples</u>.

**Styles** contains submenu with **Apply Style** and **Edit** commands. **Apply Style** sets parameters of selected objects like density, pull compensation and underlay according to chosen style. **Edit** displays table of predefined and user defined styles, and allows user to edit existing styles and create her/his own styles.

	Name	tta mm	<del>ĝ</del>			∽.	Ø	4	đ.	N
la.	Canvas	0.5	5.0	0.4	0.1	3	~	~	40	5.1
2,7	Cap	0.5	4.0	0.2	0.1	3	×	×	40	4,1
3.	Fleece	0.5	4.0	0.3	0.1	3	~	×	40	4,1
ŧ.	Jeans	0.5	4.0	0.2	0.1	3	~	~	40	4.1
5. 1	Leather	0.5	4.5	0.1	0.1	3	×	×	40	4.

Editor of Styles.

**Group 1**, **Group 2** and **Group 3** are functions for combining several objects into one for easier manipulations. They allow user to create hierarchically organized combined objects. This hierarchy simplifies the editing of combined parts.

When digitizing some lettering, for example, the basic parts of letters (columns and connections) may be joined with **Group 1** command, so that each letters is composed of parts grouped together. Letters may be joined into words with **Group 2** command and words may be joined into sentence with **Group 3** command. The numbers 1,2 and 3 indicate the level of the group. Many programs have just one group level. Several levels allow to ungroup and manage objects on some level, while leaving other levels untouched. For example, you can ungroup parts of letter for editing, while preserving words and whole sentence grouped.



Basic parts of letter 'A' are selected. Use Group 1 to combine them into a single object.



There is a small black lock icon at right side of A indicating that this object is composed of parts grouped on level 1.



Select the letters in a word ABN now a use **Group 2** to combine then into single object. Letters in the second word AMRO are already grouped (indicated by medium size blue lock icon).



Select all words and use Group 3 to combine them into single object.

The fact that this object is composed of objects grouped on level 3 is indicated by a large magenta lock icon.



Use **Ungroup 1**, **Ungroup 1** and **Ungroup 3** commands to divide groups on respective levels (in this example, use Ungroup 3 to split sentence into words, Ungroup 2 to split words into letters and Ungroup 3 to split letters into basic objects).

**Erase Stitches** function removes stitches from selected objects, which allows a clear view of their vector boundaries. This function is usefull when you need go back and revise part of design.

**Sort Colors** function changes order of selected objects so that objects of the same color are in the successive order. This function helps to eliminate the color changes.

**Sort Types** function changes order of selected objects so that objects of the same type are in the successive order.

**Sort Sizes** function is very important for editing of objects imported from <u>vector graphics files</u> like EMF, WMF and CMX. Such files often contain large number of a very small objects (often smaller than 1 millimeter) that are not possible to sew out and they spoil embroidery design. Use **Sort Sizes** command to re-order imported objects according to their size. Then select too small objects and delete them.

**Order** submenu contains functions for change of the selected object(s) order.

**Tune Colors** allows to adjust colors of all selected objects, or even whole design at once. Tune Colors command opens window with **Brightness**, **Contrast**, **Gamma**, **Saturation** and color balance controls (**Cyan-Red**, **Magenta-Green**, **Yellow-Blue**). These controls work with color of vector objects and stitches (thread), not with the image colors.



Original colors before tunning.



Brightness increased for all objects at once.

## Main Menu - Convert

These commands work on objects selected with the **Transform Tool (arrow)** or in **Objects Inspector**. They allow to change the way of how the vector objects are filled with stitches by conversion of objects from one **type** to another.

**Create Outlines from Fill** creates outline object from selected fill object. If fill object has openings, Studio will create also outlines of openings as a separate objects. Start point of each outline is identical to start point of the corresponding fill or opening. It is often desirable to place start of outline on the place where fill ends. Switch outline to editing mode and use '**Place Start Point here**' command from pop-up menu to change the outline start point.



**Create Columns from Fill** creates complex object composed of columns and connections from selected fill object. It is intended mainly for cases when user uses Auto Column option for fill object and more parameters than provided by Auto Column are needed.



Create Column from Outlines creates column object from selected outline.



**Split Border into Elements** creates complex object composed of columns and/or outlines and/or connections from selected outline object. It is intended for cases when the user needs to edit the parts of the predefined border outline (like rope border, for example).

**Create Fill from Opening** creates a new fill object from selected opening in existing fill. Opening must be selected in the Parts Inspector window. This command is intended for situation when user needs to create cover stitches of other color for a hole (opening) in the fill. User should adjust the newly created fill object so that it overlaps the opening underneath, in order to create overlay to avoid gaps in stitching.



**Create Fill from Outline** creates a new fill object from selected outline objects. If outline is not closed, Studio automatically closes the newly created fill object.

**Split Appliqué into Layers** creates separately editable layers from selected appliqué objects. These layers include following objects: 1.marking stitches - outline object(s), 2.tack-down stitches - column object(s), 3.cover stitches - column object(s). Layers on below illustration are pulled aside to show objects underneath.



It is important to note that all above commands will duplicate an object and then convert the new object as

selected. For example, if the Create Columns from Outlines command is selected, Studio will duplicate the object, leaving the first one an Outline object, and converting the second one to a Column object.

Next commands are:

**Appliqué to Column** 

**Column to Appliqué** 

**Column with Pattern to Column** 



#### Column to Column with Pattern



- **Column to Outline**
- Column to Fill
- **Connection to Manual Stitches**
- **Connection to Outline**
- Manual Stitches to Connection
- **Fill to Opening**
- **Outline to Connection**
- **Fill to Opening**
- **Fill to Sfumato**

#### Sfumato to Fill

Each of them converts objects from one type to other. They do not duplicate objects. **Column to Appliqué** joins beginning and end of object, because **Appliqué object** must form a closed loop. Functions **Column to Outline** and **Column to Fill** convert also Columns with Pattern and Appliqués to Outlines and Fills.

Special command **Areas to Centerline** allows to create redwork object(s) from fill or column object(s). Result is a set of outline elements, which have to be combined into single outline object with use of <u>main menu ></u> <u>Transform > Arrange Outline Parts</u> function. This function is mainly intended for creation of redwork lettering.



Command **to Editable Stitches** converts stitches in selected vector objects to editable manual stitches. Create any object as a start and then use this function to access and edit individual stitches. This function can be used for precise adjustment of motif fill, for example.

## Main Menu - Transform

These commands work on objects selected with the Transform Tool (arrow) in work area or in Objects Inspector list.

Use the first command, **Snap to Previous Object**, to eliminate a jump caused when an object is moved accidentally.

The second command, **Create Connection to Previous Object**, is designed for designs where the selected object does not touch the previous object; invoking this command will place a **Connection object** between noncontiguous objects to eliminate jump stitches.

Use Flip Vertically to flip selected objects along the horizontal axis.

Use Flip Horizontally to flip selected objects along the vertical axis.

Use Rotate Left to rotate selected objects 90 degrees anti-clockwise.

Use Rotate Right to rotate selected objects 90 degrees clockwise.

**Important !: Apply Rotation to Fill Stitches** option. If this option is checked, angles of cover stitches and zig-zag underlay of Fill objects are adjusted whenever the object is rotated or mirrored. There are several function that use this setting: common rotation, flipping, corner function, auto-repeat function. If this option is not checked, stitch angles remain the same regardless of object rotation and mirroring.

**Transformation window** allows user to make transformations like objects movement, rotation, skewing, resizing and change of order. These operations are all available in an interactive form directly in the Work Area or in Object Inspector window. Moreover, Transformations window allows user to **align and distribute** selected objects within selection.

The next command, **Bring to Center**, is to help when an object is moved accidentally off the Work Area. Select the object in the **Object Inspector** window and click Center to bring the object back to the Work Area.

Center Vertically and Center Horizontally commands center selected objects according to respective axis.

#### **Outline Transformations**

This is a group of commands specially designed for work with outlines. Description of different approaches to create outlines is available in <u>"Outlines - Overview" chapter</u>.

**Arrange Outline Parts** is intended for making complex thin outlines with double stitching. Any running stitch outline regardless on its complexity can be done in this way. User has to draw separate outline objects in any order. Parts must approximately touch each other. This function works so that it combines separate outlines, splits them if necessary, sorts them in a proper order and creates a backward path (second layer of stitching) to them.

Result is a new object - grouped series of outlines with double stitching in a right order. The order of outline parts is adjusted automatically by Studio. Only the first outline part remains on its place. As there is double stitching on the outline, the end of outline is identical to its beginning. Therefore, place the first outline part on a place where you want whole outline to begin and end.



Drawing of outline parts for the "Arrange Outline Parts" function. Design contains 3 outlines.



"Arrange Outline Parts" function automatically splits original outlines on a proper places (red dots),

reorders them and creates the backward path (second layer of stitching).

Arranged elements are combined into larger segments to optimize stitches layout. If you want to preserve original elements for easier editing instead, switch off this feature in **Parameters window > Whole Design > Main tab**. Arrange Outline Parts command does not work if there is already some backward path among selected objects.

Other related topic is **<u>Automatic Outline</u>**.

If there are separate outline parts that do not touch the rest of outline (like hole outline, for example), This function creates connection to this separate object(s). if you do not want such connection, please use next command.

Arrange Outline Parts (no Connections) works exactly like above command, but it does not <u>connect</u> separate objects to the main outline. For example, if you outline letter "i", it will leave outline of dot a separate object.

The **Create Backward Path** command can be used on series of Outline, Manual Stitches or Connection objects to duplicate and reverse these objects. Doing this will result in two paths: one path, from beginning to end, created by user and the other path, from end to beginning, created by Studio. Create Backward Path command does not work if there is already some backward path among selected objects.

**Delete Backward Paths** command is meant for situation when complex outline created with **Arrange Outline Parts** must be edited. Use this command to delete all backward paths in selected objects and thus to achieve original outline parts without second layer of stitching (backward paths). Make editing of parts and then use **Arrange Outline Parts** again to rebuild the complex outline.

Combine Outlines makes single outline object from series of outlines.

Change Column Width allows user to make selected column objects wider or narrower.

**Broaden Thin Parts of Column** is intended for making thin columns parts like serifs on lettering wider for better sewing. Only those section of column object that are narrower than given width are broaden. The rest of column remain unchanged.

**Expand Objects** enlarges selected objects by offsetting the object contours. It is intended for creation of overlay of constant width between adjacent objects. Expand Objects command does not provide the same result as normal enlargement.



**Shrink Objects** reduces size of selected objects by offsetting the object contours. Shrink Objects command does not provide the same result as normal size reduction. You can use it for fill opening to make it smaller, in order to create overlay between opening and another object that covers the opening.

**Reduce Nodes Number** removes nodes from selected objects according to chosen "Simplicity" parameter. This function is intended mainly to smooth lettering with distorted edges and large number of nodes, which is hard to edit node-by-node.

**Shaping** submenu contains command for so called Boolean operations on filled areas, like <u>union, intersection</u> <u>and difference</u>.

**Envelope** function allows to deform selected object(s) with envelope curves. It is very useful for creating special layout effects with **lettering**.





<u>Auto Outliner</u> function creates double-layered thin <u>outline</u> around selected object(s).



**Corner ...** command opens window with options to copy selected objects symmetrically into the hoop corners. Corner options are: 1. **Place** - copy objects as they are, 2. **Mirror** - each corner is mirrored, 3. **Rotate CW** - each corner is rotated clockwise with respect to the previous corner. 4. **Rotate CCW** - each corner is rotated counter-clockwise with respect to the previous corner. Please note: if **Apply Rotation to Fill Stitches** option in the <u>main menu > Transform</u> is checked, stitches angle is adjusted when object is rotated.

**Auto Repeat ...** command opens window with options to duplicate selected objects along line, around the circle or rectangle, or to fill rectangular area. It is possible to set distance (gap) between the objects.



In this example the triangle at top was auto-repeated 8 times around the circle.

Please note: if **Apply Rotation to Fill Stitches** option in the <u>main menu > Transform</u> is checked, stitches angle is adjusted when object is rotated or mirrored.

### Main Menu - Select

Commands in this menu allow to select vector objects with use of various criteria, or modify selection.

The first command is **Zoom to Selected Objects**. This command scrolls selected object(s) to center of the screen and zooms in or out to fit selection to the screen. It helps to localize object(s) selected in the **Inspector window** in the work area.

Next command **Zoom and Edit Selected Objects** works in the same way as above command, but it also starts nodes editing mode.

Select All command selects all vector objects in the design.

**Deselect** command cancels any selection.

**Invert Selection** command unselects currently selected object(s) and selects the rest of objects. It can be used when you want to apply some changes to most (but not all) objects. Select the those that should remain untouched and use **Invert Selection** command to switch selection.

**New Selection**, **Add to Selection** and **Select Subset** options allow to define the way of how vector objects are selected with rest of commands in this menu. These options work like radio buttons. Only one of them can be turned on. You can define whether you want to make a new selection (and disregard existing selection, if there is any), or add objects to existing selection, or select only certain objects from existing selection.

#### Example 1 - selection of all fills and outlines

- 1. Check the "Select>New Selection" option.
- 2. Use "Select>Fills>All Fills" command.
- 3. Check the "Select>Add to Selection" option.
- 4. Use "Select>Outline>All Outlines" command. All fills and all outlines in design are selected now.

#### Example 2 - restricted selection

- 1. Select part of design in the work area or in the object inspector.
- 2. Check the "Select>Select Subset" option.
- 3. Use "Select>Outline>Backward Paths" command. Selection now contains only backward paths in the previously selected part of design. It means that NOT all backward paths in design are selected, but only those that are inside of previously selected part.

Rest of the commands in this menu allows to select multiple objects of the same type (like **Manual Stitches**, **Backward Paths** or **Fills with Motif**) at once. They work with either whole design or just selection, according to selection mode defined by above options.

Commands for selection of text work only until you remove link from objects to respective text label with use of **main menu > Text > Convert Text to Normal Objects**. When link is removed, object are no longer associated with text label and cannot be selected with **Select > Text** commands.

## Main Menu - View

Use this menu configure view mode and to hide/show controls, vector objects, boundaries or stitches. These changes do not affect the design itself or how it is sewed, only the way how it is displayed on the screen. They allow more comfortable work by hiding controls and design objects standing in the way.

**Objects boundaries** are lines and curves visible only on the screen. They are not actual stitches.

**Normal** and **Enhanced** view modes affect the way of how stitches and boundaries are displayed. Enhanced mode uses extra pixels to smooth rasterized lines and curves. This technique is called anti-aliasing. It is slightly slower than the normal view mode.



Normal view mode (left side) and enhanced view mode (right side).

**<u>Guide Lines</u>** are lines that help with precise placement and alignment of objects. You may need to hide and show them alternately during the work.

**Jumps** displays jumps stitches between objects or inside of objects that may contain jumps (Sfumato objects, for example). Jumps between objects are also always indicated in the Object Inspector window by small red scissors icon next to the object icon.

**Thicken One-Way Outlines** displays those outline objects that have no backward paths as a thick lines or curves. This helps user to identify which parts of outline need second layer of stitches, i.e. backward path.

Unlike the Eye icon in the Object Inspector window which hides/shows only particular objects, commands in the **Show/Hide Objects** submenu affect all objects that fit user-specified criteria. Showing and hiding of design parts is useful for creation of complex design, when you need to hide some parts of design to see others.

Hiding the **Button Bar** and/or **Rulers** may be useful when you work on a small screen. All functions accessible via Button Bar are also available through main menu.

**<u>Grid</u>** is not visible in some <u>**display modes**</u> (D. Map, X-Ray, 3D with fabric background). This option allows to hide grid in the rest of display modes.

**Zoom Window** shows/hides zoom window in the bottom right corner of the screen. Hiding this window is useful in case of low screen resolution (800x600, for example) in order to enlarge **Object Inspector window**.

Display modes like **3D**, **1:1**, **Sew Simulator** and other are accessible via **Display mode tabs** 

#### Parameters

Studio works with vector objects which are filled with chosen type of stitches. The way of how stitches are generated is defined by **parameters**. For example, the most common parameter is density of stitches. All objects created in Studio have adjustable parameters that can be used for creation of special effects and for accommodation of design for sewing on specific type of fabric.

Most parameters have numerical value. They are displayed in the following form (name or icon, value, unit):

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To change any of these parameters, press the left mouse button on the parameter value to increase it, or press the right mouse button on the parameter value to decrease it. You can also click on the parameter's name or icon to access panel with track bar for easier change of the parameter.

To change parameters of several objects at once, select objects, click right mouse button and select 'Parameters' command from the pop-up menu. Parameters are organized in several tabs, according to type of objects.

There are also common parameters that apply to all objects in design, regardless of if they are selected or not. These parameters are located in **Whole Design** tab.



Buttons (2) serve to select previous or next object from the **inspector window** and access its parameters

restart of Studio the default parameters are used for new objects.

without need to close and reopen the Parameters window. Index of selected object is displayed next to the buttons (3).

## **Parameters - Whole Design**

These parameters are organized into several tabs:

#### Main Tab

**Minimum Stitch Length**: This is a global parameter (unlike maximum length of stitches, which can be adjusted separately for each object).

**Columns Start/End Gap**: This number defines the size of the small gap at beginning and end of column-like objects. The stitches seen on screen are just the axis of real stitches that are wider, in fact. This gap prevents the thread bulging at ends of columns, and columns with pattern.

**Fills Start/End Gap**: This gap prevents the thread bulging at ends of fill. It is especially important if there is a thin running stitch outline around the fill object.

**Additional Density**: This parameter allows user to adjust whole design at once for sewing with a different types of thread. If the whole design seems to be too loose or too dense because of the threads used, adjust the density with this parameter.

**M**•**M** Additional Pull Compensation: This parameter allows user to adjust whole design at once for sewing on a different types of fabric. If the fabric is too elastic or if the design sinks into the fabric, use this parameter to add more pull compensation to the whole design at once.

**Comment, Reference Width, Reference Height**. These parameters are used for user defined **Border Samples**.

**Combine Arranged Outline Parts** - if turned on, outline elements are combined into larger segments when **<u>Arrange Outline Parts</u>** function is used, to optimize stitches layout. If turned off, outline elements are preserved for easier editing.

#### **Tie-Up Stitches Tab**

**Fill Tie-Up Stitches**: These are small stitches that Studio automatically adds before and after jump stitches to anchor the thread on Fill and Sfumato objects.

**Outline Tie-Up Stitches**: These are small stitches that Studio automatically adds before and after jump stitches to anchor the thread on Outline, Connection and Manual Stitch objects.

**Column Tie-Up Stitches**: These are small stitches that Studio automatically adds before and after jump stitches to anchor the thread on Column, Column with Pattern and Appliqué objects (The only exceptions are jump stitches inside a column that is wider than about 1.2 cm).

Tie-Up Stitches Length: maximum length of all above types of the tie-up stitches.

#### **Offset Tab**

This global offset setting affects distance of edge and zig-zag underlay of all objects in the design. There are two ways of how to use global underlay offset:

- 1. Optimized and scaled offset (in %)
- 2. Absolute offset (in millimeters)

These options are available from the combo box on this tab.

When you select option #1, underlay offset of individual objects is automatically optimized according to size of respective object. Moreover, you can apply overall % scale to these offsets to adjust design for sewing on various fabrics. Use scale larger than 100% if you are sewing on elastic material or on the fleece.

Option #2 allows to set all underlay offsets to constant distance in millimeters.

Controls described below use % or mm units according to chosen offset mode.

**Offset of Edge Underlay**: this global parameter affects distance of edge underlay of all objects in the design. There is a separate offset parameter available for <u>fills</u>, <u>columns</u> and <u>appliqués</u>.

**Offset of Zig-Zag Underlay**: this global parameter affects distance of zig-zag underlay of all objects in the design. There is a separate offset parameter available for **fills**, **columns** and **appliqués**.

#### Length Tab

Minimum and maximum length of fill and column underlay.

# Parameters - All Selected 🔛

There is only one local parameter common for all types of objects, currently. This parameter is **Color** of objects. It can be changed either here or in Object Inspector window by dragging the color from palette and dropping it onto selected object (objects).

## Parameters - Fill 🗩

These parameters apply only to Fill objects.

The Fill object can be filled with stitches in one of three ways:

- 1. Plain Fill parallel running stitches with Pattern.
- 2. Motifs
- 3. Auto Column object is automatically filled with stitches in the same way as Column objects.



Plain Fill mode, Auto Column mode, Motif fills mode

**Density** is distance between rows of stitches or motifs. Density 4.0 indicates that this distance will be 0.2 mm. Default value of density is derived from the Default Thread Weight in Preferences.

**Pull Compensation** is extension of each stitch on edge of object in order to compensate for thread pull (on elastic fabric) or sinkage (on fleece). The thread pull causes the ends of stitches are pulled inwards and object is smaller (narrower) than intended.

#### **1. Plain Fill Parameters**



**Pattern** defines the texture of cover stitches of the fill. User can define up to five own patterns in main menu/Objects/User Editors/ **User's Patterns** Tab. Pattern effect is created with layout of needle points within rows of stitches. Therefore, length of stitches in fill is given by needle points distance in pattern. Additional lines and curves in patterned fill can be achieved with use of Carvings objects, which must follow immediately after Fill object and its openings.

**Random Shift** randomizes pattern to allow user to create fur-like effects, for example.

**Scale** parameter determines the size of the pattern and consequently the length of fill stitches.

**Complete row if density above** defines the density under which the last point on each row of stitches is omitted (see the left picture). If the last point is not omitted, the result would be stitches that may be too small on the edge of fill. The pointed ends of rows are not visible on actual embroidery if default density is used. If distance between rows is higher than this threshold, last point on row is not omitted. This parameter is visible only if **Show More Parameters** box is checked.

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**Max. Random Broadening** defines maximum random prolongation of fill stitches to side. Random Broadening adds 'ragged edges' effect to objects.

**Use jumps (if loose density)**. If checked, connections between blocks of stitches are replaced with jumps (trims). Objects can be seldom sewn in a single draw. Therefore, object is usually divided into several blocks and they are connected either with connection stitches or jumps (mostly used on objects with gradient). This parameter is visible only if **Show More Parameters** box is checked.

**Plain Fill Underlays.** Edge and both Zig-Zag underlays can be usually turned on on all Plain Fill objects because Studio ignores these underlays on small objects. Turn them off if the fabric is firm and does not need the stabilization.



Edge and Zig-Zag underlay. Red circle indicates the edge of object. **Edge Walk Underlay** helps to make crisp edges of fill. Click <u>here</u> to find out more about **Edge and Zig-Zag underlay offset**.

**Zig-Zag Underlays** parameters define the angles and densities of these underlays. Zig-Zag underlays stabilize the fabric with a grid of loose stitches before sewing the higher density cover stitches. The angles of underlays can be set here as well as in the editing mode (press I or O key while moving the mouse in editing mode). To change the angle click on circular angle indicator or press mouse button on the angle value. **Show More Parameters** box must be checked to allow user to adjust angles and densities of zig-zag underlays.

If **Show More Parameters** box is not checked the angles of zig-zag underlay are adjusted automatically according to angle of cover stitches.

#### 2. Motif Parameters

**Motif** is a simple stitch design that can be used to fill object instead of dense parallel stitches. User can define up to 5 own motifs in main menu/Objects/User Editors/ **User's Samples** Tab.

Shift defines movement of motifs in each row with respect to previous row.

Scale parameter determines the size of the motif and consequently the length of fill stitches.

**Use jump stitches** defines whether the jump (trim) or connection is inserted between distant rows of motifs or stitches. This parameter is visible only if **Show More Parameters** box is checked.

It is possible to use **multiple motifs** in a single object. Click <u>here</u> to find out more.

#### **Common Plain and Motif Fill Parameters**

**Make Cover Stitches** allows user to switch off cover stitches. Uncheck the box when one large underlay under the whole design is needed to provide stabilization. Edge, Zig-Zag 1 and Zig-Zag 2 allows user to switch off automatic underlays by checking the boxes. Click on the circular angle indicator at right side to set the cover stitches angle. When the Make Cover Stitches option is un-checked, a small green arrow icon appears next to the check box. This icon warns user that some settings (like density) are not applicable when there are no cover stitches.



**Gradient** affects the distance between rows of stitches or motifs within object. If density is 4.0 and gradient is 30.0, for example, the distance of rows will gradate from 0.2 mm to 15 mm according to set Gradient Type (Gradient Type combo box).

**Effect**. Plain Fill and Motifs Fill\* may be combined with additional effects like Wave, Contour fill, Radial fill, Square fill and Rounded fill. Parameters of Wave can be adjusted by clicking on the wave control or by pressing mouse button on parameters values. Wave parameters define the curve of fill rows.Radial, Square and Rounded fill effects create stitches in a spiral starting from the 'Focus Point' of the object. User can adjust the Focus Point position in the Editing Mode.

\* Motif Fill can be combined only with the Wave effect.



#### 3. Auto Column Parameters

**Use Pattern**. If checked, the Auto Column uses pattern set in Plain Fill pattern combo box. Otherwise the column stitches are without pattern.

Following 5 Auto Column parameters are visible only if **Show More Parameters** box is checked:

**Auto Select Column Underlay**. If checked, the type of underlay for Auto Column objects is selected automatically.

**Center**. If Center is checked then columns will have underlay running along their center. Use this type of underlay for small or thin objects.

**Edge** underlay runs along edge of the object. It should be used for medium size and large objects.

Zig-Zag underlay should be used in combination with edge underlay for large or thick objects

**Density** parameter indicates the density of the zig-zag underlay.

If more control is needed, convert the Fill object to Column object with more parameters available.

**Direction of stitches** in auto column fill can be controlled to some degree with direction lines. Click <u>here</u> to find out more.

# **Fill with Multiple Motifs**

Studio allows to use several motifs within a single fill. See below examples of object filled with use of several motifs at the same time. To use this feature, create common <u>fill object</u> first, then access its <u>parameters</u> and select **Motif option (1)**. Then click on the tab **(2)**.



Multiple motifs can be combined with all options available for single motif like **scale**, **shift**, **fill angle**, **wave** and **gradient**. However, respective motifs must be all of the same size. User does not have to care about it, because respective motifs are automatically resized to size of the 'master' motif, which is the motif marked with (1). Master motif is displayed also in below grid in a top left cell.

The tab with grid of multiple motifs is visible only when **Motif option** (1) is checked.

Use **Rows** and **Columns** controls to set number of motifs. It is possible to define up to 3x3 motifs.



Setting of desired number of rows and columns defines a grid of motifs that will be used to fill the object. Select predefined or **<u>user-defined motifs</u>** to respective cells of the grid. Then click **Apply**, **Generate Stitches** or **OK** button to store new settings for object.

With a grid of properly digitized user motifs (left side) it is possible to achieve homogenous random-like fill.



## Parameters - Column 🖄

These parameters apply only to selected objects that are Column objects. Column objects can be filled with stitches in two different ways:

- 1. Sample fill using the various zig-zag samples
- 2. Strips fill using the lines stitched along contours of the column

#### 1. Sample Fill

Sample is the zig-zag stitch pattern that fills the Column object. Stitch samples differ in number of stitches and their layout.

**Density** parameter defines the maximum distance between stitch samples. If the Column object forms a bend, the distance on the inner curve is lower.

*M*→*M* **Pull Compensation** is extension of each stitch on edge of object in order to compensate for thread pull (on elastic fabric) or sinkage (on fleece). The thread pull causes the ends of stitches are pulled inwards and object is smaller (narrower) than intended.

**Envelope** shortens some column stitches to create special effects. When using Envelope, turn off all underlays.



Auto Corners. Studio automatically splits or folds too sharp corners on Column objects. Use this check box to turn off this function.



Normal corner (left) and automatically adjusted corners.

Make Cover Stitches allows user to switch off cover stitches. Turn off the cover stitches if you need to add only the underlay to design digitized in other software.

Auto Shortening is function that shortens some stitches on inner side of bend object to prevent too high density (see below picture).



Perpendicular Stitches function automatically divides long columns with line (not curve) edges to two or three

parts to make middle part of column perpendicular to its virtual axis (see the upper picture).

**Max. Random Broadening** defines maximum random prolongation of column stitches to side. #1 parameter applies to first edge of column and #2 to second. Random Broadening adds 'ragged edges' effect to objects.

**Gradient** affects the distance between stitches within object. If density is 4.0 and gradient is 30.0, for example, the distance of stitches will gradate from 0.2 mm to 15 mm according to set Gradient Type (Gradient Type combo box).

**Auto Select Underlay** check box allows user to switch off the automatic program decision on what type of underlay will be used for the object.

Center, Edge and Zig-Zag check boxes allow user to <u>choose which underlays will be used for the</u> <u>object</u>.

**Density** parameter indicates the density of the zig-zag underlay.

#### 2. Strips Fill

Strips fill the column object from one side to the other, with stitches running along the column edges.



**Number** parameter defines number of strips.

**Min. Length** and **Max. Length** define minimum and maximum length of stitches. Length of stitches is adjusted automatically to ensure smooth approximation of curved parts of the strips.
# Parameters - Column with Pattern 差

These parameters apply only to selected objects that are moreover the Column with Pattern objects.

All parameters are the same as on **Column object** except the following:

- 1. Pattern the texture of cover stitches (same meaning as on Fill object).
- 2. Random Shift (same meaning as on Fill object).
- 3. Scale (same meaning as on Fill object).
- 4. Column with Pattern does not have the Make Cover Stitches option.
- 5. Column with Pattern does not have the **Strips fill** option.

# Parameters - Outline 💭

These parameters apply only to selected objects that are moreover the Outline objects.

The Fill object can be filled with stitches in one of these ways:

### 1. Sketch

### - Million Marian

Sketch resembles a very flat satin stitches. It can be used for outlines that are thicker than running stitch outline and thinner than narrowest possible satin stitch outline.

### 2. Samples

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Samples are stitch patterns repeated along the outline.

### **3.Satin Stitches**

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Satin stitches can be used to create zig-zag object of constant width similar to column objects.

### 4. Appliqué

Appliqué contains tack-down stitches of separate color to stitch appliqué fabric to the underlying fabric.

### 5. Border



Border is composed of pre-digitized objects. It can have outlines of separate color.

**Satin Stitches, Appliqué** and **Border** modes share the same parameters except the Outlines Color and Border sample length that is only used with Border.

**Width** parameter is common to all five modes. **Width** is the width of reference cells along the outline to which the stitches are projected. It is not necessarily the width of finished outline, because projected stitch sample can be wider or narrower than reference cells.



Outline object with stitch sample (left) and with satin stitches (right).

**Mirror Sides** option is common to **Sketch**, **Samples** and **Border** modes. Use this option to mirror stitch pattern for respective outline mode.

### **Sketch and Samples Outline Parameters**

**Sketch** is a special outline that resembles a very flat satin stitches. It can be used for outlines that are thicker than running stitch outline and thinner than narrowest possible satin stitch outline.

**Sample** is a series of stitches that are repeated along the outline. When you change the sample, program automatically sets the **Width**, **Minimum Length** and **Maximum Length** parameters to values default for this sample. However, you can change these parameters if you wish. User can define up to 5 own stitch samples in main menu/Objects/User Editor/ <u>User's Samples</u> Tab.

In curves, program automatically decreases the length of samples for better approximation of curve. If you want to have all samples of the same length even in the curves, set the Minimum Length equal to Maximum Length.

### Satin Stitches, Appliqué and Border Parameters

**Density** parameter defines the maximum distance between stitch samples. If the Outline object forms a bend, the distance on the inner side is lower.

**Pull Compensation** is extension of each stitch on edge of object in order to compensate for thread pull (on elastic fabric) or sinkage (on fleece). The thread pull causes the ends of stitches are pulled inwards and object is smaller (narrower) than intended.

**Auto Select Underlay** check box allows user to switch off the automatic program decision on what type of underlay will be used for the object.

Center, Edge and Zig-Zag check boxes allow user to choose which underlays will be used for the object.

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**Density** parameter indicates the density of the zig-zag underlay.

If more control is needed, convert the Outline object to Column object with more parameters available.

Outlines Color defines the color of running stitch outlines if border sample contains outlines.

**Border sample length** defines the size of samples along the outline.

# Parameters - Connection

These parameters apply only to selected objects that are **Connection objects**.

Maximum and Minimum Length have same meaning as on Manual Stitches object.



Connections are automatically adjusted when objects are moved or otherwise transformed

to prevent insertion of jump (trim).

**Jumps** option allows user to create controlled jump stitches between objects. If objects are too close one to the other, it may be hard to scissor the tiny jump stitch between objects (left picture). User can create connection with **jumps** option between objects to achieve controlled jumps that are longer and easier to scissor.



# Parameters - Manual Stitches M

This parameter applies only to selected objects that are Manual Stitches objects.

The **Maximum Length** defines the longest stitches generated when compiling Manual Stitches object into actual stitches. Each Manual Stitch longer than Maximum Length + Minimum Length is divided into one or more stitches of maximum length one (or none) shorter stitch, but not shorter than **Minimum length**.

# Parameters - Appliqué 🖻

These parameters apply only to selected objects that are Appliqué objects.

Appliqué parameters are subset of the Column object parameters.

### **Parameters - Sfumato**

These parameters apply only to selected objects that are Sfumato objects. Sfumato objects are used for creation of photo-like embroidery designs. It is often used to create **portraits**. Sfumato object is drawn exactly like the Fill object, but the stitches inside of object are generated in other way. Thread creates **meanders of various size** to approximate the picture (photo) under the object.



**Meanders** are replaced with plain fill of given angle on the highest density places. Sfumato does not cover whole area of the object with stitches, but it leaves fabric show through stitches on loose places. Therefore, it is important to choose Background Color of Sfumato objects properly, because density of stitches is adjusted according to Background Color and thread colors.

Sfumato object is filled with 1-5 shades of thread. Shades are generated automatically from Basic Color of the Sfumato object. User can switch on and off respective shades and thus control number of colors within single object. Each color (thread shade) has adjustable parameters like Blend Range, Additional Density and Shade Threshold.

Sfumato object can have openings like the Fill object. Use the opening tool to add openings to Sfumato object. Also, Sfumato object can have carvings. Unlike the Fill object, carvings on Sfumato are formed by additional stitches and not by needle points pattern. User can adjust width and color of carvings. Carving objects must follow immediately after Sfumato object and its openings.

Parameters denoted with \* are visible only if **Show More Parameters** is checked.

### **Thread Parameters**

Thread Shades. Actual colors of threads that fill the Sfumato Stitches are generated automatically from the Basic Color. User can control number of used thread shades (click on any color box to enable/disable color) and following 3 parameters of each color:

 $\pm \Box$  Additional Density. Sfumato automatically adjusts density of all parts of the objects. However, user may want to increase or decrease density of particular color within object.

 $+ \overline{\frown}$  Shade Threshold \*. Sfumato automatically splits whole range of color tones within object into 5 thread shades. User can adjust the shade thresholds with this parameters.

### **Color Mask Parameters**

Some photos may contain many small areas of various colors (flowers on the meadow, for example) and it is hard to trace each of them as a separate Sfumato object. In such case, **use Color Mask** to fill only part of object with stitches:

- 1. Make one large Sfumato object.
- 2. Select number of mask colors.
- 3. Pick respective mask colors from image in the Work Area with use of the Pick Tool 🧷.
- 4. Adjust balance of the masks. Use  $\overset{(m)}{=}$  button to display layout of masks.
- 5. Activate any mask (green meadow, for example) and adjust rest of Sfumato parameters.
- 6. Close parameters window and generate stitches for the sfumato object.
- 7. Copy and paste this Sfumato object and change active mask and color selection so that the rest of the object is stitched (red flowers, for example).

### Whole Object Parameters

**Angle** defines the angle of plain fills in heavy density areas.

**Highest Density** - measured in tenths of millimeter (1/10 mm). Set this value according to weight of your thread in order to achieve fully covering on most dense places. Fabric should not show through on the most dense places where plain fill is used. Usual values are 3.5 - 4.5. defines the angle of plain fills in heavy density areas.

**Basic Color.** This color is used as a base for threads generation. It is also used for displaying of Sfumato object in Object Inspector and in the work area.

**Background** is the fabric color. This color is supposed to show through stitches. Density of each thread shade is derived from the Background color.

**Carvings** are lines or curves that are drawn after the Sfumato object. They can be used to emphasize some hardly visible edges in the Sfumato object. User can adjust two carving parameters:

**Carvings Color** \*. Carvings may be only of one of the thread shades color. Even if thread shade is disabled, carvings may be of this color.

**Carvings width** \*. Use this parameters to make carvings bolder. Carvings wider than 1 are composed of short lines going at the same angle as plain fill in Sfumato object. Carving width is length of these short lines (2=0.4mm).

**Contrast** affects the colors of automatically generated threads. When doing portrait, use lower contrast on child or woman face to achieve softer thread shades.

**Quality** parameter affects the stitch count and fidelity of Sfumato object. Higher Quality means higher stitch count and better fidelity. To reduce stitch count and speed-up the sewing process, use lower quality (0-4) on objects like background, cloths, sky etc.. Higher quality (7-8) is recommended for faces and other areas where fidelity is more important than stitch count.

### **Density Parameters**

**Overall density of Loose Areas \*.** This track box allows user to make loose areas of design even looser or heavier. There are 2 other controls that affect the loose density areas:

**Style** of loose density areas - defines the stitch style or layout of loose stitches. Use it to give object desired texture.

**Max. Stitch** \* is a maximum running stitch in loose density areas measured in tenths of millimeter (1/10mm). Longer stitches are replaced with jumps. Long running stitches may not look good, if they cross eyes, mouths or other parts of design. However, too many jumps complicate the sewing process.

**Overall density of Heavy Areas \*.** This track box allows user to make heavy areas of design looser or even heavier. There are 2 other controls that affect the heavy density areas:

### **Display Modes**

### There are several display modes for Sfumato object in the Parameters window:

**Stitches Preview** shows approximate look of the object. It allows user to see the influence of various parameters on the Sfumato object. However, effect of some parameters like Quality, Fills, Carvings and Max. Stitch is not visible on the preview.

Thread Shades Layout helps user to adjust color thresholds and color masks balance accurately.

**Pick Tool** allows user to pick Background, Basic or Selection colors from the Work Area.

## How to Create Portrait with Sfumato Stitch 3.0

Sfumato generates stitches from picture (photo) imported into background of the work area. User draws boundaries of areas that will be turned into stitches and assigns proper **parameters** to each area (object).

Resolution of the raster picture determines size of the finished design. The ratio between picture units (pixels) and design size is 10 pixels/ 1 millimeter. This means that design with 10 centimeters (3.94 inches) height should have 1000 pixels. Each time the sfumato stitches are generated, the underlying picture is used. Therefore, sfumato object cannot be resized without resizing also the underlying raster picture.

1. Use the Sfumato Tool to draw the area you want to fill with stitches. Each area can have up to 5 shades of the 'basic color'. In this example, draw the face area as a first object. Make the face object so that there is an overlay into hair. Face will be filled with shades of 'skin color'.

We want to make mouth in other color. Therefore, use the 应 Opening Tool to cut off the mouth area.

**Please note:** besides Openings, Sfumato objects can also have **Carvings**. **Carvings** are lines or curves that are drawn immediately after the Sfumato object. They can be used to emphasize some hardly visible edges in the Sfumato object.



2. Select the face and click right mouse button on it. Choose 'Parameters' command from the pop-up menu. Use the eye dropper tool to pick 'skin' color from the photo as so called 'basic color' of the object. Program automatically generates 5 shades of this color. Decrease the contrast of shades with use of the Contrast control.

Please note: use the preview buttons to see the influence of adjusted parameters on the Sfumato object

Stitches Preview shows approximate look of the object.

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Thread Shades Layout helps user to adjust color thresholds and color masks balance accurately.

Parameters		
#     0       4,0     0       Basic Color     Background	Mask Colors: 0	
	Style	
Contrast: 1 Quality: 7		
? <u>OK</u> C	ancel	

3. Select the mouth opening in the Parts Inspector window and use the main menu 'Convert>Create Fill from Opening' command to create filled Mouth object. Adjust parameters of the mouth object. Because it is a very small object, it is not necessary to use 5 color shades for it. Disable 3 or 4 shades by clicking on respective color boxes.



4. Create the last area, hair, in the same way as face and pick appropriate color for its fill with use of the Parameters window. Disable two shades, because 3 shades are enough for this object. Click on Parameters button in the top left corner and check 'Show More Parameters' to access advanced controls. Adjust 'Shades Threshold' (value -41) to give the hair better shades balance.



5. Generate stitches for all three objects. The portrait is finished. Save design into Studio \*.EOF file. Use the main menu 'Design > Compile and Put into Embird Editor' function to place design into Editor for saving in desired embroidery format. If you are not registered user of Sfumato Stitch, this command is disabled.

# How to Use Color Mask in Sfumato Stitch 3.0

Use the color mask with Sfumato object if you want to fill only the part of object with stitches. This approach is useful if there are too many different color areas in the photo and it would be hard to draw them all separately.

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1. Use the **Sfumato Tool** to draw the area you want to fill with stitches. Each area can have up to 5 shades of the 'basic color'.



2. Select object and click right mouse button on it to access pop-up menu. Click on 'Parameters' item.

There is green background and pink flower on the photo, therefore we will need 2 masks. Set 'Mask Colors' to 2. Use the eye dropper tool to pick green color from the photo as a 'Mask Color 1'. Then pick pink color from photo as a 'Mask Color 2'.

Click on first (green) mask box to enable mask 1, because we will generate the green stitches first. Adjust balance between both masks (values 13 and 20).

It is not necessary to use too many shades for the green background. Therefore, disable shades 1 and 2. Also, set decrease Quality (to 1) to reduce the stitch count.

Please note: use the preview buttons to see the influence of adjusted parameters on the Sfumato object

Stitches Preview shows approximate look of the object.

Thread Shades Layout helps user to adjust color thresholds and color masks balance accurately.

Parameters	
<b>≢</b> ⊖ 0 4,0	
Basic Color Background	20
<ul> <li>() ±</li> <li>○</li> &lt;</ul>	Style
Contrast: 10 Quality: 1	
? ОК С	ancel

3. Click **OK** to close Parameters window and generate stitches. Of course, only the green part of object is filled with stitches. Select the object and **Copy** and **Paste** it to create a duplicate that lies just on top of the first object. Notice that there are two identical objects in the **Inspector window**.



4. To switch stitching from green to pink part of the second object, bring up the **<u>Parameters window</u>**. Click on pink mask box to enable the second mask. Disable some shades to prevent too many thread colors. Click OK.



5. **Generate stitches** for all three objects. The design is finished. Save design into Studio \*.EOF file. Use the main menu **Design > Compile and Put into Embird Editor** function to place design into Editor for saving in desired embroidery format. If you are not registered user of Sfumato Stitch, this command is disabled.



# How to Make Fine Detail Design with Sfumato Stitch 3.0

1. Let's digitize below image in Sfumato Stitch. Image contains fine lines and small lettering, mostly in black and gray shades. The background is white. We want the design to be stitched in a single color (black).



2. **Import image** into Studio. Adjust its size to fit the hoop or resize it to a proper size. For a good detail, size of design should about 15-20 cm. Then create Sfumato object with Sfumato tool. In the example shown below, Sfumato object is of polygonal shape. It includes large background area. Select **basic color** for the object (black). If we use default parameters setting, generated stitches cover whole area of the Sfumato object (including background) and there are 5 shades of gray thread used in this object.



3. We need to eliminate the background with use of the Color Mask. However, program cannot distinguish white color from the scale of gray tones used in the image. <u>Color Mask</u> in Sfumato is based on the chromatic component of the color. The brightness component is ignored. Therefore, black and white are regarded as just a different shades of gray and they cannot be separated with use of the Color Mask. We will use the image <u>Background Filters</u> to change white to some other color and thus allow Color Mask to separate black details from the colored background. Please notice the below parameters. Brightness, Contrast and Gamma were adjusted to make all lettering and thin lines darker. Yellow-Blue balance was adjusted so that background is

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Working Area	ł			
Brightness	-22.7 %		(111)	>
Contrast	42.5 %	<	(111)	>
Gamma	-100.0 %	% < 🔲		>
Saturation	-100			>
Cyan-Red	0	<		>
Magenta-Green	5	<	()	>
Yellow-Blue	-75	<	(	>



4. Now we can easily separate black detail from the yellow background with use of the Color Mask. Set **number of masks** to 2. Pick black for the mask 1 and yellow for the mask 2. Adjust mask ranges so that lettering is as much legible as possible. Then select the first mask (black). As we want only single color design, disable brighter tones (1-4) and use only the darkest tone 5. for stitching. Click **OK**.



5. Generate stitches. Finished design has only one color and background is eliminated.

