

Dahao Embroidery Punching System

emCAD User's Manual

(Version: V03)

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Brief Introduction

Developed by Dahao Company, the emCAD is the pattern-making software system for embroidery machines. Since the computerized embroidery machine replaced the hand-driven embroidery machine, the pattern-making software has been known to the market as the tool for making and generating the pattern. From the design tape at the beginning, which can only turn the manually inputted spot coordinates to the vector displacement, to the system at present whose input method and stitch having their own styles, the technical revolution of pattern –making software encourages the vigorous development of the embroidery machine industry, along with the development of the embroidery machine. This is another example for mutual development and promotion between the hardware and software, same as the story between the CPU and the Operating System. Dahao Company, combining its decades' experiences on development and research of embroidery machine control system, pays high attention to the development of the pattern-making system. On one hand, the emCAD can meet the needs of users on the new embroidery methods; on the other hand, it can also promote the popularity of these new methods and new crafts. From the date it was born, the emCAD has begun taking the advantages of other pattern-making software and formed its own features by depending on the character of the Dahao series computerized products. At present the emCAD is beginning to create its own history, and along with its continuous improvement, it will become the best partner of the Dahao controllers.

In the age of manual embroidery, the ordinary thread are granted with the life by the rich imagination and the skillful crafts of the workers, who use the various stitching methods to creates the lively creatures and landscape on the cloth. The invention of the pattern-making software enables the computerized embroidery machine to perform the automatic embroidery in large scale. By using the technology in the field of graphic processing, the system can automatically create the needed stitch data according to the input figure and the selected stitching method; therefore the designers can put their energy to the higher level design works, such as shaping, coloring, detail processing and so on, thus improves the efficiency of pattern-making rapidly. The emCAD provides the adequate functions in designing. In the field of the input method, it integrates the classic equal width satin (Input Method C), changeable width satin (Input Method A), radial satin (Input Method B), linear stitch, complex filling and character embroidery. In the field of stitch methods, it supports satin stitch, zigzag stitch, tatami stitch, E-shape stitch, motif, multi-sequin and easy looping. On stitch effect, it can realize the special effects like auto underlay sewing, smart corners, short stitch adjustment and customized division. After using the input tool to create the objects, user can also use the adjustment tools and the edition tools to change the objects easily. The entire of the created objects can be viewed in the object list, where user can directly adjust the properties of the object. In the stitch table, there are the

details of all stitches, which is easy for user to have analysis. Besides that, there are several assistant functions relating to the display and operations, like stitch tracing, thumbnail view and simulated embroidery. When user starts to use the emCAD, he will find it user-friendly and become a skillful pattern designer in a short time.

Reading Guide

Part 1: In this part, we will introduce how to make a pattern, so as to display the usage of the main functions of emCAD. From this part, user can have a brief concept on how to generate a pattern and what data objects are contained in the design file.

Part 2: In this part, we will introduce the software interface, input method, stitching method, stitching effect, adjustment of shape, stitch edition, object list, assistant functions, according to the sequence of making a ordinary pattern. The content in this part will look like a regular product's manual, where we will provide the detailed explanations on function and operation in order. We suggests the user who meets the pattern-making software for the first time should read each part carefully (To operate the system along with the reading is recommended), so that he could become familiar to the performance of each function. The experienced users can select his interesting chapter or check this manual when encountering the certain usage.

Part 3: This part is an independent part where the usage of basic skills or crafts will be discussed. As the techniques of drawing are divided into sketch, watercolor and oil painting, the selection on different input methods will cause the different effects. This part is beyond the functions of the software. Although not so typical, we still want to get some suggestions in this field. The development trend of the pattern-making software technology in future is to get the higher productivity and more beautiful effects, so it is of importance to have the further discussion on the embroidery techniques. Only when the researchers really comprehend the embroidery, can they develop the more perfect functions.

Summary of Chapters

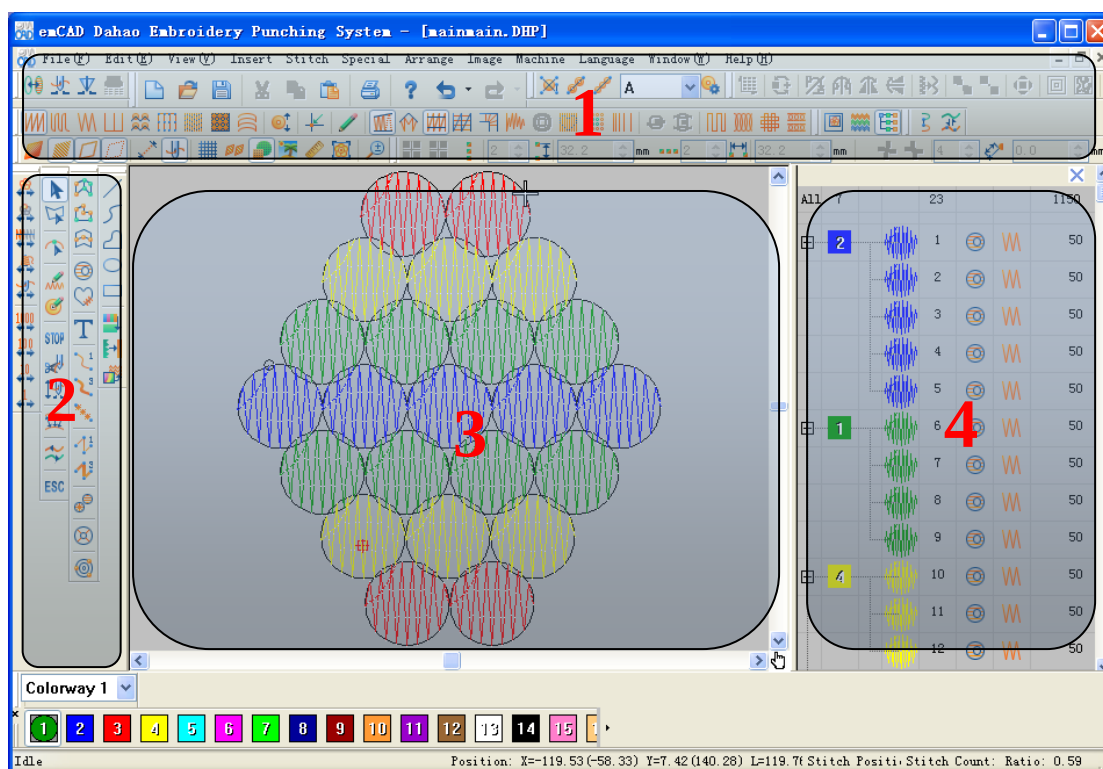
Part	Chapter	Content
Part 1	Chapter 1 Software Interface	Introduce the basic information, function bar and information bar in the software interface.
	Chapter 2 Simple Pattern	Display how to completely design a pattern in each step, like finding materials, designing, delineation and modification on details.
	Chapter 3 View Pattern	Display how to select and move object, how to change the display status of the pattern in design window, how to check pattern via object list.
Part 2	Chapter 4 Input Object	Display the procedure of creating object with the input method for each kind of shape.
	Chapter 5 Basic Input	The input method for the common objects like satin, complex filling and Run.
	Chapter 6 Basic Stitch	The usage of satin stitch, tatami stitch and other basic stitches.
	Chapter 7 Character Embroidery	Input method and properties modification of character embroidery.
	Chapter 8 Sequin	Input method of sequin and multi-sequin setting.
	Chapter 9 Stitch Effect	Display the properties of the modified object, mainly, they are some of stitch methods and stitch effects.
	Chapter 10 Object Adjustment	Change the outline of the generated object.
	Chapter 11 Stitch Edition	Use stitch edition tools and stitch list to edit the stitch.
	Chapter 12 Object Management	Use tools of object list to view and sort out the object.
Part 3	Chapter 13 Pattern Output	Pattern I/O formats and relating operations of network pattern transfer.
	Chapter 14 Design Plan	List some materials that determine the pattern design specifications, provide simple analysis of materials and pattern-making solutions, as well as the details that needs attention during the design process.
	Chapter 15	How to let pattern adapt the different machines

	Strengthening Adaptability	and the processing materials, discuss how to preserve the modification space of pattern.
Appendix	Appendix 1 Hotkey List	The list of the hotkeys for this software.

Chapter 1 Software Interface

The basic information, function bars and information bars of software interface are introduced.

1.1 Main Interface



The main interface contains 4 areas: **1. Main Tool Bar**, including the common tool bar. **2. Tools for Editing and Generating Object**, including the input method, stitch trace, object edition and other tools. **3. Design Area**, the area for designing the pattern. **4. Parking Tools Bar**, in this picture the tools of object list are displayed. This tool bar can be concealed.

At here, we'd like to introduce the features of this design area at first, other parts will be described in details at following chapters. The design area is the window where the pattern file is generated and displayed. One pattern file is formed by several objects, which are the designing elements with independent properties. The objects include image object, graph object and embroidery stitch object, among which the embroidery stitch object can be still divided into several subclasses according to the input method and the combination of stitch. Enabling users to create, check and modify the object directly, the design area has couple of operation modes (Select& Drag Mode, Object Input Mode, Reshape Mode and Stitch Edition Mode) to meet the needs of users during their using. Selecting the tools for generating and

editing the object can change the mode. **Select & Drag Mode:** In this mode, user can select one or several objects. For the selected objects, user can change their position, shape and properties. **Object Input Mode:** in this mode, user can input the object on the interface. The method of the input is different according to the user's selection. **Reshape Mode:** this mode enables users to adjust the outline of the existing objects and some additional properties like the needle direction at tatami stitch. **Stitch Edition Mode:** In this mode, user can select one or several stitch points. The selected stitch can be moved or deleted. In the Stitch Edition Mode, user can also add stitch point manually.

1.2 Tool Bar

1.1.1 Main Tool Bar



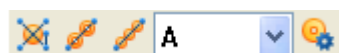
It contains the regular operation items, such as Open New File, Copy, Paste and so on. The orders of Undo and Redo are also on this tool bar

1.1.2 Tools for Display Option



In the purpose of easy designing, user can select the data to be displayed in the design area, for an example, user can have the image displayed or concealed. The Magnifier and the Overview are also the common tools in the design. For the usage of the relating tools, please refer to the Chapter 3 View Pattern.

1.1.3 Sequin Tools



By using the tool relating to the sequin input, user can set the form of the sequin, combination method of multi-sequin and the manual/auto input of sequin. These tools will be introduced in details at Chapter 8 Sequin.

1.1.4 Edition Tools



The design area has several operation modes. In the edition tool bar, there are Select& Drag Mode, Reshape Mode and Stitch Edition Mode. The edition tool bar also contains the tools like Adding Thread-trimming, Repeat Object.

1.1.5 Tools for Graph Object



The relating tools for inputting graph object. The graph object is the object that only has the outline and has no stitch properties.

1.1.6 Tools for Inputting Embroidery Object



The tools for the input method of the embroidery object. The input method is the method for creating the particular stitch, like the satin input method that needs user to point the two borders of the retrieval stitches (like satin stitch), while the linear stitch only needs user to point one border.

1.1.7 Stitching Method Tools



The effect of it is same with that of changing the properties of object. The stitching method, comparing to the input method, is used to create the stitch with different direction, interval and division effect on the basis of the outline created from the input method.

1.1.8 Tools for Stitch Trace



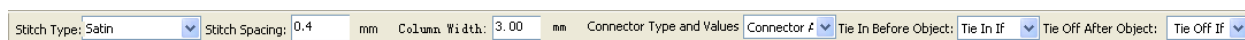
During the pattern design, there is a current working point , which represents a stitch point. Generally, the stitches before the number of current working point are the finished ones, which are displayed in their own color. The stitches after the working point are not finished yet, so their color will be displayed in black no matter what its own color is. With the stitch tracing function, user can move the position of the current working point

1.1.9 Assistant Tools



Assistant tools include thumbnail figure, stitch list, object list and so on.

1.1.10 Instant Parameters Tools

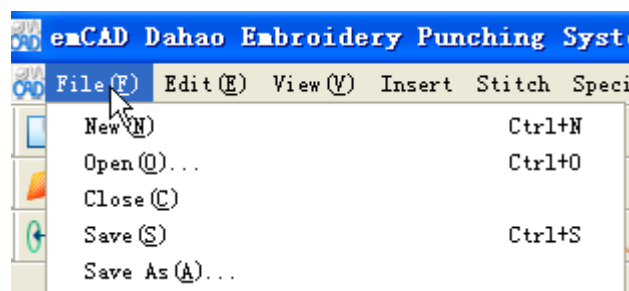


Instant Parameters Tools can change the selected object parameters, or design parameters for the selected input method.

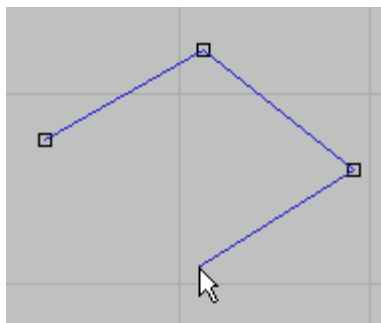
1.3 Operation of Software

The operations of the software are divided into two types mainly, which are menu orders and icon orders. Some orders have menu options and icon options both, which will reach the same effects through these two operation ways. The icon order will hint the specific figure and the tool bar locating, for an example, the Selecting

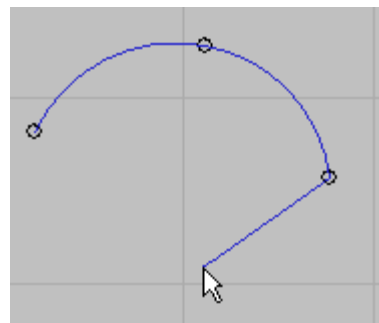
Tool , at edition tool bar. The menu orders are displayed in paths at multiple levels, for an example, the operation for opening the file is displayed as: Main menu →File →Open.



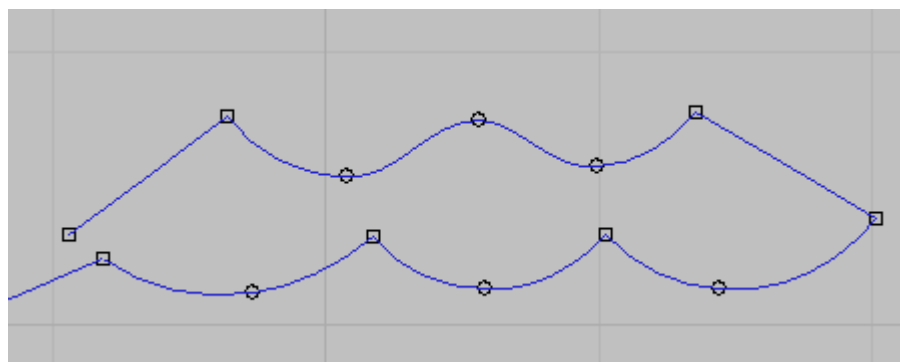
Same with the most software, emCAD uses the mouse left key as the main input method. In some occasional circumstances, like inputting curve control point or inputting different filling method at star input method, the mouse right key can be also used as the mouse left key does.



Input with Left Key 



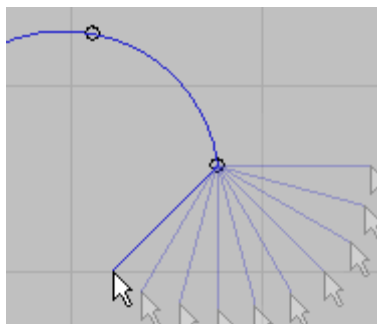
Input with Right Key 



In above figures, the square point is input with left key, the round point is input with right key.

User can also double click the left key for inputting. In emCAD, double clicking the object can open the properties window of the object, which is used to change the properties of the object.

For the input methods that need several operation steps, like complex filling, user can use **Enter** key to skip some steps. The **Enter** is another standard operation method for ending. The combination usage of other function keys like **Ctrl** & **Shift** will have a special function at certain condition.



At inputting the object, if user presses the **Ctrl** at same time, only the connecting lines by every 15 degrees, from current

point to previously inputted point, can be formed. When user needs the vertical/horizontal lines or the connecting lines at 45/60 degrees, user can use this function. For the usage of the relating hotkeys, user can refer to the special table at the end of this document, where will introduce the functions of the hotkeys. For the specific operation methods, please refer to the corresponding chapters.

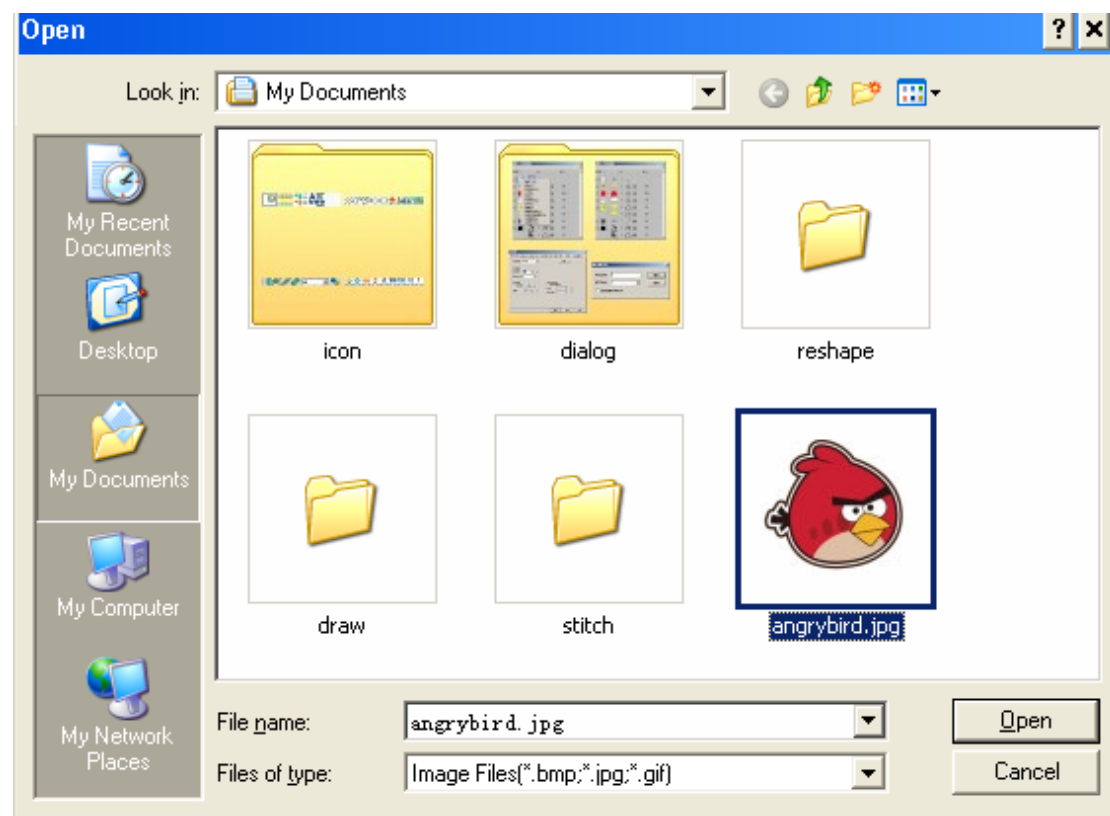
Chapter 2 Simple Pattern

Display the complete pattern-design procedure, including finding the materials, designing the pattern, delineation and modification of details.

The easy way for fast creating the pattern is to use the current image object: firstly, draw its outline; secondly, select the color and the stitching method; at last change the details of the outline and adjust the positions of the start point and ending point of the object. The design without the reference figure will take long time and also require the designer to have the skillful techniques.

2.1 Load Image Object

With the operation “Main Menu→Image→Open, user can open the interface for selecting image file.

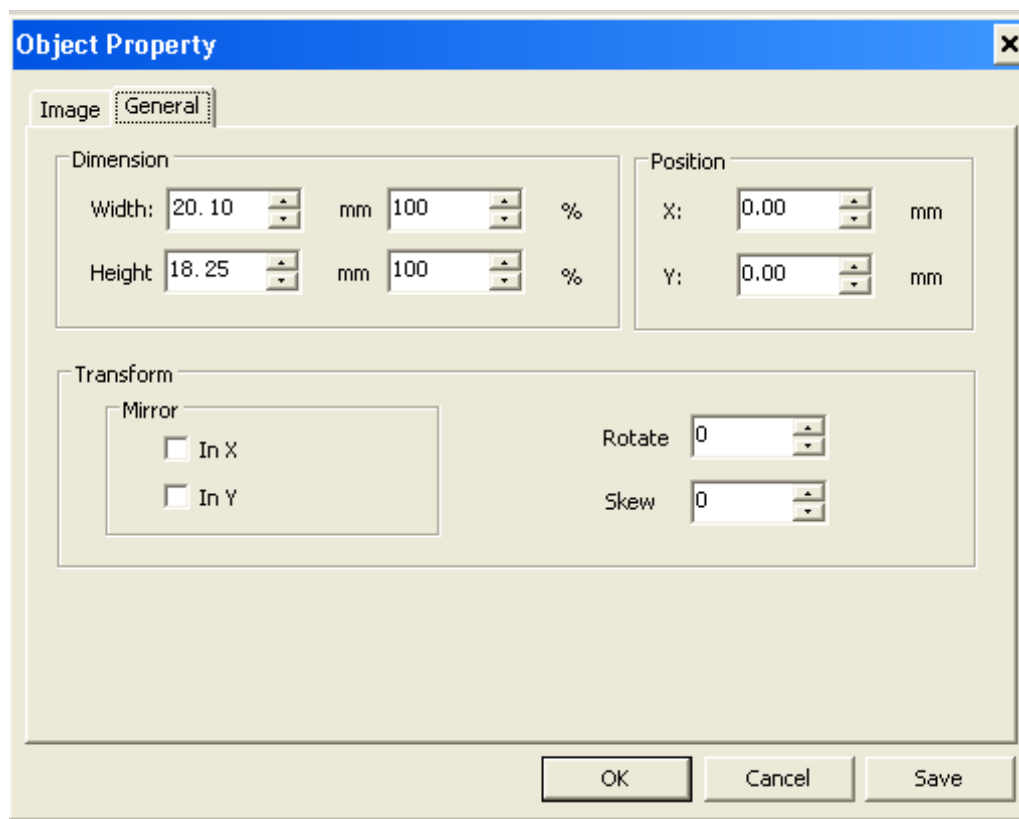


Select the image for loading, then press **Enter**. Attention: The image should be in format of bmp, jpg or gif.

2.2 Check Properties of Image

After inserting image objects, click  to select it. As selecting object, the

instant object tool will appear, and user can change the object parameters. Also you can double click the image object, the object properties window will open. These operation methods are also available for the objects in other types.



In the property interface, the “Position” is the coordinate of the center point of the image object, and the Size is the actual size of the image, unit in mm. By modifying or inputting figures, user can changes the size and position of the image object. To know the size of the image is to make preparation for planning the design size of the pattern.

2.3 Designing

Even it is the simplest pattern, user will also need design it before making the pattern. The design at here does not mean to finish the written document only; it may be only a thinking process in the brain of the skillful pattern-maker. Only after the careful thinking can the designer start the formal design. The problems have to be solved in this process are mainly the following ones:

2.3.1 Size of Working Range

It is the actual size of the embroidery, which also determine the embroidery method used in some degree. It is as same as drawing. With the larger working range, we can display the details clearer; while the smaller working range will request us to abandon the details so as to maintain the

main body. It is due to the difference of the source of the image. Like the image that above, the size of it is 20x18mm, which is a little difficult for the new learner, so the size of it shall be larger.

During the design process in actual industrial production, the work will be divided more detailed. Usually, the designer of the pattern, the pattern maker, will receive the request on the size, which is determined by the outlook designer at upper level. Because no matter it is trade mark or the decorative embroidery, it shall be match to the size of embroidery range on the specific products, like garments, bags, shoes or caps, whose embroidery standard is set by the outlook designer of the product.

But finally, these patterns shall be done at the embroidery machine, where the pattern designer can give the amendment suggestion on the applicability of the production. Because the available embroidery range on the embroidery machine is limited and the functions of different machines from different manufacturer are also various, the pattern maker shall not be only familiar to the usage of the pattern-making software, but also have to be familiar to the embroidery machine and the entire embroidery procedures. By referring to the actual working condition, can the designer judge whether the setting on the working range is ok for the work. There is a kind of processing method called as “Fabric Embroidery”, which is to embroider on the whole fabric. This kind of embroidery will set the higher requirement on the size of the working range, because in this embroidery, the seamless joint of the pattern is of necessity.

The setting of working range seems to be easy; however, if you find you have to adjust the range size, after the pattern is designed, it will be a nightmare. Therefore, the new learner shall pay attention to this question.

2.3.2 Image Analysis

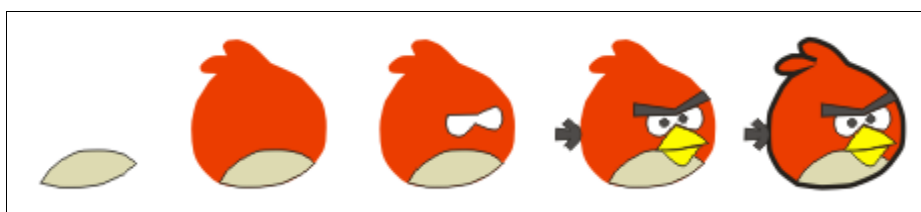
As the simple pattern, we only need to consider the structure of the pattern in the way of 2D plane. The element used at here is the figure designed in vector; however, the senior design with the natural colors will require the more elements in consideration, which we will introduce in other sections later.

The 2D plane can be simplified to the combination of the color block and lines; therefore, we need check the division of the color block and the lines. Generally, the color block covering large area shall be produced at

first, and then the detailed designs can be done in order. If the color block is contained in a larger color block, the outer color block shall be done at first and then the inner color block. If these color blocks are neighboring to each other, the production order shall follow the principles of “the farther, the first; the nearer, the later.” For an example, the beak of bird is the outstand part in the pattern, therefore it shall be done later than the eyes.



According to the rule described at above, we can resolved the above picture into the order at below.



The Procedure of Actual Designing

Usually, the image in the pattern-making are more complicated, but the analysis method is of similarity. However, it is easy to make the similar pattern; it will still need a lot of additional works to create the lively and beautiful pattern.

2.3.3 Selection of Stitching Method

The three most commonly used stitching methods are Run, Satin and Tatami, and their corresponding shapes are thin lines, thick line and color blocks. Of course, this is only the ordinary condition, these stitching method can be used in other circumstance as innovations, for an example, you can use the satin stitch to create the filling effect of gradual color-changing. This will be discussed in chapter below.

Generally, user can use the size of the pattern to select the stitching method. The largest stitch length for the embroidery machine running in the high speed is usually at 8mm, while for tatami stitch, the stitch length is at 4mm as default. The satin stitch below 2mm is quite difficult and easy to have the thread broken, so it is not recommended except for the special requirements. According to the conditions at above, for the width above 4mm, the Tatami stitch can be selected; for the width between 2mm-8mm, the satin stitch can be used; for the width below 2mm, the Run is

recommended.

From the analysis result of the above image, we can easily make the selection of the stitching methods used. The large shape can be embroidered with tatami stitch. At the tail and eyebrow, user can use satin stitch. At last, user can use the Run or Satin to sew the outline, which is depended on the size of pattern.

In the actual practice of making the pattern, the quantitative index is only for the reference. The final embroidery effects, including color, 3D effect and connection effect, determine the stitching method selected. In sometimes, user also needs make the trial embroidery with different stitching method to find the best.

2.4 Delineation

The delineation is the process to turn the reference image to the design object, where user needs to use the selected input method to draw the outline of the object. The drawing method provided in emCAD is the fitting graphic curve based on the Bezier, which enables the fast drawing and the optimized fitting of curve. In this section, we will introduce the using technique of this drawing method mainly.

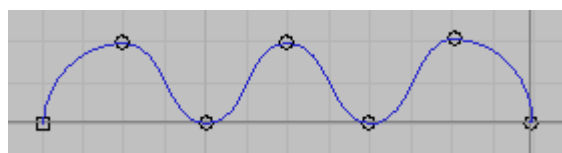
2.4.1 Linear Point and Curve Point

As introduced in the paragraph at above, in the object input status, clicking the mouse left key is to input linear point, while clicking mouse right key is to input the curve point. Two neighboring linear points will be connected by the line, while two neighboring curve points will be connected by the smooth curve. If a linear point neighbors a curve point, the smooth curve between them will stop at the linear point.

At below, we will take the complex filling as the example. Clicking

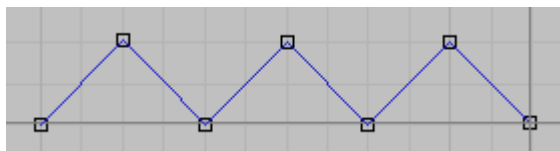


to have access to the object input status.



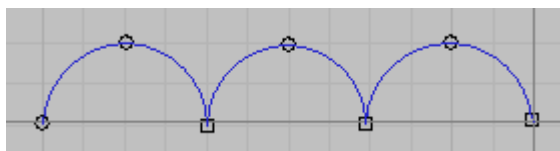
Input the curve points continuously.

The curve is smooth and has no sharp angle and linear segment.



Input linear point continuously.

The connections between two points are the straight lines.



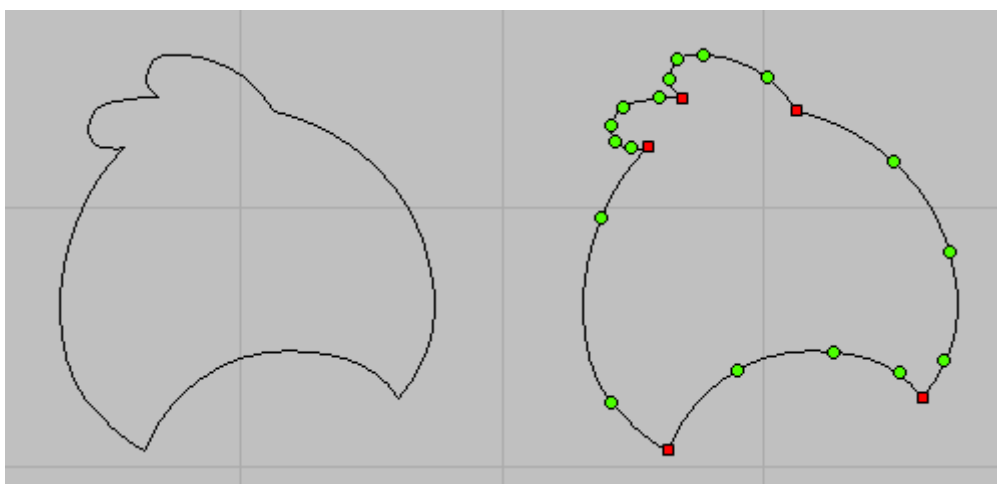
Input the linear points and the curve points as mixture.

The curve will be broken at the linear points.

Basically, the combination of lines and the curves are able to meet the needs in the entire outline delineations. The inputted outline can be modified via the tools for reshaping.

2.4.2 Density of Points

Due to the control point of the input curve in emCAD is concealed, in order to acquire the outline accurate enough, user can enhance the density of the control points. Usually, less points are needed inputting in the relatively smooth part of the curve, while more points are needed at the complicated part of the curve.

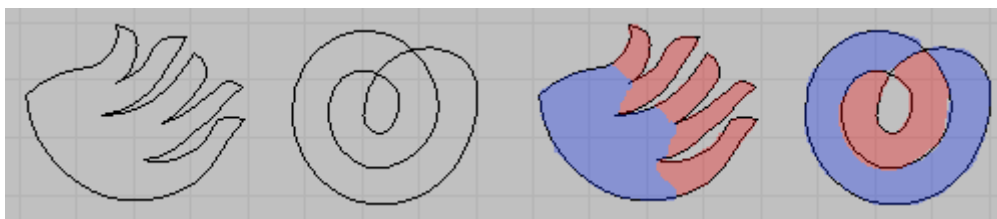


If the input point is not so ideal, user can use **Backspace** to delete the previously input point, or use **Esc** to cancel the current inputting.

2.4.3 Wrong Input

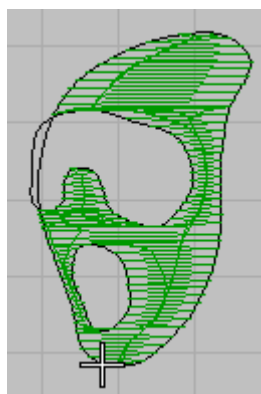
At inputting the outline, user needs avoid some curve in certain formations, which will cause the non-ideal stitch and also make the modification become difficult. These curves include the self-crossed curve

and the excessively complicated figure.



The complicated figure and the self-crossed curve can be divided into the combination of the simple curve.

The input method of complex filling supports the continuous input of several close curves, among which the first one is the main outline, others are the assistant outlines. The assistant outlines repel the main outline.



The complex filling can be used to draw the outline containing the blank area.

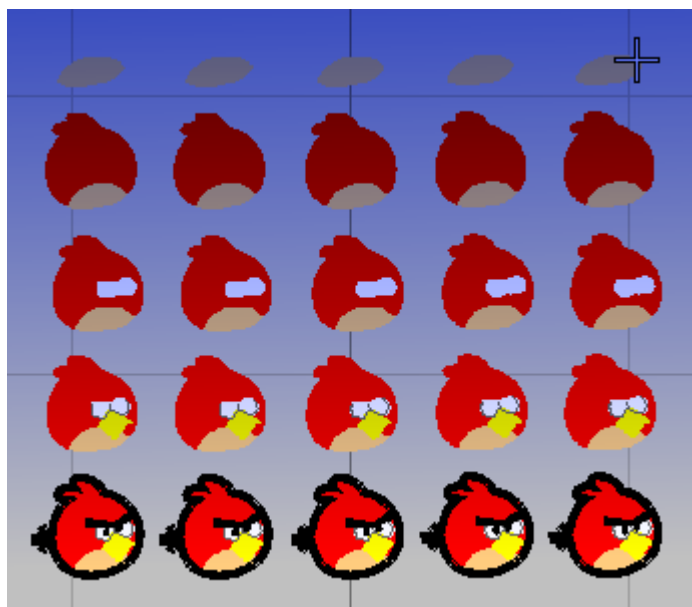
2.5 Trial Embroidery and Improvement

The final modification of the pattern shall be done according to the actual effect embroidered on the embroidery machine. Due to the precision of the design file is over ten times of that on the file in embroidery machine, there will be unavoidable difference between these two files. Additionally, the fabric will shrink during the embroidery, thus causes the difference between the actual embroidery effect and the display effect at pattern-making. This difference will be clearer at the pattern with large working area and more colors, so the pattern design file shall be modified to eliminate the error. In sometimes, for the pattern that has been modified, in order to have it to fit the new fabric or the new machine, user also needs to readjust the part of it.

2.5.1 Embroidery Sequence Adjustment

Although we have basically set the embroidery sequence for each part at designing, we still need to change the embroidery sequence of the object

in some circumstance. For an example, at embroidering one pattern in repetition, user can decrease the times of color-changing to enhance the productivity by combining the color. At the circumstance of embroidering several repeating patterns, user can embroider one color in the entire patterns and then embroider another color.



For several repeating patterns, user can embroider one color in the entire patterns and then embroider another color.

But for the pattern in large working range, due to the fabric can shrink during the embroidery, the next embroidered color may be located at the wrong place. So user needs to finish the pattern one by one to ensure the coherence of each pattern.



Embroider the pattern one by one to avoid the wrong-position embroidery

2.5.2 Reshape and Adjustment of Start/End Stitch Point

The reshaping can adjust the details of the pattern outline, which is the important step in the pattern modification. And the adjustment of the start point and the end point can optimize the embroidery sequence, decrease the frame-moving distance between objects and enhance the productivity. For the operation of reshaping the pattern, please take the specific chapter for reference.

2.6 Summary

The skill of a pattern-maker is relating to his experience in a large extent. Same as the other industry, the attracter must be the one with rich knowledge. The key on creating the beautiful patterns is the application and the accumulation of embroidery knowledge, instead of the mere skillful usage of the software. The knowledge includes the comprehension of the characters on assistant materials, such as needle, thread and fabric, the accumulation of the experience in actual practice and the knowledge of basic techniques like coloring and designing. By accumulating one tip by another, the new leaner will become an excellent designer gradually. As the user's manual on pattern-making, this book is the media we share these "tips" with the users, besides the manual for introducing the basic function of software. At the last of this manual, we will have the further discussion on these techniques.

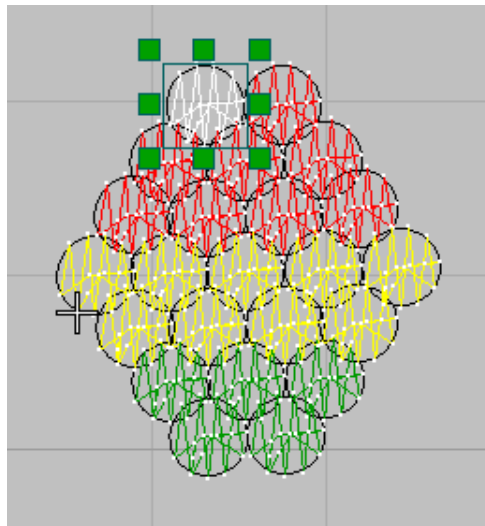
Chapter 3 View Pattern

Display how to select and move the object, how to change the pattern status in the design area and how to view the pattern via object list.

3.1 Selection of Object

Before performing the operation like changing properties, moving or transforming to an object, user shall select the object at first. User can use  and  to select the object.

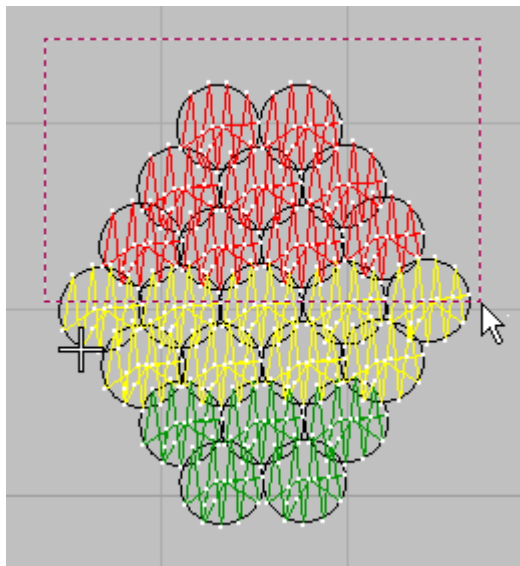
Click  with left mouse key to make it enter the status of “Selected” . And the design area will enter the object selection status as well. At this moment, click on the object to select it. In the operation of point selection, the system will select the object according to the position of the outline. For the open outline, when user clicks the mouse near the outline, the object containing the open outline will be selected. For the close outline, if the clicked area is within the outlined area, the object will be selected. When several outlines are all meeting the standard, only the top outline will be selected. User can hold **2** key and click the mouse left key at the same place to select the lower outline.



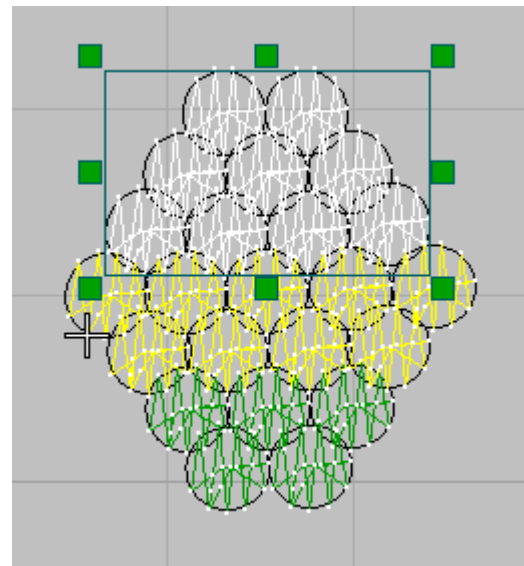
When the object is selected, the stitch will be displayed in highlight.

The frame selection will select objects within the range of the rectangle. The method is: 1) Click mouse left key to set an angle of the rectangle; 2) Hold the left key and move the mouse to form a rectangle frame; 3) Release the left key to make the selection become effective. All the objects within the selection frame will be selected, while the objects not in the frame or the object only having part in the frame

will not be selected.

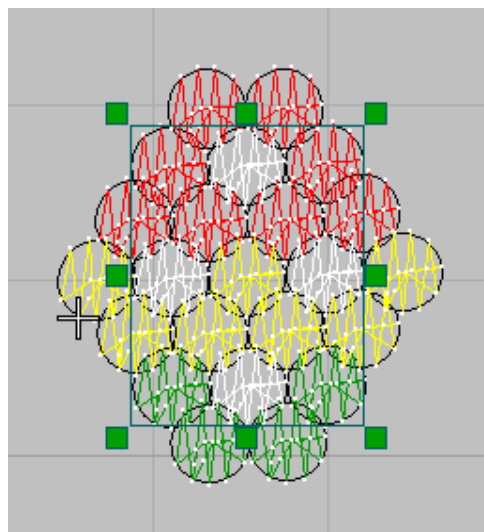


Hold the left key and move mouse to form the selection frame.



Release left key to select objects within frame.

Point Selection Add/ Decrease Mode: Hold **Ctrl** and select the objects. If the object is not selected, this object will be added into the group of the selected. If the object has been selected, this operation will have that object turn to an unselected one.

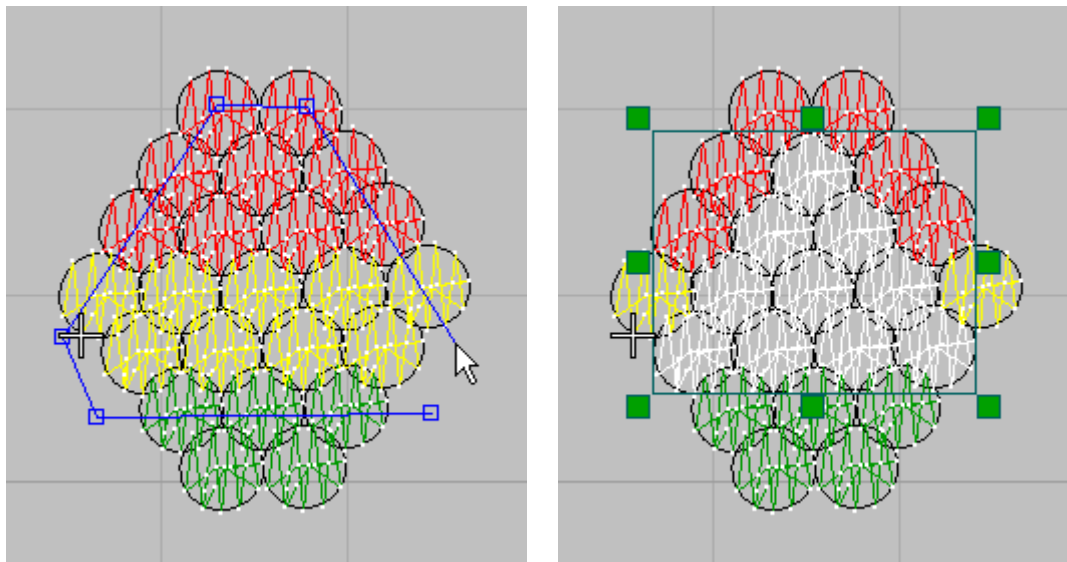


This mode can select a group of objects flexibly

Transparent Mode: As mentioned at above, when user hold **2** key, he will be able to select the covered object. If several objects are overlapped, each effective click will have the object at the next layer become selected, and the previous object will be into unselected status. If the currently selected object is at

the lowest layer, the effective click will have the object in the top to be selected.

Tools of Polygonal Frame Selection: Similar to the frame selection. Click the tool to select it. Then continuously input the points of a polygon within the design area. Press **Enter** to end the input, the objects within the polygon will be selected.

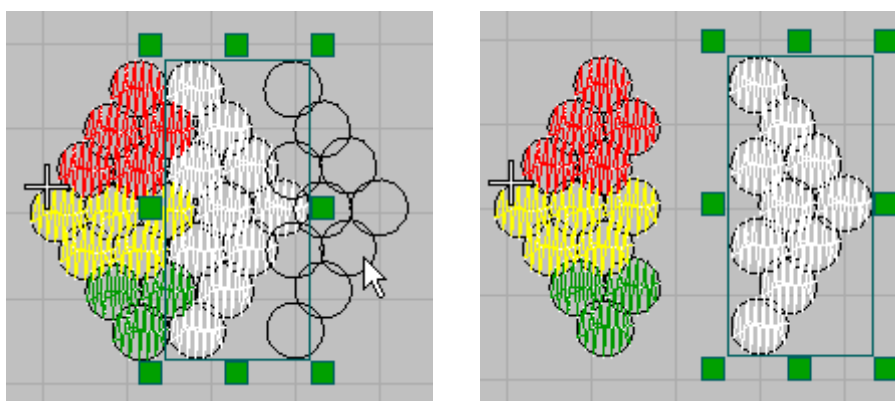


The close polygonal area is the effective area. The objects totally within the selected area will be selected

3.2 Move and Transform

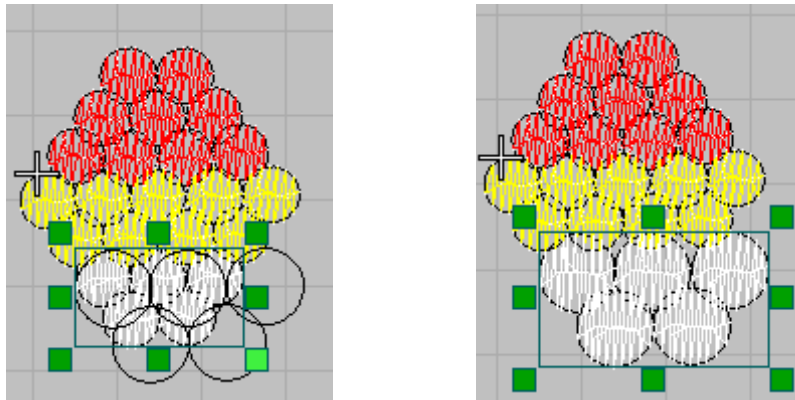
When the objects are selected, the stitches of objects will be displayed in white. At the outskirts of the object, there is a rectangle selection frame, which has an operation handle at each angle and side.

The selected object can be moved or rotated. User can judge the status from the shape of the handle. When the handles are all displayed as small rectangles, the object is in the status of Move. And user can move the object.

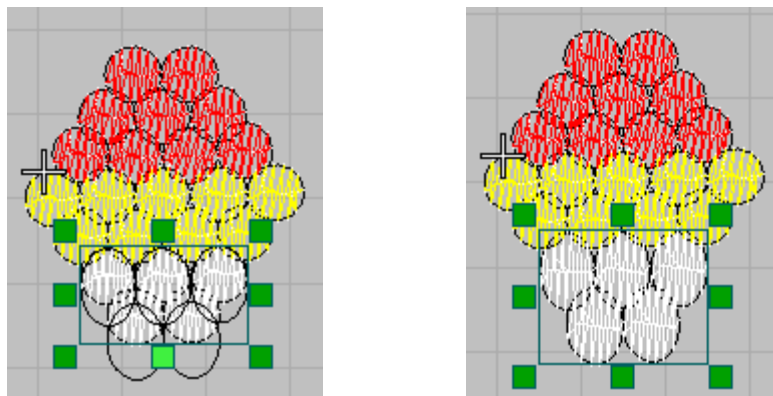


When moving the object, the outline of the objects will displayed in real time as the referred position at moving

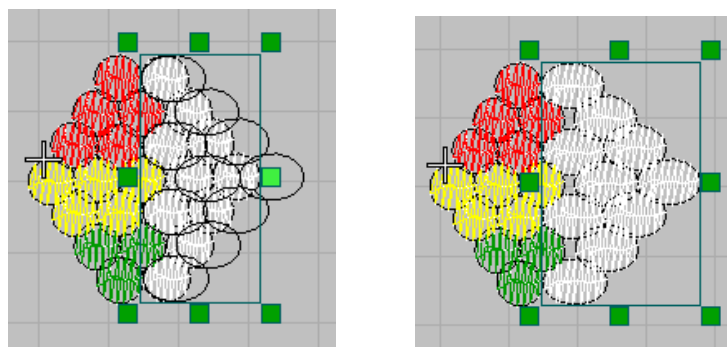
Dragging each handle will stretch the object. Dragging the handles in the corners will scale the object in same ratio in both X and Y direction. Dragging the handles at up/down side will stretch the object in Y direction, while dragging the handles at left/right side will stretch the object in X direction. When user performs the stretching operation, the handle at other side will keep still.



Dragging the handles in the corners will scale the object in same ratio in both X and Y direction.

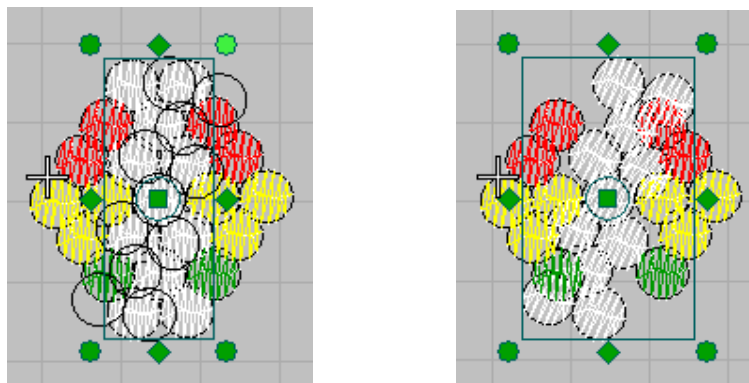


Scaling Operation in Y Direction

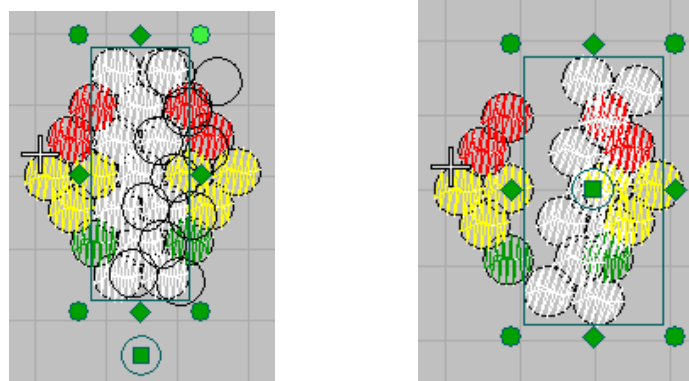


Scaling Operation in X Direction

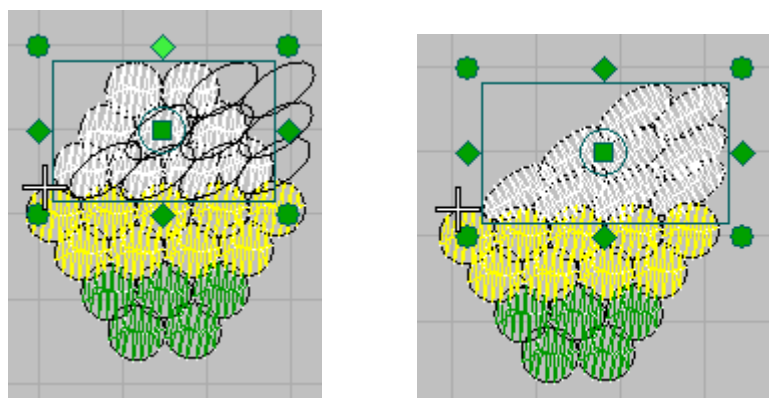
Single clicking on the frame will change the operation status. At this moment, the handles at corners will turn to round and the handle on each side will turn to diamond. And in center of object, a small rectangle with circle will be displayed, which is the axis for rotation. This figure is only displayed in the rotation status. Dragging the round handle is to rotate the object. If user drags the rotation axis, the rotation will be done with the new centre. Dragging the diamond, the shear operation is available.



Use the round handle to rotate the object.



After moving the center point, user can use the new circle center to rotate the objects.



Use the diamond handle to perform the shearing operation.

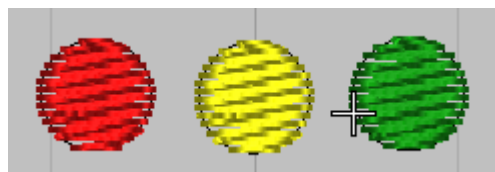
If the more precise displacement operation and rotation operation is needed, user can use the tools in the general property bar, where the operation functions like displacement, rotation, mirror and shear are provided.

3.3 Display & Conceal the Element

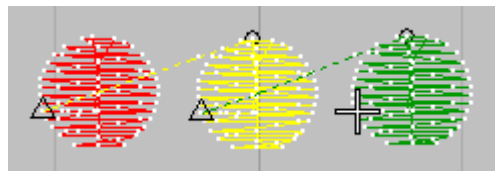
By using the tools for display option, user can display or conceal some element in the interface. By shifting the display of these elements, user can easily check the details of the pattern.



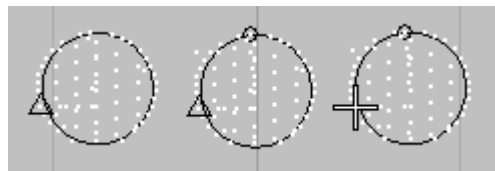
Simulation: After user activates this function, the system will simulate the actual appearance (color & 3D effect) of the pattern. It will be easy for user to check the embroidery effects of the satin and tatami stitch.



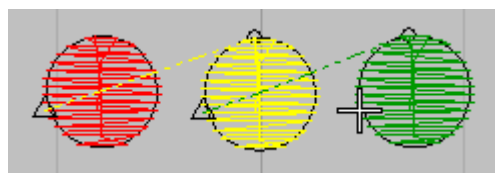
Display Outline: Enable to display/ hide the outline. By shifting the display of outline, user can compare the coherence of stitch and the outline.



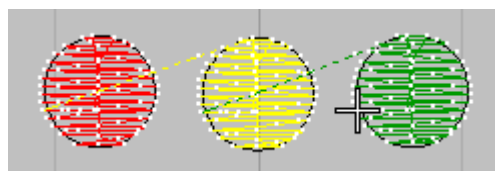
Display Stitch: By hiding the display of the stitch, user can check the density of the needle entry point.



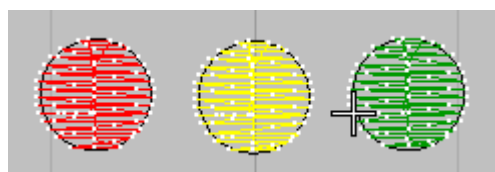
Display Needle Entry Point: by hiding the needle entry points, user can check the direction of the stitch and the real covering effect.



Display Function Code: Display/ hide the assistant function figures, mainly the triangles for thread-trimming and the circles for start sewing. When the pattern contains so many thread-trimming operations, user can use this function to simplify the display of interface.



Display Connection Line: This function is similar to that of “Display



Function Code”. Because in actual embroidery the connection lines will not be embroidered, the display will be closer to the actual effect after the display is shifted.



Display Grid: Shift the display of the grid.



Display Scale: Display or hide scale



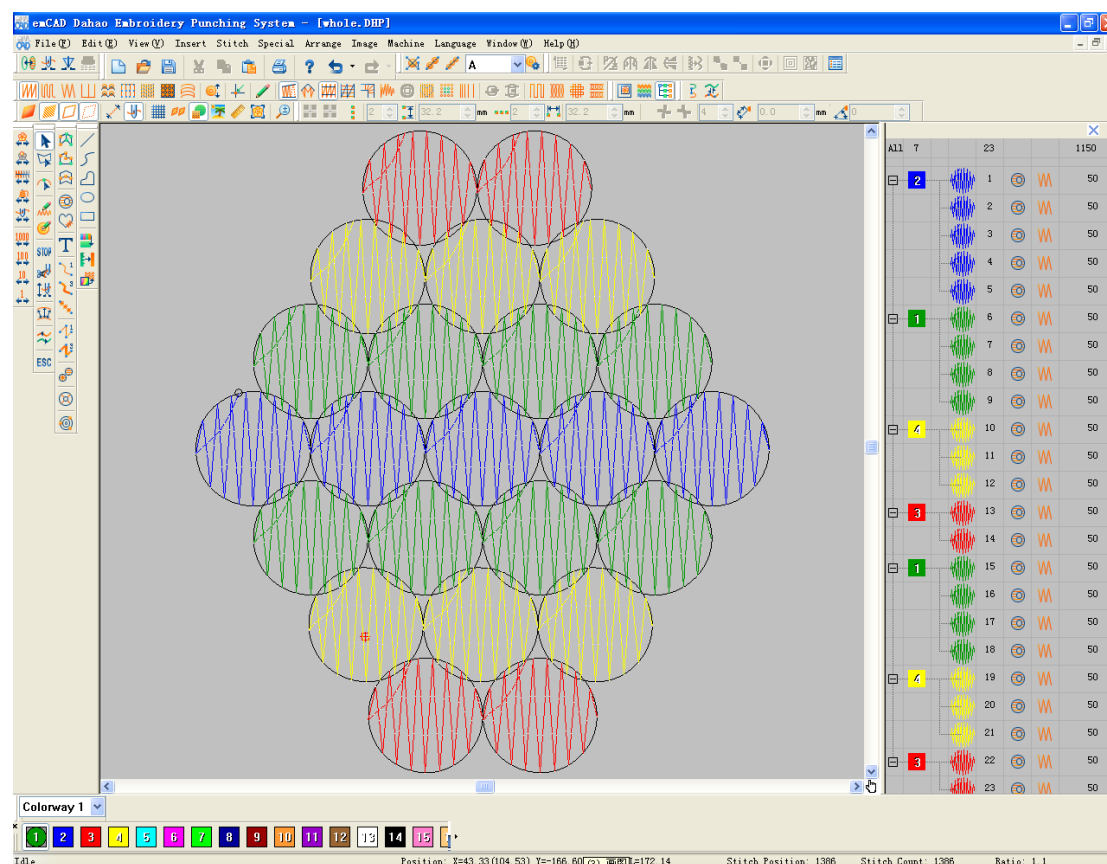
Display Figure: Shift the display of Figure



Display Image: shift the display of image object



Display Whole Pattern: Click the Icon, then the entire objects designed at present will be displayed in the design area in full.

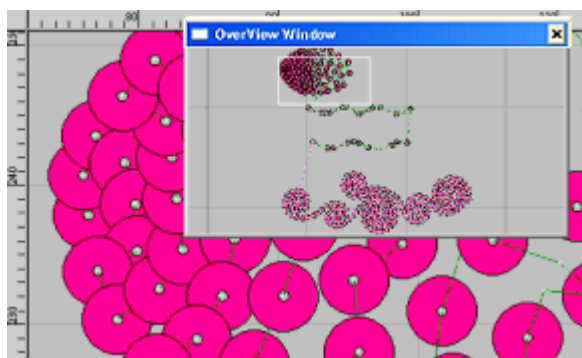


3.4 Overview Window



Click  to activate the windows to scale down the entire objects designed currently. The displayed area on the design area is the area within the white rectangle. User can drag the white rectangle to change the displayed content in

the design area.



3.5 Stitch Trace

The tools for stitch trace are used to move the current working point . Clicking mouse left key on the icons is to move the working point forwards, while clicking mouse right key on the figure is to move the working point backwards.



Click left key to move to the first stitch of the current design; click right key to move to the last stitch.



Start Position



End Position



Move by Object: Click left key to move to the first stitch of the object. If it is the first stitch of object, the point will move to the first stitch of the previous object. Click right key to move to the last stitch of the object. If it is the last stitch of object, the point will move to the last stitch of the next object.



First Stitch Position of Object



Last Stitch Position of Object



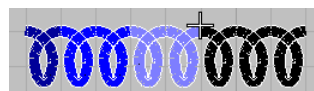
Move by Section: If the object only contains one section, the move effect will be same as that of the Move by Object.



Move by Color-changing Code: Click left key to move backward to the color-changing code position; click right key to move forward to a color-changing code.



Color-changing Code Position



Next Color-changing Code Position



Move by Function Code: Click left key to move backward until a function code is met. Click right key to move forward to the nearest function code.



Move by Stitch Number: Click left key to move backward for 1000 stitches; click right key to move forward for 1000 stitches.



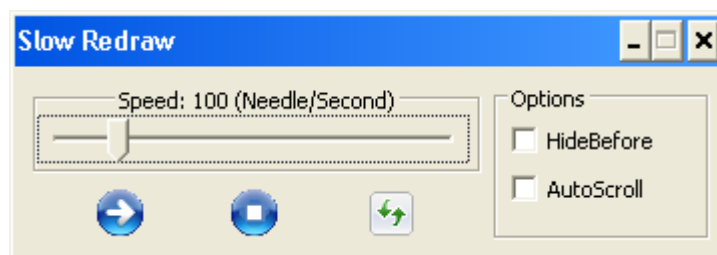
Count 1000 stitches from first stitch



Count another 1000 stitches

3.6 Simulation

Use **Shift** + **R** or Main Menu → Check → Slow Redraw will be able to activate the dialogue window of low speed replay.

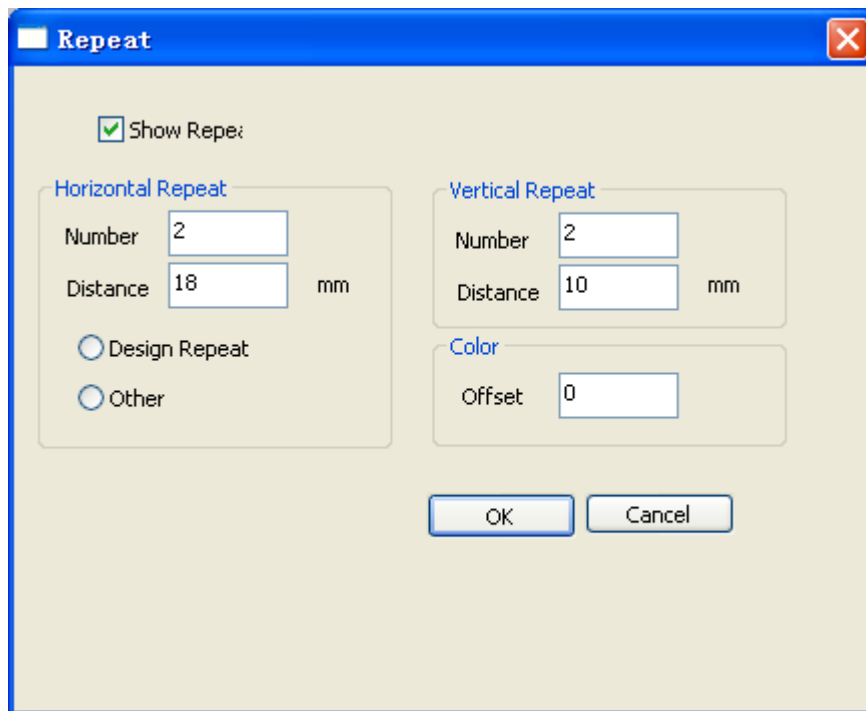


The Speed is the number of stitch drawn at each second. Press “Start” to begin the drawing; press “End” to stop it.

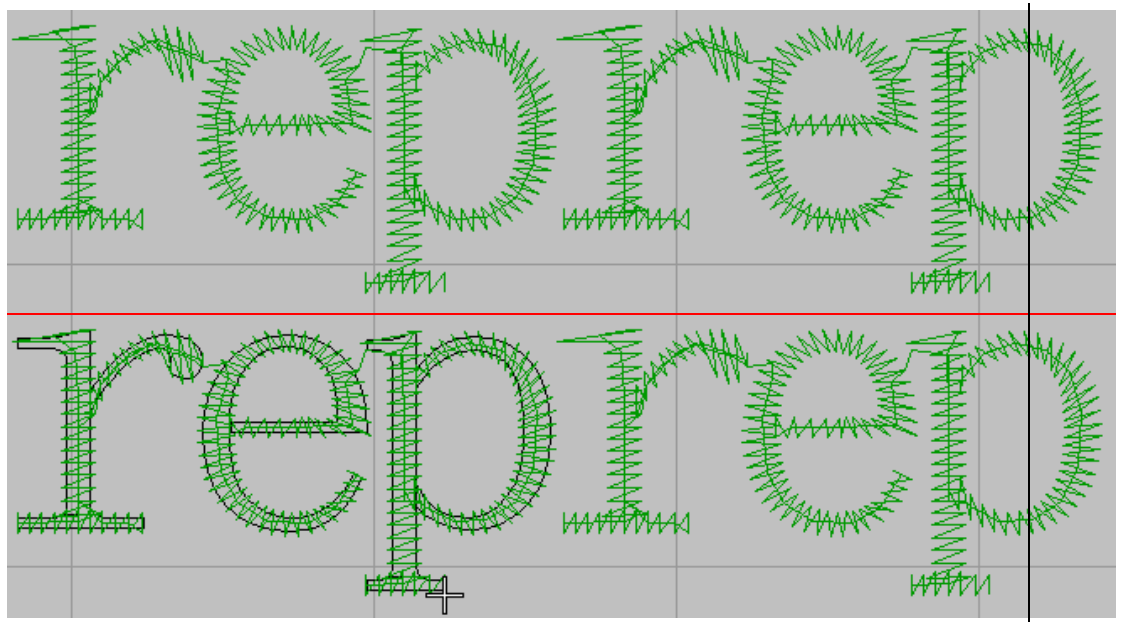
3.7 Repetition Display(Repetition Embroidering)

Repetition display is useful for repetition embroidering, which can check whether the design size is fitting to repetition embroidering.

clicking “” with mouse right key, to set the below parameters.



Select and check “”, the design will be displayed as following:



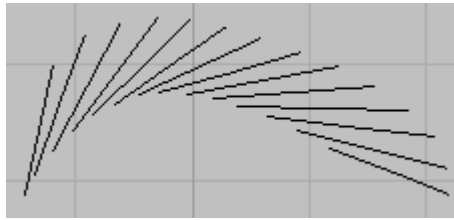
Chapter 4 Input Graph Object

Display the procedure of creating graph object with the input method for kinds of shapes.

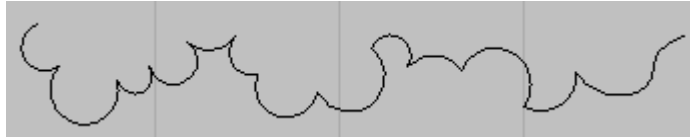
4.1 Lines and graph



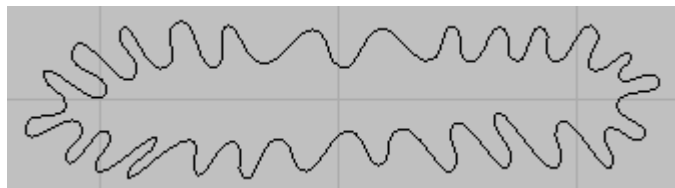
Line: Inputting two points will create a line.



Curve: Input control points continuously. The system will create a curve according to the types of the control points input. Press **Enter** to end the input and generate the object. Press **BackSpace** to cancel the previously input point; press **Esc** to cancel the input.



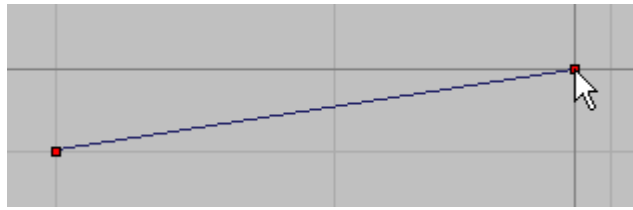
Close Curve: The input method is same as that of curve. After user presses **Enter** to end the input, the curve will be closed automatically.



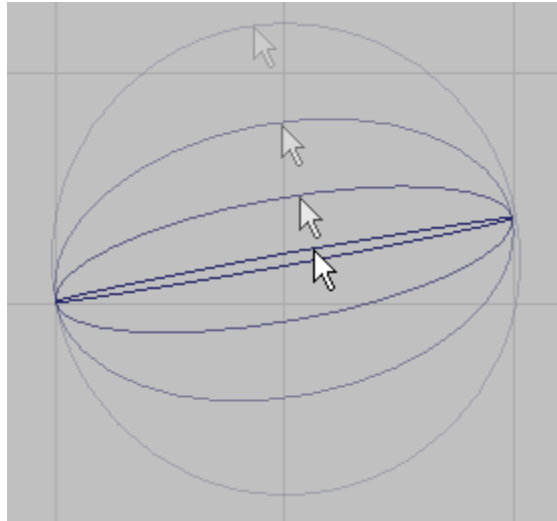
4.2 Circle and Rectangle



Circle: Inputting the long axis and the short axis will create the eclipse as default. Continuously input three points to create a circle object. Input two endpoints of an axis, because the long axis and the short axis of the eclipse are vertical to each other, then input an endpoint of another axis to generate an eclipse.



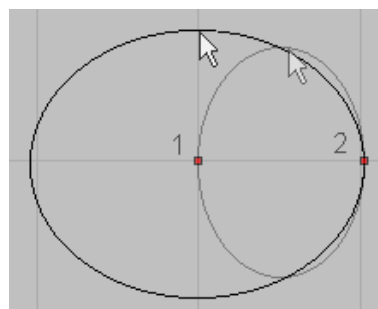
Input two point to create an axis of the eclipse



After setting an axis, user can move the mouse to generate the eclipse dynamically.

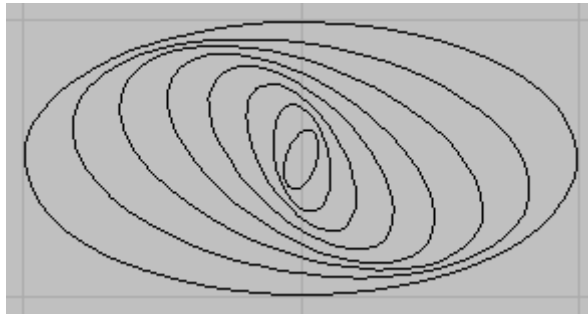
Before the third point is input, the system will generate the eclipse according to the other axis set by the current position of the mouse. At this moment, user can confirm the input according to the size of the eclipse displayed.

Compared with the regular circle input method, rectangle frame method, the eclipse input method in emCAD supports the eclipse input at any tilt angle so that the operation for the second rotation adjustment can be avoided. For the border of the eclipse, user can also refer to the center point and the length of the axis. When inputting the first axis for the eclipse, user can still hold the **Control** to perform the adjustment of tilt angle in the step of 15 degrees. Therefore, user can precisely create the eclipse with horizontal angle at 0 degree. After the first axis is input, pressing **Control** is to input circle, while pressing **Shift** is to double the first axis



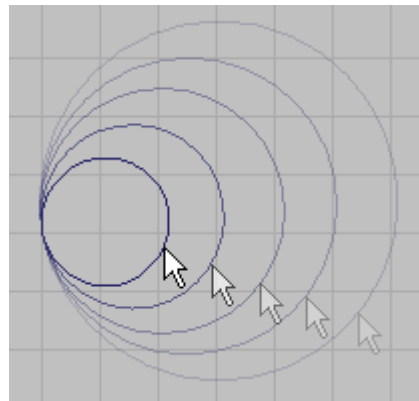
The line between point 1 and point 2 is the first axis; press shift to double it. After the user prolongs the axis with **Shift** key, the original endpoint of the

first axis, the point 1, will become the circle center; therefore the input method is changed to method of point circle, which is much easier for user to locate the position of the eclipse.



The center points of these eclipses are aligned.

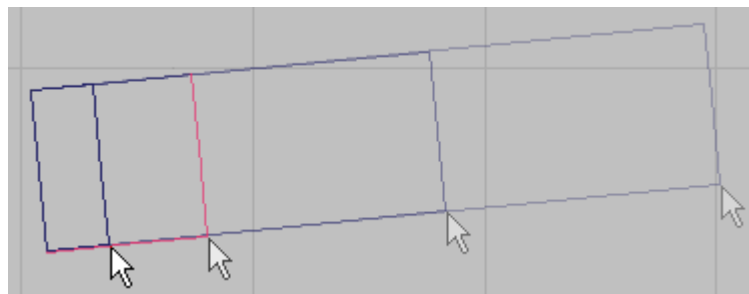
Before inputting the third point, user can press **Control** to force the second axis equal to the first axis, when the circle will be input. At this moment, pressing **Shift** can double the long axis.



When pressing **Control** to input the circle, user can move to mouse beyond the axis line to change the radius of the circle.



Rectangle: It is similar to that of the circle. Use two points to set the length of one side, and then use the third point to set the length of the neighboring side.



After the length of one side is set, user needs move the mouse to locate the neighboring side. Before the third point is input, pressing **Control** can generate the square, as the red rectangle shown in the figure.

Chapter 5 Basic Input

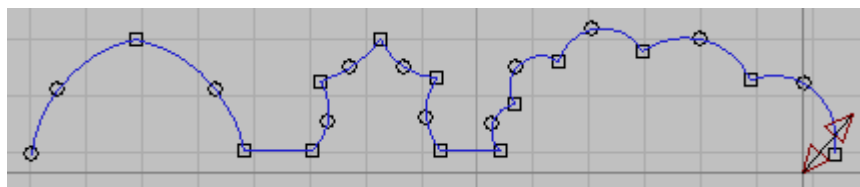
The input method for the common objects like satin, complex filling and Run.

5.1 Equal Width Column (Input Method Parallel)



Column stitch is another name of the satin stitch, featuring its vivid color.

At here, the stitch especially means the to-and-fro stitch whose stitch direction is vertical to the center line of the outline. In input method C, the base line is the single curve, whose width is equal from the beginning to the end. Therefore it is called as equal width satin to distinguish from other input methods.



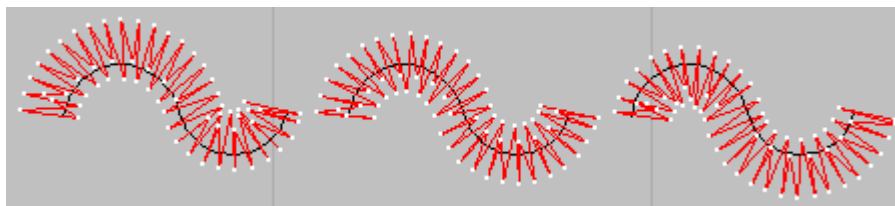
The input method of the stitch object is similar to that of the graph object. Press **Enter** to end the input of curve and then input the width. The segment between the two arrows is the width.

From the basic input method, the multi-step input mode can be found in the process of inputting the object. Because the stitch object contains many elements, user needs to input other information such as column width, start/end point, stitch direction and so on, besides the outline. Therefore, after user presses **Enter** to finish the curve input, the system will ask user to input the next element instead of generating the object. At this moment, user can press **Enter** to use the default values. For the specific input procedure, please refer to the description in each input method.

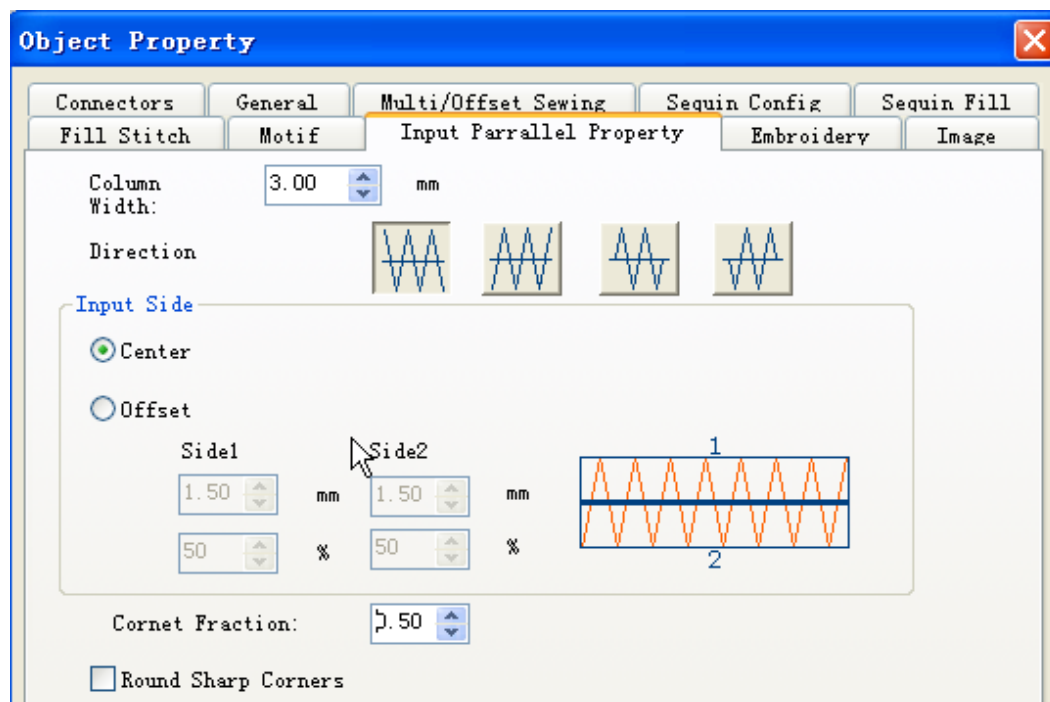


The stitch effect of the equal width satin; Attention: the effect is not so good at sharp turning.

The corresponding property input for equal width satin mainly contain two parameters: the one is width; the other is offset. The default setting is center, which means both the column 1 and column 2 are at 50%.



Effects of offset at 20%, 50% and 80% for Column 1



Width: The Width of Satin

Input Side: Adjust the offset of margin. Center means no offset, or user needs input the value manually.

Corner Fraction: the parameter for optimizing the turning.

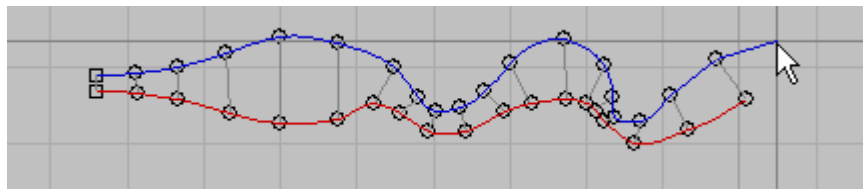
5.2 Changeable Width Satin(Input Method Symmetry)



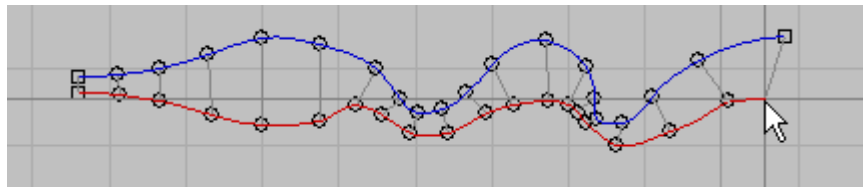
Changeable Width Satin can realize the effect similar to that of the equal width taping embroidery. Due to the changeable width, the needed control points in changeable width satin embroidery are more than twice of that in the equal width taping embroidery. Therefore user can select the proper input method according to the actual usage, flexibility and efficiency.

The changeable width satin has two basic outlines. For easy identification, at inputting the object, these two outlines are displayed in difference colors. The count of control points on these two outlines is equal and points input in pair. Therefore, the control points needs inputting in alternative mode, which shall be

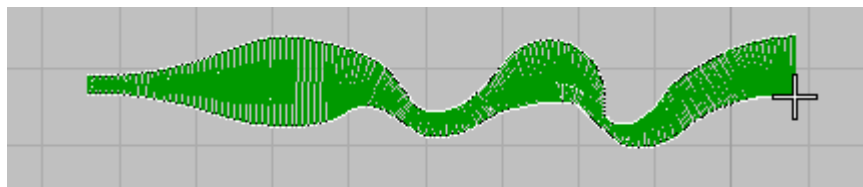
different from the next Input Method B.



At inputting the outlines, the control points on the blue line are input at first.



Then input the control points in red line. The grey segments between the red line and blue line are the angles of stitches.

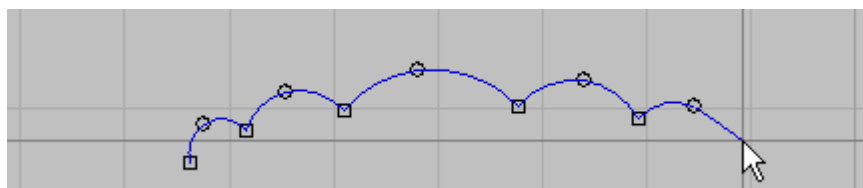


Final Effect

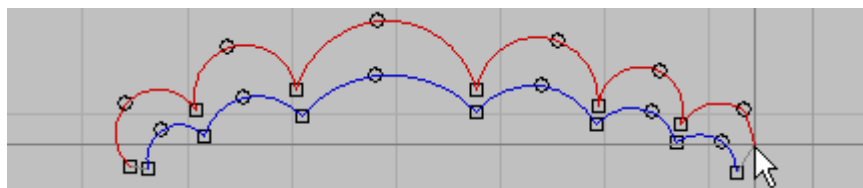
5.3 Radial Satin (Input Method B)



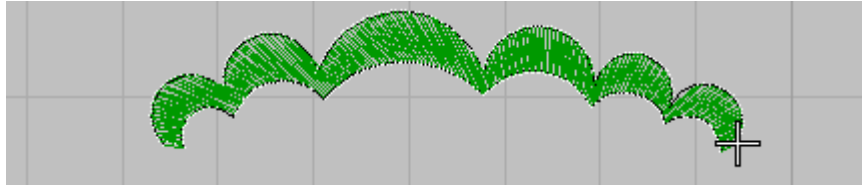
Radial Satin is the special changeable width satin, which is able to automatically judge the direction on the stitch between the two outlines, thus forms the stitch effect in the shape of radiation. At inputting radial satin, user needs finish the outlines one by one. When inputting the simple lines, the input efficiency of radial tape is higher.



Input one outline and then press **Enter** to end the input.



Then input another outline. These two outlines are displayed in different colors.

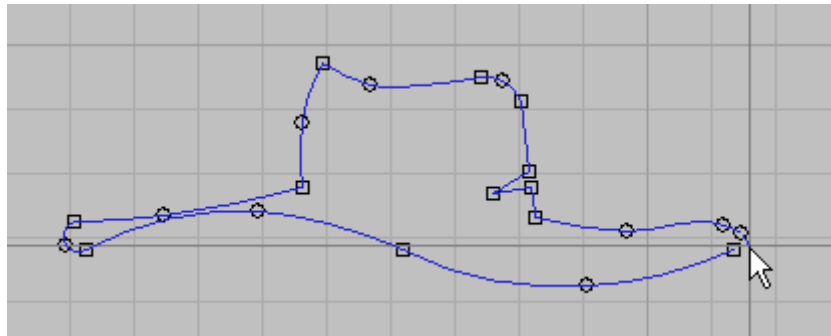


Final Effect: The angles of the stitches are automatically generated. If user needs modify the stitch direction, the tools for reshaping can be used.

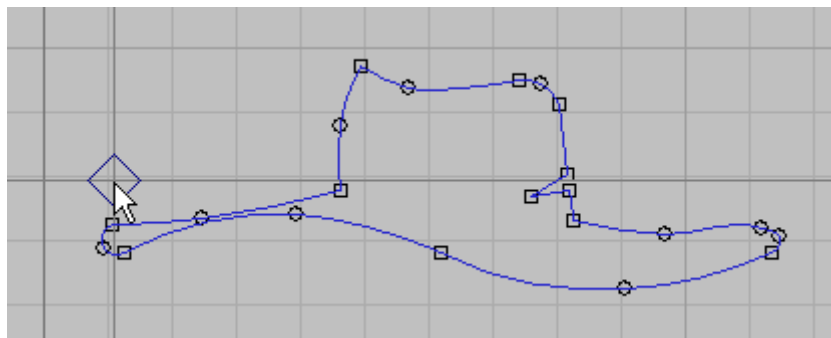
5.4 Complex filling



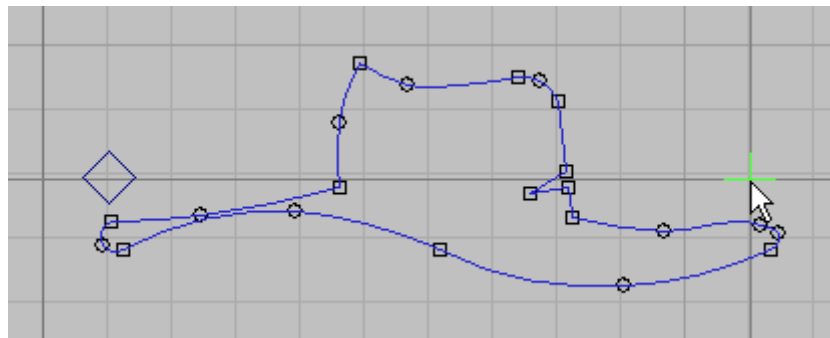
The complex filling is the special input method for inputting the closed area of filling. It also contains many input steps. The complex filling supports the input operation of several outlines, but the filling area is determined by the first outline, the next inputted outlines can be removed on the basis of the first outline. Besides the outline, user also needs input the start point, end point and the stitch direction. After inputting the basic outline, user can press **Enter** to skip the input steps left, and then the system will initialize the object according to the default settings.



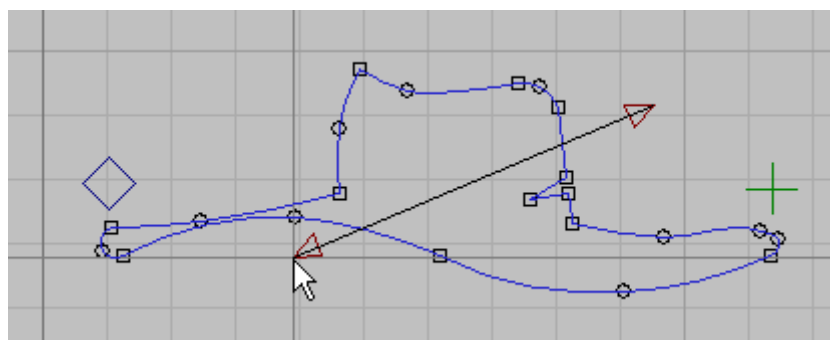
Input outline: After pressing **Enter** to finish the input of the first outline, user can press **Enter** to start the input operation of start/end point, or click the mouse to start the input of the second outline.



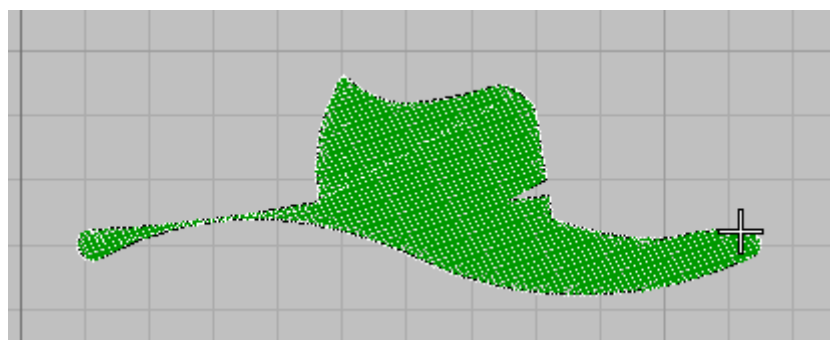
Input the start point of object, which is displayed as the diamond figure.



Input the end point of object, which is displayed as the cross figure.



Input the stitch direction. It is represented by the segment between the arrows.



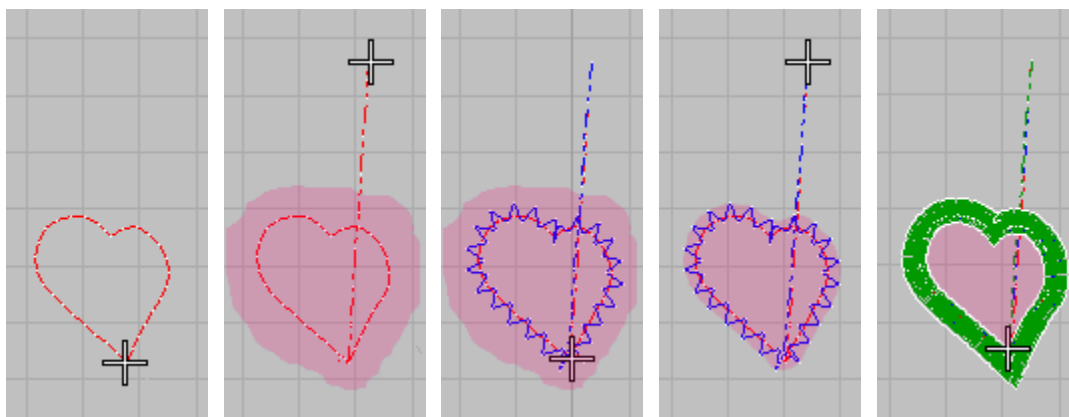
Final Effect: Several stitching method can be used in complex filling. For the usage of stitching method, please refer to the following chapter.

5.5 Auto Appliqu é



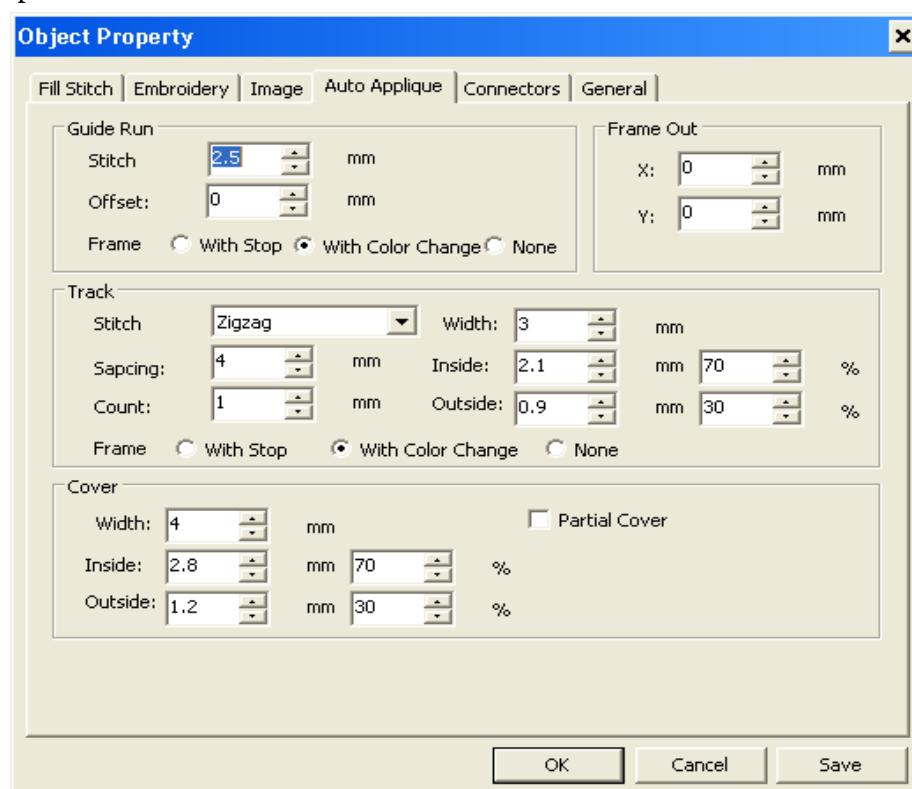
It is also called as appliqu é which is a common embroidery method.

This operation are divided into five steps: 1) Embroider the standard line; 2) Move machine to the frame-out point and patch the cloth along with the standard line; 3) Embroider the locking stitch to fix the cloth on the fabric; 4) Move the machine to the frame-out point again, and then cut and adjust the patched cloth; 5) Finish the margin of the appliqu é in the stitching method of equal width satin generally.



In the five steps of the standard appliqué embroidery, the head are moved out of the frame twice for patching cloth and cutting operation respectively. But in the actual practice, in order to save the processing time, users have introduced many new crafts. For an example, the users use the laser cutter to cut the cloth into the proper shape, and then use the mould to locate the patching point precisely, which saves the operations for sewing the standard line and cutting the patched cloth. After this modification, the processes are simplified to two steps: 1) Fix the cloth with glue; 2) Finish the locking stitch and the margin.

The appliqué has the independent parameter settings, which contains many parameters. However, they are still related with the 5 basic steps at above. By referring to these five operation steps, user can easily understand the meaning of the parameters



Guide Run: it is the stitch for the standard line at the first step, where the *stitch* and *offset* can be set. The Frame-out is the stitch properties for the frame-out point at the second step. It is usually set as color-changing to be compatible with most embroidery machine.

Frame-out: The position of points out of frame in Step 2 and Step 4

Track: This is the method for fixing the stitch in Step 3, whose setting of Inside and Outside are similar to that of the margin offset in equal width satin.

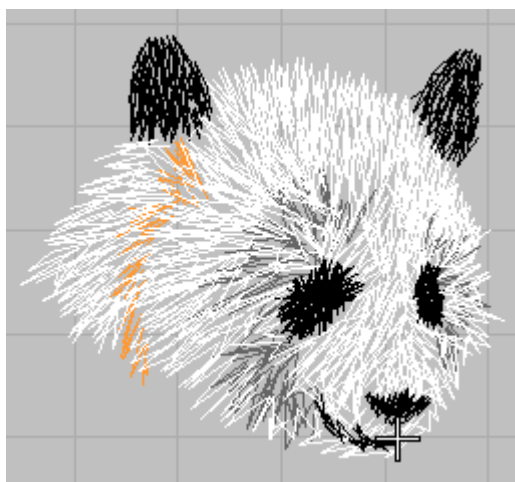
Cover: The operation for embroidering the margin at Step 5. The settings of parameters are same to that of the equal with satin.

There is a special appliqué method, which is for the embroidery machine with laser cutting needle position. After the stitch is fixed in step 3, there is also an operation for laser cutting. At this moment, this machine will cut the patched cloth according to the stitch of pattern. In order to realize the laser cutting function, user can use the standard stitch in first step as the fix stitch and change flat stitch into the laser cutting stitch in step 2. Because the cutting position shall be away from the fixing stitch, user shall properly set the offset at the **Track**. Generally, the value of outside shall be increased.

5.6 Manual Stitch



In this method, the needle entry point of each stitch is input manually by the designer. The input of the manual stitch is absolutely depended by the techniques of the designer. The manual stitch has the lowest input efficiency, but it is the most flexible stitch in the designing. The designer can realize any wished effect with this method. However, the designer shall control the quality of the stitch, try to avoid the stitch with improper length and ensure the proper density of stitches. (The excessively dense stitches will be very thick and hurt the fabric; the excessively sparse stitches are unable to cover the fabric, whose effect is not so beautiful. The excessively long stitches will lower the embroidery productivity; and the excessively short stitches are easy to cause the thread-breakage.)



Effect of Disordered Embroidery Made by Manual Stitch

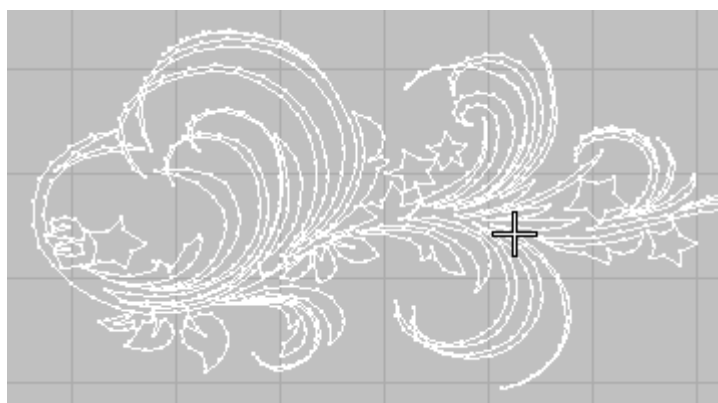


Triple Manual Stitch: Each stitch will be embroidery in to-and-fro according to the set value. The time for retrieval is the odd times, user can set it from 3~15. The effect of stitch is same to that of the manual stitch. Because of the retrieval, the actual effect of it is thicker.

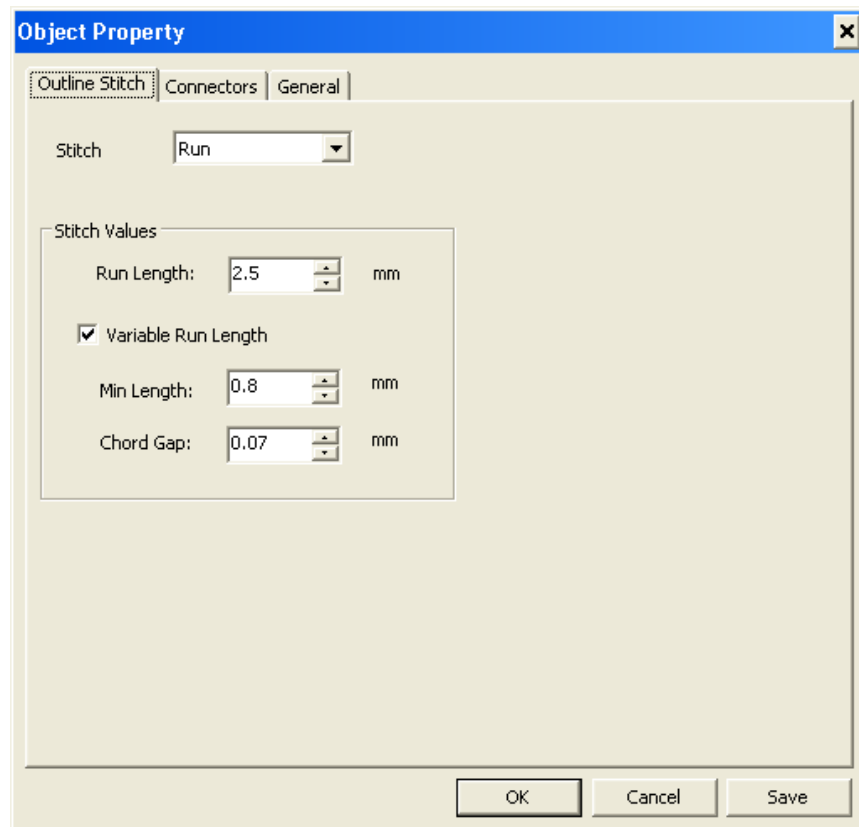
5.7 Linear Stitch



Run: the input method of the single stitch generated by curve. The linear stitch has its corresponding parameters to control it, which are to set their lengths and the changeable stitch length mainly. The parameter of the changeable stitch length can fit the direction of the basic outline better.

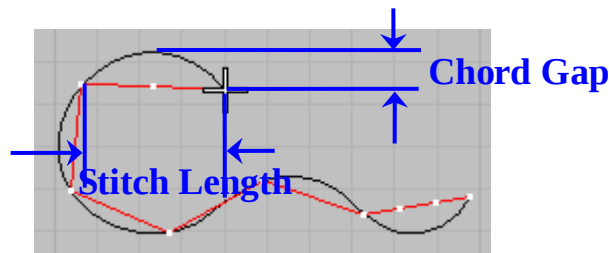


Pattern drawn by the applied linear stitch, the productivity of this kind of stitch is higher than the manual stitch at drawing the outline.

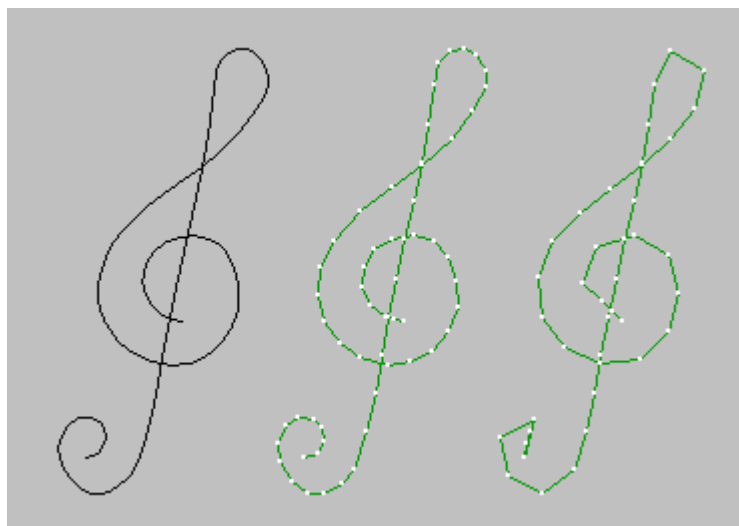


Run Length: When user doesn't select the option of Variable Run Stitch Length, this parameter will be the fixed length of the stitch.

Variable Run Length: After user activates this option, the system will create the curve according to the set parameters.



The explanations on the stitch length and the chord gap: The stitch length is the distance between the two neighboring stitch points. Because the stitch point of flat stitch should be on the outline, the chord gap is the max vertical distance between the stitch and the outline. When the Variable Run Length is activated: the stitch length shall be the set value if the chord gap conditions are met; if it is over the chord gap, the stitch length will be shortened until it meets the chord condition or it reaches the Min Length. This can ensure the higher coincidence between the stitch and outline.



The left one is the outline, the middle one is the effect of using the **Variable Run Length**, the right one is effect of using the fixed stitch length.

After the activation of **Variable Run Length**, although more stitches are needed, the stitch will be closer to the outline, which creates the better embroidering effect.



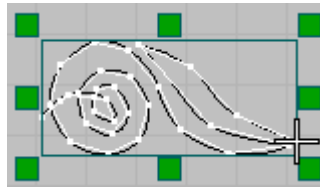
Triple Liner Stitch: Similar to the Triple Manual Stitch. Each stitch will move back and forth according to the set value, which is the odd number from 3 ~15. The actual embroidery effect is thicker than the linear stitch.

5.8 Linear Motif

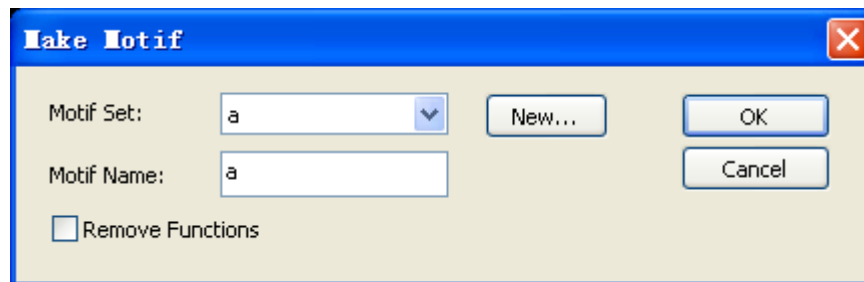


Motif Linear Stitch: it is the stitching method that repeatedly copies the pattern object according to the outline curve. The motif object is a special stitch object, which is saved in motif library. Besides to the common properties of the stitch object, it still contains the additional properties of the referred segment. During the repeated copy of the motif, the system will use the referred segment as the base line for arranging the direction of the motif.

Make Motif: User can add the needed stitch object into the motif library at any time. Generally, there is no special limitation on the pattern object. Almost the entire input method objects can be used as pattern object. Firstly, user needs select the object for adding; secondly, he needs click Main Menu →Others→Motif→Create to open the window of making motif.

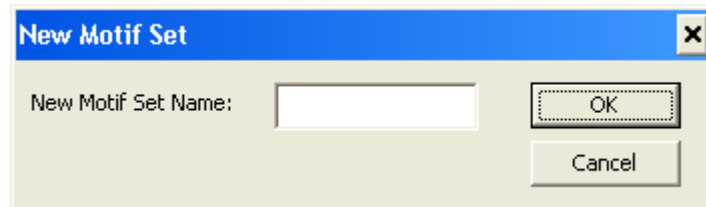


As shown in figure, select a object at first.



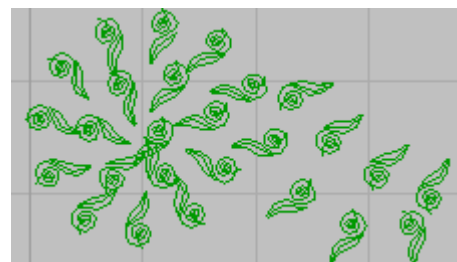
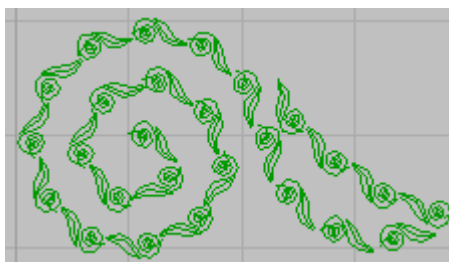
Adding motif window

Firstly, select the motif set, where user can add the new motif set by pressing the “New...”. Then input the name of the motif, and locate the position of the referred line for that motif. User can use the left key of mouse click the first position and the second position.



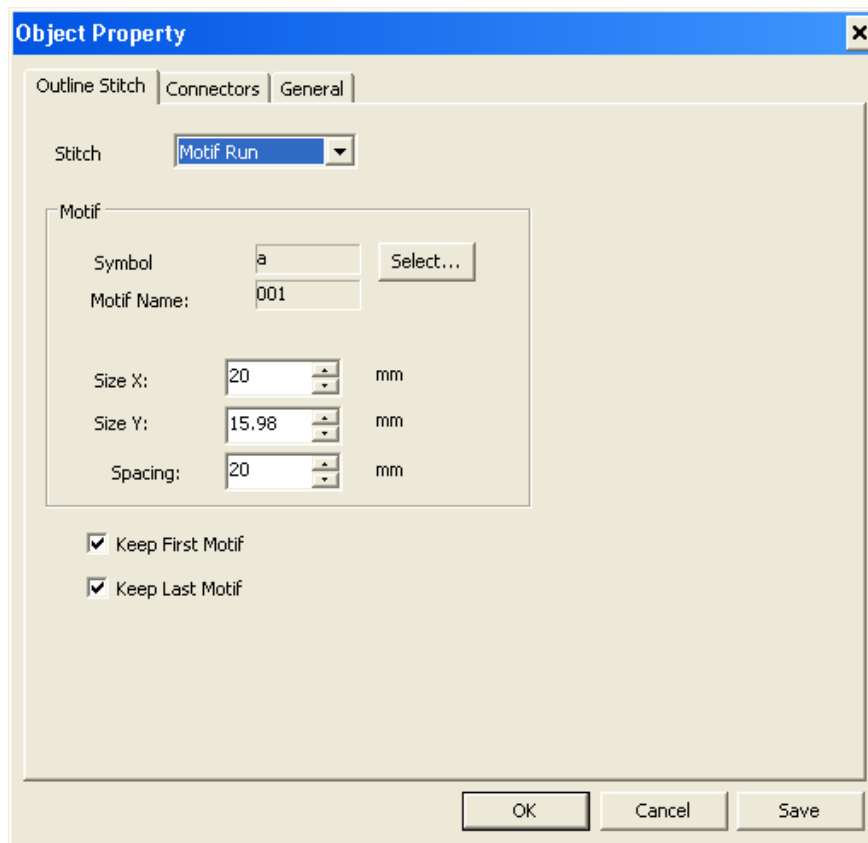
Create a Motif Set

At selecting the patterns with their referred lines at difference positions, even these pattern objects share the same outline and stitching method, the difference of the referred line will cause the differences of the motif created.



The actual effect of pattern with the same outline but difference referred lines

Property of Linear Motif Object shows as following:

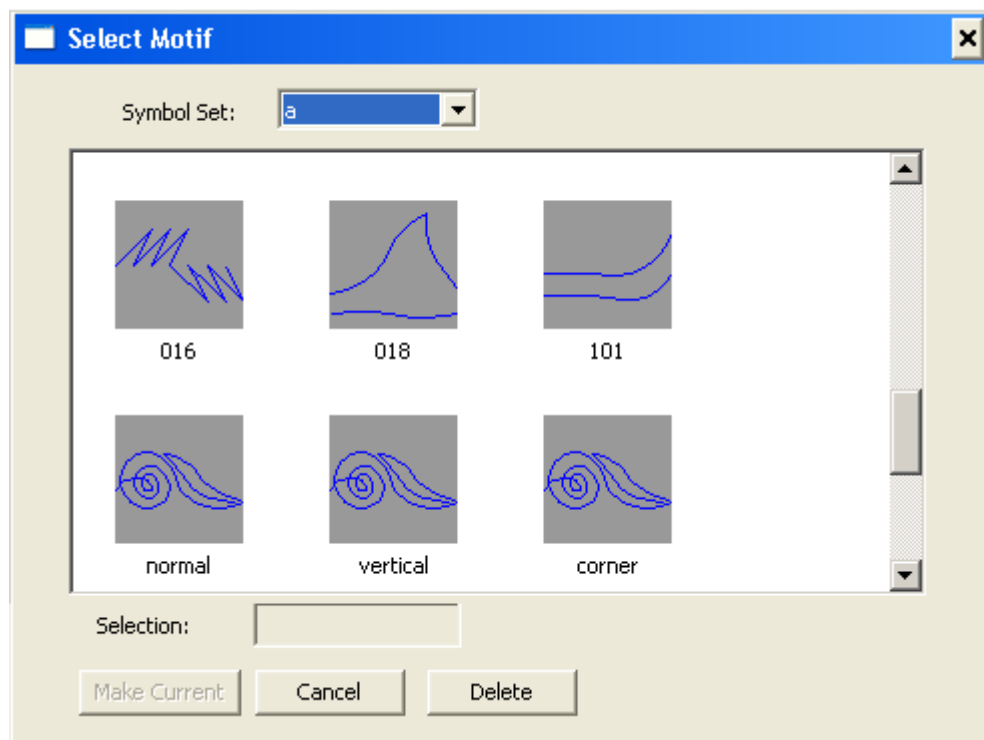


Select...: user can re-select the motif.

Size X/Y: The size of the motif object. The default value is the original size.
To modify this value can realize the scaling.

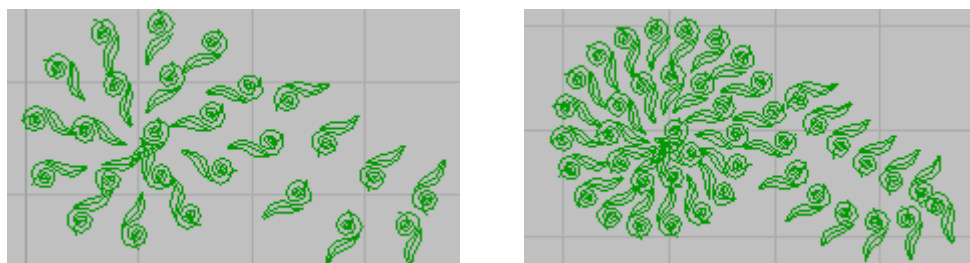
Spacing: The interval at arranging the motif. The min distance is the default value.

Keep First/Last Motif: This determine whether to save the patterns beyond the range of the outline at both sides.



Interface for Selecting Motif

In the Motif selection interface, user can modify the motif of the current object. User can also achieve the result by pressing Main Menu → Others → Motif → Selection. When the identical motif selection windows are opened, the system will modify the default motif.

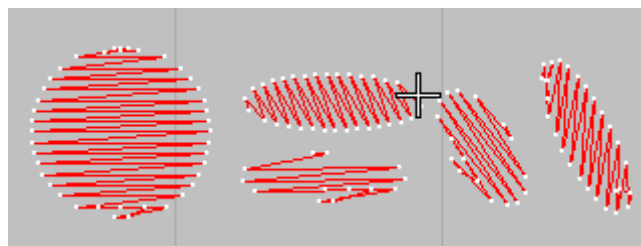


This is the high density effect of motif after user changes the Interval parameter.

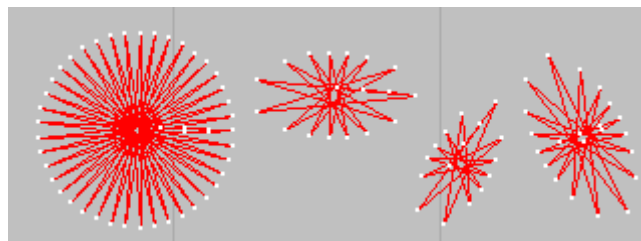
5.9 Circle and Ring



Circle: the input method is same as the circle input in graph object. After the circle input method is selected, there are two kinds of the stitch for the inputted object: the one is to fill the radial stitch with the circle centre as the radial center; the other is to fill the satin stitch in the in direction of the first input axis. The selection of these two stitch types is determined by the mouse keys used at inputting the first axis.



Left Key: satin stitch



Right key: radial stitch



Ring: The ring satin stitch created by two concentric circles that are inputted continuously. The input method of these two circles is similar to that of the circle in graph object.

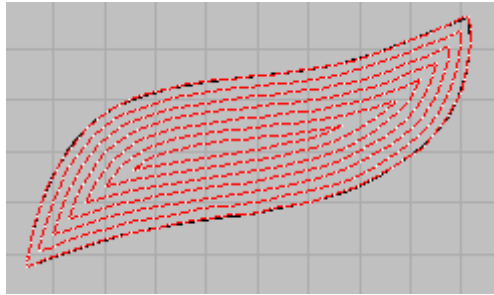


Three basic forms to input ring

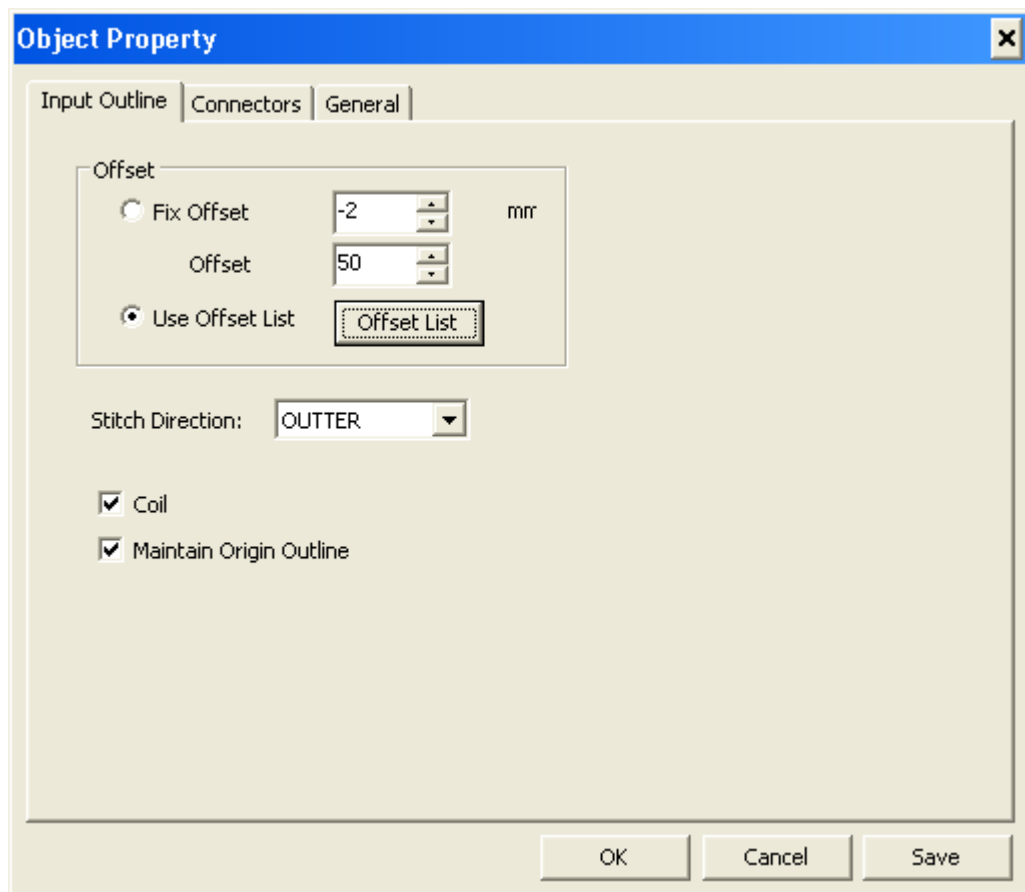
5.10 Outline Stitch



Outline Stitch: a special stitching method that fills offset stitches according to the outline. The new outline keeps an equal distance to the neighboring outline in the vertical direction. The stitches on the outline are the linear stitches; the outline stitches can be used at the special embroidery, like looping embroidery and carpet embroidery. Due to its characters in stitching method, the distribution of its needle entry points is quite average so that it meets the requirements of the special embroidery on the density of needle entry points.



Effect of outline stitch (filling in the equal distance as default)



Double click the outline stitch object to open the property page, where the offset amount and the direction of the outline stitches can be set.

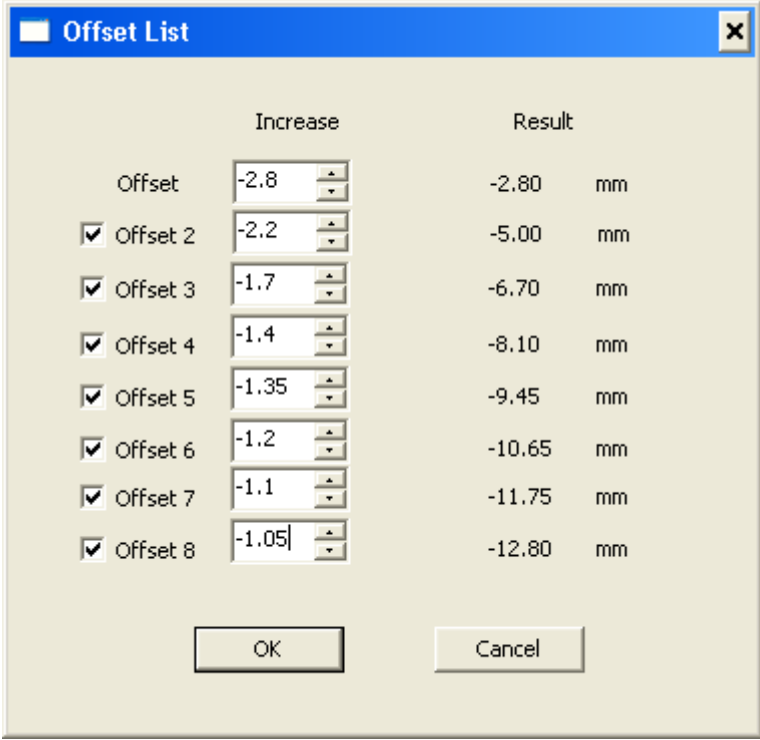
Fixed Offset: the distance of the offset from the outline at each time. The positive number is to offset to the outer side; while the minus number is to offset to the inner side.

Offset: the times for creating the new outline by the accumulated offset.

Offset List: according to the set offset list to create the new outline. It can be used to create the outline stitch with different distances.

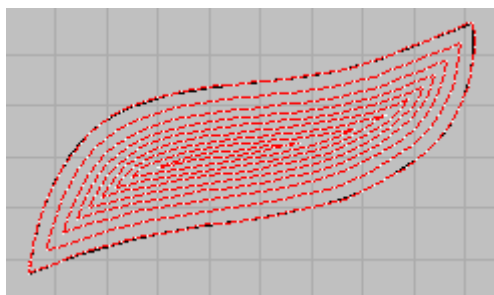
Stitch Direction: select the start/end position of stitch. It only contains two options: the one is outer; the other is from inner.

Maintain Original Outline: whether to create the stitch on the original outline.

The image shows a software dialog box titled "Offset List". It contains a table with two main columns: "Increase" and "Result". The "Increase" column has a sub-column "Offset" and a series of input fields with up/down arrows. The "Result" column shows the calculated offset values in millimeters. There are checkboxes for "Offset 2" through "Offset 8". At the bottom are "OK" and "Cancel" buttons.

	Increase	Result
Offset	-2.8	-2.80 mm
☒ Offset 2	-2.2	-5.00 mm
☒ Offset 3	-1.7	-6.70 mm
☒ Offset 4	-1.4	-8.10 mm
☒ Offset 5	-1.35	-9.45 mm
☒ Offset 6	-1.2	-10.65 mm
☒ Offset 7	-1.1	-11.75 mm
☒ Offset 8	-1.05	-12.80 mm

Offset List: manually set the amount of offset at each time



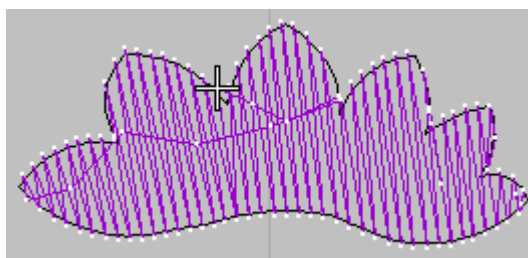
The effect of the outline stitch created in order of “From outside to inside”,
“Decreasing the offset amount”.

Chapter 6 Basic Stitch Method

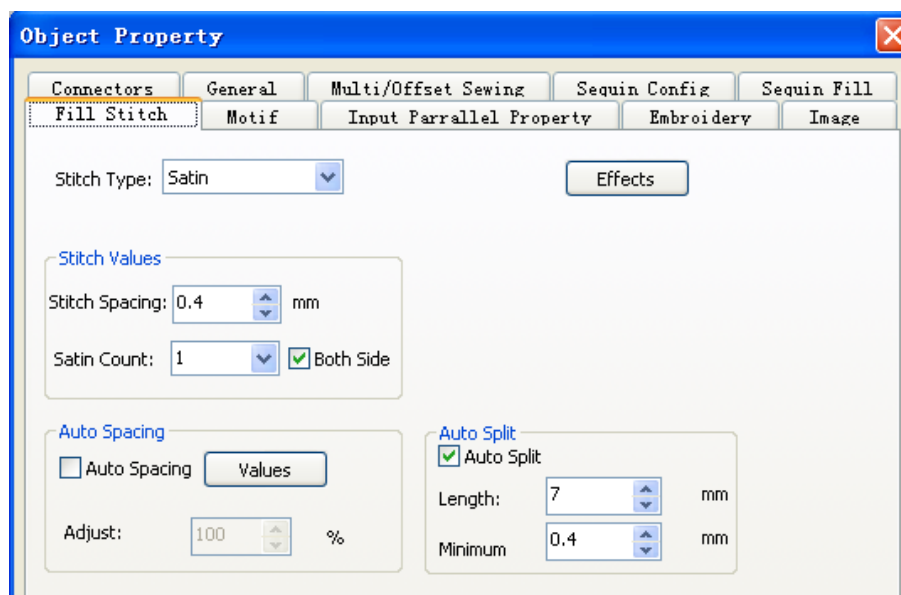
The usage of satin stitch, tatami stitch and other stitching methods.

6.1 Satin Stitch

It is applicable for the satin input (three kinds of satin) and complex filling. Due to its intensive stitch, the actual embroidery effect of it is of luster, which is the most common stitch.



The effect of satin stitch



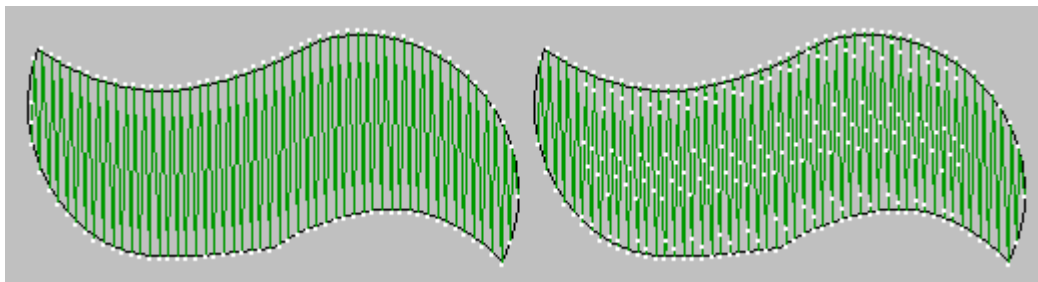
Property of satin stitch

Stitch Spacing: It is to set the density of the stitch, the default setting is 0.4 mm that is able to cover the fabric generally. When users need the more intensive stitches in special condition, like 3D embroidery, they can decrease the stitch interval properly. If the thick thread above 120D is selected, user shall increase the stitch interval properly

Satin Count: This parameter is similar to that of the repeat times in triple run. After it is set, the satin stitch will repeat and form the effect of thick stitch.

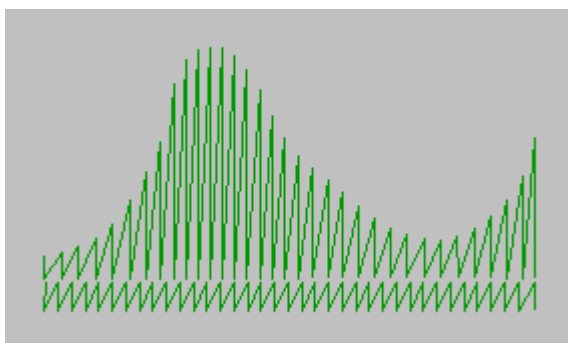
Auto Spacing: Automatically adjust the stitch length according to the change of the stitch direction, so as to optimize the effect at corner.

Auto Split: Divide the long stitch according to the set parameters.

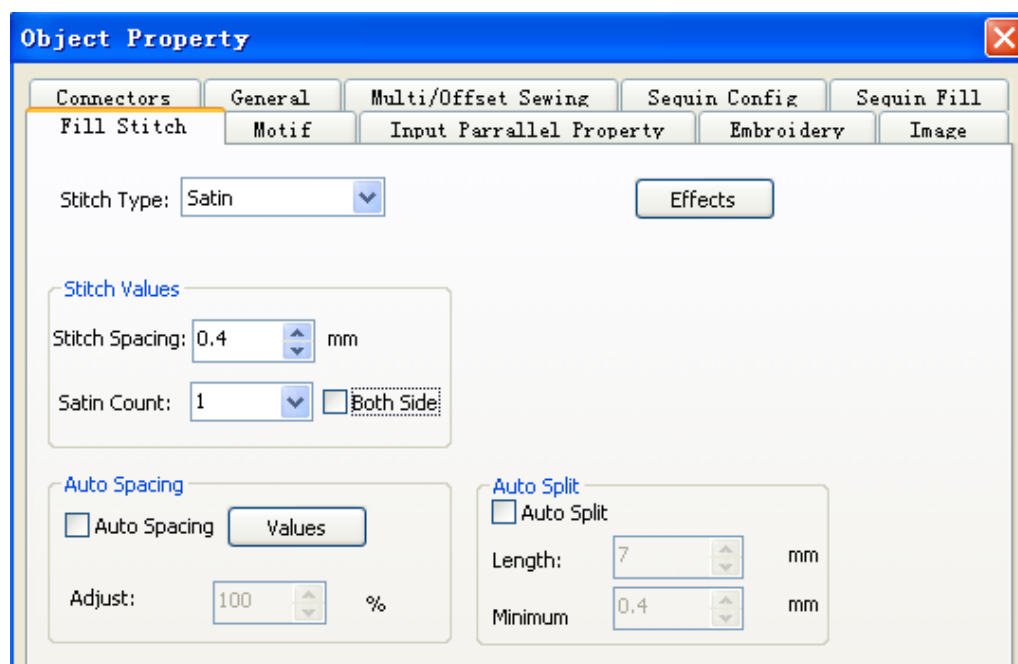


The effect of activating the **Automatic Split**

After user activates the automatic interval function, the system will automatically adjust the stitch interval according to the stitch length. As we can see the below picture, the interval at the long stitches is narrow while the interval at the short stitches is wide.



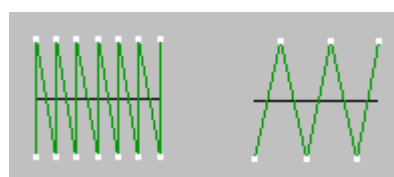
Click “Values“ button at right of “Auto Spacing” to adjust the stitch interval automatically.



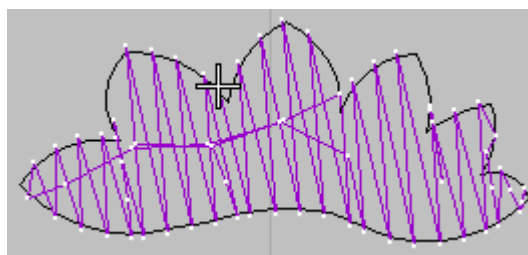
Length column is the stitch length; interval means the stitch interval for the stitches whose length is below the set range. Interval deviation is the compensation according to the types of embroidery thread. The different types of thread have the different thread width.

6.2 Zigzag Stitch

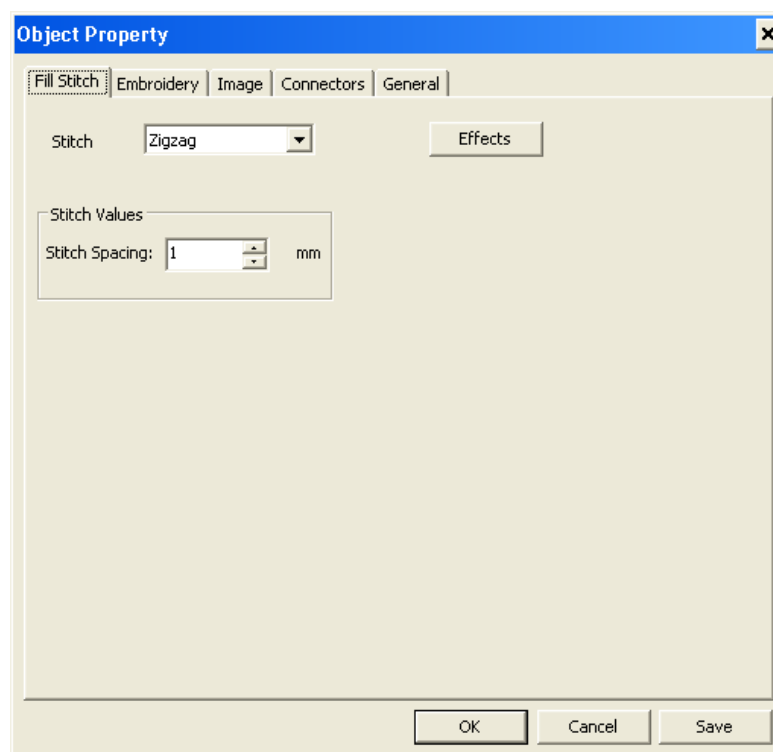
It is the stitching method that forms the stitches in the alternative structure. When the interval is quite low, they will be hard to be distinguished from the satin stitches.



Satin Stitch: the stitch points at both column sides are symmetrically located;
Zigzag Stitch: the stitch points at both column sides are alternatively located.



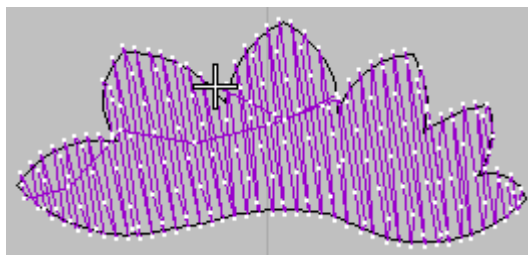
Effect of Zigzag Stitch: The default interval of zigzag stitch is larger.



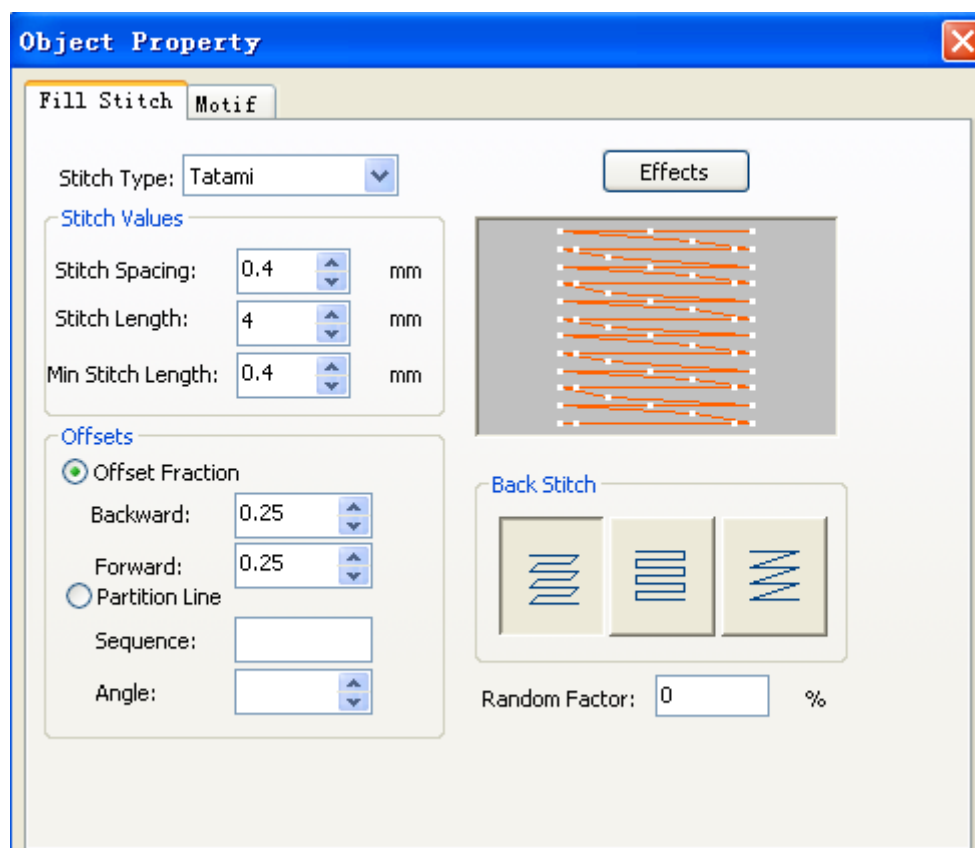
Property of Zigzag Stitch: Contain only one option of Stitch Spacing

6.3 Tatami Stitch

The name “Tatami” comes from the effect of its stitches look like the knitting effect on tatami. It is caused by the stitches generated by the alternative stitch point. The tatami stitches are usually used for filling the stitches.



The default effect of tatami stitches



Stitch Spacing: The vertical interval between two stitches in the same direction.(Note: it is the interval between two stitches that gaps with one row, instead of two neighboring stitches).

Stitch Length: The length of each stitch, which can also be deemed as the maximum stitch length.

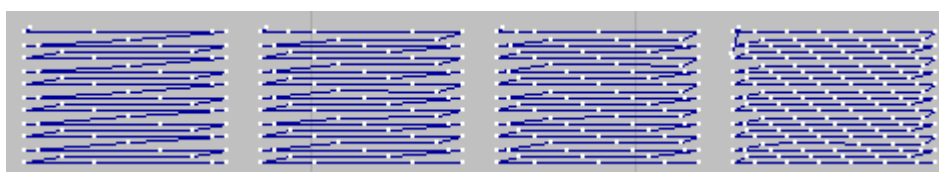
Min Stitch Length: The minimum stitch created by the division. The stitch below this length will not be divided.

Offset A/B: Section range: 0~1 in 100 percents. They are used to set the offset of the two retrieval stitches comparing to the base line. When they are set at 0 or 1, there will be no offset.

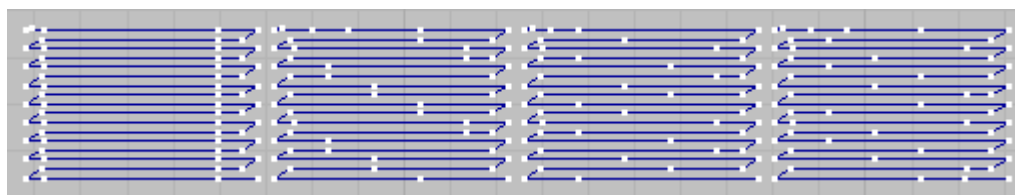
Partition Line: Manually set the offset point.

Back Stitch: The handling method of the returning stitch point.

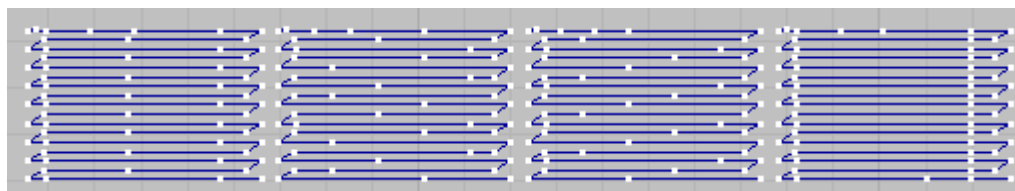
Random Factor: Add a random amount at the division point, which makes the needle entry point become irregular.



The effect of stitches whose stitch length are set at 4, 3, 2 and 1mm respectively.



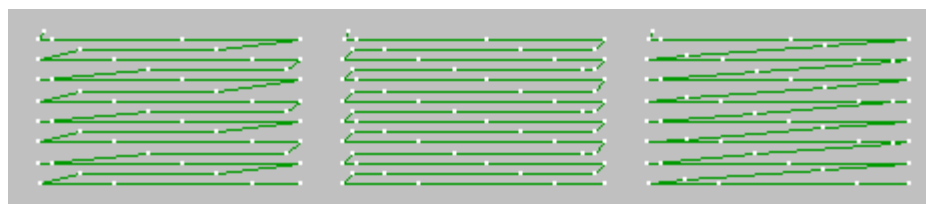
A=0, B=0, A=0, B=0.25, A=0.25, B=0.5, A=0.5, B=0.75.



A=0.5, B=0.5, A=0.75, B=0.5, A=0.75, B=0.75, A=1.0, B=1.0.



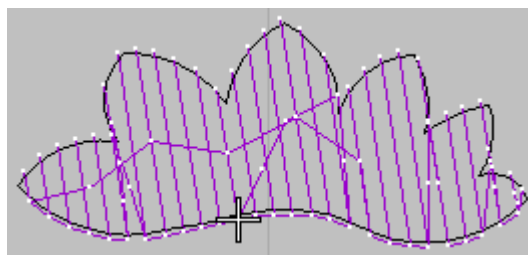
The effect of stitches whose Min Stitch are set at 0.4, 0.8, 1.2 and 1.6 mm respectively.



The three return stitches corresponding to the button in property page.

6.4 E Stitch

It is the stitching method which shape looks line char “E”. The E stitch can be used as the fixing stitch in appliqué



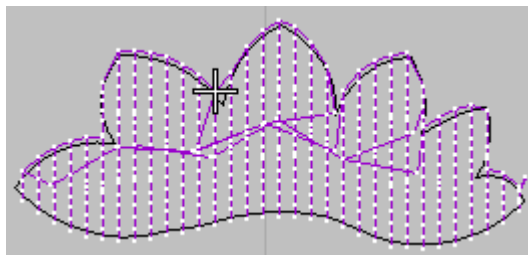
Effect of E Stitch

In the property page of E stitch, there is only one option, the Stitch Spacing.

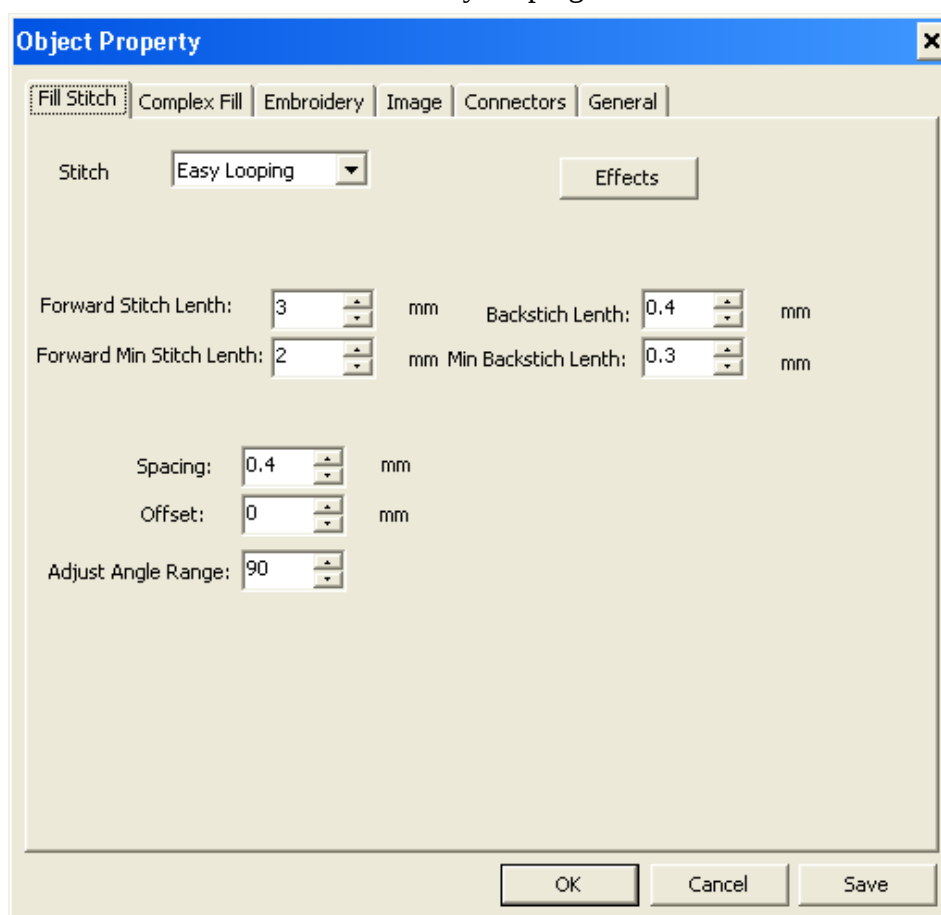
6.5 Easy Looping

It is the filling stitching method whose retrieval stitches are not symmetrical in the vertical direction. The easy looping stitch method is the special stitching

method that is able to realize the effect of the looping embroidery with the easy looping device.



Effect of Easy looping Stitch



Forward Stitch Length: It is the down stitch length. Because the stitch lengths between up stitch and down stitch are not symmetrical, the down stitch is the longer normal run.

Forward Min Stitch Length: The min division length of the down stitch.

Backstitch Length: it is the up stitch length. The up stitch is shorter, which is the looping stitch.

Min Backstitch Length: The min division length of the up stitch.

Spacing: Interval between two neighboring stitches.

Offset: the offset of backstitch from forward stitch, which can prevent from

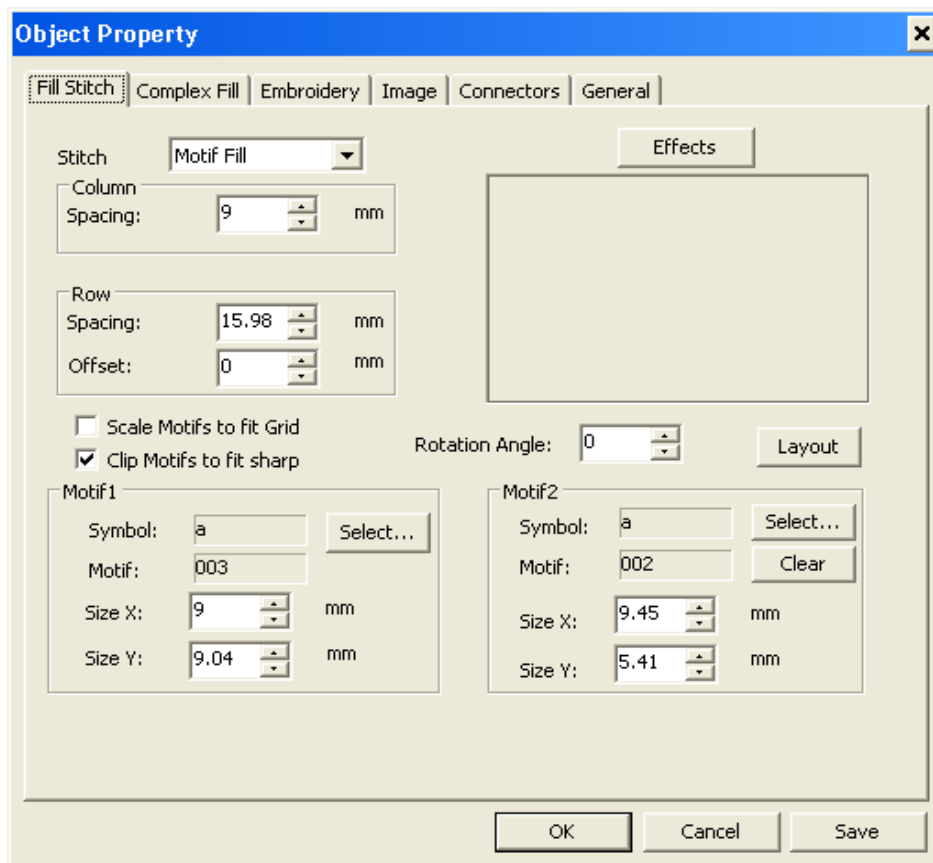
overwhelming forward stitches.

Adjust Angle Range: Default angle is 90. The recommended adjustment range is 80-100, or user can set the angle according to the requirement of the device.

At the actual practice of easy looping embroidery, user can set the height of the loop via the setting of the machine color-changing. But the height of the device and the tension of the upper/bottom thread will affect the loop height. User needs to adjust the machine to make sure the embroidery effects of the entire heads are similar.

6.6 Motif

Motif filling is similar to that of motif run, but there is still a difference. The motif filling will copy the filling pattern in the method of matrix and support the alternative filling method of two patterns.



Column/ Row Spacing: The interval between the arranged motifs. The default value is the size of the currently selected motif.

Offset: The offset distance between two neighboring motifs, which cause the alternative effect of the motif.

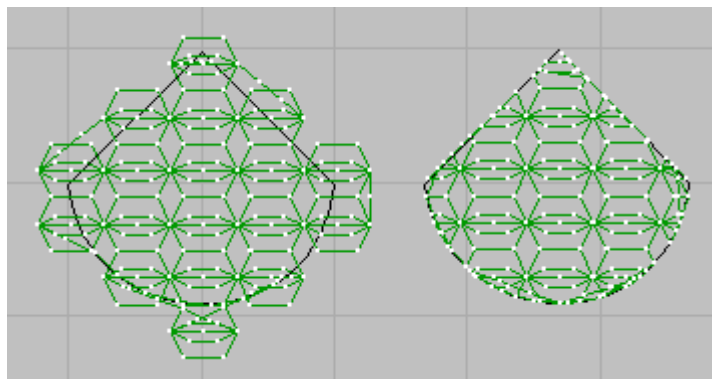
Rotation Angle: The patterns are filled in the horizontal direction as default.

After the modification, user can set the filling angle.

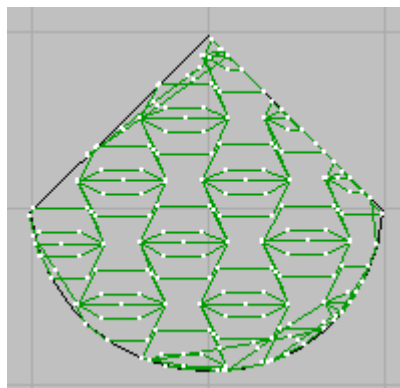
Clip Motif to Fit Sharp: After the activation of this parameter, the stitches beyond the outline will be deleted.

Motif 1: The default motif can be selected in the motif library via the button “Select”. By changing the size in X/Y direction, user can scale the size of the motif.

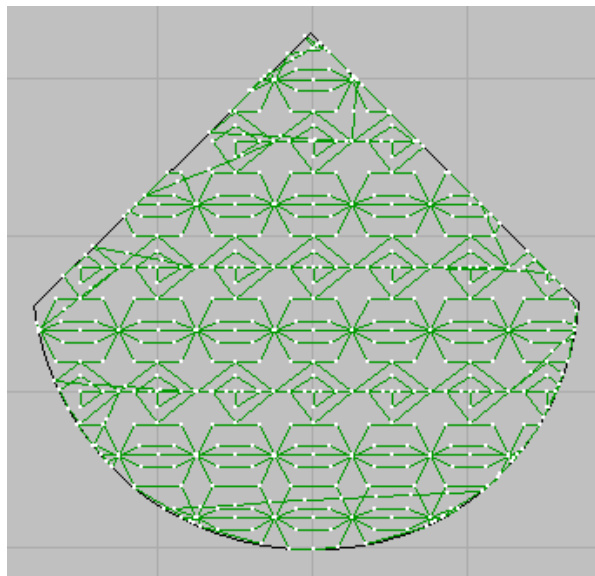
Motif 2: After user select the shape of motif, the system will fill it at the next line of motif 1. The filling of motif 2 is alternative with the motif 1. Pressing “Clear” can clear the motif 2.



The comparison between the stitch effects after the activation of **Clip Motif to Fit Sharp**.



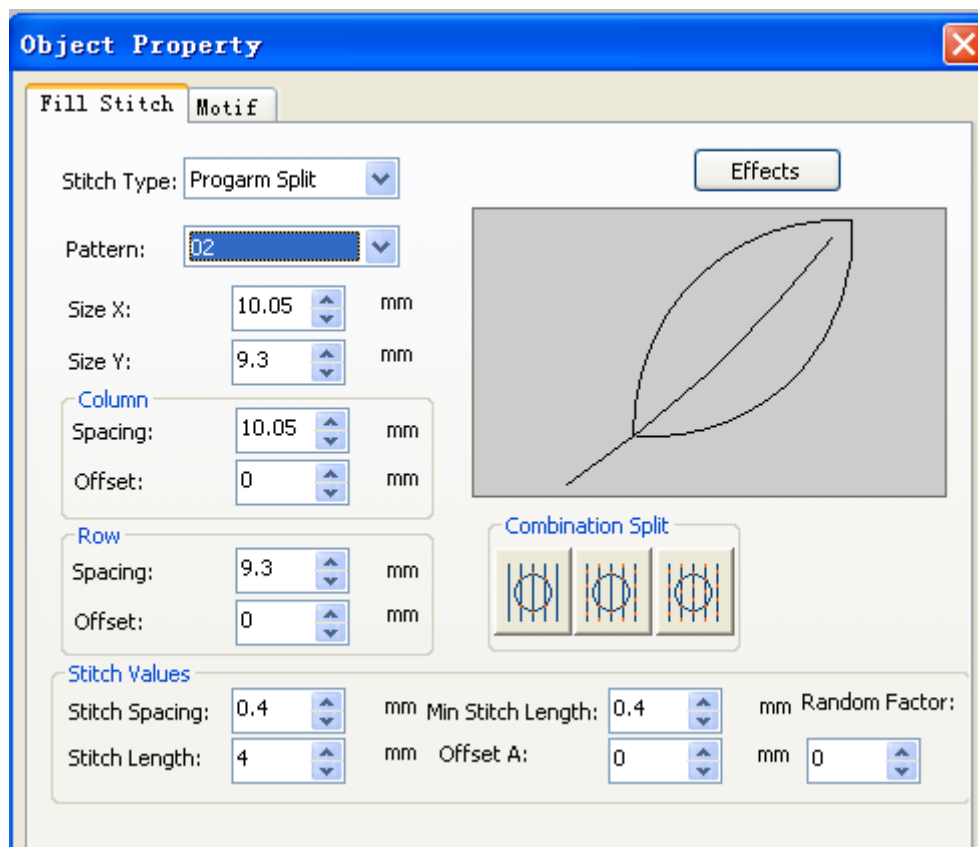
Effect of filling, the rotating angle at 45 degrees



The effect of alternative filling (after the motif 2 is set)

6.7 Repeating Division

It is a special tatami stitch. According to the set partition line, the system will repeat the partition lines in the way of matrix. The actual embroidery effect can display the direction of the partition line, which can realize the special effects like the relief.

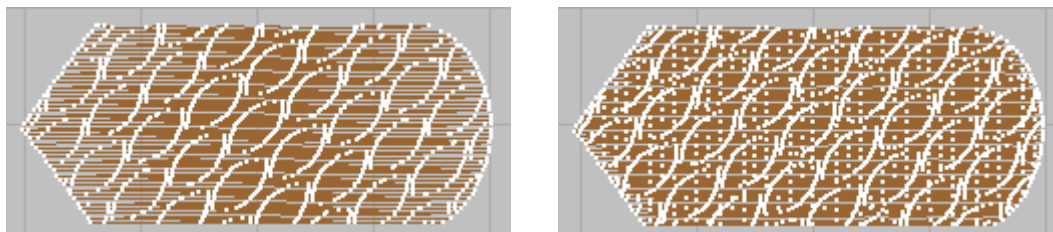


Pattern: Select the pattern for division. The default sizes in X/Y direction are the original sizes in pattern. After the modification, user can scale the pattern.

Column/Row Spacing: The interval of patterns arranged by matrix. The default value is the original size of the pattern.

Column/ Row Offset: The offset of patterns arranged by matrix. The alternative effect can be achieved from this parameter.

Stitch Value: The parameters for the Tatami filling operation, similar to the basic parameters of the Tatami.



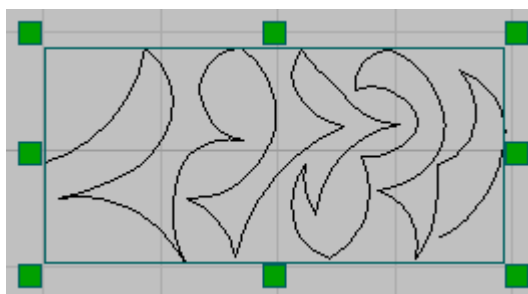
Effect of normal division and effect of division with Tatami



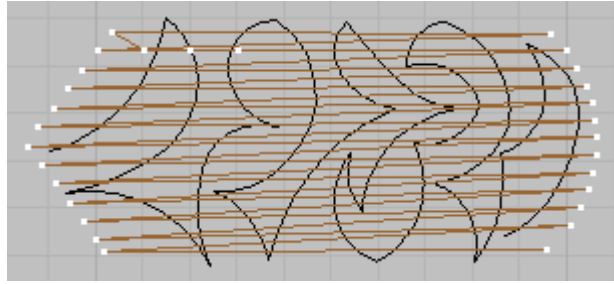
Effect of simulation embroidery, where the clear division textures can be seen.

6.8 Customized Division

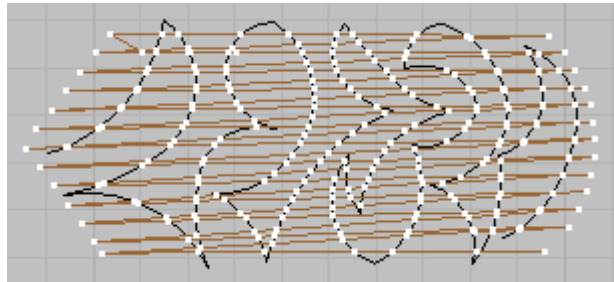
It is to let the user to set the stitch division line. The generation of the stitch is divided into three steps: 1. Set the outline, select a graph object and select the customized outline via Main menu → Others → Make segment → Customized division of stitch; 2. Select a stitch object, whose stitching method is satin stitch, zigzag stitch, tatami stitch, E stitch or other retrieval stitches. Move the object to the position overlapping the outline mentioned in step 1; 3. Activate the customized division function of the object so that the new stitch points can be created at the positions where the stitches and the outlines are crossed.



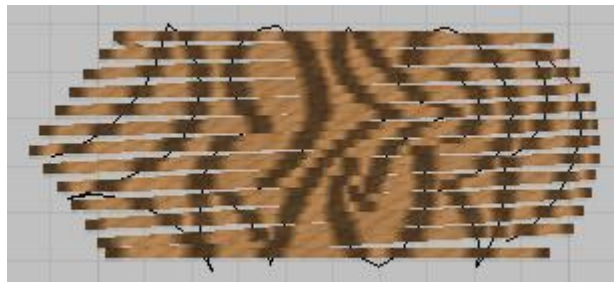
Select one graph object as the customized outline



Move the stitch object that needs division to the position to cover the outline



Active the customized division function and then click .



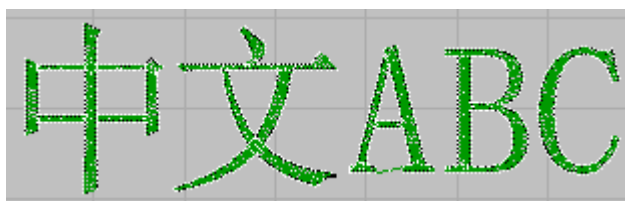
The effect of simulation embroidery where the division lines can be seen.

Chapter 7 Character Embroidery

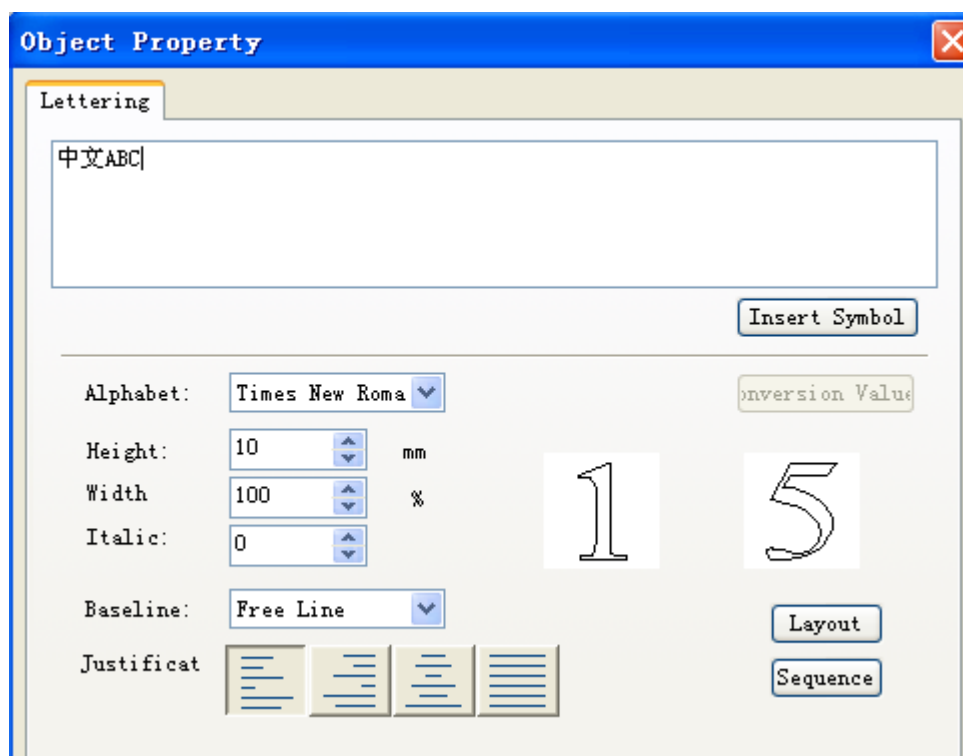
The input method and property modification of character embroidery

7.1 Input method

Select , then click the mouse left key at the position, where the characters are needed, on the design area to activate the frame for inputting. Input the character, set the font and click Enter to generate the character object.



The stitch of character object: where user can use the stitching method of changeable width satin.



In the property dialog of character object, user can input or change the character in the character frame directly.

Alphabet: select the font. The list will display the system font. When user

selects a new font, the letter within the frame will be changed according to the font selected by user.

Height: The height of the character created. Default value is 10mm.

Width: The scaling ratio comparing to the standard width. The default value is 100%.

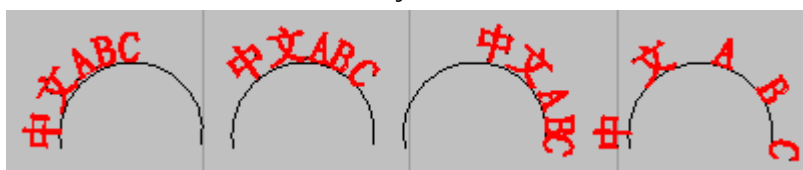
Italic: The tilt angle of the character.

Base line: The referred curve at arranging the characters; User can select the linear or the curve.

Justification: The four alignment methods of the characters comparing to the base line, including left, middle, right and even distribution.



The character object at different fonts



The effect of four alignment method, the black arc is the base line

7.2 Modification of Property

After the character object is inputted, user can realize the different stitch effects by changing the properties of the object. By setting the height/ width and the tilt angle, user can change the size of the characters.

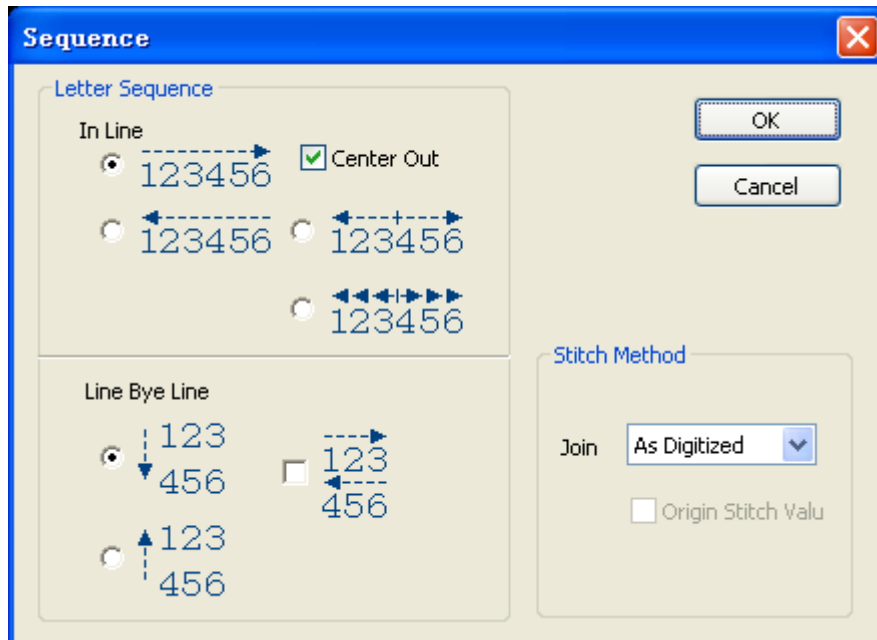


The effect of stitch whose tilt angle is set at 15 degrees

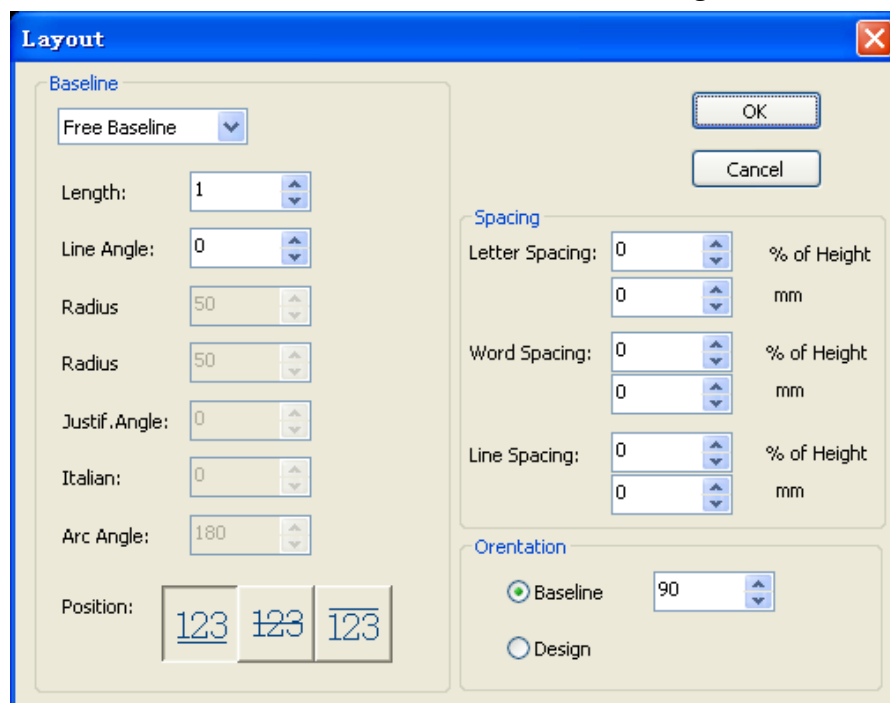
The Layout and Sequence on the character property window can open two additional windows for adjusting the character properties respectively. Among these two interfaces, the Layout interface enables users to set the details of the base line, like the length and angle of the base line. If the base line is a curve or circle, user will be able to set the axis length, tilt angle and arc angle. The Layout interface also provides the more accurate method for adjusting the base line, which also can be achieved with the reshape tools. And we'd like to introduce

them in the Chapter 10.

Sequence interface is mainly used to adjust the order of the generated characters, which are the position of start stitch, position of end stitch and the sequence of letter embroidery.



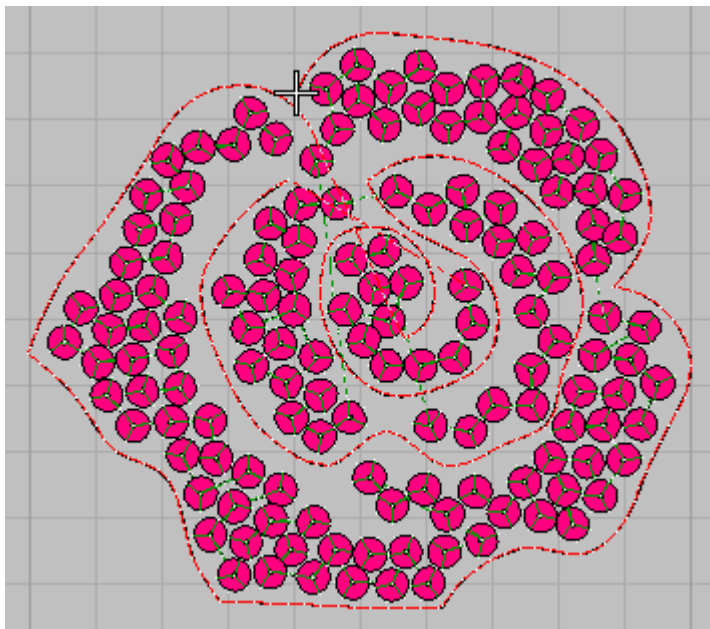
The interface for setting the character order can let user to set the embroidery sequence of the letters. The actual effect is shown in the figures on the window



In the layout interface, user can set base line types, base line length and interval of characters.

Chapter 8 Sequin Embroidery (Only for standard version)

Input method of sequin and the setting of multi-sequin.



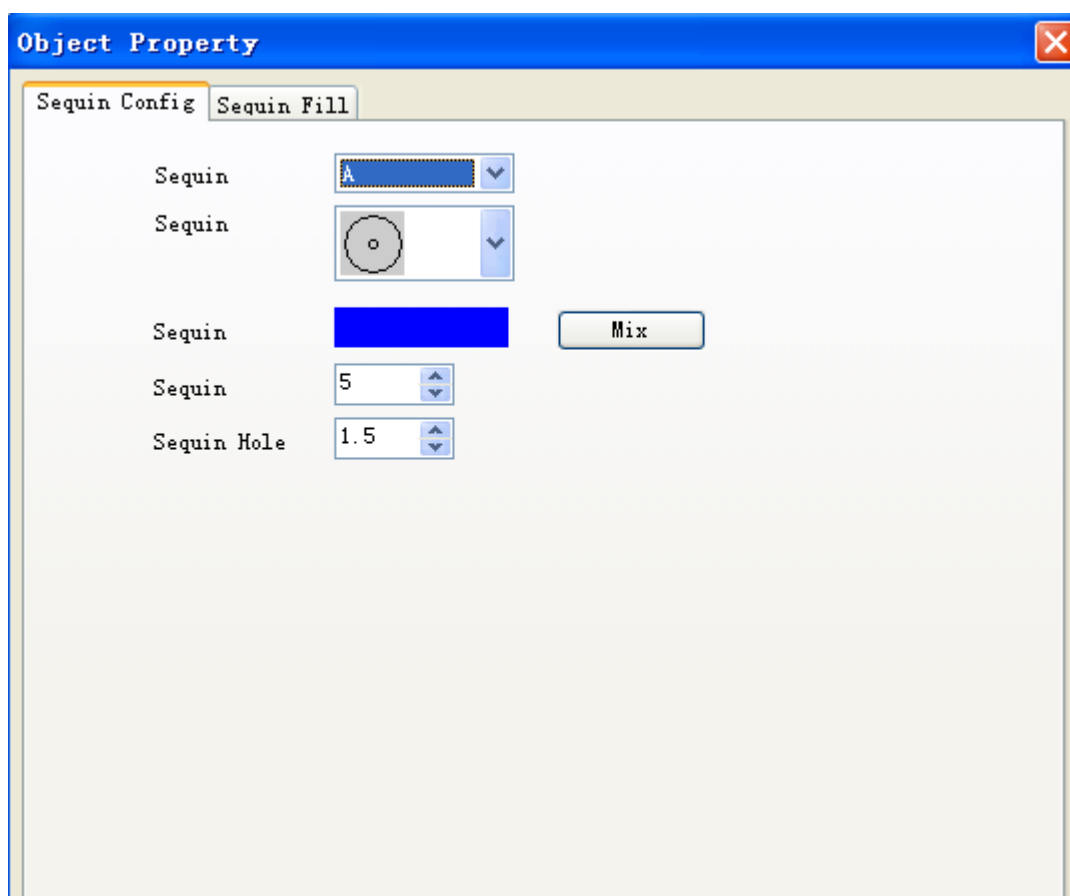
As a kind of special embroidery, sequin embroidery is to use the sequin feeding devices added at the first/last needle position to sew the colorful plastic chips on the fabric. The sequin embroidery almost can be used on any embroidery products that are applicable for the normal flat embroidery. The sequin embroidery can be used as the small part interspersion or as the main body of the embroidery product. Due to its special color and luster, the sequin embroidery has gained the favor from the consumers since it was invented.

Multi-sequin is the derivative embroidery method of the sequin. The traditional sequin embroidery is the single sequin mode, which can only embroider one kind of sequin at one stitch point. But the multi-sequin sequin can have the sequins at different sizes embroidered at a single stitch point simultaneously. The overlapped sequin mode and the alternative feeding mode are the exclusive characters for the multi-sequin. In the overlapped sequin mode, the sequins at different sizes will be overlapped from small to big in order; while in the alternative feeding mode, the sequins at different sizes will be alternatively and continuously embroidered on the fabric in the sequence set by the users.

8.1 Setting of Sequin Mode

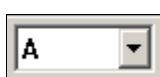
The default feeding mode in emCAD is the Type A in the multi-sequin mode. There are 15 types of feeding methods in multi-sequin, among which the A, B, C and D are the single sequin, while others are the overlapped modes with the combination of these four kinds of sequin. By pursuing the order on size A < B < C < D, the system can only accept the overlapped sequin mode following the principle “small one is overlapped on the big one”. Any overlapped sequin mode violates this principles will be deemed as invalid and will not be found in the options either.

Click  to active the interface for setting the sequin.

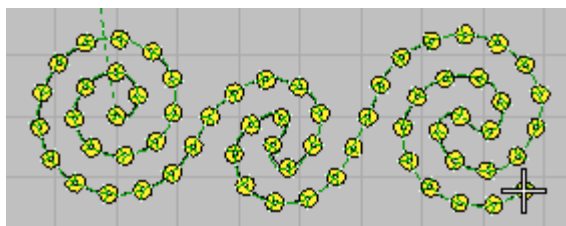


On this sequin interface, user can respectively set these four single sequin modes in the fields of sequin pattern, sequin color, sequin size, sequin hole and sequin feeding mode. The setting of colors can only be used at the interface display.

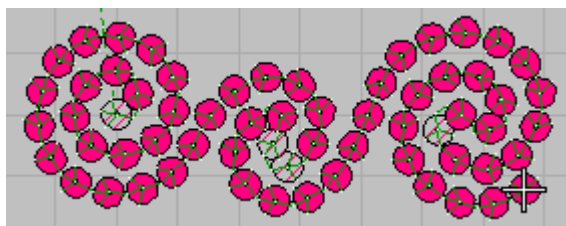
User can set the sequin at different shapes (Round, eclipse, diamond, square, club and drip type), colors and sizes according to the sequin device installed so as to realize different embroidery effects.

Click  to open the list, then user can select the corresponding

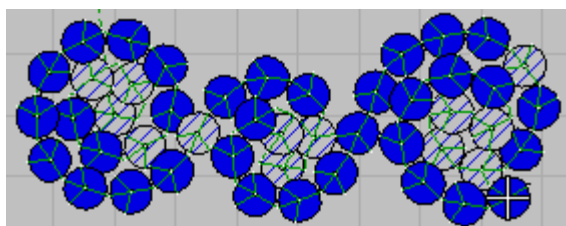
feeding method. The system will create the sequin pattern according to the current setting. For the generated objects, user can select the object and click the sequin list to change the sequin mode of it.



Sequin A, 3mm, Yellow



Sequin B, 5mm, Red



Sequin C, 7mm, Blue

The unfilled sequins in the picture are for the sequins that would be pierced by needle, and the system will ask user to modify them. In actual embroidery, user needs avoid the needle to pierce on the sequin that was embroidered, because on one hand the needle holes on the sequins will lower the embroidery quality, on the other hand the thread is easy to get broken when the needle runs into the sequin.



From the left to right, these are the 15 kinds of sequin modes in the list

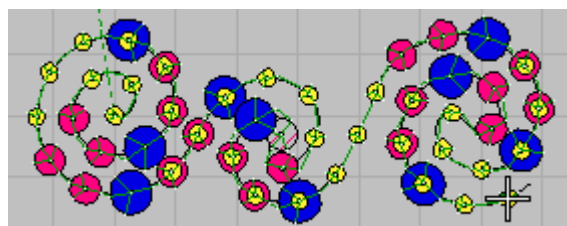
Select the last option in this list to activate the window for customized sequin feeding mode.

MultiSequin Rule

No	Sequin Type	Repeat
1	A	1
2	B	1
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		

OK Cancel

The customized sequin feeding mode is to feed the sequins according to the set sequin order and to repeat the same sequin order one by one.



A *3, B *2, C *1, AB *2, AC *1, 5 modes in total , and nine sequins are in one cycle.

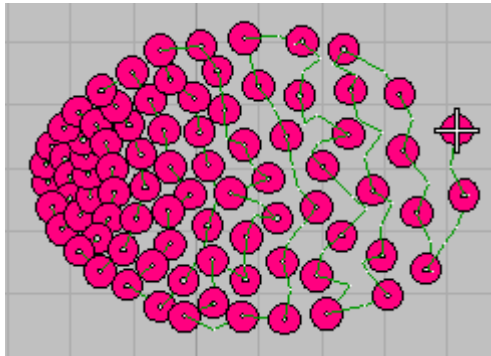
8.2 Linear Sequin

In linear sequin, there are three input modes mainly: Manual Sequin, Manual Sequin Run and Auto Sequin Run.



Manual Sequin: The input method is similar to that of the manual stitch.

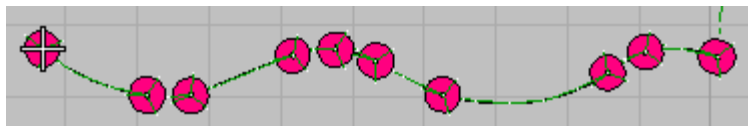
The left key is used to input stitch point, while right key is used to input the sequin-feeding code. During the manual sequin input, user can press **Q** or **W** to change the current sequin-feeding mode. The sequin feeding code and the fixing stitch of the sequin shall be set by user. This mode is relatively flexible but the input efficiency is low, and the latter modification and maintenance are also relatively complicated.



The manual sequin is suitable for realizing the irregular sequin effect like the graded filling.



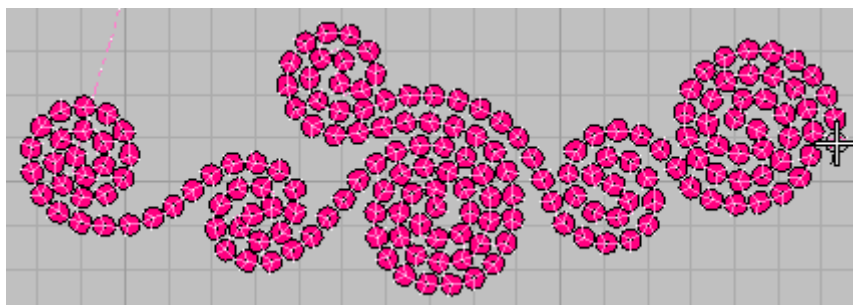
Manual Sequin Run: The input method is similar to Linear Stitch; the left key is used to input the linear point, while right key is used to input curve points. In default, at each control point the system will create a sequin feeding code. If user holds **D** and inputs the points, the system will only generate the stitch line without feeding sequin. This method is suitable for interspersing some sequins on the basis of Linear Stitch.



The effect of the interspersed sequins on basis of Run



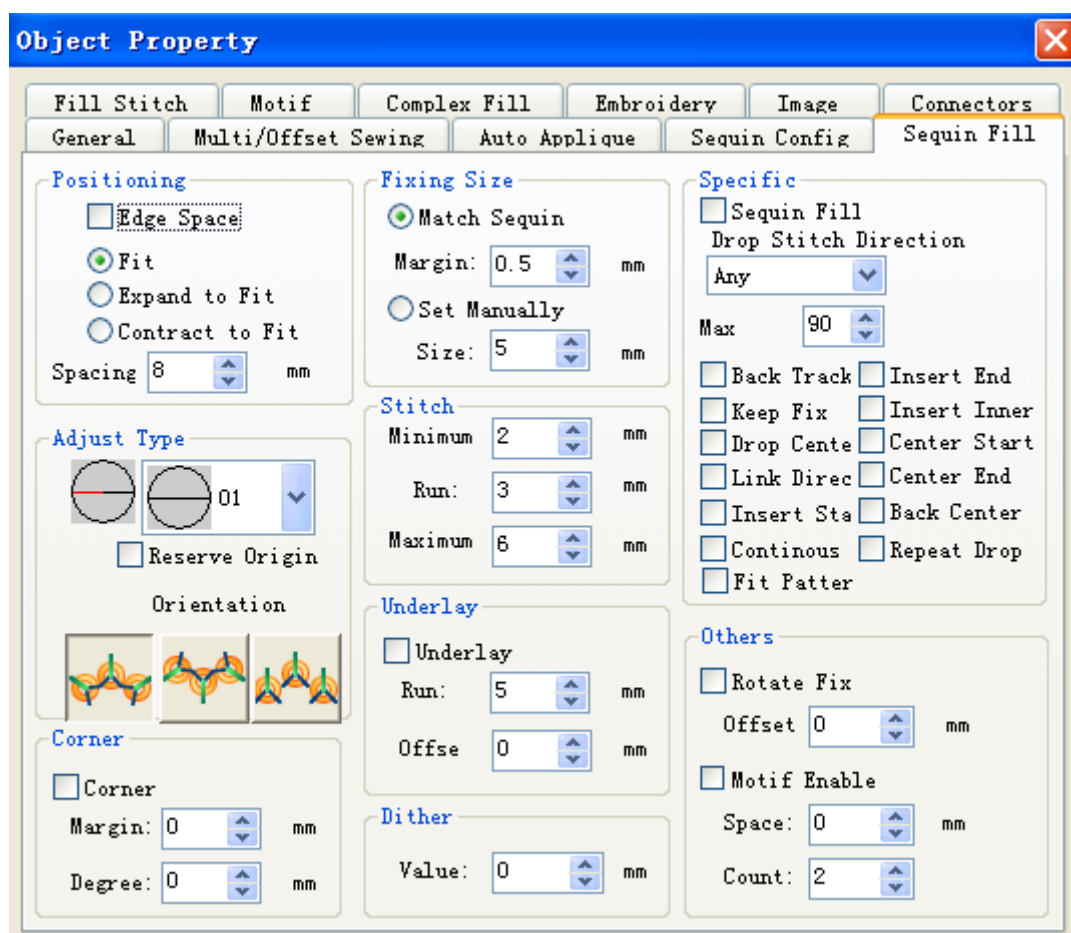
Auto Sequin Run: The input method is similar to Linear Stitch; the left key is used to input the linear point, while right key is used to input curve points. After the object is created, the system will automatically generate the sequin feeding order on the outline according to the set sequin interval. The generating method of it is similar to that of the liner motif.



It is suitable for filling the blocks and the lines formed by the continuous sequins.

8.3 Properties of Sequin Feeding

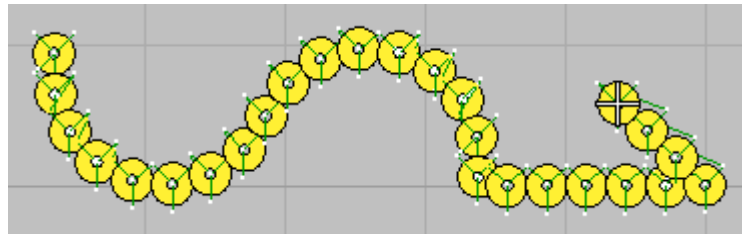
Mainly, the relevant properties of the sequin can be set, such as the feeding mode, arrangement type, feeding direction, fixed stitch length. Select the sequin object, double click the left key on object to activate the property page, and select the outline stitch.



8.3.1 Positioning setting

The positioning setting is to set the sequin interval at the auto sequin run mainly. If it is set as **Auto Spacing**, the emCAD will automatically

calculate the optimized interval of sequin according to the size of sequin



Effect of Sequin Distribution with **Auto Spacing**: Because the sequins keep the minimum distance to each other, the distribution of sequin with **Auto Spacing** will be compact and uniform.

The interval mode contains three options, which are Exact, Expand to Fit, Contract to Fit. The Exact means to arrange the sequins strictly according to the set value. The Expand to Fit is to enlarge the interval properly on the outline to extend the filling gap, while the Contract to Fit is to decrease the filling gas.



The effect of Exact: At the corner of the outline, the offset distance between sequin and outline is large.

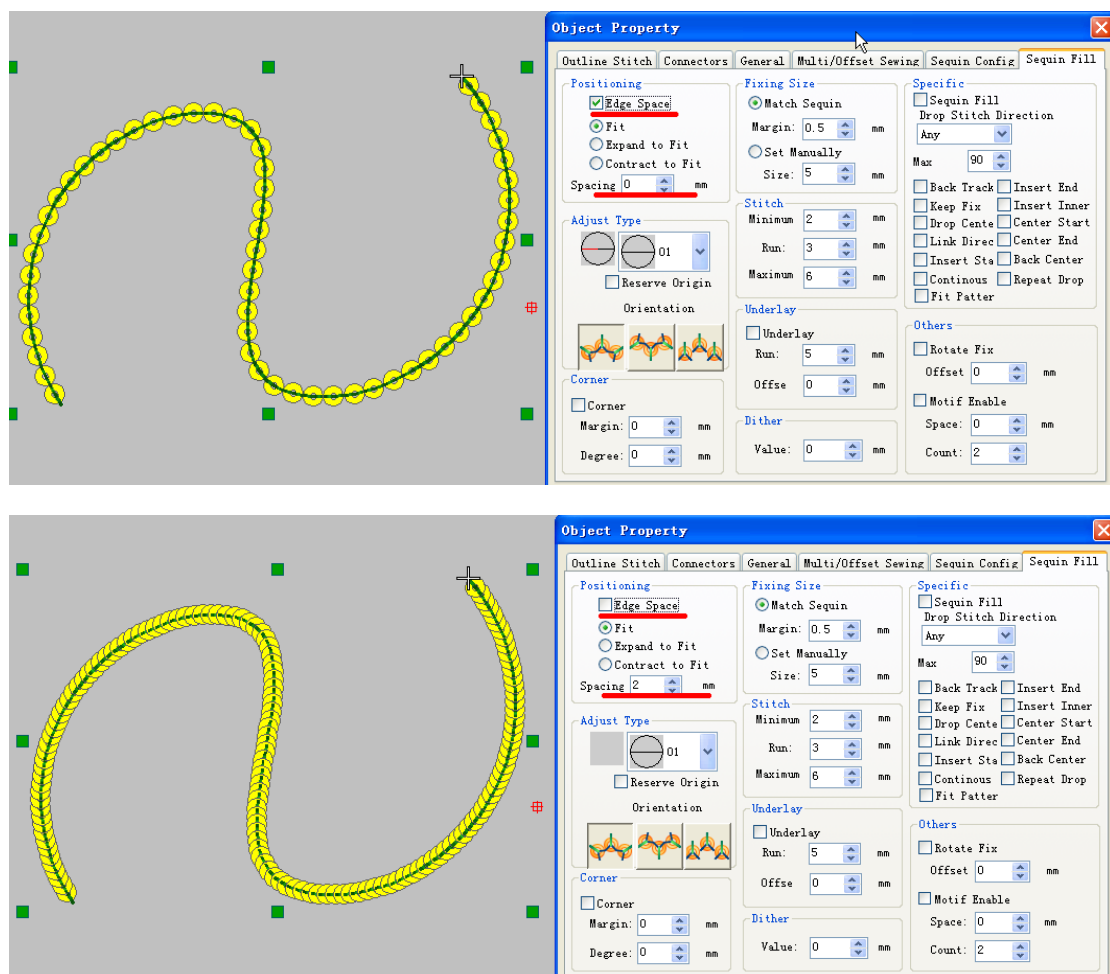


The Expand to Fit: It will properly enlarge the distances between sequins so that the error at turning of the outline can be reduced.



The Contract to Fit: It will properly reduce the distances between the sequins, which will fit the outline well but the more sequins will be used.

There are two types of sequin distance: center interval, boundary interval.



8.3.2 Sequin Type

The sequin type is the sequin feeding type including the feeding stitches and the fixing stitches. In emCAD, there are scores of common sequin types, and user can select the proper one according to the actual needs at embroidery. Usually, the sequin types with more fixing stitches will be firmer and suitable for making the interspersed sequins, while the sequins types with less fixing stitches will be better on the embroidery effect and suitable for filling the sequin in large area due to their loose fixing.



Several sequin feeding types

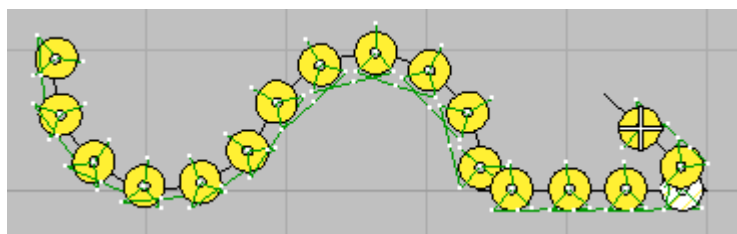
8.3.3 Set Direction

It is to set the arrange type of sequins on the outline. There are three

options, which are Left , Right  and Center .



Left: The system adjusts the angles of sequins along with the direction of the outline tangent, where we can see the start stitches and end stitches of sequins are all located at the left side of the outline in the forwarding direction.



Right: The system adjusts the angles of sequins along with the direction of the outline tangent, where we can see the start stitches and end stitches of sequins are all located at the right side of the outline in the forwarding direction.



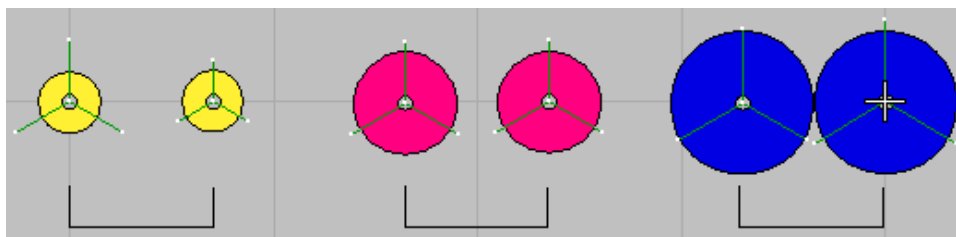
Center: The system will not adjust the angle of the sequin. The sequins remain their angles. The distributions of start stitch and end stitch are irregular.

Some vertically symmetrical sequin patterns will not have the obvious change after their direction properties are changed.

8.3.4 Adjustment of Size

Mainly, it is to adjust the length of the fixing stitch in sequin embroidery. The default setting is the **Match Sequin**. In this mode, the system will automatically adjust the length of the fixing stitch according to the size of the sequin. In the mode of **Set Manually**, the length of the fixing stitch will not

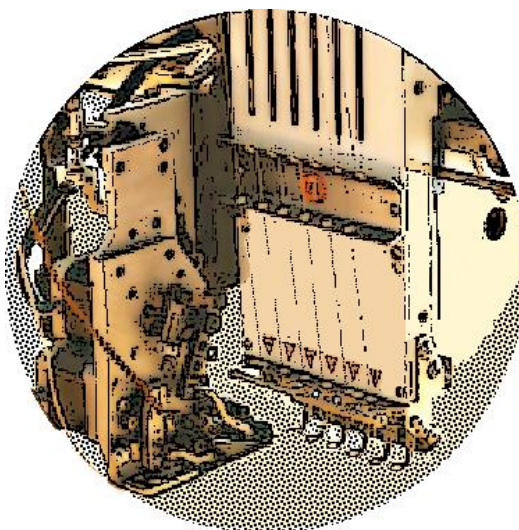
be change along with the size of the sequin.



The comparisons among the three groups of sequins: in each group, the fixing stitch on the left one keeps unchanged, while the fixing stitch on the right one is adjusted according to the actual size of the sequin (The stitch point always keeps 0.5mm to the edge of the sequin).

8.3.5 Sequin-feeding Direction

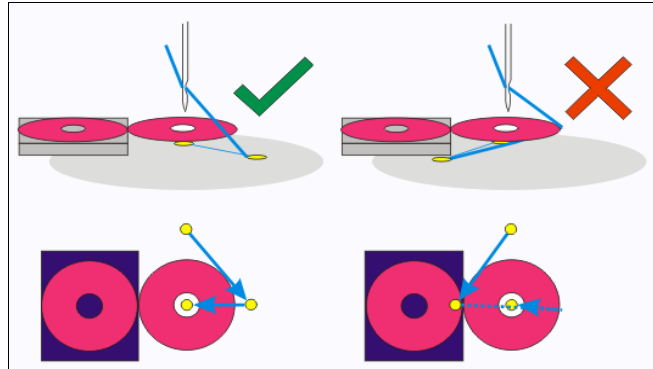
Usually, sequin device is installed in the front of the head or at side of it. For the device installed at front, the sequins are fed from the down to up, so the stitch should go from up side to the down side. At this moment the frame is moving sequin from down to upper, which is in the same direction as the sequin-feeding. For the devices installed at side of the head, the feeding directions of sequin only have “Left” and “Right”, so it has less influence on the direction of the feeding stitch that moves along the vertical direction.



Sequin device in front

If the reverse feeding stitch that is contrary to the embroidering direction of device appears, the sequin embroidery may not be performed normally, where the sequin-missing, stitch displacement and thread-breakage may happen. It is due to that the sequin crashes with the upper thread when the embroidery direction is contrary to that of the sequin-feeding. If this

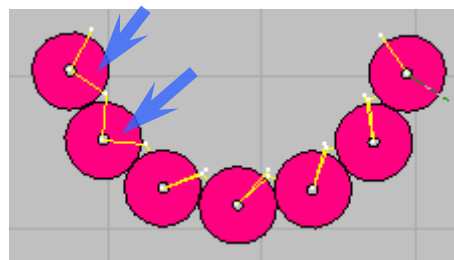
reverse feeding stitch happens seldom, the fault on embroidery may not be seen. However, in the circumstances of high speed embroidery (speed over 750rpm) and sequin-filling in large area with same feeding direction, the fault on the embroidery product will be quite obvious. At this situation, user can solve this problem by rotating the entire pattern for 90 degrees or changing the sequin-feeding direction.



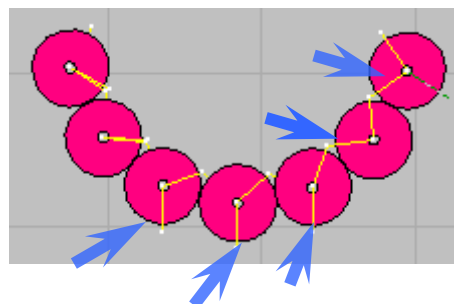
The crash between the embroidery direction and the sequin-feeding direction



If the sequin-feeding direction is set at random, the system will sent the sequin according to the actual design of pattern.



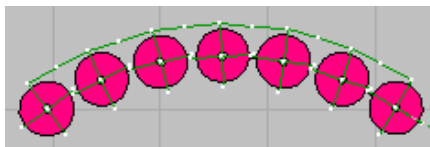
The original embroidering stitches don't match to the feeding direction (to North Side), so the new embroidering stitches are added.



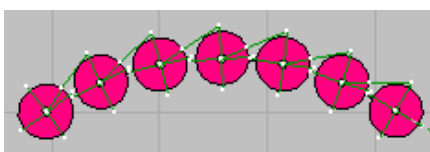
If the sequin feeding direction is set as South, the new embroidering stitches in the direction of south will be added.

8.3.6 End at Center Point

This parameter is to set whether the last stitch of the sequin pattern is ended at the center point.



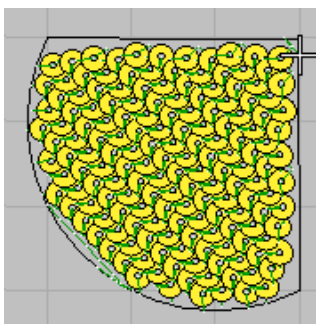
Effect of deactivating this function: Embroidering of each sequin is ended at the ordinary position.



Effect of activating this function: Embroidering of each sequin is ended at the center.

8.4 Sequin-filling

Sequin-filling  is one of the filling stitches, which is similar to the motif filling. The selected sequin-feeding type is the basic pattern, which will be copied and filled into the filling area according to the set values in line interval and the row interval. The line interval/row interval determines the density of the filling. For each sequin-feeding type, the system has the best settings on line/row interval in default. When the interval set by user is smaller than the default values, the system will create the filling object according to the default value instead of the value given by user.



Effect of sequin filling: with the different feeding types, the filling effect will different.

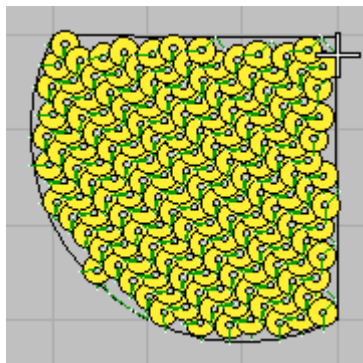
Double click the object or click right key on  to active the interface for

setting the parameters for sequin-filling.

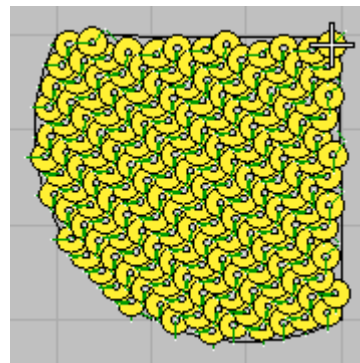
The image shows the 'Object Property' dialog box with the 'Fill Stitch' tab selected. The 'Stitch' dropdown is set to 'Sequin'. There are four input fields for 'Row' (5.0 mm), 'Column' (5.0 mm), 'Offset' (0.0 mm), and 'Error' (0.0 mm). The 'Fill Direction' is set to 'From Down To U' and 'Stitch Direction' is 'Continuous'. The 'Fix With Shape' dropdown is set to 'No'. At the bottom are 'OK', 'Cancel', and 'Save' buttons.

The **Row** and **Column** are used to set the density of the filled sequin. If these two values are too small, the system will set the optimized values automatically.

The **Offset** is the alternating distance between two neighboring sequin rows. The **Error** is the allowed distance over the outline during the filling. With the proper setting on the **Error**, user can have the filled sequins become closer to outline. The recommended value is the radius of the sequin.



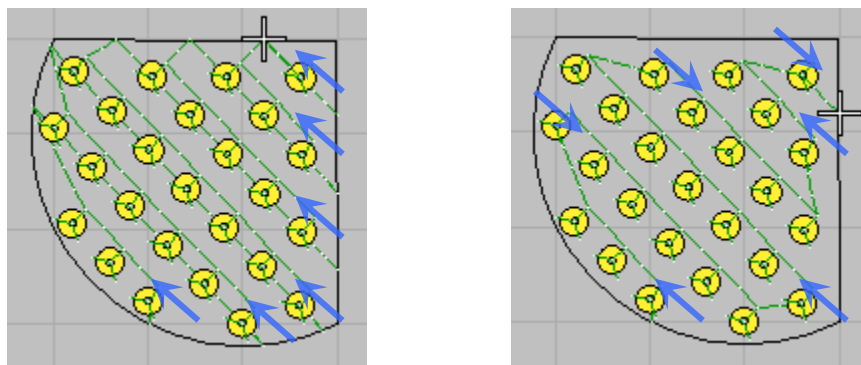
Effect of Sequin-filling (Error at 0.5mm)



Effect of sequin-filling (Error at 1mm)

Fill Direction: It means that the filling start from the bottom or from the top. User can change the filling method by setting the start/end point of the object.

Stitch Direction: User can select to continue or not. There are two filling methods: 1) The lines are in the same direction; 2) Two neighboring lines are in contrary direction.



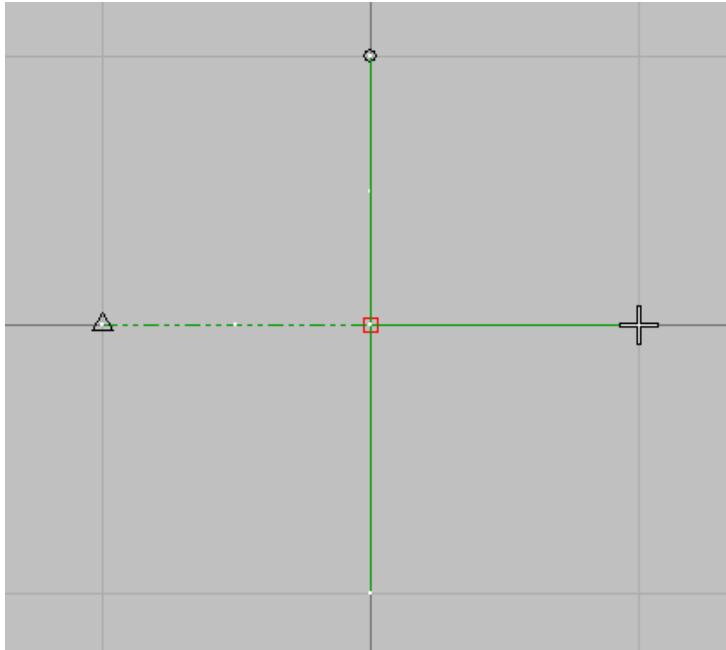
After user activate the parameter of “Fit with Shape”, the emCAD system will adjust the position of sequins slightly, so as to make the sequin filing effect match to the outline better.

The sequin-filling also has the relating properties, such as feeding mode, arrangement type, feeding direction, fixed stitch length. User can use the methods mentioned at above for adjustment.

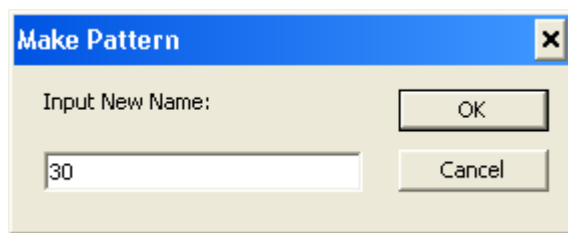
8.5 Customized Design of Sequin-fixing Style

emCAD provides 29 sequin-fixing styles as the default, meanwhile user can also design the Sequin-fixing style by himself.

Select “”, make a sequin object in the principle of “left key for Run, right key for sequin feeding” (Attention: generally, only one sequin is needed), as shown at below:



Select this object and click the Menu “Others”—>“Make Pattern”. Then the system will activate the dialogue frame, where user needs to input the name and press **Enter** to finish it.



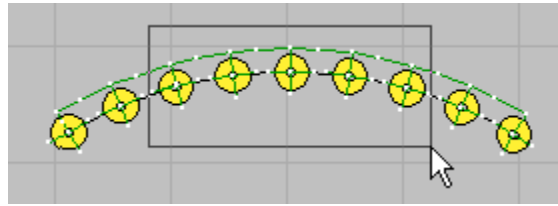
8.6 Sequin Editing

emCAD can modify the sequin mode. Press button  to sequin editing statues.

In sequin editing statue, you can click or frame the sequin codes, which hints with red X.



Click the sequin to make it selected

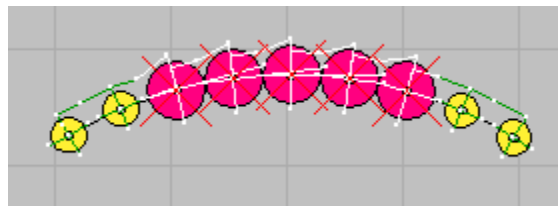


Frame to select some sequins



Some sequins is selected

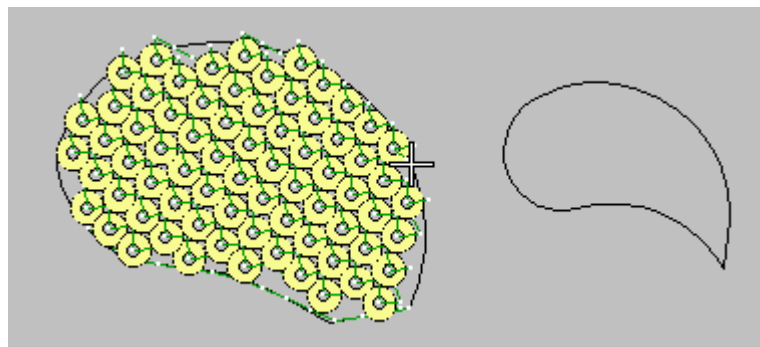
After selecting sequins, you can changed sequin mode with this button



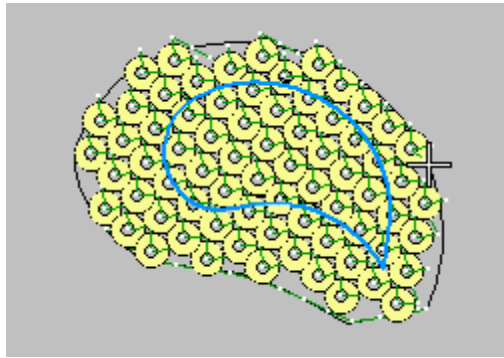
Sequin A is changed into sequin B.

8.7 Sequin Texture

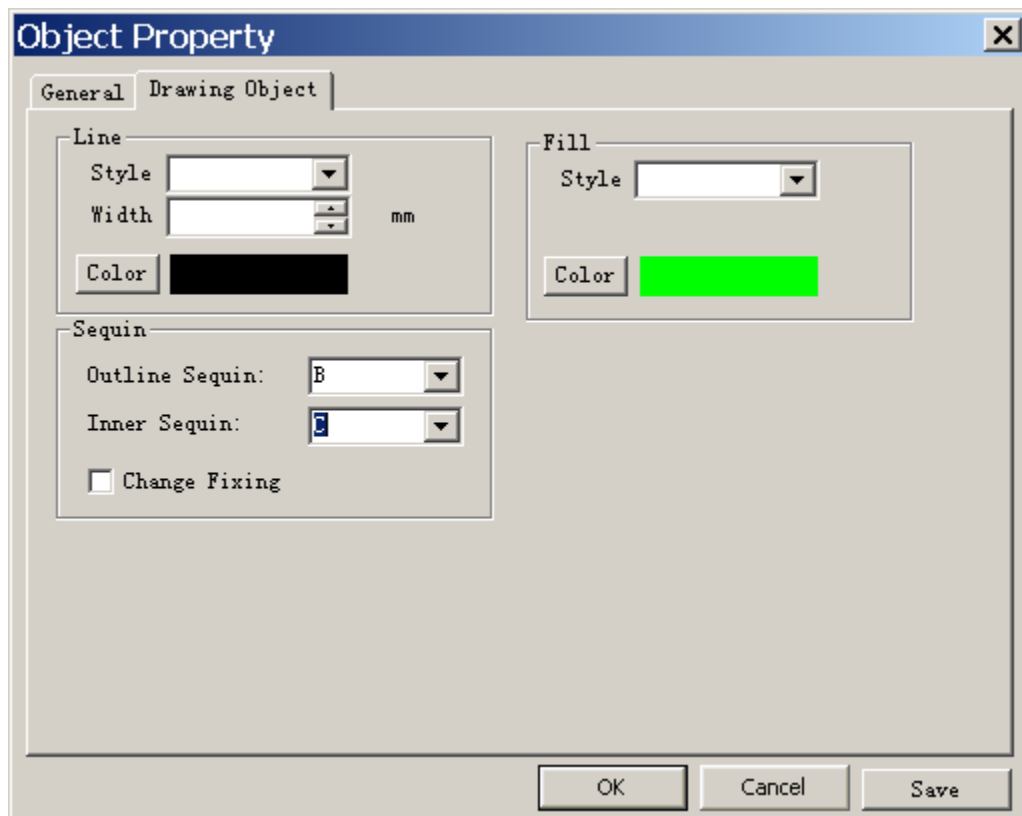
The sequin texture is used to make the sequins to form as a special pattern. By combining the sequin-filled object and a close shape, user can change the properties of the sequins within the shape and the sequins in the outline of the shape respectively. With the texture function, user can easily create the mixed sequin-filling pattern instead of departing the original object to create that pattern.



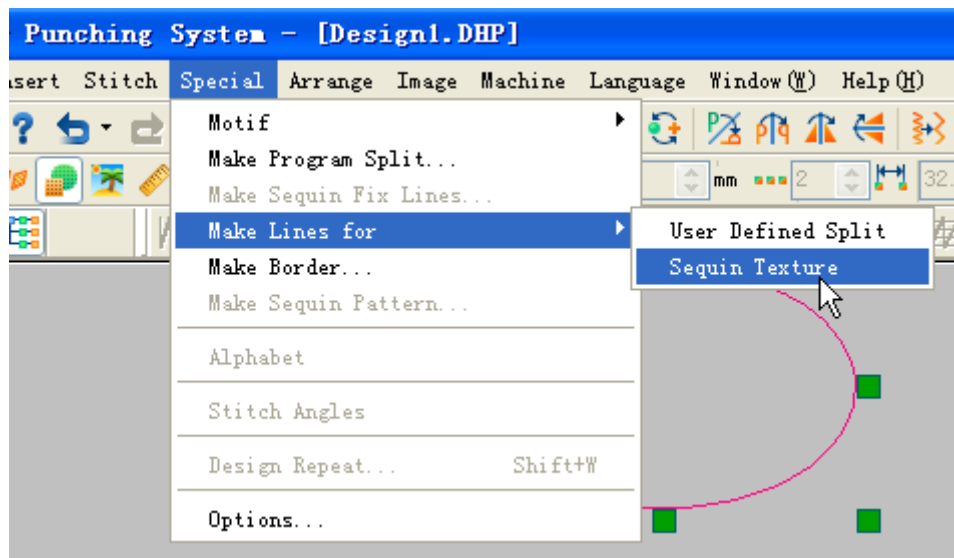
Firstly, create the close shape  respectively.



Secondly, open the window of combined object properties. Then user can set the attributes of the outline sequin and the internal sequin. There are 15 available modes for the sequin code, but usually we just select the sequin combination relating to the mode of the original sequin object. The item of Change Stitch Length is used to automatically change the satin length of sequin.

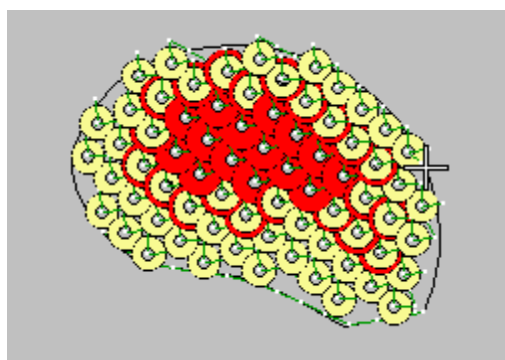
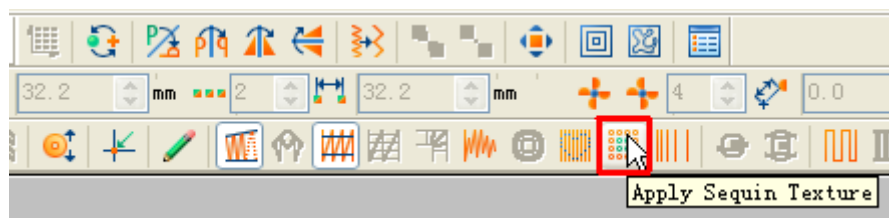


Select the drawing object, and make it as sequin texture object. Do menu operations: Special>>Make Lines for>>Sequin Texture.



Move the close shape to the proper position of the sequin-filling object. Please refer to the current sequin position. The sequins passed by the curve will be handled as the outline. The sequin within the close shape will be treated as the internal sequins.

After selecting the sequin object, click .

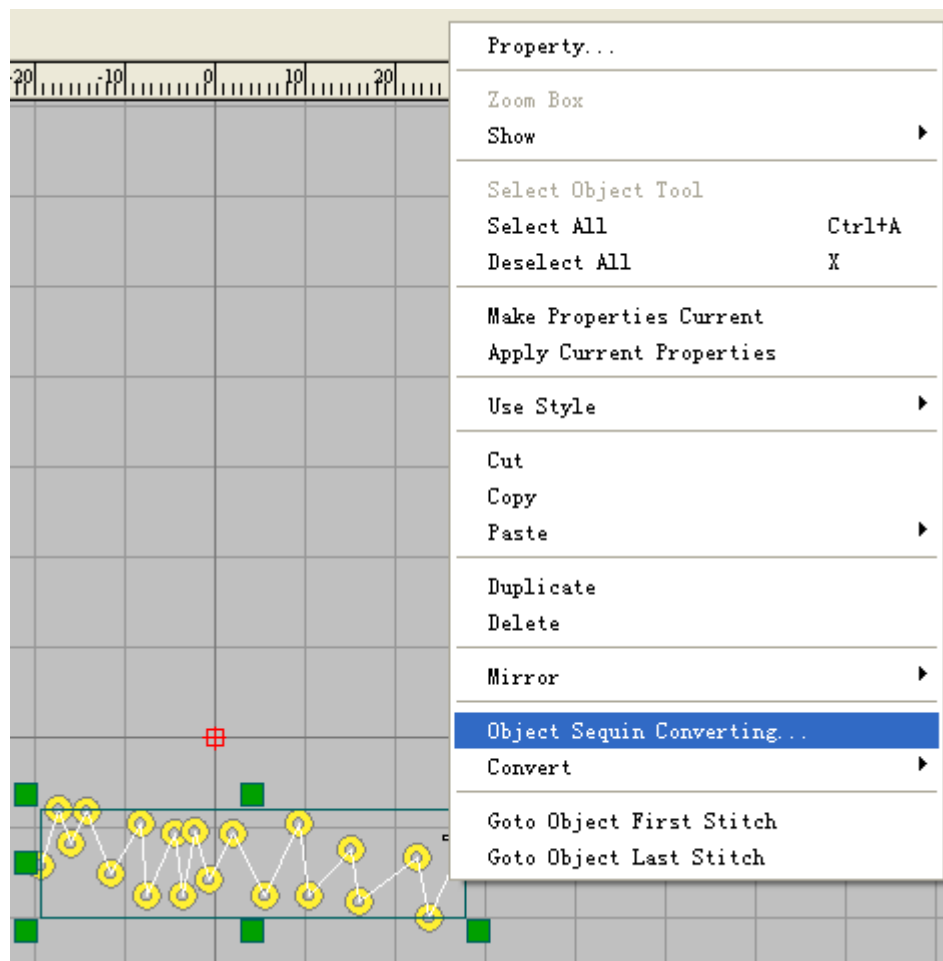


Sequin-filling effect after using the texture

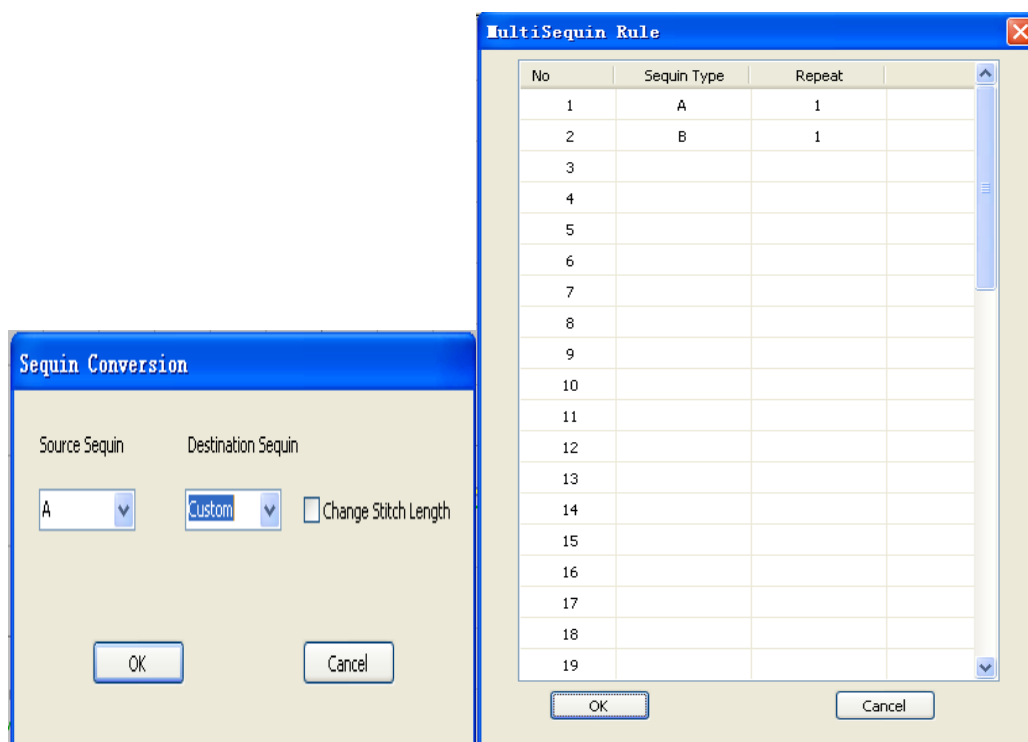
8.8 Object Sequin Converting

Sometimes, user would change the sequin A to sequin B.

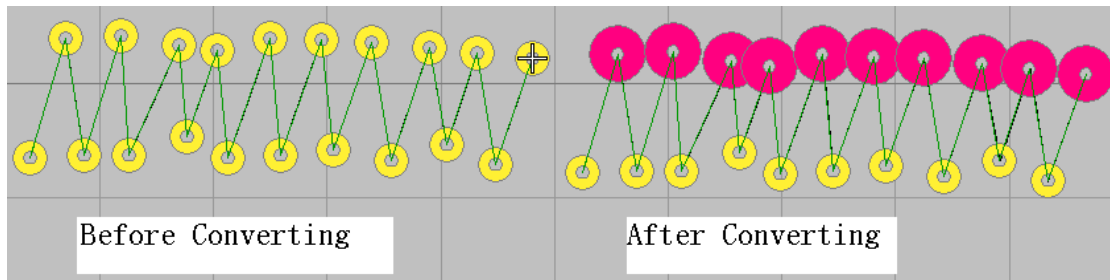
After select sequin object, click the right key:



Set the sequin convert way:



The sequin object has convert the sequins as following:



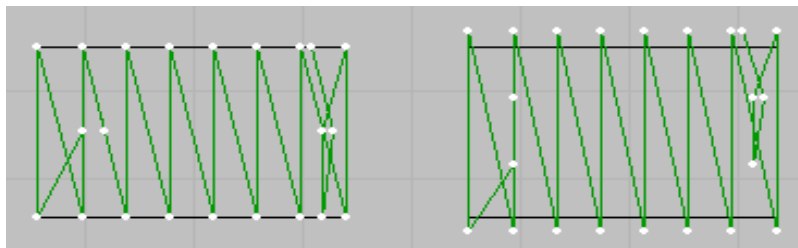
Chapter 9 Stitch Effects

The Application of stitch effects.

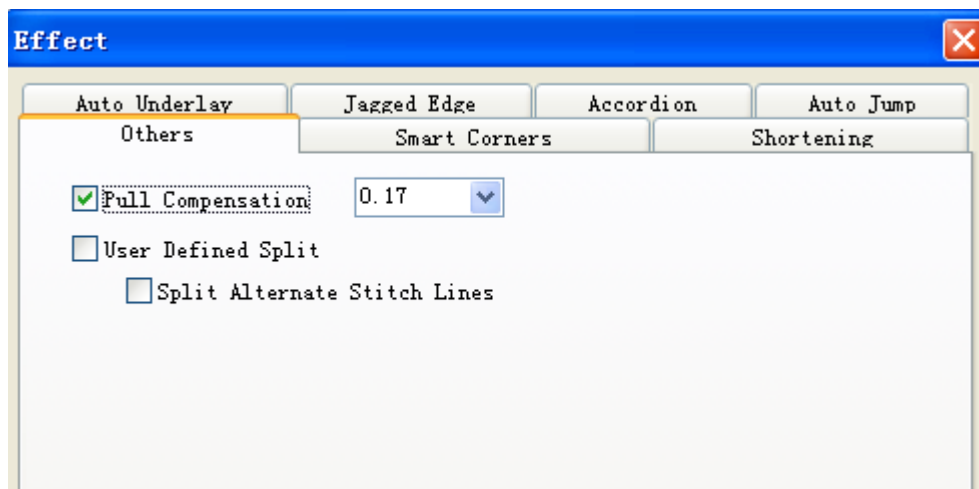
9.1 Pull Compensation



It is a kind of common stitch effect. Because the fabric shrinks at the retrieval points of stitches like satin stitch and tatami stitch, user can use the pull compensation function to automatic prolong the stitch length at the retrieval points so as to have the actual embroidery effect match to the designed outline.



Effects of stitch without/with pull compensation function

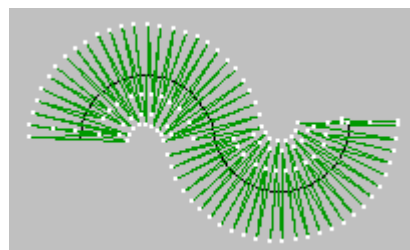
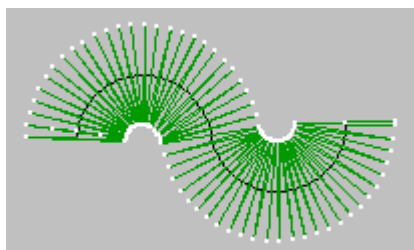


Setting of the Pull Compensation: Default value is 0.17mm.

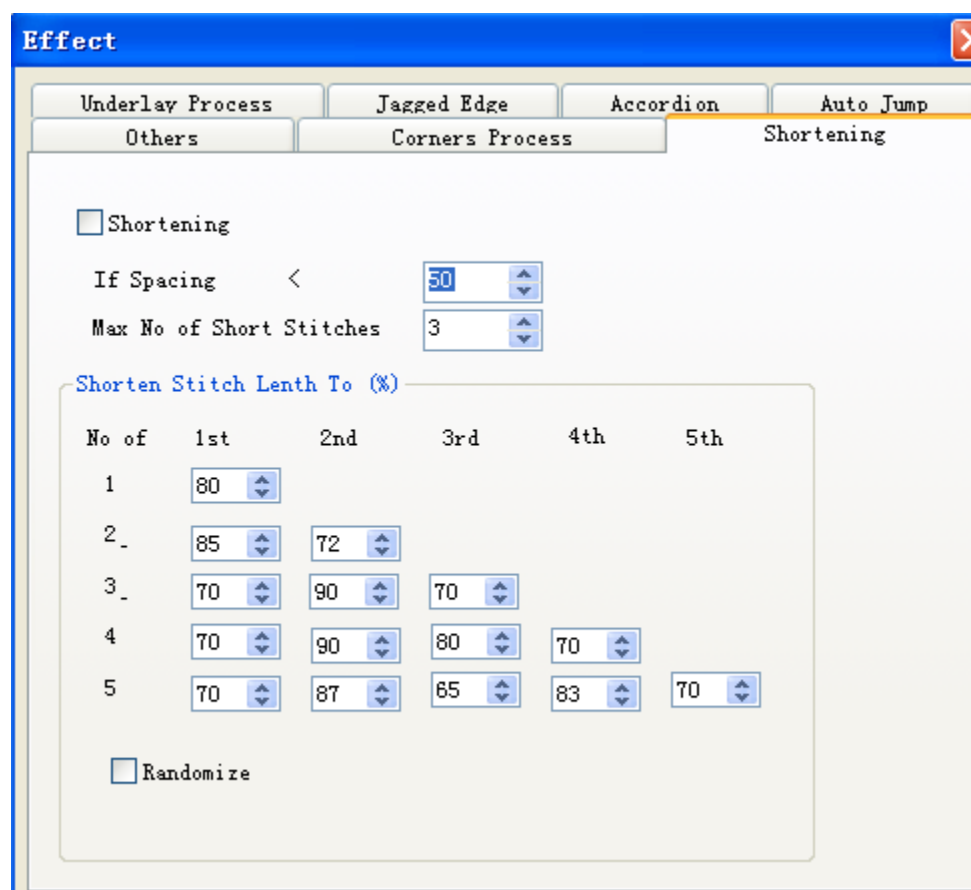
9.2 Shortening



This function is used at the turning where the stitch is intensive. This function can lower the density of the stitch and improve the embroidery quality by automatically shortening the stitch length.



The left is the effect of turning off the Shortening function: the stitches at the inner part of the turning will be very intensive, which is not suitable for embroidery. The right is the effect of turning on the Shortening function: the lengths of stitches are reduced and the stitch points become dispersed.



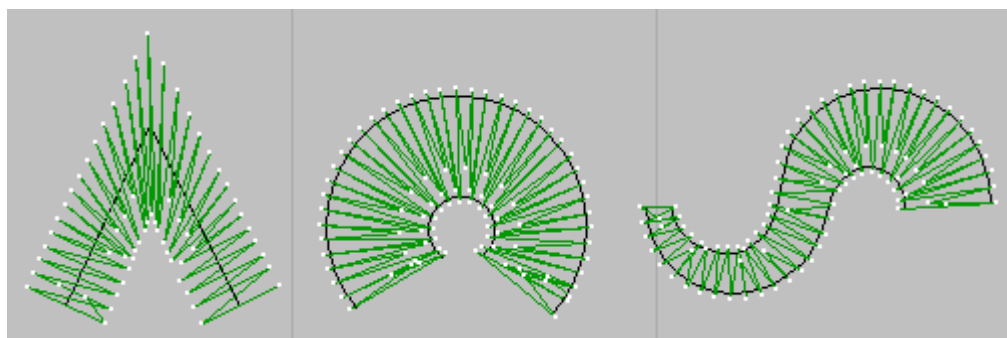
Setting of Shortening

“Spacing smaller than 50%” means, the actual interval will be less than 50% of the set interval. For an example, if the default interval of satin stitch is 0.4mm, the

system will perform the operation of Shortening when the interval is less than 0.2mm.

Max No. of Short: The Max amount of the continuously shorted stitches. The maximum is 5.

The data in the figure column of “**Shorten Stitch Length to**” is the ratio for shortening the stitch. And each row shows the number of stitches meeting the requirements of shortening the stitch length. If only one stitch is shortened, the shortening scale will be 80%. If two stitches are needed shortening, the first stitch will be shortened to 85% and the second stitch will be shortened to 72%. User can adjust this parameter according to the actual embroidery effect.

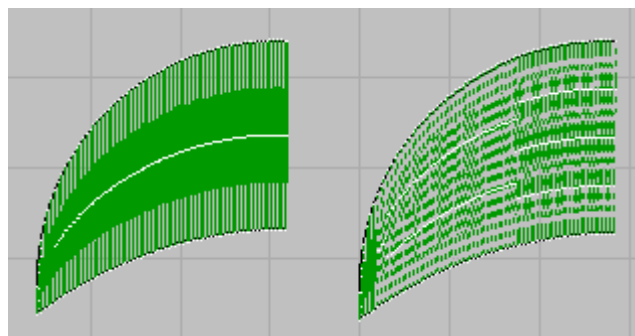


Effects of the Shortening

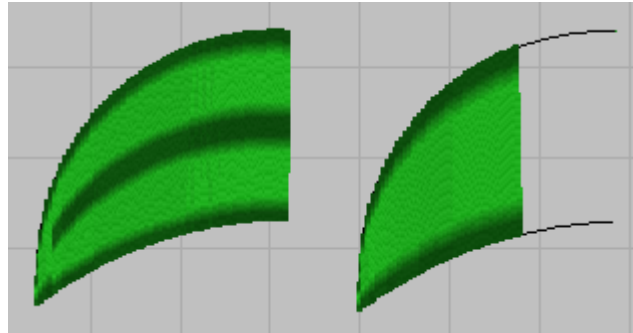
9.3 Auto Jump



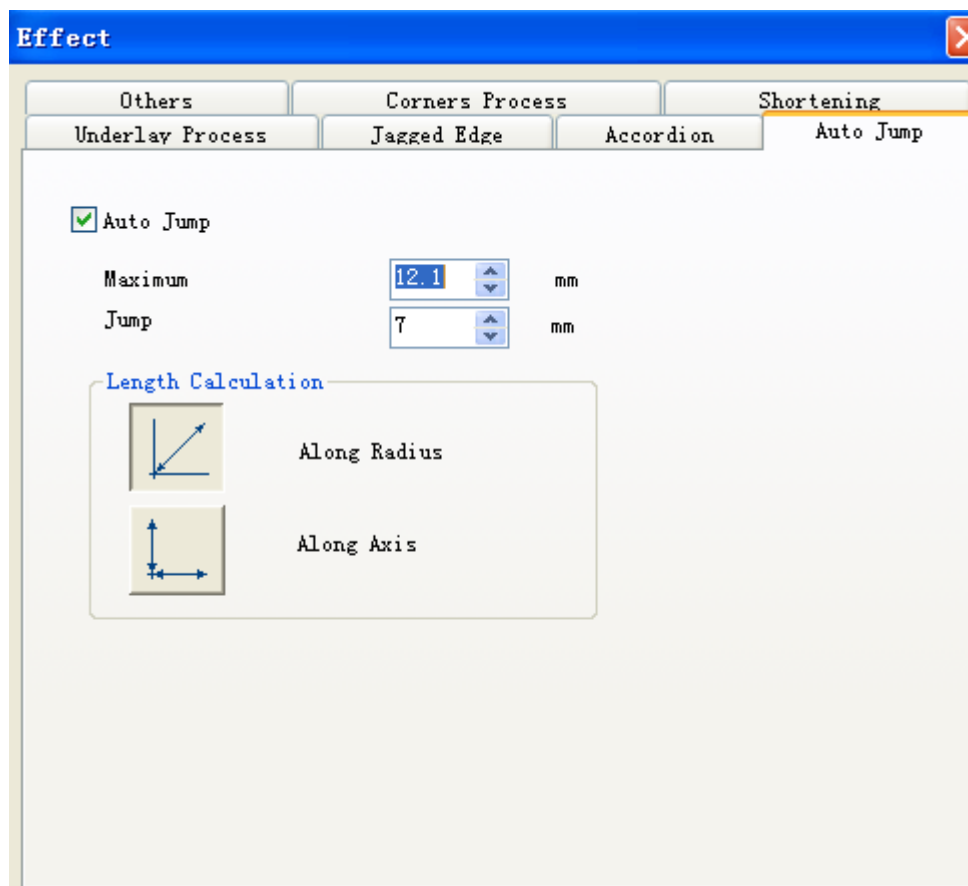
This function can divide the long stitch into jump stitches and normal stitch so as to form the effect of the long stitch. When this function is turned off, the connecting lines over 12.7mm will be divided into the flat stitches. When this function is activated, the connecting lines over 12.7mm will be divided into jump stitches.



Effects of stitch without/with Auto Jump



Effect of simulation embroidery: The area not displayed has been handled as frame-moving by the system. User can solve this problem by enlarging the length of the jump.



Maximum Stitch: The stitch over this length will be divided into jump.

Jump: The stitch length of the jump after the division.

Length Calculation: The calculation method of length: Calculated in X/Y direction or in the diagonal direction.

9.4 Corners Process



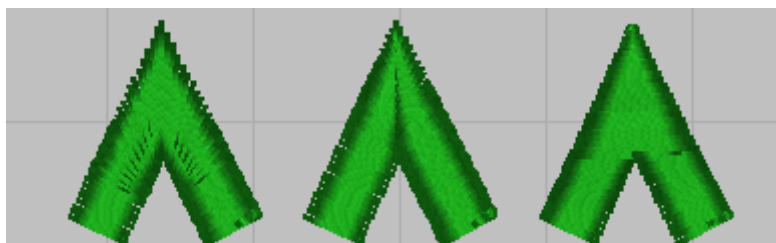
This is used to improve the embroidery effect of equal width satin embroidery at turning. User can select **Mitre Corner** or **Cap Corner**.

Mitre Corner is to divide the object into two independent stitches at the turning and join them at the angle. This function will have both sides of the angle keep the original direction of stitch. The actual embroidery effect is good, but this function is not suitable for the sharp turning.

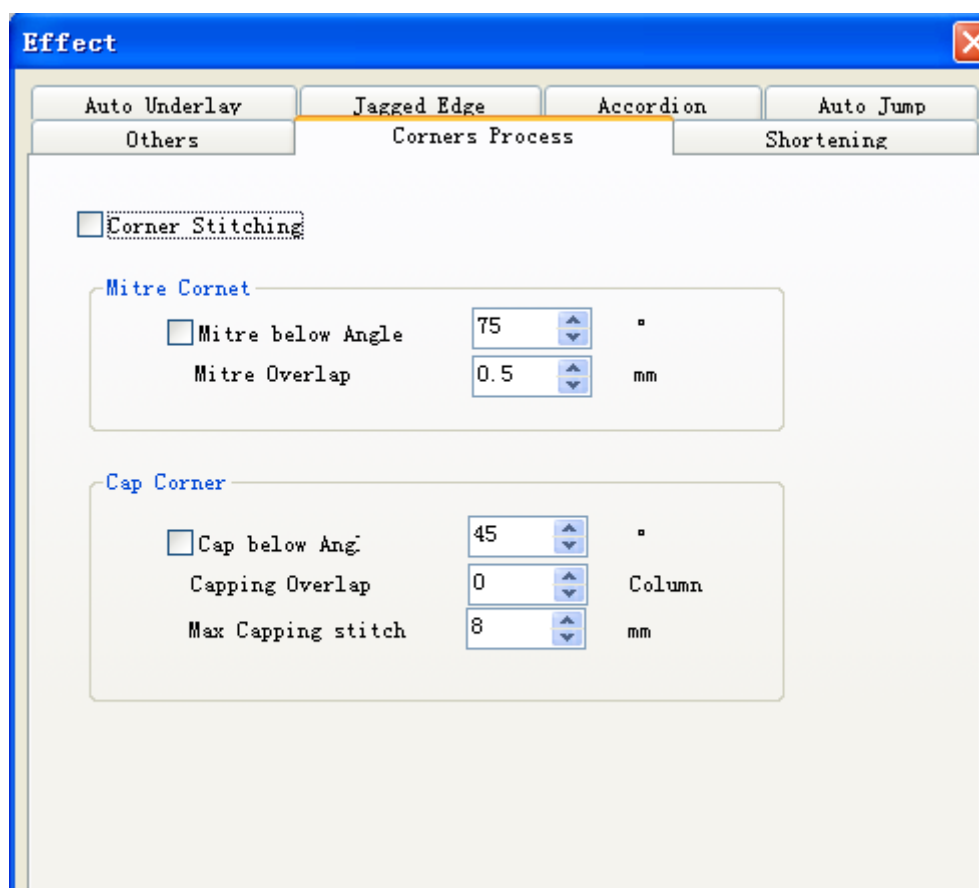
Cap Corner is to turn the stitch at turning into three parts: the stitches at the sharp angle will be turned to the satin stitch that is vertical to the middle line of the angle. Both sides of the angle will become the independent stitches, whose direction are transiting to the satin stitches at the angle. The name of it comes from the shape of the stitches at turning which look like a cap. This function is suitable for the optimization of the stitches in sharp turning.



The left object doesn't use the smart corners function, the middle one uses the "**Mitre Corner**" and the right one uses the "**Cap Corner**".



The effects after simulation embroidery: the effect of **Mitre Corner** is better.



Mitre below Angle: When the angle between the base lines is smaller than the set angle, the function of Mitre Corner will be effective. Generally, user can set a large value at here. The default value is 75, and the max value is 90.

Mitre Overlap: It is the length of the overlapped part when the stitch is divided into two parts.

Cap below Angle: When the angle between the base lines is smaller than the set angle, the function of Cap Corner will be effective. Generally, user can set a small value at here. The default value is 45, and it is also the recommended max value. If the angle between base lines meets the activation conditions of both Mitre Corner and Cap Corner, the system will perform the Cap Corner function.

Capping Overlap: The number of rows overlapped by the cap-shaped stitches and satin stitches.

Max Capping Stitch: The max stitch length in the cap-shaped satin stitch.

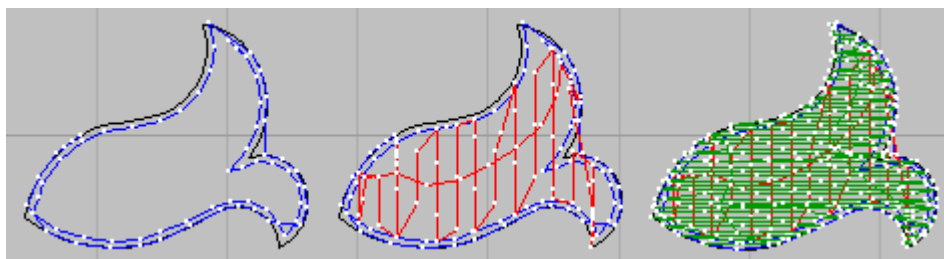
9.5 Underlay Process:



For the filling stitches at large area, in order to reduce the deformation of the fabric or enhance the effects of tatami stitch, user needs perform the underlay

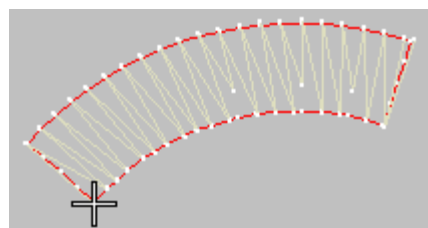
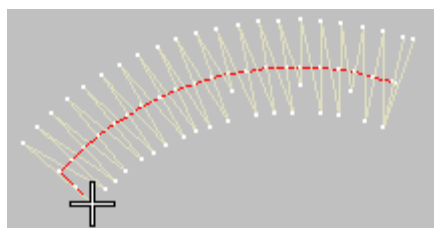
embroidery before the tatami stitches are embroidered. For some satin stitches, in order to improve its 3D effects, user also needs perform the flat stitch embroidery for the outline. All these stitches hidden beneath the formal embroidery stitches are called as the Underlay Embroidery.

The Automatic Underlay Embroidery is to automatically add the underlay stitches at the identical object, which simplifies the operations of users and reduces the time for making pattern.

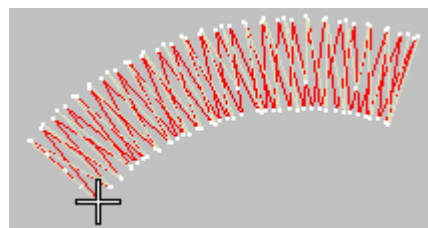
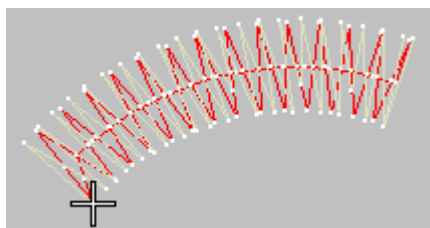


The embroidery process of a pattern with Underlay Embroidery

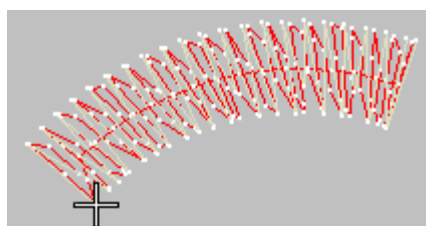
The Underlay Embroidery includes Center Run, Border Run, Zigzag and Tatami. User can set the underlay Embroidery for twice and respectively select the stitch methods used.



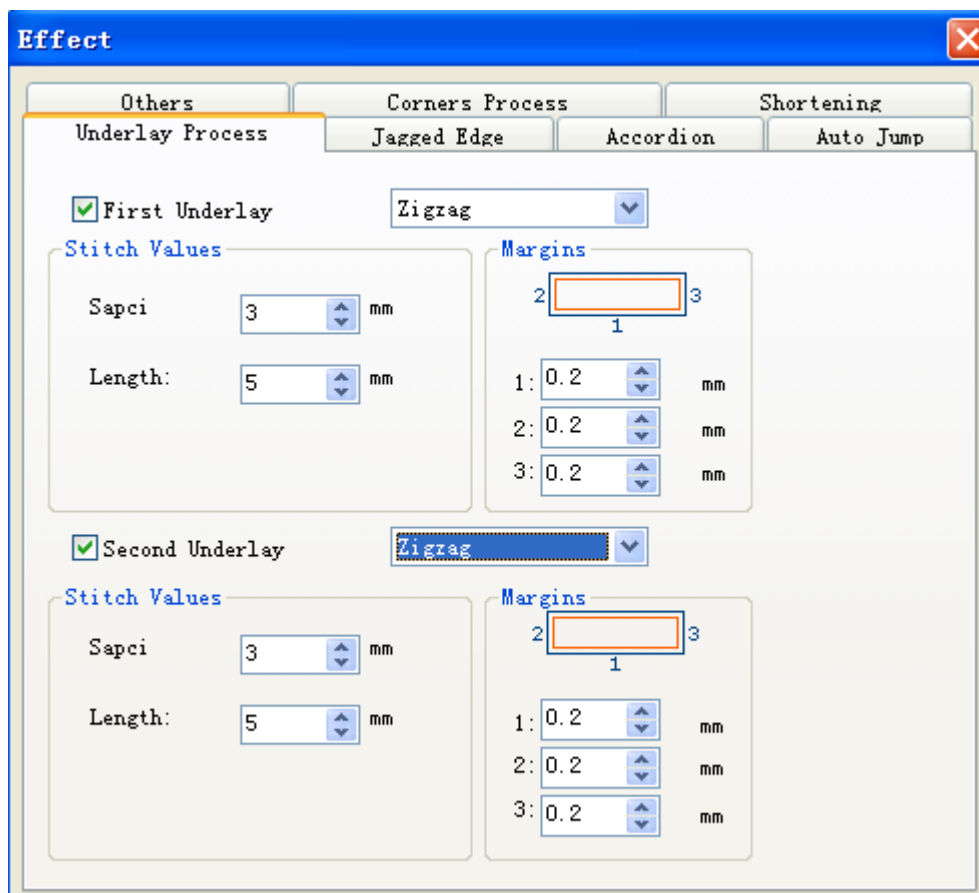
The center Run and Border Run are suitable for the objects with small width or to user to use them as the first time underlay embroidery.



Zigzag and Double Zigzag are suitable for the objects with medium width. Because they use more thread, the effect of them are better than the Run underlay.



Tatami is suitable for the objects with large width and filling stitches at large area



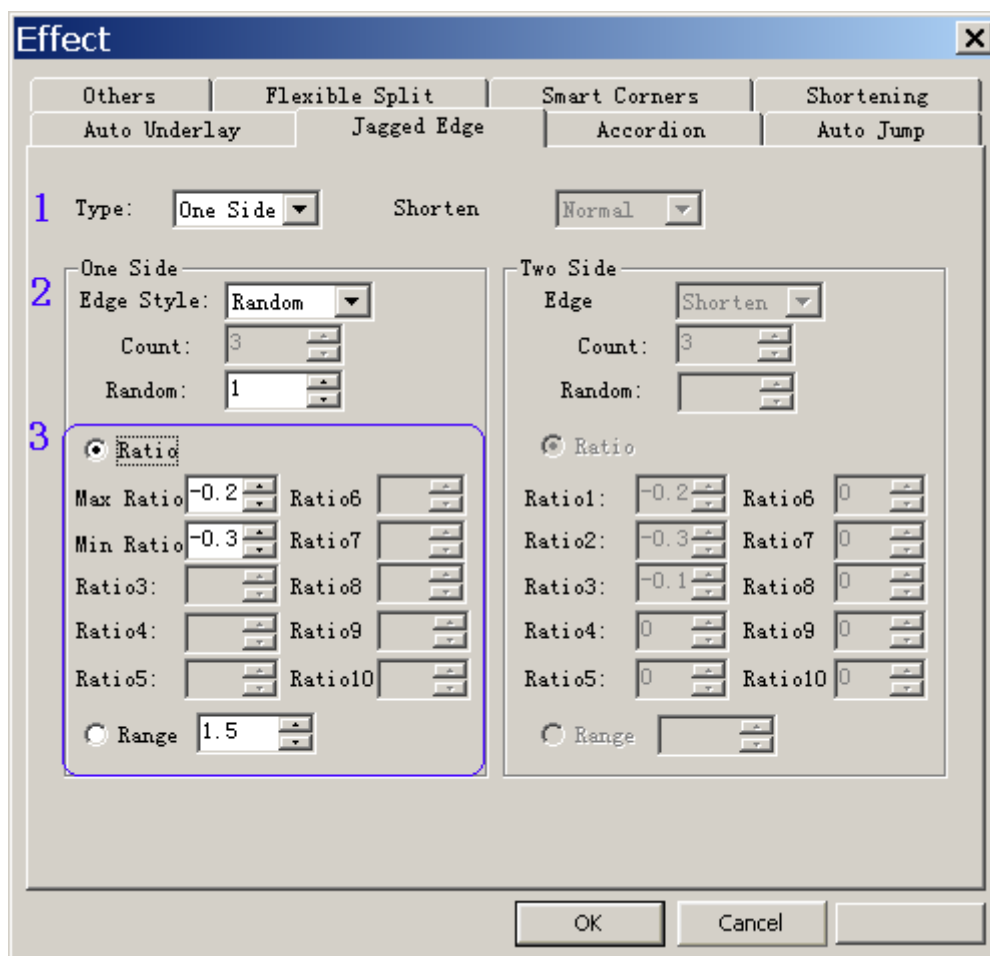
Underlay Embroidery: For the satin stitch method, user can select the 5 stitch method mentioned at above. For the complex filling, user can select the three underlay embroidery methods instead of the two run methods.

Stitch Value: User can set the corresponding parameters according to the selected stitch method.

Margins: the distance between the outline of underlay embroidery and the standard outline of object.

9.6 Zigzag Border

The zigzag border  can be used at the most stitch forms, like satin stitch, tatami stitch and so on. With this function, we can achieve the effect of rough edge. The zigzag border contains the random zigzag and the set zigzag, among which, the stitch length of random zigzag changes without any order but user can set the range for that change, while the stitch length of the set zigzag changes according to the stitch number in periodical repetition.



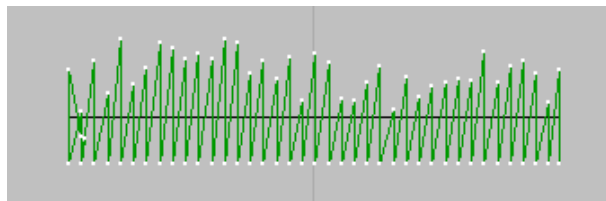
Mainly, the parameters of zigzag border include three parts: 1. Status Parameter, user can set disorder stitch at one side solely or at both sides. If you set No Insertion, the function of zigzag border will be invalid; 2. Disorder Stitch Type, user can select All Disorder, Short Stitch or Disorder Stitch; 3. Disorder Stitch Parameters, the different type of disorder stitch will have the different corresponding parameters.

Type of Disorder Stitch:

1、All Disorder. Then entire stitch lengths change randomly. Once you select this item, user can use two parameters to realize the function.

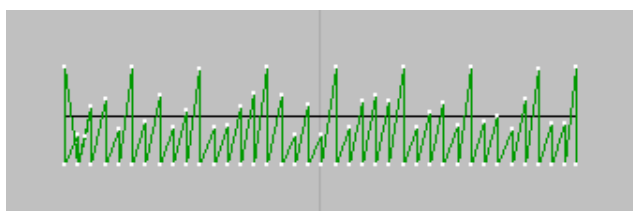
Ratio: Select the ratio setting. The ratio is the varying length of stitch in on the basis of the original stitch. The positive value means to increase the stitch length, while the minus value means to decrease the stitch length. The Max ratio and the Min ratio determine the variation range of the stitch length. The random coefficient determines the effect of the created pattern. When the random coefficient is 0, each reshaping or the scaling and rotating operation will recreate the disorder stitches. If the random coefficient is not 0, no matter what reshaping or geometric operation is done, the sequence of the disorder stitches will keep remained as long as the random coefficient doesn't change.

Range: it is the varying range of the set value, and the unit is at mm. if it is set at 3, that means the varying range is ± 3 mm. The setting of random coefficient is functional to this parameter. Only when the random coefficient is set at 0, the sequence of the disorder stitch will change at reshaping or geometric operation.



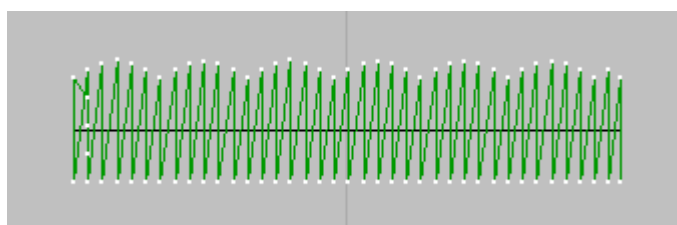
Effect of All Disorder, Single Side

2、Disorder Stitch. Comparing to the All Disorder, the Disorder Stitch adds a parameter, the stitch number. According to the set value of the Stitch Number (Let's record that value as X), the system will leave one stitch embroidered in original status by every X stitches. Other settings and stitch form effects are same as that in All Disorder.



Effect of Single Side Disorder Stitch, Stitch Number at 4

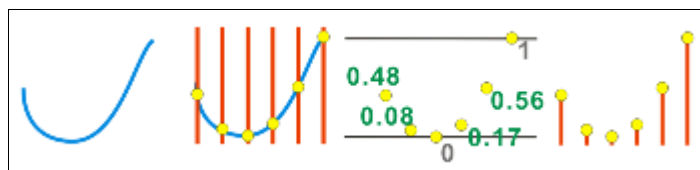
3、Short Stitch. When the disorder stitch type is set at short stitch, the varying length of each stitch is determined by the set ratio. The ratio number functions similar as the stitch number, so the stitch lengths will change in cycle according to the set stitch number. Before a new cycle, there will be one stitch left in original status,



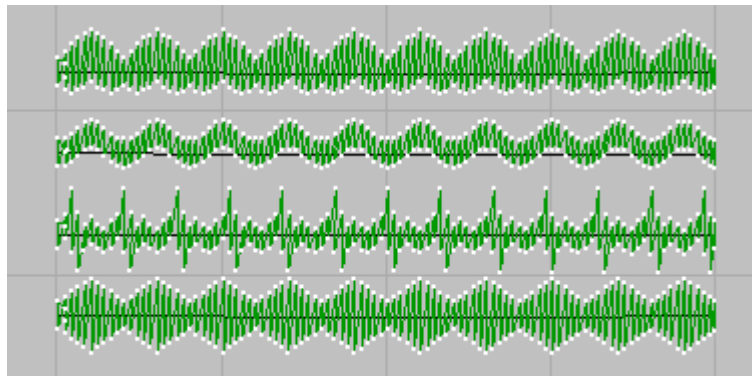
Effect of Single Side Short Stitch, Stitch Number at 5

The setting craft of short stitch sequence: Usually, if user wishes to create a certain shape, user can draw the effect of the figure on the paper at first. And then he should draw the parallel lines to divide the curve according to the stitch number. The

top point is 1 while the lowest point is 0. The ratio is percentage between the distance from a point to 0 and the distance from 1 to 0. In the actual setting, user can use it to time the coefficient according to the effect

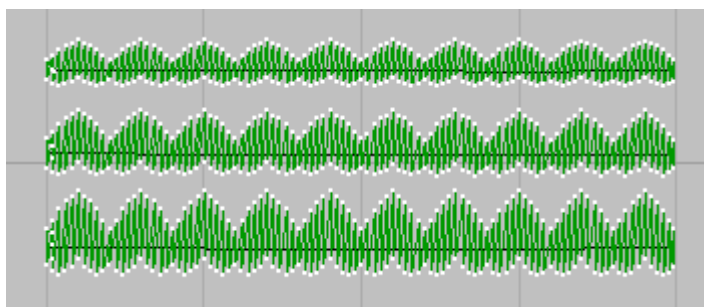


Use the known curve to acquire the Short Stitch Sequence



The effects of zigzag borders acquired from the Non-symmetry, Mirror and Reverse Symmetry

Because the short stitch sequence is the setting of the coefficient, the actual length is the original stitch length times the coefficient. Therefore, when we use the same short stitch sequence parameter to the different objects, the effects will be of difference.



The same short stitch sequence will have the different effect when the column width changes.

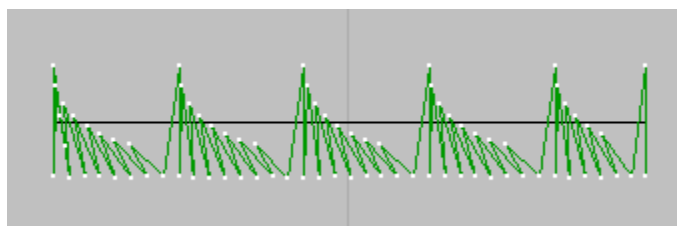
A special short stitch sequence

When we select short stitch for single side embroidery, the method parameter at the upper right corner of the zigzag border parameter frame will turn to optional status. At this moment, selecting the Tajima Method will change the meaning of the short

stitch sequence. At this moment, the ratio at every stitch will realize the accumulated effect, which means that the actual ratio of the current stitch will be sum of the above ratios and the set value of current stitch, as shown in the form at below:

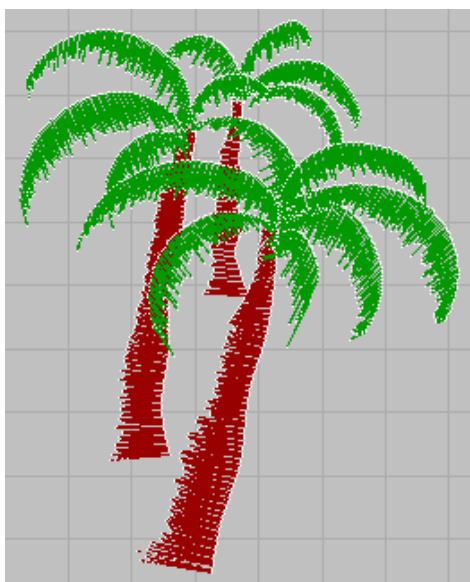
Stitch Order	1	2	3	4	5
Ordinary Method Setting	0	0.1	0.3	0	0.5
Ordinary Method Actual Ratio	0	0.1	0.3	0	0.5
Tajima Method Setting	0	0.1	0.3	0	0.5
Tajima Method Actual Ratio	0	0.1	$0.4(0.1+0.3)$	0.4	$0.9(0.4+0.5)$

In Tajima method, the actual ratio is the sum of the entire ratios at above.



Effect of Zigzag Border in Tajima Method, Ratio at -0.2

The zigzag border can be used in many circumstances, such as the edge effects of the animal or plant that can make the effect much lively. Additionally, the zigzag border can be used for overlapping the satin stitch so as to receive the effects like “waterfall”

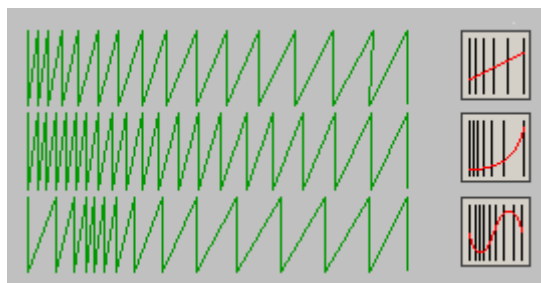


Application of Zigzag Border

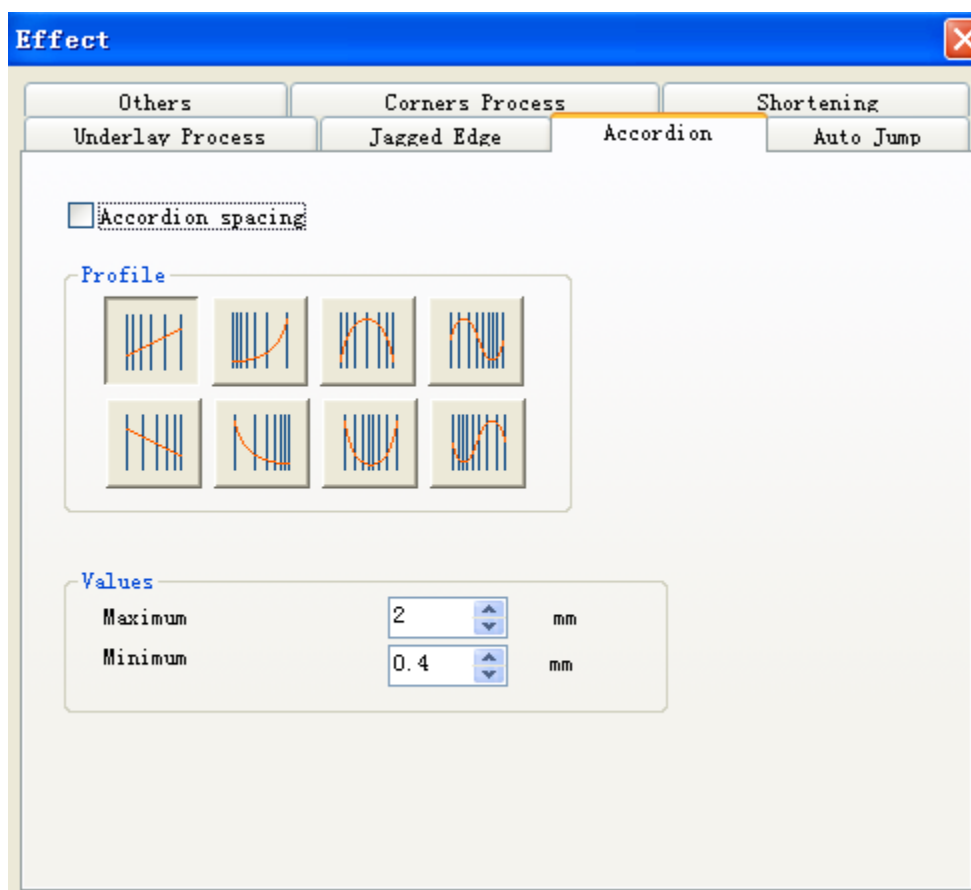
9.7 Graded Interval

The graded interval  can be applied at the objects created from the input

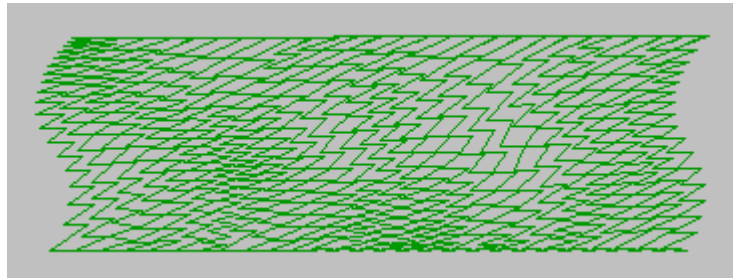
methods A, B and C. By setting the Max stitch interval and the Min interval, the emCAD will automatically generate the stitch forms whose intervals are from the min interval to the max interval gradually. For the speed and direction of the stitch variation, there are eight optional methods, which are displayed as the buttons in the figure. The shape in the figure is the final stitch effect



From the top to down side, these are linear interval change, parabola interval change and wave interval change. User can select the needed effect from them.



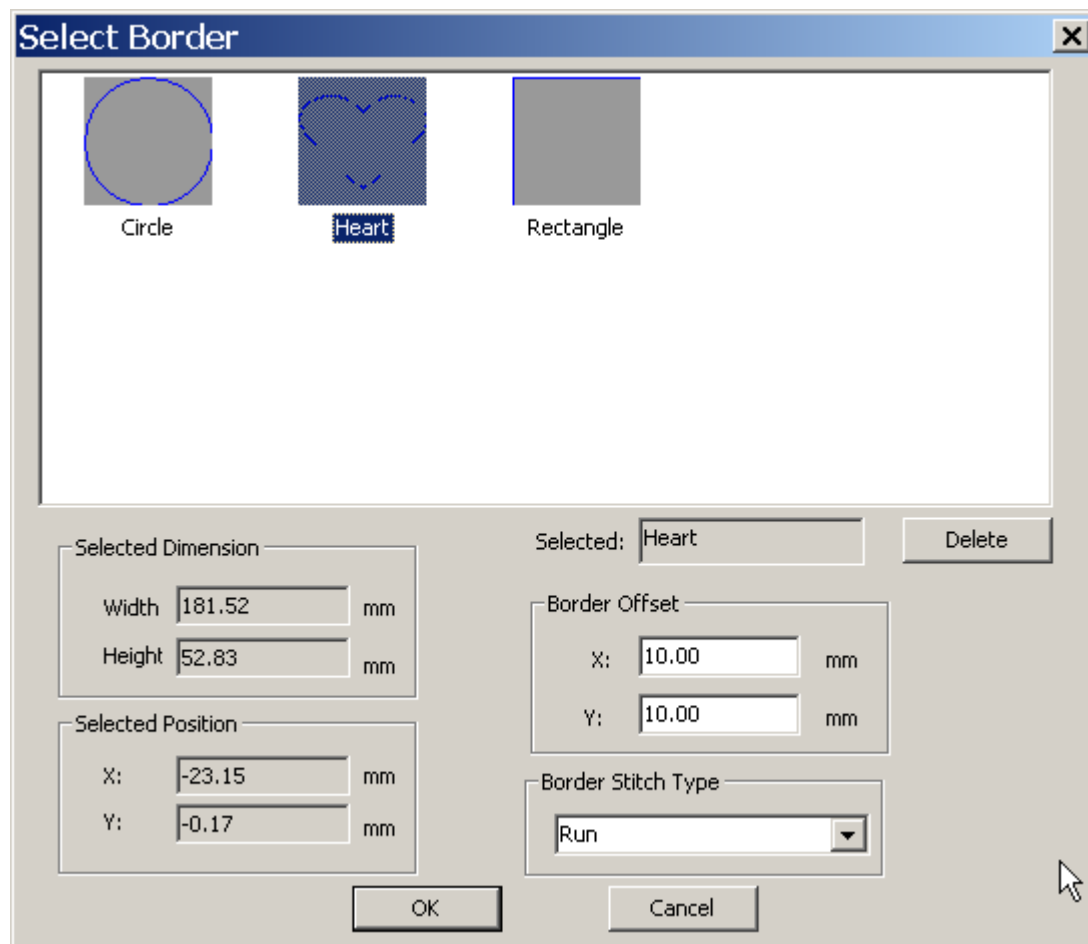
Graded Interval Properties: User can select anyone from the 8 interval variation methods. The Max Range & Min Range are the two limitation values of the stitch interval.



Effect of Graded Stitch with 8 interval variation method

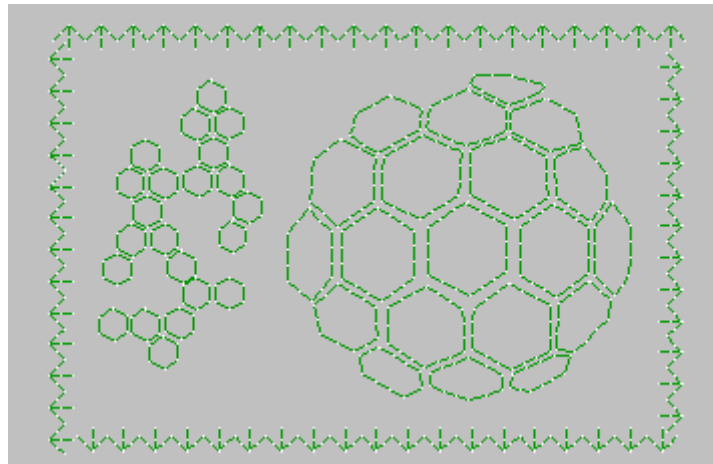
9.8 Border Pattern

The border pattern is a method to automatically create the outline stitches. After selecting the object to add border, user can click Main Menu → Insert → Border Pattern to activate the window of border pattern.



At the left side, they are the size information of the selected object. User can select the needed border in the figure list. The Deletion button can delete the currently selected pattern from the list. The border deviation is the deviation distance between the generated border to the peripheral frame of the selected object. This value can be

adjusted according to the area size displayed at left. The border stitch type is the method for generating the stitch on the basis of the border deviation line.



Effect of the Rectangle Border of Motif

9.9 Others

There are two ways to realize the stitching method effects: 1) Select an object; click the tools in the stitching method tool bar to activate the corresponding stitching effects; 2) Double click the object to open its property window, then click the effect of filling stitches to activate the interface of stitching method property, where user can select the corresponding stitching method, and then press Enter to display the corresponding effects.

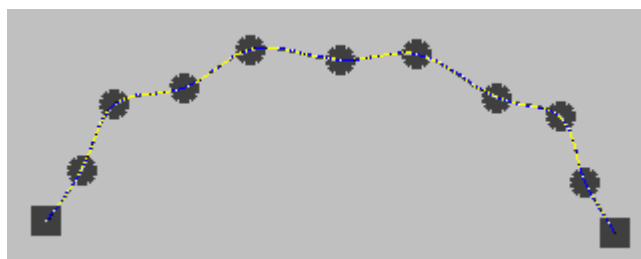
Chapter 10 Reshaping Object

Change the outline of the generated object.

10.1 Reshaping Ordinary Objects

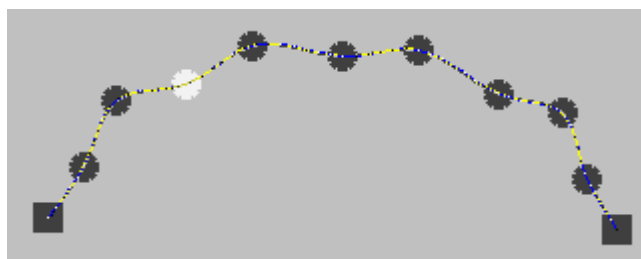
After selecting the independent object, user can press  to have access to the status for reshaping object. At this moment, the control points on the object outline will be turned to the adjustment handle. The linear point is displayed as small rectangle, while the curve point is displayed as small circle.

10.1.1 Object of Run



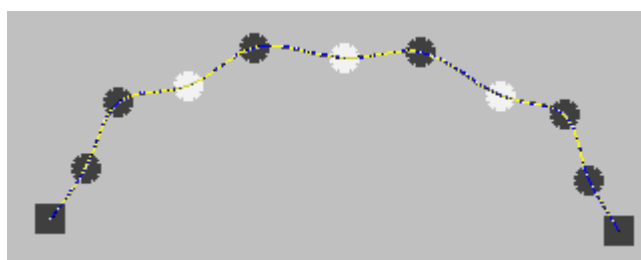
Object is in the status of reshaping.

Use the left key to select the outline point for modification. The selected outline point will be displayed in the color different from that of others.



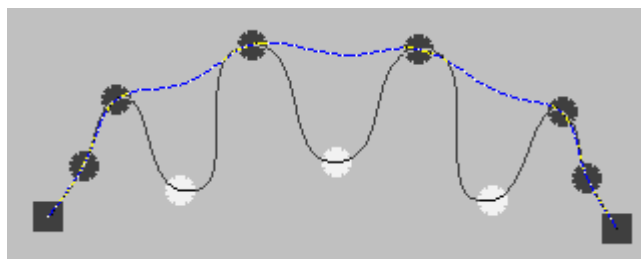
The Selected Point for Reshaping

It is similar to the operation of selecting several objects. By holding the **Control** key, user can select several points for the reshaping operation. All these points are in the status of “Selected”.



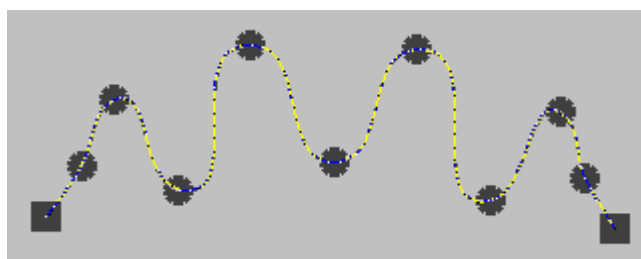
Several Selected Points

When the point is selected, user can move that selected point by dragging it. When several points are selected, user can move all of them by dragging any point.



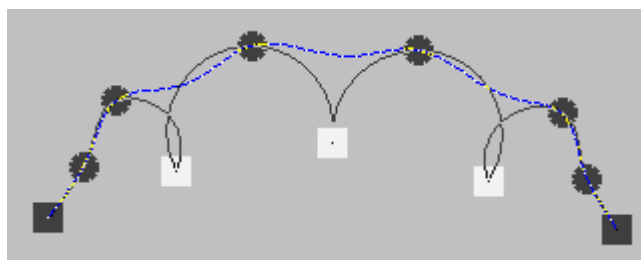
Move the Selected Points

After the point is moved, a new outline will be displayed, which is the hint outline, representing the new outline generated by the new reshaping points. The original outline of the object will remain at this moment. Pressing **[Esc]** or shifting to other edition status, like the object input, the outline of the pattern for adjustment will not be changed. Only after the **[Enter]** is pressed, the object outline will be updated according to the hint outline.



The modification of the object outline is finished, and no additional outline is displayed.

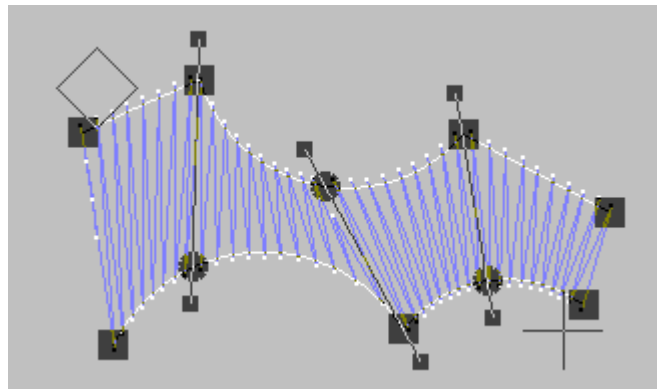
The type of the reshaping points can be changed. User can turn the linear points to the curve points or turn the curve points to the linear points. When the reshaping points are selected, user can press **[Space]** key to change their types. Pressing **[Delete]** key can delete the reshaping points that are selected.



The curve points are shifted to linear points, meanwhile the system hints user to refresh the outline.

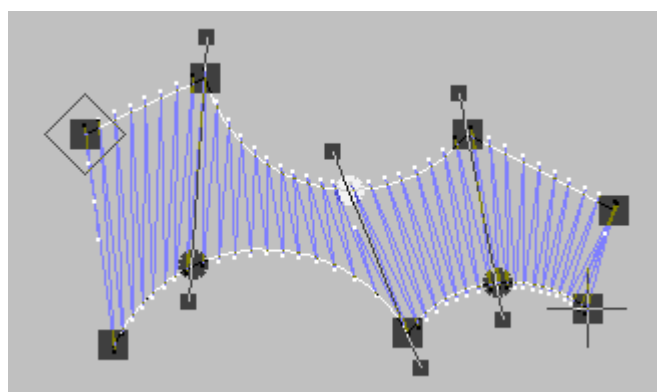
10.1.2 Changeable Width Satin

The object of the changeable width satin is formed by two facing outlines, so user can adjust these two outlines respectively in the status of reshaping object. Additionally, the numbers of the outline points on these two outlines are equal. Between each pair of the outline point, there is a stitch angle line. The angle line can also be adjusted.



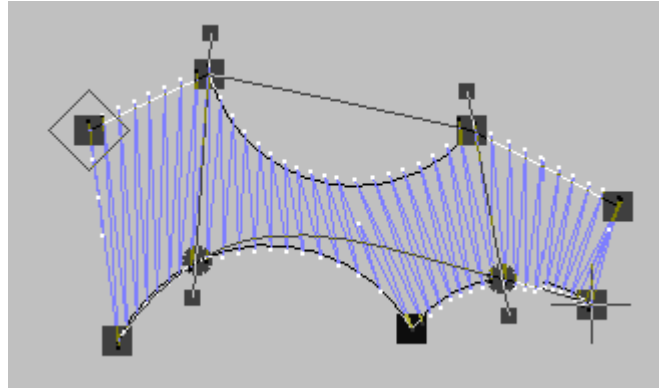
The reshaping status of the changeable width satin: Two outlines are in the object. The stitch angle line is between each pair of the reshaping point. The diamond figure represents the start point, and the cross is the ending point.

The reshaping points on the outline and the endpoints of the stitch angle line can be selected with mouse. The selected reshaping point will be displayed in the status of “Selected”. And user can directly drag the start point and the end point.

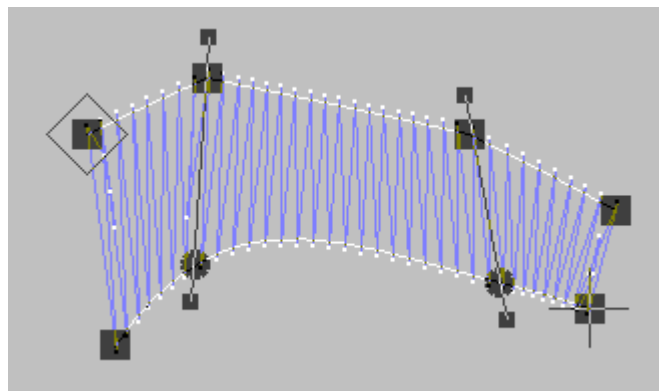


Select an outline point

The operation for selecting the outline point is as same as the selecting operation at object in other types. User can change the position of the reshaping point by dragging it. Press **Enter** to make the change become effective.

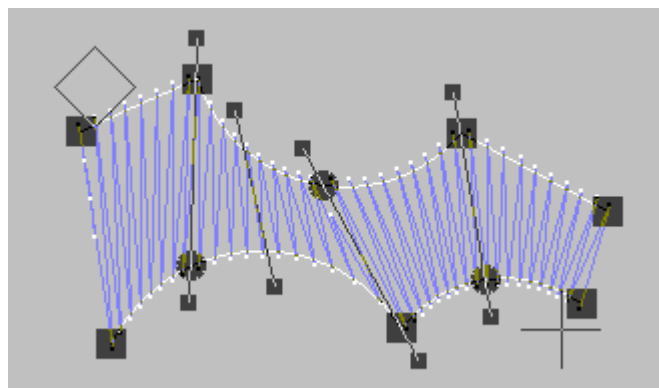


The control points will be deleted in pair: Deleting the selected control point will also have its partner point in the other side deleted.

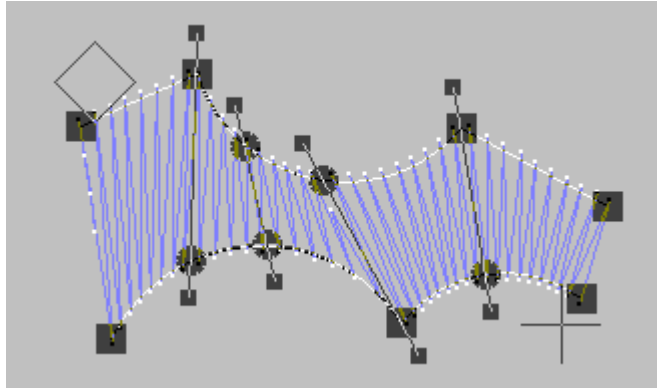


Object after user presses **Enter** to delete the reshaping point.

The control points should be added in pair. Hold **Control** key and click mouse left key at the position where the new control point is wanted. At this moment, a new stitch direction line will be displayed on the interface. Pressing **Enter** will add a pair of new control points at the intersections of the outline and the new stitch direction line.

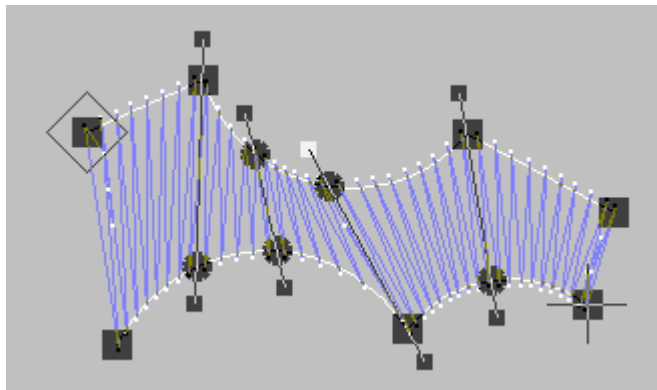


The newly added stitch direction line: At this moment, there is no outline point.

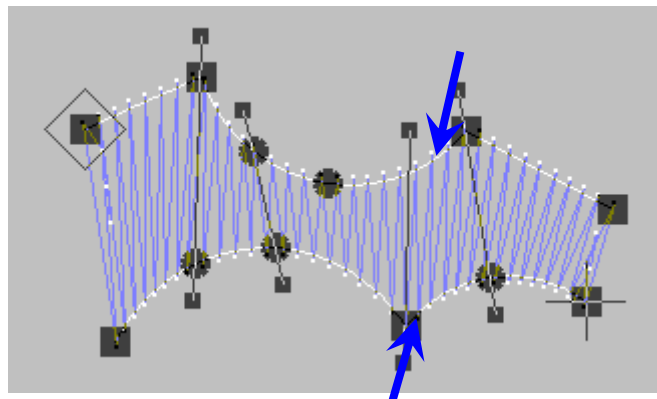
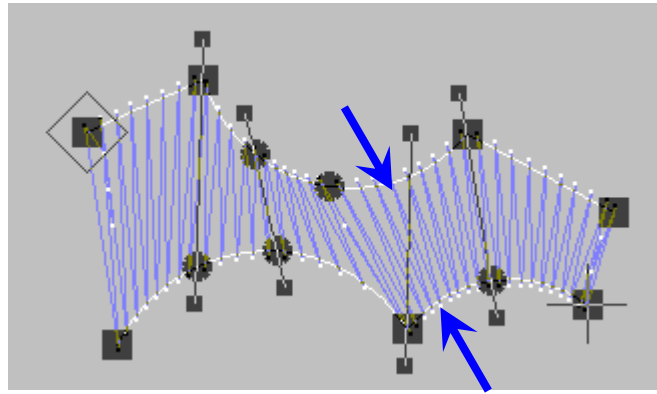


After user presses **Enter**, the new outline points will be added at the intersections of the outline and the new stitch direction line.

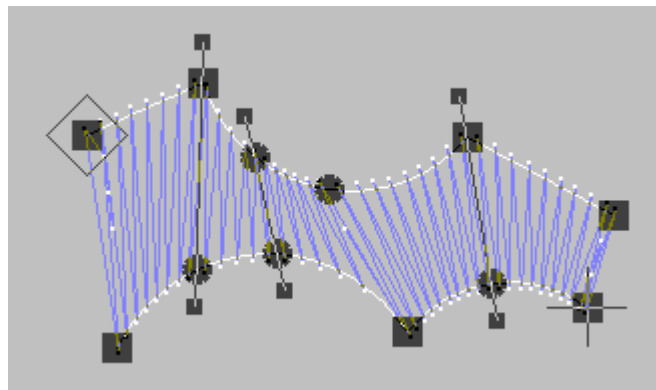
Adjustment & Deletion of Stitch Angle Line: Because the outline points are corresponding to the stitch angle line one by one at the changeable width satin. If user solely adjusts the direction of the stitch angle line or deletes the stitch angle line, the object will be transferred to the object of radial satin, which also contains two independent outlines. However, in radial tape, the control point is not corresponding to the stitch angle line one by one.



By selecting the endpoint of the stitch angle line, user can adjust the stitch angle line solely.



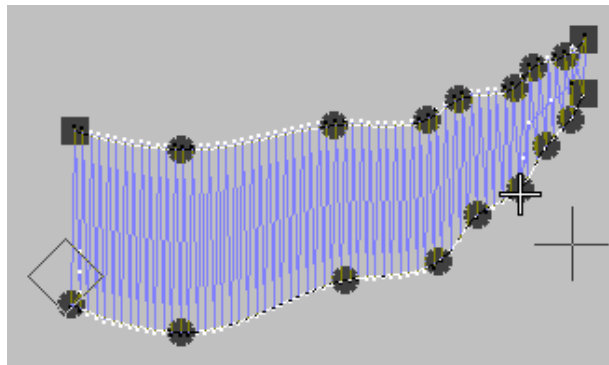
The changes of stitch direction after user presses **Enter**



Delete the stitch angle line individually: at this moment, the properties of the object have been changed to Radial Tape.

10.1.3 Radial Satin

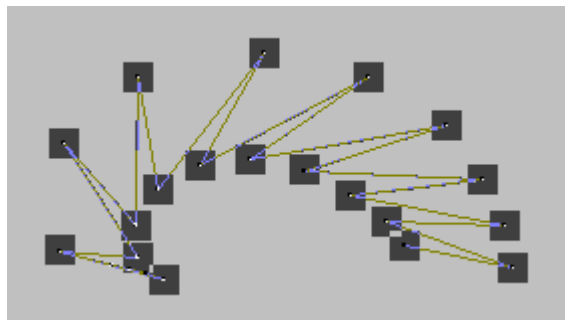
The operation of radial satin is similar to that of the changeable width satin. As the default setting, the object created with the input method of radial satin has no stitch angle lines. User can add the stitch angle lines by clicking the outline with pressing **Control** key.



The radial tape without stitch angle lines

10.1.4 Manual Stitch Object

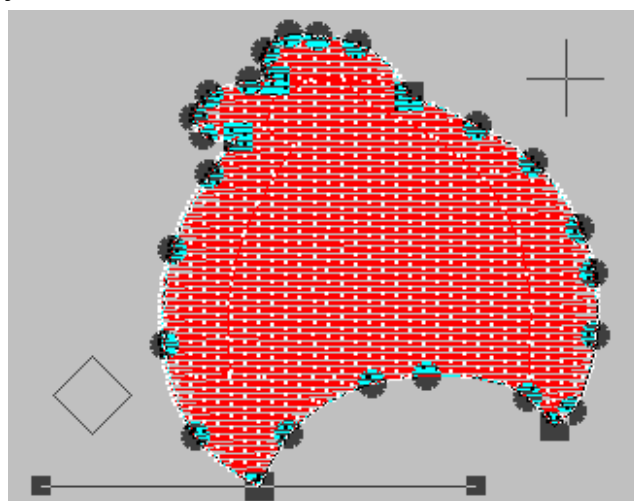
Because each stitch at manual stitch is inputted manually, the entire reshaping points are the linear points. To adjust the reshaping point is equal to adjust the stitch point.



Adjustment status of manual stitches

10.1.5 Object of Complex filling

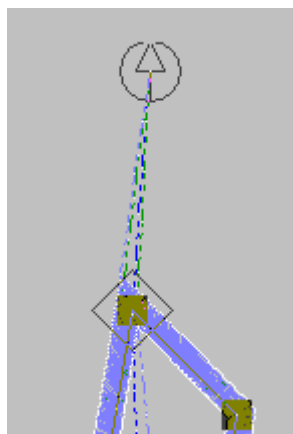
The outline of the tatami object is the close curve, which only have one stitch angle line. Except that, other operation for reshaping is same as that of the satin object.



Reshaping status of complex filling object

10.1.6 Appliqué Object

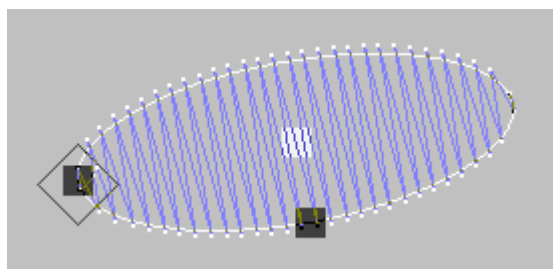
The appliqué object has the special object element of adjustment, which is the frame-moving point. By modifying the position of this point, user point out the position beyond the frame at patching the cloth.



The position of frame-out point is displayed by an arrow.

10.1.7 Circle

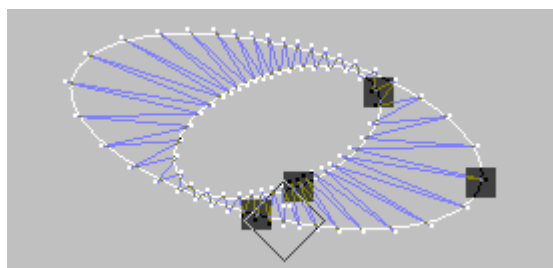
The reshaping points of the circle object are the circle center and two axis endpoints. Dragging the circle center can move the circle, while dragging the axis endpoint will adjust the shape of the circle.



Reshaping status of circle object

10.1.8 Ring

The ring object is the overlapped result of two circle objects; therefore the reshaping points of it are the four axis endpoints and the center point. The reshaping method of is as same as that of circle.



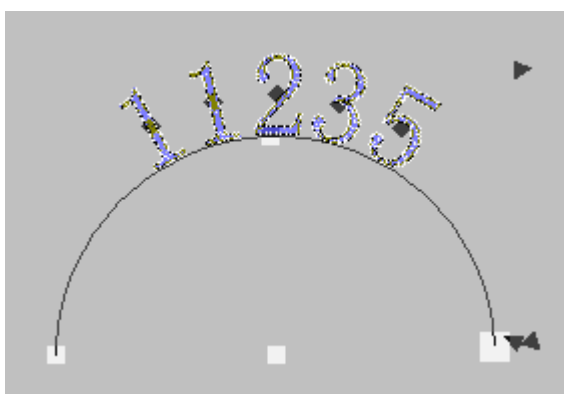
Reshaping status of ring object

10.2 Reshaping of Character Embroidery

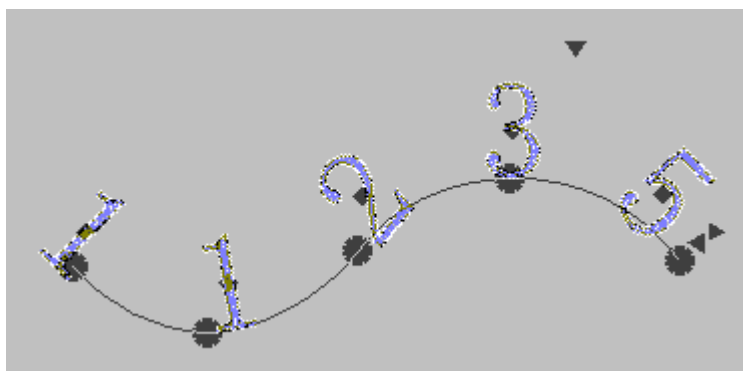
The reshaping of the character embroidery object is similar to that of the motif, which is also divided into two parts, outline reshaping and sub-pattern reshaping. For the specific operation, please refer to the section of Motif reshaping. The special part of the character embroidery is the outline reshaping. Because user can select various kinds of outline for the character embroidery, the reshaping operations for the corresponding outline will be of difference.



Select the character embroidery object of a single letter. The meanings of the handles are same as those in motif reshaping.



When the outline is the clockwise arc, the handles of the outline will be at the circle center, endpoints of arc and the middle point of arc. User can use the handle on the endpoints of arc to change the arc length, and used the handle at circle centre to change the radius.



The outline is the free curve. At this moment, the reshaping of outline is

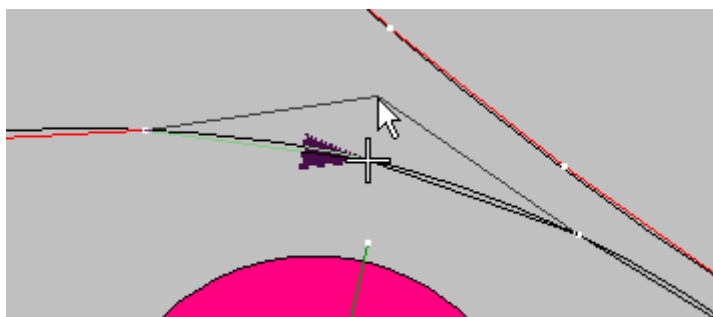
same as that of ordinary object.

Chapter 11 Editing Stitch

Use stitch edition tools and stitch list to edit the stitch.

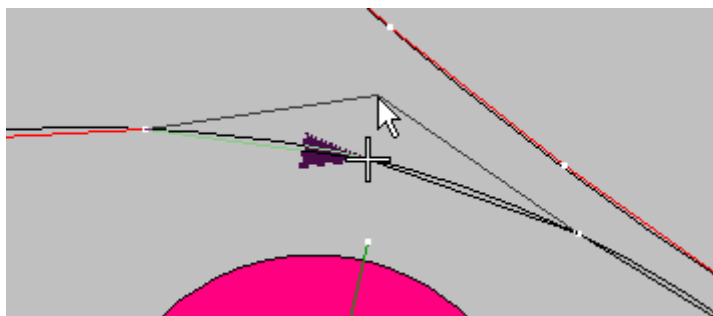
11.1 Stitch Edition Tool

Click  to have access to the stitch edition status. At this moment, user can click the stitch point to select the stitch. The selected stitch will be displayed in high light, and the previous stitch of it has arrow pointing forwards.



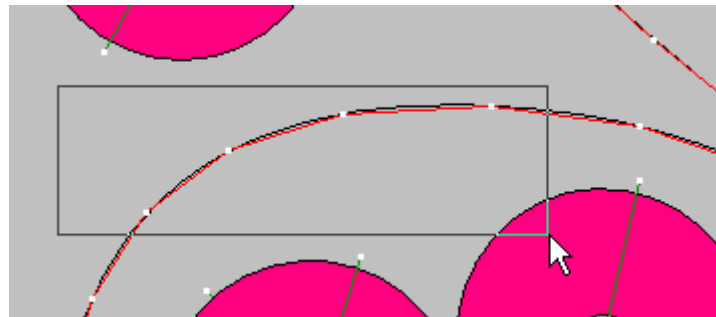
The selected stitch is displayed in high light, and the previous stitch has arrow pointing forwards

User can drag the selected stitch. Pressing **Enter** will make the modification become effective. Attention: Make sure the moving distance of the stitch is within the range of the Max Stitch Length, or the stitch will be turned to the jump stitch.



Move the selected stitch point so as to change its position

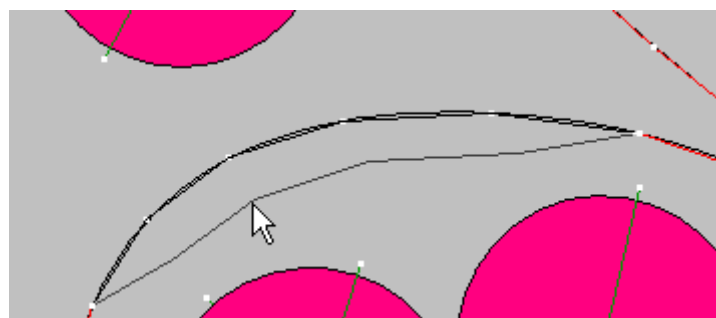
In the status of stitch edition, user can select the stitch with the selection frame. All the stitches within the selection frame will be selected, when the dragging operation will change all the selected stitch points simultaneously.



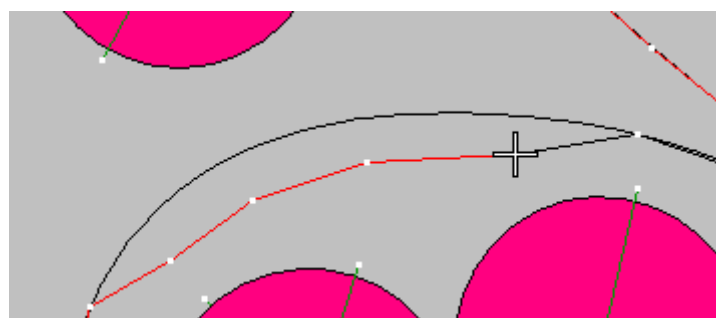
Use selection frame to select several stitch points



The selected stitch will be highlighted.



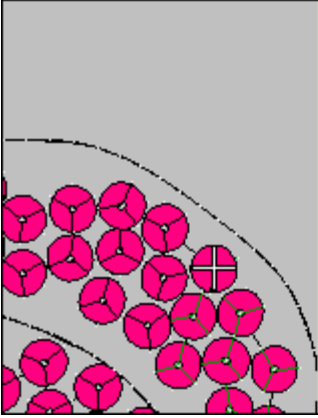
Several stitch points are moved to new position. The entire of the selected points will be moved simultaneously.



Press **Enter** to make it become effective

11.2 Tools of Stitch List

Click  to activate the interface of Stitch List, where user can modify and add the function code easily.



No	X	Y	Length	Function
626	2.51	1.08	2.73	
627	-2.51	-1.08	2.73	SequinB
628	-0.32	-2.68	2.70	
629	0.32	2.68	2.70	
630	-2.16	1.62	2.70	
631	-0.44	0.56	0.71	
632	-2.71	4.87	5.57	
633	0.10	-2.69	2.69	
634	2.29	1.43	2.70	
635	-2.29	-1.43	2.70	SequinB

When user selects a stitch point in the stitch list, the icon of the current stitch in the design area will also move to that stitch. At the operation of stitch trace, along with the movement of the stitch icon in the design area, the stitch list will be updated correspondingly.

Click right key in the stitch list to activate the assistant menu, where user can change the display of the stitch list and realize the edition function of stitch.



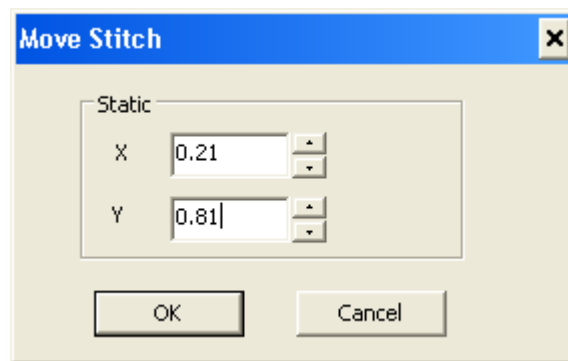
No	X	Y	Length	Function	Tag
1659	3.99	1.11	4.14		
1660	-4.05	-0.78	4.12		
1661	3.97	1.18	4.14		
1662	-4.03	-0.85	4.12		
1663	3.95	1.24	4.14		
1664	-4.02	-0.91	4.12		
1665	3.94	1.30	4.15		
1666	-4.00	-0.97	4.12		
1667	3.92	1.37	4.15		
1668	-3.99	-1.04	4.12		
1669	3.90	1.43	4.15		
1670	-3.98	-1.06	4.12		
1671	3.89	1.45	4.15		
1672	-3.98	-1.08	4.12		
1673	3.88	1.47	4.15		
1674	-3.97	-1.11	4.12		
1675	3.87	1.49	4.15		
1676	-3.96	-1.13	4.12		
1677	-0.10	0.36	0.38		
1678	-0.10	0.36	0.38		

Assistant Menu of Stitch List

Black Text: Display the entire stitches in black.

MultiColor Text: Display the stitch according to the color properties and color-changing information of the object. It is the default display method of stitches.

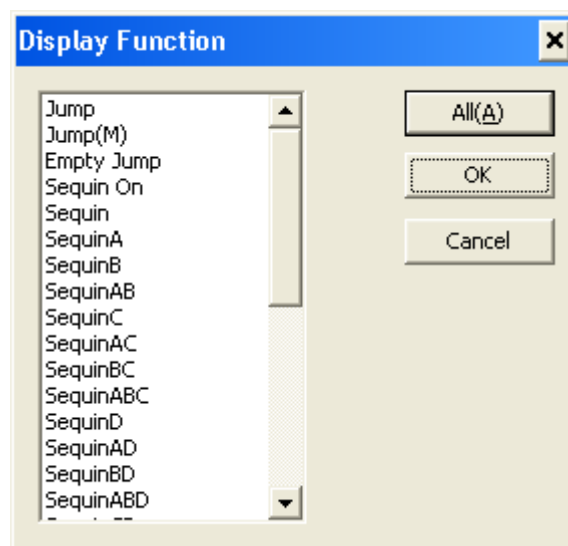
Move Stitch: Use the dialogue frame to modify the position of current stitch.



Dialogue window for moving the current stitch in the list

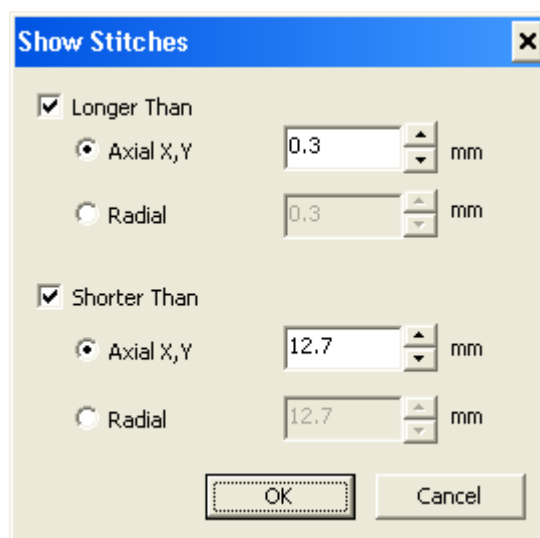
Show All: It is the default setting to display all the stitch points. It is different from the stitch displays in accordance with the functions and stitch length section.

Show Function: User can display the corresponding stitch by setting the needed function for display. This function can be also used to count the function or to locate the function.



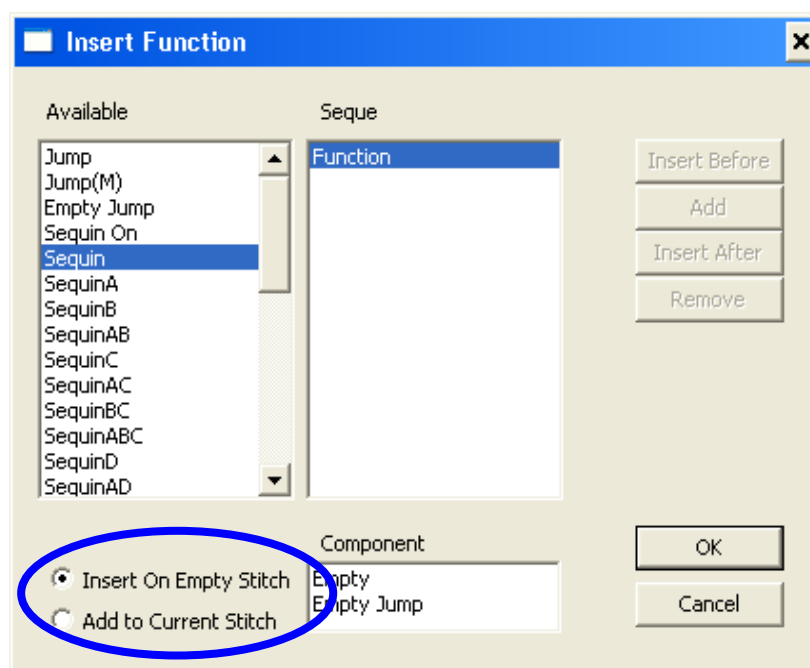
Interface of Display Function, where user can select several items.

Show Stitches: By setting the sections on stitch length, user can have the stitch, whose length is within the set range, to be displayed. This function is very useful in searching the stitch with special length.



The interface of show stitches, where the length section can be set. The Axial x/y is the stitches meeting the requirements in X/Y direction. The Radial is the actual stitch length.

Insert Function: Insert the stitch point or the function code at current stitch point. The relative displacements of the inserted stitch point are usually (0, 0), which means the stitch is the empty stitch. Several function codes can be inserted at same time.

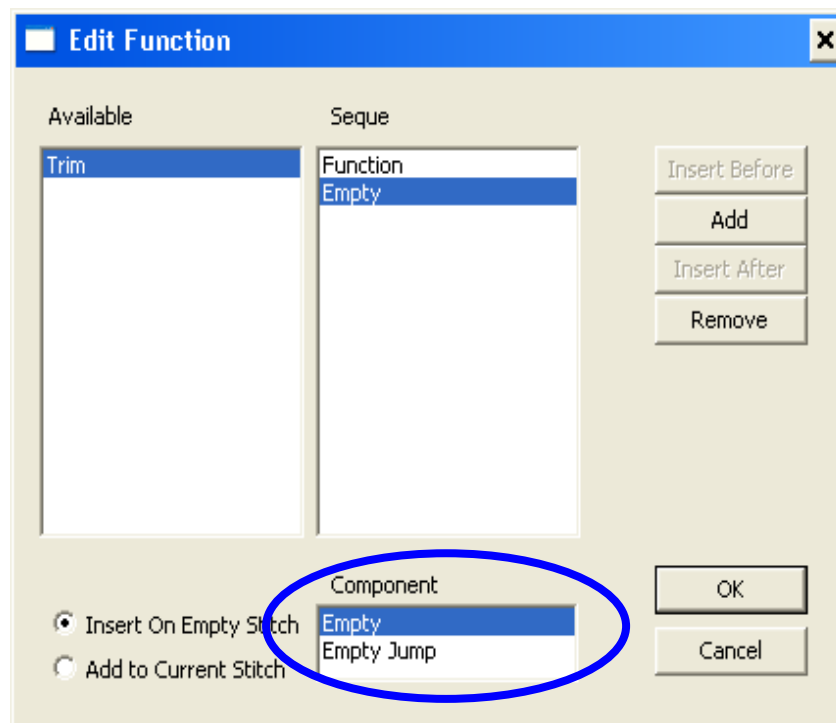


Interface of Insert Function

When inserting functions, user can select ***Insert On Empty Stitch*** or ***Add to Current Stitch***. When user selects ***Insert On Empty Stitch***, the function stitch with the relative displacement at (0, 0) will be added into the list. If user selects

Add to Current Stitch, the function code will be directly added to the current stitch. The original function code on the current stitch will be replaced by the new function code.

Edit Function: Enable to add empty stitch or empty jump stitch on the basis of the current function codes.



Select Empty or Empty Jump and then use “Add” to add the corresponding stitch.

Clear Function: Clear the function code at current stitch.

Select **Relative Coordination** or **Absolute Coordination** at the top of the Stitch List to shift the X/Y coordinates displayed in the interface.

Stitch List					
☒ Relative Coordination ☐ Absolute Coordination					
No	X	Y	Length	Function	Tag
1	0.00	0.00	0.00	Design Start	
2	-1.33	-3.90	4.12		
3	0.95	4.02	4.14		
4	-1.27	-3.92	4.12		
5	0.88	4.04	4.13		
6	-1.20	-3.94	4.12		
7	0.81	4.05	4.13		
8	-1.13	-3.96	4.12		
9	0.73	4.06	4.13		
10	-0.39	0.09	0.40		
11	-0.40	0.08	0.40		
12	-0.03	-5.62	5.62	Jump	
13	-0.03	-5.62	5.62	Jump	
14	-0.03	-5.62	5.62	Jump	
15	-0.03	-5.62	5.62	Jump	
16	-0.03	-5.62	5.62		
17	-0.06	-4.13	4.13		
18	0.35	4.10	4.12		
19	0.05	-4.13	4.13		
20	0.30	4.11	4.12		

Stitches Displayed in Relative Coordination

Stitch List					
☐ Relative Coordination ☒ Absolute Coordination					
No	X	Y	Length	Function	Tag
1	-5.30	17.64	0.00	Design Start	
2	-6.64	13.74	4.12		
3	-5.69	17.77	4.14		
4	-6.95	13.84	4.12		
5	-6.07	17.88	4.13		
6	-7.27	13.94	4.12		
7	-6.46	17.99	4.13		
8	-7.59	14.03	4.12		
9	-6.85	18.09	4.13		
10	-7.25	18.18	0.40		
11	-7.64	18.26	0.40		
12	-7.67	12.64	5.62	Jump	
13	-7.71	7.02	5.62	Jump	
14	-7.74	1.40	5.62	Jump	
15	-7.77	-4.22	5.62	Jump	
16	-7.80	-9.83	5.62		
17	-7.86	-13.96	4.13		
18	-7.51	-9.86	4.12		
19	-7.46	-13.99	4.13		
20	-7.16	-9.88	4.12		

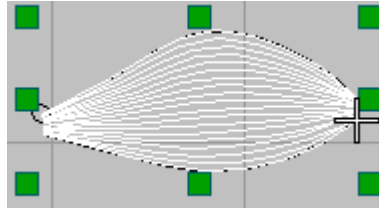
Stitches Displayed in Absolute Coordination

Chapter 11 Object Special Copy

Object special copy function include array,mirror,circle,kaleidoscope,insert offset,continuous copy.

11.1 Array

Select the original object:

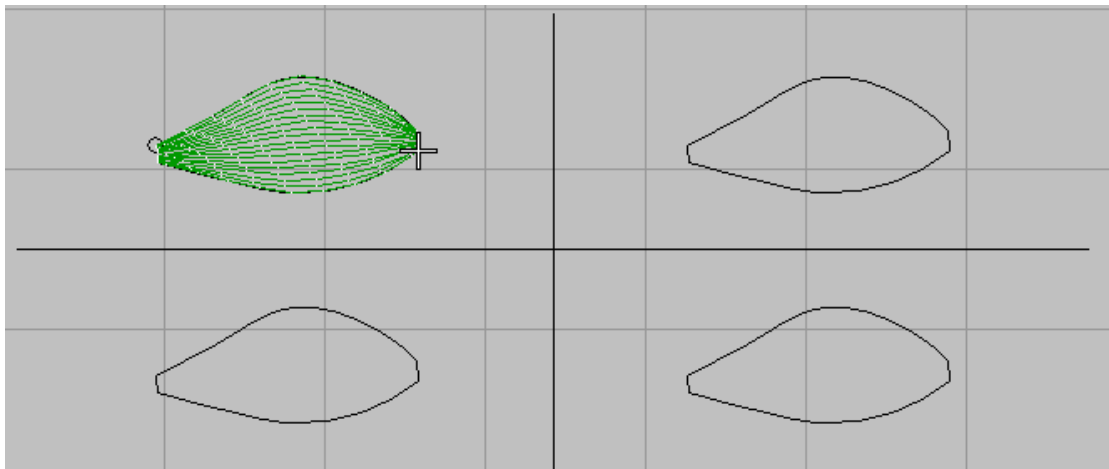


Press the array toolbar button .

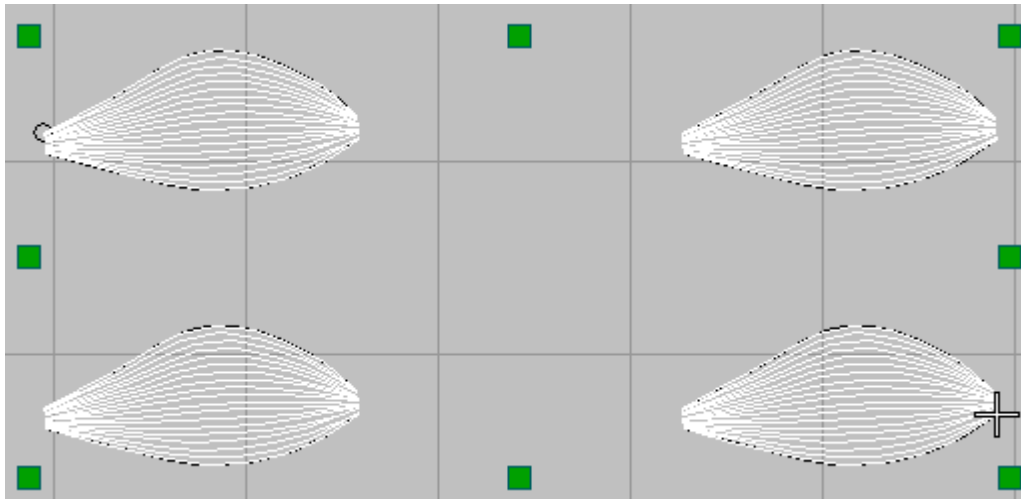
Setting repeat row repeat count,row space ,col repeat count col space.



User may move the mouse adjust the row space and col space

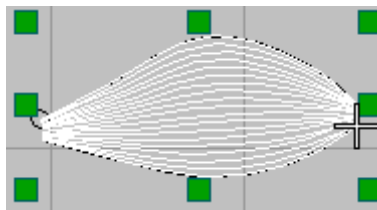


Click the left key of mouse , finish the operation



11.2 Mirror

Select the original object:

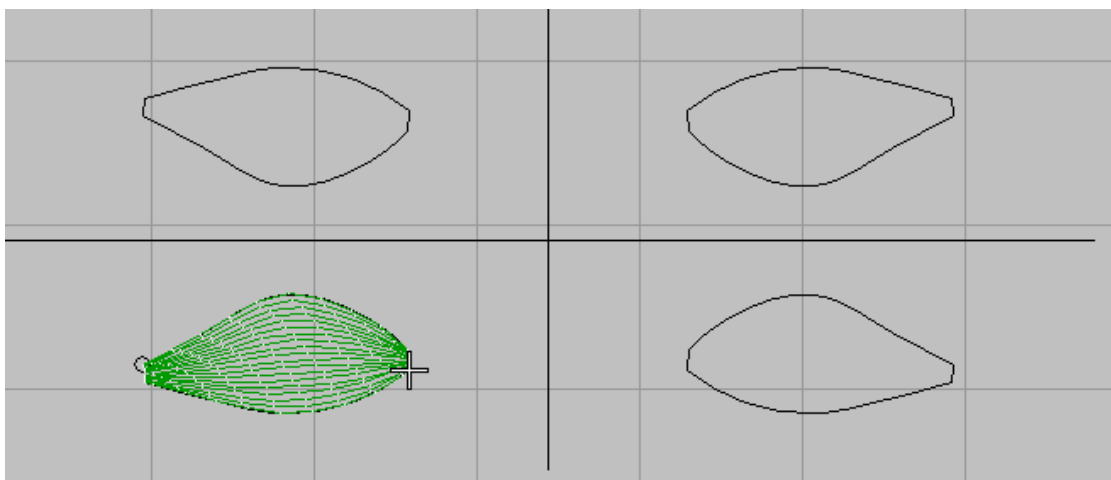


Press the mirror toolbar button .

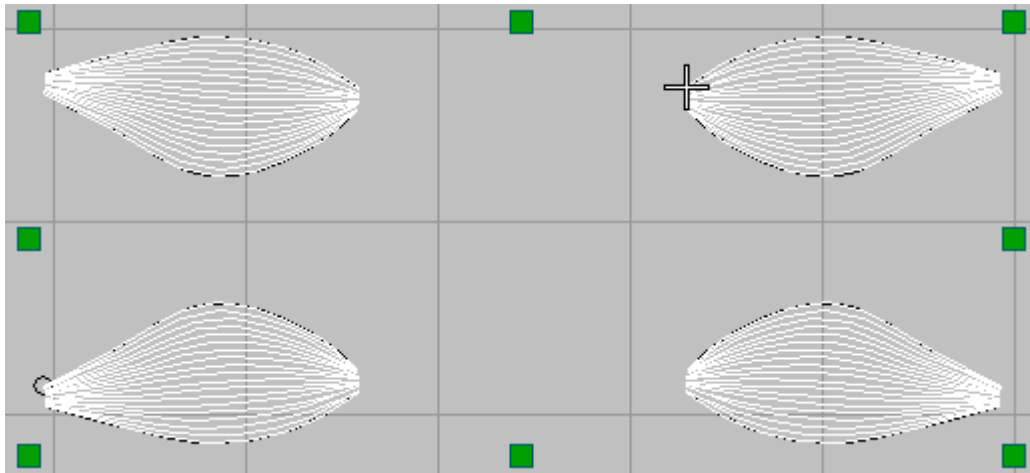
Setting repeat row repeat count, row space, col repeat count col space.



User may move the mouse adjust the row space and col space

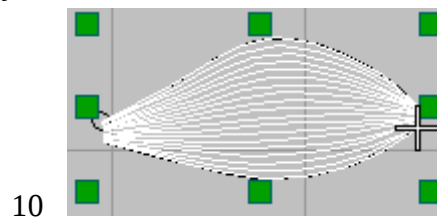


Click the left key of mouse , finish the operation



11.3 Circle

Select the original object:

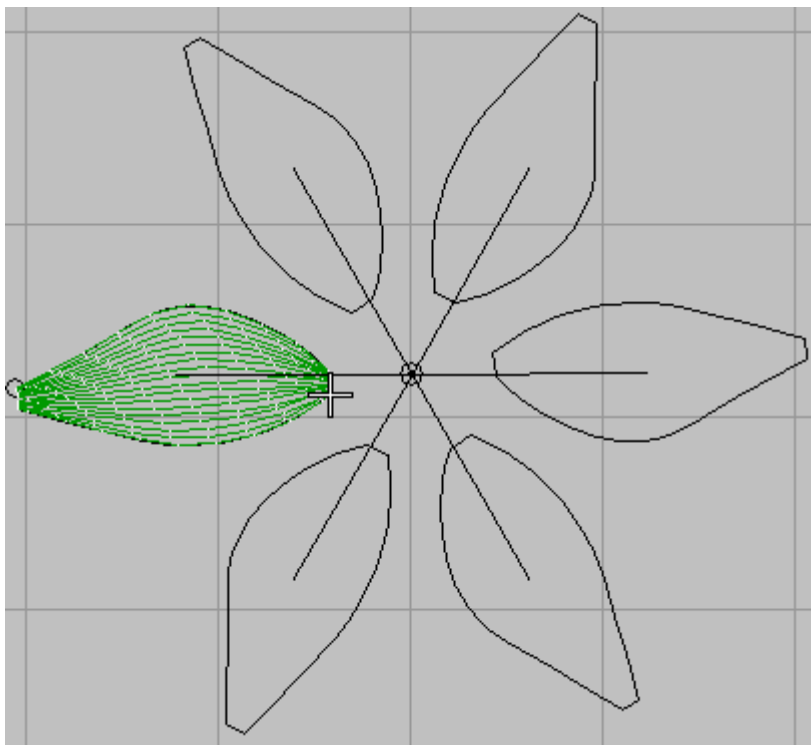


Press the circle toolbar button .

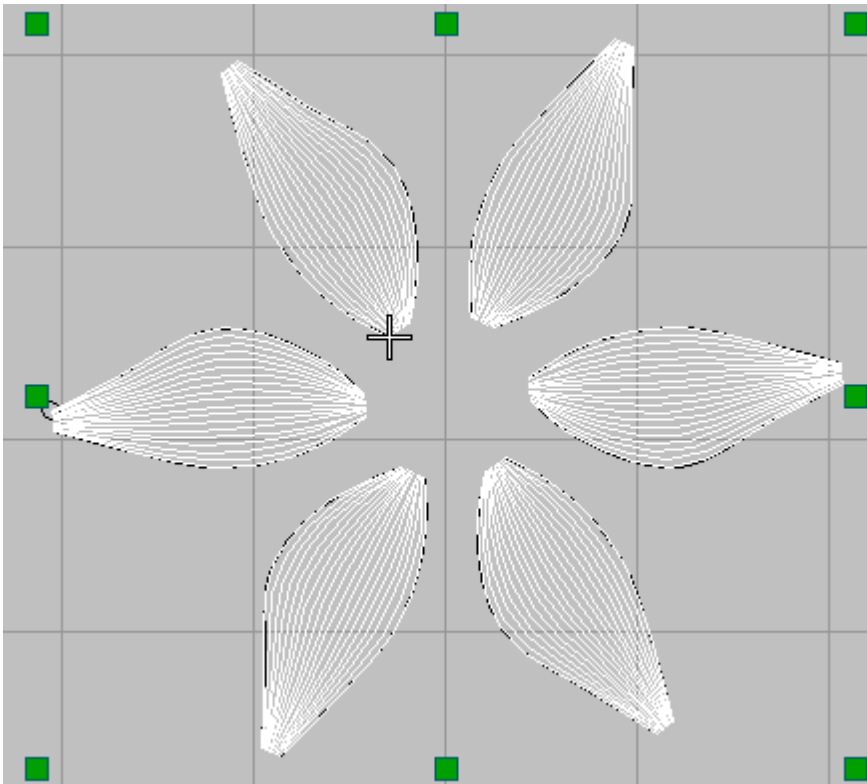
Setting repeat times, radius, start angle.



User may move the mouse adjust the radius and start angle

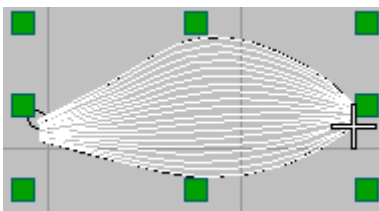


Click the left key of mouse , finish the operation



11.4 Kaleidoscope

Select the original object:

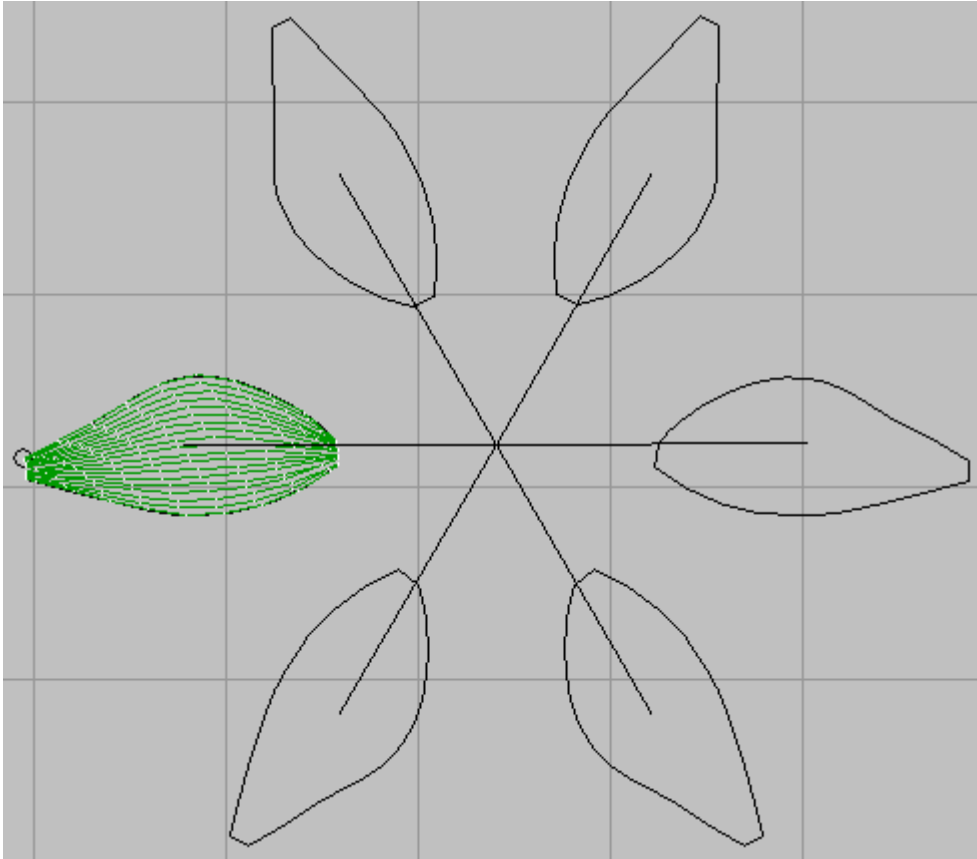


Press the kaleidoscope toolbar button .

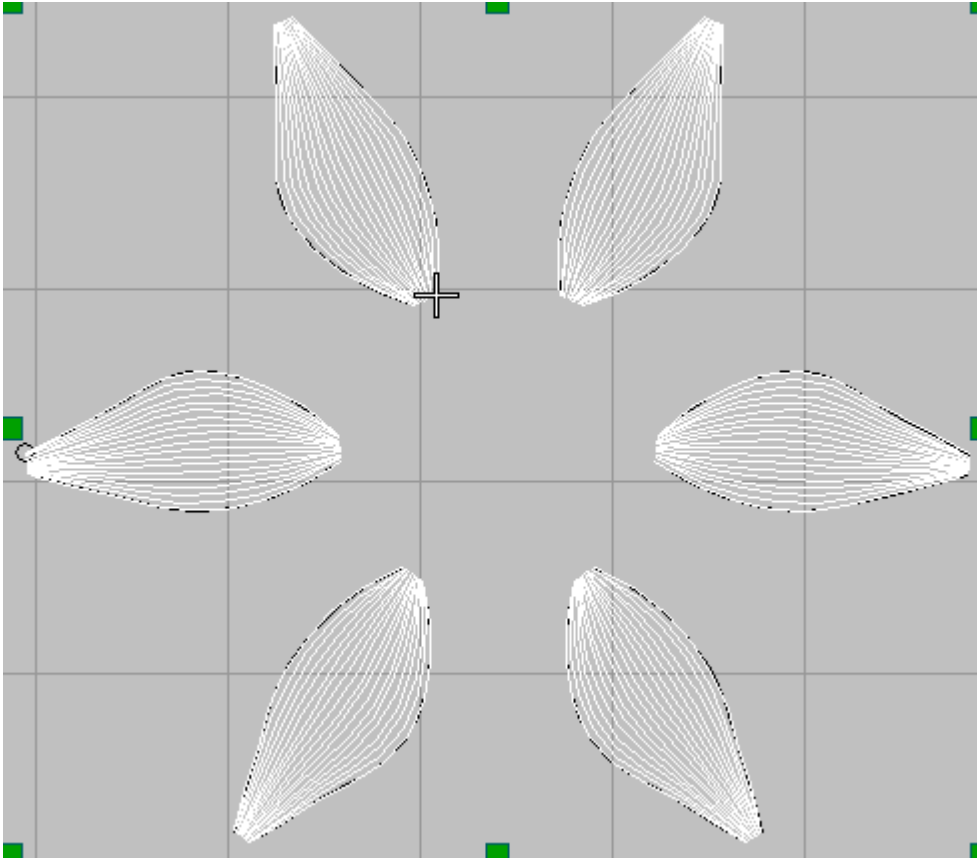
Setting repeat times, radius ,start angle.



User may move the mouse adjust the radius and start angle



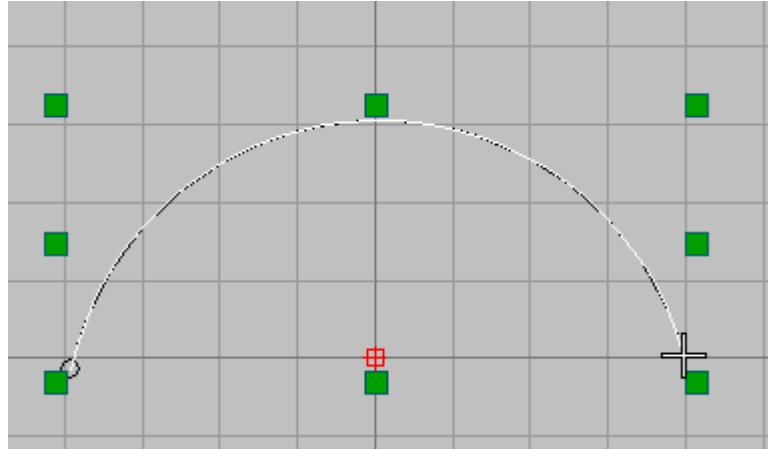
Click the left key of mouse , finish the operation



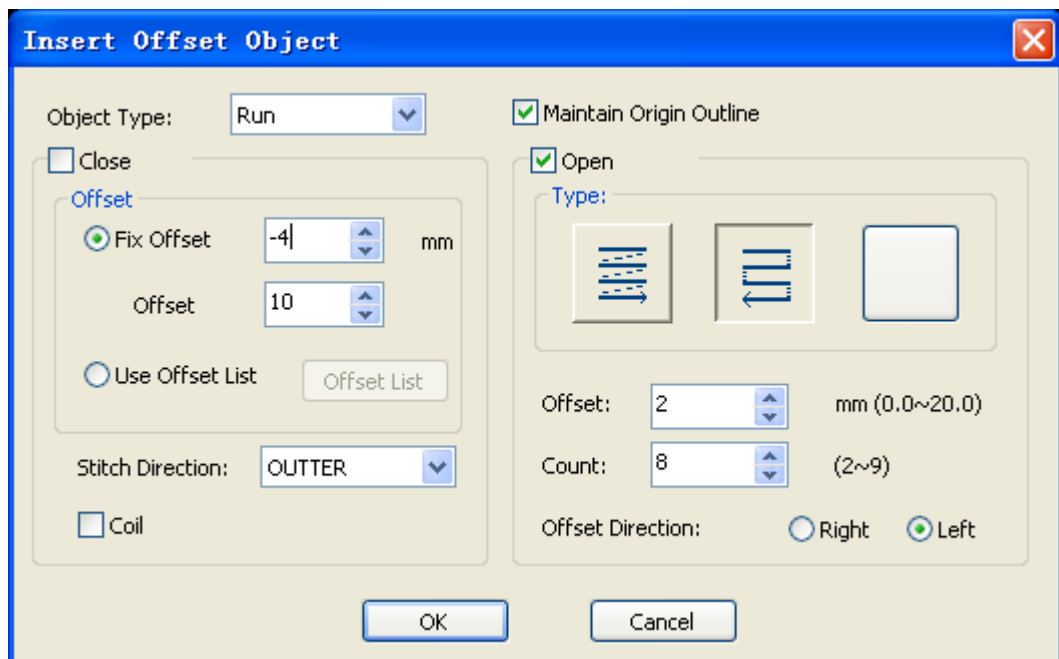
11.5 Insert offset object

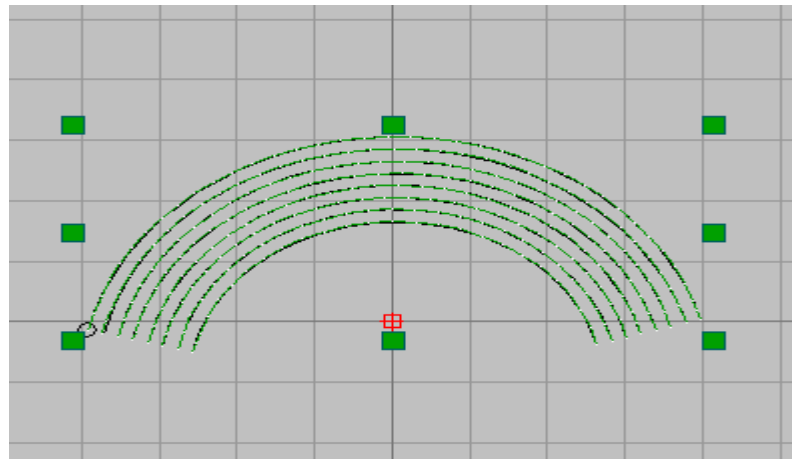
Insert offset object is offset the original object according to some space to create new object . the new object maybe is not same to the original object .

Select the original object:



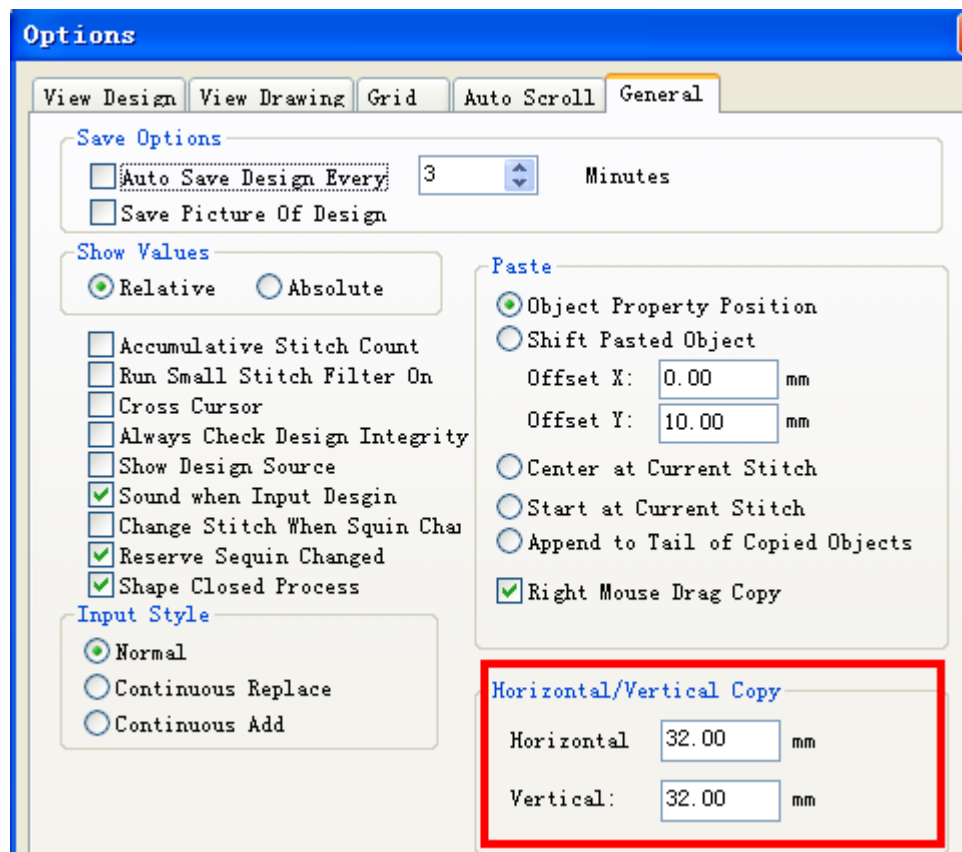
Press the insert offset toolbar button .





11.6 Continous copy

Select the original object, press **Alt**+ direction arrow key $\leftarrow \rightarrow \uparrow \downarrow$. setting horizontal space and vertical space



Chapter 12 Color/Object List Management

Use the tools for Color/Object List to check and sort out the objects.

12.1 Check Object Information

By using , user can easily check the object information, such as the input method, stitching method, stitch amount of object, color information of object and the object sequence of the entire pattern.

☐	1		1	T		221
☐	2		2			468
☐	1		3			1290
☐	3		4			1331
☐	2					
☐	1		5	T		450
☐	2		6			4
☐	1		7			30
☐	3		8			37
☐	1		9			3
☐	2		10			15
☐	1		11			326
☐	3		12			3311
☐	1		13	T		37

Object List: The neighboring objects with same color can be unfolded with figure  / .

At object list, user can check the object color, thumbnail, input method, stitch method, stitch number and so on. Compared to the design area, the object list let user have clear view on the composition of the whole pattern.

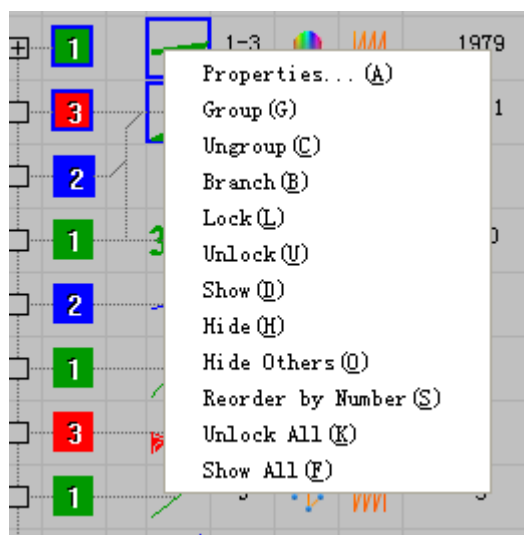
12.2 Adjust the Embroidery Sequence of Objects

By dragging the figure of the object, user can move the position of the object within the list. If user drags the color figure, the entire objects within that color group will be moved. Due to the rules on the embroidery sequence, generally, the

filling stitches should be done at first, and then the detailed embroidery at upper layer can be done. Therefore, user can easily adjust the embroidery sequence of objects with the object list during the modification of pattern.

12.3 Object Group

Click right key in the object list to activate the assistant menu. With this menu, user can group, hide or lock the objects.



Assistant Menu on Object List

User can hold **Control** to select several objects. And user can press the **Shift** and pick up two objects so as to select all the objects between them as well. The selected objects can be grouped. The grouped objects will be deemed as a single object by the system at the selection and dragging operation. The group function can make the package of the adjusted objects be easier, avoid the mistake operation at edition and provide convenience at managing the objects of big patterns.



1	3213	1	T	450
2		2	1	4
1		3	3	30
3		4		37
1		5	1	3
		6	T	221
		7		468
		8		1290
3		9		1331
2				

After the objects are grouped, the objects within the group will have a mark on the upper left corner on their input method figures.

With the ungroup function within the assistant menu, user can cancel the selected object group. The group function support the combination of several groups, which means the object group can be deemed as an independent object to be grouped with other objects or object groups

12.4 Hide

With the hide function in the assistant menu, user can hide the objects. After the object is hidden, that object will not be displayed at the design area. The hidden object will not be displayed until user cancels the hide status of object with assistant menu. This function can simplify the design of the complicated pattern. By hiding the finished part, user can design and modify the complicated pattern in steps.

12.5 Lock

With the assistant menu, user can lock the object. After the object is locked, the editions in the design area will be invalid to the locked object. The locked object can not be modified and edited on the design area until user unlocks it via the assistant menu.

Chapter 13 Pattern Output

Pattern I/O format and relating operations of pattern network transfer.

13.1 Format of Pattern at I/O

The pattern files of emCAD will be saved in the format of *. DHP (DaHao Pattern). The patterns saved as DHP will contain the entire design information.

Besides that, the system supports the output of patterns in DST and DSB format. The patterns in these two formats can be inputted to the computerized embroidery machine directly. When user saves the pattern in the machine format, only the stitches in relative coordinates can be inputted. Other design information of the objects, such as outline, input method and properties of stitching method will not be saved.

The above files can also be inputted to emCAD, where the further designing is available.

Dahao pattern files as format of *.DHA, can also be saved. It has stitches, color line, needle color. It can be input into Dahao Computer Control System.

13.2 Network Pattern Transfer

By pressing Main Menu →Machine→Network Transfer, user can open the interface for transferring pattern to realize the network transfer of pattern.

Chapter 14 Design Plan

Brief Analysis of Materials and Pattern-making Plan

In the section of making the simple pattern, we have already discussed this matter primarily. In this chapter will continue to discuss the details that require attentions in the whole design at all the time.

14.1 Handling the Materials

The materials used for designing the pattern are mainly coming from two resources: the one is pixel picture, the other is vector diagram. If the material is the pixel picture, user should turn it to the vector picture, where user needs simplify the color and draw the outline.



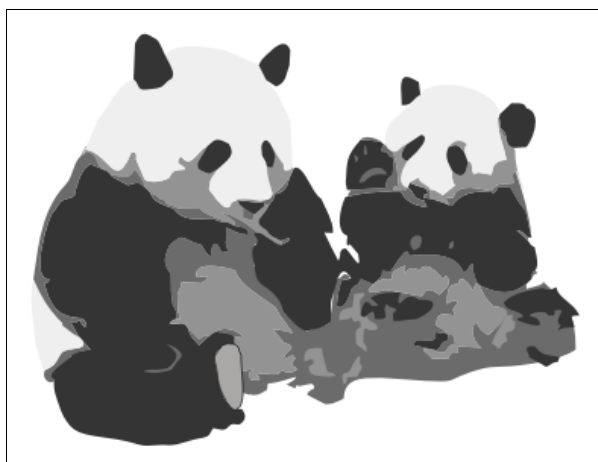
The color of original picture is over 256, user needs simplify the color.

To simplify the color, user can use the picture processing software like Photoshop, CorelDraw and so on. The color simplification will combine the pixels with the similar values so that the area with single color can be formed for next operation of drawing the outline.



After the simplification, only 4 colors are used. At this moment, the color blocks and lines are obvious.

After the color simplification, the picture may still contain a lot of “color noises”, when user can manually draw the outline to realize the vectorization or process the picture with the graph tracking software.

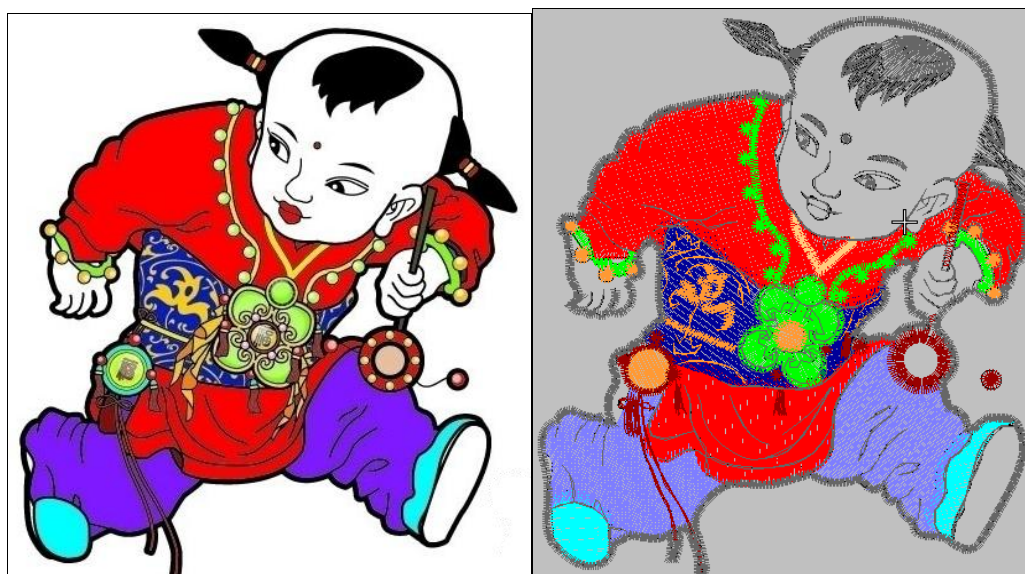


Effect of Vectorization: 4 colors and 61 color blocks are used.

For the effect of the vectorization at above, user needs process the picture with graph tracking software, optimize the details manually and delete the background. To reach the ideal effect, user still needs many practices. The processing result of leaving 61 color blocks is still a little complicated for the pattern design at primary level.

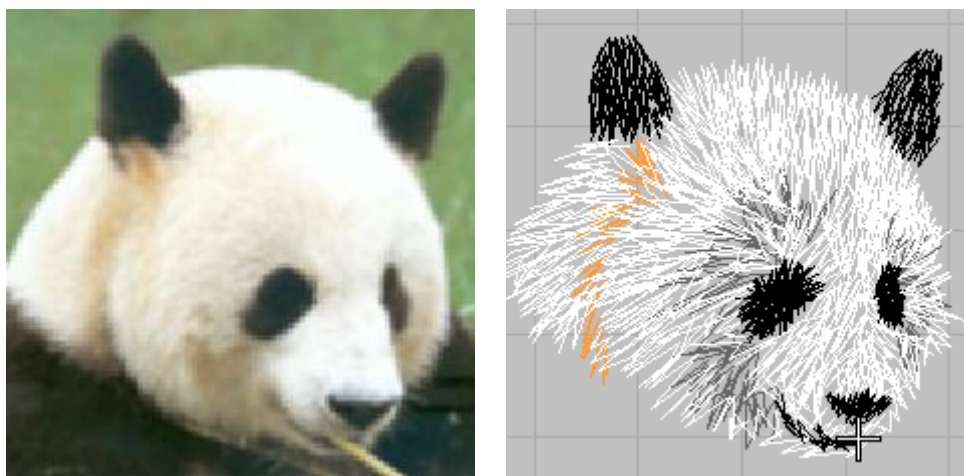
14.2 Make Pattern

Due to the limitation on input method of embroidery and the display method of thread, it is hardly to recover the original picture. Therefore, users should make the choice on the details, such as abandonment of some transfer colors, properly thickening some lines and thinning some lines, so as to fit the realization of stitching result.



The 3D effect of the embroidery design is not as good as that in original vector

design. The larger the pattern is, more obvious this difference will be. Therefore, user needs some innovation on stitching method and processing on details at designing the pattern with large working area.



To use the disordered stitches for designing pattern is to simulate the manual embroidery. The disordered embroidery is not to embroider at will, but to seek the comprehensive harmony among the irregularities. It needs practices and accumulation of techniques so that the pattern can have its own spirit. The disordered embroidery on the picture above is made in hurry, just for explanation. Due to the rough processing on the face and eyes, this pattern is hard to show the effects of the original picture.

14.3 Coloring

The proper coloring plan will get the pattern more beautiful, but the wrong coloring plan can probably ruin a nice design completely. At embroidering the pattern with high craft requirements, because many similar colors would be used in the embroidery, it is of importance to select the threads with proper color.



The left one (original design) is in warm color; the right one is in cold color.

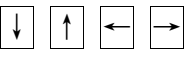
14.4 3D Effect

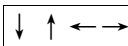
Limited by the current technology, the pattern-making software can not show the 3D information and effect of pattern well. For the embroidery craft, besides to the lengths in X/Y direction, the levels and thickness of the pattern is also of great importance. Because the thread has its own thickness, the laying of the threads will thicken the embroidery. In the traditional pattern-making craft, there is a method

called as “3D Stitch”, which is to continuously stack the radial stitch to generate the 3D effect.

In the four traditional embroidery styles of China, the Yue Embroidery focuses on filling the base fabric to create the effect of uplift. For the pattern-maker at present, because the current software can not clearly display the 3D information, the pattern-maker shall image the 3D effect of the pattern in their minds. Thus they can soundly handle the transfer and connection of the pattern. And the detailed levels in the pattern design can be clear. Only when the pattern appears the sense of levels, can we say that the embroidery is vivid.

Appendix 1 Hotkey List

Types	Operation	Buttons used	Description
File Operation	New File	Ctrl + N	
	Save File	Ctrl + S	
	Open File	Ctrl + O	
	Print File	Ctrl + P	
Object Input, Object Modification	Set whether to let icon catch grid at inputting the object.	G	
	Select Sequin in Backward	Q	Only available at Manual Sequin
	Select Sequin in Forward	W	Only available at Manual Sequin
	Not drop down sequin	Shift	Only available at Manual Sequin
	Moving selected object in X/Y direction.	Mouse + Ctrl	
	Moving selected object with keys.		
	activate Reshape tool	H	
	activate Stitch Edit tool	E	
	change reshape control point type	Mouse + Space	
	apply Satin stitch	Shift + I	
	apply Tatami stitch	Shift + M	
	apply Run stitch	Shift + N	
	toggle Auto Underlay on/off	U	
	toggle Snap Cursor At Grid Cross on/off	G	
Object Operation	Copy	Ctrl + C	
	Paste	Ctrl + V	
	Cut	Ctrl + X	
	Delete	Del	
	Select All	Ctrl + A	

Types	Operation	Buttons used	Description
	Cancel Select All	X	
	Undo	Ctrl + Z	Cancel the operation of a single step
	Redo	Ctrl + Y	Repeat the operation of a single step
	activate Select Object tool	O	
	activate Polygon Select tool	Ctrl + L	
	group selected objects	Ctrl + G	
	ungroup selected objects	Ctrl + U	
	lock selected object	K	
	unlock selected object	Shift + K	
	select multiple objects	Mouse + Ctrl	
	select object beneath	Mouse + 2	
	Redo of single operation	Ctrl + Y	
	Undo of single operation	Ctrl + Z	
	Continous Copy	Alt + 	
Display Mode	toggle TrueView on/off	T	
	show/hide grid line	Shift + G	
	show/hide stitches	S	
	show/hide outlines	L	
	show/hide needle points	.	
	show/hide connectors	Shift + C	
	show/hide function symbols	Shift + F	
	show/hide vector	Shift + D	
	show/hide image	D	
	redraw screen	R or F4	Refresh the display on interface
	activate Slow Redraw	Shift + R	Simulate the sewing effects
	measure distance on-screen	M	Distance between two points on

Types	Operation	Buttons used	Description
			interface
	Display Pattern in Center	0	
	Display Selected Pattern in Center	Shift + 0	
	return to previous view	V or F5	
	Zoom in 1 time	Z or F9	
	Zoom out 1 time	Shift + Z or F10	
	specify zoom factor	F or F3	
	Scale Frame	B or F8	Display the selected content in center
	Display Real Figure	1	Scale rate set at 1.0
Stitch Trace (number keys is on the number pad.)	to start of design	Home or 7	
	to end of design	End or 1	
	to next color	Pagedown or 3	
	to previous color	Pageup or 9	
	to next segment	Ctrl + → or Ctrl + 6	
	to previous segment	Ctrl + ← or Ctrl + 4	
	to next object	Ctrl + T	
	to previous object	Shift + T	
	100 stitches forward	+	
	100 stitches backward	-	
	10 stitches forward	↓ or 2	
	10 stitches backward	↑ or 8	
	1 stitches forward	→ or 6	
	1 stitches backward	← or 4	
Function Interface	Overall Window	Shift + V	
	Stitch List	Shift + J	
	Object List	Shift + L	