Introduction: Pixel images versus Spline images.

Pixel images: (JacqCAD, PhotoShop, Canvas, Studio, …)

JacqCAD, PhotoShop, and many other image editing programs are designed to work on Pixel based images. These images consist of a large number of color dots (the pixels) arranged in a grid.

Pixel images are ideal for textile designs because of the natural correspondence between pixels and thread crossings.

When a Pixel images is magnified (zoomed up), the individual pixels become visible. For instance, curved lines which appeared smooth before being magnified will be seen to contain "jaggies" - see example at right which shows the magnified petal tip from the above image.

Woven designs have identical properties - when you magnify them you will see individual threads and stair-stepped curves.

Like textile designs, Pixel images are characterized by their width (number of Ends) and height (number of picks). No detail can be smaller than one End by one Pick, i.e., no detail can be smaller than a single pixel.
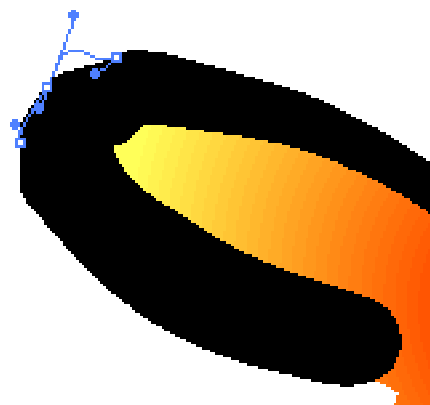
Spline images: (Adobe Illustrator, Freehand, other EPS files, …)

Spline images take an entirely different approach to images - they store them as curved objects described by mathematical equations called "splines". The fine blue line around the petal to the right is the spline which defines the black petal edge. The small squares are "knots" which join spline segments.

Splines are the basis of Postscript type fonts - each letter is stored as splines which are scaled as needed to provide each font size.

The second example shows how one changes the shape of the curve between two knots; similarly, the position of the individual knots can be changed. These examples are taken from Adobe Illustrator, the premier editor for spline based images.

The great strength of spline images is that they can be scaled, stretched, rotated, and so on while perfectly preserving their smooth shape.
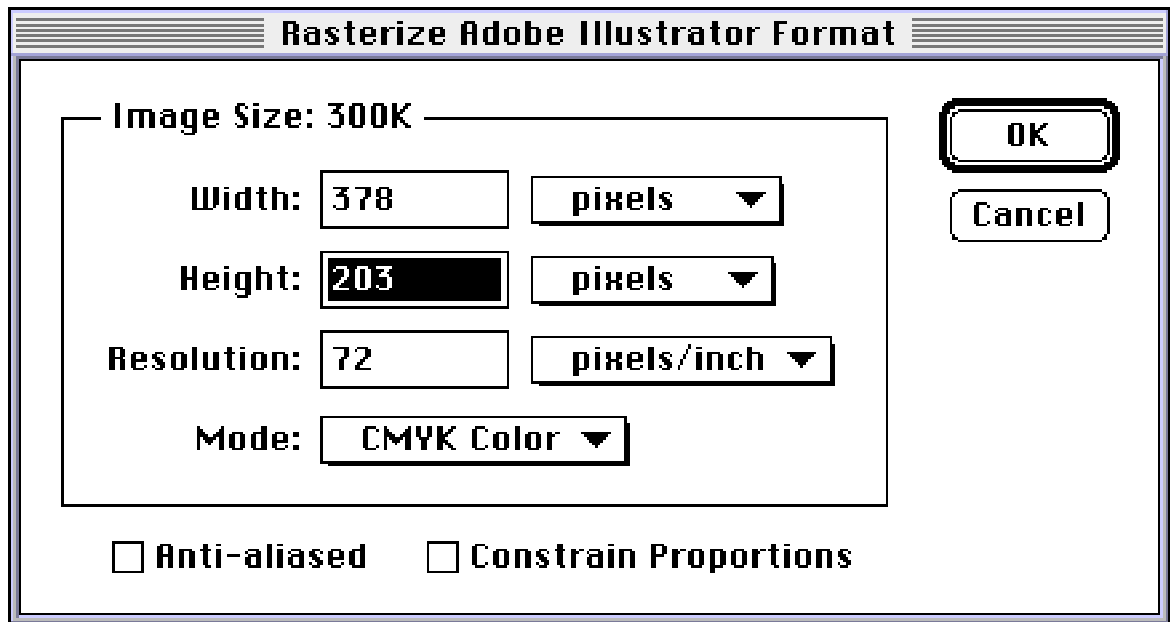
Of course, splines have their weaknesses. An enormous number of calculations are needed to display the curves - this can make editing quite slow. Also, while well suited to simple curvi-linear shapes, they are completely inappropriate for "busy" images such as scanned images. Finally, in spline format they are not 'weaveable'; first they must be 'rasterized' which is to say converted to a pixel image of the appropriate dimensions.

Despite these limitations, splines can be very useful, especially in the early stages of composition.

JacqCAD does not yet provide any spline tools. Instead, Adobe Illustrator is recommended and an Illustrator image can be imported into JacqCAD for final processing through the following steps:

Importing Adobe Illustrator designs into JacqCAD

• While in Illustrator, save your design in EPS format (use Save As..).

• While in Photoshop, open the EPS file; this opens the following dialog:

Be sure to UNcheck "Anti-aliased" and "Constrain Proportions".

Set the Width and Height to the desired dimensions, i.e., to the number of Ends and Picks you want. In this example the full sized image would have been 378 x 406, but we specified 378 x 203 to provide for a 2.0 to 1 aspect ratio (weft spacing 2X wider than warp spacing). This was only allowed because we UNchecked "Constrain Proportions". In PhotoShop the image will be distorted because PhotoShop only displays in square pixels.
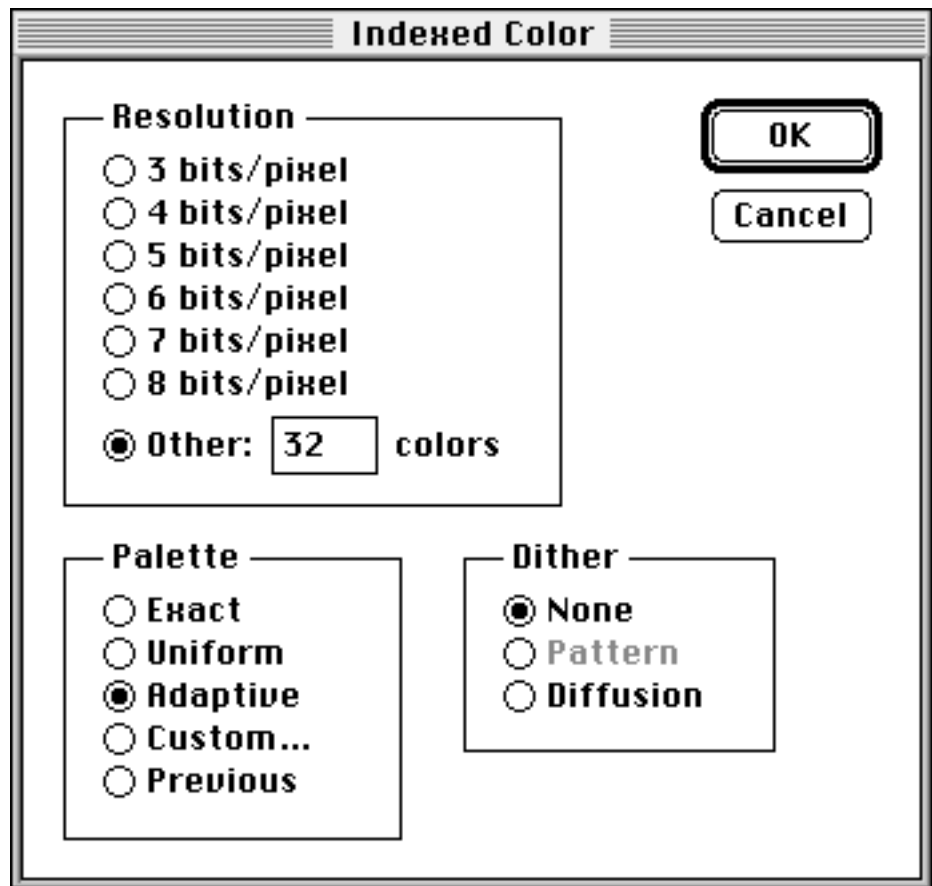
• Next, using PhotoShop's Mode Menu, convert the image from CMYK Color to RGB Color.

• Then convert it to Indexed Color which brings up the following dialog:

You can either choose "8 bits/pixel", or "Other:" if you wish to reduce the number of colors during the conversion. In this example we have chosen to reduce it to 32 colors.

For the Dither setting you should choose "None" as indicated.

The palette selection can be "Custom" if you wish to force the image to use an existing palette, or Adaptive to create a new "best" palette for this image.

• use "Save As" to save the image as a PICT File.

Indexed Color

Resolution
- ○ 3 bits/pixel
- ○ 4 bits/pixel
- ○ 5 bits/pixel
- ○ 6 bits/pixel
- ○ 7 bits/pixel
- ○ 8 bits/pixel
- ● Other: [32] colors

[OK]
[Cancel]

Palette
- ○ Exact
- ○ Uniform
- ● Adaptive
- ○ Custom...
- ○ Previous

Dither
- ● None
- ○ Pattern
- ○ Diffusion

• Then open this PICT file in JacqCAD, setting the Aspect Ratio appropriately (to 2.0 for this example since we reduced the number of Picks by a factor of 2.0 to 1).

The final result is a correctly dimensioned and proportioned image, ready for weave application and other technical processing.

SUMMARY: • save your spline based design as an EPS file, • open the EPS file in PhotoShop to rasterize to correct size and to convert to indexed color, • save converted design as a PICT file, • open the PICT file in JacqCAD setting the appropriate aspect ratio. Any EPS file can be converted using the above mentionned technique.

A cautionary note:

One of the delights of spline based design comes from the infinity of detail that is possible. The sharpest of points, the finest of lines, the most intricate of details are all supported.

Of course, this is not the case for Jacquard textile designs which, by their very nature, provide limited resolution. Simply put, you can not weave 200 line per inch details with 50 threads per inch.

Raterization (conversion from splines to pixels) is often a time of aesthetic pain. The stylist is horrified at what the mill has done to her beautifully detailed design; the technical weaver is frustrated at once again having been given a design that she could not possibly weave.

It is crucial to keep in mind from the very beginning the resolution that will be available in the final product. Where a single person is responsible for the design from concept through rasterization and into weave application, they soon learn to work within the constraints of the medium.

The conflicts occur when the tasks are split among two or more departments - typically an artistic/ stylist group and a separate technical textile group. Often this split is implemented right at the rasterization boundary - the stylist's job ending just before rasterization, the technical weaver's job beginning with rasterization - and the mills echo with cries of anguish from both groups.

Moving rasterization to the other side of the boundary, into the stylist's group, prevents much of this sorrow. By providing immediate feedback to the stylist when the details are too fine to be woven, it prevents the creation of unweavable designs. Indeed, it can improve the quality of design as the stylist learns how to create the illusion of detail through precise control of the thread crossings.

The following examples show the effects of increasingly coarse rasterization. Although letter shapes have been used as the figures, the same effects occur with any design element.

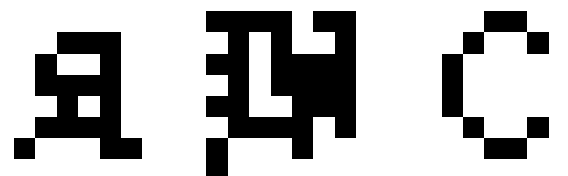The original, EPS file >>

Rasterized into 208 Ends

Rasterized into 104 Ends

Rasterized into 52 Ends

Rasterized into 26 Ends