

JacqCAD MASTER®

Now being distributed free as Shareware

The Complete Design Software for Jacquard Weavers

JacqCAD MASTER®, the textile design system of choice for many of the industry's top designers, is being used to design a wide range of Jacquard fabrics for home furnishings, automotive, contract, apparel, wall coverings, upholstery, terry, and Raschel. **JacqCAD MASTER®** provides powerful image editing features, extensive technical weave creation and application tools, and unparalleled support of industry file formats.



First introduced in 1990, by 2008 more than 450 **JacqCAD MASTER®** systems were in use in industry and universities in the United States, Canada, Mexico, Europe, Africa and Asia.

JacqCAD MASTER® offers a design system that is:

- * **Complete** : **JacqCAD MASTER®** includes everything needed to take your design from image creation, through image editing, expansion, weave and box motion assignments, to punching to a wide variety of loom formats.
- * **Open** : **JacqCAD MASTER®** runs on PowerPC Macintosh computers, including the PowerBook G3 and G4 laptops. Our users are free to purchase their computers from the most advantageous source, free to expand their systems at any time to suit their needs, and free to add any software they wish to use.
- * **Compatible** : **JacqCAD MASTER®** works with standard image files, so users can exploit images from an extraordinary range of other graphics programs. It is also compatible with a wide range of textile-specific formats used by other textile CAD systems.
- * **Portable** : All **JacqCAD MASTER®** features are fully supported on the PowerBook G3 and G4 laptops. You can hand carry your entire design system to a customer site or to the loom for on-the-spot corrections.
- * **FREE** : **JacqCAD MASTER®** is now being distributed as "shareware".

Hardware Requirements & Capabilities

- * **CPU** : any Macintosh PowerPC computer including PowerMac, G3, G4, G5 desktops and PowerBook G3 or G4 laptops. It can not run on Intel-based Mac computers.
- * **System Software** : requires either Mac OS 9 or Mac OS X 10.4 or earlier with Classic. It can not run under Mac OS X 10.5 (Leopard) or later.
- * **Displays** : all monitor sizes from 13" (640x480) and above are supported. Multiple displays are supported - we have users who work on two side-by-side 21" monitors to provide an effective display width of 32".

General Software Capabilities

- * **Maximum design size** : 16,000 ends X 30,000 picks
- * **Aspect ratio** : 0.05 to 20.0 (End density / Pick density)
- * **Colors per design** : 256 (user selectable from a palette of 16 million),
- * **Weaves per design** : 256 independent weave assignments
- * **Maximum weave size** : essentially unlimited (16,000 x 30,000)
- * **Box sequences** : up to 5,000 steps per sequence, 128 sequences
- * **Shuttle selection** : up to 16 shuttles
- * **Cards per pick** : up to 32 to support double picking, etc.
- * **Standard image formats** : PICT (Macintosh standard), TIFF (PC standard).
- * **Textile image formats** : EAT, Grosse DES, NedGraphics PAT, Sophis, Viable RLS, Muller M3D.
- * **Card (loom control) formats** : Actrom-5; AVL J1P, Bonas EP; Dornier Dobby; Digital Weaving Norway, Grosse WEA; Schleicher punch; Somet Socos Dobby; Staubli JC3, JC4, JC5, Punch, Dobby, and Network; TIS Electronics; Viable PUN; Sophis CILIB, Muller UNI, UPT.

About *JacqCAD International* :

A brief history:

JacqCAD International is a registered *d/b/a* of Fletcher Applied Sciences, Inc. (FAS), a New Hampshire corporation organized in 1979 to develop computer programs, initially for research laboratories working in the life sciences.



FAS has been involved in the development of textile CAD programs since 1982.

Work on what eventually became *JacqCAD MASTER*® began in late 1989 in collaboration with Raxon Fabrics Corporation of Allentown, PA. "First cloth" was woven at Raxon in late 1990 and the program, then called "TexTech", was offered to the industry at large beginning in 1991.

At that time, most Jacquard CAD systems cost in excess of a hundred thousand dollars and often came bundled with hardware in closed systems. *JacqCAD*'s cost was a fraction that of comparable software and its "unbundled" approach allowed users to provide and control their own computer systems; a significant change.

In 1993 the program was renamed *JacqCAD MASTER*® with North American distribution and support being provided through DILAN in Hickory, North Carolina. Program development continued at FAS which also provided backup technical support.

In 1997, *JacqCAD MASTER*® distribution and support activities were brought back under the direct control of FAS with the name *JacqCAD International* established as the corporate identity. Many new features were developed over the following decade.

However, by 2008, it had become apparent that my approach of incremental adaptation, which had served well over almost two decades of changes in hardware and OS, would not be capable of adapting to Mac OS X 10.5 (Leopard) and its successors.

It became clear that a complete "from the ground up" rewrite of *JacqCAD MASTER*® would be required to remove its dependence on OS 9, Classic and PowerPC-based computers. We did not have the resources to undertake such a major effort and the painful shrinkage of the US textile industry provided little confidence that such a major investment could be repaid. Consequently we announced the end of development in January 2008.

Shortly after that announcement, an independent user group undertook their own effort at modernizing JacqCAD. They assembled a programming team and assigned to them the task of completely rewriting JacqCAD to make use of the latest technologies and ensure long term compatibility with modern Mac computers and operating systems. I served as an unpaid consultant to this effort.

The team made impressive progress but unfortunately in late 2009 this effort had to be terminated due to cost over runs.

Which brings us to the present, March 2010.

JacqCAD currently requires PowerPC Mac computers, such as the G3, G4 or G5 series. These are widely available, but only on the used equipment market. It also depends on OS X's Classic support, which was discontinued with the release of Apple's OS X 10.5 (Leopard).

Most corporations are very uncomfortable with relying on obsolete used equipment; many also expect their IT departments to routinely update software with the latest patches, especially operating system (OS) software. *JacqCAD's* dependence on used equipment and its inability to run under the latest OS releases renders it unsuitable for such users; *JacqCAD* has come to a dead end as a commercial product.

On the other hand, it remains easy and inexpensive to procure suitable Mac computers. Their maintenance costs tend to be low, reliability is high, and there is no real need to upgrade OS software on a stand-alone system being used for Jacquard design. It is therefore possible that *JacqCAD* may be of use to those who cannot afford or justify the purchase of a modern commercial system - artisanal weavers, students, small start-up mills and independent designers.

It is with this group in mind that we have decided to offer *JacqCAD MASTER*® as a free "shareware" release to any who are interested so long as they understand that it is offered without any warranty as to suitability, without any commitment that bugs will be fixed or support provided, and for use entirely at the user's risk.

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JacqCAD MASTER® Process Overview

JacqCAD MASTER® provides the most flexible approach to Jacquard designing. In the simplest case, the process can be summarized by the following five stages:

Image formation - a design is painted using **JacqCAD**, or imported from other image sources such as scanners, other graphics programs, or image collections. The design is edited as needed to bring it into the desired size, repeat pattern, and colors.

Expansion - the image is expanded into its textile-structured form which accounts for each thread crossing. Repeats - plain, mirrored or pick drop - can also be created during expansion. If your design includes supplemental weft (“tissue”), the required extra cards are created as part of the expansion process.

Application of weaves, box motions, regulators - assignment of weaves to colors, application of box sequences, addition of regulators (fabric take-up, fringe,...).

Final edit - a final editing stage as needed to detect and control floats or make any other adjustments which require control on a thread by thread basis.

Punching - output in final loom control format.

Many supporting processes are provided, for example to create weaves or to define castouts for different looms.

The above five step sequence is by no means “locked in”. While most designs can be processed in a largely automated fashion, some designs will require exceptional system flexibility in order to achieve the exact desired result.

A central objective of **JacqCAD MASTER®** is to give the designer total control over the fabric structure - **JacqCAD** always gives the designer the tools needed to control the execution of a design on a thread by thread basis.

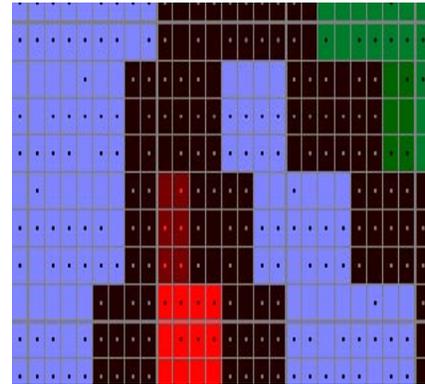
For example, users can apply weaves before expansion (sometimes done to define binder points), may paint “color strips” into the image which can be used to control expansion and box assignments, may “expand” an image several times for special effects, may convert expanded images back into simple ones, may even read punch files back in as expanded images for further processing (or conversion to other loom setups), and so on.

A Few Selected Features

JacqCAD MASTER® is a powerful program whose Technical Reference Manual exceeds 250 large format pages; a full review of its capabilities is far beyond the scope of this brief introduction. In the discussion which follows we have highlighted a few features which we hope can give you the “flavor” and some idea of the capabilities of the program.

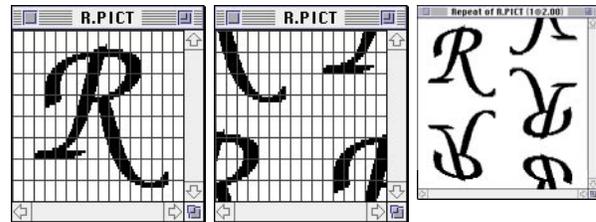
Image Creation & Editing

Images are edited in correct aspect ratio; the example to the right shows a small section of a design being displayed at an aspect ratio of 2.36:1 with the Grid turned on to demarcate the individual Ends. In this example, the Cut marks from the overlain weaves are being displayed as “center dots” in contrasting colors. Any aspect ratio between 0.05 to 20.0 can be selected.



Up to 20 image windows may be open simultaneously - the designer can Cut/Copy parts from one design to Paste into another, temporarily move selected sections into a separate window for special editing before pasting them back, or simply use adjacent windows to compare designs.

A window can be displayed in “Repeat View” - see the two views of “R.PICT” at the right - to facilitate editing of the seams between repeats.



A “window of repeats” can be opened to show various repeat patterns of a base window - see example at the far right which shows a 2x2 repeat of the R.PICT window with a 1/2 Pick drop and selected mirroring in each repeat. Live update is supported in which changes to the base window are immediately replicated in the repeats window.

A rich collection of tools is provided by the ToolBox window, shown to the right.

The Selection Tools are used to create complex selection outlines. Selection outlines can be moved, rotated, expanded or shrunk, and combined, used in Masks, or used to limit various other operations to the image areas selected by them.

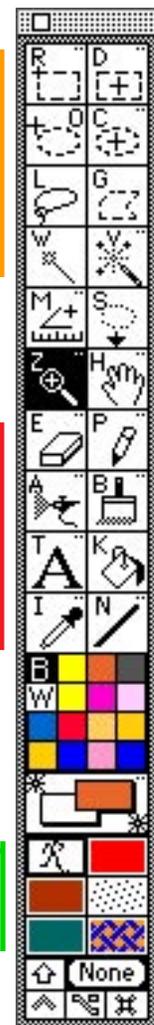
Selected image areas are used in Cut/Copy and Paste, can be filled or outlined with colors or patterns, scaled and/or rotated, filtered, and manipulated in many ways.

The Drawing and Painting Tools are used to draw and edit the image. The Eraser, Pencil, Text, Eye Dropper, and Line tools will be familiar to most graphics users, as will be the Paint Bucket tool, except that it can be used to also fill areas with patterns, weaves, or tiled repeats as well as with the usual solid colors.

The Airbrush tool is extremely flexible - flow pattern, shape, and rate can all be adjusted, with the rate linked to stylus pressure if desired. Droplet size can be set and locked to a grid, e.g., when it is desired to spray only complete units of a weave structure. The Airbrush can also spray graded mixtures of 2 colors and even complete images - the latter being useful for blending motifs into a background.

The Brush tool is the most complex. Six independent customized brushes are stored in the Brush palette, instantly selectable simply by clicking in the ToolBox.

The shape, size, colors, and transparency of each brush can be adjusted. Brush types include Solid, Pattern, Weave, Tiled, Stamp, and Substitution. Pattern and Weave brushes draw in 2 colors (one if Transparent). Tiled and Stamp brushes draw

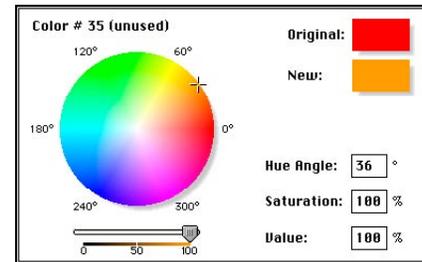
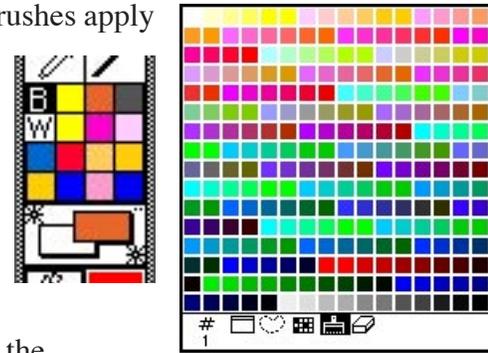


full-colored images. Any selected image area - for example an entire flower - can be made into a Stamp Brush. Any rectangular image area, including an entire image, can be made into a Tile brush. Substitution brushes apply color changes to the brushed area - for instance to recolor selected repeats.

The Micro Palette in the ToolBox provides instant access to Black, White, and to 14 user selected colors.

The image's entire palette, shown at far right, is accessed by clicking on the ToolBox's Foreground or Background color patches (below the Micro Palette). Clicking on the * near the Foreground or Background color patches causes the corresponding color to "flash" in the image to locate instances of use of that color.

Any color in the palette, except for the first and last (White & Black) can be selected by the user from a palette of 16 millions colors. A variety of Color Pickers are available - the HSV version is shown in miniature to the right.



The Navigation Tools include the Magnifying Glass and the Grabber used to zoom the image in and out and to scroll it around. They also can be accessed while using any other tool (except the Text tool) via keyboard presses; scroll bars along the edges of the image provide immediate scrolling. Zooms are supported from a maximum of 16:1 (~ 4 Ends/inch), to low enough to fit the entire image on the screen. Correct aspect ratio is maintained at all zoom levels.



To further enhance efficient navigation, the user is provided with eight "Bookmarks" which can be used to mark specific views of images (locations and zoom settings) for instant recall.

A Miscellany of Editing Functions

Any selected area can be *Copied* or *Cut* and subsequently *Pasted* into a different location or image. The pasted copy can be moved around, mirrored in Ends, Picks, or both, and set to paste normally, with transparency, or using one of several blending modes.

Repeated Paste provides repeated pasting on user determined spacing - in the example the original R (shown in red) was Selected with the Wand tool, Copied, and subjected to a Repeated Paste set to move over 48 ends and down 12 picks between pastings in each row and over 10 ends and down 40 picks between rows.

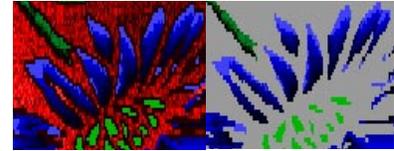


A *Gradient* is defined as a specific sequence of colors; a gradient can include as few as 2 and as many as 256 colors, and up to 32 independent gradients can be defined at any one time. *Gradients* are applied to a selection in a variety of modes - as Linear or Radial or Modeling gradients - with dynamically adjustable starting points, directions and spans. They only use the colors specifically included by the user in the gradient, hence do not create the multitude of extra colors which are the bane of the more common graphic arts gradients when used in textile design.

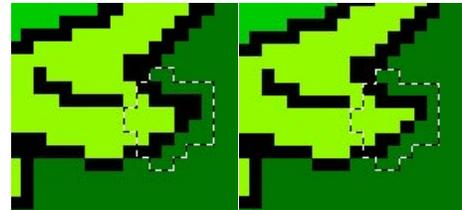
Gradients



JacqCAD MASTER®'s *Masking* function is one of the most powerful editing features available to the industry. Masks are extremely useful for editing. Areas of the image can be selected by color, color group, selection shape, pick/end pattern, shuttle assignment, differences between images, and *any combination of these*, and used to create a mask. The example shows a mask (top) being used to isolate just the inner parts of the petals and stem of a single flower in a floral design. Masking protects the desired parts of the design, allowing, for example, the designer to paint only into the background while leaving the foreground motif unchanged, or vice-versa. All operations which can change the image are controlled by the mask, including the cutting in of weaves, the changing of colors, etc. Masks can be saved and used on other designs.

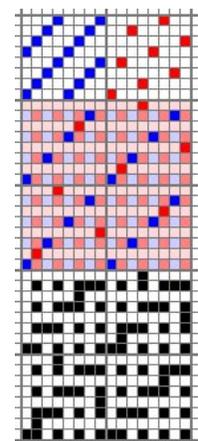


JacqCAD MASTER®'s *Find and Replace* provides a powerful and flexible feature limited only by the designer's imagination. The user defines a Find pattern to be matched and a corresponding Replace pattern. The Find and Replace pattern can be used to Find matching areas and to replace them with the defined Replace, either one by one using *Replace* and *Find Next* or automatically for all occurrences using *Replace All*. In the example, the Find pattern on the left (the 40 pixels inside the selection outline) can be replaced by the pattern on the right everywhere in the image in one step. Find patterns can be as large as 3,072 pixels (e.g., 64x48) and can look for patterns containing specific colors or general color relations. Find and Replace patterns can be saved and chained into automatic Find and Replace macros. Common uses are for finding & repairing floats, applying corrections to all instances of a defect, and even converting back from card image files to colored designs (by finding weaves at specific alignments and replacing them with solid colors).



JacqCAD MASTER® provides calculators for Yarn Measure (converts between various yarn measures, materials, densities) and Repeats (calculates repeat widths, number of repeats). It provides a range of textile specific analyses such as *Warp Balance* (compares activity of warps to help prevent slack or stretched warp ends), *Two in the Shed* (finds excessively parallel wefts, even in multi-layer constructions), *Two in the Warp* (same in warp dimension), *Float Length* (analyses distribution of floats - by warp and weft, face and back), and *Color Use* (analysis of color usage and weft consumption).

JacqCAD MASTER®'s full set of tools can be used to draft weaves of any size. Color is especially useful when designing multi-layer weaves, see the two layer weave at right which combines a satin face with a twill back. Any rectangular area, even an entire design, can be selected and converted into a weave. An ISO 9354 weave generator is also provided for simple weaves, Weaves can be combined into weave libraries for convenience, or kept separate.



Weaves are assigned to each color in the design so each design can have up to 255 separate weaves. The user controls each weave assignment individually by specifying the starting Pick and/or End, the weave advance mode (by Color Use, by Card, By Shuttle Group, or by Pick), weave polarity, and cut color. Weave Assignments can be saved in files for later use. Overlaying of the weaves onto the design is a very efficient process - less than 30 seconds for a 1152 x 1000 design containing 255 different weaves.

JacqCAD MASTER® lets the designer create and edit the design in the efficient *condensed* form in which each pixel represents the group of yarns which must logically be controlled as a single entity (for example 6 warp x 3 weft for a 6 color tapestry construction).

Once the condensed design is complete, it is converted through *Expansion* into an *Expanded Image* which displays every yarn and provides the textile structures for box assignments, regulators, etc. All editing tools can be used with the *Expanded Image* because it still is an image, although a larger one which contains additional structural information.

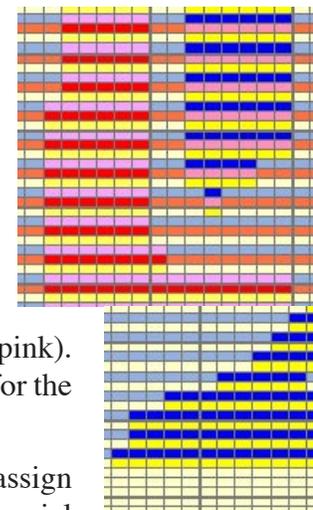
Expansion is a very flexible process which supports mirrors, repeats, scaling, pick drops, banding and other effects. It can be controlled through dialogs or through a color strip in the design.

During expansion, each pick from the design can be expanded into as many as 32 cards (*logical shuttles*) in the expanded design. Although expansion of a pick into 8 cards is usually ample, e.g., for an 8 color brocade, the extra logical shuttles support double picking and other techniques.

Activation of each shuttle can be set to *always* or *conditional*. *Always* creates a card on every pick - for running shuttle constructions or for the ground in brocades. *Conditional* creates a card only if the pick includes a specific design color or colors; this is used for supplemental weft (tissue) in Brocade fabrics and woven labels.

During expansion colors from the design can be duplicated into the resulting shuttles or changed shuttle by shuttle to support assignment of different weaves in each shuttle. In the example to the right, expansion is Always for the first shuttle (painted in white and yellow) which weaves the ground fabric and Conditional for the 2nd and 3rd shuttles which are activated by the occurrence of Red and Blue respectively in the design. The lower close-up shows only Shuttle 1 weaving below the base of the B and both 1 and 3 weaving in the B. The upper close-up shows shuttles 1, 2 and 3 weaving where the A and B are side by side.

AB



The example makes full use of color changes to provide three separate colors on shuttle 2 (red) to differentiate between “figure” (bright red), “on back in ground-only area” (salmon) and “on back in blue figure area” (pink). Similar color differences have been created for the 3rd (blue) shuttle and for the 1st (ground) shuttle to provide total control of the fabric’s structure.

Expansion rules can be saved for future re-use. The user can easily assign Box Sequences, in sequences of up to 5,000 steps. Box Sequences and special regulator sequences can also be painted directly into color strips in the design.

JacqCAD MASTER® produces a Yarn Map image which provides the user yet another tool to check weave assignments. The user specifies yarn colors which, in combination with the loom control (punch) file, provide a color image displaying the color of the yarn, warp or weft which is on the face at each thread crossing. While this is not fabric simulation, it is a useful feature that can aid the designer in checking box sequences and weave assignments before the file goes to the mill. It is certainly better to fix an error before a sample is woven.

We hope this brief overview of some of **JacqCAD MASTER®**’s features provides insight into its approach, philosophy, and power.