DesignTuft for UTPA-FRS-ICN-LCL Tutorial

The purpose of this document is not to replace the DesignTuft manual, but it is intended to give the user a quickstart on how to use the DesignTuft program to convert industry standard Windows .BMP files to the CES UTPA-FRS-ICN-LCL machine .TUF format, with detailed explanations along the way. For a summarized quickstart, skip to the final page of this document and view the 11 steps to use for .BMP file to .TUF file conversion. Although the DesignTuft program has many more features than are outlined in this document, for simplicity sake, these instructions will take you through the UTPA-FRS-ICN-LCL conversion process using two simple examples: one will show you how to make a broadloom carpet pattern with an 18 inch wide by 18 inch long repeat, and the other will use DesignTuft to make a 24 inch wide by 40 inch long rug pattern with a "quarter-section" mirror.

One of the features of the DesignTuft program is that it allows the user to utilize virtually any painting or drawing program to create the original Windows .BMP files that represent the basic design he wants to tuft on a tufting machine. Some of the popular programs that can be used for this function are Adobe PhotoShop, Corel PhotoPaint, Corel Draw, JASC PaintShop, and even the free Paint program that comes with all Windows operating systems. Other users may decide to utilize a .BMP file export facility from their existing design system software, or the .BMP output of a scanner or camera program (may require the number of colors to be reduced before import into DesignTuft). There is also a simple painting utility built-in to DesignTuft, as well. The beauty of DesignTuft is that it doesn't force the designer to re-learn a different set of paint/draw methods, he can use the program and methods he is already familiar with, and furthermore he can use different programs for different design needs. The only DesignTuft requirements are that it be installed on a Windows 95, 98, ME, 2000, or XP compatible computer system with adequate RAM memory (recommend 256MB or more for WinXP) and available hard disk space (at least 300Mb free), and that the .BMP files to be imported into it are stored in a 4-bit (16-color) or 8-bit (256-color), uncompressed Windows-compatible .BMP file format.

Program Installation

To install the DesignTuft program on a Windows computer, simply insert the DesignTuft Installation CDROM disk into a CD or DVD drive to begin the auto-install process, and select all the installation defaults. This process should copy all the DesignTuft program files on the CD to the computer's hard disk (default installation folder = C:\ProgramFiles\CES\DesignTuft) and also install a new DesignTuft icon on your Windows desktop. If the auto-install process doesn't automatically start when the disk is inserted into the CD or DVD drive, select "Run" from the Windows Start menu, then type **d:setup<ENTER>**, where d is the drive letter of the CD or DVD drive, and <ENTER> means press the ENTER key).

Creating .BMP Files

Although this document obviously can not go into the particular details of how to use your selected paint/draw program to create a DesignTuft compatible .BMP file, a certain few basic operations, that are common to most programs, do exist. If you would prefer to advance directly into the Using DesignTuft process detailed below, there are a couple of example .BMP files (plus this Microsoft Word document file) contained on a separate 1.44Mb floppy diskette marked "Tutorial Disk". These files are called Example1.BMP (an 18 inch wide x 18 inch long, 1/8 gauge carpet pattern) and Example2.BMP (a rug design representing a quarter-section of a 24 inch wide by 40 inch long rug for a 5/32 gauge machine). First, please understand that you only have to paint or draw the smallest <u>unique</u> portion of a pattern. This might be a single small repeat of a broadloom carpet pattern or a quarter section (one corner) of a rug pattern, or, conversely, it might be an entire (non-mirrored) rug design or a large, non-repeating carpet pattern, that fills the entire width of your target machine. The length of the pattern is limited only by the size of the diskette used to transport the diskette to the machine, how many patterns are stored on the disk, and how complex the pattern(s) are, but it should be adequate for most situations. For your reference, the Example1.TUF file is only 23Kb, and the Example2.TUF pattern is only 16Kb, but a normal pattern diskette has a capacity of 1.44Mb, so you could store the equivalent of approximately 88 of the Example2 size patterns on a single diskette.

The next step is to convert the units of measurement of the physical pattern into the machine (and design) units. Although DesignTuft will map or resize the input bitmap size in pixels to fit the designated finished pattern size (stretch/shrink both length and width), for simplicity's sake and this discussion, we will assume that the bitmap pixel size is the same as the finished carpet size for both length and width. For my carpet pattern example listed above, the machine unit width is derived by simply dividing the 18" width by the gauge of the machine. Let's start with an 1/8 gauge machine (in other words the needles are spaced 1/8 inch apart from one another, or there are 8 needles per inch), so the equation is 18 divided by 1/8 (or 18 multiplied by 8), which results in a pattern width of 144 controls. (The DesignTuft term "controls" is meant to represent the widthwise units of measurement across the machine or pattern, but for this example, you can also interchange that term with "needles", "tufts", or "ends".

Also, during the design process, we will be drawing the “controls” information as design screen picture elements, or “pixels” for short, so by keeping the design pixels at the same resolution as the machine, you can use the terms “controls”, “needles”, “tufts”, “ends”, or “pixels” all to mean the same thing).

Down the length of the pattern, the units of measurement are known as “pattern lines” (or “plines” for short, or “stitches” if the machine is run in Mode 1, or needle synchronized) and the lengthwise resolution is known as the pattern line spacing (also called the stitches per inch or stitch count for Mode 1 patterns). From a design standpoint, this pattern line spacing is adjustable (by using the Pattern Line Spacing parameter of the Pattern Option file) to accommodate different carpet/rug weights, yarn weight, or pattern construction, but while running patterns in Mode 0 (backing synchronized) or Mode 2 (both backing and needle synchronized) the units of measurement aren’t as critical, because the pattern can further be shrunk or stretched at the machine. Although the pattern line spacing is variable, for simplicity sake, our examples we will also assume that the lengthwise spacing is also 1/8 inch, just like the needle or “controls” spacing. On our 18 inch by 18 inch carpet pattern example, this means we will be creating a “computerized piece of blank, square grid paper” that is 144 pixels by 144 pixels (or 144 controls x 144 pattern lines), and each pixel is representative of a 1/8 inch by 1/8 inch tuft in the final carpet, making an evenly divided “square” canvas.

For our rug pattern example, we will assume the machine gauge is 5/32, and our pattern is to be tufted as 24 inches wide by 40 inches long. The calculations (for the entire rug) would then be as follows: 24 x 32/5 = 154 pixels wide and 40 x 32/5 = 256 pixels long. Because we will actually be designing the smallest, unique portion of the rug pattern, or only one corner (known as a quarter-section mirror), then we will further divide the width and length measurements by one half to determine the actual drawing size of the quarter-section. This will result in a drawing size (or computerized grid paper size) of 77 pixels wide by 128 pixels long (or 77 controls by 128 pattern lines), with a 5/32 x 5/32 square grid. Please note that the pattern orientation for most paint/draw programs, the patterns will be designed with the width of the pattern across the width of (left to right on) the screen, and the length of the pattern will be represented up and down on (the height of) the screen. Depending on where the paint/draw program orients the 1,1 (or 0,0) x,y coordinate corner on the screen, you may also have to mirror, or reverse, your design screen image to make it match what you intend for the face side of the carpet produced on the tufting machine. There is usually a simple 1-step command (usually called the “mirror” or “flip” command) that will accomplish this operation after you have completed drawing the pattern.

Now on to the basic steps of “drawing” the design with paint/draw program, but remember that these steps are generic in this documentation, as your selected design program will probably reference the commands to be used by a different function name. After starting the paint/draw program, select to create a “New” drawing. Depending on your paint/draw program, executing a “New” command may automatically bring up dialog that allows you to enter the width and height of your design, or you may have to enter the size using another function, either before or after using the “New” command. If necessary, select the units of measurement to be used as pixels or picture elements, then enter the width and length measurement we calculated previously (carpet pattern = 144 pixels wide by 144 pixels high, rug pattern = 77 pixels wide by 128 pixels high). You may also be given the opportunity to select the background color of the pattern during or after this step. The background color can be thought of as the “blank” color of the “computerized sheet of grid paper” or canvas color, on which you will be drawing. By pre-defining the background color to be the most predominant color of your design, you can save time by only having to “draw” the remaining colors of your design. You may also think of the background color as being the low areas of an UTPA or FRS type pattern, or the untufted areas of an ICN type pattern, but it doesn’t have to be that way.

At this point, the computer screen should show you a blank piece of “computerized paper” or canvas that is the size designated in the step above. You should be able to zoom (scale the image size up and down) and pan (move your point of view) around within the design space at any time, to see the amount of detail you need to accomplish your desired result. There should also be a way to turn on a “coordinate” or x,y pixel number display (if it is not already on), that will show you the current position of the cursor or pointer on the screen as you move your pointing device, and you may be able to specify a user grid spacing and turn its visibility on an off. The user grid spacing can usually be different than the invisible pixel grid (where each pixel grid point will represents a single tuft in the final carpet). At this point, in the simplest mode, you will be able to change the color of an individual pixel with your paint/draw program by using the “Paint” tool with a width setting of 1 pixel. However, if you properly use the “tools” your paint/draw program provides in its “toolbox”, you will be able to more rapidly and more accurately generate your desired design result. During this painting/drawing process, you will be able to select the current drawing (or ”foreground”) color from the “palette” that the drawing tool(s) will use and the width (number of pixels), and possibly the shape (square, circle, etc.), of the tool. You will also be able to “erase” or “clear” mistakes with the “Eraser” or “Color Eraser” tool, which actually “paints” the background color back on the screen for the “Eraser” tool path. Many paint/draw programs also have an “Undo” function that will back up over the previous command, or sequence of commands, if a mistake is made or you are not satisfied with the result. While drawing the design, try to limit the number of colors you draw with to the number of colors you wish to be

used in your final pattern, and fill in all the pixels of the drawing space, unless you intentionally want to leave some untufted spaces (as in “special” cutmarks or locators) in your final pattern.

After you are satisfied with the design on the screen, use the paint/draw program’s “Save”, “Save As”, or “Export” command to save the result on to your computer’s hard disk in the Windows .BMP file format. During this process, select a location (directory or folder to save to) that will allow you to keep your drawing files in a logical order. This might be a folder name that corresponds to the style number of your pattern, or a folder that will hold all of your 5/32 gauge UTPA designs (and maybe another folder for 1/8 gauge FRS designs) for the year 2006, for instance --- you decide your degree of pattern file organization based on your own needs. Also during this process, select a pattern file naming sequence that makes sense for your needs (ie. a descriptive name of the pattern, or a combination of number and letters that represent the style number, size, and/or revision level, for instance). You may decide to limit the design filename to 8 characters at this point, if you want the .BMP file to share the same filename as the final .TUF file that will ultimately be used by the Tuft Control computer system on the machine, which is limited to displaying only 8 characters of a filename, however, at this level, there on no file-naming limitations, other than those imposed by Windows. During this step, you should also be given the opportunity to select the file format to save the file --- select the Windows .BMP or bitmap file format, with either 1-bit (monochrome or black/white), 4-bit (16-color), or 8-bit (256-color), uncompressed format for this step. After the .BMP file is saved to the hard disk, the “Quit” or “Exit” command, or the program “Close” functions can be used to return to the Windows desktop.

Using DesignTuft

The process of using the DesignTuft program to convert a Windows .BMP file to a machine compatible .TUF file can be a very easy step by step process. After double left-clicking on the DesignTuft icon from the Windows desktop, the program is loaded and you are presented with the DesignTuft screen. In this tutorial, I will not explain the details of each function possible or the many features available with the DesignTuft program, as that is done in the DesignTuft manual, but I will describe the step by step procedure to convert the example pattern files (Example1.BMP = 18 inch by 18 inch, broadloom carpet pattern for an 1/8 gauge FRS machine, and, Example2.BMP = quarter section of a symmetric, 24 inch wide by 40 inch long rug pattern for a 5/32 gauge UTPA machine) into a compatible .TUF file on a pattern diskette ready for the tufting machine.

Begin by left-clicking the “Wizards” pulldown menu from the top of the screen and left-click the desired function – New Carpet Pattern for Example1 or New Rug Pattern for Example2. After that a dialog box will appear that will allow you to enter information about the size of the machine and how the .BMP file (or section) will be repeated across the machine width.

For the Example1 pattern, after selecting the New Carpet Pattern wizard, enter the following values in the places provided:

Pattern Size = 1200 Controls (wide) by 144 Pattern Lines (represents height on the screen / length on the machine)
Section Size = 144 Controls (the number of pattern lines, 144, will automatically be set by the Pattern Size)
Center Pattern on Machine = Unchecked
Start Pattern at Specified Needle = 1
No. Repeats in Picture = 1

(These settings will repeat the pattern across the full width of your 1/8 gauge FRS machine, or 1200 needles, and start the left edge of the first repeat at needle 1.)

Or, for the Example2 pattern and the New Rug Pattern wizard, use these values:

Pattern Size = 466 Controls by 259 Pattern Lines (machine width by total rug length plus 3-end cutmark)
Rug Size = 154 Controls by 256 Pattern Lines
Cutmark Size = 3 Controls (width cutmark -- the lengthwise cutmark in plines is auto-set by the pattern size)
Mirror Type Machine = Checked (typically checked for a UTPA machine, but unchecked for a FRS or ICN types)
Start Pattern at Specified Control = 1
Start Pattern at Specified P(attern) Line = 1
Layout = 4 Sections (mirrored length and width)

(Starting the first rug at needle/control number 1 and stitch/pattern line number 1, these settings will mirror the quarter-section design to produce a full rug, place as many full rugs as possible across the machine width, with 3-end cutmarks between each strip across and after each rug repeat down the length.)

After left-clicking the OK button on the “New Carpet Pattern or “New Rug Pattern” window, the pattern project “Tree” will be automatically created as a sequence of labels including the default pattern name of “Pattern1”, the control setup as “ControlSetup1” (most of this information is known as the Pattern Option File by the control system), the pattern creel / palette (color) setup / mapping information as “PatternSetup1”, and various “Pictures”, “Regions”, “Windows”, and “Sections”. It is normal for one region to be highlighted in red. Except as outlined below, for our examples and most of your pattern needs, we won’t be using or entering any information into the various Picture, Region, Window, or Section screens at all.

Now is a good time to establish a name for the design project. To do so, left-click the Pattern1 line on the project Tree (the next line under the line with the “Patterns” label), then left-click the Save As button. At this point navigate to the desired hard disk folder (or the 3-1/2” Floppy A: icon, if you only want to save to a floppy diskette), type the desired name you want to save the project under in File Name: box, then left-click the Save button. This will save all the information associated with the project in a .PAT file. (Again, you are allowed to enter any length of filename for the pattern project .PAT file to be saved under, but you may want to limit the name to the 8-character length imposed by the control system at the machine, to keep the .PAT file the same name as the .TUF file for organizational purposes.) After the project name is established, you may left-click the Save button at anytime to save any further changes to the same .PAT file.

At this point double left-click the ControlSetup1 label on the project tree. This will bring up the Control Setup screen showing the current settings of all machine and pattern related parameters. The correct values for this screen, and for your various machine setups, are as follows:

Machine Type = UTPA, FRS, or ICN (depending on the target machine type)
No. Controls = 1200 for 1/8 gauge FRS, 600 for 1/8 gauge UTPA, 466 or 480 for 5/32 gauge UTPA , or 192 for 3/16 gauge ICN (normally set by the New Carpet/Rug Pattern wizard)
No. PLines = 144 for Example1 or 259 for Example2 (normally set by the New Carpet/Rug Pattern wizard)
Allow Pattern Offset = Checked
Reverse Pattern = Unchecked
Stitches per Backing Step = 1
Style Code = <Blank>
Size Code = <Blank>
Description = <Enter anything you want to be displayed when pattern is loaded at the machine, if a color monitor is present>
File Version = 6
Needle Spacing = 0
Pattern Line Spacing = 0.125 for 1/8 gauge, 0.15625 for 5/32 gauge, or 0.1875 for 3/16 gauge (actually variable depending on your weight or resolution needs)
Stitch Count = 0
Length Multiplier = 1.00000 (or as needed by Pattern Line Spacing or stretch/shrink requirements)
Control Mode = 0 for UTPA or FRS, 1 or 2 for ICN (depending on your synchronization needs)
Pattern Offset = 0
Offset Mode = Offset
Starting Cam Position = 0 (0 turns off this unused function for ColorTec)
Starting PLine = 0 (0 turns off this unused function for ColorTec)
Allow Operator to - Change Control Mode = Unchecked (possibly checked for ICN if you need to switch between mode 1 and 2 at the machine)
Allow Operator to - Change Pattern Length = Unchecked (mode 0 and 2 patterns can be stretched/shrunk at the machine)
Allow Operator to - Change Pattern Offset = Checked (move the pattern laterally, or left-right on the machine)
Allow Operator to - Invert Pattern = Unchecked (or checked if you want to allow a high/low image reversal, including cutmarks, at the machine)
Flags - Auto Start Pattern = Checked
Flags - Invert Pattern = Unchecked for FRS and ICN, checked for UTPA, usually
Flags - Test Pattern = Unchecked

(The No. Controls and No. PLines parameters are automatically and correctly set by the previously used wizard. The Description can be anything you want displayed on the control system, and a blank description is OK, too. All the other parameters of the ControlSetup will probably remain the same as listed above from pattern to pattern, and as listed by machine type, unless you are not going to match bitmap pixel resolutions to machine resolutions. These settings can be saved as the default settings that will be displayed when DesignTuft is started by saving them using the Default.PAT or Default.SET procedure described in more detail in the DesignTuft manual. Different control setups can also be established for each machine type, like UTPA5-32 or FRS1-8, if you want.)

To complete the ControlSetup step, left-click on the Apply button, then left-click on the Tree button to re-display the pattern project tree.

Next you will setup the creeling or threadup sequence, or the assignment of yarn colors or types to each needle, and also the mapping of the input of bitmap colors to tufting machine states (high / low, overtufting / not over tufting, sewing / not sewing, cutting / not cutting, etc.), which can also displayed as different colors. This is done with the PatternSetup screen, so double left-click on PatternSetup1 on the pattern project tree. On the PatternSetup screen you will see the Color Palette on the left side of the screen, a few Definition Items at the top middle, the Creel Table at the top right, the Machine Table in the middle of the screen, and the Design Table at the bottom right. For our 1-color high/low carpet and rug examples, Example1 and Example2, set the Definition Items as follows:

No. Colors = 16
No. Yarn Types = 1
Repeat = 1
Undefined = 1-High

Next you will left-click the Repeat button to set the definitions in place. Next, you will set the machine's "High" color definition by left-clicking on the Color Palette's entry 1 (the top one), and then left-click on Machine Table's HIGH palette entry. Do the same for the machine's "Low" color, by left-clicking on Color Palette's entry 2, then left-clicking on the Machine Table's LOW palette entry. The colors selected in the machine table will be used to display the pattern on the control system's color monitor, if one is present, and can be changed to a different RGB values, if desired, by double left-clicking the Color Palette's entry to bring up the Color window where the change can be made. Because we will be working with a one to one relationship between the input bitmap and output pattern or machine file, and the pattern is a one-color, high-low type, we will not have to make any assignments to the Design Table at this time. To complete the PatternSetup assignments, left-click on the Apply button, then left-click on the Tree button to re-display the pattern project tree.

Next we will actually import the Windows input bitmap that was created in the Design stage using your own Paint/Draw program (or using the provided ExampleX.bmp files). This is accomplished by first left-clicking once on the Region that is highlighted in red, then left-click on the Import Bitmap button to read in the Windows .BMP file created previously (or use the provided Example1.BMP or Example2.BMP files). After navigating through the computer system's folders to find the location of the previously stored .BMP files (you can navigate to 3-1/2" Floppy A:, for the supplied ExampleX.BMP files), left-clicking on the desired filename, and left-clicking the "Open" button (or double left-clicking the desired filename directly), the Import Bitmap window will appear. At this point you should see a picture of your imported pattern. On the Import bitmap window, you will see the familiar Color Palette on the left, the colors used by the bitmap file just the right of that, and two more colors labeled 1 and 2, to the right of that. Left-click on the "High" color you previously selected in the Color Palette, and then left-click on the 1 or 2 block to set the translation of the bitmap's "High" color to the machine's "High" color. Do the same for the "Low" color. We are working with a single-color, high/low pattern, so left-click on the Machine View button. If you want the machine colors to be the same as the input bitmap's colors, left-click the Palette button. Finally, when you are ready to complete the import bitmap function, left-click the Apply button.

Now by left-clicking the Window 1-1 line on the project tree, you will be able to see how the pattern has been repeated (and mirrored, in the case of the rug pattern) across the full machine width. At this point you can also verify the final size (and cutmark spacings) of the pattern by observing the Control / PLine display at the bottom left corner of the DesignTuft window. With the "Zoom" button pressed (displayed as a recessed button), you will be able to left-click with the cursor/pointer anywhere in the pattern display space to zoom in on the pattern (larger display), or right-click to zoom out (smaller display). By left-clicking on the Zoom button once (displays Zoom button as an un-recessed button), the pointer becomes a "paintbrush" tool. With this mode, the pattern can be edited in a simple dot by dot fashion with the left mouse button acting as a paintbrush of one color and the right mouse button used to paint another color. (The selected left/right colors are displayed as the L and R color blocks at the bottom in the color palette that is on the left side of the screen, and can be changed by left- or right-clicking on the 1-N color blocks at the top of the palette. The B color block in the palette indicates the background color, and the U color block is the color that will be displayed for undefined pattern elements.)

When you are satisfied that the pattern is laid out the way you intended, left-click on the Tree button to re-display the pattern project tree, then left-click on the pattern project name you established earlier, then left-click the Save button to save the all changes to the pattern project up to this point. Then left-click the Export Tuft button, then navigate to the desired destination, and then left-click the Save button to save a .TUF pattern file (the .DAT pattern option file is also automatically saved by the same filename and to the same location). By selecting the

destination as 3-1/2" Floppy A:, you will be able to create a pattern diskette ready for the CES control system at the tufting machine.

To summarize the bitmap to machine pattern conversion procedure, you will:

1. Create a Windows .BMP file (use the same size and number of colors to be used on the machine to avoid problems).
2. Start the DesignTuft program by selecting that icon from the Windows desktop.
3. Select the Wizards pulldown menu, and from the list, select the one that represents the closest match to your final design needs (typically New Carpet Pattern or New Rug Pattern).
4. Enter the machine width in controls, and the pattern length in pattern lines (carpet pattern = repeat length, rug pattern = total rug length + lengthwise cutmark / total rug length is section length X 2 for 2-section/horizontal and 4-section patterns). Also fill in the other Wizard information (Section or repeat Size, total Rug Size, widthwise / left to right Cut Mark Size, Layout type, Starting point, etc.) as needed.
5. Use the Save As button to name the pattern project, navigate to the desired destination folder or disk, type in the desired name of the pattern, and select the Save button.
6. Select the ControlSetup label and verify or change the settings to match the list above. When everything is right, select the Apply button, then select the Tree button.
7. Select the PatternSetup label and setup the number of colors and yarn types used, the creel sequence, palette color assignments to the high and low states in the Machine Table. When everything is right, select the Apply button, then select the Tree button.
8. Select the red-highlighted Region x-x, and then select the Import Bitmap button to read in the .BMP file created in step 1. Navigate to the previously created Windows bitmap to import, and Open it. In the Import Bitmap window, set the colors for high and low, select the Machine View button, then select the Palette button, then select the Apply button.
9. On the project tree, select the Window 1-1 label to view and edit the resultant, repeated machine pattern. When satisfied with the result, select the Tree button again.
10. Select the pattern name label on the project tree, then select the Save button to save all changes and settings of the project.
11. Finally, select the Export Tuft button and navigate to the 3-1/2" Floppy A: drive as the destination, and select Save to create a pattern diskette, which should be ready for the tufting machine.

If you have any questions or problems, I suggest you email me a detailed description, along with all associated .PAT, .BMP, .TUF, .DAT, and any other related files as attachments, so that we can duplicate it here. My contact information is as follows:

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