

## How to Properly Prepare Screen Printing Art Files

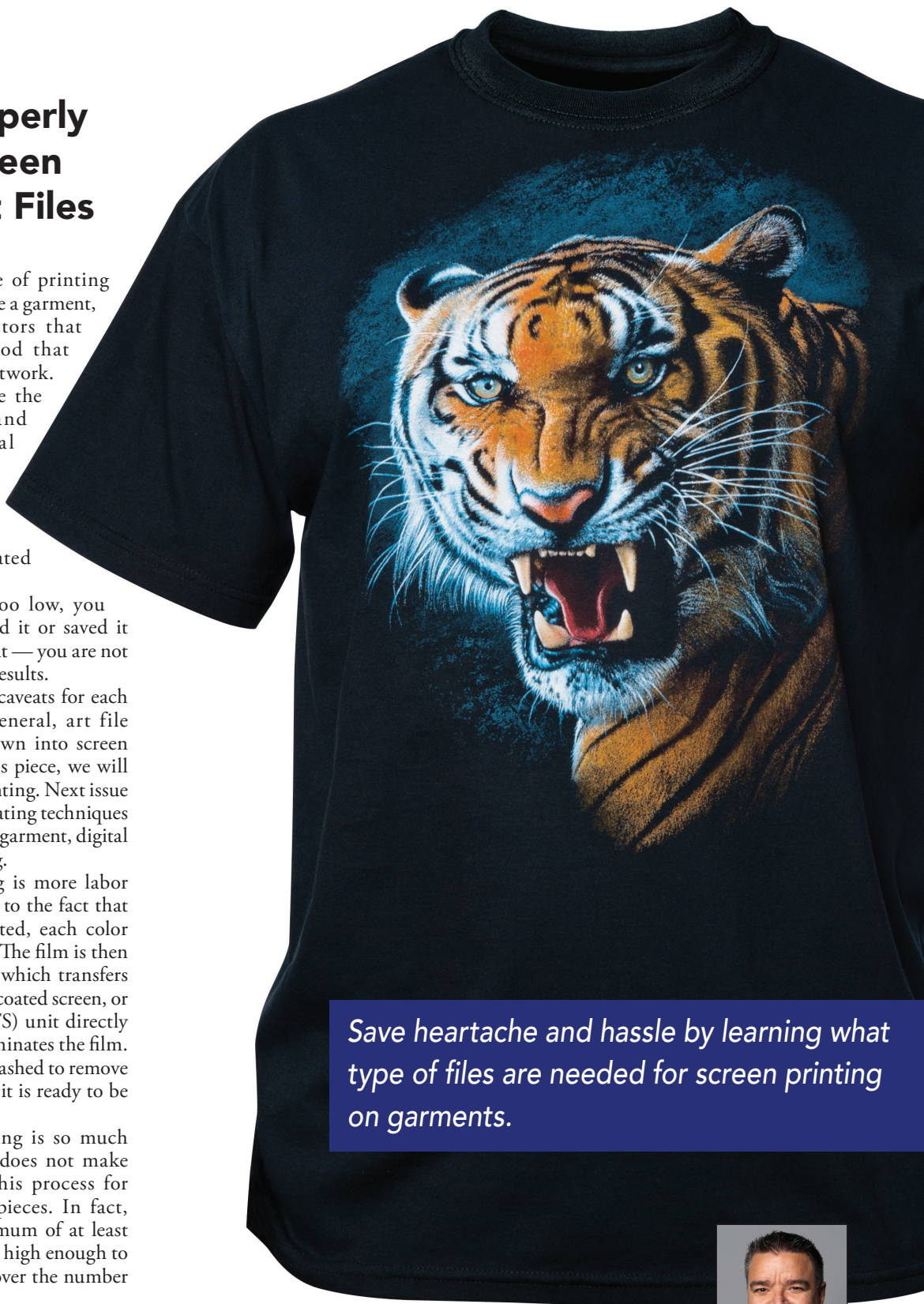
No matter what type of printing process you use to decorate a garment, one of the greatest factors that will determine how good that print turns out is the artwork. Whether or not you like the design is subjective and dependent on personal taste. But aesthetics aside, your artwork needs to be created and converted into a file format that will work with your designated process.

If the resolution is too low, you haven't properly separated it or saved it into the appropriate format — you are not going to get professional results.

While there are some caveats for each of these processes, in general, art file preparation is broken down into screen printed or digital. For this piece, we will focus on textile screen printing. Next issue we will cover digital decorating techniques including digital direct-to-garment, digital transfers and vinyl cutting.

Direct screen printing is more labor intensive than digital due to the fact that once the artwork is created, each color must be printed to a film. The film is then put on an exposure unit, which transfers the image to an emulsion-coated screen, or a computer-to-screen (CTS) unit directly images the screen that eliminates the film. The screen must then be washed to remove excess emulsion and then it is ready to be set up on a press.

Because screen printing is so much more labor intensive, it does not make financial sense to use this process for quantities of under 24 pieces. In fact, many shops have a minimum of at least 48. The quantity has to be high enough to amortize the setup costs over the number of pieces being printed.



*Save heartache and hassle by learning what type of files are needed for screen printing on garments.*



By Dane Clement, President, Great Dane Graphics

## What is A DCS 2.0 File?

A DCS (Desktop Color Separation) 2.0 file is a popular format based on EPS (Encapsulated PostScript) for saving color separated files and printing the separations. When the file is saved, the separations that are created as alpha channels are saved within the file.

That way when you import or place the file into the vector program of your choice, the colors will load into your palette making it easy to print out your separations. If you are using Separation Studio, this is the format in which all files are created. If you are using another program, such as Photoshop or Corel PHOTO-PAINT, you can "save as" a DCS 2.0 file.

## What is Moiré?

A common problem when preparing an art file is choosing a halftone line count and screen angle that doesn't conflict with the pattern of the screen mesh. This creates a radiating pattern referred to as "moiré."

Other causes can be a conflict with the artwork pattern or the texture of the fabric being printed. Occasionally, moiré may not appear until after the artwork is printed.

Back in the day, Charlie Taublieb, a 41-year veteran of the screen printing industry, and I tested just about every screen angle and halftone line count. We found that if you choose a 61-degree screen angle and a 45-line halftone count, you can't go wrong. It works every time.



When screen printing a design on a dark color shirt, part of the art file preparation will be to create a white underbase. This allows the colors printed on top to be bright and vibrant. Photo courtesy of Great Dane Graphics.

## Screen Printing

Screen printing can be divided into two categories: spot color or full (four) color. In this article, we will focus on four-color and simulated process. Although you can use the same artwork for either, the file preparations and separations are different.

Spot color means that each color is separate and independent and prints only in that shade. So if you have a three-color design of red, green and purple, you would need to create a film for each of those three colors and each color would be printed one at a time. A spot color design can be created from a vector or raster artwork file depending on the situation.

The vector format is essentially line art and is easy to edit. The two most popular programs used for commercial apparel decorating to create vector artwork are Adobe Illustrator (using the .ai file extension) and CorelDRAW (.cdr). There are, however, other programs on the market that will create a vector file.

Vector artwork is ideal for logos, text, borders, shapes and even complicated illustrations, in some cases. This format uses a postscript language, so resolution depends on the printer's quality, not the artwork's quality, making it easy to edit and resize without losing resolution (detail and clarity). Another bonus: Decorators can print spot color films directly from vector art as long as they create the art using spot colors with no additional art time.

## Four-Color Process

Four-color process printing is a different animal from spot printing. While spot printing consists of flat, solid areas of color or gradations of the same color using a halftone, four-color process and simulated process is what is used to replicate photographs, paintings and any other kind of art with a variety of colors in different shades and gradations.

To reproduce a multicolor design using four-color process, it must be separated into cyan, magenta, yellow and black. The halftone dots, when printed, will help create all the other colors in the design.

The biggest advantage is it allows you to have a multicolor design without using more than four screens, which saves time and money. Now, you may need an extra screen to create a white underbase to print your design on top of and sometimes you will use a spot color to make a color pop more. For this reason, I recommend simulated process over four-color.

Raster artwork is a bitmap file that is created using a series of dots or pixels.



Once you have separated your design, you should bring it into Illustrator or CorelDRAW and then you can add whatever type is needed. While it is not required, if you save the (type/text) as outlines before sending the file to the production department or your printer, it can eliminate certain issues that can crop up. Photo courtesy of Great Dane Graphics.

Halftone screens are used to reproduce this type of artwork for screen printing.

Common raster bitmap extensions include TIFF, PNG, PSD, EPS, BMP, GIF and JPG, the latter two of which are usually small, low-resolution files made for fast loading on the Internet. They should not be used for garment decoration. The number-one image editing program for raster images is Adobe Photoshop (PSD), although Corel PHOTO-PAINT (CPT) and others are used.

Bitmaps work well for reproducing continuous tone images such as photographs and illustrations. (See definition on page 8.) Bitmap images are resolution dependent. Each pixel is assigned a specific color value. It can only be resized if it was originally created with enough resolution, so unlike with a vector image, you must pay close attention to resolution.

For example, if an image has only 72 dots per inch (dpi), when enlarged up to 300 dpi, dots are added to fill in the space between the pixels and this results in a blurry or fuzzy image.

For the purposes of textile screen printing, there are more ways than one to separate colors depending on the look you want or the size of your screen printing

press. Here are examples of three popular methods:

**Index color separations** create images using two to 256 colors, thus the number of colors must be cut down to something manageable for printing on a press. It uses a dithered dot instead of the usual halftone dot. It also requires a lot of heads (colors) on your press to do a good job.

**Four-color process separations** use the cyan, magenta, yellow and black (CMYK) to reproduce full-color images.

**Simulated process color separations** use spot colors to reproduce an image. This technique allows you to boost the brightness and vibrancy of selected colors in a design.

When printing with halftones, my recommended settings are a 45-line screen at a 61-degree angle using an elliptical dot. This ensures you avoid problems like moiré. (See sidebar on page 6.) For simulated process, I recommend using a 156 mesh count for the underbase and a 230 mesh for printing the colors on top.

**File Preparation of Vector Artwork**

As mentioned above, there are many programs that can create a vector file. If you have created vector artwork using only solid spot colors, no further steps need to be

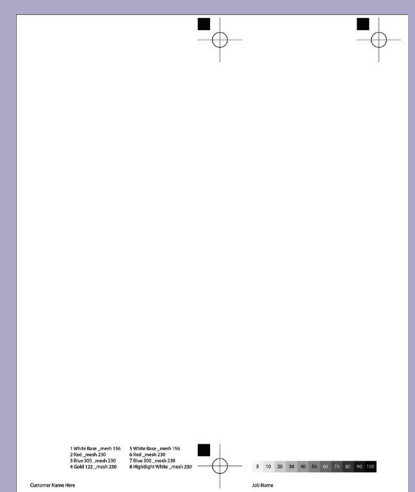
**Tip: Use a Grayscale Bar to Verify Proper Screen Exposure**

A great way to ensure you are properly exposing your screens is by creating a grayscale bar using your graphics software. Then add it in the margin of your film's design so it prints out when you output your film. I typically place it near the registration marks.

My grayscale bar is an 11-step graph (the standard is 10) that starts with 5% density and goes all the way up to 100%. It is easy to create by simply making little squares and putting percentages in increments of 10.

I highly recommend always creating one because it gives a visual reference point if the image isn't coming together correctly on press. In addition, get an exposure calculator and run a proper exposure test to make sure you are getting properly exposed screens.

An overexposed or underexposed screen can absolutely change the way the print looks. What you never want to do when a print does not look right is to go back to the art department and make changes without testing the screen exposures. Without a guide, you may be all over the place, which can create a lot of frustration.



At the bottom between the two registration marks is an example of a grayscale bar. This is a great tool to use to ensure you are achieving a proper exposure on your screen.

## Continuous Tone

Any image in which colors and shades of gray smoothly merge into the neighboring colors or shades instead of producing distinct, sharply outlined areas of color or shade. A good example of a continuous tone image is a photograph.

## Halftone

A halftone is a technique used to recreate gradations, shading or photorealistic elements in a continuous tone graphic design like a photograph or an oil painting. It is made up of dots, lined up in rows. Lines per inch (LPI) equates to the halftone size or frequency, so a 45-lpi screen has 45 dots, lined up in a row within a linear inch.

The higher the halftone count, the greater the number of dots lined up in rows. So 65 lpi has 65 dots lined up within a linear inch. The higher the line count, the harder it is to control on screen. The screen angle refers to the angle the rows of dots are printed out.

More specifically, a halftone needs to be created if you are printing a full-color design or a spot color design with gradations. For example, you might be printing black on a white shirt but using shades of gray to create variation and depth to the design.

## RGB

RGB (red, green and blue) refers to a system for representing the available color space. Red, green and blue can be combined in various proportions to obtain any color in the visible spectrum. If you take a photograph with your cell phone, it already is in RGB. If you are creating a design inside a graphics software program, you can specify RGB. The advantage of using RGB is the color gamut is much larger than CMYK. It has millions more colors.



For full-color screen printed designs you can use vector or raster artwork. The artwork must then be color separated. This example is a simulated process color separation created from a raster image with vector text. Graphic courtesy of Great Dane Graphics.

taken. You simply send the vector files to your printer designed to output films. They are printed and ready to be used to expose your screens.

If you use different opacities of a spot color or use gradients in your design, halftones will be required to reproduce your image.

If you are printing on a dark color, you will need to add a white ink underbase that will go down first and then subsequent colors are printed on top. This is to ensure that your colors remain bright and true.

Underbases are created at different densities depending on what color goes on top. For example, a light, bright color, like yellow, may need a 100% underbase. However, a darker color such as navy should be at a lesser percentage. The higher the percentage of underbase, the thicker the layer of ink, which creates a heavier hand. The goal is to use the least percentage possible, but still get sufficient coverage to allow the color on top to pop.

### File Preparation of Raster Artwork

When it comes to raster artwork, it must be separated into CMYK or simulated process using spot colors.

When scanning or photographing original artwork, you have control over the resolution and size.

- 1. Set your resolution.** Go into your settings and choose 300 pixels and 14 by 14 inches to ensure you have sufficient resolution for printing. That will cover any decorated apparel type usage. What you cannot do is download low resolution artwork from the Internet. It will never be high enough resolution to be used unless you are able to obtain a high resolution version.

- 2. Separate the artwork.** Separations are done by importing the raster artwork into software that can do separations such as Separation Studio. Although you can manually create separations in Adobe Photoshop or CorelDRAW PHOTO-PAINT, I do not recommend it. I always use Separation Studio, but there are other programs on the market as well. Once this is done, each color file is sent to the printer to output the film for exposing the screen.

If you use Separation Studio, it automatically saves the file in a DCS 2.0 format, which is what I recommend. If you do not use Separation Studio, then you can save

it into this format from Photoshop or Corel PHOTO-PAINT.

Normally, any raster artwork (created in Adobe Photoshop or CorelDRAW PHOTO-PAINT or other raster software program) has to be separated into four process colors or simulated process color prior to printing out the films used to expose each screen.

**3. Add type.** Once artwork is separated and in your graphics program, you can add type to it and choose what color you want the type to be. You also can size it up or down depending on its location and application.

Once you have the type the way you want it, especially if you are sending the file out to be screen printed, I recommend saving an original with all your text and layers as a copy for yourself. Then save it as another file, convert the text to outlines and send that to your screen printer or to your production department.

You do not have to convert the type to outlines; however, it helps avoid potential issues. One example is if the person you are sending a design to does not have the font you used installed, it may change the font to something else. Essentially, it ensures the design gets printed exactly as you intended.

**4. Create an underbase.** If you are printing on a dark color garment, you'll need to add a white underbase screen. If you use Separation Studio, it creates one automatically as part of the process. If using another program, you may need to create one separately.

The goal is to always create a solid enough underbase to ensure you get bright color, but not so solid as to dramatically increase the heaviness of the print. If you print 100% white underbase, it will give it a heavier hand.

**5. Send file to film printer.** By saving all your colors to a DCS 2.0 or PDF, you only need to send a single file to the printer and it will print out all the colors, underbase, and any additional spot colors as indicated.

*Dane Clement is president of Great Dane Graphics, a GroupeSTAHL company. Clement has been speaking and writing for the decorated apparel industry since 1987. He is considered an expert on computer graphics and color separations for textile screen printing, dye sublimation, digital direct-to-garment and heat-applied graphics. He is the author of T-Shirt Artwork Simplified, a how-to book on creating artwork for decoration apparel.*



This is an example of a raster artwork. To create this type of artwork, you would need a graphics software program such as Adobe Photoshop (PSD), or Corel PHOTO-PAINT (CPT).



Once the artwork is separated, each color is printed on a piece of film that is then used to expose each screen in preparation for setting up on the press. Photo courtesy of Taublieb Consulting.