

# **Sublimation Success Guide: The Complete Guide to Successful Sublimation Printing**

# Welcome to the World of Sublimation



Dye sublimation is one of the most effective methods for creating a wide range of customized and personalized products on demand. Your sublimation system will make it easy and cost-effective to provide more products than ever before for your existing clients and while bringing in new customers by reaching new markets.

Using off-the-shelf graphics software, Sawgrass sublimation inks, popular desktop inkjet printers from Epson and Ricoh, and a standard heat press, business owners can quickly produce high-margin, full-color photographic images that will not crack, peel or wash away.

To help you get your equipment up and running smoothly so you can start making money as quickly as possible, we have put together the Dye Sublimation Handbook. In the pages that follow you will be introduced to the elements of sublimation production including step-by-step instructions for the most common applications.

# Introduction to Sublimation Printing Technology

## Overview

Dye sublimation is a digital printing technology that enables the reproduction of colorful images on common everyday items. Prior to digital printing, reproducing images on these items required a complex and labor-intensive processes, such as screen-printing. Many printing technologies are not cost-effective when small quantities are involved, due to the time preparing the artwork and the equipment for the production process.

Digital dye-sublimation printing is quick and inexpensive in the setup and production, making it an ideal choice for creating personalized, one-of-a-kind items or for mass producing a variety of custom products. It delivers beautiful and permanent colors that are embedded in the substrate or fabric, rather than printed on the surface. Images on fabric won't fade or crack even after multiple washings. Images on hard substrates will not chip, peel or scratch.

The dye sublimation process is simple. You **create** an image on your computer using standard graphics software, **print** it onto special transfer paper using Sawgrass sublimation inks, then using a heat press, the image is pressed onto the surface at 400 degrees Fahrenheit / 204 degrees Celsius, which then causes the inks to sublimate from the paper to the polyester fibers or polymer coating on the substrate. After a short period, the heat is removed and the transfer paper is peeled away, leaving behind a permanent, full color image.

## *Sublimation, Dyes, Polymers and Substrates*

To ensure consistent results from the process, it is important to understand the technology.

Firstly, the key terms associated with the process are

**Sublimation** is the change of a solid particle directly into a gaseous state, i.e., without the particle becoming liquid in this case using heat and pressure.

A **dye** is a substance used to color materials and fibers. To dye is to impregnate color into a material. Often, this color change is permanent. In comparison, pigment (particles of solid color) inks, such as those used in screen printing, are applied to the surface of a substrate.

A **polymer** is a chemical compound made of smaller and identical molecules (called monomers) linked together. Some polymers, such as cellulose, occur naturally, while others, such as nylon, are man-made. Because of their versatility, polymers are widely used in industry, including in the making of plastics, glass, and rubber.

**Substrate** is a term used to describe the base material onto which images are printed. Typical substrates include not only paper (coated and uncoated), but also fabrics, plastics, metal, acrylic, glass, wood, films and foils.

Dye sublimation ink consists of a solid, heat-sensitive dye, which provides the color, dissolved in liquid. Under heat and pressure, the solid dye particles change into gas, bond with any receptive polymers, and change back into a solid. The high temperature used in sublimation opens the pores of the polymer and allows the gas to enter. When the substrate is removed from the heat source and is allowed to cool, the pores close, and the gas reverts to a solid, becoming a part of the polymer. As such, the dye particles can no longer be removed and will not wash out.

Digital dye-sublimation printing is achieved using inkjet printers, which deliver their ink through nozzles onto transfer paper. Sublimation inks are not 'liquid' they are solid particles in suspension. When enough heat is applied to the printed image on the transfer paper, the solid dye particles sublimate and the dye

migrates from the paper to the substrate. The dye has very little color until heated, so the sublimated image will look very different from that which you see on the paper.

The dye particles are designed to bond only with polymers (such as polyester). The higher the polyester content in the material, the more dye will bond to it, and the brighter the final image will be. This is why it is not possible to sublimate 100% cotton fabrics as there are no fibers that are receptive to the dyes present. Similarly, other natural materials used in dye-sublimation, such as ceramic, glass and metal, are first coated with polymers before they can be used.

### ***White Substrates are Best***

Sublimation dyes are transparent when sublimated – this is why almost all sublimation substrates are white. They allow the full color range to be visible and, exhibit their full vibrancy. Other background colors may affect the image making it invisible or changing the gamut. It is possible to sublimate on substrates that are not white as long as the sublimated image is predominantly darker than the substrate color. For example, black lettering on a red shirt. This is not recommended for photographs, or multi-color graphics as much of the image color will be lost in the base color of the substrate.

# Building Your Sawgrass Sublimation Studio

## *What Makes Up a Sublimation System?*

There are three main components to a sublimation system: a supported inkjet printer, specialty sublimation inks and an industrial grade heat press. There are a number of supported inkjet printers available on the market from Desktop Models to Wide Format/Production Models (44" and above). Depending on the printer, decorators can choose from a variety of ink configurations from straight CMYK to eight color sublimation. Lastly, there is the heat press which is arguably the most important component as this is the catalyst for sublimation. Many manufacturers produce industrial-grade heat press equipment offering many models from which to choose.

With so many options, how do you narrow your choices down to the system that will work best for you? While you always must take into account budget and space, there are two critical questions that you'll need to ask when choosing a supported inkjet printer and a heat press:

**What products will you be making?**

**What is your anticipated volume?**

If you can answer these questions to the best of your ability, it will greatly narrow your choices to a system that will work for the products you intend to make and the volume you plan to produce. Based on these answers, you will have the option of choosing systems based on the following:

Printer Page Width

The available printing width of your supported printer dictates two things: the largest size product you can make and the number of product images you can print at a time. For example, if you are interested in producing a 12" x 12" / 30cm x 30cm glass tile, you could not print out this image using an 8.5" x 14" or A4 printer.

Just as important, if you are seeking to produce a large number of products at the same time (volume production), you would do well to look at a larger print width which allows you to print more individual images per sheet. But don't get carried away, as larger printers cost more money.

A good rule of thumb is to buy the smallest printer that will produce the largest image that you will need on a regular basis.

In addition, the size of your heat press will also play a key role and it should be slightly larger (as a minimum) than the largest image your printer can produce. Ideally your heat press should be 1inch-2inches / 2.5cm – 5cm larger in each direction than your largest printed image.

## *Recommended Equipment List*

The following components are needed to build an effective Sawgrass desktop sublimation studio – your dealer can help you with selecting the right components for your needs.

- Sawgrass supported Epson or Ricoh inkjet printer with
  - Sawgrass Sublimation Ink
  - Sublimation Printing (Transfer) Paper
  - Sawgrass Print Drivers / ICC Color Profiles
  - PowerDriver print driver for SubliJet IQ and SubliJet-R inks
- Professional graphics design software
  - CorelDRAW Suite
  - Adobe PhotoShop, Adobe Elements or Adobe Illustrator
- Heat Press (choose size and style depending on your intended product line)
  - Flat press
  - Mug press
  - Specialty press
  - Vacuum Press
  - Convection oven (for volume mugs used in conjunction with wraps)
- Layout and Production Accessories
  - Heat resistant tape and dispenser
  - Temporary Spray Adhesive (mainly for apparel)
  - Blow out paper (throw away paper)
  - Teflon sheets or skirt to protect bottom platen of press
  - Oven Glove (for handling hot items)
  - Paper cutter
  - Scissors

## Heat Press Size & Style

Just as you would choose your printer based on print width, the platen size and style of an industrial quality heat press should be observed. If you are going to be producing large items or multiple items at a time, your heat press should be of sufficient size to accommodate these demands. For example, if you will be concentrating on t-shirts, consider that there are great variances in decoration area between a child's small t-shirt and a men's XXX-large. Your heat press should be able to accommodate your product in a single pressing (per side). Look for a commercial quality heat press with even temperature distribution, a fast recycle time, an accurate thermostat, and a platen designed to accommodate your products. When purchasing a commercial quality heat press, shoot for the top third of the price range.

## Choosing a Heat Press

There are many types and sizes to choose from depending upon your needs and because sublimation requires precise temperature and pressure, it is important to invest in a quality unit. Presses come in four basic configurations: flat, mug, cap and vacuum.

The flat (flat platen) press is available as a clam-shell style or a swing-sway style. The clam-shell version opens and closes like a clam, where the bottom platen is stationary and the top platen moves up and down. The swing-away press opens by lifting up the top platen, but then will move sideways completely out of the way for ease of placement and removal of transferred products.

Non-flat products require special heat presses such as the mug, cap and vacuum press. Since both the mug and the cap have curved surfaces, the mug and cap presses are designed to fit the curvature of those products. There are also combination presses which offer both flat and curve pressing capabilities via the use of specialized attachments. Vacuum presses (3D) allow greater flexibility when imaging 3D items such as multiple mugs, plates and glassware.



## Clam Shell Heat Press

The clam shell is the most commonly used press in sublimation. These units are ideal for most flat products such as plastics, metals, ceramics, plaques etc. and t-shirts. Because the upper platen opens at an angle to the bottom platen, these units work best for thinner substrates, as pressure must be consistent across the entire surface of the substrate.



### Swing Away Heat Press

The heated platen swings completely away to allow access to the transferred product. Because the upper platen moves straight up and down in relation to the bottom platen, this style is typically better for thicker substrates such as wooden plaques as it provides equal pressure across the entire product, whereas a clamshell press may provide unequal pressure due to the upper platen opening and closing at an angle.



### Mug Press

The mug is placed inside of a rounded heating element which provides equal pressure and temperature all the way around.



### Cap Heat Press

Heat and pressure is applied only to the front panel of the crown of the cap.





### Combination Heat Press

A combination press with various attachments can be the answer to the problem of creating a variety of different products with one heat press.



### Vacuum Heat Press

A versatile press that can be used for 3D items such as plates, mugs and phone covers.



### Large Format Flat Heat Press

A high volume and large size press that can be used for textiles and large form photographic panels.



## ***Computers, Professional Graphics & Imaging Software***

The quality of your end products is a direct result of obtaining good graphics and being proficient in a full graphics suite of software to enhance and personalize those graphics. Sawgrass recommends a newer version of either CorelDRAW® or Adobe® Creative Suite. Both suites provide you with the ability to import expansive color management tools and the ability to manipulate both vector and raster images.

For the best results, Sawgrass recommends a current generation computer with a fast processor and plenty of memory. For those working with digital photographs and customer-supplied artwork, you may wish to look into purchasing a scanner and a digital camera (the higher the resolution, the better).

## ***Sublimation Workspace***

In addition to choosing the correct printer and heat press based on products and volume, you will need to consider other needs when setting up your sublimation business, such as how much space is required to support your production in an organized and efficient manner.

### **Separate Your Sublimation Equipment**

This is especially important if you work with other technologies that might pollute your sublimation environment (e.g. fabric dust from embroidery equipment or shavings from engraving equipment). Keeping your printer, press and peripherals separate from your other equipment will also help you in pricing products as you can better determine what percentage of your total business is dedicated to sublimation.

### **Set-Up/Staging Area**

You should have a section of your sublimation area where you can easily prepare products for the sublimation process. Usually, this section contains your pre-press accessories such as a paper cutter, heat resistant tape, tack adhesive spray, lint roller and other essentials. This section should not be crowded; you should have ample room to work with your substrates.

### **Product Cooling & Packaging Area**

Once your substrates are removed from the heat press, many will need to be set aside to cool down properly. Consider a metal work table or a wire rack combined with clip on fans to circulate air around the products as they're cooling. Many mug manufacturers recommend dunking the ceramic mugs in a bucket of room temperature water when done to stop the sublimation process. After the substrate is cool, you will need to ready it for pick-up or shipping, and the same area can often be utilized. Setting aside a separate area for cool downs and packaging will allow you to streamline your production process: design the graphic; print sublimation transfers; marry transfer and blank products in staging area; press at heat station; then on to cooling and packaging.

### **Ventilation & Lighting**

While the sublimation inks you're using are water-based and very safe, there are a variety of substrates that emit an odor when placed under extreme heat. It is always recommended you work in a well-ventilated area which will also help with the cooling process. In addition, lighting plays a key role in hitting registration marks and determining color matching. The more natural light you have available, the easier it will be for you to ensure successful transfers.

## Humidity Levels and Temperature

Sawgrass recommends the following:

Supported Environmental Conditions			
	Operating	Storage	Shipping**
Temperature (°F)	59° - 77°	59° - 77°	40° - 100°
Temperature (°C)	15° - 25°	15° - 25°	4° - 38°
Rel. Humidity (No Condensation)	Above 35%	n/a	n/a

\*\*Shipping temperatures are only acceptable for limited exposure

# The Sublimation Production Process: Create – Print - Press



Dye sublimation printing makes it possible to create products in an easy three-step process:

**Create!** Create an image or import your artwork into a graphics program, such as CorelDRAW® or Adobe® PhotoShop®.

**Print!** Print your image using Sawgrass sublimation inks, a standard Epson® or Ricoh® printer and high quality sublimation paper.

**Press!** Transfer your image onto your desired substrate (photo-panel, phone or tablet cover, T-shirt, mug, mouse pad, etc) by using a standard heat press.

## ***Create: Image Creation & Preparation***

The first step is to create or prepare an image for sublimation. Upcoming chapters will provide specific information and recommendations for things like resolution and color correction, but in general the goal is to create the highest quality image possible.

Sublimation, like any other form of digital decoration, is simply a means to produce an image on a substrate. Though sublimation has the capability of rendering finished images with an extremely high level of detail, clarity and sharpness, the final product will never be better than the initial image.

If your initial image is low in quality, then it's logical to assume that the sublimated image will be too.

To get good results, you must generate high quality images during the creation stage, as the printing and pressing stages will only duplicate what is developed in the creation stage.

Assuming you have the ability to create, edit and/or modify artwork for sublimation, any professional graphics software will work. Unlike embroidery and certain other forms of product decoration, no specialized software is required to create images for sublimation. All you need is a software program that will generate and output standard graphic files that can be printed by an inkjet printer that is configured for sublimation printing.

The most popular choices of software are Adobe Photoshop and CorelDRAW. Other commonly used programs include Adobe Illustrator, Adobe Photoshop Elements, and Paintshow. All of these programs

are designed specifically to create and edit graphic images, though each has its own unique characteristics.

## ***Print: Sublimation Printers***

Printers fall into two main categories: small and large format. Small format describes all printers under 42" (1.06m) in print width, large format printers are capable of printing images wider than 42".

### **Print Resolution**

Printing above 300dpi is generally not recommended as any subtleties you may gain using a higher resolution may be lost when the ink turns into a gas for the sublimation process.

### **Transfer Papers**

You should use a high quality sublimation paper as the paper is the media that receives the printed image and allows the gaseous dyes to be released consistently to the item being imaged. It is a critical element of the production process and will have a detrimental effect if an inferior product is used.

## ***Press: Sublimating Your Image***

Sublimation transfer is not an exact science. Because you can sublimate onto a variety of surfaces, you will need to take all of the variables into account when selecting time, temperature and pressure setting including:

- *Thickness of the substrate*
- *Surface texture*
- *Surface size*
- *Surface color (shade of white)*
- *Substrate conductivity*
- *Heat press variations such as accuracy of temperature.*

We've already learned that dye sublimation is a marriage between art and science. In order to decorate a polyester-based product, the end user needs to introduce three elements to the printed sublimation transfer and the blank product.

### **Pressing Basics**



#### **Time**

Based on the polyester coating, woven nature of the fabric or the other materials used in the manufacturing process, each sublimation substrate has a recommended dwell time when placing it under your heat press or within a convection oven. The harder a substrate's sublimation coating, the longer it will take to sublimate. Whereas you can decorate a t-shirt in 45 to 60 seconds, a large ceramic tile might take 12 minutes. Other factors contribute to dwell time, too. The condition of your heat press equipment, different paper types, the amount of ink saturation, and even altitude can affect the ideal transfer time. To determine the optimum results based on your conditions and equipment, you will often have to experiment with dwell times when you're starting out.

Dealers usually sell test pieces of sublimation products, and you can always go to a fabric shop to purchase a quantity of 100% polyester fabric for testing purposes. Always check with your dealer or the

manufacturer to determine the recommended dwell times, and use this as a starting place. If the image looks too light, try increasing the dwell time by five or ten seconds. If the image looks blurry, you might be leaving it under heat for too long.



## Temperature

The temperature at which you press your product is critical for the sublimation process to occur. Typically, the sublimation industry uses 400°F/204°C degrees as a benchmark. That being said, it is not unusual for some product manufacturers to recommend a reduced temperature coupled with a longer dwell time based on their product.

While you can transfer an image to polyester fabric in 35 seconds at 400°F/204°C, individual manufacturers may have specific recommendations for their products. For example, Vapor Apparel recommends 195°C and 50 seconds for their apparel to reduce press and achieve optimum results. Manufacturers of some sublimation films and other thin, soft products might have you drop the temperature as low as 350°F/175°C based on a lower melting point of the product. Again, always check with your dealer and the manufacturer to determine recommended temperature settings.



## Pressure

How tightly you close the heat press on a product or ratchet a wrap around a ceramic mug determines pressure. For the most part, sublimation requires medium pressure for most products. While this might not sound as scientific as the other factors, it means exactly that: not too much, not too little.

So, how do you determine what equates to medium pressure? With a manual, flat heat press, an easy way to determine medium is to loosen the pressure on the press to where there is very little contact with the product after closing. Then, tighten the pressure as much as you can by hand. This usually works best from a cold state or using an extra substrate on hand.

With a pneumatic press, medium equates to about 30 - 40 psi (pounds per square inch). With some substrates, such as tiles, you may want to lighten the pressure a little bit to avoid breaking the product.

More than anything, determining the best dwell times, press temperature and pressure is a matter of practicing. Each heat press operates a little differently, so it's a matter of determining what works best for you. Order some substrate test pieces from your dealer or buy some polyester fabric, and keep practicing! Once you get time, temperature and pressure dialed in, it's a matter of consistently following the same rules down the line.

## Pressing Tips & Tricks

### Heat Press and Substrate Variation

Due to variations in substrates and heat presses, the recommended heat press settings may vary for your environment. On this basis, recommended time, temperature and pressure settings are useful starting point. For best results, test different time / temperature combinations to find one that works best with

your substrate / heat press combination. Remember, large variations of any setting may lead to poor quality imaging.

Calibrating your heat press is recommended to ensure an accurate temperature. For this procedure, temperature test strips are more accurate than the use of infrared temperature guns.

### **Recommended Paper and Substrates**

Always use the recommended paper and substrates for sublimation transfers – variations in paper and substrate quality lead to variations in print, transfer and finished product quality.

### **Print Overlap and Margins**

Print your images approximately ¼ inch / 6mm larger than the size of the substrate you are transferring to. This allows a margin of error when aligning everything under the heat press.

### **Preventing 'Scorching'**

Higher temperatures generally require less time to prevent 'scorching'.

### **Preventing 'Washed Out' Images**

An insufficient time / temperature combination could hinder complete transfer of the sublimation inks to the substrate which may then appear "washed out."

### **Cooling Sublimated Items**

After transferring the image to the substrate, promptly remove the transfer paper. Do not stack the transferred items with anything else until they have completely cooled. Any paper residue left on the substrate after transferring can be removed with isopropyl alcohol.

### **Using Software Templates**

Software templates are a good idea for substrates that you will be creating over and over again such as tiles and mouse pads.

### **Dealing with Moisture and Humidity**

The introduction of moisture into the sublimation process can cause unwanted results. During production with a heat press operating at 400°C /204°C, moisture can flash to steam and literally blow the ink away from its intended target. Some of the problems that are attributed to moisture include color shifting (colors lose accuracy), image bleeding and the uneven transfer of solid-filled areas.

Under normal circumstances, a small amount of moisture can accumulate in the transfer paper and it's usually absorbed directly into the substrate during pressing. However, hard substrates like metal and ceramic are unable to absorb excess moisture. Thus, it's important that you take steps to minimize the introduction of moisture into the process.

The first step is to protect the paper from moisture absorption. As a preventative measure, store your paper in dry place. Consider a sealed container such as a re-sealable bag. If you suspect moisture, set the paper on your press for a few seconds. Do not press it; just expose it to the warmth. The heat radiating from the press should help evaporate most of the moisture.

Another trick is to use newsprint or butcher paper instead of a Teflon sheet. The paper will help absorb moisture from the transfer sheet during pressing, whereas Teflon will not. Be sure to use a fresh sheet of paper for each pressing cycle.

If you are working with garments or fabric, it's also possible that the substrate may contain some moisture. Pre-pressing the garment for about 10 seconds should remove the moisture, as well as any



wrinkles. To avoid this problem, keep your paper or fabric in a dry place. If you suspect moisture, try these techniques:

1. Place paper on the raised pedestal bottom of the press and let it dry under the heat platen. Don't close the heat platen!
2. Pre-press fabric for 10 seconds before transferring.
3. Use a fresh, non-textured paper towel behind the transfer sheet.

### ***Humidity***

In addition, you should focus on your work environment. High humidity levels usually contribute to moisture issues. A dehumidifier can help control these issues, but reducing it too much can have negative effects on the inks and your equipment.

It's wise to invest in a hygrometer and take some readings. The ideal operating conditions for sublimation are 59°F - 77°F / 15°C to 25°C with above 35% relative humidity (no condensation).

### **Keeping Your Press Clean**

It is important to protect the rubber pad that is attached to the lower section of the heat press. The same is true for the rubber pad found in a mug press. Covering the pad with a protective sheet of paper, a paper towel or a Teflon sheet will prevent sublimation ink from being absorbed into it.

- If you use paper: Choose an inexpensive white bond paper or a roll of white paper (cut as needed)... discard after each pressing. Unprinted newsprint paper is also a good choice.
- If you use a paper towel: Choose an inexpensive, white, non-textured brand (the texture will leave a pattern on the substrate)... discard after each pressing.
- If you use a brown Teflon sheet, it should be cleaned with alcohol after each pressing.

### **Preventing 'Ghosting'**

Sublimation requires a tight connection between the transfer page and the blank product when under heat. For the best results, as the inks gas and dye the product, you must ensure that the paper doesn't shift. If the transfer page moves during the sublimation process, this could result in a blurry image or "ghosting," which resembles a shadow effect. To prevent this, always fix the transfer paper to the product itself using heat resistant tape or repositionable (temporary) spray adhesives.

### ***Hard Substrates***

When decorating hard substrates, use heat resistant tape to attach the transfer page to the product. Do not tape across the image area as this can often damage the image quality. Press the product normally, and then remove the transfer carefully. Heat tape can be purchased from your distributor.

### ***Soft Substrates***

It is difficult to tape to soft substrates like t-shirts and mouse-pads. Instead, you can use a repositionable adhesive spray to tack the transfer paper to the product. To use spray adhesive, spray a light mist on the image side of the transfer paper from about 12"/30cm away. Do not spray the product. Then, simply press the transfer paper to the product. If you position it incorrectly, you can lift it off and reposition it. Press the product normally, and remove the transfer. Ask your dealer about suitable adhesive sprays.

# Learning to Use Graphic Design Software

When it comes to pricing the actual cost of your products, the two biggest contributors are the cost of the blank substrate and your time. Your time will be spent printing the image, preparing the substrate, pressing the product, and cooling the substrate. However, before you can perform any of the above steps, you need to **design** the graphic. If you don't know how to use your software, you are most likely losing money by either spending too much time trying to design graphics for clients or by spending money outsourcing your graphic design.

In addition to getting training, there are ways you can improve your design skills on your own. One of the best concepts to keep in mind, especially after opening your CorelDRAW or Adobe software for the first time, is this: you will never use all of the functionality contained within your software suite. Software collections are designed to provide tools to a wide range of users. Just because your software has the ability to perform thousands of design tasks doesn't mean you'll need to learn all of them.

The most popular graphic software packages and the image formats they are based on are:

- Adobe Photoshop (Raster)
- CorelDRAW (Vector)
- Adobe Illustrator (Vector)
- Corel Photo-paint (Raster)
- Corel (ex JASC) Paint Shop Pro X (Combination of Vector and Raster)

As with any printing production, to produce high quality results you must start with a high quality image. Whether you are creating your own designs or working with existing designs you must be critical of the original. Unless you are satisfied with what you see on-screen you are not likely to be satisfied with the end result.

## Set aside learning time

You will not become proficient unless you practice. Take a couple hours a week to sit down at your computer and get familiar with your software. This includes getting to know your toolbar (while keeping in mind you probably will not use all of them). Use the Help section that comes with your software - it's there for a reason. You can often learn how to perform many functions by reading through this information.

## Join an online forum

It's good to have peers to rely on when you get stuck or you can't remember how to do something. Consider joining an online forum where you can have access to hundreds of other people's collective experiences. There are many forums to choose from, and they're often specific to a technology (e.g. sublimation, embroidery, engraving, screen printing, et al). If you are a member of a trade association, they often have online forum resources for you to join.

## Set design goals for yourself

Do you have an idea for a graphic? Have you always wanted to learn how to do something in your design software? Set short, achievable goals for yourself, then sit down at your computer and learn how to reach that goal. For example, let's say you want to learn how to wrap text around a circle or other shapes. Whether you're Corel or Adobe based, there are numerous learning tools available for self-paced learning. In addition, the internet is a vast resource of "how to's." and often you can search for a phrase (e.g. "text on a curve CorelDRAW") and find a wealth of information that has been placed on the web for free access. Once you learn how to perform this function, it becomes a part of your design arsenal. Master one design goal at a time, then move on to another.

The most important thing to remember is not to get discouraged. Everyone has to start somewhere, and with a little practice you can greatly improve your skill sets. Remember that your design software is a

revenue-generating tool. Just as you'd take the time to learn about a sublimation system, an embroidery machine or a laser engraver, so to should you take the time to learn your software.

## Working With Graphic Image Files



### *Image Formats and Graphics Software*

There are two basic types of image formats: vector and raster. The type of format will determine how and what you can edit within the image.

#### **Raster Graphics**

A **raster** graphic or bitmap is a data structure composed of a rectangular grid of pixels or points of color that represent an image. Most pictures taken with a digital camera or found on the web are examples of raster graphics. A raster image is technically categorized by the width and height of the image in pixels and by the number of bits per pixel (color depth) which determines the number of colors it can represent.

The larger a raster image is, the more disk space the image file will take up. For example, a 640 pixels x 480 pixel image requires information to be stored for 307,200 pixels, while a 3072 x 2048 image (from a 6.3 Megapixel digital camera) needs to store information 6,291,456 pixels.

Since raster graphics need to store so much information, large bitmaps require large file sizes. Fortunately, there are several image compression algorithms that have been developed to help reduce these file sizes. JPEG, BMP, TIFF, GIF and PNG are the most common compressed image formats on the Web, but several other types of image compression are available.

Raster graphics can typically be scaled down with no loss of quality, but enlarging a bitmap image causes it to look jagged and "pixelated." A raster file is also difficult to modify without loss of information, although there are software tools that can convert a raster file into a vector file for refinement and changes.



**High Resolution Bitmap**



**Low Resolution Bitmap**

## Vector Graphics

**Vector** graphics, unlike raster images, are not made up of a grid of pixels. Instead, vector graphics are comprised of paths, which are defined by a start and end point, along with other points, curves, and angles along the way. A path can be a line, a square, a triangle, or a curvy shape. These paths can be used to create simple drawings or complex diagrams.

Because vector-based images are not made up of a specific number of dots, they can be scaled to a larger size and not lose any image quality. If you enlarge a bitmap file, it will have rough edges and fuzzy detail. In contrast, enlarging a vector graphic, yields an object with smooth edges and fine detail. This makes vector graphics ideal for logos, which can be small enough to appear on a business card, but can also be scaled to fill a billboard. Common types of vector graphic files include AI, SVG, DRW, CDR and EPS.



## Graphic Image File Types

There are many universally recognized file types for storing images. Here is a list of the most commonly used formats as well as specific details about the characteristics of the file type:

### **bmp**

A .bmp (commonly referred to as bitmap\*) file is a raster-based or pixel-based format that only supports the RGB color space and bit depths of 1, 4, 8, or 24 bits per channel. These attributes make bitmap images unsuitable for use in a high-end print production workflow.

*\*Bitmap files have some confusion associated with them as most people refer to any pixel-based image as a bitmap file. However, a true bitmap image file refers to the standard Windows image format. This type of file is mostly used on DOS- and Windows-based machines.*

### **eps**

An encapsulated post script file is a graphics format that describes an image in the PostScript language. An extension of the PostScript graphics file format developed by Adobe Systems, eps

lets PostScript graphics files be incorporated into other documents. The eps file format supports both vector graphics and raster images as it can contain two versions of an image: a bitmap used to display the image on the screen, and a PostScript™ description used to print the image.

### **psd**

Adobe Photoshop (.psd) files are generally written and read by Photoshop exclusively, however, there are several other applications that will read this format. Most page layout applications (except Adobe InDesign), do not allow native Photoshop images to be placed. A Photoshop file will retain all of the original files attributes. Saved file characteristics include the following: resolution, color info (CMYK, RGB, grayscale), spot color channels and image bit depth.

### **jpeg (jpg)**

The jpeg (Joint Photographic Experts Group) file is one of the most commonly used graphic formats. Initially, this raster file format was intended for use in Web applications, but has found a home in the high-end print production markets, as well.

A jpeg file is encoded by using an adjustable loss compression approach. This means that to achieve smaller file sizes, image data is deleted. In small increments, the jpeg compression approach can be very effective and efficient. However, in larger amounts, the resulting file will contain distortion and blurriness in the image. Caution must be used when preparing jpeg files for use in a print production workflow. The jpeg format will support the RGB, CMYK, and grayscale color settings.

### **tiff (tif)**

The tiff is, a very flexible format that retains all of the image data when edited or resized as the details of the image storage algorithm are included as part of the file. In practice, tiff is used almost exclusively as a lossless image storage format that uses no compression. Consequently, file sizes are quite large. (Sometimes a lossless compression algorithm called LZW is used, but it is not universally supported.) *Of the file formats discussed, the tiff is probably one of the best for dealing with high quality images.*

## Preparing Raster Images for Sublimation



One of the most frustrating aspects of producing decorated products from digital images is the quality of some of those original images. Unless you start with a good source image there is very little chance of producing a high quality product. Think of the phrase “garbage in = garbage out”. No matter how good your sublimation printer is, it can never output an image that is higher in quality than the graphic image file that was delivered to it. A good measurement of quality, especially with raster images is resolution.

### Understanding Resolution

Resolution is one measurement of the image quality. Every raster digital image whether a scanned image, a printed image or an image displayed on your monitor is composed of tiny dots. The more dots in a given space, the greater the resolution. In general, increased resolution means that an image is sharper and displays more detail resulting in a better quality printed image.

When dealing with graphics files there are three properties that go into determining the resolution of an image file: pixels, dpi and inches.

#### The Basic Units of Resolution

##### *pixels*

Refers to the total number of 'dots' both horizontally and vertically that make up the file. This is the actual resolution of the file. Once a raster image is created, the total number of pixels is fixed.

##### *DPI / PPC*

Refers to the number of 'dots' or pixels per each inch of a printed or scanned document - the more 'dots', the higher the quality of the image. The metric alternative to this measurement is Pixels Per Centimetre (PPC)

##### *inches/centimetres*

Is the linear measurement that refers to the actual physical size (either printed or scanned) of an image.

#### Calculating Resolution

The following formulas illustrate the relationships between the different parameters that define resolution:

$$\text{pixels} = \text{inches} \times \text{dpi} \quad \text{OR}$$

$$\text{dpi} = \text{pixels} / \text{inches}$$

$$\text{pixels} = \text{cm} \times \text{ppi}$$

$$\text{ppi} = \text{pixels} / \text{cm}$$

$$\text{inches} = \text{pixels}/\text{dpi}$$

$$\text{cm} = \text{pixels}/\text{ppc}$$

**Example:** An image is created in Photoshop at 300pixels x 300pixels with a dpi of 100 (39 pixels per centimetre). What is the actual size in inches or centimeters?

$$\text{Width: } 300\text{pixels}/100 \text{ dpi} = 3 \text{ inches}$$

$$\text{Width: } 300\text{pixels}/39 \text{ ppc} = 7.69 \text{ cm}$$

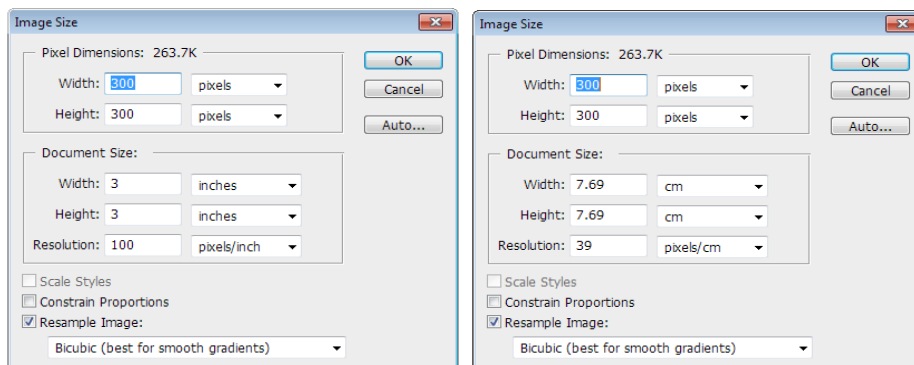
$$\text{Height: } 300\text{pixels}/100 \text{ dpi} = 3 \text{ inches}$$

$$\text{Height: } 300\text{pixels}/39 \text{ ppc} = 7.69 \text{ cm}$$

**Image size will be 3" x 3"**

**Image size will be 7.69cm x 7.69cm**

If you look at the Image Size Menu in Photoshop you can see how these parameters relate. Notice the Resample Image check box. This determines whether you want to actually resize the image. With this box unchecked, when you enter a new DPI Photoshop will automatically change the DPI to compensate and vice-versa.



## Resolution and Resizing

A digital raster image has no absolute size or resolution. All it has are a certain number of pixels in each dimension. The resolution changes as the image size changes because the number of pixels that make up the image are being spread over a greater or lesser area. Therefore the resolution changes accordingly.

Suppose you had an image provided to you by a customer that was 4" x 4" (10.1cm x 10.1cm) with a dpi of 350 (138 ppc). Using the formula **pixels = inches(cm) X dpi** you would see that the image has 1400 pixels x 1400 pixels.

$$\text{pixels} = \text{inches} \times \text{dpi}$$

$$\text{pixels} = \text{cm} \times \text{ppc}$$

$$1400\text{pixels} = 4.0\text{inches} \times 350\text{dpi}$$

$$1400\text{pixels} = 10.1\text{cm} \times 138\text{ppc}$$

But what if you wanted to make it larger, say 9" x 9" (22.86cm x 22.86cm)? Because the number of pixels are fixed for a raster image (after its created) you would be spreading out the same number of pixels over a wider space, which effectively lowers the dpi/ppc rating and the result is a lower resolution image.

$$\text{dpi} = \text{pixels}/\text{inches}$$

$$\text{ppc} = \text{pixels}/\text{cm}$$

$$155.55\text{dpi} = 1400\text{pixels}/9.0\text{inches}$$

$$61\text{ppc} = 1400\text{pixels}/22.86\text{cm}$$

Conversely, reducing the size of the image will actually increase the resolution or at least the dpi setting as the pixels are compacted into a smaller space. In the case of a new image size of 3" x 3" (7.62cm x 7.62cm), the resolution will increase.

$$\text{dpi} = \text{pixels}/\text{inches}$$

$$\text{ppc} = \text{pixels}/\text{cm}$$

466.67dpi = 1400pixels/3.0inches

183.72ppc = 1400pixels/7.62cm

A good rule is that you can always decrease the size of a raster image without degrading the resolution, but increasing it could cause quality problems.

## Resolution and Equipment

The resolution of an image is impacted by the device that creates or displays it as each one (scanner, digital scanner, monitor) has a maximum number of dots that it can process and display, no matter how many dots are in the image.

**NOTE:** From this point on we will refer to image resolution in dpi and printing sizes in inches.

**Example:** A 300 dpi inkjet printer can print up to 300 dots of image information in an inch. If you print an image that was scanned at 600dpi, the extra pixels are “discarded” by the printer since it is not capable of processing them. When an image has more dots than the processing device can support, those pixels are lost. They increase the file size but will not improve the quality of the printed image. In this example the image resolution is too high for the device.

**NOTE:** A photograph scanned at both 300 dpi and at 600 dpi will look the same printed on a 300 dpi inkjet printer.

**Example:** Pictures on the Web are usually 96dpi or 72 dpi because that is the resolution of most computer monitors used to display them. If you print a 72dpi picture on a 600dpi printer, it will not look as crisp as it does on the computer monitor, as the printer does not have enough dots of information to create a clear, sharp image at its print resolution. It may be necessary to reduce the physical image size in order to increase the dpi value to take advantage of the printer resolution.

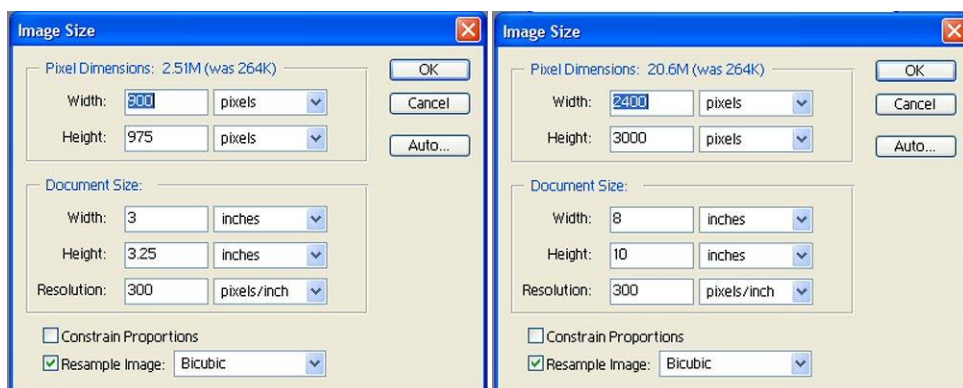
When creating the image you should focus on higher resolutions and larger image sizes so that you have enough image data to work with (INPUT or CAPTURE resolution) Through the processing of the image, the resolution can be adjusted to more closely match the specifications of the printing device, which is referred to as the OUTPUT or PRINTING resolution.

*It should be noted that the in general, the normal resolution at which the human eye can discern details, is around 200dpi or less.*

## Resolution and Dye Sublimation Printing

A final output resolution of 300 DPI at the actual output print size will almost always give you a high quality results when printing raster images for dye sublimation.

Take a look at these two images that are going to be used for pressing onto a mug and an 8” x 10” tile.



Mug Image

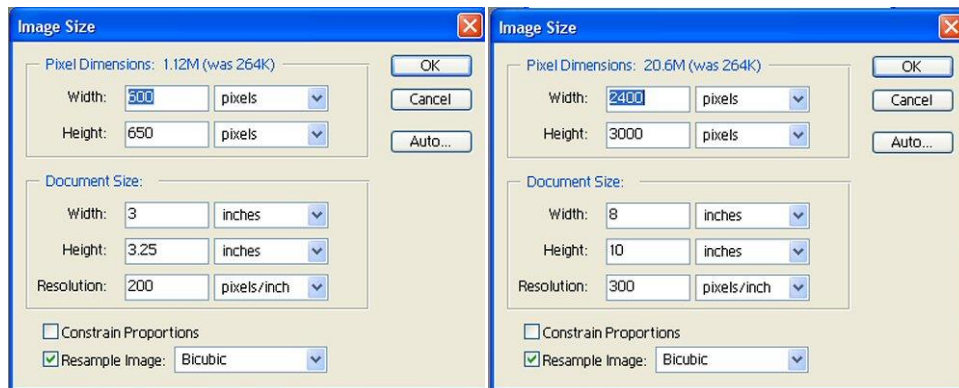
Tile Image



Note the respective file sizes (pixel dimensions) of each image. The image for the tile is over 8 times larger than the image for the mug.

While it is good practice to scan your images at a high resolution there are certain limitations in dye sublimation transfer that negates the need for a very high dpi setting. Due to the nature of the process, which involves the ink turning into a gas to bond to the polymers of the substrate, resolutions higher than 300 dpi are usually unnecessary.

On fabrics (t-shirts, mouse pads etc) it is quite often possible to use printing resolutions as low as 150 dpi, whereas for hard substrates (ceramics, metals etc) 200 dpi is the recommended printing resolution. Let's look at what this does to the sample images from above:



Mug Image

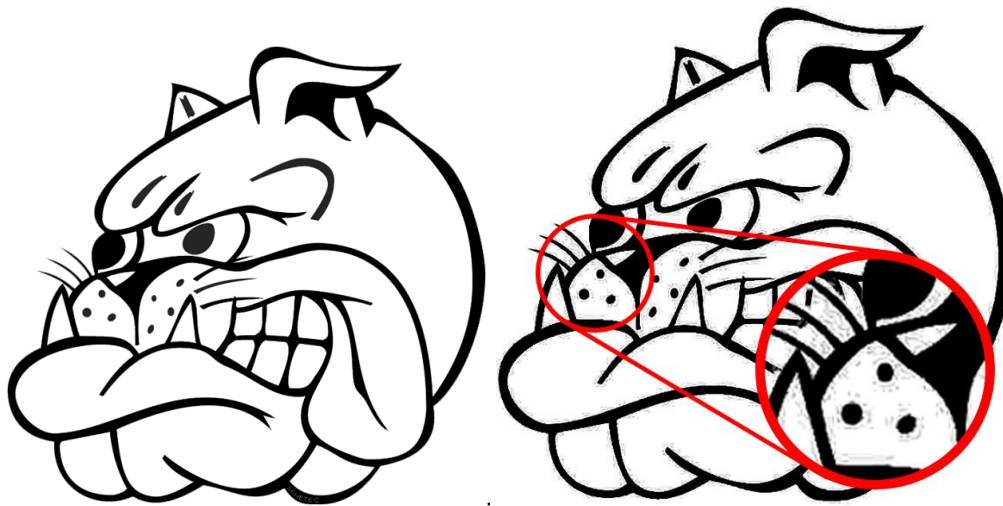
Tile Image

Note that the new file sizes are now less than half that of the original. If these images were going to be used on fabrics at 150 dpi then the file sizes would be even lower, 643K and 5.15M respectively.

This serves a number of purposes as smaller file sizes require less processing time. Image editing in Photoshop and CorelDRAW will be quicker and more efficient. Sending image information to the printer (spooling) will be faster. If importing multiple images into a design the finished file size of the overall design will be much smaller. And of course, each file will take up much less space on your hard drive.

## JPEG Compression versus TIFF Quality

As you apply greater amounts of JPEG compression, an image gets smaller in size and at the same time it undergoes a certain degree of degradation of image quality by virtue of the process. Take a look at the images below. One has been highly compressed as a jpeg the other is an uncompressed tiff.



Uncompressed tiff

Compressed jpeg

On the tiff, notice how this image has crisp and clean edges. This image will reproduce well. The jpeg on the other hand has much softer edges that appear fuzzy, plus there is some “noise” (unwanted pixels) in the red circle which gives the image a “dirty” look. In most cases, the noise is not readily visible on the computer, but shows up during printing.

#### **File compression permanently affects the file**

Since the jpeg compression process removes image data, once an image has been compressed (or over compressed), the damage done is permanent. Even if you try to convert the compressed jpeg image to a tiff image, you cannot fix the issues. Unfortunately there is no repair for an over compressed JPEG image.

### **Raster Image Color Correction**

Ensuring that your raster images reproduce effectively requires an understanding of how to correct color problems and enhance certain types of image. Working with a professional image manipulation tool you can quickly alter the tonal range and change the color balance - these two basic functions can bring extra life into your photographs.

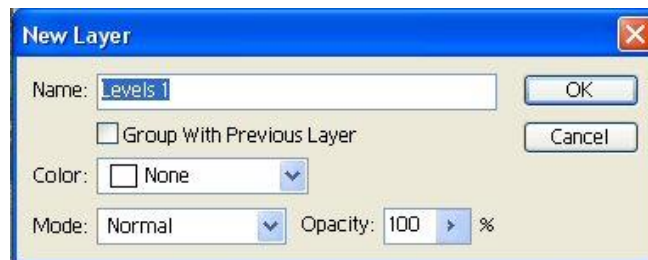
#### **Tonal Range**

Many raster images produced by scanners and/or digital cameras tend to have a “flat” look to them. Before using for dye sublimation, you may wish to adjust your pictures to add a little ‘life’ to the image. Obviously this very much depends on the actual image but usually 1-2 minutes of adjustment can make the difference between a good image and a great image.

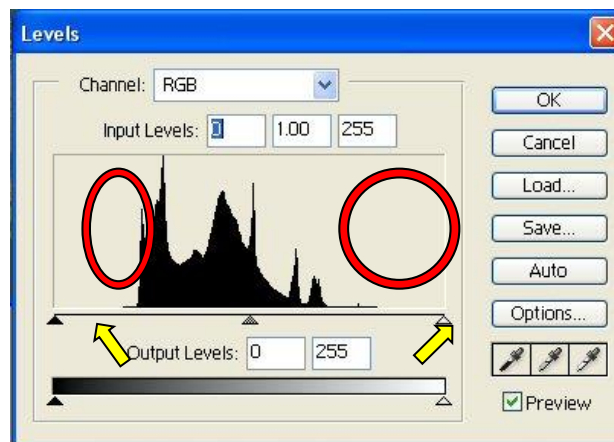
Here is an image, which is definitely ‘flat’ and ‘bland’. It looks like it was taken through a haze.



The first thing to adjust is the levels. In Photoshop go to 'Layer' – 'New Adjustment Layer' – 'Levels'

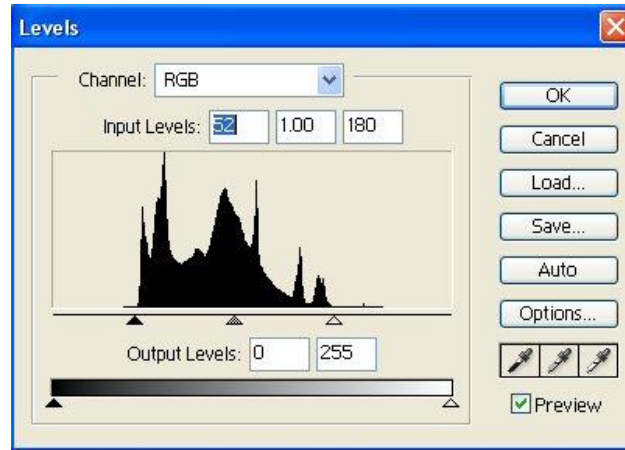


Click on OK



The histogram (the black series of spikes) represents the tonal range of the image. Clearly, there are two areas where the data is missing, as indicated by the red circles. If the histogram was concentrated to the left it would mean there was plenty of information in the shadows, concentration to the right would mean there was plenty of information in the highlights. A good image has the information spread across the entire histogram.

To make changes, first drag the two triangles towards the edges of the histogram using the mouse pointer.



Click on OK

Now we see a transformation in the image. This is infinitely more desirable than the original image.



Similar enhancements are usually available in any of the recommended software packages (In Corel Photo Paint for example you would use 'Contrast Enhancement' in the 'Image'-'Adjust' menu).

### Color Balance

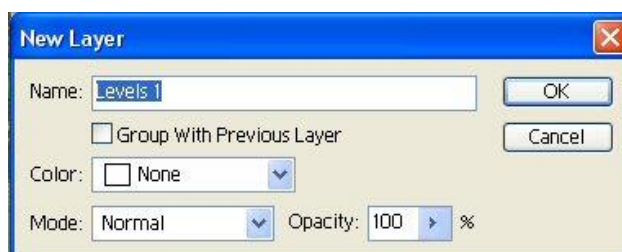
Sometimes a raster image may seem ok in the brightness and contrast area but has a strange color-cast to it. This is not something that "color correction/color matching" can cure. Fundamentally, if it doesn't look good on screen there is a distinct chance it will not look good when printed.

There are many ways to cure color issues within a raster image, some more complex than others (particularly when using a professional package like Photoshop). Here is one fairly simple way using the same process as the previous 'Tonal Range' correction.

The image below has a distinct "yellow cast" to it making the sky very look "muddy" and "dull".

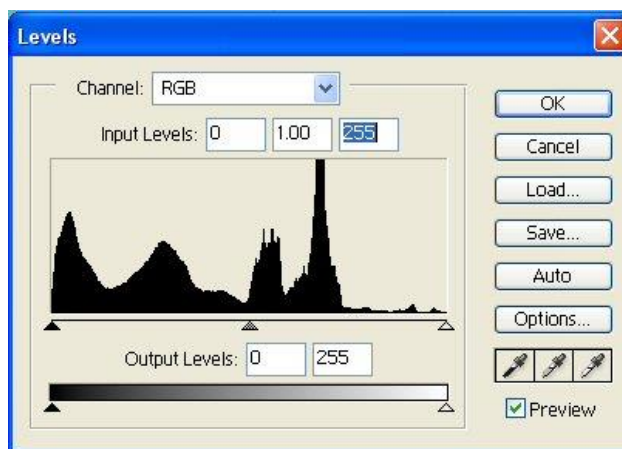


To get started with this adjustment in Photoshop go to 'Layer' – 'New adjustment layer' – 'Levels'

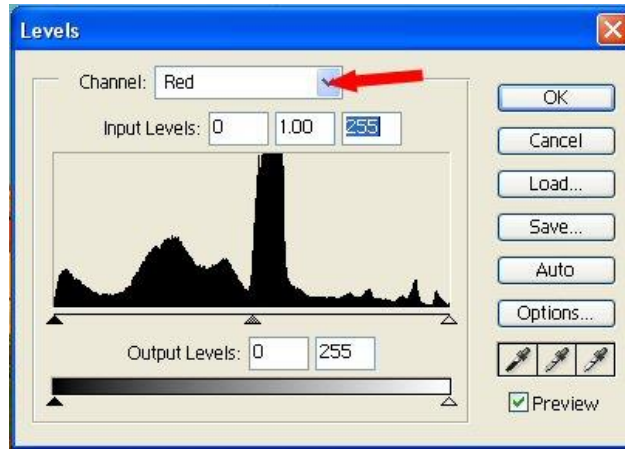


Click on OK

Here we see the tonal range spreads across the whole Histogram (albeit a little weak in the highlights).

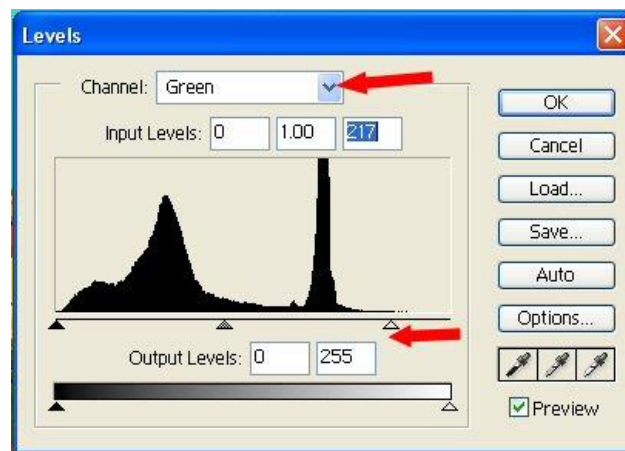


Click on the drop-down arrow for Channel and select Red.



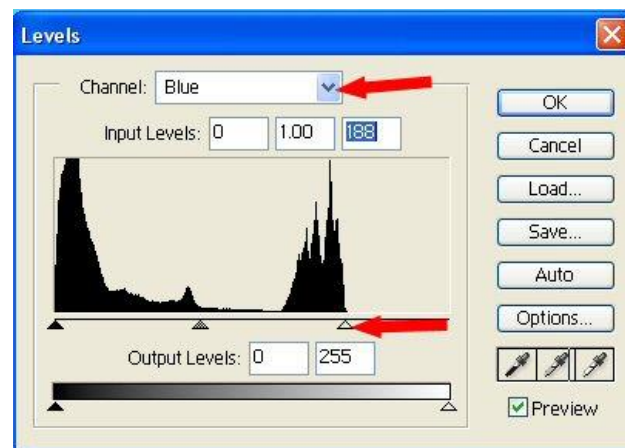
This Channel is fine and we do not need to move any of the triangles.

Next select the GREEN channel from the channel list.



Here we can see a lack of data to the right so we move the right triangle towards the start of the data.

Next select the BLUE channel from the channel list.



Here there is a larger area of data missing so we move the triangle towards the start of the data.

You can see that the "yellow" cast has been removed and the sky is now very clear.



You can tweak the design color even further by using the same approach to adjust the Brightness and Contrast. Just open another 'New Adjustment Layer' with the 'Brightness and Contrast' controller and adjust the image further to get an even more impressive image as shown below.



There are many very useful tools in Photoshop to improve an image further (Curves being the most useful but not quite as intuitive to use). The image opposite has been adjusted further with masking off areas and enhancing them individually.

It cannot be overstated how important it is to make sure your image is as good as it possibly can be before you even consider sending it to the printer. If a little care is taken in the production of your images a great deal of improvement will be noticed at the finished product stage. There is nothing more satisfying than presenting a product to a customer which you feel proud to have created.

Software programs such as Photoshop and CorelDRAW may seem a little daunting when you first start to work with them but persistence and practice will be greatly rewarded in the long run.

The internet is a fantastic source of Photoshop and CorelDRAW tutorials for the user who wish to develop their skills further.

## Preparing Vector Images for Sublimation

The previous section deals with raster images (bmp, jpeg, tiff etc.), here we will look at the unique attributes of working with vectors. It should be noted that image resolution does not apply when dealing with vectors.

While color correction usually works very well with raster images it is sometimes lacking in absolute accuracy for spot colors. Vector designs are very often created using a single color for each section (this is only not true when filling a section with a gradient or a pattern) and in some circumstances (e.g. company logos) the accuracy can be critical.

### Working With Colors

If a design is being created on screen then the accuracy of the monitor itself becomes critical. Setting up a monitor to show accurate colors is difficult enough but it is also possible to choose a color on screen that is outside the color gamut range of a printer.

For these reasons we always recommend creating a design using a color swatch that you have created yourself (using the kind of substrate that will be used for your customer's products). The printing industry has always worked with these swatches (e.g. Pantone Charts) but these are primarily CMYK charts. We recommend you always work with RGB data and it is advisable to create your own RGB color swatches for future reference.

Print these swatches using the correct setup for your printer/software package and press them onto the type of substrate you plan to use for the finished item. It is possible to use a good quality white 100% polyester fabric or coated metal sheets to create swatches as for most cases these will produce colors that are within the tolerance for accuracy.

Once you have created the color swatches they can be used as color references for future work.



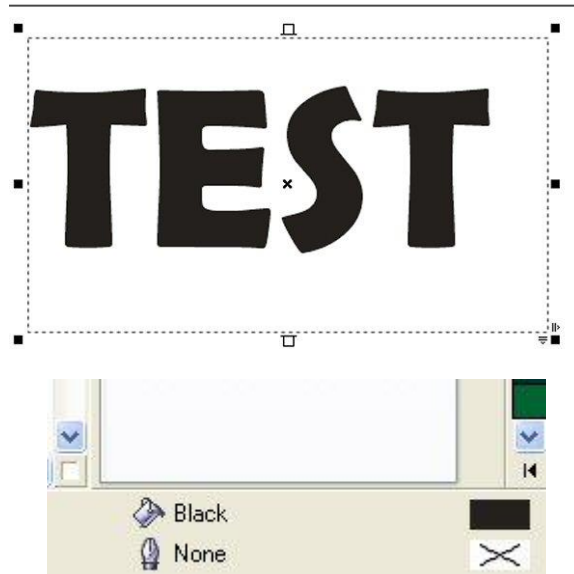
### RGB vs CMYK

When working with vector based programs the default palette is often set to CMYK values. This would be fine if you were sending the print information to a color separations printer, you are however sending this information to a composite printer. In practice you will create more accurate results (using the RGB profile) if you create your designs with RGB values.

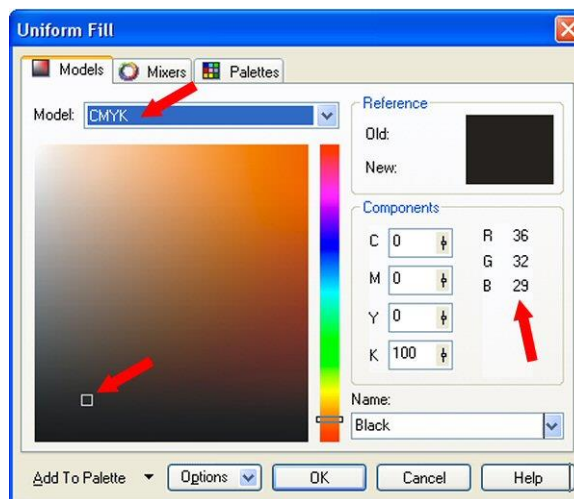
One of the most common complaints with sublimation printers is the inability to create a solid black. There can be many reasons for this but the first area for inspection is the image itself. If, for example a design was being created without checking the palette values there is a distinct possibility that the design is using CMYK values. This example (in CorelDara) shows some text being created and 'Black' being chosen as the text fill color.



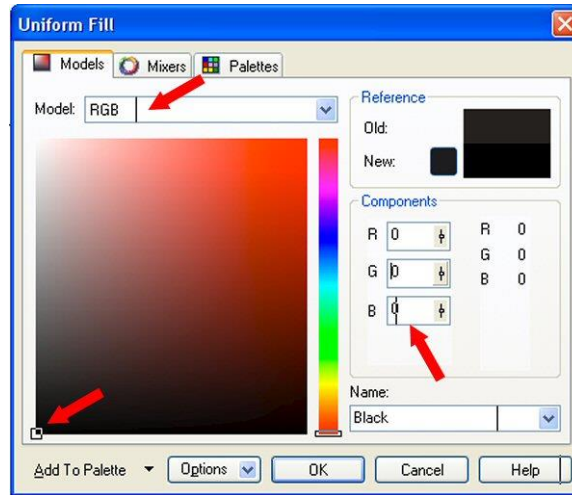
If we double click on the black rectangle in the bottom right corner of the screen we will open up the 'uniform fill' box.



If the default palette is still being used this is the result you will see. The 'Model' is set to CMYK and the small square showing where the color is in the color space is a long way from the bottom left corner (which would be actual black). We can also see the RGB values showing as 36,32,29. This would in fact tell the printer that you wished to print Grey (and not even a neutral one as the three values are not identical)



To tell a composite printer that you want Black you need to first change the 'Model' to RGB. Then you can change the RGB values to 0,0,0. The small square showing the colors position in the color space is now at the extreme bottom left corner and the printer will print a good solid black.

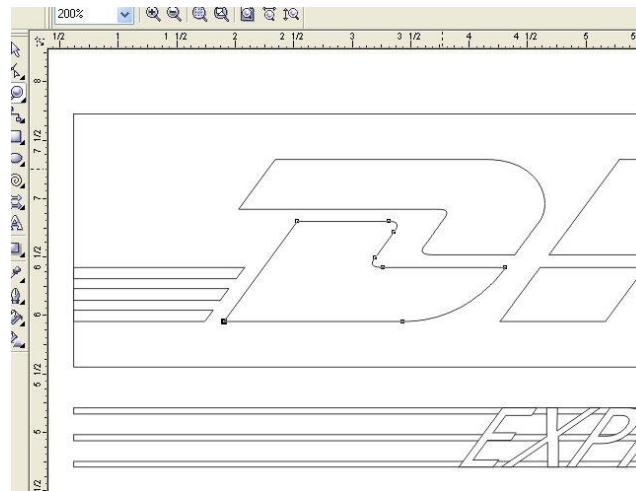


This is a good example why it is imperative that you use RGB values in your designs when printing to a composite printer. It's a good idea to change your default palette to an RGB one. In Corel this would be under 'window' – 'color palettes' – then check the Default RGB palette. Here you can also uncheck the default CMYK palette to avoid confusion.

## Applying Colors to a Vector Image

In the following example, CorelDRAW will be used to create some products that will be sublimated with the logo of the shipping company DHL. You can use any other vector image editing package to do this where the principles remain the same.

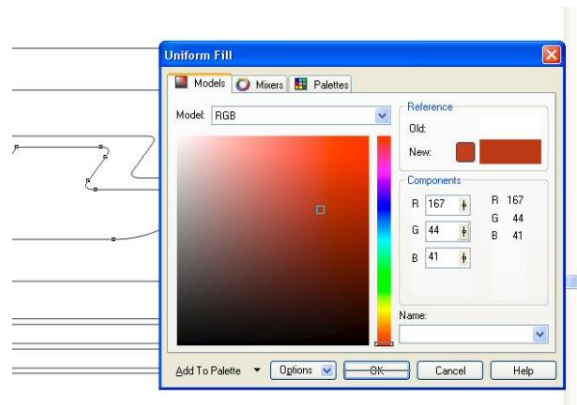
The first step was to create the vector (wireframe) logo for DHL.



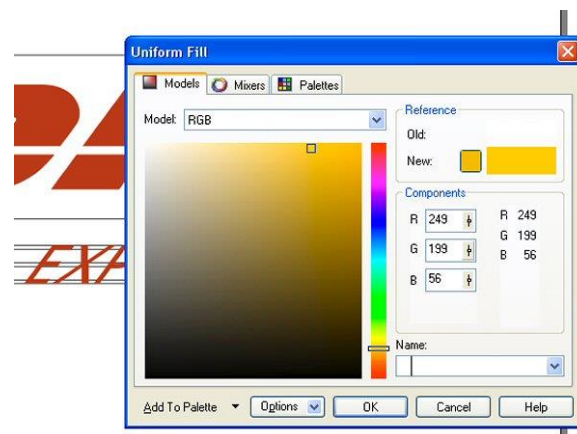
An RGB red of 167,44,41 was then selected for this printer/ink/substrate combination by comparing the color chart to the artwork provided by the customer. On the screen the red actually looks slightly browner than the artwork, but this can be attributed to the fact that the monitor color is not an exact match to the actual color.



The next step is to fill each of the 'red' areas of the design with the chosen color. The quickest way to accomplish this is to choose all of the affected elements at the same time. It may also be necessary to remove the outline color.



Now choose any other colors required for the design and fill those accordingly. Again, reference the color chart, preferably under a bright daylight as artificial light can change your color perception



Now you have a finished design which, when printed and pressed will give you the colors you chose from the swatch irrespective of how they look on screen. The accuracy of the design is reliant on choosing the correct color from the swatch. This is also something that can be done with the client before starting the job so that the colors to be used can be approved for production, which will eliminate any questions about the concerning the look of the finished product.

To ensure the highest degree of color accuracy, you can print and press the chosen logo colors onto the actual material that will be used for the final product, as different substrates may affect the colors slightly, particularly if the white background is not pure white.

If accuracy is critical and there doesn't appear to be a color on your standard RGB swatch that matches closely enough, then a different swatch may need to be used. You can create your own custom swatches

from the RGB palettes that ship with CorelDRAW. Go to: 'Window' – 'Color Palettes' – 'Open Palette' – and browse the RGB folder.

One huge benefit of working with vector graphics is the sizing capabilities of the design. Once the design is complete it can be used on any size product the customer requires without any loss in quality. Whereas with a raster file, enlarging the design will reduce its clarity and resolution.

# Color Management & Correction

## *Understanding Color & Light*

Understanding color is fundamental to achieving consistent and high quality results when sublimation printing.

If it is to be an effective tool, it must be possible to create and control consistent, predictable color in the production chain: scanners, software, monitors, printers etc. The challenge is that different devices can't create the same range of colors. It is in the field of color management that this color matching effort comes into its own.

## Understanding Color Gamut

A Color Gamut is the range of colors which can be reproduced by any given device (scanner, camera, monitor, printer etc.).

Following is a list of color systems in order from large to small color gamut.

### Photographic Film

This is one of the best systems available for detecting and reproducing color. Movie-goers are familiar with the difference in color quality between the film projections seen in theaters and the home video versions. This is because the color gamut of film far exceeds that of television.

### CRT (Cathode Ray Tube) Monitors

CRT have a roughly triangular color gamut which covers a significant portion of the visible color space. In CRTs, the limitations are due to the phosphors in the screen which produce red, green, and blue light only, and then have to be combined to create the desired final color.

### TFT LCD (Thin Film Transistor Liquid Crystal Display) Monitors

LCD screens filter the light emitted by a backlight. The gamut of an LCD screen is therefore limited to the emitted spectrum of the backlight. Older LCD screens use fluorescent bulbs for backlights, newer screens use light emitting diodes (LED) as the light source. These monitors generally have a gamut much smaller than CRT screens though with certain LED backlights this can yield a more comprehensive gamut than CRTs.

### Television

Television does generally not take full advantage of its color display properties, due to the limitations of broadcasting. HDTV is far better, but still somewhat less than that of similar products using the same display technology, such as computer monitors.

### Paint

Paint mixing, both artistic and for commercial applications, achieves a reasonably large color gamut by starting with a larger palette than the red, green, and blue of CRTs or cyan, magenta, and yellow of printing. Paint may reproduce some highly saturated colors that cannot be reproduced well by CRTs (particularly violet), but overall the color gamut is smaller.

### Printing Inks

Ink printing typically uses the CMYK color space (cyan, magenta, yellow, and black). A very few printing processes do not include black; however, those processes are poor at representing low saturation, low intensity colors. Efforts have been made to expand the gamut of the printing

process by adding inks of non-primary colors; these are typically orange and green or light cyan and light magenta. Spot color inks of a very specific color are also sometimes used.

These examples show that printing using ink offers a very small color gamut

## Color Models

Color models help us to define color in a numeric and structured way - the most common color models are:

### RGB

The RGB model is the usual method of describing colors on monitors. The actual red, green and blue primaries used depend upon the phosphors used on the monitor. It is not possible to define the complete set of visible colors as defined by the CIE standard with the RGB primaries.

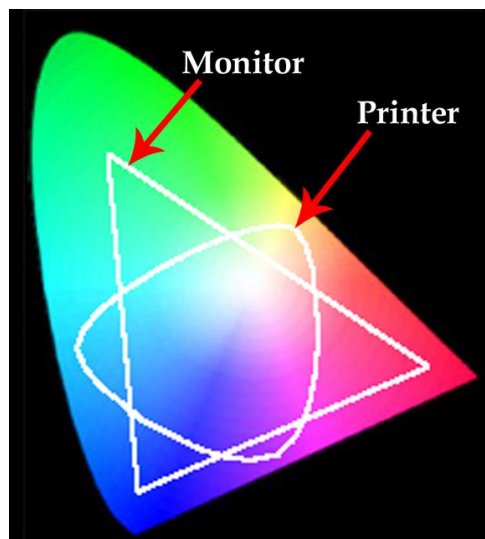
### HSB

The HSB model is based upon Hue, Saturation and Brightness. This model allows a more intuitive method of designing a color.

### CMYK

The CMYK model is a subtractive model that is used in printing. It uses the subtractive primaries Cyan, Magenta and Yellow. In addition because it is impossible to produce a pure black from these primaries a Black (K) primary is added thus giving the CMYK model. When the gamut of this model is plotted on the CIE diagram it only covers a subset of the interior and will not usually cover the entire monitor gamut either. Thus the image on a monitor can never be completely accurately captured in print.

Here we see an example of the different color ranges of two devices. The difference has been exaggerated for clarity.



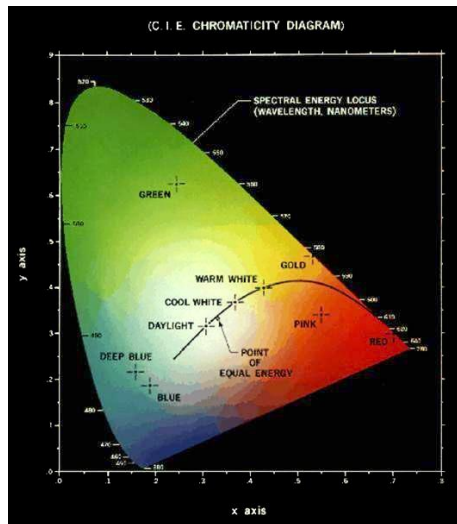
## Color Gamut Gauges

The human eye can distinguish about 300,000 colors which have been defined by empirical analysis based on **Color Mixing**. For the color mixing analysis process, three colors are chosen to act as the standard primary colors. A common choice is: red, green and blue. By mixing these primary colors with varying intensities many different colors can be produced. For a given set of primaries the totality of

colors that can be produced is called the color gamut. Unfortunately whatever the choice of primary colors the color gamut associated with the primaries can never match the gamut of visible colors using only positive weightings.

The usual standard used as a reference is that produced by the Commission Internationale de l'Eclairage (CIE) in 1931 which defined three primary colors that can be combined additively with no negative coefficients to produce all visible colors.

The CIE model below is very useful as a standard. However because it is based on three imaginary color primaries it is not practical to use in hardware devices. Thus, various other more practical standard color models have been created for everyday use.



## Color Rendering

This demonstrates why the colors of an image on the computer screen never look quite the same as the colors in the final printed image. To try and compensate for this anomaly we use a **rendering** designed for handling out-of-gamut colors.

## Perceptual Rendering

Perceptual rendering attempts to compress the gamut of the source space into the gamut of the destination space in such a way that the overall relationships between the colors (and hence the overall image appearance) is preserved, even though all the colors may change in the process.

## Absolute Colorimetric Rendering

Absolute Colorimetric rendering matches those colors in the source space that are inside the gamut of the target space exactly and forces out-of-gamut colors to the nearest reproducible hue, sacrificing lightness and saturation.

## Relative Colorimetric Rendering

Relative Colorimetric rendering first scales the white of the source space to the white of the target space, adjusting all other colors relative to that white. Then it matches the adjusted colors in the source space that are inside the gamut of the target space exactly and forces out-of-gamut colors to the nearest reproducible hue, sacrificing lightness and saturation.

## Saturation Rendering

Saturation rendering maps fully saturated colors in the source space to fully saturated colors in the target space, sacrificing hue and lightness.

## Rendering Recommendations

We recommend Perceptual Rendering as the one to use for all your printing output. When using this method the entire gamut of the image is compressed to fit within the gamut of the destination device.

This means that all of the colors that were actually in-gamut will need to be adjusted to make room for the out-of-gamut colors. Moreover, unlike what happens in the saturation rendering processes, with perceptual rendering all pixels are treated with respect for each other. As a result, out-of-gamut pixels may not be moved to the closest reproducible color.

You may think that this adjustment makes every color wrong. That assumption, in fact, is correct. Therefore, it would seem that perceptual rendering processes would make things even worse. But strangely enough that is not the case because all of the colors have been adjusted proportionally, even those that the destination device could accurately reproduce. With perceptual rendering, the chance that a viewer will notice that all of the colors have been modified is minimized. This is the most common rendering intent that is used when converting from RGB to CMYK color space.

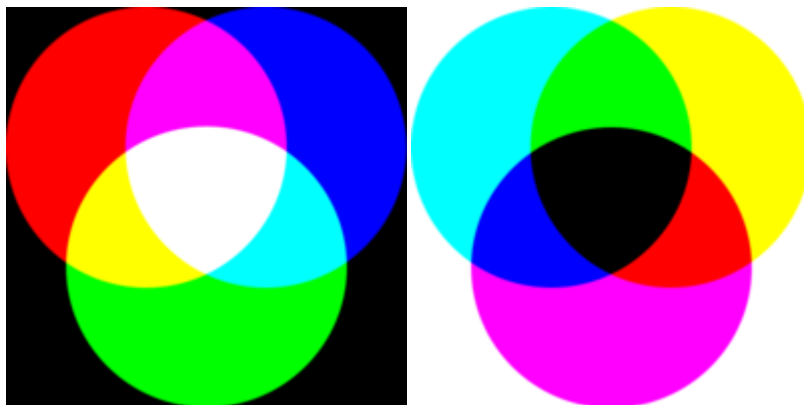
## RGB vs CMYK

Computer monitors emit color as RGB (red, green, blue) light. Although all colors of the visible spectrum can be produced by merging red, green and blue light, monitors are capable of displaying only a limited gamut (i.e., range) of the visible spectrum.

Whereas monitors emit light, inked paper absorbs or reflects specific wavelengths. Cyan, magenta and yellow pigments serve as filters, subtracting varying degrees of red, green and blue from white light to produce a selective gamut of spectral colors.

Like monitors, printing inks also produce a color gamut that is only a subset of the visible spectrum, although the range is not the same for both. Consequently, the same artwork displayed on a computer monitor may not match that on a printed publication. Also, because printing processes, such as offset lithography use CMYK (cyan, magenta, yellow, black) inks, digital art must be converted to CMYK color for print.

Many printers now prefer digital art files be supplied in the RGB color space with ICC profiles attached. Images can then be converted to the CMYK color space by the printer using color management methods that rely on color profiles if present; this helps preserve the best possible detail and vibrancy.





RGB – Additive

CMY - Subtractive

The two diagrams here show just how distinctly different the Color Spaces are. This also helps to explain the difficulty in accurately converting from one space to another.

Don't let this information overwhelm you. On a day-to-day basis you will most likely be using either the Sawgrass PowerDriver or an ICC profile to manage color.

## Color Correction

With dye sublimation there is another element of the color control process that has to be addressed. When a dye sublimation transfer sheet is pressed onto a substrate, the ink turns into a gas to bond to the polymers of the substrate. During this "gassing" certain colors will 'shift' so the finished product will not look like the original image on the screen or the image that printed out on the transfer paper. **Color correction** is the art of adjusting this color transformation so that you can produce the best quality results on your substrate.

*(It should be noted that the colors of the ink printed on the transfer paper are very different from the final image that is created when heat and pressure is applied due to the chemical characteristics of the dye sublimation process. Thus, there is no need to consider the ink colors at this stage when performing any type of color correction.)*

When using dye sublimation ink, color correction needs to be addressed for each individual printer and ink combination. In extreme circumstances color correction may be needed for every combination of printer/ink/substrate and transfer paper. However, extensive testing has shown that in most cases good quality transfer paper does not affect the final color, therefore it's recommended that you only deal with high quality papers.

It should be noted, that suitable substrates for sublimation will have white surfaces. However, there are varying degrees of white, which technically could have an effect on the colors of the final image. But in reality, these varying shades have little or no effect on the finished appearance, and thus it's not necessary to perform color correction for every shade of white surface you come in contact with.

Another factor that must be considered when addressing color correction is that each device that deals with an image, whether it's your scanner, digital camera, monitor or printer has a unique way of handling color. The subtle differences among these devices must be overcome and replaced by consistency of color interpretation by known standards.

## Different Methods of Color Correction

There are two basic methods of color correction for dye sublimation: ICC profiles and custom printer drivers. Though both methods are somewhat similar, they have specific differences.

An **ICC (International Color Consortium) profile** is a software file that ensures that when a specific color is selected on the computer screen, the designated color is consistently and correctly delivered on the substrate. Think of it as a color matching program, as the screen color rarely produces exactly the same output color. Thus a profile creates a [link](#) between specific screen colors and specific output colors. It doesn't change the color, rather it ensures the correct output for a given input.

To use this method you must work with ICC compliant software (e.g. PhotoShop, Corel). The profile will be placed in the output stage of printing and the manufacturers' (OEM) printer drivers will be set to 'No Color Adjustment'. This method will color correct the image and then send the data to the printer without affecting the colors further.

Color correction profiles for dye sublimation have their own unique problems. Under normal profile creation when a printer has printed out the color swatch for testing, the profiling software knows how to adjust the colors to print out the correct ones. When a dye sublimation transfer is pressed onto a substrate the ink turns into a gas and while in this state the colors change properties. This change can be quite dramatic (e.g. some blues look like green on paper) and it is therefore impossible to judge whether the print is correct or not. Thus, many sublimation printers create custom profiles that correlate the screen color to the final sublimated color, rather than just to the ink color.

## Color Matching

Creating color accurately on paper has been one of the major areas of research in color printing. Like monitors, printers closely position different amounts of key primary colors, which from a distance, merge to form any color. This process is known as **dithering**.

Monitors and printers do this slightly differently however because monitors are light sources, whereas the output from printers reflects light. Monitors mix the light from phosphors made of the primary additive colors: red, green and blue (RGB), while printers use inks made of the primary subtractive colors: cyan, magenta and yellow (CMY). White light is absorbed by the colored inks, reflecting the desired color. In each case, the basic primary colors are dithered to form the entire spectrum. Dithering breaks a color pixel into an array of dots so that each dot is made up of one of the basic colors or left blank.

The reproduction of color from the monitor to the printer output is referred to as color matching. Colors vary from monitor to monitor and the colors on the printed page do not always match up with what is displayed on-screen. The color generated on the printed page is dependent on the color system used and the particular printer model, not by the colors shown on the monitor.

It is suggested that the user print out and sublimate the entire palette to a pure white substrate, and then retain this color "chart" as a visual reference for working with the ColorSure™ palette.

## Printing RGB Color Charts

We recommend making RGB color charts for both your hard and soft substrate sets. This is easily accomplished by printing out one set of charts for transfer on to white metal and another set for transfer on to a t-shirt or swatch of fabric. The printed chart demonstrates the exact color that is created via sublimation (plus the RGB settings), so the graphic designer has an accurate reference when choosing the proper colors for the image being created. Keep in mind that the color of the substrate will affect the transfer color, so if you're going to be working with a lot of colored garments, you might consider devoting colored t-shirts for representative color charts.

There are a variety of ways to obtain RGB color chart files. First, check with your distributor. They should have files available for both CorelDRAW and Adobe products. The file format EPS (encapsulated post script) is a uniform file format that can be opened within both Corel and Adobe environments.

There are also businesses that can provide you with RGB color swatch files (usually for a fee). If you do an internet search for "RGB color swatch files," you can explore these options.

For CorelDRAW users, there is a useful tool that is bundled with the graphics suite that allows you to make your own printable RGB (or any color mode) color swatches refer to the software manual for detailed instructions.

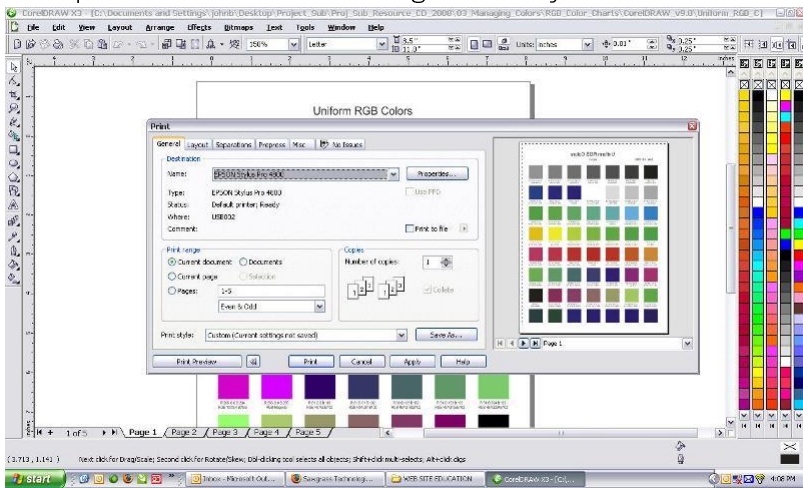
## Pressing RGB Color Charts

As mentioned earlier, we recommend making at least two sets of RGB color swatch charts: one set for hard substrates using white metal and one set for soft substrates using white polyester fabric (t-shirt or piece of polyester material). Once you've printed the RGB color charts transfers, you need only press them on to the two types of substrates.

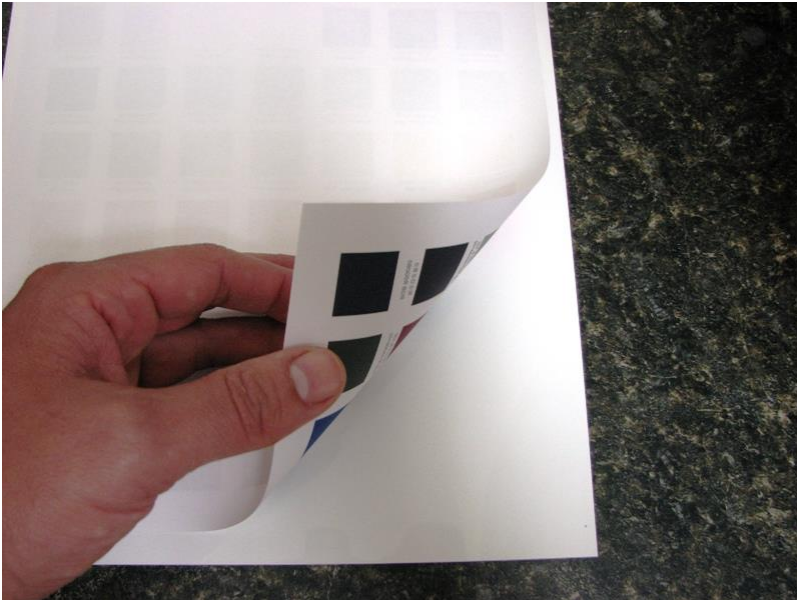
Under a heat press, face the mirrored transfer against the blank substrate. To avoid ghosting the image through shifting when opening the press, you should fix the transfer to the substrate using heat resistant tape. Place the substrate under your heat press, transfer side up, and press for the allotted time based on the material (refer to the substrate manufacturer's guides for optimum time, pressure and temperature settings).

## Creating RGB Color Charts - Step-By-Step Instructions

From your graphics software, print the color chart using the ideal settings for the substrate (these settings are explained with the installation guides that you downloaded before setting up your printer)



Marry the mirrored transfer face down toward the blank substrate and secure using heat resistant tape



Place the substrate under your heat press, place a piece of throwaway paper over the top and press according to the substrate manufacturer's recommended guidelines



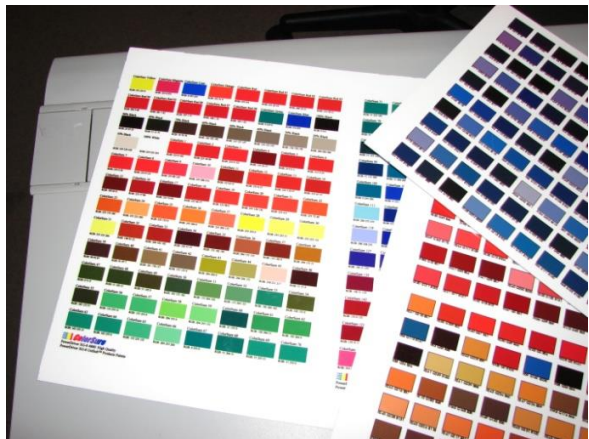
Carefully remove the substrate and peel off transfer when the pressing time is complete



You now have a representative RGB color chart showing how specific RGB values will look after pressing

## Using Your RGB Color Charts

After you've made your color charts on a hard substrate and a soft substrate, you are now able to determine what your colors will look like after being pressed. To hit specific spot colors, simply change the RGB value of vector graphics (e.g. logos, text, etc.), print it using your sublimation system and transfer the image using the same time, temperature and pressure you used to make the RGB color chart.



## Printer Drivers

These are software programs that have color correction built into the printer control system. The advantage of this method is the ability to use non-ICC compliant software (e.g. Paint Shop Pro, Print Shop) as well as ICC compliant software, as the color correction is performed at the printer driver stage. In addition, it's easier and less technical to use a custom printer driver than it is to use an ICC profile.

Sawgrass offers the exclusive PowerDriver™ printer driver system for most of its sublimation products. It contains built-in profiles specific to the sublimation process. It should be noted that PowerDriver™ works with most popular graphics programs including Photoshop and CorelDRAW.

### Sawgrass PowerDriver™

The PowerDriver™ software also inserts a color palette into the graphics program so that a user can select colors from the palette while working on images and thereby ensuring that the correct “final” color will be consistently produced during the sublimation production process.

### Sawgrass ColorSure™

### Sawgrass ICC Profiles

# Sawgrass Dye Sublimation Quick Reference Guide

The following chart should serve only as a starting place. Producing high quality sublimated products is a result of practice, color management, following manufacturer guidelines and experience.

SURFACE	PRESS TIME	TEMP	PRESSURE	TIPS / COMMENTS
SOFT L'INK T-SHIRTS	35-40 seconds	400° F 205° C	40 psi  (medium)	Pre-press shirt for 3-5 seconds to eliminate moisture. Tack spray transfer and use blow-out sheet to avoid ghosting.
VAPOR APPAREL	50-55 seconds	390° F 199° C	40 psi  (medium)	See <a href="http://www.vaporapparel.com">www.vaporapparel.com</a> for tips on reducing press lines.
POLYESTER / MOUSE PADS	45 seconds	400° F 205° C	40 psi  (medium)	Look for a tight knit and high white point for more brilliant color.
METAL (Unisub)	60 seconds	400° F 205° C	40 psi  (medium)	Use blow-out paper. Remove plastic coating before pressing.
METAL (Other) - White, Silver, Bronze	60 seconds	375° - 400° F  190° C- 205° C	40 psi  (medium)	Time varies with metal manufacturer (always consult manufacturer for correct time and temp). Place absorbent sheet on bottom of heat press. Then, place product transfer side DOWN on top of the absorbent sheet.
UNISUB PRODUCTS	60 seconds	400° F 205° C	40 psi  (medium)	Remove plastic coating. Tear transfer paper away immediately after pressing.
FR PLASTICS	60 - 75 seconds	400° F 205° C	40 psi  (medium)	Remove plastic coating. Tear transfer paper away immediately after pressing.
CERAMICS / MUGS	150 - 210 seconds	350° - 400° F  177° C- 205° C	40 psi  (medium)	Time varies with press. Press into silicon pad. Mugs should be cooled down after transfer paper is removed in either a bucket of warm water or using a cooling plate.
CERAMIC & GLASS TILES	300 - 720 seconds	400° F 205° C	40 psi  (medium)	Time varies depending on tile type and size. Always consult manufacturer. Press tiles from back (transfer side down). Press into silicon pad.

SUBLIMATABLE FILM	30-60 seconds	350° - 400° F	40 psi (medium)	Time varies depending on film type. Transfer should be slightly larger than film and placed face down on the substrate (adhesive side down). Clear materials may be either adhesive front or adhesive back. Watch out to not mirror your image on clear film.



# Sawgrass Step-By-Step 'How To' Guides

*EN01- How To Sublimate A Ceramic Mug In A Mug Press*

*EN02 - How To Sublimate A Ceramic Mug Using A Convection Oven And A Mug Wrap*

*EN03 - How To Sublimate Metal Products In A Standard Flat Heat Press*

*EN04 - How To Sublimate Soft Polyester Fiber Products In A Standard Flat Heat Press*

*EN05 - How To Sublimate Wood Products In A Standard Flat Heat Press*

*EN06 - How To Sublimate Fiber-Reinforced Plastic (FRP) Products In A Standard Flat Heat Press*

*EN07 - How To Sublimate Acrylic Panels In A Standard Flat Heat Press*

*EN08 - How To Sublimate Ceramic Tiles In A Standard Flat Heat Press*

*EN09 - How To Sublimate Ceramic Tile Murals In A Standard Flat Heat Press*

*EN10 - How To Sublimate Polyester Apparel/Clothing In A Standard Flat Heat Press*

*EN11 - How To Sublimate Polyester Apparel/Clothing In A Standard Flat Heat Press – The Foam Process.*

*EN12 - How To Sublimate Plastic Products In A Standard Flat Heat Press*

*EN13 - How To Transfer Cotton Apparel/Clothing In A Standard Flat Heat Press*

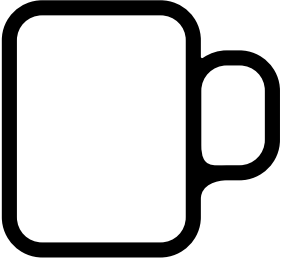


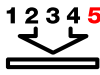
*EN14 - How To Transfer Cotton Apparel/Clothing With A Hand Iron*

*EN15 - How To Sublimate Glass Products In A Standard Flat Heat Press*

*ENX01 – Common Sublimation Problems*

*ENX02 – Sawgrass Production Reference Log*

## EN01- How To Sublimate A Ceramic Mug In A Mug Press

		400°F / 204°C
		4 - 4.5 MINUTES
		5 - HEAVY
	VIDEO: <a href="http://youtu.be/EA9h7XsfkWY">http://youtu.be/EA9h7XsfkWY</a>	

### Substrate Examples

Ceramic mugs, ceramic cups, ceramic water bottles, soap dispensers, tooth brush holders etc.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:






- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Ceramic mugs must have a polymer coating for sublimation.
- All ceramics need time to heat up - pressing times will be longer than other substrates.
- Always ensure that the mug fits snugly in the press when closed, with equal pressure on all surfaces.
- Tapered mugs cannot be sublimated in a standard mug press – use the correct heating element for each shape.




### Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Mug Press
- Quality Coated Mugs Manufactured For Sublimation ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove

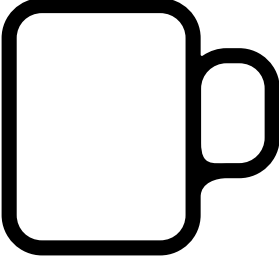





## Instructions

1	<p>Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi. If available, use graphics templates provided by substrate manufacturers for exact print sizes.</p>	
2	<p>Print the image in reverse (reflected) onto sublimation transfer paper.</p>	
3	<p>Trim the transfer to fit the size of the substrate.</p>	
4	<p>Attach the transfer (image side against the substrate) with heat resistant tape. Ensure that the transfer is tightly pressed against the entire surface.</p>	
5	<p>Wrap the substrate and transfer print with a Teflon sheet or absorbent paper to prevent any excess ink from coming in contact with the press.</p>	

6	<p>Preheat press to 400°F / 204°C.</p> <p>Place the substrate into the mug press. Press for 4 - 4½ minutes at heavy pressure. (Refer to press and substrate manufacturers' recommendations for exact settings.)</p>	
7	<p>Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!</p>	
8	<p>Cool the substrate - in the air or by placing in room temperature water in accordance with the manufacturer's instructions.</p>	
<p><b>Recommendations</b></p>		
1	<p>Make a Test Piece.</p>	<p>Define the actual printable area that will ensure consistent quality results. For example; a mug may take an image up to 0.25' / 6mm from the top and bottom edge and no closer than 1' / 25mm from the handle horizontally.</p>
2	<p>Create a Production Reference Log.</p>	<p>Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.</p>

## EN02 - How To Sublimate A Ceramic Mug Using A Convection Oven And A Mug Wrap

		400°F / 204°C
		12 - 15 MINUTES
		5 - HEAVY
	VIDEO: <a href="http://youtu.be/dIKIsT4qKkg">http://youtu.be/dIKIsT4qKkg</a>	

### Substrate Examples

Ceramic mugs, ceramic water bottles, pet food bowls, ceramic vases, ceramic containers.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:

- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Ceramic products must have a polymer coating for sublimation.
- All ceramics take time to heat up – sublimation transfer times will be longer than other substrates.
- Always ensure that the wrap fits snugly around the substrate, with equal pressure on all surfaces.
- This process utilizes a convection oven instead of a heat press.
- Different size wraps are available for different size substrates.

## Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Substrate Wrap
- Convection Oven
- Quality Coated Mugs Manufactured For Sublimation ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove



## Instructions

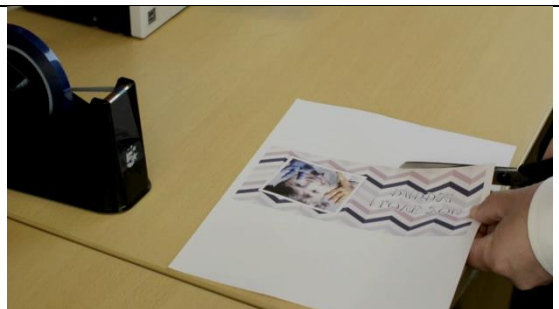
- 1 Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi. If available, use graphics templates provided by substrate manufacturers for exact print sizes.











- 2 Print the image in reverse (reflected) onto sublimation transfer paper.



- 3 Trim the excess paper around the image.



4	Attach the transfer print (image side against the mug) with heat resistant tape. Ensure that the transfer is tightly pressed against the entire surface.	
5	Wrap the substrate and transfer print in a Teflon sheet or absorbent paper to prevent any excess ink from coming in contact with the wrap.	
6	Place the wrap around the substrate, latch and secure as per the manufacturer's instructions.	
7	Preheat the convection oven to at 400°F / 204°C.	
8	Place the wrapped substrate in the oven and cure for 12 - 15 minutes. (Refer to wrap and substrate manufacturer's recommendations for exact settings.)	





		
9	<p>Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!</p>	
10	<p>Cool the substrate - gradually in the air or quickly in the room temperature water in accordance with the mug manufacturers' instructions.</p>	

### ***Recommendations***

1	<p>Make a Test Piece.</p>	<p>Define the actual printable area that will ensure consistent quality results. For example; a mug may take an image up to 0.25" / 6mm from the top and bottom edge and no closer than 1" / 25mm from the handle horizontally.</p>
2	<p>Create a Production Reference Log.</p>	<p>Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.</p>



## EN03 - How To Sublimate Metal Products In A Standard Flat Heat Press

		400°F / 204°C
		1 - 3 MINUTES
		3 – MEDIUM (40 psi)
	VIDEO: <a href="http://youtu.be/OUrwNds5VQ8">http://youtu.be/OUrwNds5VQ8</a>	

### *Substrate Examples*

ChromaLuxe products, photo panels, jewelry, phone & tablet cover inserts, clocks, license plates, signage, pet tags, key chains, magnets, name badges, bag tags.

### *Before You Start*

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:

- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Metal products must have a polymer coating for sublimation.
- Metals are very thin and highly heat conductive, which makes it possible to place the transfer print on the lower platen and the metal substrate on top if it (the opposite of how most products are positioned).
- Metals are available with white surfaces, silver surfaces or bronze surfaces (dependent on the manufacturer).
- Most polymer coated metal products have a plastic coating over the printing area - this must be removed before production. A simple method is to hold one edge of the print surface against the upper platen of the heat press for approximately 3 seconds - this will cause the plastic to soften so it can easily be removed.

## Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Flat Heat Press
- Quality Coated Metal Products ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove



## Instructions

- 1 Create your image using a standard graphics program in RGB mode.  
The ideal design and print resolution is 300dpi.  
If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.





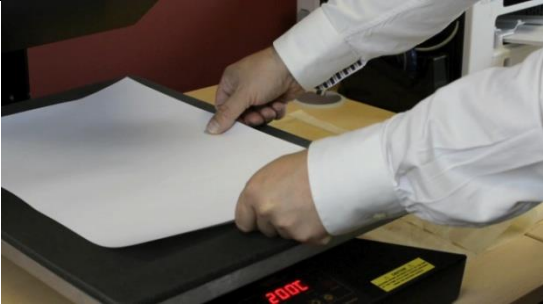





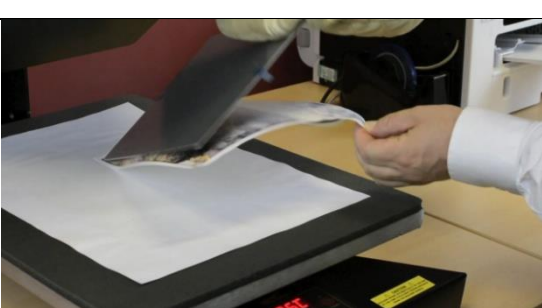

- 2 Print the image in reverse (reflected) on to high quality sublimation transfer paper and trim to size if necessary.



- 3 Remove the protective plastic coating from the substrate.

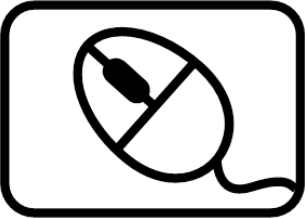





4	Attach the substrate to the transfer print using heat resistant tape.	
5	Preheat the press to 400°F / 204°C.	
6	Set the time to 1-3 minute.	
7	Set the pressure to medium (40 psi).	
8	Place a clean sheet of absorbent paper on lower platen of the heat press to prevent the excess ink from coming in contact with the press.	

9	Place the substrate onto the press with the transfer image side facing up.	
10	Cover with a Teflon sheet to protect the press.	
11	Press at 400°F / 204°C for 1-3 minutes at medium pressure.	
12	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!	
13	Cool the substrate in accordance with the manufacturers' instructions.	
<p><b>Recommendations</b></p>		
1	<p><b>Make a Test Piece.</b></p>	<p>Test your settings for color, temperature, pressure and time.</p>

2	Create a Production Reference Log.	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.
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## EN04 - How To Sublimate Soft Polyester Fiber Products In A Standard Flat Heat Press

		400°F / 204°C
		1 MINUTE
		3 – MEDIUM (40 psi)
	VIDEO: <a href="http://youtu.be/Oo7qLJD1cgo">http://youtu.be/Oo7qLJD1cgo</a>	

### Substrate Examples

Mouse pads, laptop sleeves, flip-flops, beverage wraps, polyester bags/cases.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

Dye sublimation soft polyester fiber products have a top layer of white polyester fabric which is ideal for images and photographs. These types of products are available in many shapes, sizes and thicknesses - the production process is very similar for each one.

#### Key Points:






Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.






### Minimum Equipment Required

Sawgrass Supported Printing System  
 Sawgrass Sublimation Inks  
 High Quality Sublimation Transfer Paper  
 Flat Heat Press  
 Quality Soft Polyester Fiber Products ('the substrate')  
 Protective Teflon Sheet or Absorbent Paper  
 Scissors  
 Heat Resistant Adhesive Tape  
 Heat Protective Glove

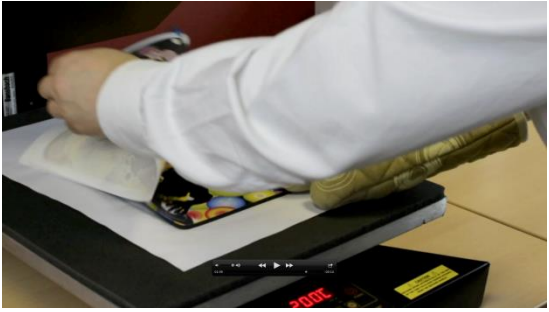



## Instructions




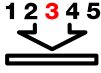
1	<p>Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi. If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.</p>	
2	<p>Print the image in reverse (reflected) on to high quality sublimation transfer paper and trim to size if necessary.</p>	
3	<p>Attach the transfer print (image side against the substrate) with heat resistant tape.</p>	
4	<p>Preheat press to 400°F / 204°C.</p>	
5	<p>Set the time to 1 minute.</p>	

6	Set the pressure to medium (40 psi).	
7	Place a clean sheet of absorbent paper on lower platen of the heat press to prevent the excess ink from coming in contact with the press.	
8	Place the substrate (with the transfer paper on top) onto the press.	
9	Cover with a Teflon sheet or absorbent paper to protect the press.	
10	Press at 400°F / 204°C for 1 minute at medium pressure.	



11	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!	
12	Cool the substrate in accordance with the manufacturers' instructions.	
<b><i>Recommendations</i></b>		
1	Make a Test Piece.	Test your settings for color, temperature, pressure and time.
2	Create a Production Reference Log.	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN05 - How To Sublimate Wood Products In A Standard Flat Heat Press

		400°F / 204°C
		1 MINUTE
		3 – MEDIUM (40 psi)
	VIDEO: <a href="http://youtu.be/FPT3g1sGQVE">http://youtu.be/FPT3g1sGQVE</a>	

### Substrate Examples

Photo panels, plaques, awards, home décor products, office products, jewelry boxes.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:






- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Wood products must have a polymer coating for sublimation.
- Many wood products have a plastic coating over the printing area - this must be removed before production. A simple method is to hold one edge of the print surface against the upper platen of the heat press for approximately 3 seconds - this will cause the plastic to soften so it can easily be removed.






### Minimum Equipment Required



- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Flat Heat Press
- Quality Polymer Coated Wood Products ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove



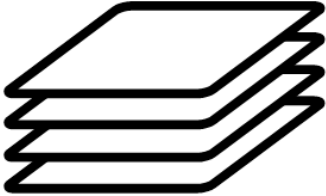


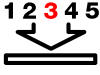
## Instructions

1	<p>Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi. If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.</p>	
2	<p>Print the image in reverse (reflected) on to high quality sublimation transfer paper and trim to size if necessary.</p>	
3	<p>If the printable surface has a plastic covering, remove it.</p>	
4	<p>Attach the transfer print (image side against the substrate) with heat resistant tape. Allow the image to overlap the substrate slightly to ensure a professional finish.</p>	
5	<p>Preheat press to 400°F / 204°C.</p>	
6	<p>Set the time to 1 minute.</p>	

7	<p>Adjust the height of the press on the thickness of the substrate.</p> <p>Set the pressure to medium (40 psi).</p>	
8	<p>Place a clean sheet of absorbent paper on lower platen of the heat press to prevent the excess ink from coming in contact with the press.</p>	
9	<p>Place the substrate (with the transfer paper on top) onto the press.</p>	
10	<p>Cover with a Teflon sheet to protect the press.</p>	
11	<p>Press at 400°F / 204°C for 1 minute at medium pressure.</p>	

12	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!	
13	Cool the substrate in accordance with the manufacturers' instructions.	
<p><b><i>Recommendations</i></b></p>		
1	<p><b>Make a Test Piece.</b></p>	<p>Test your settings for color, temperature, pressure and time.</p>
2	<p><b>Create a Production Reference Log.</b></p>	<p>Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.</p>

## EN06 - How To Sublimate Fiber-Reinforced Plastic (FRP) Products In A Standard Flat Heat Press

		400°F / 204°C
		1 MINUTE
		3 – MEDIUM (40 psi)
	VIDEO: <a href="http://youtu.be/AaJlft4Pxbw">http://youtu.be/AaJlft4Pxbw</a>	

### Substrate Examples

Coasters, placemats, serving trays, photo panels, photo frames, clocks, interior signs.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:

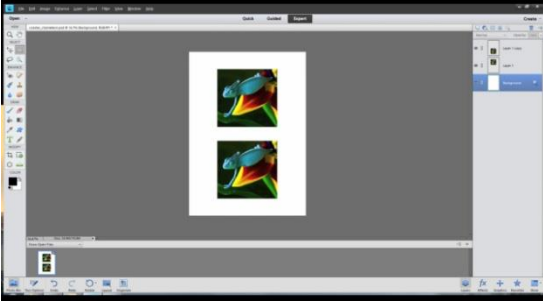

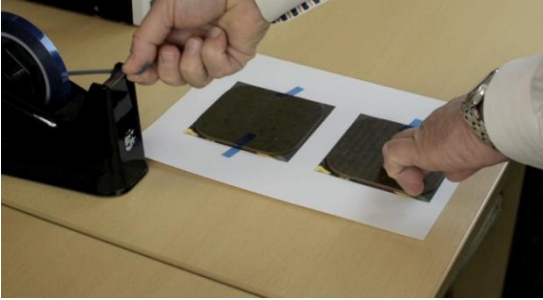


- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Many products have a plastic coating over the printing area - this must be removed before production.  
A simple method is to hold one edge of the print surface against the upper platen of the heat press for approximately 3 seconds - this will cause the plastic to soften so it can easily be removed.






### Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Flat Heat Press
- Quality Sublimation Blanks ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove





## Instructions





1	<p>Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi. If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.</p>	
2	<p>Print the image in reverse (reflected) on to sublimation transfer paper and trim to size if necessary.</p>	
3	<p>If the printable surface has a plastic covering, remove it.</p>	
4	<p>Attach the transfer print (image side against the substrate) with heat resistant tape. Allow the image to overlap the substrate slightly to ensure a professional finish.</p>	
5	<p>Preheat the press to 400°F / 204°C.</p>	
6	<p>Set the time to 1 minute.</p>	

7	Set the pressure to medium (40 psi).	
8	Place a clean sheet of absorbent paper on lower platen of the heat press to prevent the excess ink from coming in contact with the press.	
9	Place the substrate (with the transfer paper on top) onto the press.	
10	Cover with a Teflon sheet or absorbent paper to protect the press.	
11	Press at 400°F / 204°C for 1 minute at medium pressure.	



12	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!	
13	Cool the substrate in accordance with the manufacturers' instructions.	
<p><b><i>Recommendations</i></b></p>		
1	Make a Test Piece.	Test your settings for color, temperature, pressure and time.
2	Create a Production Reference Log.	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN07 - How To Sublimate Acrylic Panels In A Standard Flat Heat Press

		400°F / 204°C
		7 MINUTES
		3 – MEDIUM (40 psi)
	VIDEO: <a href="http://youtu.be/hAhaOulYUdk">http://youtu.be/hAhaOulYUdk</a>	

### Substrate Examples

Awards, plaques, clocks, photo panels.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:






- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Acrylic panels must have a sublimation polymer coating.
- Do not mirror the images when printing as they will be applied to the back of the substrate rather than the front.






### Minimum Equipment Required




- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Flat Heat Press
- Quality Coated Acrylic Products ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove
- Silicon Foam Sheet



## Instructions

1	<p>Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi. If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.</p>	
2	<p>Print the image for normal viewing (<i>not reflected - as it is viewed through the acrylic substrate</i>) on to sublimation transfer paper and trim to size is necessary.</p>	
3	<p>Attach the transfer print (image side against the coated (white) side of the substrate) with heat resistant tape. Allow the image to overlap the substrate slightly to ensure a professional finish.</p>	
4	<p>Preheat the press to 400°F / 204°C.</p>	
5	<p>Set the time to 7 minutes.</p>	





6	<p>Adjust the height of the press platen to the thickness of the substrate.</p> <p>Set the pressure to medium (40 psi).</p>	
7	<p>Place a clean sheet of absorbent paper on lower platen of the heat press to prevent the excess ink from coming in contact with the press.</p>	
8	<p>Place the substrate (with the transfer paper on top) onto the press.</p>	
9	<p>Cover with the silicon foam sheet.</p>	
10	<p>Cover with a Teflon sheet to protect the press.</p>	

11	Press at 400°F / 204°C for 7 minutes at medium pressure.	
12	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be extremely hot!	
13	Cool the substrate in accordance with the manufacturers' instructions.	

***Recommendations***

1	<b>Make a Test Piece.</b>	Test your settings for color, temperature, pressure and time.
2	<b>Create a Production Reference Log.</b>	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN08 - How To Sublimate Ceramic Tiles In A Standard Flat Heat Press

		400°F / 204°C
		8 - 10 MINUTES
		2/3 – LIGHT/MEDIUM (20 - 40 psi)
	VIDEO: <a href="http://youtu.be/tv1d4vjRsKk">http://youtu.be/tv1d4vjRsKk</a>	

### Substrate Examples

Ceramic tiles used as stand-alone items or as inserts in jewelry boxes, picture frames etc.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

There are two methods of pressing a tile. One is 'face up' so the heat is transferred through the paper. The other (and highly recommended) method is 'face down'. This method requires the use of a heat resistant felt pad and has several advantages over the first method.

- There is no need for taping the transfer paper to the tile as the weight of the tile will hold it in position.
- The tile will sink into the soft felt and force the paper transfer to wrap around the edges which finishes the beveled edges cleanly.
- There is no texturing of the coated surface of the tile this leaves a high gloss finish.

The only disadvantage of this method is the transfer time is double the 'face up' method, as the heat has to travel through the thickness of the tile.

#### Key Points:

- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Ceramic tiles must have a sublimation polymer coating.
- All ceramics take time to heat up - pressing times will be longer than other substrates.

## Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Flat Heat Press
- Heat Resistant Felt Pad (Min. Thickness 0.5" / 12mm)
- Quality Coated Ceramic Tile Products ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove



## Instructions

- 1 Create your image using a standard graphics program in RGB mode.  
The ideal design and print resolution is 300dpi.  
  
If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.  
  
If the image is not full bleed (i.e. a motif in the centre on a white background) then it is advisable to draw a boundary slightly larger than the finished product with the artwork in the correct position within the boundary.



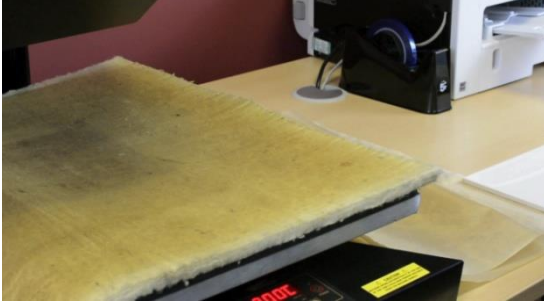




- 2 Print the image in reverse (reflected) on to sublimation transfer paper and trim to size if necessary.







- 3 Preheat the press to 400°F / 204°C.







4	Set the time to 8-10 minutes.	
5	<p>Adjust the height of the top of the press to the thickness of the felt and tile.</p> <p>Set the pressure to light/medium (20-40 psi).</p>	
6	Place the felt pad on the heat press.	
7	Place the transfer print (image side facing up) on the felt pad.	
8	Place the substrate onto the transfer print sublimation side down.	



9	Cover with a Teflon sheet or absorbent paper to protect the press.	
10	Press at 400°F / 204°C for 8-10 minutes at light/medium pressure.	
11	Remove the substrate off the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!	
12	Cool the substrate in accordance with the manufacturers' instructions.	
<b>Recommendations</b>		
1	<b>Make a Test Piece.</b>	Test your settings for color, temperature, pressure and time.
2	<b>Create a Production Reference Log.</b>	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN09 - How To Sublimate Ceramic Tile Murals In A Standard Flat Heat Press

		400°F / 204°C
		8 - 10 MINUTES
		2/3 – LIGHT/MEDIUM (20 - 40 psi)
	VIDEO: <a href="http://youtu.be/OoFxQdFiWN8">http://youtu.be/OoFxQdFiWN8</a>	

### Substrate Examples

Ceramic tile murals may be affixed to a wall, countertop, table top or other flat surface. They may also be installed in picture frames.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

There are two methods of pressing a tile. One is 'face up' so the heat is transferred through the paper. The other (and highly recommended) method is 'face down'. This method requires the use of a heat resistant felt pad and has several advantages over the first method.

- There is no need for taping the transfer paper to the tile as the weight of the tile will hold it in position.
- The tile will sink into the soft felt and force the paper transfer to wrap around the edges which finishes the beveled edges cleanly.
- There is no texturing of the coated surface of the tile this leaves a high gloss finish.

The only disadvantage of this method is the transfer time is double the 'face up' method, as the heat has to travel through the thickness of the tile.

This method requires your printer and heat press to be capable of creating the mural in one pressing.

The example shown here is for a mural of six 6"x6" / 150mmx150mm tiles configured in 2 rows of 3, giving an overall mural size (excluding frame) of 12" x 18" / 300mm x 450mm. It is recommended to lay out the tiles as the finished mural and measure it accurately and prepare your artwork and transfer print with consideration to the finish size.

Care needs to be taken if the edges of the tiles have large radius bevels. Sufficient pressing time needs to be allowed to ensure the ink gasses into the space between the tiles. You will need to experiment with pressure to achieve acceptable coverage without breaking the tiles, as the paper must form into the gaps as much as possible.

If in doubt (or your efforts have failed) then you will need to use Method 2.

**Key Points:**

- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Ceramic tiles must have a sublimation polymer coating.
- All ceramics take time to heat up - pressing times will be longer than other substrates.

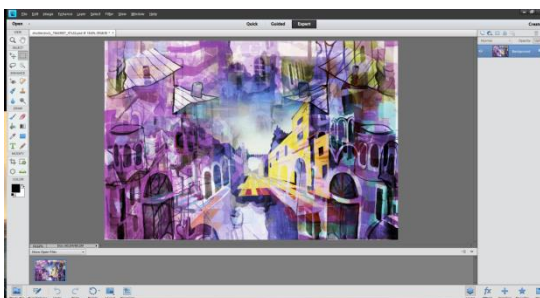
### Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks and Paper
- Standard Flat Heat Press
- Quality Sublimation Ceramic Tiles
- Heat Resistant Felt Pad (Min. Thickness 0.5" / 12mm)
- Protective Teflon Sheet
- Clean Paper (to absorb excess ink)
- Scissors
- Heat Protective Glove






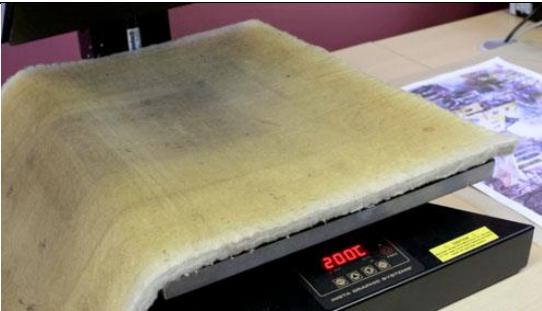

### Instructions


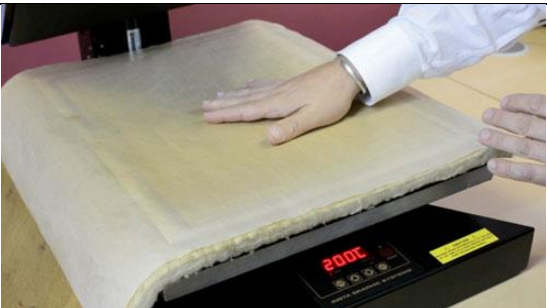
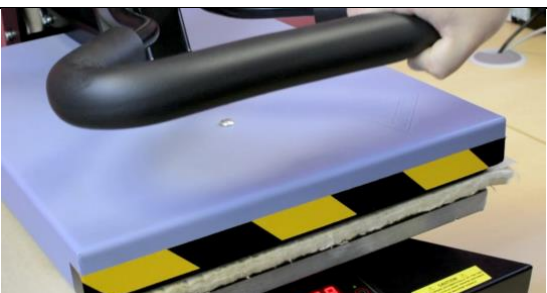

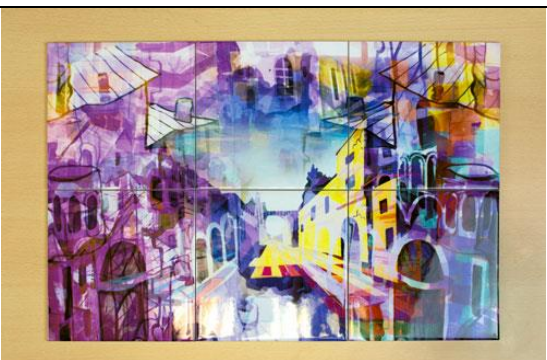
- 1 Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi. If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.  
  
It is recommended to lay out the tiles as the finished mural and measure it accurately.  
  
If the image is not full bleed (i.e. a motif in the centre on a white background) then it is advisable to draw a boundary slightly larger than the finished product with the artwork in the correct position within the boundary.



- 2 Print the image in reverse (reflected) on to sublimation transfer paper and trim to size if necessary.

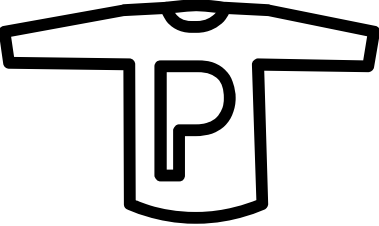


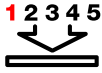


3	Preheat press to 400°F / 204°C.	
4	Set the time to 8-10 minutes.	
5	Adjust the height of the press platen to the thickness of the felt pad and tiles.  Set the pressure to light/medium (20-40 psi).	
6	Place the felt pad in the center of the press.	
7	Place the transfer print onto the felt pad image side facing up.	

8	Place the tiles, sublimation side facing down, onto the transfer print. Lay out all of the tiles together.	
9	Cover with a Teflon sheet to protect the press.	
10	Press at 400°F / 204°C for 8-10 minutes at light/medium pressure.	
11	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the tiles will be very hot!	
12	Cool the substrate in accordance with the manufacturers' instructions.	

<i>Recommendations</i>		
1	<b>Make a Test Piece.</b>	Test your settings for color, temperature, pressure and time.
2	<b>Create a Production Reference Log.</b>	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN10 - How To Sublimate Polyester Apparel/Clothing In A Standard Flat Heat Press

		380-390°F / 193 - 199°C
		35-45 SECONDS
		1 – VERY LIGHT (10 psi)
	VIDEO: <a href="http://youtu.be/lh39nulqmSA">http://youtu.be/lh39nulqmSA</a>	

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

Sublimation works most effectively with 100% polyester fabric - it will not work with high percentage cotton fabrics as the dye will not adhere to the cotton fibers and will wash out.

It is possible to sublimate on a polyester/cotton blend textiles (minimum 65% polyester), but there will be a degradation in quality, resolution and detail. Also, some of the dye will wash out giving a 'faded' look. Unless you are trying to create a specific look you should only choose 100% polyester textiles for sublimation.

Sublimation can also be used on colored fabrics though experimentation, care and creativity need to be employed for good effect. For example; dark and bold designs on light colored textiles are very popular.

#### Key Points:

- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Apparel is normally done with reduced time, pressure and temperature settings.
- Different brands and styles of apparel/clothing may require different settings.






## *Minimum Equipment Required*


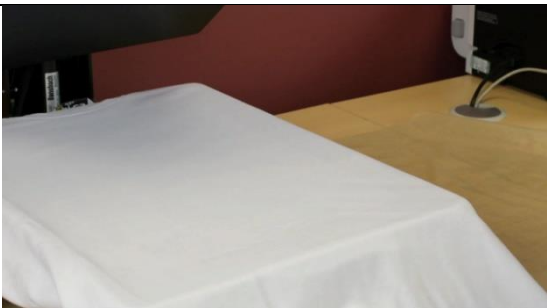


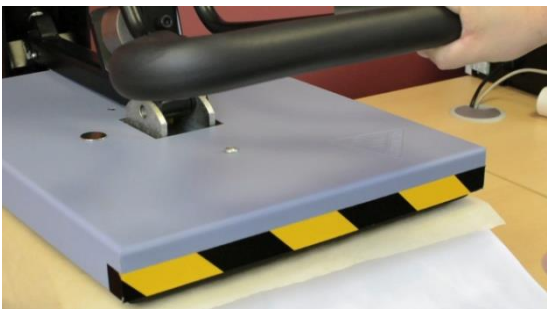
- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Standard Flat Heat Press
- Quality Sublimation Polyester Apparel/Clothing ('the garment')
- Protective Teflon Sheet
- Clean Absorbent Paper
- Scissors
- Lint Roller










## Instructions

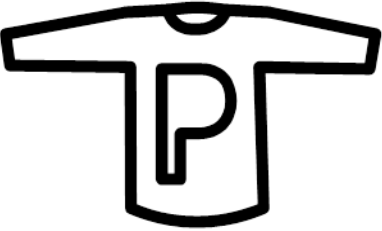



1	<p>Carefully measure the image area of your garment. Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi.</p>	
2	<p>Print the image in reverse (reflected) on to sublimation transfer paper and trim to size if necessary.</p>	
3	<p>Preheat the press to 380-390°F / 193 - 199°C.</p>	
4	<p>Set the time to 35-45 seconds.</p>	
5	<p>Set the pressure to very light (10 psi).</p>	

6	Place a clean sheet of absorbent paper on lower platen of the heat press to prevent the excess ink from coming in contact with the press.	
7	Place the garment, face-up, on the press and smooth out any folds and wrinkles.	
8	Use a lint brusher or roller to remove any dust from the garment.	
9	<p>OPTIONAL STEP:</p> <p>Cover with a clean Teflon sheet.</p> <p>Press the garment for 5 seconds to remove wrinkles and moisture.</p>	 

10	Place the transfer print (image side down) on the garment.	
11	Cover with a Teflon sheet to protect the press ensuring that both remain in position.	
12	Press at 380 - 390°F / 193 - 199°C for 35-45 seconds at very light pressure.	
13	Remove the transfer quickly and smoothly to stop the sublimation process.	
14	Cool the substrate in accordance with the manufacturers' instructions.	
<b>Recommendations</b>		
1	Make a Test Piece.	Test your settings for color, temperature, pressure and time.

2	Check Printable Areas of Each Garment Size.	Take note of the variation of printable areas of different garment sizes. You may need to adjust your transfer size for each shirt size or design to suit all variables.
3	Create a Production Reference Log.	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN11 - How To Sublimate Polyester Apparel/Clothing In A Standard Flat Heat Press – The Foam Process.

		380-390°F / 193-199°C
		35-45 SECONDS
		1 – VERY LIGHT (10 psi)
	VIDEO: <a href="http://youtu.be/g3YrfAliwog">http://youtu.be/g3YrfAliwog</a>	

### Substrate Examples

Polyester and polyester-performance apparel and clothing including t-shirts, polo shirts, sweatshirts, hoodies, bibs, towels, quilts, pillows, polyester textiles and fabrics.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

With many polyester garments, the combination of heat and pressure will result in “press lines” where the edges of the transfer paper are in contact with the garment surface. The use of a layer of **high temperature foam** during pressing may solve this problem. Foam is available from sublimation equipment suppliers.

Sublimation works most effectively with 100% polyester fabric - it will not work with high percentage cotton fabrics as the dye will not adhere to the cotton fibers and will wash out.

It is possible to sublimate on a polyester/cotton blend textiles (minimum 65% polyester), but there will be a degradation in quality, resolution and detail. Also, some of the dye will wash out giving a ‘faded’ look. Unless you are trying to create a specific look you should only choose 100% polyester textiles for sublimation.

Sublimation can also be used on colored fabrics though experimentation, care and creativity need to be employed for good effect. For example; dark and bold designs on light colored textiles are very popular.

#### Key Points:

- Always read the manufacturer’s instructions for the press and the substrate - settings may vary between brands.
- Apparel is normally done with reduced time, pressure and temperature settings.

- Different brands and styles of apparel may require different settings.

## Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Standard Flat Heat Press
- Quality Sublimation Polyester Apparel/Clothing ('the garment')
- High Temperature Foam Sheet (Only use foam that is designed for high temperatures 400oF/204oC min) available from sublimation equipment/ garment supplier)
- Protective Teflon Sheet
- Clean Absorbent Paper
- Scissors
- Lint Roller
- Repositionable Spray Adhesive
- Heat Protective Glove



## Instructions

- 1 Carefully measure the image area of your garment. Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi.




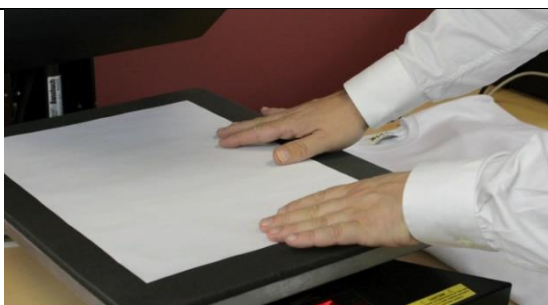



- 2 Print the image in reverse (reflected) on to sublimation transfer paper.













- 3 Obtain a sheet of high temperature foam and cut it slightly larger than the size of the printed image but smaller than the transfer paper. Then bevel the top edge (using a craft knife) to a 45° degree angle all the way around.\*



4	Preheat the press to 380-390°F / 193-199°C.	
5	Set the time to 35-45 seconds.	
6	<p>Adjust the platen height so the foam is compressed to no more than half of its original height.</p> <p>Set the pressure to very light (10 psi).</p>	
7	Place a clean sheet of absorbent paper on lower platen of the heat press to prevent the excess ink from coming in contact with the press.	
8	Place the sheet of high temperature foam on the press.	

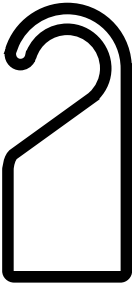





9	Place the garment on the foam sheet, face-up, and smooth out any folds and wrinkles. You should be able to see the outlines of the foam through the shirt.	
10	Using a lint brush or roller remove any dust from the garment.	
11	<p>OPTIONAL STEP:</p> <p>Cover with a clean Teflon sheet.</p> <p>Press your garment for 5 seconds to remove wrinkles and moisture.</p>	 
12	Using repositionable spray adhesive, lightly spray the transfer on the image side from about 12-15" / 30-38cm away. This will prevent it from moving during pressing.	

13	Place the transfer on the substrate image side down.	
14	Cover with a Teflon sheet or absorbent paper to protect the press ensuring that the foam, garment and transfer remain in position.	
15	Press at 380-390°F / 193-199°C for 35-45 seconds at very light pressure (10 psi).	
16	Remove the transfer quickly and smoothly to stop the sublimation process.	
17	Cool the substrate in accordance with the manufacturers' instructions.	
	* Note that the foam can be re-used until it begins to lose its shape.	

<i>Recommendations</i>		
1	<b>Make a Test Piece.</b>	Test your settings for color, temperature, pressure and time.
2	<b>Check Printable Areas of Each Garment Size.</b>	Take note of the variation of printable areas of different garment sizes. You may need to adjust your transfer size for each shirt size or design to suit all variables.
3	<b>Create a Production Reference Log.</b>	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN12 - How To Sublimate Plastic Products In A Standard Flat Heat Press

		400°F / 204°C
		1 MINUTE
		3 – MEDIUM (40 psi)
	VIDEO: <a href="http://youtu.be/3a6RrP0fEfM">http://youtu.be/3a6RrP0fEfM</a>	

### Substrate Examples

Interior signs, bag tags, license plates, photo panels, door hangers, ornaments.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:

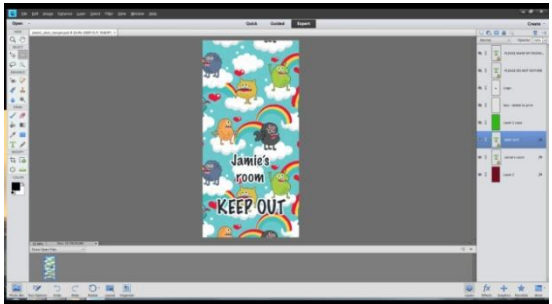




- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Many products have a plastic coating over the printing area - this must be removed before production.  
A simple method is to hold one edge of the print surface against the upper platen of the heat press for approximately 3 seconds - this will cause the plastic to soften so it can easily be removed.






### Minimum Equipment Required



- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Flat Heat Press
- Quality Sublimation Blanks ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove








## Instructions

1	<p>Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi.</p> <p>If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.</p>	
2	<p>Print the image in reverse (reflected) on to sublimation transfer paper and trim to size.</p>	
3	<p>If the printable surface has a plastic coating, remove it.</p>	
4	<p>Attach the transfer print (image side against the substrate) with heat resistant tape.</p>	
5	<p>Preheat the press to 400°F / 204°C.</p>	
6	<p>Set the time to 1 minute.</p>	

7	Set the pressure to medium (40 psi).	
8	Place a clean sheet of absorbent paper on the heat press to prevent the excess ink from coming in contact with the press.	
9	Place the substrate (with the transfer paper on top) onto the press.	
10	Cover with a Teflon sheet or absorbent paper to protect the press.	
11	Press at 400°F / 204°C for 1 minute at medium pressure.	

12	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!	
13	Cool the substrate in accordance with the manufacturers' instructions.	
<p><b><i>Recommendations</i></b></p>		
1	Make a Test Piece.	Test your settings for color, temperature, pressure and time.
2	Create a Production Reference Log.	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## EN13 - How To Transfer Cotton Apparel/Clothing In A Standard Flat Heat Press

		375°F / 190°C	
		20 - 40 SECONDS	
		5 – HIGH (60 psi)	
	VIDEO: <a href="http://youtu.be/IonNGOD9A00">http://youtu.be/IonNGOD9A00</a>		

### Before You Start

This is a guide only, based on production with Sawgrass ChromaBlast Cotton Transfer Inks and Media - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that cotton transfer requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:

Digital transfer printing allows you to create customized and personalised full color images on a variety of cotton and poly-cotton products that rival those produced by direct-to-garment printing systems.

ChromaBlast™ utilizes heat and pressure during the production process to create a cross-link between the cotton, the inks and the media which transfers the image into the fibers of the garment. The result is a garment with a soft hand, vibrant color and superior washability.

- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Apparel is normally done with reduced time, pressure and temperature settings.
- Different brands and styles of apparel/clothing may require different settings.
- ChromaBlast is recommended for white or light colored 100% cotton fabrics.






### Minimum Equipment Required


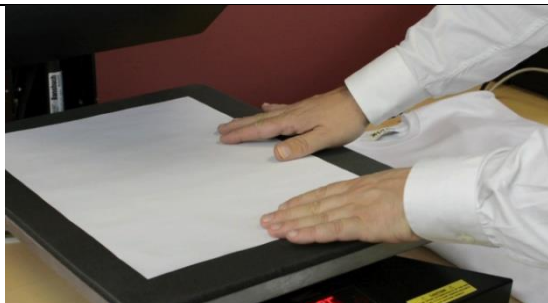
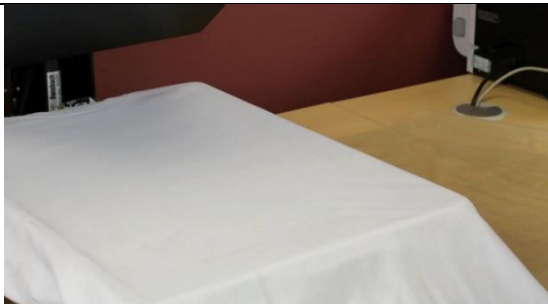


- Sawgrass Supported Printing System
- Sawgrass ChromaBlast Cotton Transfer Inks
- Sawgrass ChromaBlast Transfer Media
- Standard Flat Heat Press
- Quality Cotton Apparel/Clothing ('the garment')
- Protective Teflon Sheets
- Clean Absorbent Paper
- Scissors
- Lint Roller












## Instructions

1	<p>Carefully measure the image area of your garment. Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi.</p>	
2	<p>Print the image in reverse (reflected) on to cotton transfer paper.</p>	
3	<p>Trim the transfer print leaving about 3-5mm gap around the image.</p>	
4	<p>Preheat the press to 375°F / 190°C.</p>	
5	<p>Set the time to 20-40 seconds.</p>	

6	Set the pressure to heavy (60 psi).	
7	Place a clean sheet of absorbent paper on the heat press to prevent the excess ink from coming in contact with the press.	
8	Place the garment, face-up, on the press and smooth out any folds and wrinkles.	
9	Use a lint brusher or roller to remove any dust from the garment.	
10	<p>OPTIONAL STEP:</p> <p>Cover the garment with a clean Teflon sheet.</p> <p>Press for 5 seconds to remove any moisture.</p> <p>Remove the Teflon sheet.</p>	





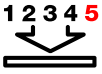
		
11	Place the transfer print on the garment, image side down.	
12	Cover with a Teflon sheet to protect the press ensuring that both remain in position.	
13	Press at 375°F / 190°C for 20-40 seconds at heavy pressure.	
14	Peel the transfer off quickly and smoothly in one even motion while the garment is still hot. <i>Cold peel transfer removal is <b>not</b> recommended.</i>	

15	Stretch the image area from top to bottom and side to side to reduce the hand on the fabric.	
16	Cool the garment in accordance with the manufacturers' instructions.	

<b>Recommendations</b>		
1	Make a Test Piece.	Test your settings for color, temperature, pressure and time as different cotton fabrics will exhibit slightly different results.
2	Create a Production Reference Log.	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.
3	Check Printable Areas of Each Garment Size.	Take note of the variation of printable areas of different garment sizes. You may need to adjust your transfer size for each shirt size or design to suit all variables.
4	Trim Excess Media from Printed Graphic	Trim the non-printed media around the printed image before transferring to garments leaving a ¼" / 6mm margin around the printed area is recommended for light-colored garments.
5	Avoid Pressing Any Zippers, Buttons or Other Plastic Decorations	If possible, avoid pressing any zippers, buttons or other plastic decorations attached to the garment. The heat and pressure needed to bond the ink to the cotton fabric may cause these to crack or melt.
6	Pressing Time	If immediately after pressing, the paper is not easily peeled from the garment and resists removal because the transfer is somewhat tacky, increase the amount of time in the press.
7	Pressing Temperature	If immediately after pressing, the transferred image has a slick or shiny appearance, increase the amount of pressure used.

		<i>If the time/temperature combination is not correct it will stop ChromaBlast from completely adhering to the cotton fibers, this will result in the image washing out and cracking after a short period.</i>
8	ChromaBlast Media Storage	Store ChromaBlast Media in a cool, dry environment. Do not remove media from protective packaging until ready to use. Once packaging has been opened, store media in the plastic bag provided.
9	Storing Pre-Printed ChromaBlast Transfers	If a large number of transfers are printed in advance of use, place printed transfers in an airtight bag to minimize curl during storage.

## EN14 - How To Transfer Cotton Apparel/Clothing With A Hand Iron

		 HIGHEST
		30-40 SECONDS
		5 – HIGH
	VIDEO: <a href="http://youtu.be/w-INeMVUzZ4">http://youtu.be/w-INeMVUzZ4</a>	

### Before You Start

This is a guide only, based on production with Sawgrass ChromaBlast Cotton Transfer Inks and Media - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that cotton transfer requires high temperatures so take appropriate care when handling substrates and equipment.

#### Key Points:

Digital transfer printing allows you to create customized and personalised full color images on a variety of cotton and poly-cotton products that rival those produced by direct-to-garment printing systems.

ChromaBlast™ utilizes heat and pressure during the production process to create a cross-link between the cotton, the inks and the media which transfers the image into the fibers of the garment. The result is a garment with a soft hand, vibrant color and superior washability.






- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Apparel is normally done with reduced time, pressure and temperature settings.
- Different brands and styles of apparel/clothing may require different settings.
- ChromaBlast is recommended for white or light colored 100% cotton fabrics.






### Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass ChromaBlast Cotton Transfer Inks
- Sawgrass ChromaBlast Transfer Media
- Standard Hand Iron - does not need steam
- Quality Cotton Apparel/Clothing ('the garment')
- Protective Teflon Sheets or Clean Absorbent Paper
- Clean Cotton Textile Sheet - such as a pillowcase
- Scissors
- Lint Roller
- Hard, Smooth Surface - do not use an ironing board







## Instructions

1	<p>Carefully measure the image area of your garment. Create your image using a standard graphics program in RGB mode. The ideal design and print resolution is 300dpi.</p>	
2	<p>Print the image in reverse (reflected) on to cotton transfer paper.</p>	
3	<p>Trim the transfer print leaving about 3-5mm gap around the image.</p>	
4	<p>Preheat the iron to the 'linen' or the highest temperature setting. Protect your work surface with a sheet of clean cotton textile. Do not use an ironing board.</p>	
5	<p>Place the garment, face-up, on the protected work surface and smooth out any folds and wrinkles.</p>	

6	Use a lint brusher or roller to remove any dust from the garment.	
7	Pre-iron the garment to remove any wrinkles.	
8	Place the transfer print on the garment, image side down.	
9	Cover with a Teflon sheet or clean absorbent paper to protect the garment.	
10	<p>Press with the iron to transfer, using firm and heavy pressure.</p> <p>Press small areas at a time for 30-40 seconds* using a circular motion. Ensure all areas of the transfer are pressed.</p>	







11	Finish by going over the entire transfer and edges for an additional 10 seconds prior to removal of the transfer.	
12	Peel the transfer off quickly and smoothly in one even motion while the garment is still hot. <i>Cold peel transfer removal is <b>not</b> recommended.</i>	
13	Stretch the image area from top to bottom and side to side to reduce the hand on the fabric.	
14	Cool the garment in accordance with the manufacturers' instructions.	

<b>Recommendations</b>		
1	Make a Test Piece.	Test your settings for color, temperature, pressure and time as different cotton fabrics will exhibit slightly different results.
2	Create a Production Reference Log.	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

3	Check Printable Areas of Each Garment Size.	Take note of the variation of printable areas of different garment sizes. You may need to adjust your transfer size for each shirt size or design to suit all variables.
4	Trim Excess Media from Printed Graphic	Trim the non-printed media around the printed image before transferring to garments leaving a ¼" / 6mm margin around the printed area is recommended for light-colored garments.
5	Avoid Pressing Any Zippers, Buttons or Other Plastic Decorations	If possible, avoid pressing any zippers, buttons or other plastic decorations attached to the garment. The heat and pressure needed to bond the ink to the cotton fabric may cause these to crack or melt.
6	Pressing Time	If immediately after pressing, the paper is not easily peeled from the garment and resists removal because the transfer is somewhat tacky, increase the amount of time in the press.
7	Pressing Temperature	If immediately after pressing, the transferred image has a slick or shiny appearance, increase the amount of pressure used.  <i>If the time/temperature combination is not correct it will stop ChromaBlast from completely adhering to the cotton fibers, this will result in the image washing out and cracking after a short period.</i>
8	ChromaBlast Media Storage	Store ChromaBlast Media in a cool, dry environment. Do not remove media from protective packaging until ready to use. Once packaging has been opened, store media in the plastic bag provided.
9	Storing Pre-Printed ChromaBlast Transfers	If a large number of transfers are printed in advance of use, place printed transfers in an airtight bag to minimize curl during storage.

## EN15 - How To Sublimate Glass Products In A Standard Flat Heat Press

		400°F / 204°C
		3 - 4 MINUTES
		3/4 – MEDIUM/HIGH (40 – 60 psi)
	VIDEO: <a href="http://youtu.be/uGIKrCB5stY">http://youtu.be/uGIKrCB5stY</a>	

### Substrate Examples

Glass products including cutting boards, coasters, pictures, clocks and picture frames.

### Before You Start

This is a guide only, based on production with Sawgrass Sublimation Inks - times, pressures and temperatures will vary and you will need to experiment to find the optimum combination for your production system. Remember that sublimation requires high temperatures so take appropriate care when handling substrates and equipment.

There are two methods of pressing a glass product. One is 'face up' so the heat is transferred through the paper. The other (and highly recommended) method is 'face down'. This method requires the use of a heat resistant felt pad and has several advantages over the first method.

- There is no need for taping the transfer paper to the glass as the weight of the piece will hold it in position.
- The glass will sink into the soft felt and force the paper transfer to wrap around the edges which finishes the beveled edges cleanly.
- There is no texturing of the coated surface of the tile this leaves a high gloss finish.

#### Key Points:

- Always read the manufacturer's instructions for the press and the substrate - settings may vary between brands.
- Glass must have a sublimation polymer coating.
- Glass will take time to heat up - pressing times will be longer than other substrates.
- Do not mirror the images when printing, as they will be applied to the back of the substrate rather than the front.

## Minimum Equipment Required

- Sawgrass Supported Printing System
- Sawgrass Sublimation Inks
- High Quality Sublimation Transfer Paper
- Flat Heat Press
- Heat Resistant Felt Pad (Min. Thickness 0.5" / 12mm)
- Quality Coated Glass Products ('the substrate')
- Protective Teflon Sheet or Absorbent Paper
- Scissors
- Heat Resistant Adhesive Tape
- Heat Protective Glove



## Instructions

- 1 Create your image using a standard graphics program.  
The ideal design and print resolution is 300dpi.  
If available, use graphics templates provided by substrate manufacturers for exact print sizes. If no template is available ensure the image is created 0.25" / 6mm larger than the substrate.  
  
If the image is not full bleed (i.e. a motif in the centre on a white background) then it is advisable to draw a boundary slightly larger than the finished product with the artwork in the correct position within the boundary.



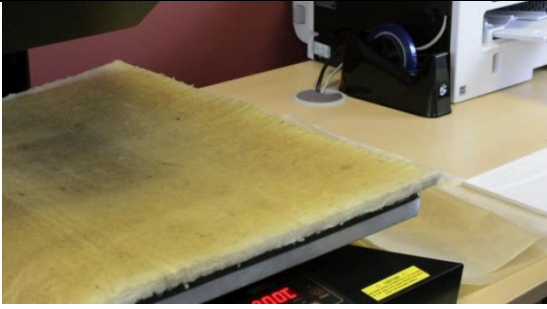






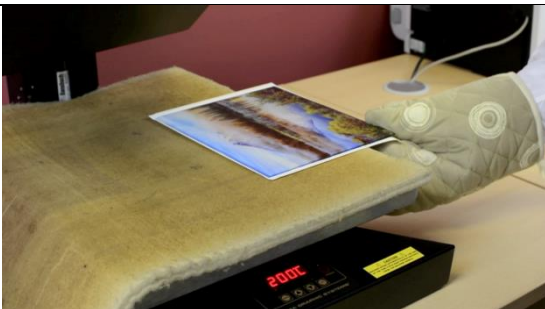
- 2 **Print the image for normal viewing** (*not reflected - as it is viewed through the glass substrate*) on to sublimation transfer paper and trim to size.






- 3 Preheat press to 400°F / 204°C.





4	Set the time to 3-4 minutes.	
5	Set the pressure to medium/high.	
6	Place the felt pad on the center of the press.	
7	Place the transfer print (image side facing up) on the felt pad.	
8	Place the substrate image side facing down onto the transfer print.	

9	Cover with a Teflon sheet or absorbent paper to protect the press.	
10	Press at 400°F / 204°C for 3-4 minutes (dependent on size) at medium/high pressure.	
11	Remove the transfer quickly and smoothly to stop the sublimation process. Beware the substrate will be very hot!	
12	Cool the substrate in accordance with the manufacturers' instructions.	
<b>Recommendations</b>		
1	<b>Make a Test Piece.</b>	Test your settings for color, temperature, pressure and time.
2	<b>Create a Production Reference Log.</b>	Make a log of the optimum settings for each substrate for future reference. Include substrate and manufacturer, temperature, pressure and time settings.

## *ENX01 - Common Problems*

Problem	Visual	Symptoms	Reason	Solution
Colors 'Not Correct'		Colors are not reproducing in the way you expect	Printing with the sublimation process requires color management - this is usually managed through the Sawgrass PowerDriver or ICC Profiles.	Use Sawgrass PowerDriver or ICC Profiles or visit Sawgrass Technical Service web portal for more information.
Image is Dull / Faint		The image is dull or faint	The transfer time was too short or the temperature too low	Increase transfer time and/or temperature incrementally until desired results achieved.
Image is Bright and Vibrant but Blurred		Over saturated and blurred image	The transfer time was too long	Reduce transfer time incrementally until desired results achieved.
Image has a 'Brown Cast'		Colors (especially reds) have a brown cast	Transfer temperature too high and the sublimation dyes are damaged ('overcooked')	Reduce transfer temperature incrementally until desired results achieved.
Blurring DURING transfer		Blurring of all or specific areas of the image	Transfer paper is not tightly wrapped around the substrate	Careful and consistent application of the transfer paper.
"Gassing Out"		Areas of distinct blurring	Transfer paper has creases or wrinkles	Careful and consistent application of the transfer paper.



<p><b>Blurring AFTER transfer</b></p>		<p>Blurring at the edges of the image or ink rising/creeping upwards away from parts of the image after transfer paper is removed</p>	<p>Substrates retain heat so ink may continue to “gas” for several minutes after transfer</p>	<p>Swift removal of transfer paper after imaging. And/or increase speed of cooling; use a fan if air cooling.</p> <p>Do not stack hot substrates as the sublimation process may continue which will reduce image quality.</p>
<p><b>Inconsistent Image Quality across the Substrate</b></p>		<p>Image quality is inconsistent across the substrate resulting in blurring/light or dark patches</p>	<p>The substrate is not in the center of the press.</p> <p>The pressure applied needs to be increased.</p> <p>The press is faulty or has uneven temperature distribution.</p>	<p>Ensure the substrate is centered and pressure applied is even.</p> <p>Increase pressure (incrementally) until you reach the desired result.</p> <p>Refer to the manufacturer for service.</p>

# ENX02 - Sawgrass Production Reference Log

Substrate	Manufacturer	Temp	Time Mins : Secs	Pressure Low - High	Notes
				1 2 3 4 5	
				1 2 3 4 5	
				1 2 3 4 5	
				1 2 3 4 5	
				1 2 3 4 5	
				1 2 3 4 5	
				1 2 3 4 5	
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## Online Educational Resources

Sawgrass Technologies provides a wide variety of useful online resources in regards to sublimation and digital decoration that can be used in conjunction with and in addition to this book.



### *How-To Application Videos*

The Sawgrass How-To Video Series is designed to provide you with visual instructions for accomplishing a variety of digital decoration applications. Quick and to the point, they make learning new processes simple and painless. You will even find a video for each of the applications discussed in Chapter 9.

[www.sawgrassink.com/education-events/digital-decoration-how-to-videos](http://www.sawgrassink.com/education-events/digital-decoration-how-to-videos)



### *“Live” Webinars*

Sawgrass Technologies hosts a live interactive, educational webinar featuring various experts discussing a wide range of topics. Subjects include: Making Money, Pricing, Marketing, Selling, Troubleshooting, CorelDRAW Basics, Photoshop Basics, etc. All you need to participate is a broadband internet connection, a computer with speakers and a comfortable chair.

[www.sawgrassink.com/education-events/digital-decoration-webinars](http://www.sawgrassink.com/education-events/digital-decoration-webinars)



### *Archived Webcasts*

Each online presentation is recorded and stored in our online Webcast Archives. Should you miss a live event or simply wish to review the material, you can view our webcasts 24/7 as needed. You will need to register one time for access, but after that you can freely come and go for knowledge on demand.

[www.sawgrassink.com/education-events/digital-decoration-webcasts](http://www.sawgrassink.com/education-events/digital-decoration-webcasts)



### *Trade Shows & Events*

Tradeshows and Conferences are the ideal way to find out about new technologies and solutions for growing your business. In addition to hands-on opportunities with cutting-edge digital decoration techniques, tradeshows also provide a range of educational opportunities in the form of seminars and workshops.

On the Sawgrass website, you can find a list of upcoming events, free passes to shows (where available) recommended seminars and lists of digital decoration Dealers that are exhibiting at the different shows.

[www.sawgrassink.com/education-events/trade-shows](http://www.sawgrassink.com/education-events/trade-shows)



## ***Digital Decoration Knowledge Base***

When you need a quick answer to a specific challenge, Sawgrass has the answer. We offer intuitive knowledgebases for sublimation and for digital garment printing, easily accessible online 24/7.

<http://www.sawgrassink.com/education-events/sublimation-knowledgebase>

<http://www.sawgrassink.com/education-events/digital-garment-printing-knowledgebase>



## ***Authorized Sawgrass Dealers***

The extensive network of Sawgrass Dealers is composed of a diverse group of Business Professionals with a wide range of expertise and knowledge in many different markets and technical disciplines. Dealers are another great source for education and training resources. You can find a complete list of Sawgrass Dealers using our Dealer Locator.

[www.sawgrassink.com/dealerlocator.php](http://www.sawgrassink.com/dealerlocator.php)



## ***Sawgrass Technical Support***

The Sawgrass Technical Support section of the website contains useful manuals, instructional documents and videos that provide information for installing, operating and troubleshooting sublimation systems. Plus you can download the latest software drivers for your system as needed.

[www.sawgrassink.com/technical-support](http://www.sawgrassink.com/technical-support)



## ***Social Media***

We also encourage you to follow us on Twitter and Facebook, so that you can stay up-to-date with the latest information in regards to educational resources, including training, seminars, webinars, events and more.



## Frequently Asked Questions

### Can dye sublimation be used on ceramics, glass and metal?

All of these products need a coating, which is a special layer of polymer for the dyes to bond.

### Can I sublimate plastics?

You cannot sublimate onto just any piece of plastic. Many polymers cannot withstand the amount of heat needed to achieve sublimation. Even if they could stand the heat, the added pressure and press time will deform them. Many of them melt and shrink. (Fiberglass Reinforced Plastic (FRP) is the plastic of choice.

### Do fabrics have to be 100% polyester?

You can't sublimate onto cotton because the dye particles are designed to bond with polyester and ignore everything else. Fabric enhancers, preparation sheets and sprays are used to add a layer of polyester to non-polyester fabrics so you can sublimate onto these fabrics. This technique works better on 50/50 shirts, since the added polyester can bond better with the polyester that is already part of the shirt, and then the dye also will have more polyester with which to bond. However, if you wish the image to be as bright and vibrant as possible, you must use 100% polyester.

### What images do I use?

You can use any image that you can import to or create on your computer with such popular programs as CorelDRAW and Adobe Photoshop.

# Markets and Applications for Sublimation

There are hundreds of different applications for dye sublimation - the process works well as a stand-alone business or as an addition to an existing business looking to diversify.

**Apparel/Clothing** - From t-shirts, fashion, work and sportswear. New polyester based performance textiles are opening up new sublimation opportunities in many markets.

**Promotional Products** - Mugs, mouse pads, clipboards, and message boards etc are ideal promotional products which are easy to personalize and easy to sell.

**Awards and Recognition** - Plaques and trophies that were once limited to single color images and/or engraving can now be decorated with high resolution, full color images via sublimation.

**Signage** - Full color, on-demand, high impact interior signs and graphics that help your customers sell, market and inform.

**Photo Gifts** – From personalized gift items such as photo-panels, phone and tablet covers, magnets, license plates, clocks and dolls sublimation is the perfect application for delivering high quality photographic images to a wide range of markets.

**Sporting Goods** - Sell personalized custom designs and enable your customers to see a finished product (snowboards, skis and more) before committing to more traditional print runs.

**Textiles** - Customize fabrics to be used in various cut-and-sew applications with images that are vibrant and detailed.

**Tile Murals** - Customized ceramic tiles for home and office décor with unique and fully customized images for kitchens, bathrooms, foyers, museums, restaurants, and offices.



# Digital Printing Glossary

## Additive Colors

Additive colors refer to the colors used to produce other colors. The three primary additive colors are Red, Green and Blue. Combining one primary additive color with another creates a secondary additive color. The three secondary additive colors which can be created are Cyan, Magenta and Yellow. Combining equal amounts of primary additive colors produces white. Combining equal amounts of secondary additive colors produces Black.

## Bitmap Image (BMP)

Is a type of image file format used to store digital images. The term bitmap comes from the computer programming terminology, meaning just a map of bits.

## CMYK

CMYK is an abbreviation of the four colors, Cyan, Magenta, Yellow and Black.

## Color Balance

Referring to image processing and manipulation, color balance is the adjustment of the intensities of colors in an image. Changing the intensity of each color produces the visual results required. The three primary colors used are Red, Green and Blue.

## Color Curves

A color curve in image editing is a color correction tool which enables the user to emphasize certain color channels within an image. Applying a curve through all color channels can be used to make light parts of image lighter and dark parts of an image darker, to increase the contrast. Applying a curve to individual channels can be used to emphasize that particular color over the image.

## Color Management

Is the controlled conversion between the color representations on your computers monitor to the colors produced after pressing your image on to a substrate.

## ColorSure™

The ColorSure™ Palette that resides within the PowerDriver is the best way to achieve spot color accuracy in sublimation transfers. The palette includes more than 170 colors that, when loaded into your graphic design software, allow you to fill solid portions of artwork with a color from the palette. By employing colors from the ColorSure Palette, you are able to control how your image will look once transferred. With the help of the ColorSure Palette, you will precisely achieve the correct colors, whether you are matching colors for a custom order or selecting colors for new artwork.

## Cotton Transfer ChromaBlast™ System

The key to the patented Cotton Transfer ChromaBlast™ system is the chemical reaction between the ink and coating. Where they touch, there is a cross-link reaction under heat and pressure that chemically bonds the printed image to the cotton fiber.

## DPI

DPI is an abbreviation of the words Dots per Inch and refers to the amount of dots or pixels which make up your image.

## EPS

EPS is an abbreviation of Encapsulated Post Script and is a standard file format for importing and exporting graphics images. EPS files are widely used as they are compatible with a large range of computer programs.

## GIF

Short for graphics interchange format. A file format often used for Web graphics; not suitable for photos because it can't handle more than 256 colors.

## Heat Press

Is used to sublimate your printed transfers on to the chosen substrate. Your heat press should be set to the correct time, temperature and pressure for each substrate.

## Hue

Hue is the term for the pure spectrum colors commonly referred to by the color names - Red, Orange, Yellow, Blue, Green and Violet - which appear in the hue circle or rainbow.

## ICC Profile

Is a color management file which is used in the output stage of the graphics software program. This file ensures that the colors which are shown on the screen are correctly delivered on the chosen substrate.

## JPEG

A JPEG is the most commonly used digital image format and is the abbreviation of Joint Photographic Experts Group.

## Layer

A way of managing elements of an image in stackable overlays that can be manipulated separately, moved to a different stacking order, or made partially or fully transparent.

## Masking

Image masking is the process of eliminating the background from a selected image, isolating the required selection.

## OEM Driver

OEM refers to Original Equipment Manufacturer; the driver is the application that connects the computer to the printer.

## Pixel

A pixel refers to a single dot in a graphic image. All images are made up of millions of pixels.

## PowerDriver®

PowerDriver® is the most advanced color management software available for digital transfer systems. Developed specifically for SubliJet IQ® desktop sublimation, PowerDriver delivers enhanced functionality and a higher level of color output. Sawgrass offers this free, user-friendly software to SubliJet IQ users to easily achieve accurate, brilliant color output, print after print.

## **PPI**

PPI is an abbreviation of the words Pixels per Inch and refers to the amount of dots or pixels which make up your image.

## **PPC**

PPC is an abbreviation of the words Pixels per Centimeter and refers to the amount of dots or pixels which make up your image - it is the metric equivalent of PPI.

## **Primary Colors**

The three primary colors are Red, Green and Blue. These colors can be combined together with different intensities to create a whole spectrum of colors.

## **Raster Image**

Is a type of graphic made up of a grid of dots or pixels. Most images found on the web are raster images and are commonly compressed into a Jpeg file.

## **Resolution**

The resolution of an image refers to the amount of DPI or PPI in an image. The more dots or pixels in an image, the higher the resolution, thus a visually higher quality image.

## **RGB**

RGB is an abbreviation of the three colors, Red, Green and Blue.

## **Sublimation**

Is the process of transition of a substance from the solid phase to the gas phase without passing through an intermediate liquid phase. In the dye sublimation industry, this is the ability of the ink to transfer under heat and pressure.

## **Sublimation Transfer Paper**

Is the specialist paper used to transfer your image from the printer to the substrate. Sublimation transfer paper is able to absorb more ink and also dry quickly.

## **Substrate**

Is a term used in the dye sublimation industry to describe the base material onto which images will be transferred.

## **TIFF**

Stands for tagged image file format. A popular image format supported by most Macintosh and Windows programs.

## **UV Coating**

You can coat your sublimated items with UV coating which will ensure your items do not fade if exposed to direct sunlight.

## **Vector Image**

Is a type of graphic made up of points, lines, curves and shapes. In most circumstances, Vector images can be scaled by any amount without losing clarity. Vector images are most suitable for logos and illustrations.



## About Sawgrass

Sawgrass Technologies, Inc. is a leading developer of digital printing technologies that allow our customers to customize a vast array of products, large and small, including plastics, metals, films, ceramics, and textiles. Sawgrass develops state-of-the-art systems that enable customers around the globe to produce highly customized, high-quality, full-color images.

Sawgrass provides whole product solutions designed to support any size business --- from desktop systems to wide format commercial and industrial systems for production environments. As a total solution provider, Sawgrass combines patented digital ink formulations with advanced color management software and technical support to meet the needs of business customers looking for profitable, short-run production. Sawgrass is committed to delivering quality products that customers can trust.

Sawgrass Technologies is headquartered in Charleston, South Carolina with additional offices in Basel, Switzerland and Sheffield, England.

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