Sublimation Printing 101

Sawgrass SG1000, heat presses & more!

Sublimation 101 Outline

- What is Sublimation and what can you make?
- What equipment does Makersmiths have?
- Sawgrass SG1000 Basics
- Sublimation Tools
- Mug Press, Clamshell heat press, Mug press, Hat press, Handheld Heat Press and Accessories for the Toaster Oven
- Common Temperatures and other useful tips & tricks!

What is Sublimation Printing?

Sublimation printing is a super cool and versatile method of printing that allows you to transfer printed images onto a variety of materials such as fabric, ceramic, metal, and *SO* much more. The resulting long-lasting prints are vibrant and durable – they won't ever crack, peel, or fade!

Unlike some of the other traditional printing methods, such as screen printing or inkjet transfers, sublimation doesn't just simply apply ink to the surface and face of a material. Sublimation printing uses a unique chemical process that actually creates a permanent and durable bond between the ink and the material.

The science behind sublimation is fascinating! The word "sublimation" refers to the process of a solid turning into a gas without passing through a liquid phase. In the case of sublimation printing, the ink is heated until it turns into a gas, skipping the liquid stage, and then it's pressed into the pores of the substrate (the material you're printing on) using a heat press machine. Once the high heat and pressure are removed, the ink cools and returns to a solid state, resulting in a vibrant, full-color image that's infused into the material.

This transformation from solid to gaseous state and back to solid form is what makes the sublimation process so unique and versatile. If you ask me, when crafting and science combine, it's one of the coolest things ever!

Why Should I Use Sublimation?

It's Bright & Vibrant, and Stays That Way!

One of the most significant benefits of sublimation printing is the ability to produce images with rich, vibrant colors that won't fade or wash away over time. Since the ink actually bonds with the material, such as polyester fabric or specially coated ceramic mugs, rather than sitting on top of it, the colors are incredibly durable and can withstand repeated washing and exposure to sunlight without losing their vibrancy.

It's Versatile!

Sublimation printing allows for a HUGE range of design possibilities, making it perfect for both hobby crafters and professionals. With sublimation, you can create intricate, full-color images and patterns that are difficult or even impossible to achieve with other printing and crafting methods. It opens up a whole new world of creative possibilities! If you can print it, you can sublimate with it!

It's Eco Friendly!

Compared to other printing methods, sublimation printing is quite eco-friendly and sustainable! Sublimation ink is made from a combination of water and non-toxic heat-reactive dyes, so the process doesn't require the use of any harsh chemicals, nor does it produce any harmful waste or create unhealthy work conditions. It also produces very little waste compared to other printing methods.

Makersmiths Sublimation Tools

Sawgrass SG1000:

Medium Format Sublimation Printer
located in the main room in our Leesburg Facility.

- **This is a mid size sublimation printer that comes with the capability of doing 8.5”x11, 8.5”x14” and 11”x17” using the built in tray, but can also do 13”x19” or up to 13”x51” with the add-on tray, which is already installed in the back.**
- **It uses Sawgrass’s PrintMate software that is very user friendly, and is installed on the computer next to it.**
- **Max Resoltion: 4880x1200 dpi**

Makersmiths Sublimation Tools cont.

Heat Presses

- 16x20 Tabletop Clamshell heat press
- 9”x9” Handheld heat press
- 5-in-1 Mug Press
- Toaster Oven
- Hat Press

Basics of the Sublimation Setup

- **Sign the Makersmiths Waiver Form** - This can be done at the iPad in the Leesburg classroom or the Purcellville Green Room
- **The Sublimation Printer AND Heat presses together are a Red Tool** – Red tools require safety training on a specific machine to operate unsupervised for safety and to prevent damage to the machine.
- **Schedule Your Time on the Sublimation Station**– The schedule system is TBD but watch for updates to the reservation system. Give the Sublimation channel a heads up if you plan to use the setup for more than an hour until the reservation system is setup.
- **Pay Your Usage Fees** – collected to cover consumables (cleaning supplies, upgrades etc.)
  - Members – $5 a half hour $1 a print sheet
  - Non-Members - TBD
  - Payment: Cash Box, square terminal, QR Code or on the Tool Reservation Page.
  - Updates to the prices section will be posted in the Slack channel first. Blanks will hopefully be available to purchase soon.

Safety Around Heat Presses

Heat Presses are HOT

The typical heat range for sublimating items is 400°, Human skin starts to burn at 125°.
DO NOT TOUCH the any heat elements while heating up or cooling off.

We have multiple items and methods that will help you keep from burning yourself while handling hot items with Sublimation.

- Transfer paper
  - While Hot items can take time to cool off, paper cools quickly. Placing your items on transfer paper at all times will give you something to hold.
- Move slowly when around the heat presses.
  - This is especially important when reaching for items as you'll feel the warmth before touching. Avoid putting yourself in the position when you may jerk your hand away. But if that happens, remember to NOT jerk your hand or arm right into the heat element. For example, remove the item from the heat press before removing transfer tape. This reduces the chance of pulling your hand away quickly and hitting the heat element.
- Metal gets hot quickly and holds heat
  - Metal items cool the fastest but hold the most heat. This means right off the press they will be SUPER hot. But cool quickly after.
- Ceramic and Glass take a long time to heat up but cool very slowly.
  - A ceramic mug in a heat press can take 10+ MINUTES to cool enough to actually touch.

What items can you Sublimate

Sublimation works by bonding the dyes to the polyester or artificially created molecules in a substrate. This means it will naturally bond to things like polyester fibers. But to bond to other things, like metal, it requires a coating.

There are hundreds and even thousands of options for things to sublimate. These items can be found on sublimation focused supplier websites, Amazon, or knowing what the items are made of.
Rather than list the items, I recommend heading to some of these websites and browsing the options:
Johnson Plastics
https://www.jpplus.com/sublimation
Coastal
https://www.coastalbusiness.com/sublimation-blanks.html
Heat Press Nation
https://www.heatpressnation.com/collections/sublimation-printers
US Cutter
https://uscutter.com/sublimation-blank/
Amazon is also a great resource, but be sure that the actual product you are ordering is in fact a Sublimation blank. There are options on there that can be misleading.

What can’t you Sublimate

There can be a lot of confusion on what can and can’t be Sublimated. Especially when it comes things the may bridge the gap between sublimation and other printing methods.

#1 Sublimation cannot and will not ever print White.
The process is a dye ink and any white pigmentation in a printing process is another method or product. For example. You could sublimate on white HTV (White glitter is common as the glitter is a poly material) and then heat press that onto a black t-shirt. But you cannot sublimate onto black and have the result be visible.

#2 Sublimation cannot print onto cotton.
Cotton will not accept sublimation dye ink. If it shows up at all it is likely to wash out. You can however print on items with cotton in it. But it will not “stick” to the cotton and so will end up with a partial print. You can also use a “promoter” which would be a material or like a spray that will bond additional poly to the fabrics, allowing more ink to transfer. This method can be tricky and can wash out.

#3 Anything that can melt.
While temps can be modified by extending time and lowering temp and still getting a print. It’s extremely tricky to print on anything that doesn’t do well under heat. If you are unsure if something can handle the heat, please check with the steward before printing. Please note that if anything melts in the heat press, it will be up to you to assist in cleaning or replacing. When in doubt, use lots of transfer paper above and below the item.

Setting up your files for Printing

We are using the program PrintMate to assist in getting your design to print through the Sublimation printer.

Some things to keep in mind:

PrintMate takes your file and sets it up on the print sheet. The SawGrass Print Manager is what converts it to print with the correct combination of inks.

Set up your file ahead of time for best results, then convert to a High Quality PDF or other high quality image.

Adjust your image size in print mate if needed. For example, you can create a file that is 2.5in x 3in and import that, then duplicate or add additional designs to fill the page. Or you can add multiple of your design to a single 8.5x11in page and export it that way. Just remember to leave margins and to keep track of your image size for best result.

Remember you are paying for the pages that don't print correctly as well as those that do. So triple check your file and measurements.

YOUR PRINT WILL LOOK DULL!

The way sublimation works is that the print will look dull and not quite color accurate when printed correctly. Once heat is added, the print color will be the "true" look. That may not be exactly as the screen shows due to differences in colors of screens. This is why printing test items is recommended.

Time - Temp - Pressure

All sublimation items require a time, temp, and pressure to successfully print the item. This changes based on the item. You can find out a good starting point by checking the item's instructions if purchasing from a sublimation supplier. Or using a search engine to find what others have recommended.

Time

This is primarily affected by what the item is made of, how thick it is, and how fast it heats up.
A metal item can print in as short as 40-50 seconds but a slate or glass cutting board can take 10-25 minutes to print correctly.

Temp

Sublimation in general prints best at 385-400°. Some items can't handle that high of a temp and so you'll reduce the temp and instead increase the amount of time it's printing insead. 350° is generally the absolute lowest you can go and still have ink transfer. If your item can't go that high, it cannot be sublimated. Try an additional print method, for example HTV can go as low as 305°

Pressure

The unsung hero of Sublimation. Pressure will vary a lot based on the item being printed. Soft items such as fabrics will do best with light or medium pressure. This is primarily to avoid crease lines and burning of the fabric.
Other items, such as metal need a higher pressure for the best quality. Think of the pressure being how exact you want your image to transfer. The higher the resolution, the higher the pressure. However the higher the pressure needs are, the more likely the image will be to shift when opening. Be sure to tape high pressure items.

Troubleshooting Tips

Design is faded
- This could be not enough time, not enough pressure, or not enough heat. Another possibility is the paper is not the correct type or it's installed upside-down. Pressure being too low is also a possibility

Black color in the design turns out brown
- Time is too long. Black inks will be the first to "burn" in a design

Paper is yellow or brown after printing
- Time and/or temp is much too long and the paper is burning

Lines on my design
- If the lines are where there was heat tape, that is a likely cause.
- If the lines are shown when first printing on the print sheets, the printer was likely turned off for a period of time or a misfeed happened and the print heads may need cleaning. Let the steward know and they may instruct you on a cleaning cycle. The machine does auto cleanings and with consistent correct use this should happen very rarely or even correct itself.

Print didn't transfer at all!
- Is the product you are printing a sublimation blank? Are you sure?

My image seems to have doubled or has a shadow
- The print sheet likely shifted while the press was opened. If the design had tape, be sure to tape it so it doesn't shift when moved. If it didn't have tape, try lowering the pressure before printing again or using tape.

My image isn't aligned to my design or there's white on the edges.
- Check that your print has enough bleed around the item and that it's lined up. Use tape if needed to stabilize or increase the design bleed area.

My paper is sticking to my blank and is blurry
- Likely there is actually a coating/plastic on your product that wasn't removed.

General Steps to printing

1. Prep your design/print file
2. Confirm the pressure for your blank before turning on the press
3. Turn on the heat press
   a. *It take 10-20 minutes to heat up. Make sure the press is open with nothing on it or touching it.*
   b. *Confirm the time settings for your blank*
4. Print your design
5. Make sure the design lines up/is the correct size
6. Prep the blank
   a. *Make sure any coating is removed*
   b. *Cut out the design if needed*
   c. *Tape the design if needed*
7. Prep the press or blank for heat
   a. *Add the extra paper below to protect the press*
   b. *Add the blank*
   c. *Add the extra paper above to protect the heat element*
8. Press!
   a. *Do NOT walk away from the press*
   b. *Make sure the time started*
9. Open!
   a. *Press may jump if opened quickly, keep your hand on then handle and open slowly*
   b. *Be careful, the blank is HOT*
   c. *If not taped, remove the print sheet. If taped, remove the item and transfer sheets.*
   d. *Use the transfer paper to remove front the heat press and set somewhere to cool. Be sure that you don't set it on anything heat sensitive.*
   e. *Allow to cool and remove tape.*
10. Blank is printed!
11. Turn off heat press!!!

REMEMBER TO TURN OFF THE HEAT PRESS WHEN YOU ARE DONE!!

Surface	Press Time	Temp	Pressure	Tips/Comments
Ceramic Mugs	150-210 seconds	350-400° F	40 psi (medium)	Time varies with press. Mugs should be cooled down after transfer paper is removed in either a bucket of warm water or using a cooling plate.
Stainless Steel Tumblers	60 - 90 seconds	365° F 185 C	40 psi (medium)	Time varies with press. If you are doing a full wrap, press for 60-90 sec. then rotate your tumbler 180 degrees and press a second time for 60-90 sec.
Polyester Fabric	35-45 seconds	400 - 410° F 204 - 210 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	45-55 seconds	380°-390° F 193 - 199 C	40 psi (medium)	See vaporapparel.com for tips on reducing press lines.
Polyester with Foam Backing (Koozie / Mousepad)	45 seconds	400° F 204 C	40 psi (medium)	Look for a tight knit and high white point for more vibrant color.
Metal/Chromaluxe (Unisub brand)	60 seconds	400° F 204 C	40 psi (medium)	Remove plastic coating before pressing. Use blow-out paper.
Metal (Other Brands)	60 seconds	375°-400° F 190 - 204 C	40 psi (medium)	Time varies with metal manufacturer (always consult 40 psi 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 204 C	40 psi (medium)	Remove plastic coating. Remove transfer paper immediately after pressing.

Surface	Press Time	Temp	Pressure	Tips/Comments
Glass or Ceramic Tiles	300 - 720 seconds	400° F 204 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.
Fire Retardant Plastics	40-75 seconds	350 - 400° F 177 - 204C	40 psi (medium)	Remove plastic coating. Remove transfer paper immediately after pressing.
Hardboard	60 seconds	400° F 204 C	40 psi (medium)	Remove plastic coating and press with the transfer paper on top. Remove immediately after pressing unless the surface is textured, then wait for substrate to cool and remove the transfer paper
Glass	180 - 240 seconds	360 - 400° F 182 - 204 C	40 psi (medium)	Be careful not to put too much pressure on the glass. This can shatter it. Wear protective gear. Always check with the substrate manufacturer for pressure and heat settings.
Felt	60 seconds	400° F 204 C	30-40 psi (light/medium)	Felt can curl as it cools. Place a heavy object on the substrate immediately after pressing and allow to cool while compressed.
Marble	120 seconds	390° F 199 C	40 psi (medium)	Peel transfer paper while hot. If the marble has attachable cork or material, wait for the substrate to cool before attaching.
Siser EasySubli	15 - 30 seconds	310° F 154 C	40 psi (medium)	Make sure to remove the backing before pressing. You can press with a mask if needed. Peel mask immediately after pressing. Do not wash for at least 24 hours.
Polyester Linen	55 - 65 seconds	385 - 425° F 196 - 218 C	40 psi (medium)	Press with substrate facing up and transfer paper on top. Press with substrate facing up and transfer paper while hot.
Wood	60 seconds	400° F 204 C	40 psi (medium)	Remove any plastic coating. Press with the transfer on top.