

## **DECAL WORKSHOP – MARCH 2020 - PATRICIA NELSON**

### **May Put on Website**

**Before we get started.....please refer to the “Sources of Supplies” for names and addresses of all products demonstrated in this workshop.**

### **BASIC DECAL INFORMATION / DEFINITIONS**

#### **STRUCTURE OF DECALS**

All our decals are “water slide” decals. This means you must soak the decal in water and then “slide” it off its paper backing and onto your work.

A decal that can be fired in a kiln needs to be made of colorants that do not burn out in temperatures exceeding 1000 degrees Fahrenheit. This material includes a wide variety of mineral and metallic oxides, similar to those found in enamels and ceramic glazes. This colorant is applied to a paper backing by means of a number of processes; silk screening, lithography, and computer decal printing - assuming that the computer prints oxides and not ink.

The mineral oxide image that constitutes the decal needs other components to function. The first “other” component is the paper onto which the image is applied. Decal paper has a water soluble glue that allows the image to detach when wet. The second “other” component is the cover coat. Most water slide decals require a covering to hold the image together when it is detached from the paper base. The two exceptions are the decals that fire a sepia color when laser printed onto a specific decal paper, and the decals screened onto that same decal paper. The toner in the laser printer seems to be adhesive enough so the image does not fragment when removed from its paper base, and the specific decal paper for laser printing has a clear film under the printed decal which allows it to slide onto your work, but does not need a separate firing. The other decals – commercial ceramic and full color digital printed – all require some sort of cover coat. This cover coat is eliminated in the first, low heat, firing. After the preliminary cover coat elimination, the object is fired in a normal, if somewhat lower temperature, firing to mature the mineral or metallic oxide image and make it permanently fuse onto the enamel.

Since decals were, and still are, primarily made for ceramics and ceramic firing, they need special techniques for firing onto vitreous enamel surfaces. A major difference is firing time. Most ceramic firing cycles last for many hours while enamel firings are minutes long, so the firing needs to be adapted. This means research! Testing is imperative when working with decals– since there are so many potential variables in the colorant, the firing time of the enamel and the respective expansion / contraction of both - a sense of adventure and experimentation goes a long way towards success.

#### **APPLICATION AND FIRING OF DECALS**

Since all the decals we use are water slide decals, so they all work roughly the same way. The first requirement, of course, is a counter enameled, base coated metal shape. This pre-enameled shape should be clean and grease free. A workspace should be set up with the following: a bowl of room temperature to slightly warmed water (some manufacturers recommend distilled water), an

absorbent surface for the enamel, a stack of lint free paper towels, a pair of scissors, and a squeegee.

#### Decal application

1. Remove the wax paper from the page of decals (if present)
2. Cut the decal from the larger paper background
3. Place the decal in the bowl of lukewarm water, it will curl immediately. Soak for about 30 - 45 seconds, then remove from water and let decal rest for a few seconds to a minute on a clean paper towel. Do not soak numerous decals in the water bowl, soak one at a time. Decals will be ruined if they slide off their paper backing into the water.
4. When the decal starts to slide a bit on its paper backing, place the decal - paper and all - on your work. Gently slide the paper out from under the decal. When the paper has been removed, position the decal where you want it. **DO NOT TURN THE DECAL OVER.** Just slide the decal off the paper and onto your work. You may apply a decal to a curved surface, it just takes a little practice.
5. Use a squeegee and lint free paper to remove all water from under the decal. Push the water from the center of the decal outwards to the edge so no air or water get trapped in the center of the decal.
6. Allow decal to dry for a few hours before firing. Ideally, let decals dry out overnight. Water or air trapped under the decal will result in a void in the finished design.

#### Decal firing

1. Be sure your decal is completely dried on your work. Again, an overnight drying time is preferable
2. **OLD INFORMATION** - I have had good luck placing the work with unfired decals in a cold kiln and slowly raising the temperature to 700 degrees Fahrenheit over a period of about 3 hours. You may set your kiln to a ramp hold cycle, or just watch it and turn the kiln off for short periods so you stretch out the heating time. I turn the kiln on and allow it to heat to @350 degrees. I turn it off for about 20 minutes. I then turn the kiln back on, allow it to rise to @ 500 degrees, then turn it off again for 20 – 30 minutes. Finally, I turn it on again, and let it rise to 700 degrees. I maintain that temperature for 20 – 30 minutes, then turn the kiln off and allow the enamels let the decal soak at @ 700 degrees for 10 to 15 minutes. This low temperature firing eliminates the cover coat. Since I am not firing hot enough to soften the enamel itself, I usually fire a whole tray of decal pieces together.
3. **NEW INFORMATION** - I now use a toaster oven to remove most of the covercoat from decals that need this treatment (not all of them do, the ones you print on decal paper do not need this pre treatment). Place the enamels with dried decals in a toaster oven, turn the heat up to 200 degrees. Let soak in that heat for one hour or more. Then turn the toaster oven up to 450 degrees (not to broil!) and leave for another hour.
4. In her book *Enamels, Enameling, Enamelists*, Glenice Lesley Matthews explains the necessity of these two separate firings: “It is necessary to preheat the decal / enamel composition at the lower temperature to burn out all the organic material (transfer paper) before the regular firing. Do not try to accomplish the organic burn out and the maturation of the decal on the enamel surface at the same time; bubble lines occur when the initial thermal shock lines burn into crack lines. There is no remedy for this problem once it occurs.” Once again, it is important to discern whether your decal has a covercoat (old ceramic decals, digital decals) or not (laser printed decals, silkscreened decals using Jan Harrell method).

5. Remove the work from the kiln and turn the kiln up.
6. Fire the decals in a 1450 degree kiln and allow the temperature to drop. Watch the firing closely, and when the kiln returns to 1450 degrees, remove the work. ( Since I usually fire at 1550, I am firing 100 degrees lower when I fire on decals. For this firing I fire pieces one at a time.) I have also experimented with even lower final firing temperatures, some as low as 1420.
7. BE SURE YOUR KILN IS WELL VENTILATED.

## **TYPES OF DECALS**

### **COMMERCIAL CERAMIC DECALS**

Ceramic decals are available from many sources. The drawback to using these decals is that you are restricted to specific imagery. Ceramic decals are made by printing processes, usually lithography or silkscreen. Many of the decals available online are actually quite old, so vintage imagery can be an interesting addition to your design repertoire – but if you fall in love with a decal and know you will be using it more than once, better purchase more than one or even all the vendor has; you may never see it again. You may also find a variety of ceramic decals at local ceramic shops, art supply stores, etc. Again, the potential drawback is the restriction of available imagery, and some decals can be pretty trite!, but a subversive touch, such as unexpected juxtapositions of imagery, cut up and rearranged imagery, and locating the decal under coats of transparent enamel to soften or partially obscure the imagery can be interesting and provocative . Beware! old decals contain unknown metallic oxides, and some may very well contain lead, so work carefully with these decals, wash your hands, and ventilate your kiln. In addition, food should not be served from pieces made with old or commercially available ceramic decals.

The application method is very straightforward – refer to “The Application and Firing of Decals”.

Be sure to ventilate your kiln because of the unknown composition of the decals.

Commercial ceramic decals can be cut up and juxtaposed in inventive ways, they can be layered, and they can serve as a base for other enamel techniques such as cloisonné and Limoges. Most are quite vivid and dramatic in coloring so they make a sturdy background for other color application. However the intensity of colors in these commercial decals can vary widely depending on the colorants and the quality. Test!

### **SCREEN PRINTED DECALS**

This technique produces a very sturdy and opaque image. I have only tried one color silkscreened decals, although you can layer multiple colors just as you would do in a printmaking silk screening class. Multi color screenings require multiple screens, registration pins etc but if you love to silkscreen, go for it!

Making silkscreened one color decals is a multi process endeavor. First you must make your screens using a photo emulsion and lighting technique or the equivalent, then silkscreen the decals, usually with with ceramic over glaze, cover coat and dry them and then you may apply them in the usual application methods.

The steps will be broken down into significant components. At this point, there are a couple of methods to produce your own decals.

1. Jan Harrell method – Jan uses and teaches a method that is easy, friendly and produces great results.

Please see her website or one of her videos for further information.

## 2. Rimas VisGirda method

When I first explored decals, the Ball State ceramics professor and I co-sponsored Professor VisGirda, a ceramicist well known for his use of silkscreened decals. This information is from his workshop. I am currently updating his method, mainly by developing alternative underglaze and overglaze pigments in place of the now discontinued Amaco Versa Colors. Stay tuned for more information as I develop it. The main advantage of this method is the finer mesh silkscreens may yield tighter image results.

Materials: Commercial silkscreen, you can develop your own images on these wood framed silkscreens (see Sources of Supplies for ready made silkscreens plus all other equipment) High contrast black transparencies

### Screen manufacture

1. Mark your screen with a magic marker on one edge. This is the “dirty edge”, and as you apply emulsion, develop emulsion, and clean screens, the screens should always be rinsed and drained with this edge down. This helps keep the screen from becoming all streaky.
2. Mix photo emulsion according to directions. Working in a subdued light, pour about 1 – 2 tablespoons of emulsion onto one side of screen, and squeegee it all over the screen on both front and back to obtain an even coat. Set the screen up to dry in a dark room, sitting the screen on the dirty edge. Dry thoroughly for about 2 hours minimum.

### Transparency manufacture

1. Transparency should be made from a high contrast black and white image. Print or Xerox it onto 3M Transparency film, available at Staples or other office supply stores.
2. Make 2 transparencies and carefully overlap them making sure image is perfectly lined up. This will make a more opaque black image, as even the least bit of light makes it impossible to wash image from your screen.
3. If you can obtain a high contrast ortho film positive or negative, it works best because of the density of the image. This is a photo process, but the supplies and equipment are still available

### Exposure

1. You can expose your screen outside in the bright sunlight, or you can use a lighting source
2. For more controlled exposure, use an incandescent flood light or a halogen work light. If you use a light bulb, the time is: for 18 inch space from the screen to the bulb, a 500 watt bulb will expose the screen in 8 minutes and a 200 watt bulb will expose in 18 minutes.

3. When you are ready to develop the image remove the screen from under the glass and rinse the unexposed emulsion with preferably a garden hose fitting on your sink and create a spray with your thumb. You should begin to see the image. Rinse until the image is clear of any emulsion. Dry the screen with the marked side down, this will keep the screen from streaking over time.

#### Printing decals

1. Obtain or make your ink. For a long time Versa Color has been used, but Amaco no longer makes Versa Color although they still have a little bit in stock. Part of this workshop is experimental ink production.
2. Screen decals, and hang up on a board to dry – we will see this demonstrated, but there are good youtube videos illustrating the actual printing process.
3. Cover coat your decals, with cover coat from a ceramics supplier or with Rustoleum crystal clear

After the decals have been cover coated and dried, cut and apply them as any other decal.

### **COMMERCIAL SILKSCREENED DECALS**

Milestone silkscreens a line of decals. They are able to obtain very crisp and delicate lines because of their equipment. See their website for stock images, custom work.

### **BLACK / SEPIA LASER PRINTED DECALS**

The critical aspect of these decals is the correct paper and the laser printer. Use Bel Decal paper (or the newer equivalent) and make sure your laser printer has enough iron oxide in the toner. This process works by using the iron oxide rich black ink from a laser printer. The problem is that not all black ink contains black iron oxide, as some manufacturers are converting to organic soy-based pigments. For now, Hewlett-Packard (HP) printers use the most iron in their toner (60%) while Apple printers are a distant second. Dell laser printers work, but not as well and yield a lighter image. NEC and Brother printers do not work at all.

Also, the laser printed image looks black on the paper, but actually fires to a medium brown, so don't be fooled. Your enamel backing needs to be light enough so that brown shows up.

Begin by printing your image(s) from your computer onto the laser decal paper, being sure to remove the thin onion skin protective film. Your image should be set to 300dpi. Print on the GLOSSY side of the decal paper. Print one sheet at a time to avoid a paper jam in your printer. Allow the toner to dry for a few minutes. Then apply the decal to your enamel surface using the standard technique (although Andrew Kuebeck places iron oxide decals "upside down", with the iron oxide directly on the surface of the enamel). You may fire these images at a variety of temperatures, from 1300 to 1500.

Laser printed decals have become very popular, because of the freedom and speed in which you can develop an image. The downside is, of course, that medium value brown which is, at present,

the only color that most enamelists can obtain with a home computer and printer ALTHOUGH, you can decal onto colored bases, paint over and under the decal with watercolor enamels, etc

Again, the fun in this technique is your freedom to develop your own images, text, and photos . In a world of digital cameras, Photoshop, and Google Image, you have unlimited sources of material, and a black laser printer is an inexpensive tool readily available almost anywhere.

### **FULL COLOR DIGITAL PRINTED DECALS**

This is the newest, and perhaps the most exciting technique because you are in control of your own imagery and you can obtain these decals in full color. You may find imagery or shoot your own photos to be transferred into decals. This method is actually a number of years old, but it has been pretty much confined to the ceramics world, and pretty much to industries making products like custom decal china or other commemorative items, memorial portrait plaques, ceramic tile murals for corporate headquarters, etc. As of summer 2015, there are a few businesses in the US who will print your decals, and some who are marketing the printers and equipment. I am showing decals printed by two businesses; Enduring Images located in Golden, CO and Milestone Decal Art located in Ossining, NY. There are other businesses which also do this printing – please see “Sources and Supplies”

At present, the down side to this process is the expense and the delay because someone else is printing your decals. The possibility of purchasing your own equipment, especially when it becomes a bit cheaper, is on the horizon. Meanwhile, here is how to prepare your artwork for printing:

#### **For Enduring Images**

Your artwork should be sent at a minimum 300dpi to scale or greater. Jpg, tif, pdf and psd formats are all fine. File transfer services can also be used for large files. We ask that you send your artwork sized to the approximate dimensions of the plate you choose.

For pages of decals - work should be on a standard format – 8.5” X 11”. The printable area is 8.25” X 10.75”

RGB color profile. Image can be emailed

#### **For Milestone**

Set up your file to print using a design program like Adobe Photoshop, Illustrator or Acrobat. We recommend saving your file as .PDF, .PSD or .TIFF formats.

The printable area on a sheet of decals is 10.25"x15.75". Fill this area with your designs to maximize the space. If you need a digital decal larger than this size, contact us about our custom large size printing services.

Send your file to [info@milestonedecalart.com](mailto:info@milestonedecalart.com). If your file is larger than 20MB, you may need to use a free file sending service like [Dropbox](#) or [google drive](#).

**Here's how to get the best from your prints – from any printing service bureau.**

1. 300 dpi resolution will yield the best results. Lower resolution or blurry images will yield a poor decal quality.
2. Black & white images should be in grayscale.  
For Milestone, color images should be in "CMYK SWOP coated" profile. This CMYK profile will give you the best rendering on your screen of the color limitation of the ceramic and glass digital decals. For Enduring Images, a RGB profile is preferred.
3. **Milestone** offers two different color sets: a bright red cadmium color set and a magenta color set which tends to yield a wider gamut of colors. They also offer two different finish on the our ceramic and glass digital decal. You will need to select your finish option at the time of purchase.  
**Option 1:** Regular Covercoat finish will burn away during the firing. Depending on the softness of the glaze, the density of the print and the type of colors, the decal will be more or less matte  
**Option 2:** Flux + Covercoat. The flux is a thin layer of glass applied over the decals to protect it and create a glossy finish. Despite the thickness of the flux being paper thin, this finish might leave a slight raised edge at the edge of the decal. The softer the glaze on the ware the less obvious it will appear. If you prefer flux, Milestone usually recommend a full coverage of the ware, or you can also cut the decal close to the edge of the image.
4. **Enduring Images** In order to enable the broadest production, MZ Toner Technologies offers a variety of toner sets that have different color tones, applications and firing temperatures. Each set has been created on the basis of these characteristics, which are essential for obtaining excellent results. Their toner selections, therefore, cannot be mixed. For further information, please contact them. The toner sets for enamels: **RED Selenium Set "Classic"** – firing temperature: from 650°C for glass decorating to 785 °C – Useful for most CERAMICS AND ENAMELED METAL. Colors: Selenium Red, Cadmium Yellow, Cyan, Black This set allows to achieve vivid colors and strong true red. Recommended for glass, most ceramic and enameled metal. **RED Selenium Set "Lead free"**\*\* – firing temperature: 780 °C Colors: Selenium Red, Cadmium Yellow, Cyan, Black This set allows to achieve vivid colors and strong true red. Enduring Images' **magenta set** fires too high for enamels, although it is best for flesh colors. The red sets fire a bit harsh for delicate flesh colors. The pink lam coating has a low melting point (1150F). The green lam is a true ceramic (silica) flux and fires more durable as well as higher (1450F)
5. **Decals4Artists** I have just received decals from them, we will try them. I set the images to be printed up as a 300dpi Photoshop file, RGB color, 10 by 15.5 inches.

## **SOURCES OF SUPPLIES**

### **FOR COMMERCIAL CERAMIC DECALS**

National Artcraft Co <http://www.nationalartcraft.com/>, Beachwood OH 44122 (they have LOTS of stuff). **Phone:** 888-937-2723 **Fax:** 800-292-4916

Olympia Decal <http://www.olympiadecals.com/default.htm>, 715 McCartney Rd., Youngstown, OH 44505. **Phone:**330.746.2726 **Fax:** 330.746.1156

### **FOR SCREEN PRINTED DECALS – Jan Harrell Method**

Stencilpro Orange from [craftyprinter.com](http://craftyprinter.com)

Decal paper – Blinggasm Waterslide decal paper, clear for laser printer from amazon.com

### **FOR SCREEN PRINTED DECALS – Rimas VisGirda method**

#### **SCREENS**

**AWT-GPI (Chicago)** <http://www.awt-gpi.com/supplies.php>

4321 N. Knox Avenue Chicago, IL 60641

**Phone:**773.777-7100 **Fax:** 773.777-0909 **Email:** [sales@awt-gpi.com](mailto:sales@awt-gpi.com)

Screens are custom made to order, allow 3 weeks lead time

A.W.T. World Trade, Inc. - ask for Bryan Green

Monofilament is for direct emulsions –designated by 50-420 mesh

The screens I use for my work and workshops:

8X8 ID\_ wood (standard 1 1/8 in)\_glue, white; monofilament (for direct emulsion)

285 mesh -for printing colors (Europe: 100-120 mesh)

125 mesh -for printing cover coat (Europe: 45-55 mesh)

#### **EMULSION**

Diazo Photo Emulsion Kit - available at Dick Blick, art supply, Hobby Lobby, etc.

### **FOR ALL SILKSCREENING METHODS**

#### **COVER COAT –SPRAY APPLICATION**

Rustoleum Brand Crystal Clear Enamel –works well, has good “stretchability”

Nikolas spray laquer

#### **DECAL PAPER**

Blinggasm – amazon.com – be sure to buy waterslide decal paper, clear for laser printer

Tullis - <http://www.tullisrussellusa.com/waterslide.htm>

Beldecal - <http://www.beldecal.com/>

#### **OVERGLAZE AND UNDERGLAZE POWDERS AND MIXING MEDIA**

Golden brand open acrylic gel – all art supplies stores carry this



Assorted over and underglazes – Thompson Enamel

Mason Stains <https://www.theceramicshop.com/store/category/57/313/mason-stains/>

China Paints - Rynne China <http://www.rynnechina.com/cat32.html>

### **FOR BLACK LASER PRINTED DECALS (Fire Sepia)**

Decal paper – same as above. Blinggasm waterslide clear decal paper

Best Printer - HP black and white laser printer model 1200 that prints 8x11 inch paper is excellent although might not be available at a Staples or Office Max. You can still find them online, however.

### **FOR FULL COLOR DIGITAL PRINTED DECALS**

Enduring Images

14818 West 6<sup>th</sup> Avenue #10-A, Golden Colorado 80401 **phones** 800-905-3295, 303-278-8868

<http://www.ceramicprinting.com/>

Milestone Decal Art LLC

56 Ferris Pl, Ossining New York 10562. **phone** 914-908-2733 [www.milestonedecalart.com/](http://www.milestonedecalart.com/)

other businesses that custom print decals, both digital and screenprint

Decals4Artists works with many contemporary glass artists, for this March 2020 workshop, I had 3 pages of Decals4artists decals printed. I am just testing them now, and we will all test some during our workshop. This is a completely new product for me.

Decals 4 Artists - <http://www.decals4artists.com/>

Expression Decals – [www.ceramicdecalprinting.com/](http://www.ceramicdecalprinting.com/). I have not dealt with this company. It is worth investigating.

### **UNDERGLAZES AND OVERGLAZES**

Underglazes are colorants or pigments only – they have no glass or flux in them, so they do not vitrify. Overglazes have a glass or flux component, they are actually a type of enamel. In ceramics, underglazes are applied to unglazed ceramics and so they must have a glaze over them or they will come off. Overglazes contain a clear glaze so their colorants are sealed in a glass surface.

In ceramics, overglaze and underglaze are very different, underglaze is much sturdier but more limited in color potential. There does not seem to be such a clear distinction in enameling,

nevertheless, the colorants we use are one or the other – either overglaze or underglaze. Here is a list of what's what:

**UNDERGLAZES:** underglaze ceramic pencils, underglaze crayons, mason stains, Thompson P-3 underglaze black, Thompson PEMC sets of mechanical pencils

**OVERGLAZES:** 900 series Thompson overglaze colors, SEC 21 Thompson painting and screening enamels, China paints, Versa Color tubes from Amaco (no longer being produced but available on secondary market), Thompson P-1 overglaze black, most commercial ceramic decals, digital decals (they have a covercoat applied at the printers) watercolor enamels

### **INK PRODUCTION FOR SILKSCREENS**

I'm currently experimenting with ink formulations, using both underglazes and overglazes. Most of the time I'm using Golden brand open acrylic gel as a vehicle for the pigments. I'm mixing about a 50 / 50 blend of gel and pigment on a glass slab, then I mix it well with a palette knife. Thorough mixing is necessary, blend to the consistency of frosting. After achieving a well blended mix, apply to the top edge of your screen and use a squeegee to screen onto decal paper (or your fired enamel, if desired). These decals dry quickly, usually within 30 minutes

### **EXPLANATION OF FUSION / EXPANSION / SOFTENING DIAGRAMS**

On the attached charts you will see enamel numbers, followed by fusion / flow, expansion, and dilatometric softening point. The fusion / flow numbers are probably the most important as you apply different color enamels on top of one another. A low fusion number means the enamel does not flow readily – it is more like molasses when it gets hot. It is not as prone to movement when heated as a high fusion number. A high fusion number means the enamel tends to thin out, it might flow or drip more readily on a vertical surface. A soft firing enamel is an enamel with a high fusion / flow number and a low softening point. Conversely a hard firing enamel has a low fusion / flow number and a high softening point. Low expansion enamels should go on top of higher expansion enamels. That is the reason for applying leaded enamels over non leaded enamels – the leaded enamels are low expansion.