

## LASER-PRINTED DECALS FOR CERAMIC USE

Commercial ceramic decals are made from China paint silk-screened onto decal paper, and fired to low temperatures of 022-016. This allows for printing of multiple colors, but requires familiarity with silk-screening and specific materials to do this.

Laser decals use a special decal paper that is heat-set in a laser printer, and takes advantage of the iron used as a toner component for most laser printers. These will be monochrome, iron-colored images. Although industry is developing color digital printing processes, the equipment is expensive at this time. Easy Ceramic Decals, artist Andy Brayman's business, has closed. Try an internet search for digital ceramic decals.

Regular water-slide decal paper requires the use of a cover-coat, as mentioned below. Newer decal paper made for laser-printing requires no cover-coat and is very easy to use.

Laser decal paper is available from various sources. At school we get ours from:

### Bel Inc

6080 NW 84 Avenue  
Miami Florida 33166

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

[http://www.beldecal.com/laser\\_paper.html](http://www.beldecal.com/laser_paper.html)

Bel makes this paper for non-fired use, and does not mention firing on their web page last I looked. Paper comes in clear or with a ground that fires translucent white. It comes with a tissue cover sheet that had to be removed before printing. Please note: as of 2013, some people have tried the Bel decal site and not found it. They seem to do intermittent maintenance or turn their server off. Try again during business hours. The current laser decal paper is an improvement on the old water-slide paper: the laser paper heat-sets the toner onto the decal medium and needs no cover coat. The old style decal paper needed a spray fixative cover coat, and that became brittle over time (leading to a limited shelf life once you made the decal).

We are using HP laserjet printers successfully. Reports are coming in that laser print cartridge manufacturers have changed formulation to be more environmentally friendly. This has lowered the amount of iron, and there are reports that the newer laser toner does not make a fireable decal. If that is the case w/the toner you try, then you'll need to get special high-iron toner cartridges for your printer made for printing checks. Because the check numbers are read magnetically, the toner does still contain the high iron needed for a decal you fire. One company that produces this toner is Ganson Engineering Inc <http://www.ganson-store.com/> 928 854-5000

If you're making images in Photoshop, it's suggested that you use 300 dpi, black and white or grayscale for your image.

### Online Resources:

Print and Clay web site, with images and tech info: <http://www.printandclay.net/>

Charlie Cummings sponsored Clay Prints Facebook group for people interested in print and clay:

<https://www.facebook.com/groups/402841139758502/>

### Book Resources:

Scott, Paul, *Ceramics and Print*

Wandless, Paul, *Image Transfer on Clay: Screen, Relief, Decal & Monoprint Techniques*

Ceramic sculptor Denise Pelletier has done workshops on these processes, and generously offers the information below. Her discussion was from a time when water-slide decal paper required a cover coat. The newer laser paper does not.

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Info below from artists Denise Pelletier [deepelletier@hotmail.com](mailto:deepelletier@hotmail.com)

Laser decals.docx



Top: unfired decal applied to cone 10 celadon

Middle: fired to cone 02

Bottom: fired to cone 2

### How and why do laser printer decals work?

Black laser printer toner is composed of tiny iron filings, other pigments, and tiny beads of plastic. When a laser printer prints an image, it establishes a static field on the piece of paper, the toner sticks to the field, then the whole thing goes through a heat element which melts the plastic bits, fixing the toner to the paper (in this case, decal paper). When a decal from a printer containing enough iron oxide is applied to a ceramic surface and fired, the iron oxide survives the firing. The resulting image on the ceramic surface is permanent and sepia colored- ranging from tones of brown, to reddish purple or ochre. The exact color depends on the composition of the glaze underneath the decal, and the firing temperature of the decal.

Not all laser printer cartridges contain iron or enough iron to work as a ceramic decal. All Apple black laser printers work, and so do Hewlett Packard black laser printers. Other brands of laser printers may work, but there is no guarantee unless you test them first. Bubble jet, inkjet, and all color printers do NOT work because they don't contain any or enough iron or other metallic oxides.

## How to make the decal

**1. Create an image** or text directly on the computer, and format it like you normally would print it - positive and right reading (so that the text reads correctly).

OR

Found images and text (from books, magazines, newspapers, or drawn) may be scanned into the computer. The image can be changed or altered in any way you like in Photoshop or another such program. Any image should work, text and line art reproduce beautifully (even old lithographic images).

Arrange smaller images, text, whatever on the page with a small bit of space between images, 1/4" is good. Lots of images can go on the same page that way so you don't waste decal paper, just like silkscreened decals. Fit them on the page in any orientation, but be sure to leave about 1/2" border at the edge of the page all around.

**TIPS:** Photographic work can sometimes be tricky. You may want to convert photographs to halftones so that there aren't any vast expanses of dark black. For any images with large expanses of black, especially from photographic images, it is a good idea to adjust the brightness/contrast about 25%-30% brighter/lighter.

**Note:** artist Jacquie Rice suggests that the very first step is working with images in Photoshop at 300dpi, grayscale or bitmap. She finds that grayscale is best.

**More TIPS:** Large images on ceramic tile or other relatively flat surfaces like plates, can be produced from smaller images using a tiling program (such as Adobe Illustrator) to grid the image for each tile.

**ALSO:** Remember that any image you print on decal paper is a decal! That means you must take into consideration the fact that a big decal won't slide onto a complex or curvy surface without wrinkling. So, relatively flat ceramic surfaces work best with larger images, unless you slice, dice cut, and collage them. Experiment!

**2.** Once your image is completed in the computer, **load the water slide decal paper into the laser printer** so that the printing goes on the SHINY side of the paper. Make sure you cut the paper to a size that the printer is capable of- many printers prefer an 8 1/2" x 11" piece of decal paper to be trimmed slightly-say, an 1/8" less on length and width. Test first and trim if needed. Same goes for 11" x 14" printers.

**3. Print your image** on the decal paper! Print extras if a particular image is important, because sometimes a decal might tear or run when you apply it, so it's best to have extras.

Almost any glazed object works, also fired burnished terra sigillata and most vitreous slips. (Porous surfaces do not work. Terra-sigged pieces should be fired to at least c/04). Every glaze is different, so students should come with an attitude of testing and experimentation. Computer decals work over varying firing ranges, so the first try is always an experiment to find what temperature will work best with my given glaze. It's a good idea to have some small glazed test pieces or tiles if you want to experiment. You might also try decals on found glazed objects.

## Transferring the decal to the ceramic surface

Apply the decals in the same way that you would apply a commercial decal. Keep in mind that computer decals sometimes give you problems if the cover coat isn't right. If the cover coat is too thin, the image will tear or break apart-if it's too thick you may have trouble adhering it to your piece or incomplete adhesion (resulting in burning off part of your image) -

1. **Clean the surface** of your piece (where the decal will go) with alcohol and a clean cloth.
2. **Cut out your image** as close to the edges as possible. Try to make curved rather than angled comers and edges. Sharp edges can cause the decal to lift up.
3. **Fill a shallow bottomed pan or tray with warm water. Soak the decal** for 30-60 seconds, or until the cover coat and image begin to separate from the paper. (Sometimes the paper will curl and flatten out again)
4. **Moisten the ceramic surface** where the decal will go with a wet sponge. This helps you position your decal without wrinkling or tearing it.
5. **GENTLY slide the decal** into position on your piece, carefully smoothing it from the center outward, with a small sponge, soft rubber rib, or rubber brayer. This forces all the water and air bubbles out from beneath the decal. Check to make sure there are no air bubbles or edges that won't stick. If the decal is not in complete contact with the surface, it will disappear in the firing. If you need to reposition the decal, flood it with a little water first.
6. Let the decal dry overnight.

## Firing the decal

The firing temperature for computer decals is quite variable, and depends on the glaze that the decal is on. Since every glaze is different, you must experiment to know what the optimum firing temperature will be for any given glaze. Success can be had from c/018 (maybe lower) all the way to c/9. Basically you should try to fire at the temperature where the glaze is just beginning to flux. This melts the iron into the glaze, preserving the image. If you fire too hot, the glaze will suck up all of the iron or distort your image. If you fire too low, the image will smudge or wipe off. These are some general firing ranges:

On china paint: c/020 - c/018

On low-fire glaze: c/010-c/06

On cone 6 glaze: c/04 - c/1

On cone 10 glaze: c/04 -c/6

On terra sigillata: fire at least to c/04, preferably a bit higher on burnished sigillata only

Make sure decals are stacked in the kiln with at least 2" of clearance between shelves. Fire slowly, especially in the beginning to allow cover coat to bum off without lifting the decal or causing incomplete bumoff of cover coat. The kiln lid should be cracked until the cover coat is completely burned off. I like to leave the kiln cracked right through red heat

EXPERIMENT! You will need to find the temperature that is right for your glaze. If your image burns out at a low temperature, your toner may not have any or enough iron. Firing hotter or cooler or a long firing time than your determined temperature will give you different colors or shades of iron.

Clear glazes w/high Gerstley borate or nepheline syenite tend to "eat" the image. Try firing the decal lower or omit that glaze! And remember, if what you need is a consistent, undistorted image, it is easier to succeed with glazes c/6 or above. [NOTE: at UF we found that lowfire works well if the glaze is stable – like majolica. Highly alkaline glazes, like Alkaline Turquoise (a.k.a. Water Blue) eats the glaze at expected temperatures, but will work much lower.]

### BIBLIOGRAPHY for Computer Decals

Johnson, Garth, MFA Thesis, Technical Statement, NYSCC, Alfred University, 2000

Ross, Katherine, "Ceramic Decals from the Computer" (handout) School of the Art Institute of Chicago