

# Laser Printing to Clean, Smooth Surfaces, version 5.1

By R. G. Sparber

Copyright protects this document.<sup>1</sup>



Using materials found at most supermarkets, you can laser print to metal. It won't even cost you much money. If you already have the materials in your kitchen and den, then it might even be free. Of course, you must have a computer able to generate the artwork<sup>2</sup> and a laser printer.

I am using an HP LaserJet P1102w with a new HP toner cartridge. Not all laser printers are equal.

None of this is original. I have searched the web for months in order to collect just the right combination of materials and techniques.

The procedure outlined here works for me most of the time. Yet there is a measure of "art" in it. I was getting repeatable results from the printer for a week, and suddenly it started to jam. I tried a few things, and the jamming stopped. I have no idea what changed. So if you do not initially get the results I show here, do not give up. Look closely at what is happening and make a few adjustments.

---

<sup>1</sup> You are free to copy and distribute this document but not change it.

<sup>2</sup> If you don't have such software, consider <http://inkscape.org/>



The basic idea is to use the laser printer to deposit toner onto a material that will easily release it. It turns out that this paper is very common – kitchen baking parchment paper<sup>3</sup>. It is a strong paper coated on both sides with silicone. It can handle up to 400° F, so it is fine in the printer. I paid about \$4 for 30 square feet.



The roll is 15” wide. I unroll about 15” of it and use a razor to cut off an 8 ½” strip.

I print on the outside face as it comes off the roll. The toner seems to stick better. If you have trouble, try the other face.



I fold the top over, so I end up with an 8 ½ by 11 piece of paper. That folded over part is critical to reliable feeding into the printer. The two rulers are preventing it from curling up.

<sup>3</sup> See <http://www.engravingschool.com/private/transfers.htm>



The problem with the rolled paper is it wants to curl back up. This tendency can be reduced by scraping a straight edge against the outside of the curl. I hold the corner with one hand and scrape using the ruler with the other.

Feed the parchment into the laser printer with the folded side down. The paper must lay relatively flat, or the toner will not transfer uniformly.

If the parchment paper jams, you can try stiffening it. Place a sheet of regular paper behind the parchment such that the top slips into the folded over section.

Create your artwork using whatever word processor or drafting program you like. Just be sure it can mirror image the artwork before printing. If you are using Microsoft Word®, you will be limited to “Word Art” since that is the only way to flip text. I am using DesignCAD, which lets me create just about anything I want. Just be sure to click the box in the mirror dialog box that says flip text.



When the parchment paper comes out of the printer, it should have toner on it that is barely hanging on. Handle it carefully by the edges and do not put anything on top of that toner.

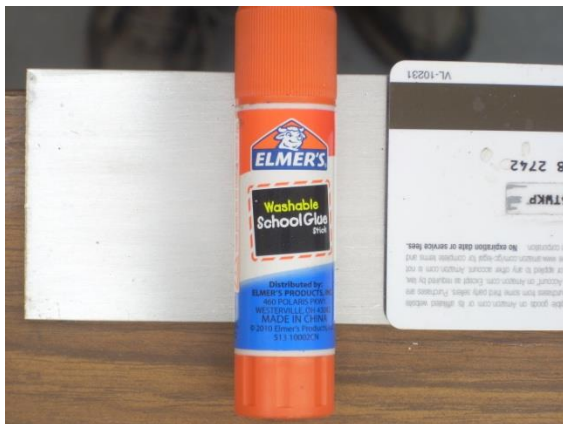
In order to fix the toner to the metal, you will need three more items. The first is some form of glue. I have tried cyanoacrylate glue, and it works well but is rather messy since it must be spread over the area receiving the toner. You might get away with spreading it on the toner, but often I get smears. I have also tried Loctite® Glass Glue, which dries clear. It shows promise, but you have to quickly spread a very thin layer and get the artwork down fast. Set time is 15 to 60 seconds.

Elmer's® white glue works OK most of the time. My favorite is Elmer's Washable School Glue stick<sup>4</sup>. It goes on purple but dries clear.



You will need something that has a smooth end to gently push the toner into the glue. I received a few of these toothpick holders from my dental hygienist, and they work great.... in my shop. They sure make a good burnisher.

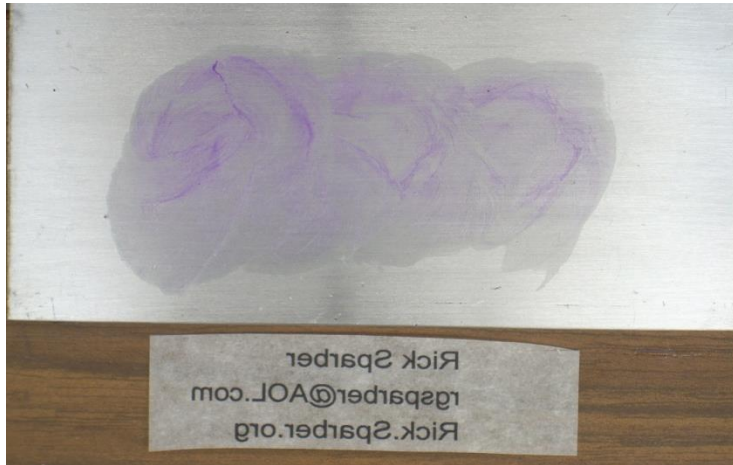
You will also need some form of squeegee. I used an old gift card.



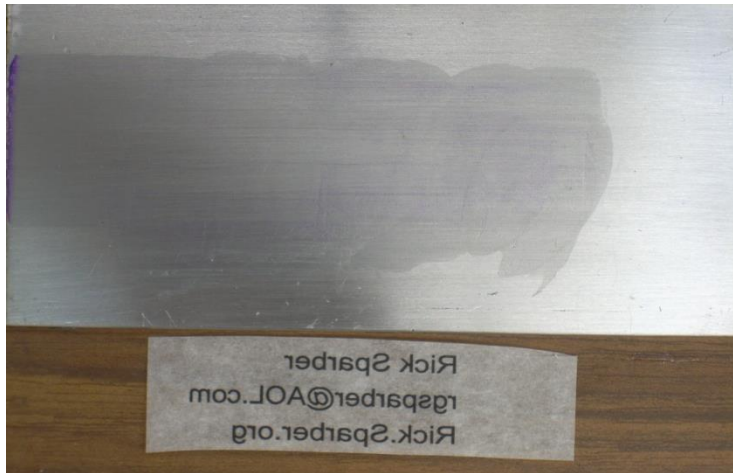
Here is my Elmer's glue and a gift card with the surface that will receive the artwork.

---

<sup>4</sup> I found it at Target® at two for 40¢.



Using the artwork as a gage, I have swirled on the glue to an area larger than needed.



Then I used the card to strike off the surface. This gives me a thin and uniform coating of glue. Note that I draw the card all the way off the surface, so no build-up is left to get in the way.



I then quickly place down the artwork. Do your alignment before the toner contacts the glue.

Rub the artwork down with your finger, so at least the paper sticks.

Then quickly start to burnish in the toner. You don't need to apply a lot of force, but you do need to cover all toner. There will be a slight lightening of the area as the toner releases from the paper and sticks to the glue.

Now, wait 5 minutes for the glue to set. It will not stick to the paper. It is common for the paper to slightly curl and lift. The toner is no longer holding the paper in place.



I have now removed the paper. You can see the toner transferred without any breaks. The glue can still be seen in the background. It is still slightly wet. You can take a moist paper towel and wipe up around the text if you like.

Wait at least an hour before disturbing the toner. Then you can experiment with spraying on a fine mist of water. This will melt some of the excess glue, and it will drip off if the surface is held vertically. One squirt of mist will probably remove most of the glue and none of the toner. Two squirts can start to remove toner.

If you are not satisfied with the results, just wash the area down with water and wipe dry. If you are satisfied, it is time to apply a cover coat.



With the toner weakly stuck to the metal, it is time to protect it. I have a small spray bottle of shellac that does the trick. Just a few squirts and then spread it around with my finger. More coats would protect better.

Another option is to use Rust-Oleum® Crystal Clear Spray Enamel. Go easy on the spray because it contains a solvent that attacks the toner. A light spray will darken the toner and improve contrast. Too much will melt it. It is essential that the can be agitated 1 full minute before spraying. Failure to do so will give you too much solvent and not enough Enamel. The toner will dissolve.



I quickly grew tired of shaking the spray can so used a trick that Rod Grantham showed me – slowly rotate the can when it is not in use.



The glue has dried now, and I have wiped the excess from around the text. I did not spray the toner with water.



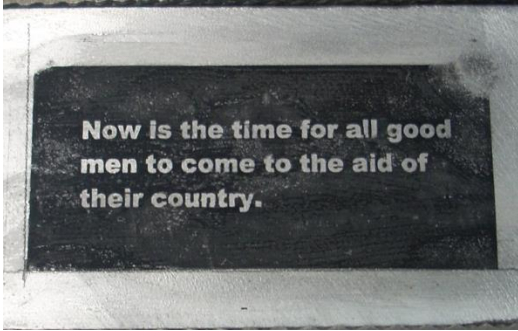
I have applied one coat of the spray enamel and used my heat gun to dry it fast.



We have finally arrived at my first *useful* project. This is a new cover plate for the speed control on my Gingery drill press. The numbered dial came out nicely, but I did put the text below it on a little crooked. It is all coated with shellac.

The dark areas on the plate are rough spots and are not related to the glue.



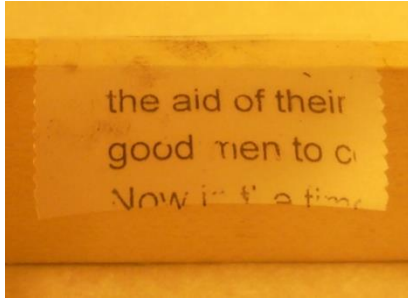


I tried to improve contrast by inverting the image and learned two things. The much larger area of toner tends to cause the parchment paper to jam in the printer. I also found that the large area of toner does not transfer uniformly to the Elmer's glue and metal. I suppose it can be made to work if enough playing around was applied.



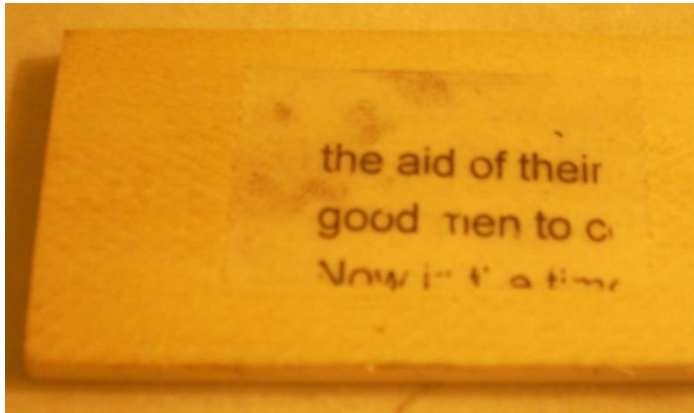
Here is a sample of toner transferred to clear plastic. I'm using Elmer's glue. The white background is just a scrap of parchment paper lying on the table.

## The Tape Variation



A variation on the above procedure is to print a non-mirror image on the parchment paper. The toner can then be picked up with clear tape. Stick the tape down, and the toner is trapped between the sticky side of the tape and the metal. For light-duty applications, this should work well.

Here you see some text picked up with 3M Scotch<sup>®</sup> tape and supported by the edge of on my wooden ruler.

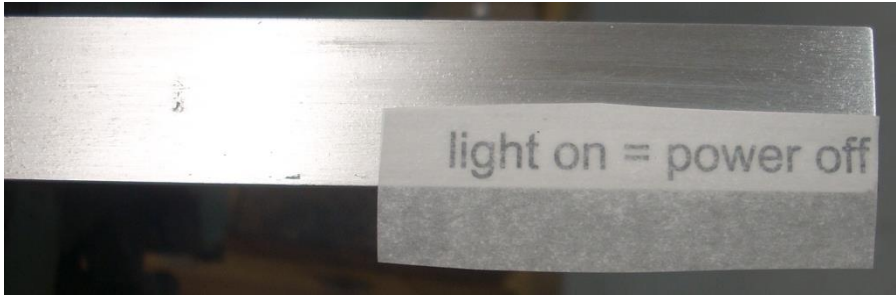


And here the tape has been stuck to the ruler. Those black smudges are toner I accidentally picked up on my fingers and transferred to the tape.

High-quality packing tape should work well here for larger blocks of artwork.

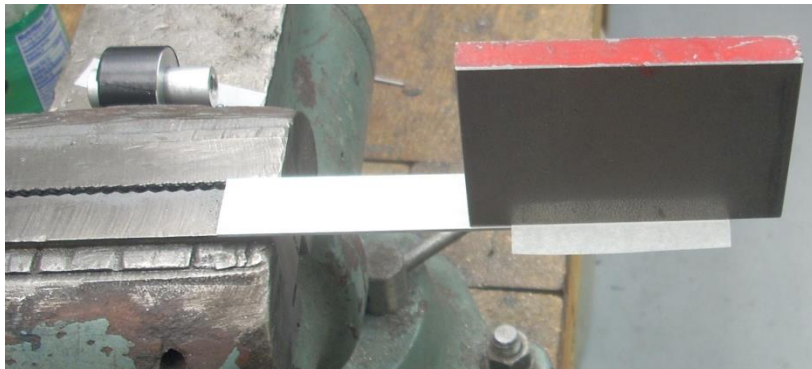
## The Heat Variation

If you are using metal and can sufficiently heat the backside of it, then this variation may appeal to you. Simulating the process in the printer, we will apply heat and pressure to the toner, which will fuse it to the front side of the metal.



Here I have clamped a piece of aluminum angle stock to my vise. After cleaning the surface with an abrasive pad and some alcohol, I

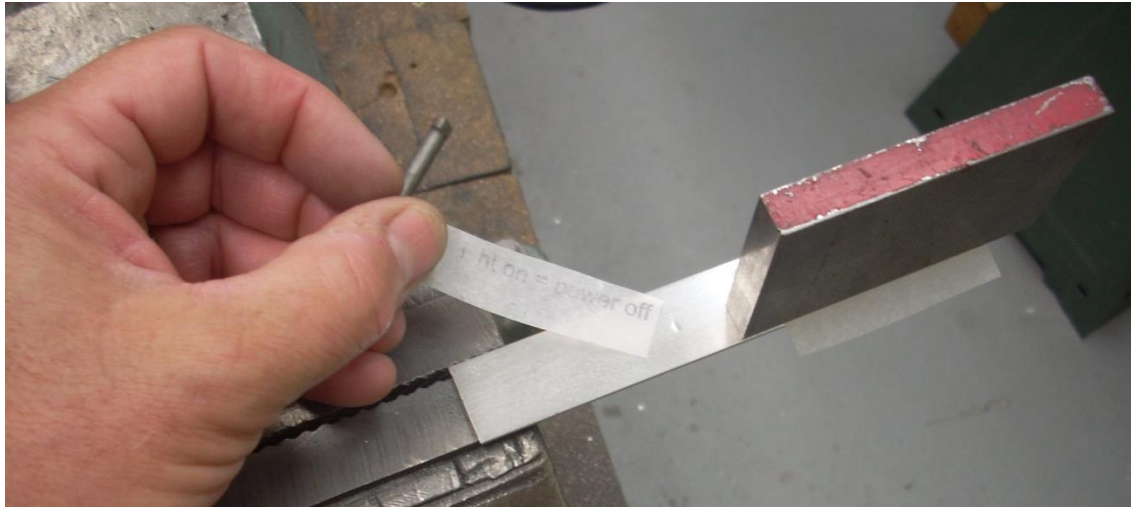
positioned the artwork, toner side down.



I then found a piece of rubber sheet about the same size as the artwork and put it between the paper and a weight.



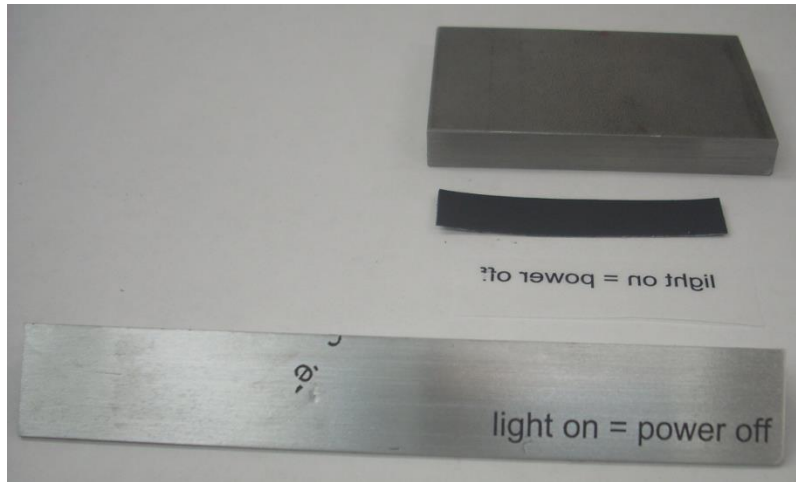
Here is the tricky part – applying heat. I am doing this on the underside because I need to heat the base metal and not the toner. The base metal will fuse to the toner when the temperature is “right.” If I just heated the toner, it would run all over that cold metal.



So But how do you know when the right temperature has been reached? The snide answer is “when the toner melts.” But that is also a good answer. Use a piece of the parchment paper with some toner on it as your temperature probe. When this toner sticks to the metal, your artwork should also be sticking.



After you have reached the right temperature, carefully lift off the weight and rubber pad. If the paper flutters off, that is good. But it may be stuck by a few areas of toner that were not fused. Using your burnish, gently rub down any toner that is still visible through the parchment paper. When all toner has fused to the metal, the paper will just fall off.



Here is the stack up. At the top is my steel weight. Note that it has a smooth and flat edge to apply an even force to the artwork.

Below it is my strip of rubber. It helps to evenly distribute the force. This is a bit of flexible magnet I received in some junk mail.

Then we have the artwork in mirror image. And finally, we have the base metal with the finished product printed on it.

Note the partial print of text to the left. That is my temperature test. It will easily come off with a light pass of my abrasive pad.

The toner is still delicate and should be covered with a clear protective layer.

This variation gives superior results because there is no glue around the letters. As long as you can heat the backside of the metal, this procedure should work well.

## Acknowledgments

Thanks to Pierre of the `gingery_machine` group for suggesting Inkscape. Thanks to James of `mill_drill` for pointing out that different laser printers may have different results. Thanks to Rod of `gingery_machines` for suggesting the Rust-Oleum spray enamel and how to keep it agitated. Thanks to Terri Talton for finding a typo.

I welcome your comments and questions.

Rick Sparber  
Rgsparber@aol.com