Specifications and File Preparation for High Resolutions Film Masks

Software for Creating Masks

We are in the graphic arts world. Programs that work well in our PostScript environment include Illustrator or FreeHand (vector art, *.eps format) and Photoshop (or any other pixel-based program - *.tiff format).

AutoCAD and our Postscript environment don't work together well. In the past, we have encountered several problems with AutoCAD. It does not seem to deal with absolute scaling and dimensioning. Line thicknesses have to be defined explicitely. Library elements don't always print in the correct locations.

Resolution of the Imagesetter

Our imagesetter uses addressable resolutions of 1270, 2540, and 3386 dots per inch (dpi) (500, 1000, and 1333 dots per centimeter). Many of your colleagues are providing Photoshop bitmapped *.tiff files. Each pixel represents an addressable spot. One caveat: the addressable resolution is up to 3386; however, the laser spot size is 20 microns (the equivalent of the 1270 dpi or 500 dots per cm resolution). The imagesetter overlaps laser spots to achieve the addressable resolution. The smallest line that can be imaged (black line against a white field) is 20 microns - the width of the laser beam. However, theoretically, the smallest gap that can be imaged (white or clear line on a black field) is 7.5 microns. As a practical matter, however, you should not try to resolve anything below 40 microns. For instance, if you try to make a mask of a 20 micron black line next to a 20 micron white line next to a 20 micron black line ... across the whole field ... some lines and gaps would appear too thick and others would appear too thin. It would be worse if the lines were horizontal (across the direction of travel of the film through our image setter) than if they were vertical (with the direction of travel of the film through our image setter). There are several reasons for this, not the least of which is mechanical variation in the film transport mechanism.

When working in Photoshop, the default color space is RGB. You want to use the "bitmap" color space of only black and white pixels. Please, do not provide RGB, CMYK, or grayscale files if you have created a black and white mask. If any pixel or group of pixels is gray instead of 100% Black, the image setter will try to create a dot pattern to mimick that gray shade. Also, the file size can be unnecessarily large in RGB, CMYK, or Grayscale for what you are doing.

You should not scale pixel-based artwork. If you design something at 4 inches, 2540 dpi, and want it to be 8 inches (200%), the pixels are enlarged. The result would be an 8 inch design at 1270 dpi.

If you are using Illustrator or FreeHand, you do not have to design to size. The image setter translates the vectors into bitmap art at the resolution of the imagesetter (1270, 2540, or 3386). Vector art is resolution independent; therefore, it can be scaled. If you design something at four inches and want to image it at 8 inches (200%) the vector art will be imaged at the larger size and at the image setter resolution.

POSITIVE versus NEGATIVE

When you print a letter on a laser printer, text is black and the paper is white. If we image film with the same settings, the text is black and the background (the rest of the piece of film) is clear. This is POSITIVE.

For certain contact exposure operations (like making printing plates) the background needs to be black (opaque) and the text or image needs to be clear. This is NEGATIVE.

The choice of positive or negative depends on your optical process. Some processes leave material where the light hits, and remove material where the light does not hit. Some processes etch away the material that is hit by light, and leave unchanged the areas where light does not hit.

If your chemistry etches away the areas hit by light, and you want to make a groove, design a black line on a white field. Tell us to give you a negative which would come out as a clear line in the middle of a black field. Place this on the prepared surface, expose it to light, and process it. The light only hit your prepared surface where the clear line let it. The etching process will etch a grove the length and width of that line. The depth of the groove is determined by the etching process. The rest of the surface is unchanged, since light did not hit it.

If your chemistry etches away the areas hit by light, and you want to make a raised ridge, design a black line on a white field. Tell us to give you a positive with a black line in the middle of a clear field. Place this on your prepared surface, expose it to light, and process it. The light hit the prepared surface everywhere except where the black line was. The etching process will etch away the entire surface except a ridge the length and width of that line. The height of the ridge is determined by the etching process.

There are other types of etching processes which etch where the light doesn't hit. Photopolymer plates for flexographic printing work this way. Where the light hits, polymerization occurs. Where the light doesn't hit, the oligomers can be washed away. In this case, the use of positive versus negative is reversed from the examples above.

RIGHT READING versus WRONG READING

When driving in a car, the license plate on the car in front of you appears "right reading." However, when you look in the rear view mirror at the car behind you, its license plate is mirrored, or "wrong reading."

The emulsion side of the film is exposed to light and developed to form your image. When you use the mask to photo etch something, you must be sure to put the emulsion of the film against the emulsion of the object to be etched (emulsion to emulsion). This is because the film is thick. If you put it upside down, the light will scatter after passing through the pattern on the emulsion side, and give you fuzzy, out-of-focus edges (think diffraction).

Right Reading Emulsion Down (RRED) implies that if your mask and your prepared surface are emulsion to emulsion, the image will not be mirrored. Right Reading Emulsion Up (RREU) implies that you must turn the film upside down to get it emulsion to emulsion with your plate. Therefore, the image on the plate will be mirrored with respect to your original artwork (wrong reading).

In offset printing, when a printing plate is exposed, it should “read right,” not mirrored. This is because, on press, the image is offset onto a blanket cylinder (at which point it is mirrored) and then offset onto paper (at which point it “reads right” again). For flexographic printing, the printing plate should “read wrong,” or mirrored (think of a rubber stamp ... it is mirrored so that when you put ink on it and press it against paper, the transferred image “reads right”).

We do not know for what you are using these masks, so we do not know if you need RRED or RREU. RRED gives you a ‘right reading” transfer. RREU yields a “wrong reading” (mirrored) transfer.

Most of the masks we have seen from your colleagues are symetrical, so right and wrong reading is not an issue. However, as soon as you put type in the design, like a number or description to identify a particular feature, it matters.