FAKING PROCESS COLOR EFFECTS

Utilizing Halftones To Gain Added Color

by
Mark A. Coudray
Impressions Masters Column
May 1993

Four-color process effects are well known, utilizing yellow, magenta, cyan, and black as the four reproduction pigments. What is not commonly known are the limitations of color reproduction with these pigments. It is theoretically possible to reproduce all of the colors that we see through the use of only three colors: yellow, magenta, and cyan. I say theoretical because the pigments available to us are not perfect; therefore we need to add black to expand the tonal range of darker colors. Even with the addition of black, it is more accurate to say that we can reproduce some of the colors that we see. In fact, the range of colors that we can match with just the four process colors is quite limited. This is one of the reasons that printers get so frustrated with process printing; they just can't seem to get the colors matched right!

As a deviation from conventional four-color process, this month we are going to discuss how you can utilize some of the basic techniques of process printing without the use of process colors. There are many creative examples of what you can do this way.

There are three basic objectives that the printer is after when using process color. The first is to expand the range of reproducible colors through the use of overlapping transparent pigments (i.e. yellow + cyan = green). The second is to expand the tonal range from white to solid through the use of halftone dots. The third objective is to expand both the tone range and color range by overprinting transparent halftone colors.

We can use these same objectives to expand the tone and color range of nonprocess colors. To give us a starting point, consider that by using halftones in 10% gradations you expand the tone range of any given ink color to ten steps (10% to 100% of that color). We can also use the following formula to help us predict the total number of colors possible if we use overlapping transparent colors. It is:

$$2^n\text{-}1 \text{ where } n = \text{number of colors}$$

For the use of four colors the resulting possible combinations are 2^4-1 = 16-1 or 15 color combinations. The following table shows the possible number of combinations using only solid overlays.

Basic colors	Combinations
2	3
3	7
4	15
5	31
6	63
7	127
8	255

You should note that these are the theoretical number of colors possible. In reality, when you overprint more than three solid colors on top of each other, the resulting colors tend to look very muddy. You are also limited to some degree by the original colors that you have selected. The lighter the original colors, the greater the chance that overprints will result in a desirable new color. I would suggest that you stick to five or less overprinting colors for good results. You may also consider using two variants of the same color. For instance, a light blue and a medium blue. In combination with a light yellow and a dark yellow, the resulting overprints would yield 15 different versions of yellow, blue, and green. For clarity's sake they would be light yellow (1), medium yellow (2), dark yellow (1+2), light blue (3), medium blue (4), dark blue (3+4), light green(1+3), light blue green (1+4), light yellow green (2+3), medium green (2+4), medium yellow green (1+2+3), medium blue green (1+3+4), dark yellow green (1+2+4), dark blue green (2+3+4) and dark green (1+2+3+4).

The real beauty of using this technique is that there are no halftone dots in use at all–only solid overprints of the colors that you have chosen. Depending on the mesh count, tension, and transparency of the colors you select, you can achieve some dazzling effects without having to worry about dot gain or moiré.

If you are going to use this method, print with the finest mesh that you can. I would recommend a 355 or 390 plain weave low elongation mesh, the same type that you would use for conventional halftone printing. The idea is to put down as thin a layer as possible while still maintaining solid coverage. The total ink film thickness (all the layers on top of each other) must be minimized to achieve the desired resulting colors. If too much ink goes down, final colors will tend to lose their individual values and medium colors will look the same as darker colors. Print from the lightest colors to the darkest. Do not put too much ink in the screen as solid overprinting tends to contaminate later colors in the sequence. Also, the overall color balance of the design will shift somewhat in the direction of later colors. If you print the blues last, the design will be cooler with strong greens and purples. If you print the magentas last, the design will be warmer with strong reds, oranges, and violets.

This method works very well when using fluorescent colors. If you substitute flo yellow, flo magenta, and flo blue for standard process colors, you will obtain an excellent flo orange, flo purple, and flo green from the resulting overprints. By combining fluorescent colors for lighter versions, and conventional colors for darker shades, you can achieve very nice rich greens, violets, purples, peaches, pinks, and purples.

The second technique involves printing halftones of nonprocess colors. The colors can be transparent or nontransparent. Using this approach, it is possible to obtain very subtle colors and some very vivid colors. This is possible because

conventional process colors are not theoretically pure. This limits the range of colors that we obtain by overprinting just the process inks. It is common to employ "touch plates" or "spot colors" in areas where overprinted process colors do not yield expected results. The usual spot colors are red, green, and purple as these are colors hardest to reproduce with conventional process ink. There are some colors (like maroon) that are impossible to obtain without using a single pigment ink of that color.

By utilizing transparent colors, you can blend halftones to obtain secondary shades. This works extremely well for areas like a Caribbean ocean scene where the water blends from a turquoise blue to deep marine blue as the water gets deeper. By blending a transparent aqua (yellow shade blue) with a marine blue (red shade blue), you can obtain a very smooth transition that would not be possible with conventional inks.

Using opaque colors offers a whole new range of tonal properties. The biggest difference is that you do not get much of a blending of color where the overlap occurs. If you blend yellow and blue, the overlap does not result in green. The blend is a smooth transition from yellow to blue. This offers some unexpected and quite interesting results. I have included some unusual examples to give you ideas of your own.

One last possibility is to include garment color into the equation. It would count as one opaque color blending into your color of choice. For instance, if the garment were red, and your ink black, the blend would be from red to black. Do not limit yourself to just color. By incorporating the texture of the garment, you expand the possibilities further. An example here would be the use of an ash or peppercorn garment to simulate birch wood, concrete, or granite textures.