

CHOOSING AND WORKING WITH A COLOR SEPARATOR

by
Mark A. Coudray
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Direction of the industry

The demand for process color is increasing at an exponential rate. As recently as last year, process color reproduction was considered a specialty, something useful to know about, but difficult to make a profit by. This is all changing. Process color is no longer a specialty. It is rapidly becoming a commodity, a required skill in your arsenal of production capabilities. The incredible increase in the sophistication of desktop color separations and the release of programs like Adobe Photoshop have unleashed a wave of designer-driven process color images into our industry.

We are not alone. The entire graphic arts industry is experiencing a revolution driven from the desktop. Traditional functions of the color separator are giving way to a new generation of digital images and predefined color specifications. With this comes a great deal of confusion, misunderstanding, and unpredictable results.

The making of four-color process separations is not a well-understood process to begin with. In talking with hundreds of printers across the country there is a general perception that color separations are made with very expensive scanners that resemble a copy machine in the way they operate. You scan the art in, and out the film processor comes four or more halftone color separations. What goes on in the middle of the process is a general mystery.

Until the last two or three years this has been the way that separations have been produced. In fact, the electronics, software, and procedures have been exceedingly complex. Some of the highest paid technicians in graphic arts have been scanner operators. They work in a sophisticated world of color, electronics, and mathematics. Their knowledge is generally far beyond the general scope of the average screen printer. We might as well be explaining the nuances of invasive intercranial procedures (brain surgery).

The power of the desktop has changed all of this. Now some of the most sophisticated techniques can be performed with the click of a mouse. Never mind that we are not fully aware of what is happening. The end result is the conversion of a full-color image into four-color separations. As more and more customers ask for process color reproduction, it will be necessary for you, the printer, to understand more about the process and what

avenues are available to you. This article is an effort to help define where the color separation business is today, and where it will be in the near future. I will also discuss some advantages and disadvantages of doing your own color separations.

Simple desktop separations

There are generally three levels of color separation preparation. The first is entirely on the desktop. Here the image is designed on the computer, and camera-ready art is generated on a laser printer. This is then photographed with a conventional graphic arts camera and film positives are generated. Another option is to output directly to translucent vellum that is then used as a film positive.

These approaches are very limited. It is very difficult to obtain any type of consistency, other than noncritical color reproduction. This means it is possible to obtain secondary (red, green, and blue) and some tertiary (grey and brown) colors. This approach is characterized by having high contrast images where the light areas burn out to white and the darker tones go to solid. The tone scale from light to dark is very compressed and lacks smoothness. There is a definite "banding" of the image as the compressed tone range attempts to make a smooth transition from white to solid. This is particularly noticeable in color gradations in areas like sky gradation to the horizon.

Dot gain is difficult if not impossible to control. This is caused by the fact that halftones produced on the typical laser printer are not precise. Size and percentage of the dots in the design cannot be controlled. They may print lighter or considerably darker than intended, and there is nothing that you can do to change this. This is compounded by the fact that the typical tonal step on a laser printer is about 4%. Our eye can easily detect a tone step

of this magnitude and sees it as a banded step.

The new 600, 800, and 1000 dpi (dots per inch) laser printers are improving the tonal stepping capacity of the image, but the lay-down of toner is still unpredictable. The factors that influence the deposit on toner on the paper include: type of toner, age of toner, humidity, type of paper, and age of the laser printer. New printers tend to give better results than older machines. I have noticed a large drop in image quality and optical darkness of toner with the age of the machine.

Opacity of the toner image on vellum is another big problem. If you look at toner under a microscope, the dots are really a cluster of toner spots. The halftone dots formed are not hard and sharp as they are on film. As a result, it is very easy to "burn" through the toner image on the vellum when making your screen. If you are using a less than optimum light source, the results are even worse.

A third major problem with images generated on a laser printer is that of registration or fit. It is almost impossible to obtain accurate register on paper that is heated as it moves around the rollers. If you further enlarge the paper after it is off the laser printer, you magnify this error.

The degree of variation that you are willing to accept depends on the type of work that you are doing. For manual printers with a good hand press, the results may be good enough. Most printers are thrilled to achieve 10 or 12 colors while only printing 3 or 4 on the garment.

If your artwork is flexible and forgiving with a degree of latitude, simple desktop separations may be good enough for you. To determine if this is the case, you must ask yourself, "Are there any critical colors in the image?" Critical colors are also

known as "reference colors" or "memory colors." These are colors that our mind remembers. Subjects like fleshtones, concrete, company logos, and food fall into this category. If you have any of these in your design, do not attempt to produce separations on the desktop. Go for the images that have simple secondary colors that can vary. Sunsets, ocean water, grass and foliage are examples of flexible subjects that are not critical.

Imagesetter separations

The next step up are separations produced with a personal computer, but imaged on a laser film recorder known as an imagesetter. These are very accurate devices that can generate film in resolutions of 1200, 2400, 3000, 3600 dpi and higher. They are very similar to film recorders of the high-end laser scanners. The printer usually does not have an imagesetter and will send his disks to a service bureau that has one. Like images generated on laser printers, there are pitfalls to imagesetters as well.

Let me say, at this point, that it is possible to obtain excellent quality color separations with the use of an imagesetter. It is also possible to save a considerable amount of money if you use a service bureau to output your film. This is definitely the direction of the future for the electronic prepress industry. Anyone with a good personal computer system and desire can achieve very good to excellent results with this technology.

Along with this encouragement comes a great deal of responsibility and the need for serious technical education. The reason that you can obtain separations at a lower price is that you are making the technical decisions about your film and printing parameters that go along with them. If you are willing to do your homework, you can benefit.

There has been quite a bit written in the trade press over the last few months about desktop separations produced with an imagesetter. This is still in its infancy and has a great deal of room for improvement and development. I do not want to get into all of the technical details here as we do not have the time or space. I will provide some of the benefits and limitations for your consideration.

The biggest advantages are those of time and cost. It is generally possible to get film imaged from your disk in 1 to 3 days. This is very quick turnaround for separations. If the service bureau that you are using will archive your digital file for several days, it may also be possible for you to get corrections and changes made almost instantly.

The second biggest advantage is in cost savings. With film produced on an imagesetter, the services that you select are on an "a la carte" menu. You determine just what you want. As a result, savings can range from 15% - 35% or more on a standard set of separations. You have the choice of film negatives or positives. By going with emulsion-up positives, you save one step in the process, and you can generally reduce your cost by about \$10.00/sq ft of film x 4 films.

You can also choose the type of proof you desire, or no proof at all! Types of proofs include digital, ink jet, overlay, and laminated. Digital proofs offer the most for the money. They have the potential to be the most accurate and also the least expensive. They are generally limited in size to 11" x 17". Ink jet proofs are digital in nature and very accurate, but very expensive. They are also known as Iris proofs. They can be as large as 30" x 40" or bigger. Overlay proofs are probably the most common, moderately priced, and not particularly accurate. They do not represent accurate dot gain, and color can be a problem. They are available in most sizes

up to 25" x 38". The last type is the laminated proof. It is expensive, and does not represent what the image will look like on the garment. Do not use a laminated proof unless there is no other alternative. Laminated proofs are usually supplied along with color separation positives provided by the customer to you. The laminated proof is the most common type of proof used by lithographic color separators.

It is very important that you use at least one of these types of proofs. Producing separation films without a proof is suicidal. There are just too many things that can go wrong. Even if you are sure about what the image is going to look like, have a proof made. This will show any differences between the color on your monitor, and the digital image that you have designed. What you see on the screen is almost never what you get. The proof will at least give you a clue as to the direction that you are going. It also will act as a check to make sure that the film was processed properly. Often the imagesetter or the film processor will be out of calibration, and the finished film will not represent what you are expecting. With a proof you will see any shifts or surprises before you burn the screens and go to press.

The down side of having separations done on an imagesetter is that you are responsible. You set the printing parameters for color, tone, dot again, ink color gamut, dot shape, angle, and all of the other elements necessary to obtain good quality separations. While most of the desktop separation programs on the market do a good job for litho prepared images, the jury is still out on how well they do for screen printing. Separation programs can cost anywhere between \$500 and \$20,000. Obviously the software that costs \$500 is not going to give you the results of the \$20,000 version. For our

printing process it may not even be necessary.

Regardless of what you select, film that comes off the imagesetter is your film. If there is a problem with dot gain or color, you still have to pay for the film. It is a risky venture if you do not have complete control and understanding of the process. If you feel confident and are willing to experiment, go for it. You may get excellent results. The good news is that as more and more screen printers start doing separations on the desktop, there will be more and more service bureaus that are familiar with the individual requirements of our industry.

As a general guideline, follow the approach with simple desktop separations. Don't do any really critical work in the beginning. Build in some latitude for yourself. It is better to be conservative and successful than wild and crazy and broke. Carefully study the results of your efforts so that the next set of seps will be better. With some effort you can achieve very nice work.

The biggest challenge that we have seen with the imageset separation is moiré. Postscript (the computer language of the desktop) is not well suited for screen printing, and as a result, there can be marginal to significant problems associated with it. Localized to global moiré is probably the biggest one that we have seen so far. Because of the difficulty in obtaining a set of angles that work for screen printing, the problem of moiré is difficult to control and eliminate. This will change in the near future with some big improvements in halftone technology. But for now, we must live with it.

High-end separations

This is the traditional approach to color separations. It has been the bastion of a

select few who are willing to invest hundreds of thousands of dollars in sophisticated equipment and highly trained personnel. There are over 2000 high-end separators in the U.S., but only a handful who are capable of working with our industry. Why is this?

The main reason goes back many years and has its roots in traditional methods of doing separations. Screen printing is a very unique type of printing process that has its own set of specific requirements. Unfortunately, these special parameters require the separator to do special set-ups on the scanner and camera for the process. Since the equipment and labor are very expensive, the separator is reluctant to make these special changes. It would be as if you had a 12-color automatic press and your customer asked you to change all of the pallets to youth sleeves for two dozen garments. It just did not make good economic sense. As a result, we were forced to live with what the separator would be willing to provide to us. Sometimes it would work, and sometimes not. What made it even more of a problem was that screen printers of the past were notorious for their lack of control and understanding of how the process works. This meant that the color separator was in a “no win” position of delivering good film. Most of the really good separators out there have been, or are currently, screen printing—and they understand the process.

High-end separations are more expensive than desktop ones. The equipment is in a league of its own. There is total flexibility to produce film that can match the most demanding of situations. For critical color work, there is still no other choice.

With an experienced high-end color separator you are connected with a resource who is familiar with the process, inks, and presses in our industry. They also know what level of experience you have

and what types of challenges you are facing. They will use their experience and knowledge of the process to maximize your results. This is not to say that you will get perfect results. You must have a certain level of professionalism and process control in your own organization to use the film properly.

It is, however, up to the separator to make the technical judgments necessary to produce film that you will be able to use. High-end separators also have capabilities far in excess of the desktop realm. These include sophisticated tonal and density masking, color correction due to pigment and substrate variation, unsharp masking (much more powerful than the desktop version), tonal gradations that are 4 to 25 times finer than desktop, and precise angle and moiré determination.

What can you expect from the separator

One of the biggest challenges that faces the prepress industry is that of professional responsibility. The process of generating color separations is not simple nor is it easy. Those who have produced film for a number of years are well trained and have a complete understanding of the color separation process. That does not mean that they understand the screen printing process. Because of this, it is common for litho separators to think that they can easily produce film for our industry. I have not met one yet that hasn't been rudely awakened to our specific challenges. Usually this is enough to discourage them.

There are a few who have shown a real willingness to make the commitment to our process, and the necessary differences between lithography. For these separators it is a long and educational road that they journey. It is like learning any other specialization. If you are a mechanic and specialize in Mercedes Benz, you can work

on BMW, but not at an optimum efficiency. Since you do not know that machine, there are special situations that you must become familiar with. After sufficient training and experience, that same Mercedes mechanic is now an experienced BMW mechanic.

For the screen printers who work with these separators, it is a mutual learning process. Both parties will experience the pain and suffering as well as the sweetness of well-deserved success. The important point here is that of commitment and dedication of both the separator and the printer to work closely together to create a workable profile for both. The separator has to make a profit, as does the printer. Just as every patient in a doctor's office is unique, so is each screen printer. A long-term relationship between the printer and separator is essential in developing the trust and understanding of each.

The desktop revolution is presenting the color separators with the same scenario that faced graphic designers when Aldus PageMaker was introduced in 1985. All at once anyone with a computer was able to design. Does that make them designers? Of course not. With the desktop publishing boom we saw an incredible number of badly designed newsletters, flyers, brochures, and anything else that came from novice designers. In the hands of an experienced professional, desktop publishing proved to be a tremendously efficient tool in increasing productivity. The generally accepted ratio of 3 times productivity on the desktop over manual art has stood up well in a number of benchmark studies.

Desktop color is only a tool. It will not make you a better color separator any more than buying Jack Nicklaus golf clubs will make you play like Jack Nicklaus. Only dedicated practice, education, and commitment will lead you to the profes-

sional results you seek. While there will be a re-alignment and redefinition of the color separation process, it will not happen overnight. Use the tools when they are appropriate to your situation, and use the traditional color separator when appropriate as well.

What are your responsibilities?

When working with a color separator, there are several things that you can do to achieve a successful outcome. Begin by setting realistic expectations. Four-color process is not going to reproduce all of the colors that we see. It is not physically possible. This is one of the most common implied myths in our industry. Process color only approximates the full spectrum of color. There are many colors where it is not possible to achieve exact color matches with process color. Knowing this going in will help establish workable results for both the printer and your client.

If you have never printed four-color process before, you will not be an expert instantly. Generally speaking, the better a printer is with flat color, the better he is with process color. Attention to detail is critical. Things like exact registration (not close, but exact) and perfect color matching are essential first steps.

Having mechanically sound equipment with no loose parts is a basic requirement. Tight screens, preferably retensionable, and a light source with the proper spectrum are also basic requirements. Without these baseline control points the best film in the world will do you no good. Poorly maintained equipment and equipment that is not designed for the task at hand can result in very unsatisfactory results. This is precise work that you will be printing, and it requires precision throughout the entire process. Unlike flat opaque color, process color demands a controlled image be deposited in precise

register with transparent ink. If there is any variation, your printed results will vary dramatically.

Do not be lulled into a false sense of security if you have one or two—or even half a dozen successful jobs. Certain types of art print better than others. With new process printers, it is very easy to identify this pitfall. It usually starts with a phone call from the angry printer demanding to know what the separator did differently on the last set of film because it didn't print like jobs in the past. Before you fall victim to this scenario, please be careful to analyze the color, tone, and neutrals in the image that you are having trouble with. Try to identify what is different with them before you call the separator. While the separator is certainly capable of making mistakes with your film, it is not his intention by any means. No one likes to redo work, and no one likes to have an unhappy customer!

This leads me to another very interesting observation. If you receive film from a separator, and it is not printing properly, do not print the job. If you use the film and get unsatisfactory results, that is your problem. It amazes me when a printer does this and has the customer refuse the job. He will then call the color separator and inform him that he is not going to pay the separation bill and that the separator is at least partly responsible for the downtime on the press and the loss of the printed garments. Sorry, it doesn't work that way. No one would consider mixing the wrong color of ink, printing the shirts, then call the ink company and tell them that you aren't going to pay the ink bill because you printed the shirts incorrectly! If the color seps are not printing properly, there is a reason for it. Get it fixed or corrected before you print the garments.

One of the most common situations for printers is to get themselves into a time

deadline. We are all aware of the trend toward short leadtimes and quick turnaround. If you are going to be printing four-color process you need to avoid the critical delivery dates if you are going to avoid problems. Until you are very experienced this is one of the fastest and surest ways of getting into big trouble. Allow at least three or four days to image your screens and proof the job before going into production. If a correction needs to be made, there will then be time. Also inform the separator that you have a deadline job and that a quick turn on corrections may be necessary. The separator can then archive your image and be ready to respond if necessary.

A word about artwork now. We have all experienced the customer who has come in with a business card or a matchbook as camera-ready art. The same situation applies with process color. If the original artwork is of poor quality or has been previously printed (like a poster), you can expect less than perfect results. Try to choose artwork that is well executed and close to 1:1 in size of the final image. Avoid very great enlargements from 35mm slides. Enlargements greater than 1200% really start to fall apart. Avoid multiple layers on the artwork. This causes shadows and other image imperfections.

Try to avoid fluorescent colors and highly saturated colors as these are difficult to reproduce on film and in your final print to the customer. There are certain colors that do not reproduce at all. These are usually the purples, reds, violets, and dark blues. They require additional spot colors in the separation process. Your color separator should have plenty of advice for you here.

Another common situation is where the customer directs the color separator to "match the original artwork." This is almost never what the customer really

wants. It is probably the most common misdirection that the separator receives. What the customer really wants is a bright clean image with good contrast. There are only one or two printers in the country that are capable of printing film that matches the original artwork. Let the separator guide you here. This is a perfect example of why it is extremely important to have a separator familiar with screen printing on garments!

When sending original artwork, pack it securely in a strong, flat container. Artwork is delicate and easily damaged. Insure it whenever possible. If you do not indicate otherwise, the returned artwork *will not* be insured. Invariably, the art that is damaged will be irreplaceable and can create real problems.

The more written communications that you provide the separator, the smoother will be your relationship. Most separators handle hundreds of jobs a month. You will greatly slow down the process if you do not include written instructions. The most basic requirements are vitals (name, address, phone, contact person), ship to, date required, inventory of what you shipped, size required, line count needed, and manual or automatic printing. If in doubt, indicate that you do not know and ask that the separator call to discuss it with you.

There are many, many more things that could be added to an article like this. I feel that the subject is relevant and will continue to evoke interest and discussion for quite some time. For now we must summarize and leave some parting bits of wisdom and philosophy borne from experience.

Each type of separation has its strengths and weaknesses. Choose the one that best fits your needs. Be willing to compromise and go in with a reasonable set of expecta-

tions. Very inexpensive separations will give limited results. Choose this type for noncritical jobs. As the type of work becomes more sophisticated, the cost of the separations will increase. The price you pay will be based on how much risk and education you are willing to undertake, as well as what you are willing to settle for. Remember that there are no free lunches here. The results you receive will be in proportion to how much homework you are willing to do in your operation, in understanding four-color process and the separation process, and in the mechanics of your equipment. If you are dedicated, you will get good results. As with anything in life, the truly committed will be the ones who excel. Marginal operators will achieve marginal success.

Where you fit in is up to you and how much time you invest with your separator. The high-end professional will be committed to you in the same manner. He is interested in a successful relationship where you are making money printing the film that he provides. If you are not, you won't be buying film from him in the future. It is in his best interest to see that you are successful.

Lastly, if you are a novice, and just getting into the business of process color reproduction, don't shortcut. The more that you learn now, the quicker you will be getting great results. If you do not have any intention of becoming proficient with four-color, you will be in for a rough time. I don't mean to sound discouraging, only a realistic admonition of what you can expect. The industry is getting more and more competitive, and your niche in your market will be determined by the skills that you learn and practice.