PHOTO LAB MANAGEMENT

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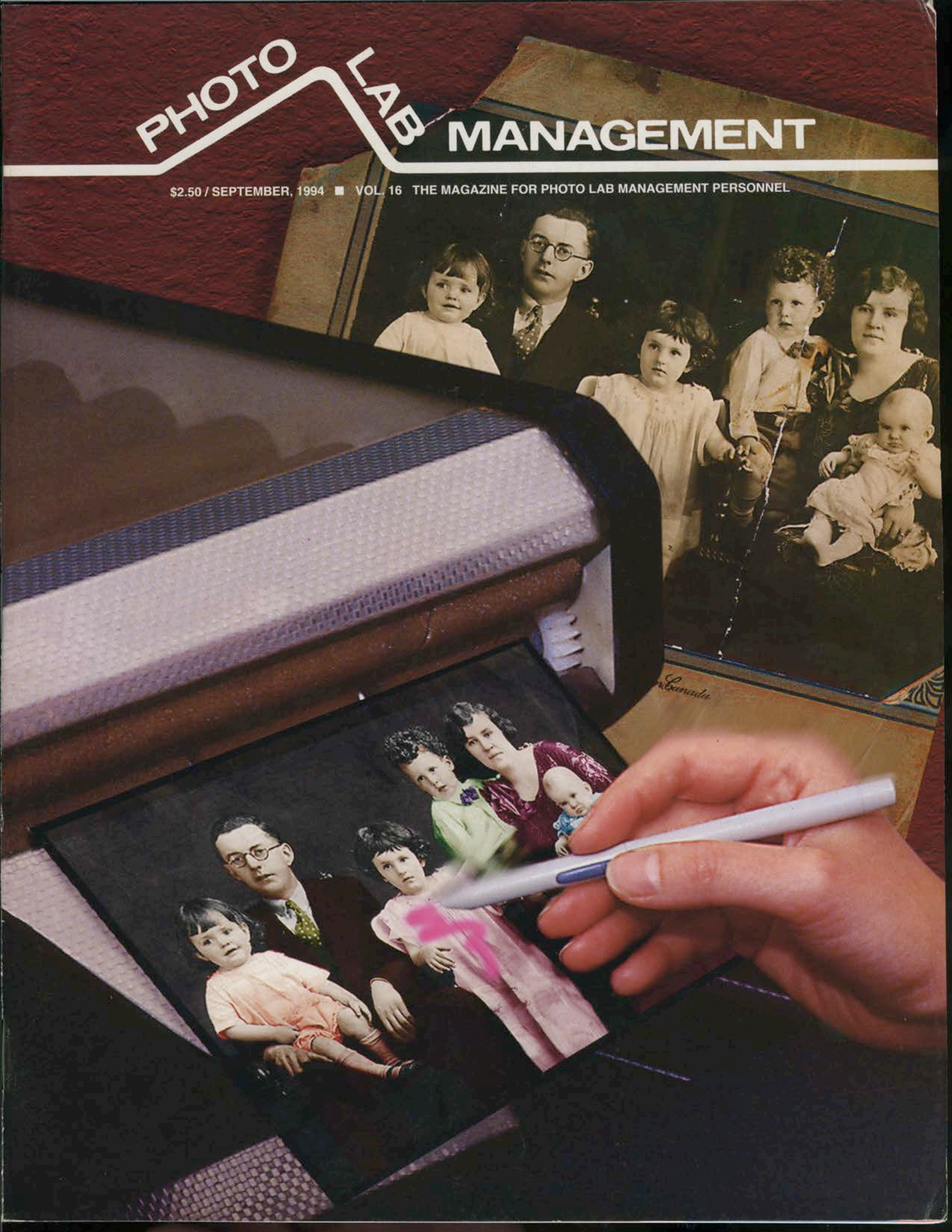
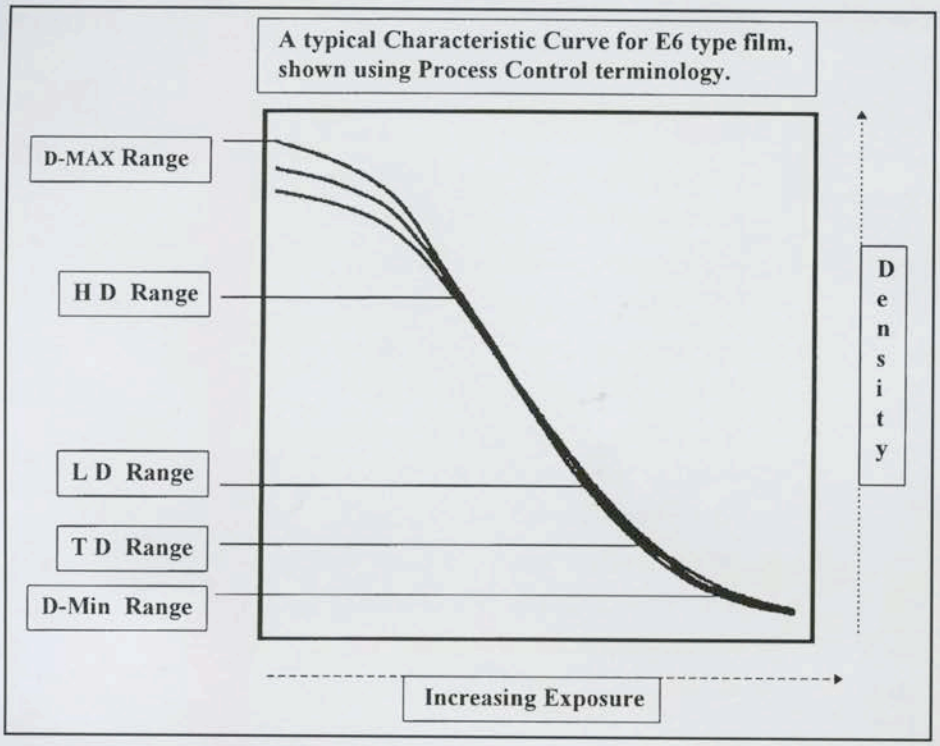
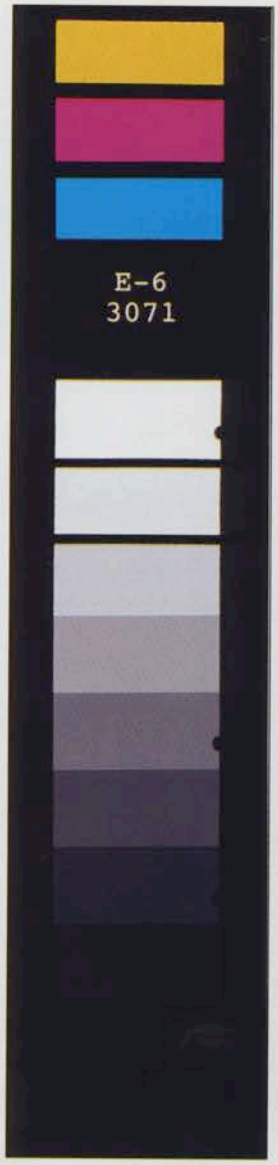


Are You Sure You're "In Control"?





Michael Peres and Jim Szczygiel

I HAVE DONE considerable work over the years evaluating color transparency films for personal as well as professional reasons. This rewarding work has included projects for Kodak and Polaroid as well as other companies. It seems the more I know, or at least the more I think I know, the more I realize I don't know about photography. There is too much going on in the realm of silver technology!

Several months ago I wrote a series of articles in *PLM* titled, "Color Interpretation, a Function of Process and Film." For that research, I exposed well over 100 rolls of medium-speed transparency film and laid out a strategy for analyzing my results. The process was very involved and further reinforced my belief in the complexity of producing high quality and accurate color reproduction work as it relates to image capture using slide films.

In producing that work I made some new contacts, many of whom posed provocative questions about the complexity of my hypothesis. One of the most intriguing questions came from Jim Szczygiel, co-author of this piece. His question was simple: Is a process actually *in control*, when the plots are in control?

Even when your charts indicate that your process is within the control tolerances accepted for E-6 lines, will your services be optimal for all users? Process monitoring strips provide your lab with a perception of the lab's ability to provide quality processing. Is the perception valid? Do your customers share this perception? More importantly, does the film demonstrate that the alleged quality exists?

Regardless of any perception held by the lab or your customer, the film provides tangible evidence. It is *this* evidence that will help to maintain a loyal customer base in the coming years. To rephrase an old proverb, the lab may test the processor, but the customer always tests the lab. So, if the plots are in control, why does customer X always complain? The answer might be something other than what jumps immediately to mind. Many labs actually use *product control*. Product control is a dog chasing his tail when compared to real process control. Perhaps your lab needs real process control rather than product control.

We use the term "process" to imply a multifaceted set of functions in this case. To control all those functions you will need a variety of tests. To introduce process control to your lab we need to investigate two additional areas of SPC (Statistical Process Control): Film Testing, and Chemical Analysis.

To begin the discussion, let's look at the role of the control strip. Control strips provide instantaneous judgments of quality at a given time. Control strips are not the product we intend to sell. Furthermore, control strips can only attempt to reasonably approximate the gamut of film emulsions. Using control strips as the only evaluator does not guarantee a proper looking roll of film.

As mentioned in previous articles, (November and December 1993) there are many medium-speed transparency products and chemicals, produced by Kodak, Fuji, Agfa, Konica, Polaroid and 3M. Equipment manufacturers use slightly different transport methods, tempering systems, replenishment schemes, and agitation designs. Mechanical differences, effete solutions, and newly released emulsions can produce differing results. These influences usually present themselves as color casts and density shifts that reflect poorly on your lab or the film manufacturer.

The first area of photofinishing SPC is Film Testing. Being in control is not enough if, for example, ScotchChrome 100 or

Kodak Lumiere does not look right. Consider visually evaluating and comparing a sample of processed emulsions. Emulsions are constantly changing, improved saturation with increased speed and finer grain structures are a few of the many new advances that influence each emulsion. Run new emulsion tests regularly to determine where subtle influences in the D-Min or D-Max would be evident on customer film. Then investigate the cause, and solve the problem before your customers bring it to your attention.

High-key and low-key renditions, and images with skin tones, will provide your eyes with a wealth of information. Create your own test rolls to use periodically for process evaluation. Use a digital film recorder to help create your own in-house standards that will be consistent over time.

Want to use a densitometer to create more objective tests? You will find it helpful to understand the construction of a typical control strip. The control strip is a portion of a traditional 21-step wedge used to plot a characteristic curve, containing up to five exposures. The critical points for process monitoring are the D-Max, High density (HD), Low Density (LD), Toe Density (TD), and D-min. These regions help to make projections about the performance of a process. Consider also that the control strip represents three emulsions, red, green, and blue. (Refer to the graph for an illustration of these key areas.) You can obtain approximate density aim values for each layer and step, from the aims currently provided to you by your control strip manufacturer. You should never attempt to take on the liability of substituting your own strips for process control. Rather, use your in-house strips as a supplement to the industry accepted control strips.

Our second recommendation to photo-finishing SPC is Chemical Analysis. Chemical testing provides you with a number of benefits. Scientists do not accept a single experiment or sample as proof of a theory. To be accurate and precise a variety of tests should point in the same basic direction. A useful analogy might be a rope: the more strands, the stronger the rope. Chemical tests add a sizable group of strands to your process control rope.

Film design, exposure, and development time can affect the status of critical solution components. Although the change will eventually show up in your plots, good SPC requires changes before problems are visible. Chemical tests for Bromine, Sulfite, Stannous Chloride (reversal agent), silver, and specific gravity aid in diagnosing problems. We sympathize with the non-chemists who just felt a shiver! Actually, analytical chemical testing is remarkably simple to learn and now comes in pre-packaged tests that are simple to perform. These tests take approximately 30 minutes, and can be done without interrupting production.

In conclusion, labs must be pro-active about their process control methods. The long term goal of any lab should be to deliver consistent quality. One of the first directions is to gain a better understanding of the control strip and to realize that by itself it is only a prediction of outcome. This awareness is imperative to providing better processing across a variety of emulsions. Successful labs have always kept pace with the increasing quality demands. New technologies still require many traditional lab services for output. These new technologies may eliminate many existing variables in the imaging arena; consequently, running the best line possible is to a lab's long-term advantage.

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