



What to Measure and What it Means

By Ron Ellis

Here are some of the basic metrics that I use for standard process control. All of these can be used in daily production and can normally be found on a standard color bar and normally do not require separate press runs.

- *LAB Values for Ink Solids.* LAB measurements of the solid ink values are helpful to have. While not used for daily production they are very helpful for troubleshooting. First they indicate whether we have achieved ISO compliance with our ink set and corresponding density. Second, these values can tell us if our ink is changing. If the lab value between the current ink and the reference measurements are great enough it means that the ink may have changed. This could indicate a press side problem such as contamination, or it could indicate consistency problem from the manufacturer. When the press and proof are not matching a simple LAB measurement of the inks is an easy way to tell if the ink has changed. This test will also indicate if the ink is ISO compliant at the densities being run. The same ink at the same density on the same paper should be relatively consistent and not change by more than a few deltaE.
- *Density Values for Ink Solids.* Although density for ink solids is a tried and true measurement, once we have determined our proper ink density it is important that we maintain them. Both accurate printing, as well as the value of LAB and other measurements is closely tied to the press operator being able to get to the same

point (usually) through density. Tolerance for this on a specific media and print condition is generally 0.05.

- *Dot Gain Values.* Dot gain is also an old-school metric, but it is very important for diagnostic purposes. If at the same density and on the same paper the dot gain shows a large fluctuation it will indicate a potential problem with the press or platemaking. For example if the reference dot gain is 16% and after learning that proofs are not matching we read it and see that one cylinder is now gaining 27% we will know exactly where to look – and why we can no longer match a proof. It is a simple metric that can usually be determined on almost any job simply by reading the colorbar with a densitometer that has a dot area or dot gain feature. Often if the issue cannot be corrected by mechanical adjustment to the press, a simple plate curve can be used to pull color back into spec. Tolerance for this varies depending on printing process but generally can start at +/- 4% and may be loosened from there if needed for daily production.
- *LAB Solids for Overprints.* LAB Solids for Overprints are often overlooked but can be valuable tools. When operating to a specification such as GRACoL, or standard such as ISO, the overprint values can be used to tweak your ink aim points so that you achieve the best possible ink film thickness as well as overprint colors (i.e. blue sky instead of purple sky). Once in daily production, a large deviation can indicate press conditions have changed and need to be examined. While there is no official tolerance for LAB measurements of overprints, a tolerance of 5 deltaE sometimes used.

- *LAB Values for c50/m40/y40.* The lab values for the neutral patch are often a great overall indicator of the presses calibration state. While it can be difficult to use gray balance as a metric for daily operation, it can be a helpful metric to see exactly where the press is and if the press can maintain the ideal calibration condition. Ideally this patch will read $L^*57 \pm$, $A^*0 \pm 1$ $B^* -1 \pm 1$. In daily production you will probably have to nudge your solid ink densities to achieve these values, but if the calibration conditions have stayed the same you should be able to come close to this. A quick glance at this patch can tell you where your system is, as well as confirm any color bias you are seeing. (Once you are familiar with LAB readings any deviation from the above will tell you exactly where the color is headed.)
- *LAB Values for Paper.* LAB values for paper are valuable as a reference point. When using tight process control the above values are valid when run in the same conditions, meaning the same paper and ink. Of course many papers are fine and can be made to work by simply adjusting the solid ink densities as printers have done for decades. For all the other values to be useful for troubleshooting you will need to be on the same or similar paper. The LAB reading will tell you if that paper has changed, or if it is a completely different paper. Even if you are checking this during runs you can detect paper changes as an operator throws in a supposedly similar paper because they have run out of the original paper.

How Much to Measure?

The above measurements are very helpful in maintain good process control. Obviously not every sheet can be measured, nor would it be desirable due to the wide variety of stocks used. There are several different aspects of process control.

The first is daily process control – how you run. In general you should attempt to run your jobs to the reference densities +/- .05. (Keep in mind with out of spec papers you densities will change slightly). The idea is to start at these target densities and make whatever adjustments are required to match the proof. At the same time operators should be comfortable checking the dot gain or NPDC curves when at density to make sure everything is running as required and that there are no major mechanical issues occurring.

The second is long-term process control – the ability to check and adjust for the inevitable changes that occur in pressrooms before they become a crisis. This can be done with the free process control tool on this site, with a simple spreadsheet such as that supplied in the GRACoL Qualification Kit, or a more powerful application built for this purpose such as SpotOn!, Colormetrix, GMG RapidCheck and others. While it would be great if every sheet could be read it is not practical, and while some shops read every job and log them, many shops simply read a few jobs a week from each press and log the results. As the press falls out of spec they will then make note of the new condition, and correct via mechanical adjustment on press or gain curves as soon as possible. The big issue is not how much you are measuring, but simply to be measuring and monitoring your printing conditions.

About the author: Ron Ellis is a New England-based consultant specializing in color management, graphic arts integration and press calibration. An IdeaAlliance G7 Expert and co-chair of the GRACoL Committee, Ron has performed more than 100 G7 calibrations. In addition to calibrating pressrooms, Ron also specializes in creating

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