TIPS AND TRICKS

Color Measurement the Right Way

INTERPRETING CIELAB, ΔE AND DENSITY CORRECTLY // Quality printing depends on precise color measurement, which makes it all the more relevant to ask why different measuring devices often produce different results. What should you rely on in this case?

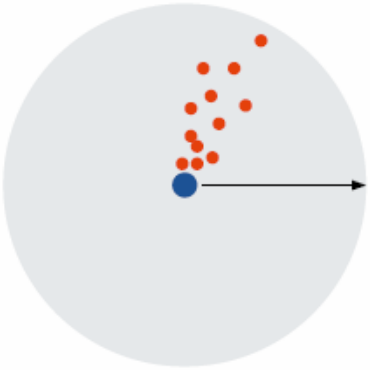
Modern color measuring devices are generally based on spectrophotometers, even if they only show densities. This is because of the higher measuring accuracy of spectrophotometry, together with a greater range of available measurement values. The measuring conditions set on the devices therefore not only need to be selected correctly but must also be identical for all devices. The correct setting often depends on the country. Regional associations such as the bvdm in Germany and CGATS in the United States formerly laid down these conditions. Today they are to be found in the relevant ISO standards. Settings can be made for the following values:

Illuminant: This defines the color temperature of the lighting source. For printing, the standard is currently D50, which corresponds to 5,000 Kelvin.

Observer angle: The standard observer angle in printing is currently defined as 2°. This corresponds to the printer's observation angle in the matching stage.

Density filter: This determines the spectral range that is to be used to calculate the density values for CMYK. Standards "Status E" (= DIN 16536) and "Status I" (= DIN 16536 NB; narrowband) are usual in Europe. "Status T" is used for measuring in the United States.

Polarization filter: Polarization filters eliminate the gloss of wet ink. The wet values therefore correspond almost entirely to the dry density and tonal values.



Typical distribution of measuring device deviations – the blue dot in the center is the ideal value for the reference device. The grey circle shows the permitted tolerance. The red dots represent the deviation for different measuring devices. As this illustration shows, the deviation usually tends toward one direction.

White reference: The "absolute white" setting is preferred for density measurement in North America. In all other countries, the white reference is "relative." Paper white is therefore always taken as the zero point here.

To match a spectrophotometer to an old densitometer, it is necessary to know the densitometer's settings precisely and apply exactly the same parameters to the spectrophotometer.

Despite identical settings, minor deviations may occur even within a group of spectrophotometers. These are generally due to the quality and design of the sensor and its calibration. Theoretically, every spectrophotometer should be calibrated to absolute white and black. However, in practice neither one exists, which means it is best to use reference values from an independent institution such as the German Federal Institute for Materials Research (BAM) in Berlin. Manufacturers can have a device calibrated here and use this "master device" to calibrate all other devices. The better the measuring device, the narrower the tolerances that the manufacturer defines for the ΔE and density values. And the smaller the tolerances, the greater the measuring accuracy.

To ensure the measuring accuracy remains constant for as long as possible, users are well advised to have devices serviced and calibrated regularly. Heidelberg is the only press manufacturer to offer a software option – the Prinect Net Profiler – that enables printers to personally calibrate almost all new-generation Prinect color measuring equipment, even including colorimetric calibration. This ensures devices are always close to the factory settings and therefore deliver highly reliable results.

It is also advisable to designate a selected spectrophotometer as the "master" in the print shop itself. This ensures maximum measuring accuracy and, ultimately, print quality across several work stations. ■