

New technologies paint a better color-matching picture

By Elaine Becker

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COLOR MATCHING, particularly in the manufacture of paint and coatings, has always been considered somewhat of an art. With the advent of color measuring instruments and software, and the subsequent technical advancements in both, the ability to generate the same color consistently has become more of a science.

While the human element will never be taken out of color matching, continued advances in instrumentation and software will further reduce the time needed to make a color match, as well as improve the accuracy of those matches. Additionally, new software packages now evaluate other aspects of paint, including VOC content, further assisting paint professionals.

Today, data collection has been simplified. Advances in portable spectrophotometers make it possible to accurately gather the necessary data right on the factory floor or at an off-site location, in a quick and easy manner. Data in and of itself cannot provide the color evaluator with all the information necessary to make a color match. It must be uploaded into a computer and evaluated with the

necessary software, which must have certain basic features to correctly match colors.

The first component is a quality control, or QC package, that allows simple pass/fail decisions to be made immediately. This portion of the software measures and compares a batch to a target, or color standard. The color differences are quantified in any number of color spaces, the newest of these being CMC DE. Recent advances in elliptical color tolerancing allow the user to directly correlate visual assessment to color difference data.

Formulation capability is one of the more important factors of a basic system. It is generally accepted that software reduces the number of "hits," or trials, needed to make a color match in half, compared to using the naked eye. Formulation capability is the biggest reason for this reduction.

Different matches are evaluated for both cost and quality in terms of metamerism, or the condition when a pair of colors match under one set of circumstances but not another. A typical example is if the color of a sample matches the standard in the daylight, but does not under different lighting conditions. With formulation software, an evaluator can analyze different pigment combinations under a variety of conditions. It also suggests the least expensive methods to make a match, allowing the user to balance the need for an exact match versus the cost.

Another benefit to using formulation software is color correction. If it is determined with the QC module of the software that the sample does not match the standard, the software shows how far it is

from the standard. It also lists what needs to be added to the formula to make it match the standard. New features in the color correction module allow the user to minimize how much is added to the batch and remain within color tolerance.

The most critical element in any color formulation system is the database. The quality of the results is directly dependent on the quality of the database used to generate the matches and color corrections. Information on the pigments or colorants used to tint the batch are characterized and stored in the database module.

Technical Focus: Color Matching

The most advanced programs feature the ability to characterize and store multiple calibration levels. This allows the user to enter the data on colorants in the range over which they will be used in the formulations. Because of this capability, matches and corrections on dark and high-chroma colors, as well as pastels and near whites, are improved.

An additional feature of a basic system is a color search or shade library search. All colors that have been matched in the past and the formulas on how they were made are stored in the library. When a new color needs to be matched, the data is input and the computer checks the library for the five to 10 closest shades. The evaluator then decides if it is an acceptable match or at least close enough for a color correction. Cost and metamerism can be evaluated to provide the most reasonable alternative for the desired match.

A newer software routine provides an

on-screen simulation of the color. A colored patch based on data from a measured sample appears on the screen. Next to it is a patch of the color standard for visual evaluation. The color for each patch can be simulated for up to three light sources at one time. When used in conjunction with a computerized color matching program, evaluation of the metamerism can be done. With these programs, color formulations can be evaluated under a variety of lighting conditions, without ever making an actual batch.

Still other features address new environmental concerns. Of particular importance for paint professionals is a package designed for waste work-off that assists in making previously off-shade batches usable. Such a package can have a tremendous effect on the accounting sheets of manufacturers because it will help turn unusable batches that not only cost money to make but would be expensive to dispose of and transforms them into batches that can be sold for profit.

One of the more eagerly anticipated software programs now available evaluates VOCs. With strict government regulations on VOCs, it is extremely important for paint professionals to know if a new batch is within the legal limit. The software program creates a formula for VOCs for quick, precise evaluation of the compounds to see if it is acceptable. Ultimately, the final decision on color matching rests on appearance — how it looks to the human eye. And while instrumentation and software will never take the art out of color matching, continued technological advancements will help paint a rosier future by continuing to make it easier and faster.