



Alfred Eichler
Colorimetry



Coloristics are crucial for production and processing of printing inks.

Coates Screen in Nuremberg has a special department, our colorimetry which is responsible for all questions related to colour.

As the name of this department indicates, this is not a simple colour chamber, but a laboratory meeting the modern requirements of colour evaluation using modern measurement technologies.

Since 1985 we have been using computer-aided formulation for screen and pad printing inks and performed a lot of the required pioneer work.



WHEN, WHERE AND HOW DOES THE KNOW-HOW OF OUR COLORIMETRY COME INTO PLAY?

Primarily it certainly is matching of colour shades requested by our customers for various applications, especially for screen and pad printers, mainly advertising and industrial companies.

There are many diverse applications and therefore requirements for colour tolerances and accompanying documents are quite different.

Colorimetry tries to achieve a uniform level for colour communication. Prior to conducting the matching work, the type of application, printing parameters and especially a clearly defined colour reference need to be determined. In most cases we can rely on our well-known formulation software. Our department is well equipped with X-RITE products. Efficiency of “Ink Formulation” and the special defined colour ranges meet nearly all customer requests. Depending on the requirements we use various spectrophotometers for colour measurements.

FORMULATION SERVICE

“Quick help or a detailed match?” – our Colorimetry offers both. Thanks to our measuring technology we can provide a “start formulation” as a short-term solution. A start formulation is a mixing formulation theoretically calculated based on printing parameters such as layer thickness, substrate colour and ink type. It can only be a first approximation. The printer (customer) is then conducting the necessary fine-tuning. This is a quick and cost-efficient alternative to chargeable matching of special colour shades. A detailed match of a special colour is very time-consuming. As soon as all required information like reference, printing parameter, quality of the material and processing is available, the colour can be matched using available base colours (e.g., C-MIX 2000) or alternatively pigments, metallic bronzes etc. This will then be a custom-tailored special colour with a corresponding code. Special colour tolerances and properties are defined and custom-fit to all requirements of the individual printing job. Any follow-up orders for this colour can easily be reproduced based on all these data.

Prior to matching any colour from a sample, it is essential to determine the following:

- Printing Technology
Screen Printing, Pad Printing,
or other printing technology?
- Ink quality
- Substrate

What kind of material do you print on? Type, quality and colour of the substrate. The more information you have and the more production conditions we can imitate during the matching process the better and more accurate the resulting colour match will be.

MEASUREMENT RECORDS

“Is this really the same colour? Does the material have a different colour than the last batch?”

The answers to such or related questions are resolved by colorimetry and accounted for using the measurement records. Documentation and traceability are the strength of modern colour measurement. Our department does not only support our quality control and applications department, but we also offer this service to our sales and service partners and our customers.

We use spectrophotometers with different measurement geometries (angle geometry 45/0 – 0/45, spherical geometry D/0°, D/8i SPIN – D/8e SPEX – D/8t transmission) as well as suitable quality control software.



Naturally, all common measurement conditions such as light source and standard observer (D65/10°, D50/2°) are also possible. The same applies to evaluation of measuring results using corresponding colour difference formulas such as DE2000, DEcmc, DEab, etc. For documentation of our colours, we distinguish between measurement records of colour matching and the quality certificate issued for individual deliveries.

MEASUREMENT RECORD OF COLOUR MATCHING

When matching a colour, we attempt to simulate production conditions in the print shop as precisely as possible. In addition to the printing ink, the colour mainly depends on printing parameters. The calculated formulation is documented by suitable measurement records. Generally, this record is provided together with a sample print and a wet sample of the ink. Use of digital colour samples is hardly suitable, such digital samples can only be used under certain conditions in some individual cases.

QUALITY CERTIFICATE OF BATCHES

For documentation of constant quality of special colours, a quality certificate is generated and provided for indi-

vidual batches. Available certificates of analysis list colour distance values as a primary option. Any deviation from this standard results in increased workload for quality control and should be discussed with laboratory management and quality control department prior to agreement.

The reference chosen for the test certificate is also particularly important. It is essential to check consistency of delivered ink compared to the colour sample released by the customer. Tolerance agreement against original references of the colour samples (e.g., Pantone or similar) is not possible. The colour values measured always refer to the comparison prints. All parameters are noted in the quality control test instructions for each special colour. When agreeing on colour tolerances, the print-specific limitations must be considered. There is no universal, binding tolerance limit for colour shades!

It is not suitable to use the perception limit as acceptance limit. Each human being has an individual colour perception. When defining/agreeing to tolerances, the measurement parameters must be defined i.e., measurement geometry (45/0 or D/8), type of light (e.g., NLD65) and standard observer (2° or 10°). Our colorimetry department can provide further information on colour tolerances for standard colour shades of Coates Screen Inks, colour distances in industrial colour measurement, CIEDE versus DE2000 and CIELAB colour space.

MEASUREMENT TECHNOLOGY

With daily handling of available measurement technology for colour matching and decades of experience with these products, our Colorimetry department is the competent contact for your first colour matching jobs. Being sales partner of X-RITE Pantone, we can offer various spectrophotometers and software, particularly suitable for screen and pad printing. Especially prepared colour ranges of our ink types ensure an elevated level of compatibility.

Formulations are based on X-RITE INK FORMULATION software. Taking substrate and layer thickness into account, reliable formulations can quickly be produced.

Prior to mixing a colour for the first time, feasibility and the layer thickness required for matching a colour is determined and documented with corresponding numbers. In addition, this is an ideal tool to use up remaining stocks.

As mobile measuring appliances spectrophotometers X-RITE EXACT (measuring geometry 45/0°) or X-RITE Ci6x (measuring geometry D/8°) are especially suitable. These are small and easily manageable devices fully compatible with Ink Formulation offering many possibilities.

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Are you interested in obtaining more information or need support from our Colorimetry, please let us know.
For further details about the measurement technology used please also see www.xrite.com