



Colorimetry in the finishing process

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Worldwide-web-supported system for colorimetry and colour formulation can be used to complement expertise in colour standardisation and formulation. Based on state of the art equipment, software installed on a central server can be accessed by satellite sites. These sites can be located at major global commercial centres and equipped with hardware, measuring and dispensing equipment that is identical to the major centre.

Colorimetry—networked, quick and accurate

This means in practice that there is no longer any need to send data or colour samples halfway round the world by post or courier to ensure that a recipe gives exactly the right shade. Recipe can be worked out and accessed accurately and ‘invariably’ in a matter of seconds.

The optical characteristics of the colourants are determined by carrying out a series of measurements where the colourants or blends are first applied on cardboard shading cards and

calibrated. In this way, all the pigments in a full range of shades can be stored in the database of the colorimetry system in a very short time.

Solving day-to-day finish problems

The system is easy to use, robust and quick, so that finisher's demands or enquiries can be dealt with promptly. In addition, if the pigment range is expanded or modified, the system can quickly calculate reliable new recipes, which give exactly the same shades as were obtained with the pigments previously used. In practice, this means that routing colour management within a finishing department can become easier to operate.

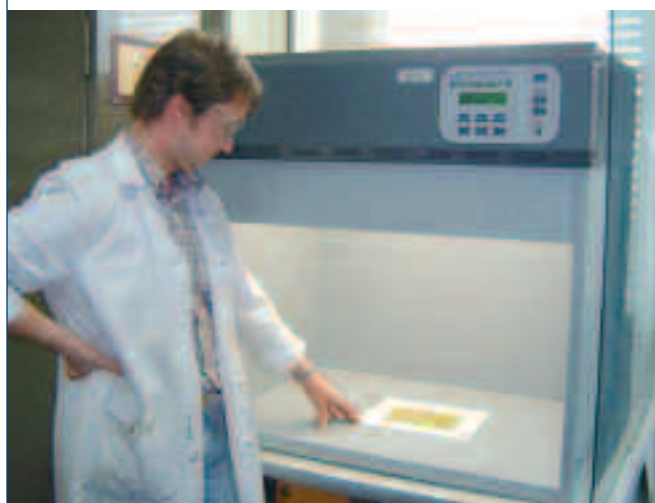
At the click of a mouse, the system calculates all the theoretically possible pigment combinations and prints the best 50 combinations that most accurately reproduce a sample shade. The calculations can be modified by taking specific factors into account, such as the maximum number of chromophores to be included in the recipe.

Panel 1: Measurement using a spectrophotometer



The image shows colour measuring equipment from X-Rite. This consists of portable sphere spectrophotometer, which uses diffuse/8° geometry (d/8°) according to DIN 5033. The advantage of this system over 45°/0° geometry (which largely corresponds to the way the human eye observes colour) is that when measuring structured surfaces—which many leathers have—there are no shadows to distort the results. A certain amount of gloss is included in the calculation, but this is not a disadvantage over the 45°/0° process, as it can be eliminated simply by means of a comparative measurement.

Panel 2: Metamerism on two leather samples



Metameric effects can be examined by exposing leather samples to different illuminants. 18 different types of light can be stored in today's systems and for each the program can calculate the corresponding colour values. The formulation is then based on these values, giving recipes with optimal metameric effects in a matter of seconds.

About Lanxess: Taking advantage of the possibilities new technology now offers, Lanxess chose the X-Rite Color Master Web Edition hardware and software package from X-Rite GmbH. Its colorimetric and colour formulation equipment is installed at four of its sites—Leverkusen (Germany), Wuxi (China), Zarate (Argentina) and Sao Leopoldo (Brazil).



Panel 3

The physics of colour

In the case of non-transparent objects, the intensity and the wavelength distribution of the reflected light determine the colour sensation. If a coloured object reflects white light, the rules of subtractive colour blending apply. Parts of the complete “white spectrum” are absorbed, and the rest is reflected. Consequently, the nature of the incident light has a major effect on the resultant colour sensation. All the theoretically possible colours can be illustrated in a colour space, the “equator” of which is the Newton chromatic circle of spectrum colours. Perpendicular to this is the lightness/darkness axis from white to black (Refer: 3/1).

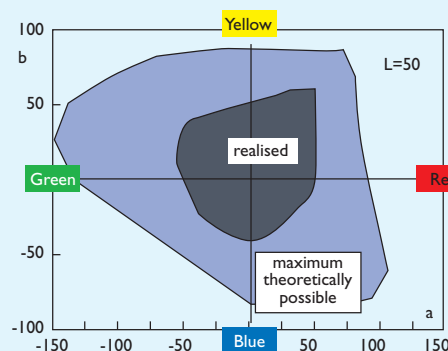
Not all these colours can be produced in practice because of the properties of the specific colourants and other auxiliaries and additives. This discrepancy can be seen by looking at a cross-section of the colour space with a constant gray scale (Refer: 3/2).

The CIELAB system devised by the Commission Internationale de l'Eclairage in 1931 is an internationally recognised standard for expressing colour numerically and unambiguously. It uses three transformed colour values L^* , a^* and b^* which refer to a standard light source. The delta values dL , da and db are used to indicate deviations. Two colour samples are described as being metameric if different colour sensations are produced when they are exposed to different illuminants. The reason for this is differences in the reflectance curve, in particular those in the high-intensity light wavelength range. Source-specific reflectance curves are obtained by offsetting the actual reflectance curves against the curves for the composition of the light source (Refer: 3/3). If these are identical, there is no metamerism.

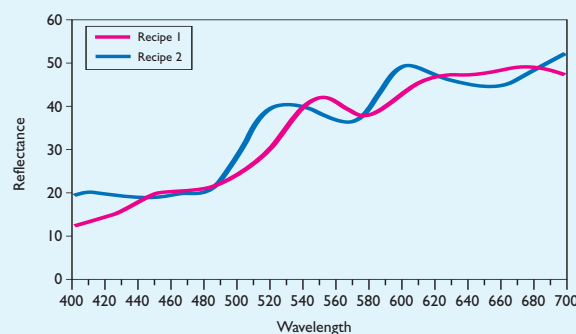
3/1: Colour space



3/2: Cross-section of colour space with a constant gray scale



3/3: Light-source-specific reflectance curves for two colourant blends with metamerism



It is also possible to specify a minimum quantity for any component in the blend. This ensures that no component has to be added in such minute quantities that it is difficult to weigh accurately, as this would result in shade deviations. Special requests with regard to the covering power of the finish can also be taken into consideration.

The role of the technician

It is important to appreciate that good technical knowledge of the finishing process is still required. This is because not every solution that looks good works in practice in the tannery: the chemical compatibility of many colouring components has to be taken into account.

However, the computer system makes the work of colour matching easier and helps in the quick and easy response to demands. Shades can be matched metamerism-free, whereas with manual colour matching there is a strong element of luck.

Avoiding metamerism

Colorimetry plays an important role in leather production

whenever tannery customers specify exact requirements regarding colour or colour effect of samples. In the automotive industry, which purchases large quantities of leather for car seat covers and interior trim, colour reproduction is critical. Here, maximum consistency is required throughout a delivery and in subsequent batches. It is essential to avoid metamerism as far as possible, so that the colour of the leather always corresponds to that of the sample, even when lit by different light sources. This is particularly important if leathers from different batches are to be combined with one another, but also if leathers are combined with other materials—such as textiles or plastic—and exposed in use to different light sources. This includes daylight and artificial light from light bulbs or neon lamps.

Keeping ahead of fashion demands

It is now possible for leather manufactures and finishers to access up-to-date information on leather fashion trends and preview fashion colours for the next seasons. Ranges can be planned and developed, and specialised products acquired in good time. 🌐