Densitometric Measurement of Special Colors using Spectral Measurement Technology

TECHKON APPLICATION NOTE 10

1 Densitometrics and colorimetrics

Combining colorimetrics and densitometrics in a device is not new. What's new about this type of devices is that they are as handy and easy to use as regular densitometers. The **TECHKON Spectro-Densitometer SD 620** and **TECHKON Spectrophotometer SP 830** λ are two typical representatives for this device generation. The Spectro-Densitometer SD 620 furnishes complete densitometric key values based on spectral measurement technology. The SP 830 λ in addition features a swiveling polarization filter apart from displaying all colorimetric key values.

Spectro-Densitometer SD 620

The heart of these measurement devices features an extremely powerful spectral module which breaks down and analyzes the visible wavelength range (380-780 nm for the Spectrophotometer and 400-780 nm for the Spectro-Densitometer) at band widths of 10 nm.

The remission curve R (λ) is the foundation and starting point for calculating all dimensions. Colorimetric as well as all densitometric measurement readings are calculated on this base.
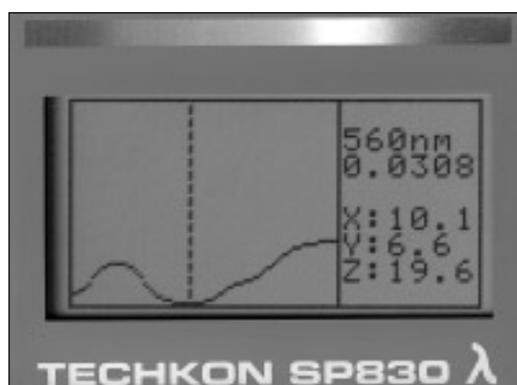
Remission curve Novavit HKS 36 K

2 Advantages of spectral density measurement

What are the advantages of spectral density measurement? First, the devices feature the same functions, capabilities and precision of a regular densitometer. Second, a spectro densitometer features a number of new functions thanks to its special measurement principle.

The measurement filters for the CMYK process colors are virtual. They do not physically exist, rather, software in the device renders them mathematically.

This mathematical calculation permits fitting spectro densitometers with any filter. Correspondingly, the devices let you choose freely among European-norm DIN filters, Status-T filters prevalent in the U.S.A. and the extremely narrow-band Status-I filters.

Another advantage is the option of using optimal measurement filters for special colors. These filters measure at maximum density for the respective color. Measuring at maximum density naturally ensures the highest possible accuracy.

Optimal filters for a special color are defined via density curve D (λ) which is derived from remission curve R (λ).
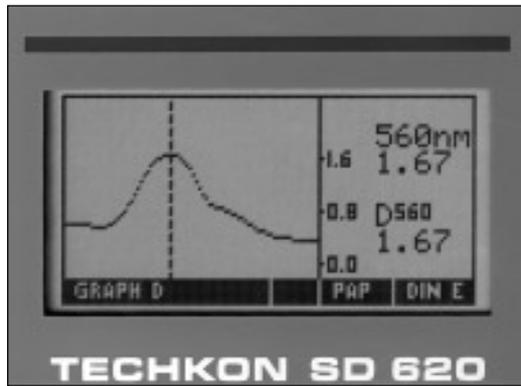
Density curve D (λ) Novavit HKS 36 K

The density curve shown, e.g., is for printing ink Novavit Offset HKS 36 K. The maximum density is at 560 nm. User may set a measurement filter on the measurement device whose maximum through-put run on the same wavelength.

Optional choice of four additional filters for measurement of special colors (with automatic color recognition)

Correspondingly, you can measure all densito-metric key values for special colors:

- Solid density
- Screen density
- Dot area
- Dot gain
- Printing contrast

An important application which requires freely definable filters is control of halftone special colors.

Special colors are not only printed as solids. Frequently, halftones (screen dots) need to be reproduced. This requires measuring dot area and dot gain and sticking to them in the production run. Moreover, the graphic display for the devices SD 620 and SP 830 λ can evaluate and display characteristic print lines, not only for CMYK, but also for any other print colors.
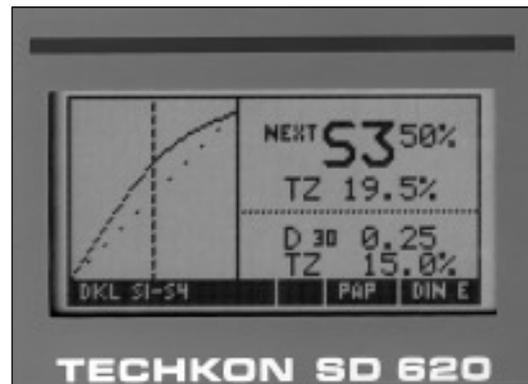
Characteristic print line Novavit HKS 36 K

3 Practical Use

To simplify the use of spectro densitometers in practice, printers use an automatic function for recognition of special colors and definition of the optimal measurement filter. The TECHKON Spectro-Densitometer SD 620 features the so-called AUTO-REF mode which automatically defines the optimal measurement filter and corresponding density during measurement of reference colors.
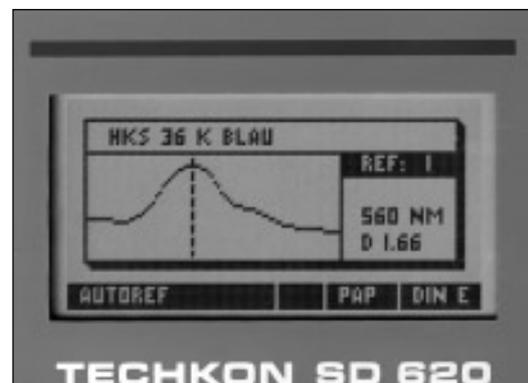
Automatic ascertainment of the optimal measurement filter

Automatic recognition of a reference color

Display as density divergence from a reference

For the following comparative measurements, the device automatically ascertains the reference which best corresponds to the measurement according to the density curve. The device also calculates the density for the defined filter and displays the density as well as the reference label. Depending on device settings, you can also render the difference to a rated density.

The measured references can be exchanged with and saved by a computer. TECHKON EXChange software helps assign the desired label to the references. You can thus measure and save complete color gamuts. Special colors needed for a print order are loaded before printing into the device and during measurement the device automatically displays density, resp. density differential.

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