Color Sentinel Systems

CSS 100 Series
Portable/Desktop Modeling Spectrophotometers

Introduction
The Color Sentinel™ CSS 100 Series of portable desktop and handheld modeling spectrophotometers provide full color quality measuring solutions utilizing integrated software modeling algorithms.

Why design and produce a new line of portable Spectrophotometers?

While attending Print Industry exhibitions and trade shows, we became aware that competitors' spectrophotometers would get different results from measuring printed color patches by merely rotating the device. We also noticed that competitors' devices required contacting, or nearly contacting, the target patch - sometimes scratching or even destroying the integrity of the patch. This can happen during static measurements or by merely sliding the instrument along a provided mechanical slider for measuring a line of patches at a time. How do you prove how well you've measured something if you've damaged it in the process?

In addition, many competitors' products are hardwired (tethered) to a computer. A wireless measurement device is the best solution for ease of use. Color Sentinel Systems   has already installed thousands of our in-line, non-contact products in Xerox platforms, so it was natural for us to extend the technology into the off-line workstation environment.

Providing a low cost, easy-to-use and easy-to-own color accuracy workstation was our goal. The true cost of owning other companies' spectrophotometers isn't just the purchase price alone; there is also the cost of annual factory calibration. Current products use conventional illumination systems that vary in intensity and/or color temperature over time. Even so-called White LED's are almost always a Blue LED doped with a yellow phosphor to smooth out the color temperature. Color Sentinel Systems employs state-of-the-art techniques and a broad spectrum of hardened emitters (Wave Stable™ Technology). Our device frees the print manufacturer from downtime and the burden of high cost of factory calibration - typically $700 or more dollars per unit, annually! All Color Sentinel Systems products offer a worry-free certification for the life of your unaltered print engine.

Ease of use is also important. Our unit sits millimeters above the patch, allowing non-destructive measurements. This technology is also used in our Powerscan™ automated X-axis scan station to easily measure print proofs.

Background
The Color Sentinel Systems ILMS emulates a standard spectrophotometer by illuminating the target with numerous highly stable LED (nearly monochromatic) light sources, each at a very precise and stable wavelength, and then measures the reflected intensity produced from each light source. A mathematical relationship is then determined that maps the numerous LED readings to the spectral readings of a standard reference spectrophotometer. This calculation is performed initially at the factory, and, once completed, *never* needs to be redone in the field.

The CSS Workstation™ software package allows you to either program your existing workflow color samples or create your own. Using the CSS Workstation on your PC or server allows the user to measure these predetermined prints wirelessly or via a USB connection where wireless environments are not supported (e.g., military use). Users can manually measure via our family of portable units or via a manual slider option. We also provide the Powerscan™ platform to measure prints quickly and accurately ensuring "No Patch Left Behind™" technology. Customers usually then select the press calibration intervals. (e.g., every job, every shift, every day, etc.).

### Sensor White Balance Calibration
Every device in operation periodically undergoes an automatic white balance calibration via commands from the CSS Workbench™ to accommodate any changes in Illuminator brightness due to age, environment, etc. This calibration process adjusts the instrument's white balance to match the known reflectance of a white tile. This white tile is provided in the foot of all of CSS portable devices and is included on the Manualscan™ and Powerscan™ platforms. Color Sentinel Systems CSS 100 Series products do not have to be sent back to the factory for light source calibration or recertification. The standard reference set of BCRA tiles are also utilized during manufacturing to provide NIST traceability. The measurements may be reported in several user-selectable formats, including the reconstructed 31 spectral points, L*a*b*, and the LED reflectance values. CSS ILMS supports M0, M1 and M2 modes of operation.

Color Sentinel ILMS Specifications

Illuminant Source	Wave StableTM Light emitting diodes (LED), unique wavelengths with individual intensity control
Measurement Sampling Time	3 ms. typical, can be customized for particular requirements
Measurement Method	Multiband reflectance converted to 31 point spectra with proprietary algorithm
Data Interface	USB 1.1 (2.0 compliant), Bluetooth
Data Format Options	31 point spectral, L* a* b*, - M0, M1 and M2 Modes are supported.
Spectral Range	380 – 700 nM, reported in 10 nM increments
Measurement Geometry	0° / 45° observer / Illumination
Standard Observer	2°
Standard Illuminant	D50
Environmental	Operating temperature 10° - 50° C
Projected Spot size	3.5/8.9 mm at 32 mm from illuminant source - Intersection of all LED illuminations
Power Requirement	Single voltage input from 20 VDC – 52.8 VDC, 1.5W maximum, limited power source
Target Synchronization	ILMS measurements may be triggered by printed synchronization marks via integrated reflective sensor internal timer, or external electrical signal (optional),
Calibration	External calibration reference surface supplied
Accuracy	1.3 dE2000 - 95th percentile over evaluation set* typical
Repeatability	.3 dE2000 - peak-to-peak over 10 complete evaluation set measurements*
Inter-instrument Agreement	.6 dE2000 - 95th percentile comparing average of 10 evaluation set measurements
Displacement Insensitivity	+/- 2 mm

Evaluation set contains 495 color patches, printed with specific printer of interest. Temperature: 21°C ± 2°C

**Color Sentinel Systems debuts
the new Powerscan™ for Drupa 2016!**
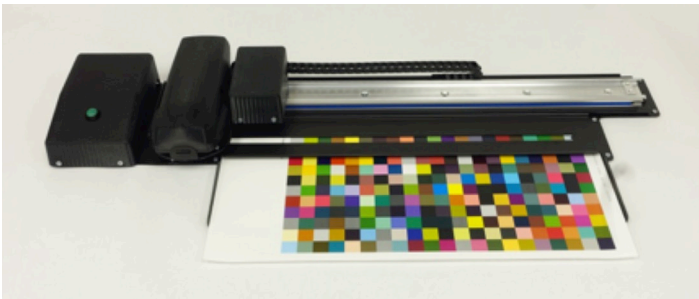
CSS 110 with Powerscan™ motorized X table

CSS 110 with Manualscan™ X table

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