Sensegood spectrophotometer for color measurement and management in textile industry

The color specification of fabric is determined by three independent factors. The first factor is the illuminant or light source, second factor is the observer, and the third is the textile material itself.

Photo: Towel Museum – Ichihiro, Japan, Photo credits: Lienyuan Lee, Source: Wikimedia Commons

Color in textile:
There are a number of variables that influence the apparent color of the final textile product. These include fiber variability, yarn and fabric constructions, and/or fabric wet processing techniques. For instance, in the case of fibers, the fiber cross-section, fiber fineness, surface roughness or luster, and ability of the fiber to uptake or resist dye can all influence the apparent color of the final textile product. In many instances, color problems due to fiber variability may not be recognized until the fiber is in fabric or garment form. Cotton fibers, because they are grown from the cotton plant, have inherent variability in various fiber properties including fiber size, fiber length uniformity, fiber convolution count, and surface roughness. [1]

Once manufactured, these yarns have different properties even if they are made from the same original fiber. For example, if knitted side by side, they will look different in color from each other after dyeing because they reflect light differently. Fabric construction such as knit or woven, twills or plain weaves, jersey or rib knits are all variables that can influence the apparent fabric color.

Instrumental color measurement:
In the process of visual color match; there are factors like eye fatigue, aging of the eye, stress, individual's different expressive perception toward color, and light source that affect the color match decision. Hence, it becomes difficult to make decision of accepting, reprocessing or rejecting the sample based on visual match. And this directly hampers the quality of the final product. While on other hand there are advantages of instrumental color quality control as it provides results with same accuracy, consistency and reliability. It provides numerical color data, a common color language amongst researchers. It eliminates subjectivity in color assessments, eliminates the variability among different analysts and maximizes precision.

SENSEGOOD SPECTROPHOTOMETER - *UNIVERSAL* (REFLECTANCE)

(a) (b) (c) (d)

(e) (f)
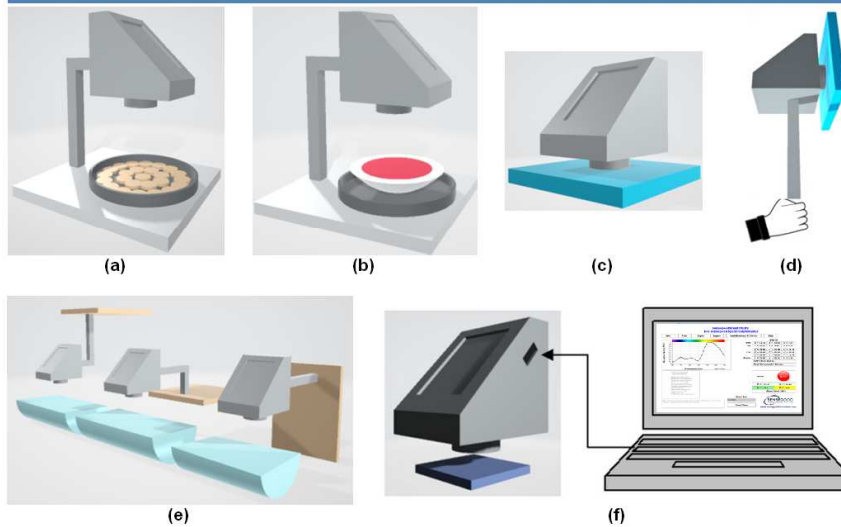
- ✓ Benchtop/ Tabletop: (a) (b) (Rotating sample platform)
- ✓ Handheld/ Portable: (c) (d)
- ✓ Online/ In-process: (e)

- ✓ Solid: (a) (c) (d) (e)
- ✓ Liquid: (b) (e)
- ✓ Paste: (b) (e)
- ✓ Powder: (a) (b) (e)

- ✓ Contact measurement: (c) (d)
- ✓ Non-contact measurement: (a) (b) (e) (Adjustable height)

Works with:
- ✓ 5V adapter (cell phone charger)
- ✓ Power bank
- ✓ Computer/ Laptop (f)

- ✓ Averaging
- ✓ Auto repeat measurement mode
- ✓ Color match percentage
- ✓ Color indices (whiteness, yellowness, …)

- ✓ *SensegoodSmart* – computer interface software utility

Sensegood spectrophotometer for color quality and consistency control in textile industry:

From raw material to final product, Sensegood Spectrophotometer comprehensively evaluates the color attributes of various samples, including solids, powders, pastes, and liquids. Sensegood spectrophotometer has large viewing area (sensor's field of view) which produces accurate result representing the sample's color. As a result, consistency can be maintained and quality standards can be met with less waste, time, and effort.

Sensegood spectrophotometer is the color instrument that serves as practical tool for color professionals. It supports reflectance measurement and related calculations as described in Instrumental Color Measurement by American Association of Textile Chemists and Colorists (AATCC). [2]

Photo: Use Sensegood spectrophotometer to ensure color consistency in all production batches. Photo: Wooltex International, Northern England. Photo by Alastair Wiper

Color matching in production:

Using Sensegood spectrophotometer, you can ensure consistency and accuracy throughout your quality process by establishing color tolerances. A color tolerance is the acceptable difference in color between a sample and the standard. Sensegood spectrometer compares color of sample with saved standard reference and gives match value in percentage. If matching is poor; below set threshold, it provides alarm and display indication on LCD to alert operator. Hence operator can quickly react and take appropriate action. The information assists for the prompt corrective action which ultimately minimizes off-quality product, increases

throughput and maximizes equipment usage resulting into batch to batch consistency. This surely results into low operational cost with improved product quality, consistency and market acceptability.

Reference: L*=+50.34, a*=+0.15, b*=-23.76	Sample: L*=+56.76, a*=+0.48, b*=-31.05

ΔL*=+6.42, Δa*=+0.33, Δb*=-7.29, ΔE*=9.72
Sample is more Brighter and Bluer than reference.
Alarm limit = 95%, **MATCH: 90%**
Alarm triggered as Match % is below user set threshold of 95%

Sensegood Spectrophotometer for color quality and consistency control in fabrics

Photo: Color variation over different production batches indicates process variations and poor quality control which ultimately results in customer dissatisfaction. To build and maintain a brand of repute; product's consistency is one of the most important parameter to be addressed. Reference can be saved in Sensegood spectrophotometer and can be recalled at any time to compare it with production batch sample.

Find out best color match using Sensegood Spectrophotometer

Photo: Different light, different object color you see. Every individual has different perception towards color. Finding the best match and conveying the same to the customer is often a challenge. Sensegood spectrophotometer assists you to find a nearest color match from the set of clothes. It has its own independent full spectrum light source that enables true color measurement.

Often it happens that customer expects a design and color same as in catalog, for an example – curtains. Manufacturer has to supply one with the same color. Similar case is for the customers in finding matching clothes. To supply desired product color, first it requires measuring one correctly by spectrophotometer. As color perspective changes for an individual, one can justify and convince the color compatibility by showing the matching percentage between display-sample with the one which is delivered.
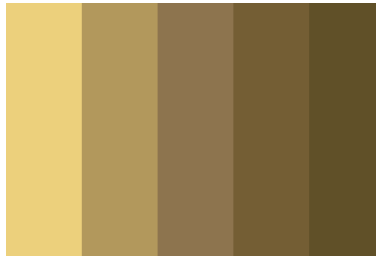
Marketing based on shades:

Photo: Khaki shade palette

Once shade tolerances are set, then fabrics that fall within those tolerance limits are sorted and grouped together for niche marketing. So each fabric buyer receives a group of similar colored fabrics as much as possible. For example, each roll of cotton twill khaki fabric will be color evaluated, and then color grouped such as slightly green, slightly red, slightly yellow, slightly blue, slightly deep, and slightly light. Once grouped, the slightly green khaki is shipped to buyer #1; the slightly red khaki is shipped to buyer #2, and so forth.

Do more with Sensegood spectrophotometer:
Sensegood Spectrophotometer also incorporates continuous auto measurement mode. In this mode, it wakes up at user selectable intervals, takes measurement, compares the sample color with the saved reference, displays percentage match, and alarms to the operator with beeping sound in case if the matching percentage is below preset threshold. It has provision for averaging option in normal mode as well as in auto repeat measurement mode.

Sensegood spectrophotometer provides varieties of indices like whiteness index and yellowness index. Measured CIE L*a*b* values indicate strength of color parameters like: bright or dull, red – green and yellow – blue respectively. Measured color is also represented as reflectance graph, peak wavelength and color temperature on color touch LCD. Sensegood spectrophotometer is non-messy non-contact type instrument which has benefit of measuring sample's color from a distance. Because of this, sensor remains scratch proof enabling long life in retaining calibration. Sensegood spectrophotometer is the versatile device that is engineered to work as handheld/portable, benchtop/table-top or in-process/online color measurement instrument.

SensegoodSmart utility:
Sensegood Spectrophotometer provides computer interface software *SensegoodSmart* which lets you to convey numeric color data across all production plants that may be located at multiple places across the globe. Each production plant uses Sensegood spectrophotometer to compare color attributes of the product manufactured in their plant with the numerical color information received from central plant or management. This enables them to reproduce each product consistently across all the plants. This feature is highly desirable for wide spread industry with plants at various places. It also assists in color consistency in packaging material supply chain.
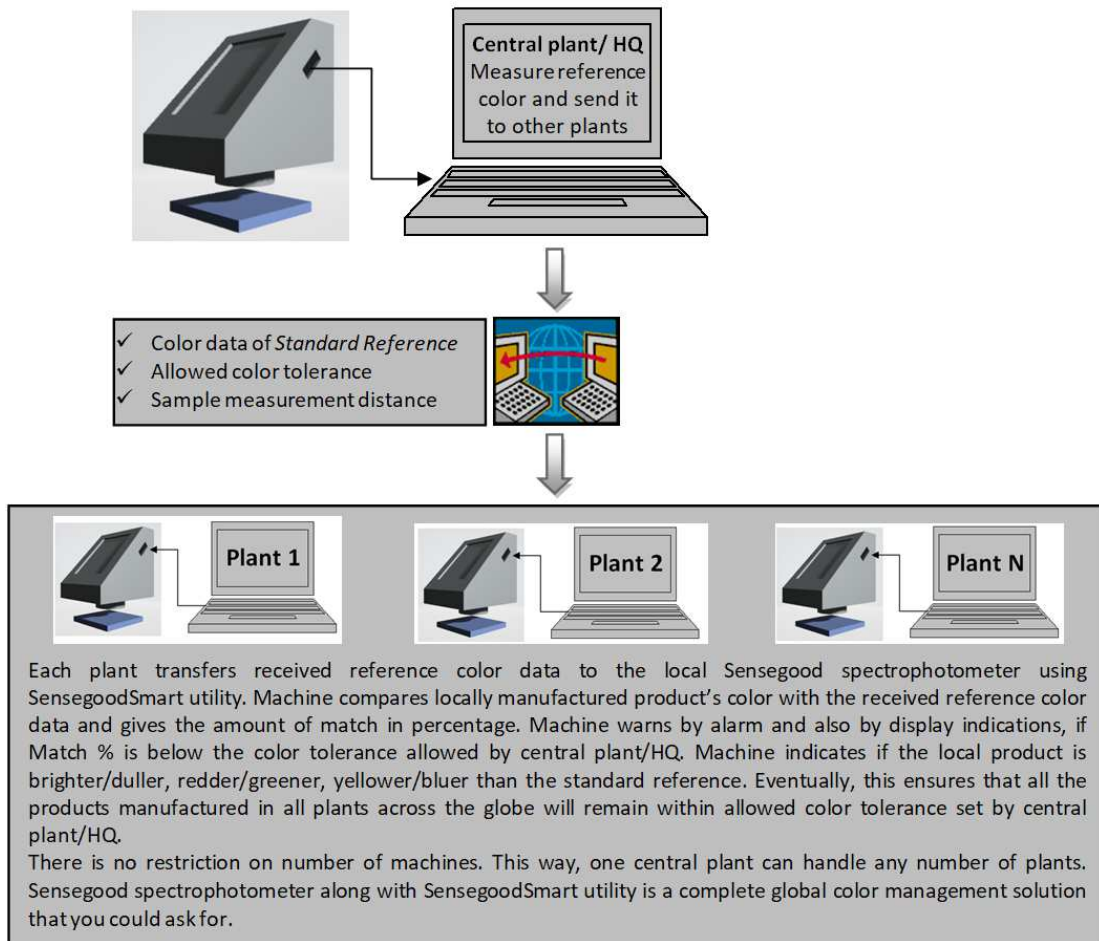
Photo: SensegoodSmart utility for color management across multiple production plants. Apart from this, SensegoodSmart utility enables user to store unlimited number of references to the computer. Any desired reference can be recalled and downloaded to Sensegood spectrophotometer whenever required. The utility provides all color related analytical information on single screen. This feature is even more desirable when using Sensegood spectrophotometer for in-process/online applications.

References:

[1] Basics of Color For Cotton Textile Products by Cotton Incorporated, North Carolina, published by America's Cotton Producers and Importers, 2003. https://www.cottoninc.com/wp-content/uploads/2017/12/ISP-1005-Basics-of-Color-for-Cotton-Textile-Products.pdf
[2] AATCC Technical Manual, Vol. 85, published by American Association of Textile Chemists and Colorists, Research Triangle Park, NC, 2010. https://www.aatcc.org/pubs/

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