

Color measurement in wood products using Sensegood spectrophotometer

Customer color expectations in wood products:

A number of colored specialty woods such as; ebony, rosewood, mahogany, amboyna and commercially important woods such as; morus, logwood, Brazilwood, Japanese yellowwood, blackwood, kwila, red beech and myrtle beech, exhibit a wide range of colors from black, violet, dark red, reddish brown, to pale yellow. [1] Customers have varied demands in wood products specifically for their appearance and color. Wood products have ever growing market in niche segment where look of the product is the first and most important determining factor for customer's willingness to purchase. Improving the quality in selecting raw wood having specific color tone; also controlling multiple finish steps can lead to desirable product appearance. Following collage shows some of the wood products where color and appearance is one of the most influencing factor for acceptance.

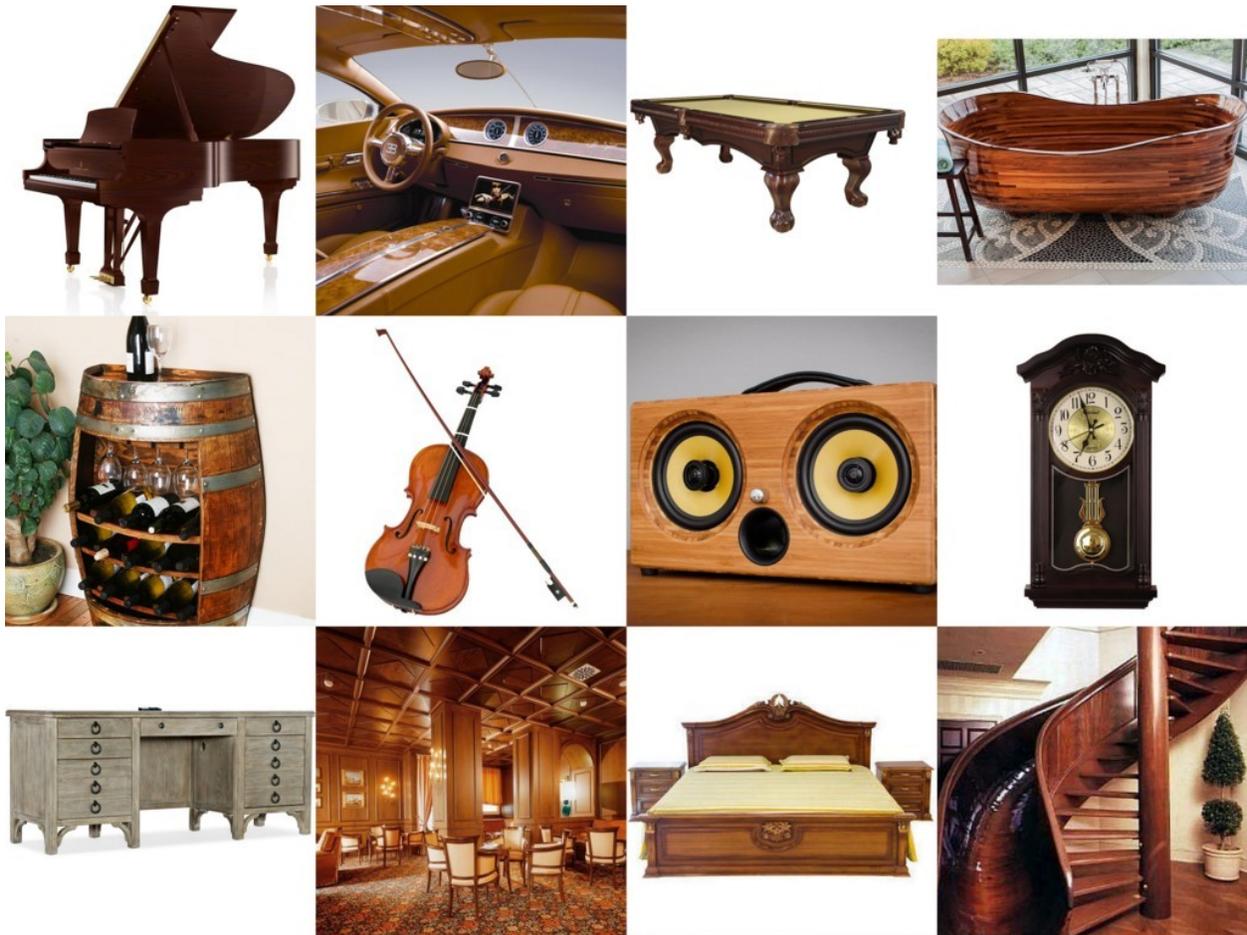
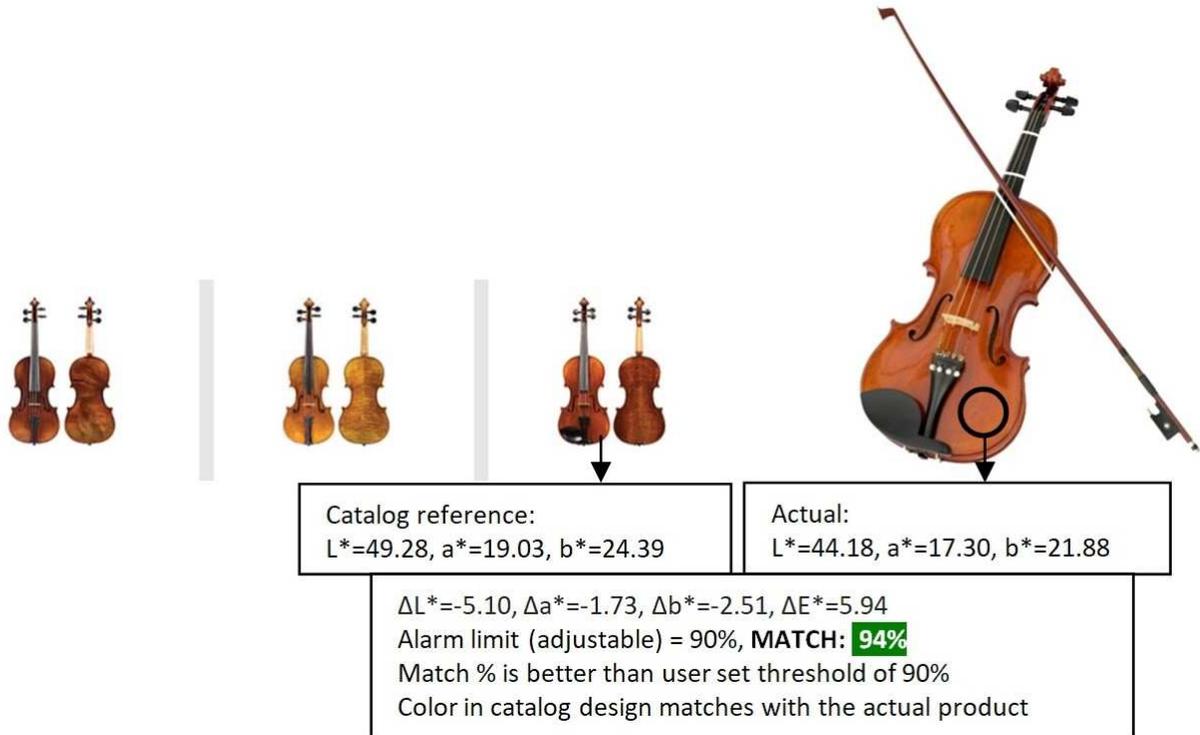


Photo: Measuring color quality of wood products: Some of the wood products where color appearance is one of the most influencing factor for acceptance: East Indian Rosewood Grand Piano by Steinway & Sons, Bugatti 16C Galibier wood interior, Dark cherry billiard table, Exotic bath tub by NK Woodworking & Design, Barrel shaped wine rack, beautiful classic violin, Thodio iBox quality wood speakers, Vintage pendulum clock, Color richness of the desk by Hooker furniture, Luxury hotel false ceiling, classic bed and home interior decor

Manufacturing and supplying catalog design:



Sensegood Spectrophotometer for color management and quality control in wood products
Illustration: Matching the color in catalog design with actual product

Photo: Use Sensegood spectrophotometer for manufacturing the right colored product compatible with catalog reference, convince your customers by proving color similarity of actual product with that of catalog/showroom display design.

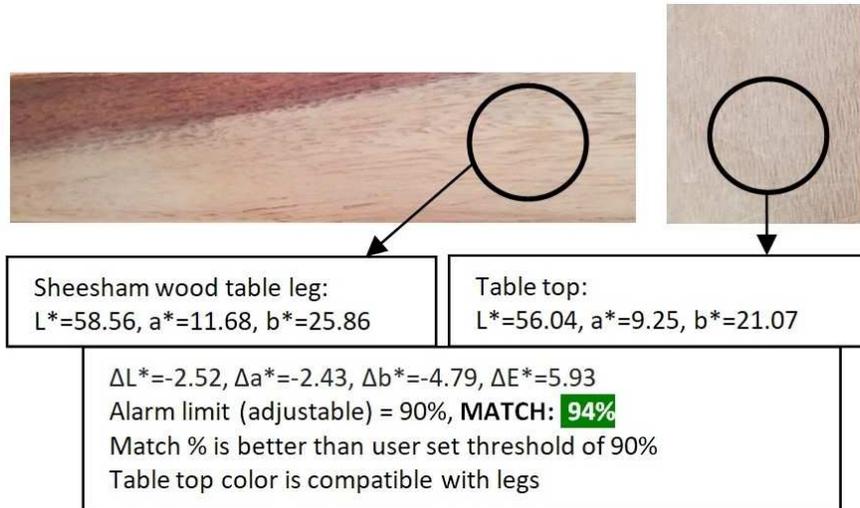
Most of the times it happens that customer expects a design same as the show-room display piece/catalog. Manufacturer has to make one and deliver with the same color. To achieve desired product color, first it requires measuring one correctly by spectrophotometer. Sensegood spectrophotometer is an instrument which measures and represents color in numerical values eliminating subjectivity. As color perspective changes for an individual, using Sensegood spectrophotometer one can justify and convince for the color compatibility by showing the matching percentage between display-sample with the one which is being delivered.

Ensuring color consistency in filling orders and repeat orders:



Photo: University library. Source: The Virco Manufacturing Corporation, USA

When you are making tables, chairs, cabinets, wood panels and similar products then it becomes extremely important that you meet color specifications with acceptable tolerance. Such products are often supplied as filling order or repeat order. In such cases, customer expects and hence it becomes mandatory to meet product's appearance to the previously supplied lot. Sensegood spectrophotometer helps in fulfilling your customer's expectations to foster the growth.



Sensegood Spectrophotometer for color management and quality control in wood products
 Determining color compatibility for wood products assembly

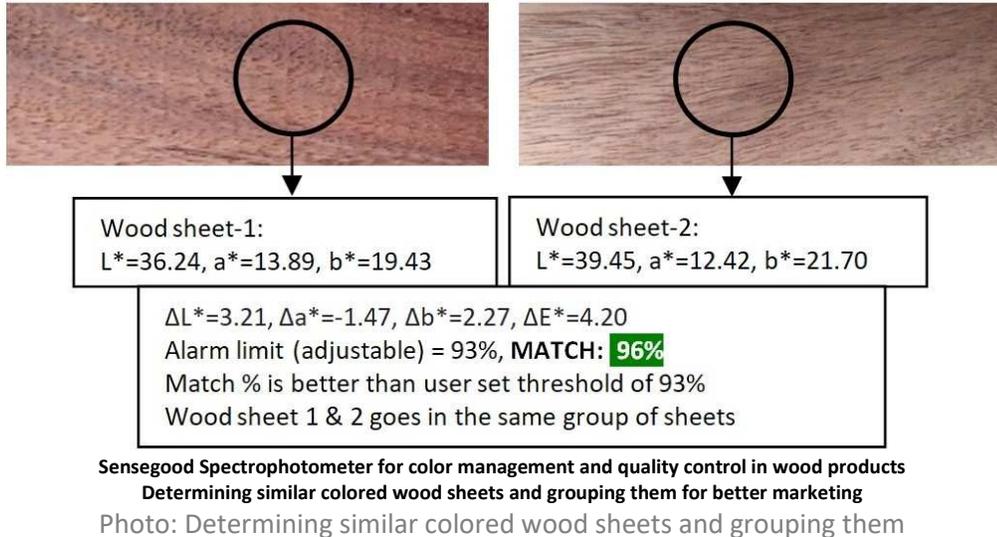
Photo: Ensure uniform look in assembled wood products

Color sorting and grouping for better target market:



Photo: Wood sheets and blocks – color measurement in wood factory

Tree of same species also exhibit the different wood color properties. This is due to variety in soil and nutrition levels, water, light and other environmental factors. In wood factories, Sensegood spectrophotometer helps in making groups of wood sheets and blocks that have similar colors. Such lots can be bunched together and marketed for better prices.



Spectrophotometer in wood researcher community:

Wood researchers use Sensegood spectrophotometers to study wood biological and chemical behavior. Spectrophotometers are being used to understand parameters that affect wood discoloration, how evaluation of color differences in wood surface takes place and also to understand color changes in wood due to thermal treatment and sanding. [2]-[5]

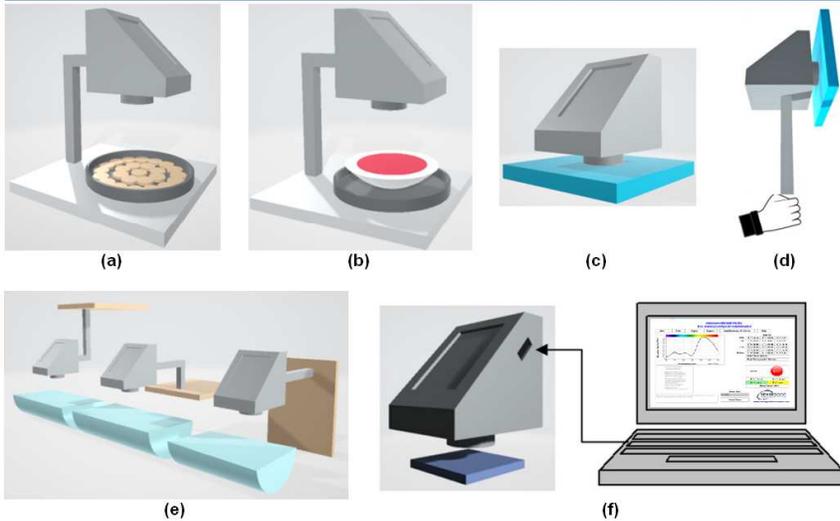
Sensegood spectrophotometer for wood color management:

Sensegood spectrophotometer assists to achieve color consistency in lot wise production. It spectrophotometer has large viewing area due to which it can deliver accurate results. It is the versatile device that is engineered to work as handheld/portable, benchtop/table-top or in-process/online color measurement instrument. It has its own independent full spectrum LED light source which enables true object color measurement.

A color tolerance is the acceptable difference in color between a sample and the standard. For color to be acceptable, your color tolerance values should always correlate to the human eye. Sensegood spectrophotometer compares color of sample with reference giving match value in percentage. If matching is poor; below set threshold, it provides audible 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. This surely results into low operational cost with improved product quality, consistency and market acceptability.

Sensegood spectrophotometer provides wide 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's optical assembly remains scratch proof enabling long life in retaining calibration.

SENSEGOOD SPECTROPHOTOMETER - UNIVERSAL (REFLECTANCE)



- ✓ 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)

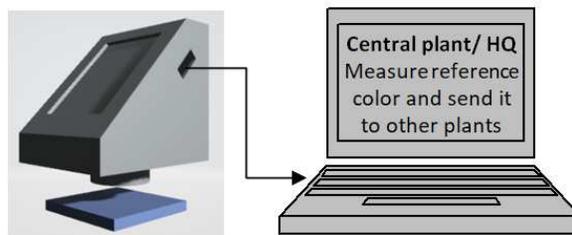
- ✓ Contact measurement: (c) (d)
- ✓ Non-contact measurement: (a) (b) (e) (Adjustable height)

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

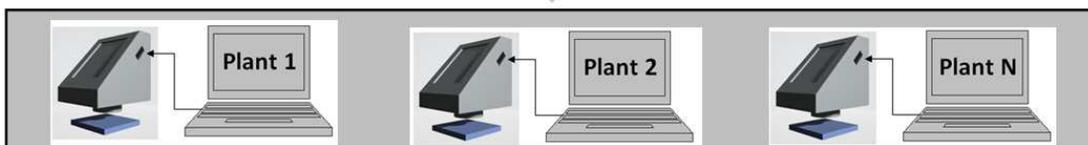
- ✓ Averaging
- ✓ Auto repeat measurement mode
- ✓ Color match percentage
- ✓ Color indices (whiteness, yellowness, ...)

- ✓ *SensegoodSmart*
– computer interface software utility

SensegoodSmart utility:



- ✓ Color data of *Standard Reference*
 - ✓ Allowed color tolerance
 - ✓ Sample measurement distance
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Each plant transfers received reference color data to the local Sensegood spectrophotometer using SensegoodSmart utility. Machine compares locally manufactured product's color with the received reference color data and gives the amount of match in percentage. Machine warns by alarm and also by display indications, if Match % is below the color tolerance allowed by central plant/HQ. Machine indicates if the local product is brighter/duller, redder/greener, yellower/bluer than the standard reference. Eventually, this ensures that all the products manufactured in all plants across the globe will remain within allowed color tolerance set by central plant/HQ.

There is no restriction on number of machines. This way, one central plant can handle any number of plants. Sensegood spectrophotometer along with SensegoodSmart utility is a complete global color management solution that you could ask for.

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.

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.

References:

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- [2] Bernhard Kreber, Understanding Wood Discoloration Helps Maximize Wood Profits, Forintek Canada Corp., Vancouver, B.C. Available at: ScholarsArchive @ Oregon State University, USA
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- [4] Sandoval Torres, Sadoth & Jomaa, Wahbi & Marc, Françoise & Puiggali, J.. (2010). Causes of color changes in wood during drying. Forestry Studies in China. 12. Available at: <https://doi.org/10.1007/s11632-010-0404-8>
- [5] Hrcckova, Maria & Koleda, Peter & Koleda, Pavol & Barčík, Štefan & Štefková, Jaroslava. (2018). Color Change of Selected Wood Species Affected by Thermal Treatment and Sanding. Elsevier peer reviewed journal: Bioresources. 13. 8956-8975. Available at: <https://doi.org/10.15376/biores.13.4.8956-8975>



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