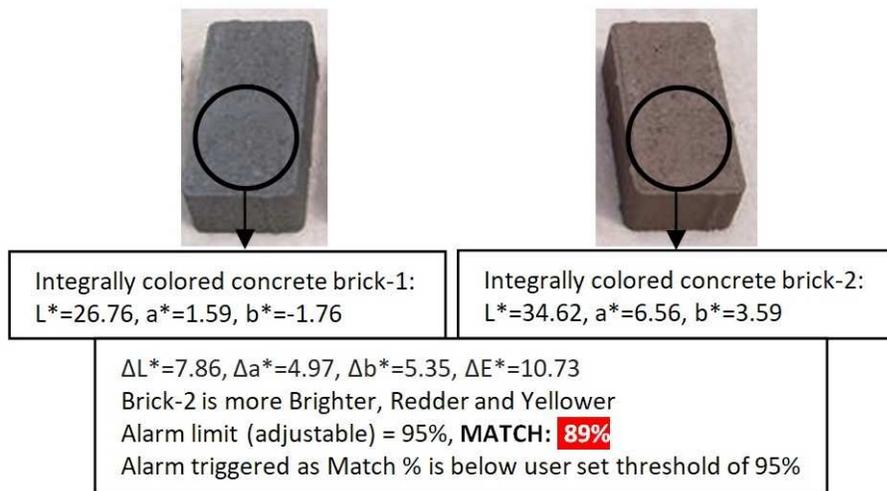


Color management and control in architecture and The effect of color on human psychology

Apart from importance of color in aesthetic appeal, it has far broader perspective to consider in architecture.



Photo: Soccer City Stadium, Johannesburg; made of glass-fiber-reinforced concrete colored with Bayferrox pigments. Source: www.bayferrox.com



Sensegood Spectrophotometer for color management and consistency control in concrete

Photo: Sensegood spectrophotometer assists by providing comprehensive color component information which can be used to control color quality at every stage; starting from ingredient selection to the last curing stage. Above photo shows two integrally colored architectural concrete bricks. Brick-1 requires brightening agents and red-yellow pigments to achieve similar appearance that brick-2 has. Alarm limit is the color tolerance settable by user. Sensegood spectrophotometer helps architects and designers to take correct color decisions, in assisting suppliers and workers considering scientific approach in project.

Perception of color in Architecture:

Color is an integral element of our world, not just in the natural environment but also in the man-made architectural environment. The architect must consider the color effect of every element of a building's construction, from the earthy colors of primary construction materials like wood, stone, brick, and marble, to the expansive variety of colors available for paint, doors, windows, siding, and trim. [1] The impression of a color and the message it conveys is of utmost importance in creating the emotional impressions and psychological mood or ambiance that supports the function of a space. Color significantly conveys cultural, trends, style and fashion attributes. Appropriate color specification has its role in safeguarding visual efficiency and comfort along with great aesthetics. Color is a flexible and powerful design element that touches

everything. Colors work as a kind of language and serve as tools of communication between people and the objects surrounding them. [2]



Photo: Under cool colors, time is underestimated (one feels one has been there less time than actually spent), weights seem lighter, and rooms appear larger [3]. Thus, cool colors may be used when monotonous tasks are performed to make the time seem to pass more quickly. Red and orange are commonly used in fast food restaurants, where quick turnover of tables is desired, such colors also relate with hunger. Image source: Yale-New Haven Hospital; Interior Design: CAMA Inc.; Architect: Salvatore Associates; Photographer: Rick Scanlan [4]



Photo: Medieval exhibition in the Historical Museum, Stockholm, rearranged and repainted in 1996. Left - Detail sketch by interior architect Gertrud Olsson, responsible for exhibition design and coloring. Right - One of the exhibition halls; in 1997 this project was given the best environmental color design award by Federation of Swedish painting contractors. [5] Photo credits: G Hildebrand

Color – perceived space:

Color selection, harmony and visual illusion can alter human perception toward spatial attributes. There is effect of the hue, saturation and luminance of ceiling color on the perceived height of interior spaces. [6] The texture of an object’s surface influences its perceived spatial extent. For a room, pattern density and pattern orientation on certain walls affect perceived spatial extent. [7]

Color – human behavior: performance, emotions, mood and psychology:

The effect of interior office colors on participants clerical task performance, mood, and color preferences were studied by Kwallek, Lewis, Lin-Hsiao, and Woodson [8]. It is reported that participants made significantly more proofreading errors in the white office than in the blue and red offices.



Photo: Monochromatic color scheme to create serenity. Accent color identifies the clinical side of the corridor. Image source: CISCO Life Connections Health Center, Photographer: Steve McClell. Interior design and Architecture: Jain Malkin Inc. [4]

Another experiment was designed in which 486 subjects were provided with an illustration of a bank's interior and asked to evaluate the service quality at that bank. In terms of hue, warm color schemes had a higher mean score on courtesy, while the cool color schemes scored higher on competence. [9]

While the effects of color on psychological influence and moods of college students were studied in another investigation. Understanding colors and how they affect our feelings; can help make better decisions and increase the use of spaces when choosing colors for different spaces to suit the purpose for which they are designed. [10] There are many such investigations proving the significance of interior color in human psychological behavior. [11]- [13]

With an effective planning in the integration process of color and space, more sensitive and relevant designs may be achieved. These kinds of spaces become more user friendly and they reduce the possible stress levels of users. Therefore, in a manner, all these three important concepts –color, interior space, emotion- are related to each other. [14]

Color and Healing:

Neuroscientific research and studies of circadian rhythms demonstrate that the color spectrum of light directly influences human biological systems and health outcomes. It has been suggested that color has a therapeutic effect. Edelstein et al. reviewed citations from biomedical literature and found that while influence of the colored light on health was supported by several decades of rigorous research into circadian rhythms, there was a paucity of consistent data on the influence of applied color on health. [4], [15], [16]

Sensegood spectrophotometer:

A professional interior designer will address the variables impacting color influences in your interiors to develop a harmony that is pleasing in appearance and produces a desired psychological, physiological and emotional reaction. At the same time, it must also be suitable for the room's purposes and available light sources. That's the professional's challenge in any project.

Constructive approach in using various color psychological characteristics like color harmony, split colors, visual illusion or Purkinje effect; an eye can be deceived and perception can be altered.

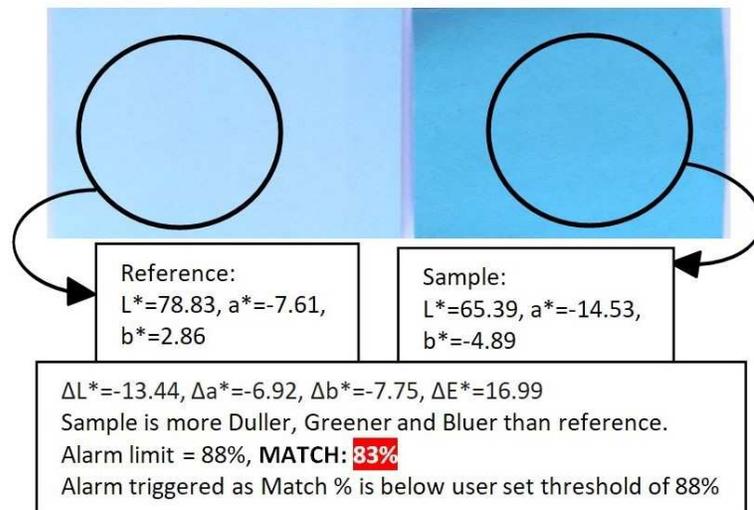


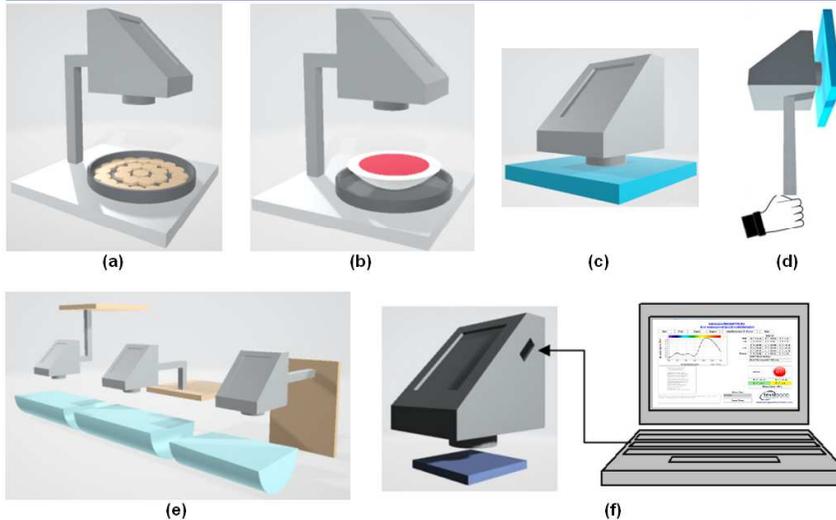
Photo: Choosing the color is important and getting it right is equally important. Ensure right color using Sensegood spectrophotometer.

Architects, designers, decorators and researchers are considering and adopting progressive scientific approach by using tools like colorimeters and spectrophotometers.[17]-[20] Sensegood spectrophotometer is an instrument which analyzes the different color spectral components of light. An element in little off-shaded color from the surroundings; will destroy the appealing uniformity and visual aesthetic of environment. Using spectrophotometer one can identify the difference in spectral components of artifact and the surrounding. Sensegood spectrophotometer assists in ensuring color consistency and harmony across all architectural elements.

Using Sensegood spectrophotometer, architect can understand the spatial distribution of color components from any object. This information assists architect or interior designer to select the best positioned seating arrangement or bed orientation. The psychology and visual ergonomics of color can be applied accordingly to achieve positive pleasant mood.

Same coating may look different depending on materials on which they are applied — wood, metals, plastic. Sensegood spectrophotometer is all-in-one non-contact instrument designed to work as in-process/online, portable/handheld or benchtop/table-top device. It can work for liquids, pastes, solids and powders.

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

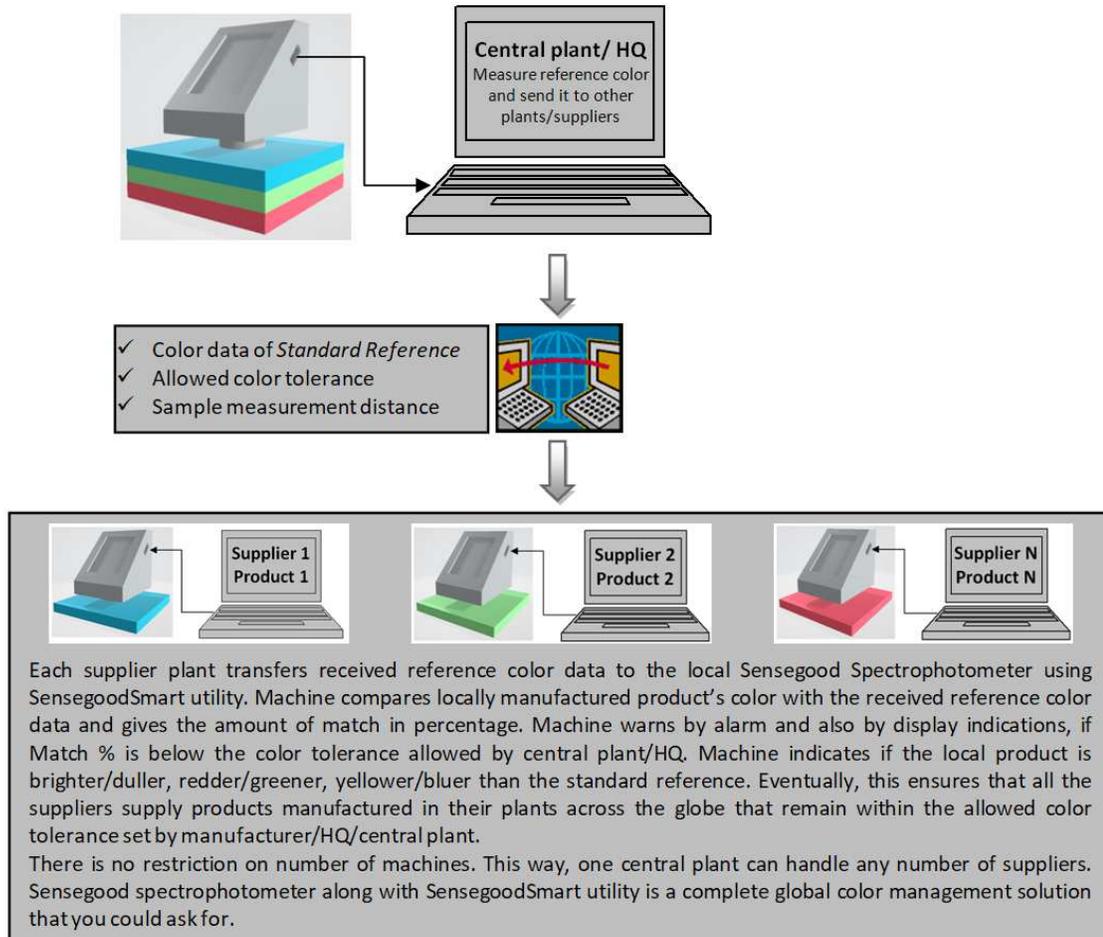
Photo: Sensegood spectrophotometer is a perfect color management solution for solid, liquid, paste or powder products.

Decision based on visible match is always subjective. Sensegood spectrophotometer helps in finding difference between two colors and shows result in percentage match. It measures color and represent in numerical data – a common color language hence the color can be conveyed. Instead of carrying an artifact, one can store its color information in Sensegood spectrophotometer and go anywhere and compare color attributes of compatible colored decor element to check the result in terms of color match percentage. The data can be remotely shared with any number of Sensegood spectrophotometers using SensegoodSmart utility. This enables color consistency in product supply chain.

Just by looking at white wall, one cannot tell how much whiteness does it have, it can be yellowish white or bluish white. Sensegood spectrophotometer has algorithm to measure amount of whiteness or yellowness. Apart from varieties of indices like whiteness index and yellowness index, measured CIE L*a*b* values indicate strength of color parameters like: bright or dull (light fastness), red – green and yellow – blue respectively. Measured color is also represented as reflectance graph, peak wavelength and color temperature on color touch LCD.

Arrangement of gradually changing shades in artifacts or selecting right architectural color element which goes perfect with surroundings, scientific approach in right color placements using Sensegood spectrophotometer boosts confidence of designers which ultimately leads to customer comfort and satisfaction.

SensegoodSmart utility:



Sensegood spectrophotometer provides computer interface software *SensegoodSmart* which lets you convey numeric color data across all production and supply plants that may be located at multiple places across the globe. 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.

Other décor elements: concrete, wood and ceramics are separately discussed.

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