gti technote

Technical & Applications Information on the Products of GTI Graphic Technology, Inc.

The Necessity of a Viewing Booth For Detecting Metamerism

Metamerism is a fact of life when judging color. One never knows when they will experience it. If you are unfamiliar with the term, you are most probably familiar with the effect. It is when a person views two samples under one light source (daylight for instance) and they appear to match and then when the same person views the same samples under a different light source (a typical tungsten light bulb), they do not.

A color matching booth or luminaire is an ideal tool to use for determining if this condition exists. They are designed with a minimum of three light sources and each source puts out the same intensity of light (foot candles or lux). In a booth, the sides are a spectrally neutral color (gray) to eliminate color contamination. If a luminaire is used, a neutral surround must also be employed to avoid non-neutral reflected light from influencing the color match. A red/yellow source (i.e. incandescent lamps), a blue source (a daylight source at 6500 Kelvin is the standard choice), and a greenish source (e.g. cool white fluorescent) are the primary sources with which to start. Additional sources can be used to verify the absence of the condition or to make certain products will have the proper appearance in the lighting environment under which they will be used or selected. An example of this would be using the same source as that used in a specific retail store chain.

The question then arises, can't an instrument like a spectrophotometer, which measures the wavelengths of light very accurately, detect this condition? Metamerism equations have been developed to allow measured data to be compared and from those comparisons, an "index of metamerism" given. Since they were first developed, they continue to be refined. Unless the two samples are perfect spectral matches (the spectral reflectance curves overlay each other precisely), however, the calculated index can only be an estimation of the actual effect. Two samples could have a low index number but still be metameric (appear differently to an observer under different light sources). To determine just how different two samples appear under different light sources, a visual appraisal will still need to be made. Even color difference calculations such as Delta E, have a hard time predicting the closeness of a color match to a human observer under certain conditions. If the matches are close, someone would need to make a visual judgment whether or not "they are close enough."

In addition, such a metamerism index cannot take into account the color differences experienced between two observers (people). This is known as "observer metamerism" and is a documented condition. This effect or condition can only be determined by having the same samples viewed under the same exact viewing conditions (a color matching booth) by different people. Therefore, what one person may say is an acceptable match, another person may find objectionable, no matter how close the actual measured data may be.

A high quality color-matching booth, such as the CMB series from GTI Graphic Technology, Inc., is an ideal tool to use for the visual detection of metamerism. They are carefully engineered and constructed to give the proper viewing conditions in light output, evenness, surround, and simulation of actual daylight, even down into the near Ultraviolet spectrum. Each of the various sources is engineered to provide the same light output to avoid incorrect decisions due to light intensity differences. They are the best and most cost effective tools available to the market today. The CMB series have features that make them extremely reliable and provide lower operation and maintenance costs than any other color matching booths available.

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