



OBJECT APPEARANCE & LED COLOR QUALITY



In this Lighting Design Application video, from the Spectrum Lighting Inc., Tech Center, we discuss a few real-world aspects of lighting merchandise: A small sports car, painted Dijon mustard yellow color. A challenging color to illuminate. For visual reference, primary red, yellow, and blue fabric swatches are placed on the hood.

Initially, the car is illuminated by 4000K (Kelvin), 80 CRI (Color Rendering Index) general light (75-100 FC at 36" AFF) from high bay luminaires. The 4000K, 80 CRI source does not render the car color very well. It appears

greyish-yellow, because the cool-tone LED's, which have "good" color rendering ability, do not have much yellow light-energy within its SPD (Spectral Power Distribution). SPD quantifies the wavelength(s) of light sources and is measured in nanometers (nm).

LIGHTING FACTS

- Visible light (to humans), contains the colors in a rainbow, and spans from short wavelength violet (400nm) to red (760nm) and every color in between.
- Natural light from the sun and sky contains all of these wavelengths simultaneously (depending on time of day, location, and atmospheric conditions) and therefore appears to our eyes as "white" light, causing all objects to appear predictably natural.
- In order for an object to appear "natural" to the human eye when illuminated by a given white LED source; the SPD of the LED must contain light energy with the wavelength(s) that correspond to the pigmentation (physical color) of the object being illuminated.

Next, we add a second layer of 4000K, 98 CRI accent lights, to deliver higher quality light from additional locations, to better model the form of the car. The illumination of vertical surfaces is important. The car looks better, but the muted Dijon mustard color has still not come to life. This suggests that despite its "excellent" 98 CRI rating, the SPD of this 4000K LED light source does not have enough yellow wavelength light-energy to do the job.

Next, we change to different, slightly warmer, "neutral white" LED light sources: 3500K, 80 CRI from overhead high bay luminaires, and 3500K, 98 CRI accent lights, to better model the form and boost overall light levels on the vertical surfaces. Both of these sources have more yellow light-energy within their SPD. Now, the car appears more lively and the enriched appearance looks more like Yellow mustard, than greyish, Dijon mustard. The muted yellow car has come to life!

FOOD FOR THOUGHT

This unscientific Before and After experiment, suggests that warm-tone LED's, such as 3000K, or 2700K, with greater yellow light-energy within the SPD's, and 80-to-98 CRI, would cause the Dijon mustard yellow car to look better and better. This may be true, however one must also be aware of, and sensitive to, the wide range of colors, forms, surfaces, and finishes that occur in any given space; and also anticipate that changes will likely occur. For example: The adjacent car in a showroom might be green or blue. Therefore, the neutral 3500K with 80-98 CRI may represent a wise choice. Visual perception, although fairly predictable, is also highly subjective from

person to person. In the design of lighting, no matter what the calculations predict, or the renderings portray, the eye will always be the final judge. With this thought in mind, we invite you to order samples from your local Spectrum Lighting Inc. sales rep., and when the time is right, please arrange to visit us at the Spectrum Lighting Inc., Tech Center and manufacturing facility - Made in the USA - Lighting Done Right!

Sincerely Yours in Light,

Markus Earley, LC

Director Lighting Design & Applications

