

# Custom Tunable Source for Camera Optimization

## Technical Challenge

In developing a camera system, a client required a tunable source for calibration and testing. They requested that the upper hemisphere be replaced with a cylinder of the same diameter in order for the exit port to be large enough to cover the camera's entire field of view. A number of colors from the Macbeth ColorChecker and standard illuminants were selected to use for testing, and it was important to match their spectrums as closely as possible.

## Labsphere's Solution

Labsphere's Trulume CCS technology presents a number of advantages over the ColorChecker by offering direct control of spectrum and intensity of a single light surface. This custom system uses a light engine with additional channels and an optimized selection of light sources for an improvement of the fitting and an increase of the spectral range.

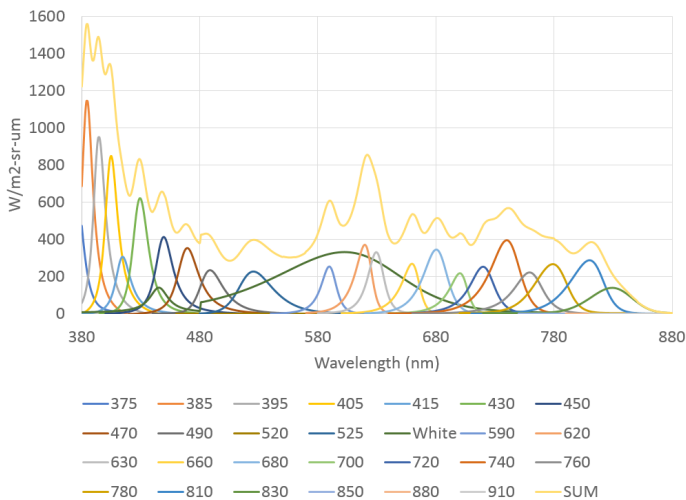
- 23 LEDs distributed over a plurality of wavelengths from 375 to 830 nm
- Spectrometer for real-time measurement of output spectrum and an incandescent source for its calibration
- Cylindrical upper portion with an exit port 10 inches in diameter
- Diffuser filter over exit port for increased uniformity
- Thermoelectric cooling unit for active temperature control
- Labsphere's CCS software for fine-tuned adjustability with added application-specific features

## Benefits

- With an average settling time of 0.4 seconds, the user can easily cycle through colors and perform tests faster.
- Interior baffling and the diffuser give the system an 84% uniform output, even after straying from the traditional integrating sphere design.
- The cylindrical design allows the client to calibrate cameras with larger viewing areas without having to acquire a larger sphere.
- With an LED for every visible wavelength and Labsphere's CCS software, the user can generate any spectral output or choose from a list of presets, with a maximum radiance of 63 W/m<sup>2</sup>-sr.
- The custom CCS software automatically generates solutions for standard illuminants and Macbeth colors, saving on calculation time and effort.
- The thermal electric cooling unit operates automatically and ensures no components will experience heat damage.



Spectral Radiance With Each LED at Maximum Output



Spectral Radiance of Illuminant Standards with System Output

