

Uniform Source for Large Aperture Sensor Testing



Technical Challenge

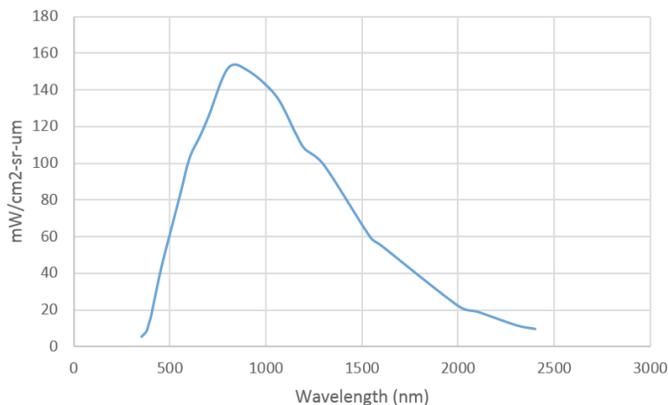
In the process of making sensors for use in satellites and telescopes, one of the most important steps is to characterize the sensor's radiometric performance and establish a relation between the light reaching the sensor and the sensor's numerical output. A national space agency requested a uniform source for conducting these tests in the development of large sensors. The exit port would have to be 1.5 meters across to fully illuminate their device. Additional requests were made to control the external temperature and ensure reliable long-term use.

Labsphere's Solution

The exceedingly large exit port requested for this system required a correspondingly large sphere and a total of thirty-seven lamps in order to achieve the uniformity and spectral radiance needed for proper testing. One of Labsphere's most advanced custom products, this system was packed with unique features:

- Automatic height adjustment with two side-mounted, motorized pistons
- Industrial casters with leveling jacks for stability
- Fully integrated computer system with software and hardware included
- Measures were taken to control the heat generated by the lamps:
 - Custom heat sink surrounding the exit port to absorb majority of the heat
 - Manual shutter at exit port to shield users and equipment from excess heat post-testing
 - Heat shield around rear hemisphere to prevent accidental injuries
 - Three temperature probes to monitor the heat inside the sphere
 - Three external blowers connected to vents around the sphere
- Detachable silicon detector with bandpass and FOV filters
- Detachable InGaAs detector with thermoelectric cooling
- Modified HELIOSense software with added functionality

Spectral Radiance at Full Power



Additional Specifications

Illuminance (lux)	176,737
Spectral Radiance (W/m ² -sr)	1,605
Spatial Uniformity (100% Power)	97.32%
Spatial Uniformity (10% Power)	95.08%
Angular Uniformity (±10°)	99.5%
Angular Uniformity (±45°)	99.2%
Short Term (5s) Stability	99.995%
Long Term (30s) Stability	99.994%
Silicon Detector Non-Linearity	0.42%
InGaAs Detector Non-Linearity	0.37%
Maximum External Temperature	39.5°C
Total Lamp Power	17,680W

Benefits

- The advanced heat redirection system prevents components and materials from damage and protects users from potential injuries.
- The adjustable height and port reducers give the client flexibility to perform tests on various different sensor systems.
- With the software optimized for the client's application, efficiency and usability is maximized.
- Broad spectral control and availability, allowing fine-tuned adjustment of spectral radiance, color temperature, and wavelength distribution with Labsphere's HELIOSense software.
- All spectral requirements are met, providing desired in-band radiance levels in the visible and infrared with over 97% uniformity.