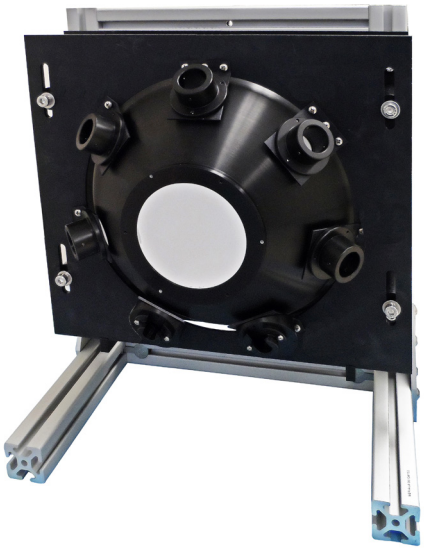
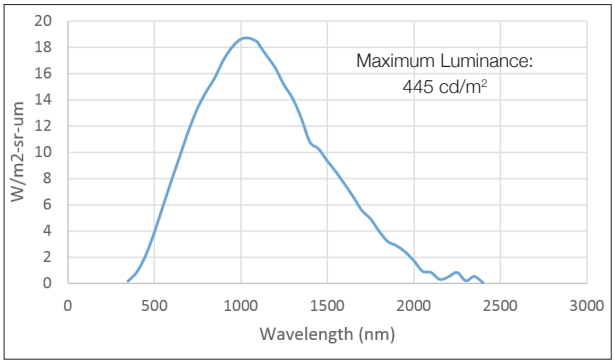
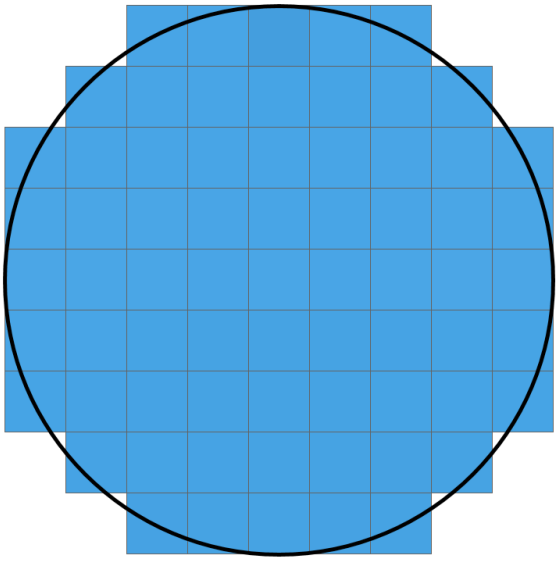
Uniform Source for Vacuum Chamber Testing



Spectral Radiance



Spatial Uniformity - 99.4%



Technical Challenge

A national space agency needed to calibrate a spectrometer in conditions like those seen in outer space - extremely low temperatures and near-vacuum pressure. They had a focus on both the visible and NIR ranges, with an interest in SWIR as well. They chose Labsphere for a reliable uniform source system that would satisfy their spectral requirements and be able to withstand the conditions inside their in-house vacuum chamber.

Labsphere's Solution

In order to protect the components from damage, the light sources and detectors used with this sphere were located outside of the vacuum chamber and connected with optical fibers. Labsphere worked with the client to arrange a test with their vacuum chamber before the system was built and finalized in order to ensure that the fibers would withstand the conditions. Every component that would be used inside the vacuum chamber was prepared with a vacuum baking process, which eliminates any particulates that could cause damage over time.

- Five halogen-based lamps and a high-resolution variable attenuator for continuous adjustability from zero to max power
- Cooling fans to prevent the lamps from overheating
- Unfiltered silicon detector and extended InGaAs detector for measurement and calibration in the full effective range
- Seven low-OH fiber optic bundles for high throughput in the visible, NIR and SWIR ranges
- Spectralon® lining for high reflectance performance in both the visible and infrared range
- Light-tight couplings designed to feed the fiber bundles into the sphere
- Custom-built vacuum bulkhead with mounts for the lamps and detectors

Benefits

- With 99.4% uniformity, accurate results are guaranteed on every test
- The vacuum-baking process allows the sphere to perform tests under the extreme conditions for a long period of time
- The fiber bundles allow the system to operate with comparable performance to a sphere with a standard setup
- Communication and working with the client ensured Labsphere could provide them with a system they can trust
- The system is optimized for performance in the visible and NIR range, allowing the client to perform the tests they need

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