Large Diameter Spectralon® Integrating Sphere

Each piece is measured and cut with accuracy to the thousandth of an inch.

Client Request	System Feature
Compatible with third-party components	Flat exterior walls with modular port holes
High uniformity	Virtually seamless interior and large back wall piece
Height adjustable up to 75 inches above the ground	Scissor jack and support pins on frame

Technical Challenge

Labsphere was contacted by NASA for an integrating sphere to calibrate and characterize a camera they were developing. The specifications of the camera required a 12 inch diameter exit port and a 14 inch seamless viewing area in the rear hemisphere. It was also requested that the sphere be adjustable up to 33 inches above its resting height. Rather than using Labsphere's light sources and detector components, they wanted the option to use and interchange their own.

Labsphere's Solution

Because the sphere would be used modularly with third-party components, it was decided to utilize a truncated icosahedral exterior design. Still sporting a spherical interior, the sphere's flat outer walls allowed the port holes to fit any component much easier than a rounded wall would have. Thirty-one carefully designed pieces made up the sphere. The Delrin outer layer allowed the pieces to be fastened together for robustness, and the inner layer was made of Labsphere's Spectralon reflectance material. Every piece was machined meticulously with tight manufacturing tolerances to minimize seams between pieces. The sphere was securely fastened to its frame with six custom anchor brackets.

- 14 inch diameter rear piece for seamless target area and maximum uniformity
- 12 inch diameter exit port with port reducers of 10 and 8 inches
- Six 2 inch diameter flat port holes at front hemisphere
  - Three port holes to be used for detectors
  - Three port holes with SMA adapters for fiber-connected light sources
- Scissor jack assembly beneath the sphere to allow for height adjustability
- A support pin on each side of the sphere bracket to lock in position
- Removable beams to allow for maximum height setting

Benefits

- With Labsphere's exceptional machining standards, the interior is visibly and effectively seamless, ensuring the same high uniformity that any standard integrating sphere would offer
- Even with nearly undetectable seams, the large circular piece in the rear ensures the camera under testing sees only solid Spectralon and eliminates any possibility of error
- Labsphere's Spectralon material gives exceptionally high diffuse reflectance in the visible, UV, and NIR spectral region, allowing for great testing flexibility
- The flat exteriors allow the client to easily use their own components as needed with the system
- The height-adjustment system allows the client to easily integrate the sphere into their testing environment

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