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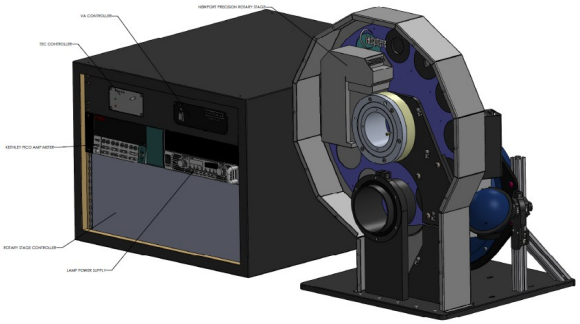
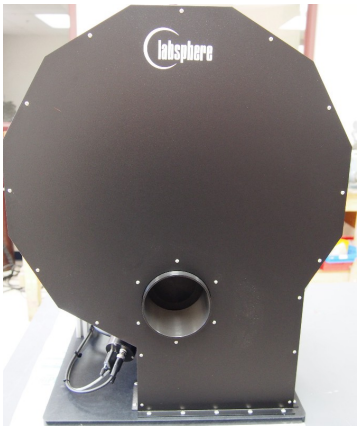




Case Study:

The HELIOS family of uniform sources, a versatile solution that adapts to a variety of testing requirements.

Technical Situation

This case study presents a real case of problem solving with a customer to enact a HELIOS system that not only provided a world class production testing solution, but also enabled the customer to collapse multiple tests into a single system, improve their efficiency, and reduce complexity in their product verification process.

Business Challenge

A large aerospace manufacturer of optical “pods” for drone and aircraft use was having difficulties conducting performance verification testing for their optical systems. Original designs of the pod systems were relatively simple guidance cameras but, more and more, customers requested to add radiometric dynamic range (daylight to night vision levels), combined thermal and visible imaging systems, laser targeting and range finding, increased image resolution and even spectral band or hyperspectral technology.

They had been using a simple uniform source from Labsphere for many years as a core test system, but felt it was time to upgrade the source capability. In addition, the uniform source was only one of many stages of test that they had to perform. The sphere sat at one position on a very large optical bench with many other test systems to perform thermal, radiometric, laser response, target imaging (MTF and point spread function and other image and resolution tests) and optical and boresight alignments…to name a few.

The sequence of tests could take several days and was extremely vulnerable to independent test system failure. An entire team was required to keep this complicated multi-test system running and calibrated.

Labsphere’s Solution

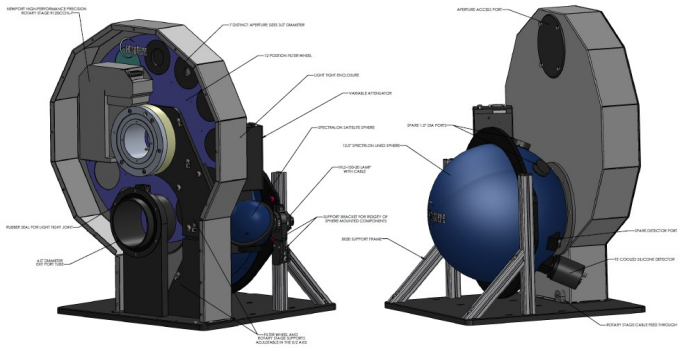
The original request from the customer was for Labsphere to provide a sphere system that could provide luminance and radiance profiles and non-uniformity correction over a wide dynamic range.

Upon inspecting the huge layout of systems arrayed to test the pods, Labsphere suggested that there might be some value combining several of the tests using the sphere as a nexus point for complete testing. The customer had always assumed that the sphere really could only be used for one thing.

Looking at the required tests, and after some discussion, Labsphere and the customer realized that there was a lot of efficiency that could be gained by adding some additional features to the sphere. Specifically, the independent tests that could be collapsed to the sphere were as follows:

- The sphere could be used as a uniform and dynamic range source as requested with much greater resolution and range than the customer had thought possible – upwards of >140dB
- A laser could be installed on the sphere to perform time-domain and spectral tests associated with the laser system in the pod
- The sphere could be used as a "backlight" for Air Force resolution targets, edge targets, pints field targets and other MTF and PSF function tests
- Filters or sources could be added to the sphere (or at the sphere port) to test spectral band passes, solar-like color temperatures, in and out of band requirements, spectral lines, polarization and a huge array of spectral problems could be solved
    - Other sources like LEDs or plasma could be added to augment spectral capability as well and all that we required was adding additional ports (for future upgrade).
- A 1200K thermal source (3-5um) could be added to the sphere that could be turned on periodically for co-bore sighting the thermal and visible optical image channels.
- Labsphere could create a flexible software DLL for easy integration with the other remaining systems in the test bench.

The customer decided that collapsing their elaborate bench into a more compact and complete system using the sphere was worth investigating and Labsphere was given a contract to design the above features into a complete solution. The results of the design effort are shown in the images below.



Benefits

The first system was a huge success:

- The customer was able to reduce the required bench space by 60%
- They lowered testing time by several hours.
- The reliability of the test system went up because multiple tests were being completed without having to move the system from location to location
- They had to use less team members to keep the system running lowering costs and freeing up valuable resources for other expanding tasks.
- They have testing capability and expansion to keep pace with future technology needs.
- They have a software platform that is easy to access and change for multiple tests.

Subsequently, due to all of these increases in capability and costs savings, in the R&D area, the customer decided this system could be moved to a production testing mode. They have replicated this system **four times** to meet increasing demands on the products and technology and have been able to use the additional capability and capacity to win more business from their customers and do better testing and product compliance than ever before. Multiple customer sites around the country are now looking at this solution as a model that can be brought other programs and production lines.

All of these benefits were derived from the advanced HELIOS system modular architecture, some active problem solving to attack multiple problems simultaneously, and employing Labsphere 35+ years of remote sensing testing experience to create a system that meets the needs today and well into the future for their program.

Objective	Benefits Achieved
Combine Multiple Tests	Higher speed and accuracy
System/Program Integration	Lower Costs
Future flexibility	Adapt system to new needs

Ask Labsphere how we can help solve your remote sensing problems, create efficiency and save time and money on your programs.