

CASE STUDY

Market: Optical Design

Product: 3D ACIS Modeler,
HOOPS

Challenge:

Develop *TracePro* as next-generation stray light analysis software that needed to:

- ▶ Handle complex geometry to define and trace millions of rays
- ▶ Visualize, manipulate, and provide a database for 3D solid models
- ▶ Import and export popular CAD and lens design program formats

Solution:

Spatial's 3D ACIS modeler chosen for its unique ability to enable high-precision modeling, data compatibility, databasing, visualization and interactive analysis.

Results:

Enabled Lambda to create a new generation of optical software in 18-20 months with carefully managed resources.

Lambda Research Corporation

Lambda provides innovative optics software and services to government and industry customers worldwide

COMPANY

Lambda Research Corporation (Lambda) provides innovative optics software and services to government and industry customers worldwide. The company's flagship product, *TracePro*®, is a powerful ray tracing program for illumination analysis, stray light analysis, and optical systems analysis. Used by engineers in manufacturing, optics, aerospace, and academia, *TracePro* is a powerful tool for modeling items such as headlights, camera lenses, and telescopes.

Introduced in 1996, *TracePro* was the first optics program to offer compatibility with mechanical CAD programs and to bring ACIS-based 3D geometric modeling capabilities to optical designers. Key to these pioneering differentiators was Spatial's 3D ACIS® Modeler (ACIS).

CHALLENGE

TracePro was originally developed under the National Aeronautics and Space Administration (NASA) Small Business Innovation Research (SBIR) program. The SBIR program funds innovative research that stimulates technological innovation in the private sector and strengthens the role of small business concerns in meeting federal research and commercial application needs.

Under the terms of NASA SBIR, Lambda was challenged to develop *TracePro* as next-generation stray light analysis software that enables efficient and accurate optical analysis. To accomplish these goals, *TracePro* had to be capable of the following functions: Handle complex geometry to define and trace millions of rays; Visualize, manipulate, and provide a database for 3D solid models; and import and export popular CAD and lens design program formats.



"Spatial's pricing strategy opens the door for all software developers, small and large, to have access to world-class 3D technologies. In addition, it demonstrates Spatial's commitment to customer success by allowing small businesses, like Lambda, to concentrate their financial resources on software development and positively impacting their product's time-to-market."

*Dr. Edward Freniere, President and CEO,
Lambda Research Corporation*

CASE STUDY - Lambda Research Corporation

SOLUTION

Lambda opted to use ACIS for *TracePro*'s vast array of capabilities, positioning it as an emerging technology for stray light analysis. Reasons for choosing ACIS include the component's unique ability to enable high-precision modeling, data compatibility, databasing, visualization, and interactive analysis.

Optical modeling requires nanometer, or 10⁻⁶ mm precision, which only ACIS delivers. "During our investigation of modelers, ACIS was the best choice, for it had the highest precision of any modeler," states G. Groot Gregory, vice president, Lambda Research Corporation.

TracePro capitalizes on particular ACIS function sets when creating optical solids, so that objects difficult to model in last-generation optical design programs, like prisms, are easily created. Rich Hassler, Manager of Engineering Services, Lambda Research, explains, "ACIS enables *TracePro* to define primitive solid shapes, including spheres, elliptical and circular cylinders and cones, blocks, and tori. ACIS Boolean Operators are used to combine shapes to intersect, subtract, and unite. ACIS extruding and ACIS sweeping offer the extruding and sweeping of 2D primitive sheets to create a wide variety of unusual 3D geometry."

A crucial differentiator for *TracePro* is its ability to import mechanical CAD models into lens designs and to export optical components into mechanical designs. With ACIS, *TracePro* can share solid model data with all other software based on ACIS, and exchange data with most other CAD and analysis programs via Spatial's ACIS InterOp Components.

As Mr. Gregory describes it, "When we were looking for modelers, the interchange from CAD programs was vital to us. With ACIS, we are able to bring data into *TracePro* from AutoCAD and hundreds of other ACIS-based systems."

ACIS also allows *TracePro* to read optical system data, which is surface data, from popular lens design programs, such as ACCOS V, Code V, OSLO, and ZEMAX.

TracePro uses ACIS for the visualization and databasing of solid models, so users can define models as optical components. Models can be created using a CAD-like interface and libraries of optical components. An extensible database of properties ensures that objects have the correct properties, including materials and surface properties.

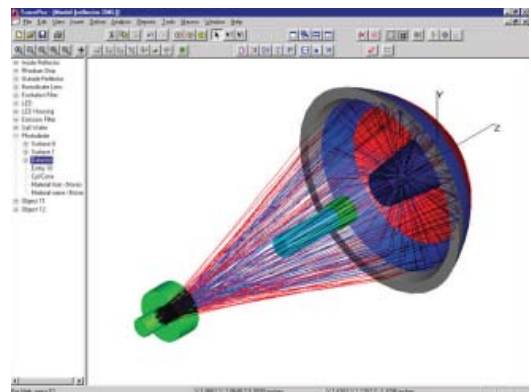
TracePro also includes a Scheme Interface, which is available with ACIS. All capabilities of ACIS's Scheme Toolkit are made accessible to *TracePro* users for interactive and multiple configuration analysis.

RESULTS

Spatial provides an excellent opportunity for innovative, small companies to integrate mature components into their emerging 3D modeling applications. As part of the OEM Partner Program, partners like Lambda get component products and engineering resources specifically designed to speed technology integration and reduce time to market.

The precision and high functionality of ACIS enabled Lambda to create a world-class product in a minimum of time with carefully managed resources.

Lambda added optical processing and simulation on top of ACIS to create a new generation of optical software in 18-20 months. To put this in perspective, it took several years for *TracePro*'s only U.S. competitor to produce its software. And, even after their competitor's considerable time investment, Lambda is convinced it has a superior application. "Our ACIS modeling code is far superior. Our competitor is a company of 45, we are a company of five, and we launched our product in under two years," states Mr. Gregory.



3D image of a Fluoremeter/Reflector modeled in 3D ACIS-enabled *TracePro*. Image provided courtesy of Lambda Research Corporation.



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