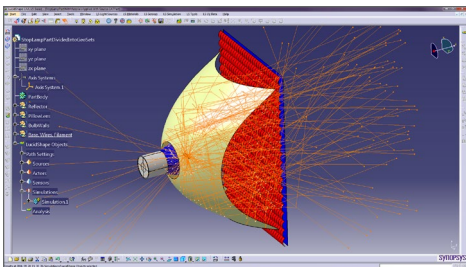
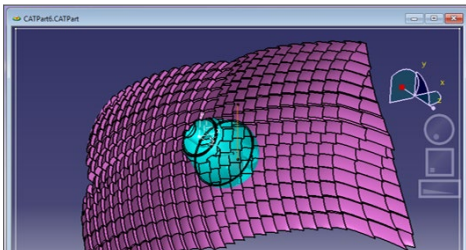
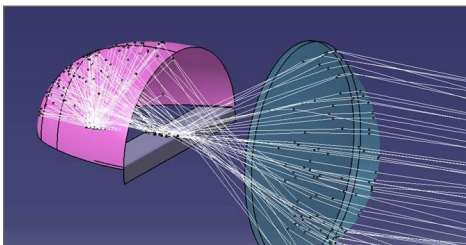


# LucidShape CAA V5 Based

LucidShape CAA V5 Based provides the industry's only complete workflow solution for automotive lighting, design, and visualization within the CATIA V5 environment. Designers who are familiar with CATIA can easily leverage LucidShape's powerful features to produce, with a minimal learning curve, automotive lighting products that meet performance, styling, visual branding, and regulatory requirements.

With LucidShape CAA V5 Based, you also benefit from seamless communication between multi-domain teams with access to a large ecosystem of tools on the CATIA platform.



## Base Module Key Capabilities

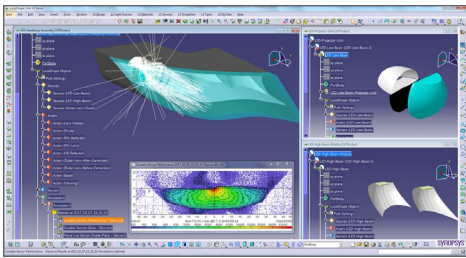
### Flexible Modeling Features

In the LucidShape CAA Base Module, you can use geometry generated in the LucidShape CAA Design Module, geometry directly created through CATIA functionality, or imported geometry. You can then insert light sources and sensors, assign, create, and edit materials and media using a materials/media library, and define simulation settings and analysis preferences.

LucidShape CAA functionality is accessible in a variety of ways. The functionality is included in a specific LucidShape workbench, but can also be directly accessed through LucidShape CAA toolbars and menus from other workbenches such as the Generative Shape Design, Part Design, and Assembly or Product workbenches. You can easily customize the software to best support your individual workflows and speed the modeling process.

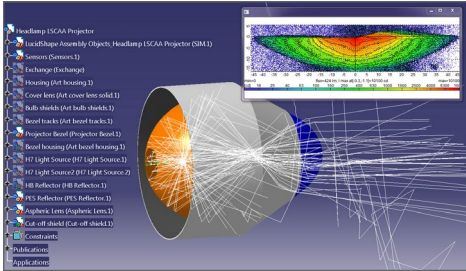
LucidShape CAA includes:

- Sources: point, plane, cylinder, and ray file
- Sensors: candela, luminance camera, ray file, ray history, surface sensor supporting both lux and lumen sensor materials
- Materials/media: compatible with LucidShape actor materials and organized in a library
- Simulation:
  - Forward and backward simulations
  - NURBS simulation (mesh free), tessellated simulation (CPU), tessellated simulation on GPU
  - CATIA Design Tables (forward simulation) so you can construct and simulate design variations quickly. Streamlines the creation of multiple design forms for a product line
- Ability to import measured bi-directional scattering distribution function (BSDF) data for precise surface scatter modeling



## Easy Design Navigation and Management

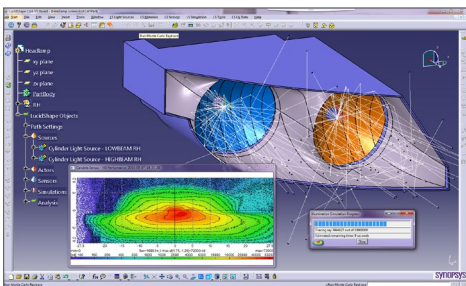
Model navigation and management are highly efficient with the LucidShape CAA Specification Tree structure, which keeps all automotive lighting components organized and accessible from a single location – supporting work on individual parts or highly complex assemblies. This infrastructure enables users to quickly understand even the most complex models.



## Rapid Design Verification

The software can rapidly and accurately ray trace part-level models or product-level assemblies using tessellated or NURBS simulation methods for comprehensive CATIA-based optical simulations. You can run a simulation on one part while you continue to work on another part in the same project.

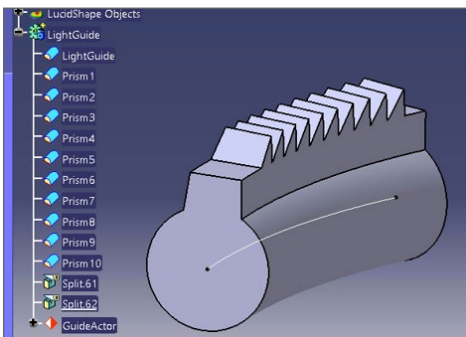
The software also supports multi-core processing and GPU ray tracing (for tessellated mode only) to further accelerate simulations.



## Extensive Suite of Analysis Tools

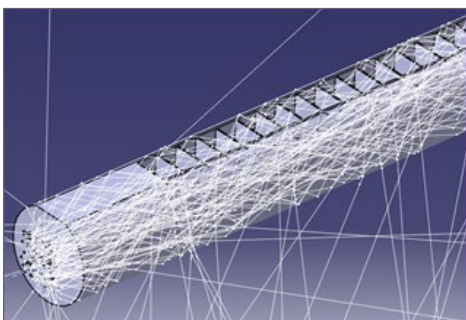
LucidShape CAA V5 Based delivers a wide spectrum of UV data analysis tools, as well as bird's eye and driver's views. A large set of test point standards are included to ensure that your system meets both industry regulations and company specifications. Analysis tools include:

- Test tables (ECE, SAE, JIS, user defined)
- Special views (bird's eye view, driver's view)
- A variety of UV data operations (scale, shift, rotate, etc.)
- Planar Lux Sensor for quantitative analysis of near-field illuminance
- Luminance Camera Sensor to produce high-accuracy luminance images to help you quickly check the appearance of an automotive signal lighting lamp from multiple viewing directions
- Ray History Sensor Capability for both Candela Sensor and Luminance Camera Sensor to provide valuable tools for troubleshooting photometric and appearance issues
- Surface Sensor for analyzing illuminance, irradiance, and flux on curved surfaces. You can trace random rays through the system and display their ray paths. This functionality can help you:
  - Verify light source placement and materials or media setup
  - Check light source image magnification and/or rotation for specific points on the optical surfaces during design work
  - Check the light spread of optics for interference with other lamp or housing components
  - Analyze stray light and glare
  - Troubleshoot optical systems



## Example Model Library

LucidShape CAA V5 Based provides an extensive collection of example models that enable you to jumpstart model creation and analysis tasks.





## Design Module Key Capabilities

### Powerful Design Tools

Geometry creation tools that give you the freedom to focus on overall design objectives rather than the implementation details of complex optics have always made LucidShape software unique.

The LucidShape CAA V5 Based Design Module provides exceptional, versatile design features from LucidShape integrated into the CATIA environment. The fundamental principle behind most of this functionality is the design-by-function concept, which enables users to create functional geometry based on lighting criteria such as spread angles or target light distributions. This feature set enables optical engineers to focus on creating the beam patterns required (and their superposition) to meet an overall light distribution, rather than on creating the freeform surfaces needed to accomplish them.

Combined with CATIA's extensive CAD modeling capabilities, these features enable users to accomplish their optical design work more efficiently, without repetitive and error prone export/import steps. Your optical model can remain fully parametric and feature based at all times, which enables you to simply update your model for subsequent design iterations.

LucidShape CAA design features can also be combined with CATIA features. As a result, the actual trimmed optics are available for simulation from the very beginning of the design. This provides a significant efficiency advantage over working with untrimmed or approximated geometry and having to perform repetitive, time-consuming CAD export/import operations and photometric validations.

## Visualize Module Key Capabilities

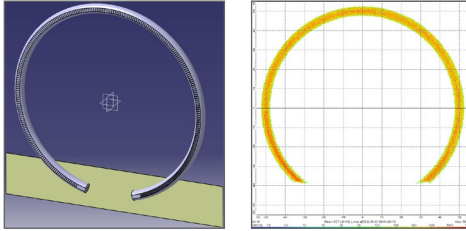
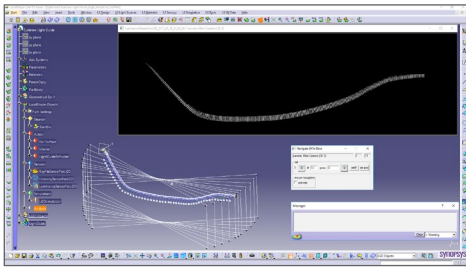
### Stunning, Physics-Based Visualization

Photorealistic visualization is used in the creative process to evaluate the aesthetics of a lighting design and in the engineering process to evaluate optical feasibility based on uniformity, brightness, and manufacturability. The LucidShape CAA Visualize Module is a CATIA-integrated photorealistic rendering capability that generates stunning, physics-based images of automotive lighting products.

Features like the Environment Light Source and the Human Eye Vision Image tool augment the realism in a scene and enable you to virtually evaluate how the human eye will perceive a headlight, tail light, or signal light:

- The Environment Light Source allows you to integrate photographic environments into a simulation, creating a photorealistic impression of a scene.
- The Human Eye Vision Image (HEVI) tool is a tone mapper that modifies luminance data so that it appears as a human would see the real scene.





## Light Guide Design Module Key Capabilities

### Optimized Light Guide Designs

The Light Guide Design Module enables you to create and optimize light guide systems for spatial uniformity and for angular centroid pointing direction. Using CATIA geometry, the Light Guide Designer can make light guides, add pyramidal prism extractors, add sensors, sources, and other items needed for designing light guide systems. This tool uses a CATIA spline curve (or a datum curve) to define the light guide path curve, and it uses special techniques to quickly optimize the uniformity along the length of the light guide.

Adding fillets to a light guide design can be a tedious task, given the typically large number of prisms to consider. The Light Guide Designer includes an automatic filleting capability to automate this task. You can create and optimize light guides with fillets that conform to manufacturing constraints, allowing you to achieve better as-built performance.

### Complete Access to Expert Support

As a LucidShape CAA customer, you can rely on prompt access to our team of technical support experts, who understand automotive lighting design and engineering. In addition, you have 24/7 access to a customer-dedicated website that contains resources to help you become more productive – including videos, documentation, and example files and models.

### For More Information

For more information, please contact Synopsys' Optical Solutions Group at (626) 795-9101, visit [synopsys.com/optical-solutions/lucidshape/caa-v5-based.html](http://synopsys.com/optical-solutions/lucidshape/caa-v5-based.html), or send an e-mail to [optics@synopsys.com](mailto:optics@synopsys.com).