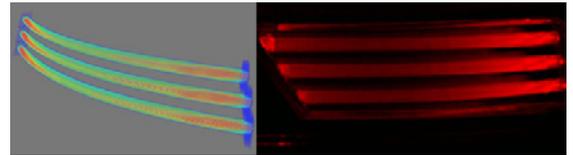# ANSYS SPEOS OPTICAL PART DESIGN ADD-ON
DESIGN DEDICATED OPTICAL GEOMETRIES FOR LIGHTING SYSTEMS WITH GENERATIVE OPTICAL DESIGN

Ansys SPEOS Optical Part Design increases optical designers' productivity and reduces the engineering development time while accelerating style convergence.

This powerful Optical Part Design Add-On can generate several dozen construction elements at once, automatically creating prisms for a light guide or pillow optics for reflective and refractive parts.

You no longer have to use approximations when building surfaces to collimate light rays. Now, you can easily create reflectors, lenses and light guides with fine control of a few parameters. Also, you can model and take into account manufacturing constraints like drafting and milling early in the process to prevent issues during the manufacturing stage.

Ansys SPEOS Optical Part Design is integrated into Ansys SPEOS to avoid loss of accuracy and time delays during geometry conversion. This facilitates exchange between customers and suppliers and/or style-engineering- manufacturing departments. Additionally, it enables engineers to evaluate the influence of trimming and manufacturing (drafting, milling) on optical performance. It is useful for both non-specialists in optics (typically in conceptual style design and feasibility study phases) and optical experts during engineering design. It helps to define and choose the optimal concept and then improve its robustness before tool launch.

/ User-Centered Design

Ansys SPEOS offers intuitive 3D modeling capabilities in a comprehensive user interface. Thanks to the simplified user experience, based on direct modeling, it's easy to create, experience, optimize and validate any optical system with just a few clicks in a rapid iterative process. Connection with multiphysics simulations

The integration of Ansys SPEOS into the Ansys multiphysics solution enables you to perform related thermal and mechanical simulations simultaneously. In addition to optical simulation, you can check the impact of heat and deformations on optical performance to certify the compliance of any system in a comprehensive usage context.

## / SPEOS Optical Part Design Iteration Management

Optical designs can be easily and automatically updated from one design iteration to another; materials and simulation data links are preserved. With this capability, you can iterate and optimize your designs faster.
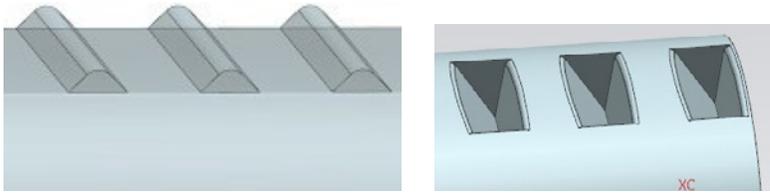
/ Light Guide

SPEOS Optical Part Design enables you to design light guides following any curve for automotive or general lighting. You will benefit from extended light guide design capabilities to achieve a compact and efficient result with a homogeneous appearance when lit, or use a light guide for surface illumination, for door panels for instance. The design is also flexible to easily comply with regulations. The construction mode is based on control points and parameters for increased efficiency and uniformity optimization. Even non-experts in optics will be able to achieve high-level designs thanks to a simple user interface. You need only one iteration to automatically obtain an optimal prism angle value that sends light along the optical axis.
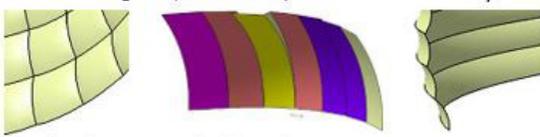

3D view of a circular light guide
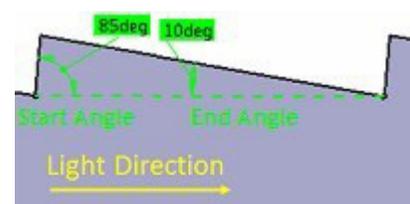
In addition, the design parameters of the light guide can be optimized to achieve a homogenous lit appearance.


Light guide feature with milling

One of the key parameters to optimize light guide homogeneity is the trimming ratio, which locally reduces the efficiency of a prism to remove hot spots.

Lightguide prisms can be milled to fit the production method for the mold. Different prism radii can be simulated along the same light guide. These added radii are beneficial to spread light and obtain better homogeneity.
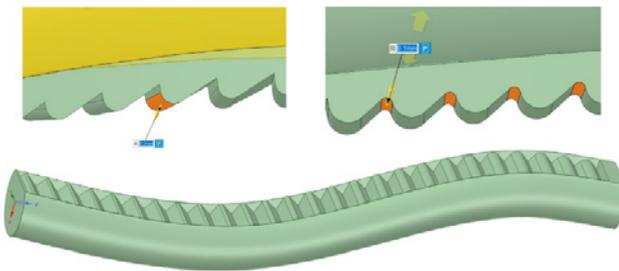
/ Optical Surface

Ansys SPEOS Optical Part Design enables you to design optical reflectors for automotive or general lighting purposes with specific styles and photometric specifications. Optical surface can use any freeform support, which can be split into smaller elements to achieve the intended style: rectangular, circular, stripe or freestyle.

To achieve the photometric specifications, the geometrical shape patterns can be set as pillows, stripes, freeform, or sharp cutoff shapes. To control light distribution, pillows and stripes are defined with geometrical parameters, while freeform and sharp cutoff patterns are defined with optical parameters. The shapes of freeform and sharp cutoff patterns are automatically computed to match the user's optical targets.

Ansys SPEOS Optical Part Design has an advanced mode for the sharp cut-off definition. Using this mode, an expert can design better lighting distribution based on the definition of control points, control horizontal and vertical beam distribution, and progressive tilt. This simplified process provides greater flexibility on the beam definition for better performance on the road.,A viewer displays the optical beam pattern or relative photometry on an intensity grid for any selected face.

Ansys SPEOS Optical Part Design also includes a dedicated feature to sew and draft patterns with an angular constraint and ensure correct demolding while preserving design intent.

After drafting, the reflector can be demolded.
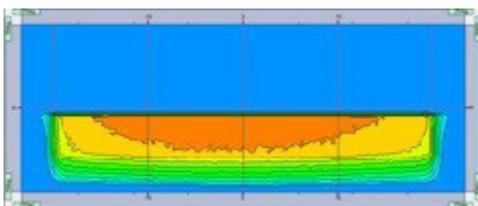
Freeform beam pattern matches user target.

/ Poly-Ellipsoidal Reflector

With Ansys SPEOS Optical Part Design, you can design a pseudo-ellipsoid reflector to control the spread of light at the secondary focus. In combination with a projection lens and a custom light shield, you can design a projector module commonly used in automotive exterior lighting.

The generated surface is smoothly evolving between user constraints to ensure perfect control of the beam pattern.
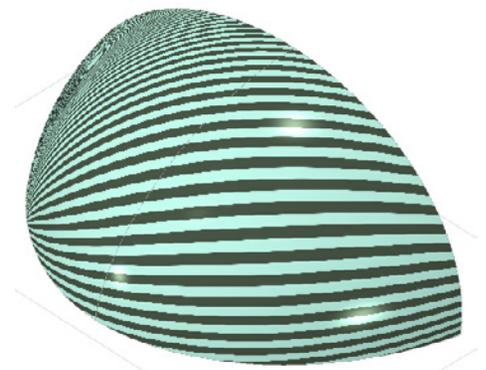
/ Optical Lens

With Ansys SPEOS Optical Part Design you can design optical lenses for automotive or general lighting to achieve a specific style and photometric specifications.

Optical lenses can use any freeform support, which can be split into smaller elements to achieve the intended style. Different types of grid patterns are available: rectangular, circular, stripe or freestyle using design input directly.

To achieve photometric specifications, you can control the light distribution using different parametric shapes like pillows, freeform pattern, prisms, pyramids or flutes. Freeform and prism patterns are automatically computed to match user optical targets. A viewer displays the optical beam pattern for any selected face.

Ansys SPEOS Optical Part Design also includes a manufacturing feature to draft patterns with angular constraints and ensure correct demolding while preserving design intent.

/ Free-Form Lens

Bridging the gap between optical engineers and designers, the free-form lens feature automatically generates an optical lens using any free-form surface as input. It ensures the accurate collimation of light, while preserving the original design intent in the results. This lens design capability can be extensively used in the general, automotive and medical lighting categories.

/ Honeycomb Lens

The honeycomb lens feature enables you to create reflex reflector and hexagonal-shaped pillow lenses. This feature addresses the usual issue of ensuring the compliance to ECE R3 regulation for a retro-reflecting device with the equivalent FMVSS. You have the flexibility to combine optical functions within the same design for an enticing final effect.

To see a full list of Ansys Optical Capabilities please visit www.ansys.com/products/optical

2020 R1 ANSYS SPEOS Packaging - Synthesis

PRODUCT	PACKAGE / ADD-ON	DESCRIPTION
Ansys SPEOS	Pro	Simulates lighting systems performance in the visible light range, evaluate photometric and colorimetric magnitude
	Premium	Evaluates materials and lighting systems performance and appearance, extends analysis to radiometry from ultra-violet to near-infrared
	Enterprise	Examines human vision, physiologically models the human eye, determines reflection visibility and information legibility
	Optical Part Design	Creates dedicated optical geometries for the design of lighting systems
	Optical Sensor Test	Assesses camera and LiDAR raw signals in a driving environment, applies electronic Processing, enables sensors layout on vehicles
	Far-Infrared Extension	Extends optical simulation range up to far-infrared, models thermal radiation
	HUD Design & Analysis	Head-up display (HUD) optical design. Designs automotive HUD imaging systems, tests HUD image quality against standards and specifications
	HPC	Shortens simulation times for high-quality results and enables the quick evaluation of systems at extremely high resolution

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