Synopsys' LightTools Delivers Innovative Modeling Capabilities for Freeform Optics in Illumination Systems

LightTools 8.3 Helps Speed the Design of Luminaires with a New Advanced Design Module

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Highlights:

- The LightTools Advanced Design Module provides specialized tools for the design of freeform optics for a wide range of illumination applications
- New capabilities help users model spatial temperature and power density variations in phosphor-based LEDs
- A new application programming interface (API) allows users to develop custom volume scattering components
- The Volume Scatter Logger reports scattering and phosphor conversion events in surface materials

Synopsys, Inc. (Nasdaq: SNPS) today announced the availability of version 8.3 of its LightTools® illumination design software, which offers a new Advanced Design Module with robust capabilities for modeling freeform optics for a wide range of applications. The new capabilities enable users to easily incorporate freeform surfaces in illumination designs to produce optical systems that have increased energy efficiency, superior light control and innovative design forms. In addition, LightTools 8.3 delivers new features for highly accurate design and modeling of phosphor-based LED systems.

Advanced Design Module

The new LightTools Advanced Design Module introduces a set of specialized tools to enable fast, robust modeling of reflective and refractive freeform optics in both single-surface and segmented configurations for a diverse set of illumination applications. Freeform optical surfaces provide many advantages over conventional optics for meeting complex illumination requirements, such as precise light control, innovative styling, compact system dimensions and energy efficiency.

In addition, the Advanced Design Module leverages proprietary algorithms from Synopsys' LucidShape® products that automatically calculate and construct optical geometries based on user-defined illuminance and intensity patterns. This unique, functional approach gives designers the freedom to focus on overall design objectives rather than the implementation details of complex optical components.

Key features in the Advanced Design Module include:

- Freeform Design features for modeling freeform reflective and refractive surfaces that are automatically shaped to form the resulting light pattern. Freeform design features are especially advantageous for systems with small light sources, such as LEDs and halogen lamps.
- MacroFocal Reflector tool for designing multi-surface segmented reflectors, with different spreads for each facet. MacroFocal Reflector is useful when designing lighting systems for applications that need precise control of the light pattern or sharp intensity cutoffs at one or more sides of the beam. Applications include street lights, outdoor and architectural lighting systems.
- Procedural Rectangle Lens tool for designing surfaces with pillowed optical arrays, which enable precise light distribution control in LED luminaires and signal lighting, as well as in applications that require superposition of optical distributions.
- LED Lens tool for creating various types of freeform LED collimator lenses, which are effective for producing efficient, highly directed light distributions.

"As the lighting industry continues to evolve, LEDs have become integral components in architectural lighting, and the use of freeform lenses and freeform reflectors has led to new photometric design possibilities," said Dr. Matthias Bremerich, chief illumination engineer at ERCO. "The new LightTools Freeform Design features enable us to develop these sophisticated optical parts. We are impressed by the accuracy and speed of these tools."

"With the LightTools Advanced Design Module, designers have powerful new tools to streamline the design of innovative luminaires," said George Bayz, vice president and general manager of Synopsys' Optical Solutions Group. "Enabled by the Advanced Design Module features, illumination engineers can take advantage of the cost and performance benefits that freeform optics offer, such as the ability to produce small, energy-efficient light sources with design characteristics tailored to their application requirements."

Temperature and Power Density Effects for Phosphor-based LEDs

LightTools 8.3 includes new capabilities to assist designers in modeling spatial temperature and power density variations in

phosphor-based LEDs. Phosphors are known to change output under various conditions, including wide temperature ranges and changes in power density. These factors are important to consider when modeling phosphor layers in applications such as high-power white LED packages.

User-defined Volume Scattering API

LightTools 8.3 includes a new application programming interface (API) that gives users a high level of flexibility for developing custom volume scattering components that can be dynamically linked with LightTools. The API is particularly useful for defining interactions in phosphor-based LEDs.

Volume Scatter Logger Utility

A new Volume Scatter Logger has been added to the LightTools Utility Library. The utility creates a log of scattering and phosphor conversion events to show what is happening in a scattering material, such as the amount of absorbed and lost energy, as well as shifts in wavelength. Without this type of capability, designers must infer what is happening within the volume by looking at the exiting rays. The new utility gives users greater insight into where energy density changes occur within the material.

Availability and Resources

LightTools version 8.3 is available now. Customers with a current maintenance agreement can download this version from the Synopsys website using their SolvNet® account.

About Synopsys' LightTools Software

LightTools is a 3D optical engineering and design software product that supports virtual prototyping, simulation, optimization and photorealistic renderings of illumination applications. For more information, visit https://optics.synopsys.com/lighttools.

About Synopsys

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