

Choosing the Right Illumination Design Software

Introduction

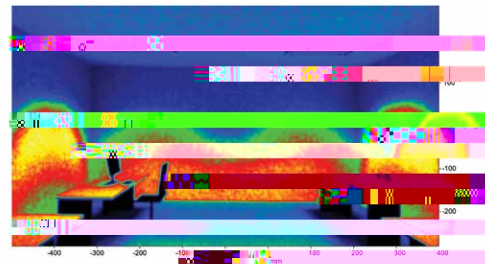
As a decision maker responsible for making the right choices for your company's bottom line, which optical design software should you choose? If the performance or cost of your illumination subsystem is critical to the success of your products, the answer is LightTools. LightTools will increase your engineering productivity, enable faster time to market, and provide your products the competitive edge they need. It accomplishes this through unique design and analysis techniques that support complex geometries and quickly provide accurate results.

Formerly an Optical Research Associates (ORA®) product, LightTools is a 3D optical engineering and design solution that supports virtual prototyping, simulation, optimization, and photorealistic renderings of illumination applications. ORA is now part of Synopsys, Inc. LightTools is developed and supported by a wide range of resources, including:

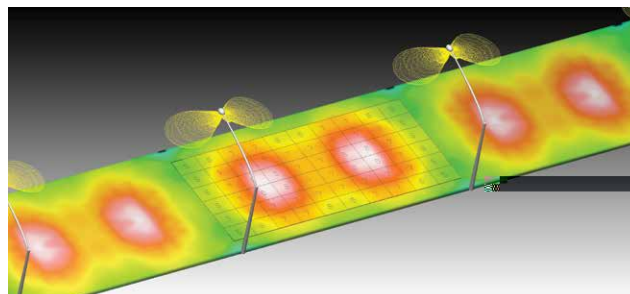
- The industry's largest software development staff devoted to commercial optical engineering software
- A customer support staff with over 50 person-years of engineering experience, who are dedicated to helping customers use our products successfully. This is their full-time job, not just an added responsibility



HUD street scene visualization in LightTools



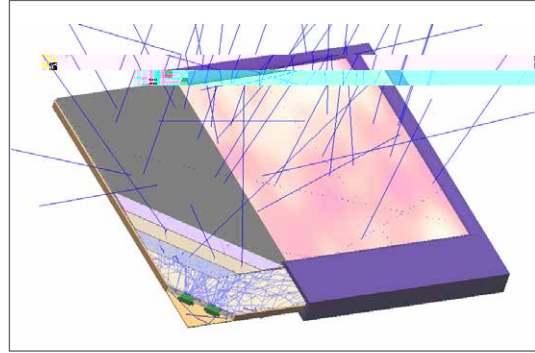
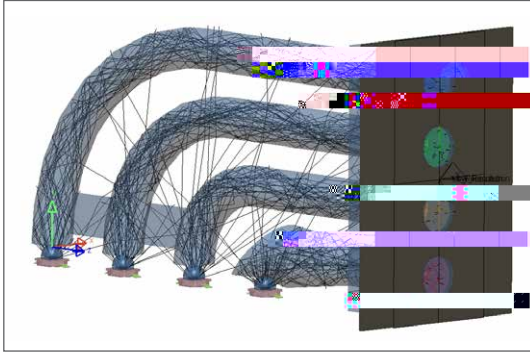
False color image of office interior illumination



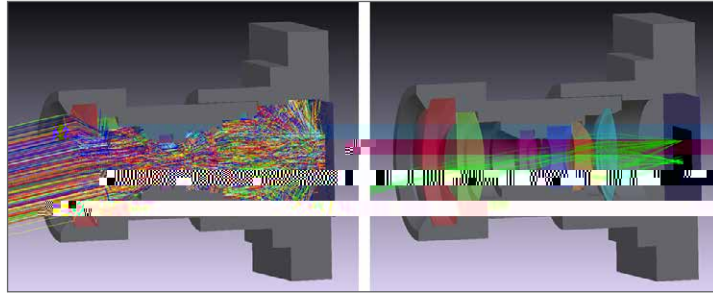
Street level illuminance shown with LightTools Street Light Designer

- Software development processes that have been formalized using state-of-the-art software configuration management methods to ensure an environment that produces innovative algorithms delivering high quality, reliable, and accurate results
- Staff of professional software testers. Our testing personnel construct and evaluate thousand of test cases run daily on code under development
- Our in-house Engineering Services group validates each version of LightTools on cutting-edge, real-world engineering applications
- Our staff includes three Fellows of the OSA and five Fellows of the SPIE. ORA Engineers have published over 300 articles and are listed as inventor or co-inventor on nearly 100 patents related to optical systems

We are organized to produce the best optical engineering software products available. Here are some of the ways this dedication to being the best can help your organization.

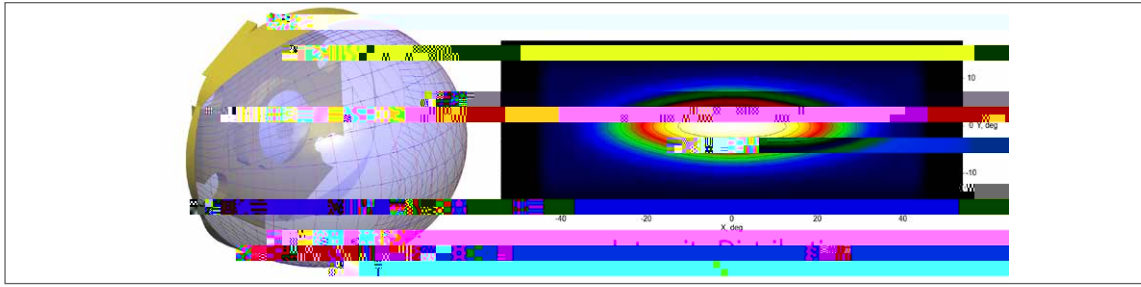


geometry via the macro feature. High-level utilities for source, backlight, and reflector creation can often reduce the initial design time on a new illumination subsystem to minutes, instead of days or weeks.



Conduct comprehensive stray light analysis with Ray Path Analyzer and Receiver Filters

The COM interface in LightTools allows the integration of LightTools functions into other COM-enabled applications, such as Microsoft® Excel, MATLAB®, and Mathematica®. Data Exchange modules support the direct two-way transfer of data between LightTools and other CAD applications via the IGES, STEP, and SAT formats, in addition to the native CATIA transfer module.



Freeform LED lens designed using LightTools' unique Freeform Designer shown with intensity distribution

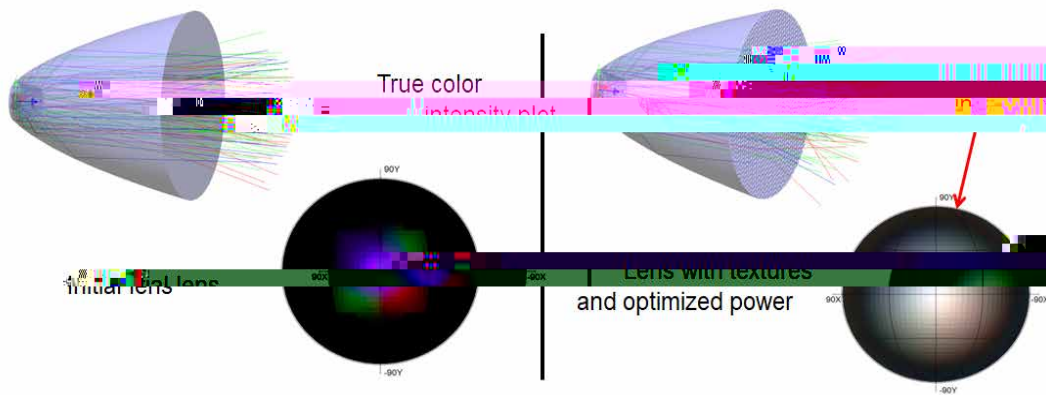
LightTools Readily Supports Complex Geometry

Illumination subsystem design challenges include not only engineering to get light through the system, but also modeling unusually shaped optical components or geometrically complex fixed portions of the system. LightTools, as a flexible 3D solid modeling design tool, addresses both of these issues.

LightTools' basic 3D solid primitives, including spheres, ellipses, toroids, blocks, cylinders (including cones), extrusions and rotationally swept polylines, can be parametrically edited and inserted at any size, in any location, and at any angle. Complex objects previously defined using Boolean operations can be edited at any time, even after they are complete. Each solid can be combined with any other solid (native or imported) using the Boolean operations, union, intersection, and subtraction. This allows the creation of complex, as-fabricated models, such as segmented reflectors and multifaceted light pipes. Note that the complex elements can be optical, mechanical, or structural components.

CAD geometry often defines existing structures of the optical system envelope. In addition to allowing you to import this geometry, LightTools' repair features automatically and interactively help you achieve more complete and accurate geometry sharing between CAD applications. Also, if your CAD modeling package is surface based instead of solid based, LightTools can automatically combine these imported surfaces into solid entities, providing increased flexibility when manipulating this geometry in LightTools.

Textures, both 2D (e.g., paint dots) and 3D (variously shaped bumps), can be applied to any planar surface with LightTools. This capability facilitates both the rapid creation of these complex surfaces and the efficient simulation of their impact on light propagation.



TIR lens with 3D texture optimized for color distribution

Uniquely Powerful Design And Analysis Capabilities

LightTools has many unique capabilities targeted toward the design of illumination optics. In fact, it can be characterized as the only illumination design program available today. Some of LightTools design capabilities include:

- Optimization for faster convergence of systems that meet specified design criteria
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- Application-specific utilities, which can generate a wide variety of backlights, reflectors, and sources to reduce design time and enhance productivity
- Task-specific utilities for searching supplied libraries and applying utility-generated surface properties, spectral data, or angular distribution. Other utilities automate repetitive tasks, such as a parameter study for tolerancing designs before manufacturing
- Parametric editing of booleaned geometry for greater flexibility during the design process by allowing manipulation of geometries without having to start from scratch

Although software programs that analyze illumination power and distribution through optical subsystems are not unique, LightTools also has analytic capabilities not found in other products, including:

- Data plot filters that sort results based on a variety of different criteria without having to rerun the simulation
- Interactive re-binning of illuminance data, receiver size, and location, at any time during a simulation
- The ability to move the illuminance meter angle on the fly, to see what the fabricated system's performance will look like at any viewing angle, in real time
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