

LightTools

LightTools is a 3D optical engineering and design software product that supports virtual prototyping, simulation, optimization, and photorealistic renderings of illumination applications. Its unique design and analysis capabilities, combined with ease of use, support for rapid design iterations, and automatic system optimization, help to ensure the delivery of illumination designs according to specifications and schedule.

LightTools Capabilities Matrix

Surface shapes	Plane, Sphere, Conic Cylinder (X or Y) Toroid (X or Y, with 20th order aspheric profile) Polynomial asphere (20th order) Swept spline (input via macro) Spline patch (input via macro) Anamorphic asphere (20th order) Odd-power polynomial asphere (30th order) Zernike (65 terms) XY Polynomial (10th degree) Superconic (20th order)
Radius specifications	Radius or curvature
Radius type solves (imaging paths only)	Marginal or chief ray slope Marginal or chief ray angle of incidence Marginal or chief ray height Aplanatic (marginal or chief ray)
Thickness solve types (imaging paths only)	Marginal or chief ray height Paraxial image location
Number of solves per element	4 (2 radii and 2 thicknesses, imaging paths only)
Surface characteristics - refract mode (can be applied to any surface shape)	Refract (fails on TIR) Reflect TIR only (fails on refract) TIR (refract or reflect, depending on angle of incidence) Split (refract and reflect, unless TIR) Absorb (stops rays) Mechanical (stops rays) Diffract
Surface Scattering	Lambertian, Gaussian, \cos^n , user-defined, mixed distributions, elliptical Gaussian (BSDF)
Volume Scattering	Mie, user-defined, or Henyey Greenstein
Importance Sampling	Yes, via aim area and/or aim sphere
Surface properties	Transmittance Reflectance User-defined coatings Polarizing properties (ideal linear polarizer or retarder) Fresnel loss (calculated transmittance/ reflectance) Maximum number of hits per non-sequential ray
Diffractive surface forms	Linear grating Radial polynomial (DOE) XY polynomial (DOE)
Diffraction direction	Transmission, reflection, both (multiple orders allowed)
Glass types	Catalog glass Fictitious (Nd and Vd specified) User materials (optical and non-optical)
Glass entry method	Info dialog box or via Glass Map
Glass catalogs supplied	Schott, Ohara, Hoya, Chance, Corning France, Kodak, Baush & Lomb, Corning, Special or user material

Aperture shapes allowed	Circular, Rectangular, Arcuate, Ellipse, or Bitmap
Number of apertures per surface	Unlimited
Aperture location	Arbitrary location and orientation on surface

Standard Interface

Export	CODE V lens data CODE V plot file PostScript LightTools script Tab-delimited spreadsheet IGES and DXF wireframe VRML export
Import	CODE V lens data LightTools script

Multi CPU Support

Multiple CPUs	Supports up to 8 processors in a single PC
Single CPUs	Supports single CPUs with hyperthreading or dual core processors in a single PC

Optical Systems

Number of optical elements allowed	Unlimited
Number of wavelengths allowed	Unlimited
Linear dimension options	Inches, nm, mm, cm, meters
Macro language	Yes (model creation, manipulation)
Number of sources allowed (Illumination only)	Unlimited
Number of receivers allowed (Illumination only)	Unlimited
Number of imaging paths allowed	Unlimited
Number of fields (imaging paths only)	Unlimited
Pupil specification options (imaging paths only)	Entrance pupil diameter Numerical aperture at object
Field specification options (imaging paths only)	Field angle (infinite conjugate) Object height (finite conjugate)
Reference rays (imaging paths)	Chief ray plus unlimited reference rays

only)	(number and position)
Aperture stop (imaging paths only)	Definable on any optical surface
Automatic and user-defined data setting	Pupil specification (EPD or NAO) Vignetting (moves all reference rays)
