TracePro 2D and 3D Optimization

Interactively Refine Your Design to Achieve Ideal Results

TracePro is award-winning opto-mechanical software used for design, analysis, and optimization of optical and illumination systems. With its intuitive CAD interface and powerful features like 2D/3D interactive optimizers, TracePro offers a sophisticated and powerful optical design environment combined with a short learning curve to accelerate product time-to-market.

TracePro streamlines the prototype-to-manufacturing process for optical and illumination systems using 2D symmetric and 3D non-symmetric optimizers. Different from traditional optimizers, TracePro offers an easy-to-use and unique capability to interactively monitor and control the process every step of the way.

You start the design process by sketching the starting design, digitizing variable limits directly into the CAD sketch utility and establishing a merit function using intensity, irradiance, color, and/or uniformity parameters.
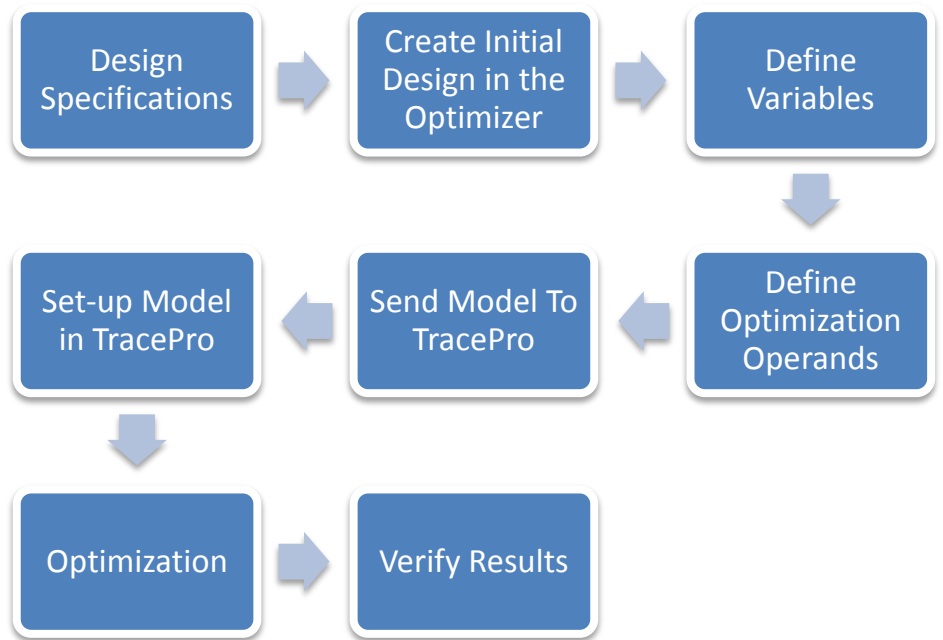
The merit function uses weights to balance the multiple operands based on your desired targets.

You can use TracePro's powerful macro language to control interaction with the created geometry, modify optical properties for each surface and solid object, and control positioning of solid objects. Each variable can be visually checked before, during, and after optimization.

The TracePro 2D and 3D optimizers use the Downhill Simplex, also known as Nelder-Mead, method for optimization.

The Downhill Simplex method is a local optimizer that converges to the local minimum solution closest to the starting point. During an optimization, you have complete control of the process and can monitor the interim solutions. You can stop the optimizer and change the initial starting parameters, then re-start the optimization. This allows you to control the process and test for better solutions in less time.

TracePro's 2D and 3D Optimizers are highly intuitive tools easily mastered by any optical or design engineer. The main functions of the tool include:

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Design                Create Initial          Define
Specifications   →    Design in the      →    Variables
                      Optimizer                   ↓
Set-up Model     ←    Send Model To      ←    Define
in TracePro           TracePro                Optimization
    ↓                                         Operands
Optimization     →    Verify Results
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Surface List: includes available surface types used to draw the objects, such as Planar, BSpline (free, X, Y, XY), Parametrized (biconic surface), 2D profile (asymmetric, symmetric, elliptical), and user-defined Path (2D, 3D)

Object View: lists the types of objects such as Radial Symmetry, Extrusion, Lens, Sweep, and Biaxial; establishes initial parameters that can be adjusted in the Property Editor

Property Editor: varies depending on the selection, generally includes origin, tilt center and angle (X, Y, Z), tilt then shift, thickness, material type, surface properties, draft angle, and refractive index

Optimization: utilizes operands to specify multiple values on which to optimize, including: flux, color space (CIE), irradiance distribution, irradiance profile, intensity, candela profile, and uniformity. Users can also define their own optimization targets
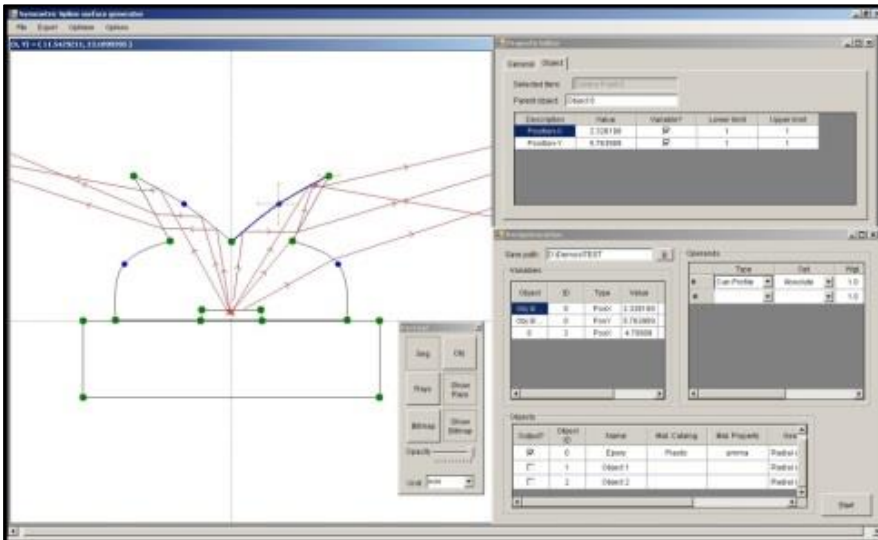
Figure 1: 2D Optimizer showing rays traced for basic design verification, variable setup, and angular operand targets provided as input.
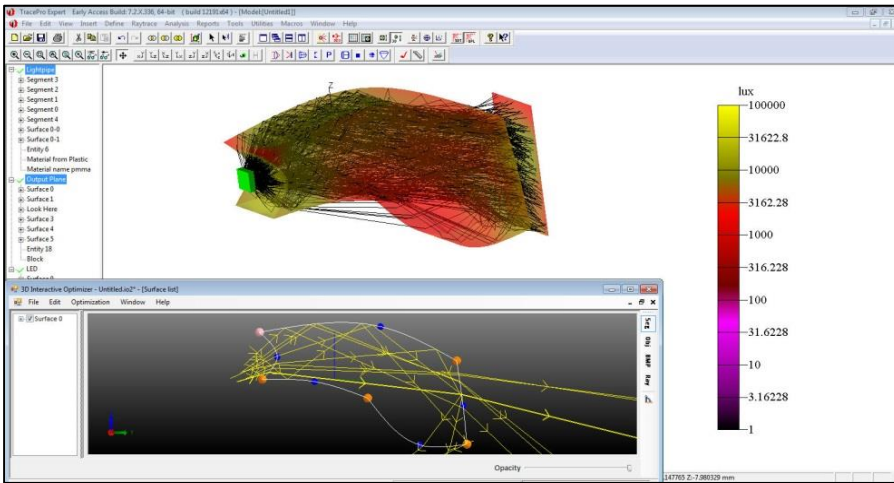

Figure 2: 3D Optimization - complex non-symmetric designs are supported with the 3D optimizer, which is perfect for designing unusually shaped complex light pipes and LED lenses.

Lambda Research Corporation, a privately-held company founded in 1992, is an industry leader in optical analysis, illumination system design and analysis, and custom software development. Lambda Research Corporation publishes TracePro®, an award-winning opto-mechanical design software used for designing and analyzing illumination and optical systems. TracePro streamlines the prototyping-to-manufacturing process by combining an intuitive 3D CAD interface, advanced utilities, and seamless interoperability with other mechanical design programs.