An extensive tool set specifically engineered for today’s complex optical design surfaces.

**Introduction**

Freeform optics are components whose surface profile is not bound by rotational symmetry, typically having high order curves and localized deformations. Advanced manufacturing methods have caught up to simulation capabilities, allowing these complex surfaces to be incorporated into optical designs. These components are already seeing their way into a range of systems from digital projectors to progressive addition lenses and LED lighting systems. As manufacturing improves further, freeform optics have the potential to revolutionize many areas of optical and illumination design.

**Freeform Surfaces**

OpticStudio has extensive tools for freeform optics design. It all starts with a wide range of surface shapes capable of modeling freeform profiles. OpticStudio 15 includes a new sequential surface model whose shape is based upon Chebyshev polynomials. This surface model was developed through discussions with asphericon GmbH on the design of freeform optics for manufacture. The polynomials are a flexible XY set that provide another capability for freeform optic modeling.

OpticStudio supports these freeform surfaces:
- Biconic Zernike
- Chebyshev Polynomial
- Cubic Spline
- Cylinder Fresnel
- Elliptical Grating 1
- Elliptical Grating 2
- Extended Cubic Spline
- Extended Fresnel
- Extended Odd Asphere
- Extended Polynomial
- Extended Toroidal Grating
- Generalized Fresnel
- Grid Gradient
- Grid Sag
- Odd Asphere
- Odd Cosine
- Polynomial
- Radial NURBS
- Supercnic
- Toroidal NURBS
- Zernike Annular Standard Sag
- Zernike Fringe Sag
- Zernike Standard Sag

Quickly find these surfaces in the lens data editor by using the surface filter tool. This tool filters sequential surfaces by category. Using this setting, users can quickly see the available surfaces for the category that they are interested in defining including freeform, conventional, diffractive, gradient index, idealized and specialist surfaces.

**Analysis & Visualization**

OpticStudio provides numerous capabilities for evaluating and visualizing freeform optics. Easily plot a cross-section or 2D map of a freeform surface. Look at surface sag or curvature to see how the surface profile varies across the clear aperture. Use a shaded model layout with arbitrary cutting planes to see any cut-away view of the optical components in a system. Numerous other analyses and plots give you just any data you are looking for.

**Optimization & Manufacturability**

Optimizing freeform surfaces in OpticStudio is as simple as defining a series of variable parameters and specifying the targeted performance. Constraints can be placed on the slopes of surfaces to ensure that they stay within feasible ranges. Furthermore, tolerance sensitivity can be incorporated into the design process, providing components that are insensitive to manufacturing and assembly errors. These are in addition to the hundreds of different performance criteria that can be targeted.

**Ultimate Value**

OpticStudio is the most widely used software in the industry because it offers the best value. The rock-solid computational algorithms provide the accuracy and speed needed for freeform optics design. Comprehensive analysis, optimization and tolerancing give you all the tools you need to get the design done. Around the globe, 24/7 support are there when you have questions or problems. No wonder more scientists, engineers and students turn to OpticStudio than any other solution.