



Optical Systems Design

SYNOPTSYS™ Lens Design Software

Search, Optimize, and Design with ease and efficiency

SYNOPTSYS™

 (*SYNthesis of OPTical SYStems*)

Powerful and Extensive

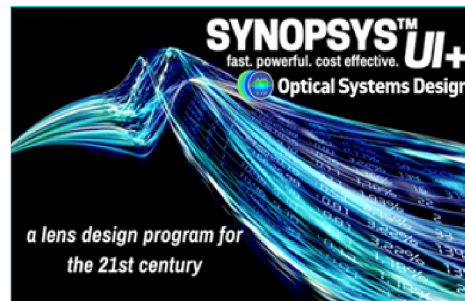
A program written by expert lens designer, Don Dilworth

- Comprehensive feature set

SYNOPTSYS™ Overview



- User-Interface Plus edition provides convenient workflow-oriented platform



- Unique and innovative Automatic Design Search Tools for fixed focus lens, zoom lens, and free form off axis mirror system



Perpetual License at a reasonable cost
Free Trial Available (12 surface limit)
<http://osdoptics.com/trial-request>

Request trial now!



LENS DESIGN SOFTWARE FOR THE PROFESSIONALS

"I have used six different optical design programs; yours has won the competition." - R.W., Massachusetts

**fast
powerful
cost effective**

SYNOPTSYS™ OPTIMIZATION

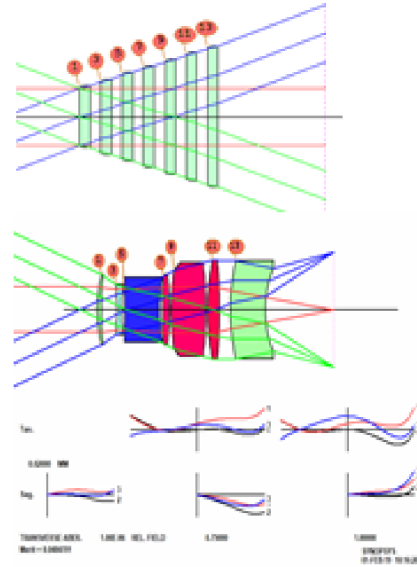
SYNOPTSYS™ runs on the powerful PSD (Pseudo Second Derivative) algorithm developed with the goal of improving the damped-least-squared (DLS) method.

By considering the effects of the higher-order derivatives, the PSD method converges faster to deeper minima. It can perform an optimization iteration in less than a second.



learn more about optimization

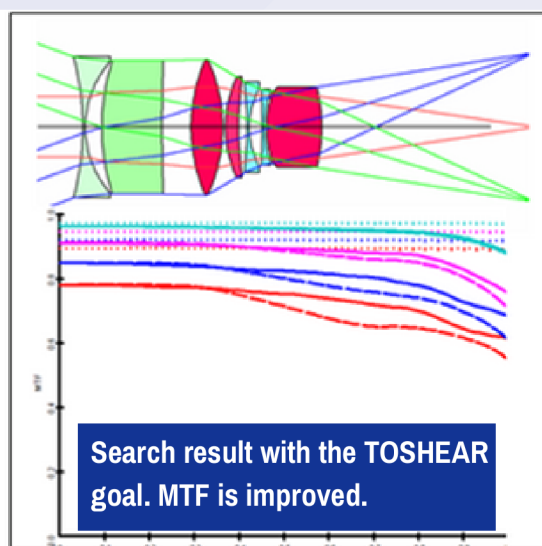
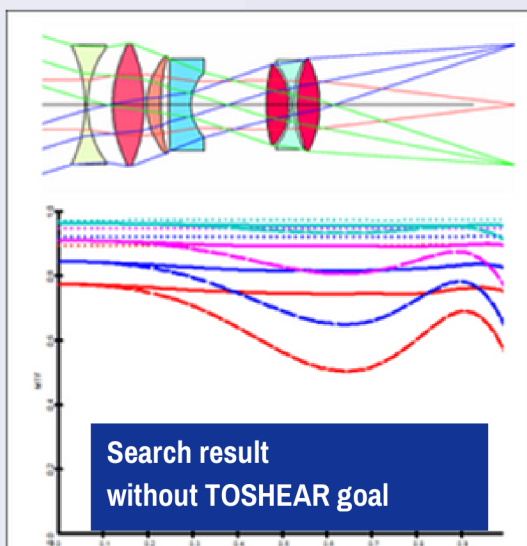
Starting with the all flat system below, in less than one second, SYNOPTSYS™ optimization turns it into an imaging system with average RMS of six microns over the three fields



Additional Optimization Features

SYNOPTSYS™ supports a variety of optimization target types including MTF, ghost and narcissus control, aspheric coefficients, component surface slope, ray incident angles, afocal accommodation, beam clearance at mirrors, HOE point location, OPDs, 3rd and 5th order ray aberrations, and OPD.

- Powerful MTF optimization with GSHEAR command
- Automatically search for systems with enhanced MTF performance via the TOSHEAR directive in DSEARCH™



AUTOMATIC DESIGN TOOLS in **SYNOPSYS™**

The Automatic Design Search Tools in SYNOPSYS™ is innovative and powerful.

It can help Optical Engineers to:

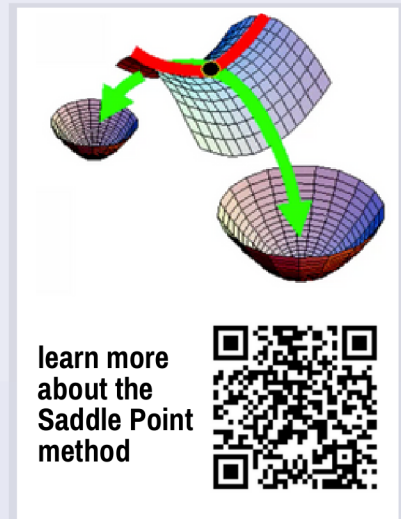
- find realistic starting points for optical designs quickly
- explore the design space and discover new design forms, sometimes with better performance, not normally realized using conventional design protocols

These tools are built on two different algorithms: Saddle-Point Method and Binary Search Method.

Saddle-Point Method for Automatic Design

SYNOPSYS™ offers a set of innovative Automatic Design Tools built on the Saddle-Point Algorithm:

- Building up a complete system with no starting lens at all
- Augmenting an existing lens by adding one or more elements to it
 - AEI (Automatic Element Insert): Automatic scanning of lens systems to find the best place to insert an element
 - AED (Automatic Element Deletion): helps you decide which element to remove without compromising system performance),
 - AAA (Automatic Aspheric Assessment): or whether to use an unusual surface type such as aspheric or kino-form surface



Binary Search Method for Automatic Design Search

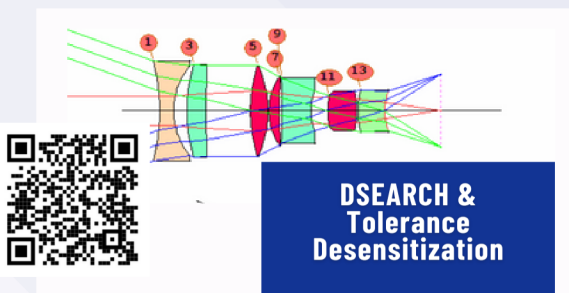
The Binary Search Method supports two design search tools:

DSEARCH™ for fixed focus systems

DSEARCH™ is designed to find good design starting points quickly for fixed focus system. You can include in the search goals directives to search for systems, for example:

- Enhanced MTF performance
- Improved manufacturability with tolerance desensitization

Scan the QR code to view a video on using DSEARCH with Tolerance Desensitization.

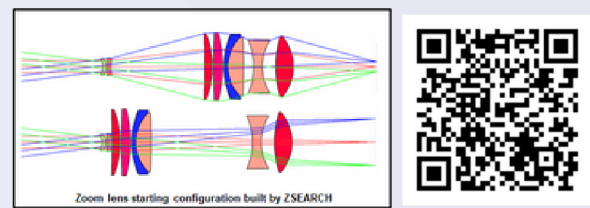


ZSEARCH™ for zoom lens

ZSEARCH™ can help you find good design starting points quickly for zoom lenses. SYNOPSYS™ also provides other convenient tools for zoom lens design. For example:

- **CAM curve:** interpolates between the zoom positions to determine optimal in-between zoom placements for lens groups.
- **ZoomSlider:** provides animated display of lens group movements and lens performance in the complete zoom range.

Scan the QR code to view a video on ZSEARCH, CAM curve, and ZoomSlider in SYNOPSYS™

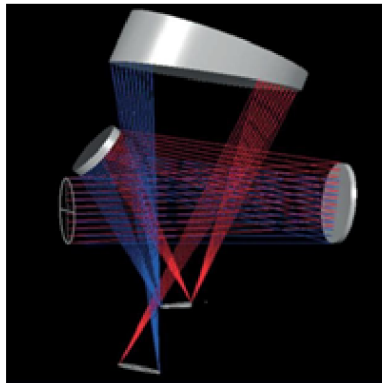


OTHER INNOVATIVE FEATURES in **SYNOPSYS™**

- **FFBUILD™** (Free Form Build):

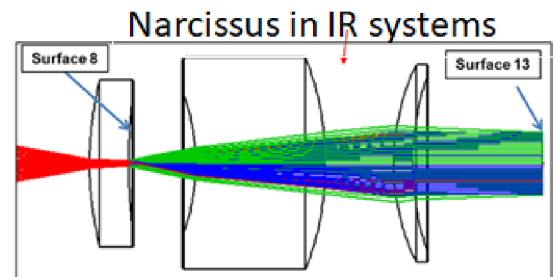
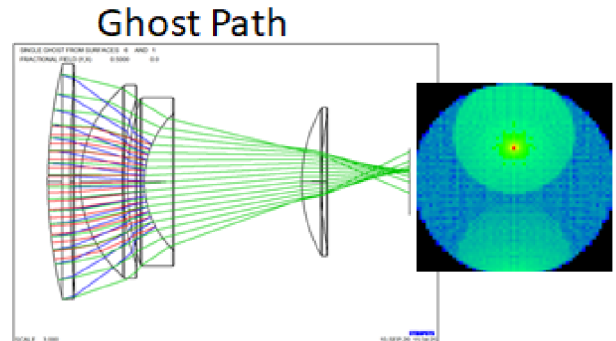
Freeform Build (FFBUILD™) in SYNOPSYS™ is a user-friendly, highly-automated tool developed for the design of compact off-axis freeform-mirror optical systems in 3D space.

- It helps you easily lay out the system in 3D space with automatic beam clearance.
- Designing free form systems is now easier than ever. FFBUILD™ will figure out the mirror angles and let you quickly optimize the system with any of several kinds of aspheric surfaces.



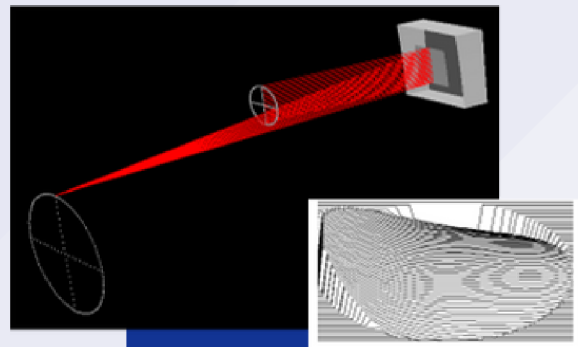
Off-axis system designed with Free-Form Build

- Easily **correct ghosts** and IR system **narcissus** with optimization



CAPABILITY HIGHLIGHTS

- Five coordinate systems to choose from; Easily tilt, shift, and fold elements in complex systems
- Free form Forbes surfaces, Nurbs surfaces, DOEs, holograms, gratings; prism library
- Diffraction-based polarization raytrace; vector diffraction calculation for point-spread function
- Zoom lens design with CAM curves
- Fast real-pupil search algorithm
- and much more...



Decentered mirror created with NURBS surface with 3x3 control point array



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osdoptics.com
office@osdoptics.com