



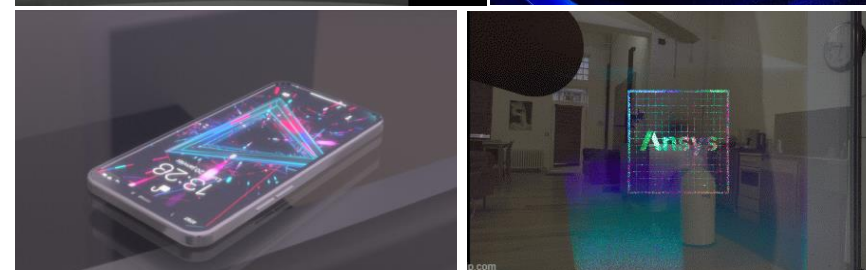
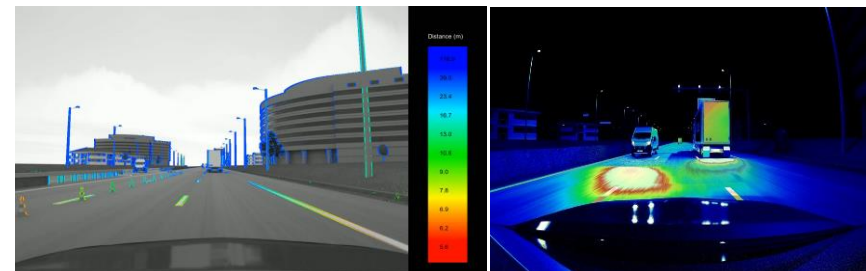
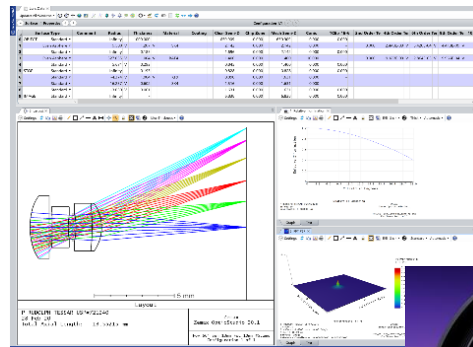
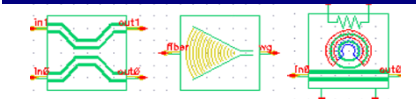
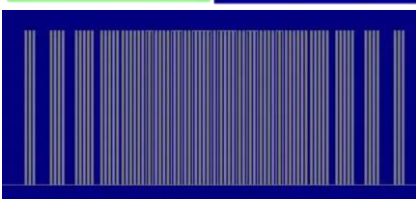
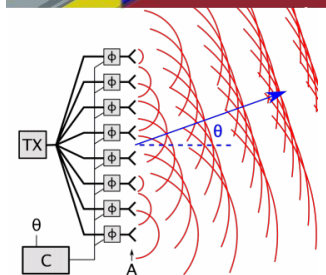
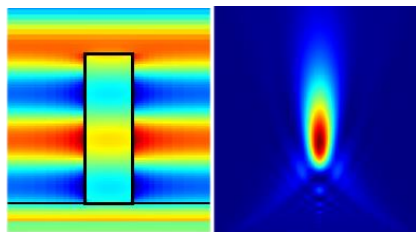
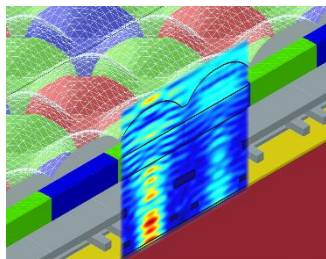
Powering Innovation That Drives Human Advancement

What's New - Ansys Zemax OpticStudio 2024 R1

Tom Pickering

ANSYS / OPTICS - Multiphysics & Multiscale Simulation Platform

Lumerical | Speos | Zemax



ANSYS Lumerical Photonic Design & Optimization

Nano-Chip-Level

- Photonic components, circuits & systems
- Tolerancing & Yield analysis
- Diffractive optical elements & waveguides
- Emissive and absorbing structures

ANSYS Zemax Optical Design & Modeling

Optical-Design-Level

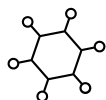
- Optical design
- Optical validation
- Optical tolerance analysis
- Mechanical tolerance analysis

ANSYS Speos Optical System Modelling & Validation

System-Design-Level

- Individual 3D environment integration
- Lighting evaluation
- Human Vision rendering
- Customer's perception for decision making

From Nano



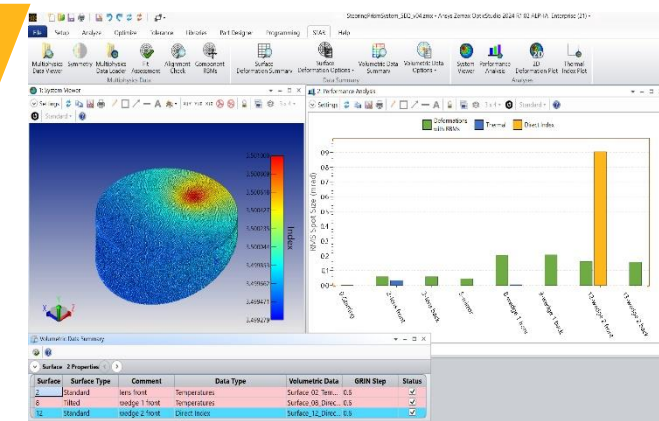
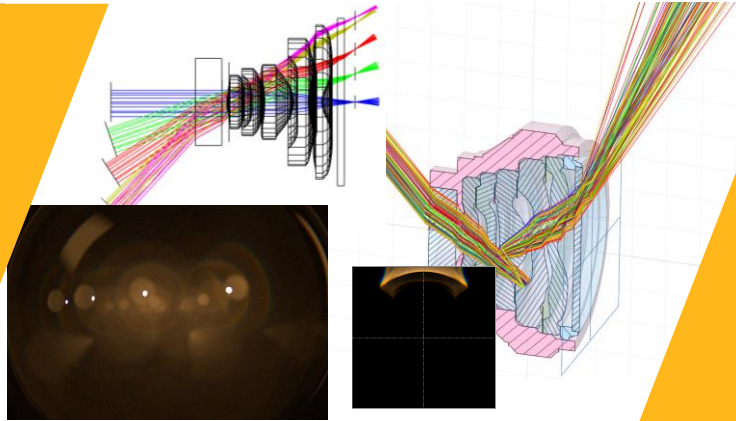
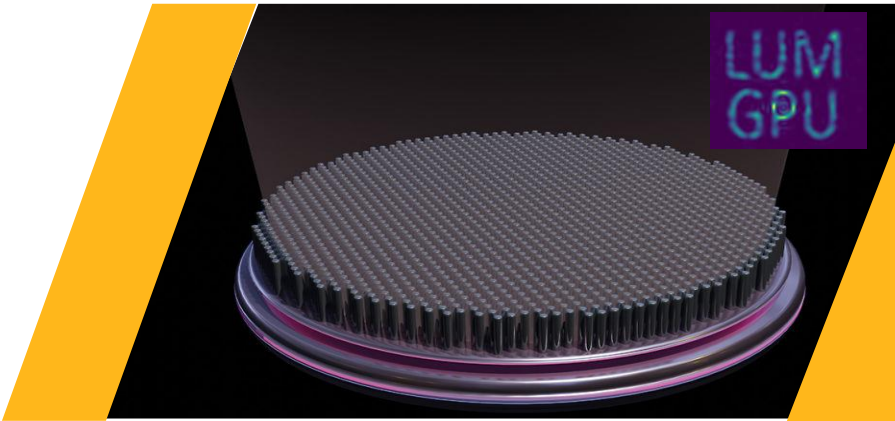
To Macro



To System



Ansys Zemax – Accelerating Optics Innovation



Metalens Simulation Advancements

- ✓ New multi-angle and amplitude data
- ✓ New metalens simulation and analysis capabilities in OpticStudio: MTF, PSF, multi-scale, and multi-lens/metalens systems, new operands for phase constraint optimization
- ✓ Simulate whole metalens with HPC CPU cluster, or accelerate FDTD with GPU (FDTD express mode)
- ✓ **Customer Impact:** Fast design and validation of large metalenses for compact optical systems
- ✓ **Products:** Lumerical FDTD & RCWA, Zemax OpticStudio
- ✓ **Industry:** High-tech, Automotive, A&D, Healthcare

Enhanced Straylight Analysis

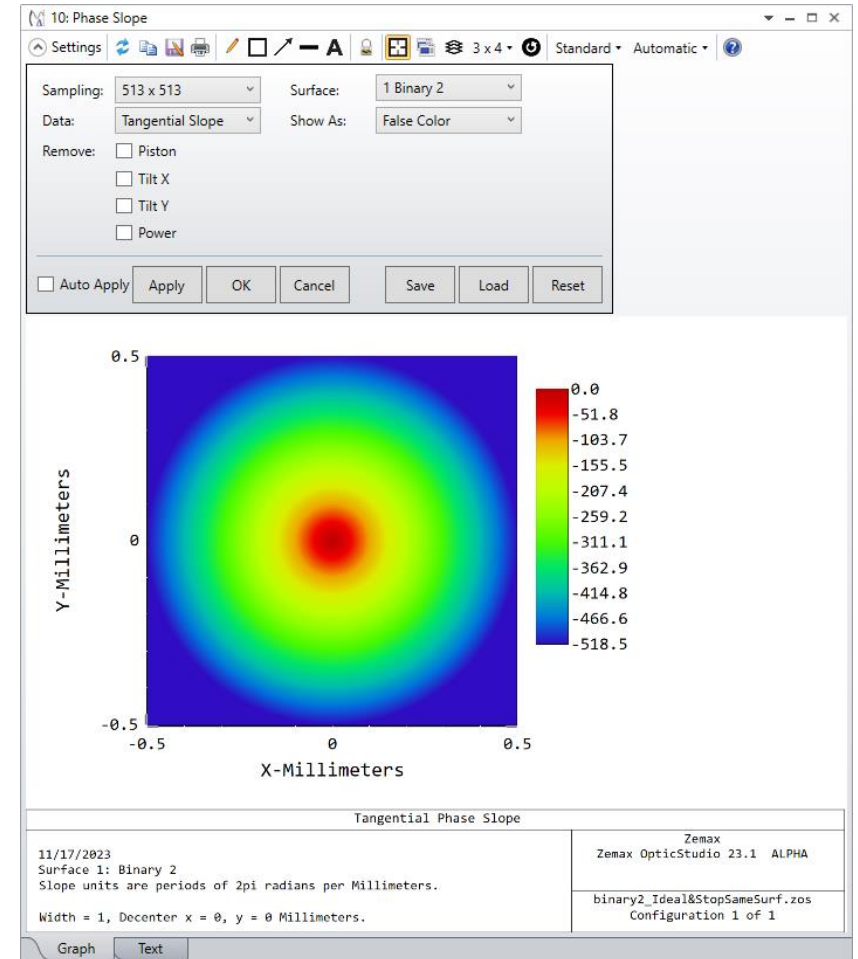
- ✓ New workflow for import of lens geometries and optical properties from Zemax OpticStudio into Speos, compatible with the physical camera sensor
- ✓ **Customer Impact:** Streamlined and comprehensive straylight analysis in optical systems including both free-floating lenses and constrained/housed lens systems, completed with the Physical Camera Sensor
- ✓ **Products:** Speos, Zemax OpticStudio
- ✓ **Industry:** High-tech, Automotive

Expanded OpticStudio Workflow Capability

- ✓ Enables you to use OpticStudio as part of your Ansys Multiphysics workflow.
- ✓ Load refractive index datasets from a wide range of sources including computational fluid dynamics tools like Ansys Fluent.
- ✓ **Customer Impact:** With these capabilities, we can support workflows that extend beyond FEA simulation tools, e.g. with computational fluid dynamics (CFD) tools like Ansys Fluent.
- ✓ **Products:** Zemax OpticStudio, Ansys Fluent
- ✓ **Industry:** Aero-Optics

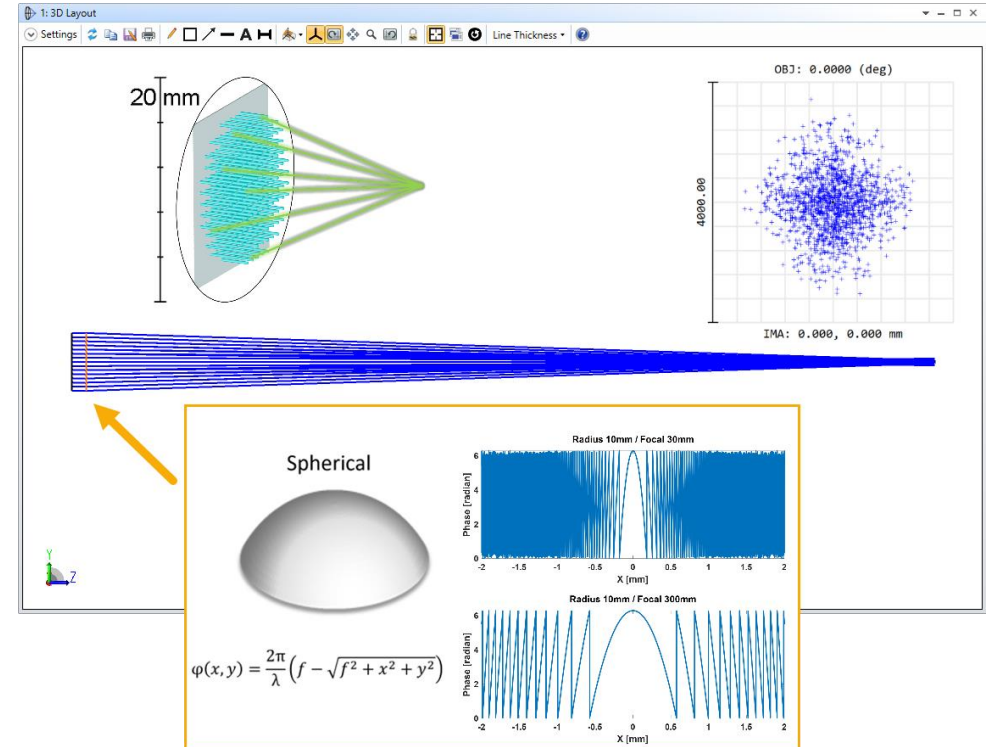
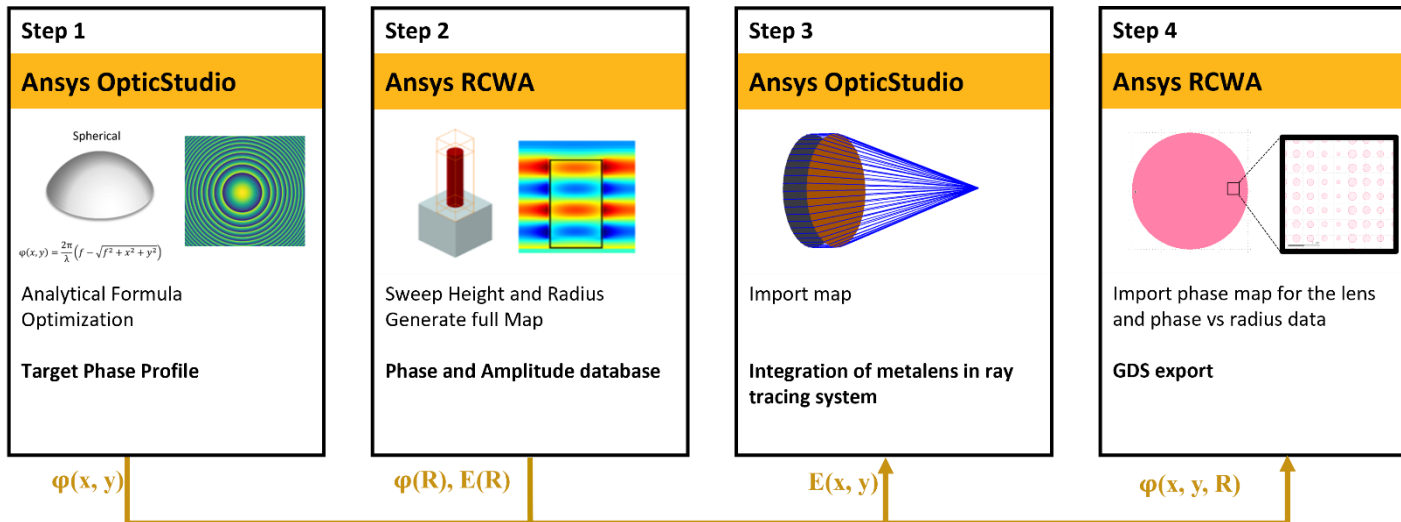
Phase Slope Map and Phase Slope Controlling Operands

- Easily analyze and control the phase slope that diffractive and phase surfaces add and keep the diffractive optics manufacturable
- Use with surfaces that add a phase change to the ray, such as diffraction gratings
- Evaluate the tangential, sagittal, x, or y phase slopes
- 2 new merit function operands constrain the phase slopes during optimization to keep phase slope values within manufacturable ranges (PSLP, QSLP)
- ALSO: Updated off-axis algorithm in the Surface Sag, Slope, and Curvature maps to provide faster and more reliable results while supporting more off-axis surface shapes



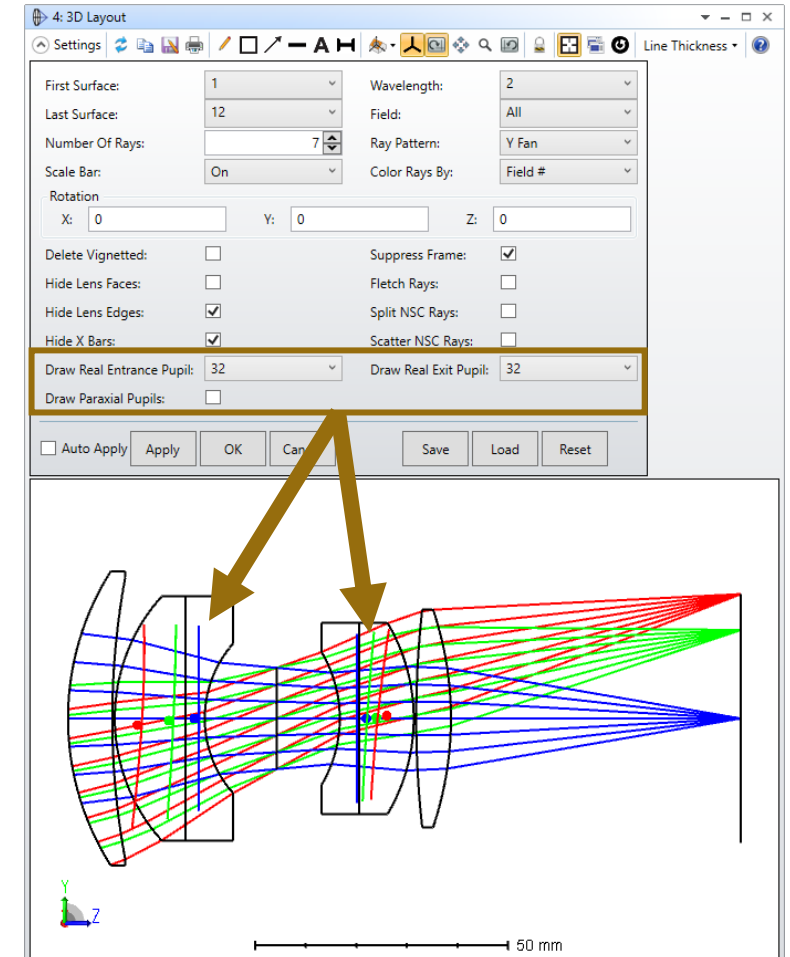
Diffraction Modelling of Metalenses in OpticStudio and Lumerical

- New DLL enables modelling of large-scale metalens components in OpticStudio
- After simulating and generating meta-atom data in Ansys Lumerical, data is read into OpticStudio via this DLL.
- Workflow example: [Large-Scale Metalens – Ray Propagation](#) (Application Gallery)



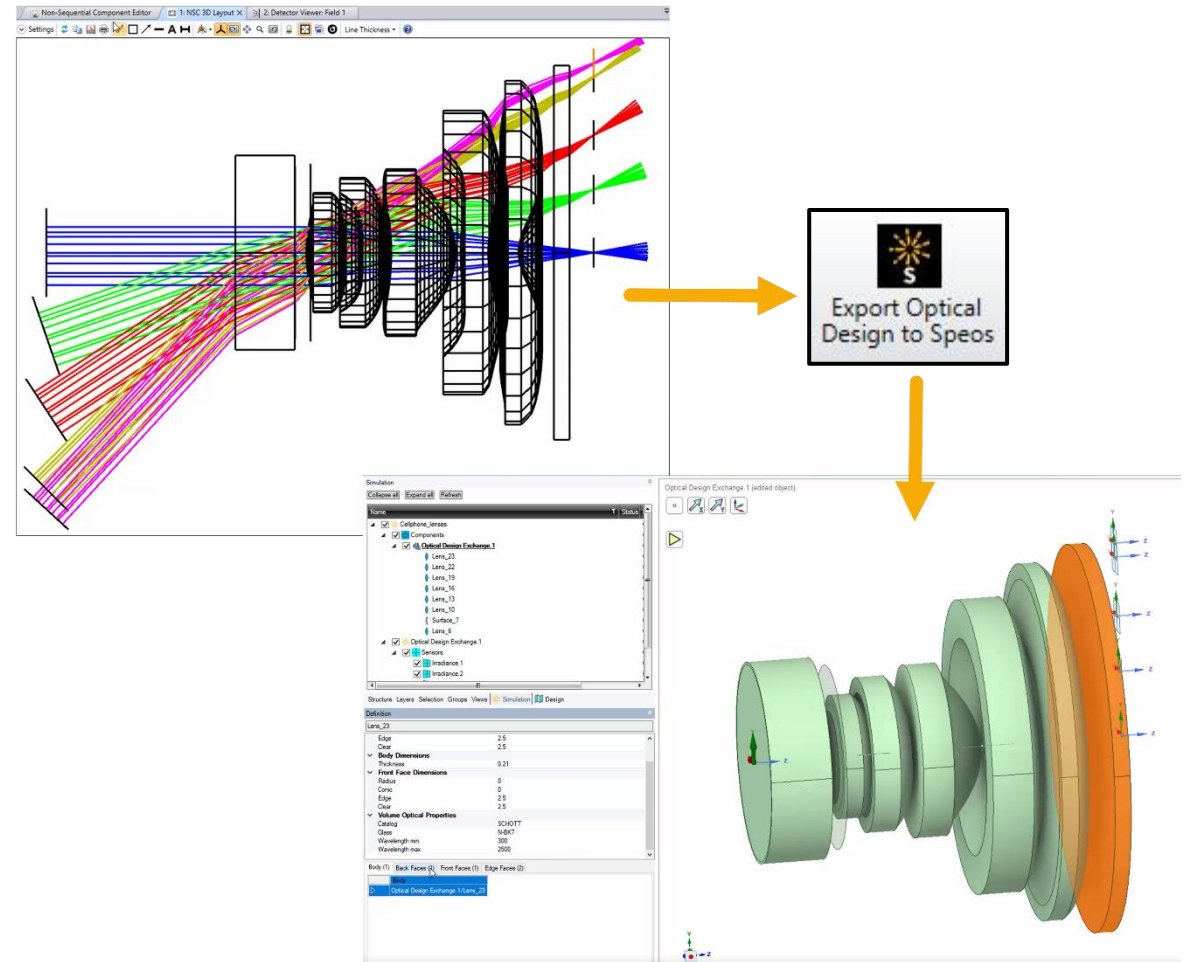
3D Layout: Paraxial and Real Entrance & Exit Pupils

- Analyze the shape and location of the pupils in your system
- Draw Paraxial Pupils: paraxial entrance and exit pupils shown as black circles
- Draw Real Entrance/Exit Pupil: pupils will be drawn as a polygon sampled by the selected number of points.
 - Pupils are drawn for each field, color follows the field settings



Export Optical Design to Speos

- Streamline workflow between component-level design and performance analysis in OpticStudio and system-level stray light analysis in Speos
- Export geometries and optical parameters from a lens design in OpticStudio into a .ODX file that can be directly imported into Speos
- SEQ and NSC models supported
- Material data and coating performance are also included



Mechanical Data in Material Catalog

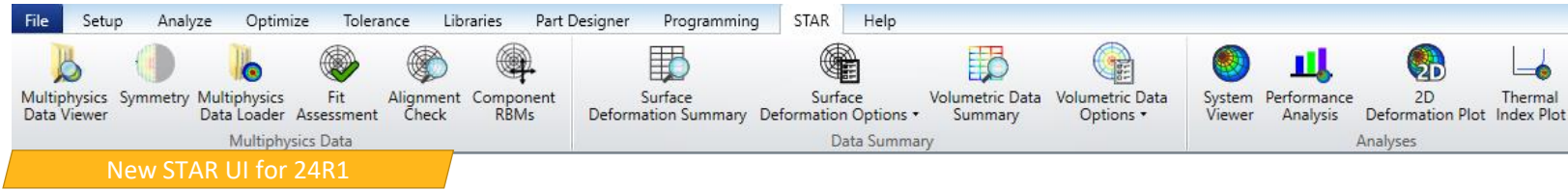
- Vendors can now provide information relevant to cross-product multiphysics workflows
 - Young's Modulus
 - Poisson Ratio
 - Specific Heat Capacity
 - Heat Conductivity
 - Stress Optical Coefficient
- Eliminates the need to search for these properties elsewhere and significantly streamlines the data exchange

The screenshot displays the 'Materials Catalog' software interface. The main window shows a list of glass materials under the 'SCHOTT.AGF' catalog, with 'N-BK7' selected. A 'Mechanical Data' window is open, showing the following properties for N-BK7:

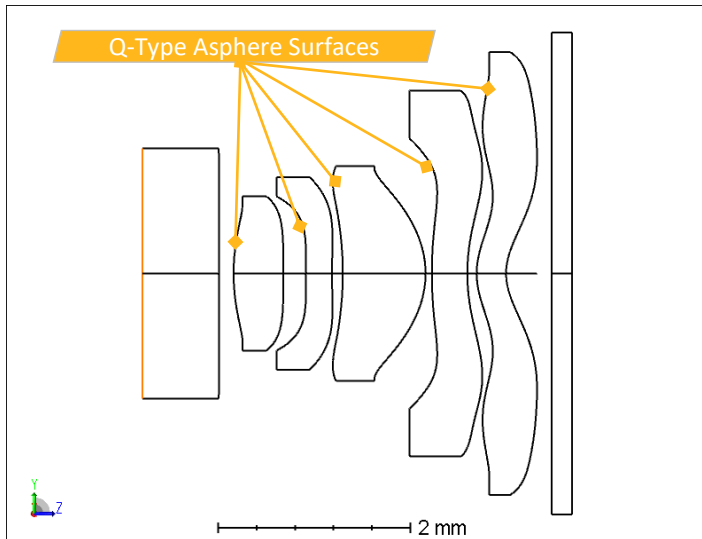
Type	Value	Unit
E Young's Modulus	82	GPa (10 ³ N/mm ²)
nu Poisson's Ratio	0.21	-
cp Specific Heat Capacity	858	J/kgK
k Heat Conductivity	1.11	W/mK

An orange arrow points from the 'Mechanical Data' window to the 'Mechanical Data' button in the bottom toolbar. The toolbar also includes buttons for 'Save Catalog', 'Insert Glass', 'Cut Glass', 'Copy Glass', 'Paste Glass', 'Stress Opt. Coeff.', 'Glass Report', 'Transmission', and 'Fit Index Data'. The 'Mechanical Data' button is highlighted with a yellow box.

Multiphysics Simulation: Direct Index UI

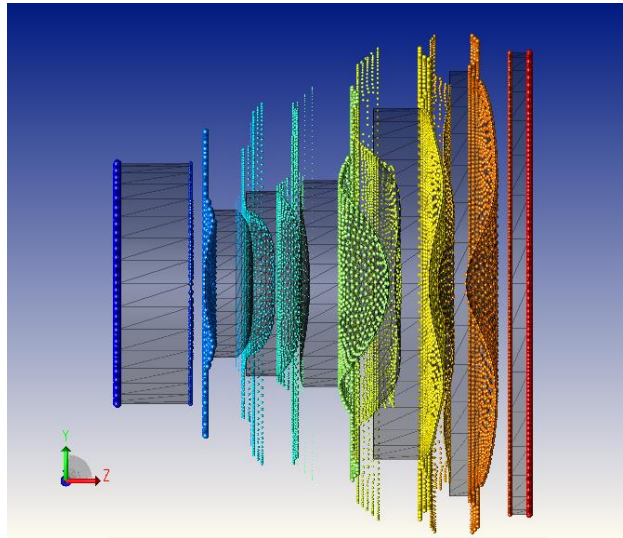


Expanded surface types can now follow GRINs = increases the range of applications that thermal/direct index datasets can be applied



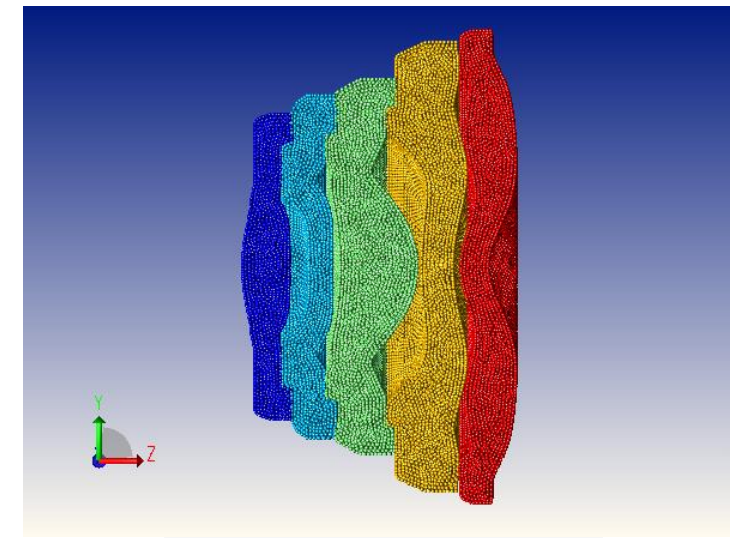
Before STAR

Cellphone lens module with Q-Type apheres. Unable to see any multiphysics effects.



STAR 23R2

Cellphone lens module with Q-Type apheres and effects from FEA surface deformations. Unable to see GRIN effects.



STAR 24R1

Cellphone lens module with Q-Type apheres. Able to see any multiphysics effects.

What's New in Ansys Zemax OpticStudio 2024 R1

Design for Manufacturing of Real Cameras

- Export to PanDao Improvements
- Surface Analyses Improvements
- **3D Layout: Paraxial and Real Entrance & Exit Pupils**

Integration of diffractive optics and metalenses into macroscopic optical modeling

- Zemax Ray Database (ZRD) Improvements
- Path Analysis Improvements
- **Phase Slope Map and Phase Slope Controlling Operands**
- User Defined Birefringence DLL
- Display Ray Segment Data when Tracing Through Gradient Birefringent Lenses

Productivity enhancements

- Stock lens Matching Tool Improvements
- Exporting Layout Plots with the ZOS-API

Multiphysics Workflows

- Reduced Restrictions on Surfaces Following GRINs
- **Mechanical Data in Material Catalog**
- **Direct Index Fitting**

Ansys Optics (Cross-Product Workflow)

- Export Reduced Order Model to Speos Improvements
- **Export Optical Design to Speos**
- **Diffractive Modelling of metalenses in OpticStudio and Lumerical**

Pervasive Insights

- Shared Web Licensing
- Elastic Licensing



Want to learn more?

- [Release notes](#)
- [Webinar](#)