Release 2022 R1 Highlights
Ansys Speos

Speos – What's New **Ansys 2022 R1**

Productivity Enhancement	Optical Part Design	Speos GPU	Sensor / Autonomous Driving	Ansys Integration
▪ **Light Field** ▪ **Speos Parameter Manager** ▪ **Presets Manager** ▪ Surface Property Plugin ▪ Speos UX enhancements	▪ MOS Freeform Lens ▪ TIR Lens: Better Control of Spread ▪ Support of Multi-facets support	▪ **GPU Compute** ▪ Live Preview Enhancement	▪ **Dynamic effects in Camera Simulation**	▪ Multiphysics: connection to Mechanical ▪ Non-Homogeneous Material ▪ Ansys Cloud: Support of Flexible Queues
Speed your Design Cycle	**Innovate with Advanced Design**	**Boost your Optical Simulation**	**Better Simulate Optical Sensors**	**Leverage the Ansys Ecosystem**

GPU Computing / Live Preview

Light Field

Dynamic Effects in Camera Simulation

Publish Parameters

Publish	Name	Parent	Value
☐	Prism Geometries/Step value	Light Guide.2	2
☑	Prism Geometries/Trimming ratio control points[0].Value	Light Guide.2	50
☑	Prism Geometries/Trimming ratio control points[1].Value	Light Guide.2	50
☑	Prism Geometries/Trimming ratio control points[2].Value	Light Guide.2	50
☑	Prism Geometries/Trimming ratio control points[3].Value	Light Guide.2	10
☑	Prism Geometries/Trimming ratio control points[4].Value	Light Guide.2	10
☐	Prism Geometries/Offset value	Light Guide.2	2.5
☐	Prism Geometries/Width value	Light Guide.2	2

Speos Parameter Manager

Speos 2022 R1

Productivity Enhancement

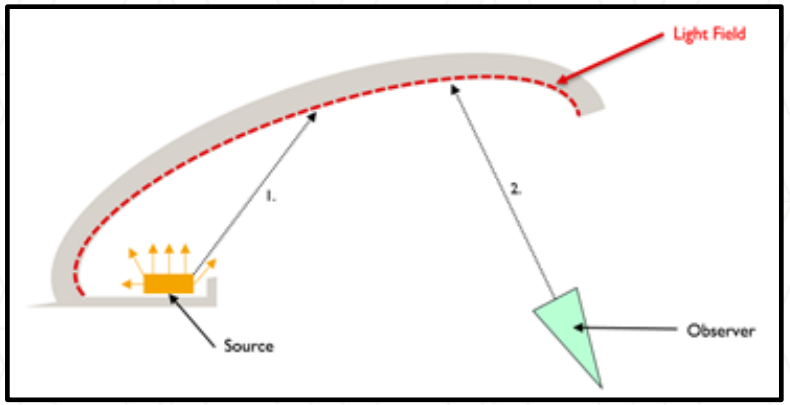
Ansys

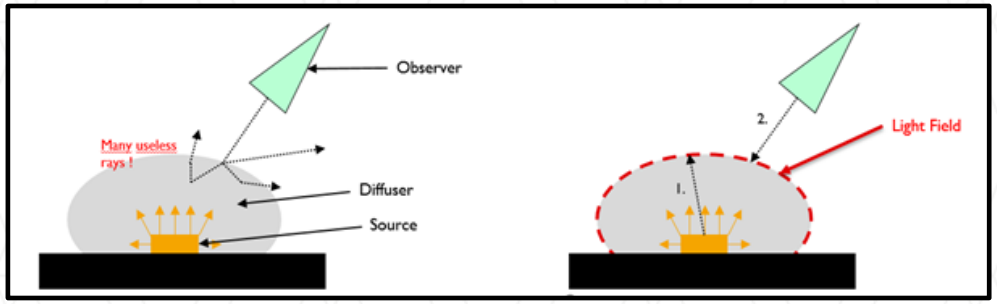
Light Field

Beta

Productivity Enhancement

- Light Source, **a new Ansys file format** to facilitate the storage and sharing of pre-computed intermediate simulation results for sub-structures within an optical system
- Improve simulation time and enables **black-box sharing** between suppliers and their customer for **improved performance and IP protection**.



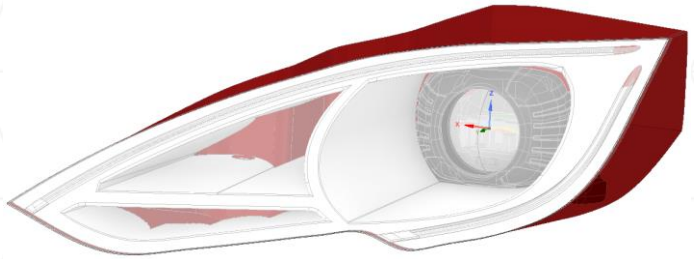


Light Field

Beta

Productivity Enhancement

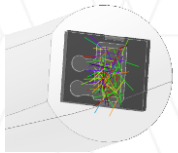
For instance, light extracted from a light guide can be collected by a Light Field sensor and then **reused as a Light Field source.**



(Same simulation time)

Lit appearance using light guides' geometries

Lit appearance using **Light Fields**



Surface sources

Direct simulation

+

Light Field sensors on light guides

Observer view of lit light guides

Optical Light Field files

Light Field sources

Inverse simulation

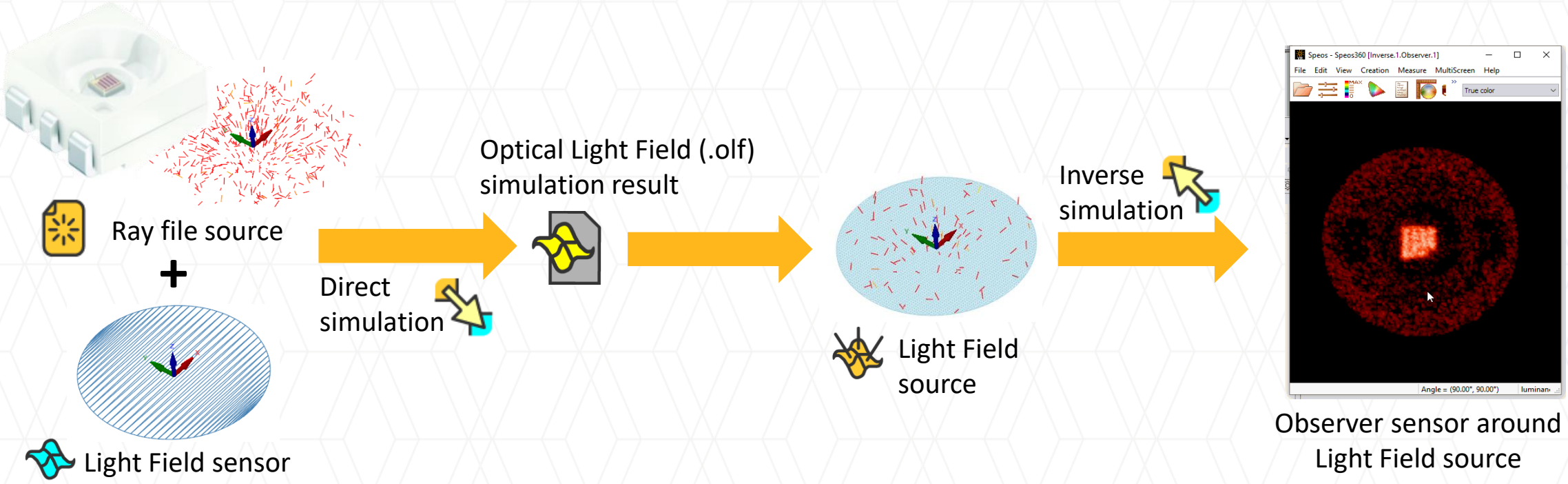
Light Field

Beta

Productivity Enhancement

Light Field can also be used to **convert ray files** that cannot be used in inverse propagation.

It aims at becoming **ANSYS standard** for data exchange with optical properties of geometries, light source (primary or secondary), **compatible with multiple CAD platforms** (SC, NX, CREO) while **protecting Intellectual Property** from supplier.

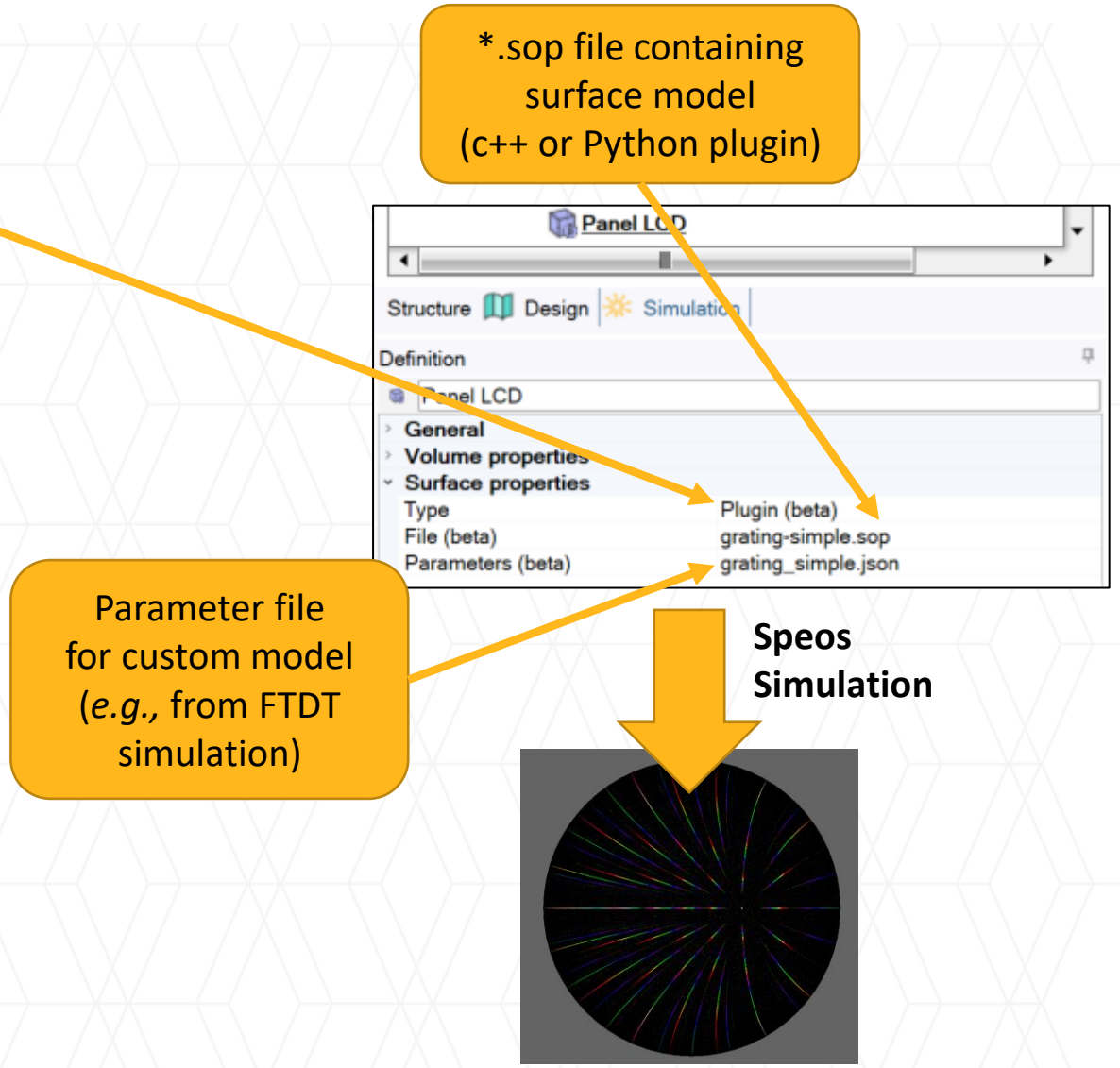


Surface Property plugin

Beta

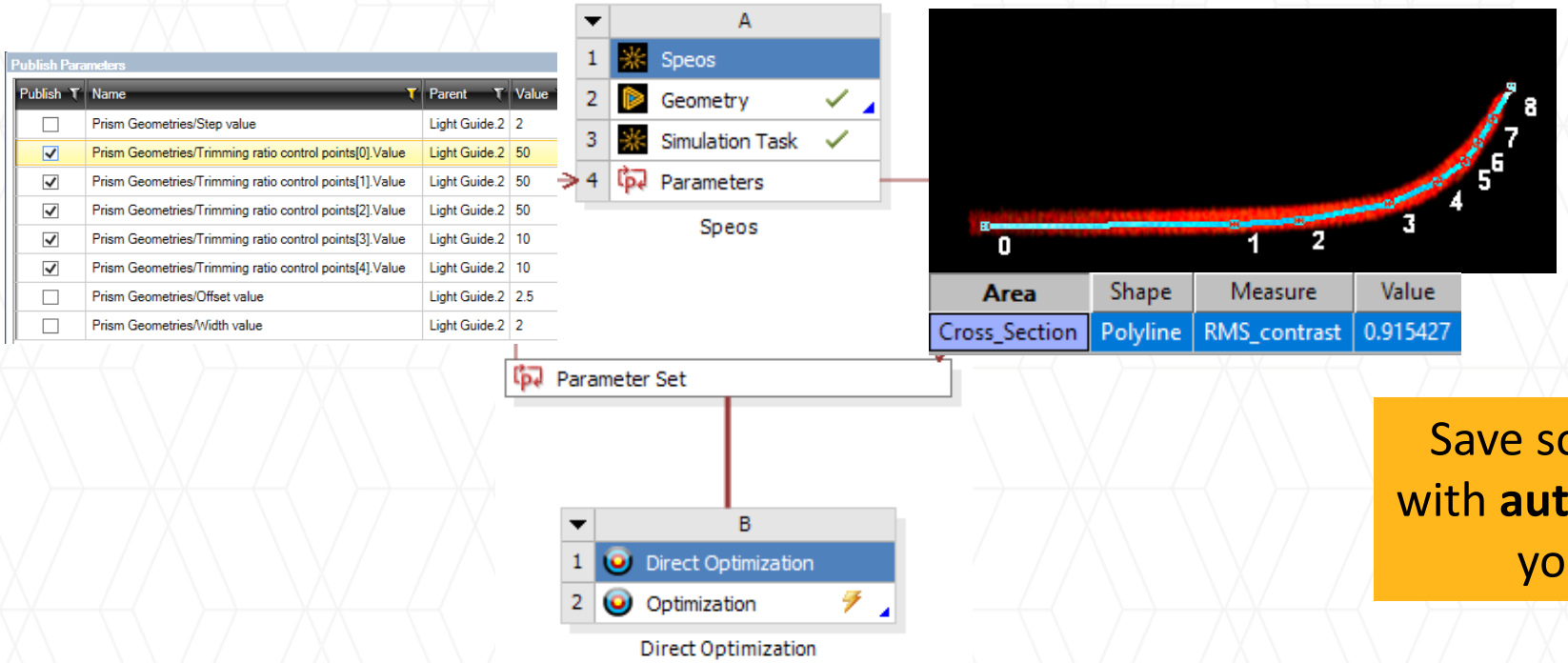
Productivity Enhancement

- **New Surface Type** for Custom Models:
  - Allow new analytic surface model
  - Allow 3rd party BSDF compatibility
- ***.sop** file contains the new model **plugin,** and another file contains the parameters required for that model
- Write plugin in **C++** or **Python**
- Example: Multi orders Grating model fitting data from FDTD results



Speos Parameter Manager

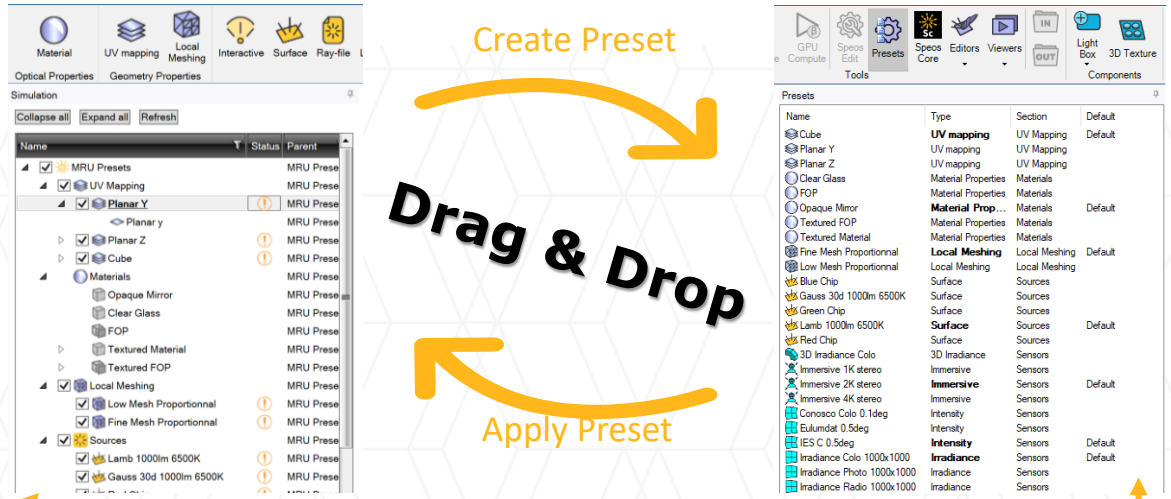
- Speos Parameter Manager allows now to **automatically optimize** LightGuide, Projection lens or any Speos design.
- All Speos Parameters can be used as variable of optimization.

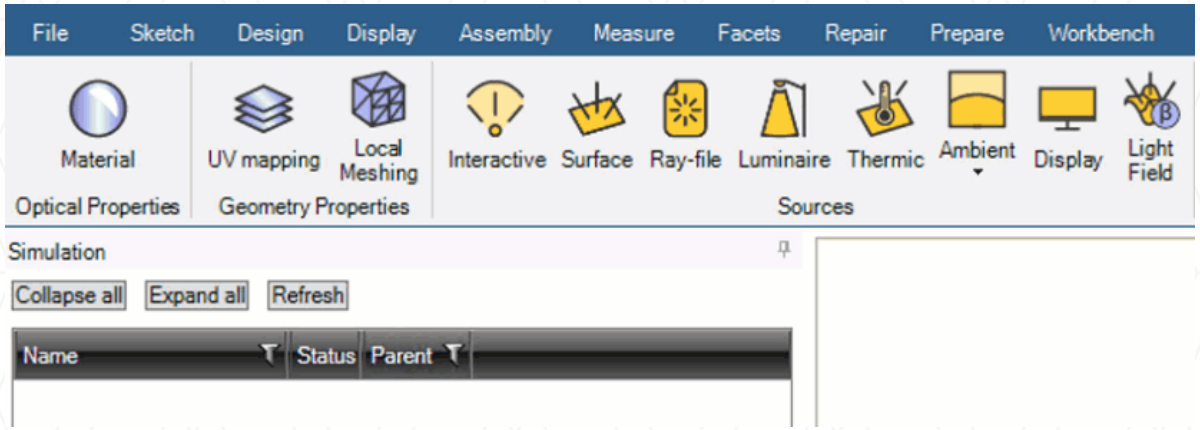


Save some engineering time with **automatic optimization** of your optical design!

Preset Manager

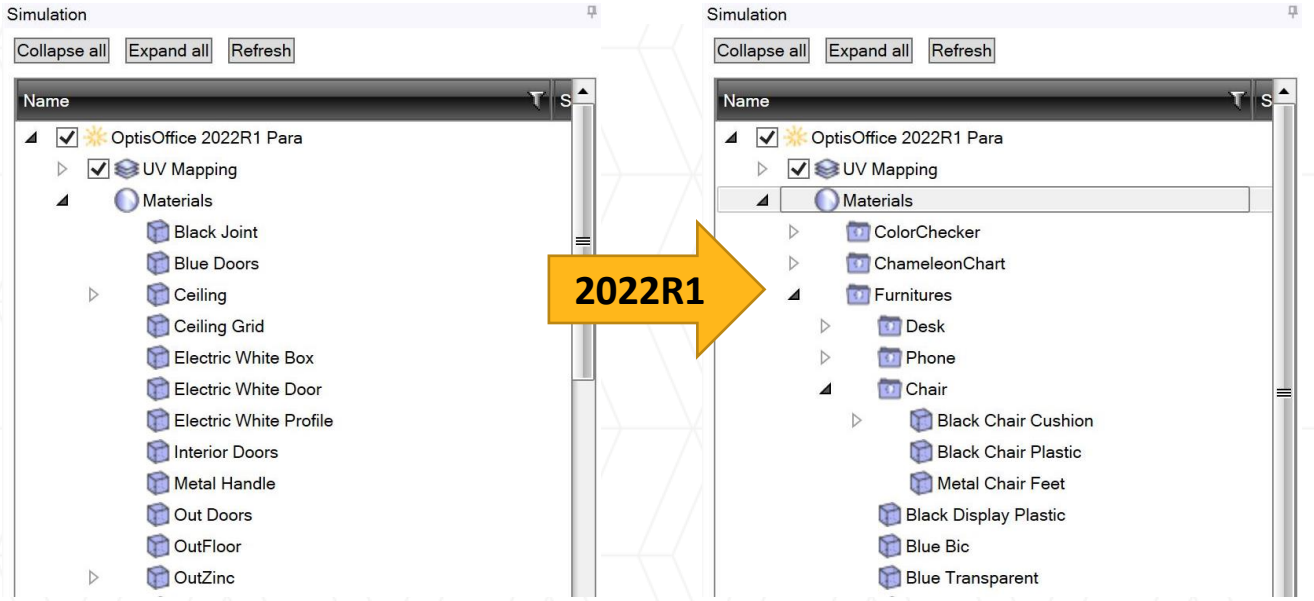
- A Preset contains all parameters of a Speos object that that it can be reused
  - Dozens of clicks reduced to a **single click!**
- Drag & Drop with 1-click assign:
  - Create a preset from **any Speos item**
  - **Drag & Drop** to create or apply a preset
  - Set new **default** parameters for any Speos object
  - **Quick menu** to all presets
- Share or centralize Presets in a network location for uniform practices across all users in a company



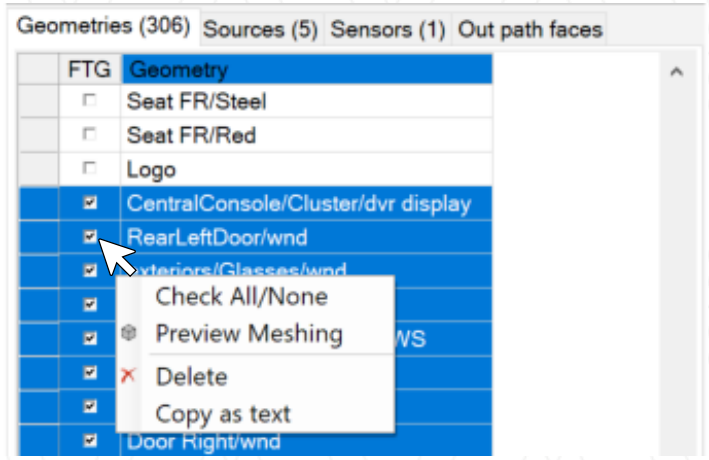


Speos Enhancements

- Node in Speos Tree
  - **Improved readability** of the Speos Tree
  - Users can create **subfolders** to group and collapse Speos items
  - **The Speos Tree view is maintained** regardless of the action performed in Speos
  - **Drag & drop is available to reorder** subfolders and content

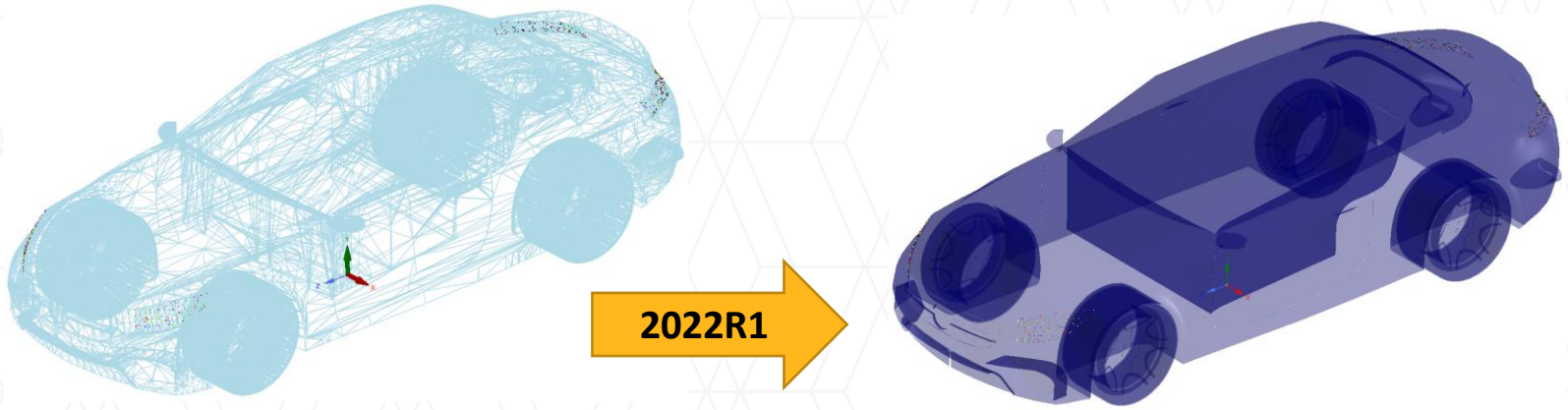


- Linked object list improvement
  - FTG/LXP/Reverse are now immediately accessible
  - Check All/None: right click to check/uncheck selection

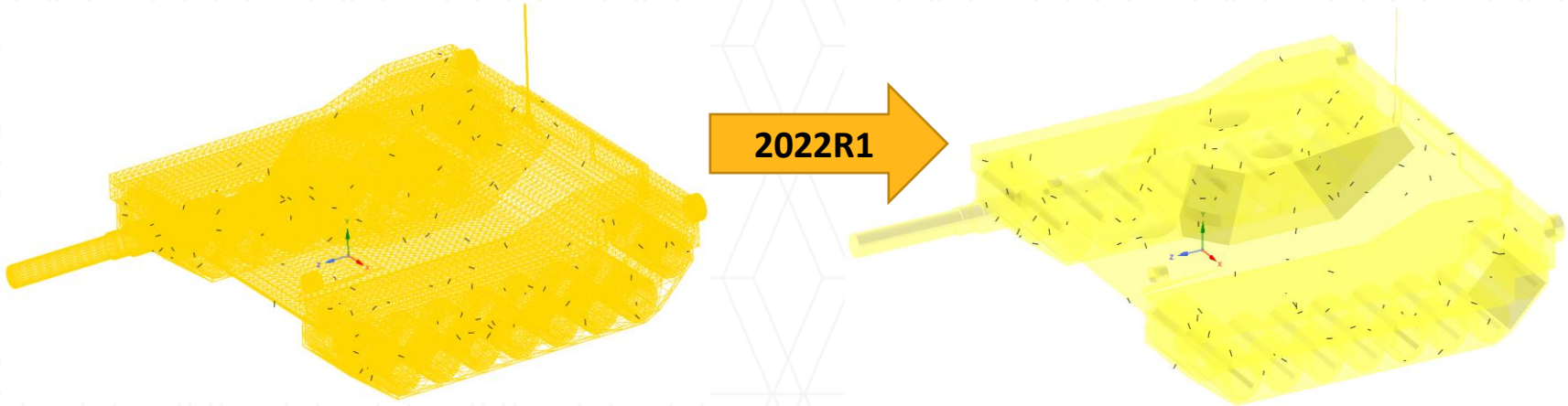


Speos Enhancements

- Visualization of Speos Light Box



- Visualization / performance of Temperature field thermic source

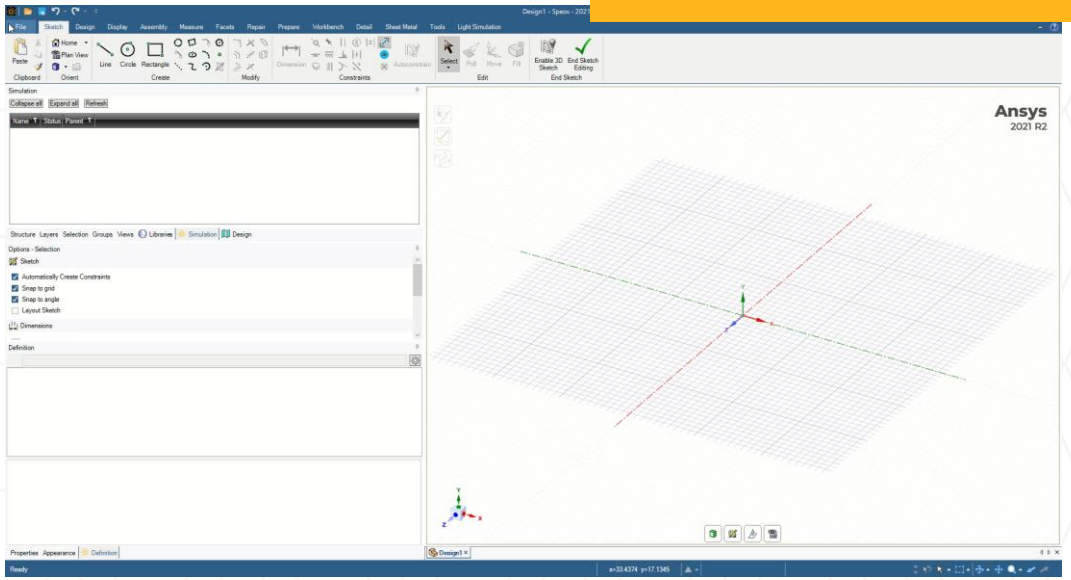


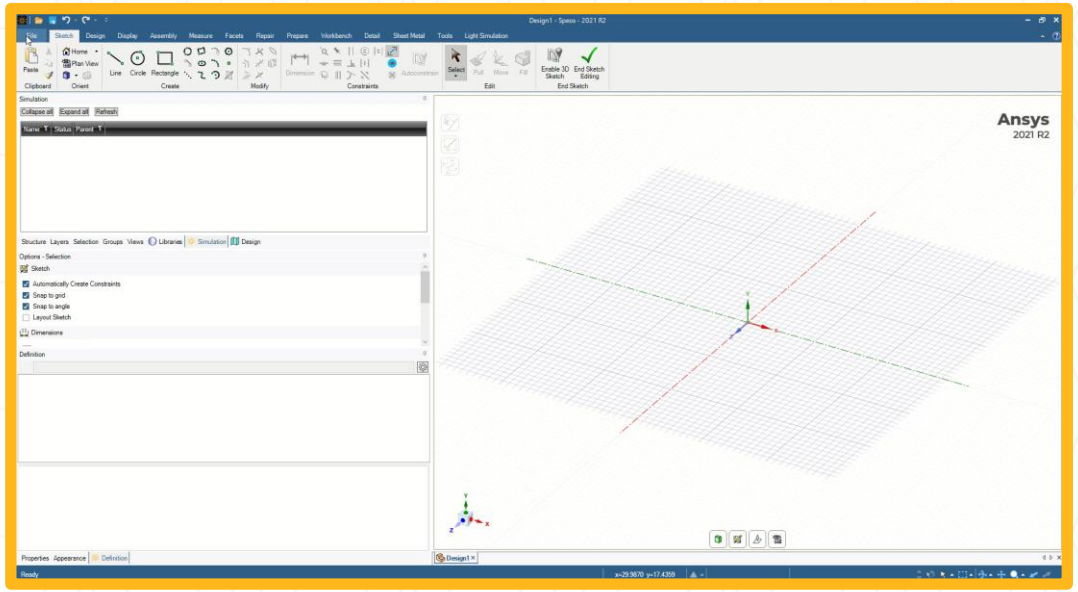
Compute time **7.8 times** faster

Faster import of CATIA projects

Thanks to new importer and Parasolid Modeler, CATIA projects have much **faster import performance**.

Navigation is smoother for large assembly is **more reactive with smooth navigation.**





Speos 2022 R1

Speos GPU:

GPU-Compute

Live Preview Enhancements

Ansys

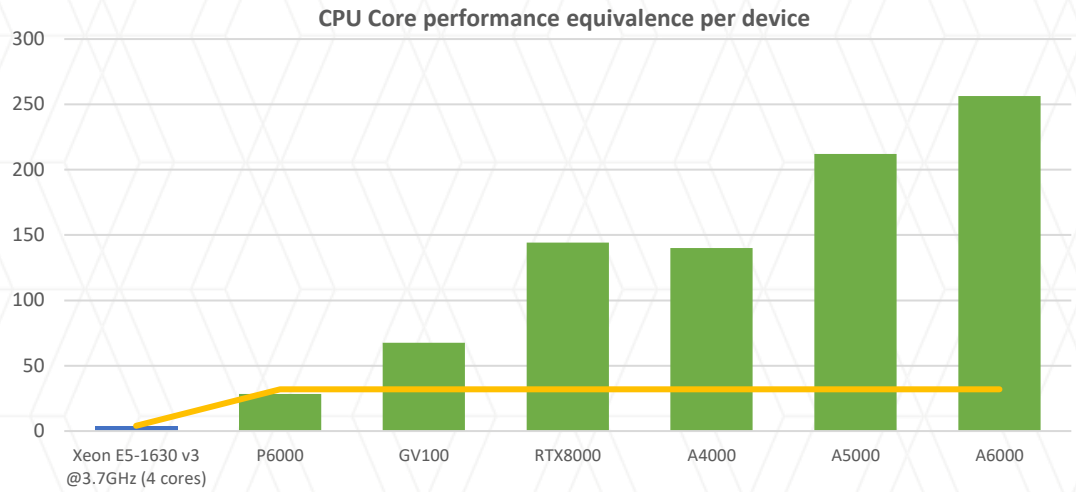
GPU Compute

Beta

Speos GPU: GPU-Compute

- Speos now offers **GPU computing** delivering dramatic improvements to simulation performance (**benchmarks indicated 140x to 260x on average**) with no loss in accuracy and with an unprecedented performance to cost ratio.
- **Multi-GPU available** with linear scalability
- Also available in **Speos for NX**
- **Workbench Compatible**

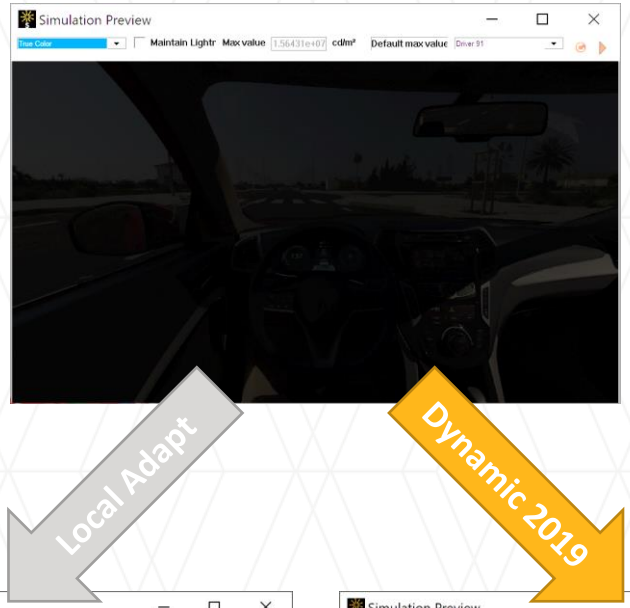
“HPC on my desk”



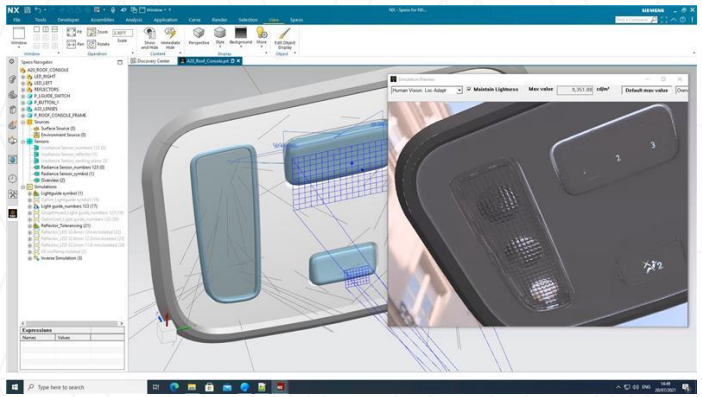
5 minutes simulations on single A6000 GPU

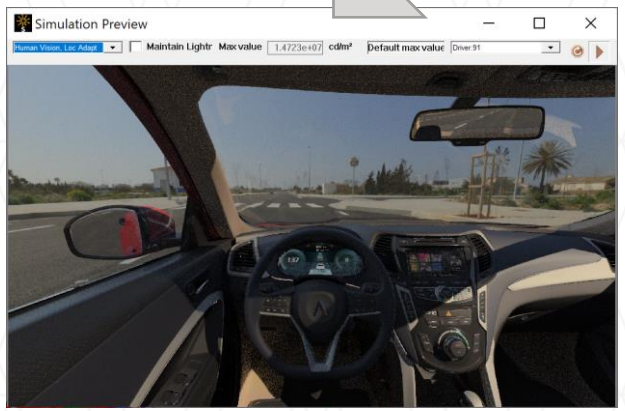
Live Preview Enhancements

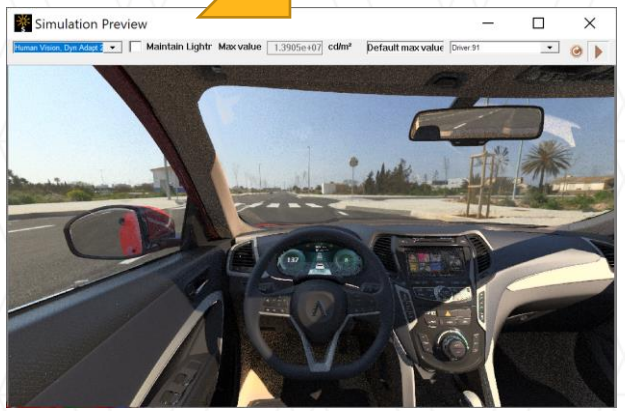
- **Human Vision**, Dynamic Adaptation 2019
  - Dynamic Adaptation: for wide field of view use cases
  - View your product's actual appearance during Live Preview
  - There is no need to export results to perform HV
  - Same aspect as HV-Lab



- **Live Preview available in SNX:**







Speos 2022 R1

Sensor / Autonomous Driving

Camera improvements

Ansys

Dynamic effects in Camera simulation

Beta

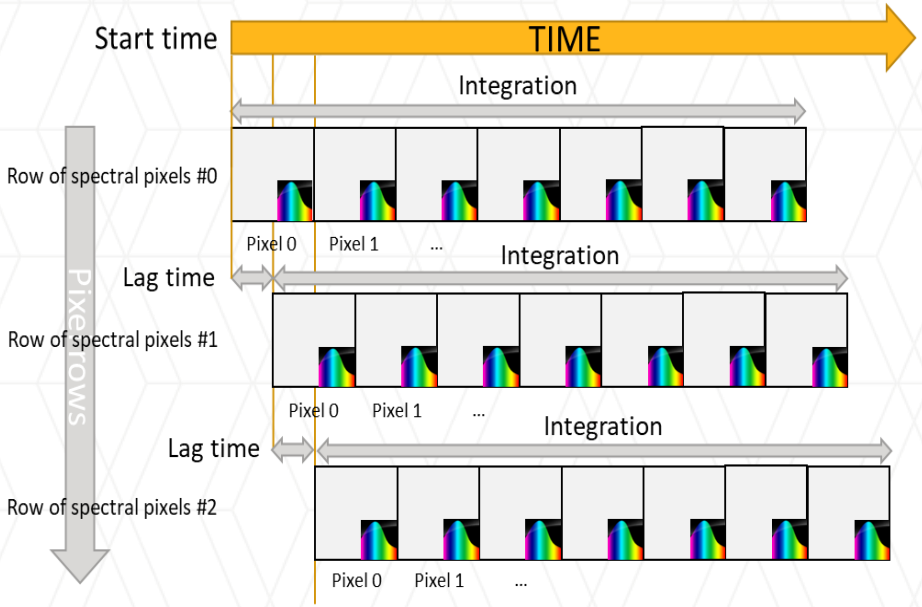
Camera Improvements

Dynamic camera simulation

A new feature to address the increasing need for scene dynamics in the context of camera simulations and the modeling of the complete acquisition chain.

Acquisition chain

Scene | Optical module (Reduced model) | Imager module | Processing module



Camera sensor new dynamic data acquisition based on CMOS sensor capturing an entire image

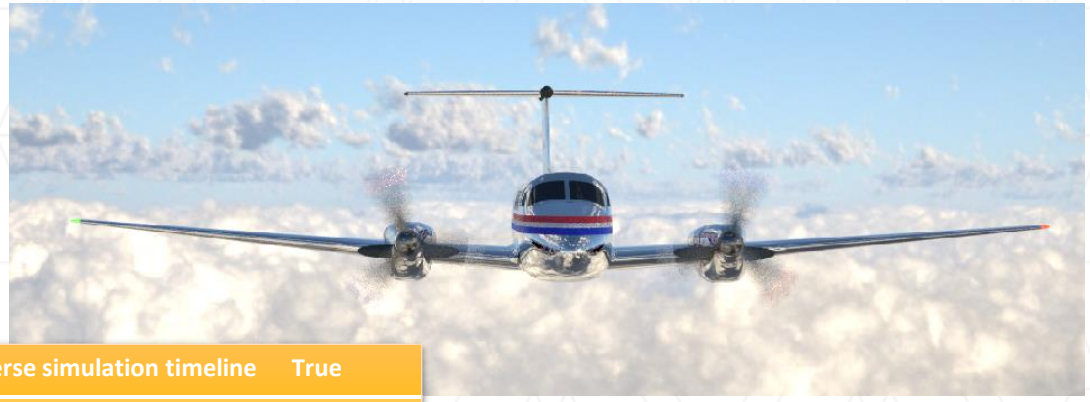
Dynamic Effects in Camera Simulation

Beta

Camera Improvements

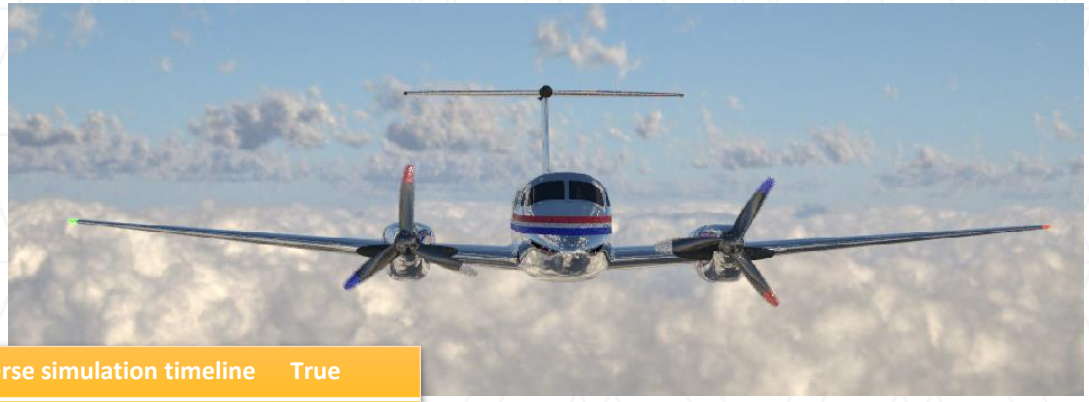
Camera sensor simulation with timeline permits enables the simulation of dynamic effects such as **Rolling shutter** and **Motion blur.**

Simulation results can feed into new post-processing algorithms dedicated to compensate for these effects.



Inverse simulation timeline	True
Camera integration	10ms
Camera lag time	0ns

Motion blur effect



Inverse simulation timeline	True
Camera integration	1ms
Camera lag time	18518ns

Rolling shutter effect

Dynamic effects in Camera simulation

Beta

Camera Improvements

Inverse simulation timeline	False

Inverse simulation timeline	True
Camera integration	5ms
Camera lag time	0ns

Inverse simulation timeline	True
Camera integration	20ms
Camera lag time	0ns

Motion blur effect

Dynamic effects in Camera simulation

Beta

Camera Improvements

Inverse simulation timeline	False

Inverse simulation timeline	True
Camera integration	1ms
Camera lag time	9259ns

Inverse simulation timeline	True
Camera integration	1ms
Camera lag time	18518ns

Rolling shutter effect

Speos 2022 R1

Optical Part Design

Ansys

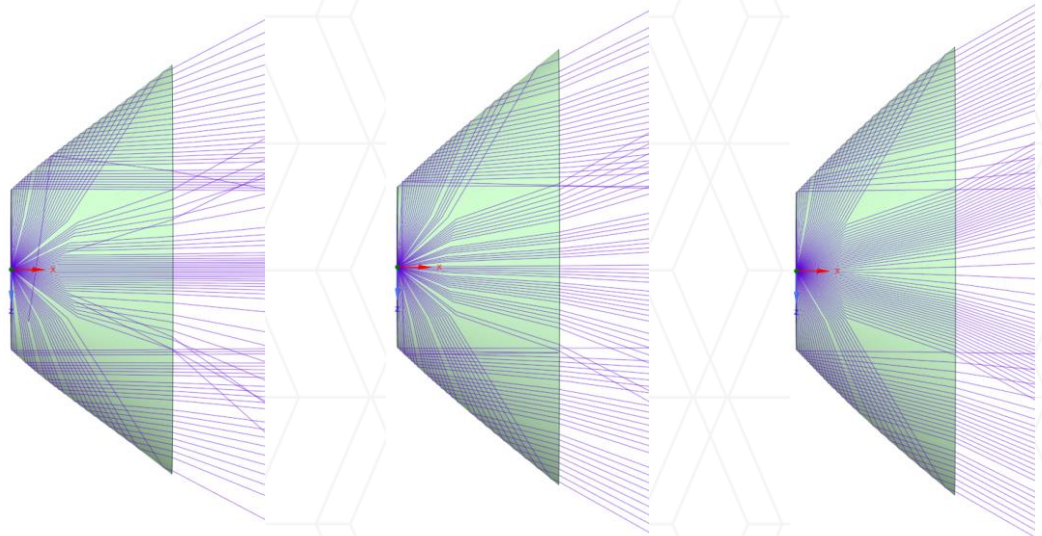
Better control of Spread on TIR Lens

- Speos allows users to fine tune the spread of TIR lens to optimize beam homogeneity.
- In addition to spread max angle, Speos users can now control how light is accumulating in the optical axis or the max spread using the Spread Control parameter.

Design efficient Lighting

Spread Control influence

20% **50%** **80%**

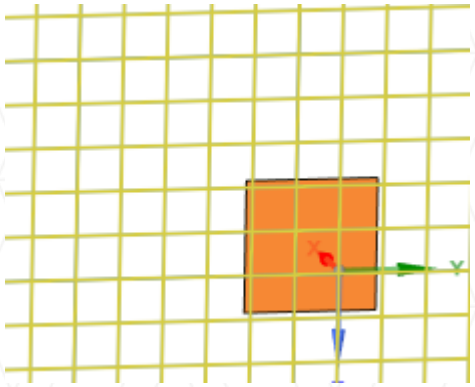


Freeform Lens

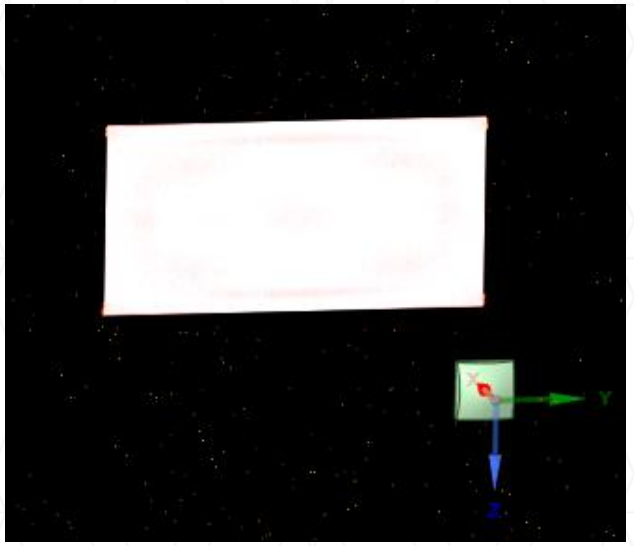
- Speos 2022 R1 introduces a new freeform lens:
  - Generated for a given surface (used in front face)
  - Define the optical beam target as uniform or gaussian
- Speos automatically computes the back face of the lens to achieve an optical target

Save engineering time with automatic optimization of your optical design!

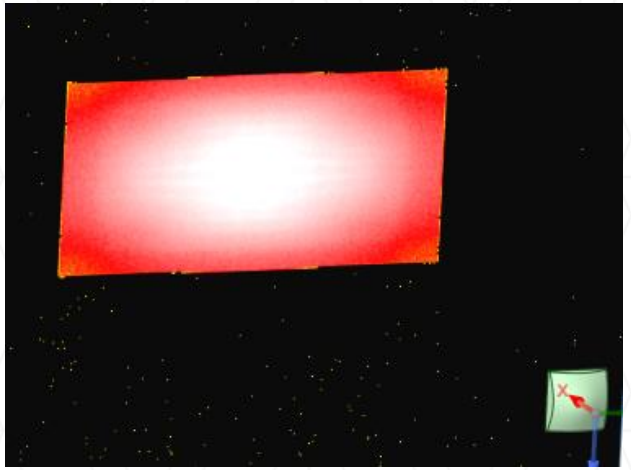
Input surface



Freeform lens beam pattern



Uniform target

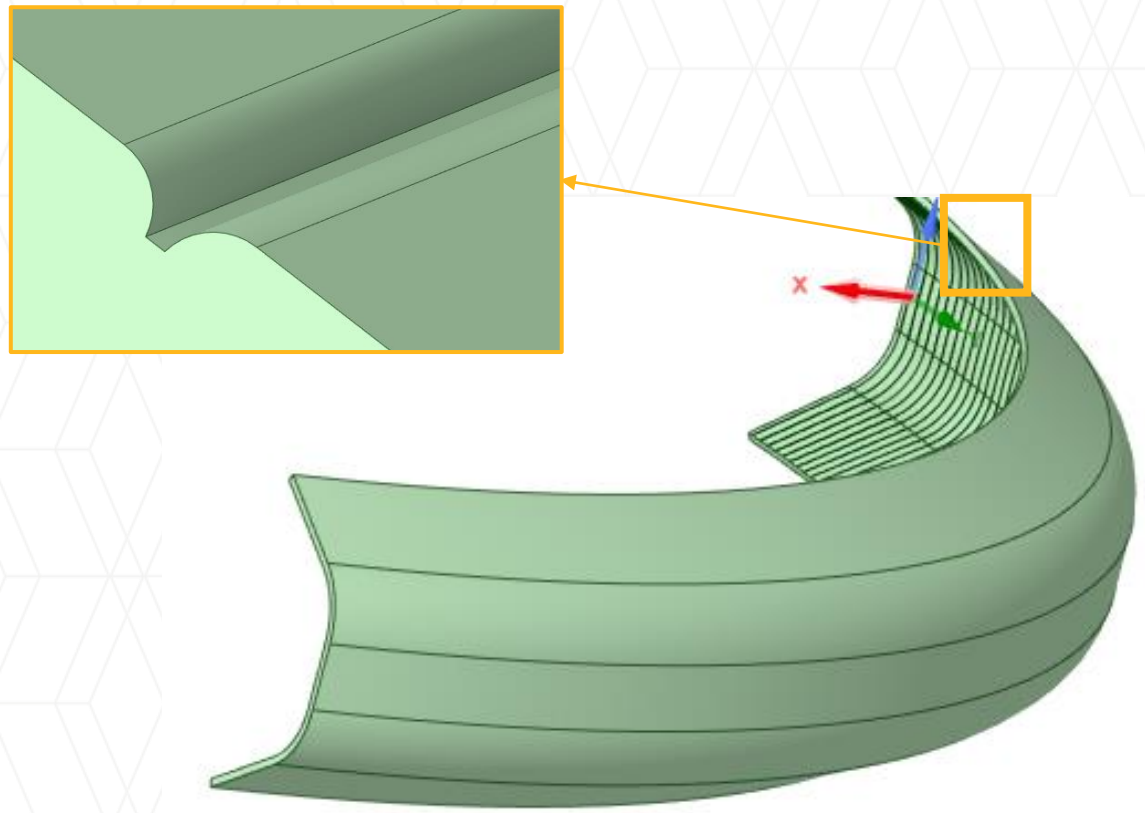


Gaussian target

Micro Optical Stripes

- Speos 2022 R1 introduces a new type of lightguide for thick lit appearance.
- Stripes are micrometer-scaled to be almost invisible to human eye.

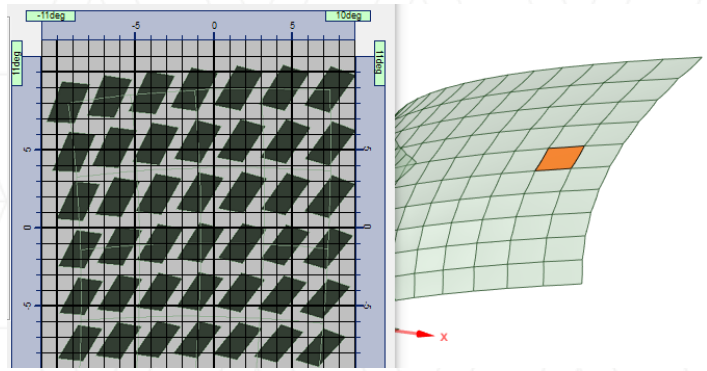
Speos for Innovative Design



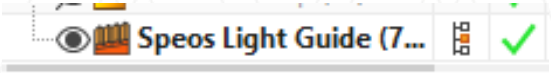
OPD enhancements

- Multi-facets Support

- Grid Enhancement Visualization in OPD viewer



- Lightguide, Parabolic, Projection Lens, TIR Lens better integrated in Speos for NX
  - Speos LightGuide is deeper **integrated into Speos for NX** with a single feature.
  - Design iteration is better supported with higher integration in user workflow e.g. when inputs are changes, design is automatically updated.



Speos 2022 R1

Ansys Integration

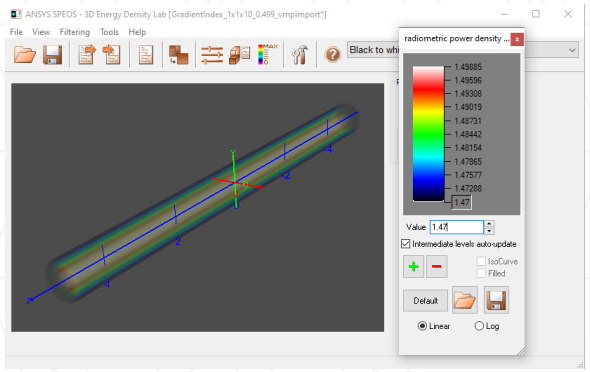
Non-homogeneous materials

Beta

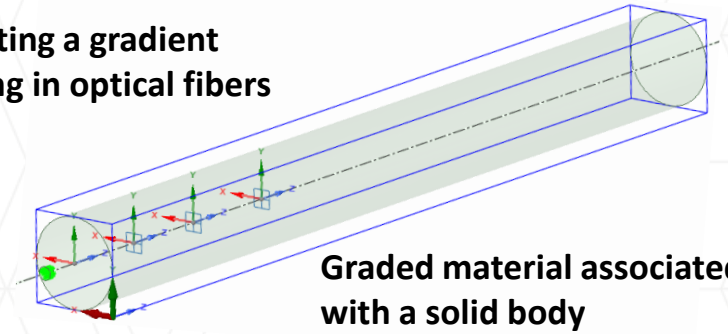
Ansys Integration

In many cases, the refractive indices of optical materials are not homogeneous and can vary spatially.

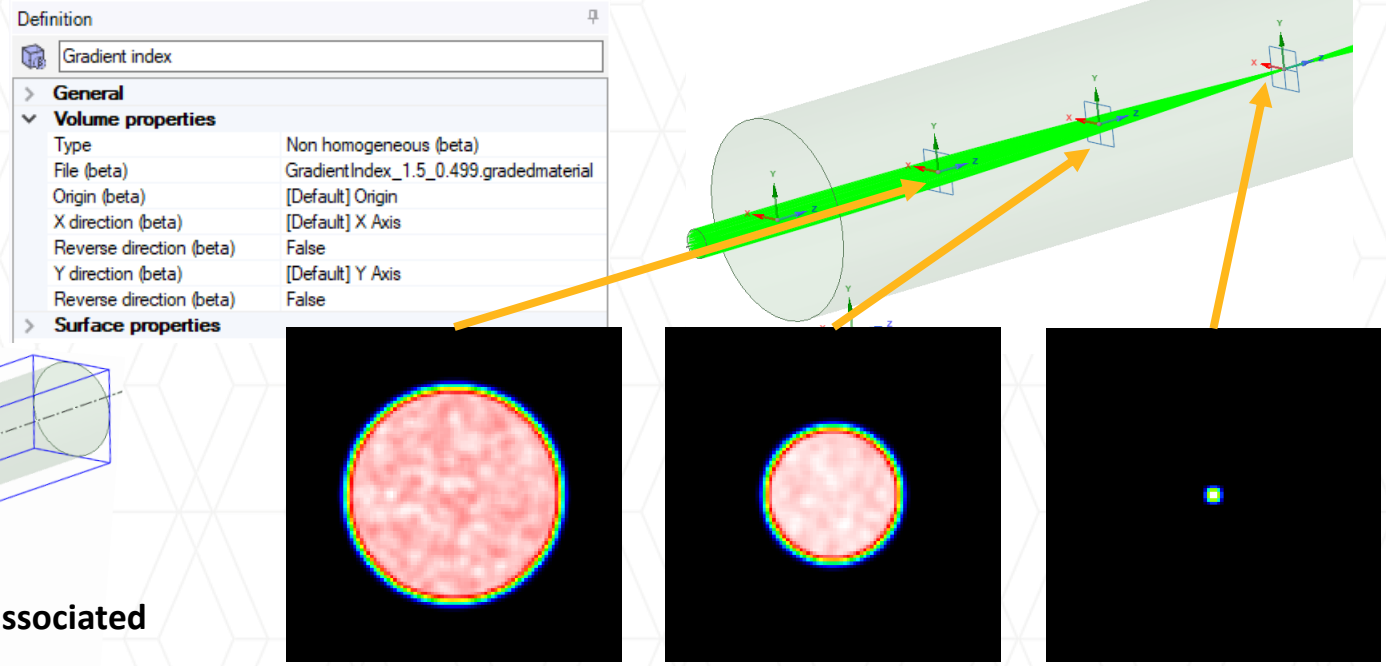
Graded materials in Speos model non-homogenous materials by describing spectral variations of refractive index and absorption with the respect to position in space.



Graded material representing a gradient refractive index variation using in optical fibers



Graded material associated with a solid body



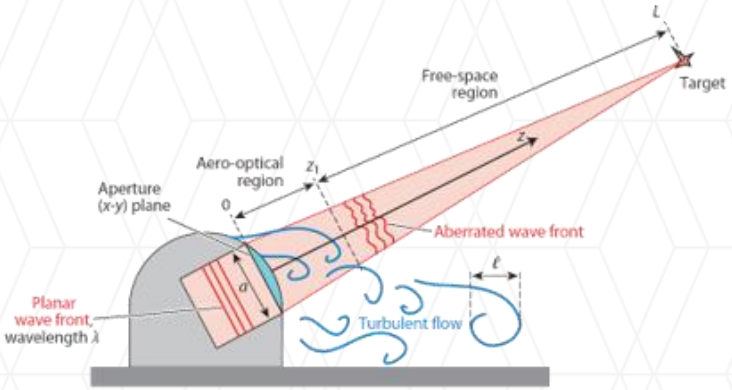
Simulation results show the beam guided in the optical fiber

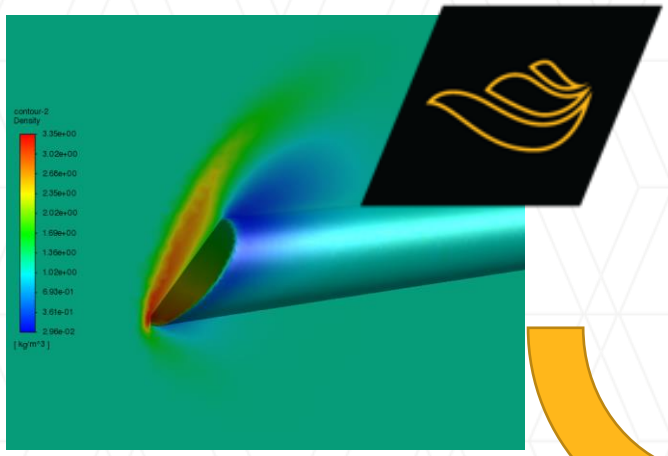
Non-homogeneous materials

Beta

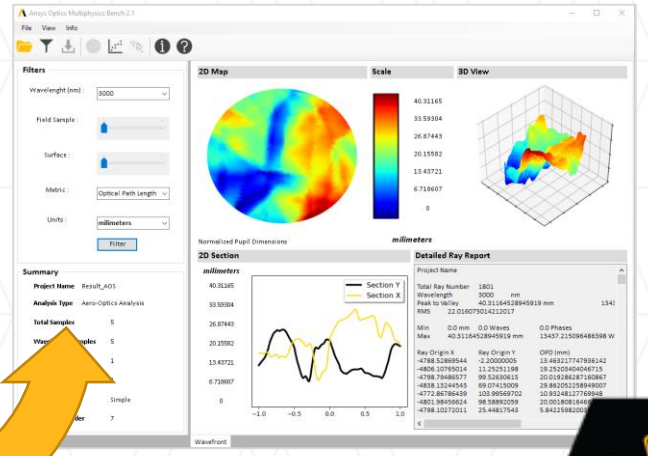
Ansys Integration

Aero-optical phenomenon is concerned with the aberration effects of compressible turbulent flows induced by solid surfaces near the projection or viewing optical aperture.

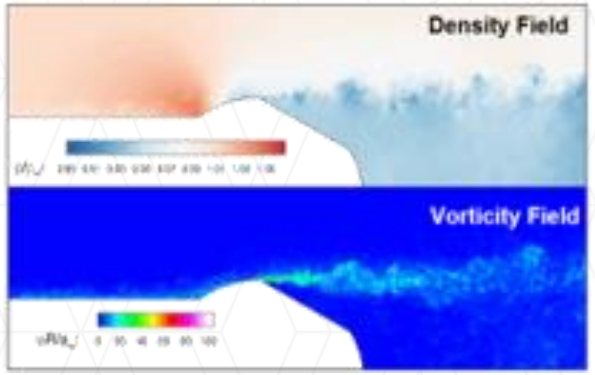




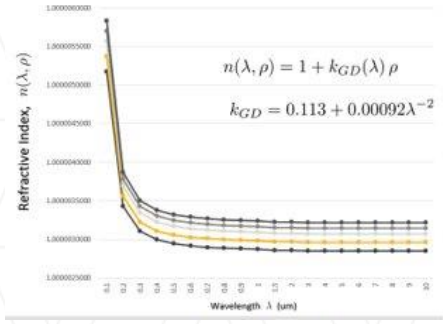
CFD simulation to obtain density field



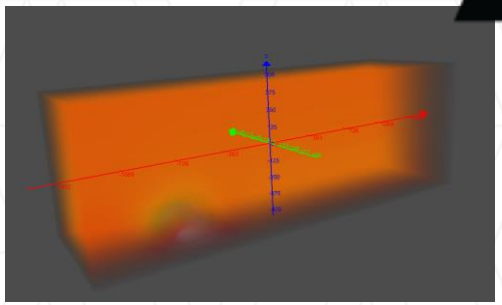
Optical Path Difference study



Refractive Index field from Gladstone-Dale coefficient



Graded material creation

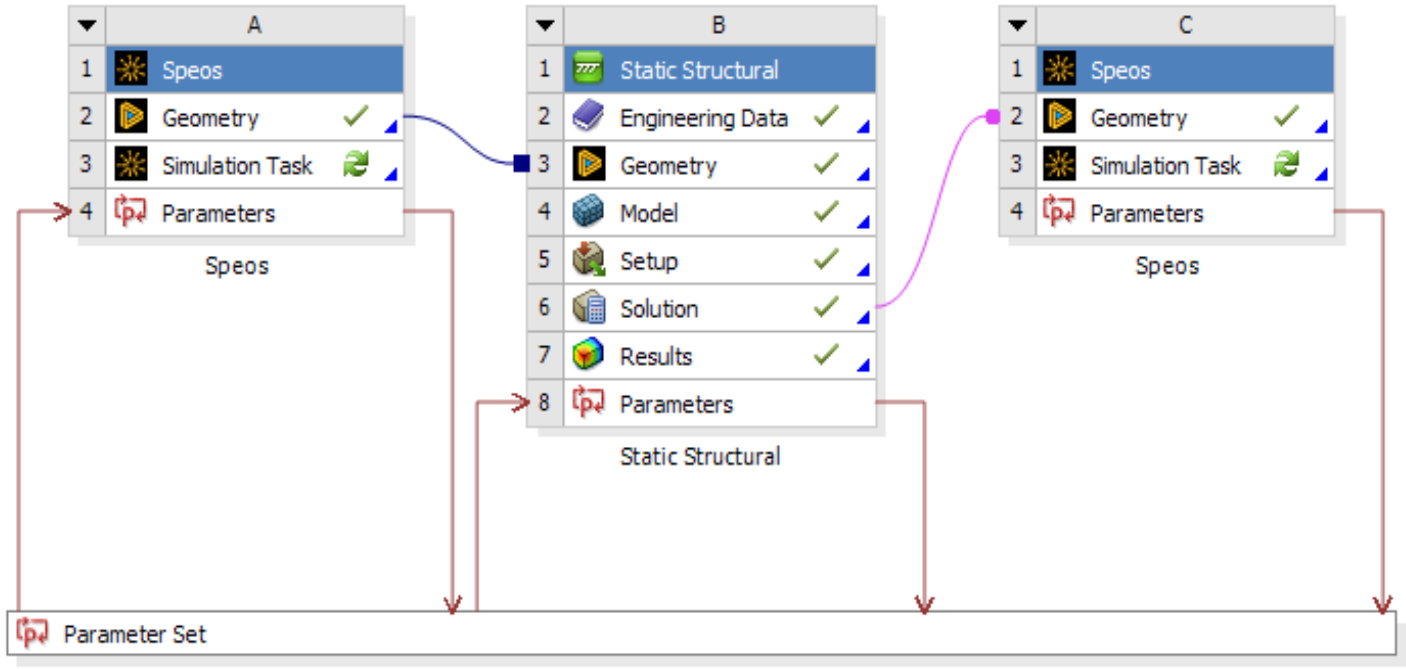


Multiphysics – Optical Simulation of Deformed Geometry

Beta

Ansys Integration

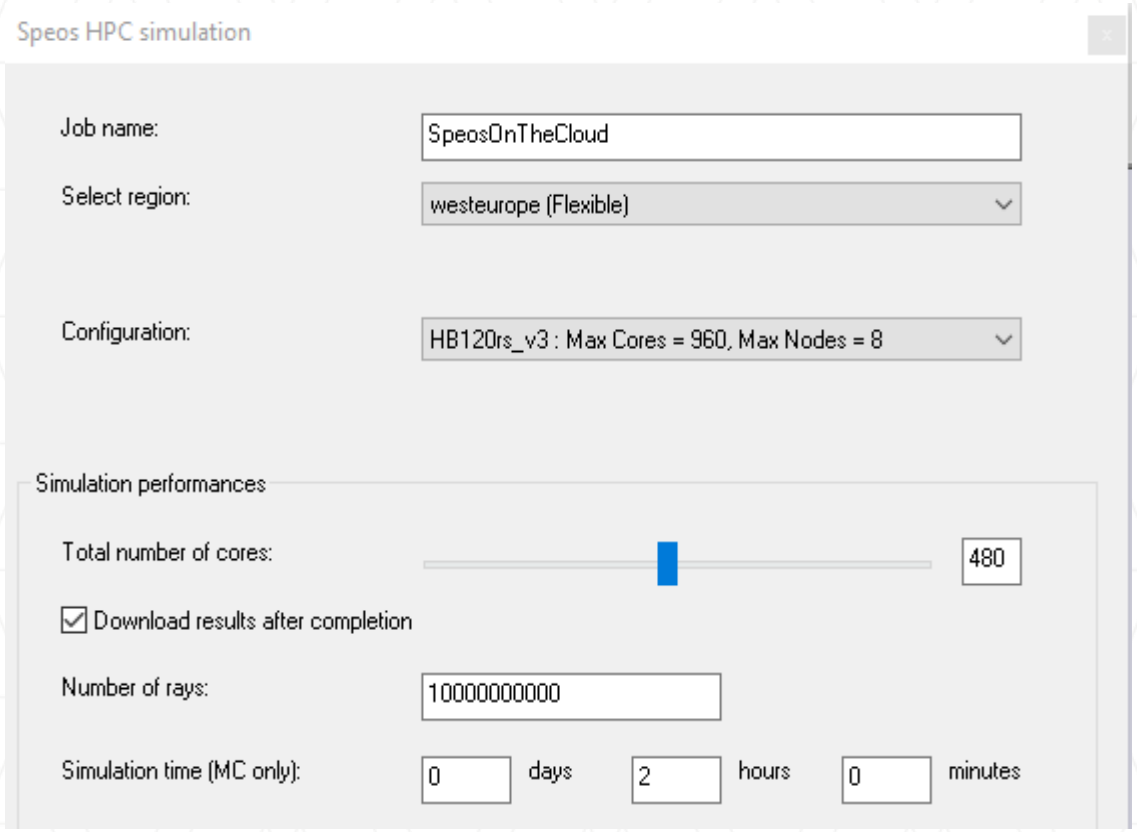
- Speos is now interoperable with Ansys Mechanical to simulate the effects of geometrical deformation
- Simulations are automatically updated with new optical properties that correspond to deformed geometries.



Include Mechanical simulation in Optical workflow for **robust design**

Ansys Cloud

- Support for **flexible queues** to easily adjust the number of cores available for Speos simulation
- **Automatic download** of results when Ansys Cloud Simulation is complete
- Benefit from new HBv3 queues for faster simulation
  - Thanks to 960 available cores, simulation is up to to **400x faster than a 16-core Workstation!!!**




Ansys