

# Backlight Unit Optimization

## Speos + optiSLang



# / Task Description

- This tutorial looks deeper into:
  - Workflow automation of Speos
  - Sensitivity Analysis
  - Optimization
- An optical analysis of a backlit display is performed in Speos with optiSLang
- The aim is to optimize the backlight in order to achieve:
  - Highest flux
  - Lowest RMS contrast (uniformity)

# / Introduction

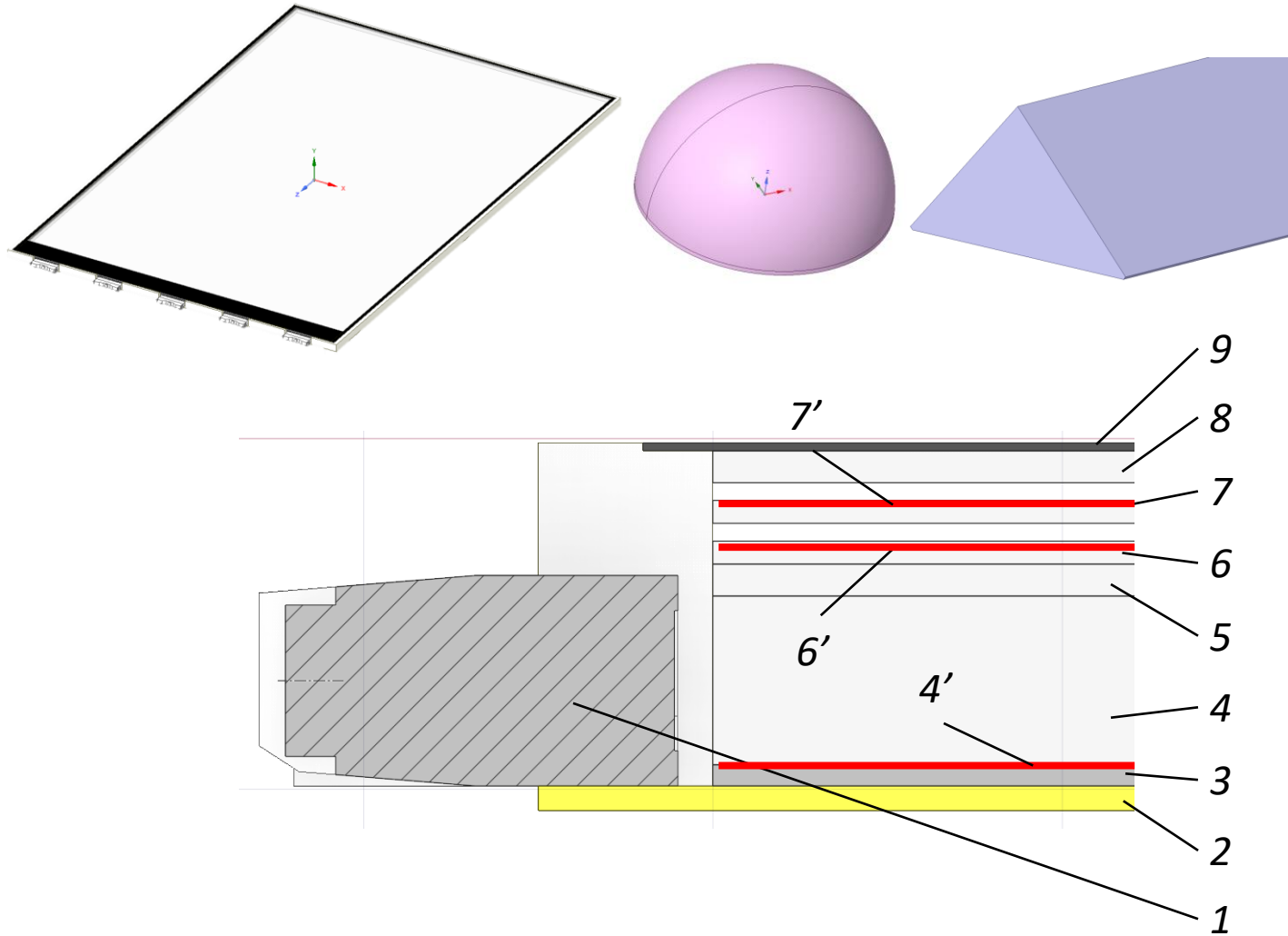
In this example of a backlight unit, we highlight the **3D texture** feature and how to optimize an illuminance distribution out of the system.

In Speos, the **3D texture** feature allows the user to virtually replicate thousands of micro-optics elements when memory limits the creation of geometries in the CAD environment.

Initially developed for backlight unit products, **3D texture** now has many other applications. It can be used to design lighting systems such as light guides, Brightness Enhancement Films (BEF) and back-lighting units that are composed of millions of geometrical elements.

# Model introduction

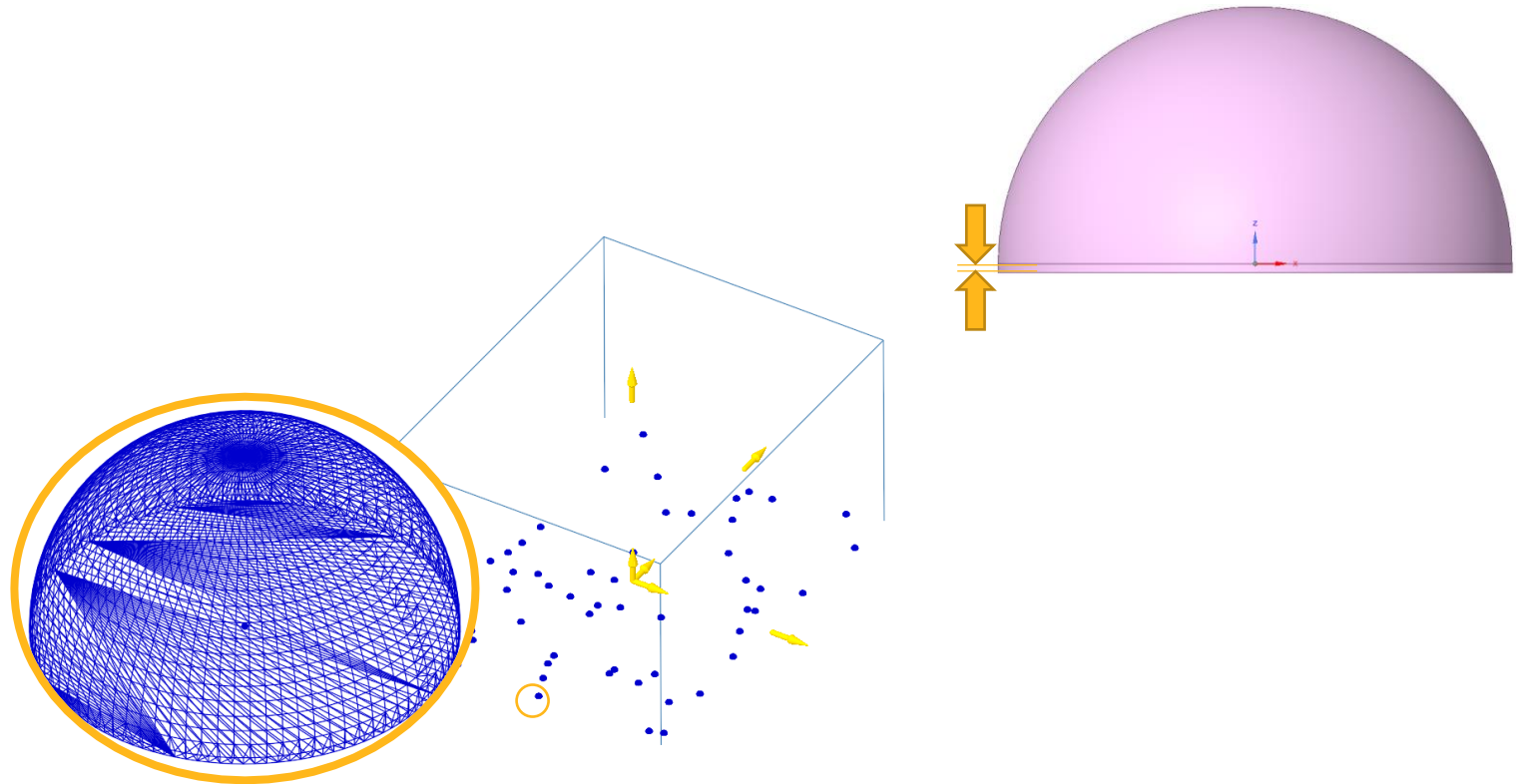
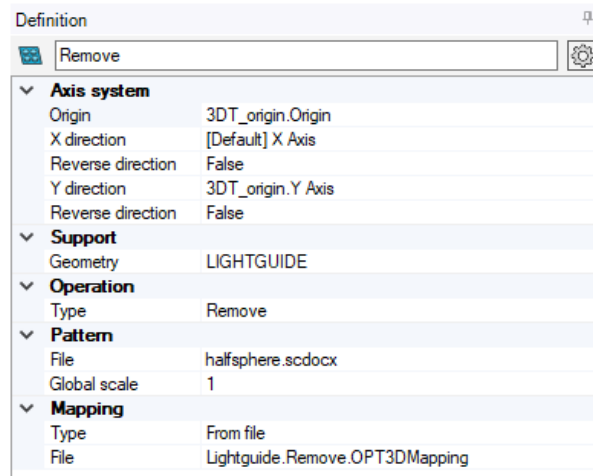
1. Nichia NSSW006 LEDs
2. Support ( $R_{\text{lamb}}=80\%$ ,  $\text{Abs}=5\%$ )
3. Mirror ( $R=100\%$ )
4. Light guide (PMMA)
  - 4'. 3D texture: half sphere
5. Diffusor (PMMA,  $T_{\text{lamb}}=50\%$ )
6. BEF (PMMA)
  - 6'. 3D texture: prism
7. BEF (PMMA)
  - 7'. 3D texture: prism
8. Diffusor (PMMA,  $T_{\text{lamb}}=80\%$ )
9. Black mask ( $\text{Abs}=95\%$ )



# 3D texture

## Light guide

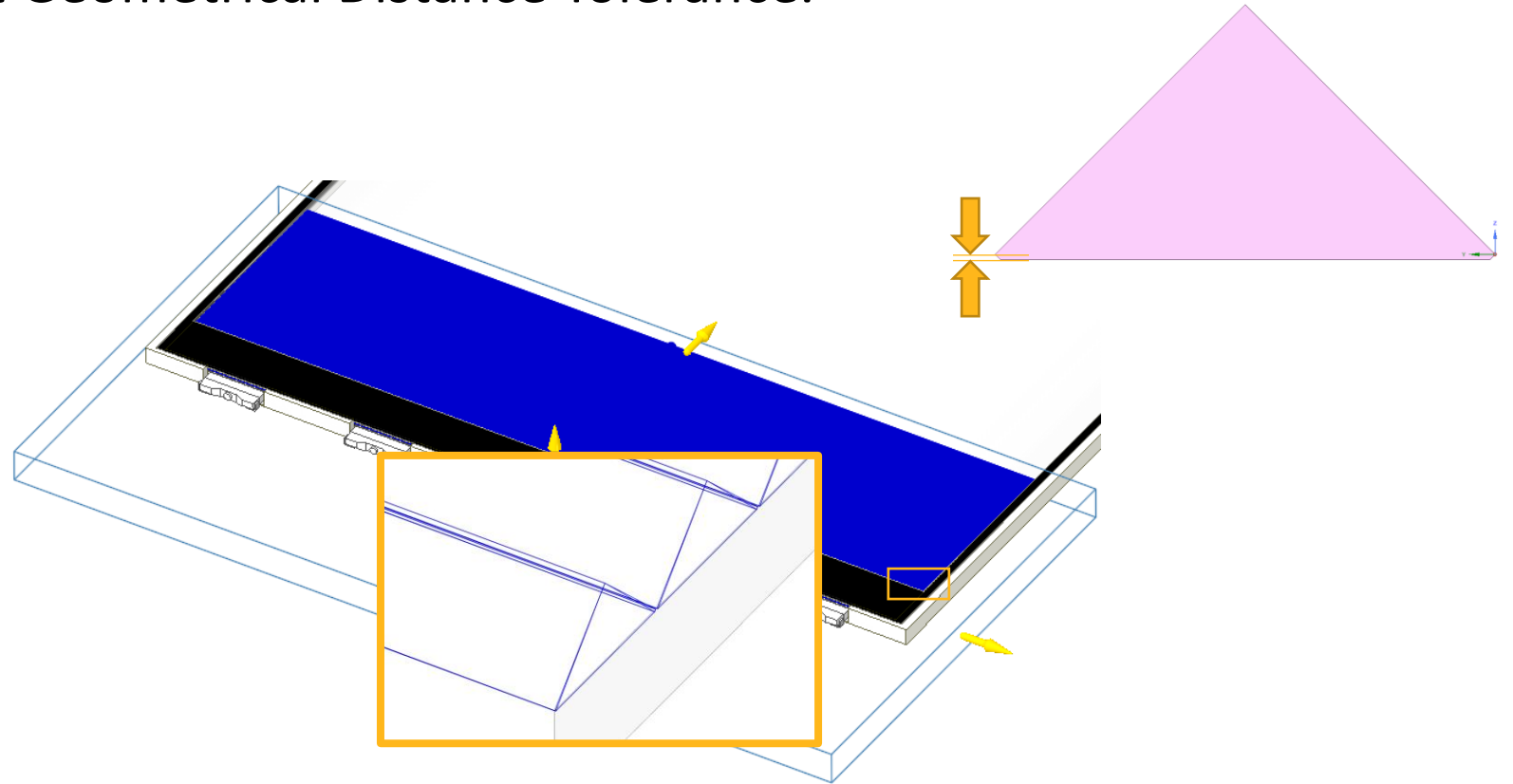
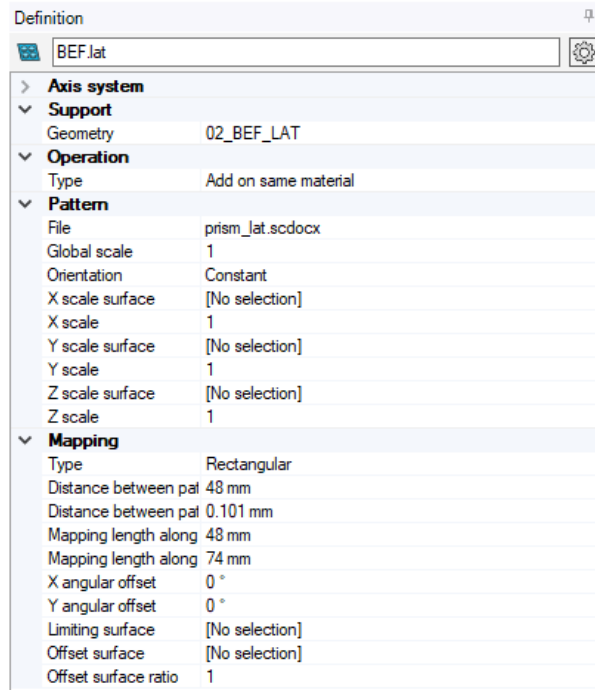
- Half sphere (1.4mm radius with 0.01 scale factor) with a tiny extrusion at the bottom to respect Geometrical Distance Tolerance.



# / Model introduction

## First BEF

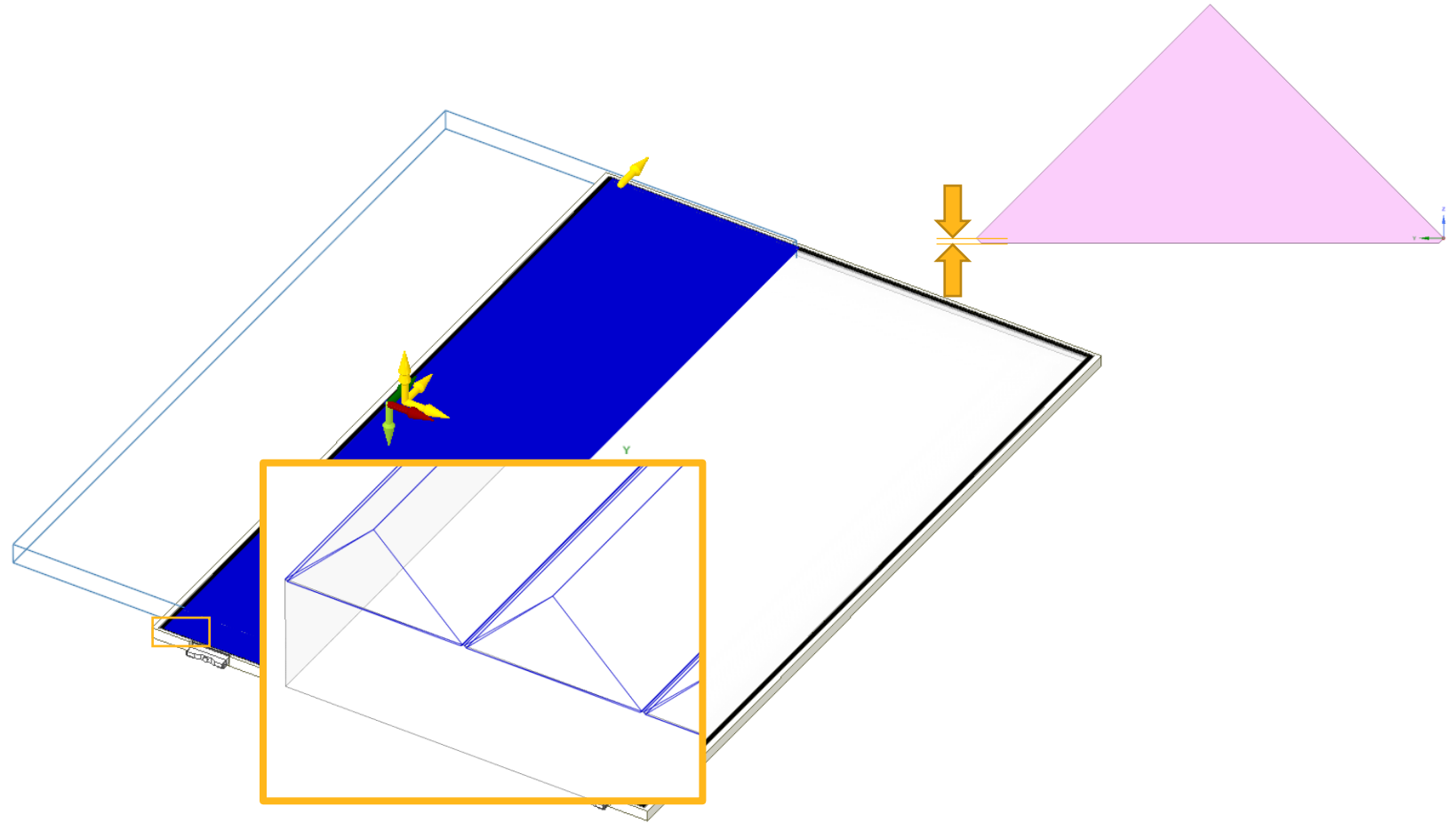
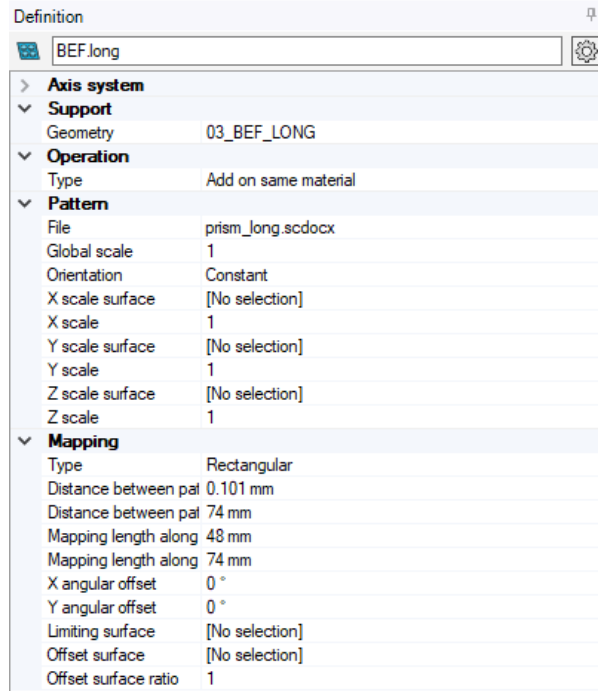
- Prism (0.1mm width, 0.051mm height) with a tiny extrusion at the bottom to respect Geometrical Distance Tolerance.



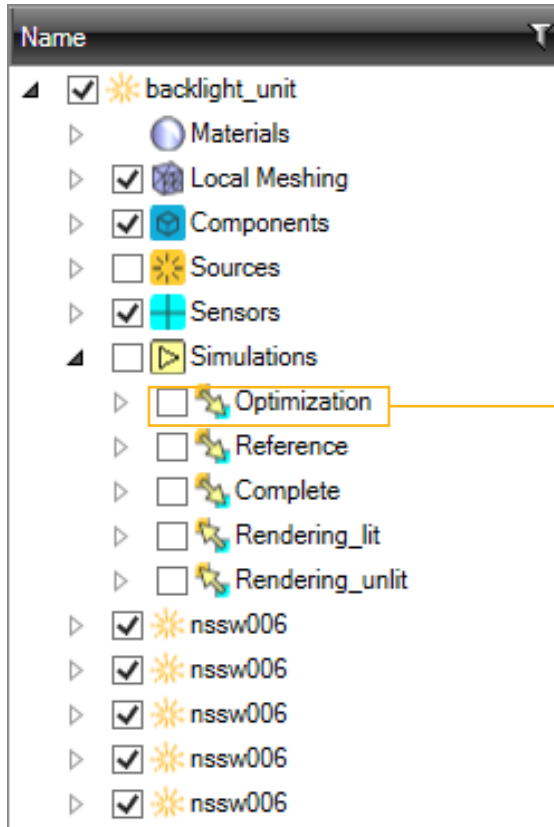
# Model introduction

## Second crossed BEF

- Same prism design



# Workflow



This simulation needs to be computed once and then exported for the optimization



# / Ansys optiSLang Setup

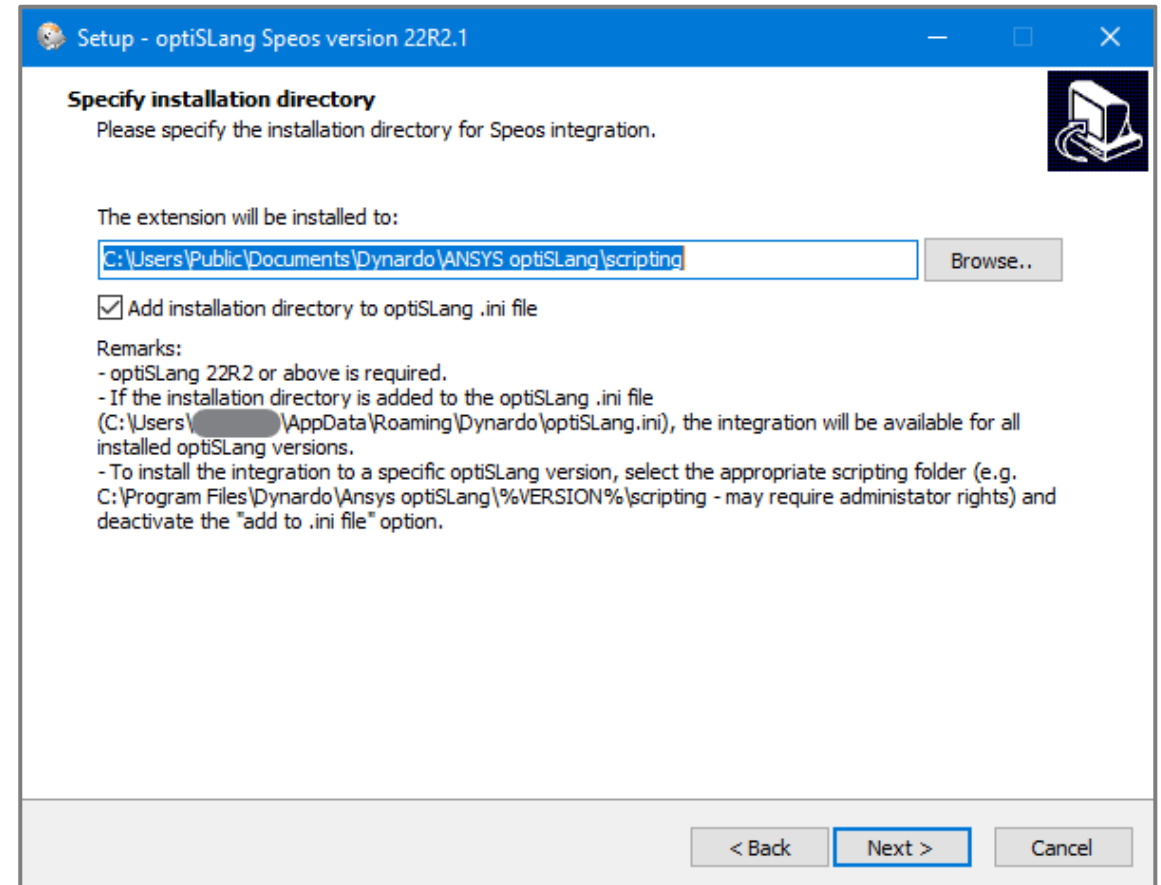
- Install the optiSLang Custom Integration ***“optiSLang\_Speos\_22R2.1.exe”***

→ contact [support@ansys.com](mailto:support@ansys.com) for download link if you have an active TECS contract. If not, please contact your local sales representative.

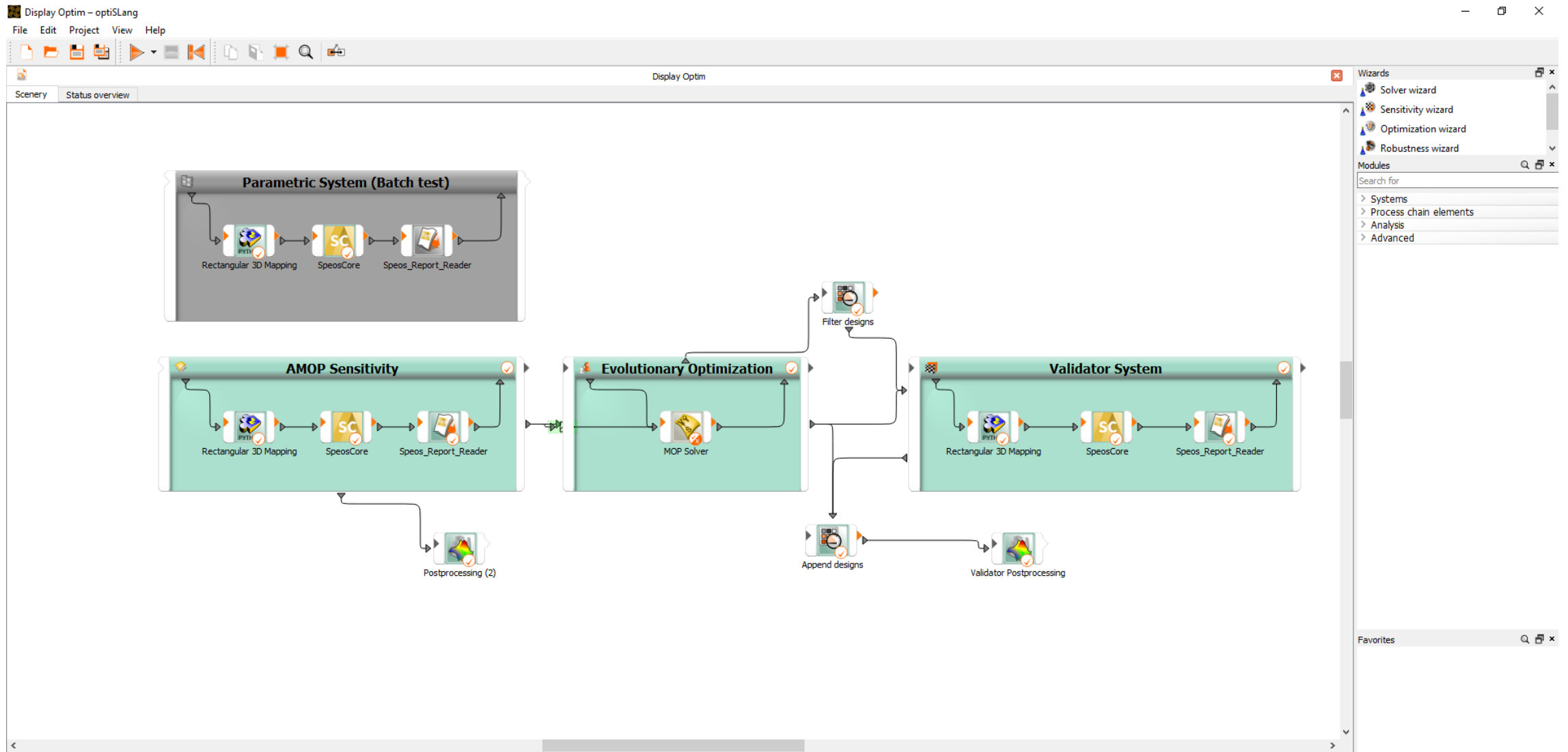
- follow the installation instructions and keep the default installation path



Ansys optiSLang



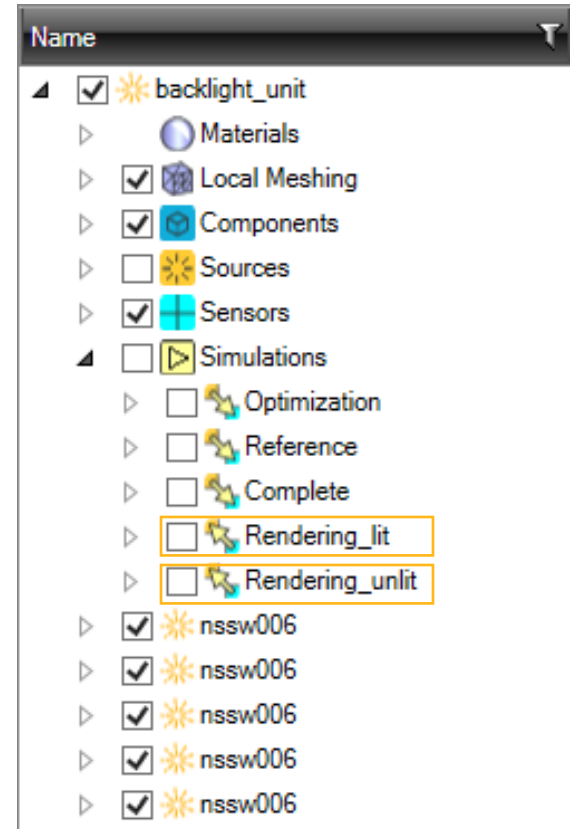
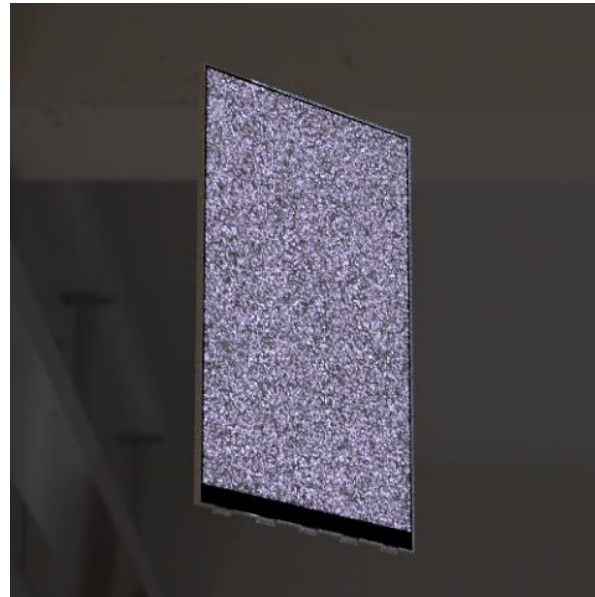
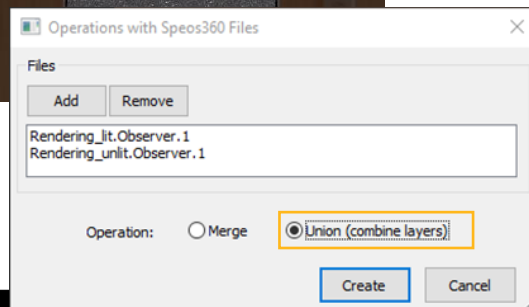
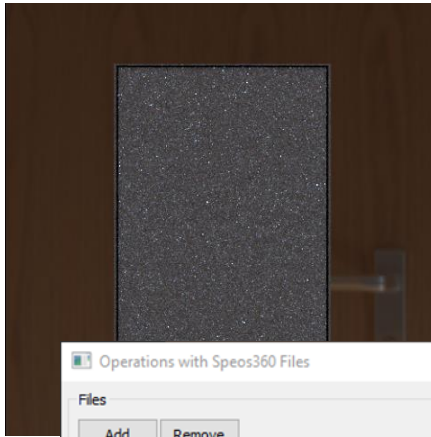
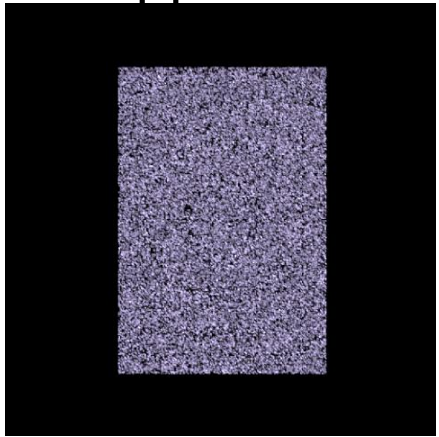
# optiSLang – Project layout



## Going further...

“Complete” direct simulation also generates an optical Light Field file (not included due to size) that can be used to define the “BLU” Light Field source.

“Rendering\_lit” and “Rendering\_unlit” inverse simulations generate speos360 results (not included due to size) to appreciate the result.

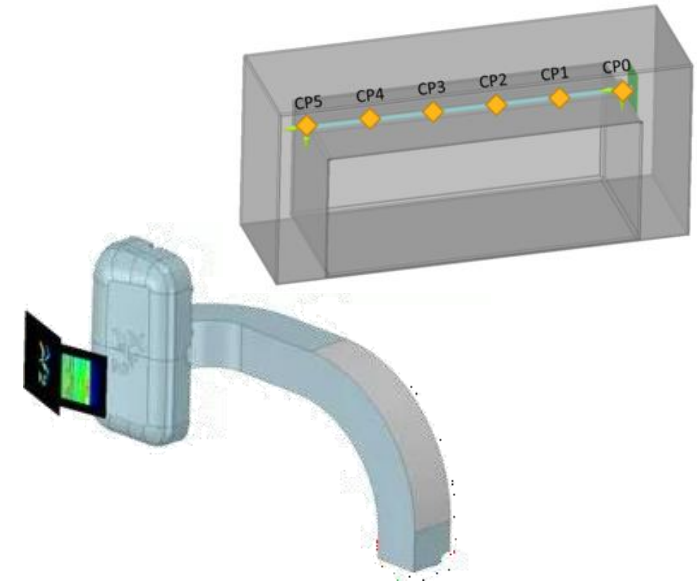


# / Going further...

More tutorials using Speos + optiSLang on ALH, here:

- Speos: Optimization of a prismatic light guide (headlamp)
- Speos: Optimization of a prismatic light guide (interior lighting)
- Speos for NX: Light guide optimization (interior lighting)

If you have any questions on this tutorial, do not hesitate to contact: [support@ansys.com](mailto:support@ansys.com)



 **Ansys**

