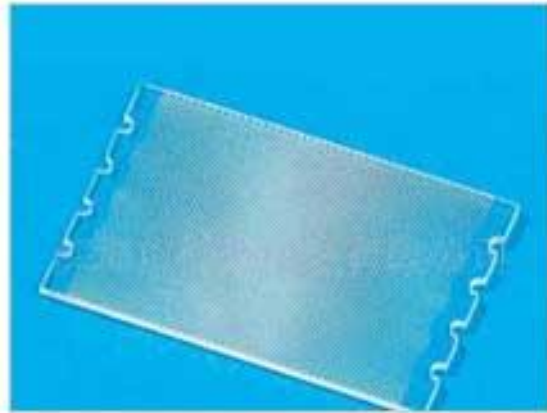
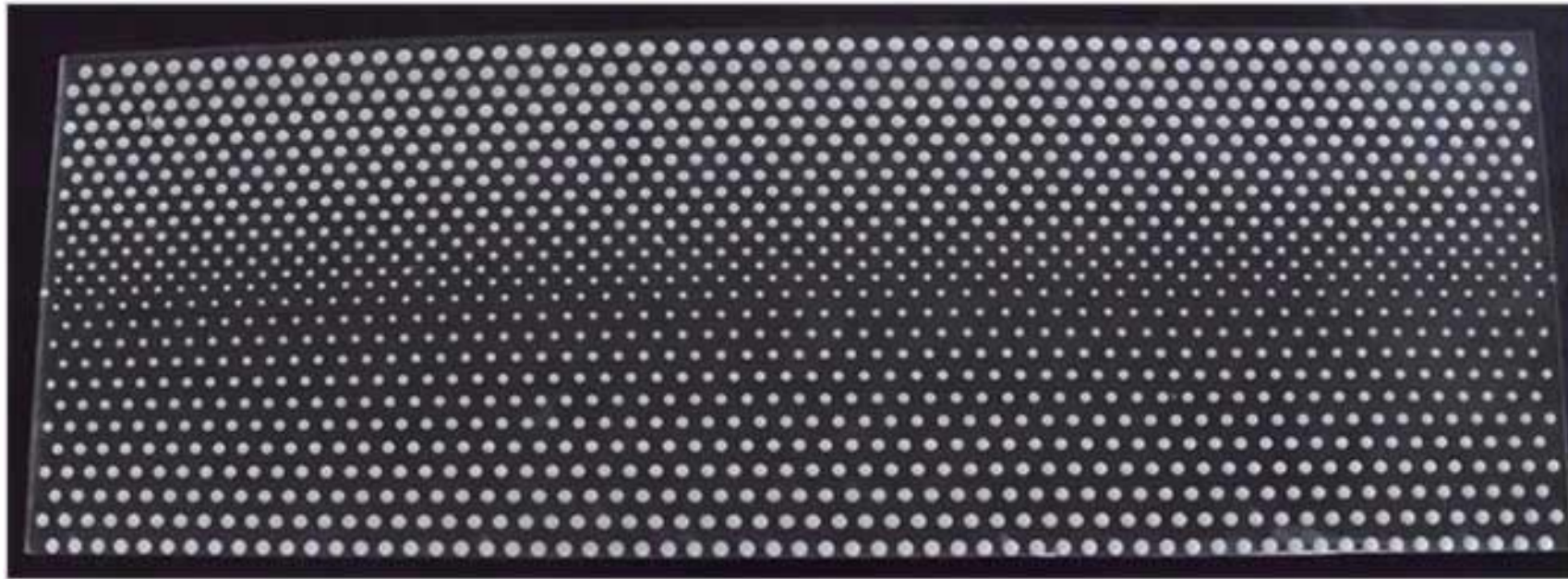


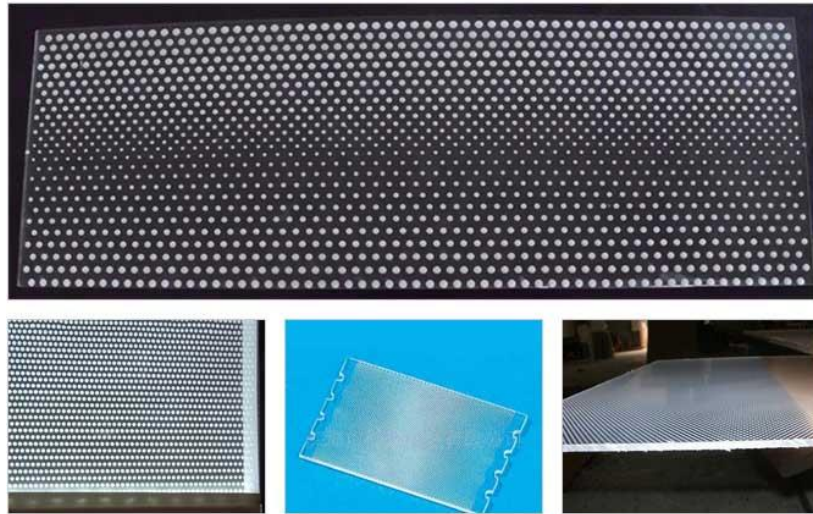
Using a Generic Genetic Optimization Algorithm for Optical Design

Ryan Kelley, Mark Jongewaard
LTI Optics LLC

The Challenge

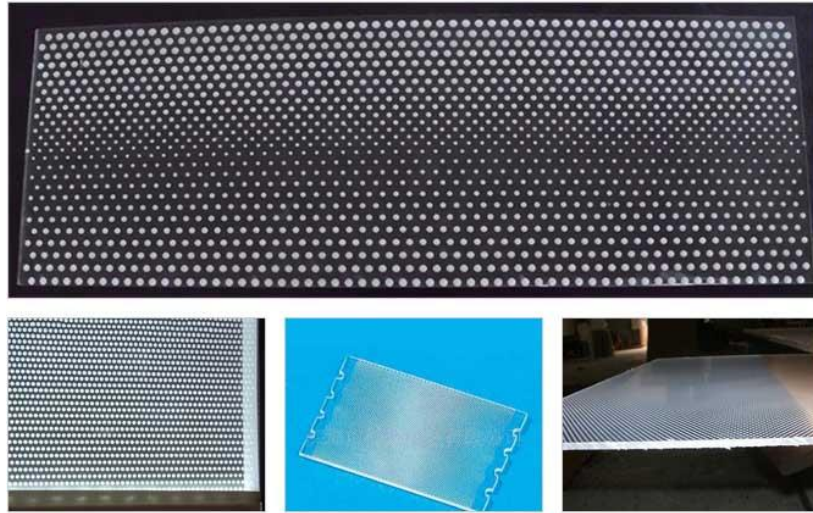


The Challenge

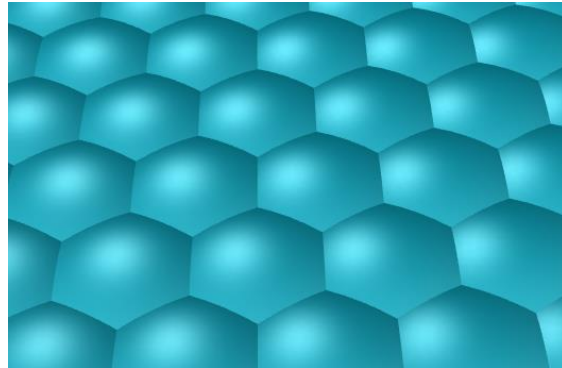
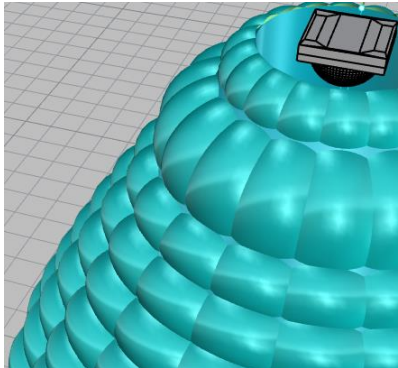


**LIGHT GUIDE
OPTIMIZER DESIGN
TOOL**

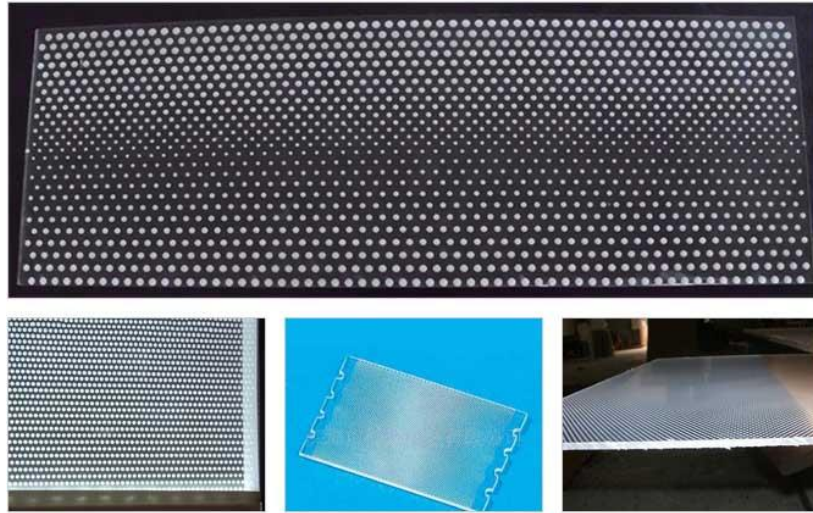
The Challenge



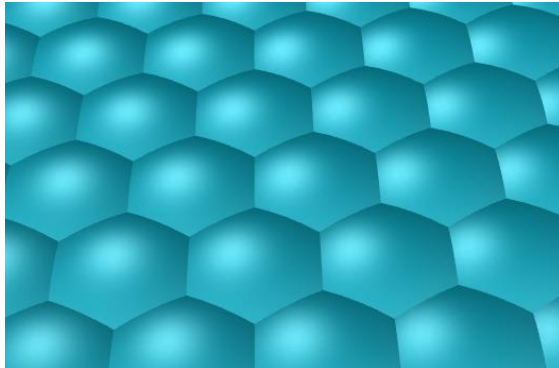
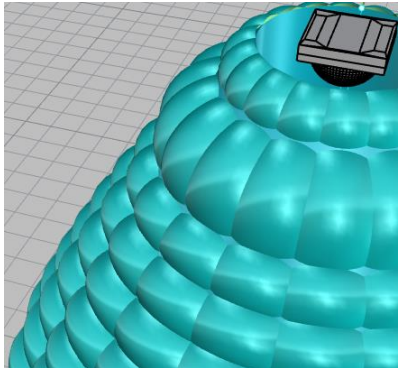
**LIGHT GUIDE
OPTIMIZER DESIGN
TOOL**



The Challenge



**LIGHT GUIDE
OPTIMIZER DESIGN
TOOL**

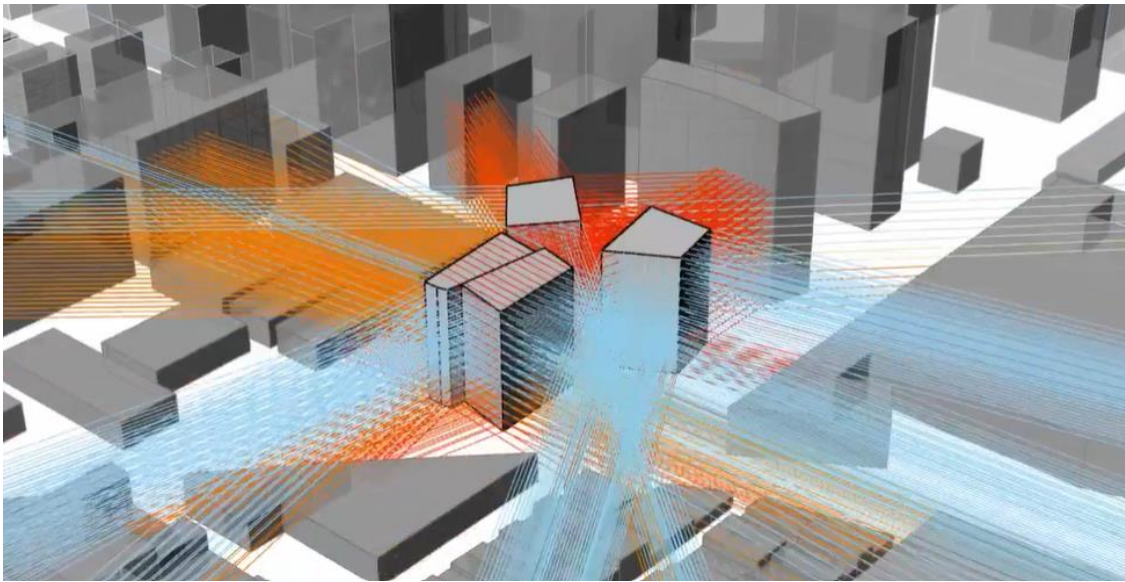


??????????????

Are There Generic Optimizers?

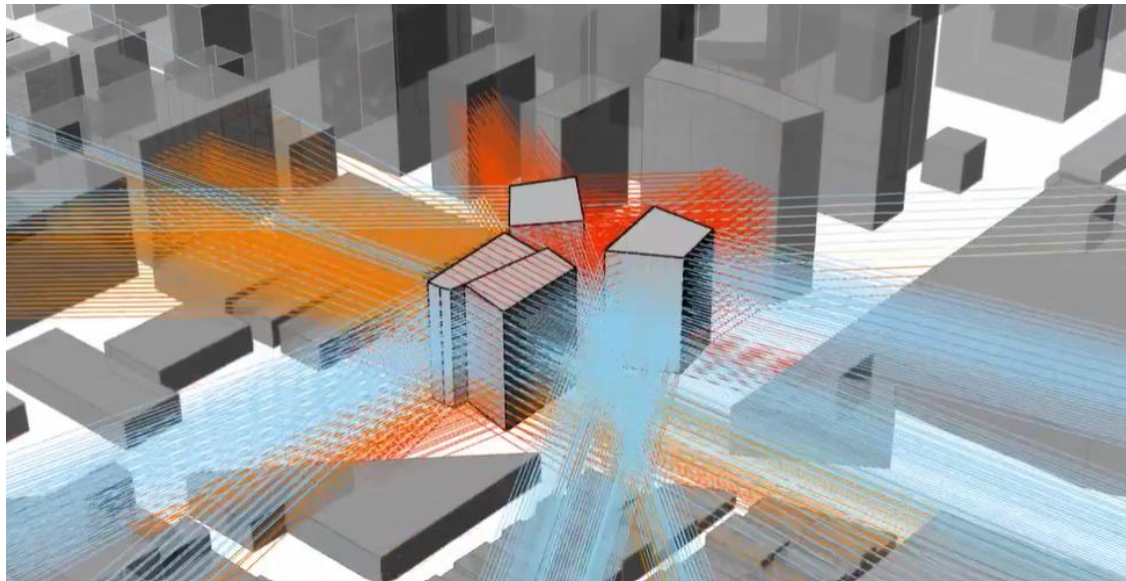
Other Examples of Optimization

View Analysis

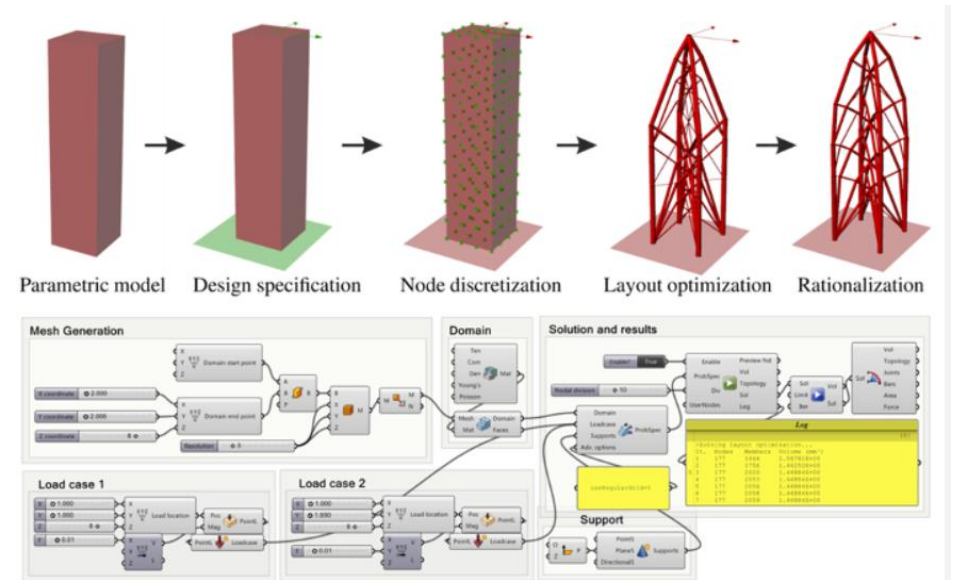


Other Examples of Optimization

View Analysis



Structural Design



What Are They Using?

A flexible and relatively open system

CAD

Scripting

Optimization

A flexible and relatively open system

CAD

Scripting

Optimization



A flexible and relatively open system

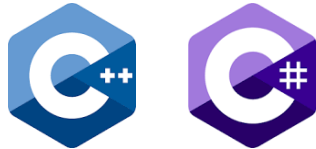
CAD



Scripting



Grasshopper



Optimization

A flexible and relatively open system

CAD



Scripting



Optimization



A flexible and relatively open system

CAD



Scripting



Optimization



Optical Simulation

photopia

A General Solution

A flexible and relatively open system

CAD



Scripting



Optimization



Optical Simulation

photopia

control & optimize any CAD Feature

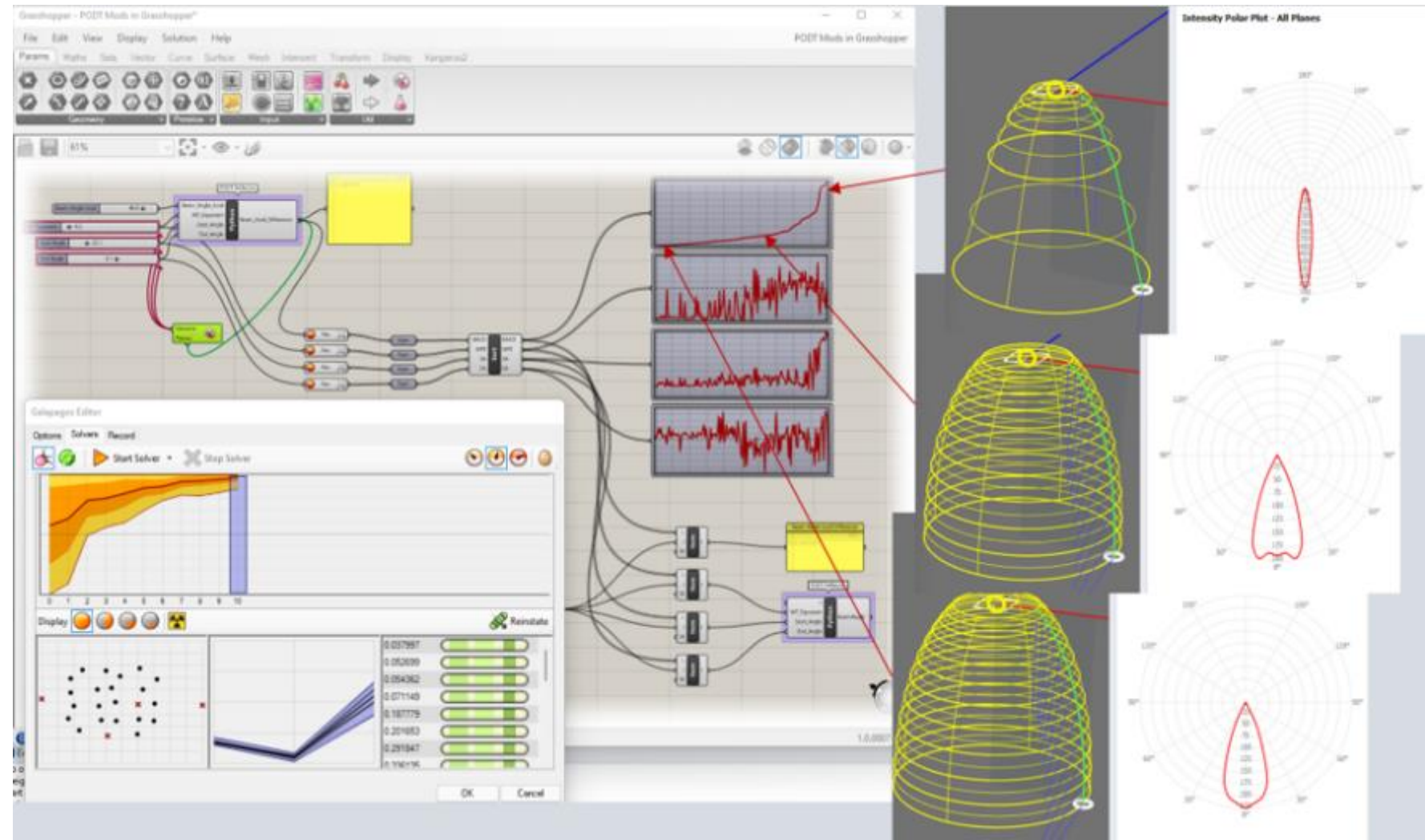
raytrace

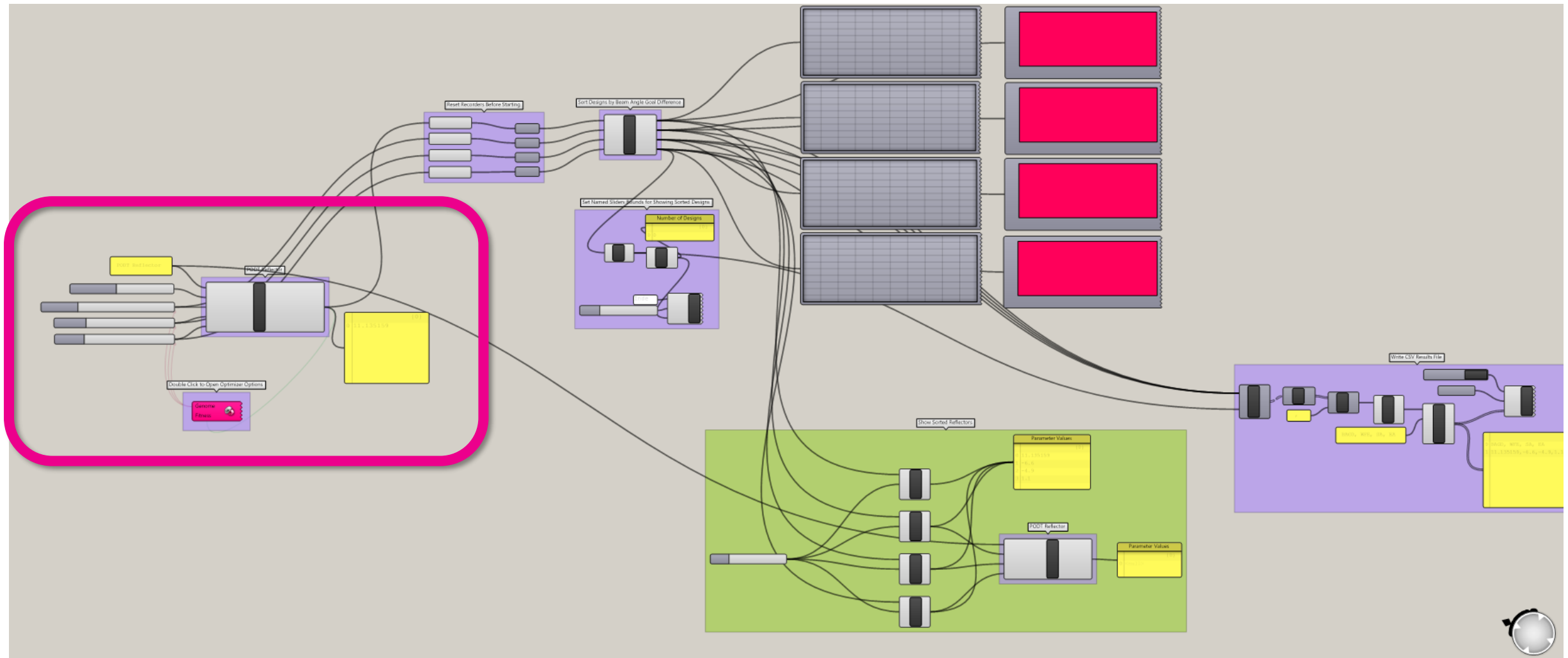
Example 1 : Revolved Reflector

Example 1 : Revolved Reflector

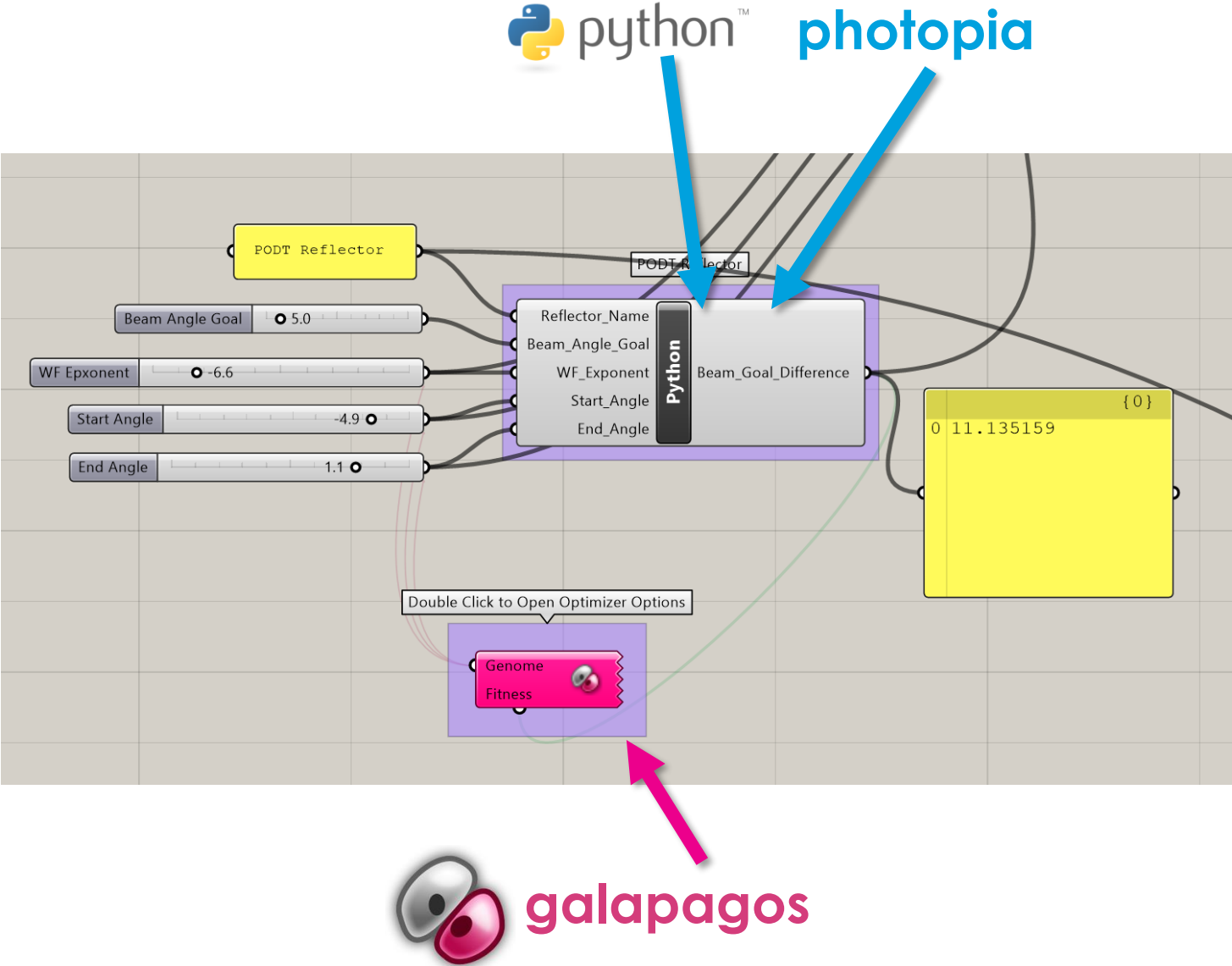
Optimize:
Beam Angle

Control:
Reflector Shape





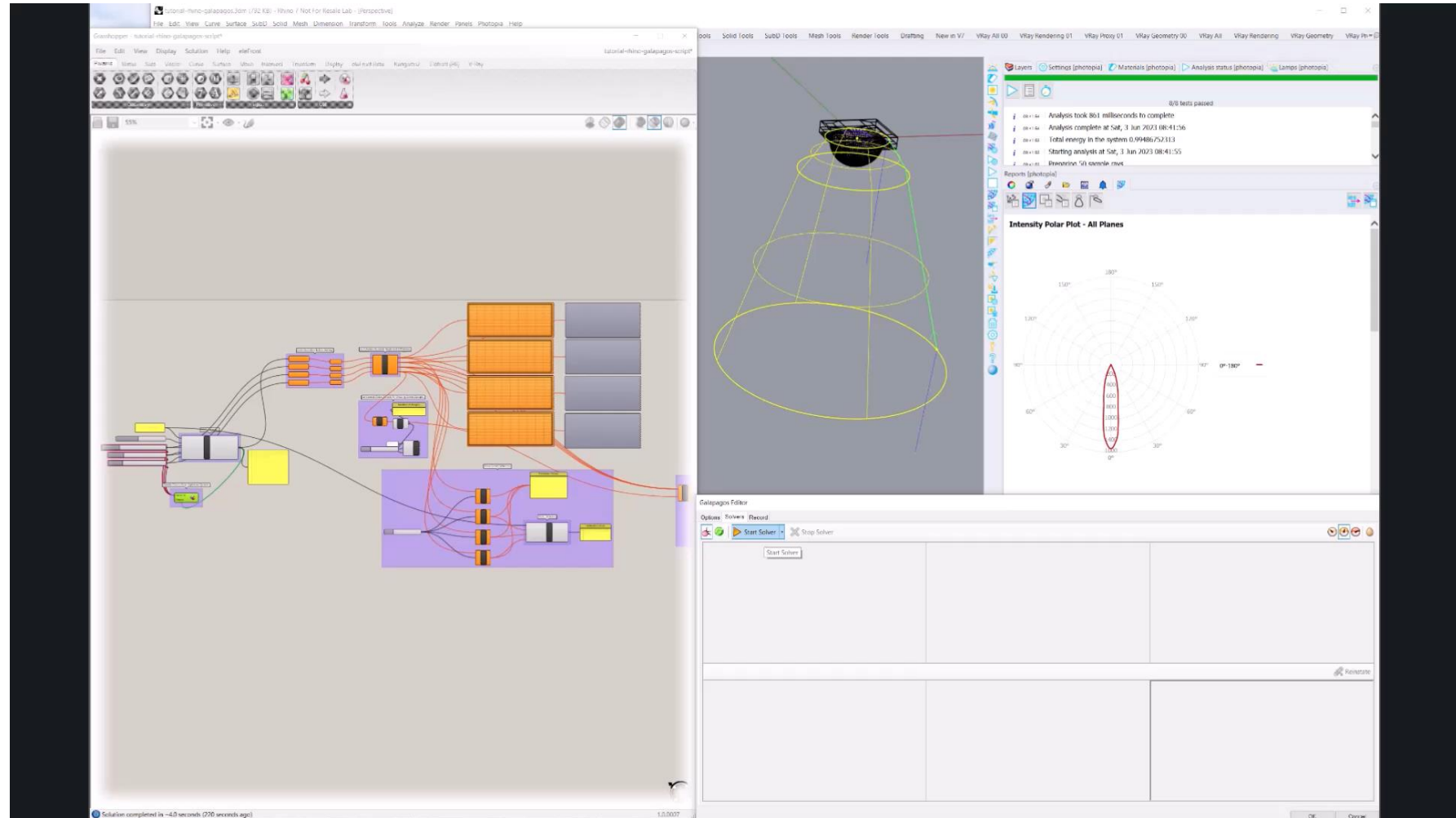
Example 1 : Revolved Reflector



Example 1 : Revolved Reflector

Optimize:
Beam Angle

Control:
Reflector Shape

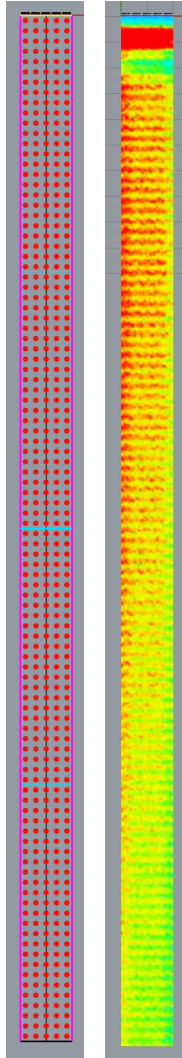


Example 2 : Light Guide Extraction

Example 2 : Light Guide Extraction

Optimize:
Uniformity

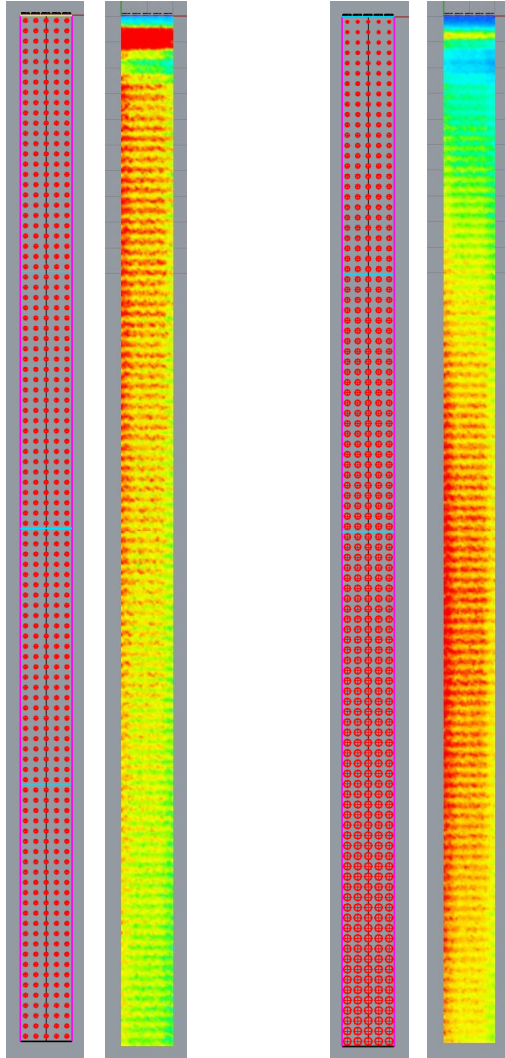
Controls:
Dot size
Dot density
Size change



Example 2 : Light Guide Extraction

Optimize:
Uniformity

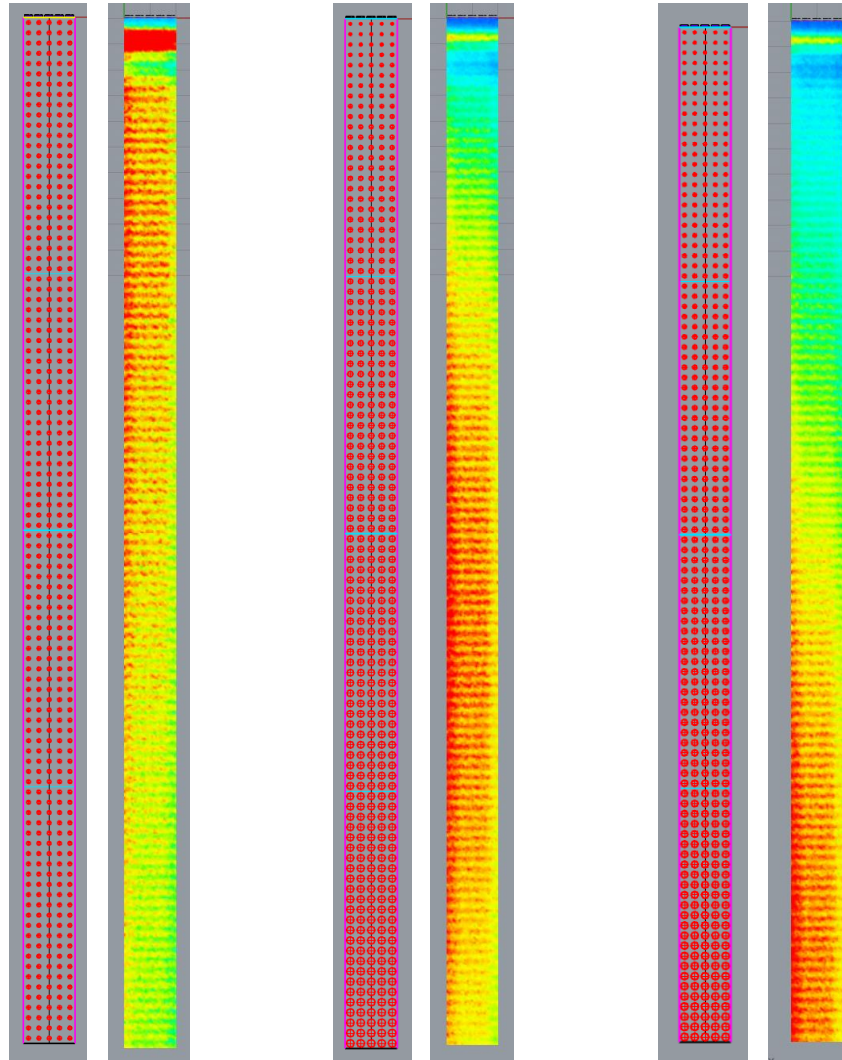
Controls:
Dot size
Dot density
Size change



Example 2 : Light Guide Extraction

Optimize:
Uniformity

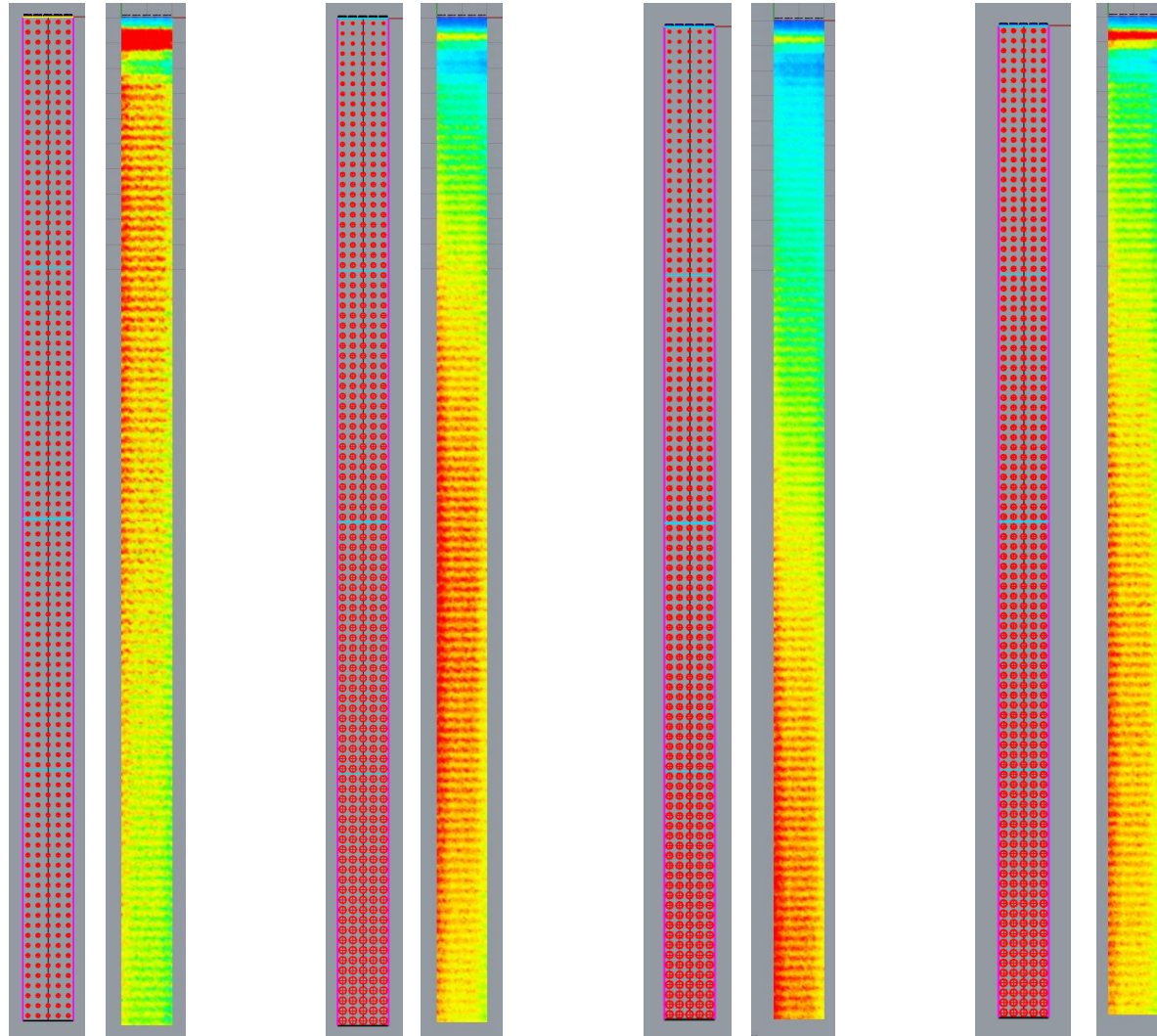
Controls:
Dot size
Dot density
Size change



Example 2 : Light Guide Extraction

Optimize:
Uniformity

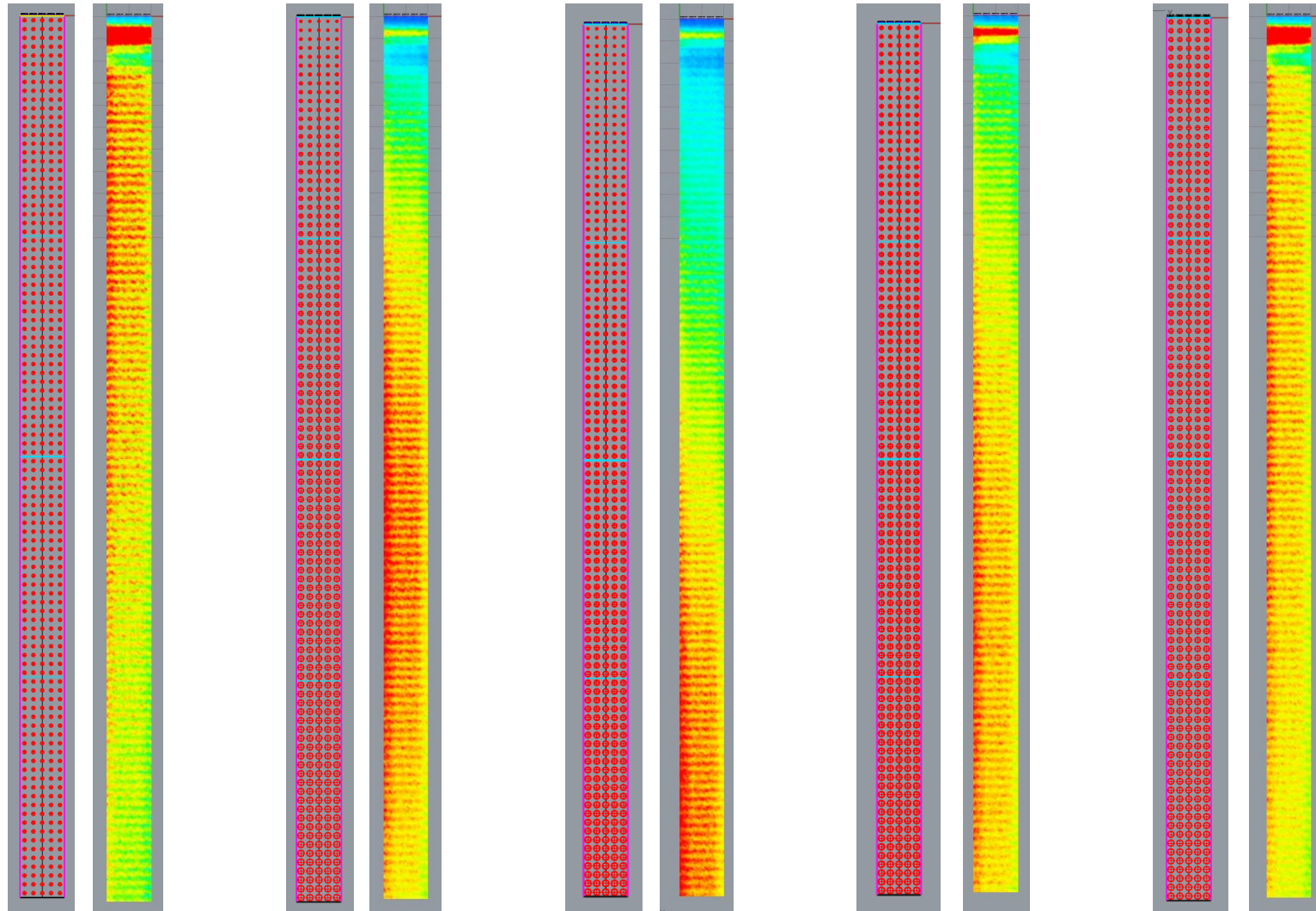
Controls:
Dot size
Dot density
Size change



Example 2 : Light Guide Extraction

Optimize:
Uniformity

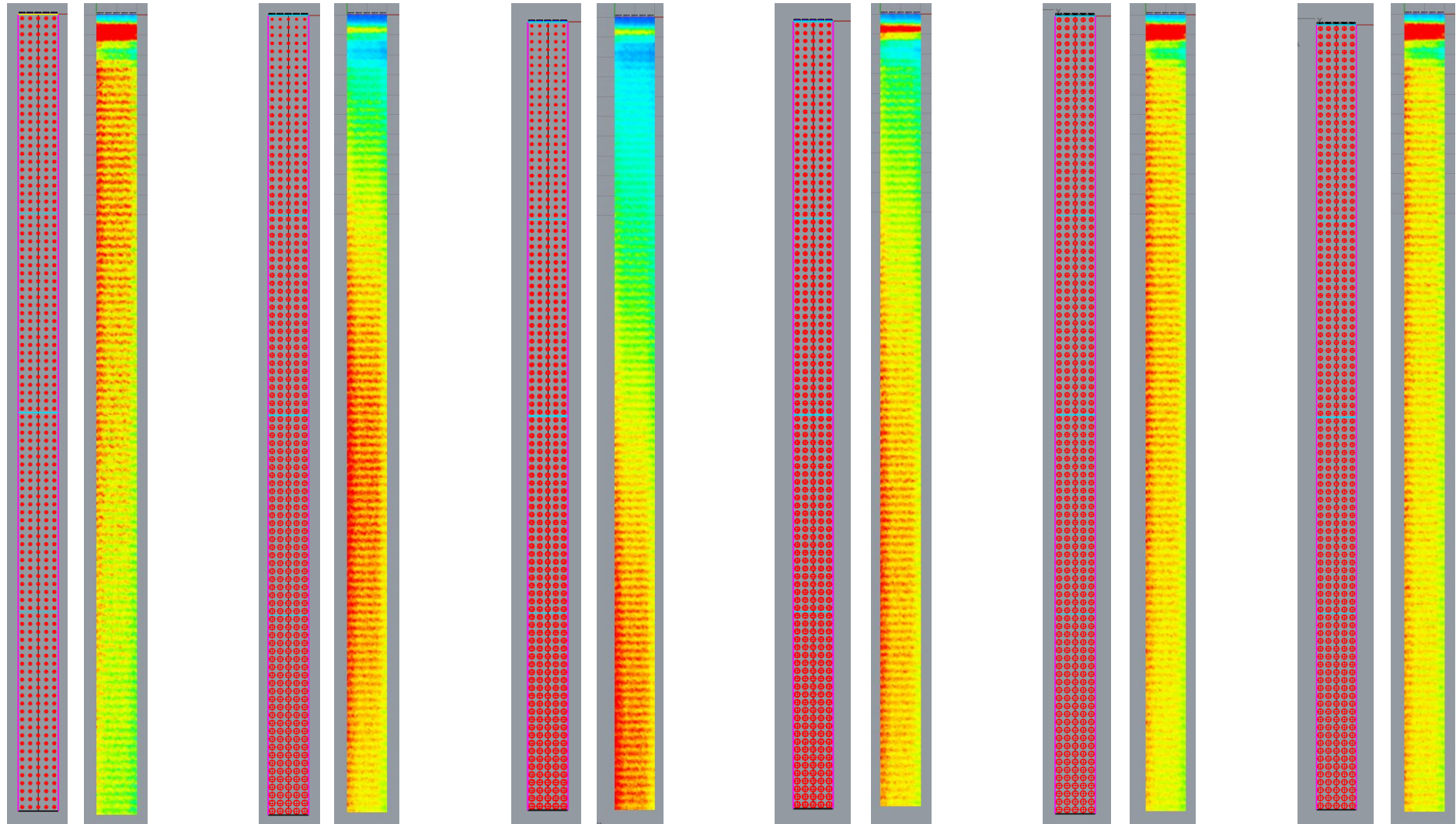
Controls:
Dot size
Dot density
Size change



Example 2 : Light Guide Extraction

Optimize:
Uniformity

Controls:
Dot size
Dot density
Size change

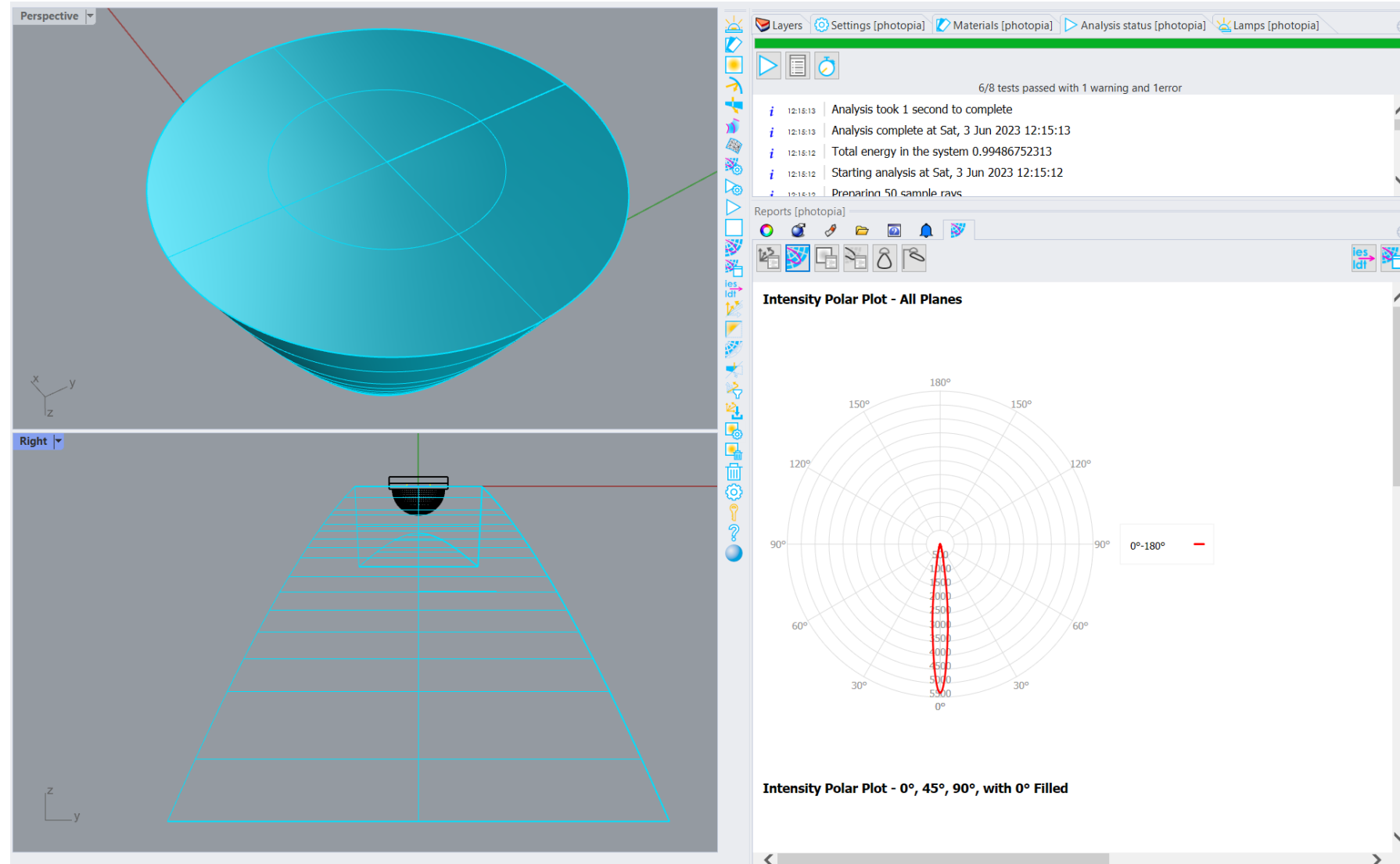


Example 3 : Pillow Facets on TIR Collimator

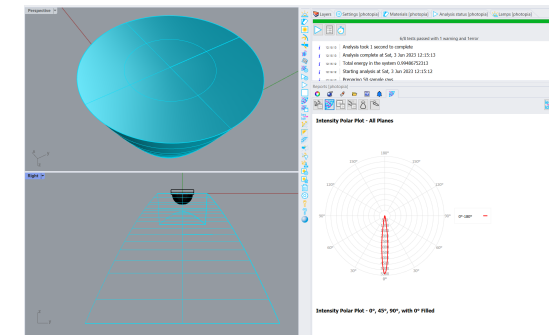
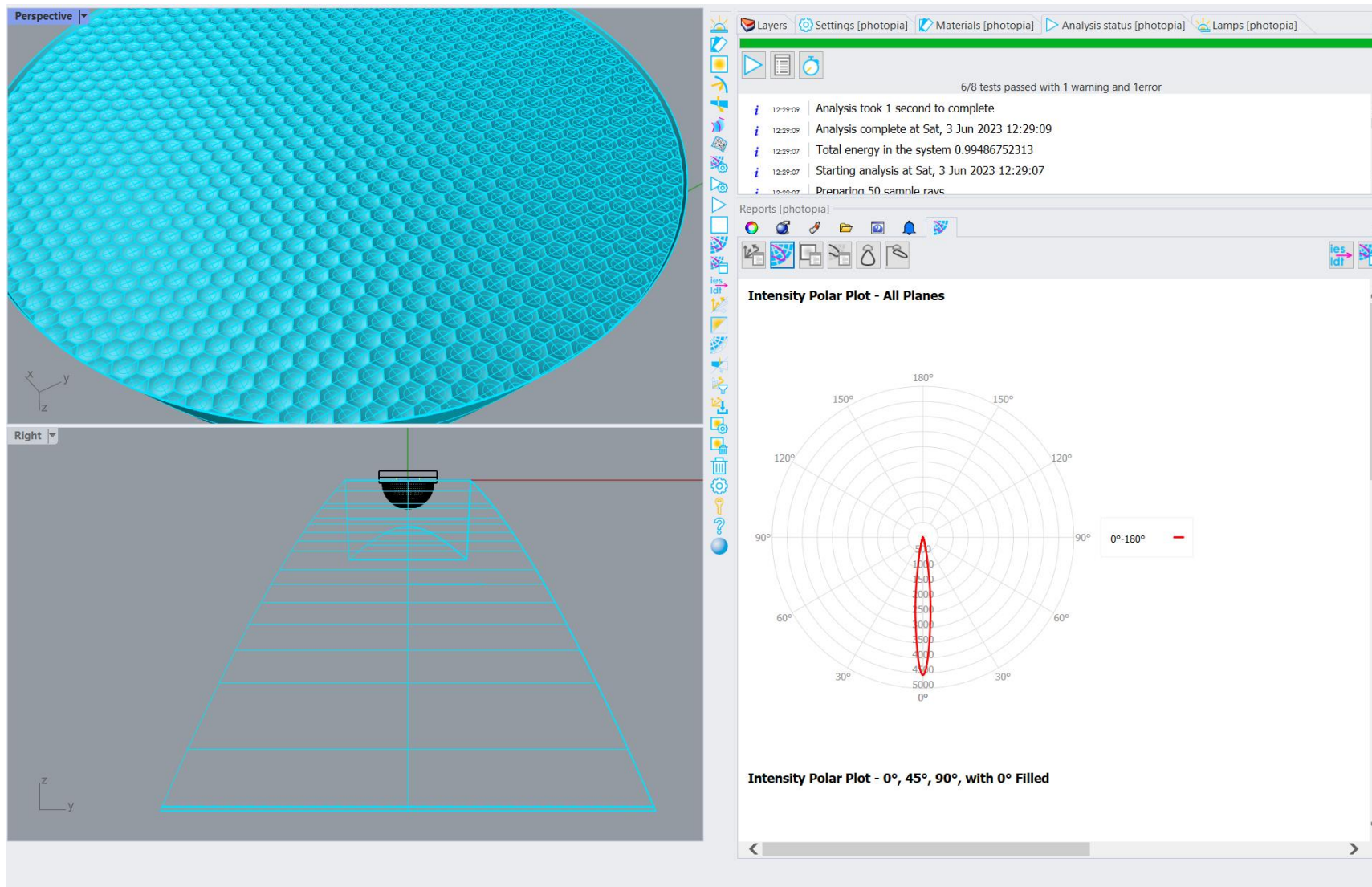
Example 3 : Pillow Facets on TIR Collimator

Optimize:
Beam Angle

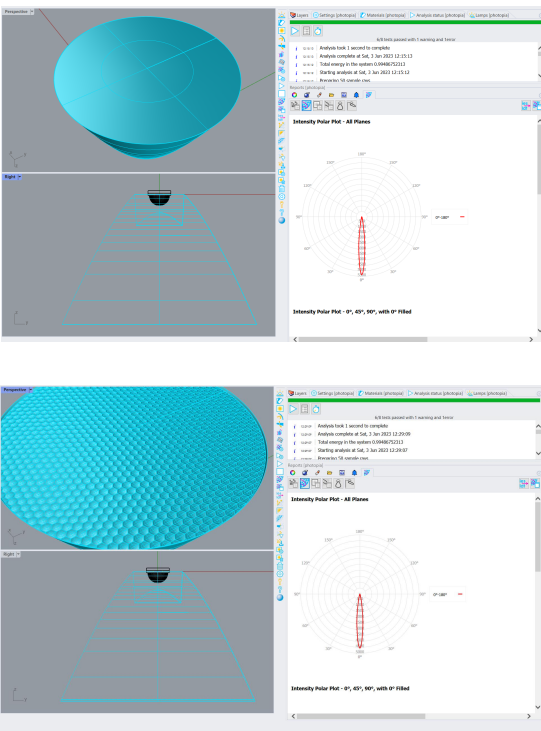
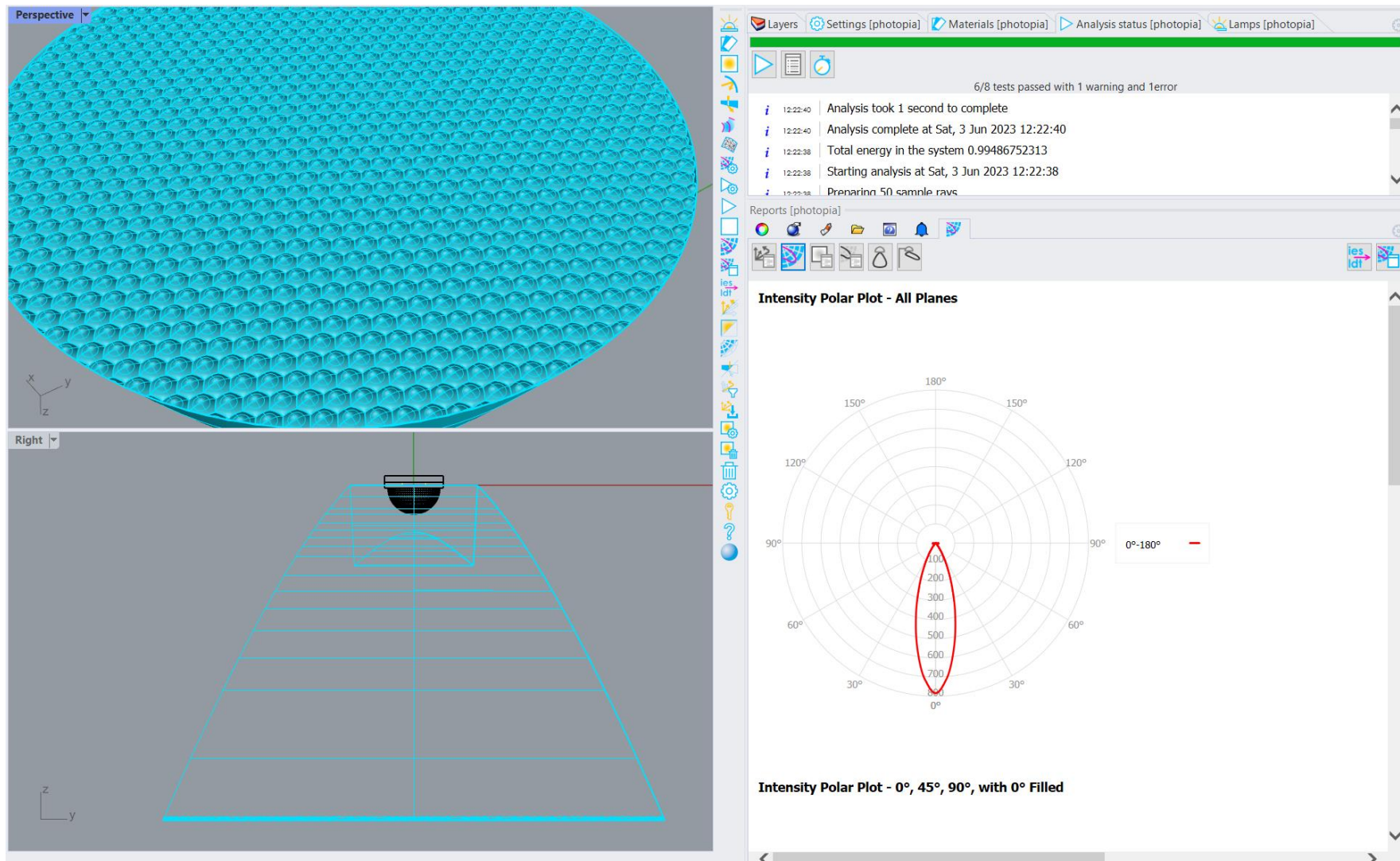
Control:
Pillow Curvature



Example 3 : Pillow Facets on TIR Collimator



Example 3 : Pillow Facets on TIR Collimator

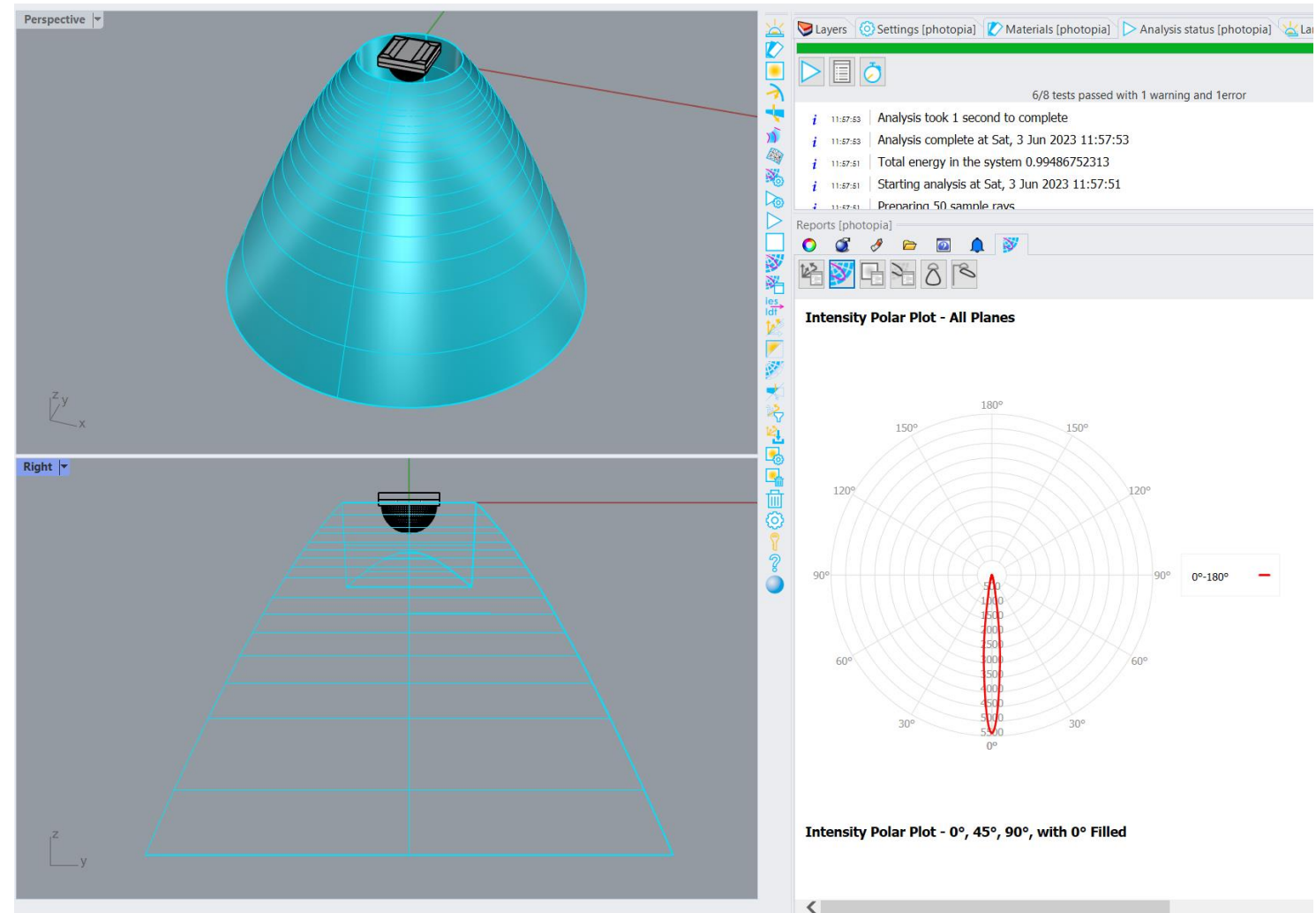
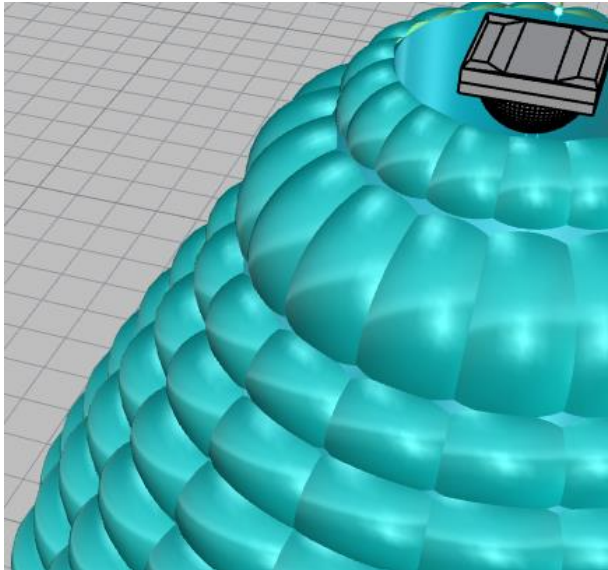


Example 4 : Pillow Facets on TIR Collimator

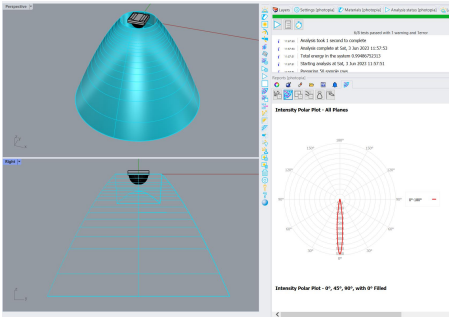
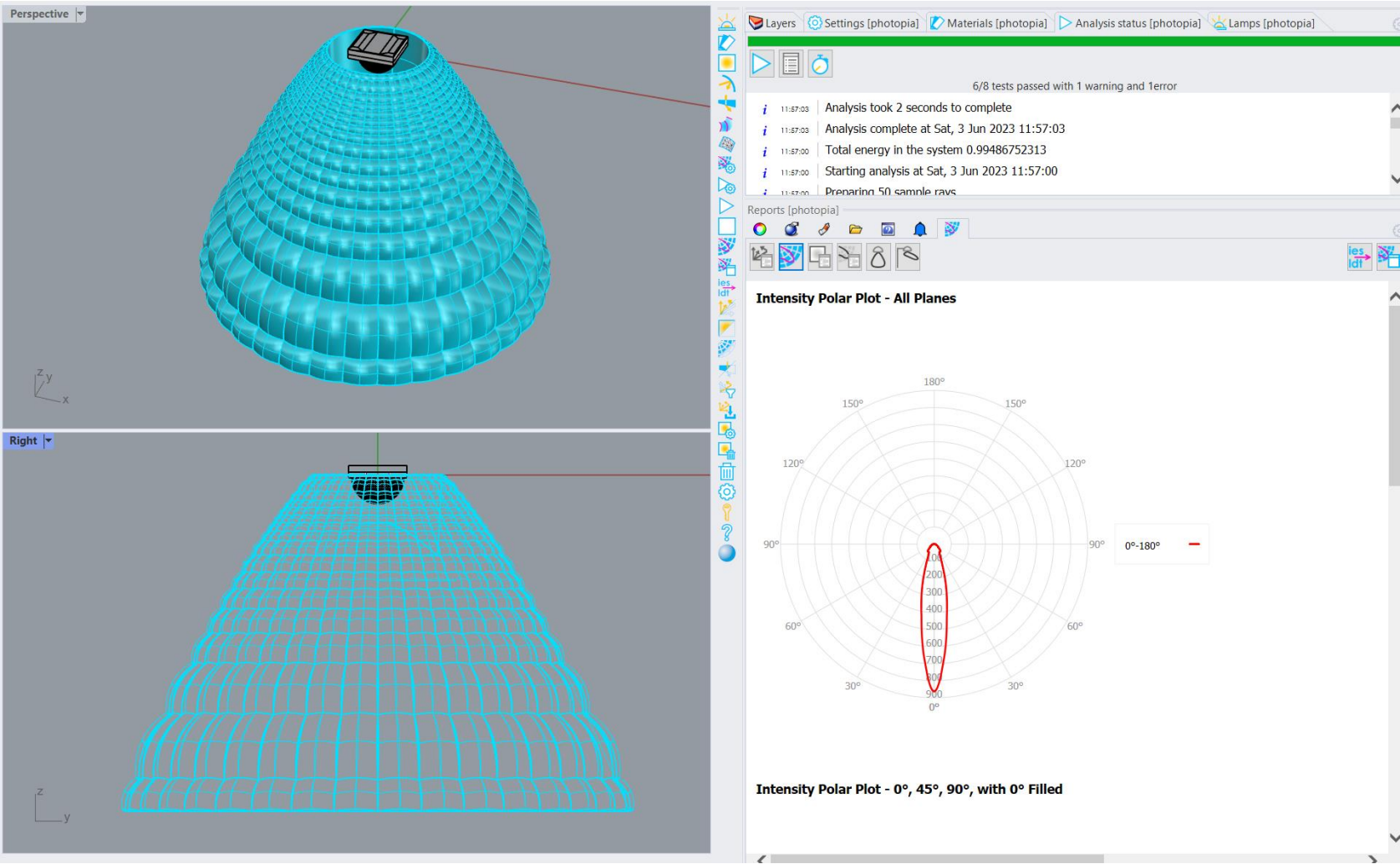
Example 4 : Pillow Facets on TIR Collimator

Optimize:
Beam Angle

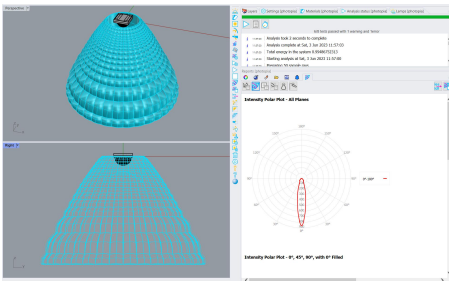
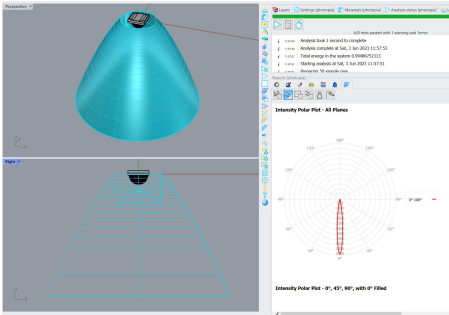
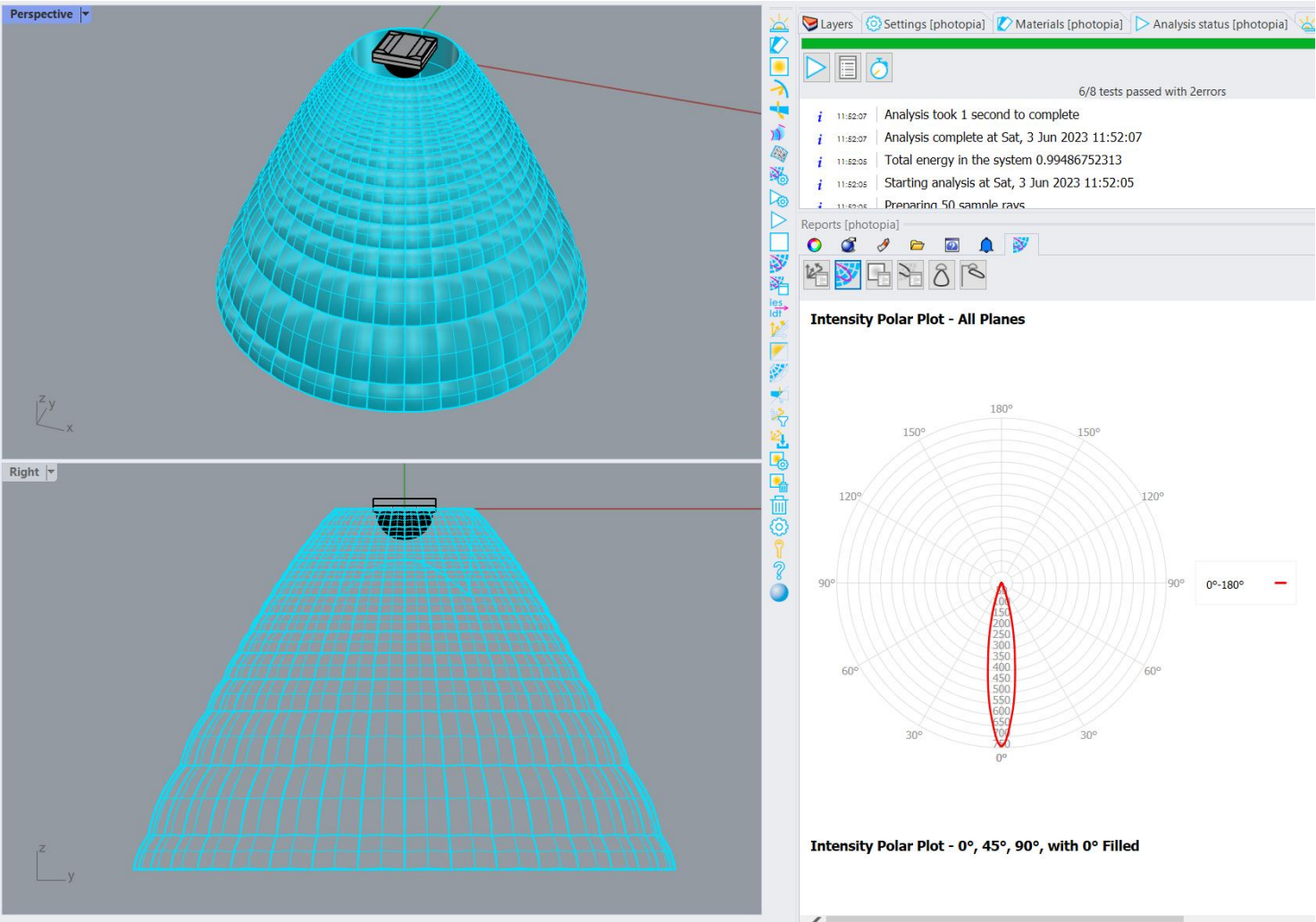
Control:
Facet Curvature



Example 4 : Pillow Facets on TIR Collimator



Example 4 : Pillow Facets on TIR Collimator



Summary

A flexible and relatively open system

CAD



Scripting



Optimization



Optical Simulation

photopia

control & optimize any CAD Feature

raytrace

Thanks & Questions

ryan@ltioptics.com