Optical Reflector Design using the TracePro Interactive Optimizer

Presented by :
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Technical Sales Manager
Lambda Research Corporation

Presenter:

Dave Jacobsen
Senior Application Engineer
Lambda Research Corporation

Lambda Research Corporation

Format

- A 25-30 minute presentation followed by a 10-15 minute question and answer session

- Please submit your questions anytime using Question box in the GoToWebinar control panel

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In this webinar you will:

- Learn how to use the TracePro Interactive Optimizer to design optical reflectors.

- Find out how the Interactive Optimizer uses the Surface Property catalog in TracePro to model different reflector coatings.

- Discover how you can use the Scheme macro language in conjunction with the Interactive Optimizer to expand its capabilities.

In this webinar you will:

•Gain an understanding on how to set up your sources and targets in TracePro and define suitable optimization targets.

•See examples of reflector designs created using the Interactive Optimizer such as trough reflectors with curved ends, facetted reflectors with non-uniform faceting, and off-axis reflector segments.

•Have your questions answered in the Question and Answer session.

Additional Resources

- Past TracePro Webinars
  - February 2010 - ***Interactive Optimizer***
  - March 2010 - ***Interactive Optimizer***
  - July 2010 - ***Modeling Light Sources in TracePro***
  - September 2010 - ***Interactive Optimizer***
  - February 2011 - ***Analysis Tools in TracePro***
  - June 2011 - ***LED Lighting Design using TracePro***
  - July 2011 - ***Scheme Macro Language***

Download at http://www.lambdares.com/webinars/

Current TracePro Release

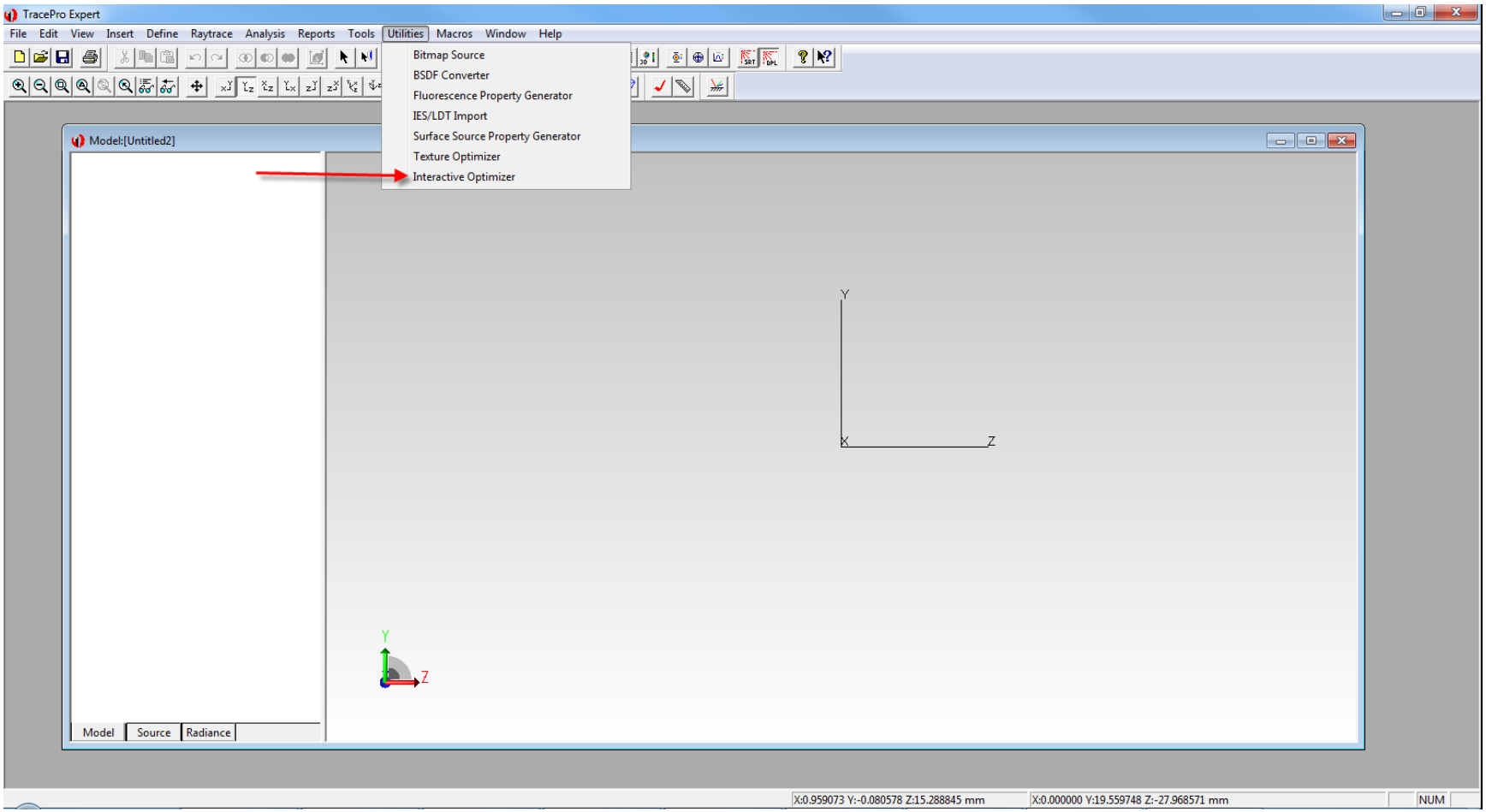
- TracePro 7.1.2

- Can be downloaded by anyone with a current Maintenance and Support Agreement

- www.lambdares.com

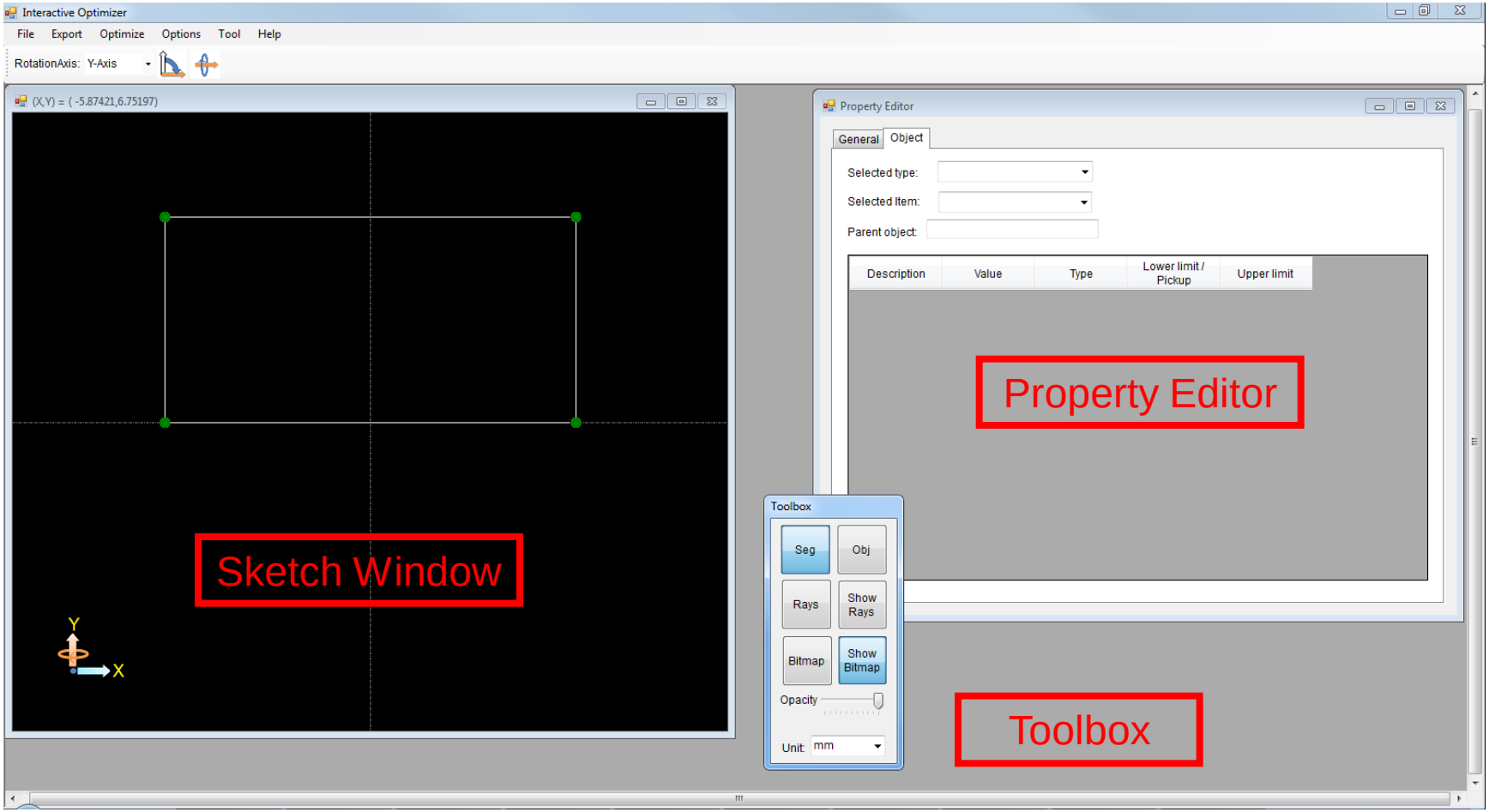
Optical Reflector Design using the TracePro Interactive Optimizer

TracePro Interactive Optimizer



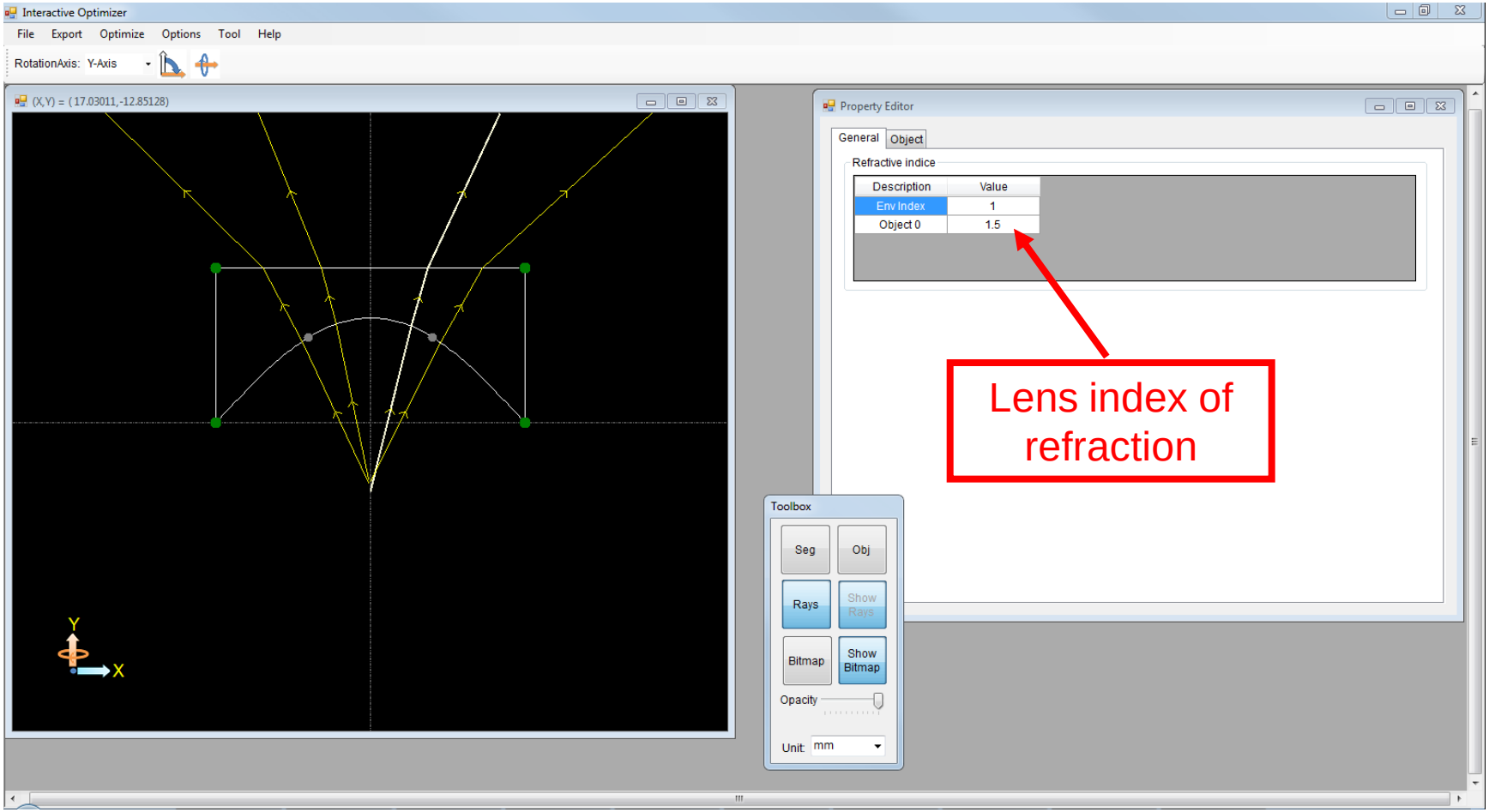
Interactive Optimizer is launched from the Utilities Menu in TracePro

TracePro Interactive Optimizer



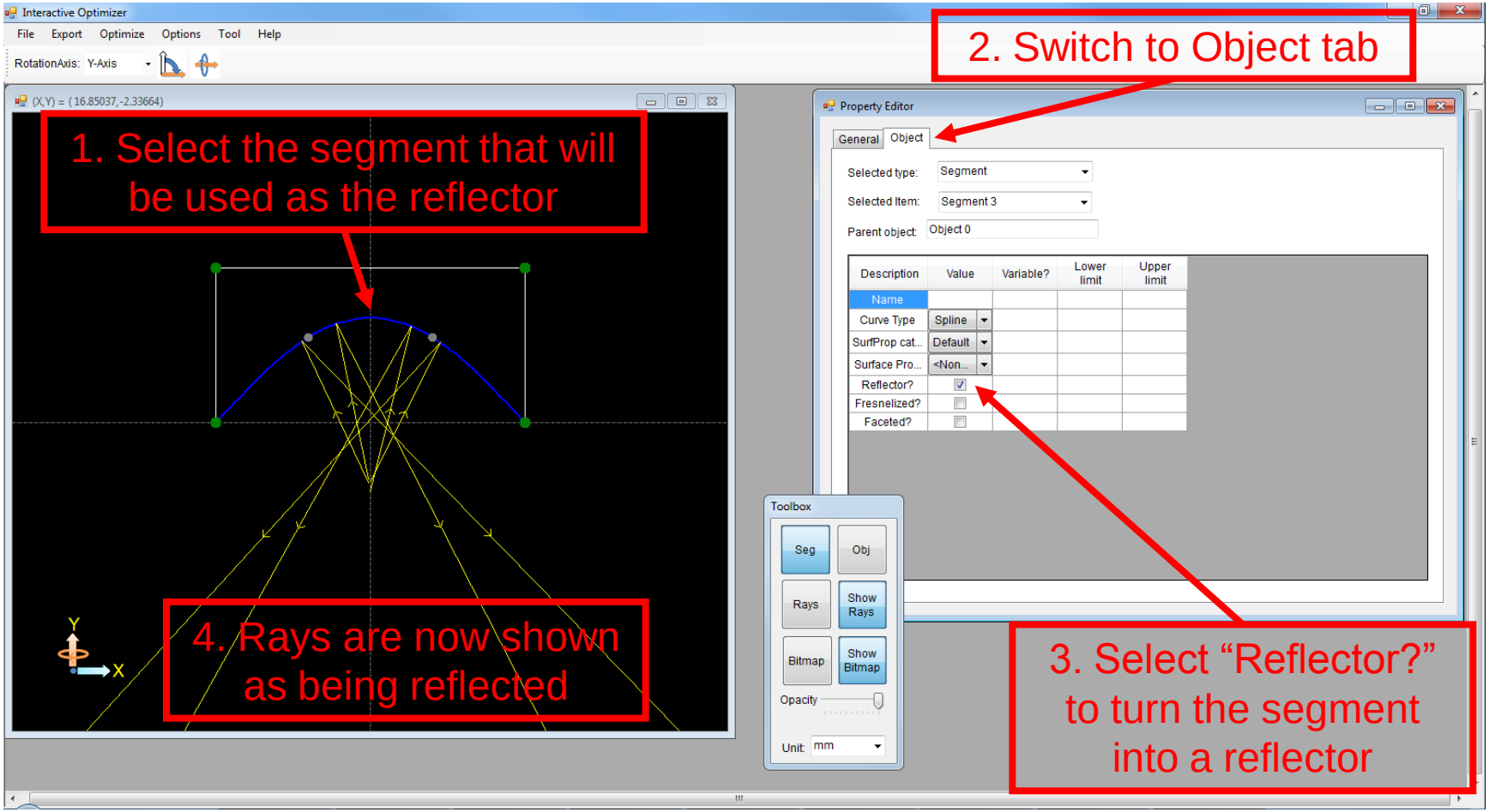
Initial windows visible when the optimizer is opened

TracePro Interactive Optimizer



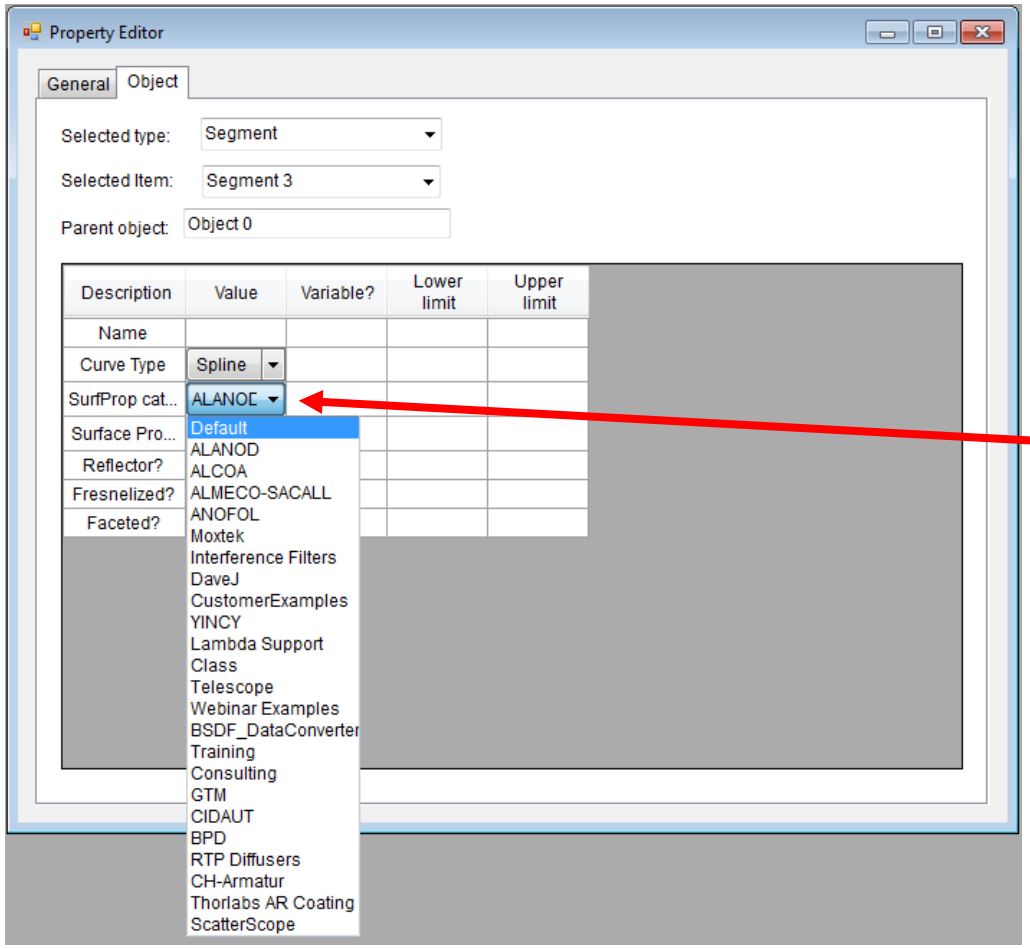
Lens design in the Interactive Optimizer

TracePro Interactive Optimizer



Reflector design in the Interactive Optimizer

TracePro Interactive Optimizer

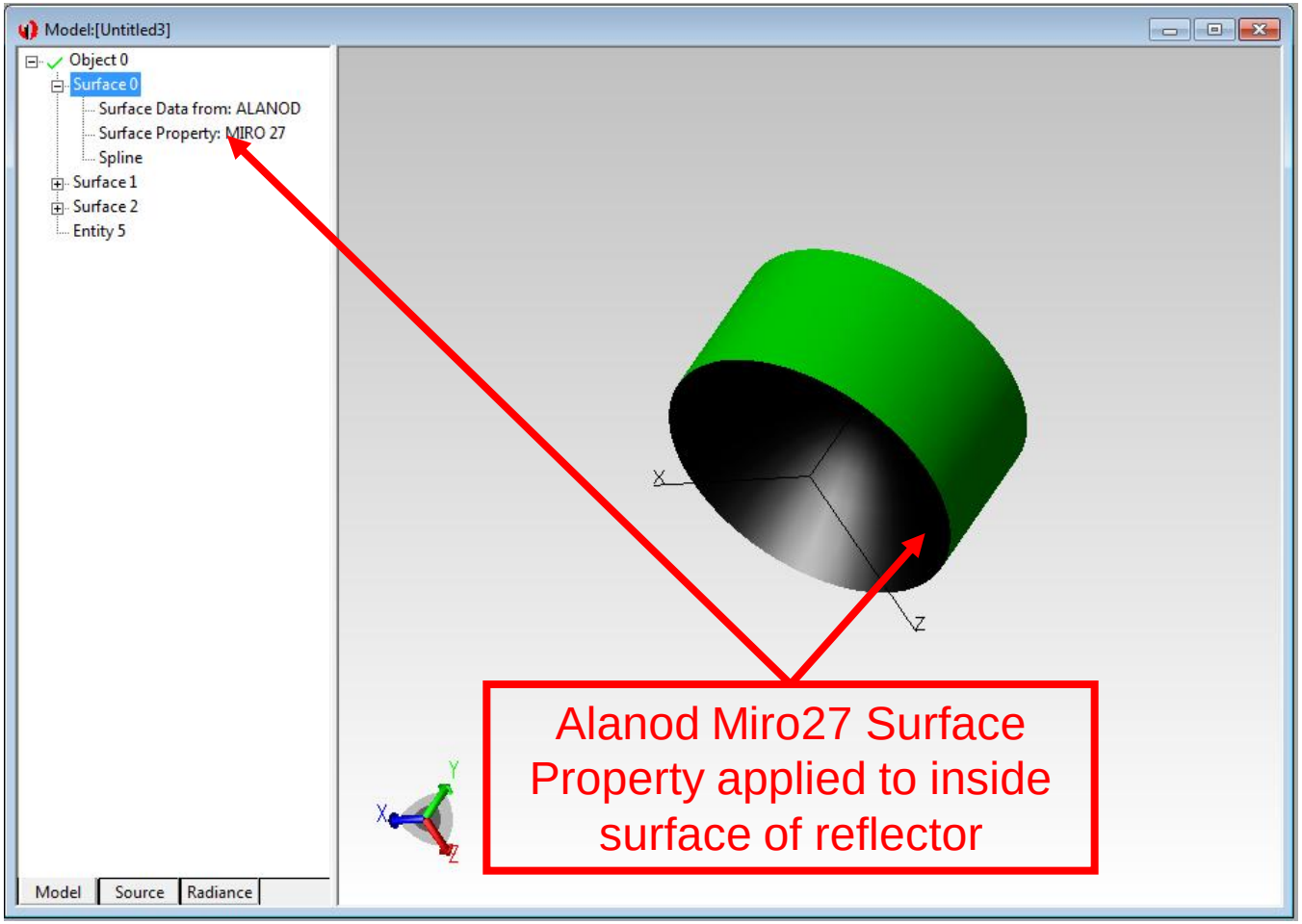


The optimizer uses your existing TracePro property database. Any custom Surface Properties you have defined in TracePro are available in the optimizer.

Select the Surface Property you want to use before exporting the reflector to TracePro.

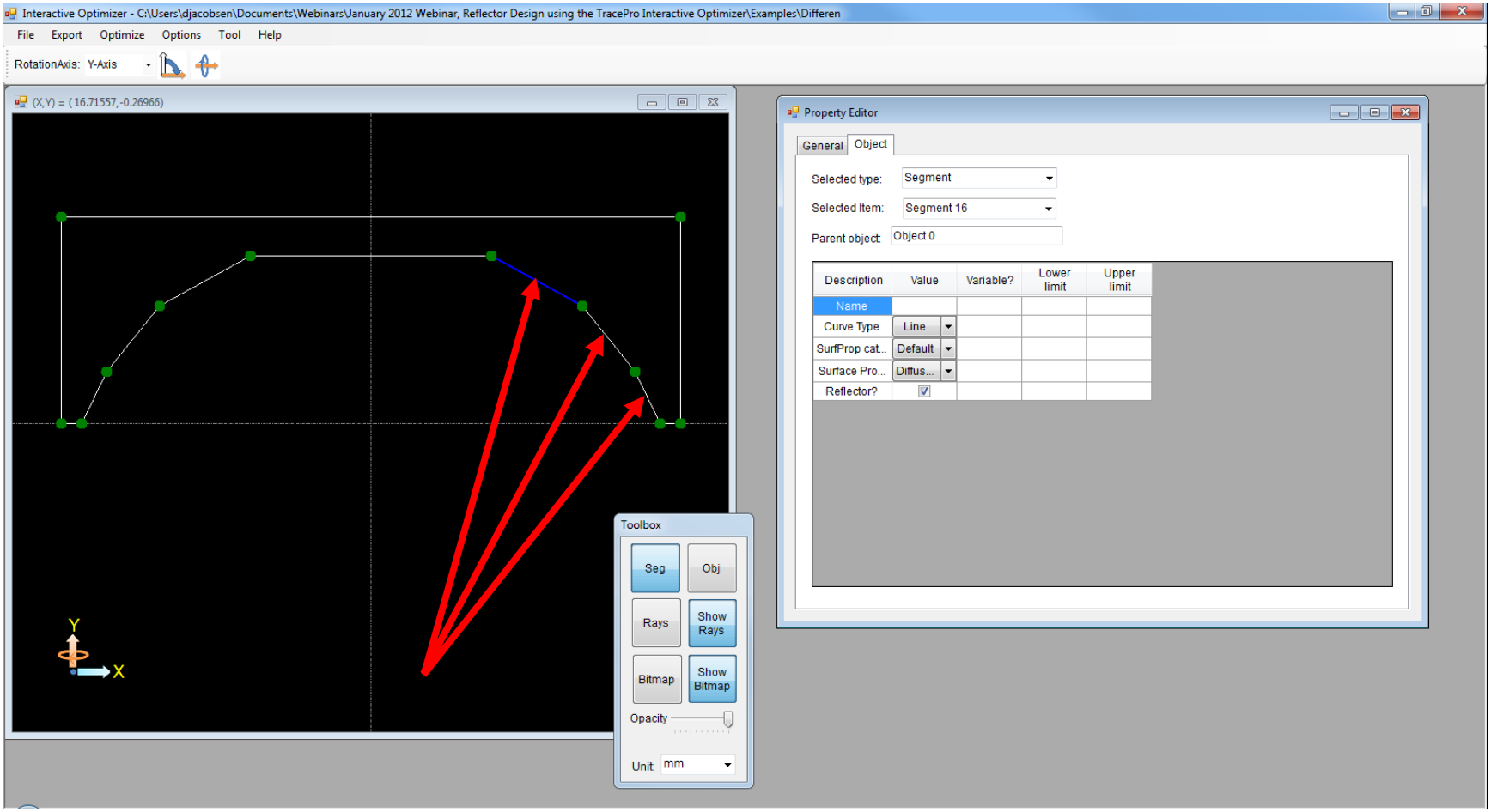
Applying Surface Properties in the Interactive Optimizer

TracePro Interactive Optimizer



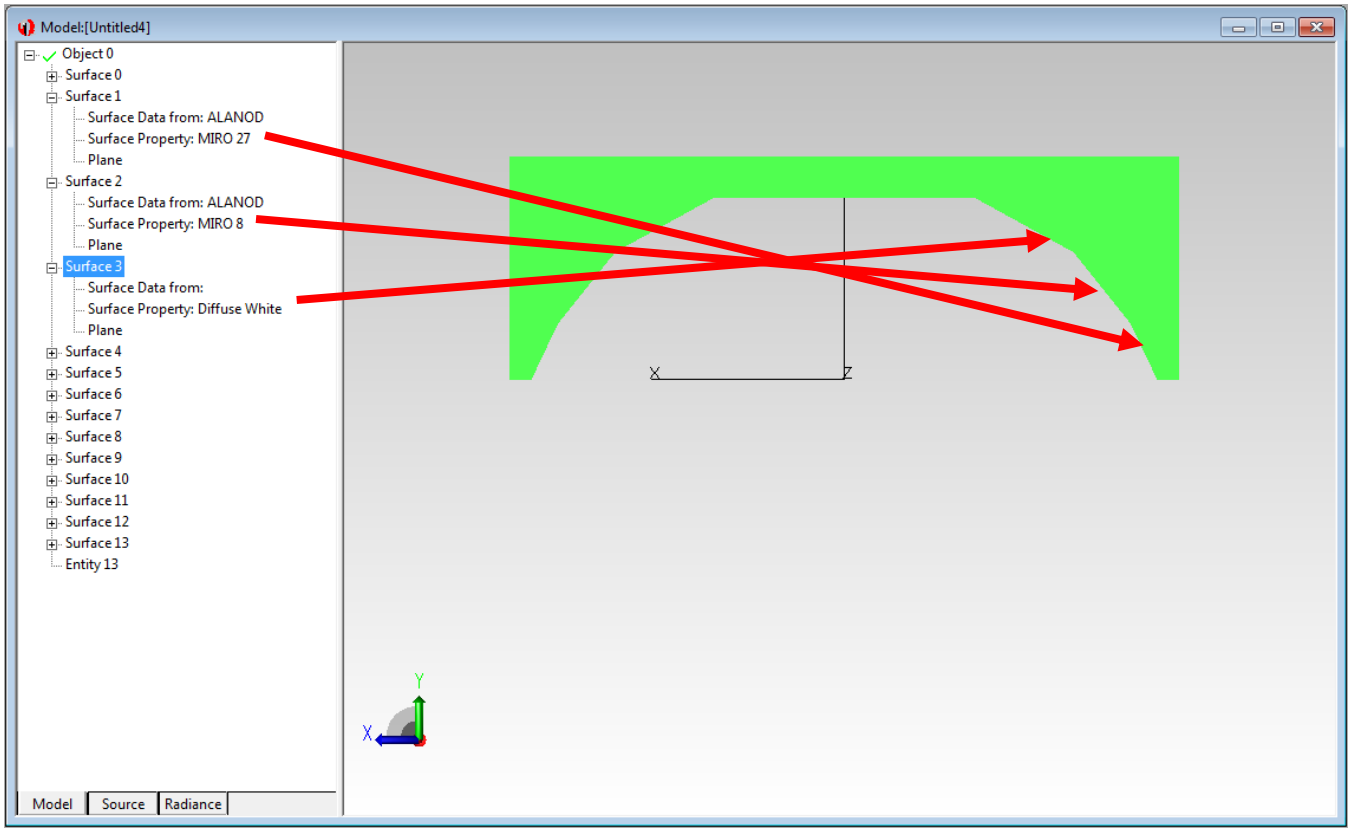
Applying Surface Properties in the Interactive Optimizer

TracePro Interactive Optimizer



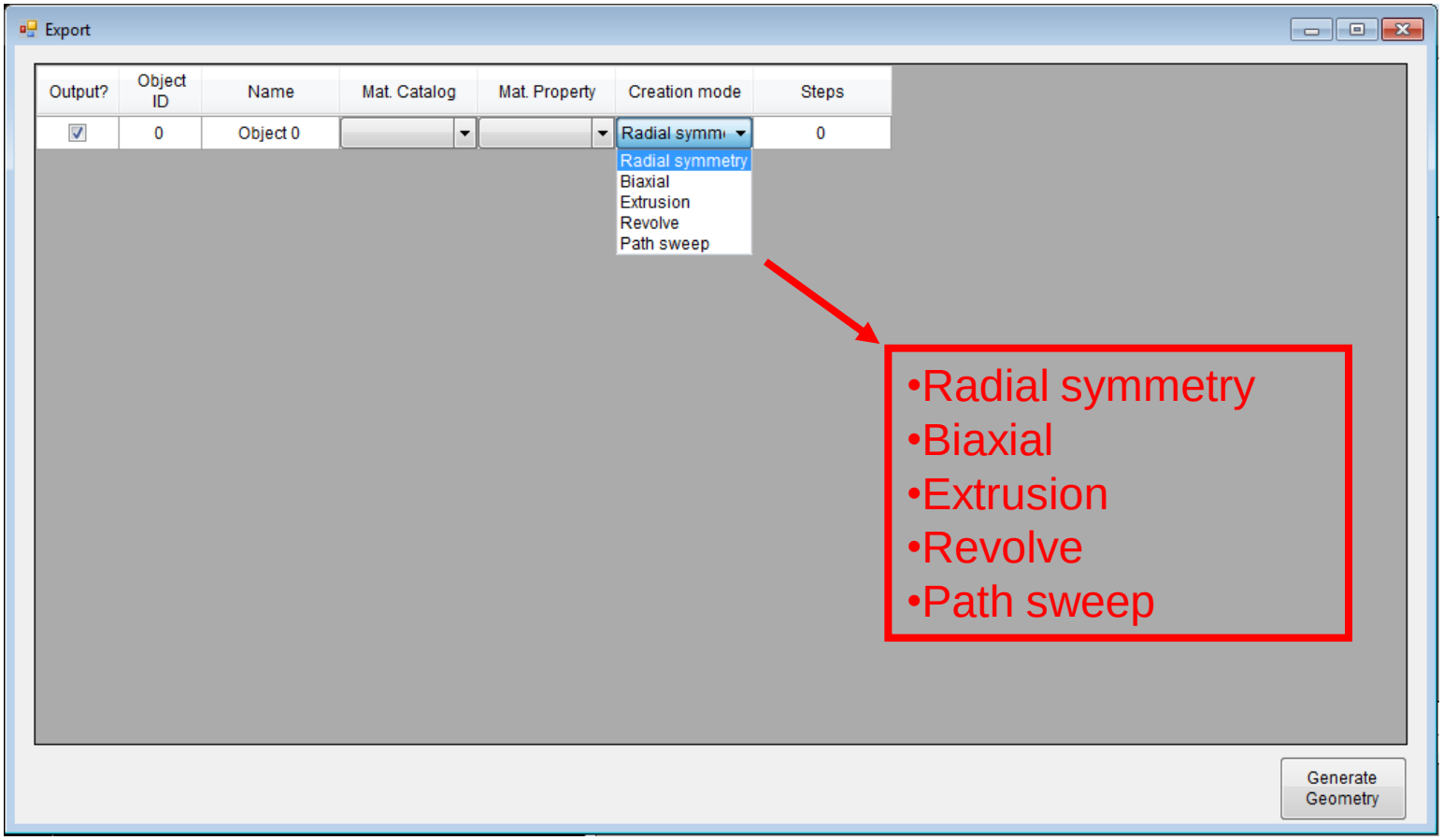
Each segment can have a different Surface Property

TracePro Interactive Optimizer



Different surfaces can have different Surface Properties

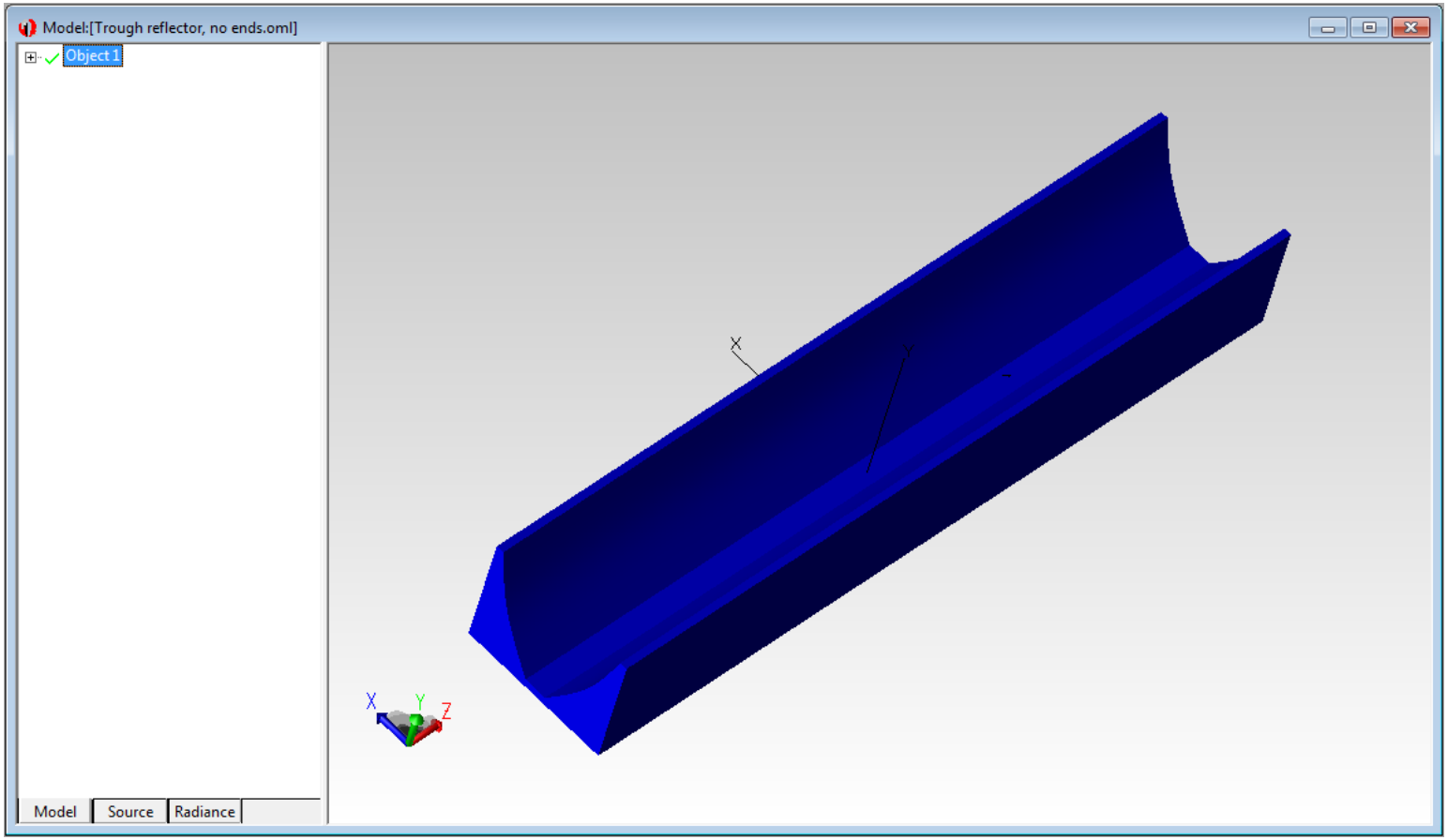
TracePro Interactive Optimizer



Interactive Optimizer geometry creation options

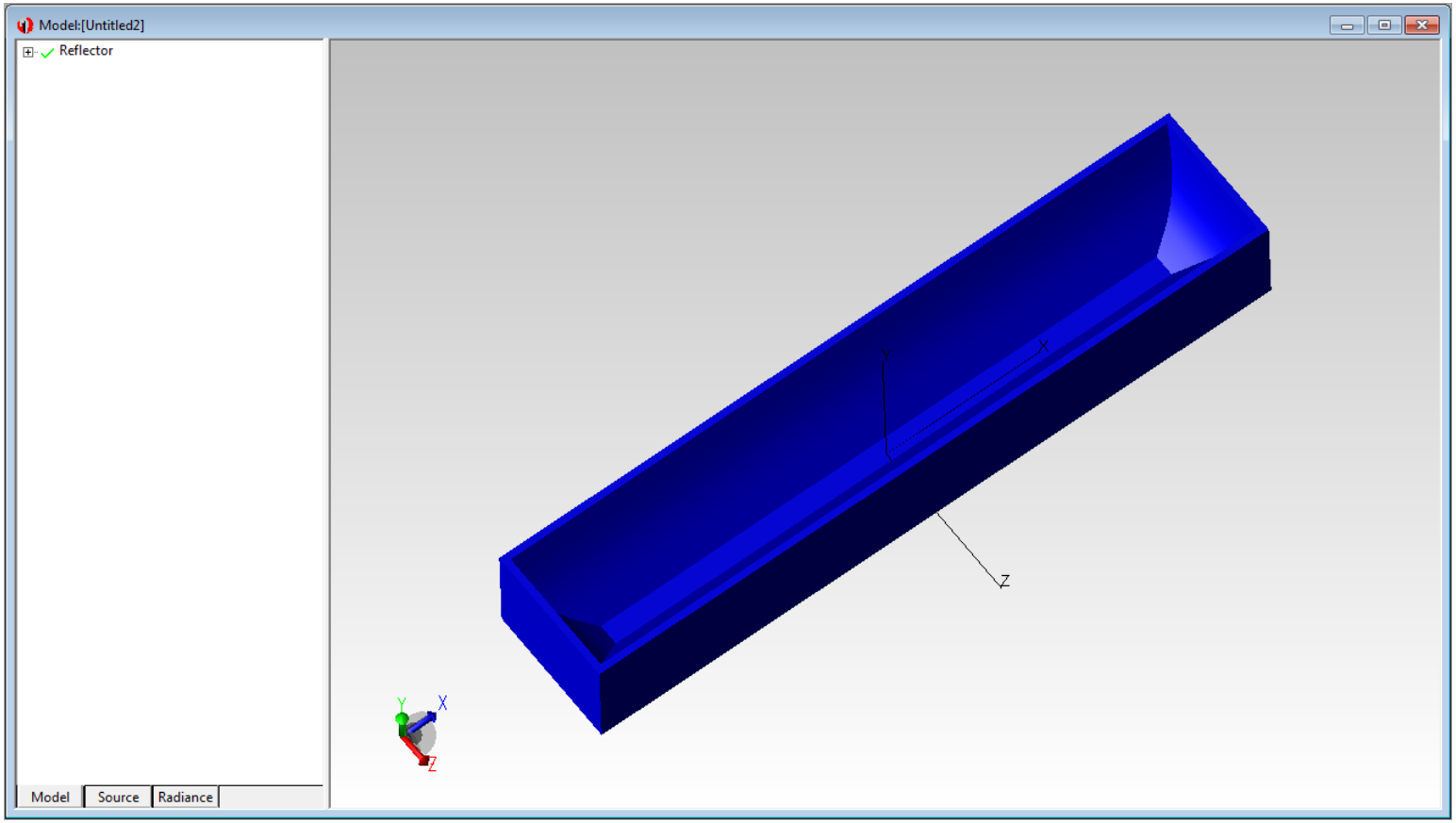
Using the Scheme Macro Language with the Interactive Optimizer

Scheme Macros and the Interactive Optimizer



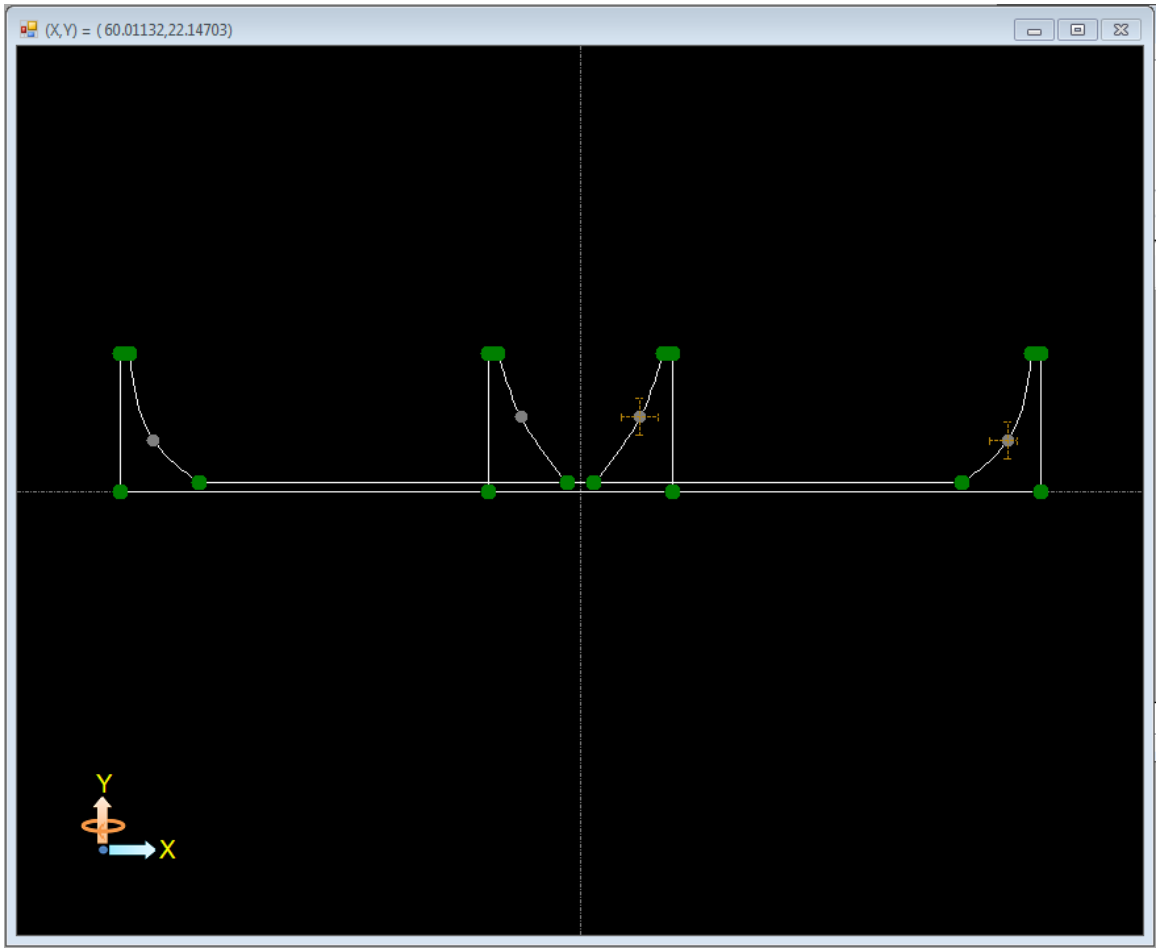
Easy - extruded trough reflector

Scheme Macros and the Interactive Optimizer



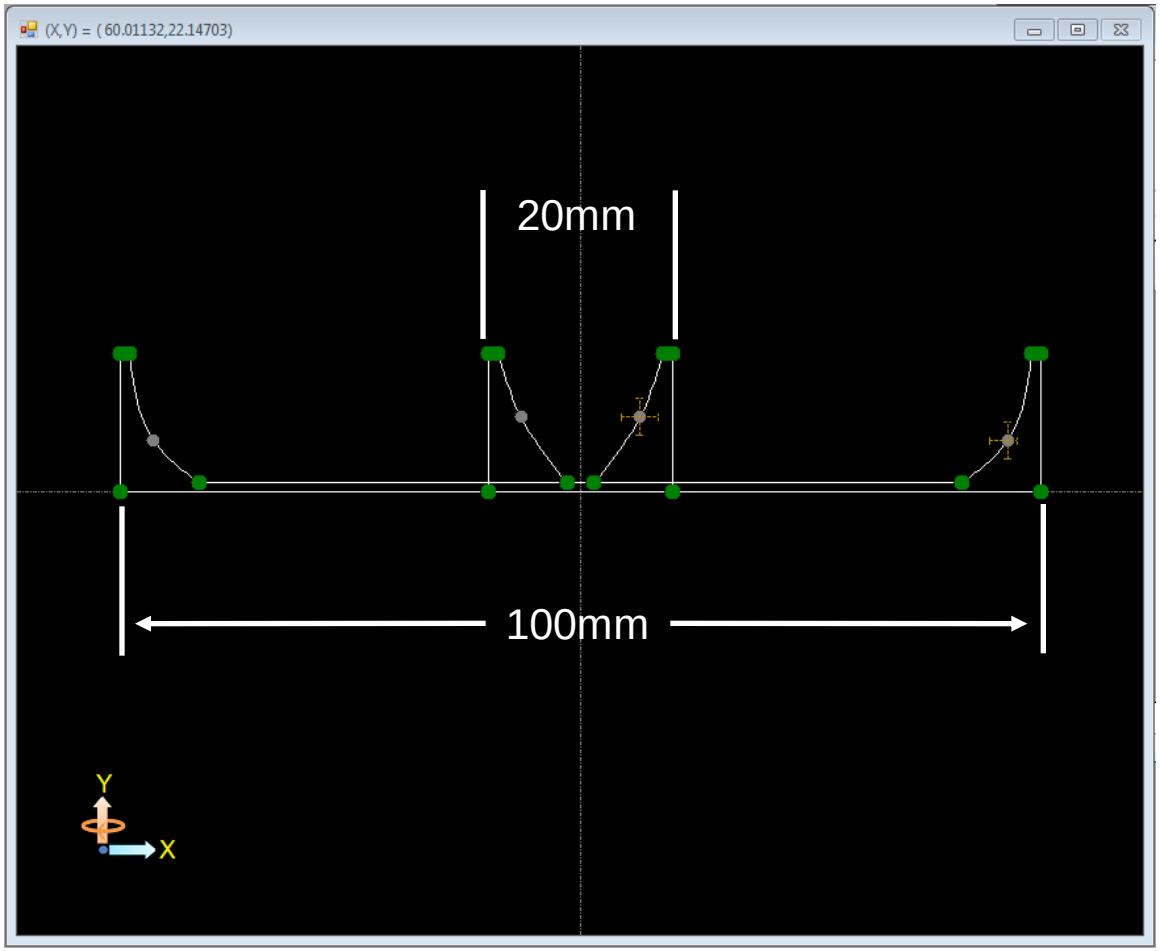
A little more difficult - extruded trough reflector with curved ends

Scheme Macros and the Interactive Optimizer



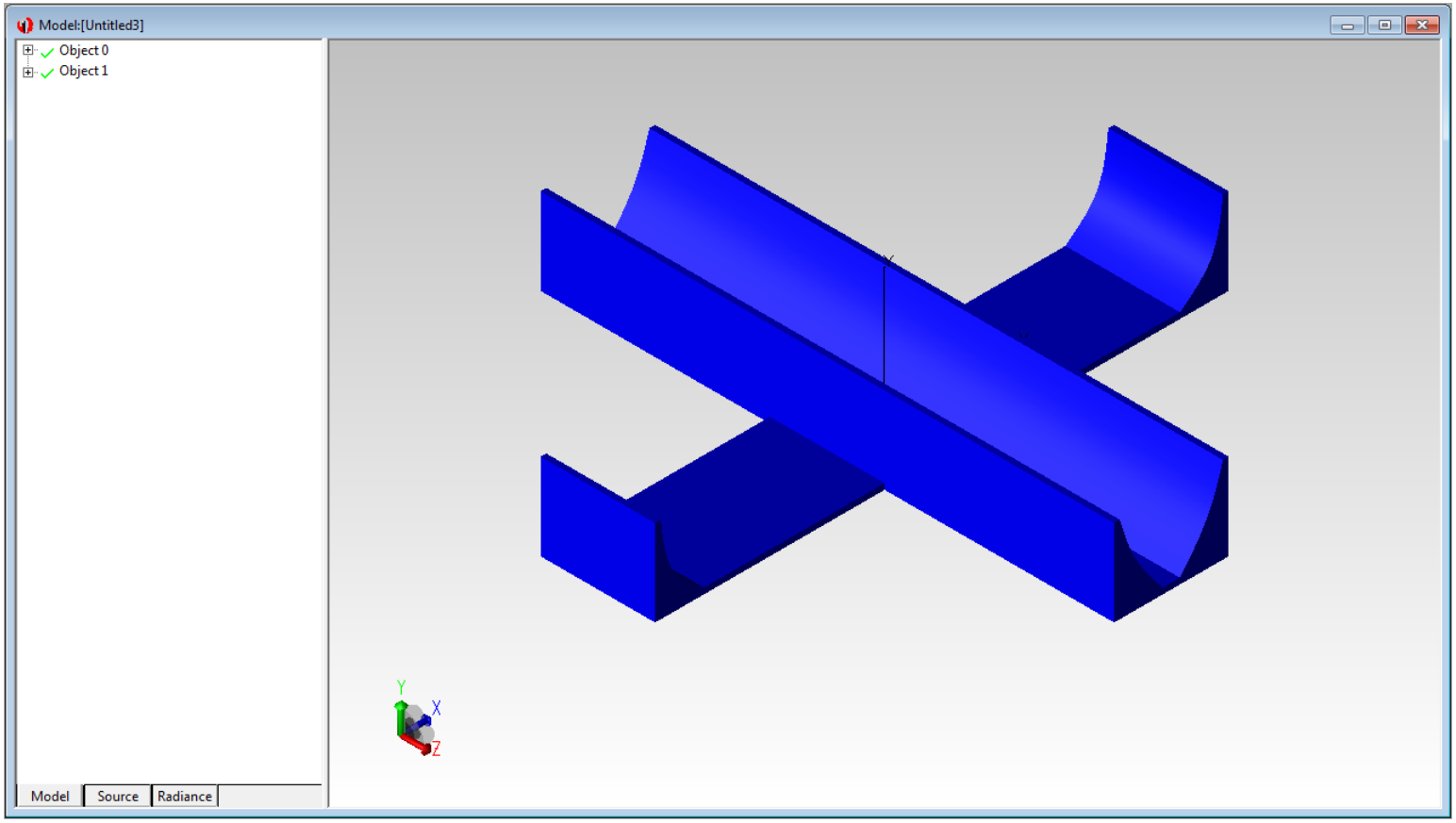
Optimizer Sketch window for extruded trough reflector with curved ends

Scheme Macros and the Interactive Optimizer



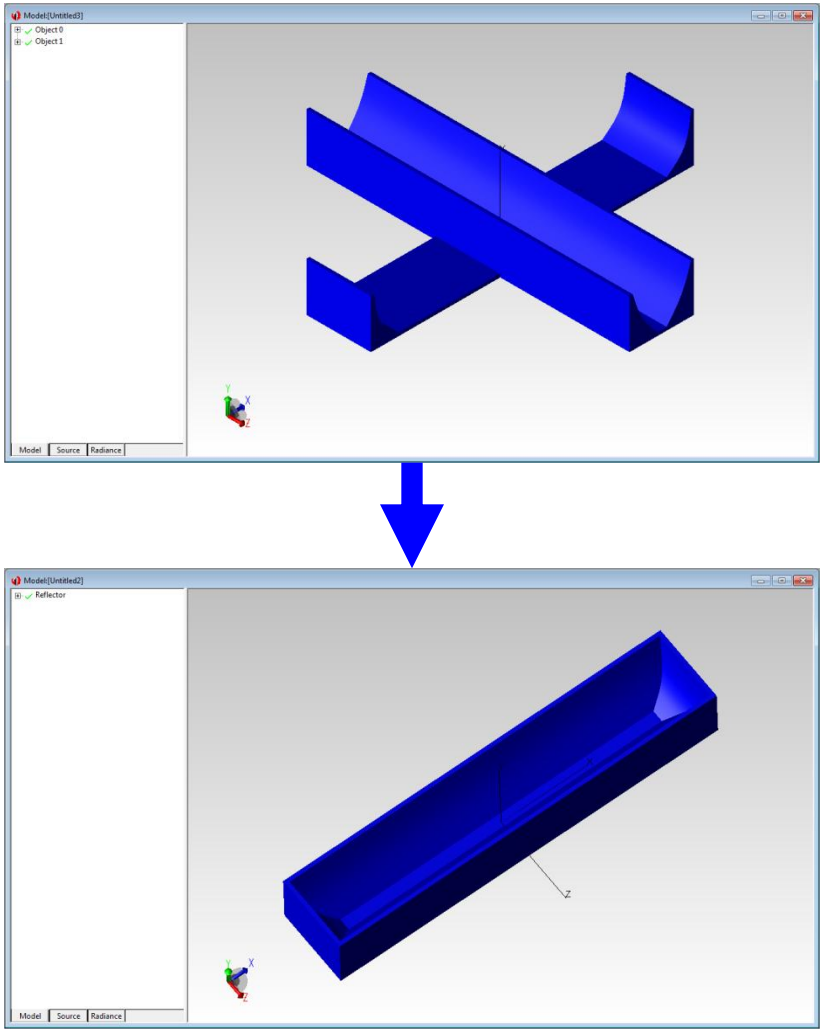
Optimizer Sketch window for extruded trough reflector with curved ends

Scheme Macros and the Interactive Optimizer



Initial results after exporting the 2 profiles from the optimizer as extrusions

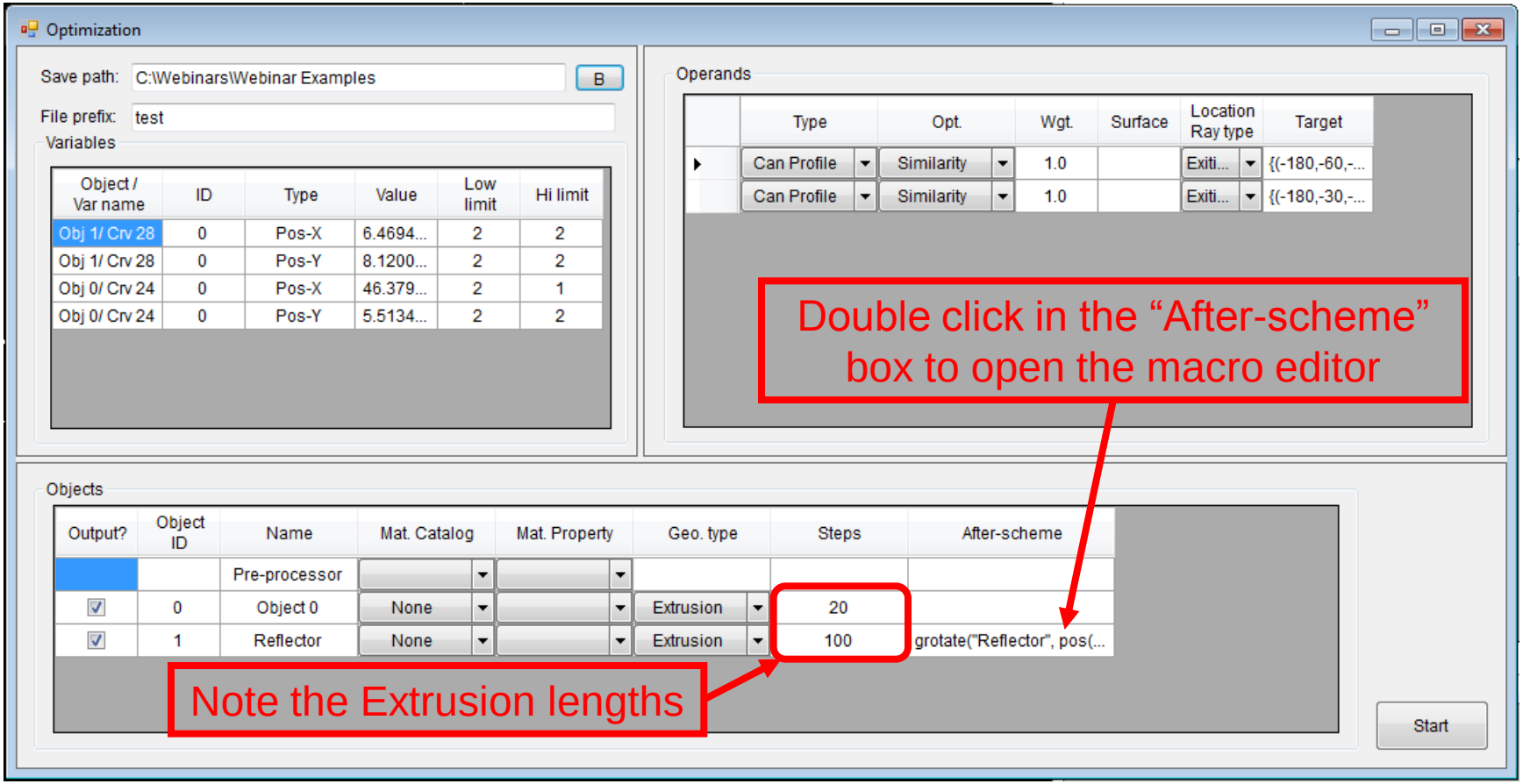
Scheme Macros and the Interactive Optimizer



To make the final trough reflector we need to write a Scheme macro to:

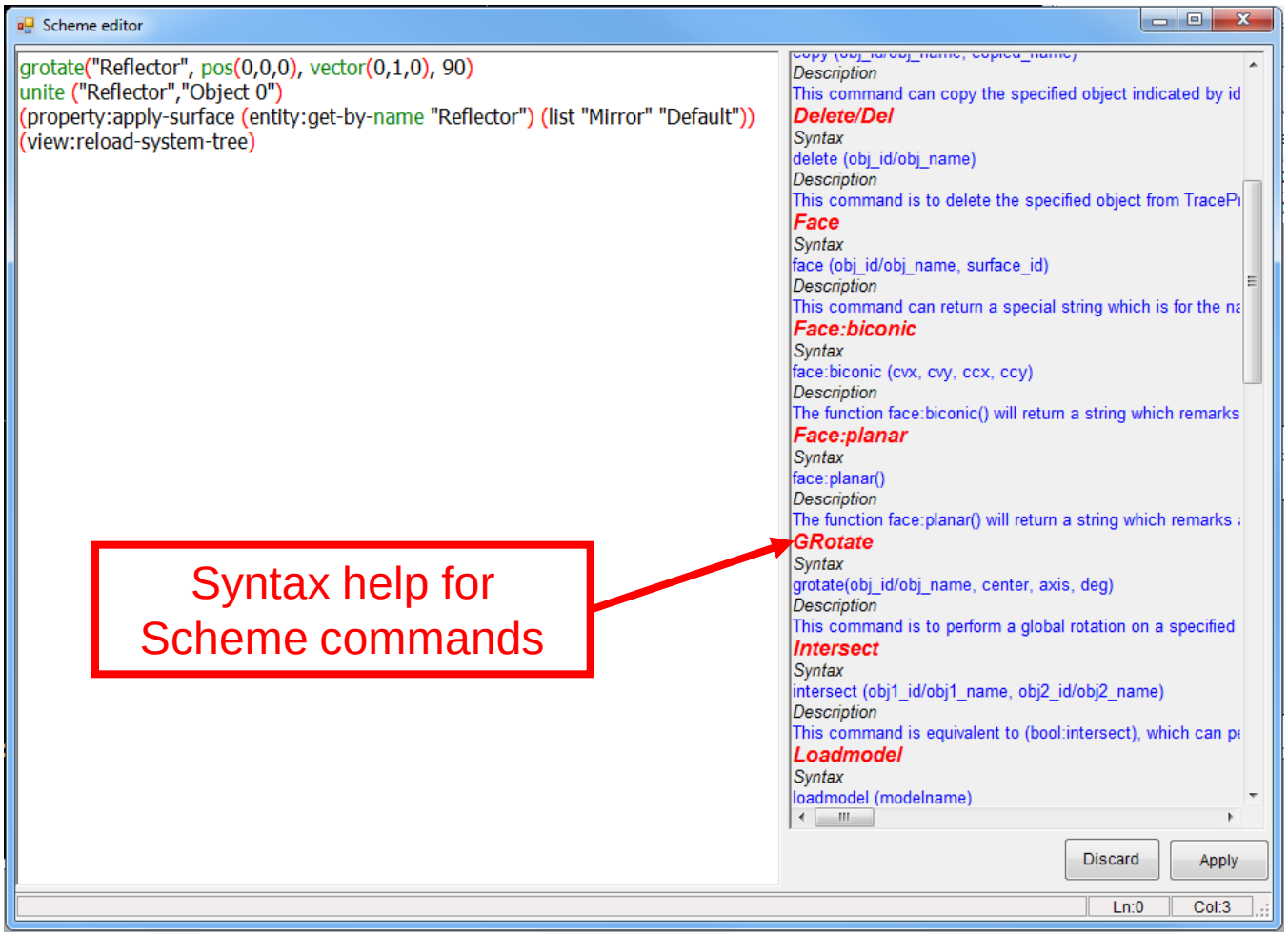
1. Rotate the long trough segment 90-degrees
2. Unite the 2 trough segments into a single object
3. Apply a Surface Property to the reflector to model the reflective finish

Scheme Macros and the Interactive Optimizer



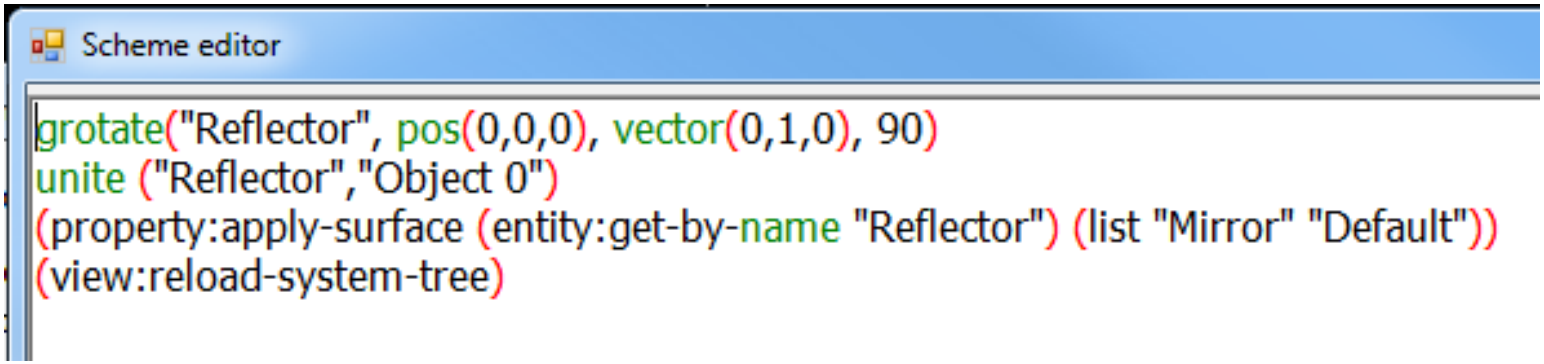
Adding a Scheme macro in the Optimization window

Scheme Macros and the Interactive Optimizer



Adding a Scheme macro

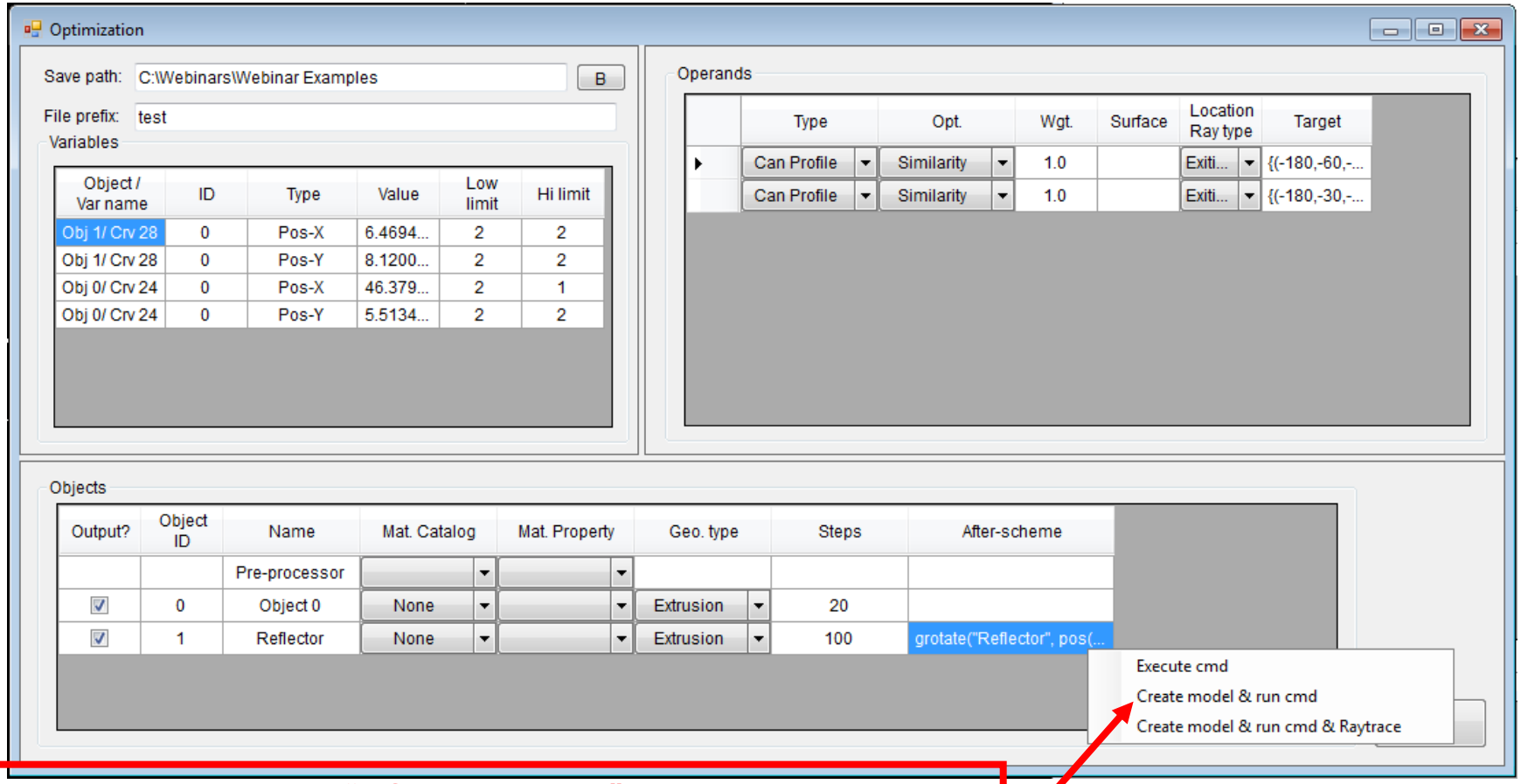
Scheme Macros and the Interactive Optimizer



Scheme macro to:

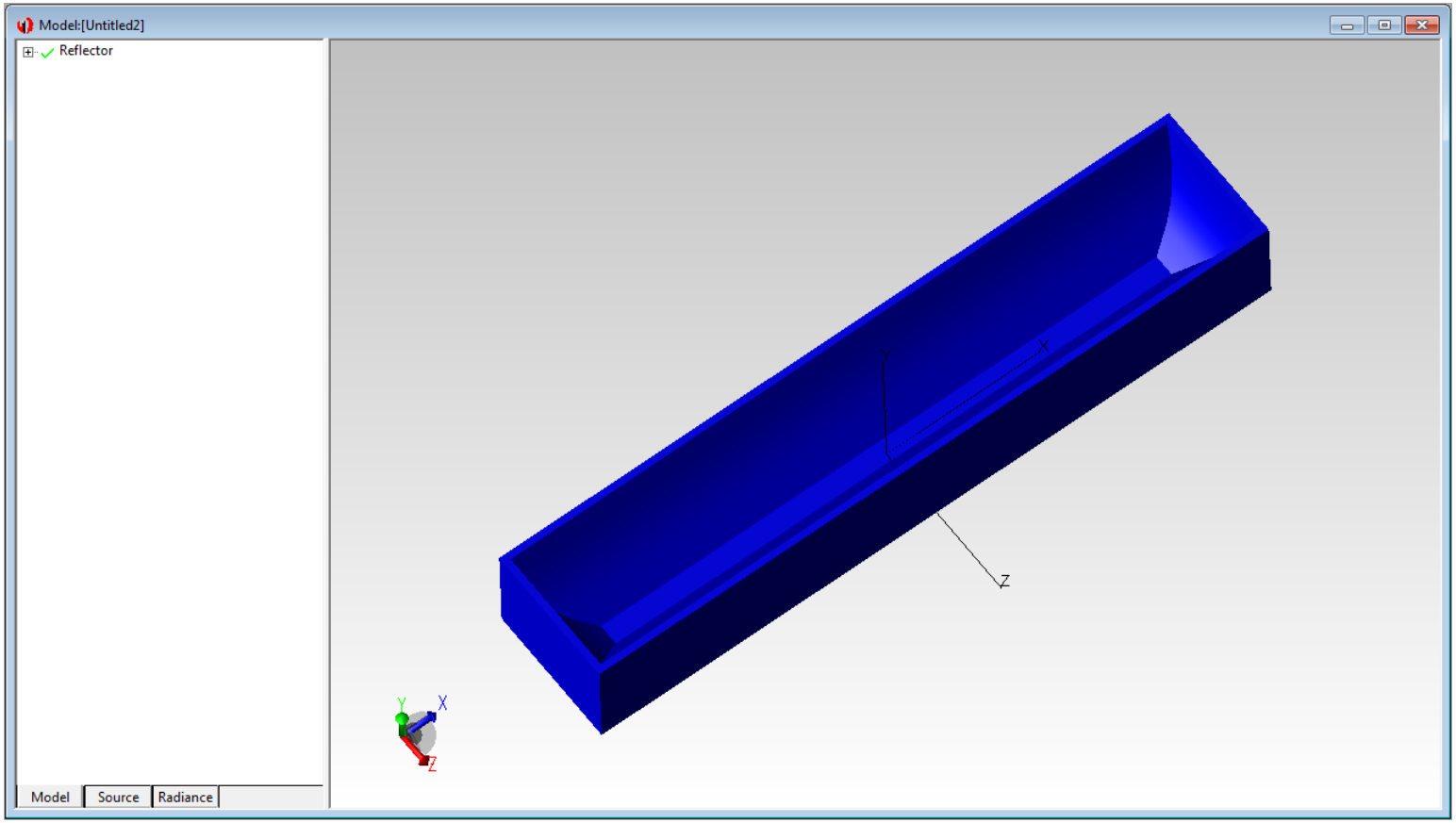
1. Rotate the long trough segment 90-degrees
2. Unite the 2 trough segments into a single object
3. Apply a Surface Property to the object to model the reflective finish
4. Update the System Tree

Scheme Macros and the Interactive Optimizer



Right click in the “After-scheme” box and choose “Create model & run cmd” to export the model and check the results in TracePro

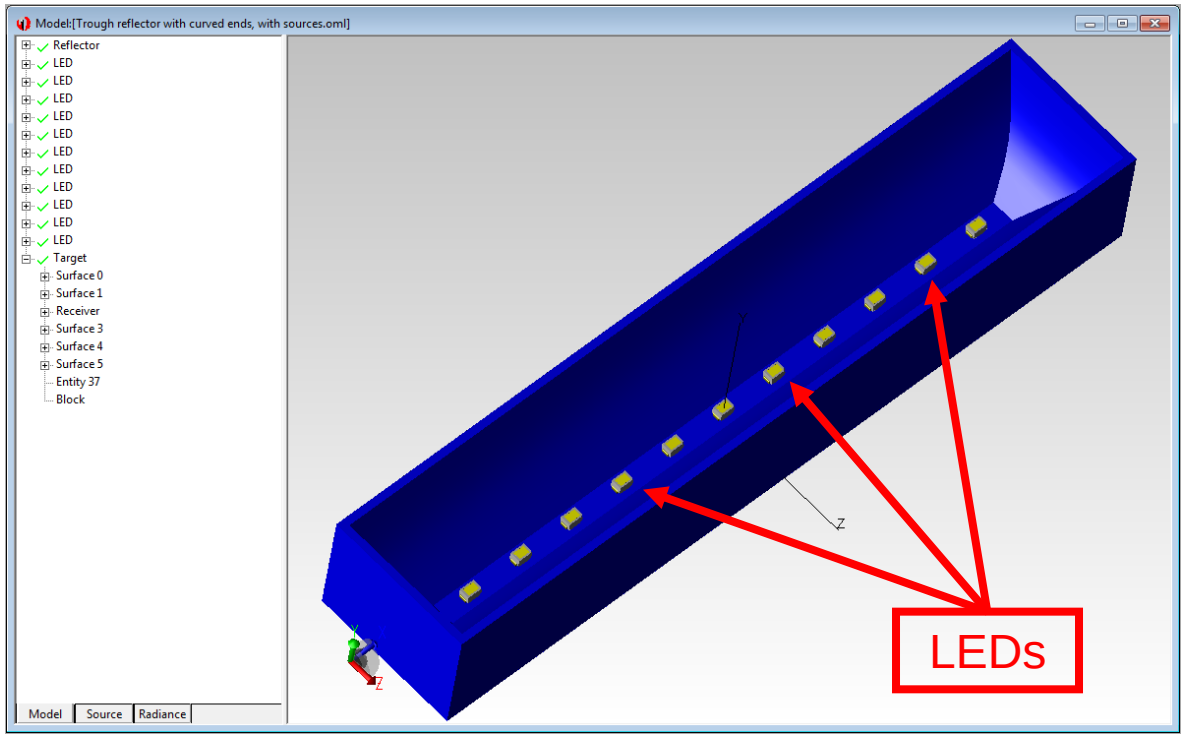
Scheme Macros and the Interactive Optimizer



Extruded trough reflector with curved ends in TracePro

Defining Sources and Targets

Defining Sources and Targets



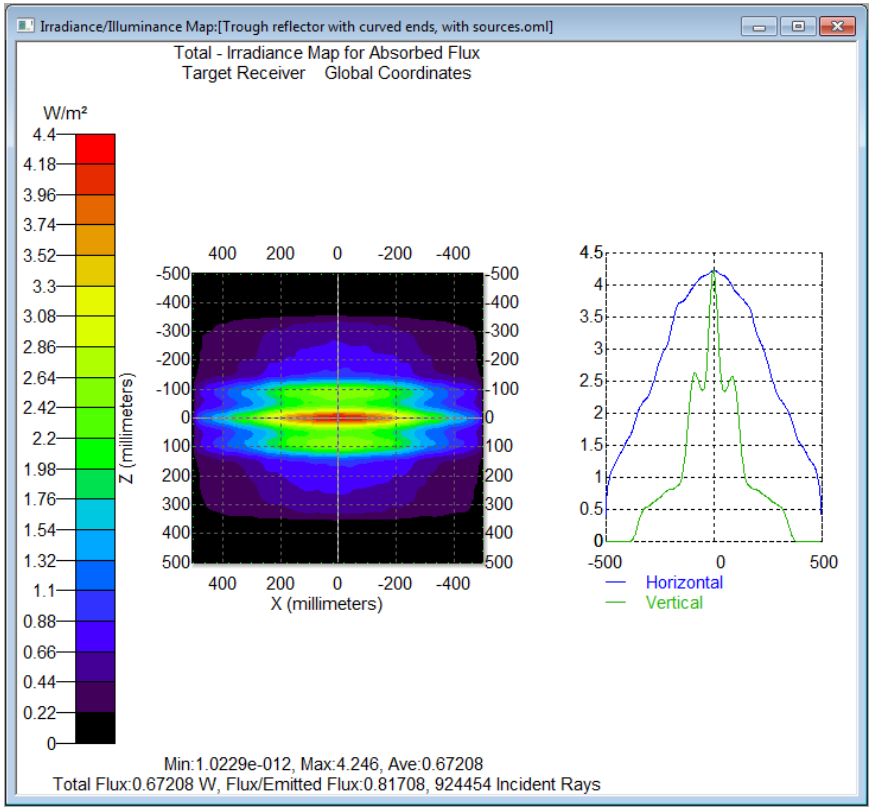
A copy of the reflector can be exported from the optimizer and used in TracePro to set-up the sources and the targets, if required

The Interactive Optimizer will use the sources defined in the TracePro model during the optimization.

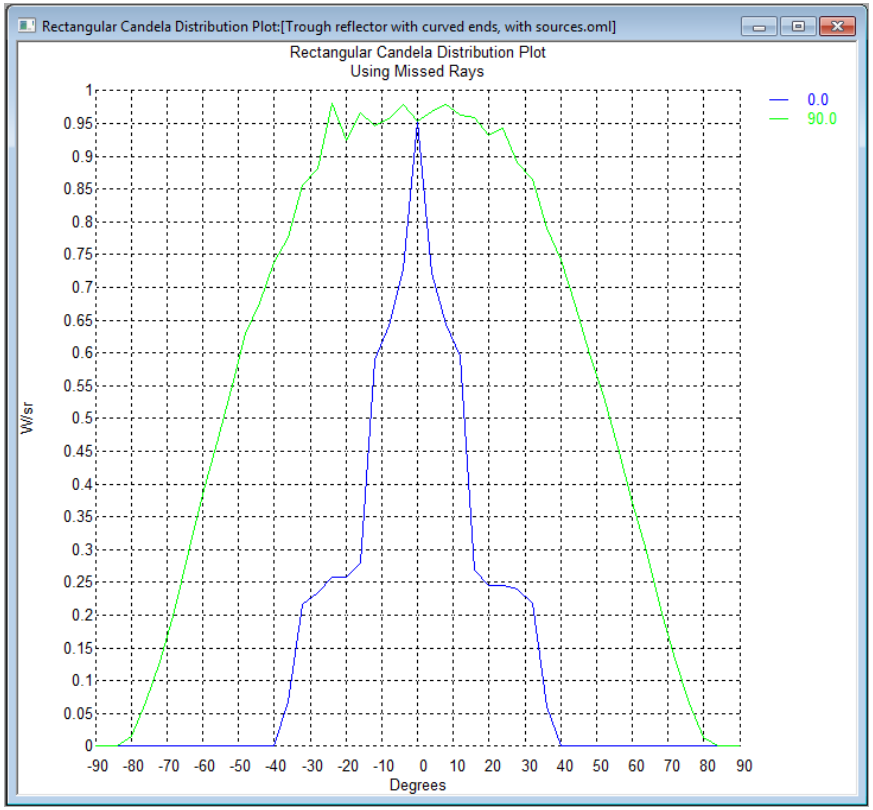
Any type of source can be used: Grid, File, Surface, or a combination.

11 LEDs used as sources.

Defining Sources and Targets



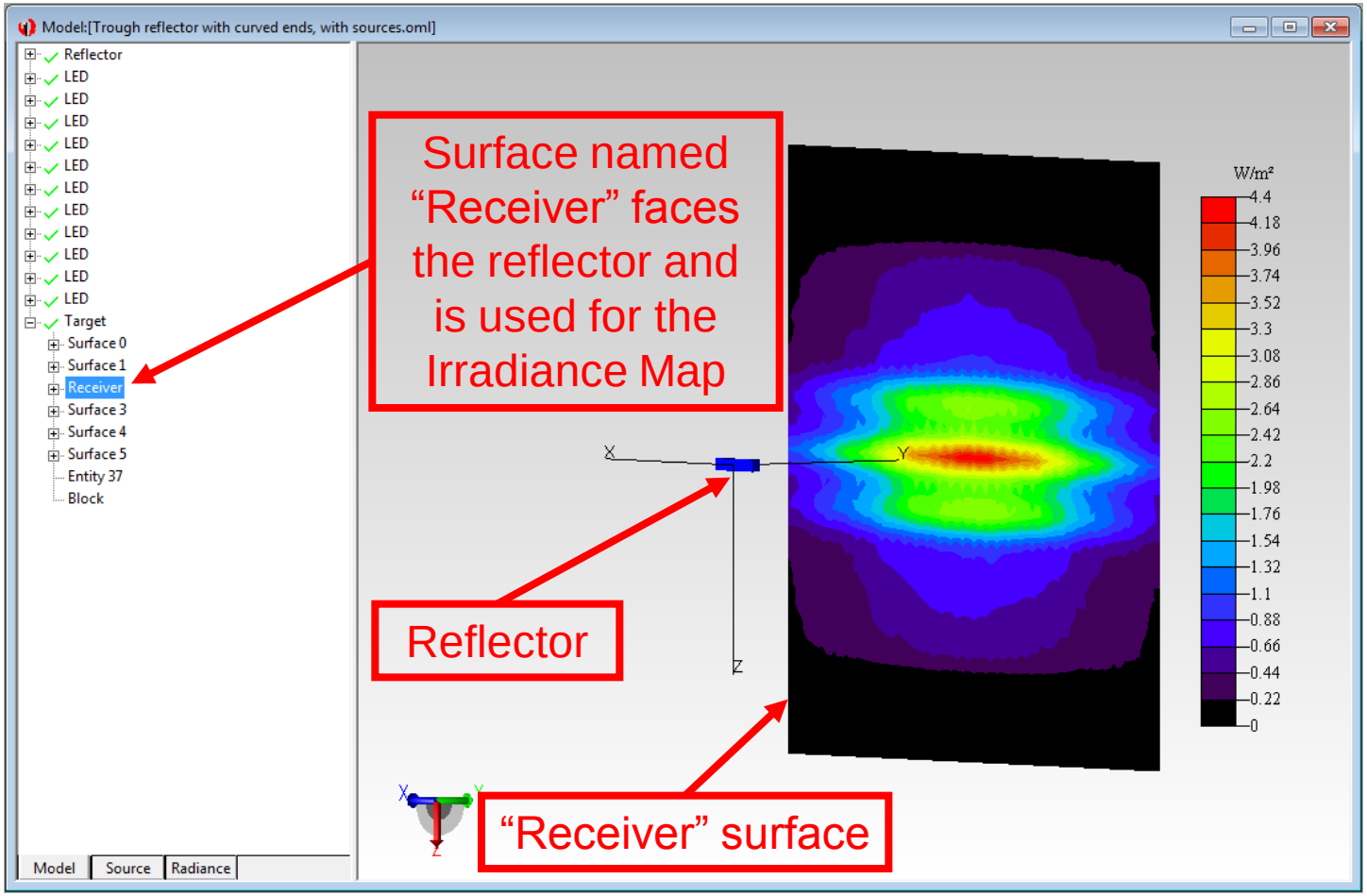
Irradiance Map



Candela Plot

Two common optimization targets are Irradiance and Candela Profiles

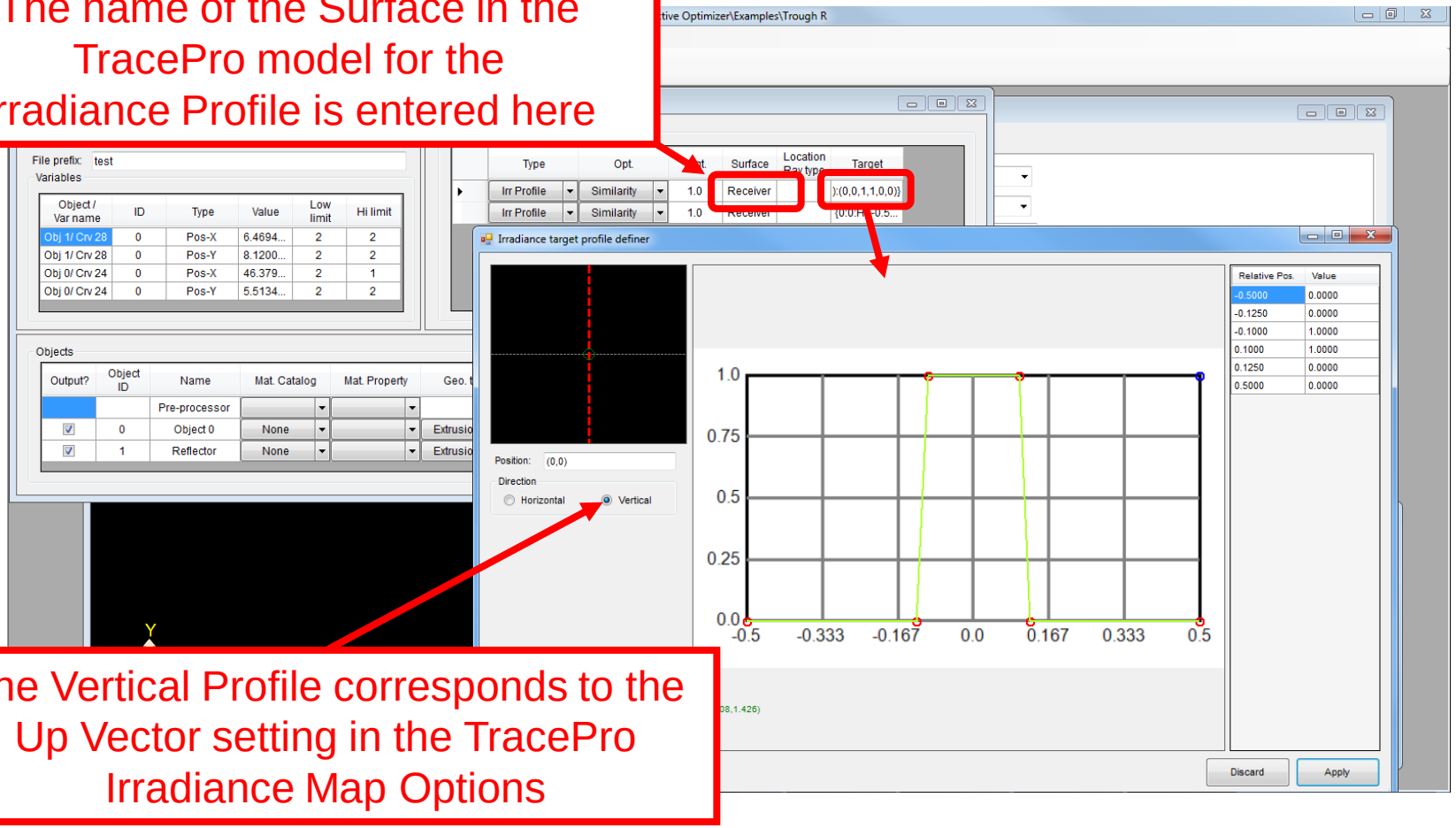
Defining Sources and Targets



If you are using an Irradiance Profile as the optimization target, you must have a surface in TracePro for the Irradiance Map.

Defining Sources and Targets

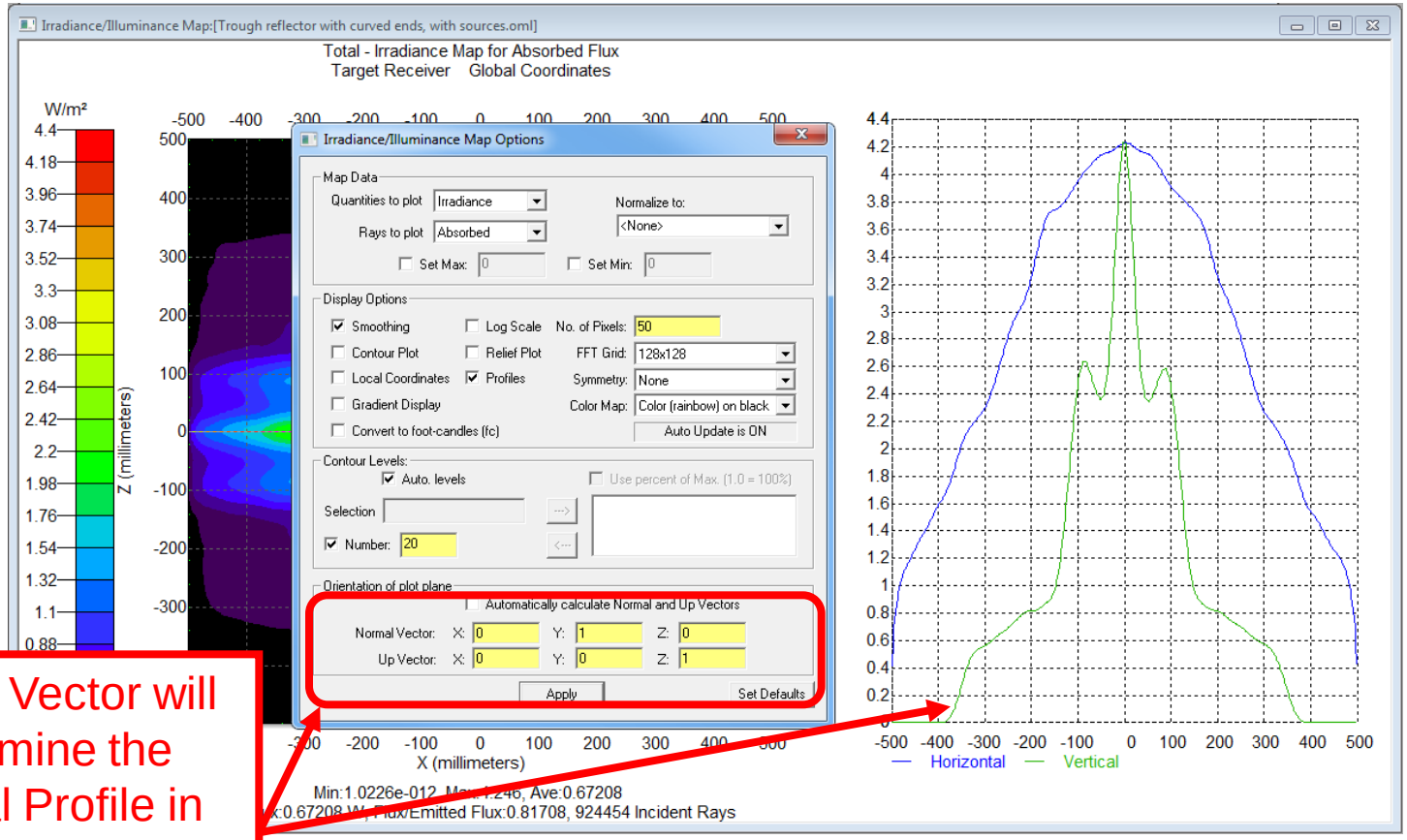
The name of the Surface in the TracePro model for the Irradiance Profile is entered here



The Vertical Profile corresponds to the Up Vector setting in the TracePro Irradiance Map Options

Different Irradiance Profile optimization targets can be defined for the horizontal and vertical axes

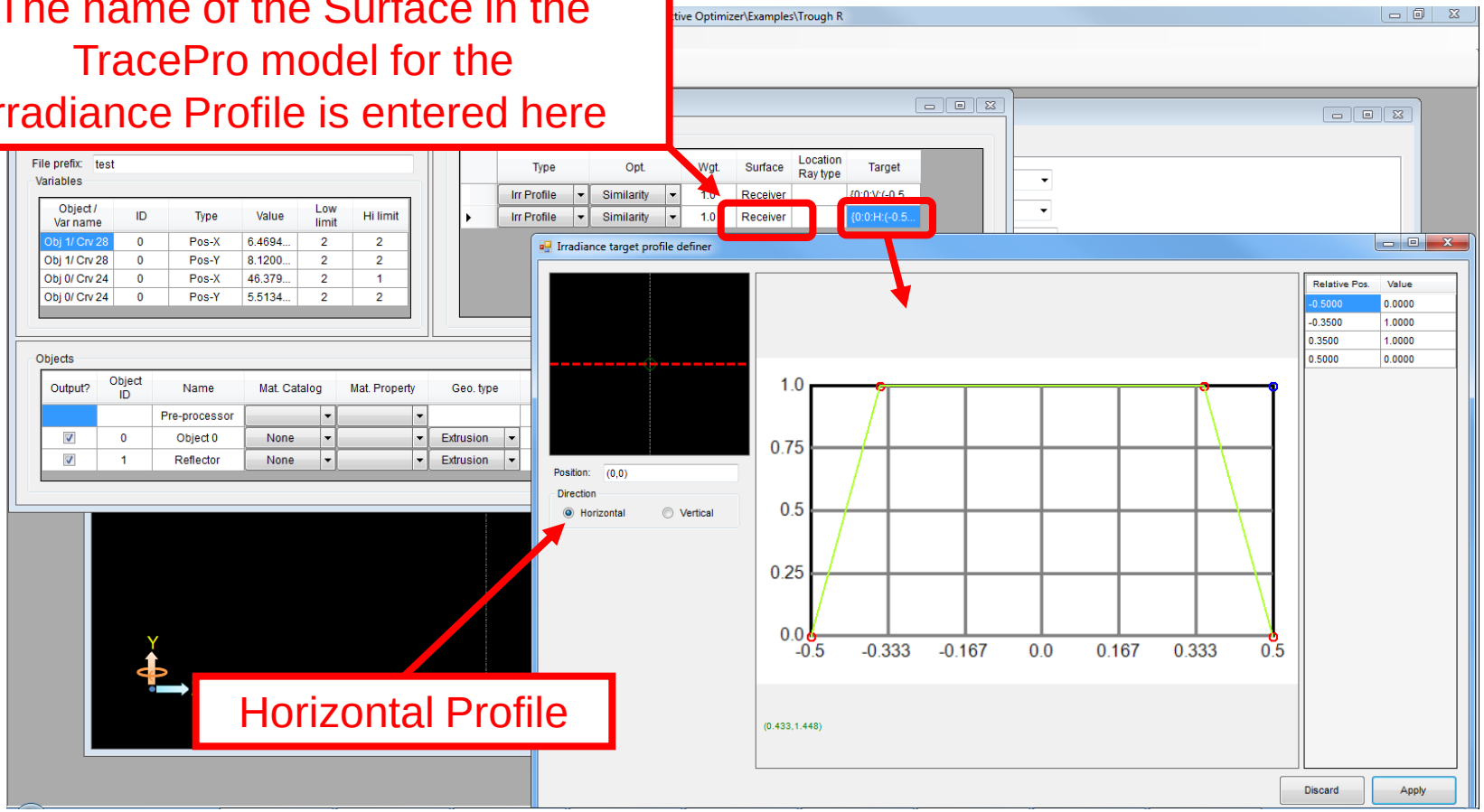
Defining Sources and Targets



The Up Vector will determine the Vertical Profile in the optimizer Irradiance Profile operand

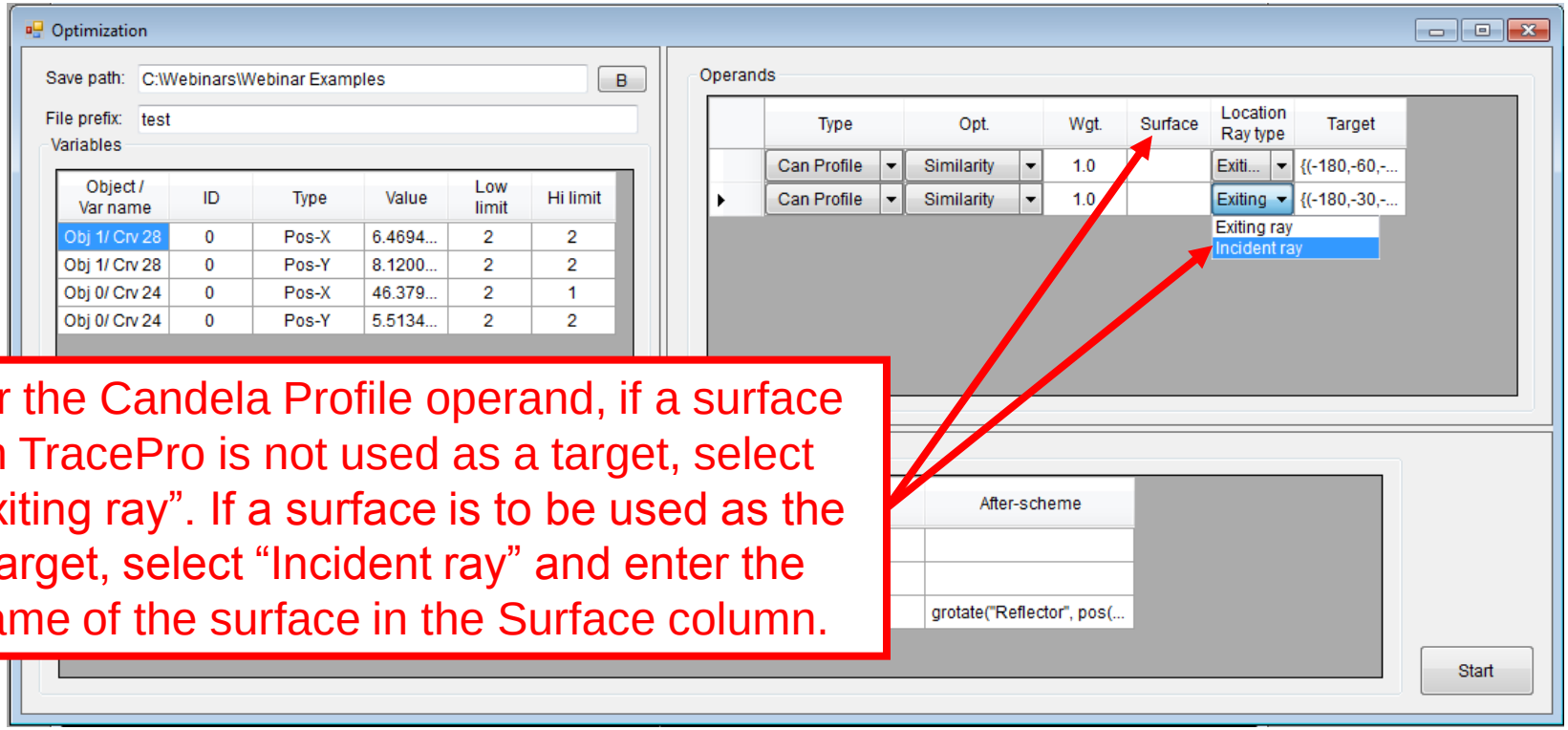
Defining Sources and Targets

The name of the Surface in the TracePro model for the Irradiance Profile is entered here



Different Irradiance Profile optimization targets can be defined for the horizontal and vertical axes

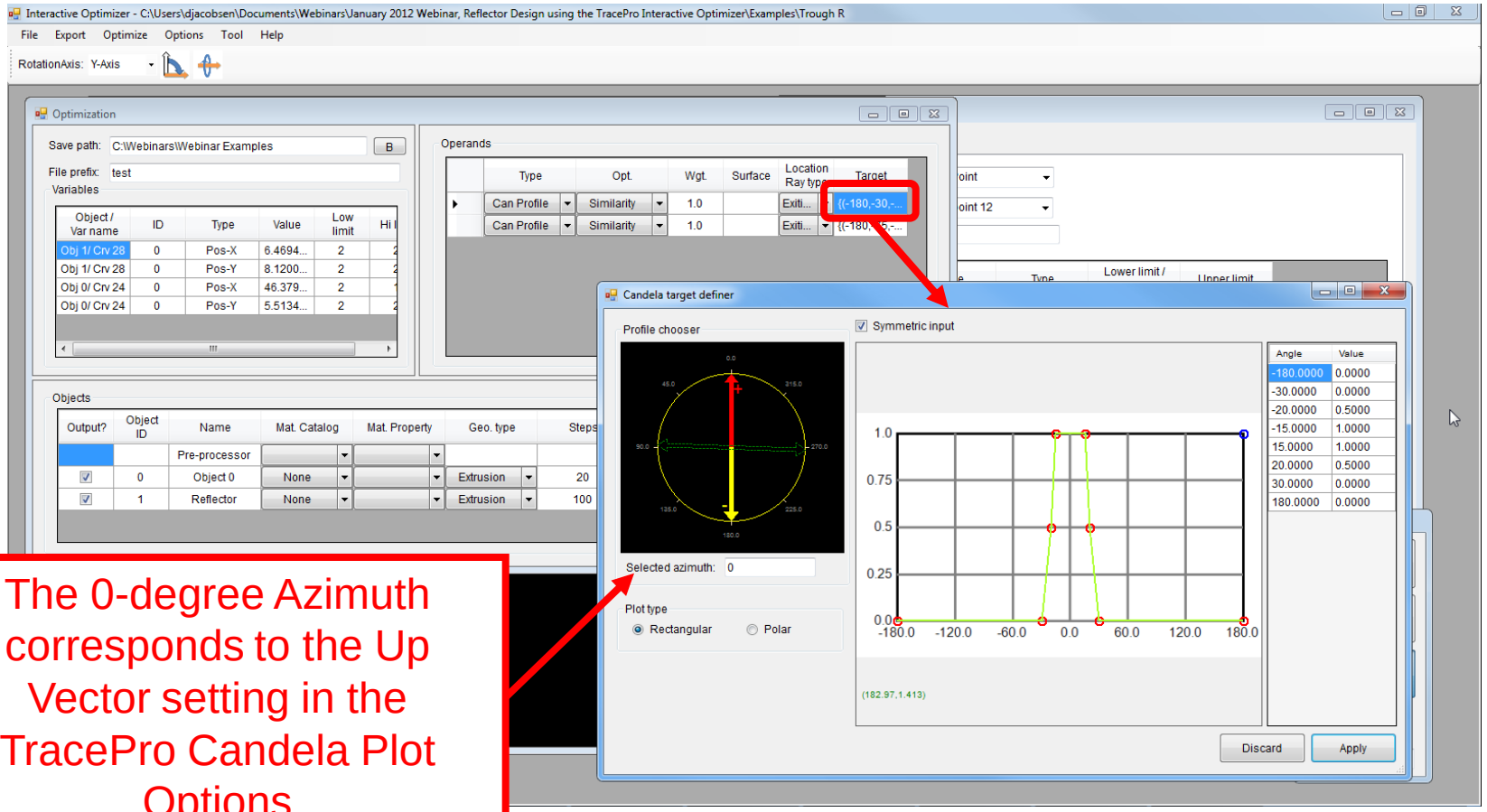
Defining Sources and Targets



For the Candela Profile operand, if a surface in TracePro is not used as a target, select “Exiting ray”. If a surface is to be used as the target, select “Incident ray” and enter the name of the surface in the Surface column.

When optimizing to a Candela Profile operand, a surface in TracePro does not have to be used as a target

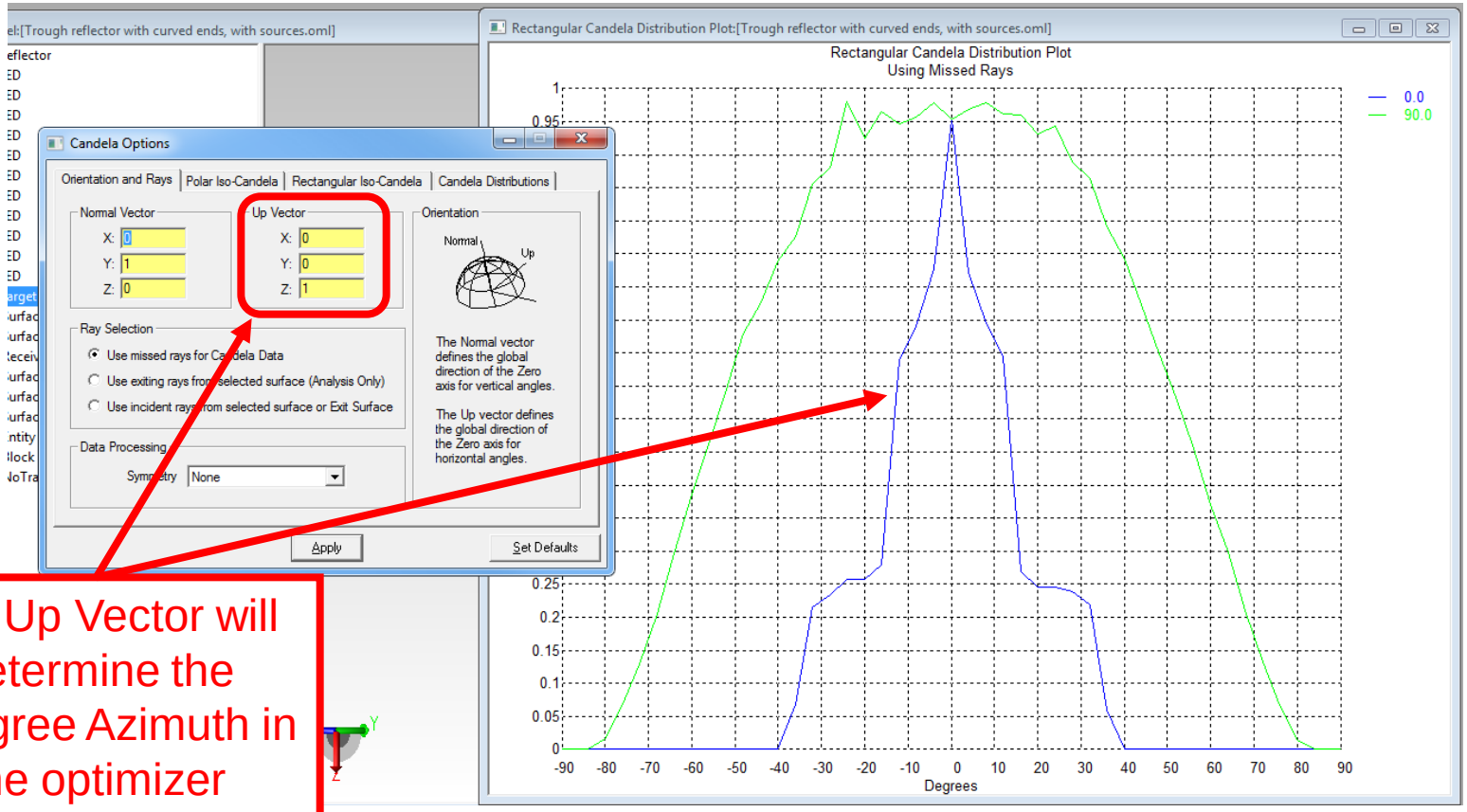
Defining Sources and Targets



The 0-degree Azimuth corresponds to the Up Vector setting in the TracePro Candela Plot Options

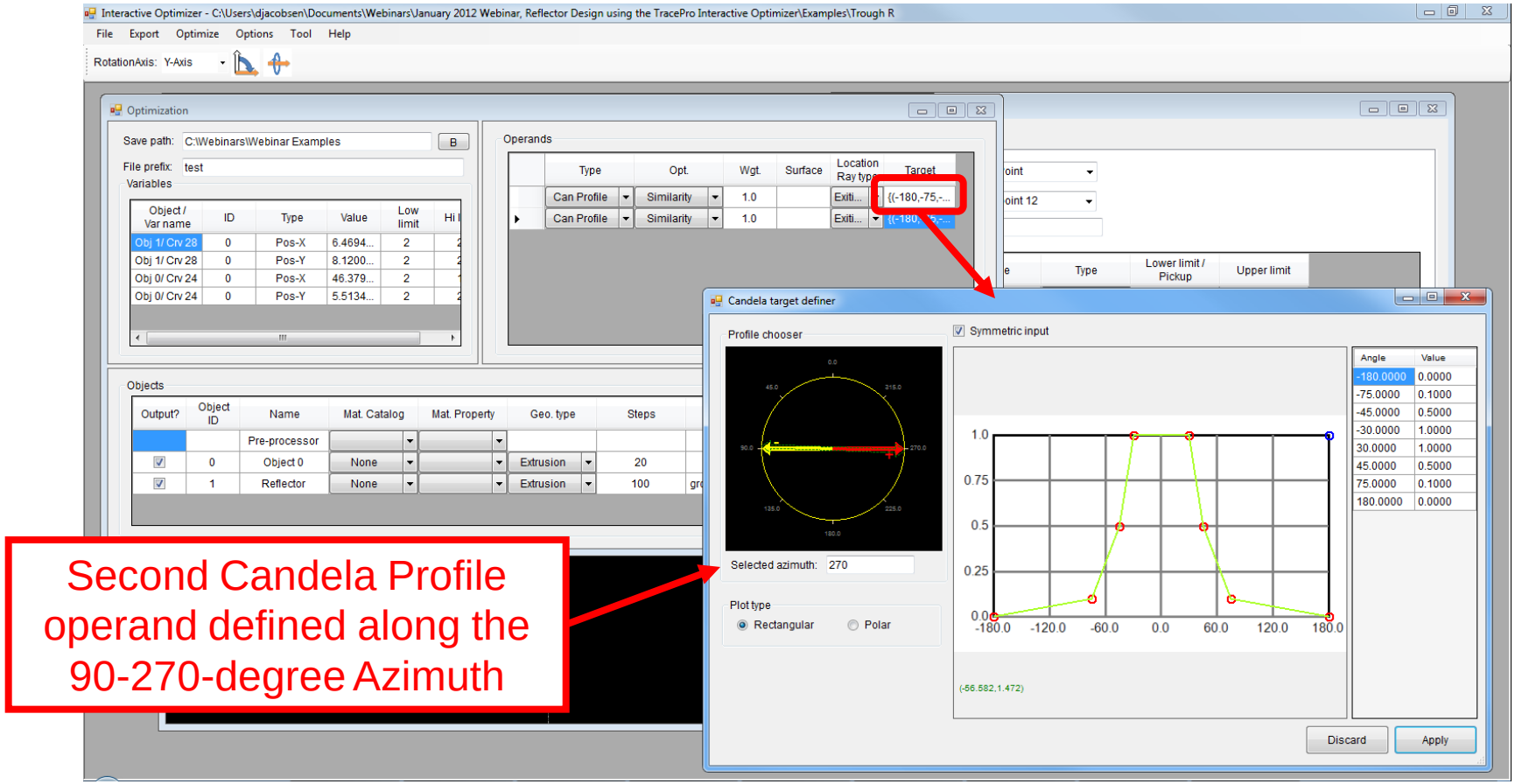
Different Candela Profile optimization targets can be defined for different axes

Defining Sources and Targets



The Up Vector will determine the 0-degree Azimuth in the optimizer Candela Profile operand

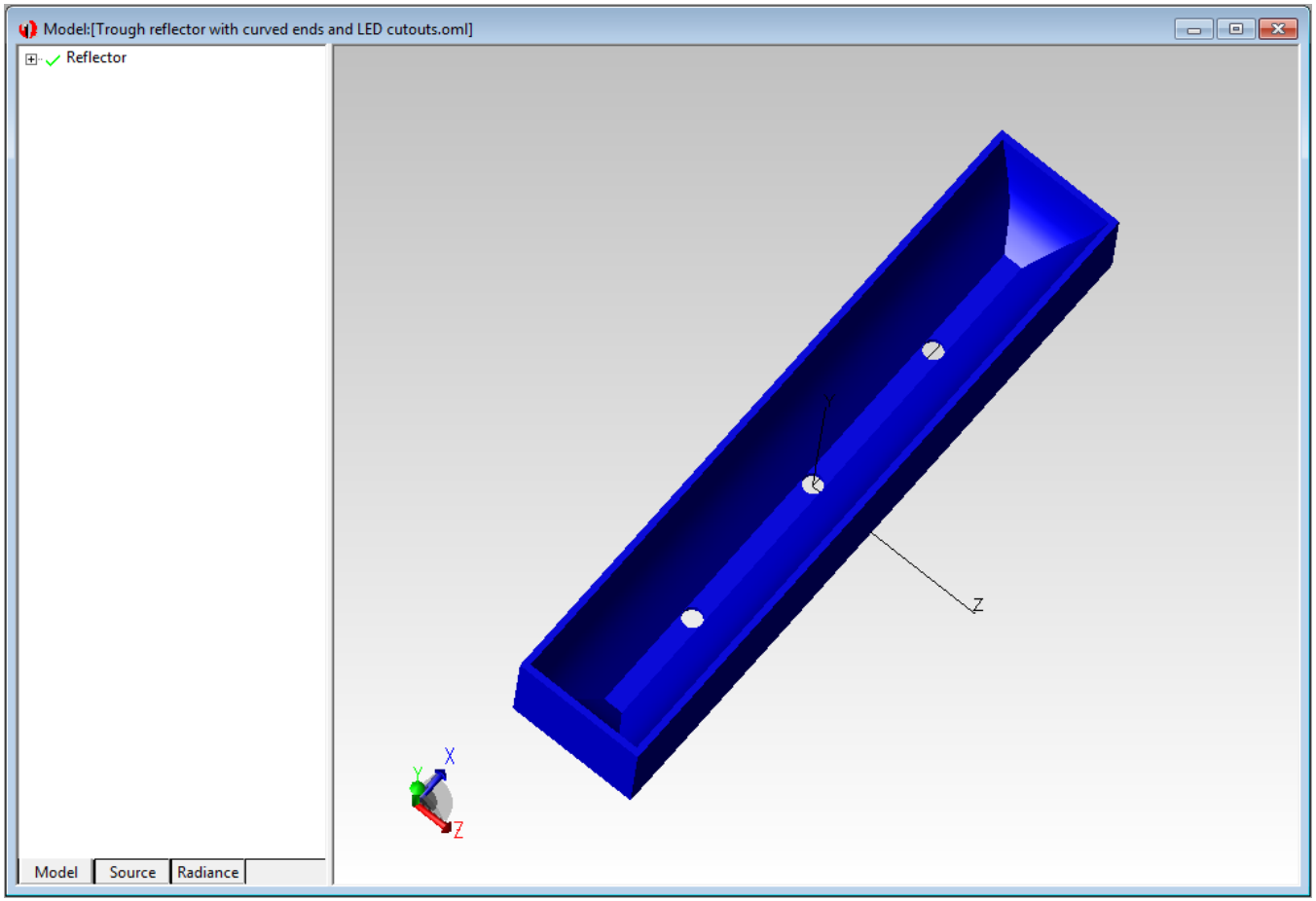
Defining Sources and Targets



Different Candela Profile optimization targets can be defined for different axes

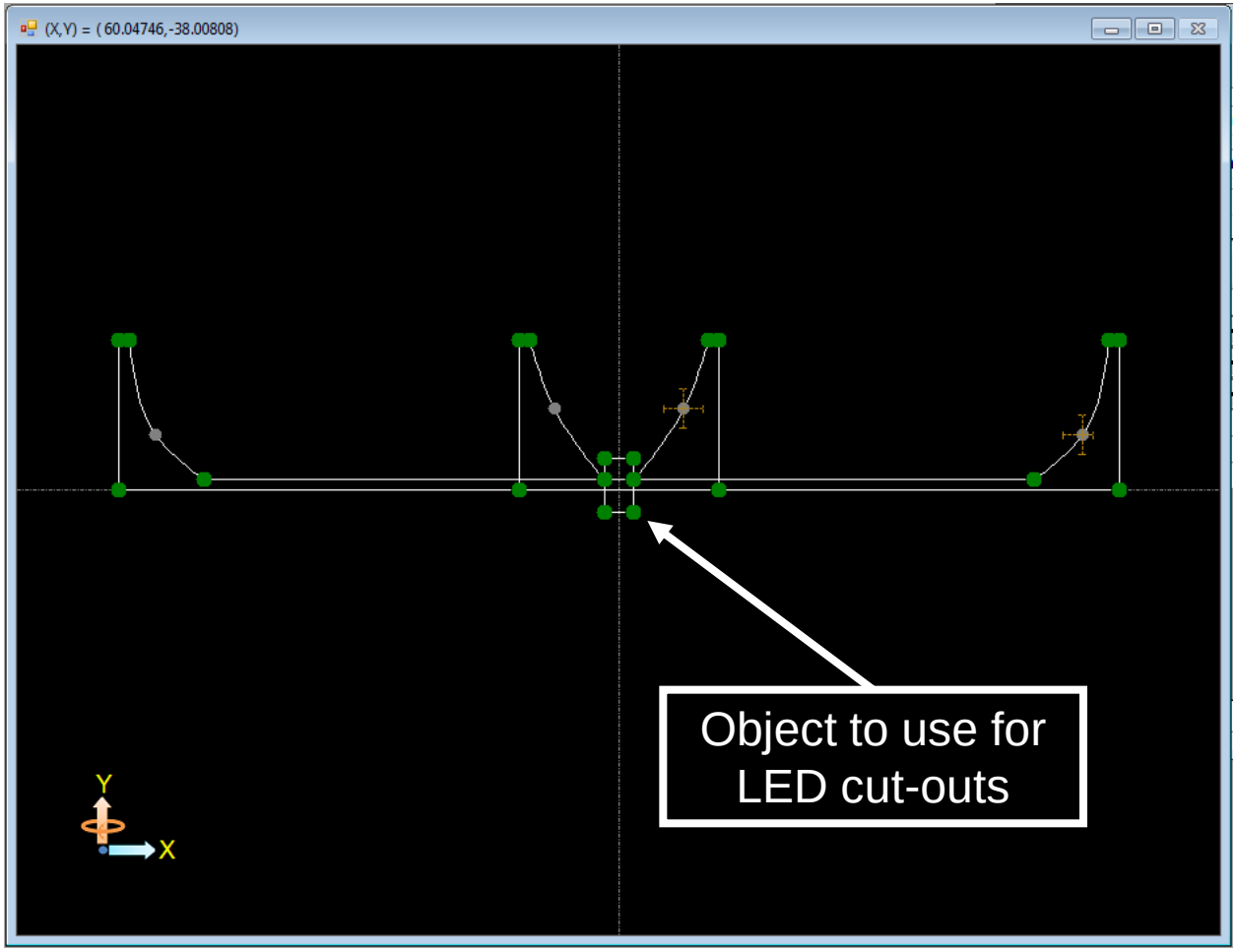
Examples

Examples



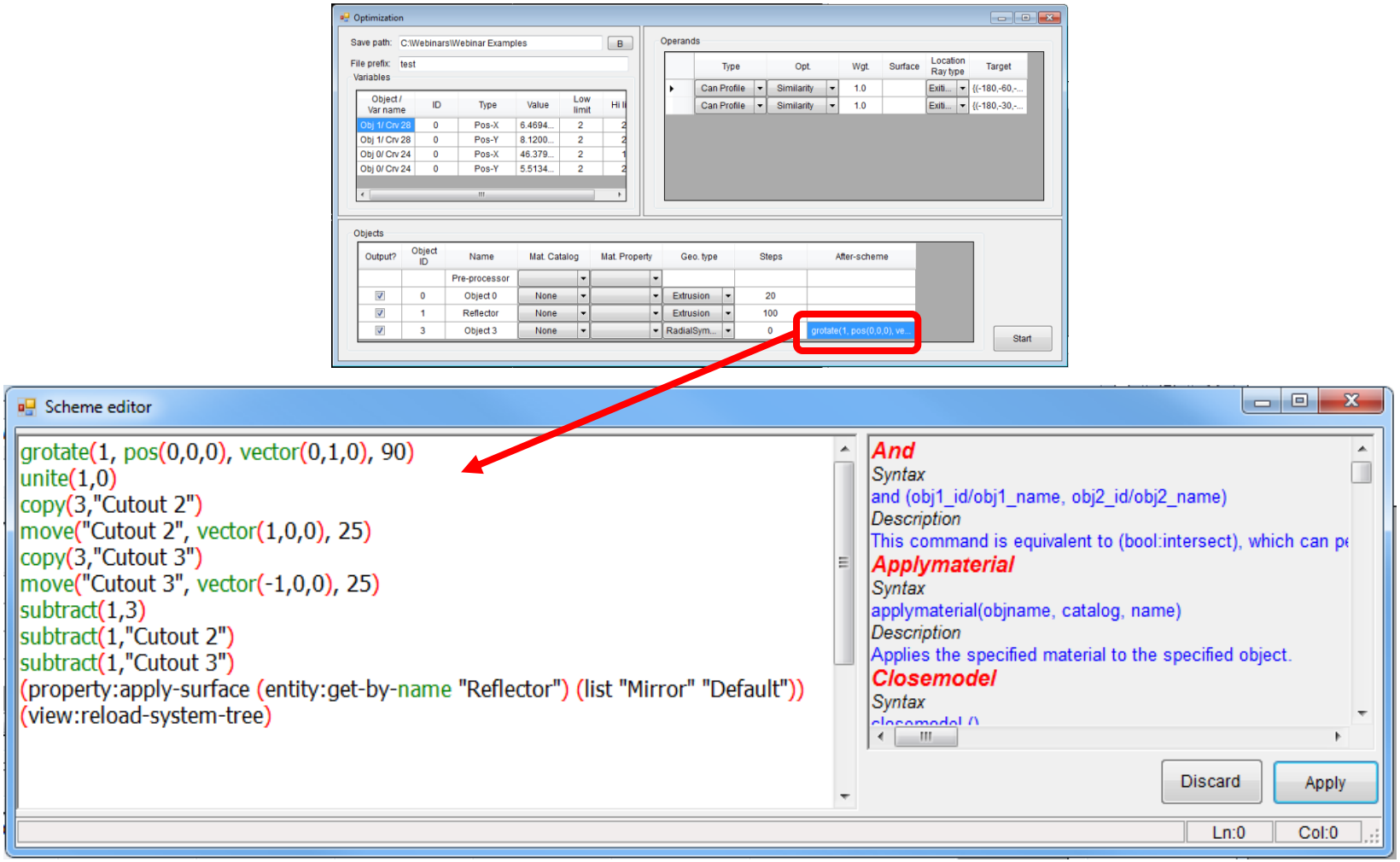
Trough reflector with curved ends and 3 cut-outs for LEDs – TracePro model

Examples



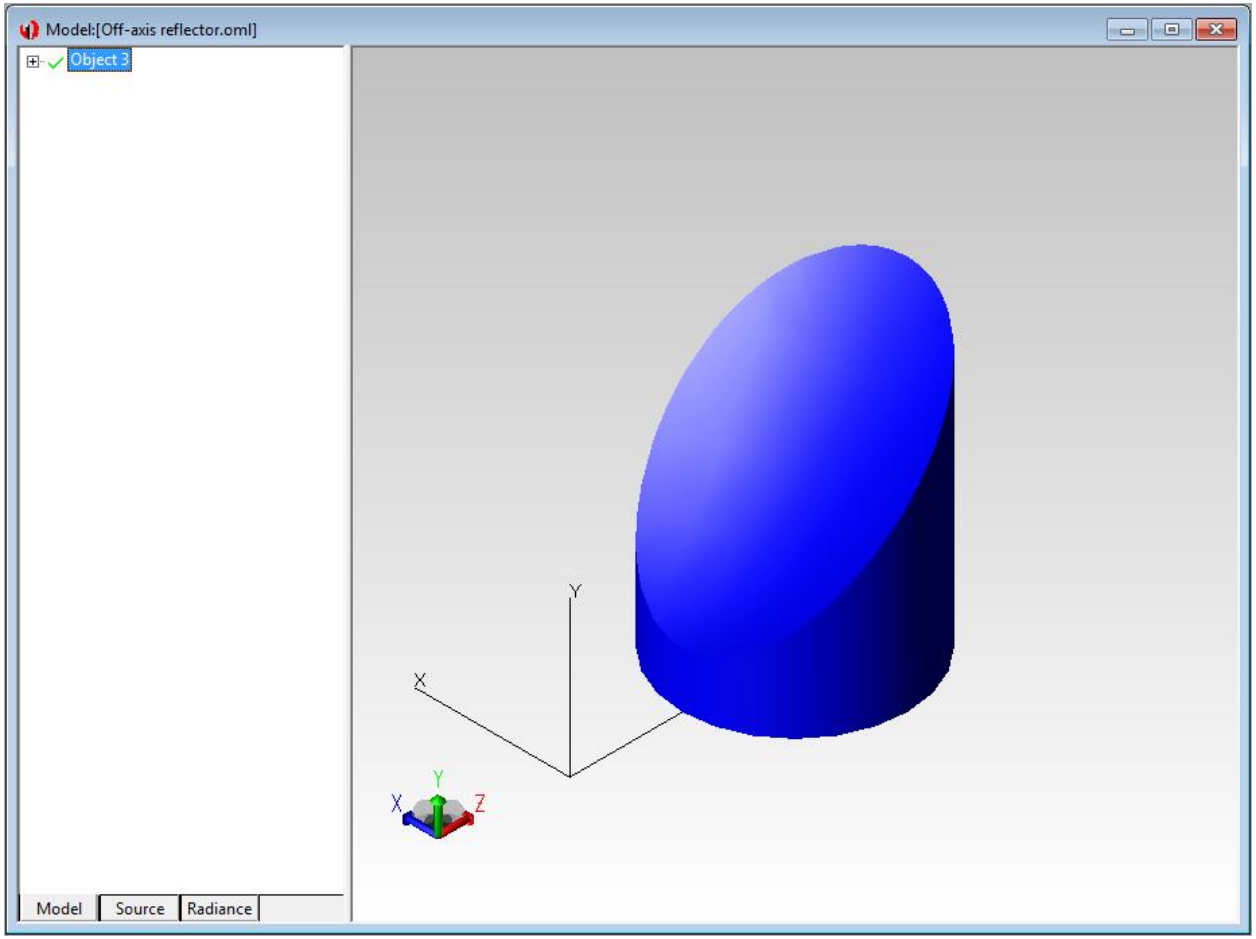
Trough reflector with curved ends and 3 cut-outs for LEDs – Interactive Optimizer Sketch window

Examples



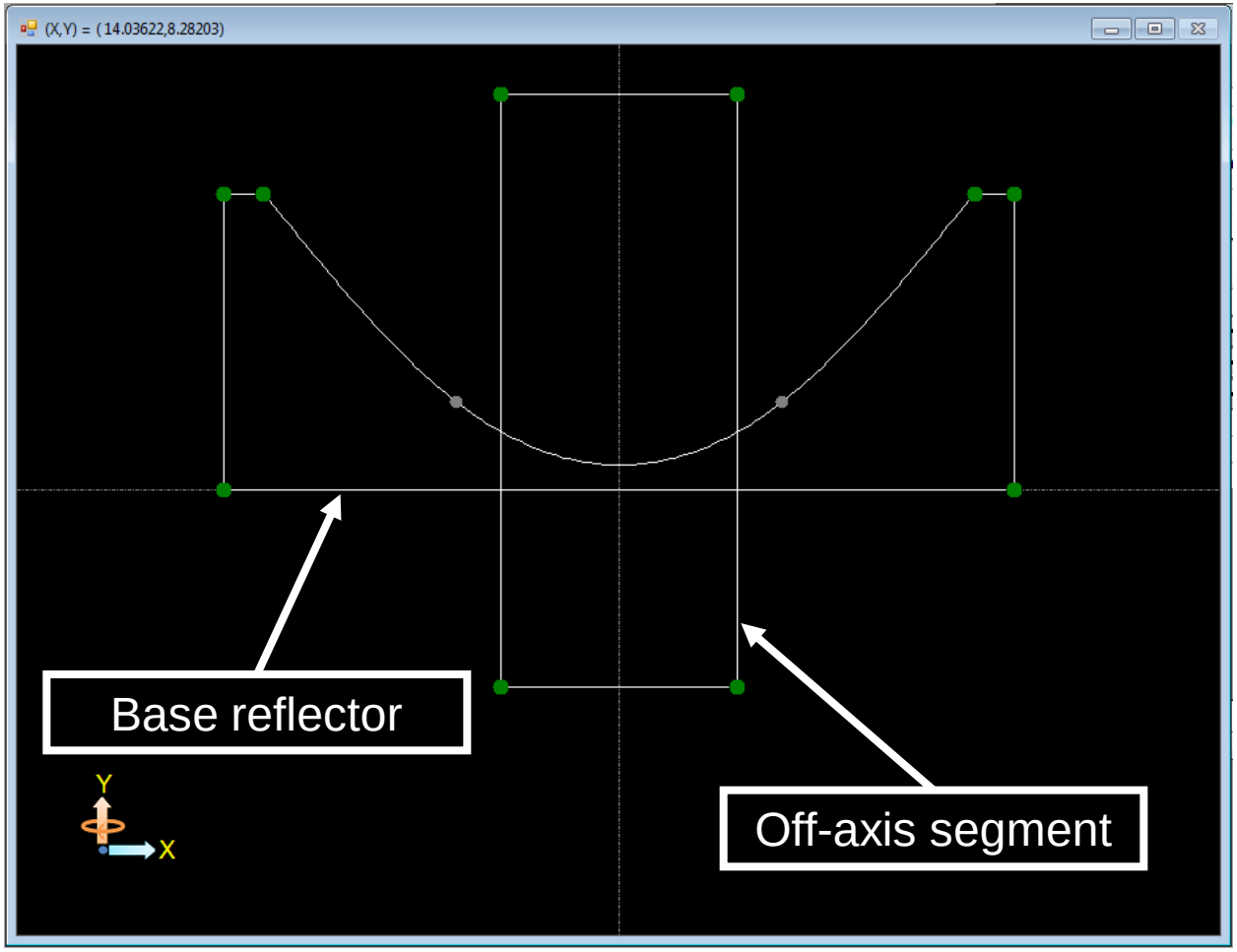
Trough reflector with curved ends and 3 cut-outs for LEDs – Optimization window and Scheme macro

Examples



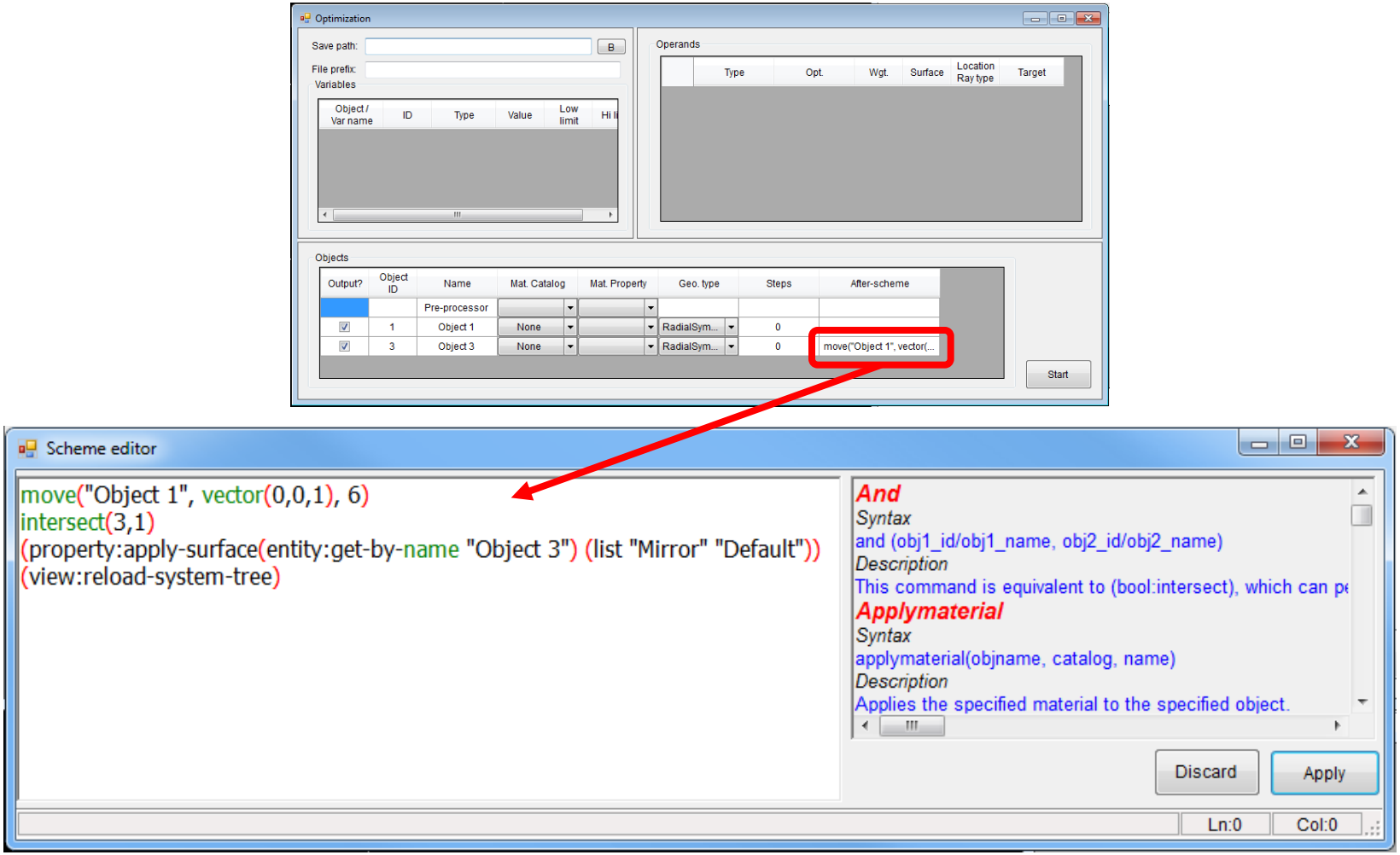
Off-axis reflector – TracePro model

Examples



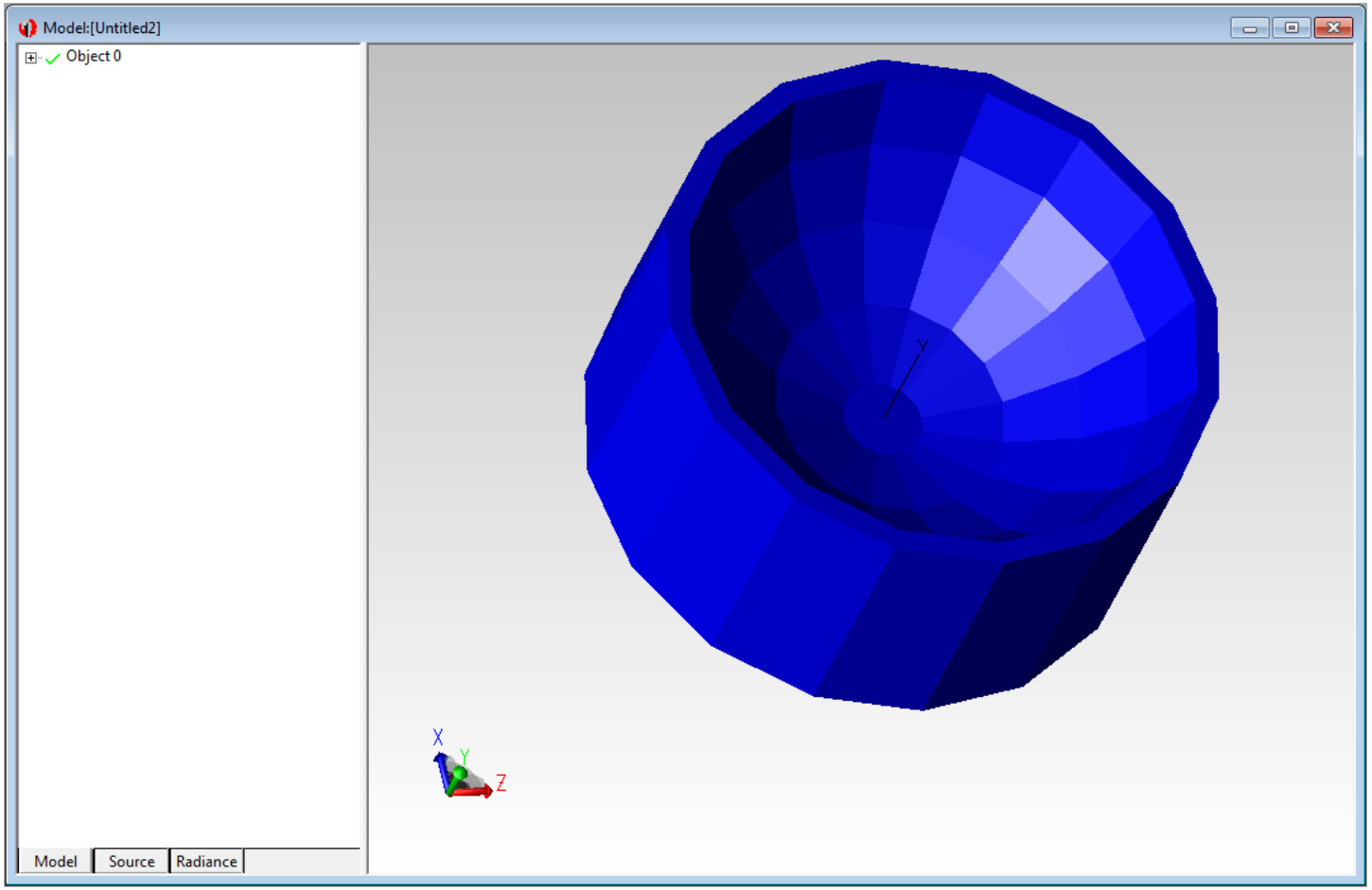
Off-axis reflector – Interactive Optimizer Sketch window

Examples



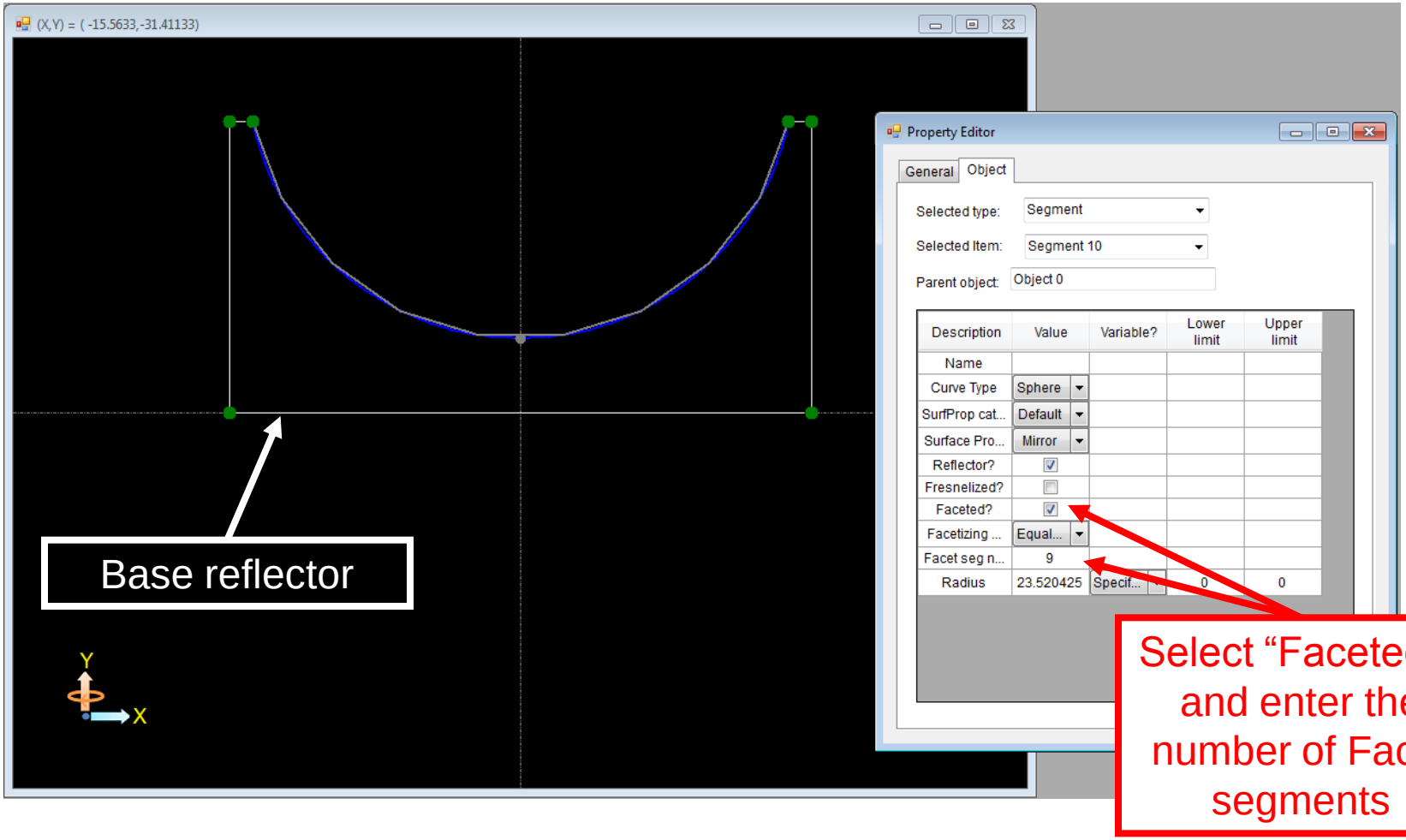
Off-axis reflector – Optimization window and Scheme macro

Examples



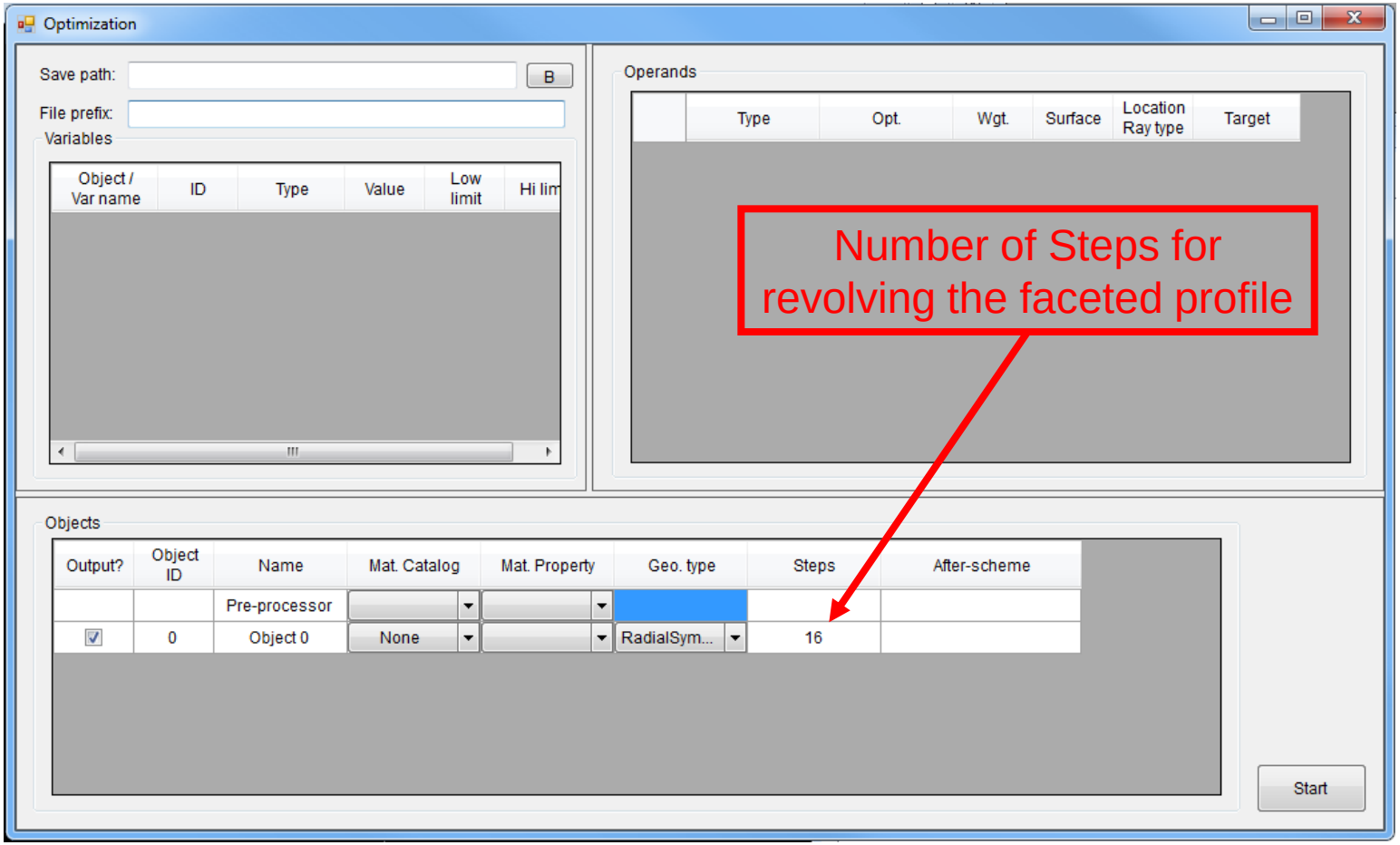
Faceted reflector– TracePro model

Examples



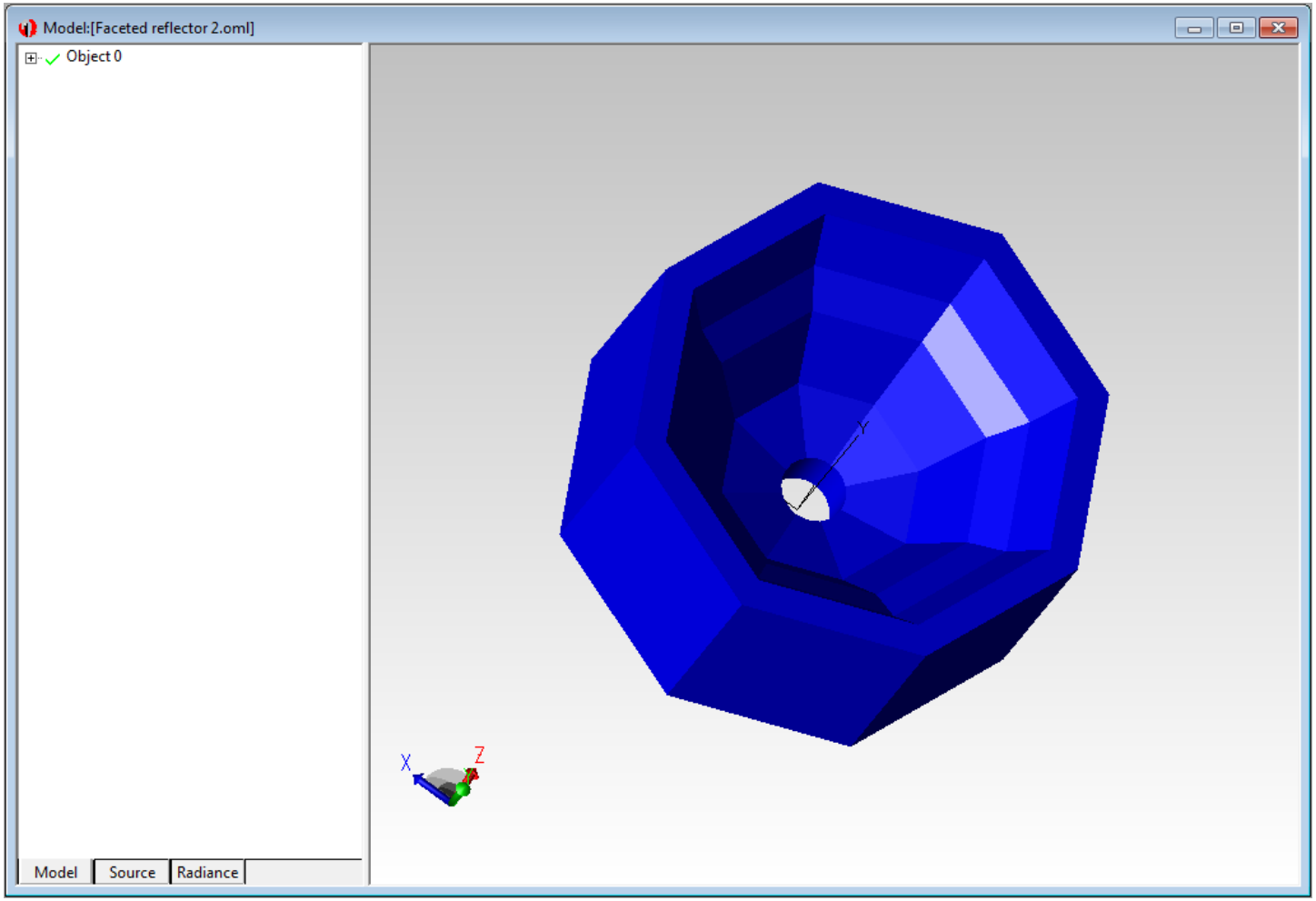
Faceted reflector – Interactive Optimizer Sketch window

Examples



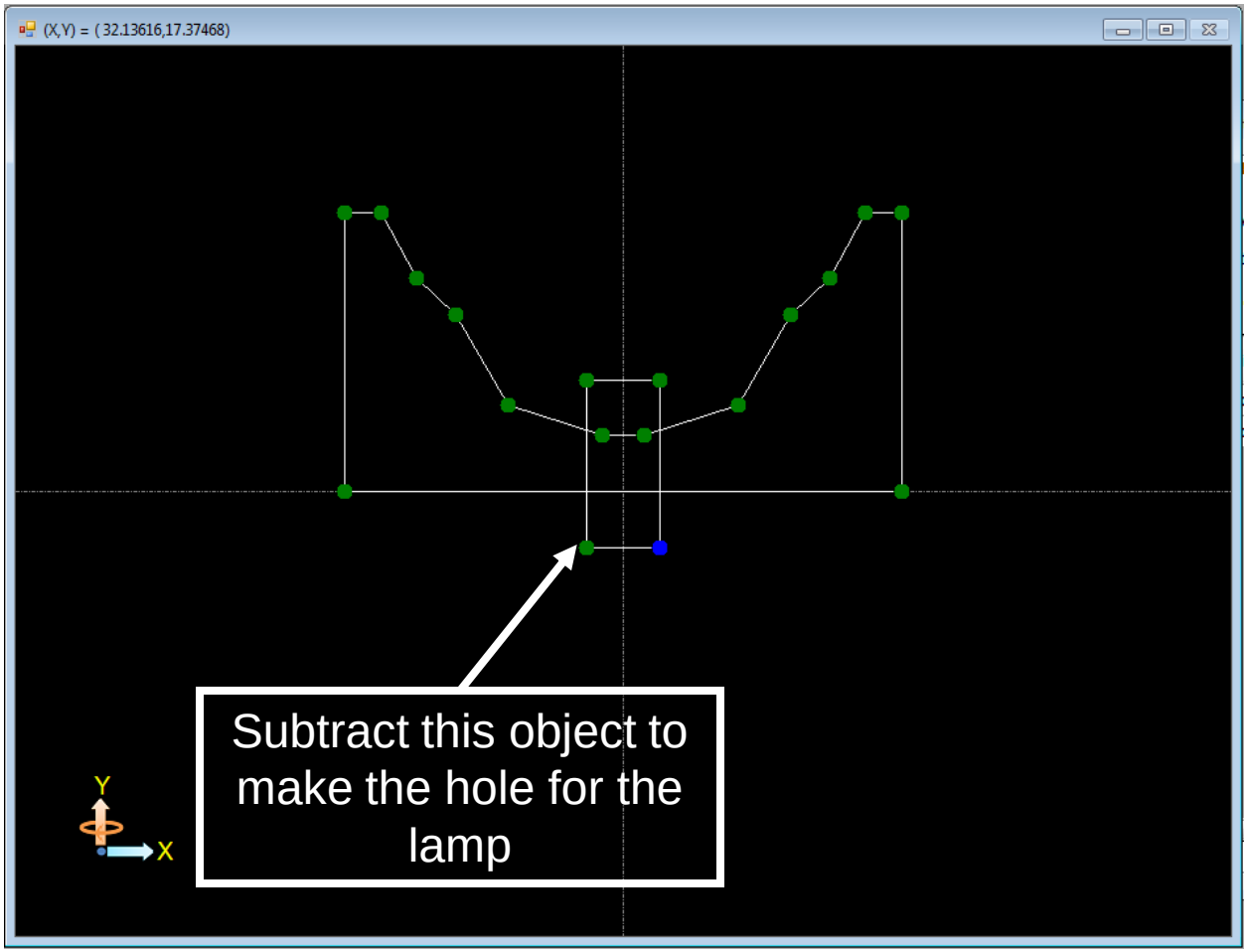
Faceted reflector – Optimization window

Examples



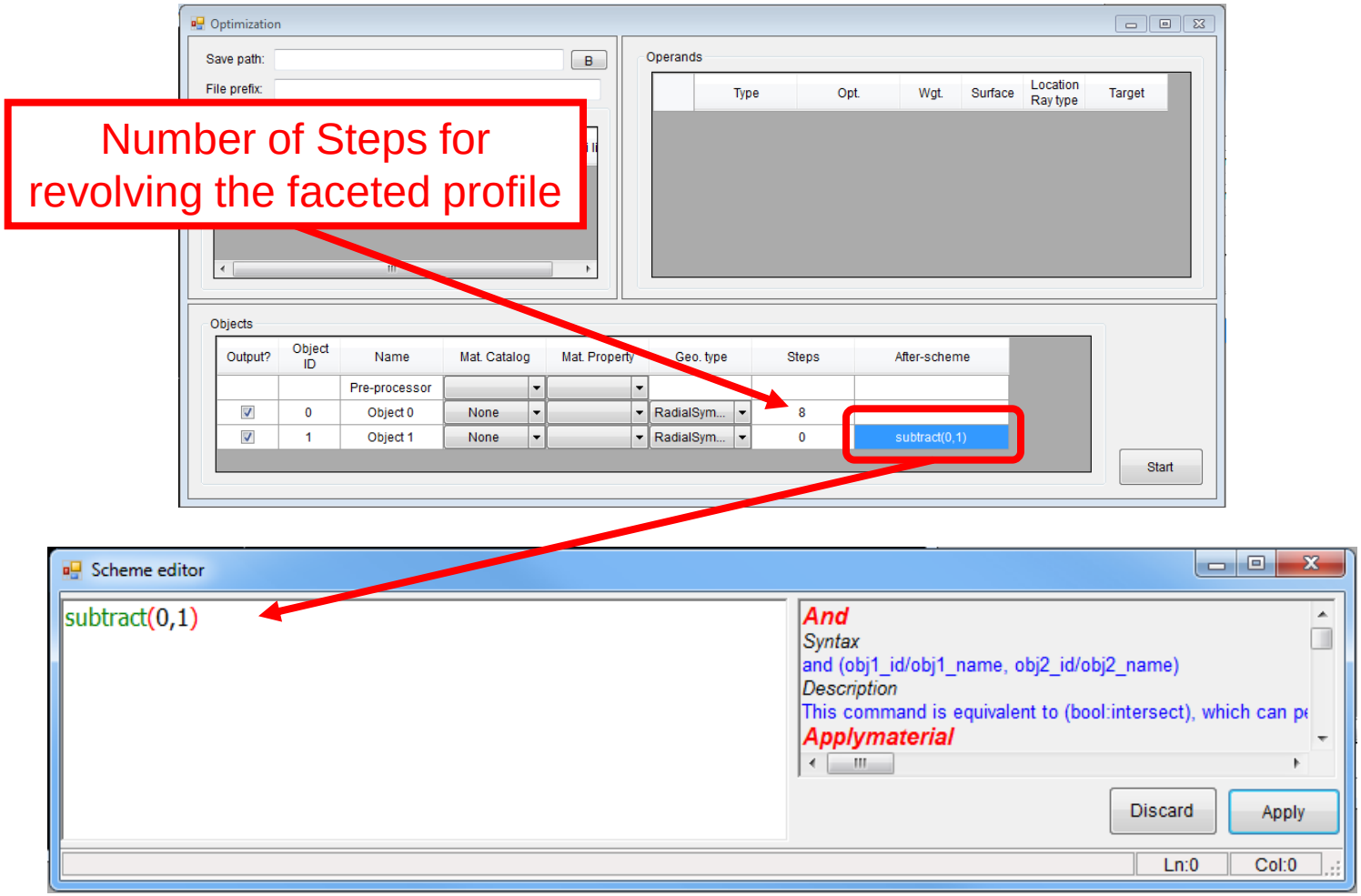
Faceted reflector 2– TracePro model

Examples



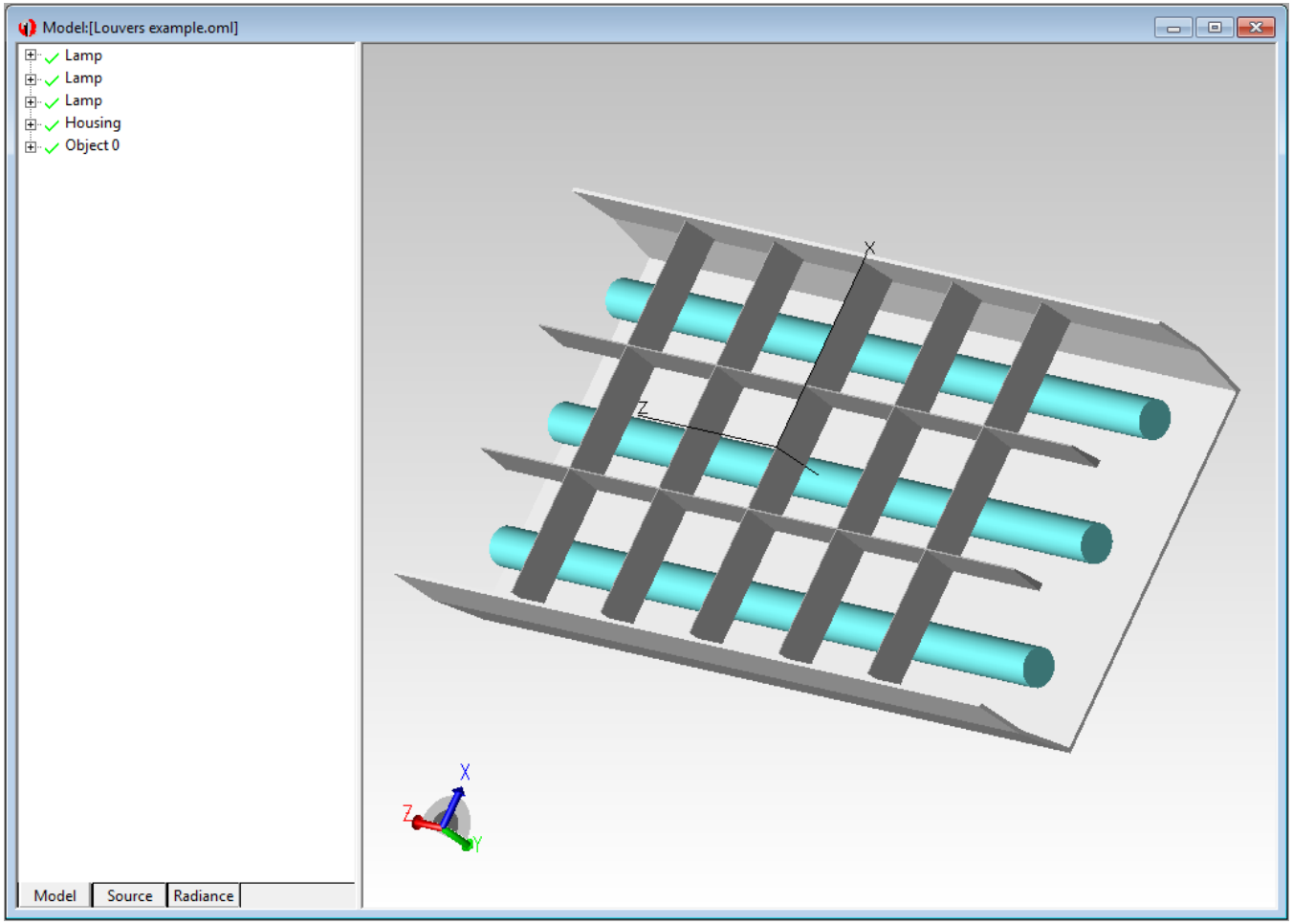
Faceted reflector 2 – Interactive Optimizer Sketch window

Examples



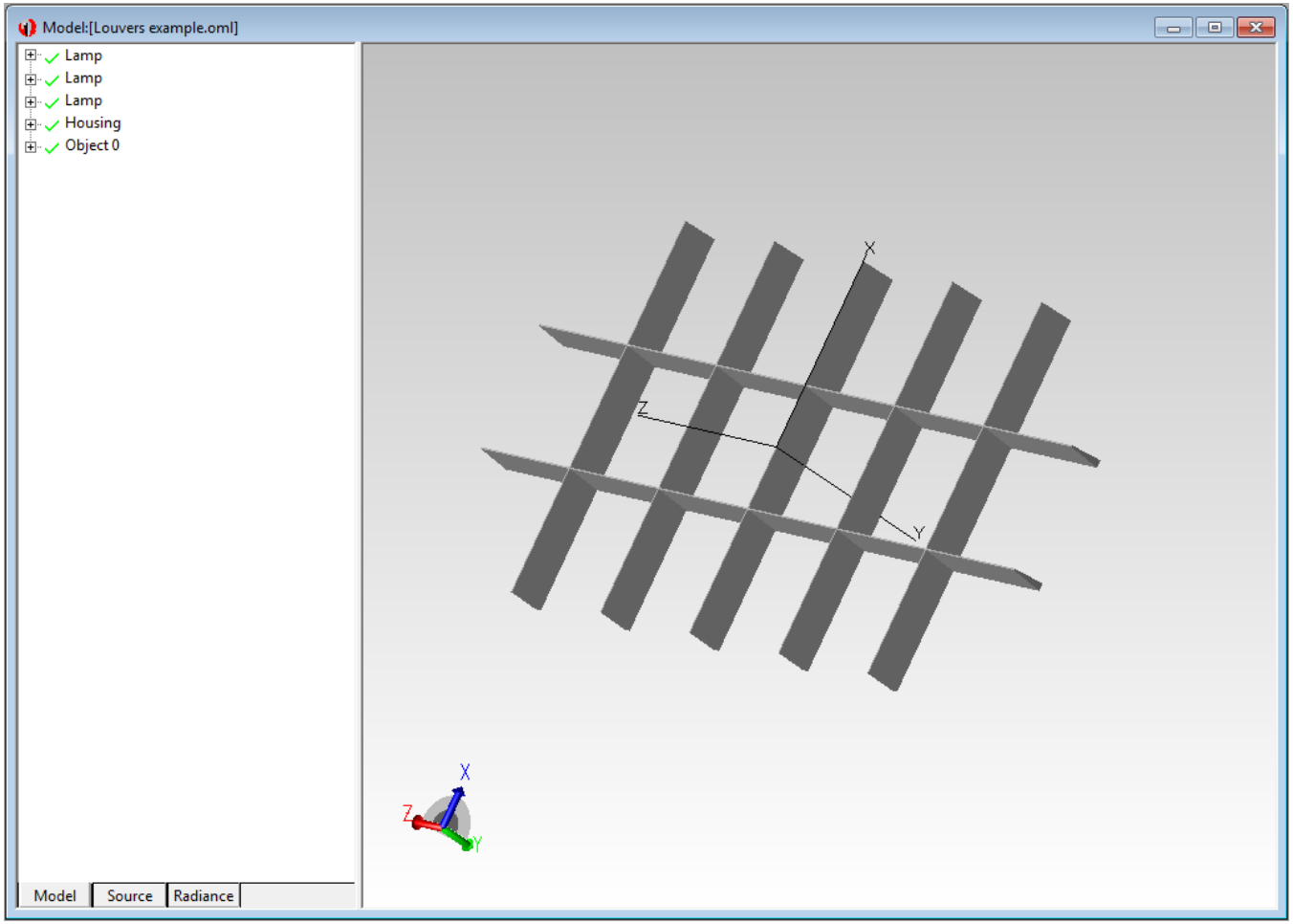
Faceted reflector 2 – Optimization window and Scheme macro

Examples



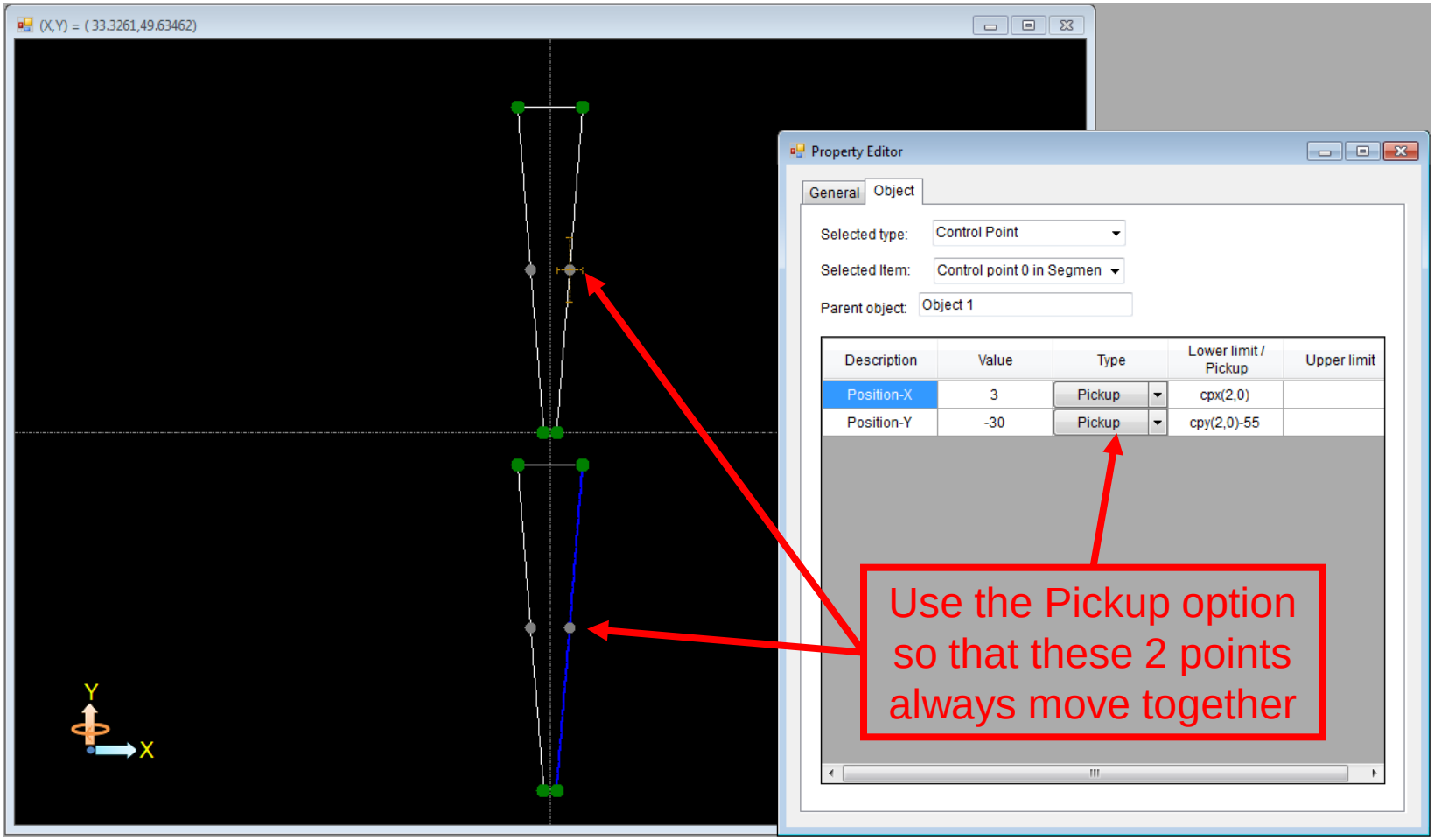
Fluorescent lamp fixture louvers– TracePro model

Examples



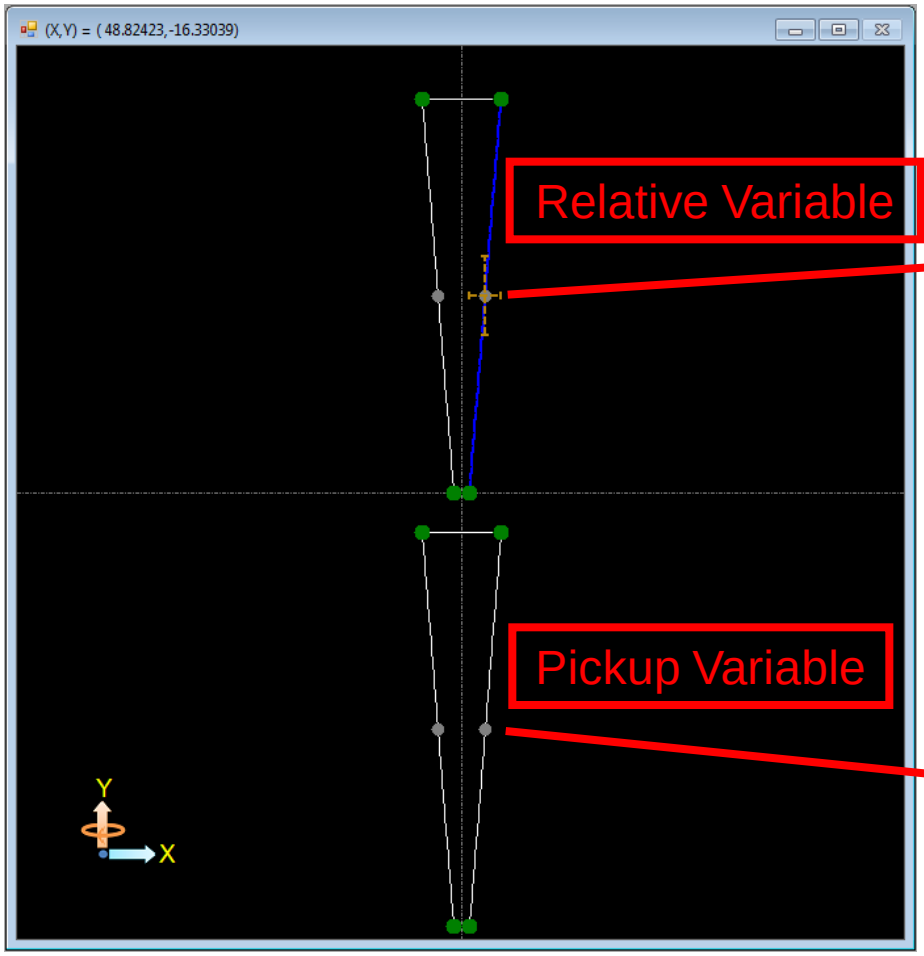
Fluorescent lamp fixture louvers– TracePro model

Examples



Louvers– Relative and Pickup variables

Examples



Property Editor

General | Object

Selected type: Control Point

Selected Item: Control point 0 in Segmen

Parent object: Object 0

Description	Value	Type	Lower limit / Pickup	Upper limit
Position-X	3	Relative Var.	2	2
Position-Y	25	Relative Var.	5	5

Property Editor

General | Object

Selected type: Control Point

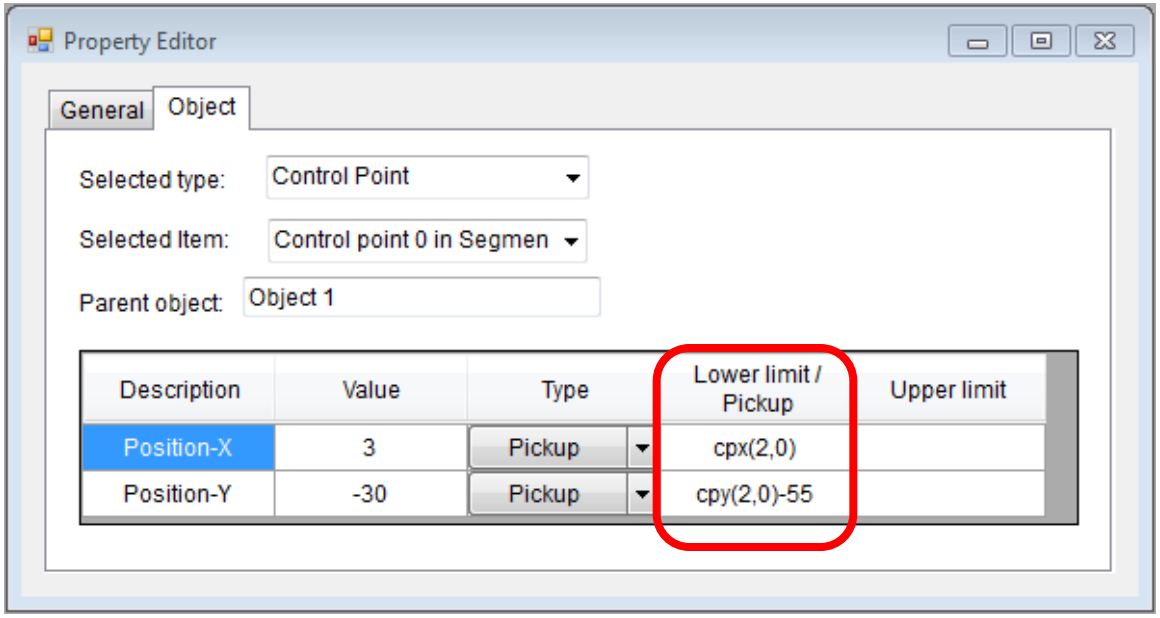
Selected Item: Control point 0 in Segmen

Parent object: Object 1

Description	Value	Type	Lower limit / Pickup	Upper limit
Position-X	3	Pickup	cpx(2,0)	
Position-Y	-30	Pickup	cpy(2,0)-55	

Louvers– Relative and Pickup variables

Examples



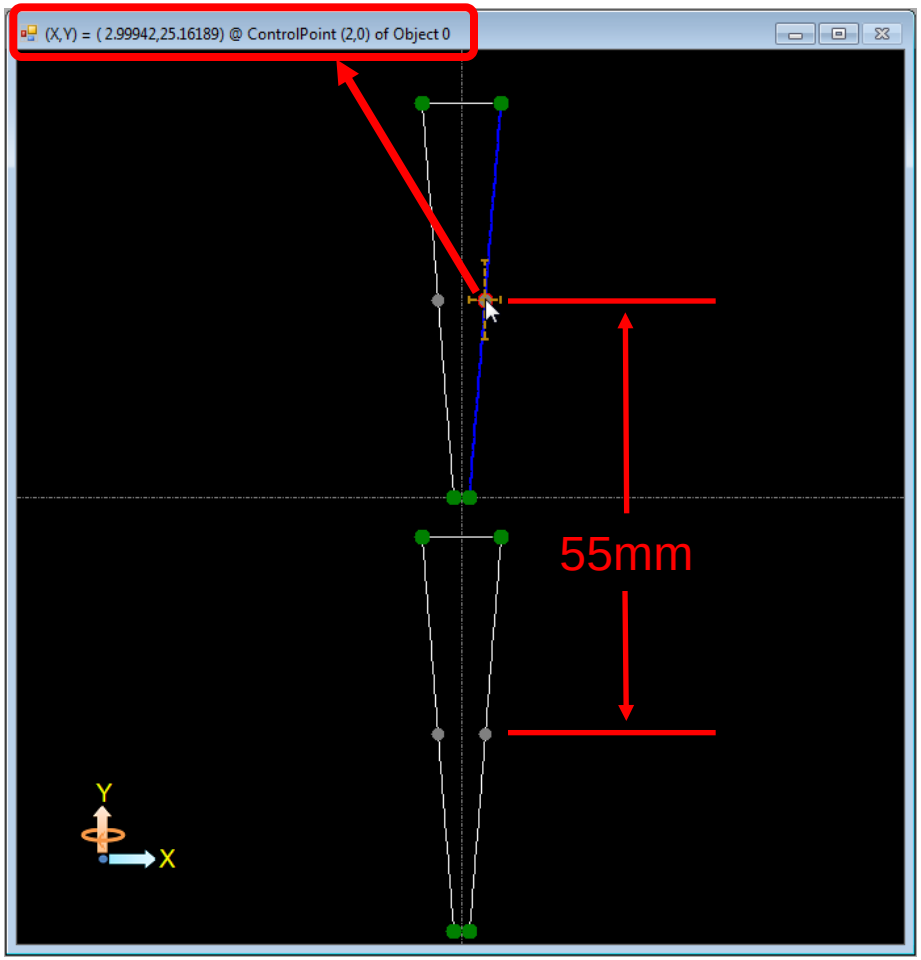
cpx(2,0) = This control point will always have the same X value as Control Point (2,0)

cpy(2,0)-55 = This control point will always have a Y value 55mm below Control Point (2,0)

For Segment Points, change **cpx** and **cpy** to **spx** and **spy**

Louvers– Pickup variable

Examples

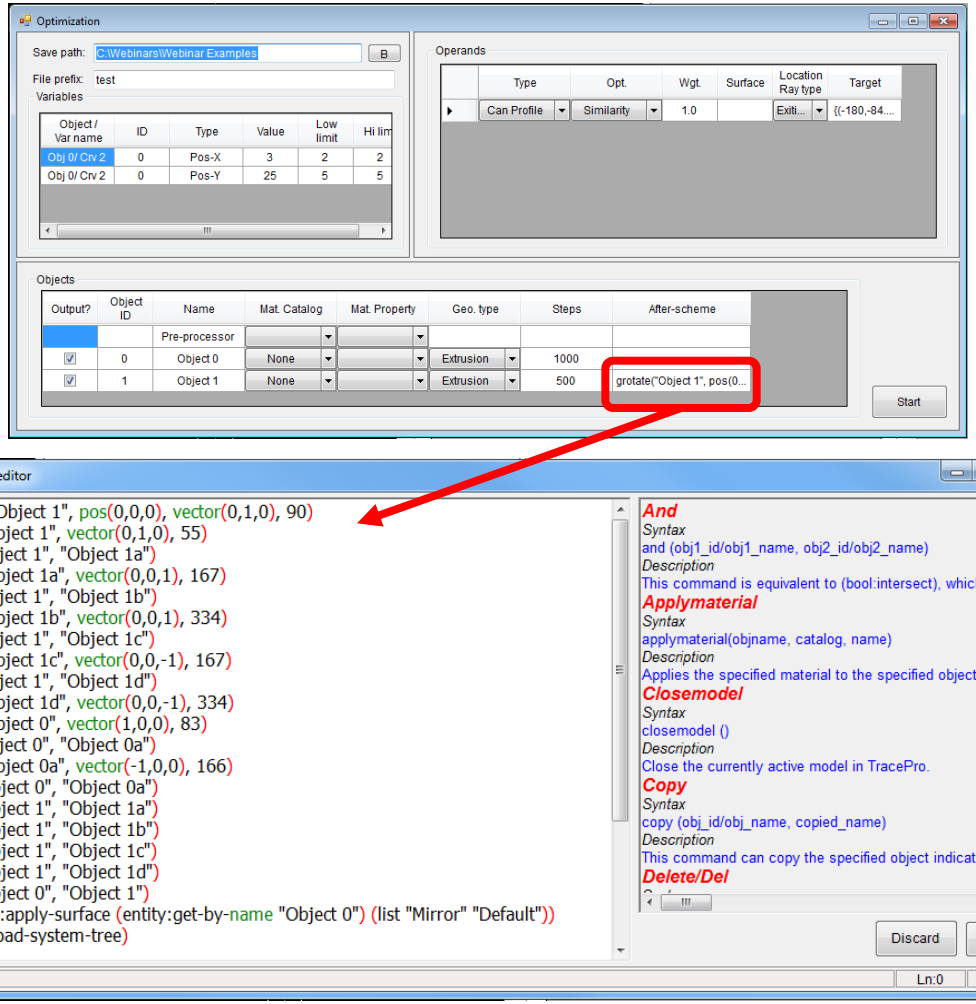


- To find the Segment number and Control Point number for a Control Point, click on the Control Point in the sketch window and read the values at the top of the sketch window

- Format is (segment #, control point #)

Louvers– Control Point number

Examples



Louvers– Optimization window and Scheme macro

Thank You

Questions and Answers

For Additional Information Please Contact:

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