

# Optical Reflector Design using the TracePro Interactive Optimizer

Presented by : Lambda Research Corporation 25 Porter Rd. Littleton, MA 01460 www.lambdares.com





Moderator: Andy Knight Technical Sales Manager Lambda Research Corporation

#### Presenter:

Dave Jacobsen Senior Application Engineer 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







# Optical Reflector Design using the TracePro Interactive Optimizer

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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 offaxis 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 <a href="http://www.lambdares.com/webinars/">http://www.lambdares.com/webinars/</a>





#### **Current TracePro Release**

•TracePro 7.1.2

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

•www.lambdares.com

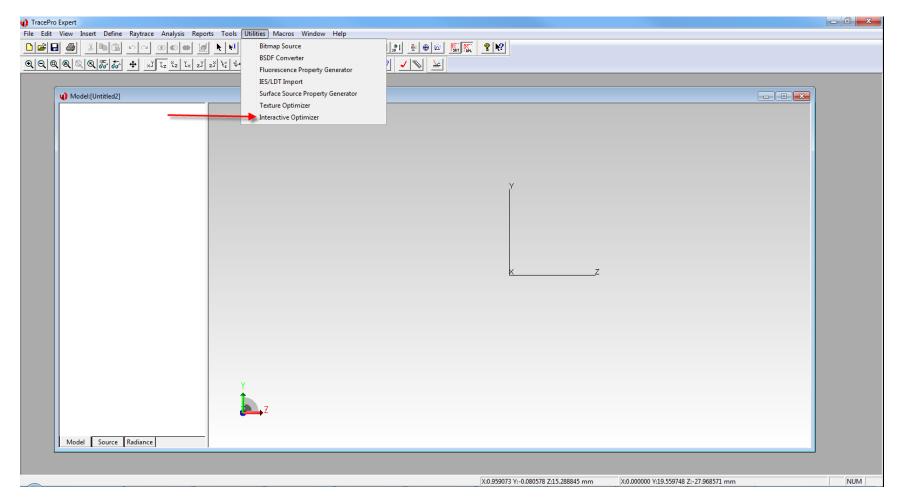




#### Optical Reflector Design using the TracePro Interactive Optimizer







Interactive Optimizer is launched from the Utilities Menu in TracePro



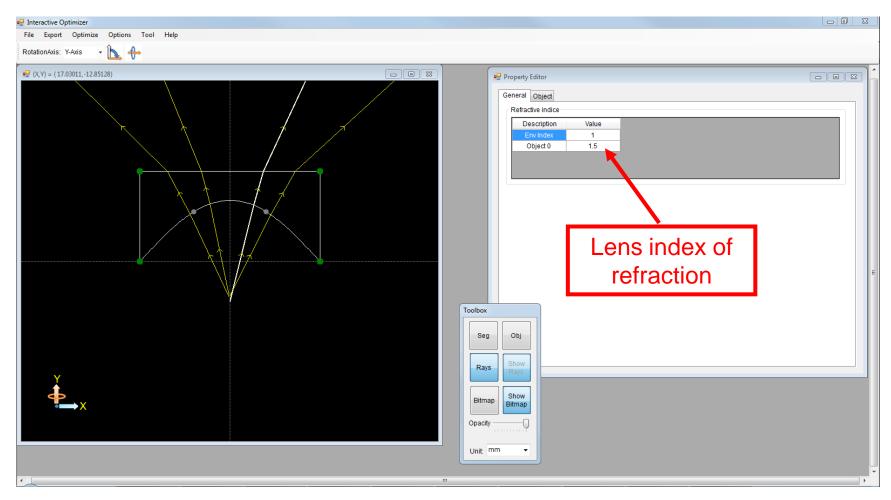


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Initial windows visible when the optimizer is opened



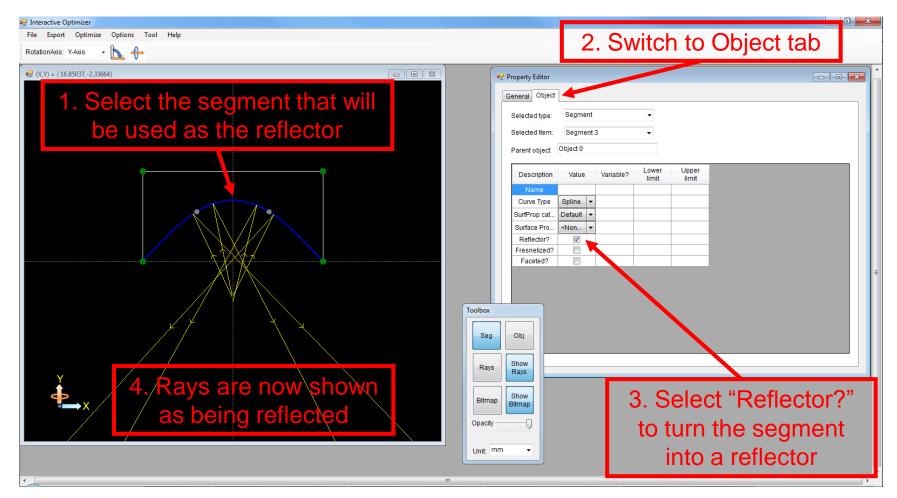




Lens design in the Interactive Optimizer







Reflector design in the Interactive Optimizer



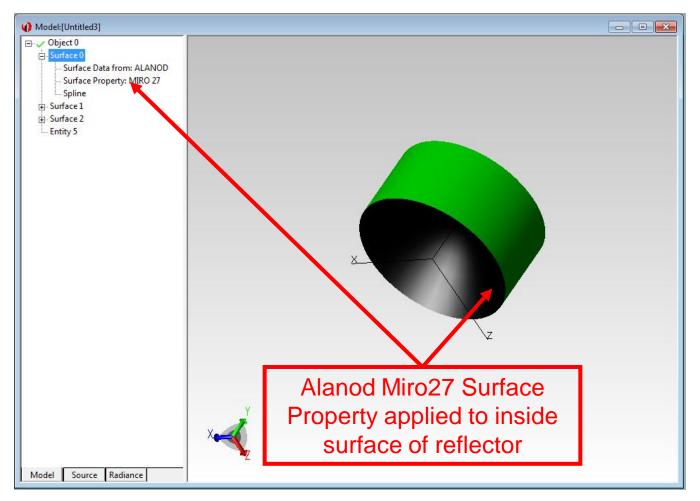


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Applying Surface Properties in the Interactive Optimizer







Applying Surface Properties in the Interactive Optimizer



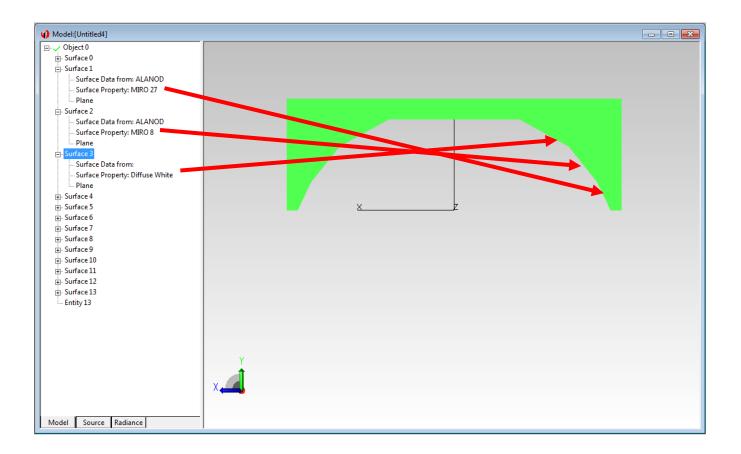


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Each segment can have a different Surface Property



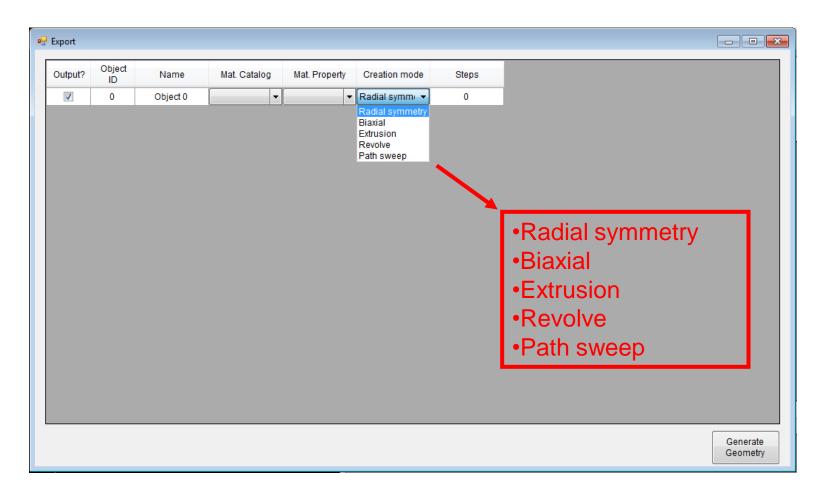




Different surfaces can have different Surface Properties







#### Interactive Optimizer geometry creation options

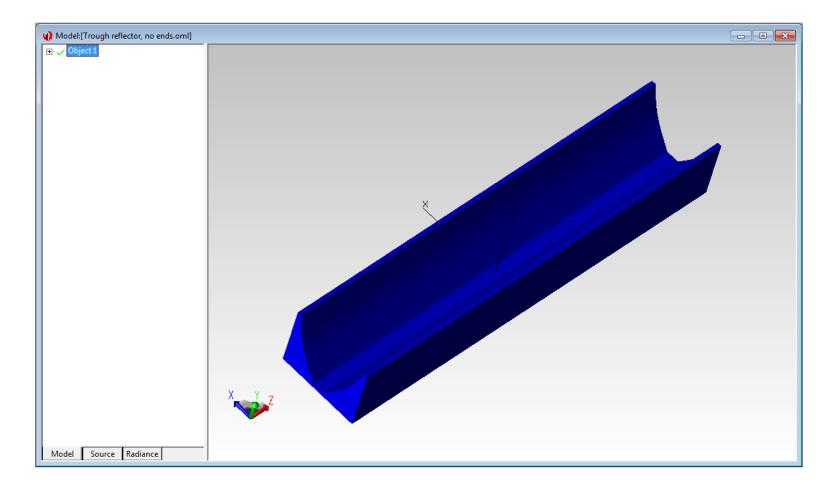




# Using the Scheme Macro Language with the Interactive Optimizer



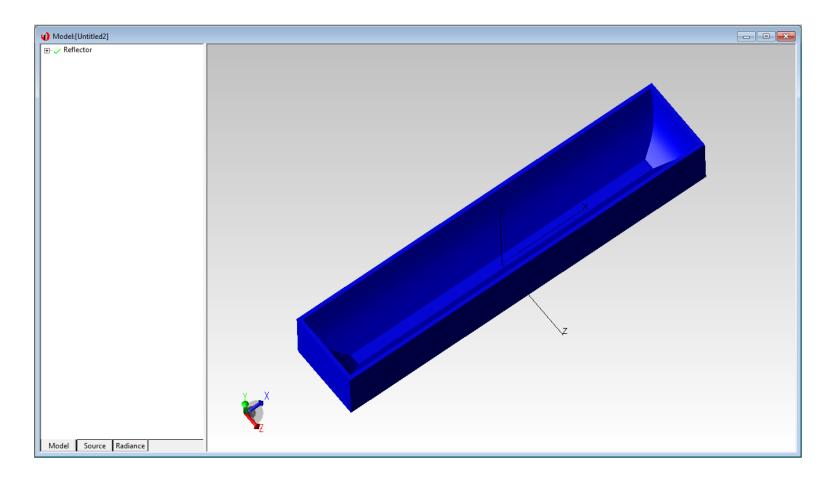




Easy - extruded trough reflector



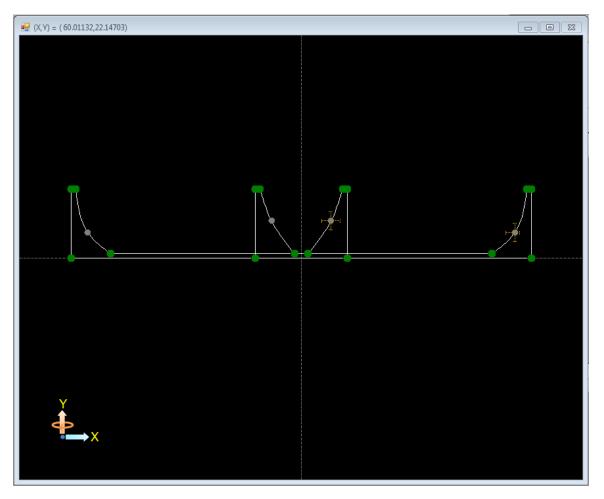




A little more difficult - extruded trough reflector with curved ends



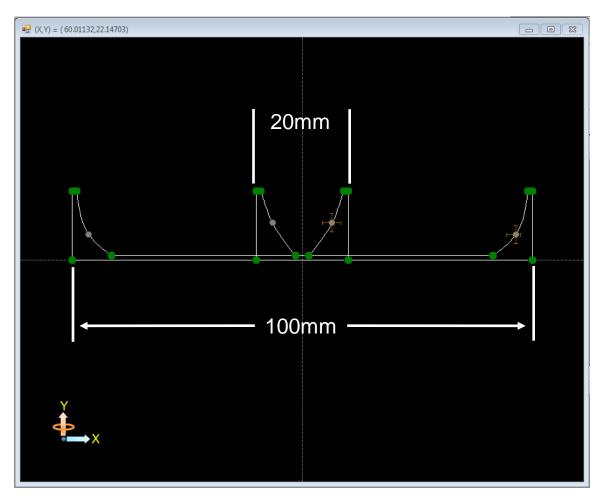




Optimizer Sketch window for extruded trough reflector with curved ends



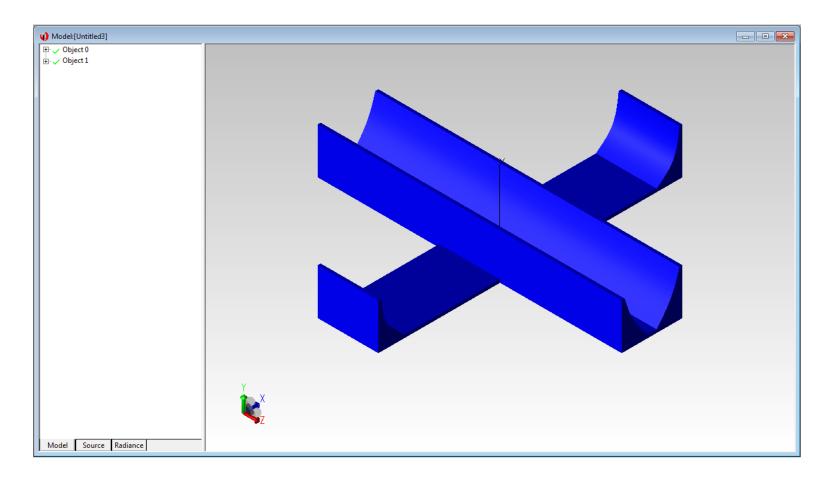




Optimizer Sketch window for extruded trough reflector with curved ends



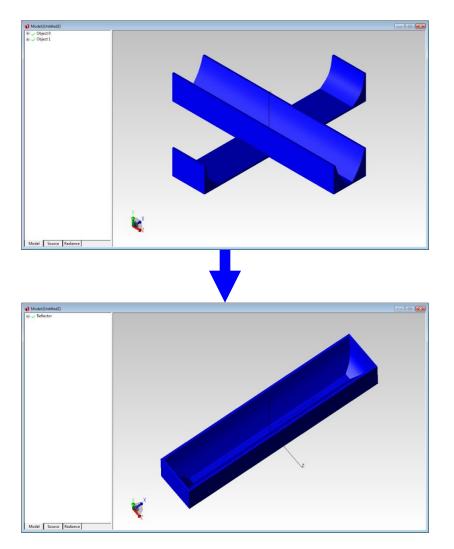




Initial results after exporting the 2 profiles from the optimizer as extrusions







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

- 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





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Adding a Scheme macro in the Optimization window





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Adding a Scheme macro





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grotate("Reflector", pos(0,0,0), vector(0,1,0), 90)
unite ("Reflector","Object 0")
(property:apply-surface (entity:get-by-name "Reflector") (list "Mirror" "Default"))
(view:reload-system-tree)
```

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

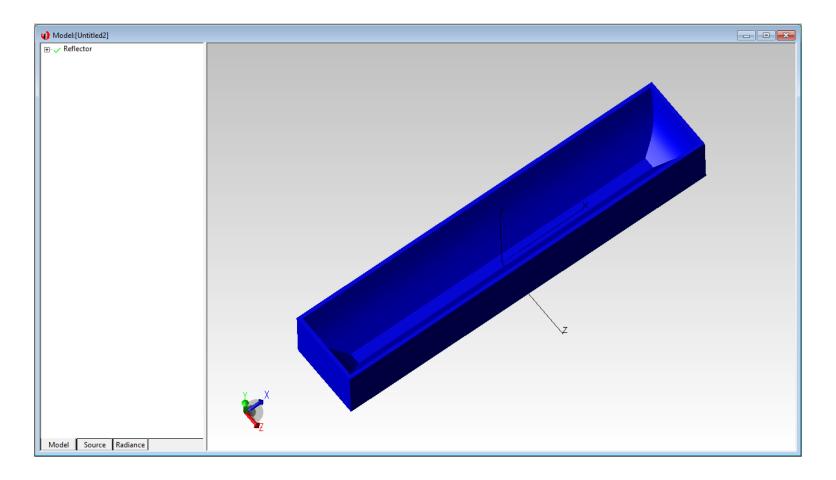




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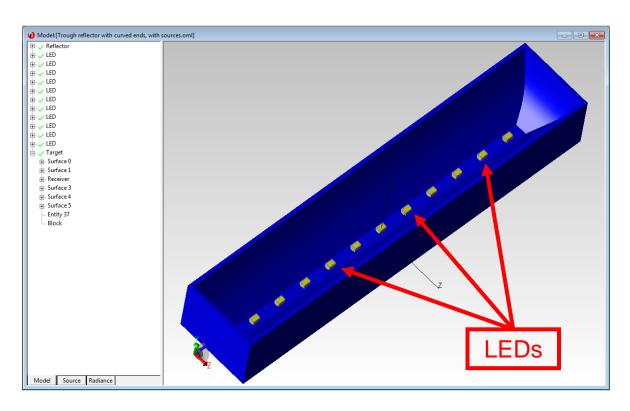
Extruded trough reflector with curved ends in TracePro











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

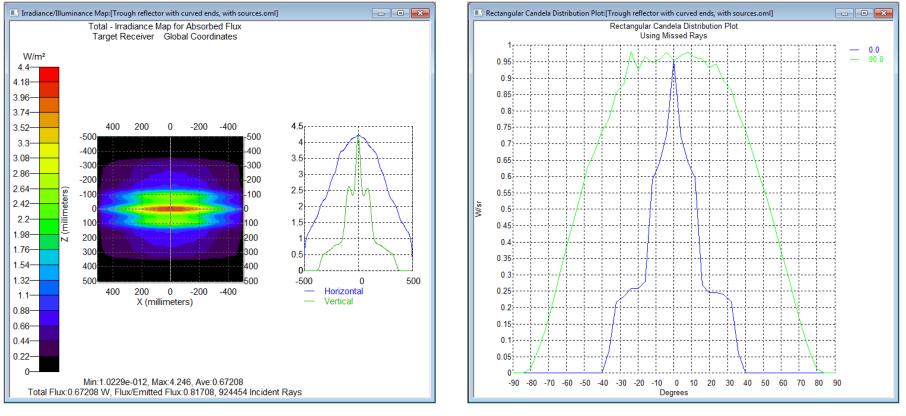
The Interactive Optimizer will use the sources defined in the TracePro model during the optimization.

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

11 LEDs used as sources.







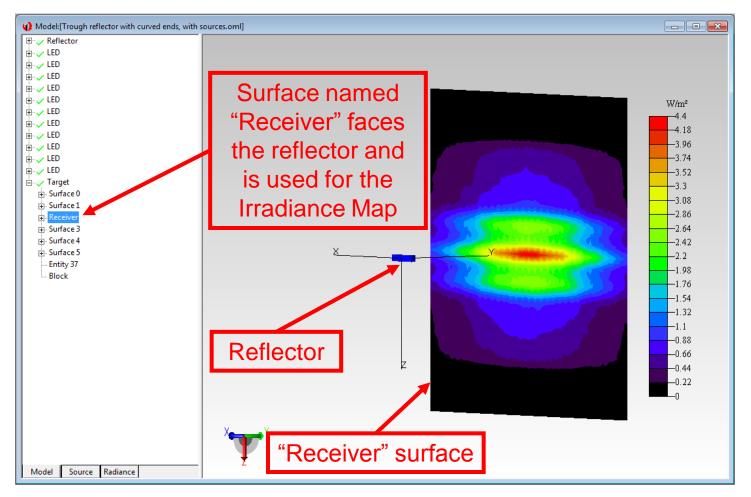
Irradiance Map

Candela Plot

Two common optimization targets are Irradiance and Candela Profiles



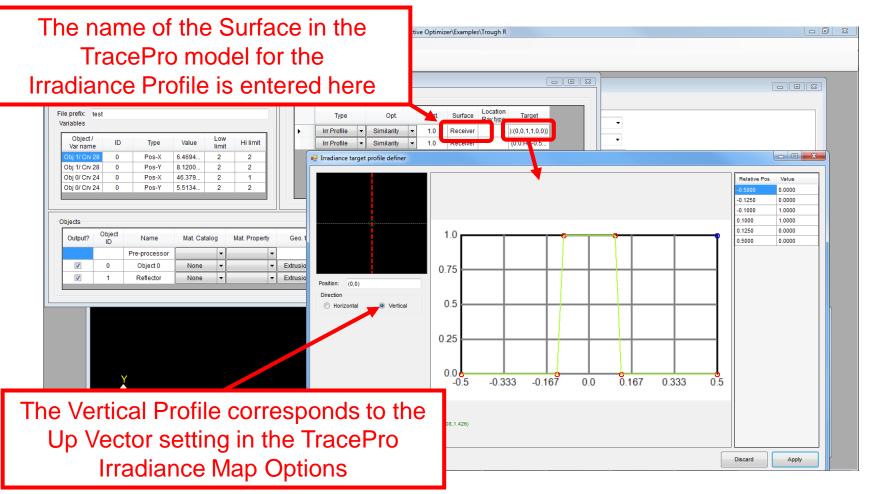




If you are using an Irradiance Profile as the optimization target, you must have a surface in TracePro for the Irradiance Map.



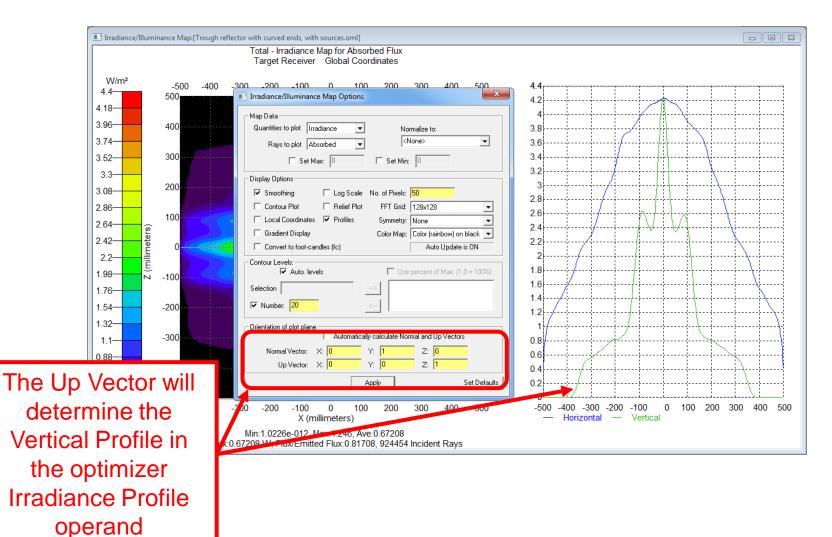




Different Irradiance Profile optimization targets can be defined for the horizontal and vertical axes

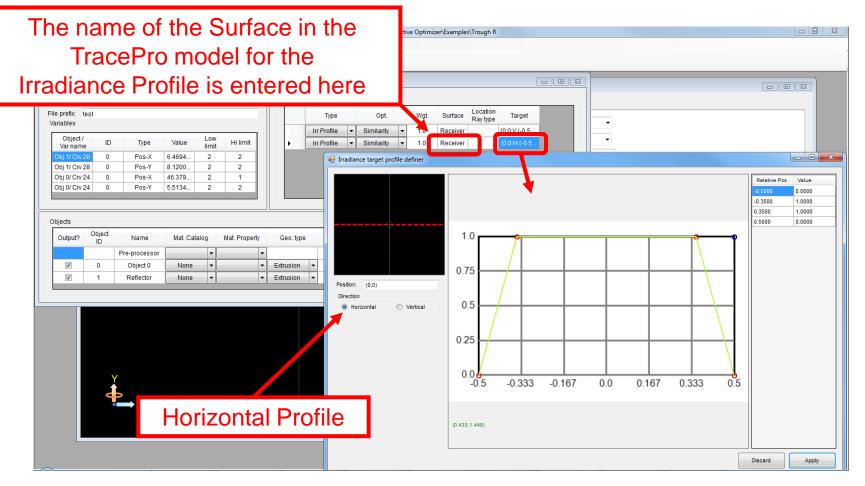












Different Irradiance Profile optimization targets can be defined for the horizontal and vertical axes



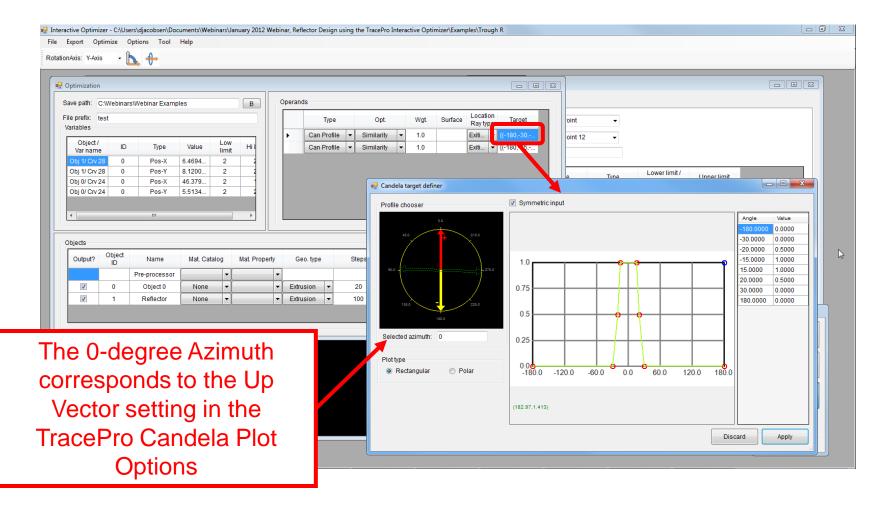


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When optimizing to a Candela Profile operand, a surface in TracePro does not have to be used as a target



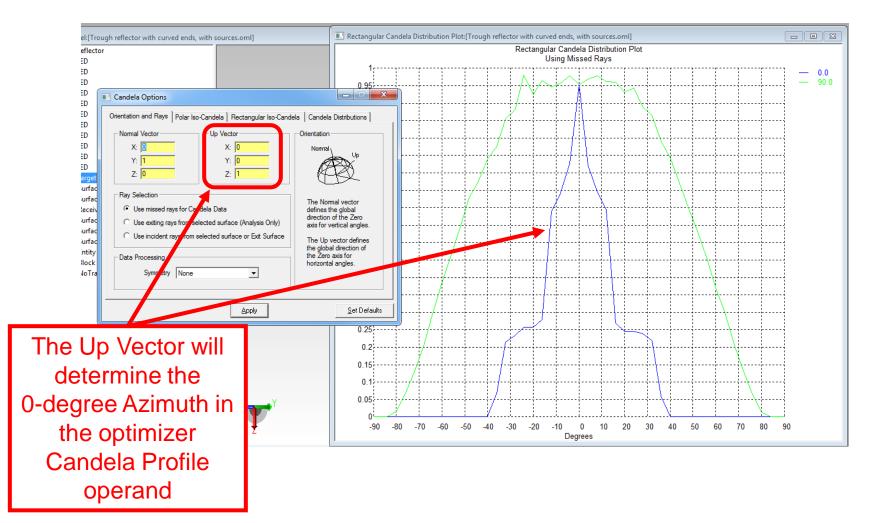




Different Candela Profile optimization targets can be defined for different axes

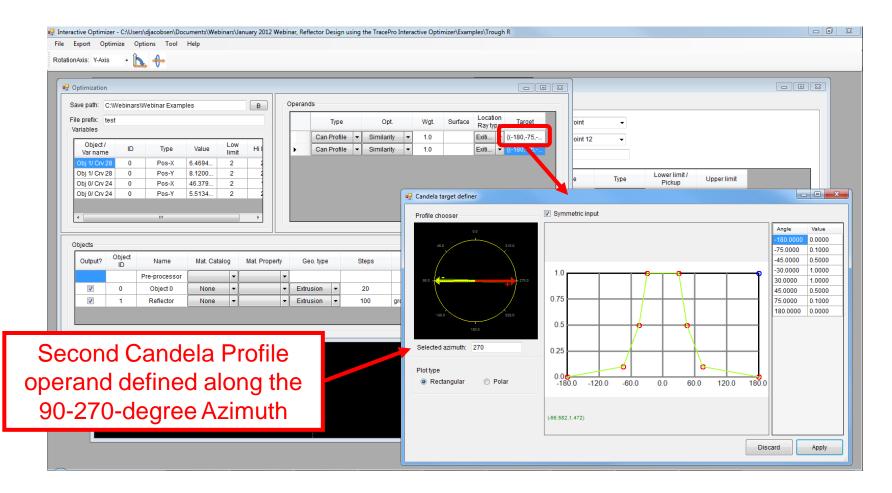












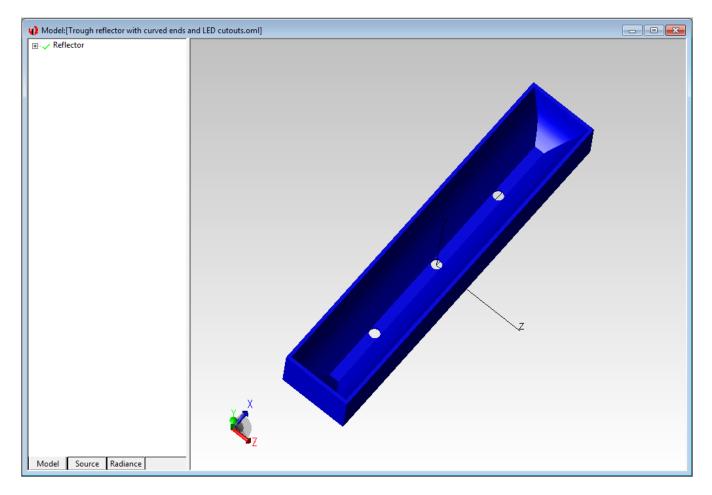
Different Candela Profile optimization targets can be defined for different axes







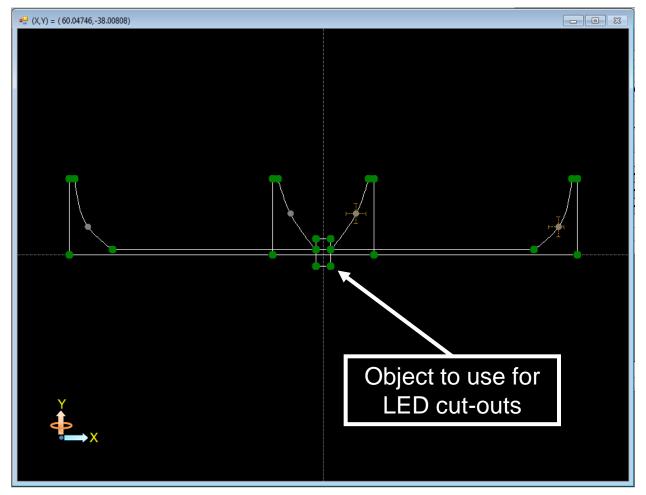




Trough reflector with curved ends and 3 cut-outs for LEDs – TracePro model







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



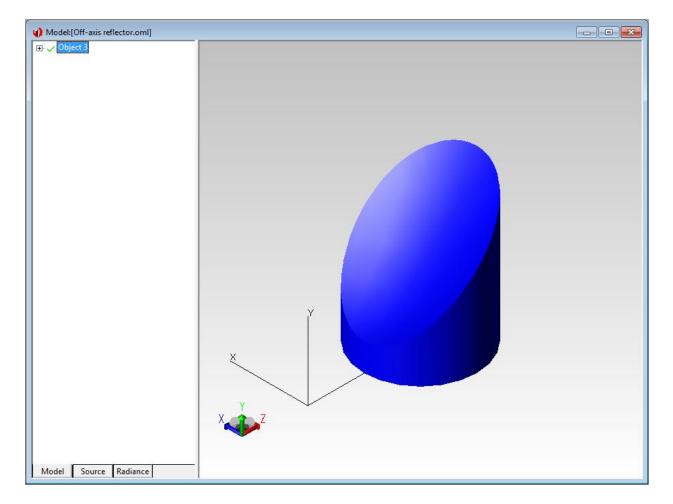


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Trough reflector with curved ends and 3 cut-outs for LEDs – Optimization window and Scheme macro



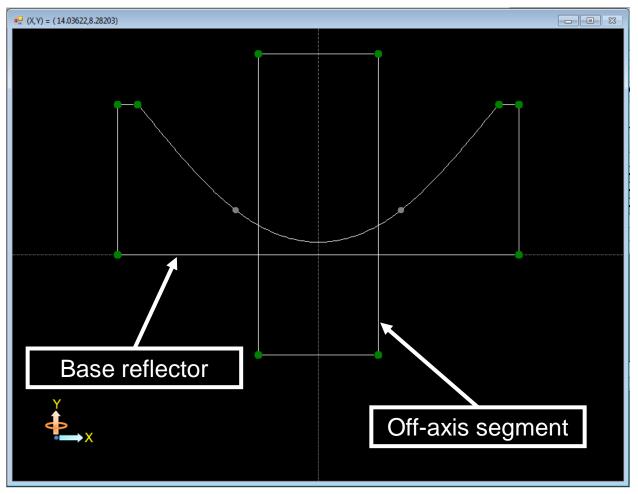




Off-axis reflector – TracePro model







Off-axis reflector – Interactive Optimizer Sketch window



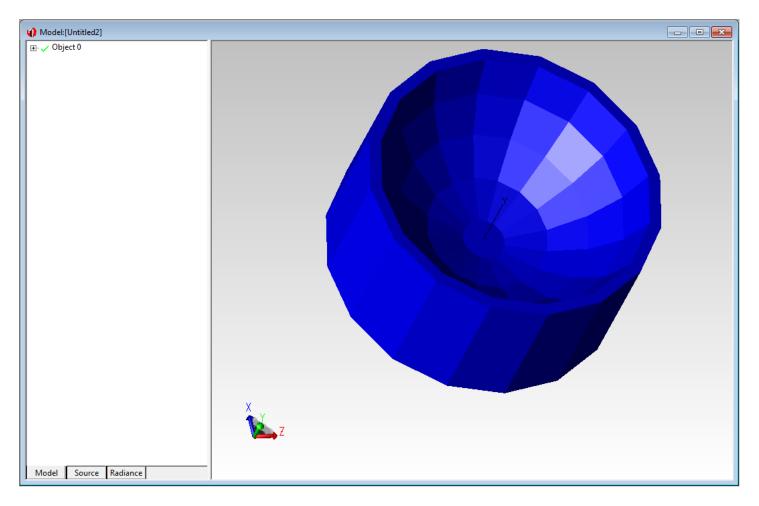


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Off-axis reflector – Optimization window and Scheme macro



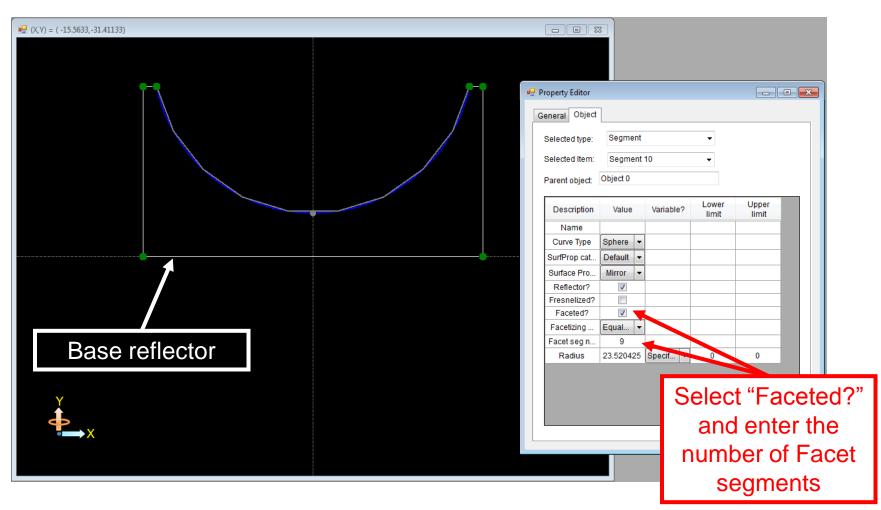




Faceted reflector-TracePro model







Faceted reflector – Interactive Optimizer Sketch window



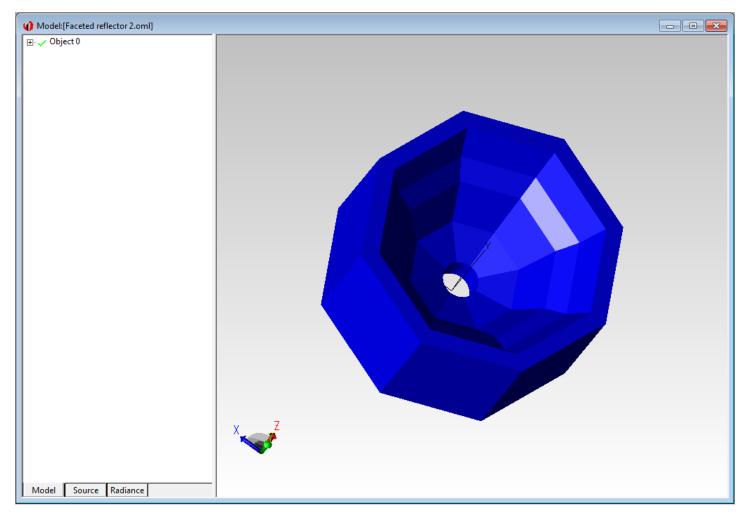


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#### Faceted reflector – Optimization window



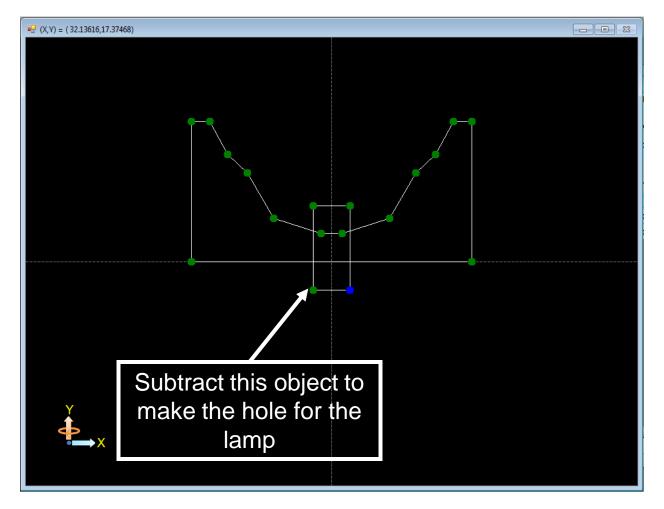




Faceted reflector 2– TracePro model



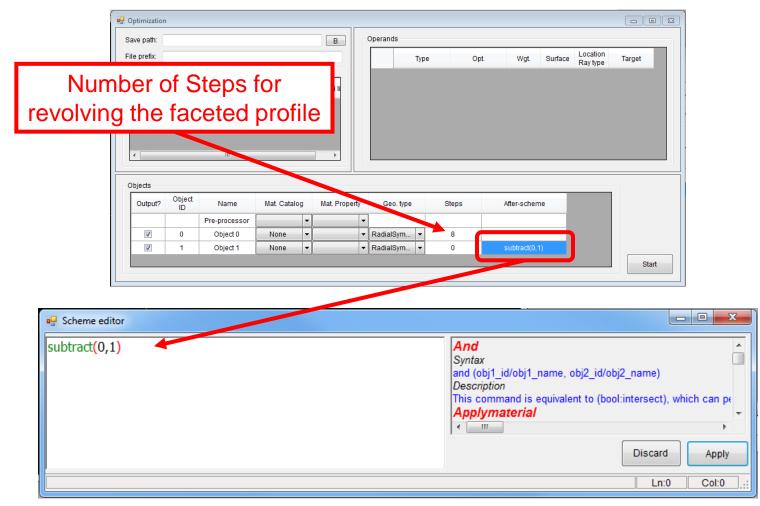




Faceted reflector 2 – Interactive Optimizer Sketch window



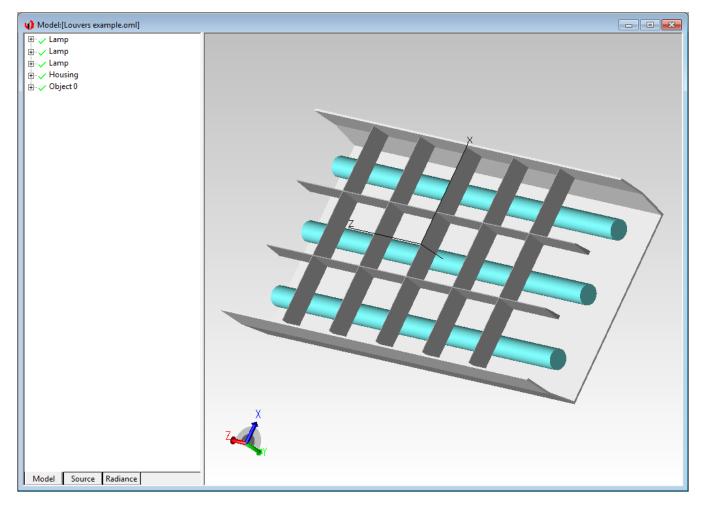




Faceted reflector 2 – Optimization window and Scheme macro



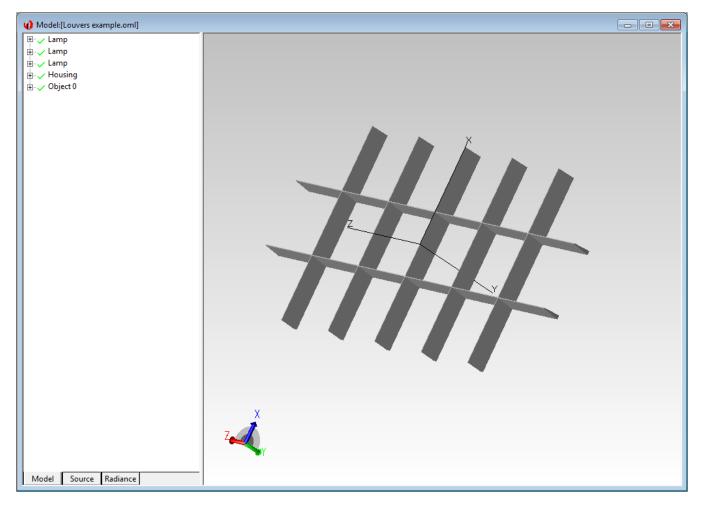




Fluorescent lamp fixture louvers- TracePro model







Fluorescent lamp fixture louvers- TracePro model





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Louvers– Relative and Pickup variables





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			Position-Y	25	Relative Var.	-	5	5
			_					
• • • • • • • • • • • • • • • • • • •	—		Property Editor					
			General Object					
			Selected type:	Control Point	•			
	Pickup Variable		Selected Item:	Control point 0 in	Segmen 👻			
			Parent object:	Dbject 1				
¥ ▲			Description	Value	Туре		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





🚽 Property Editor						8
General Object						
Selected type:	Control Point	-				
Selected Item:	Control point 0 in	Segmen 👻				
Parent object: 0	bject 1					
Description	Value	Туре		Lower limit / Pickup	Upper limit	
Description Position-X	Value 3	Type Pickup	•		Upper limit	
		r	•	Pickup	Upper limit	
Position-X	3	Pickup	+	Pickup cpx(2,0)	Upper limit	

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

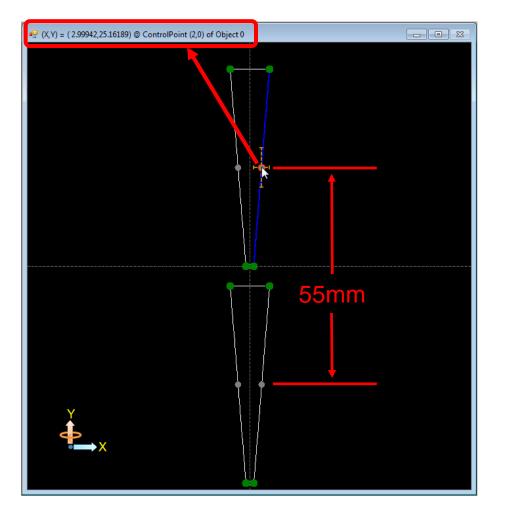
cpy(2,0)-55 = This control point will always have a Y value 55mm below Control Point (2,0)

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

Louvers-Pickup variable







•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





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Louvers- Optimization window and Scheme macro





# **Thank You**





# **Questions and Answers**





# For Additional Information Please Contact:

# Lambda Research Corporation Littleton, MA 978-486-0766 www.lambdares.com



