Tips, Tricks, and Shortcuts to Improve Productivity and Efficiency with TracePro

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 question and answer session

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

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Webinar Topics:

- Using Simulation Mode : how, when, and why.

- Determining memory usage using the Windows Task Manager and the TracePro Raytrace Report

- Modifying multiple Surface Sources at one time using the Surface Source Editor

- Grouping and moving System Tree items for better organization

- Display options, shortcuts to move and orbit the model view

Webinar Topics:

•What is the "Detect Rays Starting in Bodies" setting and when you should use it

•Irradiance Map and Candela Plot tools to get more information out of your results

•Interactive Optimizer settings

•And many other topics…..

•Question and Answer session

Additional Resources

- Past TracePro Webinars
    - http://www.lambdares.com/webinars/

- TracePro Tutorial Videos
    - http://www.lambdares.com/videos/

- TracePro Tutorials
    - http://www.lambdares.com/technical_support/tracepro/tutorials/

- TracePro Training Classes
    - http://www.lambdares.com/technical_support/training/

Current TracePro Release

- TracePro 7.1.2

- TracePro 7.1.3 Early Access

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

- www.lambdares.com

Tips, Tricks, and Shortcuts to Improve Productivity and Efficiency with TracePro

The Simulation Mode Raytrace

Analysis Mode

- The default raytrace mode in TracePro is Analysis Mode

  - Ray data is saved on every surface in the model, in RAM. This can use large amounts of memory, but it allows you to view plots such as Irradiance Maps, 3D Irradiance Maps, and Candela Plots on any surface at any time

  - 32-bit TracePro can only use up to 2GB of RAM, so it is easy to exceed the available amount of RAM with large or complex models and raytraces

  - 64-bit TracePro can use as much RAM as is available on your computer. This is better, but large raytraces may still exceed the available RAM.

- Simulation Mode is the solution

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Simulation Mode

- Simulation Mode raytrace

  - Predefine Exit Surface or Surfaces where you want to save the ray data

  - User can also choose to save Candela and Ray Path data

  - Ray data is saved to the hard drive instead of RAM

  - Creates a .sim file in the same directory as the model

  - Rays are not shown

Simulation Mode
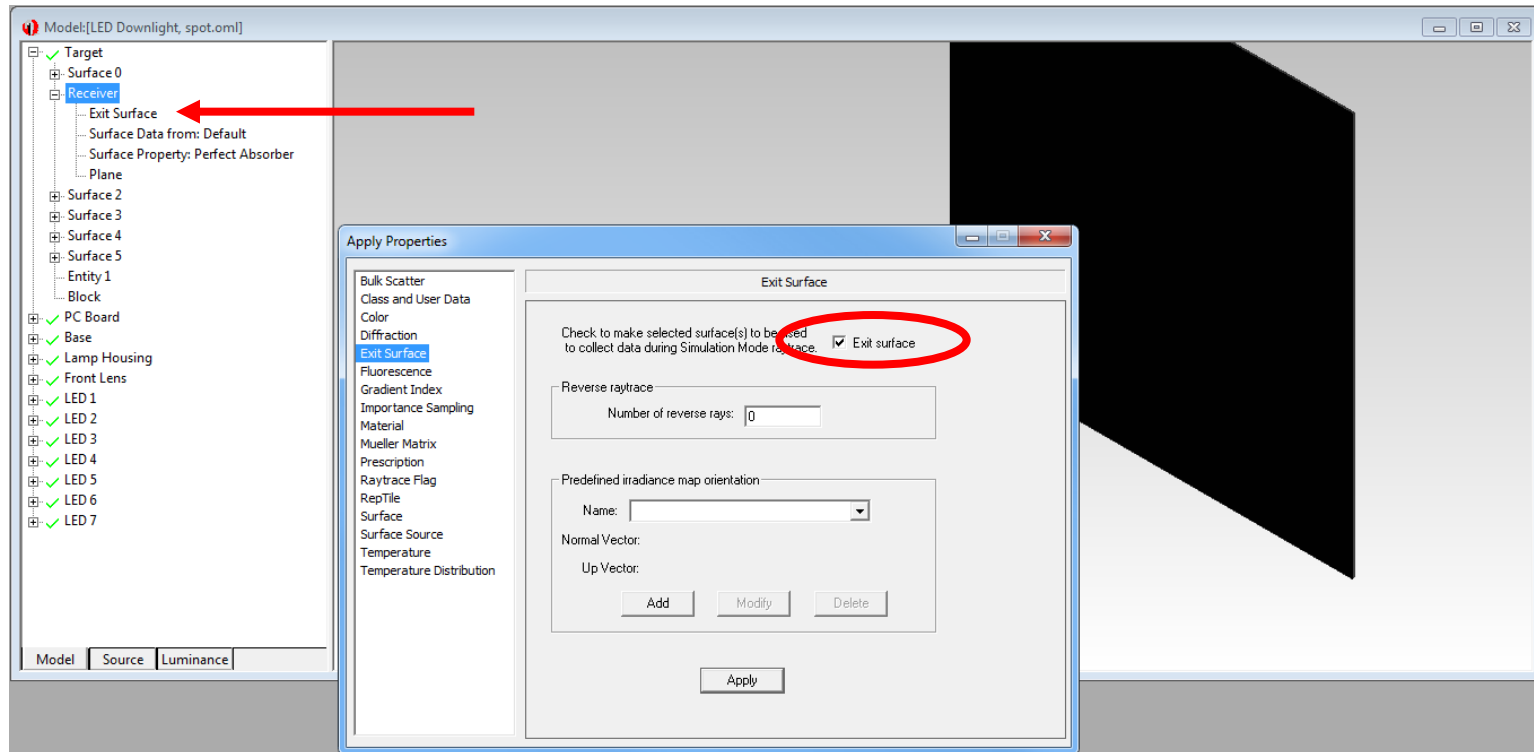
Defining an Exit Surface, or Exit Surfaces
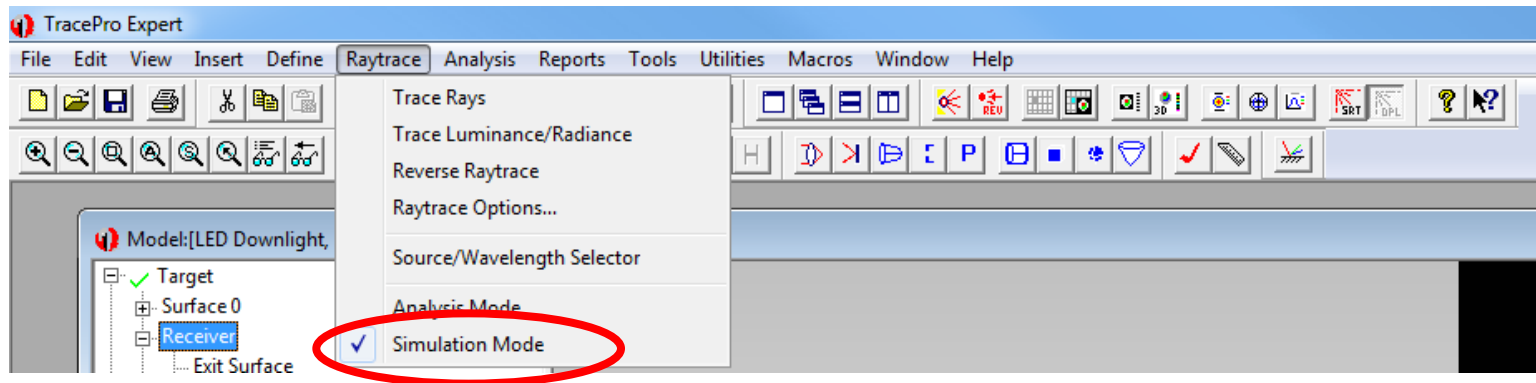
Simulation Mode
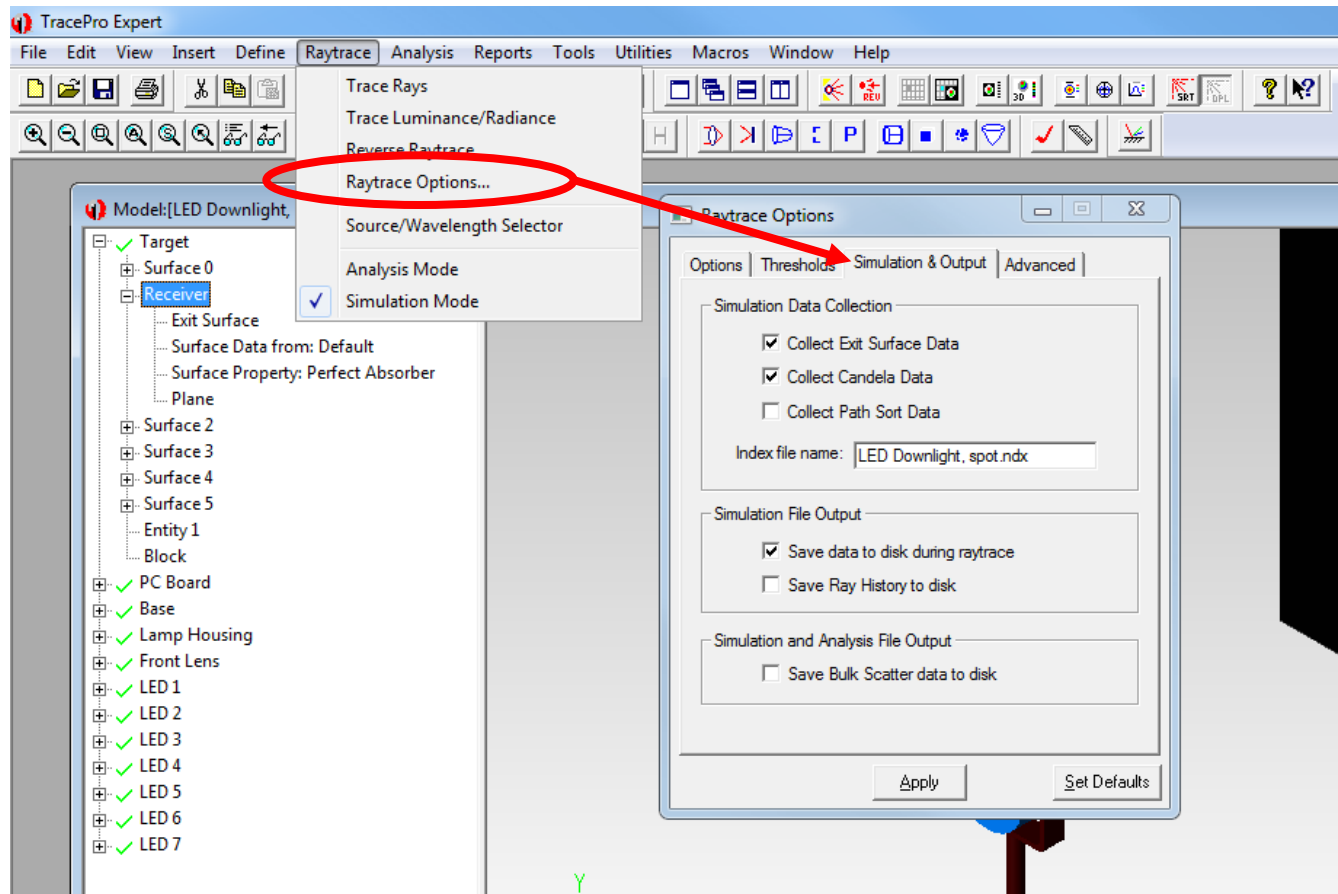
Simulation Mode Options
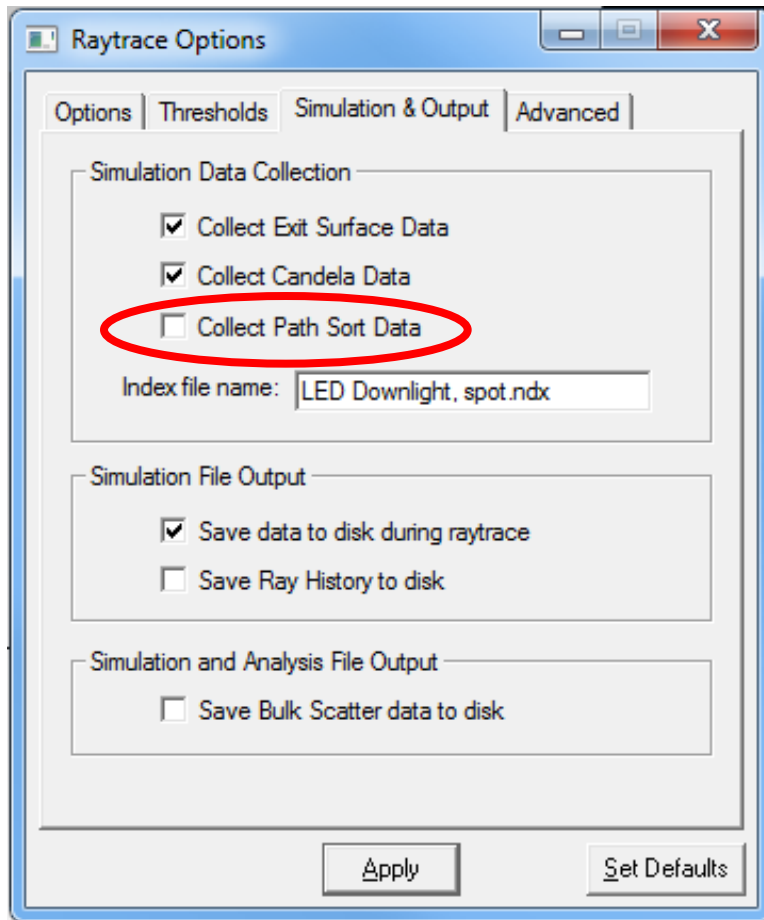
Simulation Mode

Checking "Collect Path Sort Data" can increase raytrace times. If you are not looking at Path Sort data, leave this unchecked. The default setting is unchecked in the newest releases of TracePro

Simulation Mode Options

Simulation Mode

Switching to Simulation Mode

Simulation Mode
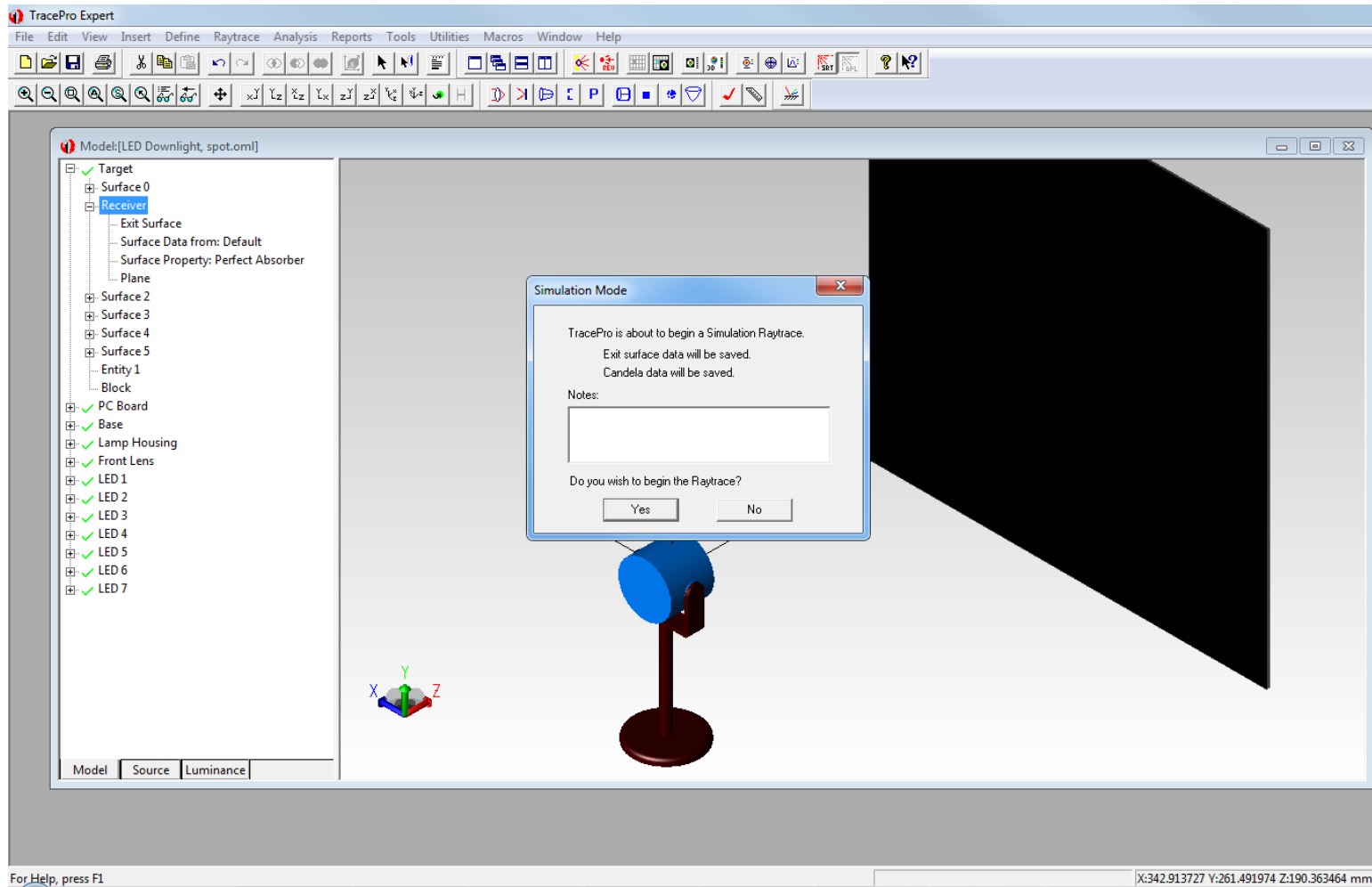
Running a Simulation Mode Raytrace
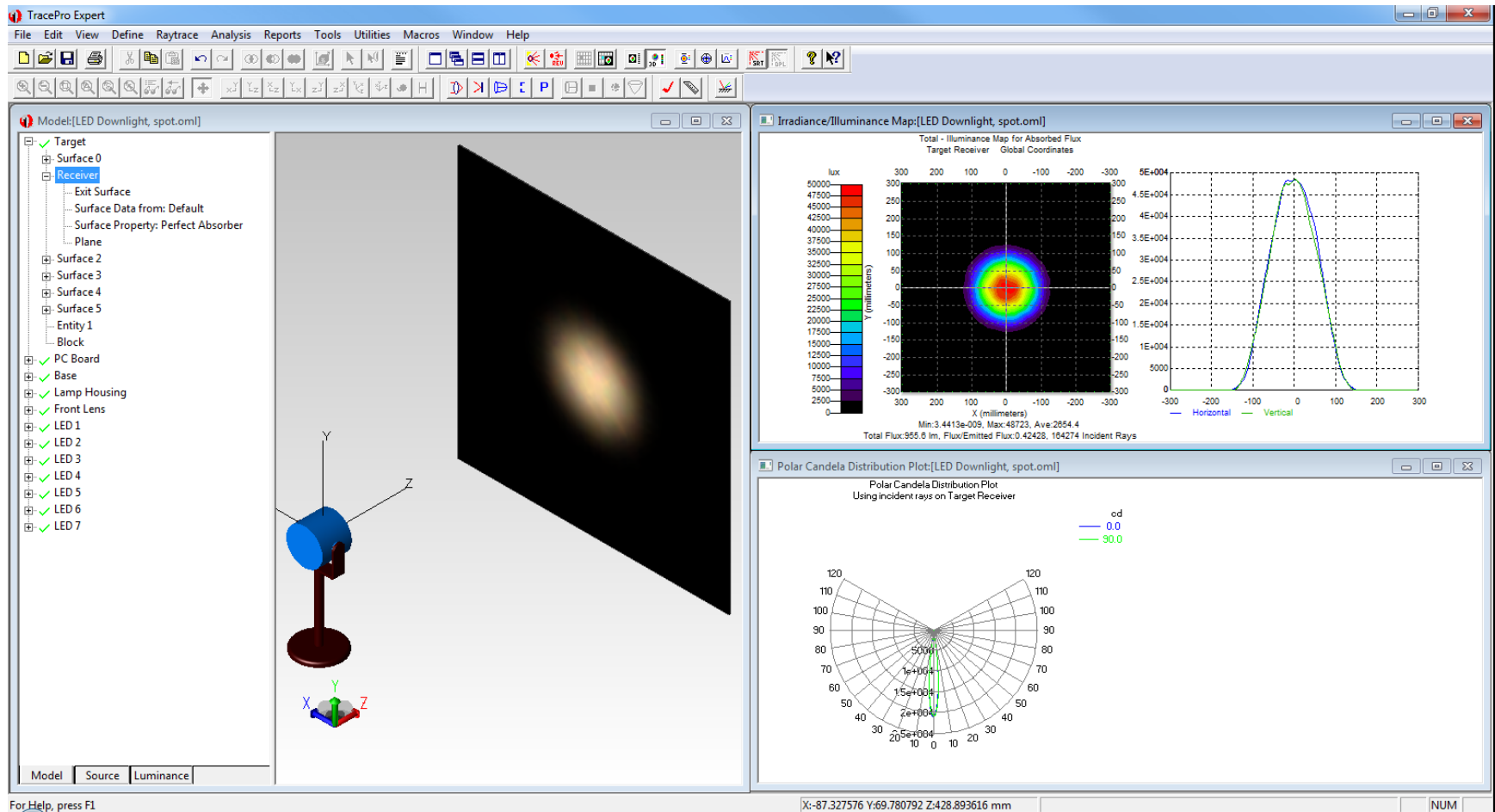
Simulation Mode

Simulation Mode Raytrace Results

Simulation Mode
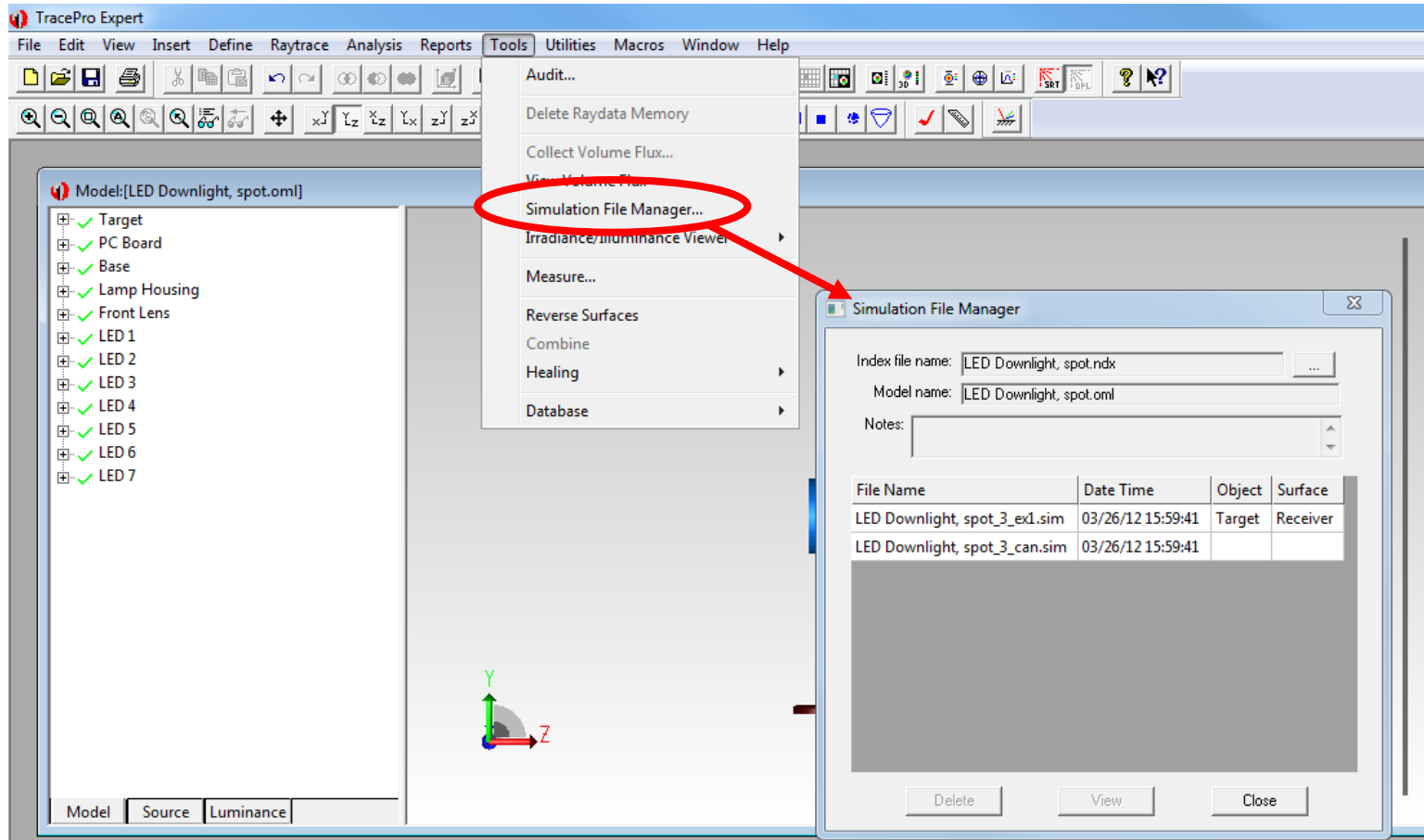
Use the Simulation File Manager and the .sim file to open an Irradiance Map for a previous Simulation Mode raytrace

Simulation Mode

```
┌─────────────────────────┐         ┌─────────────────────────┐
│                         │         │                         │
│   Create Initial Model  │────────▶│ Switch to Simulation    │
│                         │         │         Mode            │
└─────────────────────────┘         └─────────────────────────┘
            │                                   │
            ▼                                   ▼
┌─────────────────────────┐         ┌─────────────────────────┐
│                         │         │                         │
│  Run initial raytraces  │         │ Increase the number of  │
│  in Analysis Mode with  │         │      rays traced        │
│  low number of rays     │         │                         │
└─────────────────────────┘         └─────────────────────────┘
            │                                   │
            ▼                                   ▼
┌─────────────────────────┐         ┌─────────────────────────┐
│                         │         │                         │
│   Refine the model      │────────▶│ Higher resolution       │
│                         │         │ results for Irradiance  │
│                         │         │ Maps, Candela Plots,    │
│                         │         │ etc..                   │
└─────────────────────────┘         └─────────────────────────┘
```
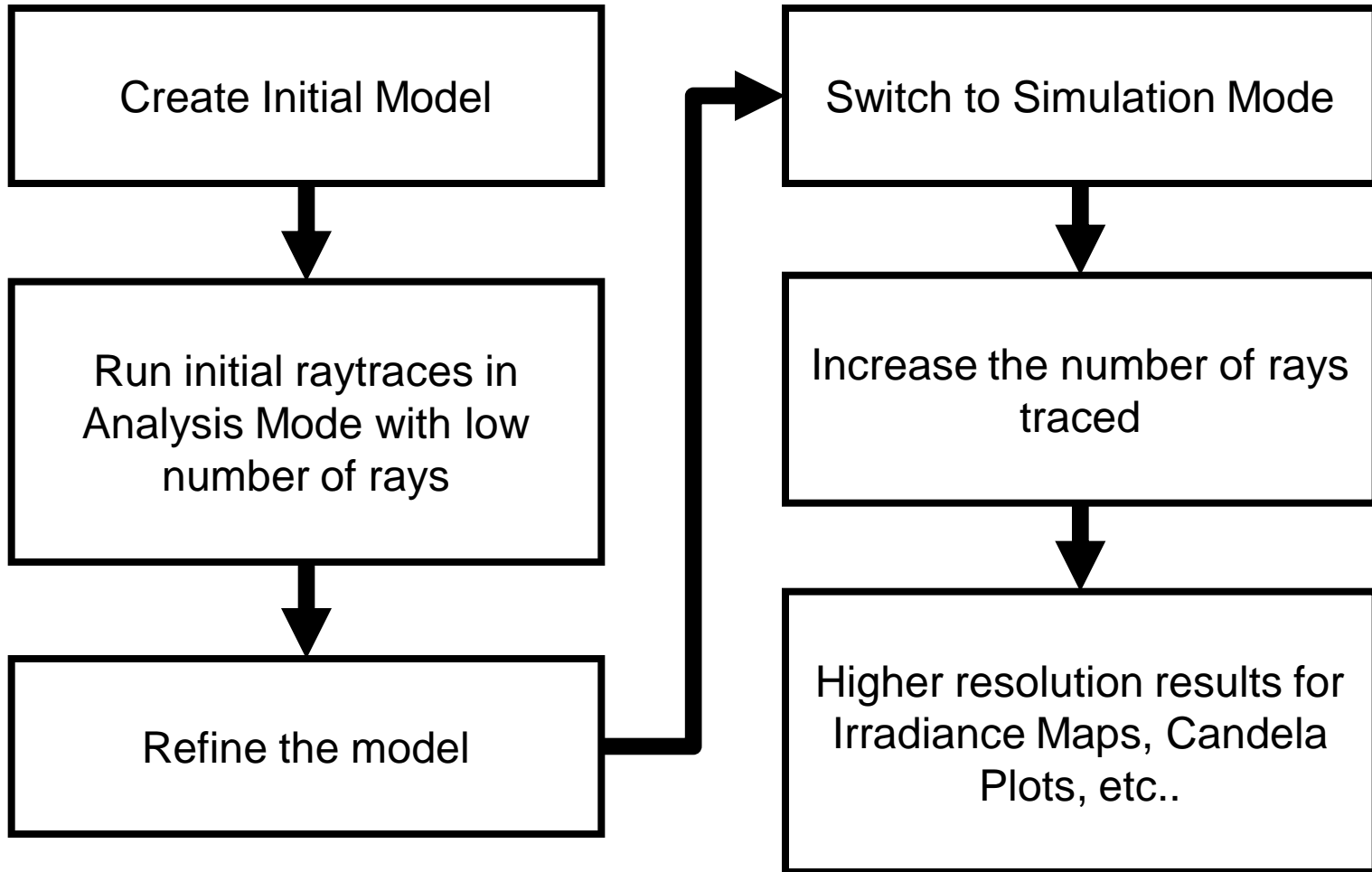
Typical Workflow using Simulation Mode

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Determining Memory Usage by TracePro

Determining Memory Usage
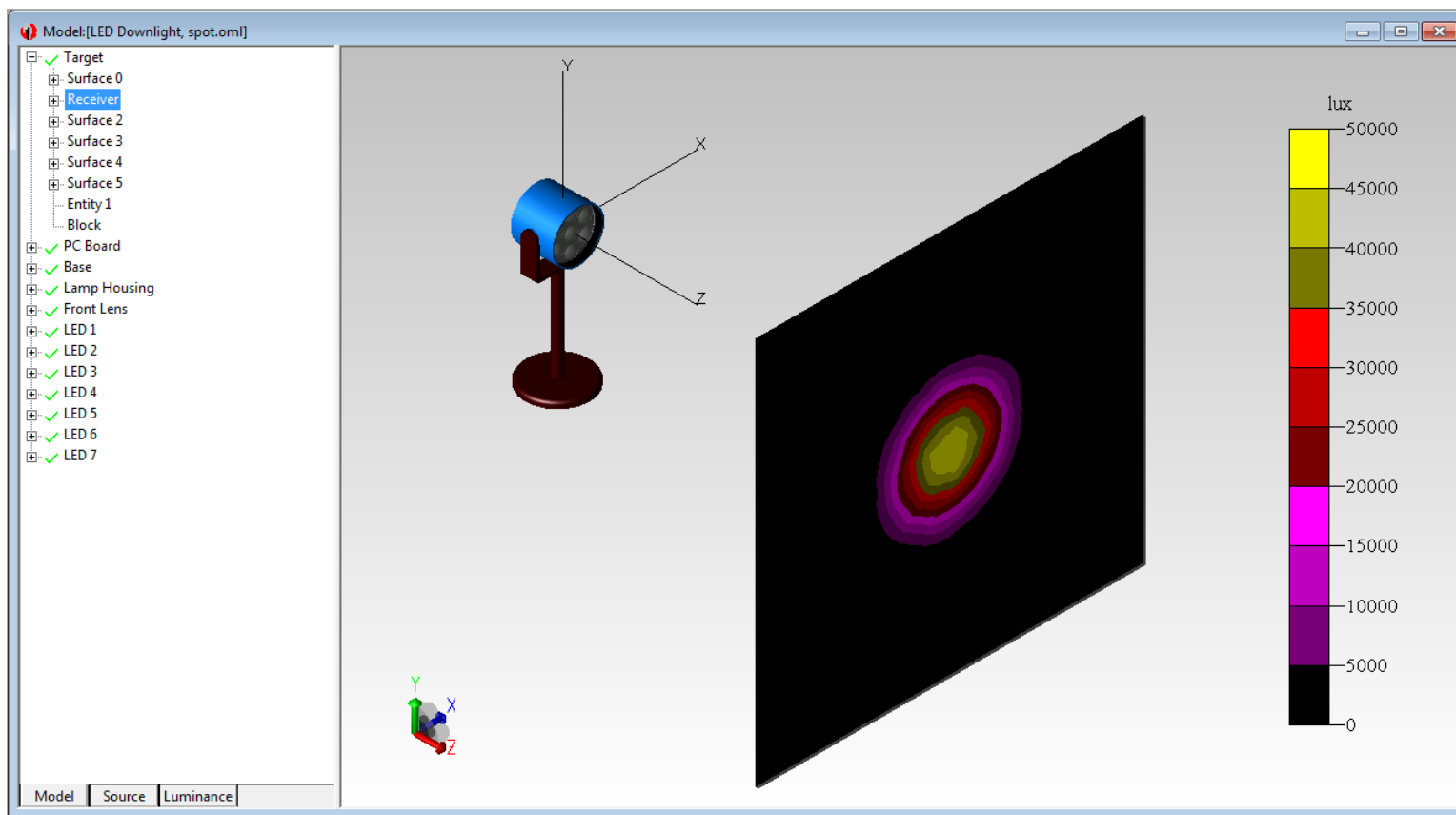
Example Model - LED light with 7 LEDs and circular lens array

Determining Memory Usage
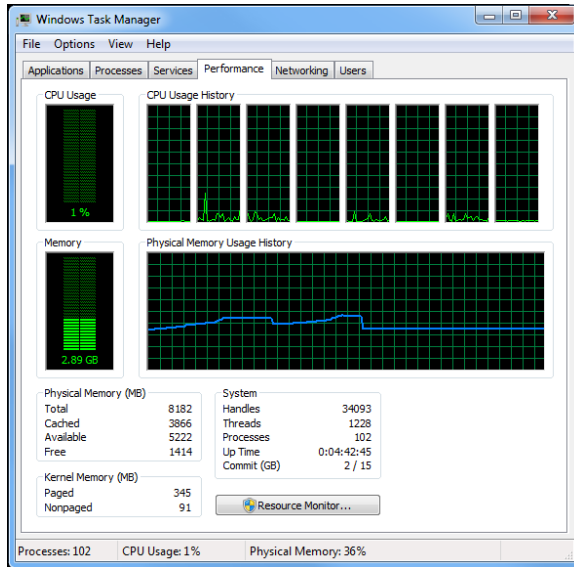
| No rays traced 2.89GB of RAM Model and other programs open | 350k rays traced 3.62GB of RAM 0.73GB used | 3.5M rays traced 7.49GB of RAM 4.6GB used |
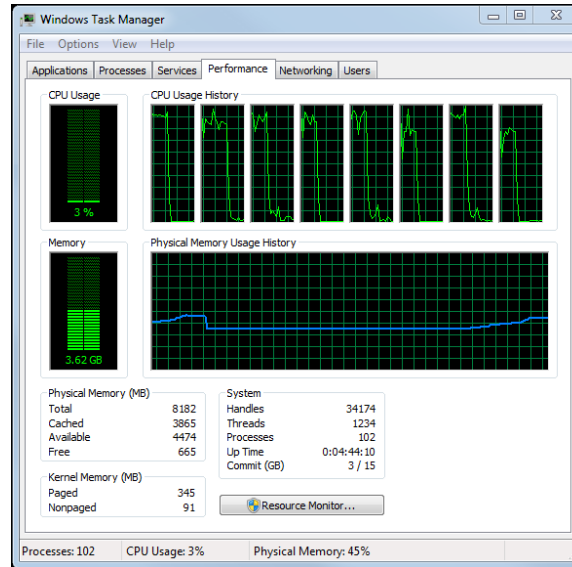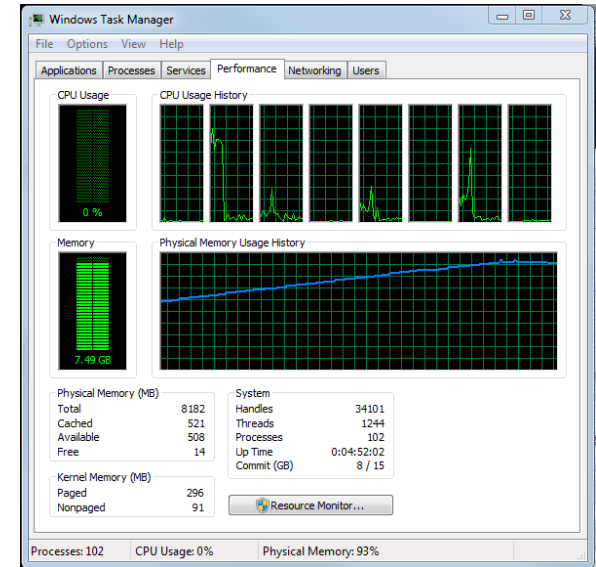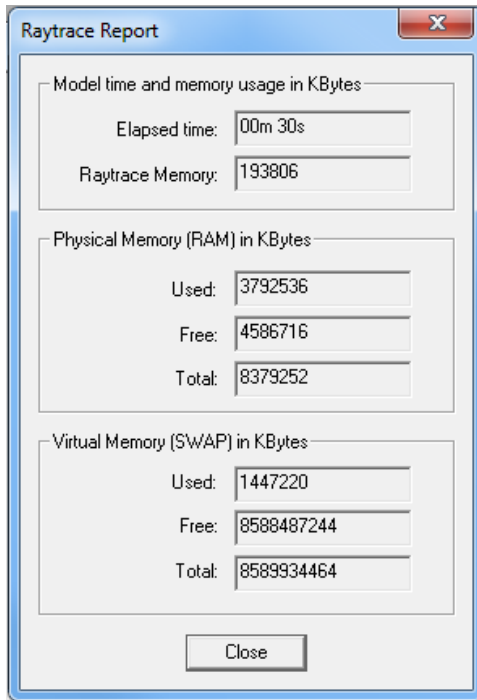
Windows Task Manager Performance Tab – Windows 7 64-bit
Run a smaller number of rays initially to determine memory usage

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Determining Memory Usage
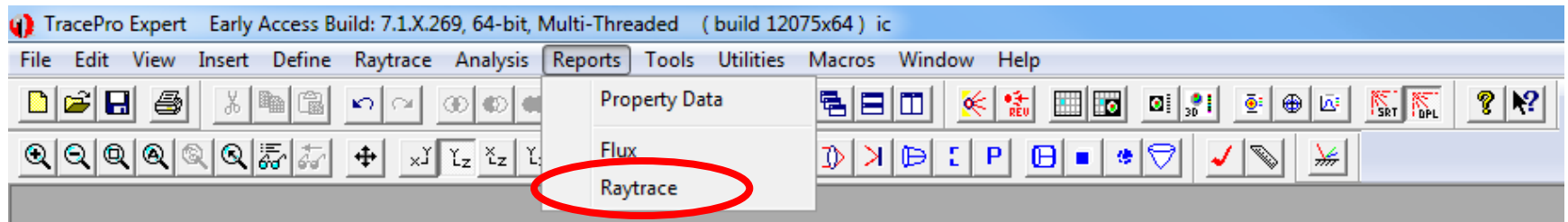
TracePro Raytrace Report – Reports->Raytrace

Determining Memory Usage

Raytrace Report

Model time and memory usage in KBytes
- Elapsed time: 00m 30s
- Raytrace Memory: 193806

Physical Memory (RAM) in KBytes
- Used: 3792536
- Free: 4586716
- Total: 8379252
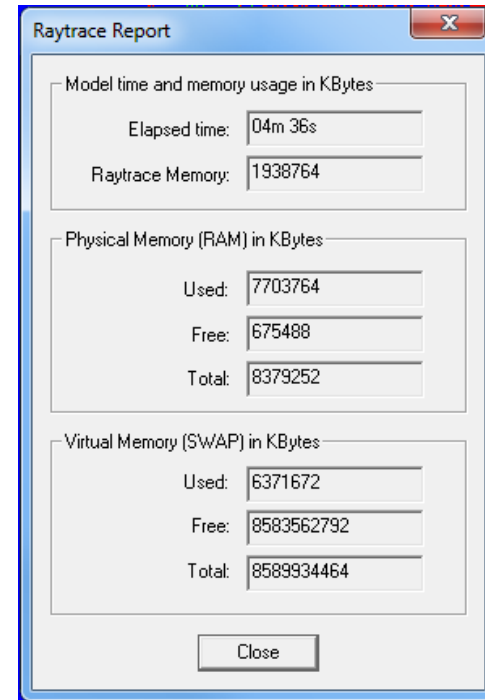
Virtual Memory (SWAP) in KBytes
- Used: 1447220
- Free: 8588487244
- Total: 8589934464

Close

Raytrace Report

Model time and memory usage in KBytes
- Elapsed time: 04m 36s
- Raytrace Memory: 1938764

Physical Memory (RAM) in KBytes
- Used: 7703764
- Free: 675488
- Total: 8379252

Virtual Memory (SWAP) in KBytes
- Used: 6371672
- Free: 8583562792
- Total: 8589934464

Close

| 350k rays traced | 3.5M rays traced |
| 0.194GB used for raytrace | 1.94GB used for raytrace |

TracePro Raytrace Report – Reports->Raytrace

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Determining Memory Usage

Why is there a difference in the RAM used as reported by the Windows Task Manager opposed to the TracePro Raytrace Report?

The TracePro Raytrace Report only shows the amount of memory used for the raytrace itself. Additional tasks such as displaying the rays, opening an Irradiance Map or a Candela Plot, etc… consume additional memory.

The Windows Task Manager is the more accurate method for determining memory usage and availability.
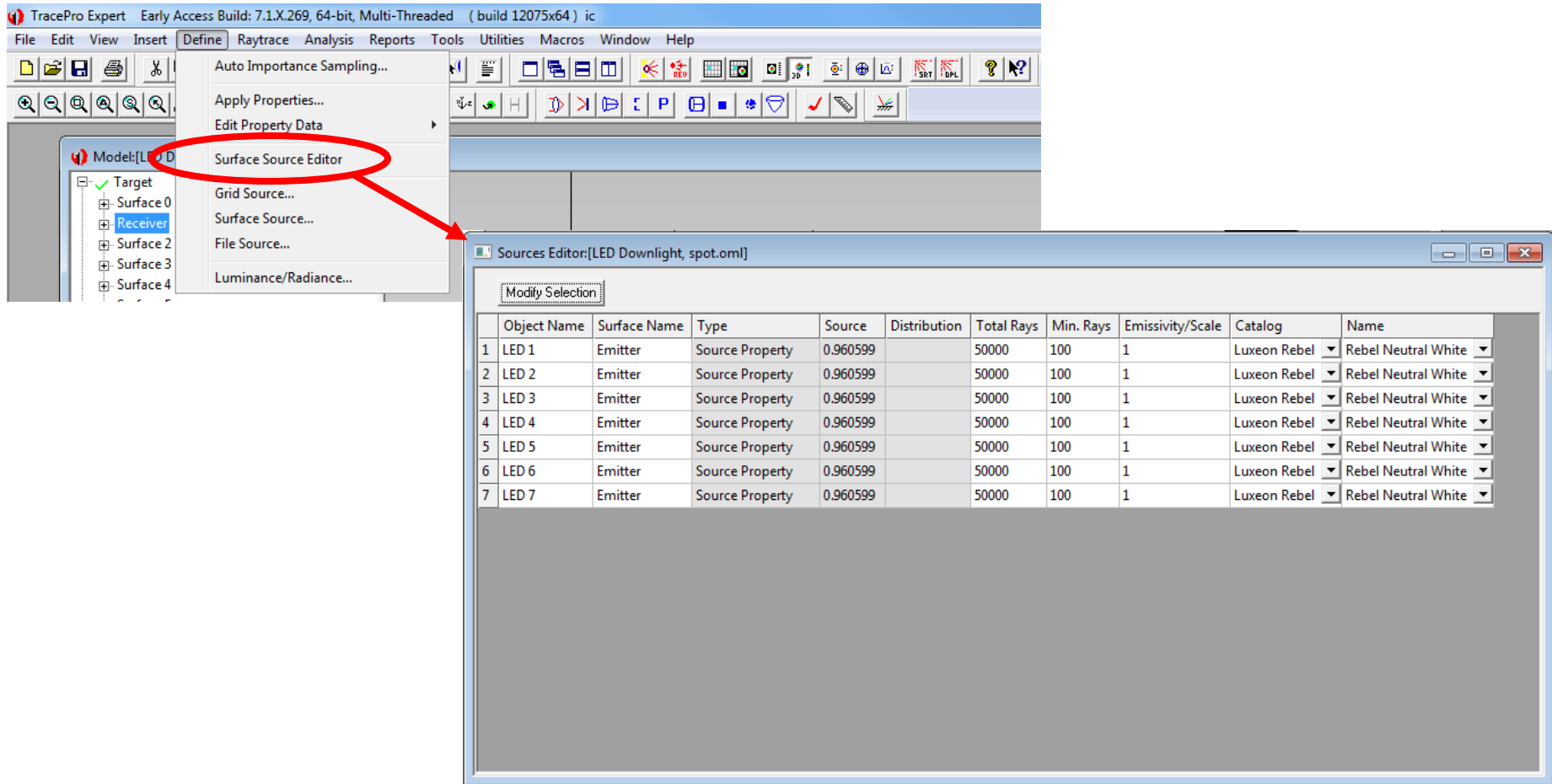
Using the Surface Source Editor to Modify Applied Surface Source Properties

Surface Source Editor
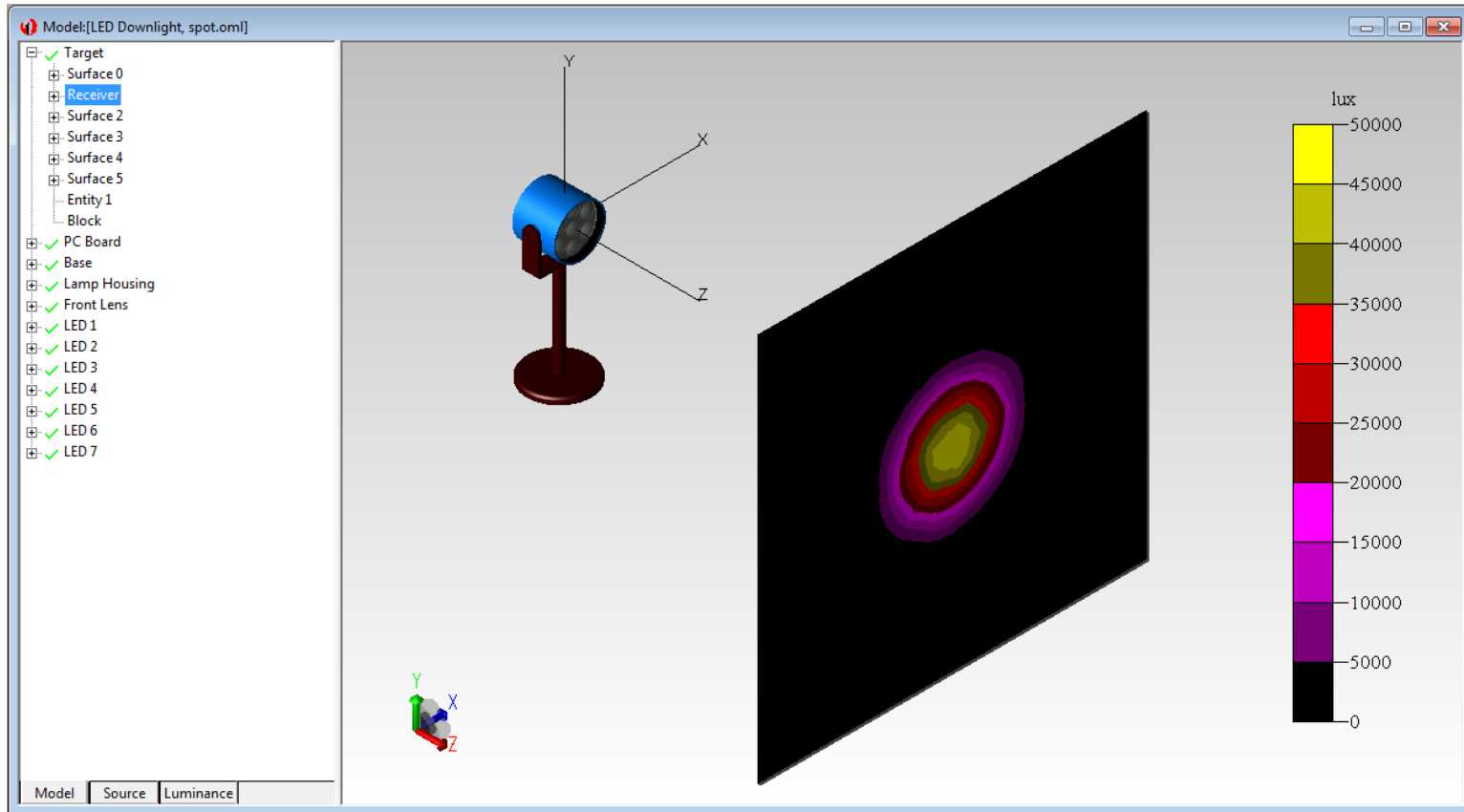
Example Model - LED light with 7 LEDs and circular lens array

Surface Source Editor

Use the Surface Source Editor to modify any or all of the Surface Sources in a TracePro model – Define->Surface Source Editor

Surface Source Editor

Click on a column header to select all of the Surface Sources, or select individual sources in the spreadsheet, then click Modify to enter changes. Values can be Scaled or Set To a discrete value. Catalog and Name can only be edited one at a time in the Surface Source Editor.

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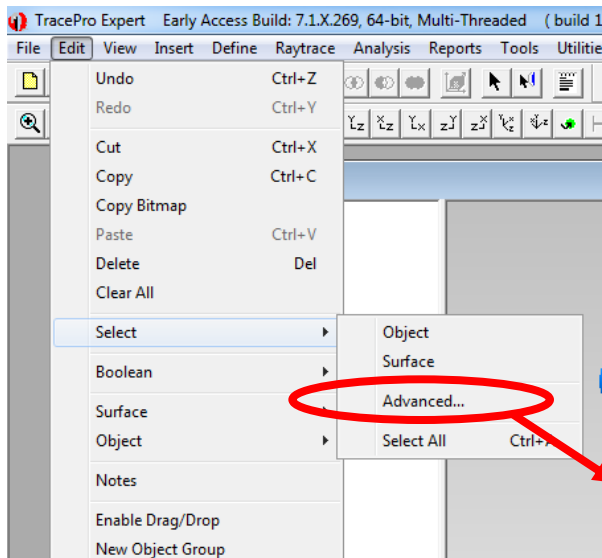
Advanced Select

Valid in TracePro 7.1.3 EA
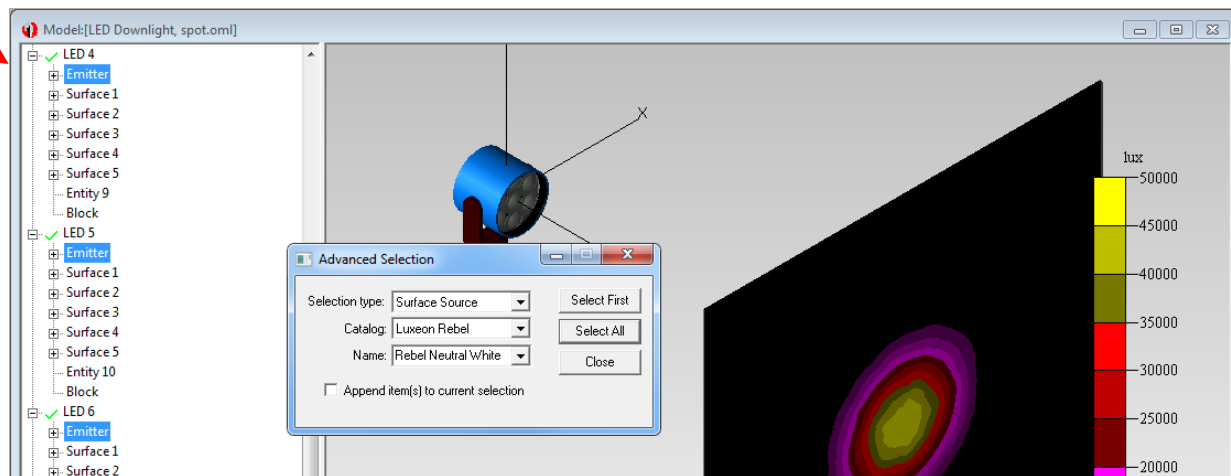
To apply a different Surface Source Property to each source in the model at one time, use Edit->Select->Advanced to select all of the Surface Sources with a given name. The Surface Source Property can then be changed for all of the selected sources using the Apply Properties Dialog Box.

Moving and Grouping Objects in the Model Tree for Better Organization

Organizing the Model Tree
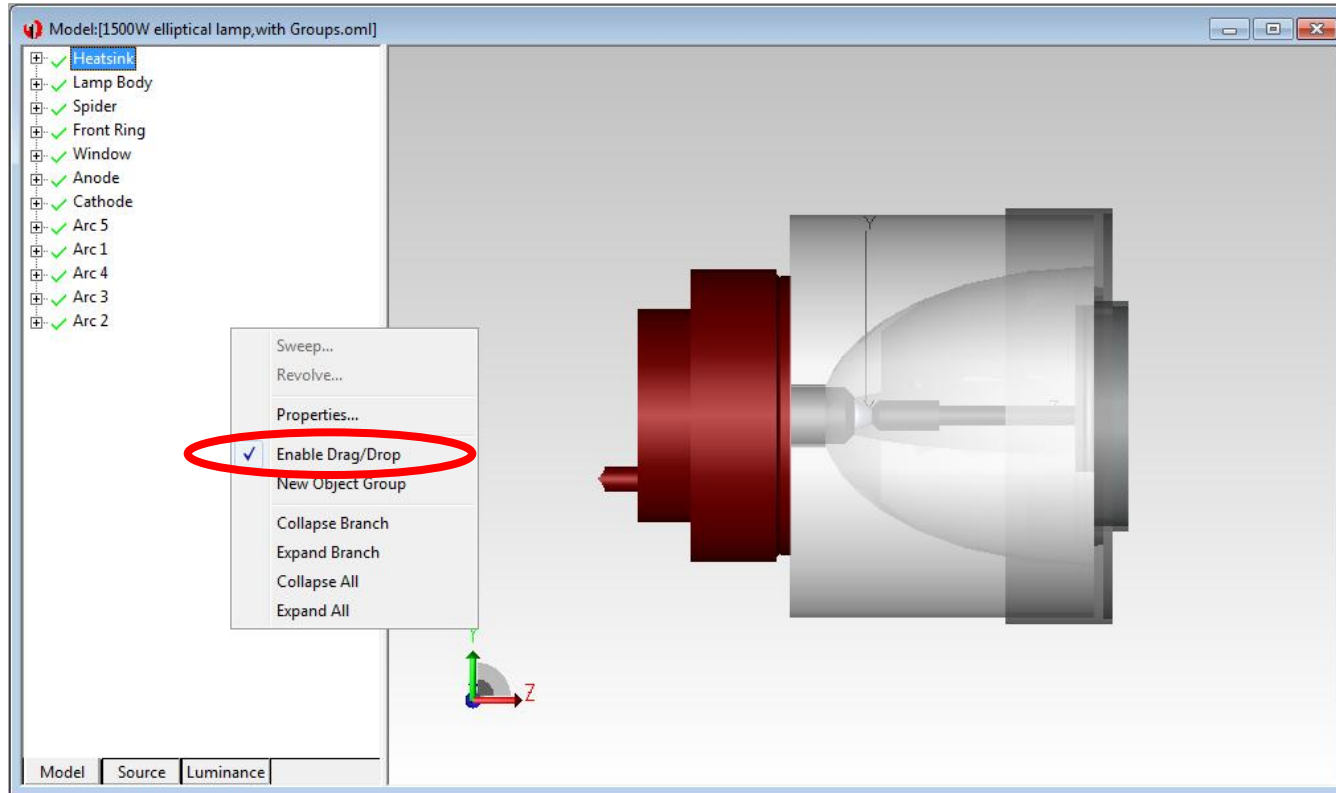
To move objects in the Model Tree, right click in the Model Tree and select Enable Drag/Drop. Then select the object to move with the left mouse button and move it to its new location

Organizing the Model Tree
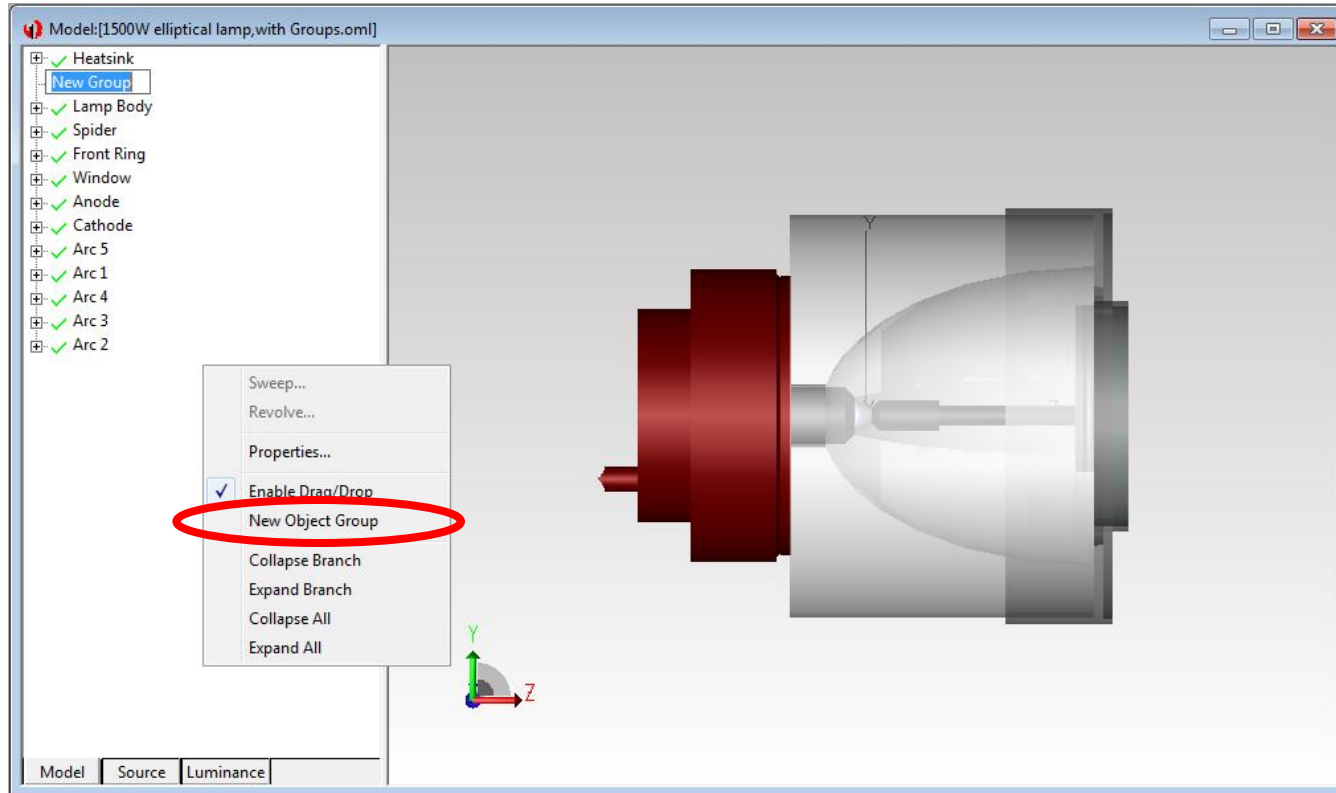
To add Object Groups to the Model Tree, right click in the Model Tree and select New Group Object. Then name the new Object Group and drag the objects into that group.

Organizing the Model Tree
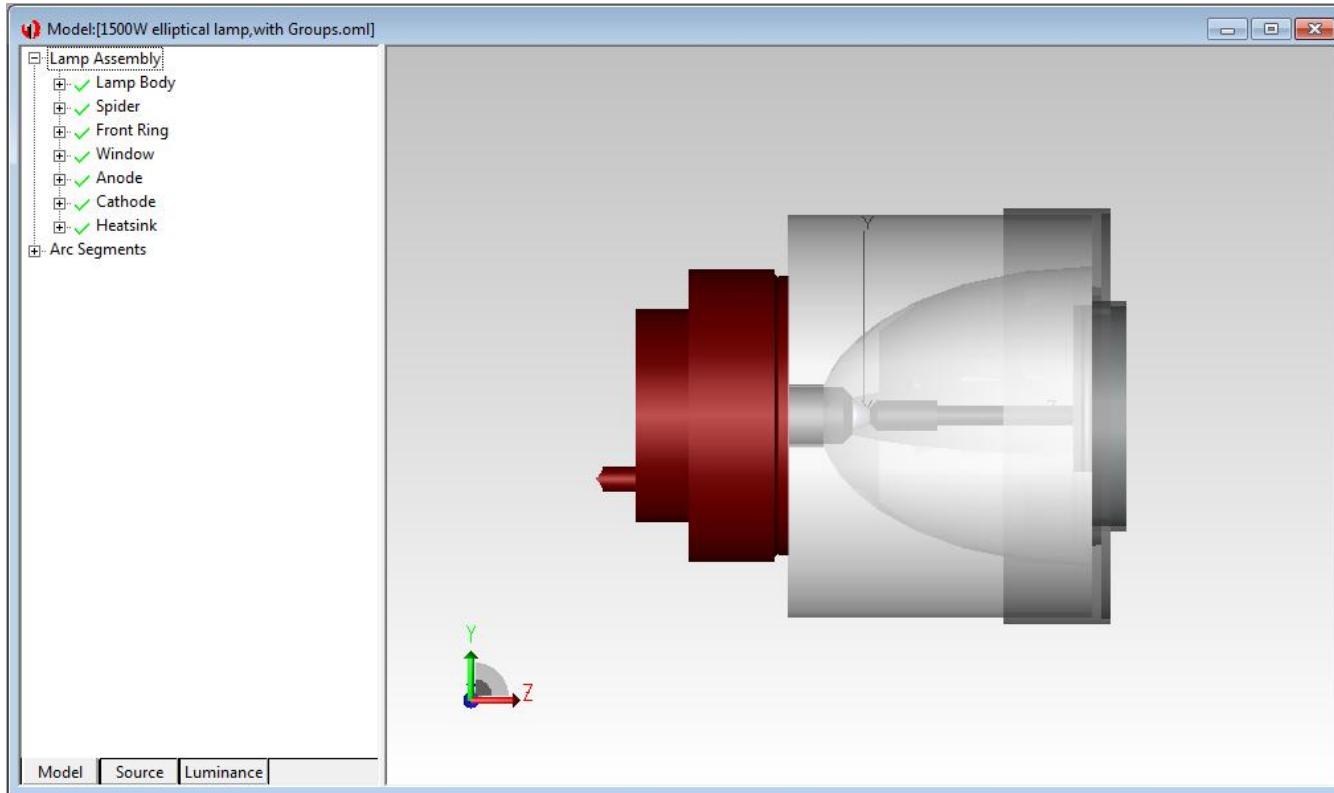
Adding Object Groups can help organize the Model Tree and make objects easier to identify and locate. It can also make for a more compact Model Tree as Groups can be collapsed when not being used.

Shortcuts for Panning and Orbiting the Model View

Panning and Orbiting the Model View
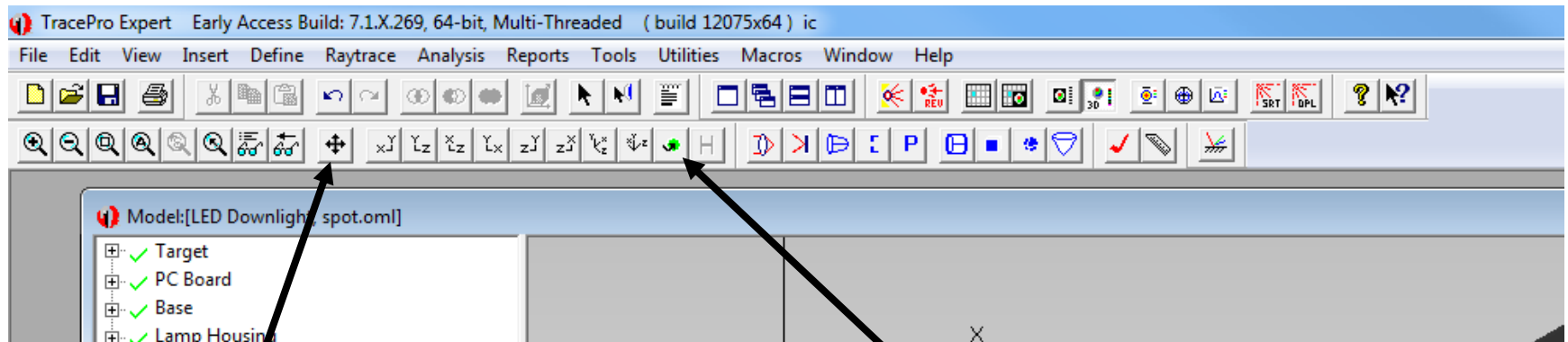
Pan icon

Orbit icon

Select the appropriate icon in the toolbar and the hold down the left mouse button in the model window to pan or orbit the model

Panning and Orbiting the Model View

• **Ctrl-right click** and drag to pan the view

• **Shift-right click** and drag to orbit the view

• Drag on one of the axes of the 3 colored XYZ axes to rotate the view

• Double click on an axis to make it point into the screen

• Double click on the shaded arc between the colored axes to display a plan view

Detect Rays Starting in Bodies

Detect Rays Starting in Bodies
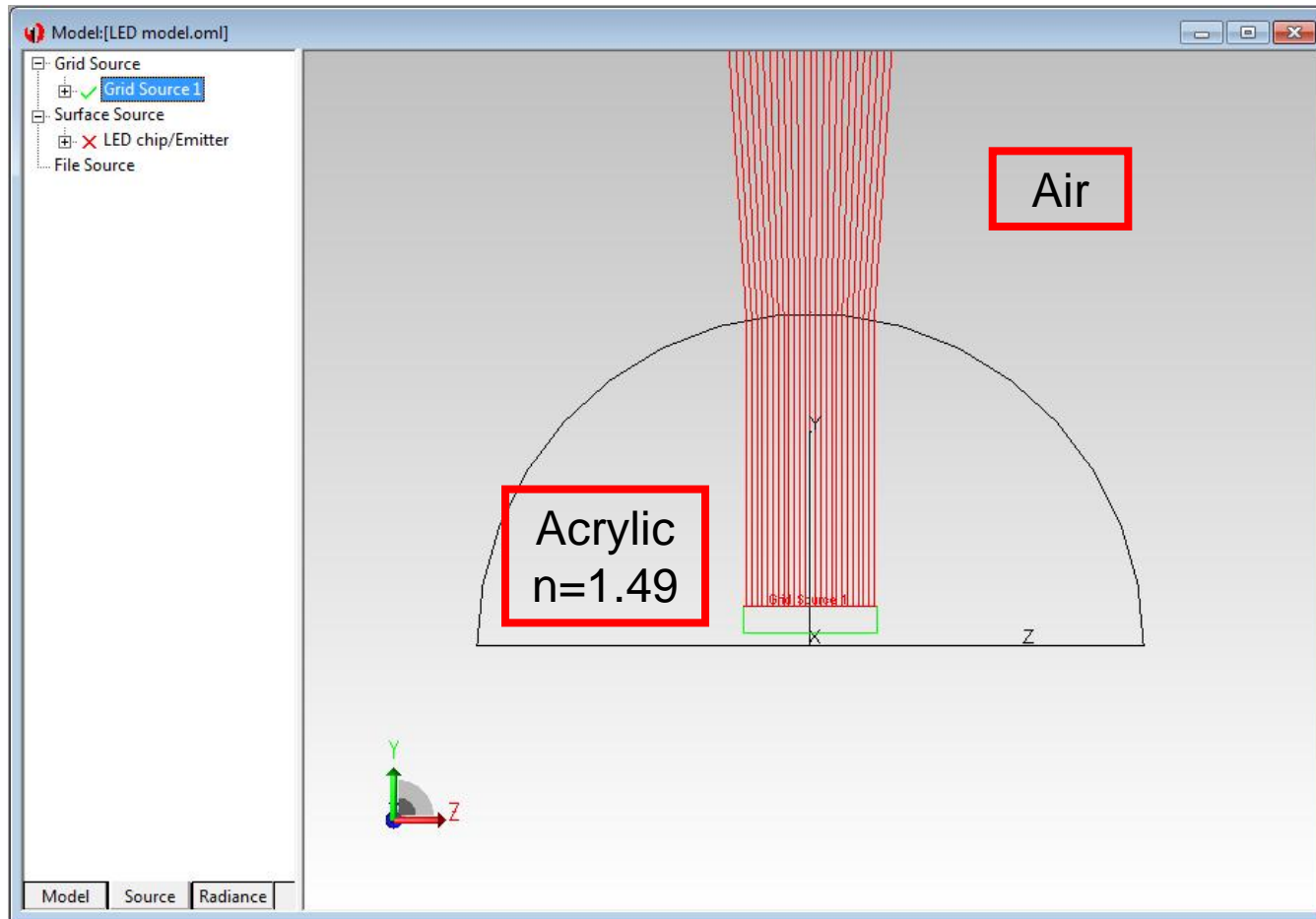
TracePro assumes rays are starting in air. This can give the wrong result if rays are started inside an object with a different index of refraction.

Detect Rays Starting in Bodies
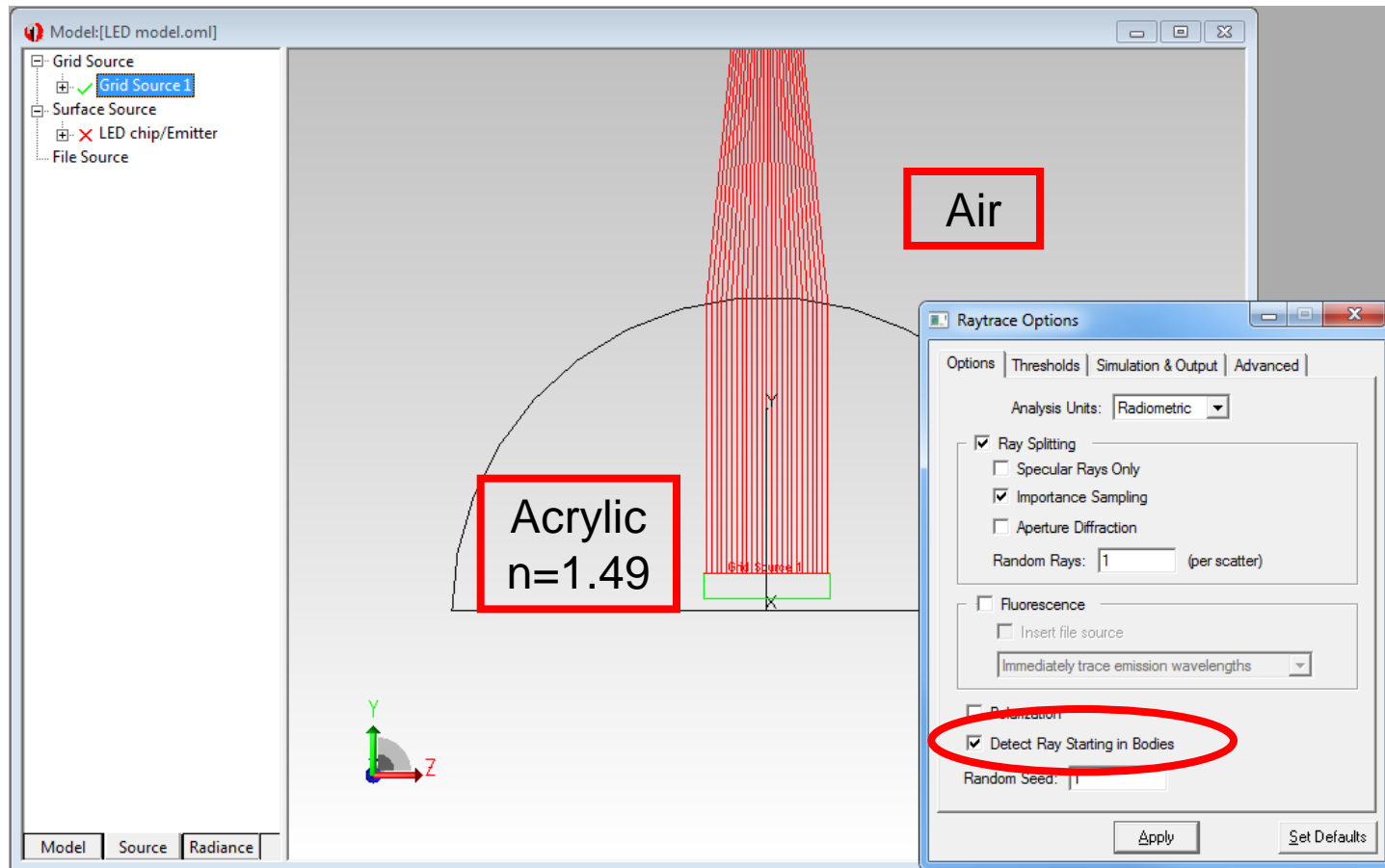
When starting rays inside an object, check the box for "Detect Ray Starting in Bodies" at Raytrace->Raytrace Options->Options

Getting More Information from the Irradiance/Illuminance Maps and Candela Plots

Irradiance/Illuminance Maps

We want to see where these rays are coming from
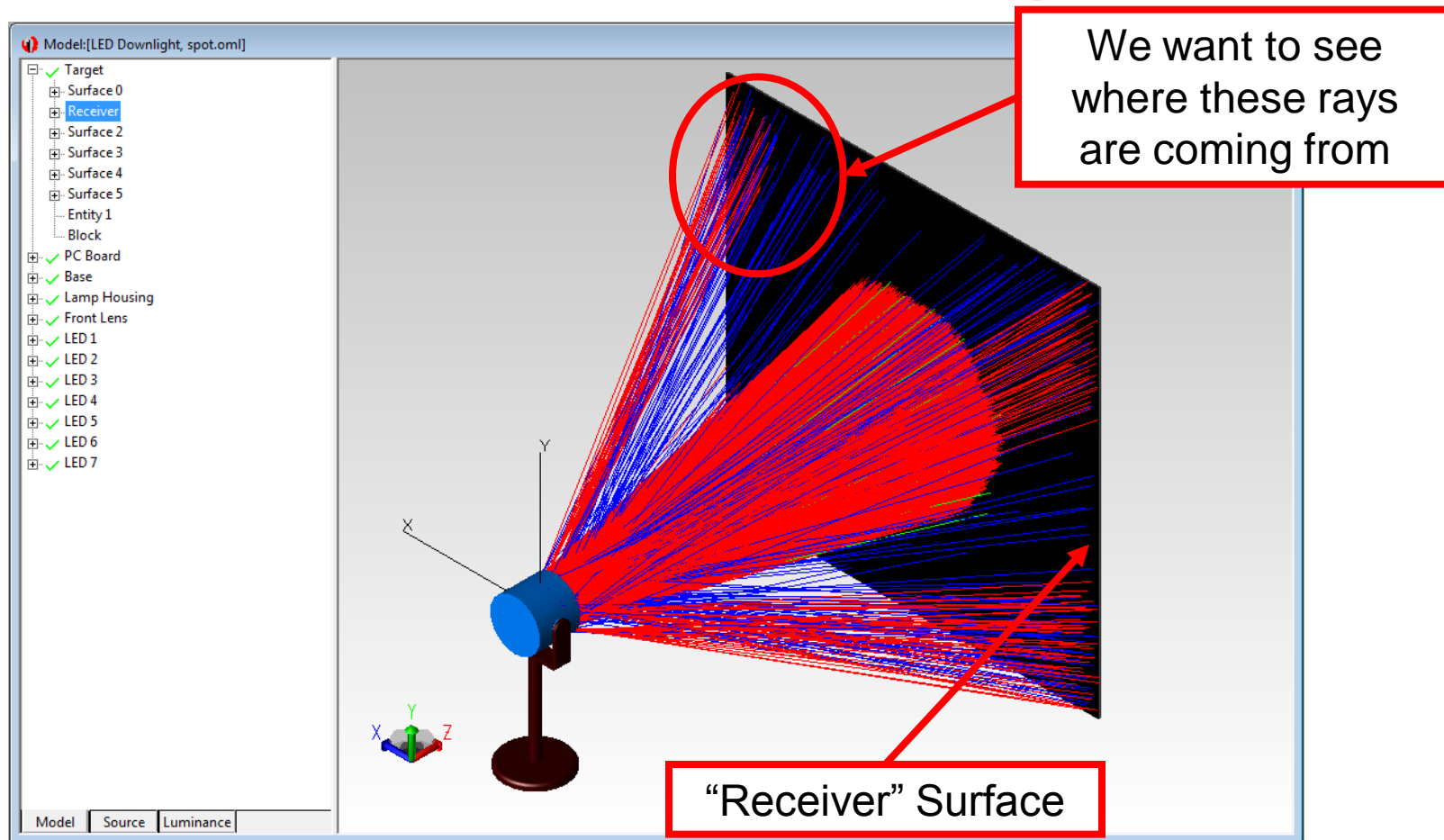
"Receiver" Surface

Example Model - LED light with 7 LEDs and circular lens array

Irradiance/Illuminance Maps
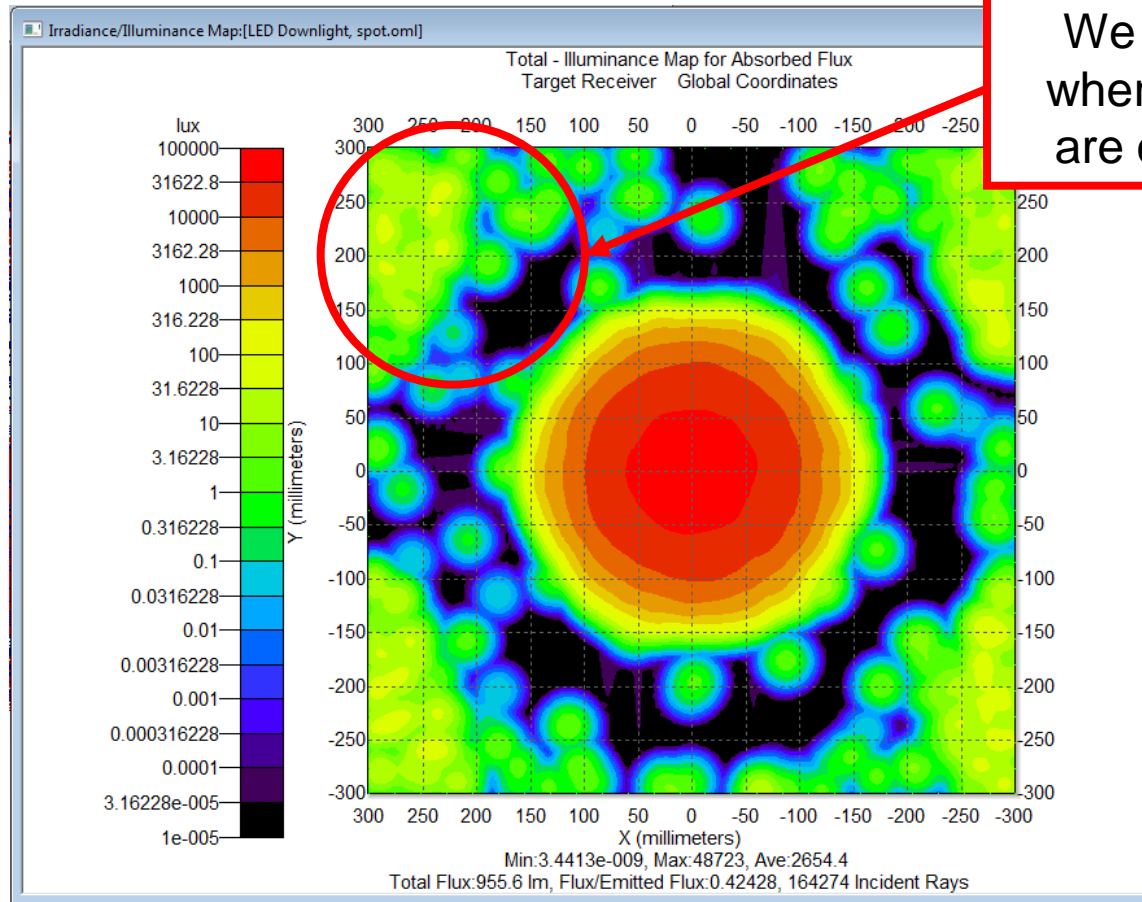
Illuminance Map on "Receiver" Surface – Log Scale

Irradiance/Illuminance Maps
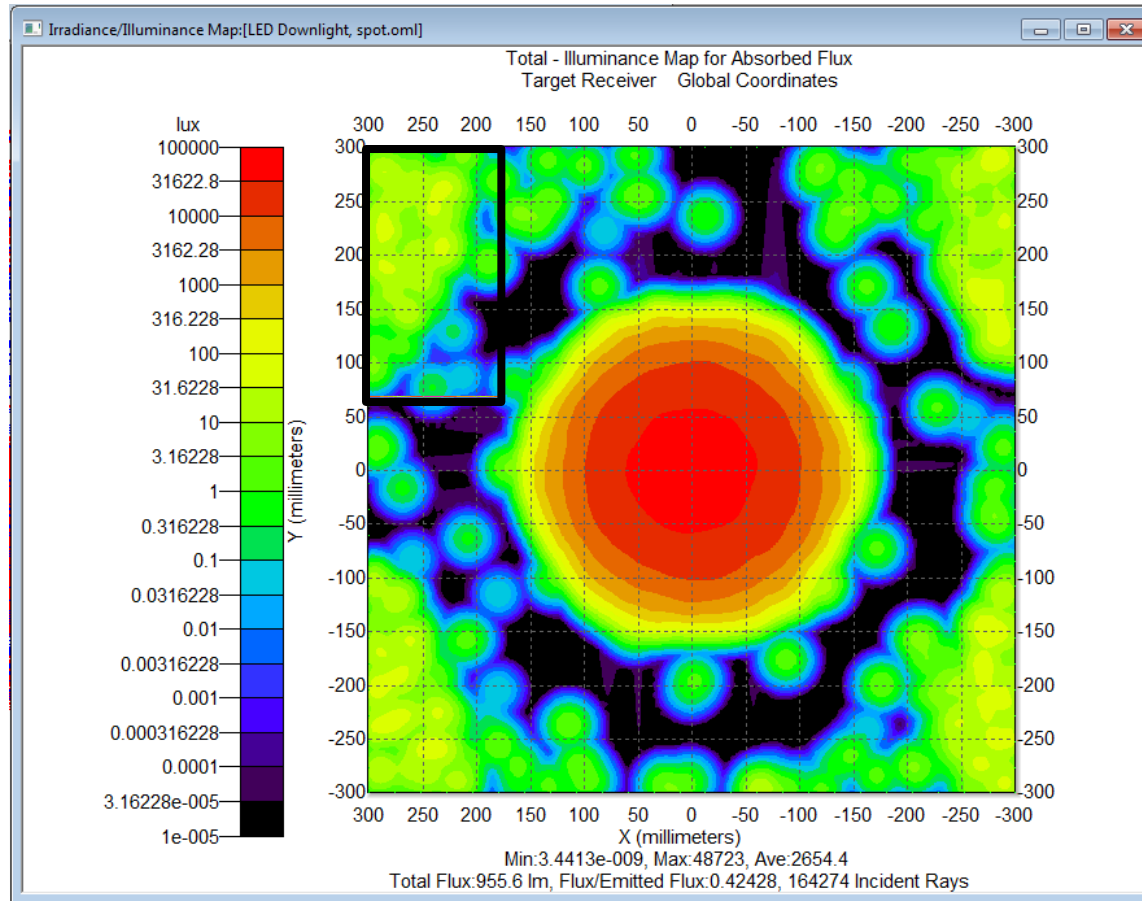
Select area of interest by **Shift- left mouse click** and dragging a box around the area of interest

Irradiance/Illuminance Maps
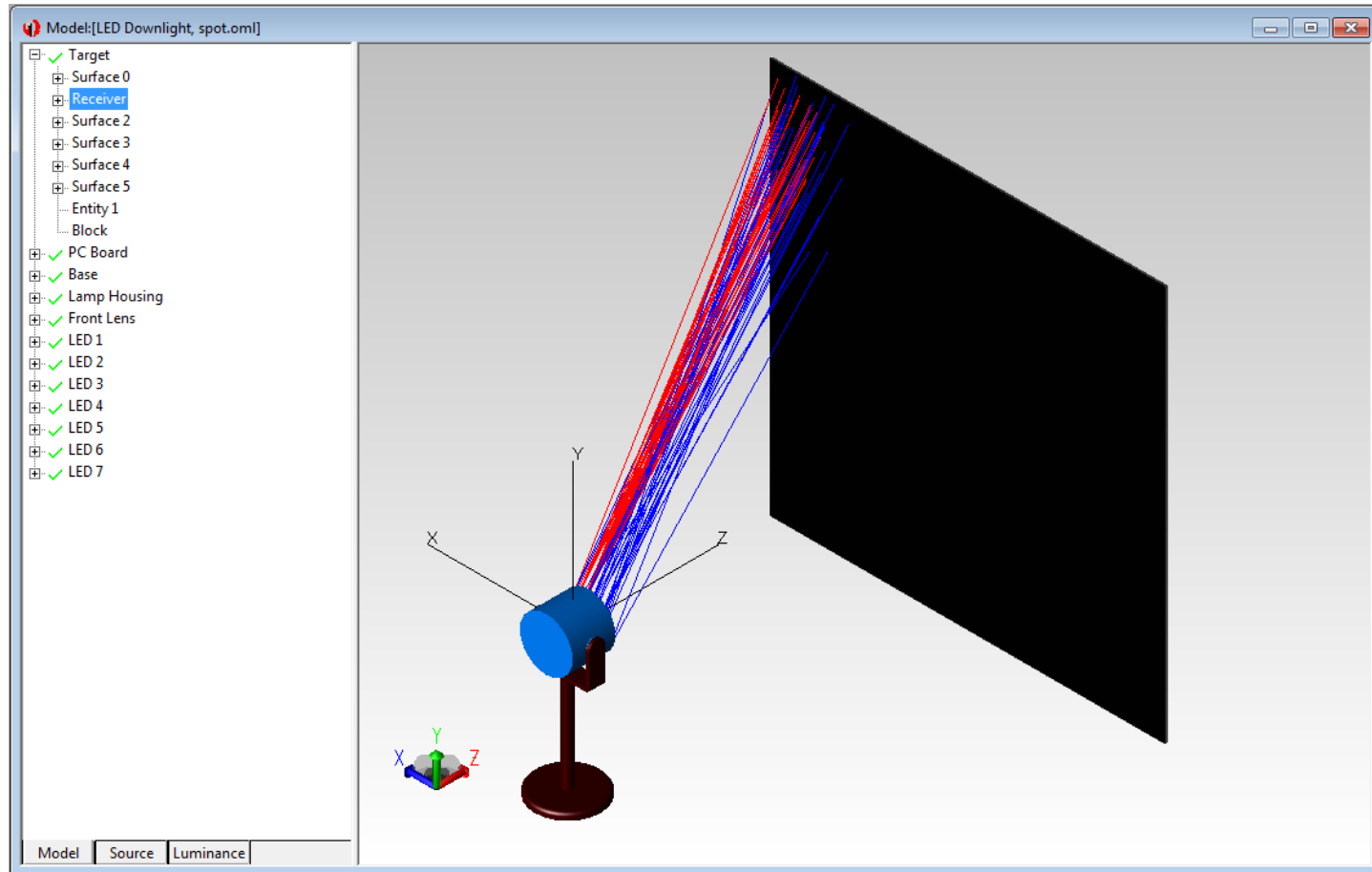
To display the selected rays, go to Analysis->Display Selected Rays, or right click in the Irradiance/Illuminance Map window and choose Display Selected Rays

Irradiance/Illuminance Maps
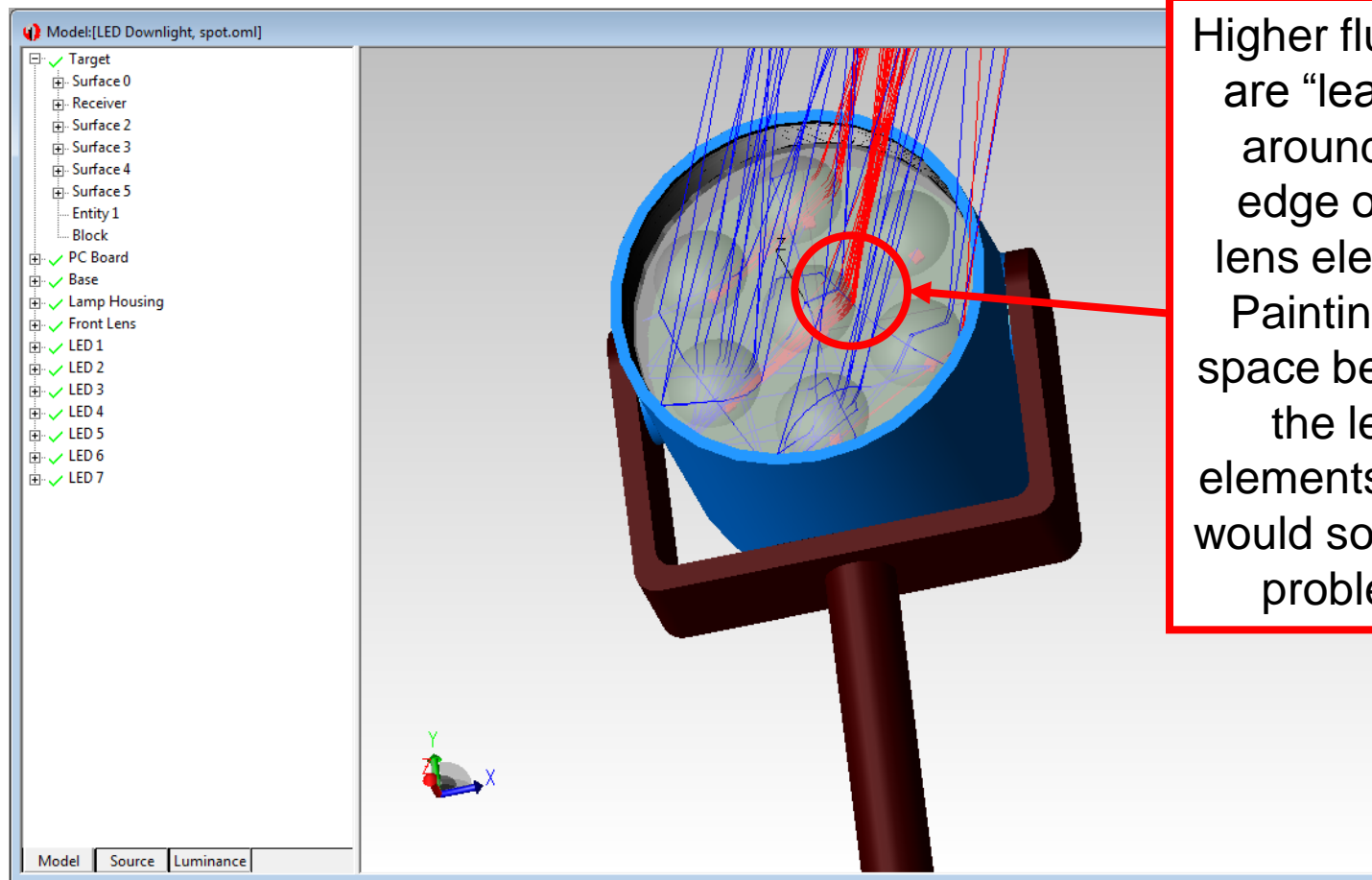
Higher flux rays are "leaking" around the edge of the lens element. Painting the space between the lens elements black would solve the problem.

To display the selected rays, go to Analysis->Display Selected Rays, or right click in the Irradiance/Illuminance Map window and choose Display Selected Rays

3D Irradiance/Illuminance Maps

The 3D Irradiance/Illuminance Map allows you to see the distribution of light on multiple surfaces at one time. The TrueColor mode is shown here.
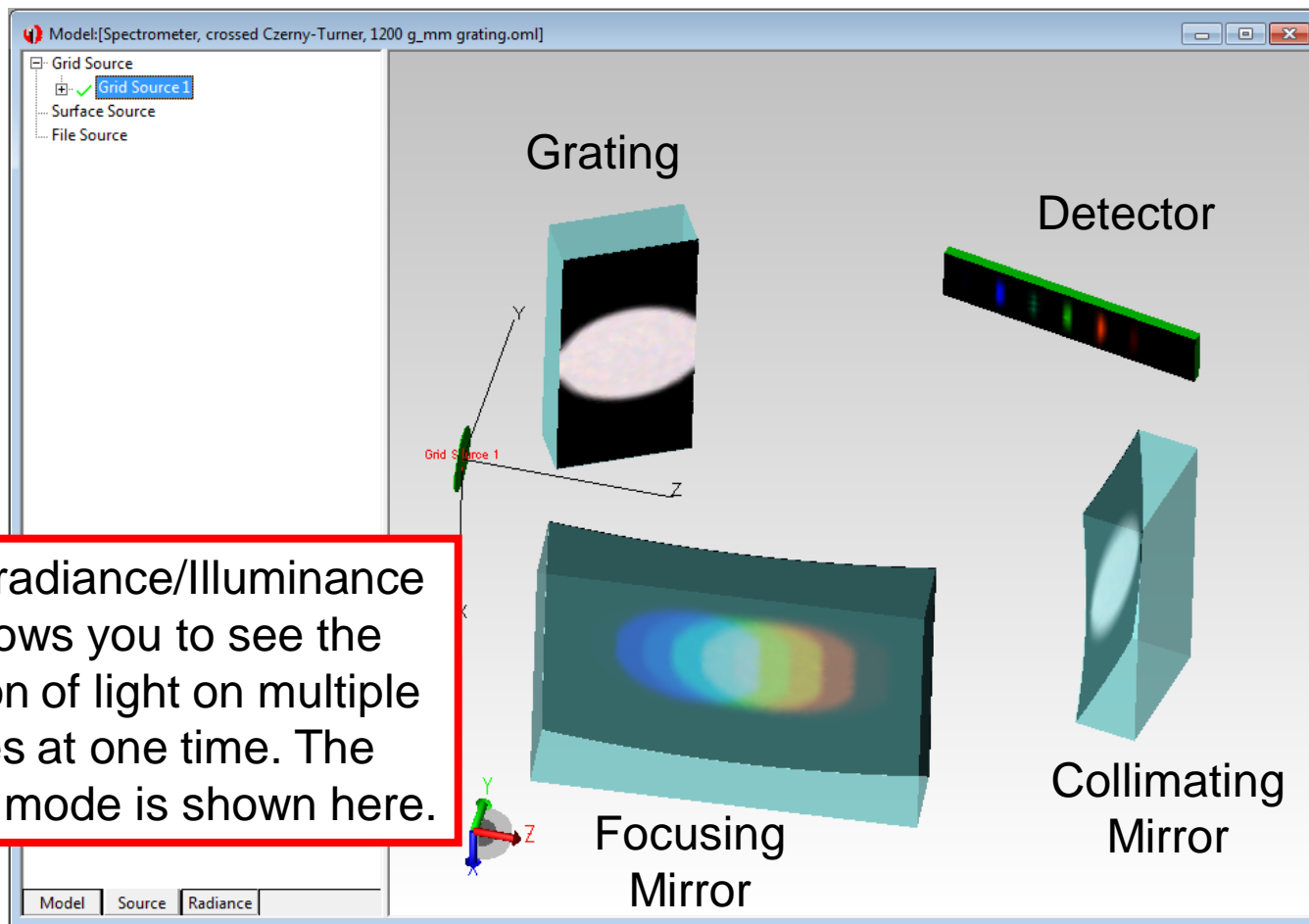
3D Irradiance/Illuminance Map shows the flux distribution on multiple surfaces in this crossed Czerny-Turner spectrometer model.

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Path Sort Table and Display Selected Paths

Irradiance Map showing rays selected in the Path Sort Table

Analysis->Path Sort Table will open a table showing all the paths in a model. To display a path, select it in the Path Sort Table and then go to Analysis->Display Selected Paths

Candela Plots
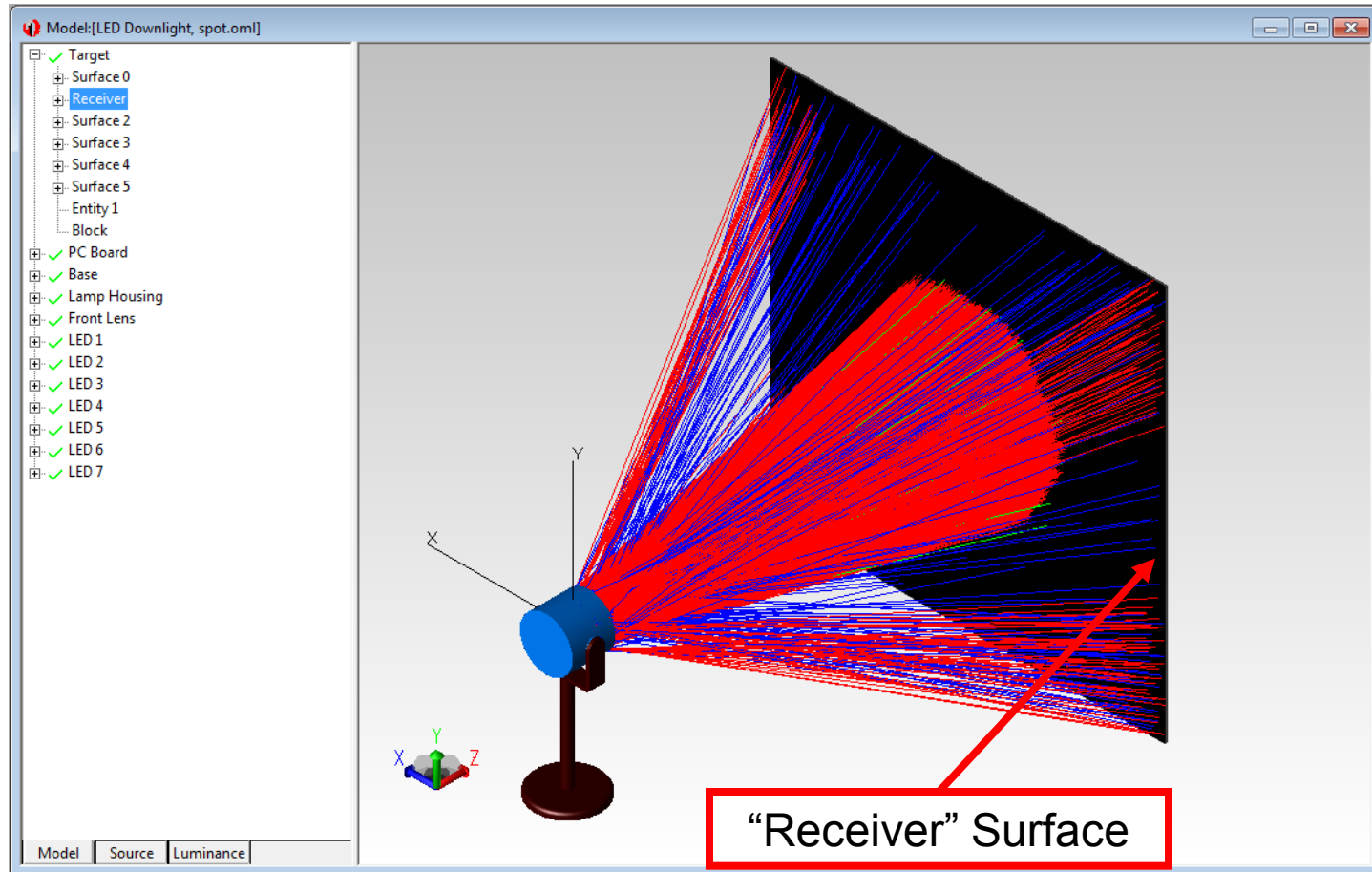
Example Model - LED light with 7 LEDs and circular lens array
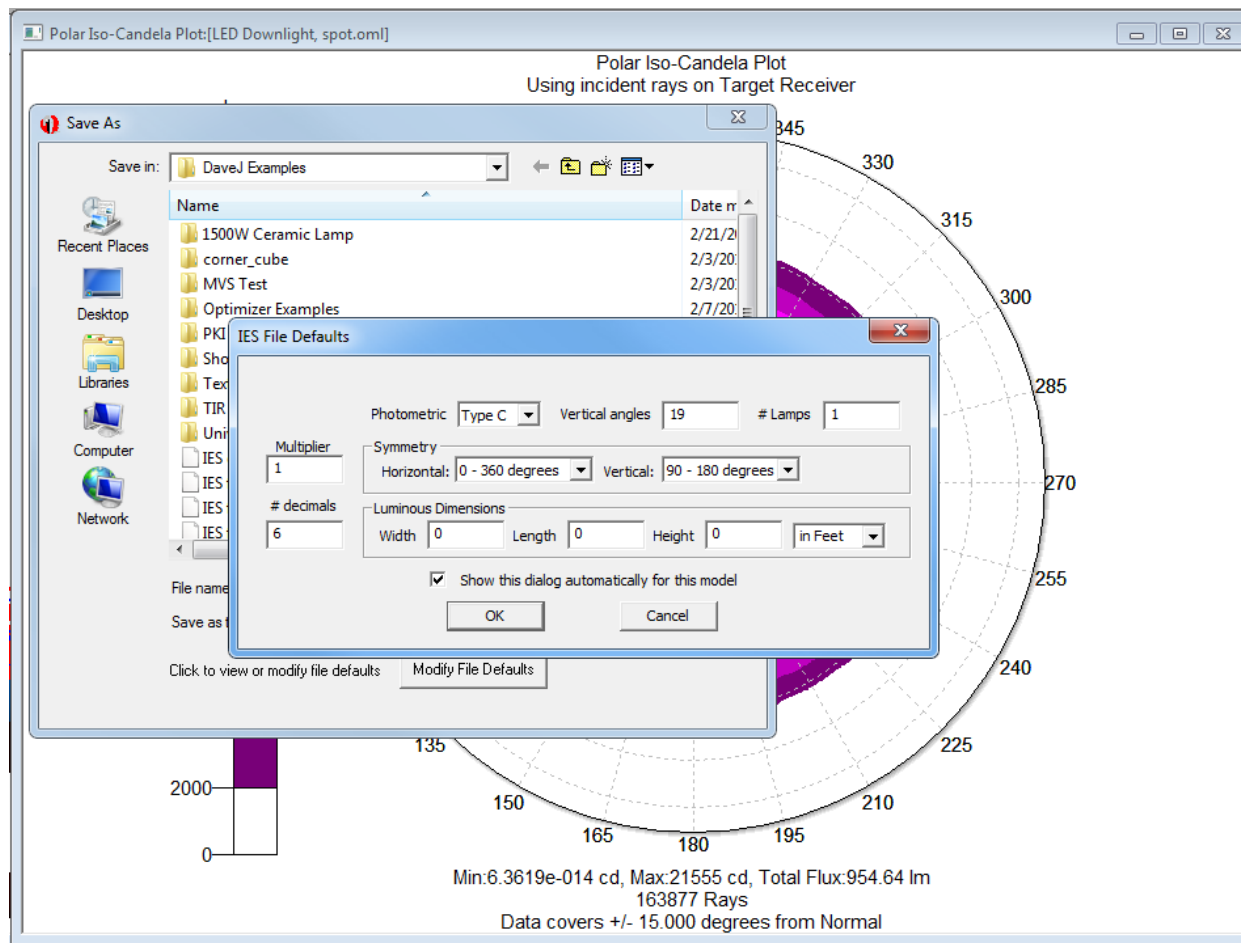
Polar Iso-Candela Plot

To find the lumens in a given "zone", go to Analysis->Display Selected Rays. Then go to Analysis->Select Rays to open the Select Rays dialog box.

Making an IES File

Right click in the Candela Plot window, choose SaveAs, and change the File Type to IESNA LM-63 (*.ies)

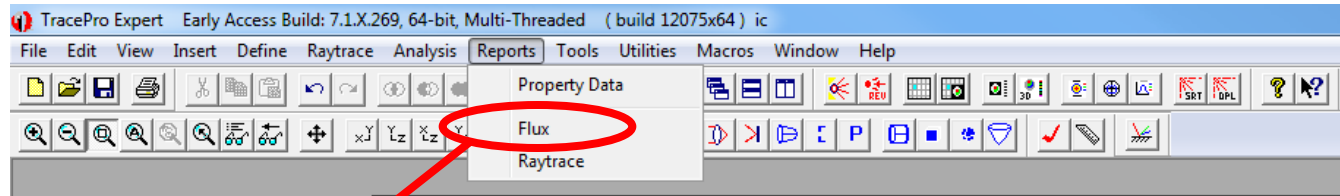# The Flux Threshold Setting

Flux Threshold

- The Flux Threshold setting in TracePro determines when TracePro will stop keeping track of rays.

- Once rays fall below the Flux Threshold they are terminated

- The default setting for the Flux Threshold is 0.05, or 5% of the initial flux value of the ray

- The Flux Threshold setting can be changed at
- Raytrace->Raytrace Options->Thresholds

- The Flux Report can be used to see if rays are falling below the Flux Threshold

Flux Threshold
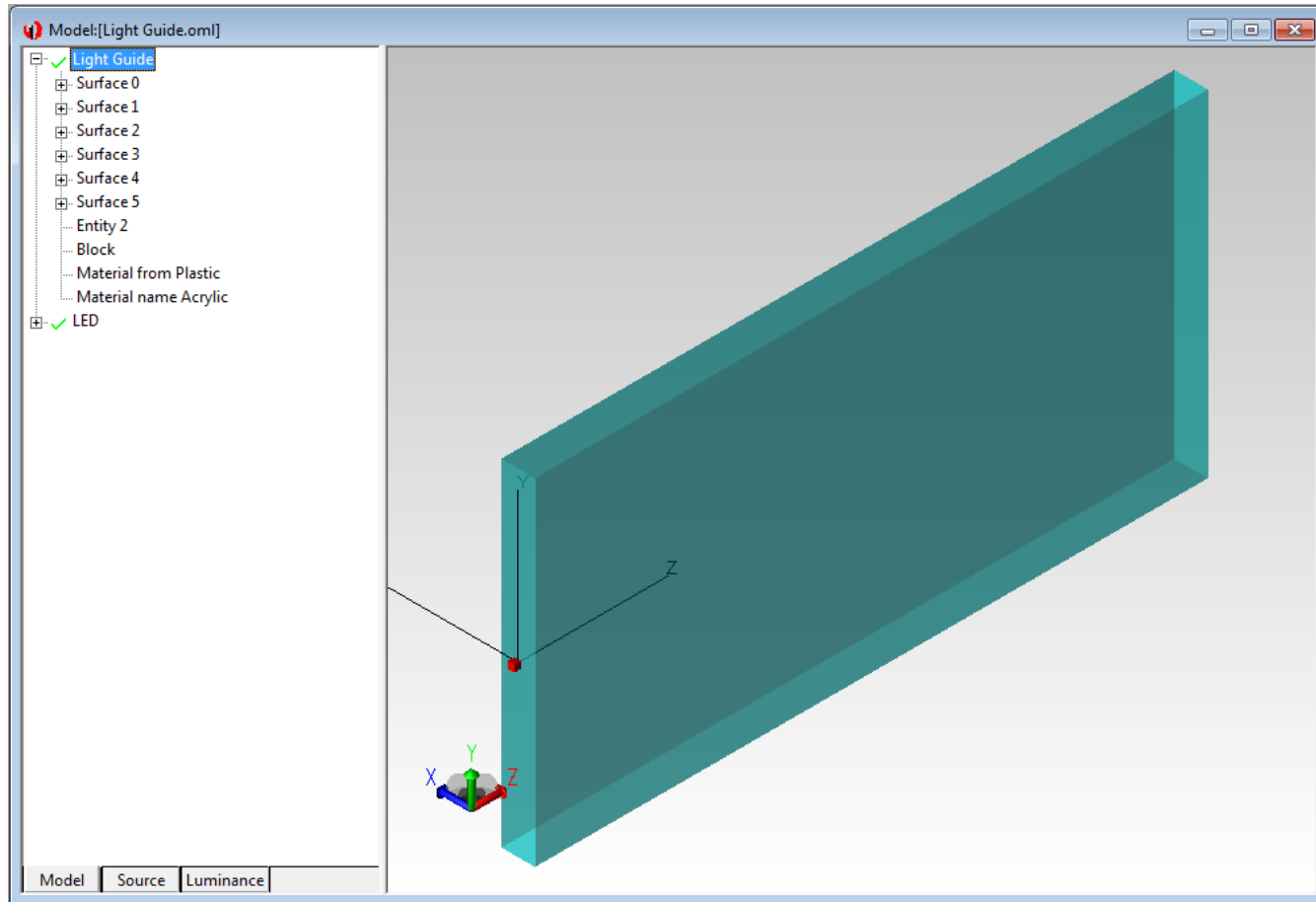
Example Model - Simple light guide with LED source

Flux Threshold

Default Flux Threshold of 5% - 5.44 lumens out of 99.9 lumens are lost due to falling below the Flux Threshold. This is about 5.44% lost.

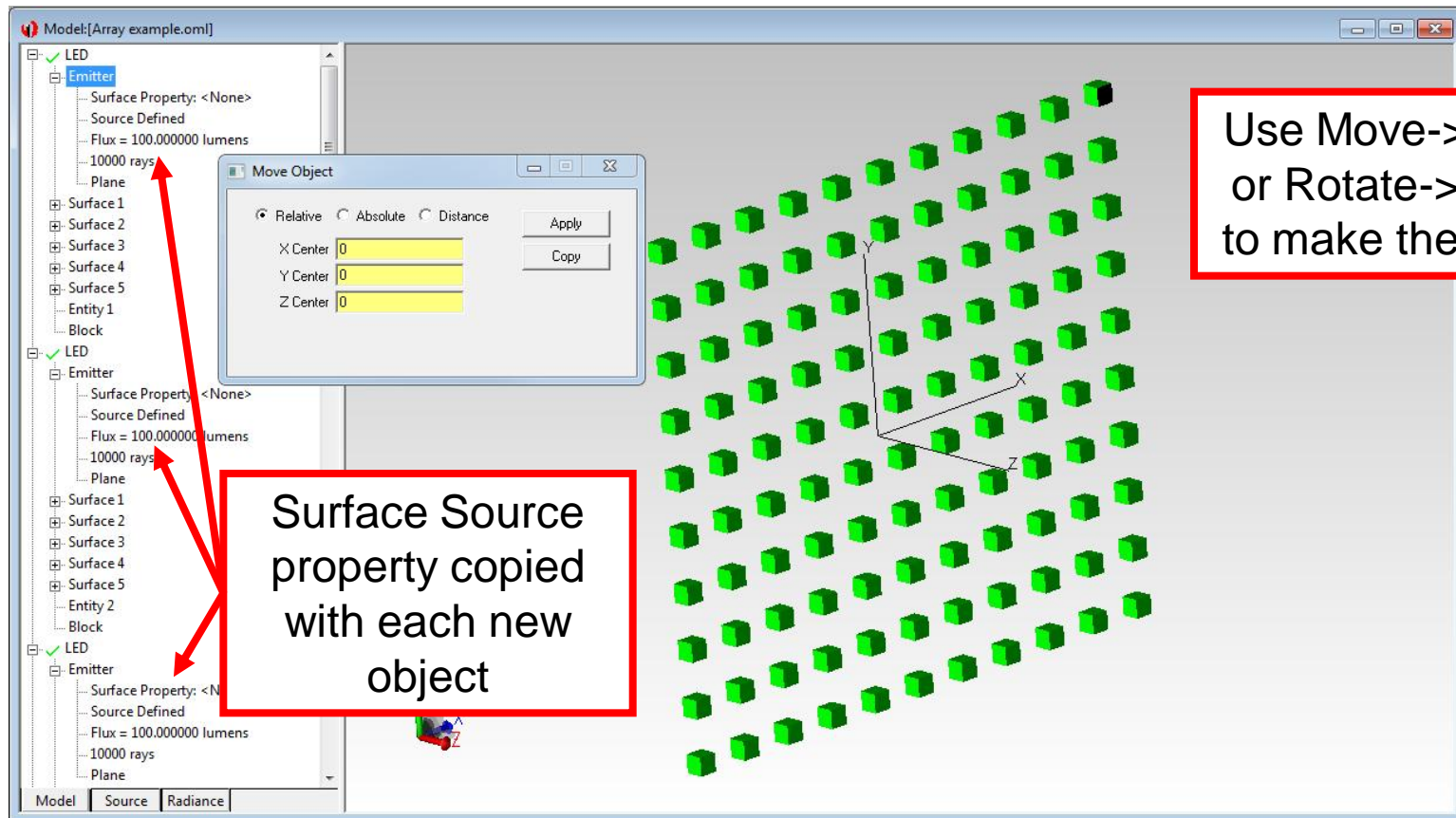# Flux Threshold

Change Flux Threshold to 0.5%

Flux Threshold of 0.5% - 0.234 lumens out of 99.9 lumens are lost due to falling below the Flux Threshold. Now only 0.23% is lost.

Apply Properties Before Copying

Apply Properties Before Copying

Use Move->Copy or Rotate->Copy to make the array

Surface Source property copied with each new object

If you need to make an array of multiple objects, apply all properties to the base object before making the array. The properties will then be copied with the object.

Speeding Up Raytracing

Speeding up Raytracing

- Voxelization is a method of "allocating" the geometry in the model to specific zones to improve raytrace speed

- Increasing the number of voxels improves raytrace speed at the expense of Audit speed

- There are two types of voxels in TracePro, Octree and Uniform

- The default is Uniform, which creates equally sized 3D voxels across the system

- Octree voxelization concentrates voxels near objects and places fewer voxels in empty spaces in the model. This is best for models with large spaces between objects. For example, a luminaire and the floor.

Speeding up Raytracing
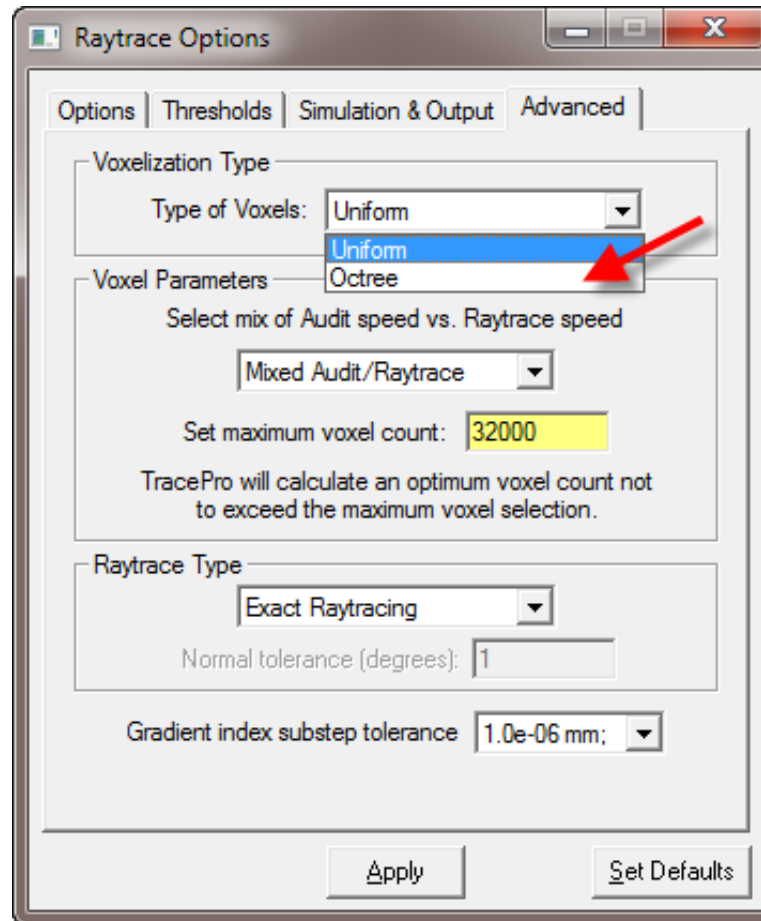
Voxel settings can be changed at Raytrace->Raytrace Options->Advanced

Speeding up Raytracing
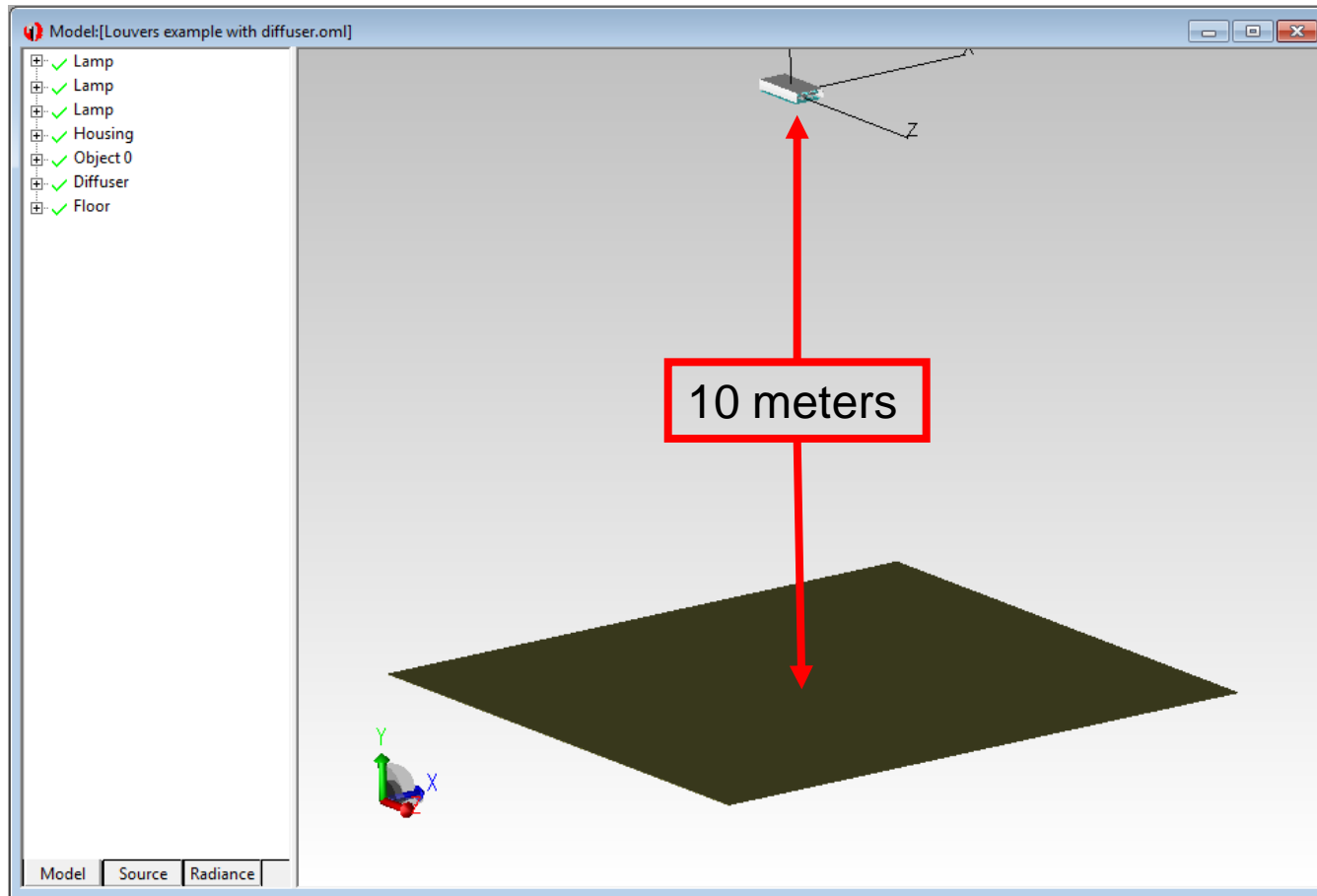
Fluorescent fixture and floor model – 10 meters from fixture to floor

Speeding up Raytracing

Higher concentration of voxels around objects

Lower concentration of voxels in empty space

To view Voxels – View->Display Voxels
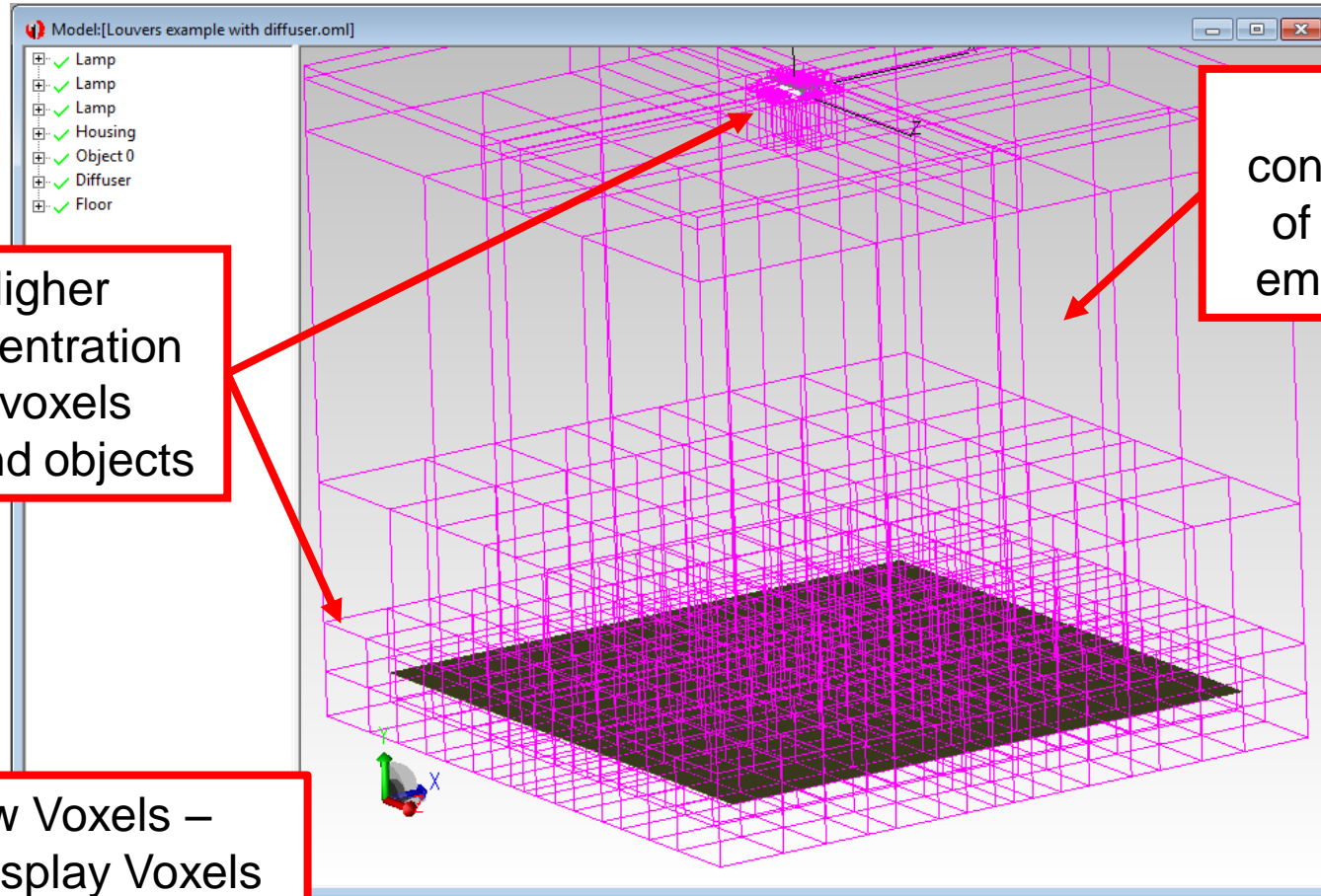
The Octree voxels version of this model raytraced 56% faster than the Uniform voxels version

Interactive Optimizer Tips

Interactive Optimizer Tips
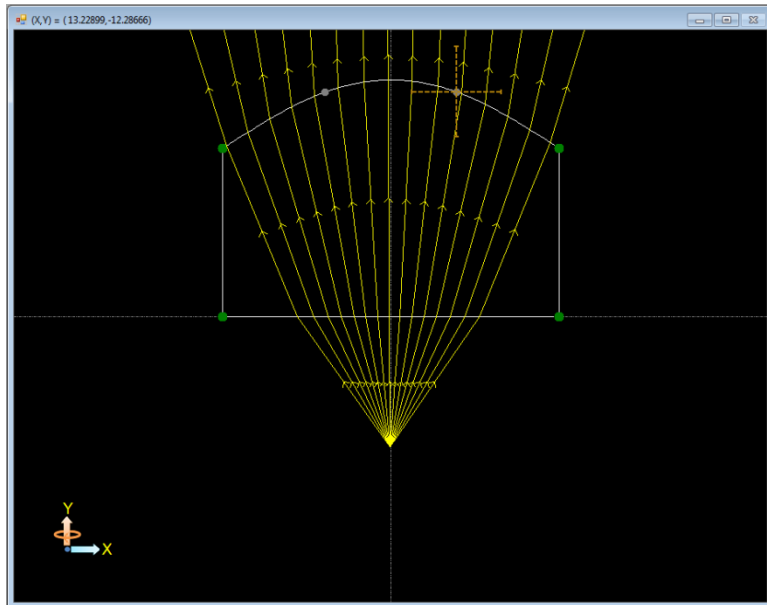
To make a Ray Fan, draw the initial ray by left clicking and dragging in the desired direction. Then press CTRL and make the fan by dragging left or right.
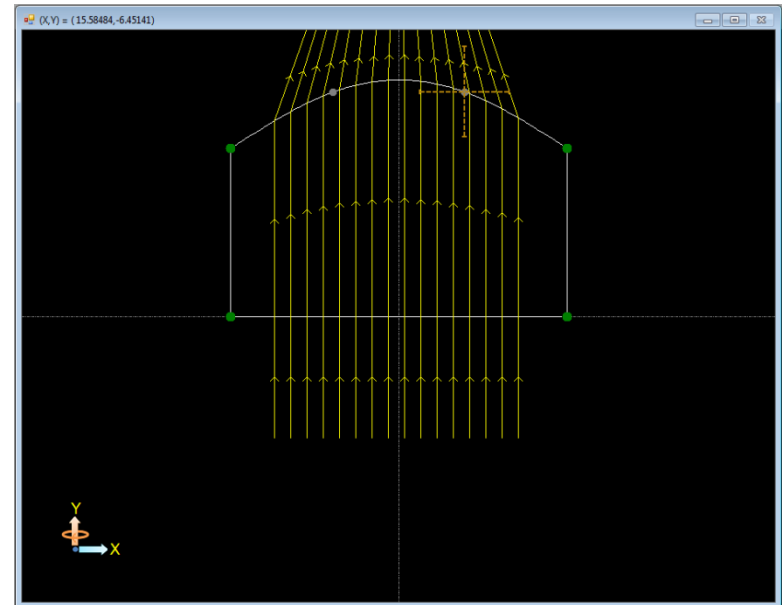
To make a Beam, draw the initial ray by left clicking and dragging in the desired direction. Then press Shift and make the beam by dragging left or right.

Making Ray Fans and Beams in the Interactive Optimizer Sketch Window

Interactive Optimizer Tips

Relative Variables are defined as being relative to the position of the control point on the segment

Interactive Optimizer Tips
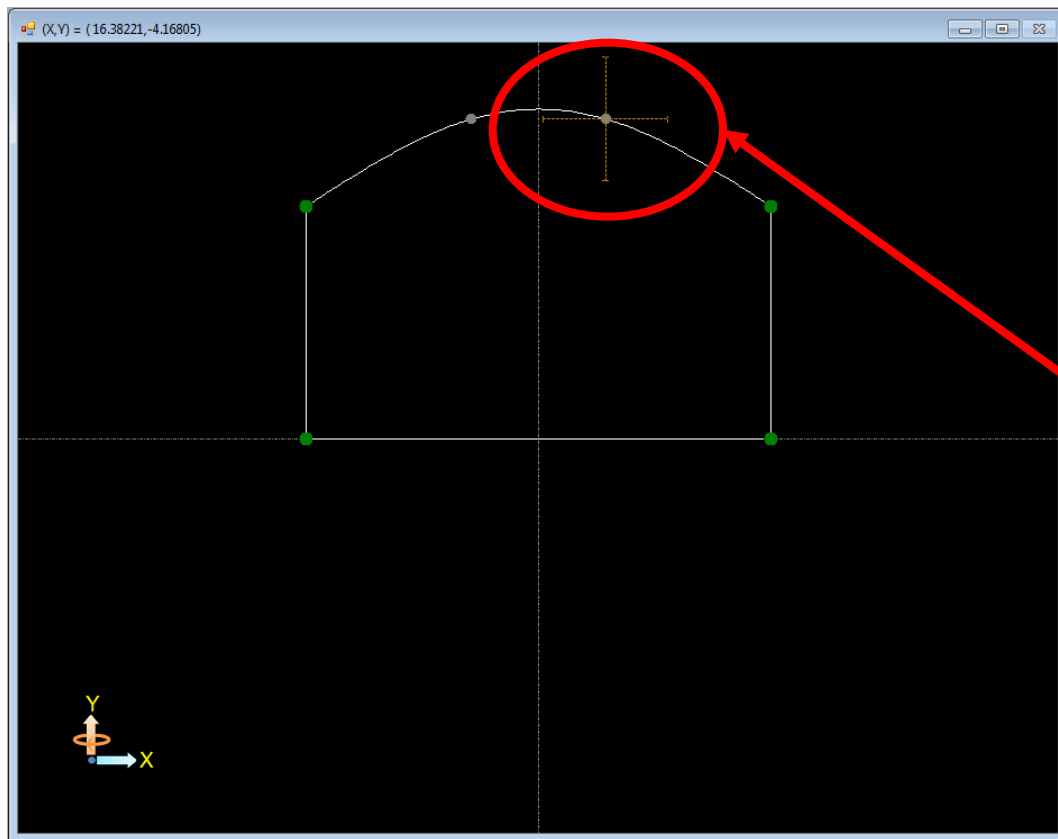
If you stop the optimization after the control point has moved, save the .SOD with the same name, and then re-open, the variable will be defined as relative to the new position of the control point.
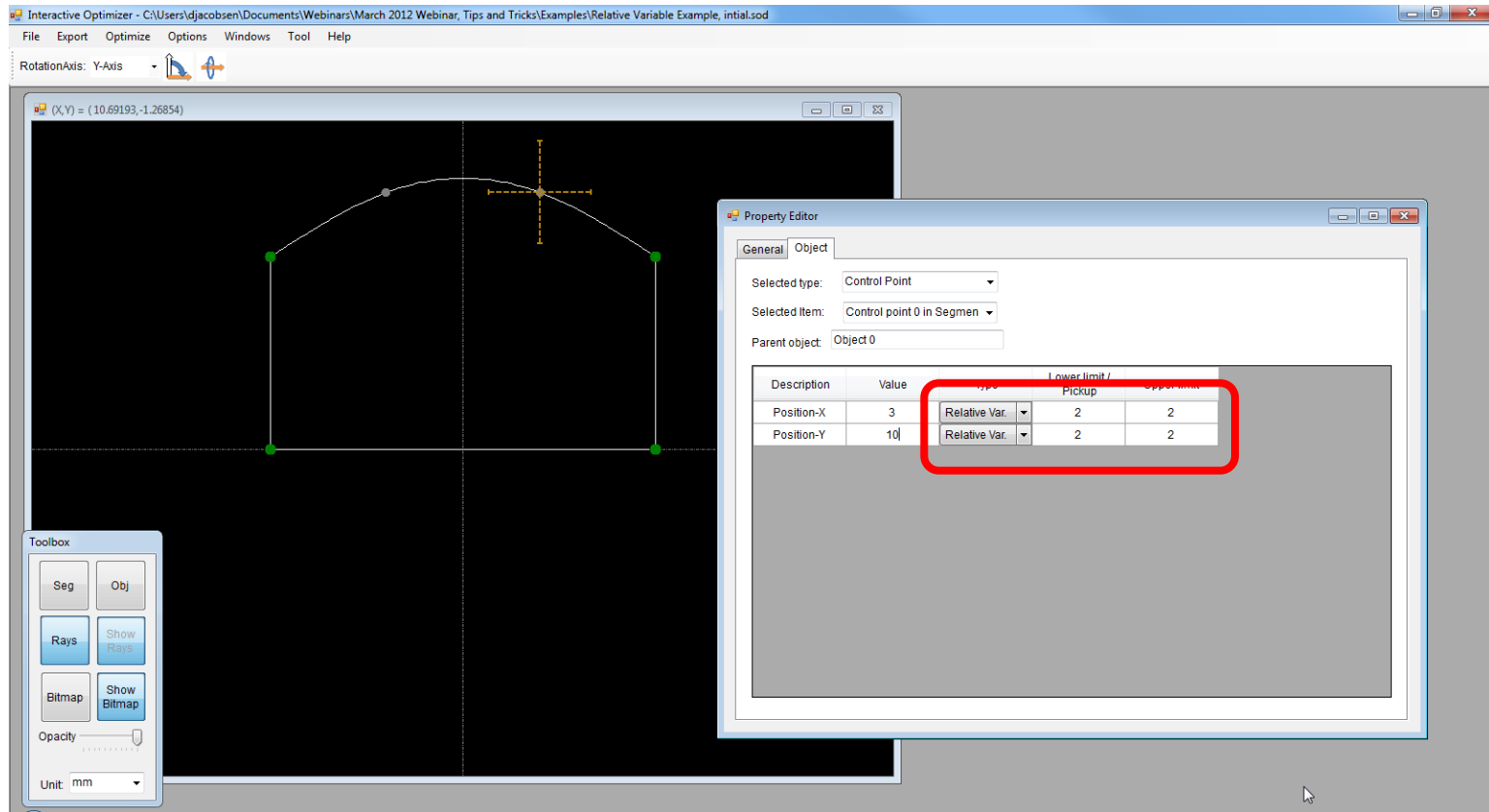
This could lead to the creation of bad geometry such as self intersecting segments.

Relative Variables are defined as being relative to the position of the control point on the segment

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Interactive Optimizer Tips

Absolute Variables are defined by absolute coordinates and are not tied to the current location of the control point

Interactive Optimizer Tips
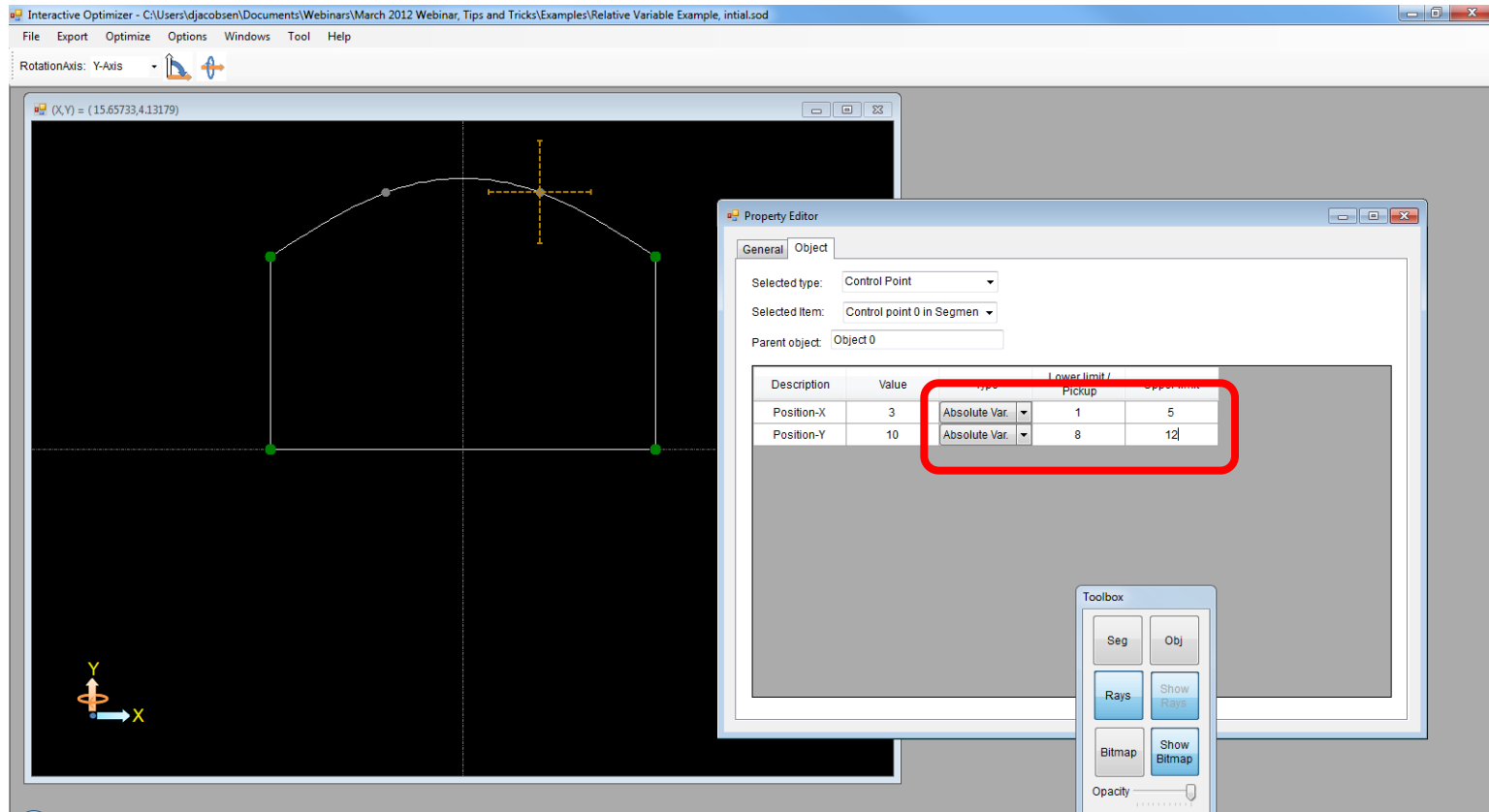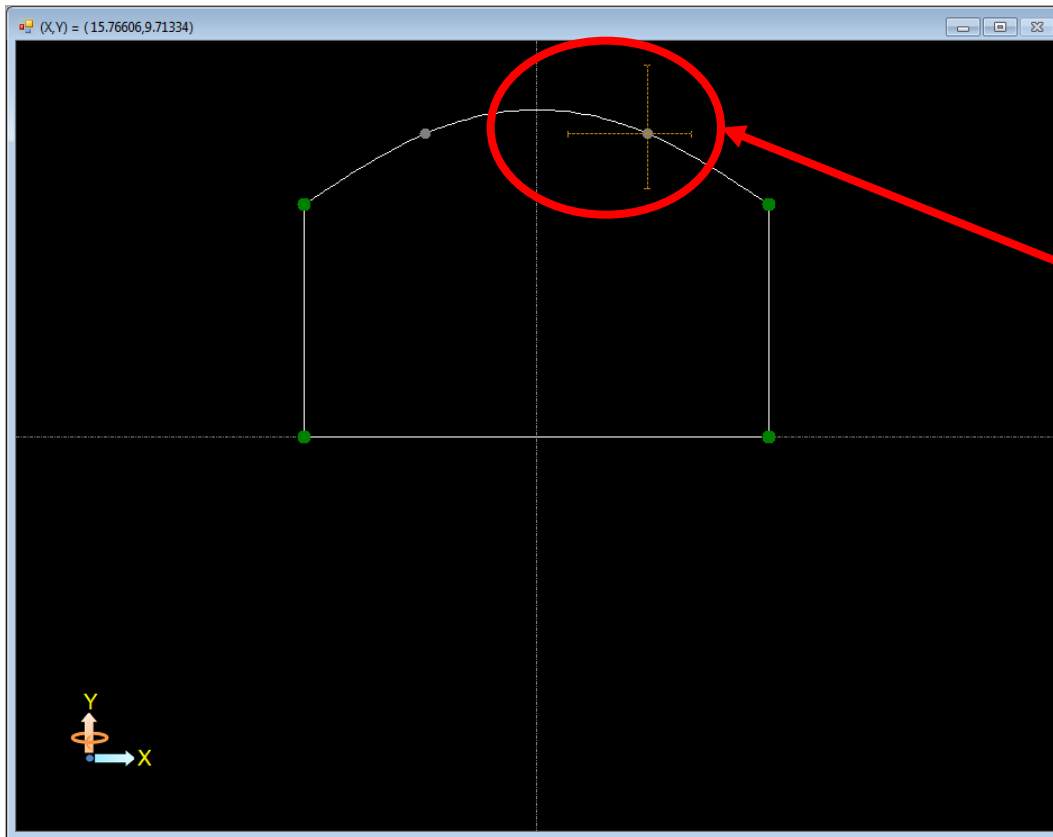

If you stop the optimization after the control point has moved, save the .SOD with the same name, and then re-open, the variable will still have the same "range" as initially defined.

Absolute Variables are defined by absolute coordinates and are not tied to the current location of the control point

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Current Promotions

OSLO Promotion

Customer who have purchased OSLO in the past, and are currently out of support ,can update to the current release of OSLO, OSLO 6.6, with one free year of support, for one low price. The price will depending on their edition of OSLO. Details of the promotion are shown below:

OSLO PROMOTION LIMITED TIME : APRIL 1, 2012 THROUGH JUNE 30, 2012	
Note: * Good for anyone who previously owned OSLO * Multiple license discounts do not apply *	
OSLO Node Locked License	OSLO Promotional Pricing
OSLO PREMIUM	$1,500
OSLO STANDARD	$1,125
OSLO LIGHT	$750
Example:	
OSLO Premium Node Locked two years out of support -- Cost to customer $1500.00	
OSLO Premium Node Locked ten years out of support -- Cost to customer $1500.00	
OSLO Network License	OSLO Promotional Pricing
OSLO PREMIUM	$1,875
OSLO STANDARD	$1,500

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Thank You

Questions and Answers

For Additional Information Please Contact:

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