

The TracePro RepTile Property and the Texture Optimizer II

A Lambda Research Corporation Webinar

September 22, 2016

Presenter

- **Presenter**

Dave Jacobsen

Sr. Application Engineer

Lambda Research Corporation

- **Moderator**

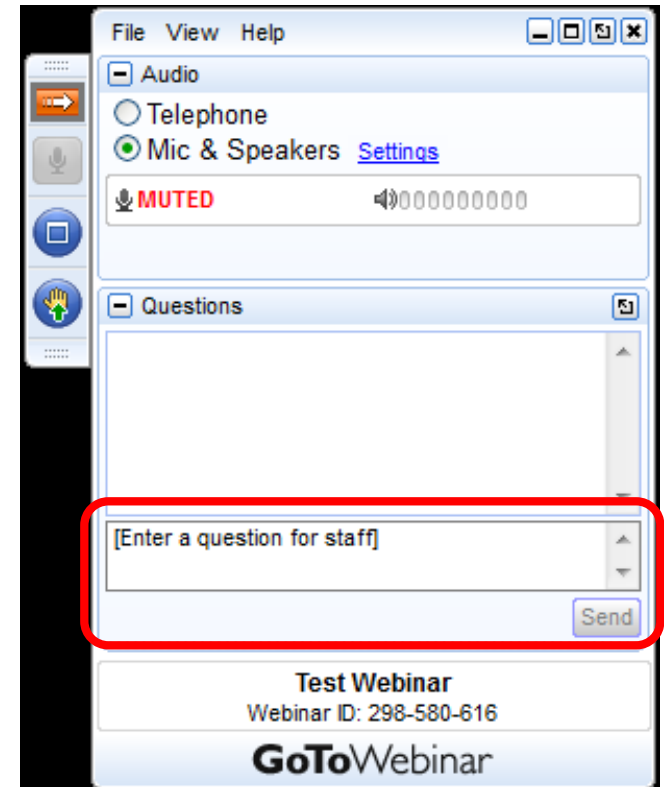
Mike Gauvin

Vice President of Sales and Marketing

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



Additional Resources

- Past TracePro Webinars
 - <http://www.lambdares.com/webinars>
- TracePro Tutorial Videos
 - <http://www.lambdares.com/videos>
- TracePro Tutorials
 - <http://www.lambdares.com/features/tracepro-tutorials>
- Information on upcoming TracePro Training Classes
 - <http://www.lambdares.com/training/software-training>

Upcoming TracePro Training

- **Jena, Germany**

- Introduction to TracePro – October. 18-19, 2016
- Optimization with TracePro – October. 20-21, 2016

- **Littleton, MA USA**

- Introduction to TracePro – October. 25 -26, 2016
- Optimization with TracePro– October. 27-28, 2016

Latest TracePro Release

TracePro 7.7.2

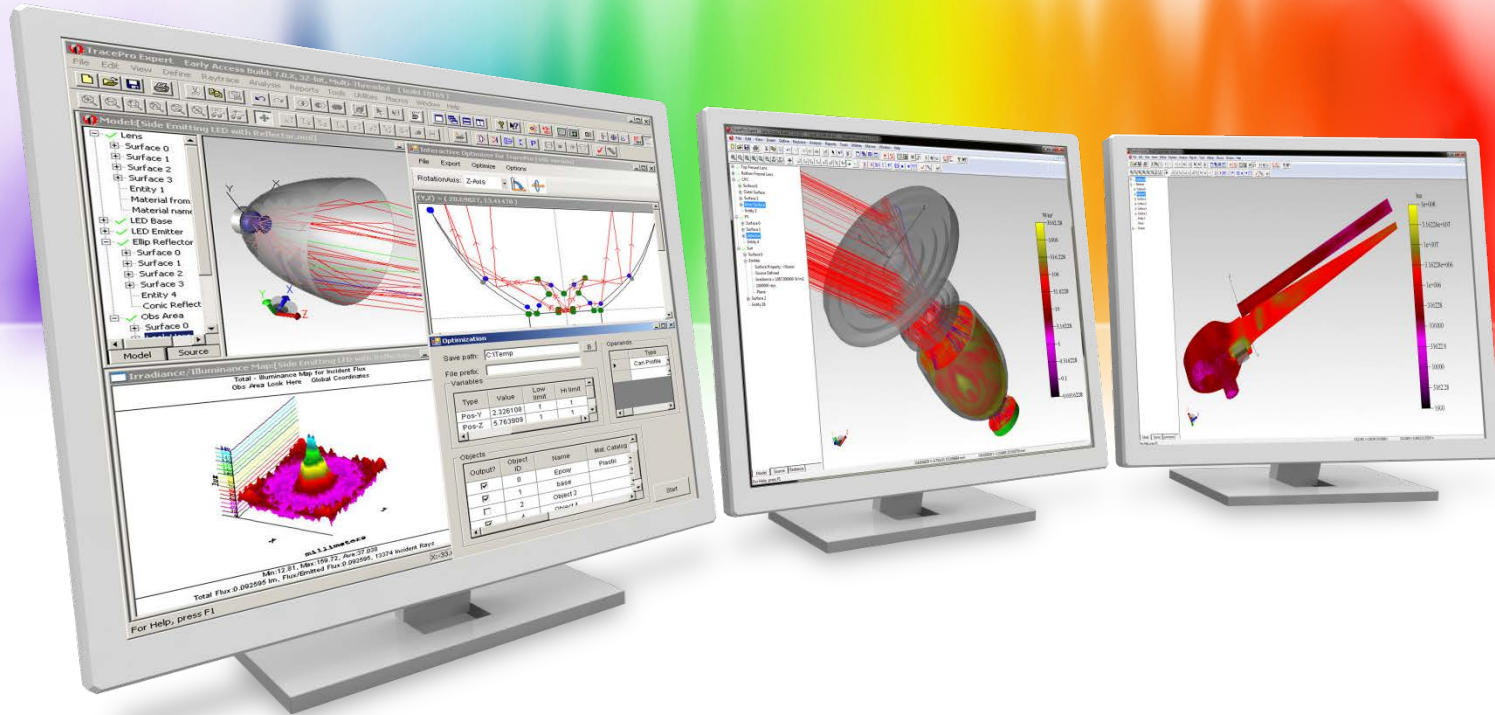
Released April 1, 2016

TracePro 7.8 EA

Currently available for download

Customers with current maintenance and support agreements can download this new release at:

<http://www.lambdares.com/CustomerSupportCenter/index.php/trace-pro/current-release>



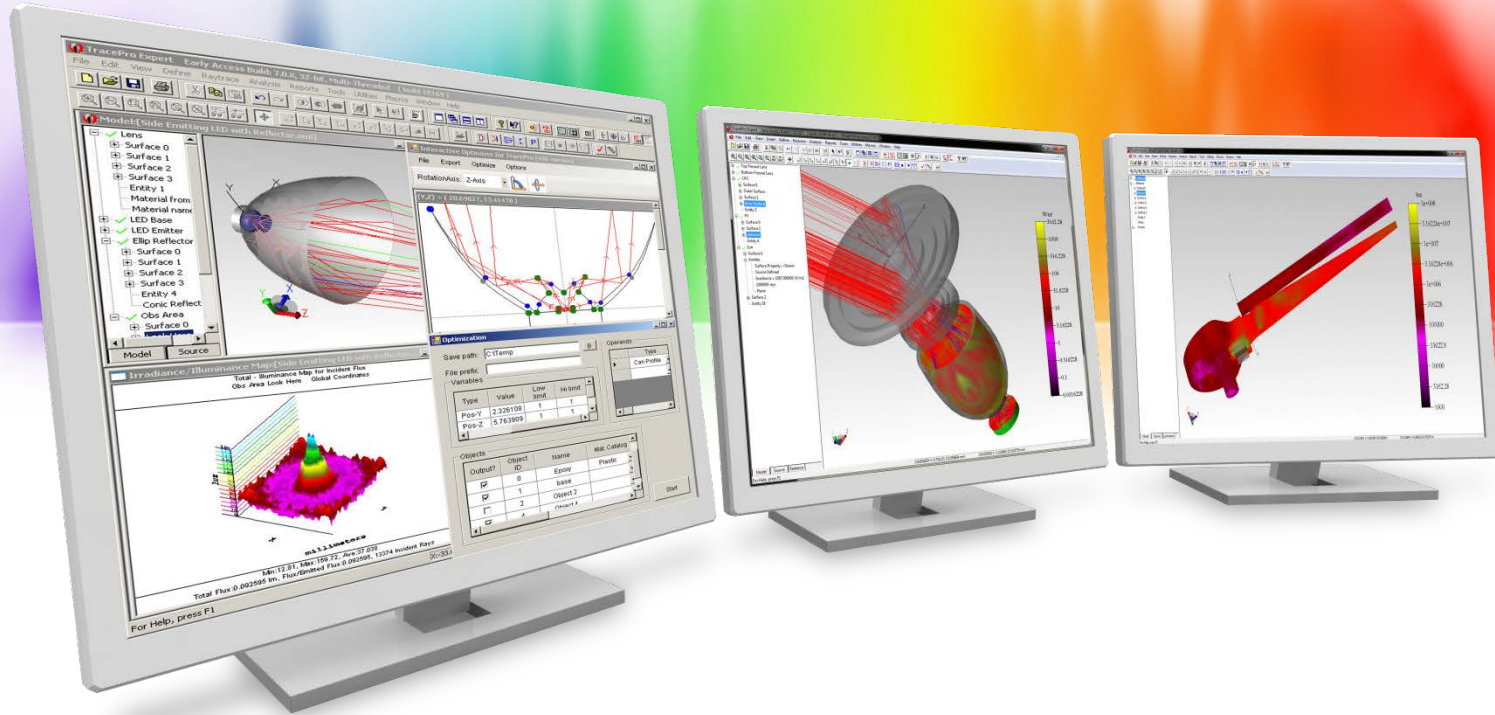
The TracePro RepTile Property and the Texture Optimizer II

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Agenda

- What is the TracePro RepTile property?
- Overview of the Texture Optimizer II
- Texture Types in the Texture Optimizer II
- Setting up the Texture Optimizer II
- The texture optimization process
- Using the Texture Optimizer II to apply texture features to curved surfaces
- Questions and Answers



TracePro RepTile Property

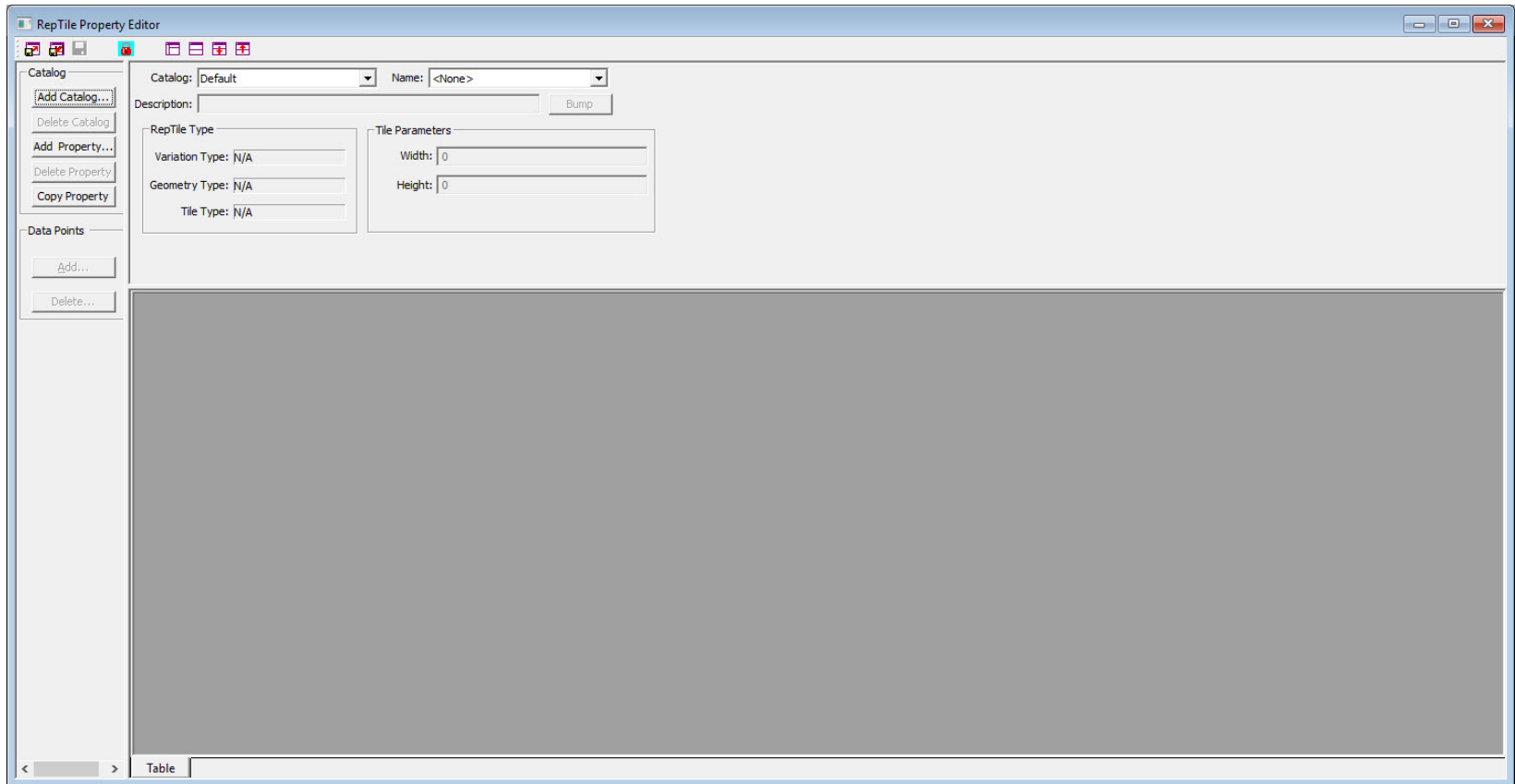
TracePro RepTile Property

What is RepTile?

- RepTile = Repetitive Tile
- Used to define repetitive microstructures in a convenient way
- Mathematical representations of the repetitive structure
- Allows for smaller file sizes as well as faster and easier modification of the structure
- RepTile properties may be applied to planar surfaces
- RepTile region is bounded by a rectangular, circular, or surface boundary
- Many geometry types may be made as either a Bump or Hole
- Requires TracePro Expert edition

TracePro RepTile Property

RepTile Property Editor : Define->Edit Property Data->RepTile Properties



TracePro RepTile Property

RepTile Example – 1mm diameter hemisphere

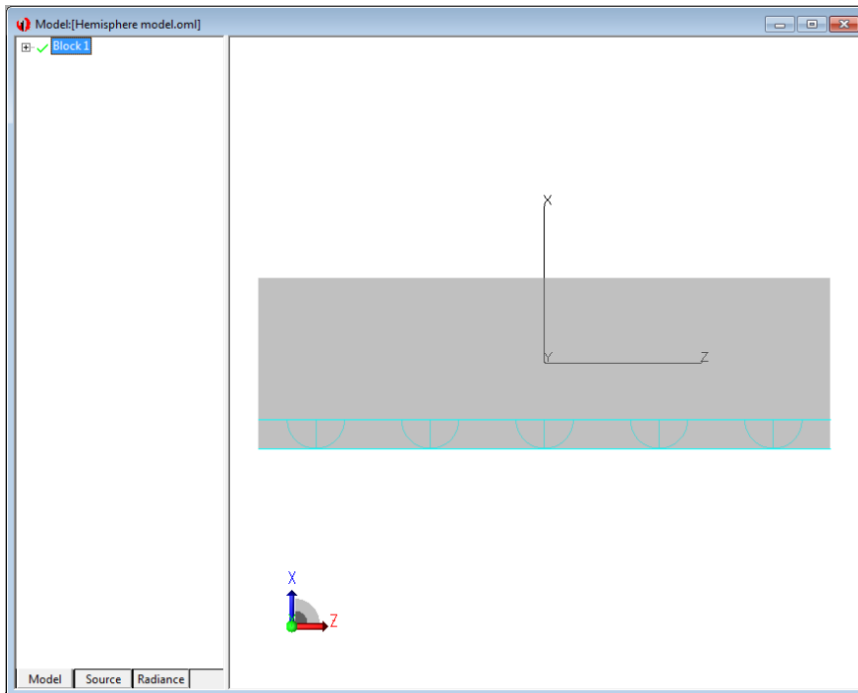
The screenshot shows the RepTile Property Editor window. The 'Name' field is set to '1mm hemisphere'. The 'Hole' button is selected, indicated by a red arrow labeled 'Bump or Hole'. The 'Geometry Type' is set to 'Sphere', highlighted by a red box. The 'Tile Parameters' section shows 'Width: 2' and 'Height: 2', both highlighted by a red box and labeled 'Tile Size'. A table at the bottom contains the following data:

Radius (mm)	Depth/Height (mm)
0.5	0.5

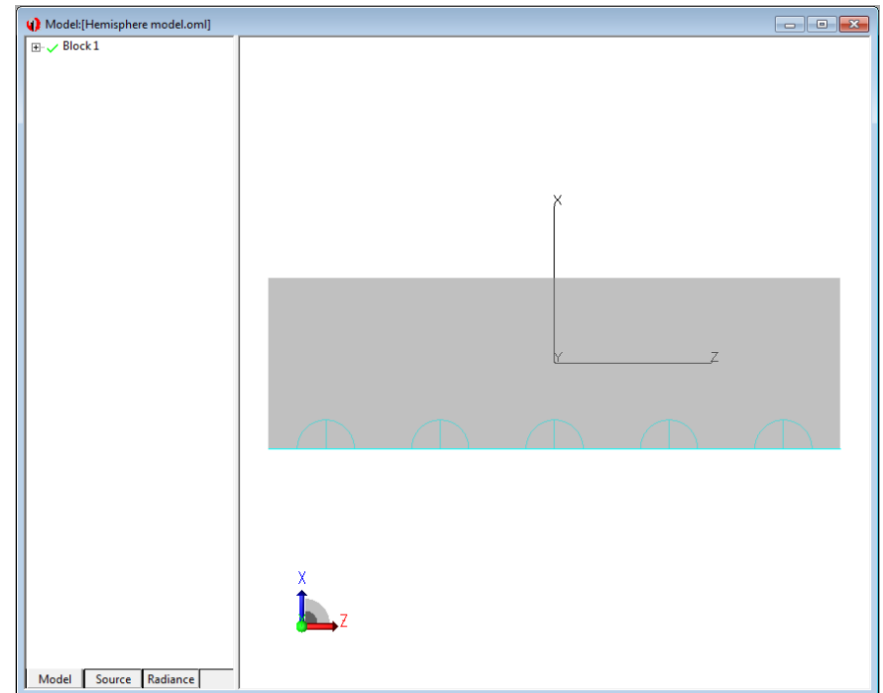
This table is highlighted by a red box and labeled 'Feature Dimensions'.

TracePro RepTile Property

Bump vs. Hole



Bump



Hole

TracePro RepTile Property

Apply Properties - RepTile

Apply Properties

RepTile

Property Data

Catalog: Webinar Textures

Name: Smaller Ink Dot, optimized

Texture File

Surface Catalog: Default

Surface Name: Diffuse White

Boundary and Orientation

Use Surface Bounds

Depth: 0.005

Boundary Center	Texture Origin	Texture Up	Boundary Up
X: 1.5	X: 1.5	X: 0	X: 0
Y: 0	Y: 0	Y: 1	Y: 1
Z: 0	Z: 0	Z: 0	Z: 0

Pixel Dimensions

Width: 0.1 Height: 0.1 Bump

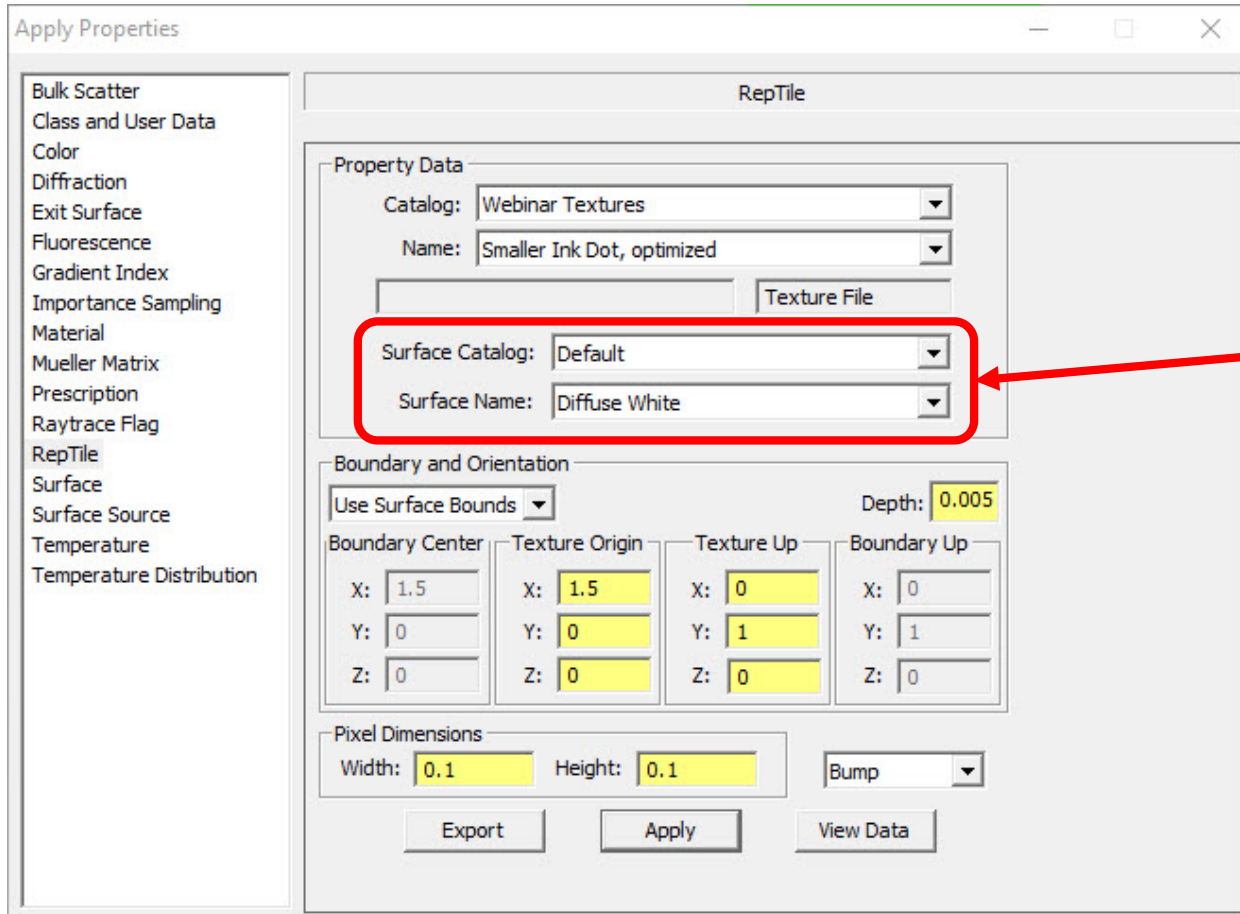
Export Apply View Data

RepTile
Name

RepTile
Boundary

TracePro RepTile Property

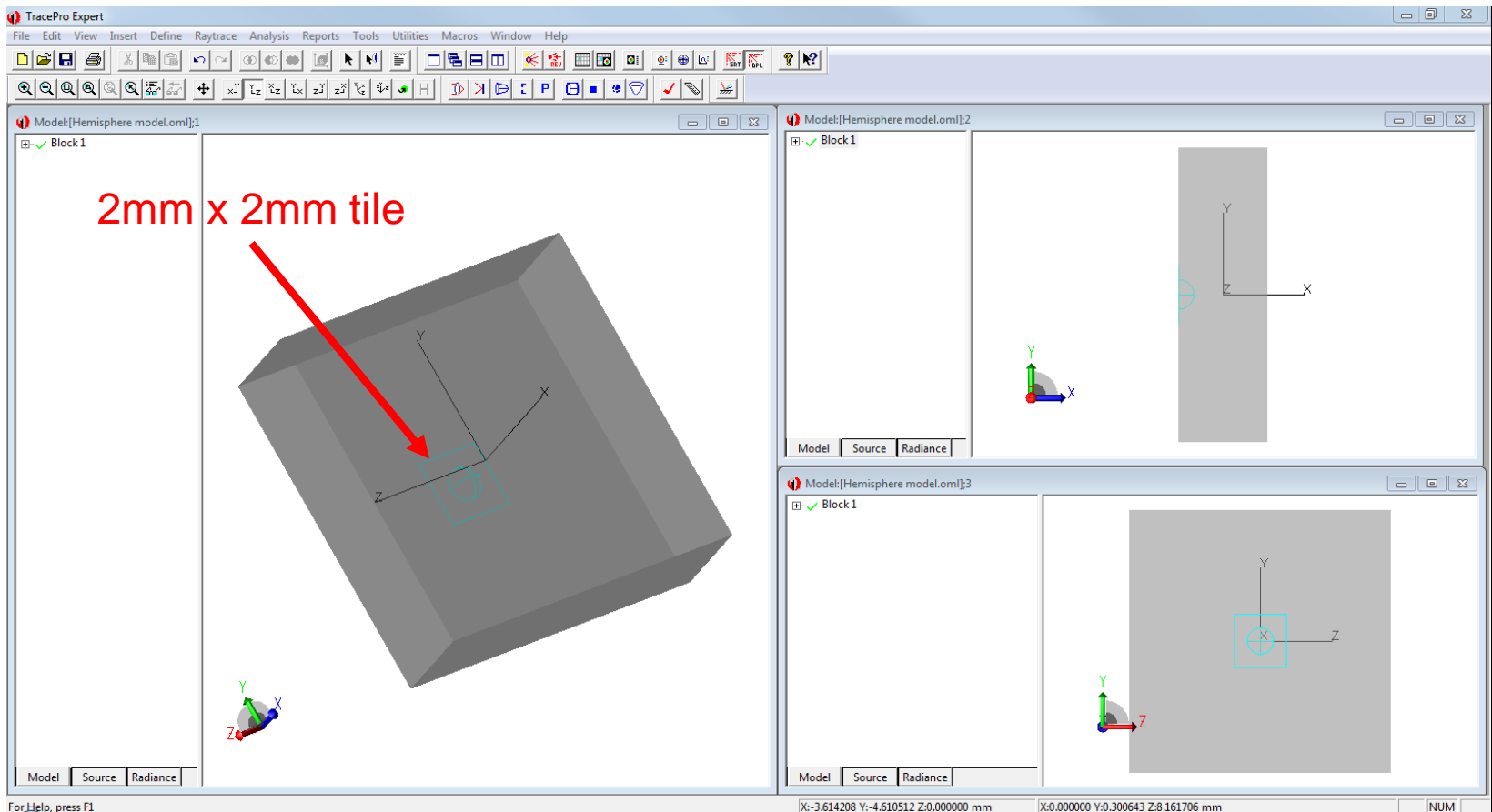
Apply Properties - RepTile



The RepTile can have any Surface Property in the TracePro Surface Property Database

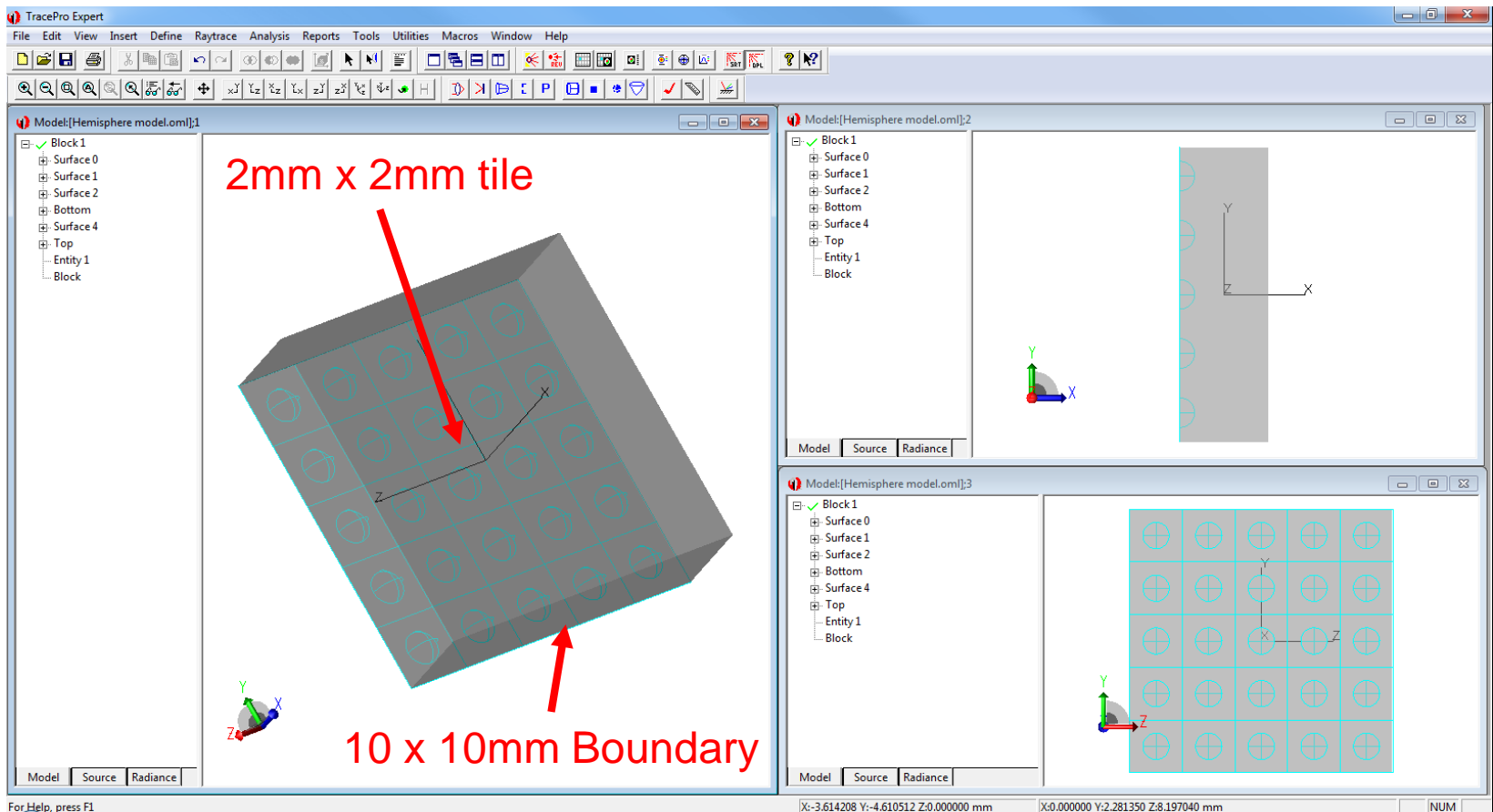
TracePro RepTile Property

To Display a RepTile: View -> Display RepTiles -> RepTiles & Boundary



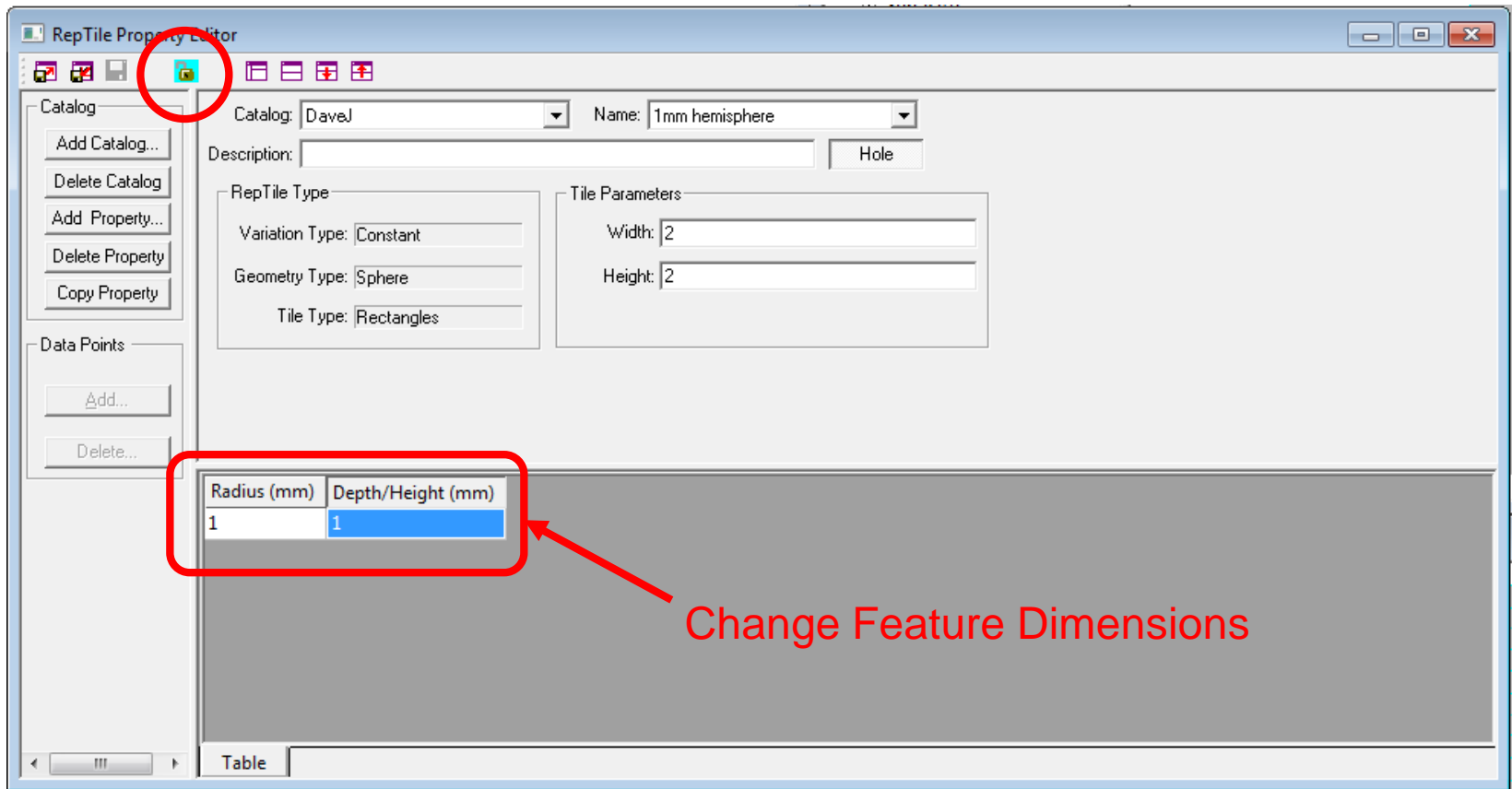
TracePro RepTile Property

To Display a RepTile: View ->Display RepTiles -> RepTiles & Boundary



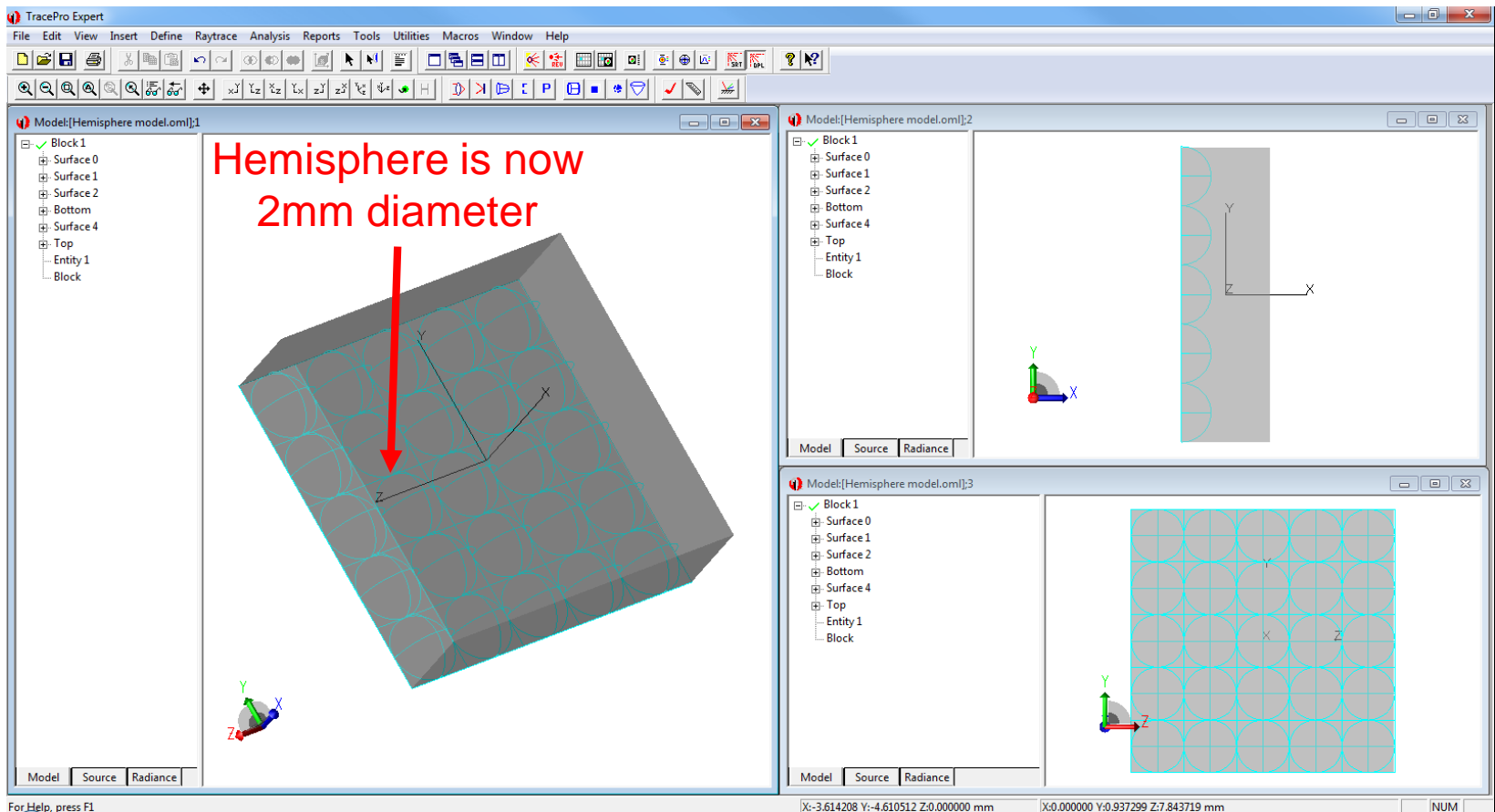
TracePro RepTile Property

Changing RepTile feature parameters



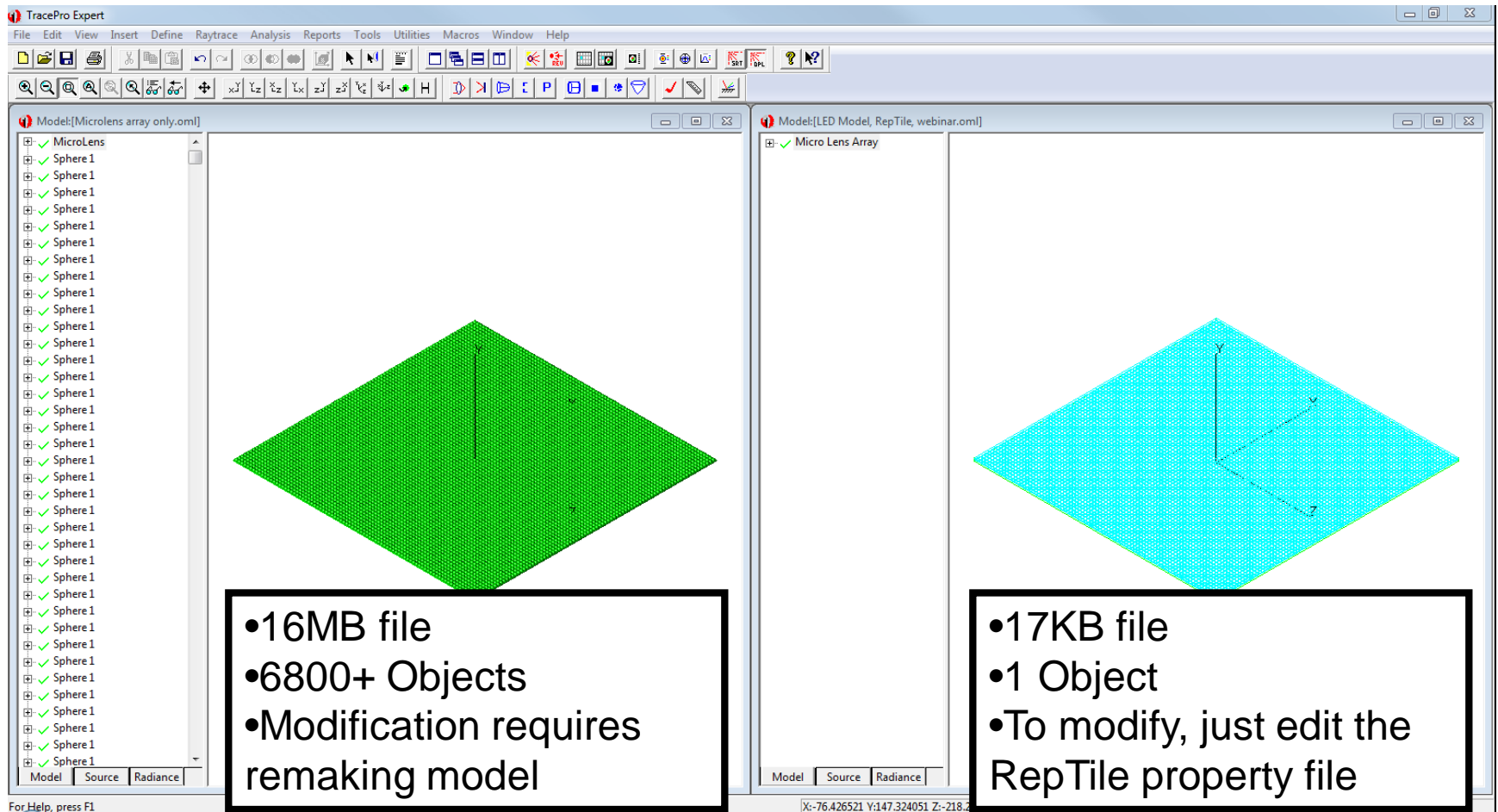
TracePro RepTile Property

Changing RepTile feature parameters



TracePro RepTile Property

Microlens array – Solid model vs RepTile



TracePro RepTile Property

RepTile Geometry Types

Enter New RepTile Property

Property Name:

Adding to Catalog: DaveJ

Variation Type:

Geometry:

Tile Type:

- Fresnel
- Cone
- Sphere
- Ellipsoid
- Hip (Mansard) Roof
- Cube Corner
- Prism
- Rounded Prism
- Log
- Enhanced Prism
- Flattened Cone
- Pointed Cone
- DMD
- Block

OK

Enter New RepTile Property

Property Name:

Adding to Catalog: DaveJ

Variation Type:

Geometry:

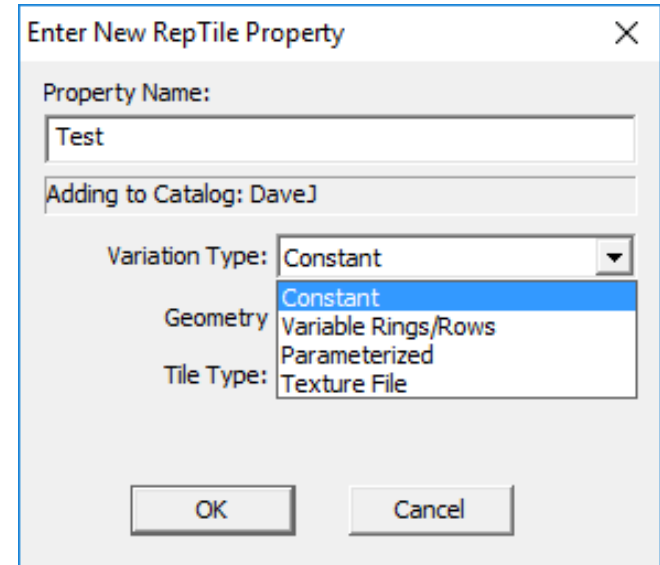
Tile Type:

- Hip (Mansard) Roof
- Cube Corner
- Prism
- Rounded Prism
- Log
- Enhanced Prism
- Flattened Cone
- Pointed Cone
- DMD
- Block
- Chiseled Log
- Torus
- Asphere
- Polygon

OK

TracePro RepTile Property

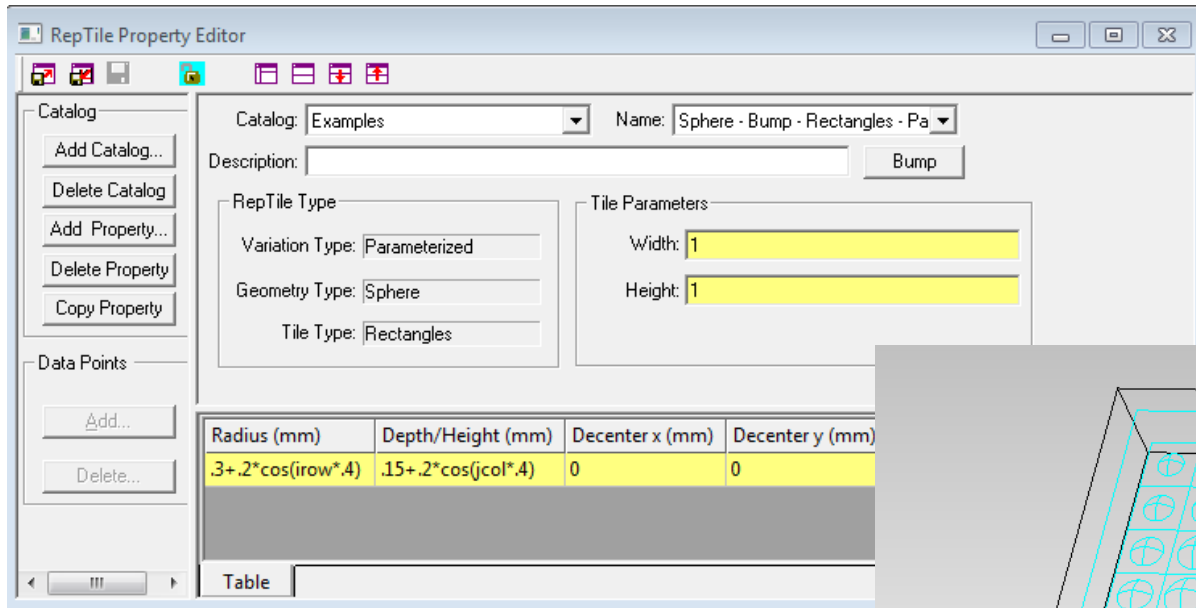
RepTile Variation Types



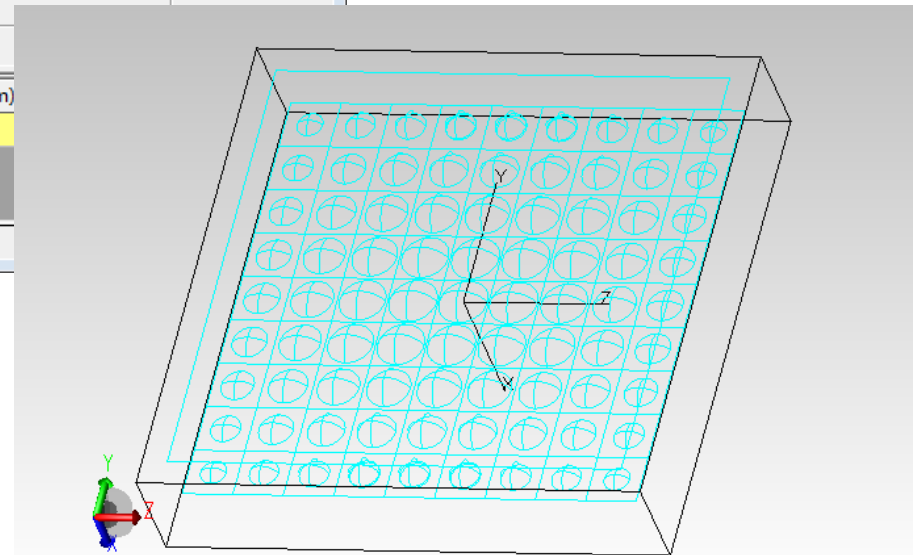
- Constant - Enter data for one tile and it is repeated
- Variable ring/row - Enter data for all tiles for each row. Each row has all the same tiles
- Parameterized - Enter a formula for each geometry dimension and tile dimension
- Texture - Each geometry feature is placed free-form, by entering the coordinates and dimensions in a txt file

TracePro RepTile Property

Parameterized RepTile Variation Type Example

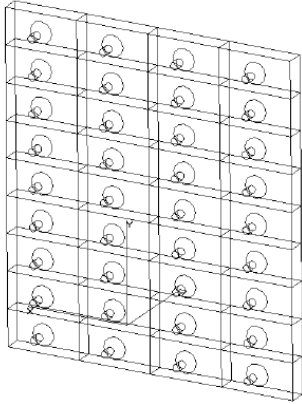


Height varying vs. column # and
radius varying vs. row #

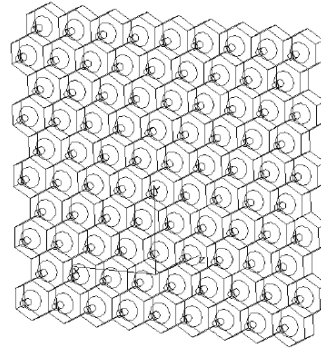


TracePro RepTile Property

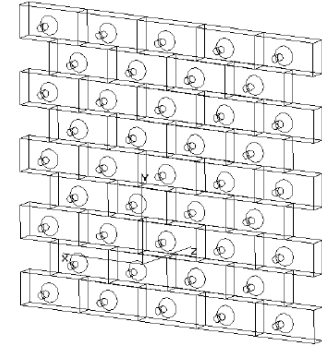
RepTile Tile Types



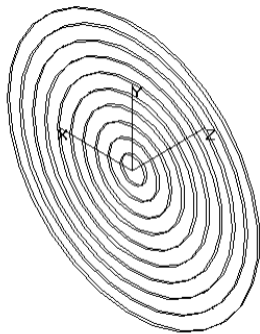
Rectangular Tile



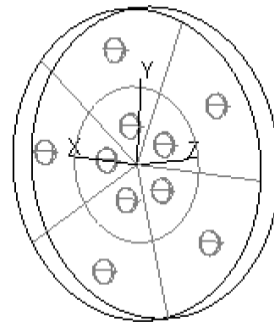
Hexagonal Tile



Staggered Rectangular Tile



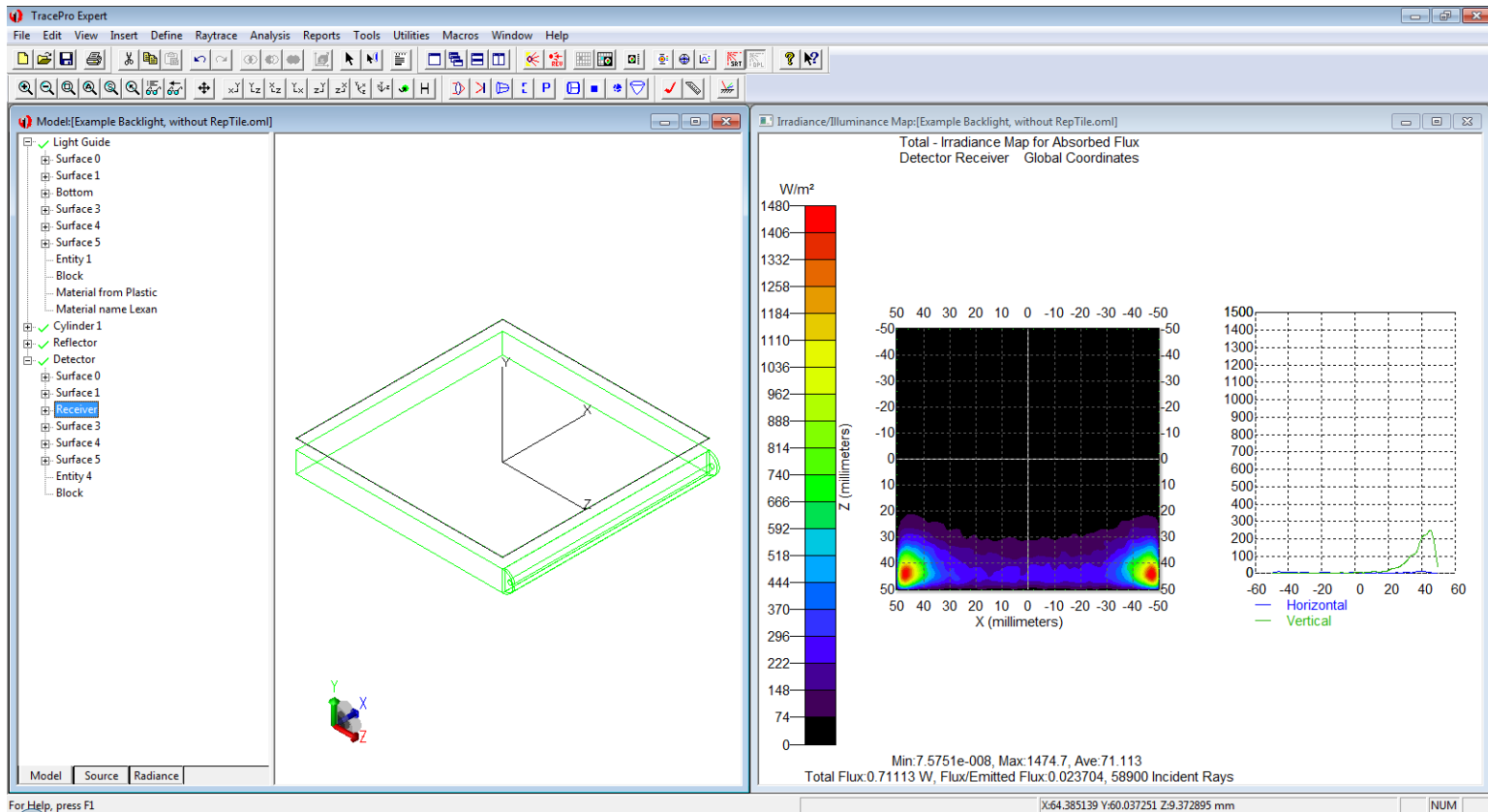
Ring Tile



Staggered Ring Tile

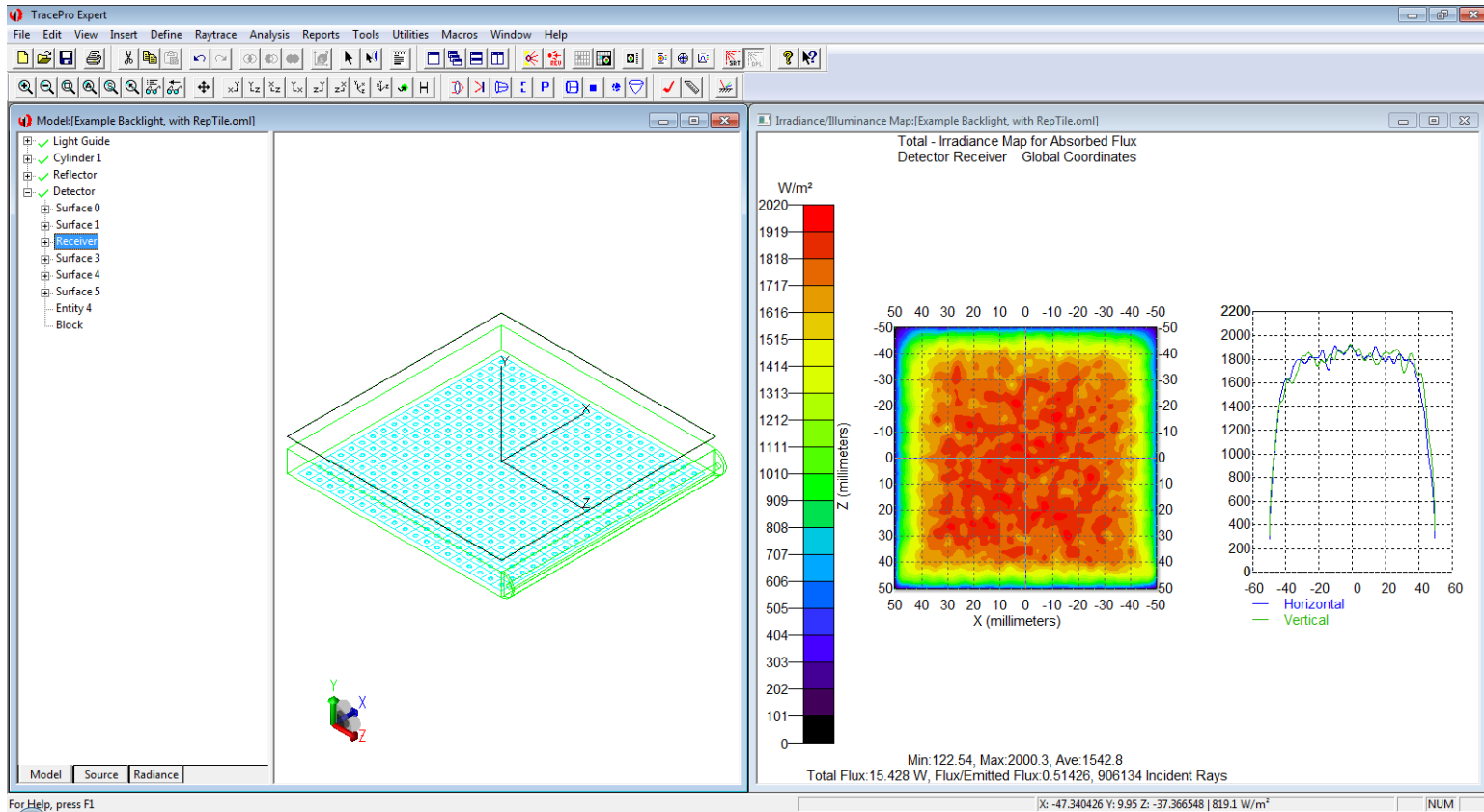
TracePro RepTile Property

RepTile Examples – Backlight with no texture applied to bottom surface for light extraction



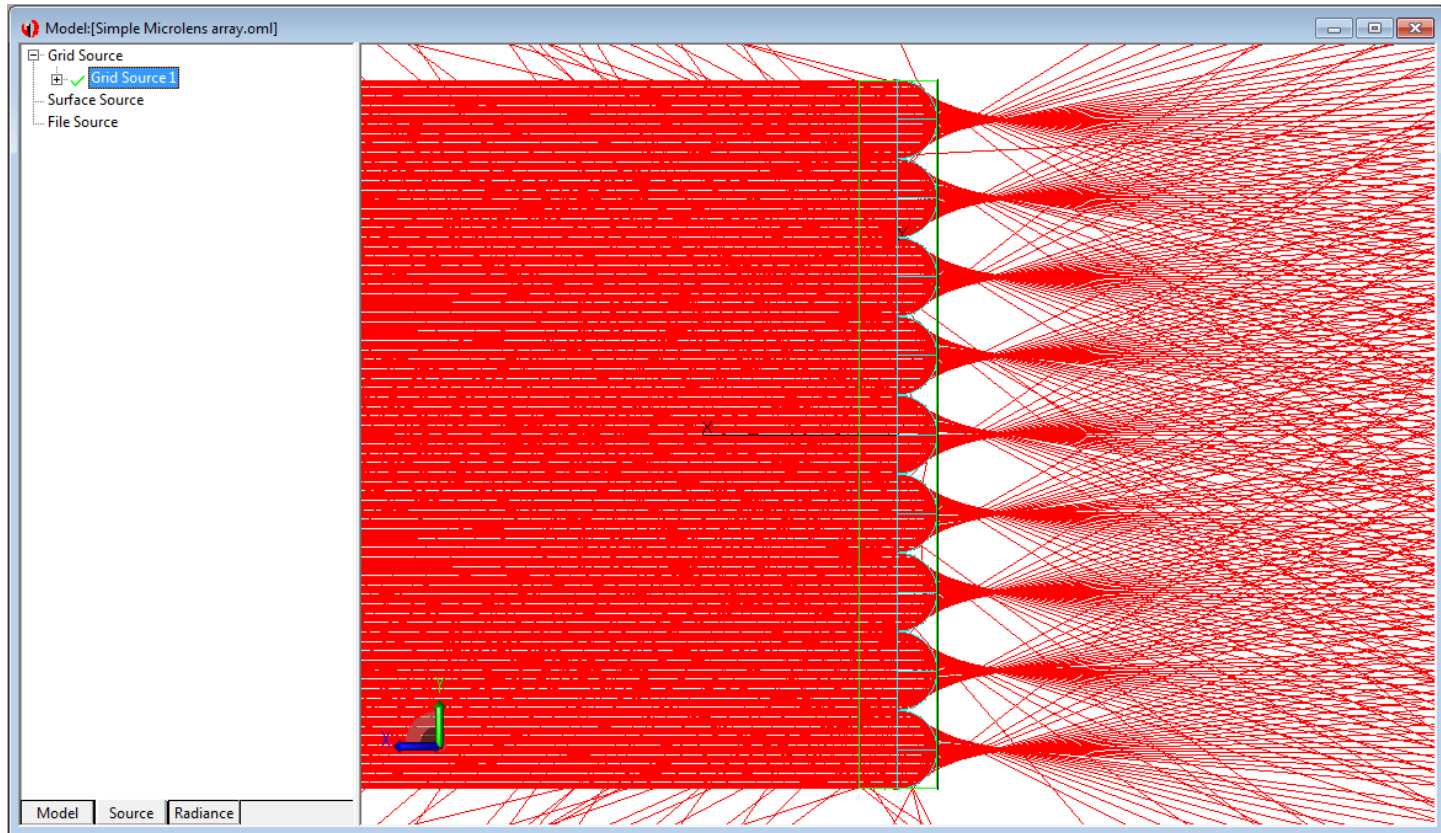
TracePro RepTile Property

RepTile Examples – Backlight with RepTile texture applied to bottom surface for light extraction



TracePro RepTile Property

RepTile Examples – PMMA Plastic Microlens Array made using RepTile Property



TracePro RepTile Property

RepTile Texture File

- Allows the User to define the location and feature type explicitly for each feature of the RepTile surface
- Allows mixing and matching of feature types. For example, a combination of spheres and cones could be defined
- Allowable geometry types: Sphere, Cone, Hip Roof, Ellipsoids, Enhanced Prism, Log, Flattened Cone, Pointed Cone, DMD Mirror, Block, Chiseled Log, Torus, Polygon
- Can be Bump or Hole
- Full description starting on page 7.108 of the TracePro User Manual

TracePro RepTile Property

RepTile Texture File

RepTile Texture File

Filename: C:\Users\djacobsen\Documents\Webinars\September 2011 Webinar, RepTile\Models

Date: 3/31/2010 12:00:00 AM

Version: 1.0

Texture Type: 0

Texture Features

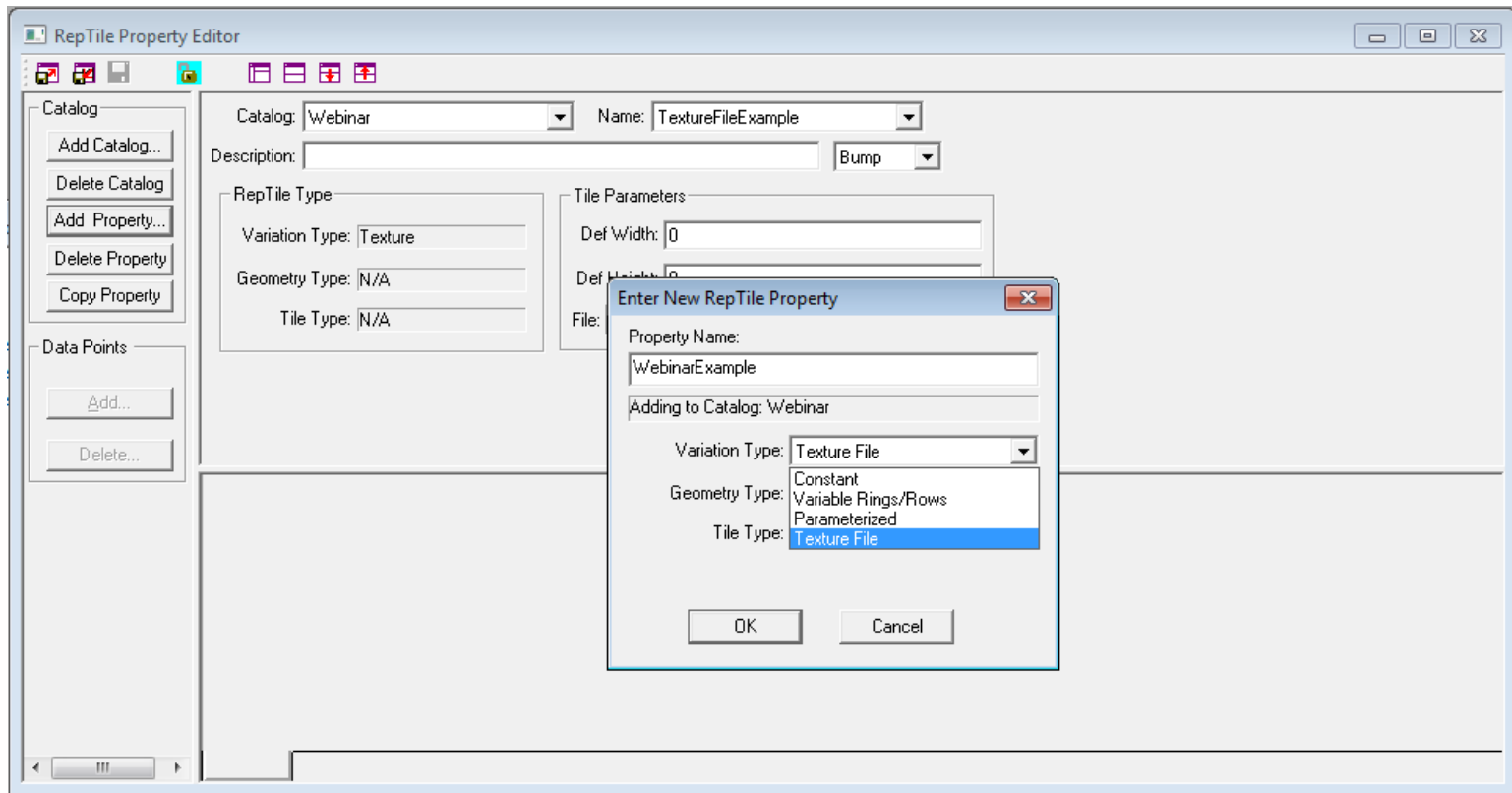
	X-center	Y-center	Feature parameters. Options will vary with feature selected.		
3	-1	0	0.75	0.75	
3	-1	4	0.5	0.5	
3	-1	-4	0.5	0.5	
3	-1	-4	0.5	0.5	
3	-1	4	0.5	0.5	
2	-1	2	1	0.1	45 0 0
2	-1	-2	1	0.1	45 0 0
2	-1	-2	1	0.1	45 0 0
2	-1	2	1	0.1	45 0 0

Bump or Hole: 1 = Bump, -1 = Hole

Feature type: 3 = Sphere, 2 = Cone

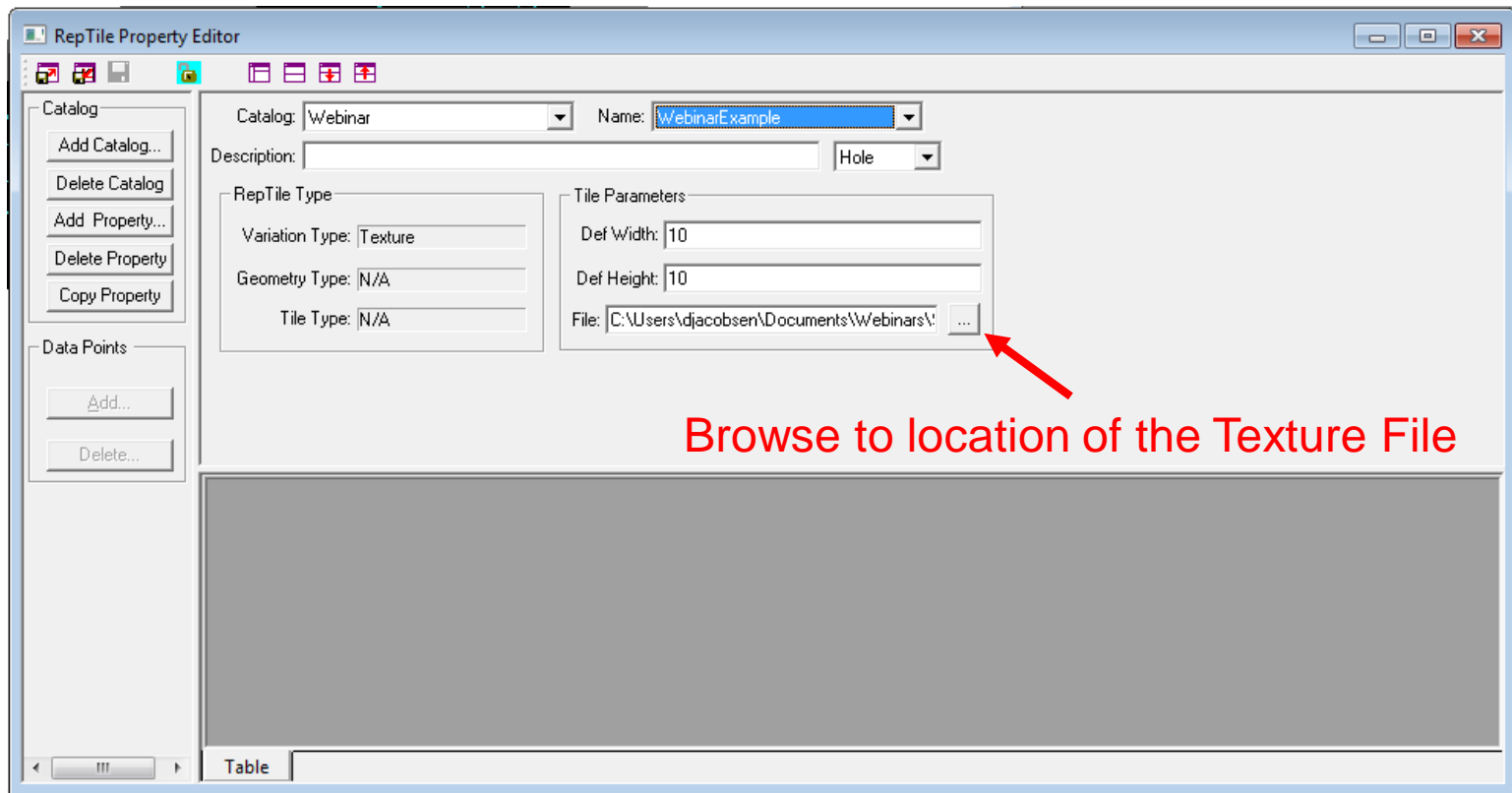
TracePro RepTile Property

New RepTile property using the Texture File



TracePro RepTile Property

New RepTile property using the Texture File



Browse to location of the Texture File

TracePro RepTile Property

Applying the RepTile property

The screenshot shows the 'Apply Properties' dialog box in TracePro, specifically for the 'RepTile' property. The dialog is divided into a left sidebar and a main configuration area.

Left Sidebar (Property List):

- Bulk Scatter
- Class and User Data
- Color
- Diffraction
- Exit Surface
- Fluorescence
- Gradient Index
- Importance Sampling
- Material
- Mueller Matrix
- Prescription
- Raytrace Flag
- RepTile** (selected)
- Surface
- Surface Source
- Temperature
- Temperature Distribution

Main Configuration Area (RepTile):

Property Data:

- Catalog: Webinar
- Name: WebinarExample
- Texture File: [Empty field]
- Surface Catalog: Default
- Surface Name: <None>

Boundary and Orientation:

- Boundary: Rectangular
- Width: 10
- Height: 10
- Depth: 1

Coordinate Systems:

Boundary Center	Texture Origin	Texture Up	Boundary Up
X: 0	X: 0	X: 0	X: 0
Y: 0	Y: 0	Y: 1	Y: 1
Z: -1	Z: -1	Z: 0	Z: 0

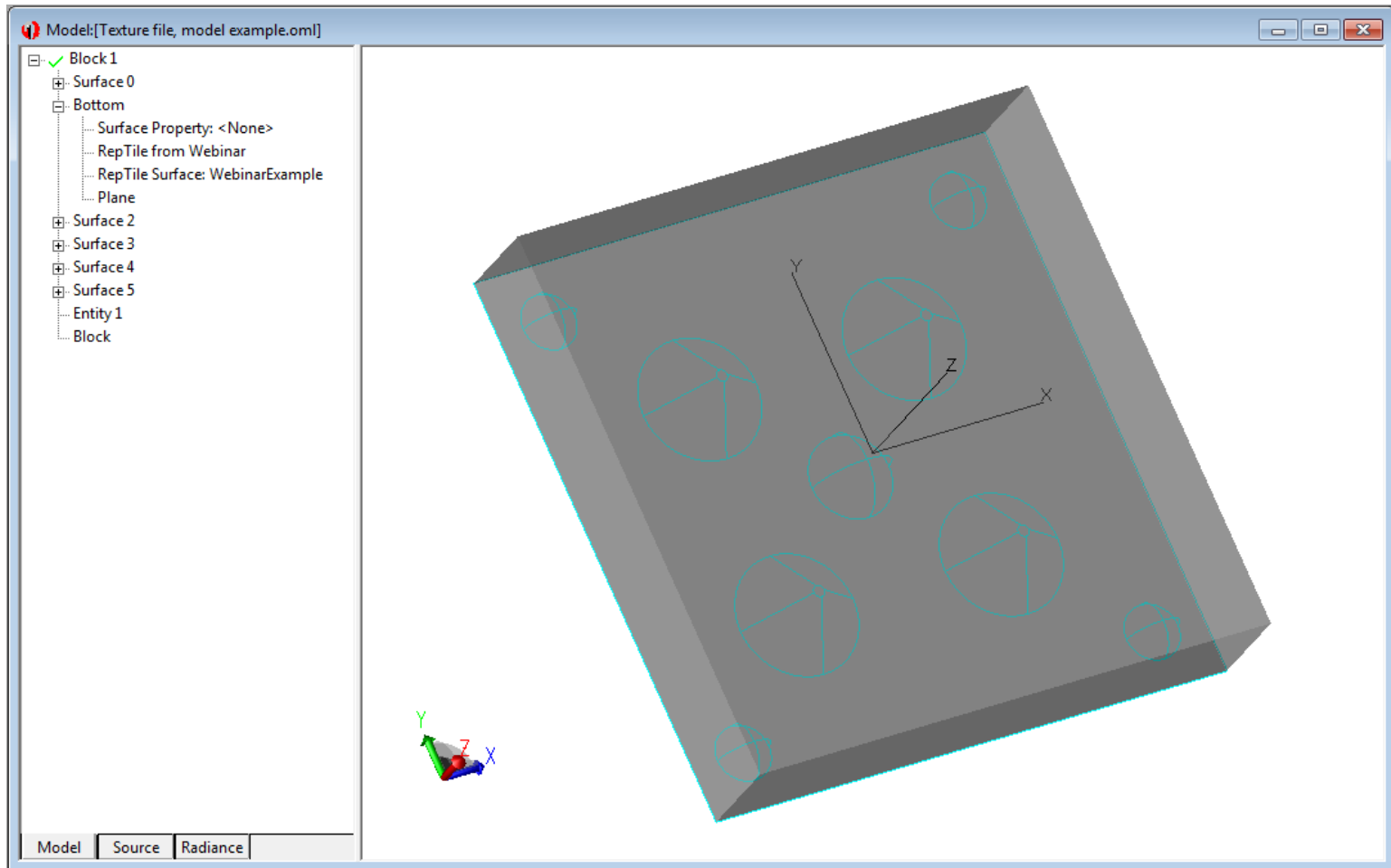
Pixel Dimensions:

- Width: 10
- Height: 10
- Hole: [Dropdown menu]

Buttons: Export, Apply, View Data

TracePro RepTile Property

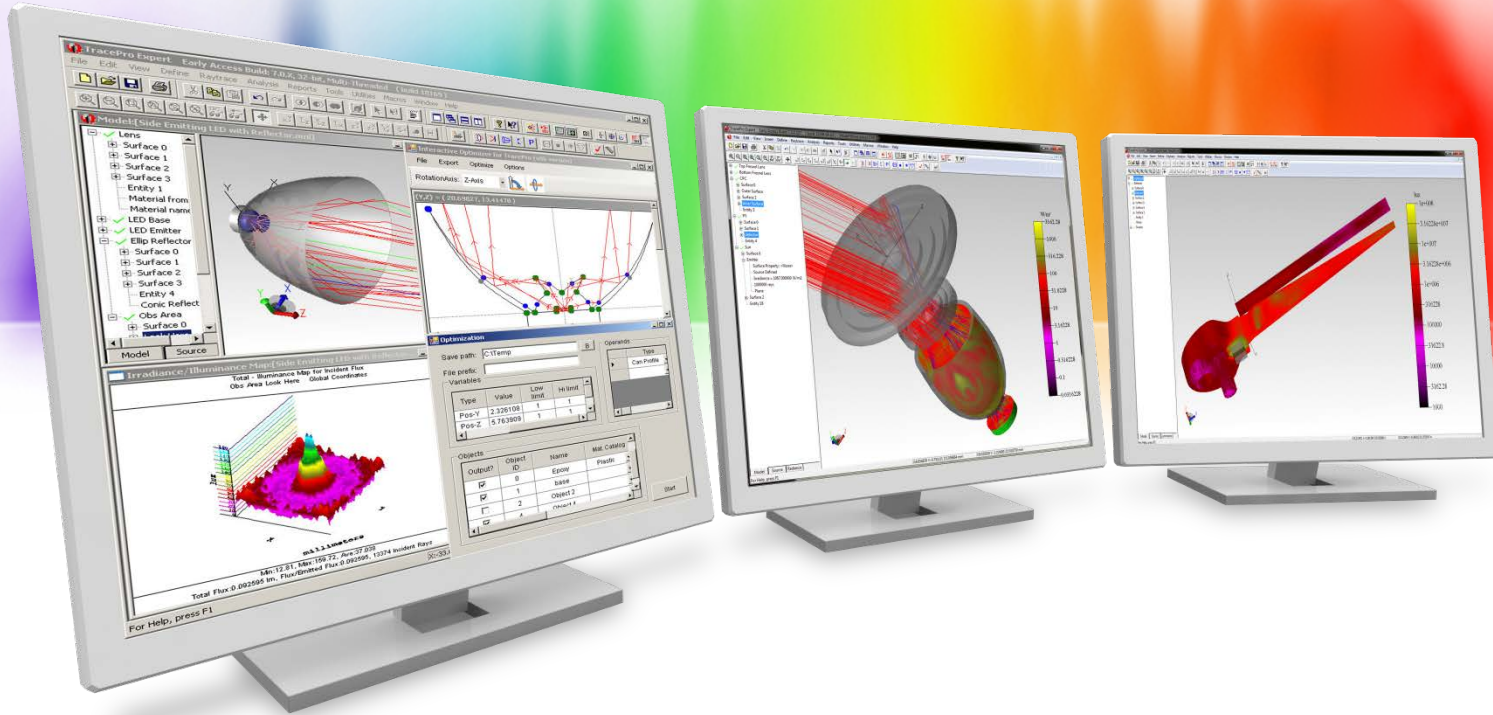
RepTile property applied to surface in TracePro



TracePro RepTile Property

RepTile Summary

- RepTile allows you to create repetitive structures quickly and easily
- Numerous geometry types are available
- Several variations are available for tile positioning
- Model sizes are greatly reduced and raytrace times can be faster
- Geometry is easily changed by editing the RepTile property file
- Texture File allows you to explicitly define feature types and location and allows mixing and matching of feature types



TracePro Texture Optimizer II

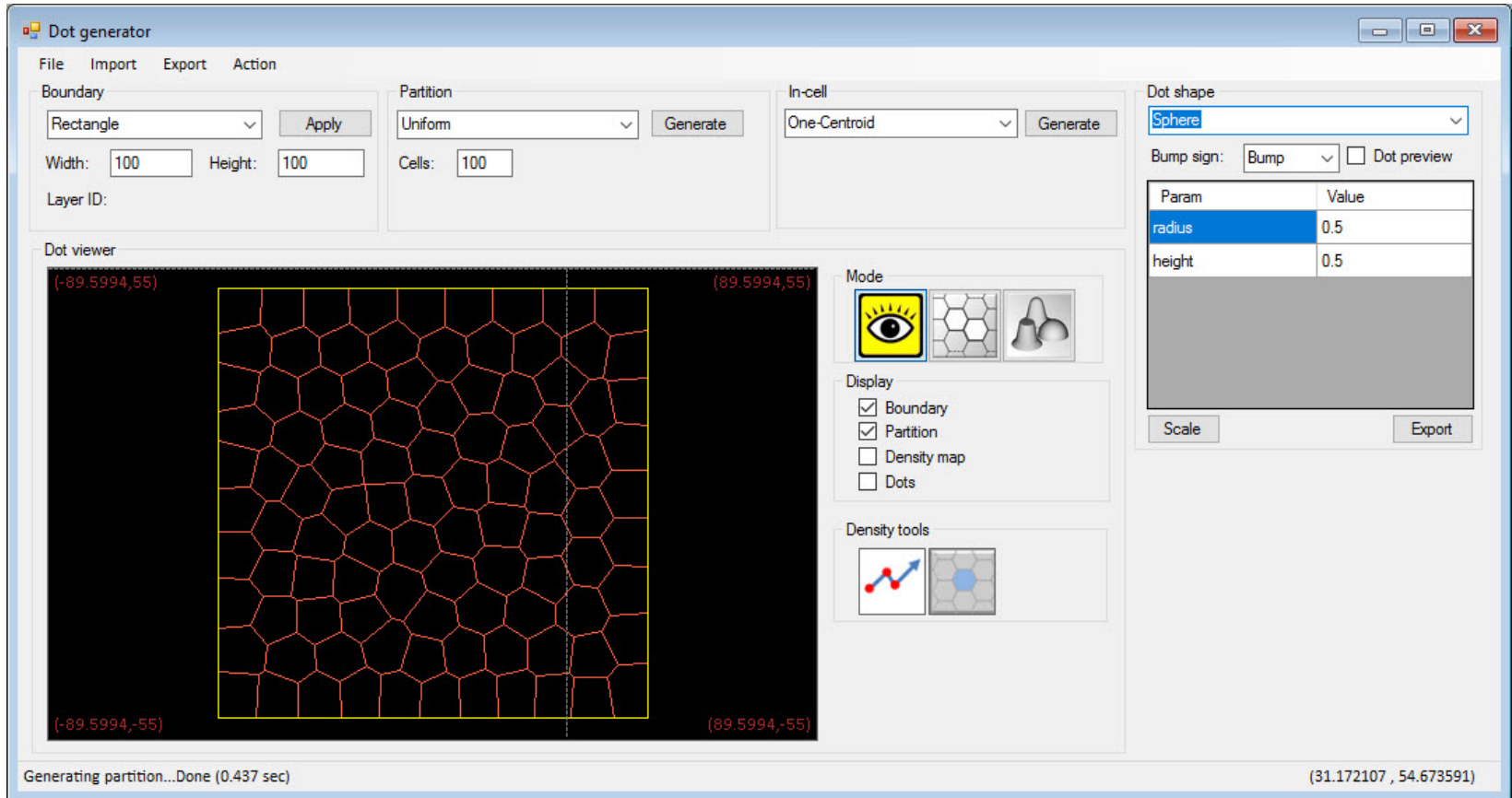
TracePro Texture Optimizer II

What is the Texture Optimizer II

- Included with TracePro Expert in the Optimize menu
- Used with the RepTile property in TracePro
- Allows the user to define the surface boundary for the RepTile, the surface partitioning, the method for filling the cells, and the RepTile feature type
- The surface boundary can be defined using the name of the surface in TracePro, this allows for complex surface boundaries
- Surface partitioning options include uniform, grid, and ring options
- Numerous options are available for filling the cells
- 12 RepTile feature types available for use
- 2 main parts, the Dot Generator and the Optimization windows

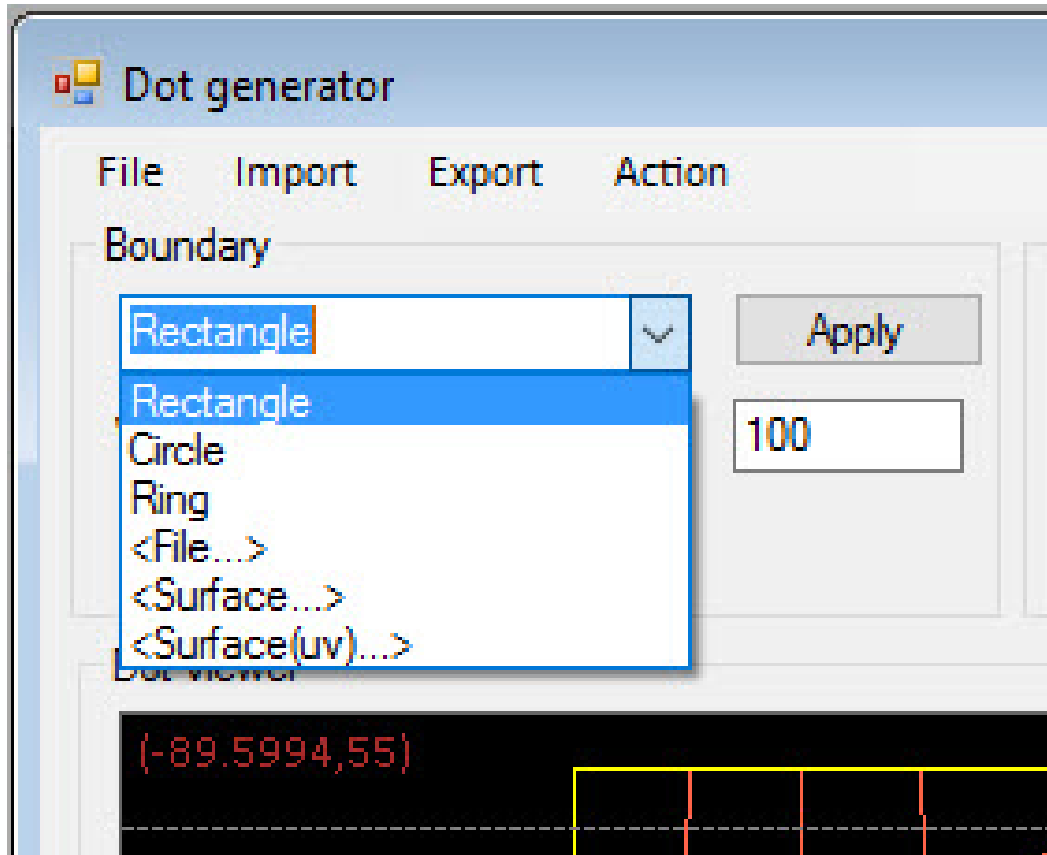
TracePro Texture Optimizer II

Dot Generator window



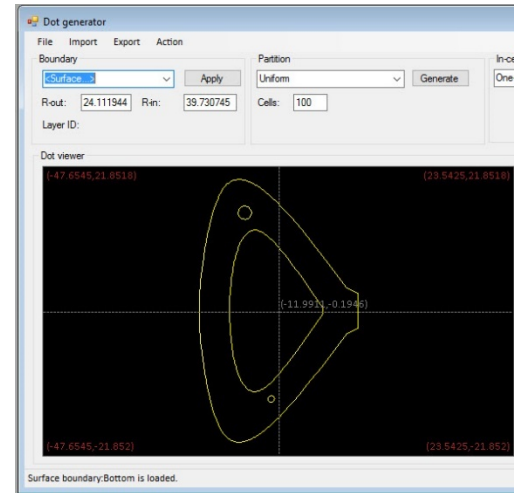
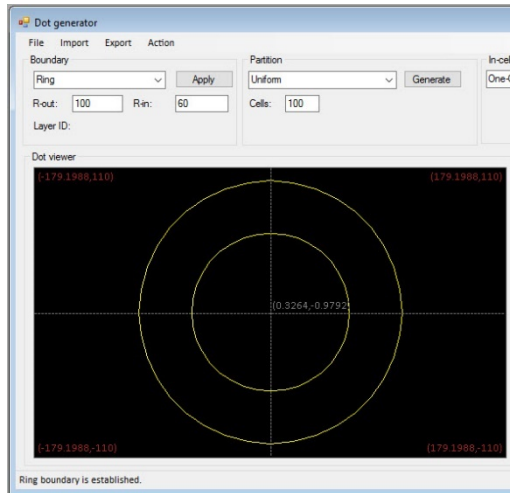
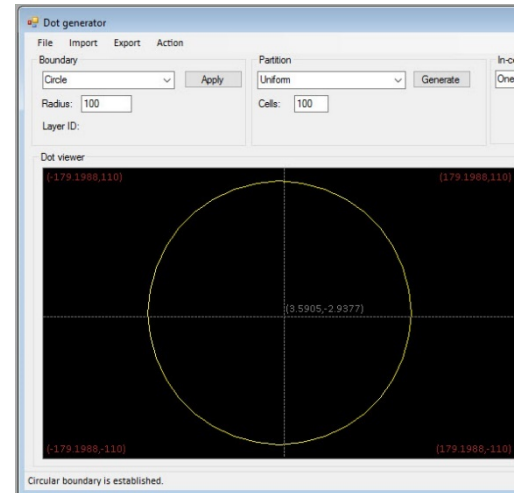
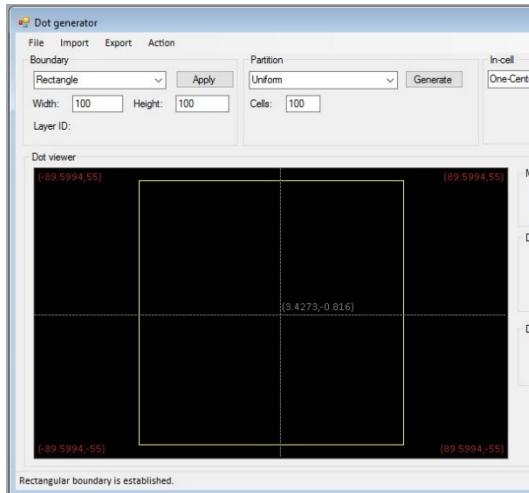
TracePro Texture Optimizer II

Boundary Options



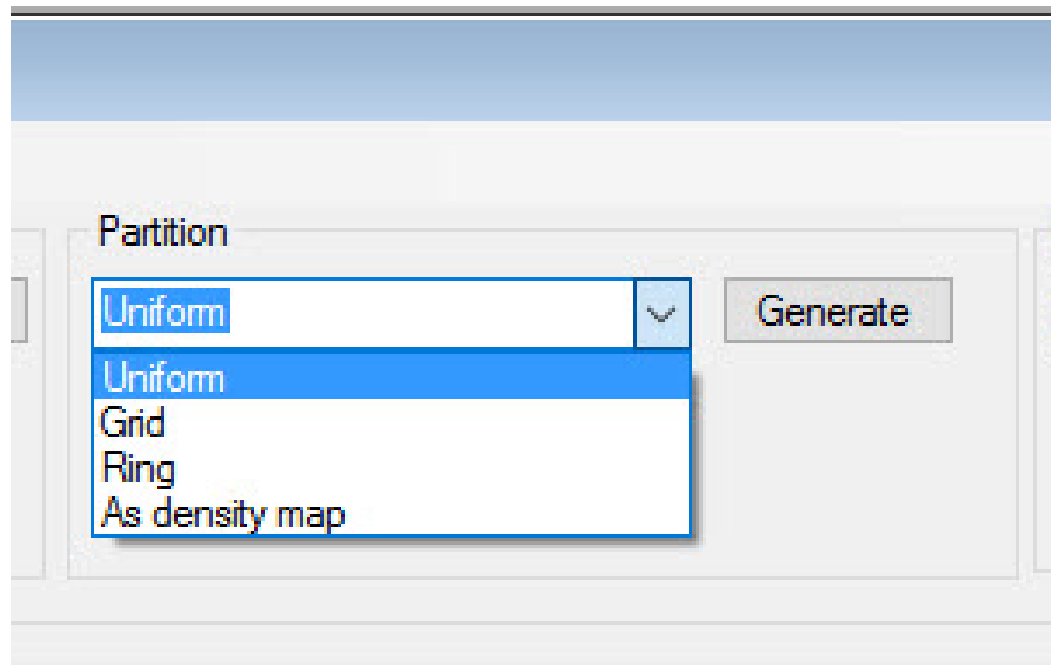
TracePro Texture Optimizer II

Boundary Options



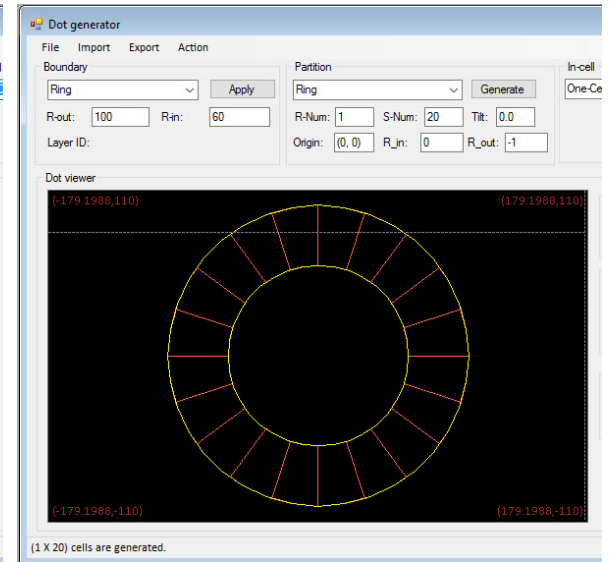
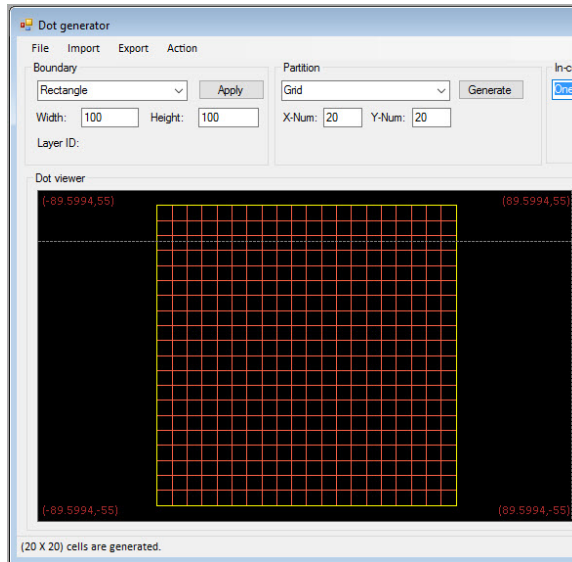
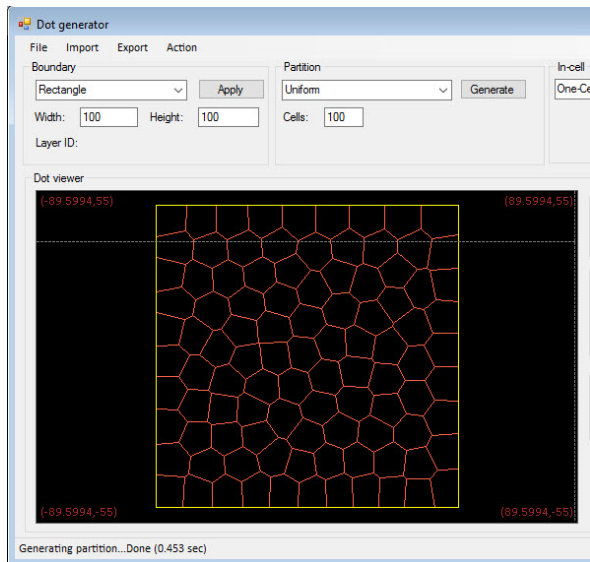
TracePro Texture Optimizer II

Partition Options



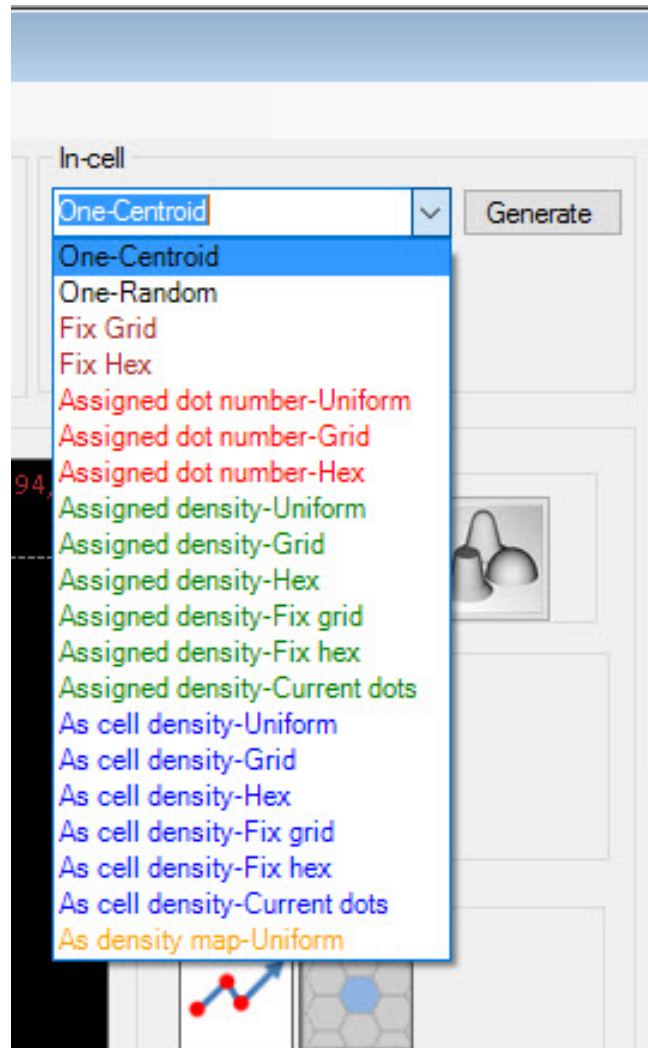
TracePro Texture Optimizer II

Partition Options



TracePro Texture Optimizer II

In-cell fill options



TracePro Texture Optimizer II

In-cell fill options

The image displays three overlapping screenshots of the TracePro Dot generator software interface, illustrating different in-cell fill options. Each window shows a 2D grid of blue dots on a black background, with a status bar indicating the number of dots generated and the time taken.

Top Window: Assigned density-Uniform
Boundary: Rectangle | Partition: Grid | In-cell: Assigned density-Uniform | Density: 0.05 | Dot shape: Sphere
Status: Generating 16000 dots done! (7.078 sec)

Middle Window: Assigned density-Grid
Boundary: Rectangle | Partition: Grid | In-cell: Assigned density-Grid | Density: 0.05 | Dot shape: Sphere
Status: Generating 15875 dots done (0.11 sec)

Bottom Window: Assigned density-Hex
Boundary: Rectangle | Partition: Grid | In-cell: Assigned density-Hex | Density: 0.05 | Dot shape: Sphere
Status: Generating 15844 dots done (0.11 sec)

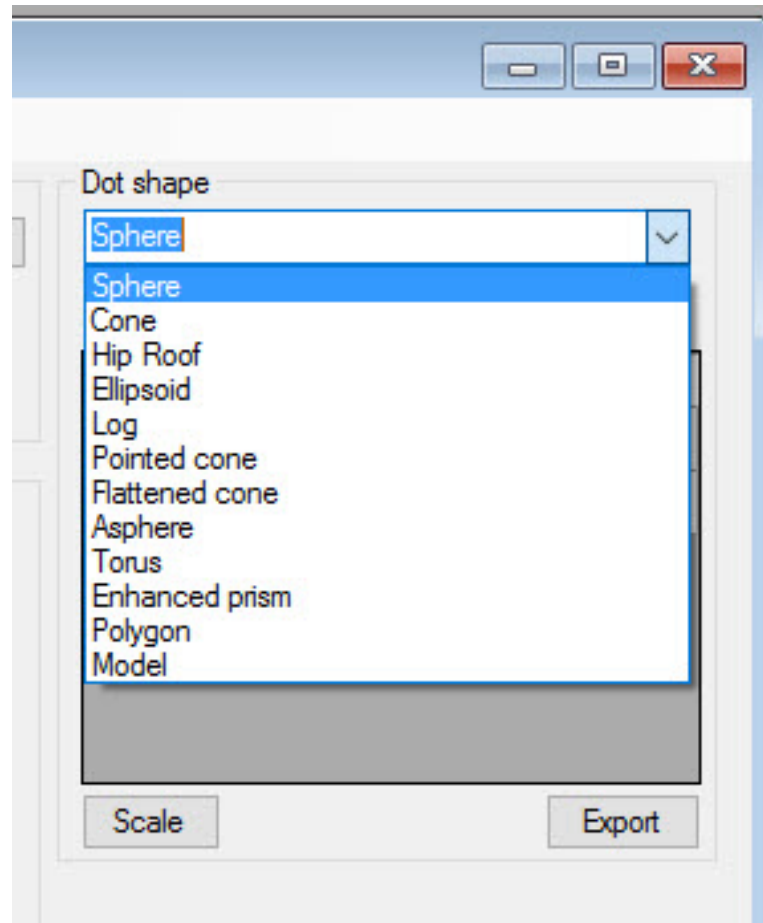
The software interface includes a menu bar (File, Import, Export, Action), a Boundary section (Rectangle, Width: 100, Height: 100, Layer ID), a Partition section (Grid, X-Num: 20, Y-Num: 20), an In-cell section (Assigned density, Density: 0.05), and a Dot shape section (Sphere, Bump sign: Bump, Dot preview). A table of parameters is shown in the bottom right of each window:

Param	Value
radius	0.1
height	0.1

Additional features include a Mode section (Eye, Grid, Bump) and a Display section (Boundary, Partition, Density map, Dots) in the bottom window.

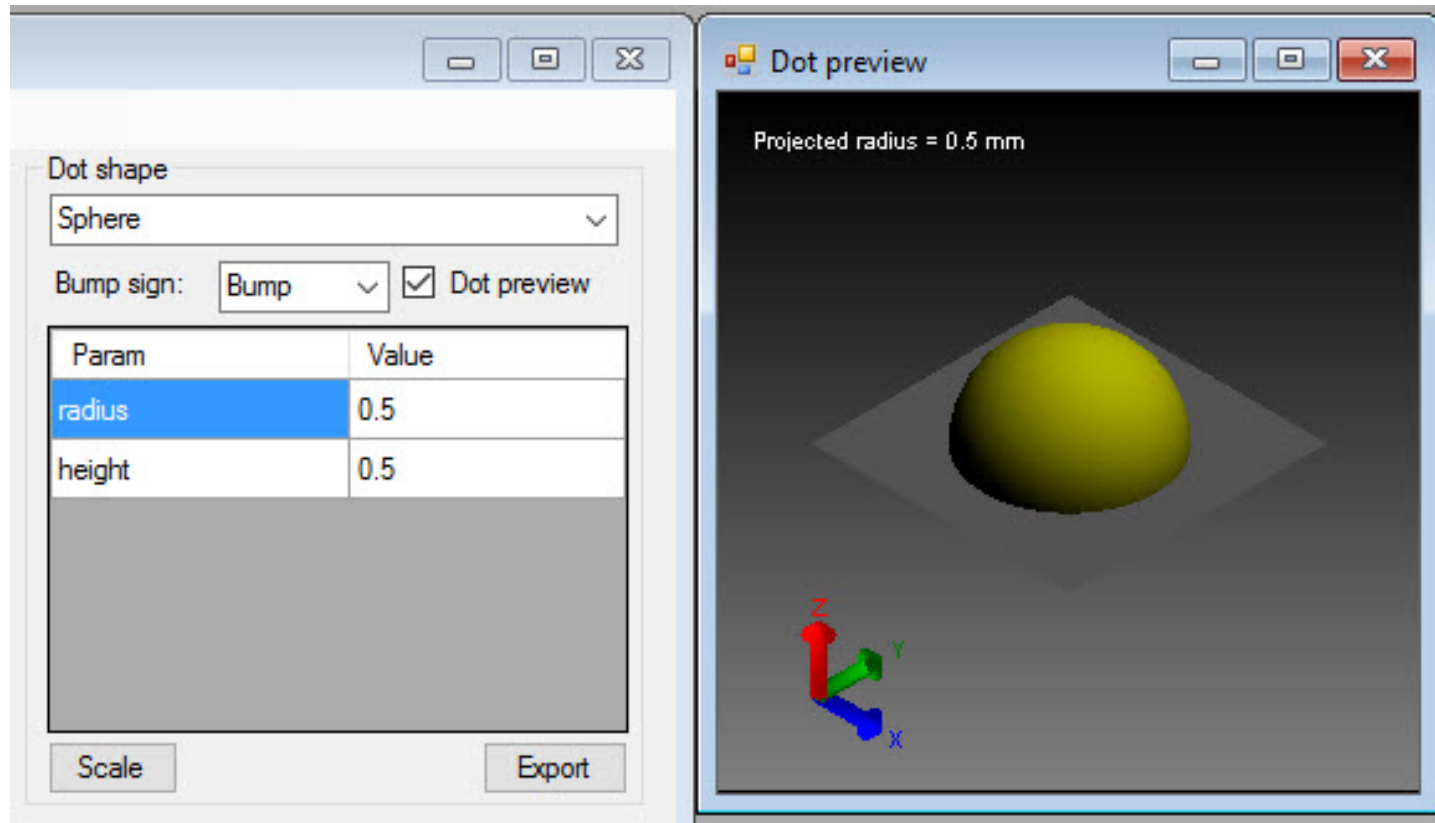
TracePro Texture Optimizer II

Dot shape options



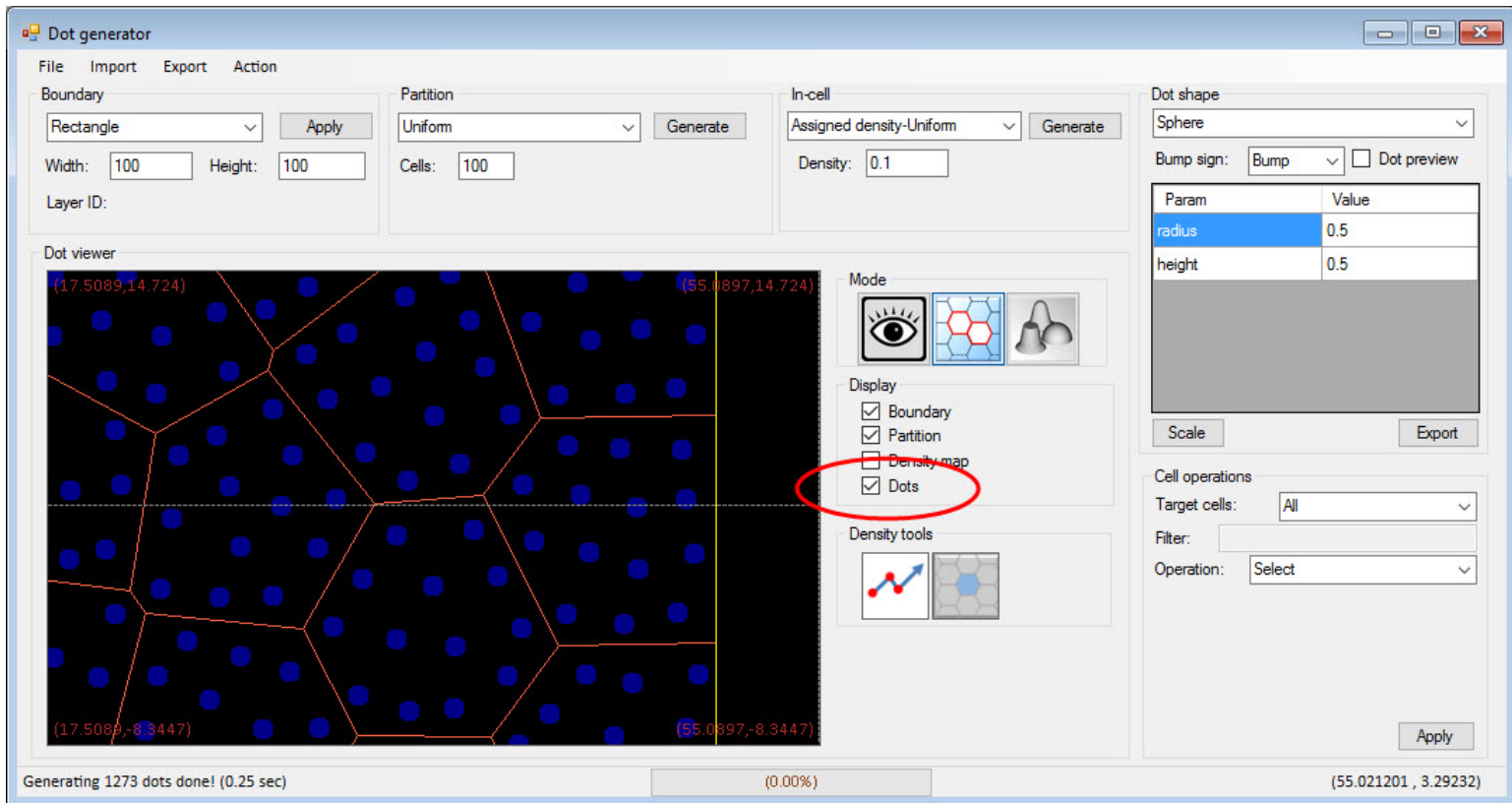
TracePro Texture Optimizer II

Dot shape options – Dot preview on



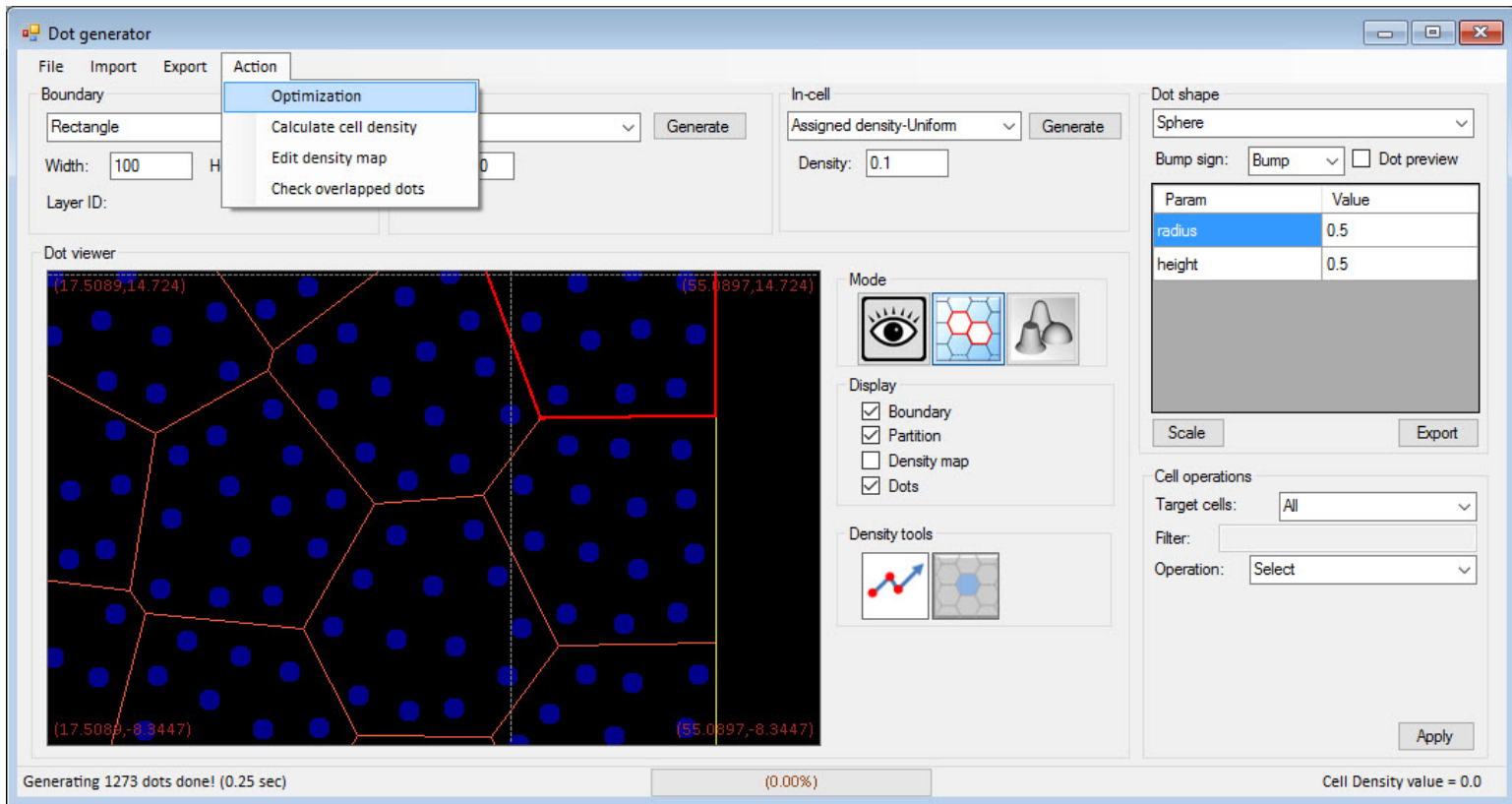
TracePro Texture Optimizer II

Dots display – on/off



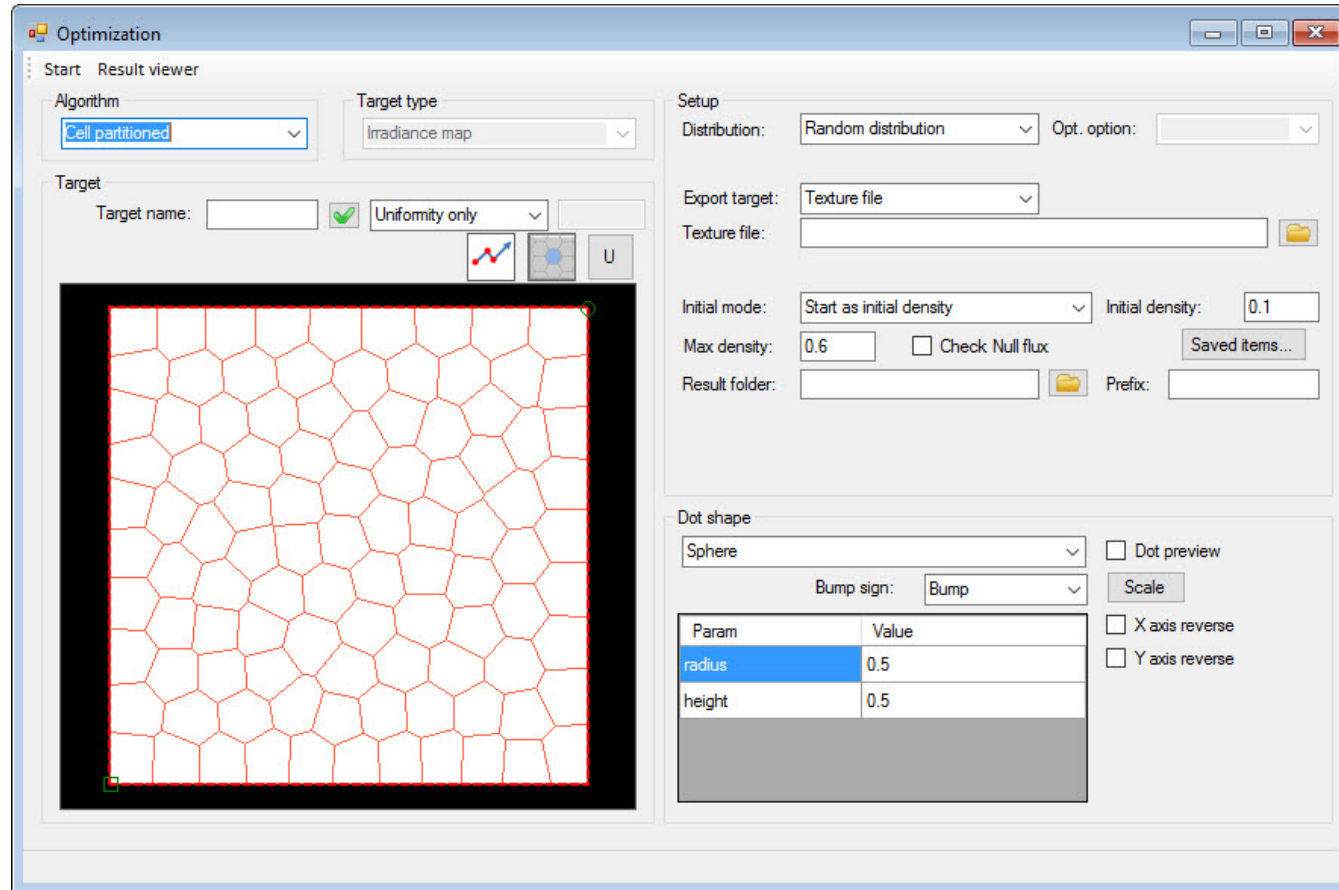
TracePro Texture Optimizer II

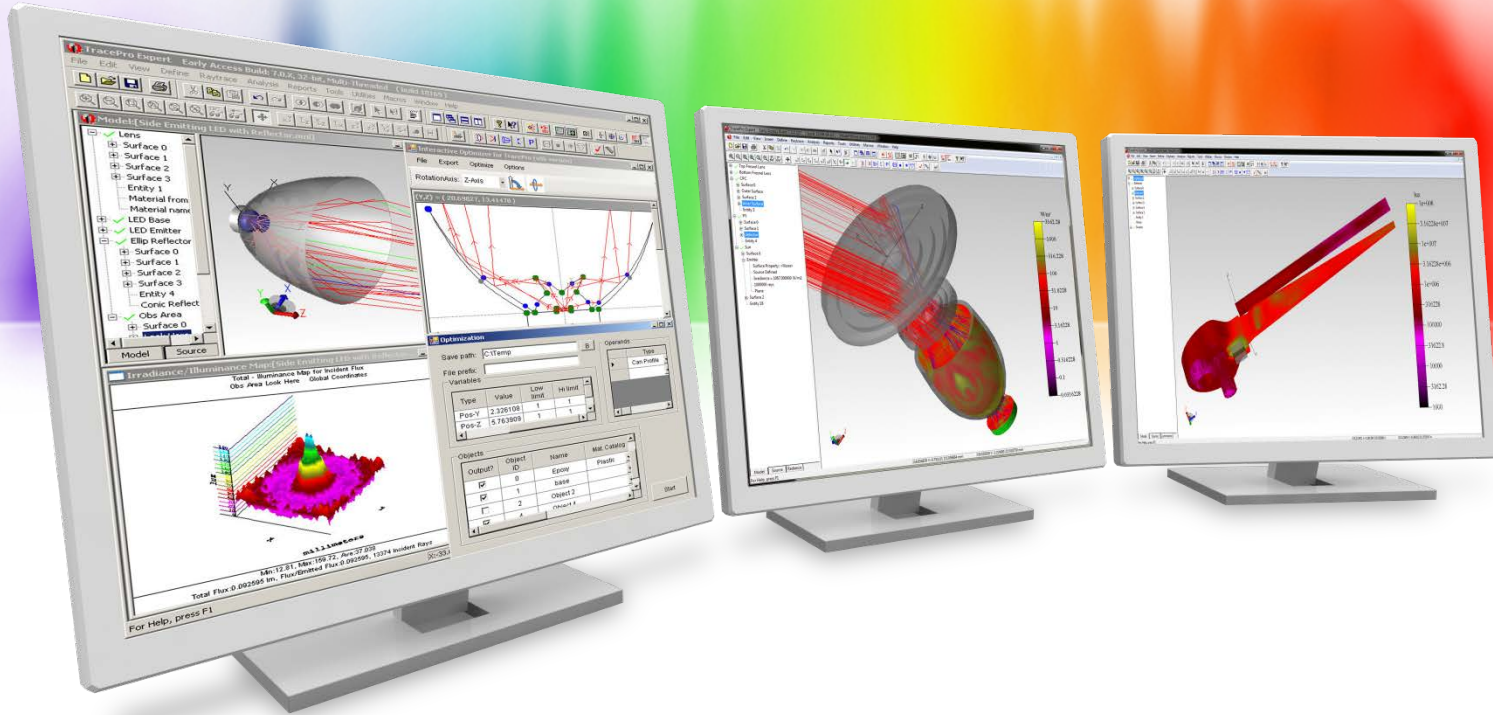
Optimization window



TracePro Texture Optimizer II

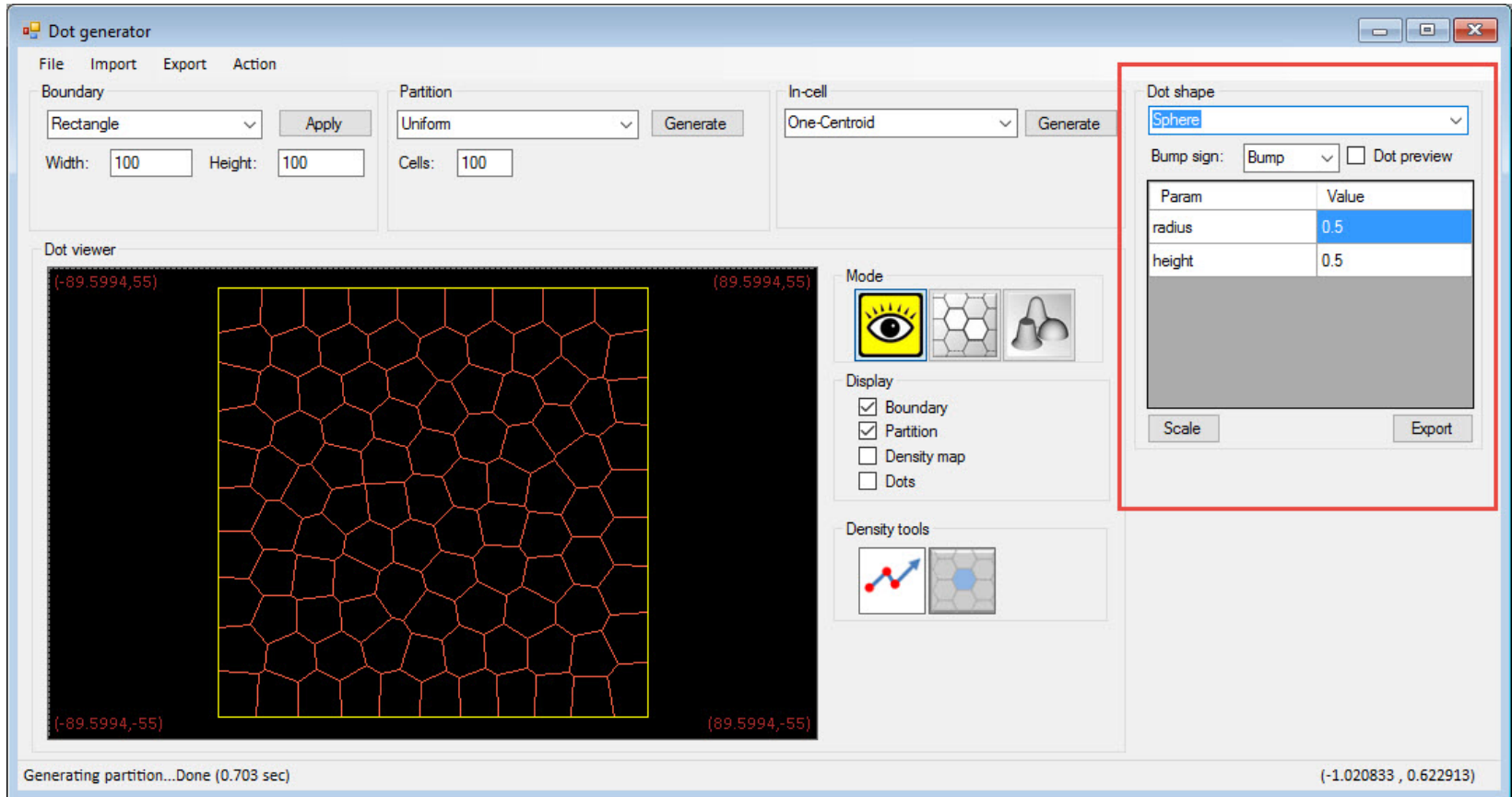
Optimization window



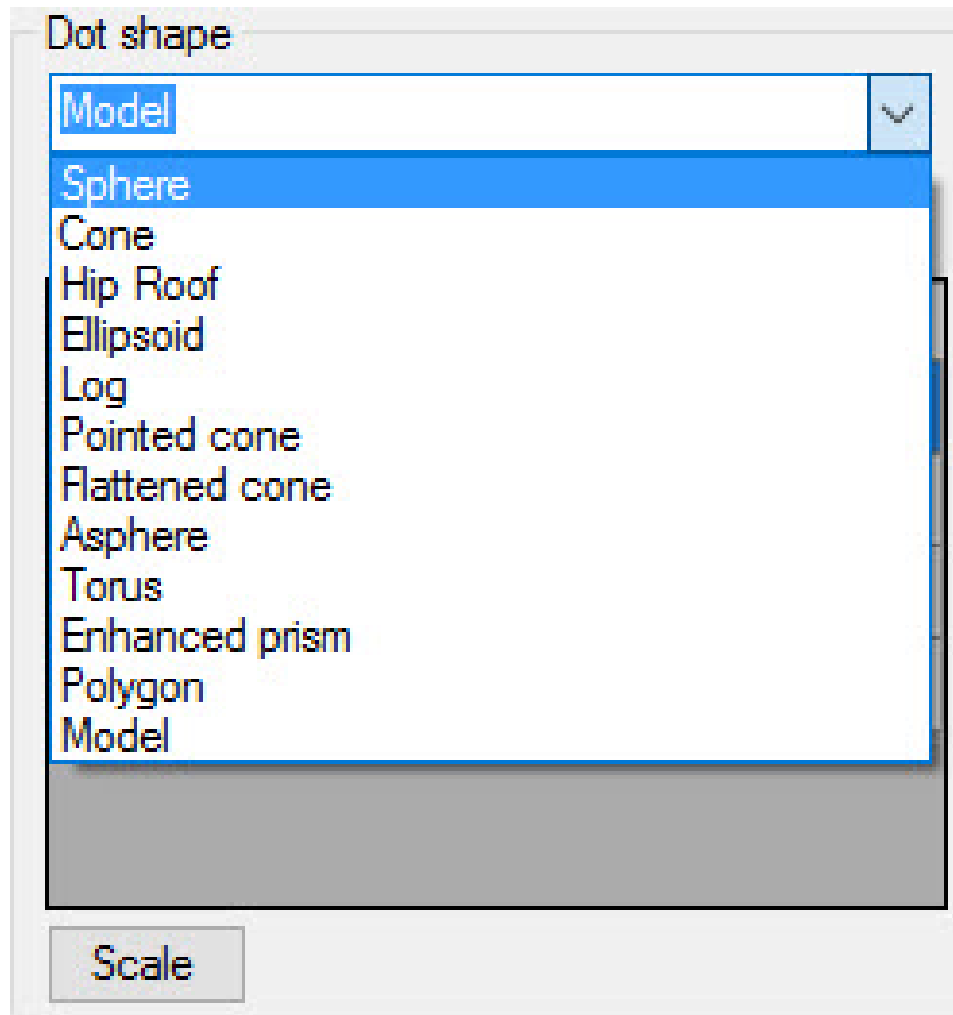


Texture Optimizer II - Texture Types

Texture Optimizer II – Texture Types



Texture Optimizer II – Texture Types



Texture Optimizer II – Texture Types

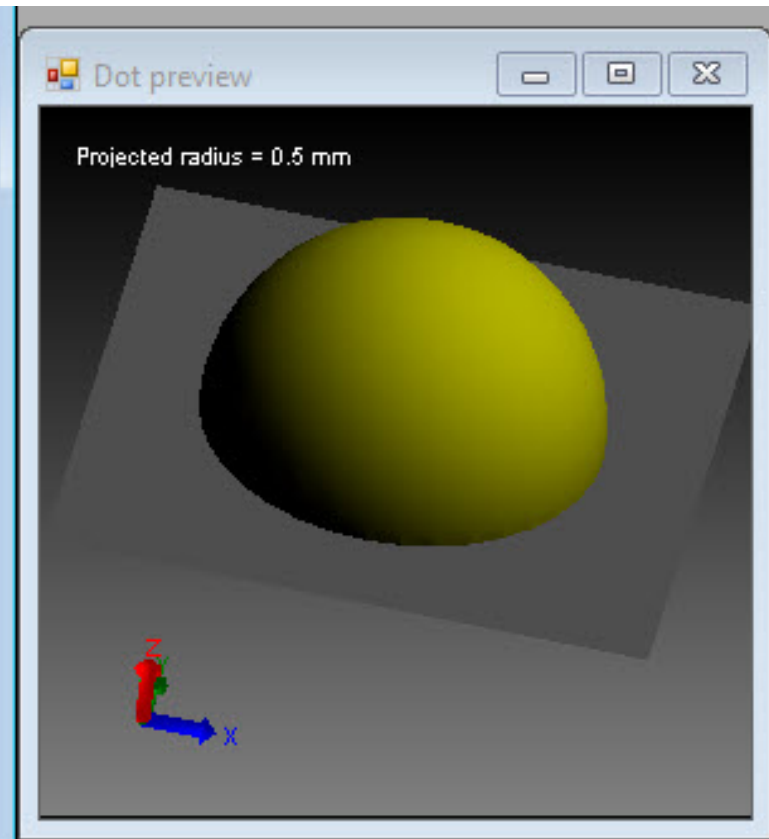
Sphere

Dot shape
Sphere

Bump sign: Bump Dot preview

Param	Value
radius	0.5
height	0.5

Scale Export



Texture Optimizer II – Texture Types

Cone

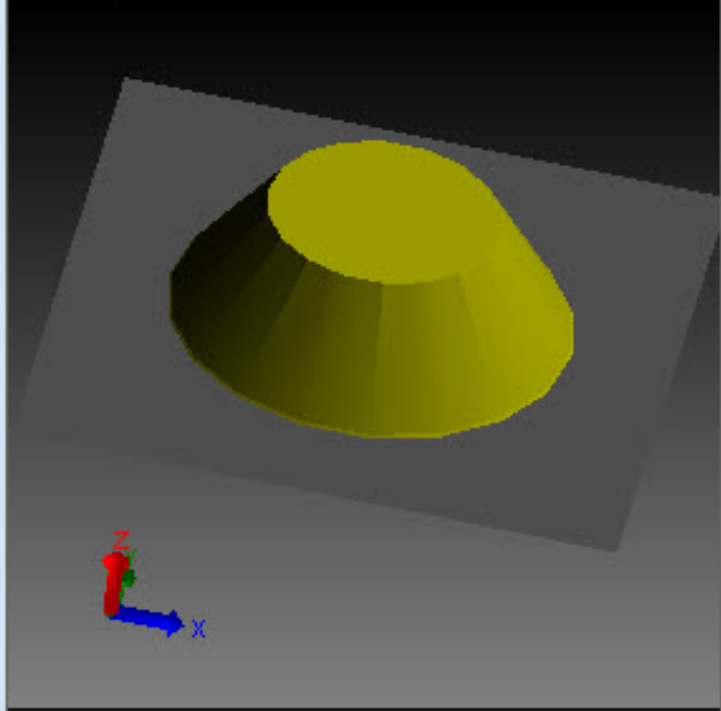
Dot shape
Cone

Bump sign: Bump Dot preview

Param	Value
height	0.5
end radius	0.3
cone angle	45
chamfer height	0.01
chamfer angle	45

Scale Export

Dot preview



Texture Optimizer II – Texture Types

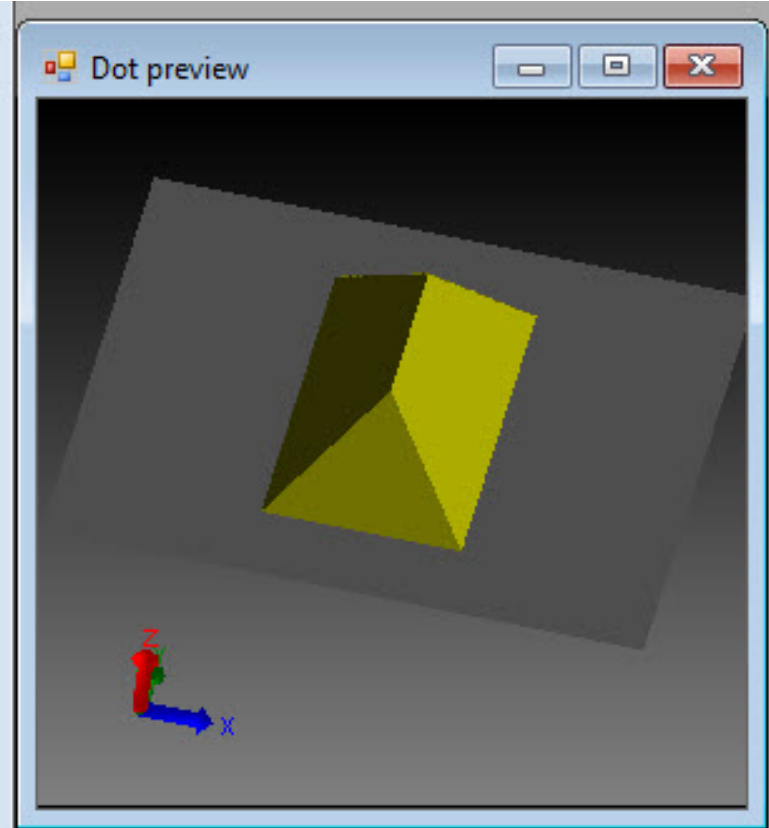
Hip Roof

Dot shape
Hip Roof

Bump sign: Bump Dot preview

Param	Value
height	0.5
y width	1
y angle	45
x width	0.5
x angle	45

Scale Export



Texture Optimizer II – Texture Types

Ellipsoid

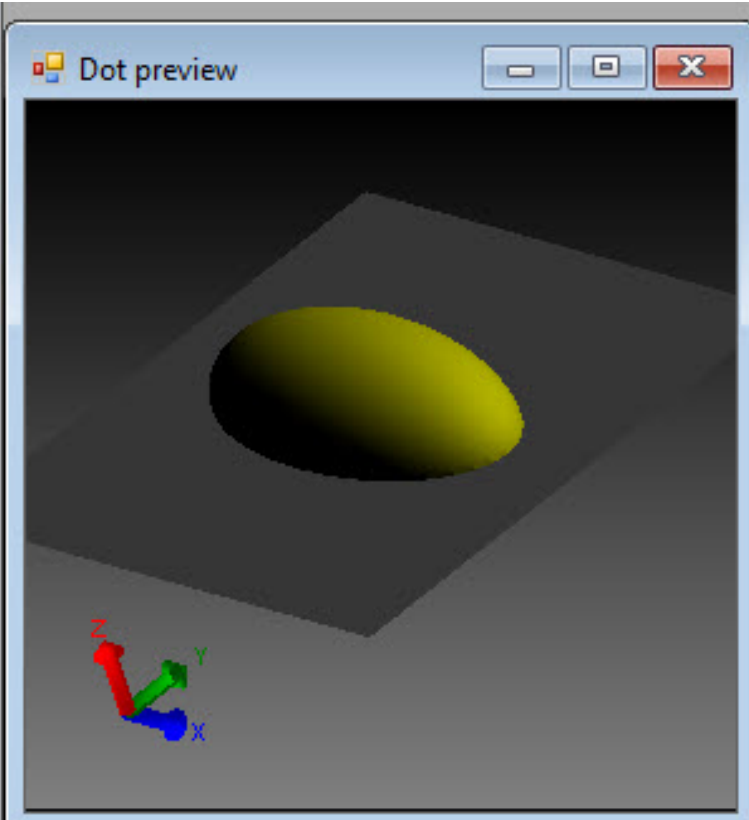
Dot shape
Ellipsoid

Bump sign: Bump Dot preview

Param	Value
height	0.5
x radius	1
y radius	0.5
z radius	0.5
x rotate	0

Scale Export

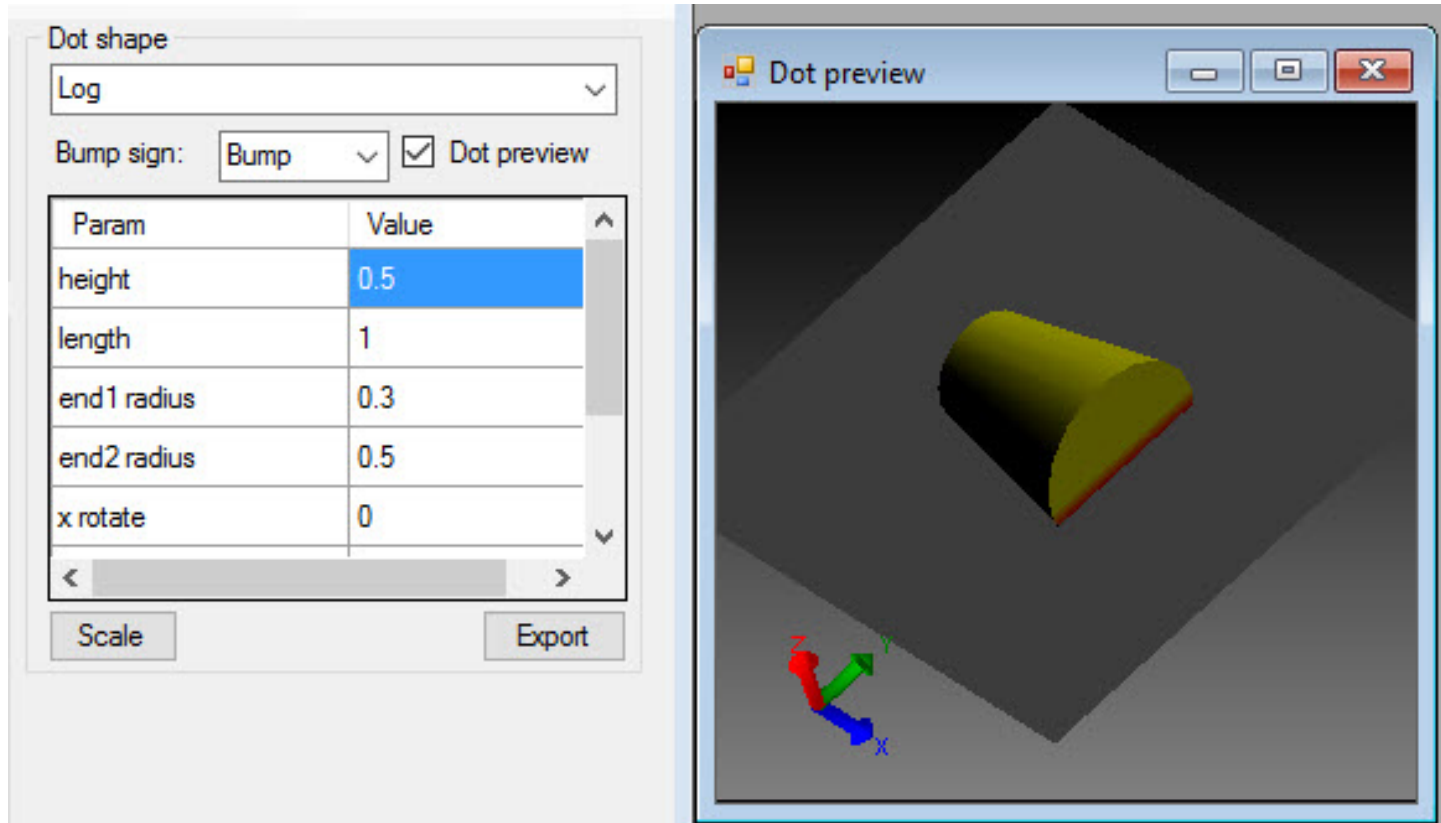
Dot preview



The image shows a software interface for creating a 3D ellipsoid. On the left, a control panel includes a dropdown menu set to 'Ellipsoid', a 'Bump sign' dropdown set to 'Bump', and a checked 'Dot preview' checkbox. Below these is a table with parameters: height (0.5), x radius (1), y radius (0.5), z radius (0.5), and x rotate (0). At the bottom of the panel are 'Scale' and 'Export' buttons. On the right, a 'Dot preview' window displays a 3D scene with a yellow-green ellipsoid on a gray plane. A 3D coordinate system with red (z), green (y), and blue (x) axes is visible in the bottom-left corner of the preview window.

Texture Optimizer II – Texture Types

Log



The screenshot displays the 'Log' tab of the Texture Optimizer II software. The interface includes a 'Dot shape' dropdown menu set to 'Log', a 'Bump sign' dropdown set to 'Bump', and a checked 'Dot preview' checkbox. Below these controls is a table with parameters and their values:

Param	Value
height	0.5
length	1
end1 radius	0.3
end2 radius	0.5
x rotate	0

At the bottom of the control panel are 'Scale' and 'Export' buttons. To the right, a 'Dot preview' window shows a 3D rendering of a yellow and green curved object on a gray plane, with a 3D coordinate system (X, Y, Z) visible in the bottom-left corner.

Texture Optimizer II – Texture Types

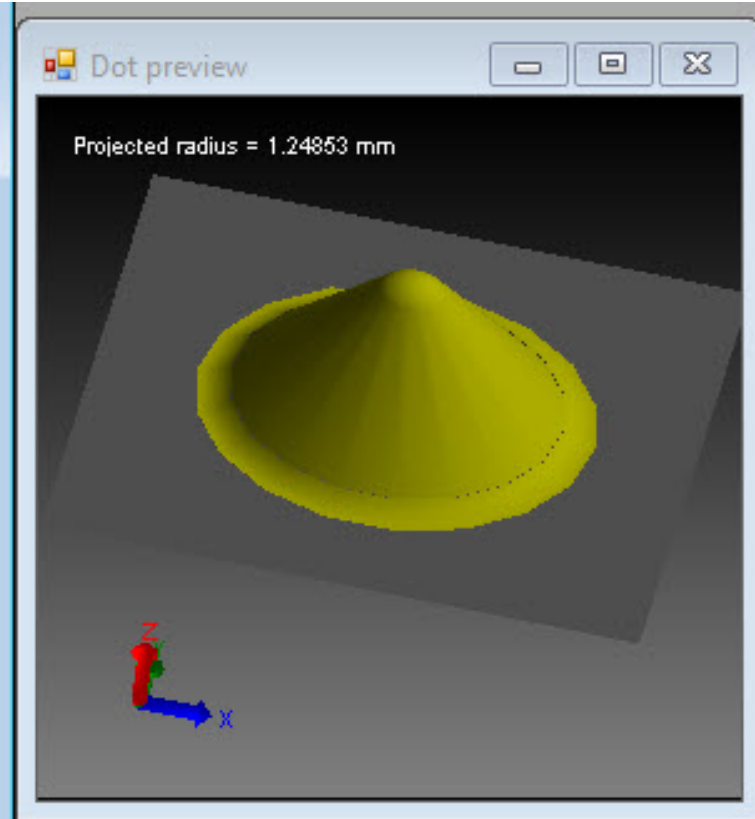
Pointed Cone

Dot shape
Pointed cone

Bump sign: Bump Dot preview

Param	Value
height	1
cone angle	45
peak radius	0.3
trough radius	0.3

Scale Export



Texture Optimizer II – Texture Types

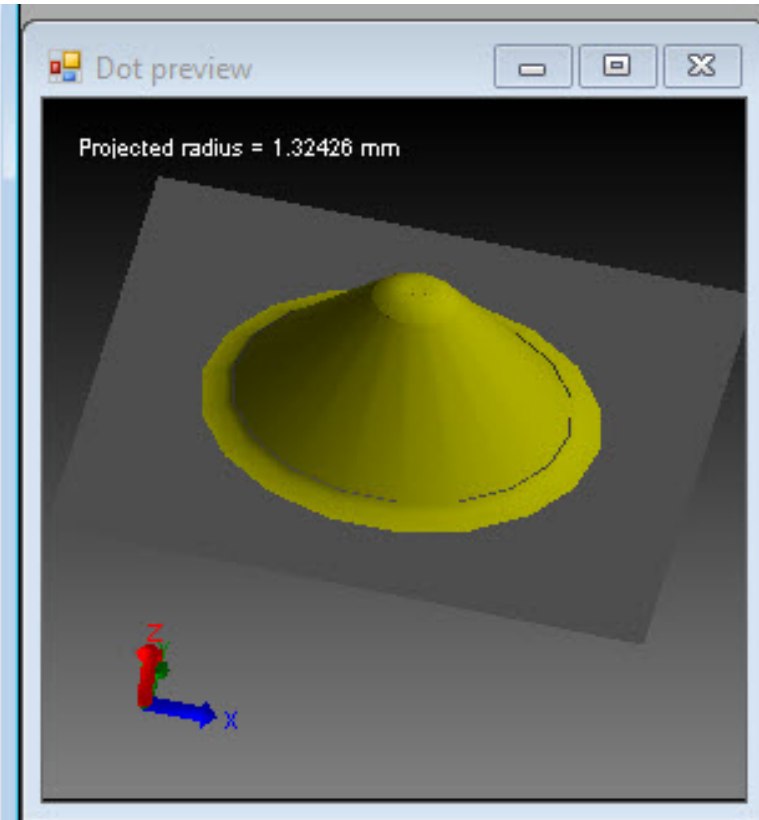
Flattened Cone

Dot shape
Flattened cone

Bump sign: Bump Dot preview

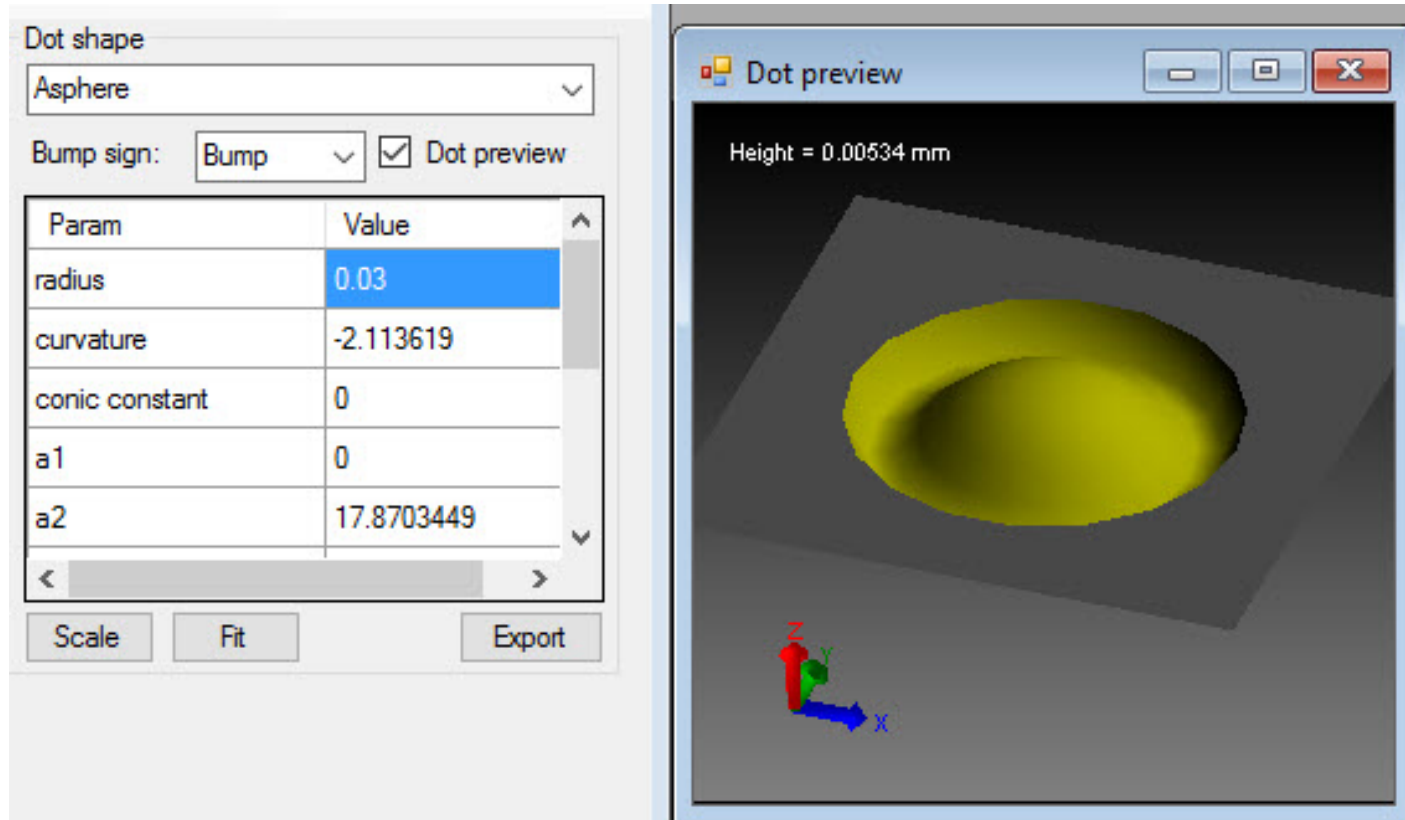
Param	Value
height	1
end radius	0.2
cone angle	45
peak radius	0.3
trough radius	0.3

Scale Export



Texture Optimizer II – Texture Types

Asphere



The screenshot displays the 'Asphere' texture type configuration in the Texture Optimizer II software. The interface is divided into two main sections: a parameter control panel on the left and a 3D preview window on the right.

Parameter Control Panel:

- Dot shape:** A dropdown menu set to 'Asphere'.
- Bump sign:** A dropdown menu set to 'Bump' and a checked checkbox for 'Dot preview'.
- Parameter Table:** A table with two columns: 'Param' and 'Value'.

Param	Value
radius	0.03
curvature	-2.113619
conic constant	0
a1	0
a2	17.8703449
- Buttons:** 'Scale', 'Fit', and 'Export' buttons are located at the bottom of the panel.

3D Preview Window:

- Title:** 'Dot preview'.
- Text:** 'Height = 0.00534 mm' is displayed at the top of the preview area.
- Visuals:** A 3D rendering of a yellow, bowl-shaped asphere is shown on a gray plane. A 3D coordinate system with red (Z), green (Y), and blue (X) axes is visible in the bottom-left corner of the preview window.

Texture Optimizer II – Texture Types

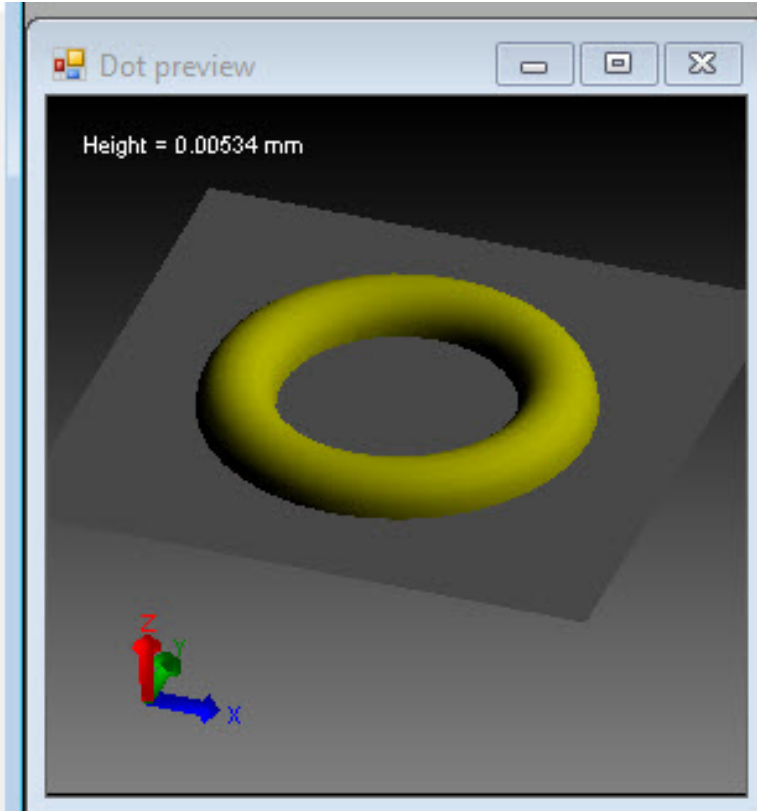
Torus

Dot shape
Torus

Bump sign: Bump Dot preview

Param	Value
height	0.5
major radius	2
minor radius	0.5

Scale Export



Texture Optimizer II – Texture Types

Enhanced Prism

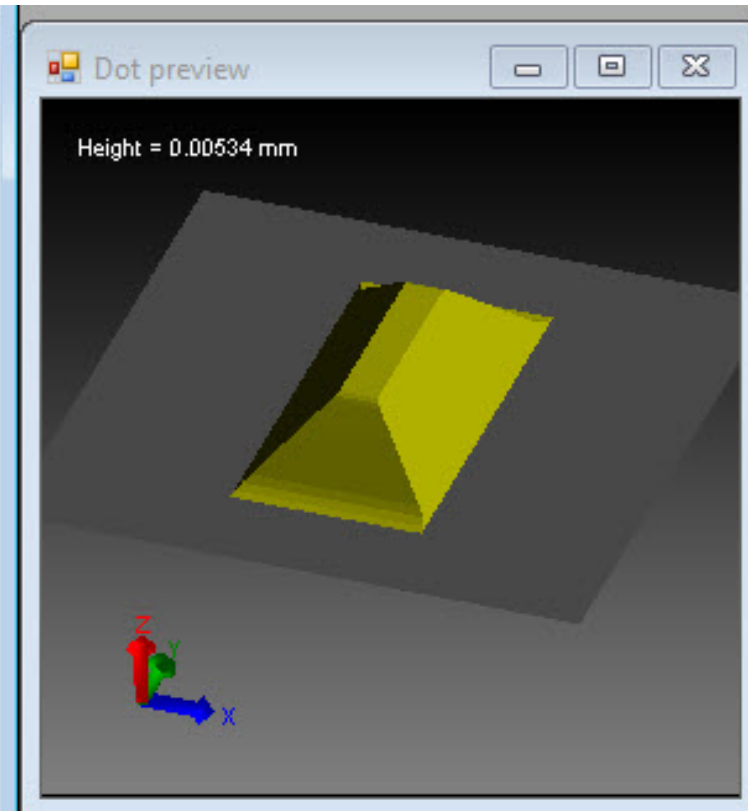
Dot shape

Enhanced prism

Bump sign: Bump Dot preview

Param	Value
x width	2
y width	4
height	0.8
x0 angle	45
x1 angle	45

Scale Export



Texture Optimizer II – Texture Types

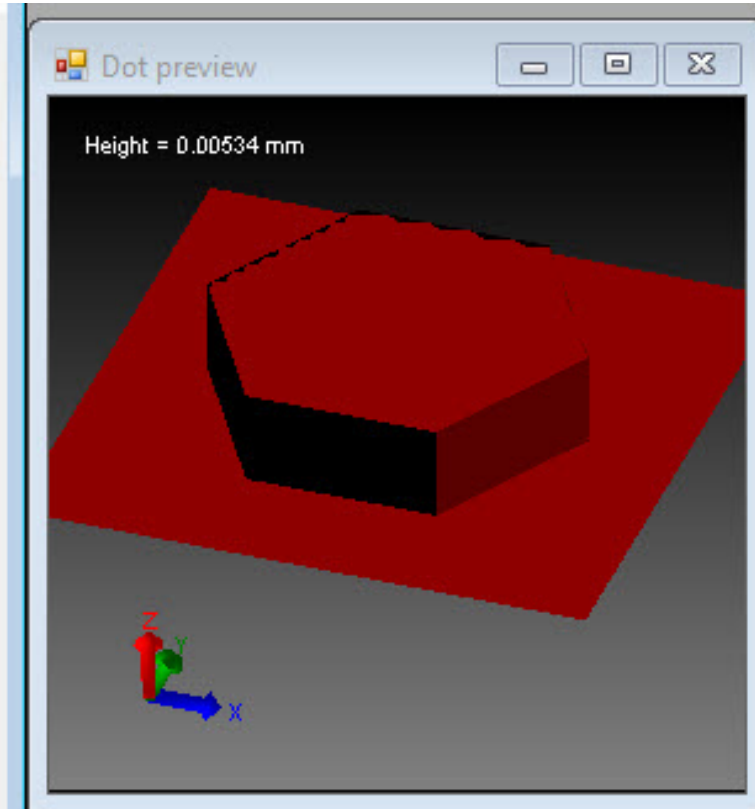
Polygon

Dot shape
Polygon

Bump sign: Bump Dot preview

Param	Value
radius	0.1
height	0.05
thickness	0.1
no. of sides	6
x rotate	0

Scale Export



Texture Optimizer II – Texture Types

Model

The screenshot shows the 'Dot generator' software interface. The main window title is 'Dot generator - C:\Users\djacobsen\Documents\Dave\ Documents\Webinars\September 2016, Texture Optimizer II\Webinar Example\Model Dot Shape Example.dgf'. The interface is divided into several sections:

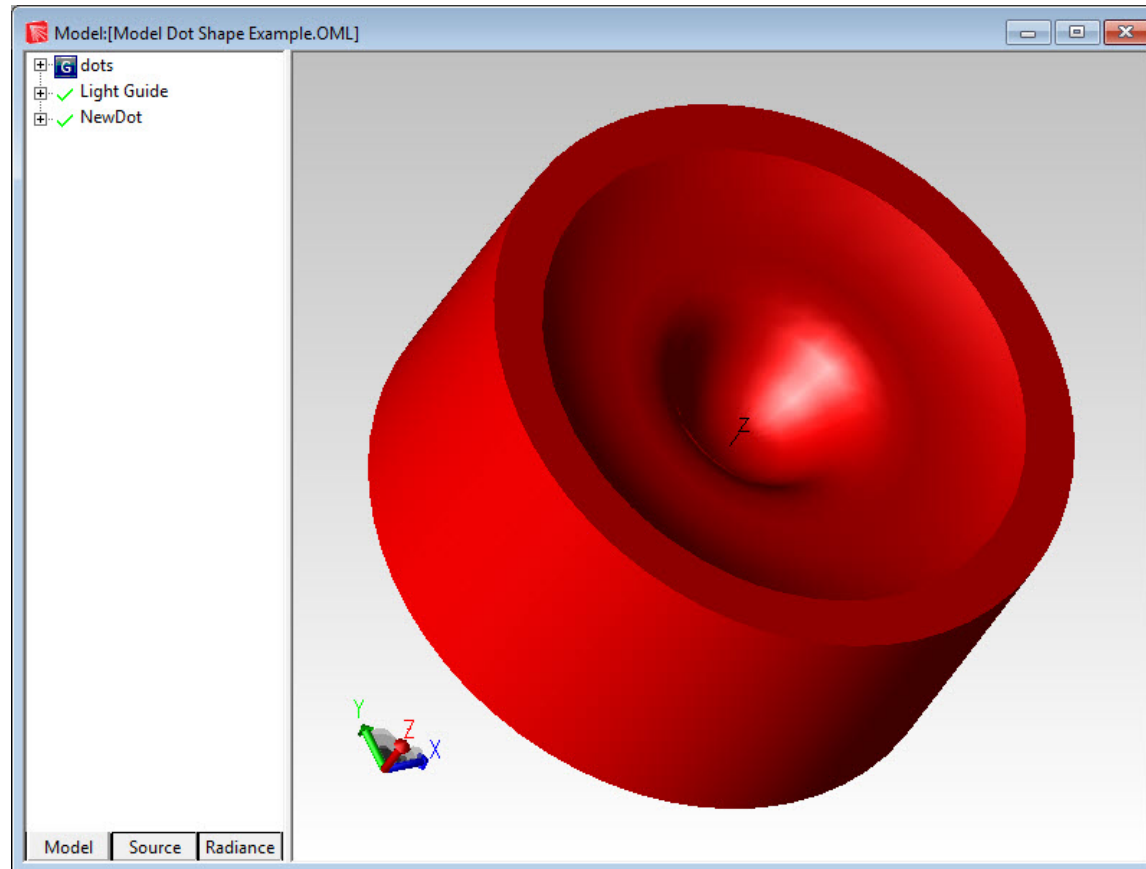
- Boundary:** A dropdown menu set to 'Rectangle' with an 'Apply' button. Below it are input fields for 'Width: 25' and 'Height: 25', and a 'Layer ID:' field.
- Partition:** A dropdown menu set to 'Uniform' with a 'Generate' button. Below it is an input field for 'Cells: 25'.
- In-cell:** A dropdown menu set to 'One-Centroid' with a 'Generate' button.
- Dot shape:** A dropdown menu set to 'Model'. Below it is a 'Bump sign:' dropdown set to 'Bump' and a 'Dot preview' checkbox. A table lists parameters and their values:

Param	Value
Model name	NewDot
Origin	(0. 0. 0)
Normal	(0. 0. 1)
Up vector	(0. 1. 0)

Below the table is a 'Scale' button. The 'Dot viewer' section shows a 2D grid of 25 blue dots on a black background, with a yellow rectangular boundary and red partition lines. The viewer shows coordinates: (-22.3999, 13.75) at the top-left, (22.3999, 13.75) at the top-right, (-22.3999, -13.75) at the bottom-left, and (22.3999, -13.75) at the bottom-right. The status bar at the bottom left says 'Generating 25 dots done (0.0 sec)' and the bottom right shows '(69.362018 , 54.347181)'. The 'Mode' section includes icons for 'Eye', 'Grid', and 'Bells'. The 'Display' section has checkboxes for 'Boundary', 'Partition', 'Density map', and 'Dots'. The 'Density tools' section has icons for 'Density map' and 'Dots'.

Texture Optimizer II – Texture Types

Model



Texture Optimizer II – Texture Types

Model

The screenshot shows the 'Dot generator' software interface. The main window displays a 2D grid of dots on a black background, with a yellow border around the grid. The grid is composed of 25 dots arranged in a roughly rectangular pattern. The coordinates of the grid corners are shown as $(-22.3999, 13.75)$, $(22.3999, 13.75)$, $(-22.3999, -13.75)$, and $(22.3999, -13.75)$. The status bar at the bottom indicates 'Generating 25 dots done (0.0 sec)' and the coordinates $(69.362018, 54.347181)$.

The interface includes several control panels:

- Boundary:** Rectangle (dropdown), Apply (button), Width: 25, Height: 25, Layer ID: (text field).
- Partition:** Uniform (dropdown), Generate (button), Cells: 25 (text field).
- In-cell:** One-Centroid (dropdown), Generate (button).
- Dot shape:** Model (dropdown), Bump sign: Bump (dropdown), Dot preview (checkbox).
- Dot viewer:** A table showing parameters for the dot shape.

The 'Dot shape' table is as follows:

Param	Value
Model name	NewDot
Origin	$(0, 0, 0)$
Normal	$(0, 0, 1)$
Up vector	$(0, 1, 0)$

An 'Export Texture Geometries' dialog box is open, showing the following settings:

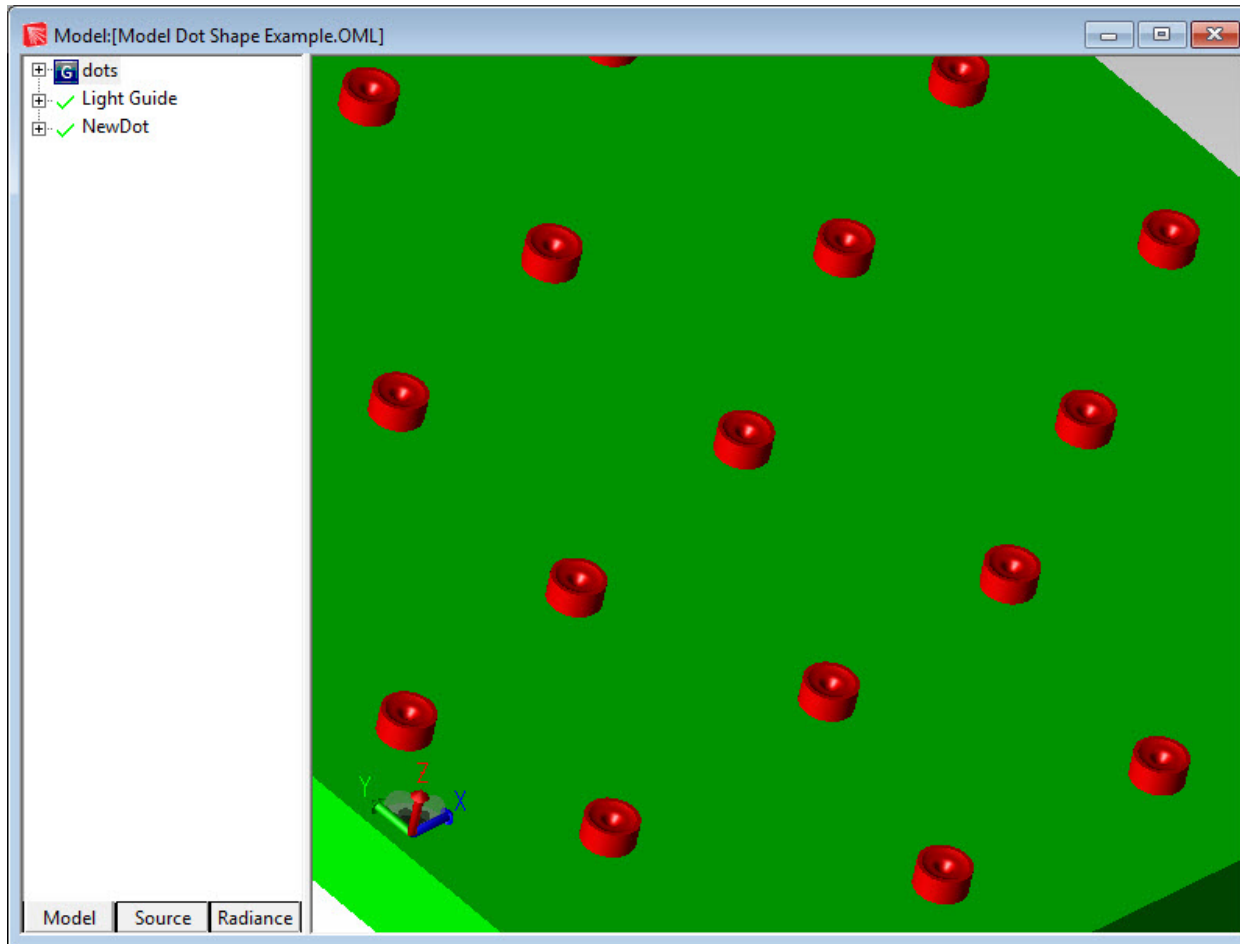
- Method: Projection (dropdown)
- Surface name: Top (text field)
- Check (button)
- Align surface nom (checkbox)
- Offset: 0.0 (text field)
- Boolean: None (dropdown)
- Object name: (text field)
- Export (button)

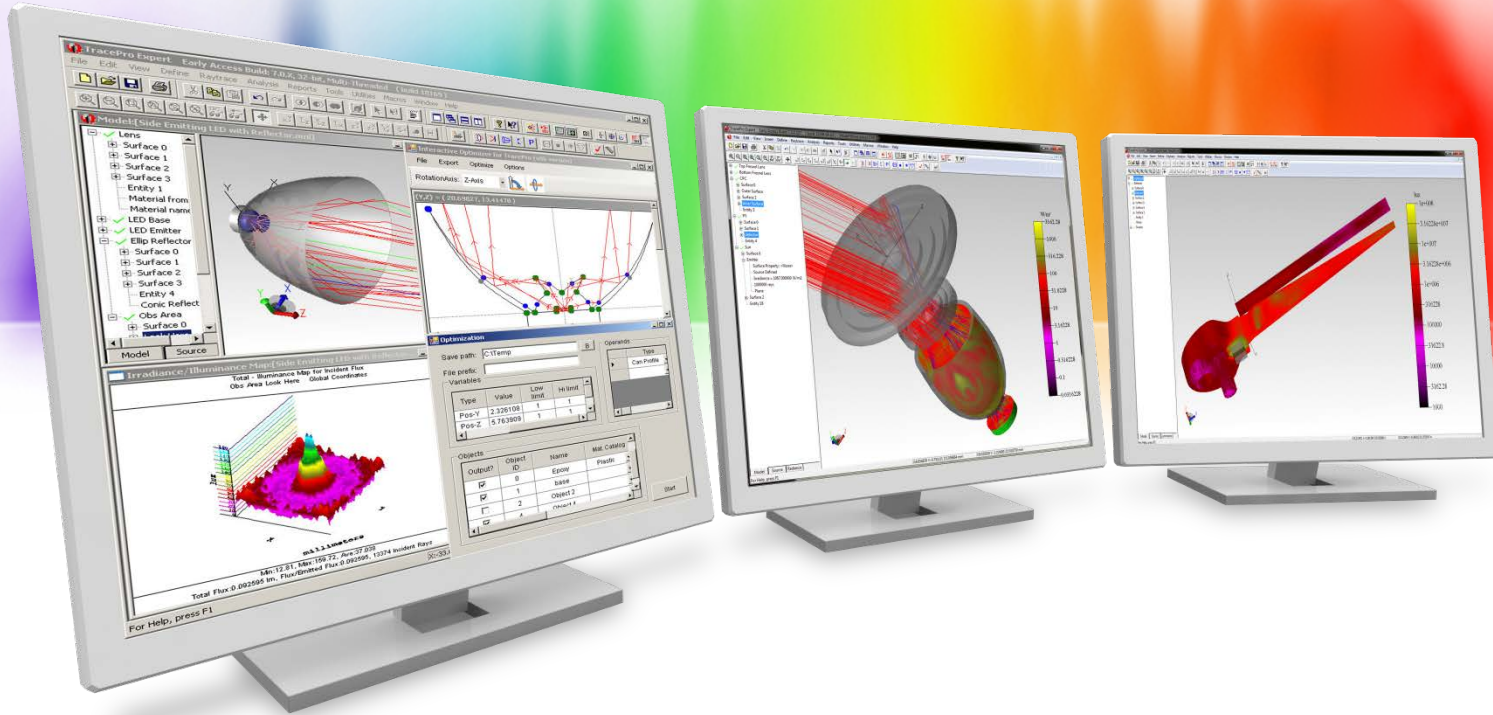
Additional settings in the dialog box:

- Type: Planar
- Norm: $(0,0,0,1,0)$ (text field)
- Projected origin: $(0,0,0,10,0)$ (text field)
- Projected up: $(0,0,1,0,0,0)$ (text field)

Texture Optimizer II – Texture Types

Model

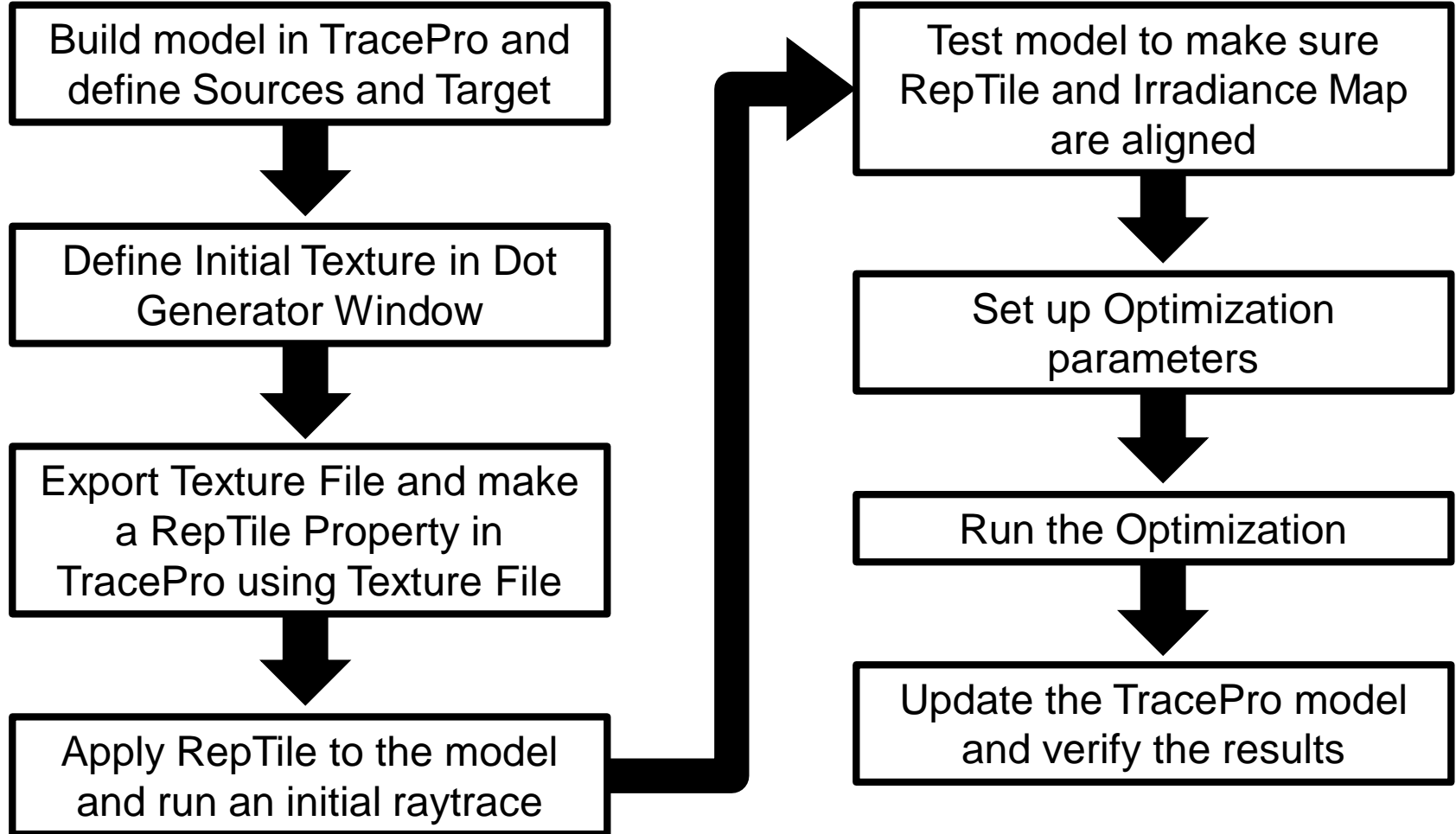




Setting up the Texture Optimizer II

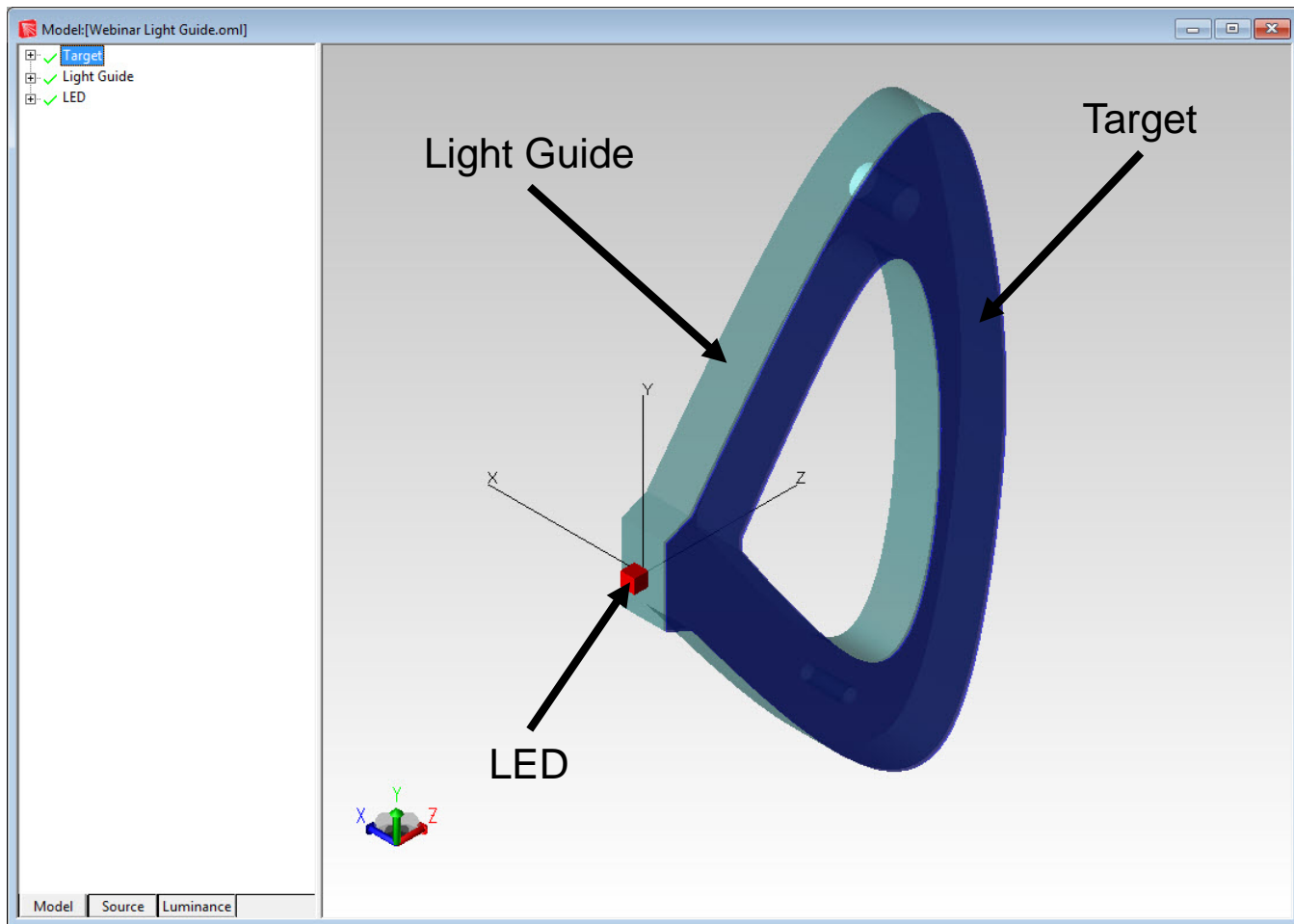
Setting up the Texture Optimizer II

Typical Workflow



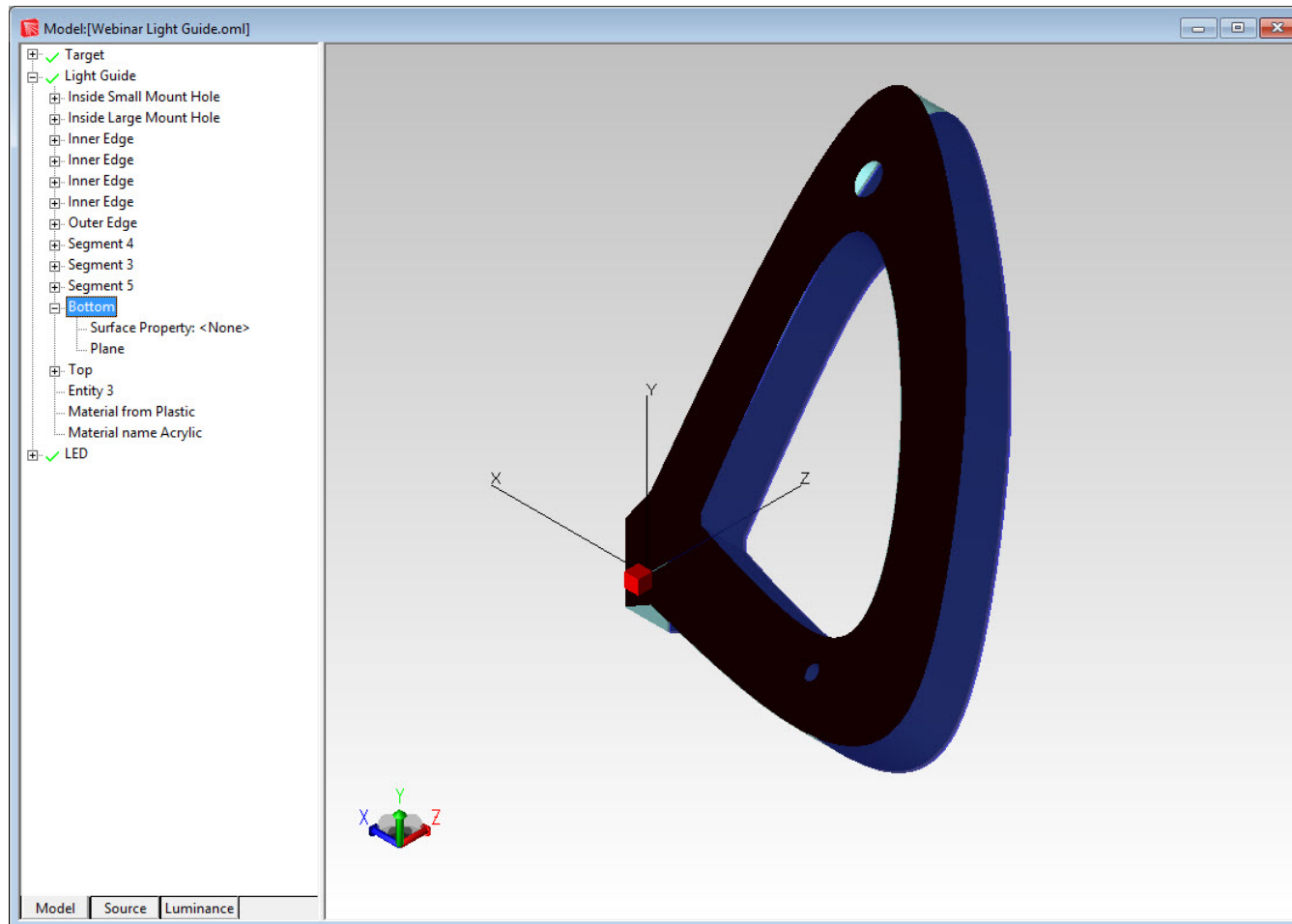
Setting up the Texture Optimizer II

TracePro model



Setting up the Texture Optimizer II

TracePro model – Acrylic Light Guide with “Bottom” surface named



Setting up the Texture Optimizer II

TracePro model – LED model with Surface Source Property

Model:[Webinar Light Guide.oml]

Target
Light Guide
LED
Emitter
Surface Property: <None>
Source Defined
Catalog - Cree Xlamp
Name - XP-E White 3700-5000K
500000 rays
Plane
Surface 1
Surface 2
Surface 3
Surface 4
Surface 5
Entity 2
Block

Apply Properties

Surface Source

Emission Type: Source Property Min Rays: 10
Catalog: Cree Xlamp Total Rays: 500000
Name: XP-E White 3700-500 Scale: 1
Rays: All rays Color: [Red]

Up Vector
X: 0 Y: 1 Z: 0

Wavelengths
Type: Calculated wavelengths Add Delete

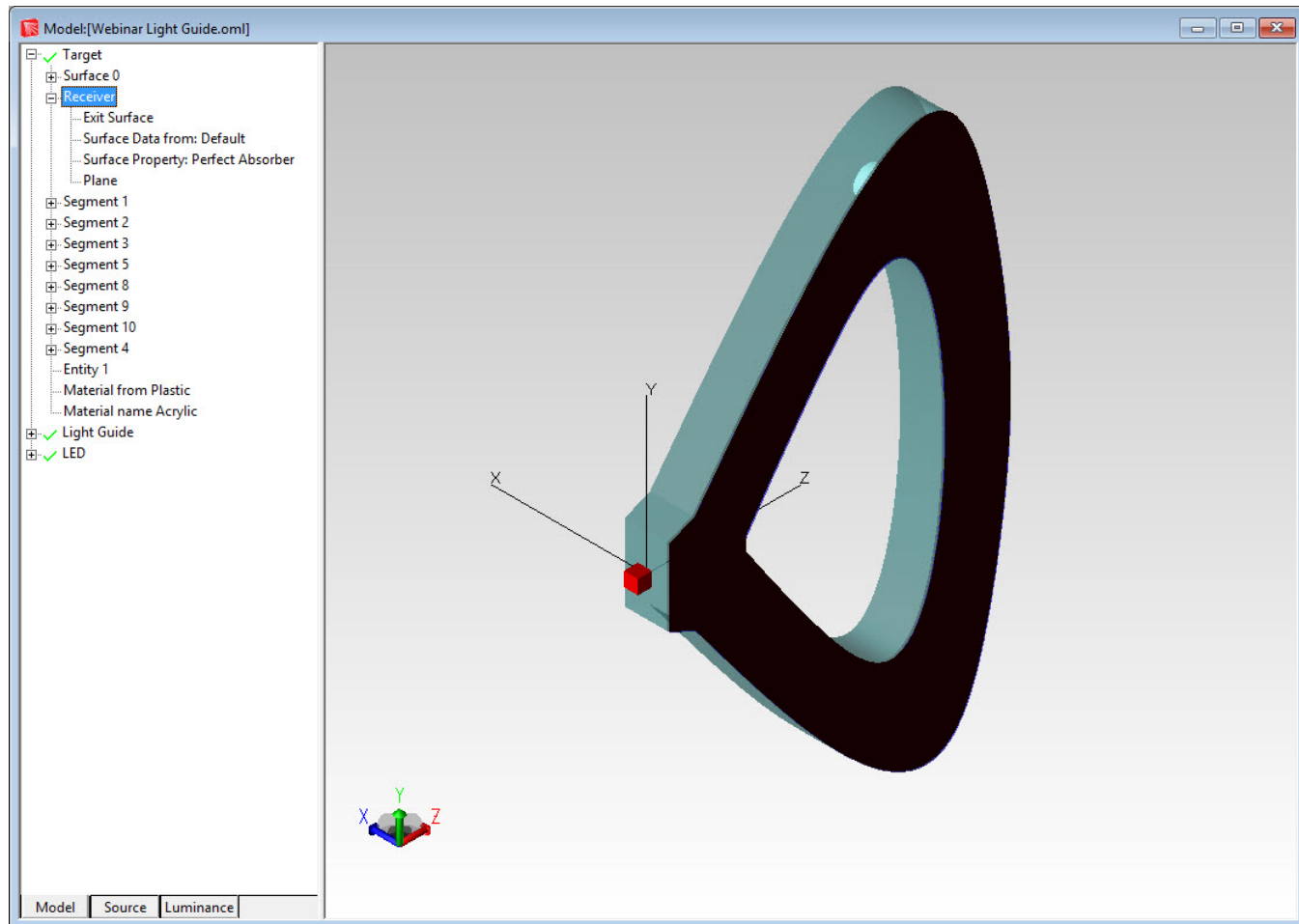
From (μm)	To (μm)	# Inc.	Calc. Wavelength	Flux(W)	# Rays
0	0.4	0	0	0	0
0.4	0.75	10	0.427392	0.01999	9995
			0.450542	0.137147	68573
			0.487872	0.0514381	25719
			0.524743	0.124628	62314
			0.557944	0.181684	90842

Apply View Data

Model Source Luminance

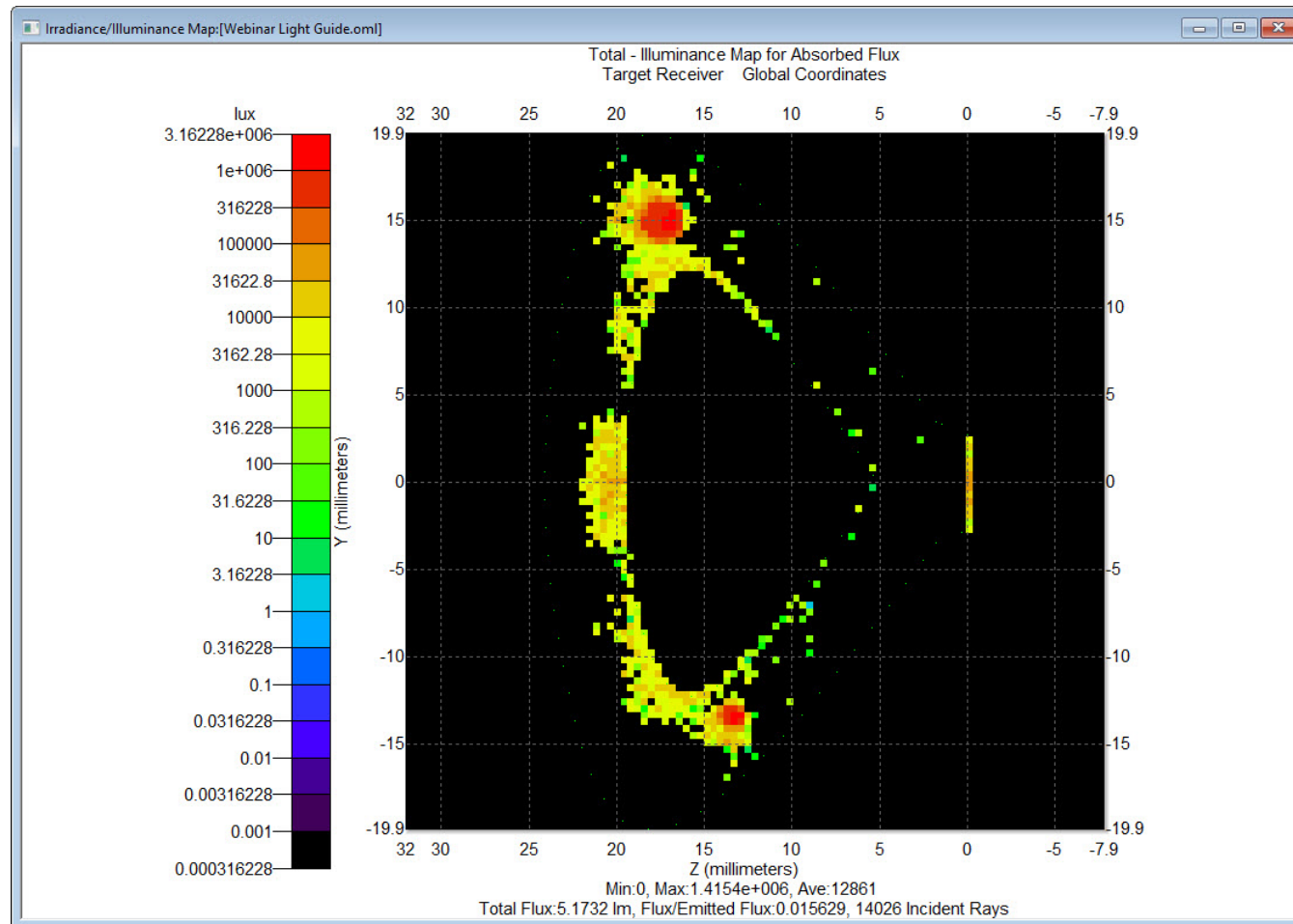
Setting up the Texture Optimizer II

TracePro model – “Target” with “Receiver” surface named



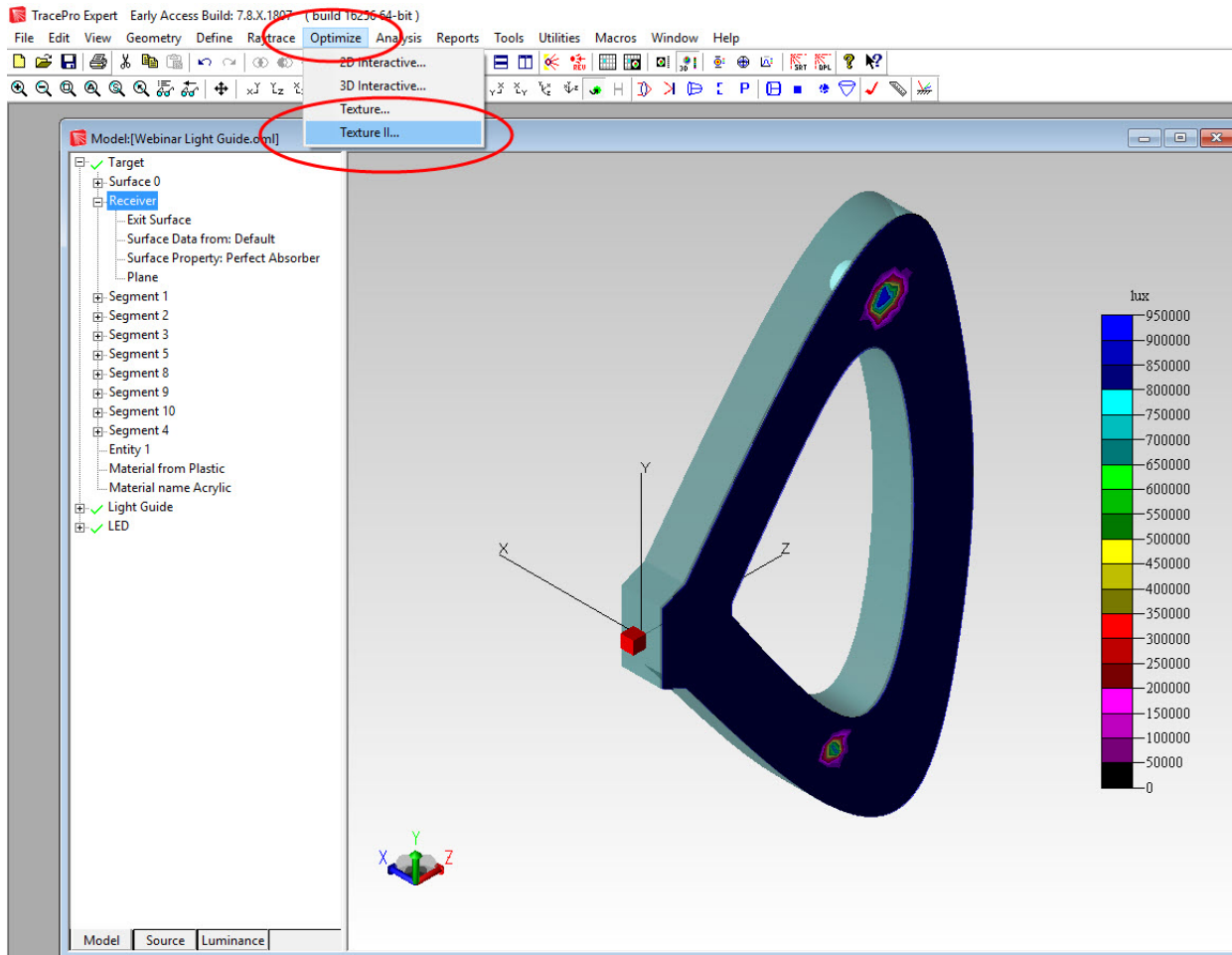
Setting up the Texture Optimizer II

TracePro model – Initial Illuminance Map – Log Scale



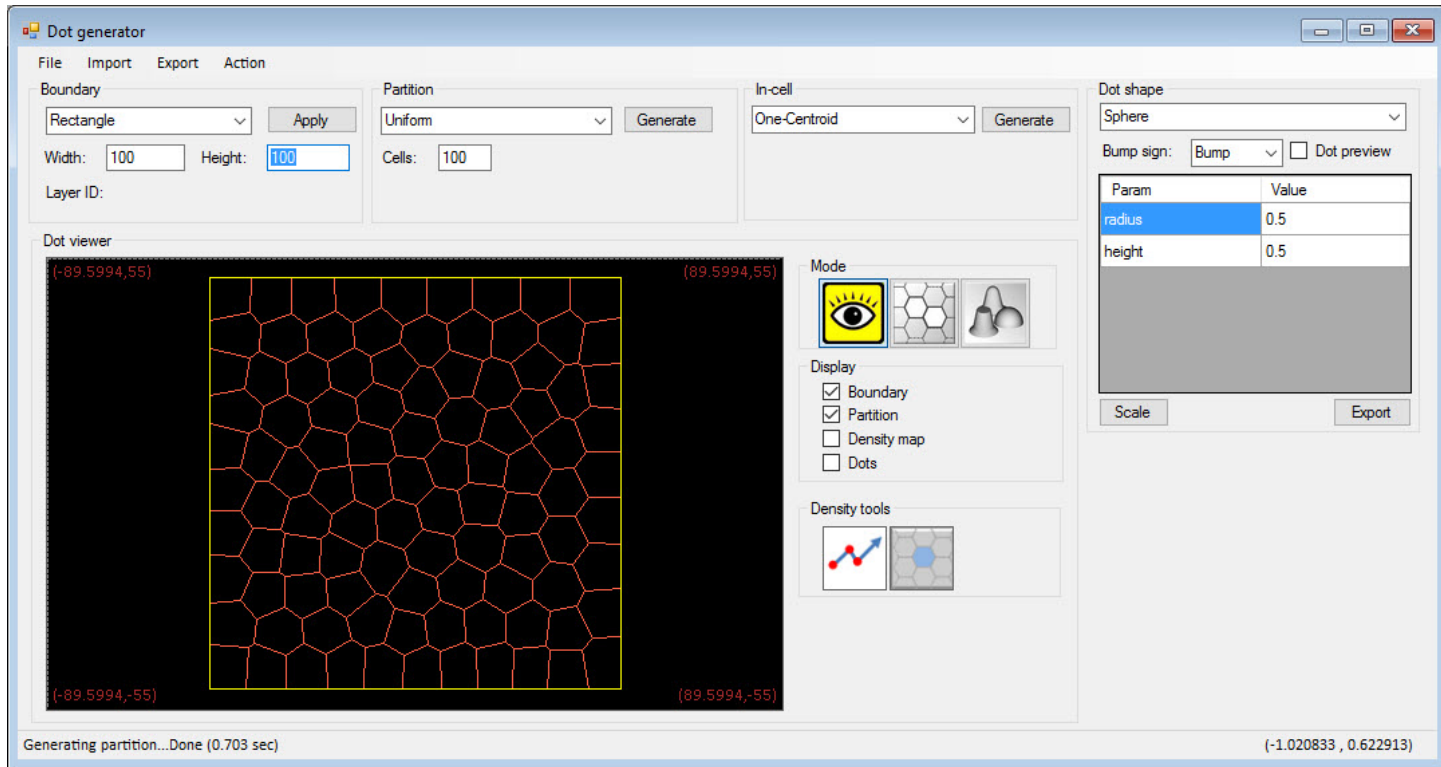
Setting up the Texture Optimizer II

Open the Texture Optimizer II



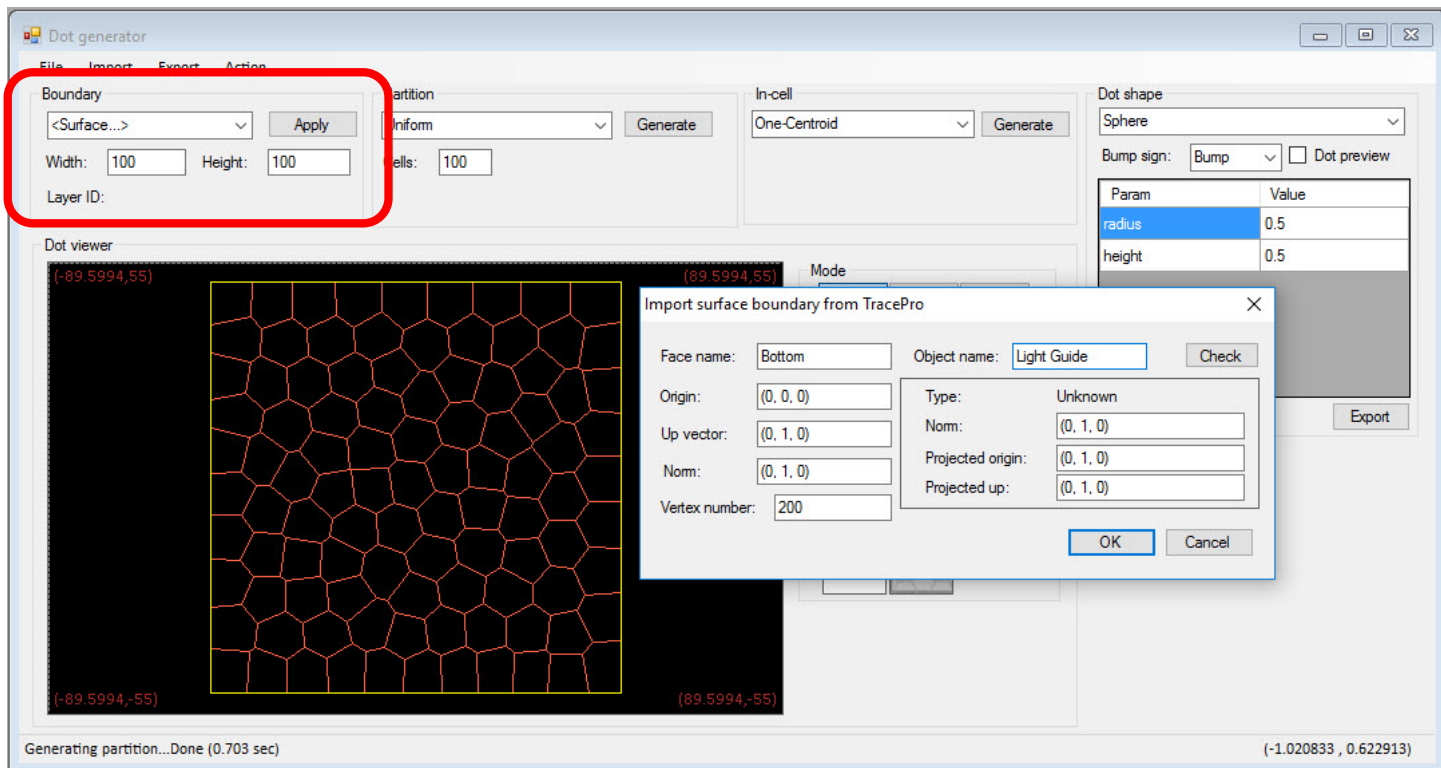
Setting up the Texture Optimizer II

Texture Optimizer II



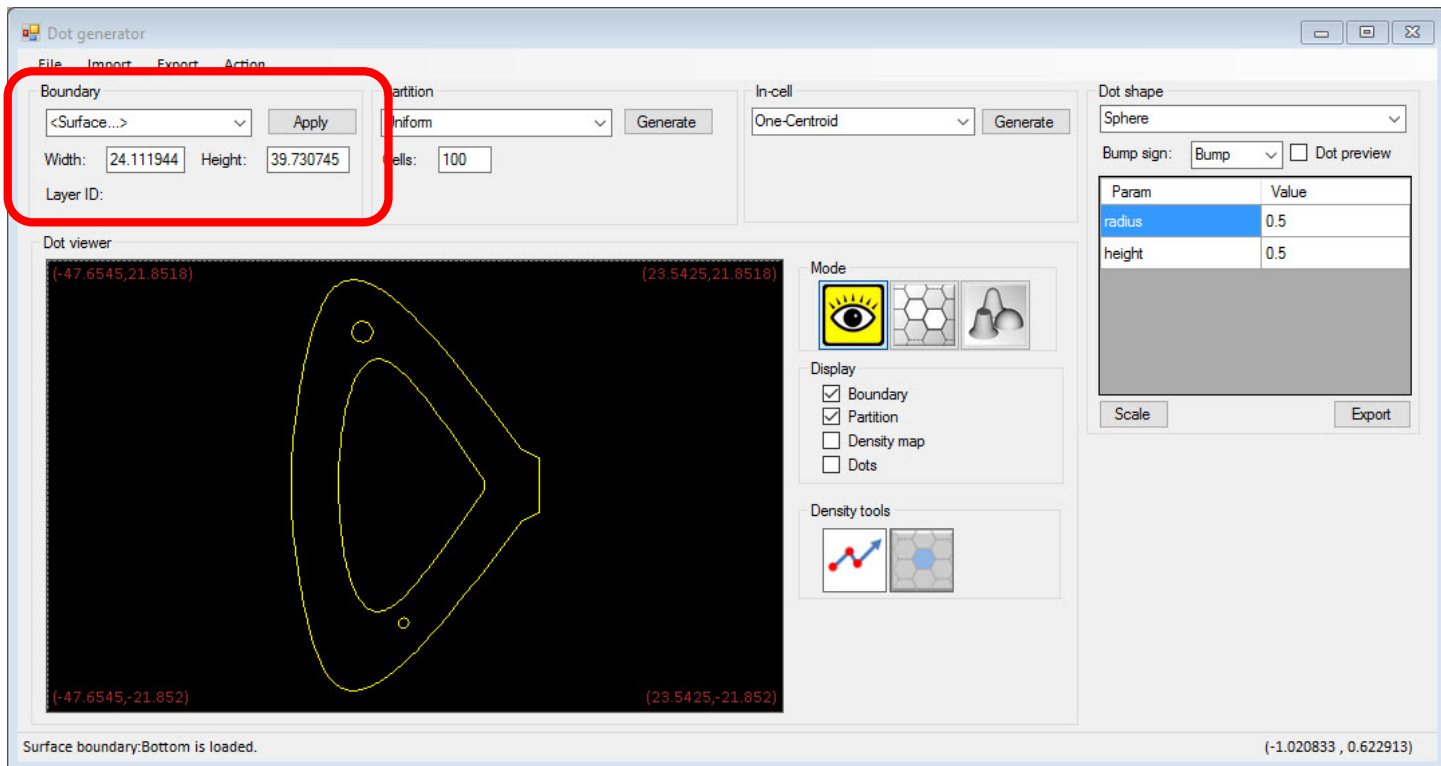
Setting up the Texture Optimizer II

Select Surface for Boundary type and then enter “Bottom” for Face Name and “Light Guide” for Object Name. Click OK.



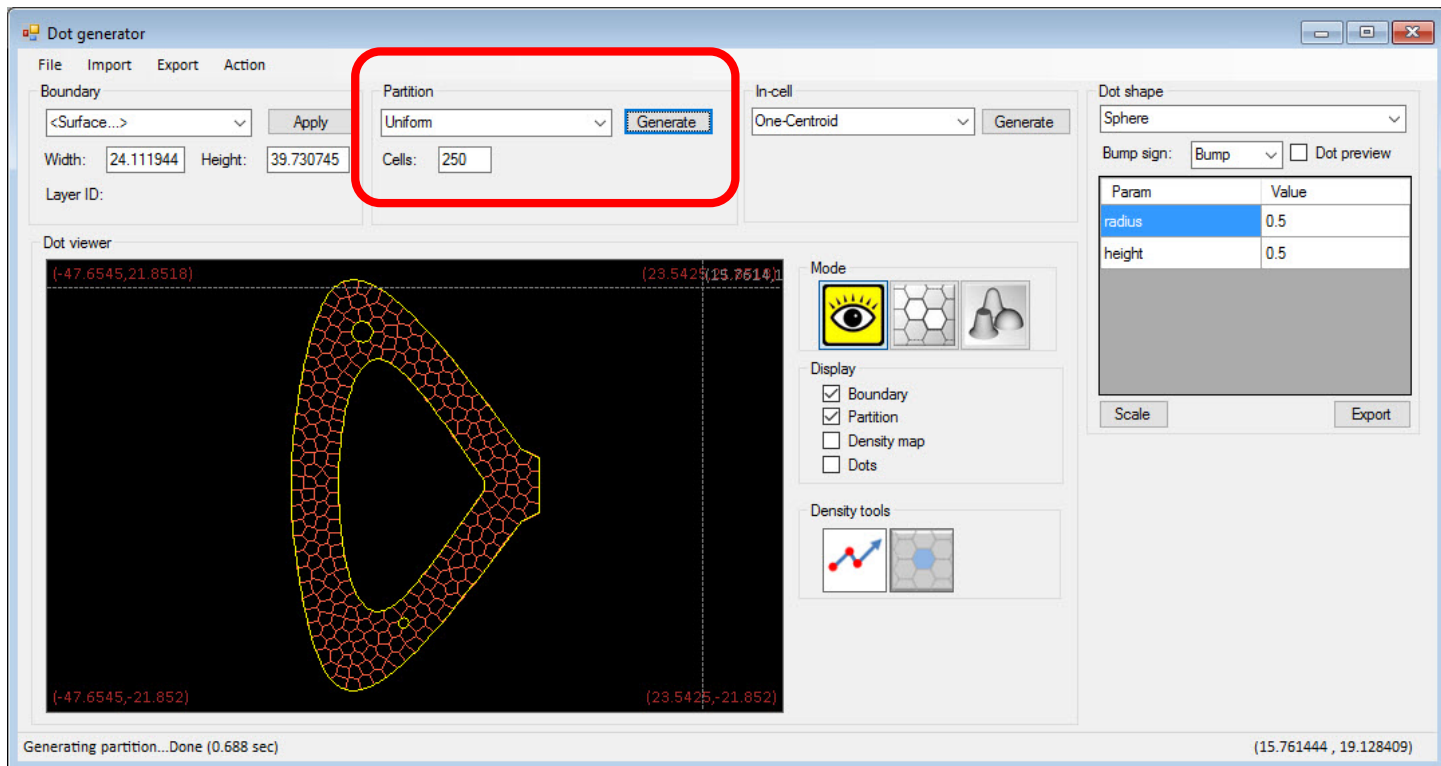
Setting up the Texture Optimizer II

Bottom surface of the light guide is now used as the boundary



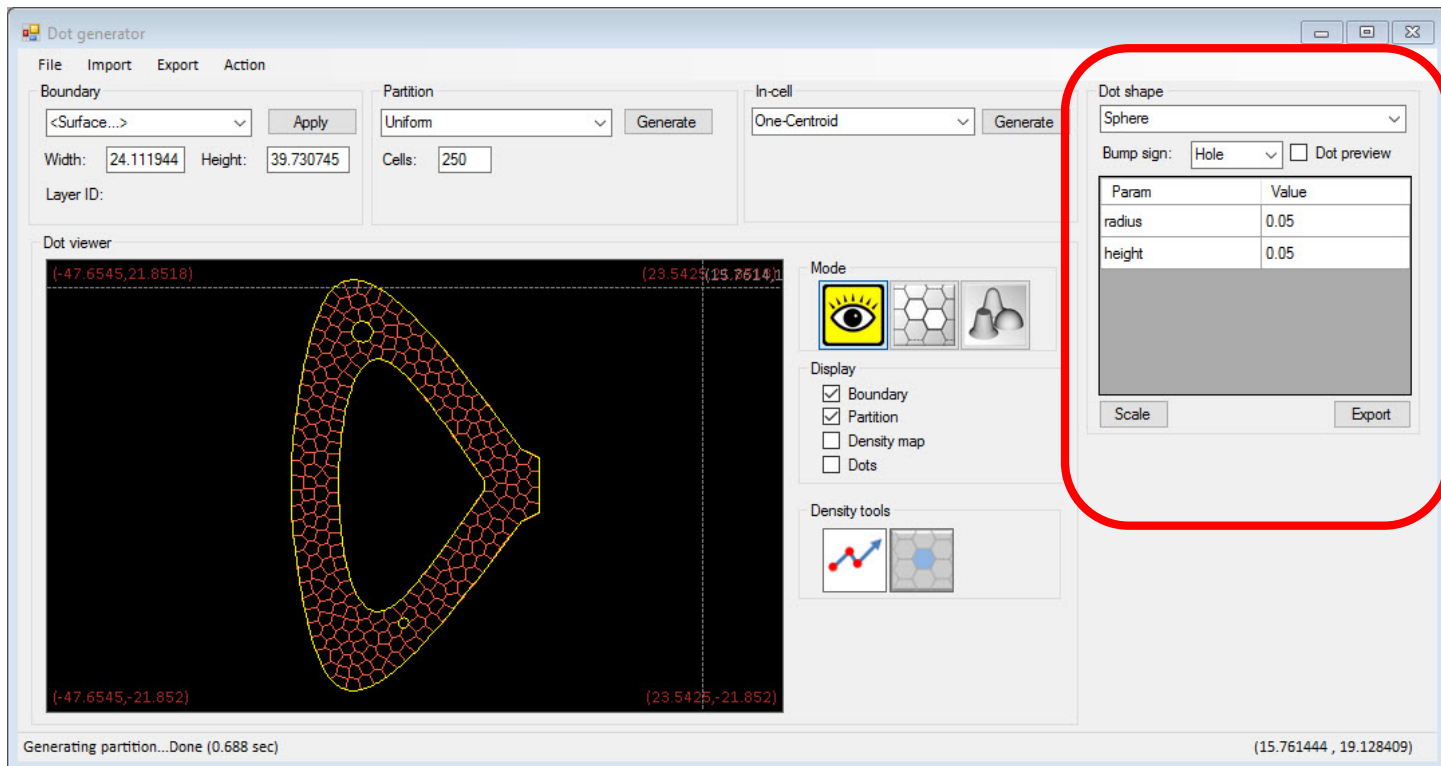
Setting up the Texture Optimizer II

Select Uniform for Partition, enter 250 for Cells, and then click Generate



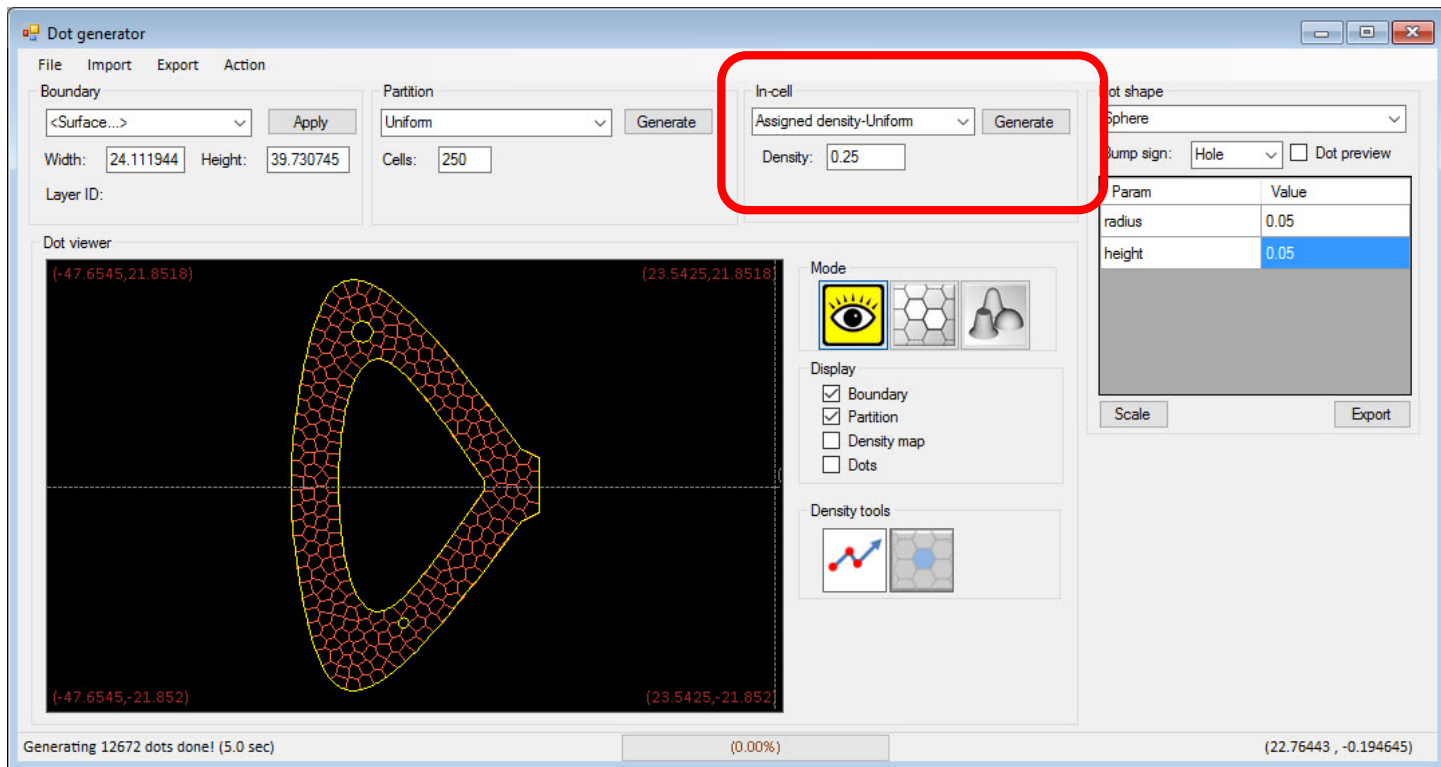
Setting up the Texture Optimizer II

Select Sphere for Dot Shape, Hole for Bump Sign, and enter 0.05 for the Radius and Height. Units are mm.



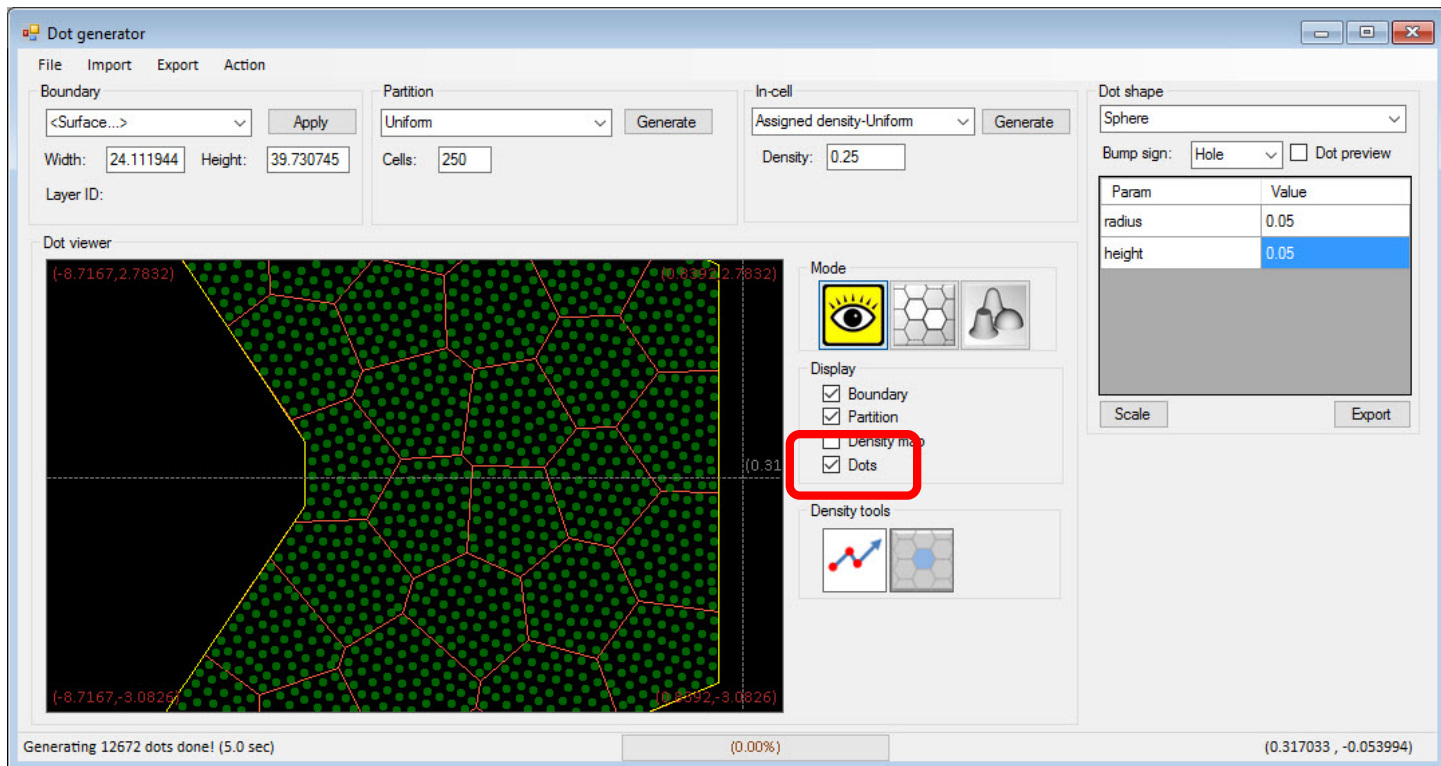
Setting up the Texture Optimizer II

Select Assigned density-Uniform for the In-cell setting, enter 0.25 for the Density, and then click Generate



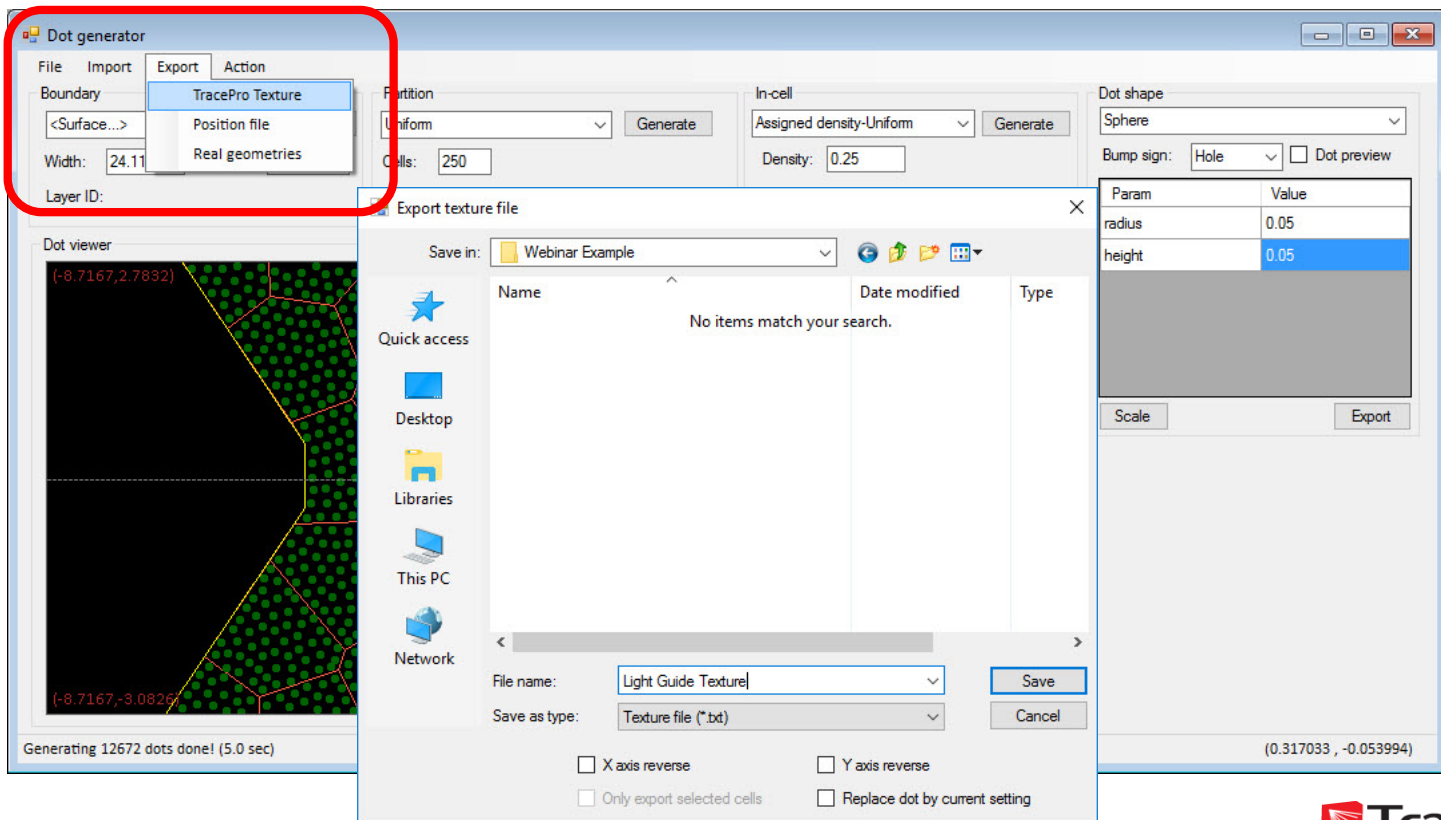
Setting up the Texture Optimizer II

Click Dots to display the dots. The scroll wheel can be used to zoom in and out.



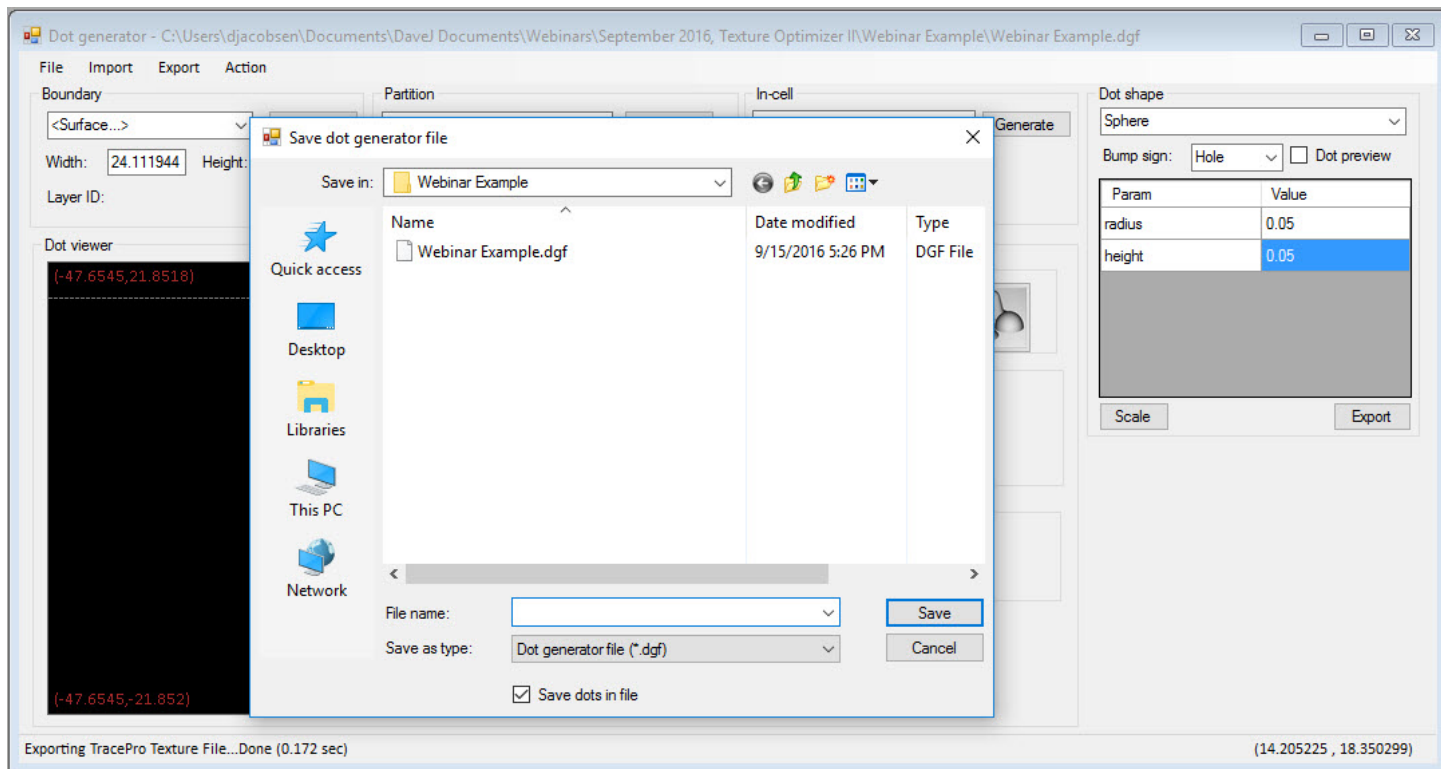
Setting up the Texture Optimizer II

Export the Texture File by going to Export->TracePro Texture and then saving the resulting .txt file



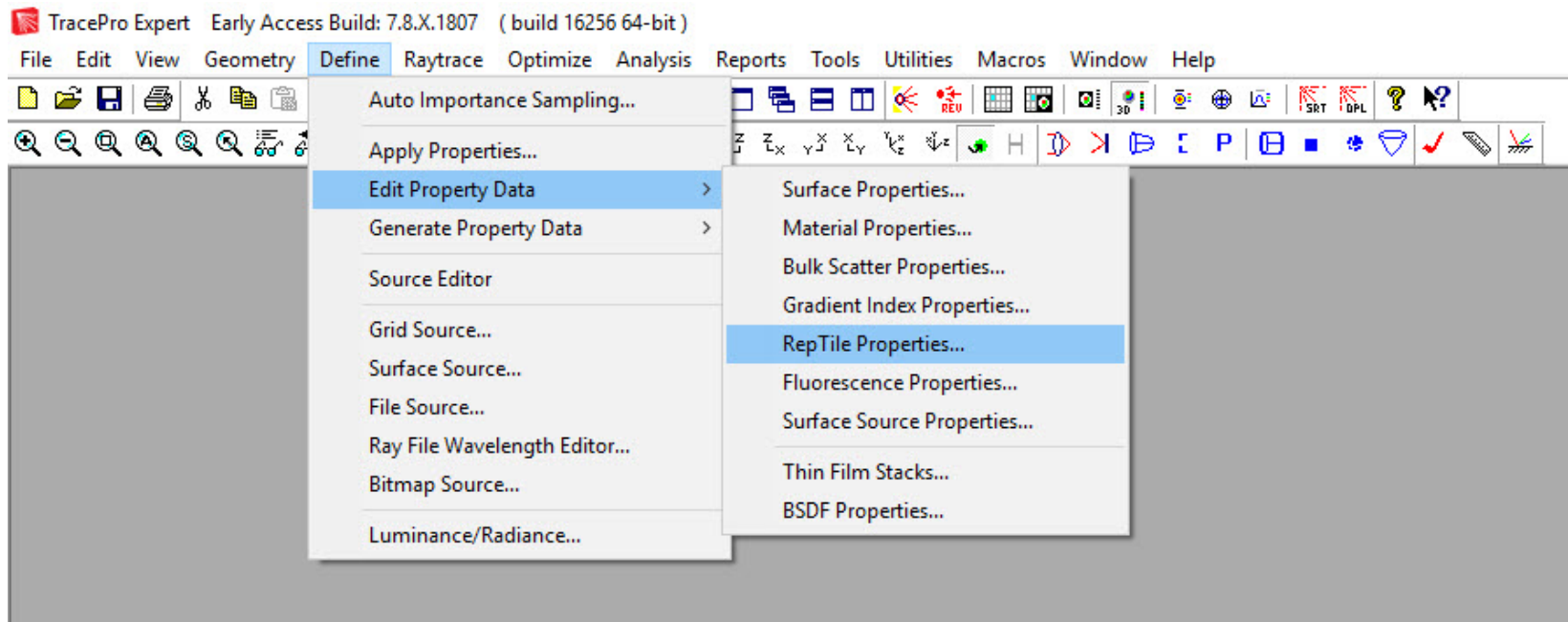
Setting up the Texture Optimizer II

Save the Texture Optimizer II file by going to File->Save as.. The file extension is .dof. This will save all of the settings defined in the texture optimizer for future use.



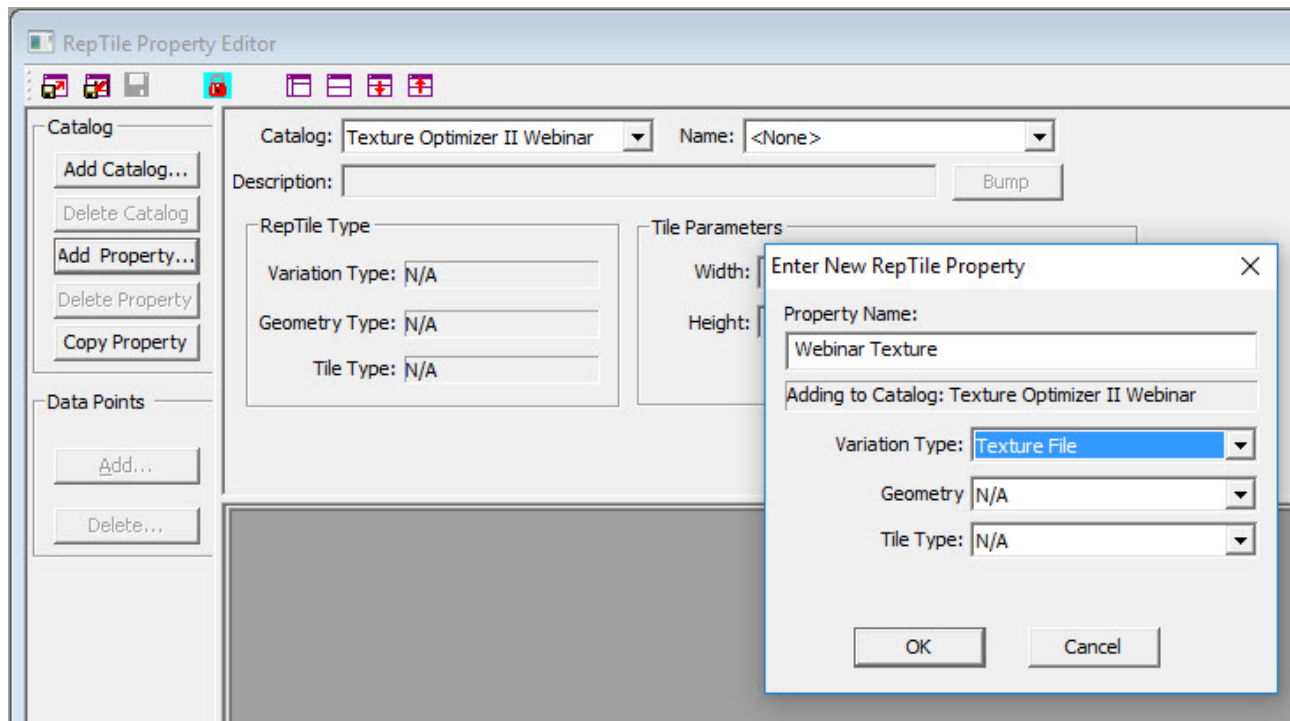
Setting up the Texture Optimizer II

Make a new RepTile Property in TracePro by going to Define->Edit Property Data->RepTile Properties



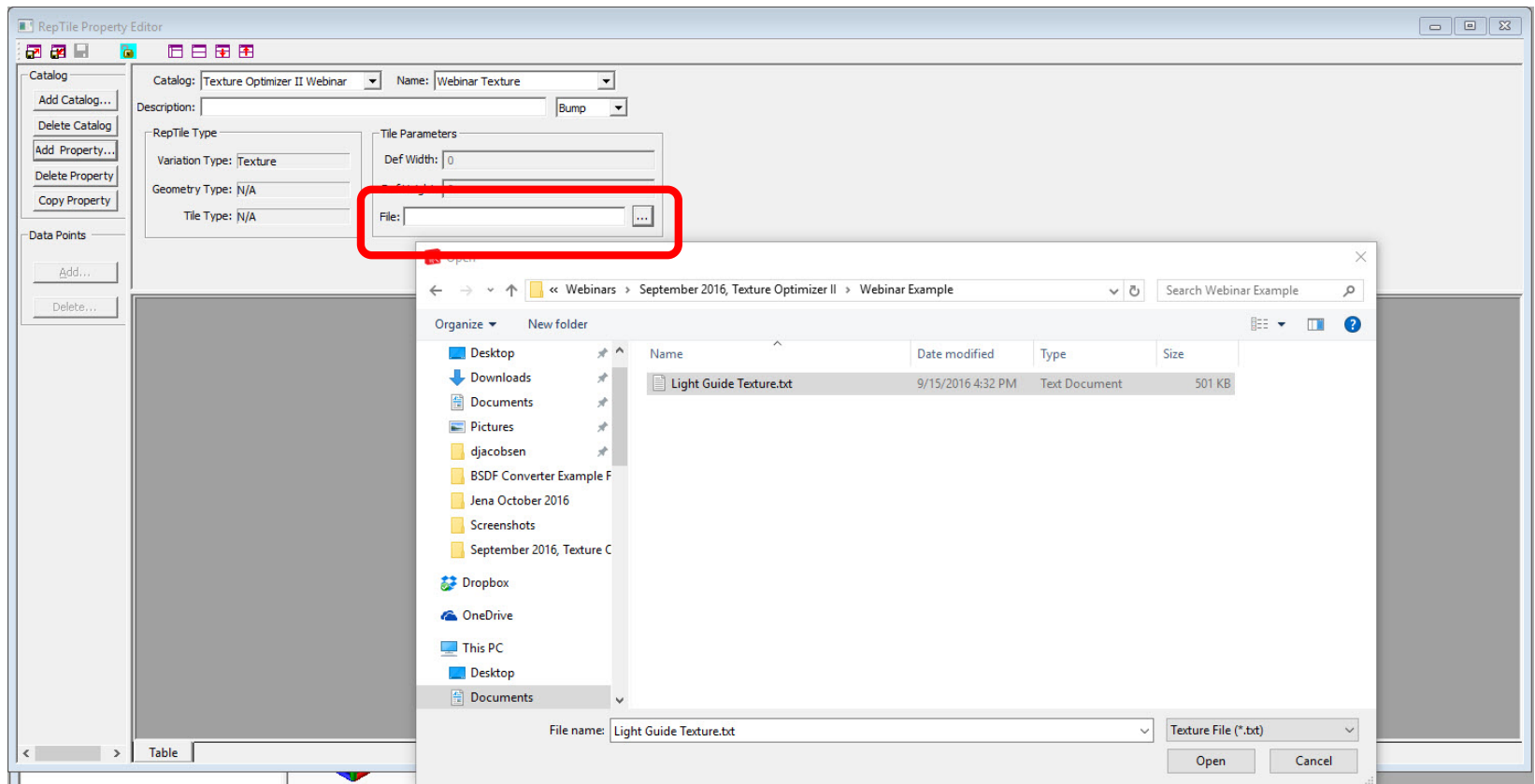
Setting up the Texture Optimizer II

Select a Catalog or make a new one using Add Catalog. Click Add Property. Give the property a Name and select Texture File for the Variation Type. Click OK.



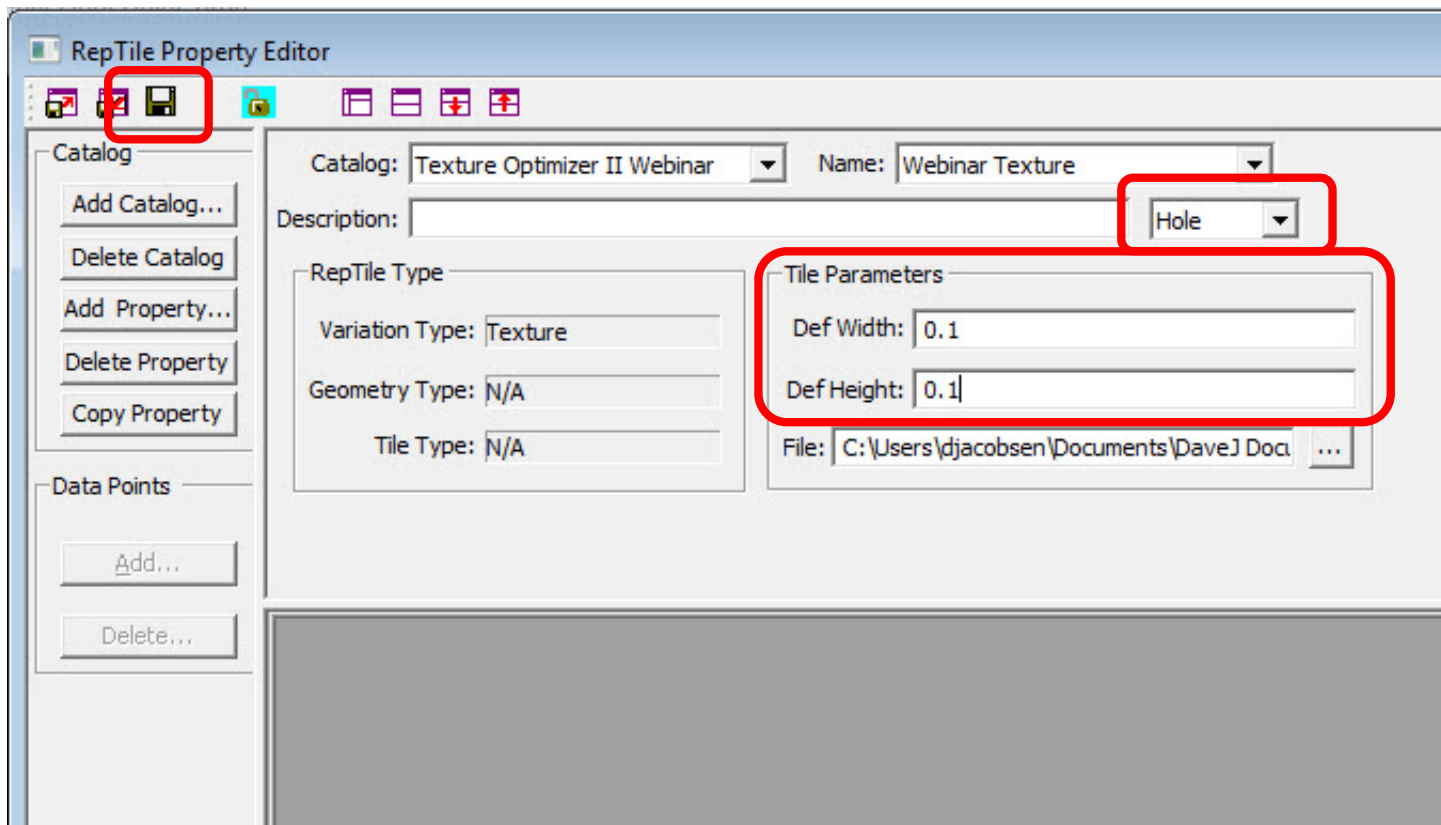
Setting up the Texture Optimizer II

Click the Browse icon next to File: and then browse to the Texture File that was previously saved and then click Open



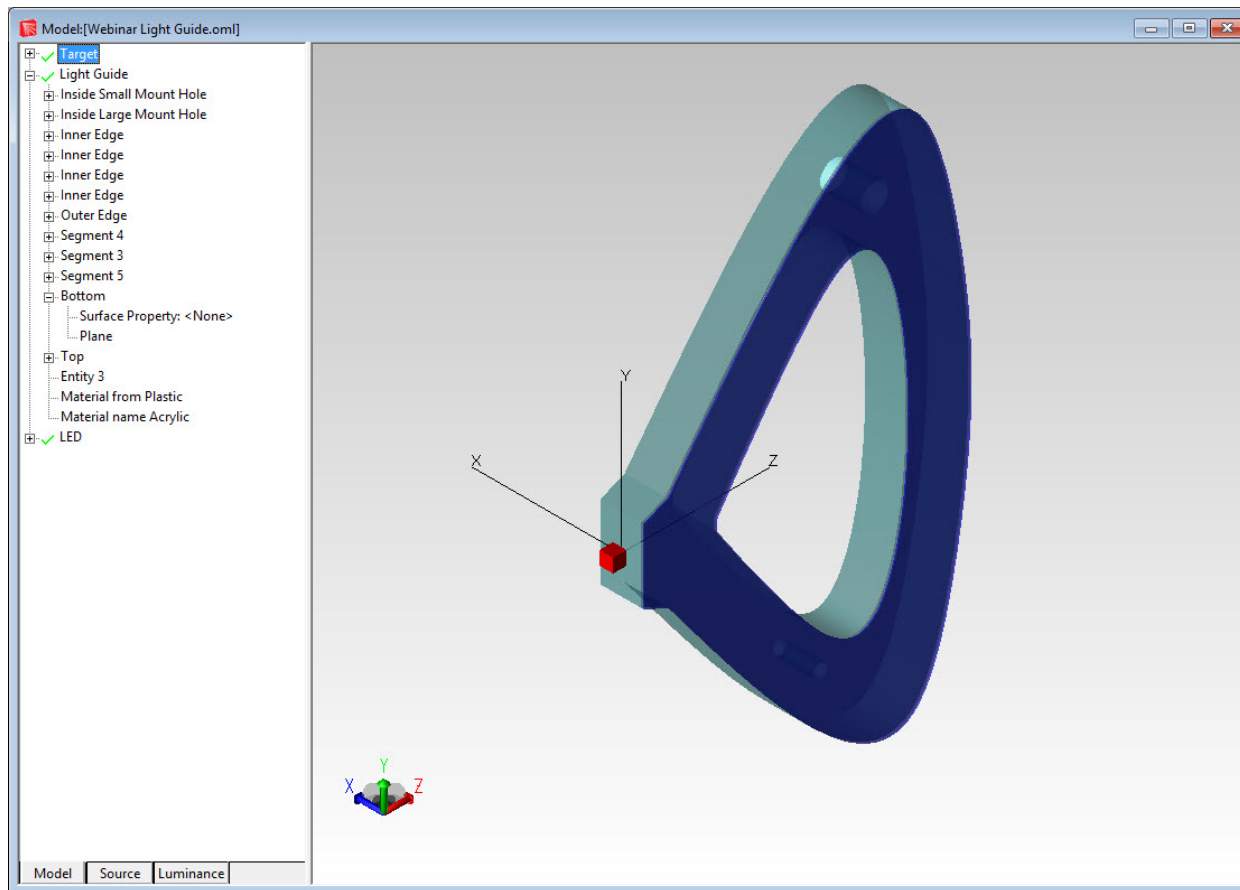
Setting up the Texture Optimizer II

Select Hole and then enter 0.1 for Def Width and Def Height Tile Parameters. Click the disk icon to save the RepTile property.



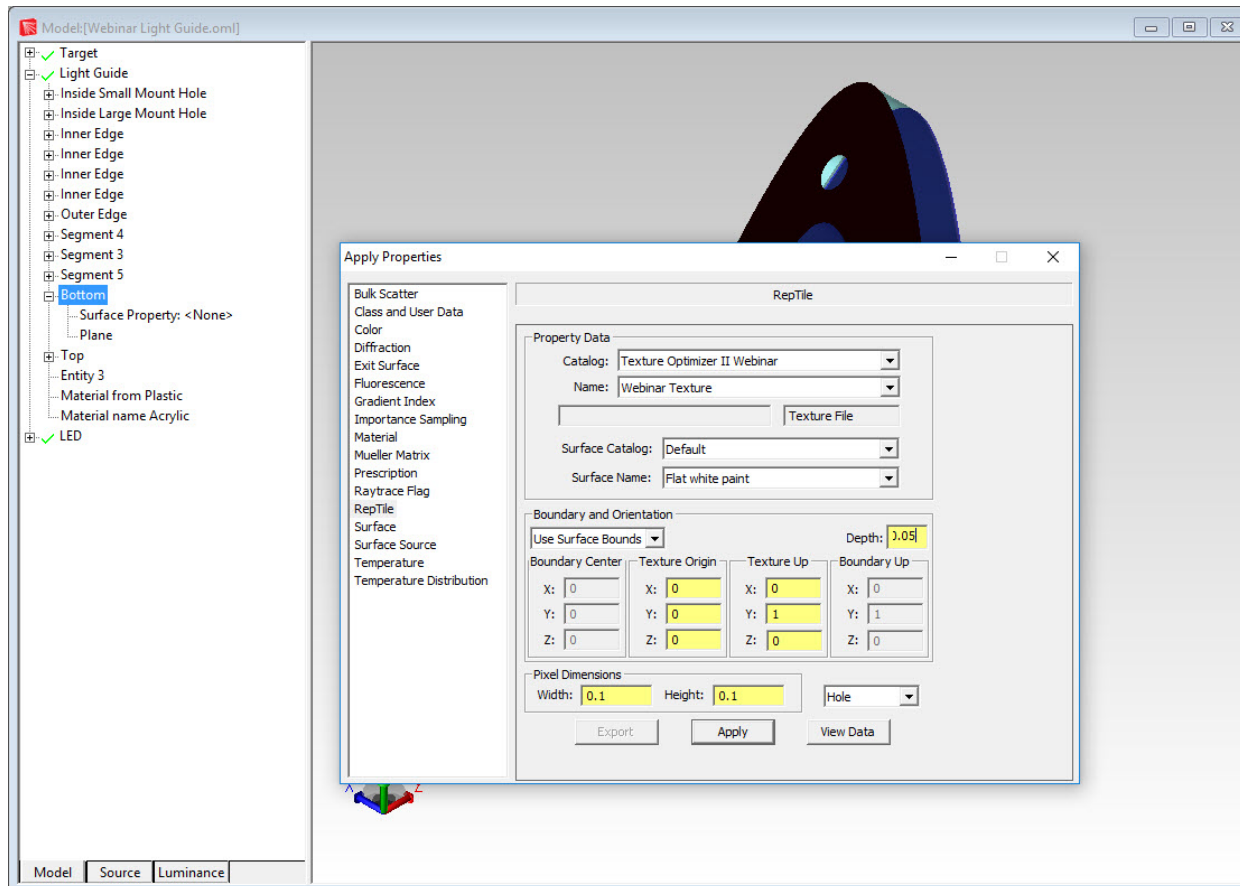
Setting up the Texture Optimizer II

Apply the RepTile to the Light Guide model in TracePro.



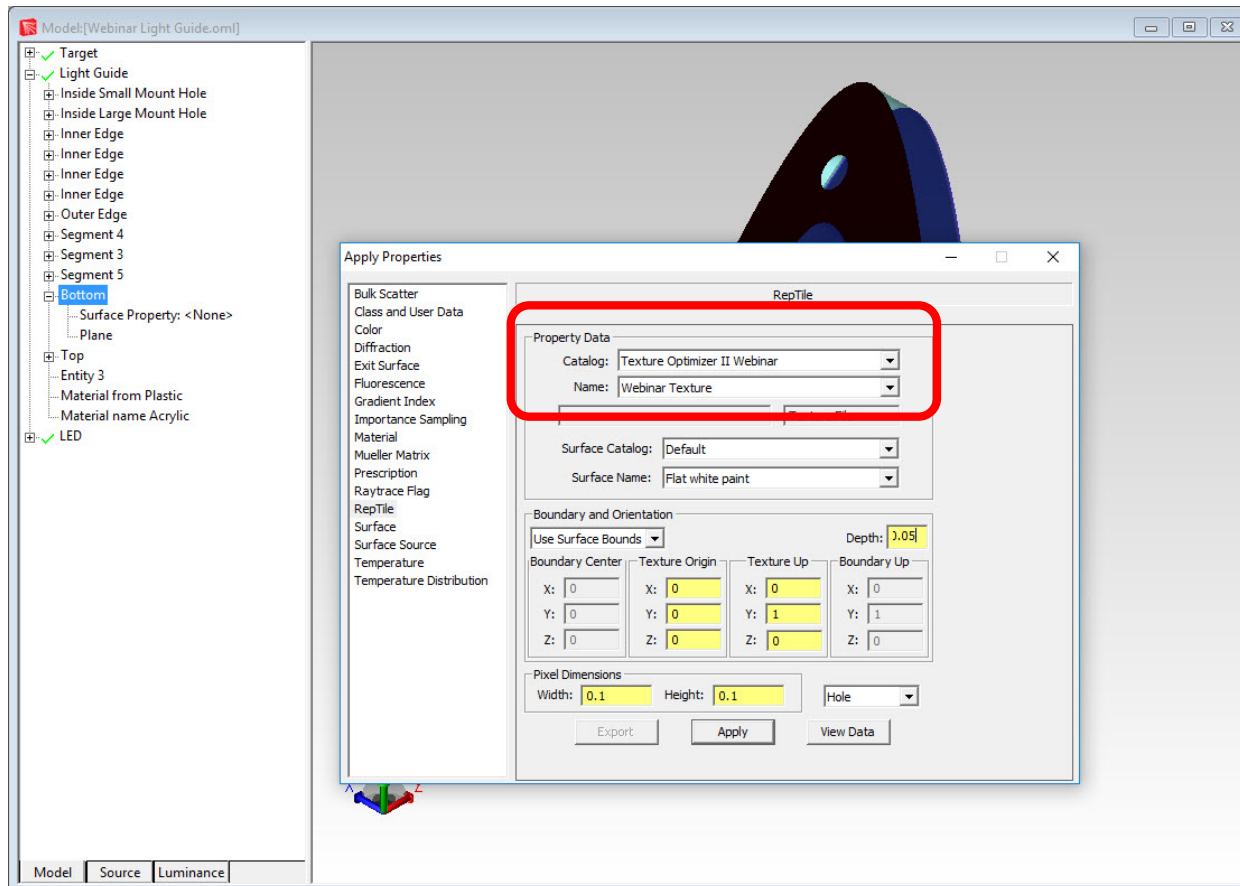
Setting up the Texture Optimizer II

Select the surface named “Bottom” of the “Target” object, right click, choose Properties, and then choose RepTile



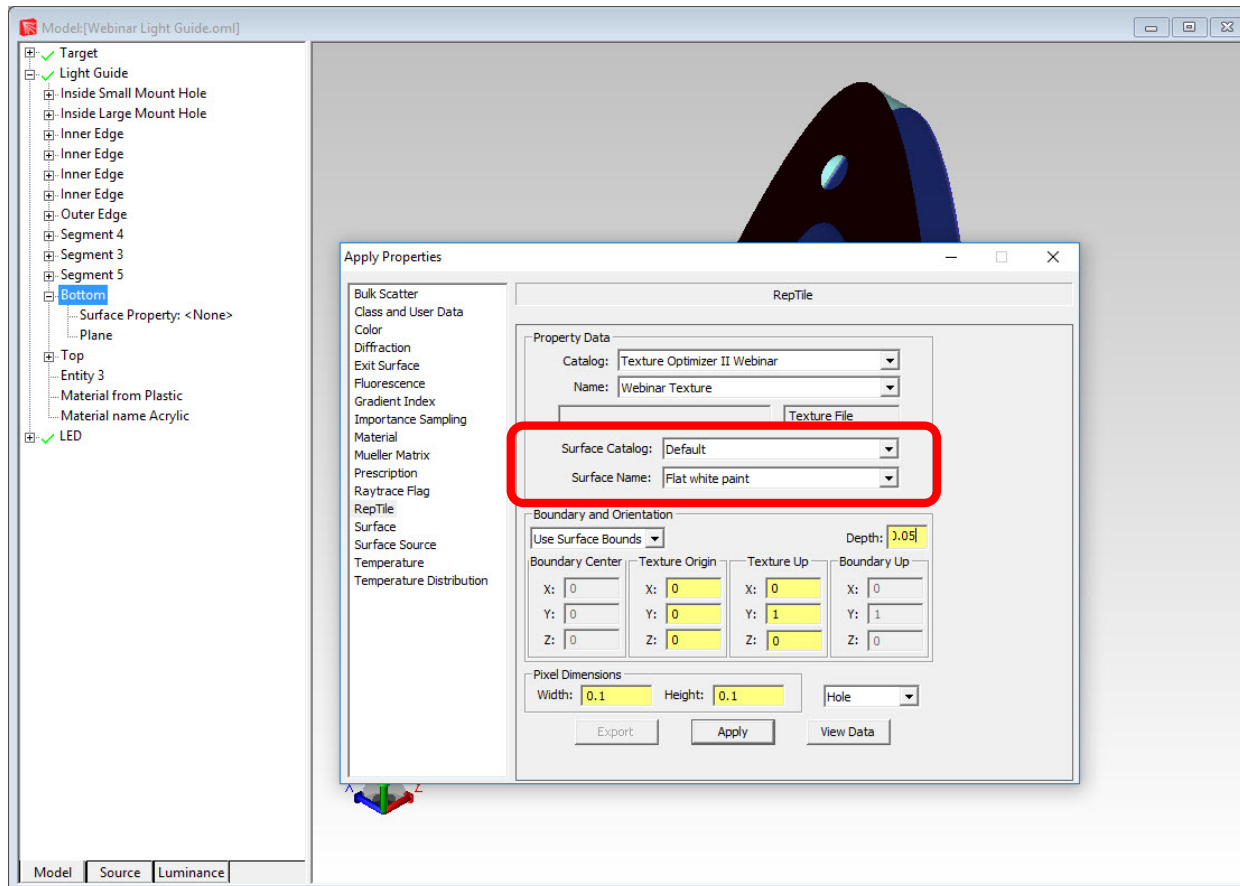
Setting up the Texture Optimizer II

Select the Catalog and Name for the RepTile property that was previously saved



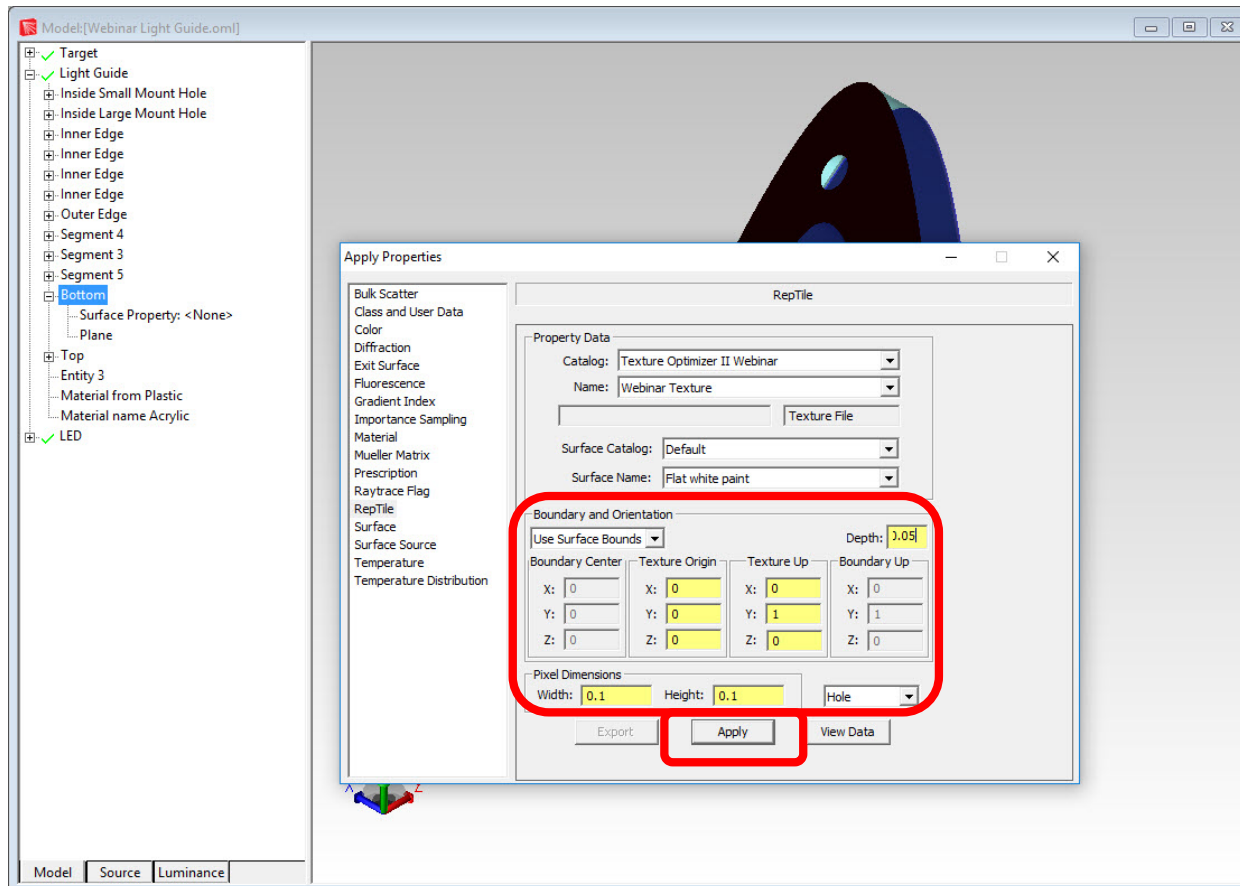
Setting up the Texture Optimizer II

Select Default for the Surface Catalog and Flat white paint for the Surface Name. This will apply the flat white paint property to the RepTile features.



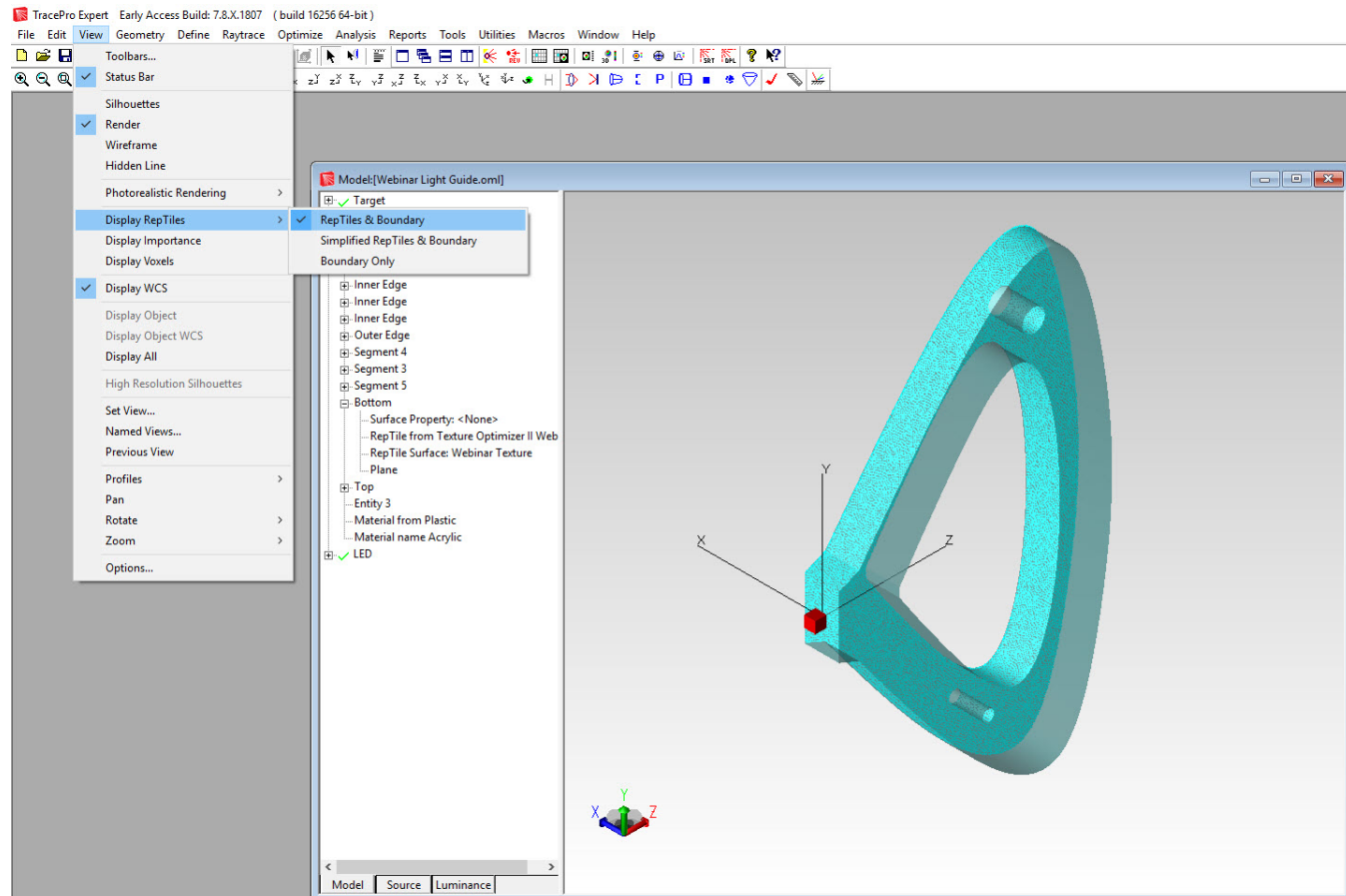
Setting up the Texture Optimizer II

Enter 0.05 for the Depth and choose Use Surface Bounds for the Boundary and Orientation. Click Apply to apply the RepTile property.



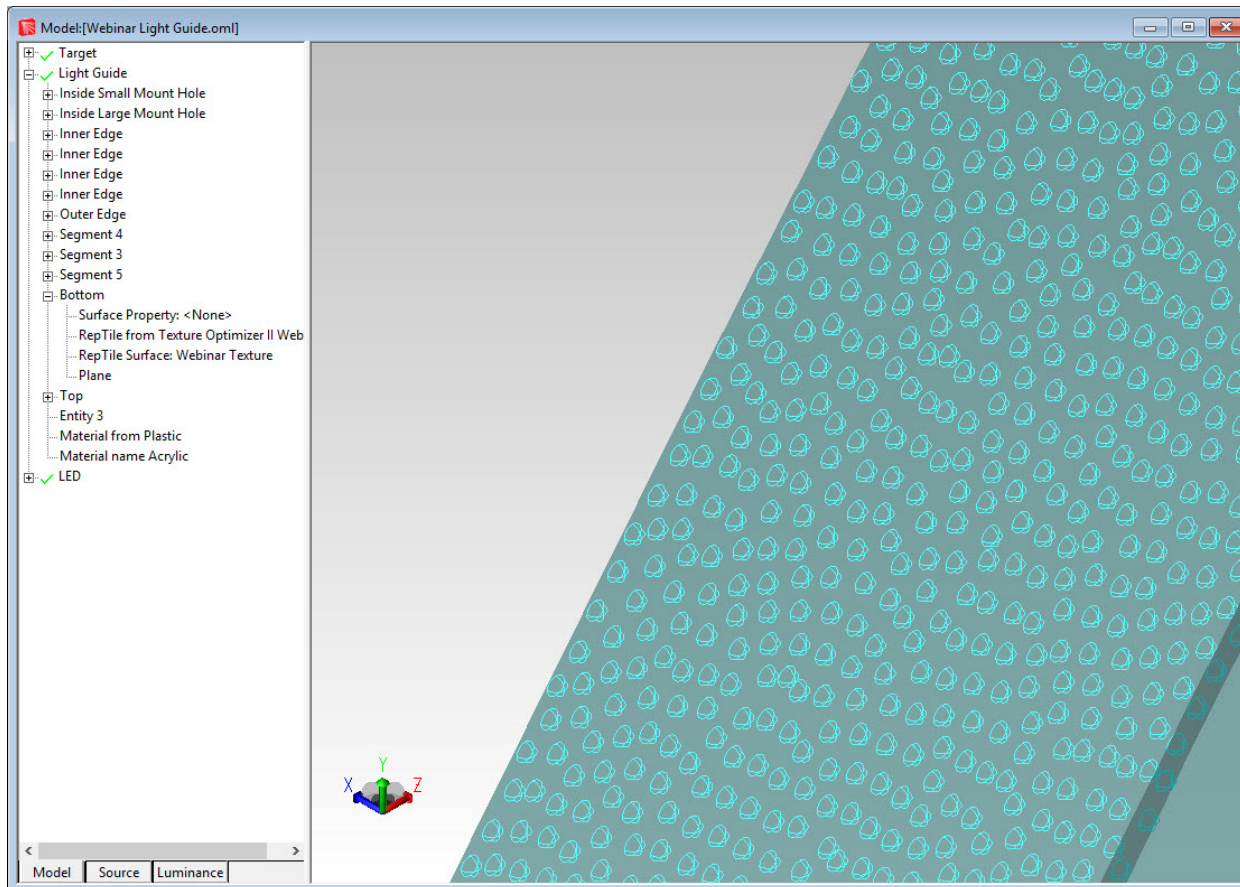
Setting up the Texture Optimizer II

Display the RepTile by going to View->Display RepTiles->RepTiles & Boundary



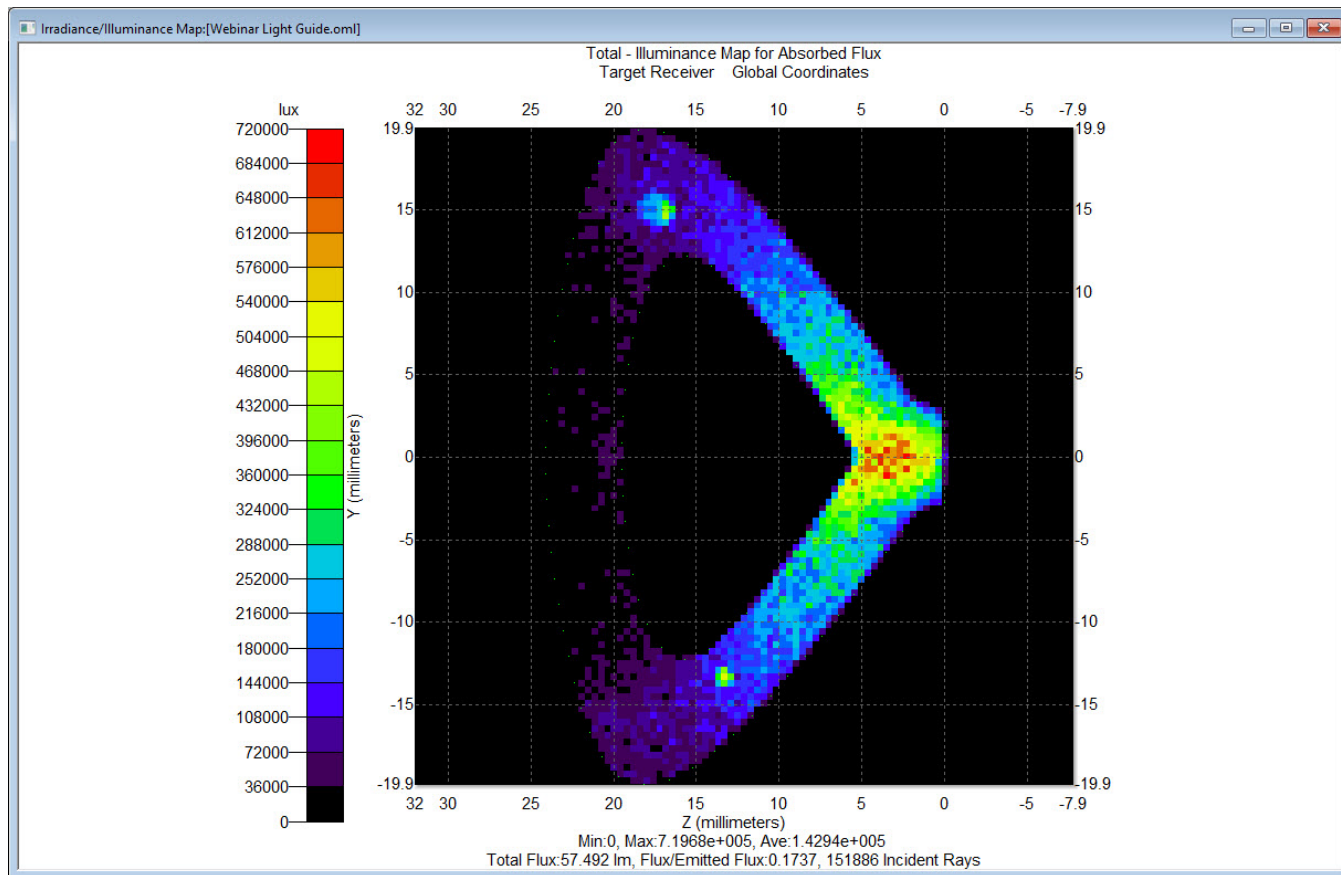
Setting up the Texture Optimizer II

Display the RepTile by going to View->Display RepTiles->RepTiles & Boundary



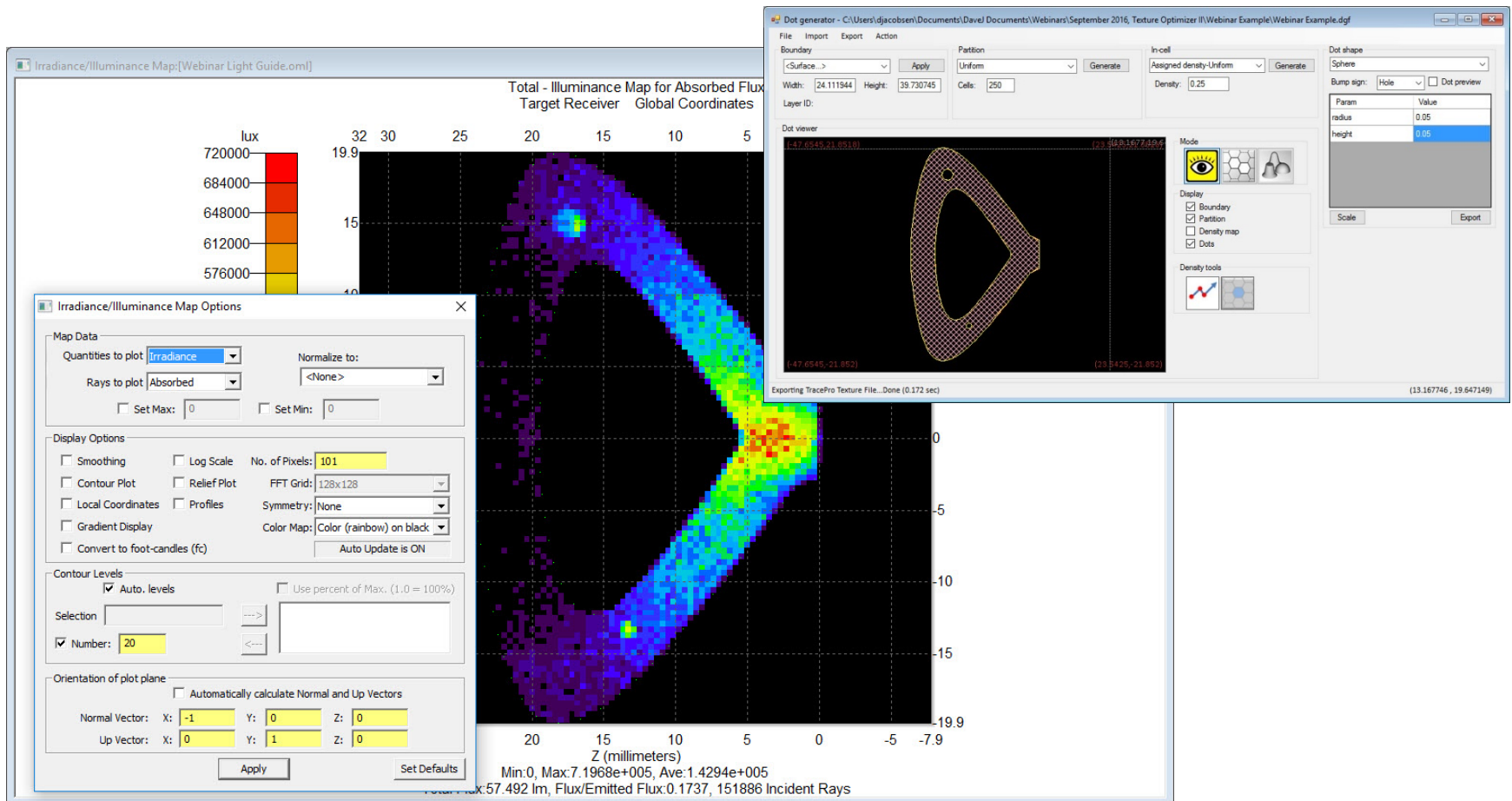
Setting up the Texture Optimizer II

Display the Illuminance Map for the “Receiver” surface of the “Target”



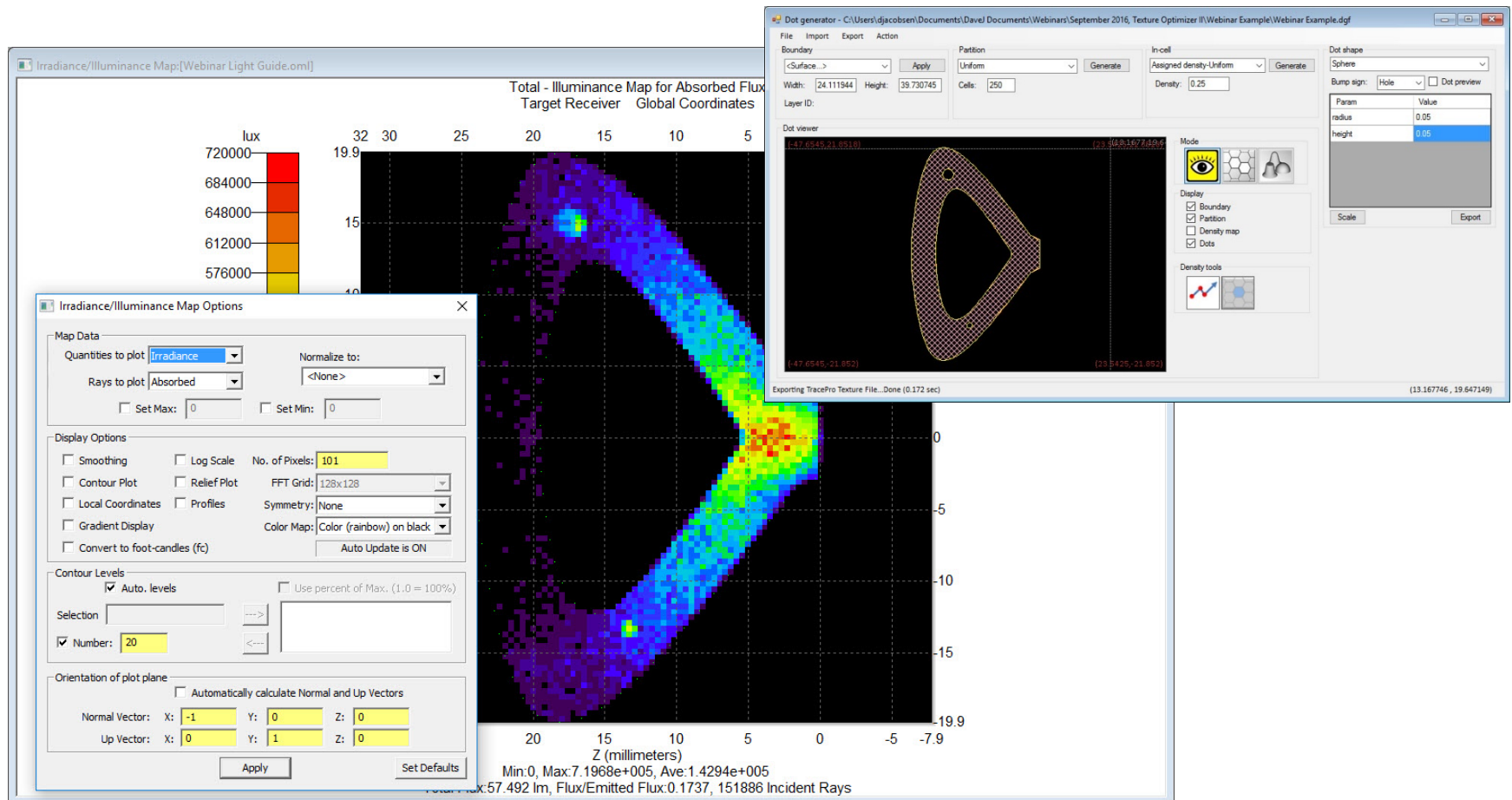
Setting up the Texture Optimizer II

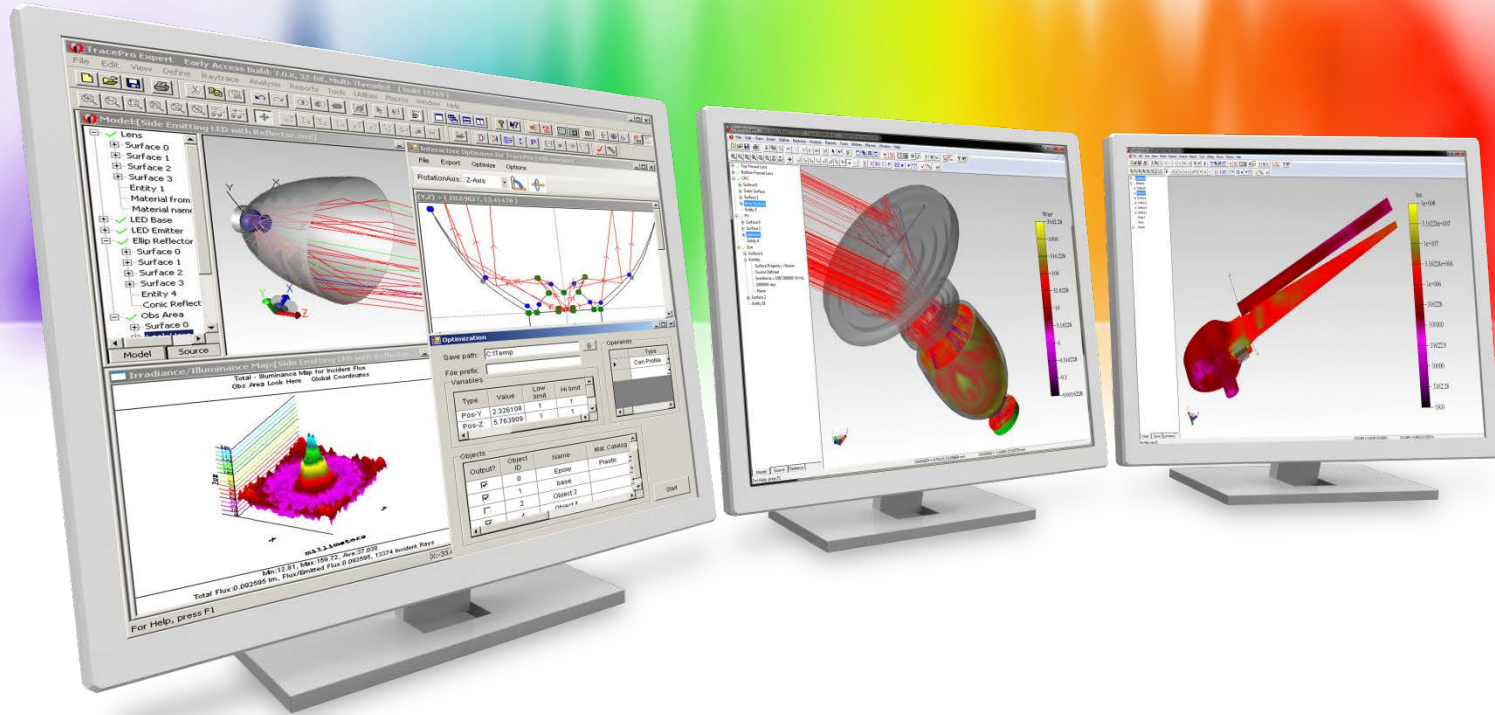
Adjust the Normal and Up Vectors for the Irradiance/Illuminance Map so that the plot matches the orientation in the Texture Optimizer II



Setting up the Texture Optimizer II

We are now ready to start the optimization process

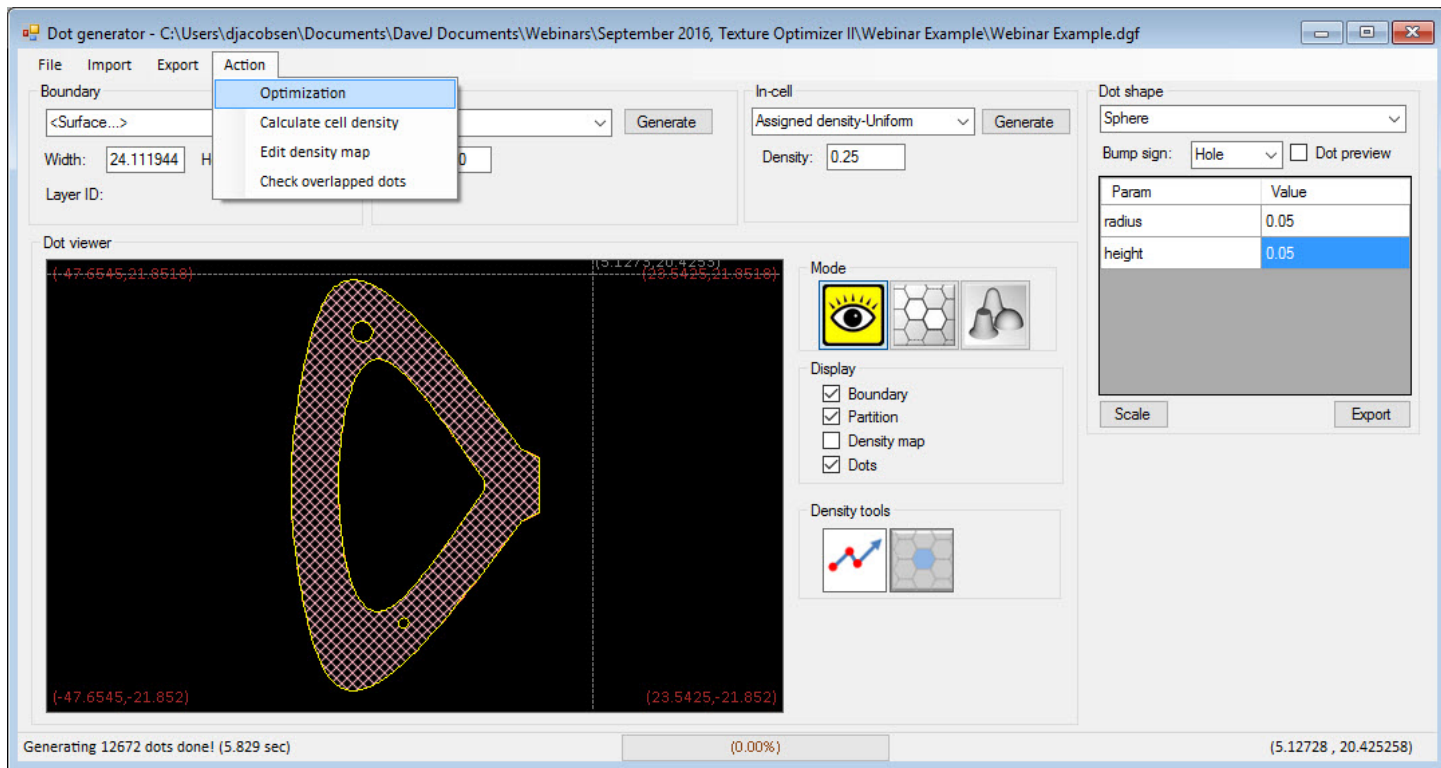




The texture optimization process

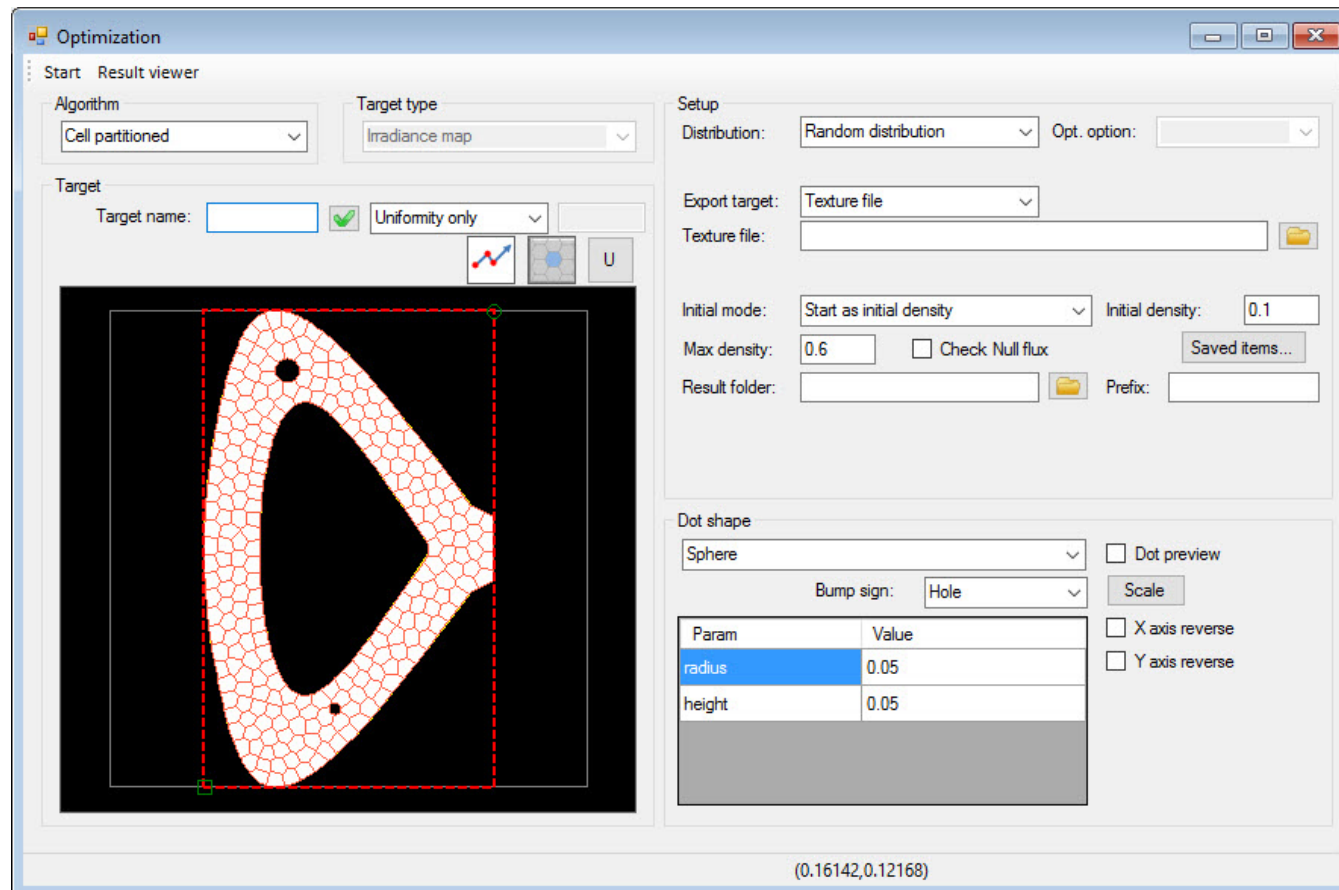
Texture Optimization

Open the optimization window by going to Action->Optimization



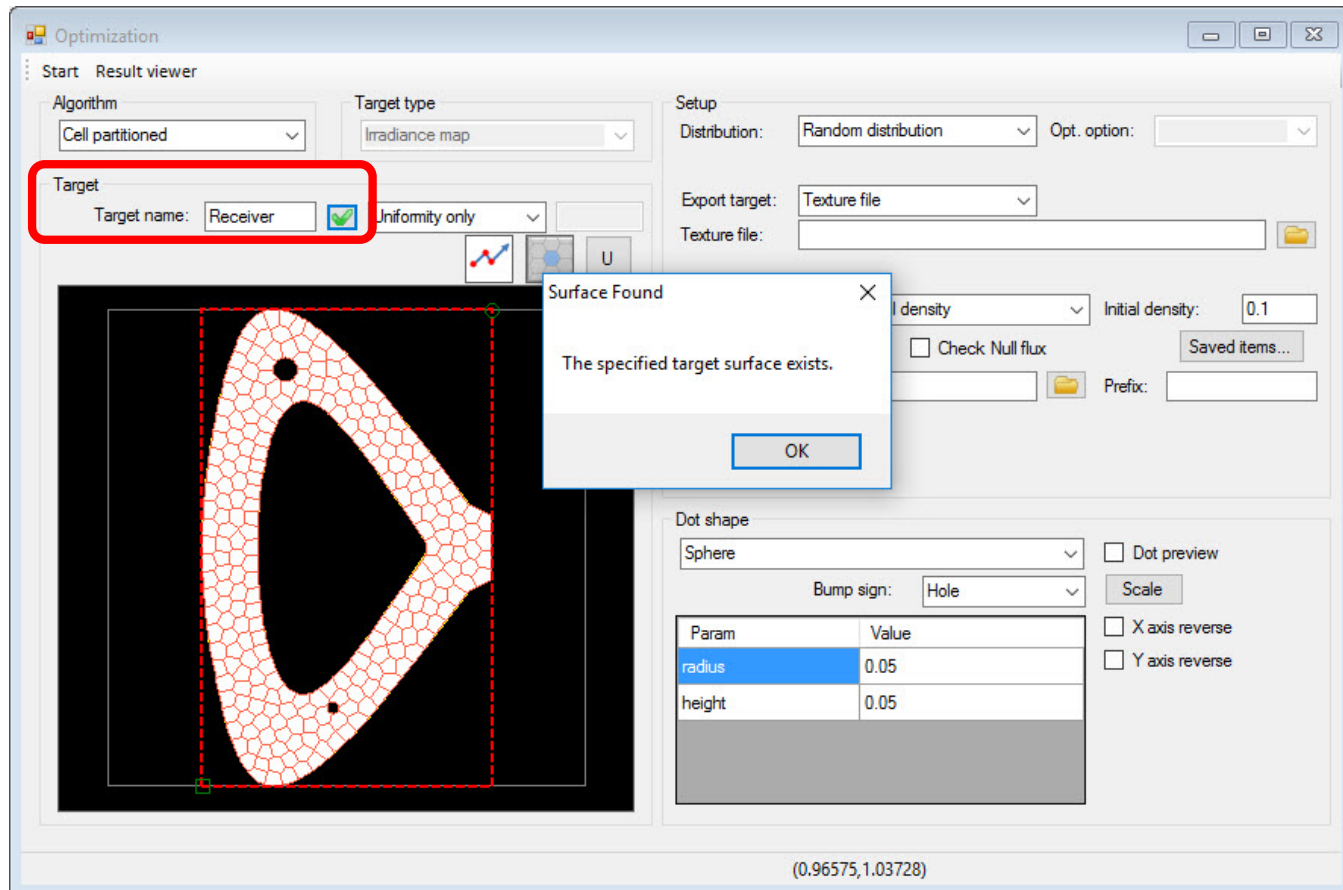
Texture Optimization

Texture Optimizer II Optimization window



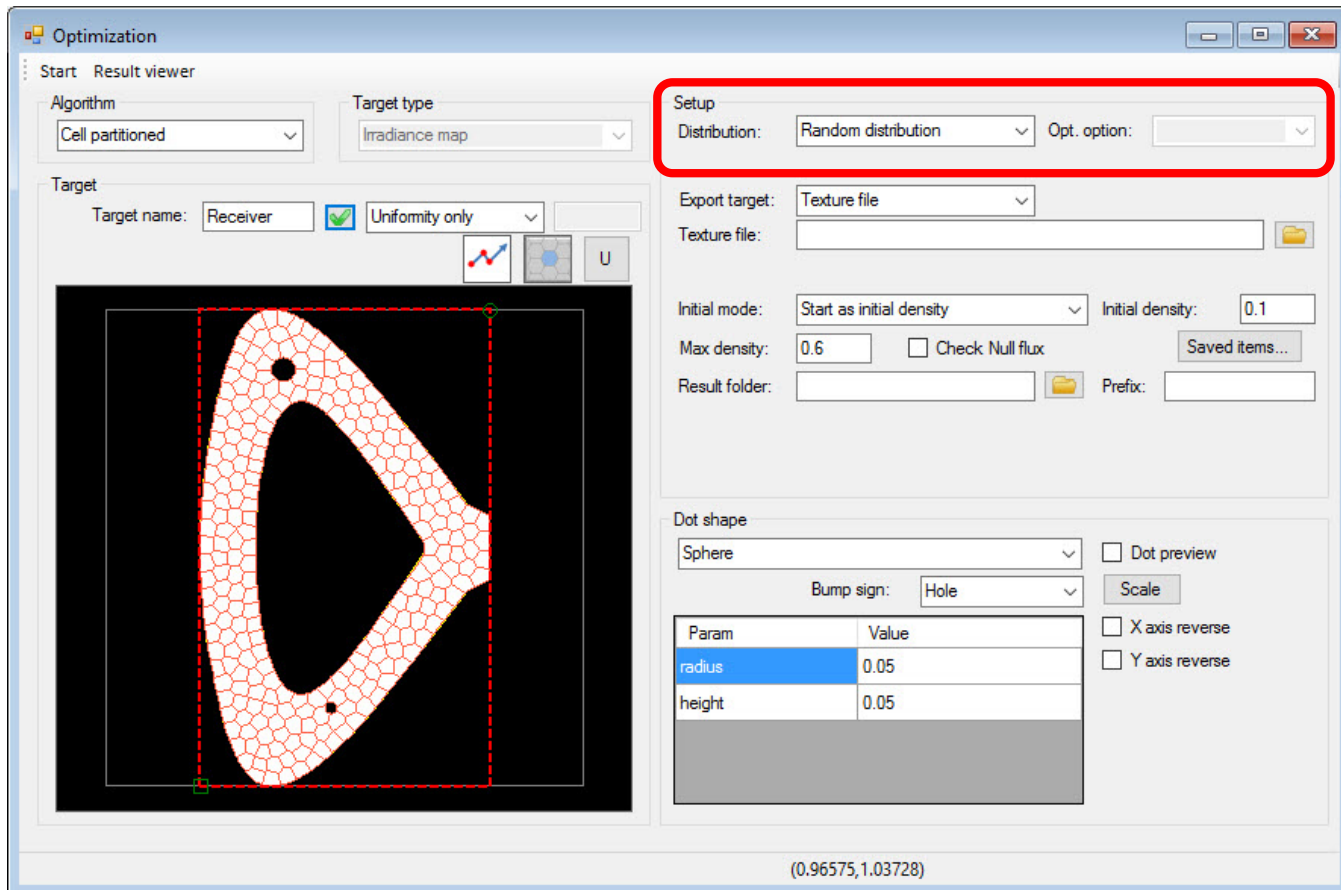
Texture Optimization

Enter “Receiver” for the Target Name. Clicking the green checkmark will verify that the surface exists



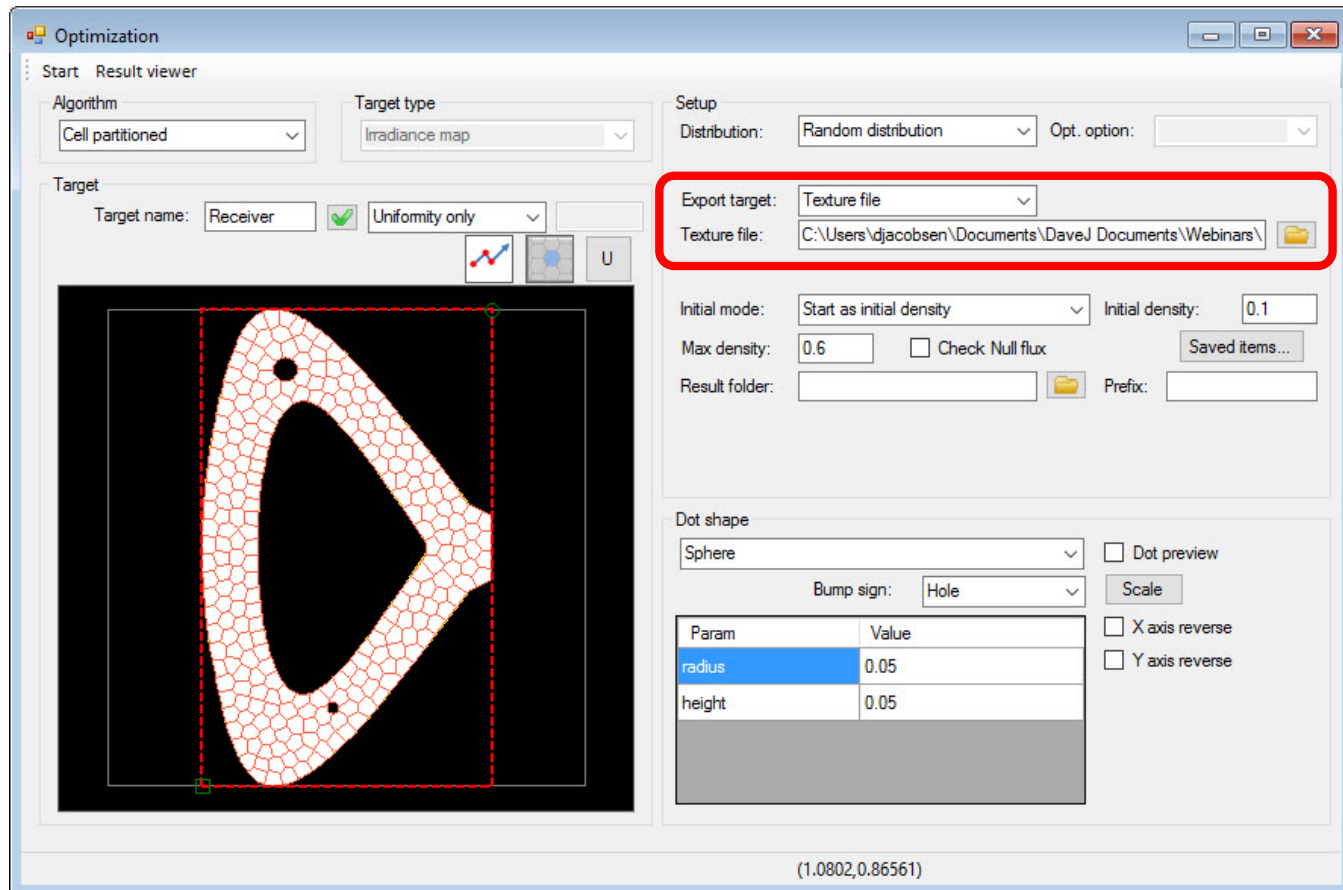
Texture Optimization

Choose Random distribution for Distribution. This option will optimize the texture pattern by varying the texture density in each cell.



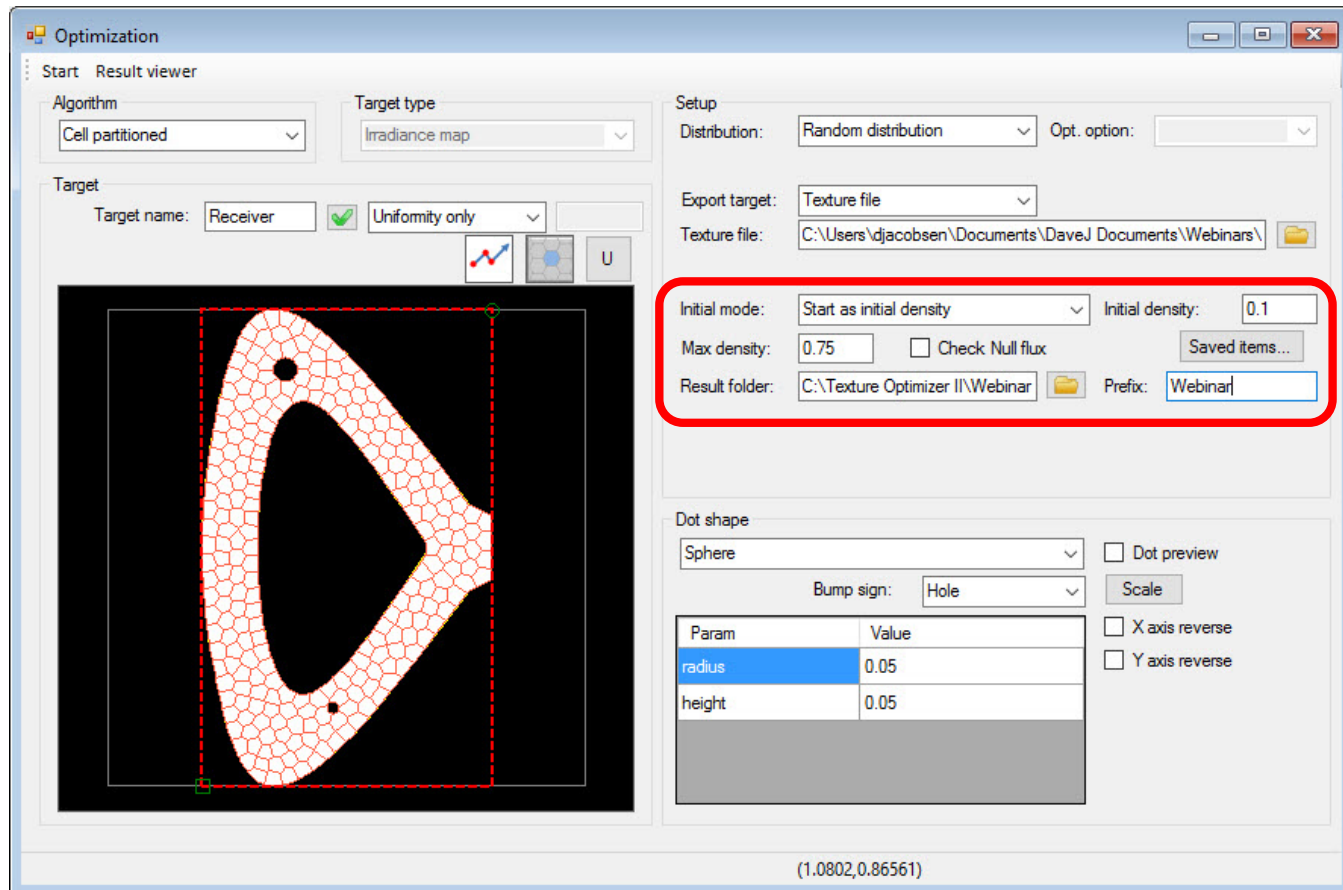
Texture Optimization

Select Texture file for the Export Target and then browse to the location of the saved Texture File



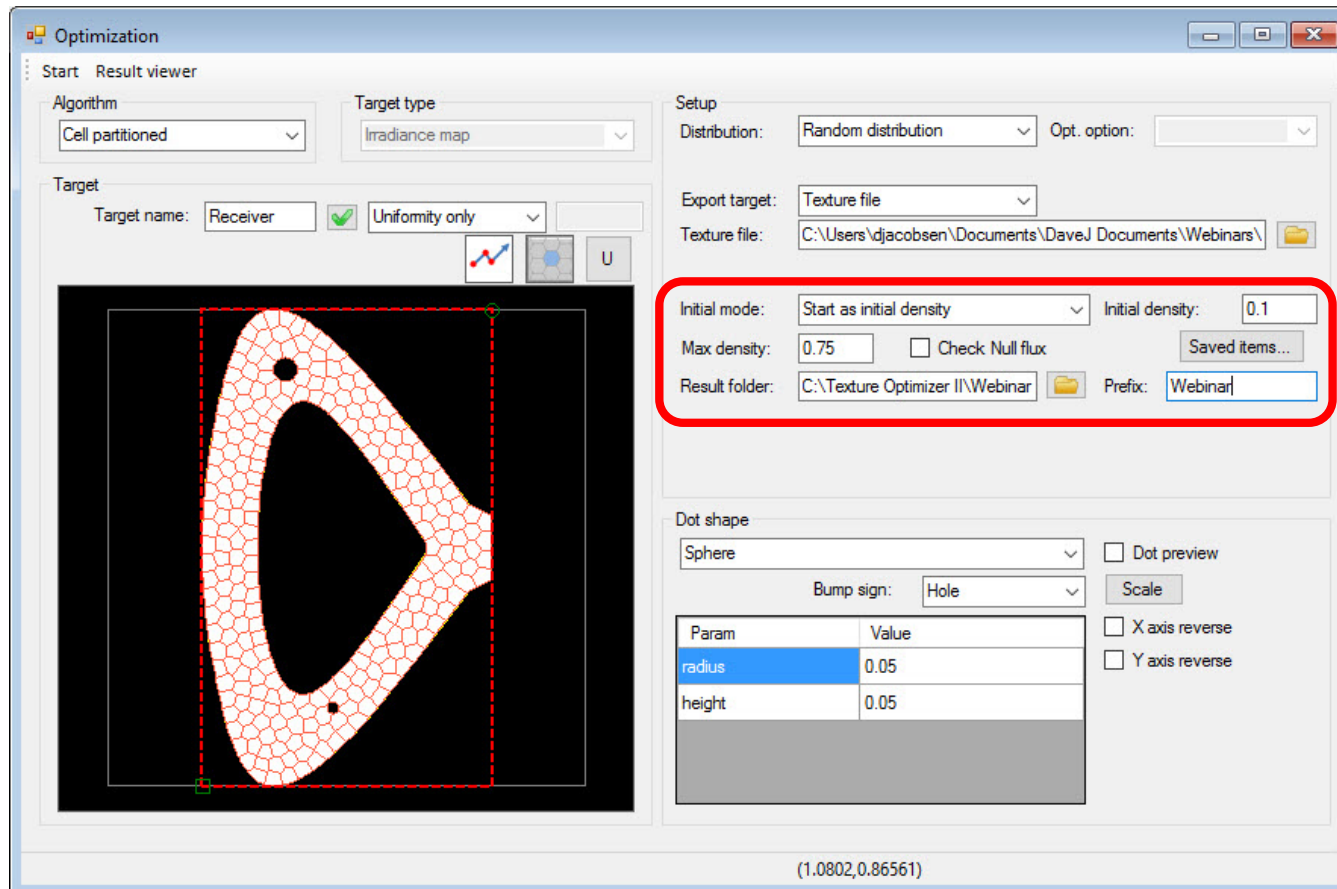
Texture Optimization

Set the Initial Mode to Start as initial density. Set the Initial Density to 0.1 and the Max. Density to 0.75.



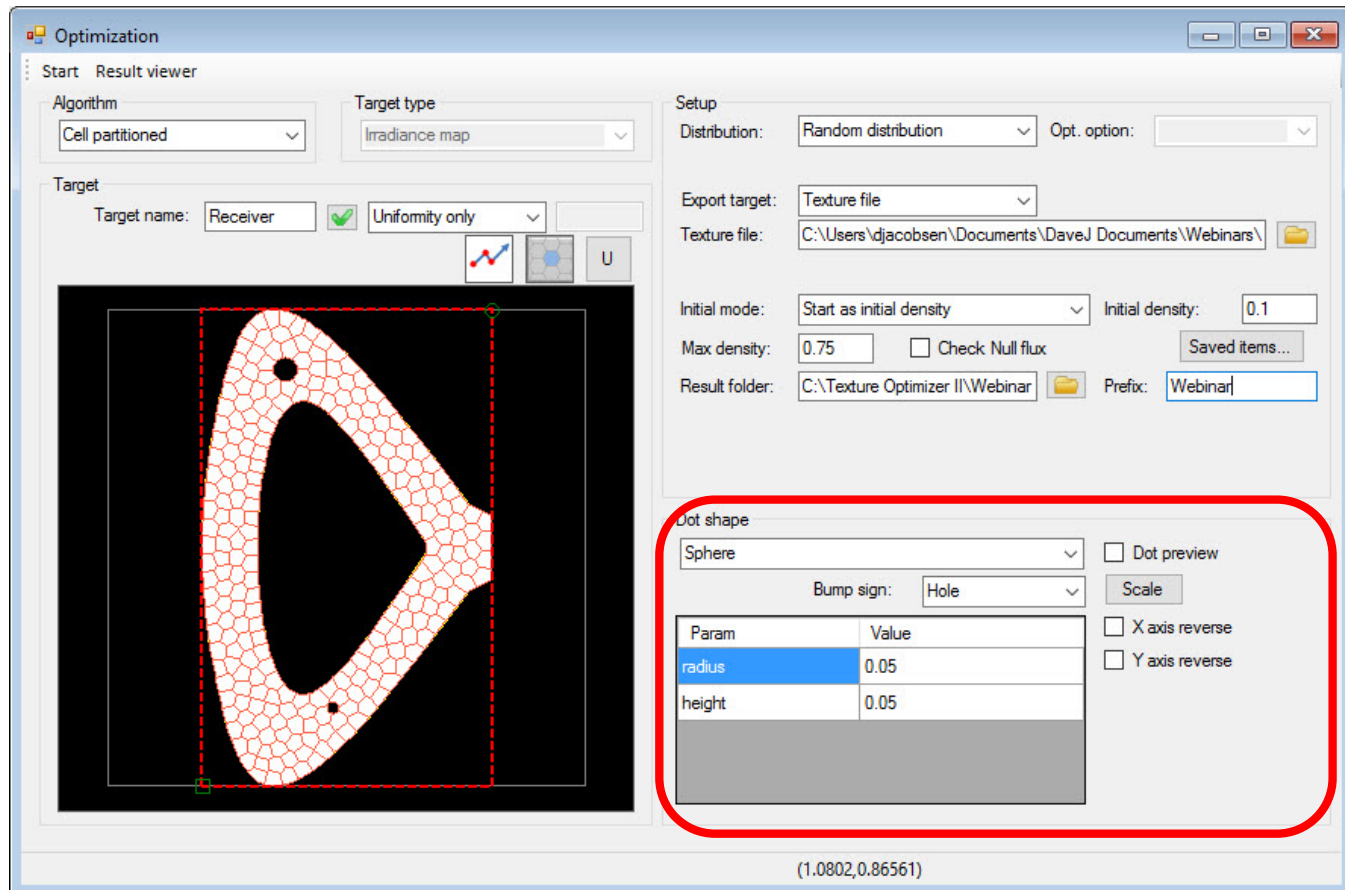
Texture Optimization

Browse to a location to for the Results Folder. This is where the results will be saved. Define a Prefix that will be used for each file.



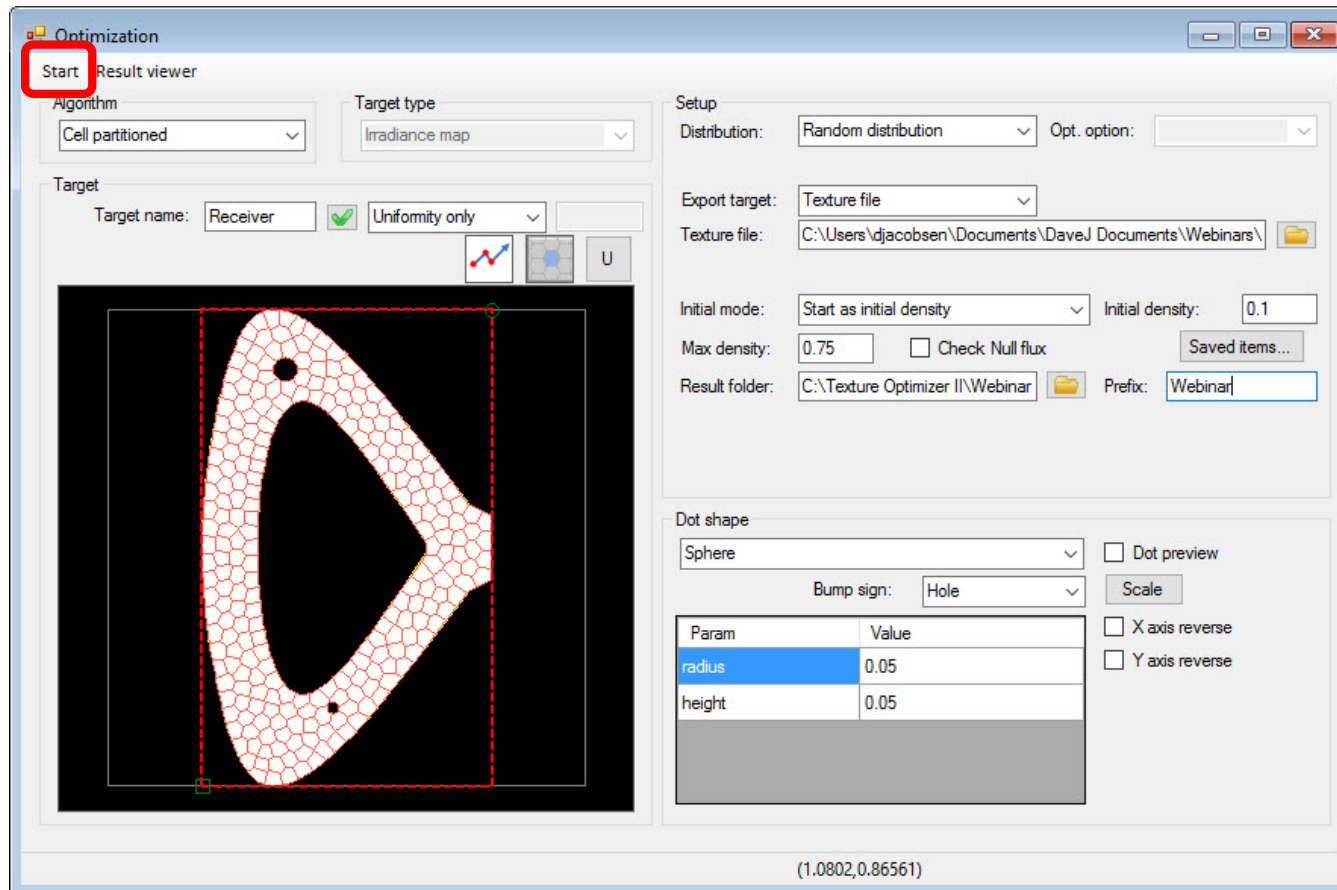
Texture Optimization

Verify the Dot Shape parameters



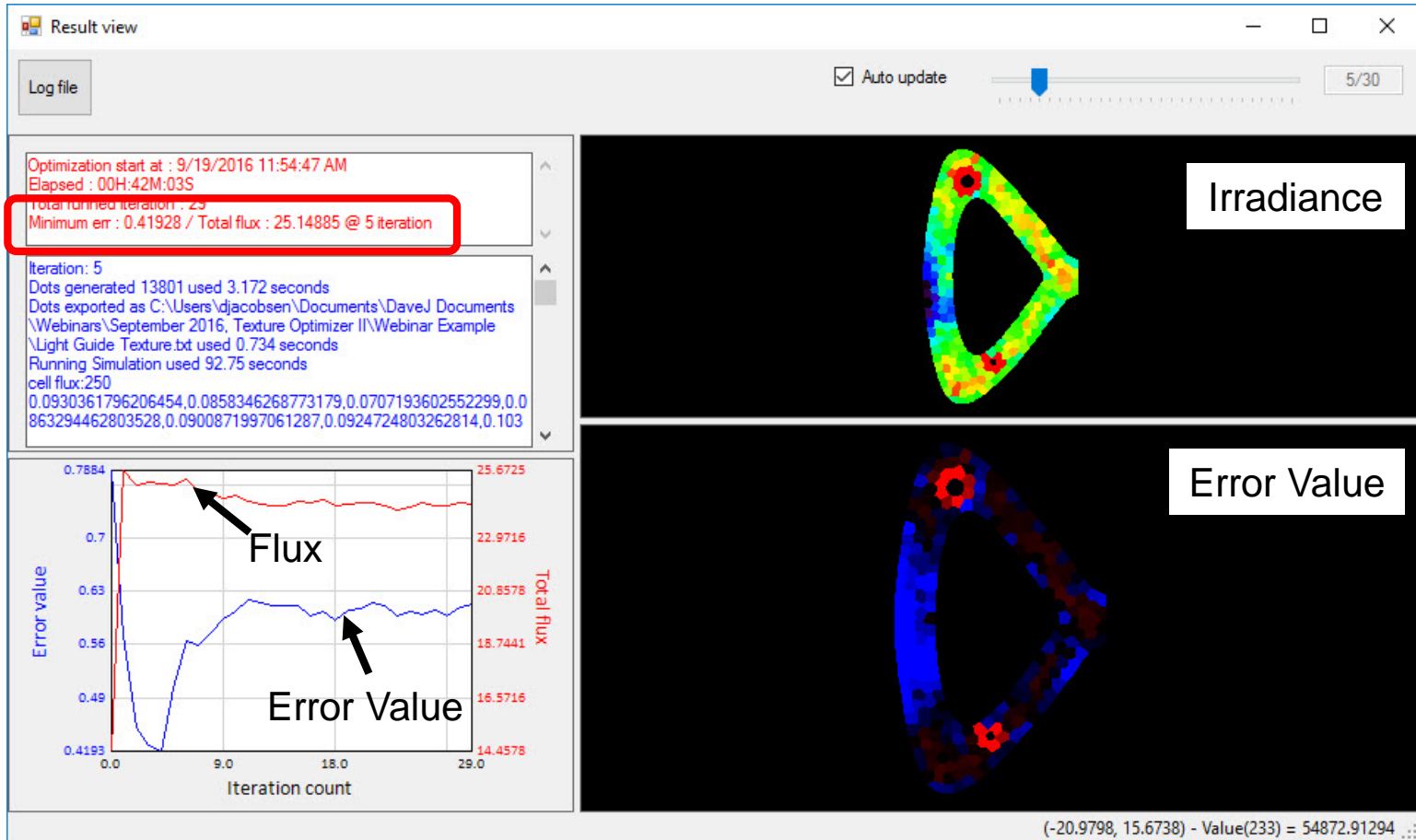
Texture Optimization

Click Start to start the optimization process



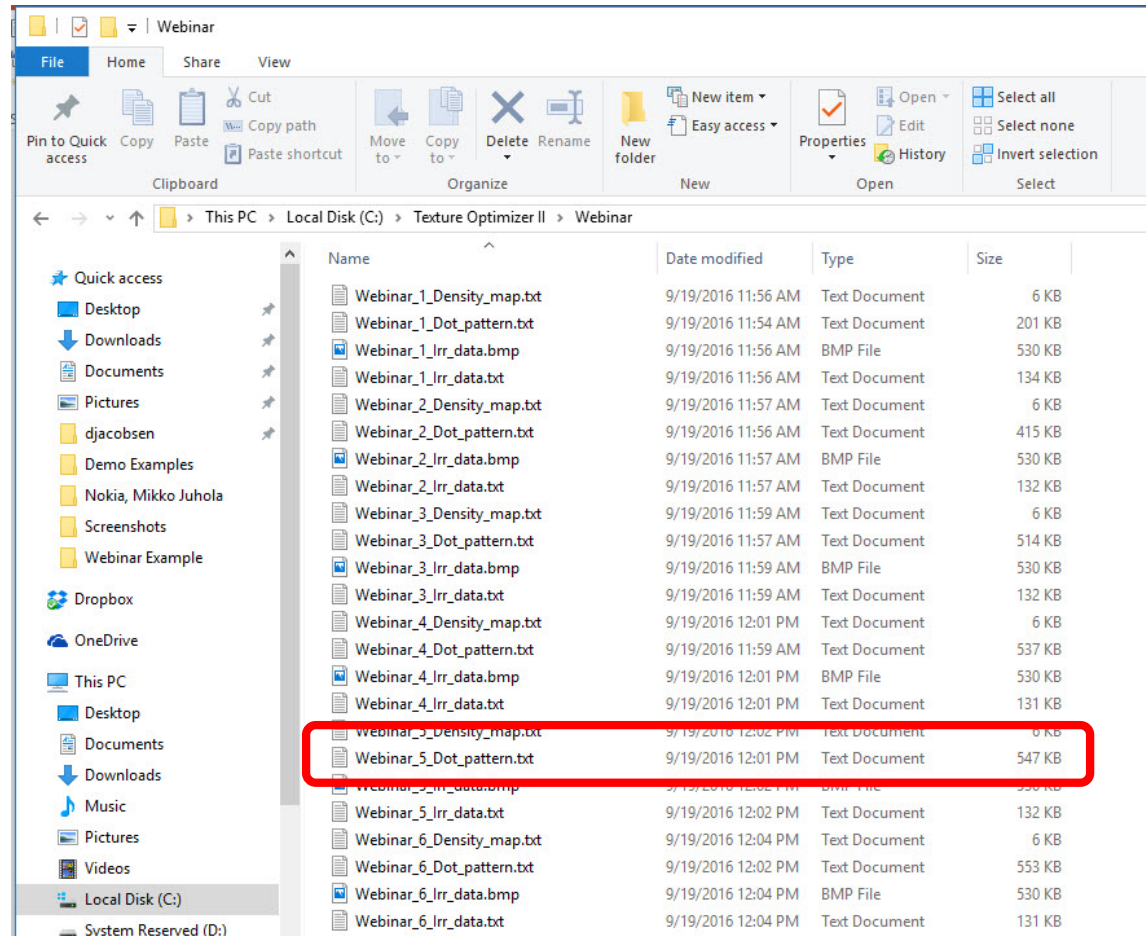
Texture Optimization

Optimization Log – Best result was the 5th iteration



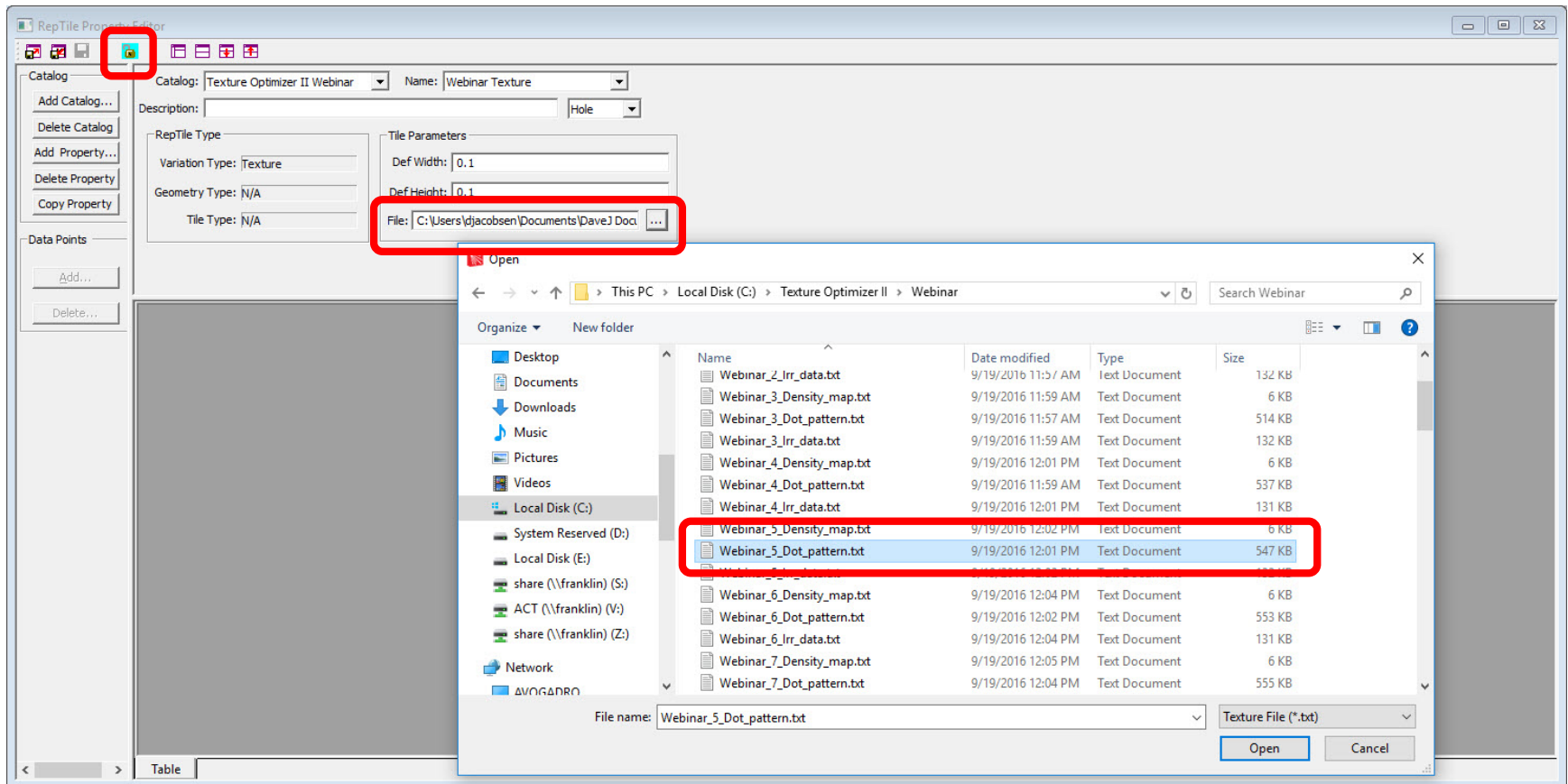
Texture Optimization

Dot_pattern.txt for best result in Results folder



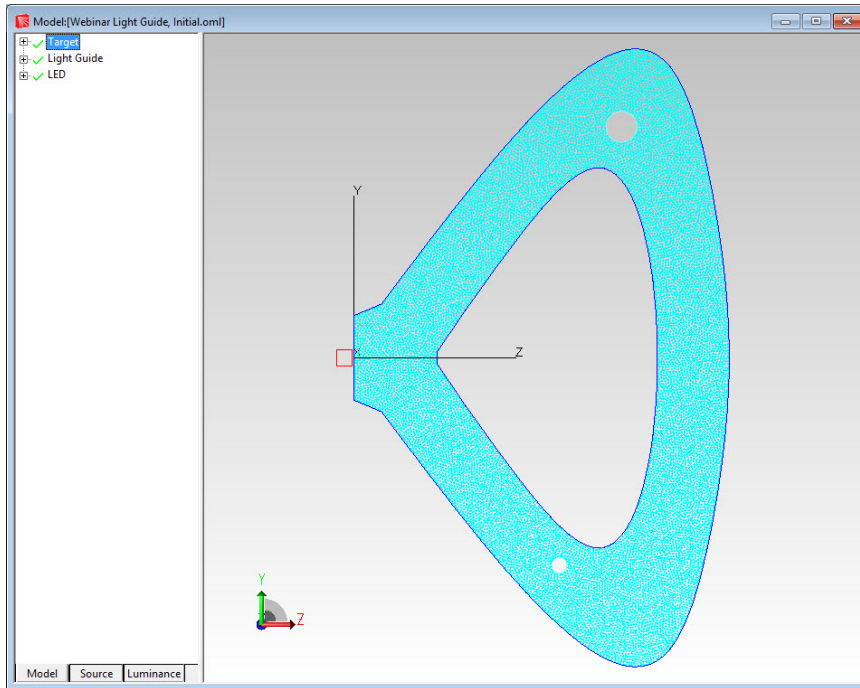
Texture Optimization

Update TracePro RepTile property using the best result Dot_pattern.txt file

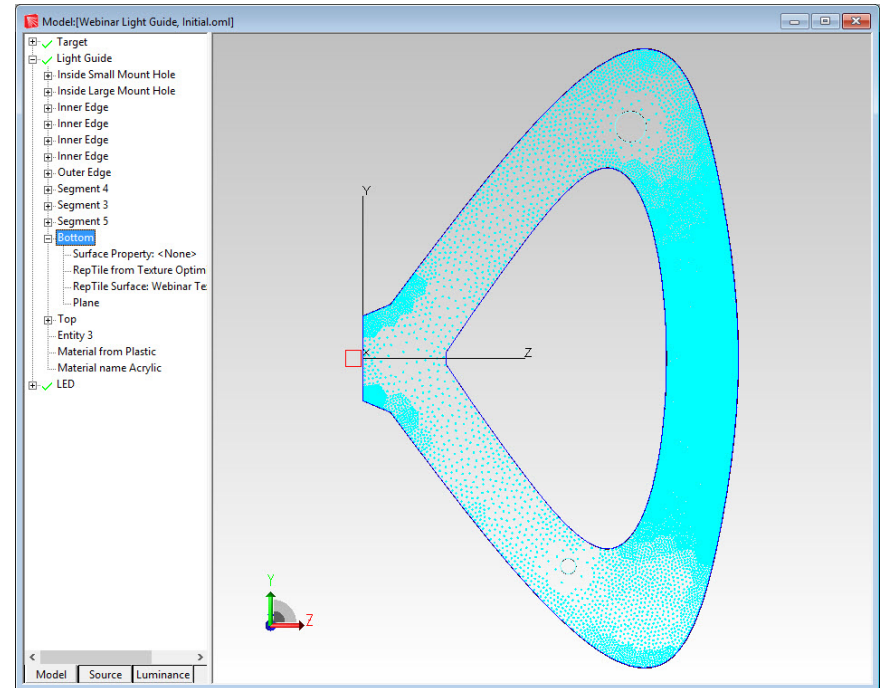


Texture Optimization

Initial vs. Optimized RepTile Texture Pattern



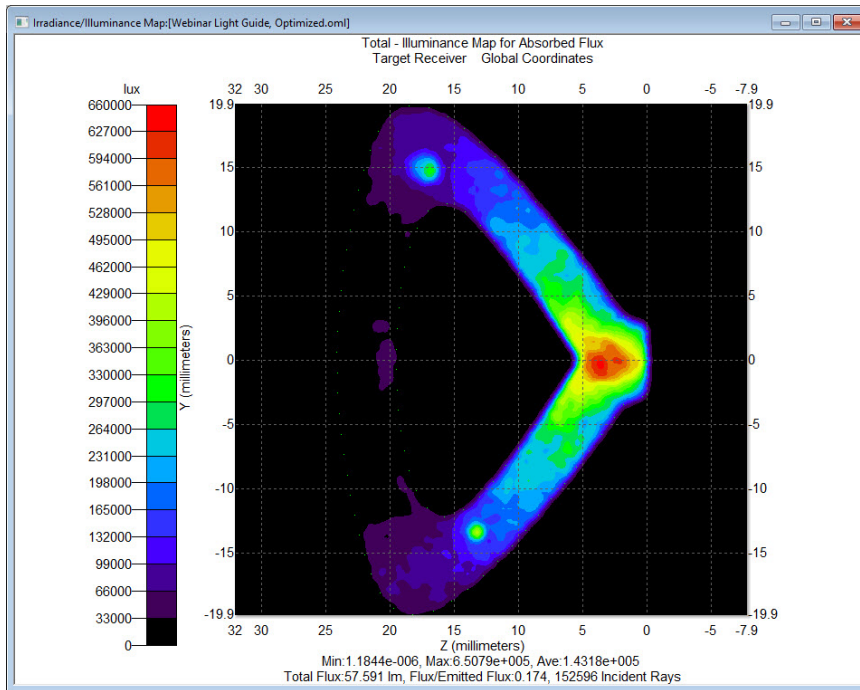
Initial RepTile Texture Pattern



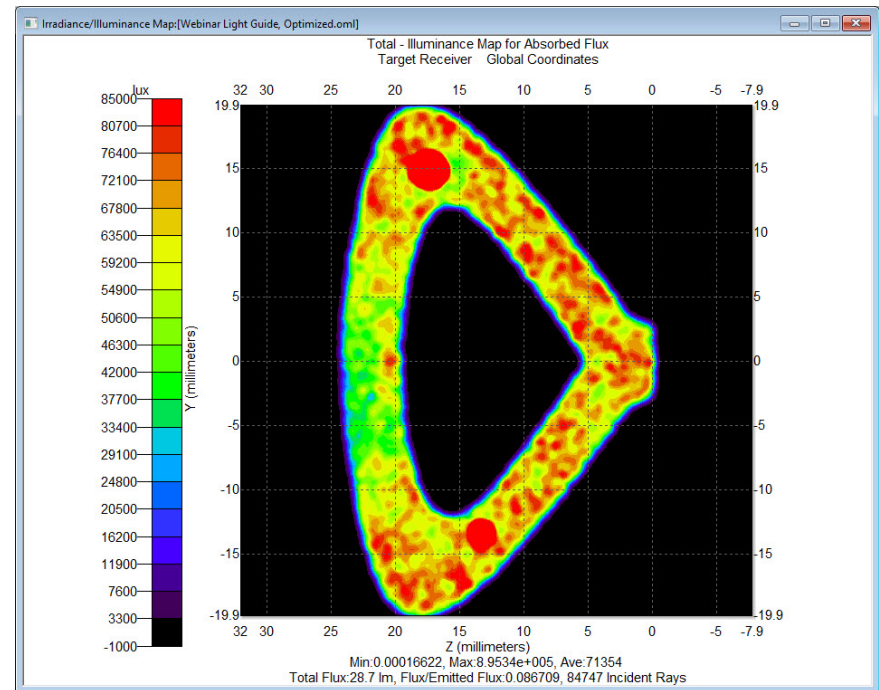
Optimized RepTile Texture Pattern

Texture Optimization

Re-run the raytrace to check the results – Illuminance Map



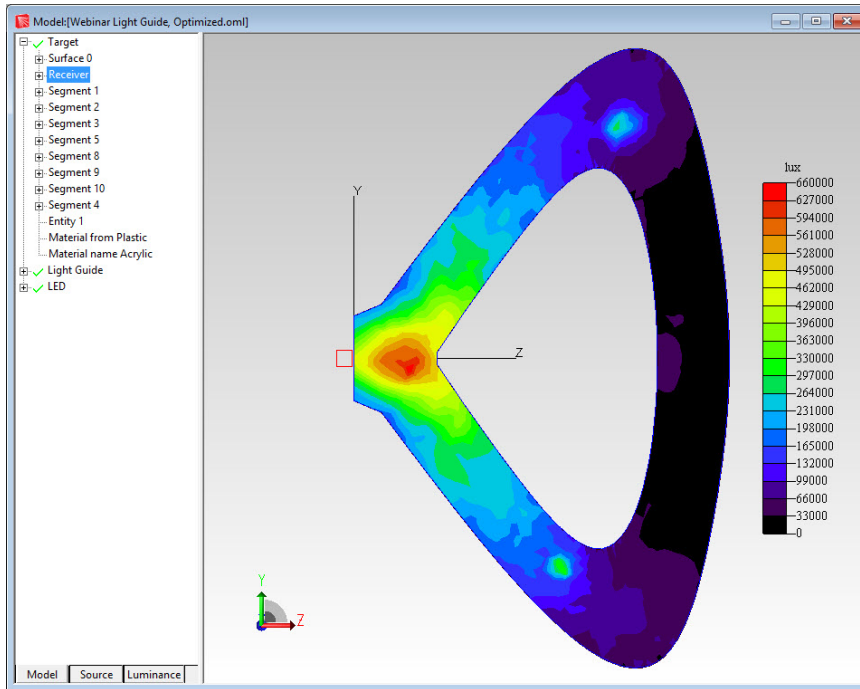
Initial Illuminance Map



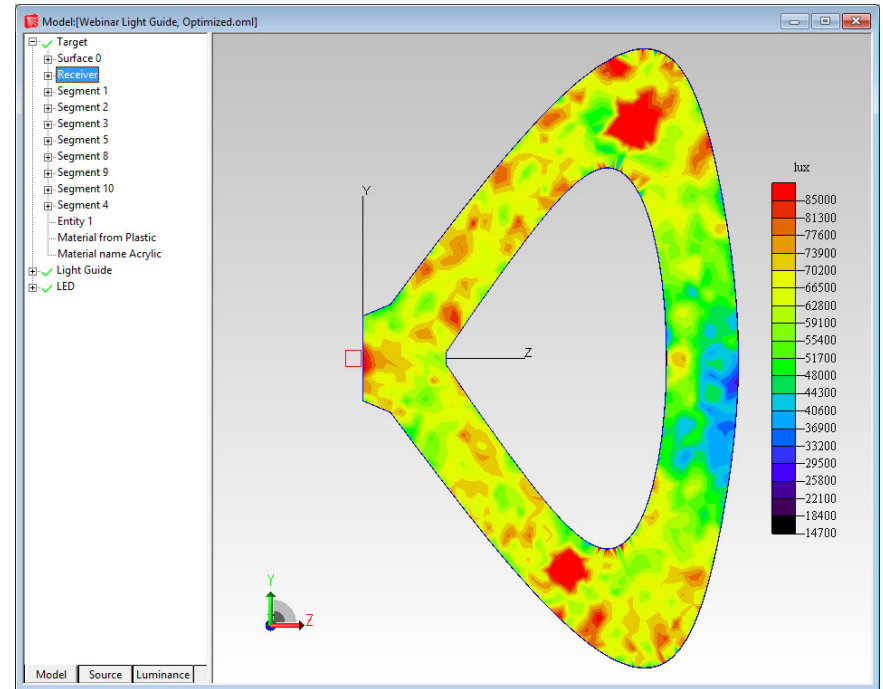
Optimized Illuminance Map

Texture Optimization

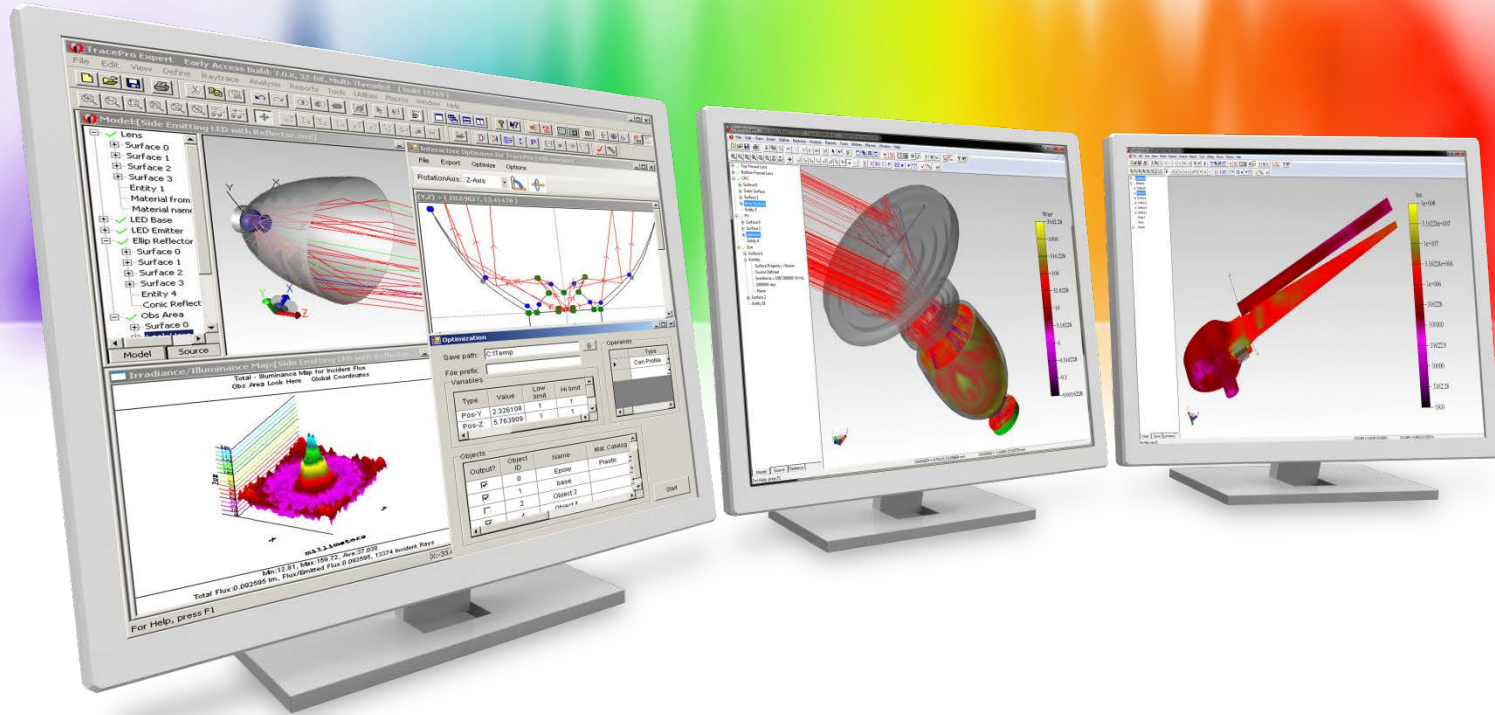
Re-run the raytrace to check the results – 3D Illuminance Map



Initial 3D Illuminance Map



Optimized 3D Illuminance Map



Applying texture to a curved surface

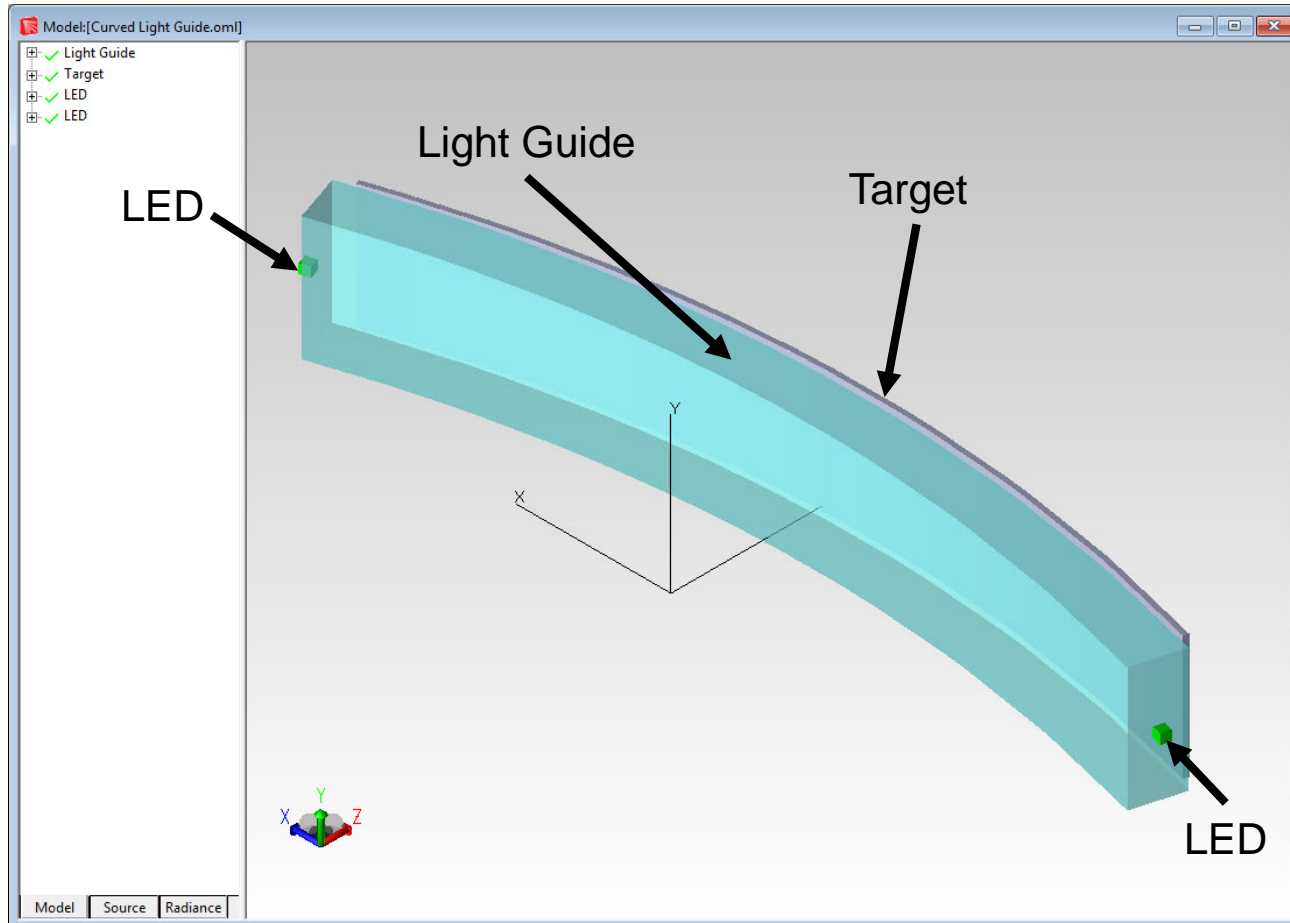
Texture on a curved surface

Applying Texture to a Curved Surface with the Texture Optimizer II

- The Texture Optimizer II allows the user to apply a texture to a curved surface
- The texture is applied as a real geometry and not a RepTile property
- The boundary, partitions, dot shape, and cell densities can be defined in the Texture Optimizer II
- Boolean subtract and unite options are available for making holes or bumps
- Because the texture is modeled as real, 3D geometry, there can be a limit to the number of texture features applied. More texture features will take more time.

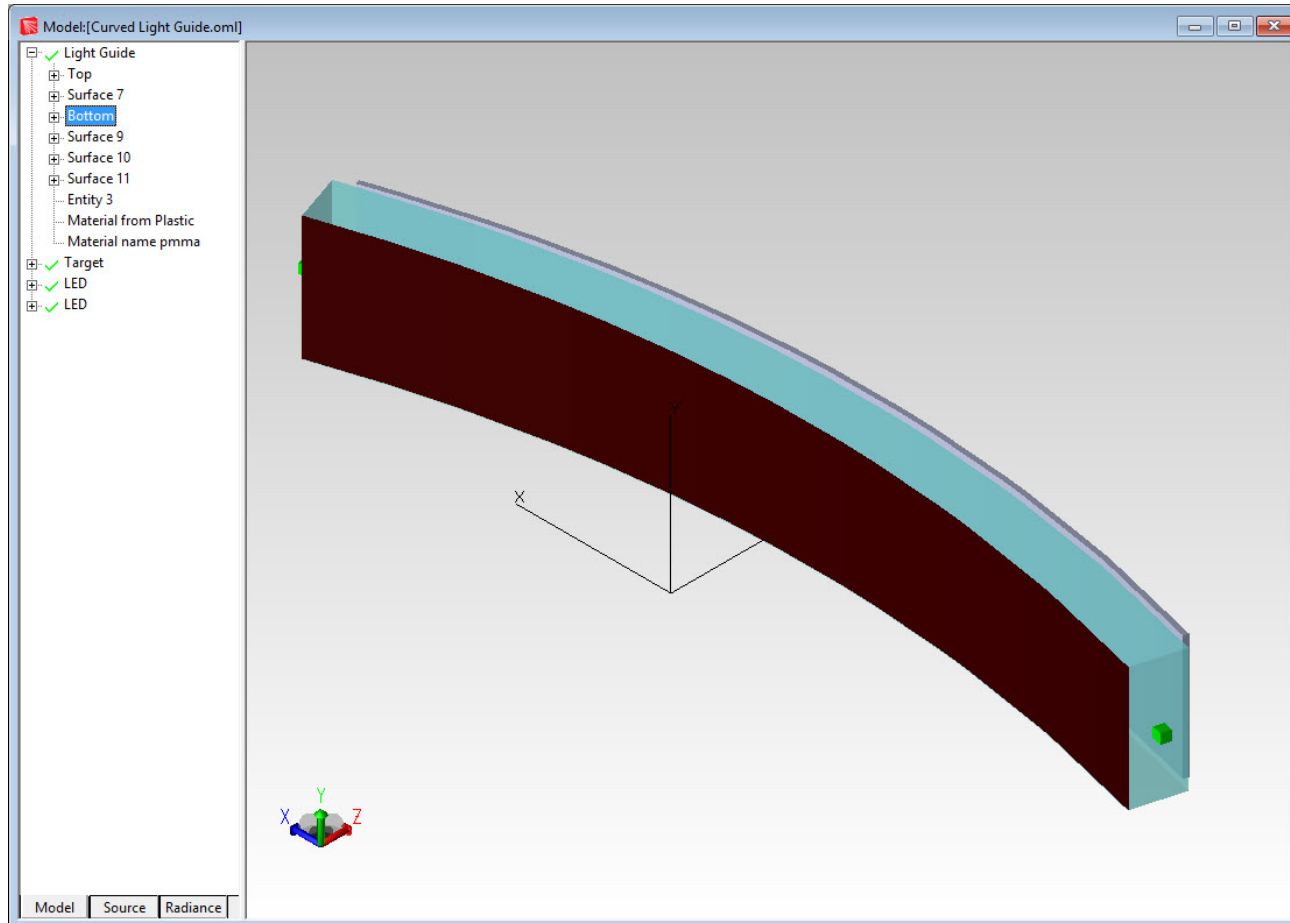
Texture on a curved surface

Curved Light Guide model in TracePro



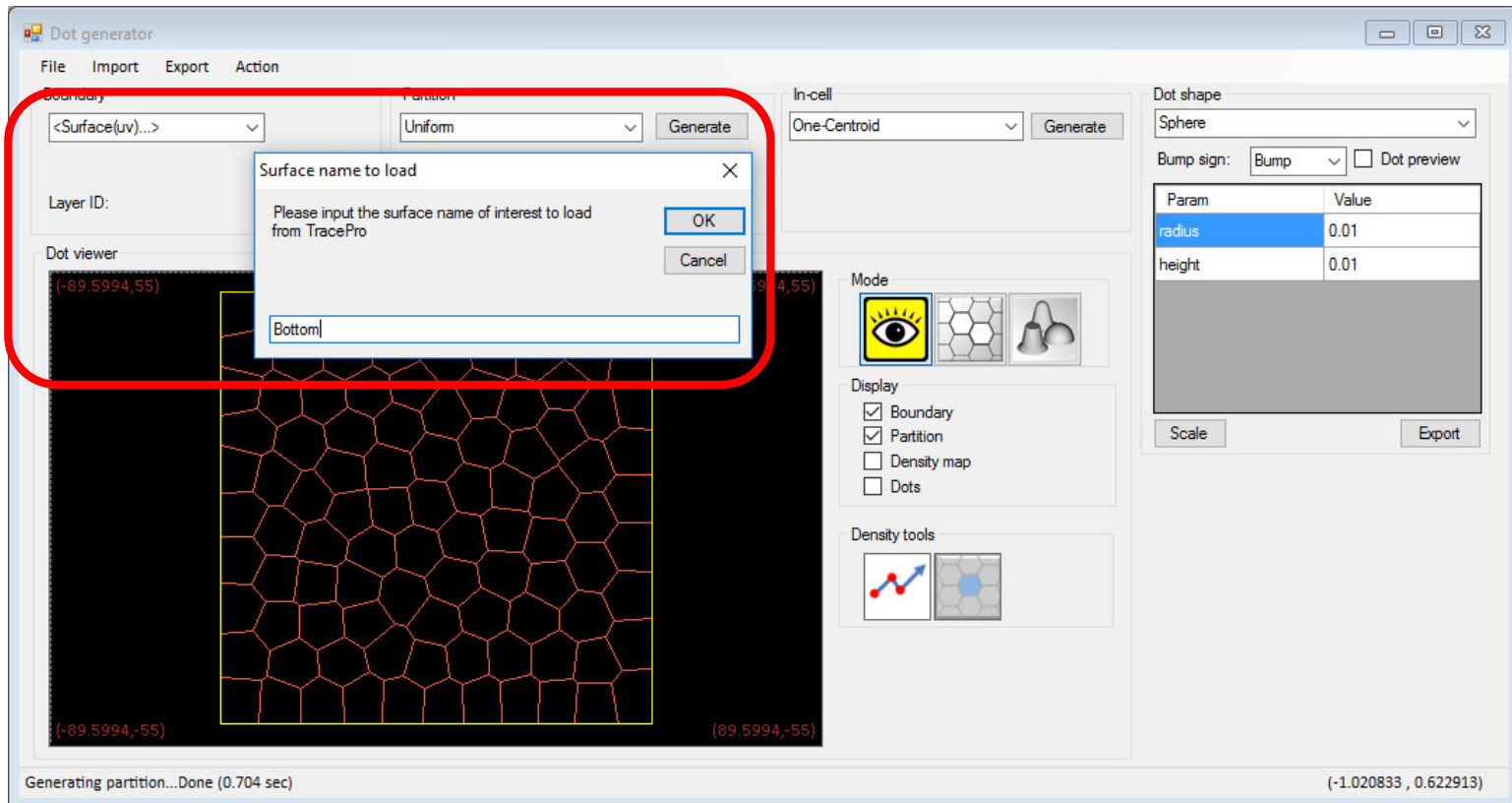
Texture on a curved surface

The texture will be applied to the “Bottom” surface of the Light Guide



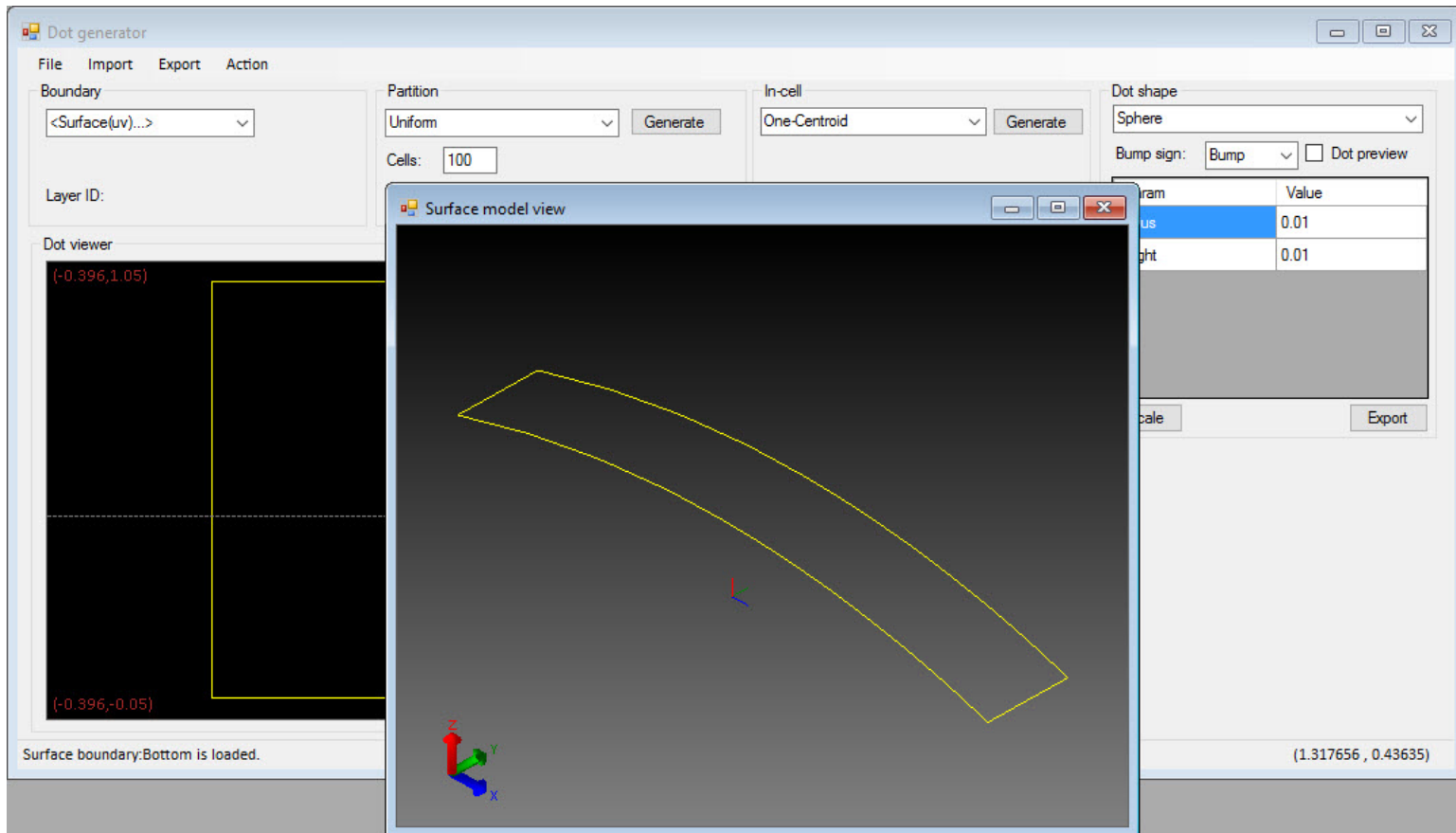
Texture on a curved surface

Select Surface(uv) for the Boundary, enter the name of the Surface in the dialog box, and then click OK



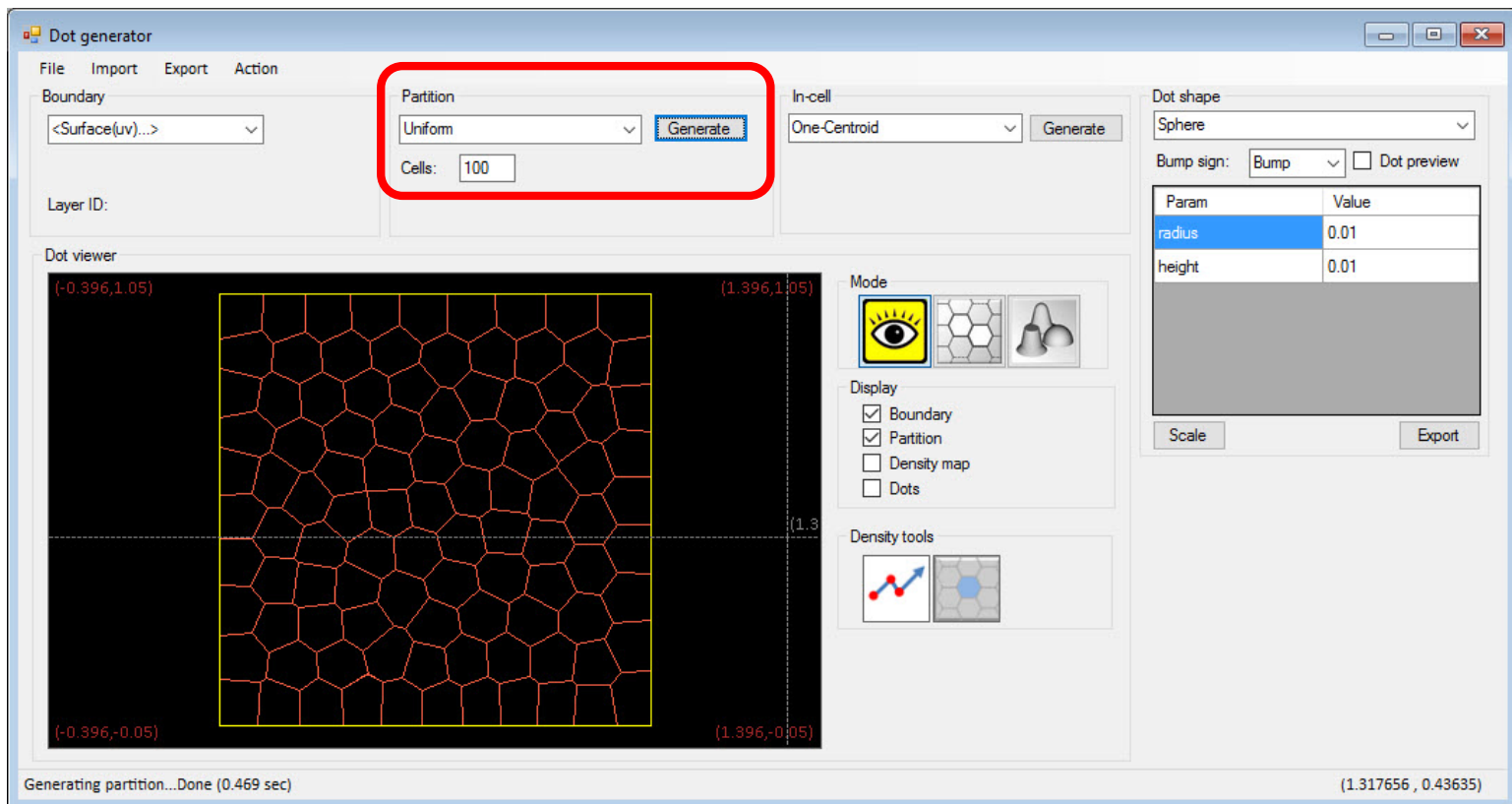
Texture on a curved surface

Select Surface(uv) for the Boundary, enter the name of the Surface in the dialog box, and then click OK



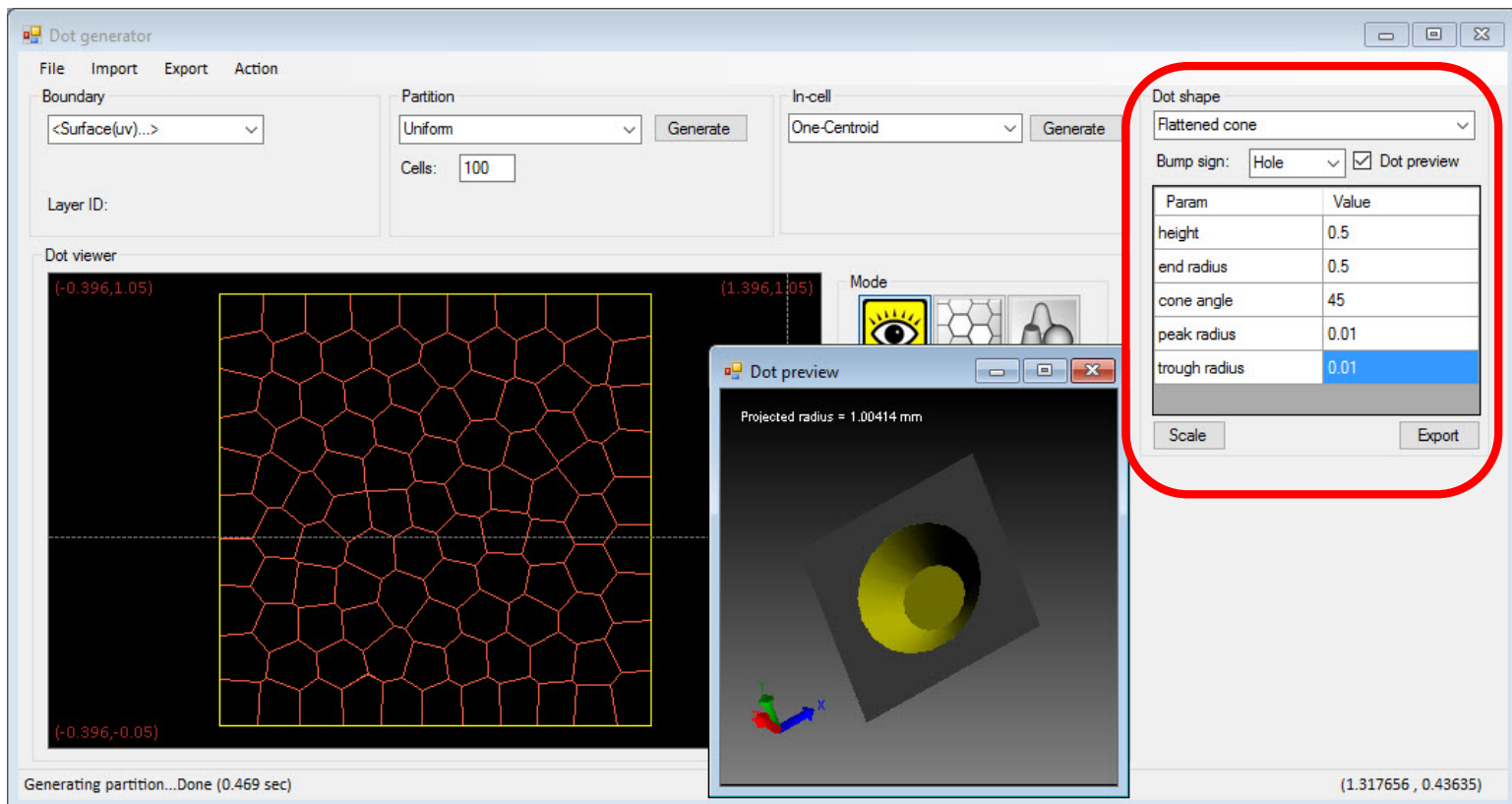
Texture on a curved surface

Select the Partition type and number of Cells. Example below is Uniform partition with 100 cells.



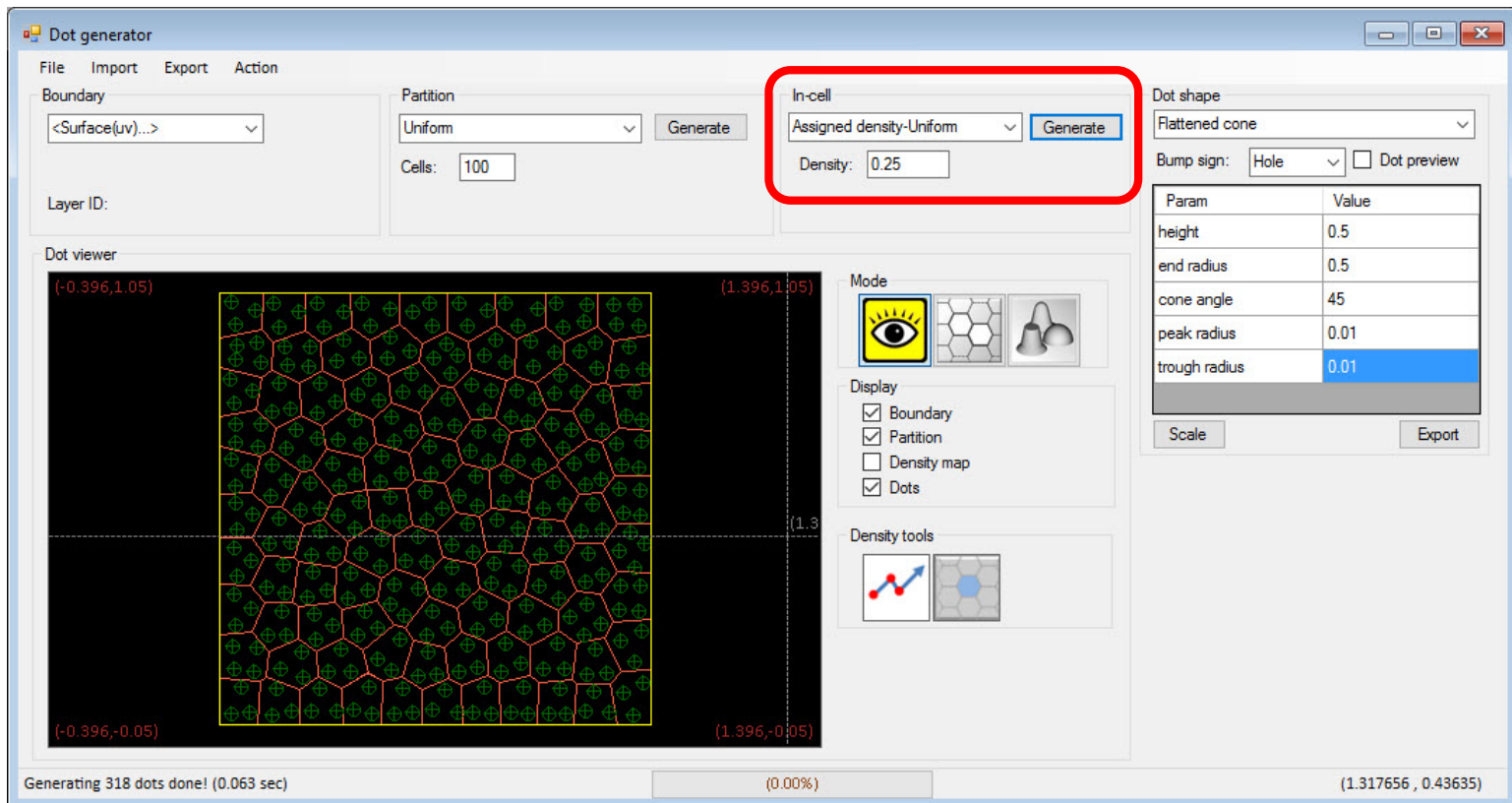
Texture on a curved surface

Define the Dot Shape. Example below is a Flatted cone, 0.5mm high with an end radius of 0.5mm and a 45-degree cone angle.



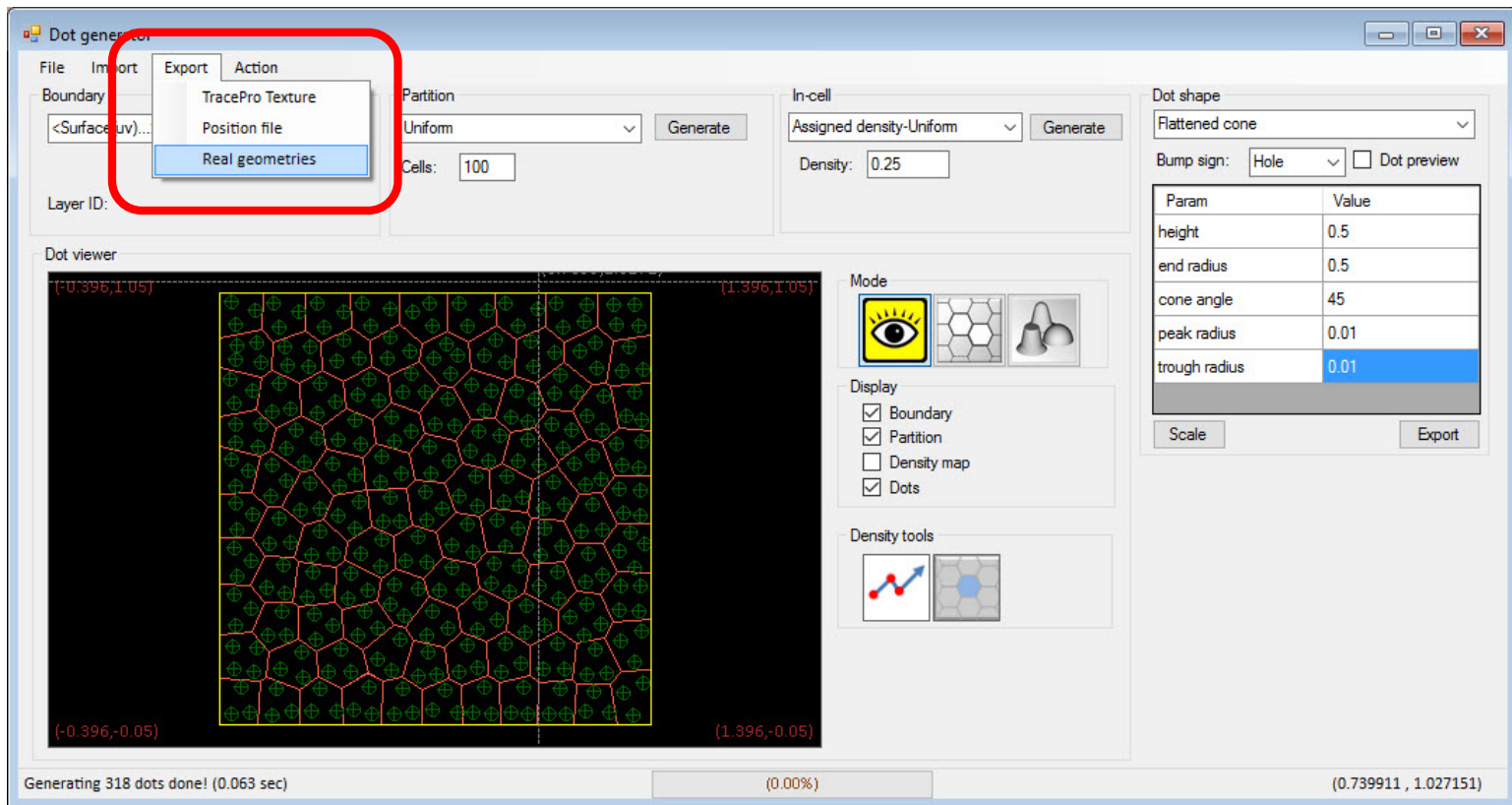
Texture on a curved surface

Choose the In-cell method and the density. Click Generate to generate the dots. Turn on Dots to see the dots. The example below uses Assigned density-Uniform for the In-cell method and 0.25 for the Density.



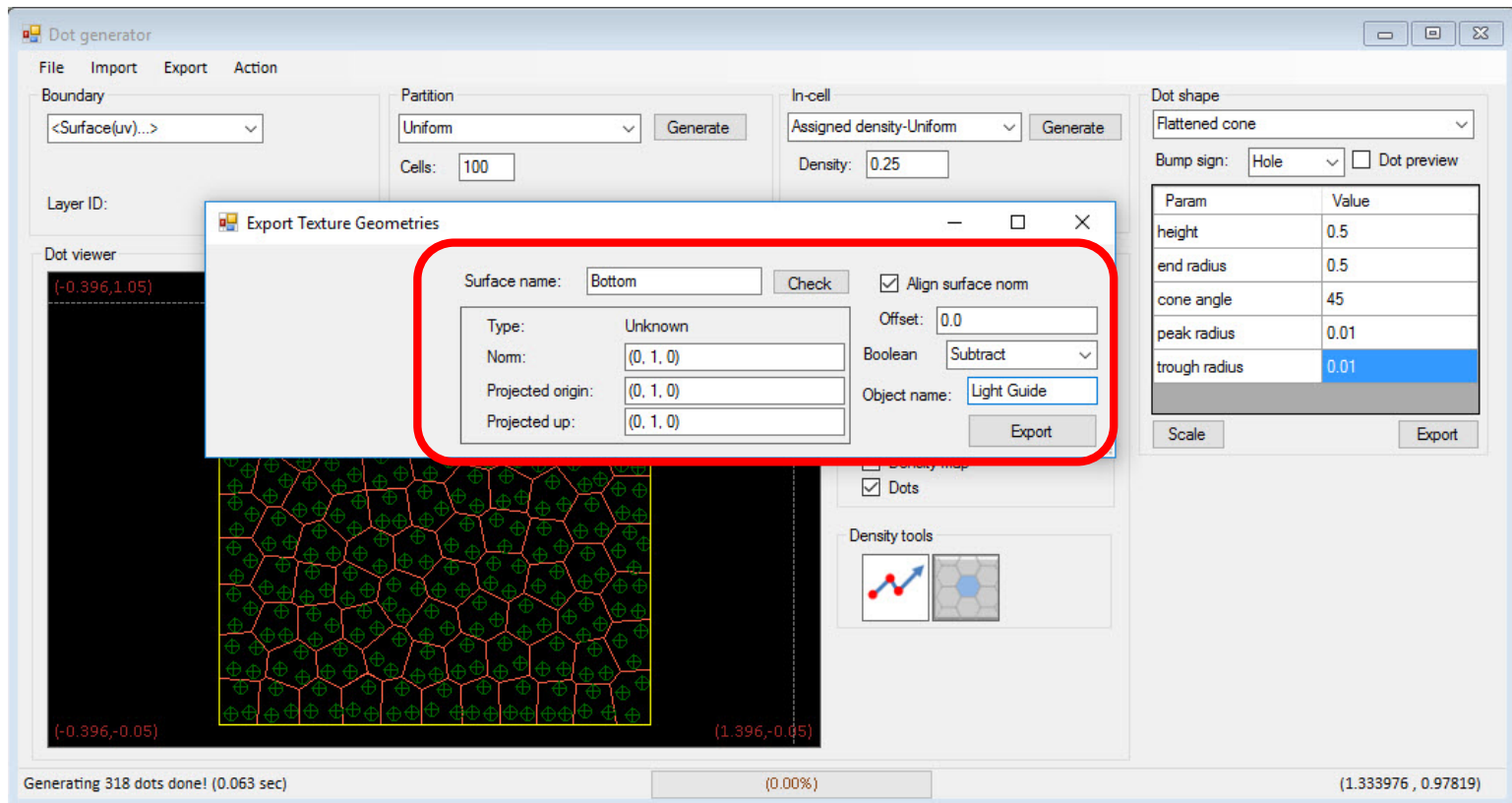
Texture on a curved surface

Select Export->Real geometries



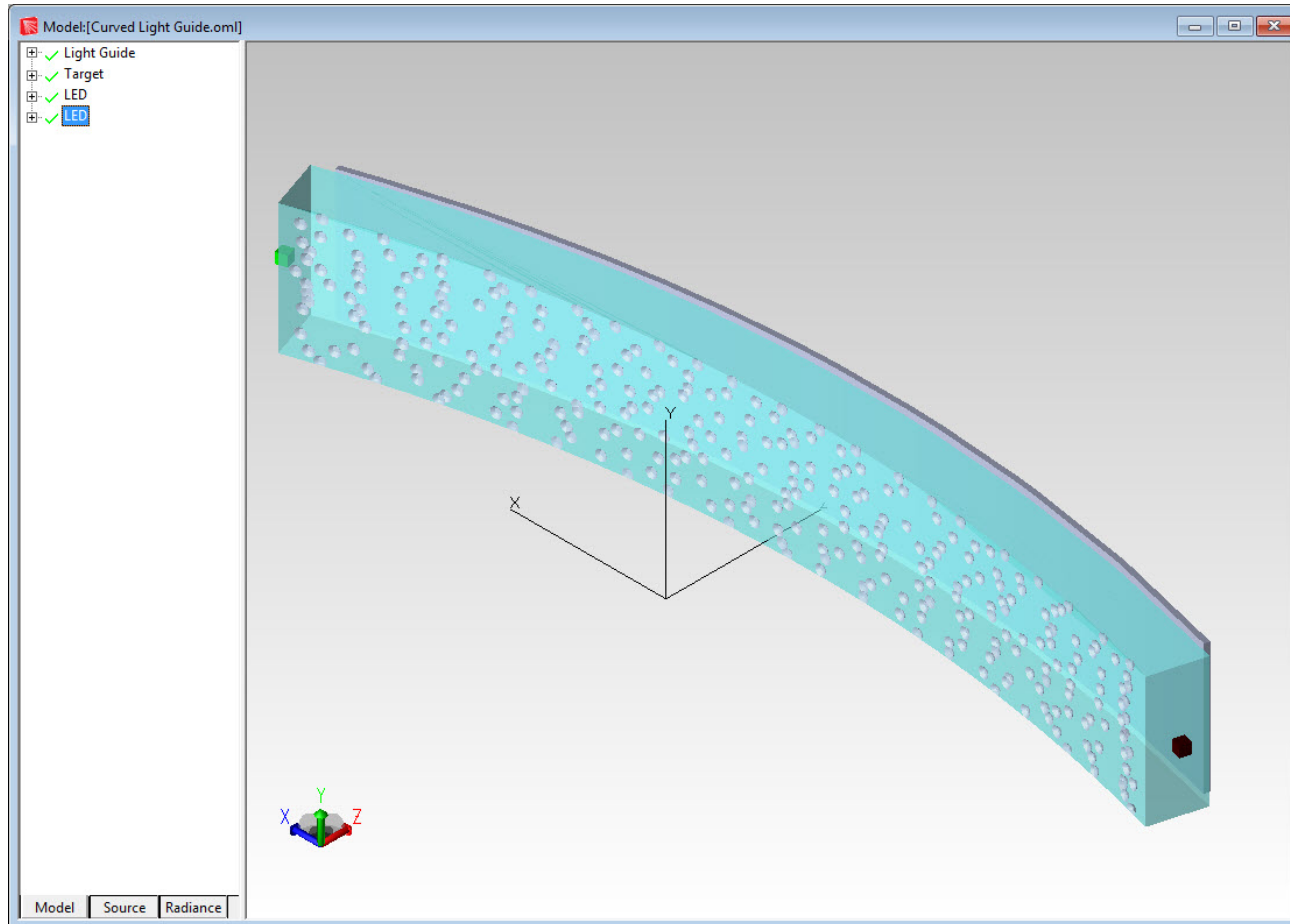
Texture on a curved surface

Enter the Surface Name, Object Name, and Boolean type and then click Export.



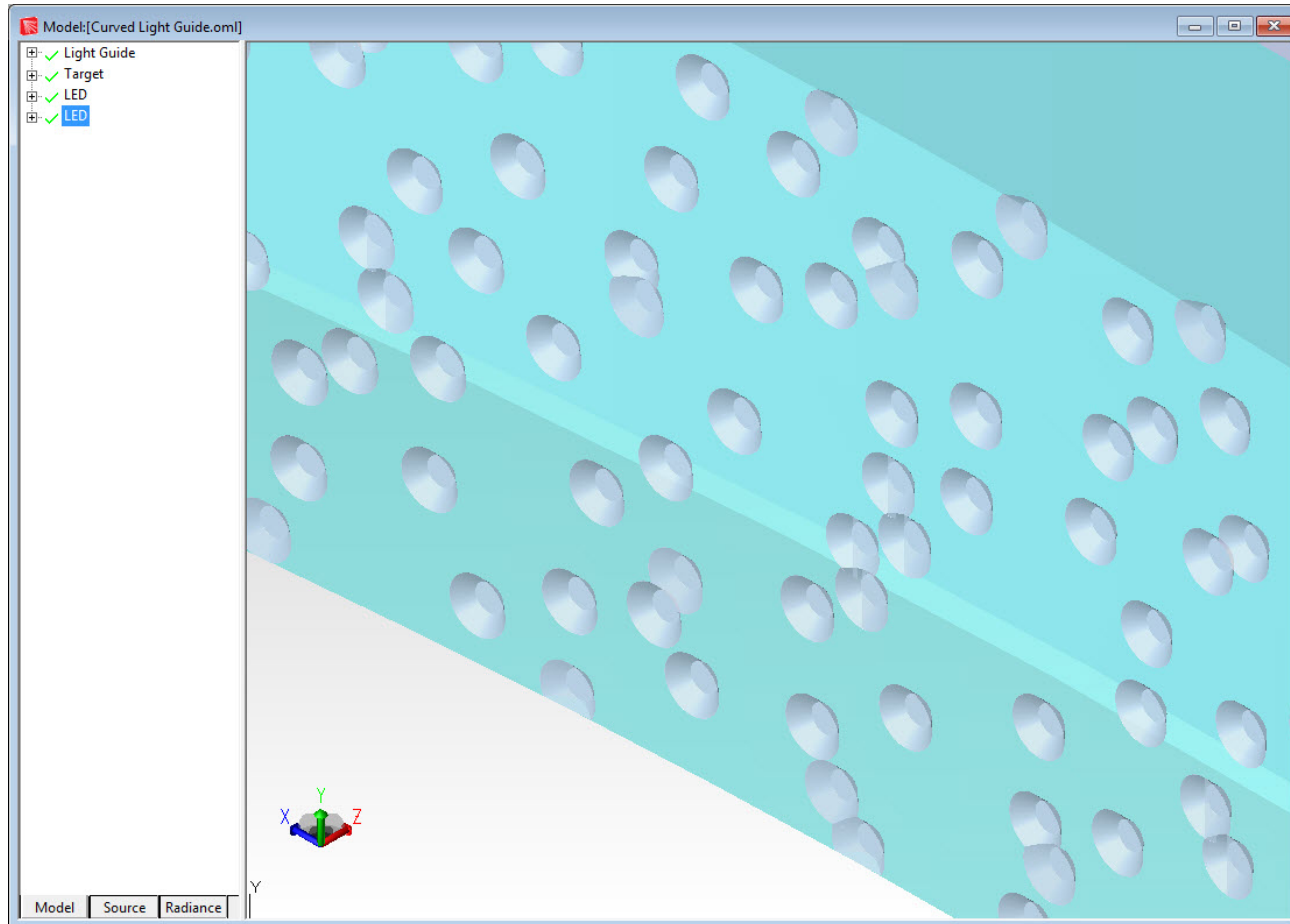
Texture on a curved surface

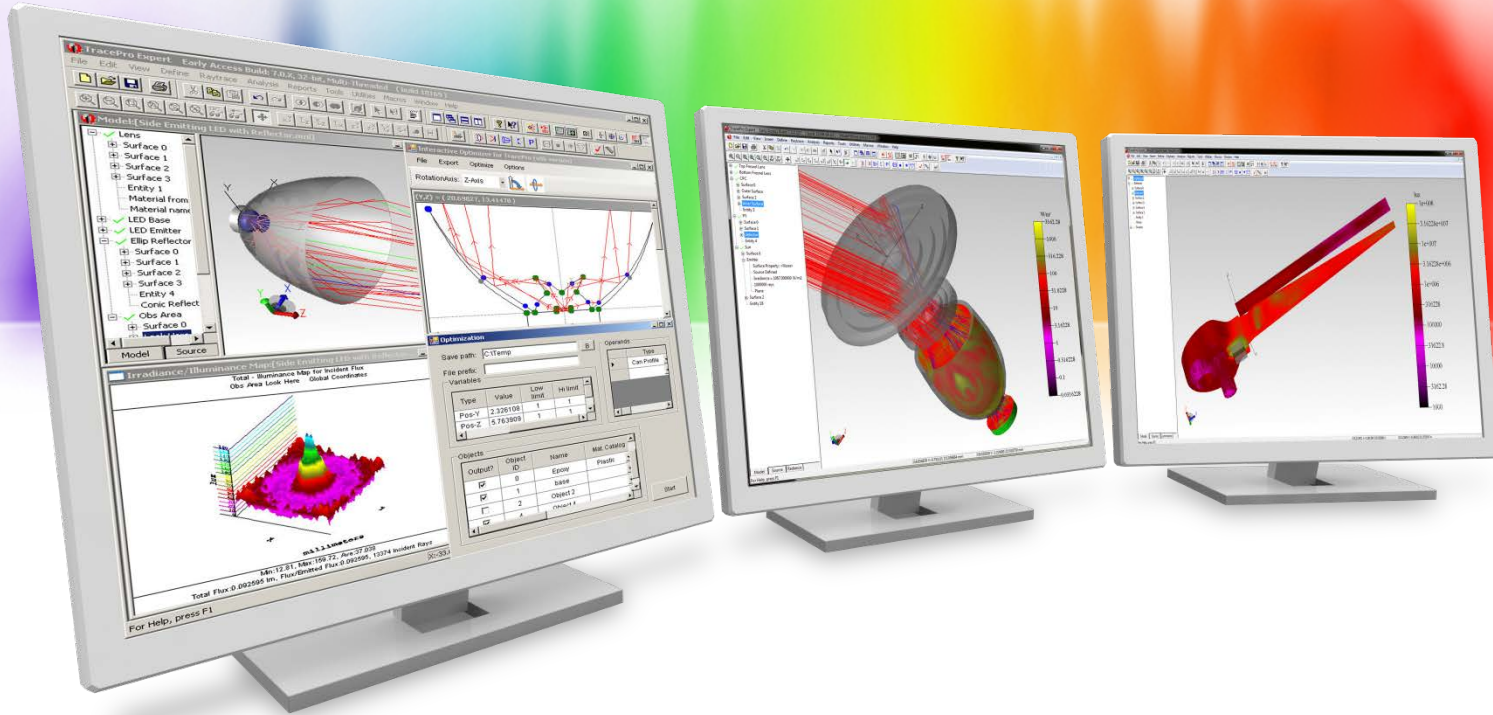
Results in TracePro



Texture on a curved surface

Results in TracePro





Summary and Questions

Summary and Questions

The TracePro RepTile property and Texture Optimizer II allows:

- ✓ A fast, accurate, and efficient way to model repetitive microstructures on light guides and backlights
- ✓ Numerous options for feature types
- ✓ Quick and easy optimization of RepTile texture patterns on light guide and backlights for improved uniformity
- ✓ The ability to add texture features to curved surfaces as real geometry

For more information or to sign up for our free 30-day trial please visit us at:

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