

# BLD224326 - Creating Flexible Revit Lighting Fixture Families for Use with ElumTools

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# About the speaker

## Andrew Leavitt

Andrew Leavitt is an electrical designer at Leo A Daly in Minneapolis, Minnesota. He graduated from Tufts University with a degree in mechanical engineering and astrophysics and has had a passion for learning ever since. He has worked closely with engineers and architects for his entire career and his breadth of knowledge has allowed him to develop strategies for bridging the gap between disciplines. He has experience with 2D and 3D design, lighting design, rendering, energy modeling, virtual reality, and a litany of programs and add-ons. He considers himself strong with computers and takes an interest in learning new software and developing new workflows to teach his colleagues





# About the speaker

## Leo A Daly

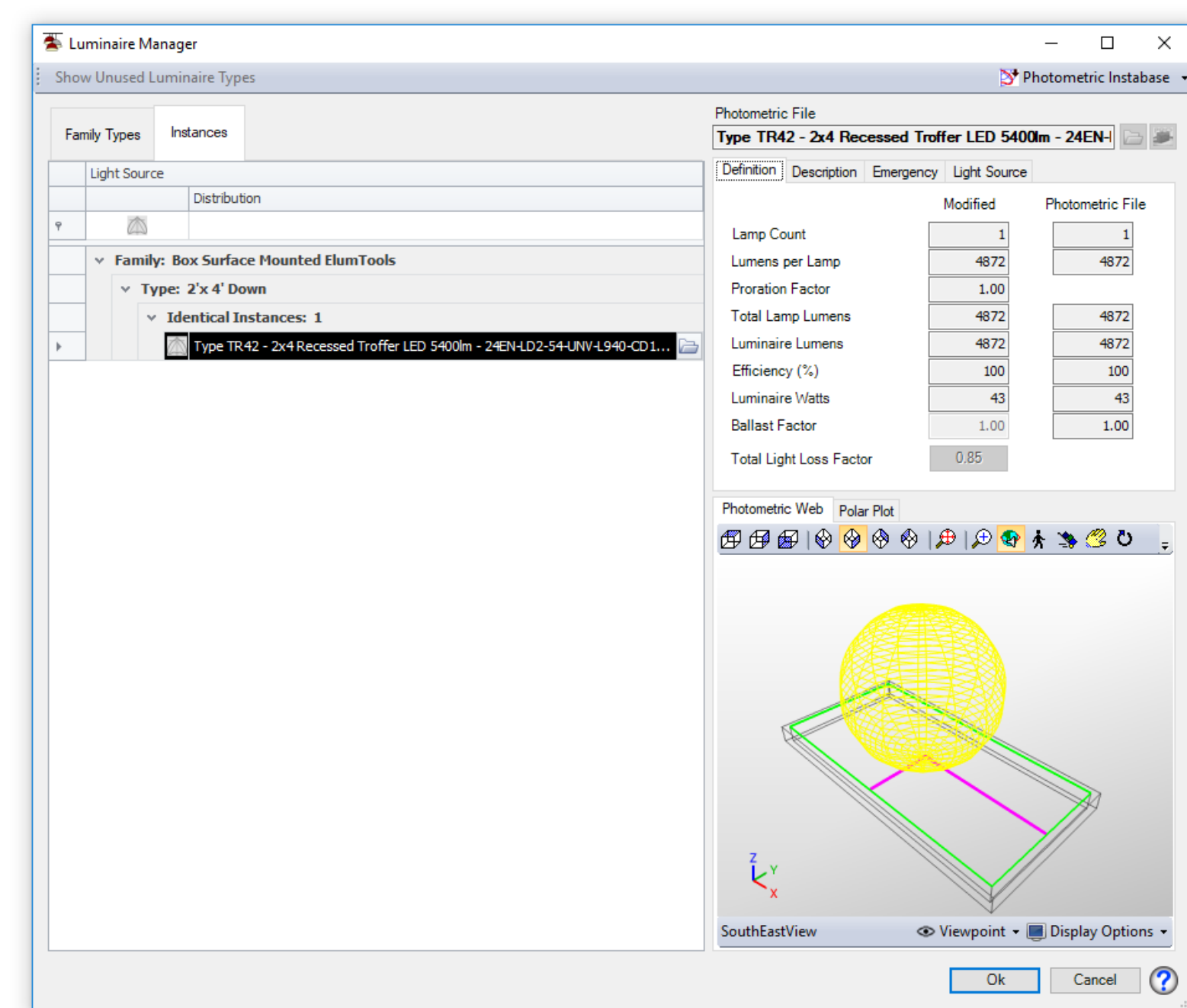
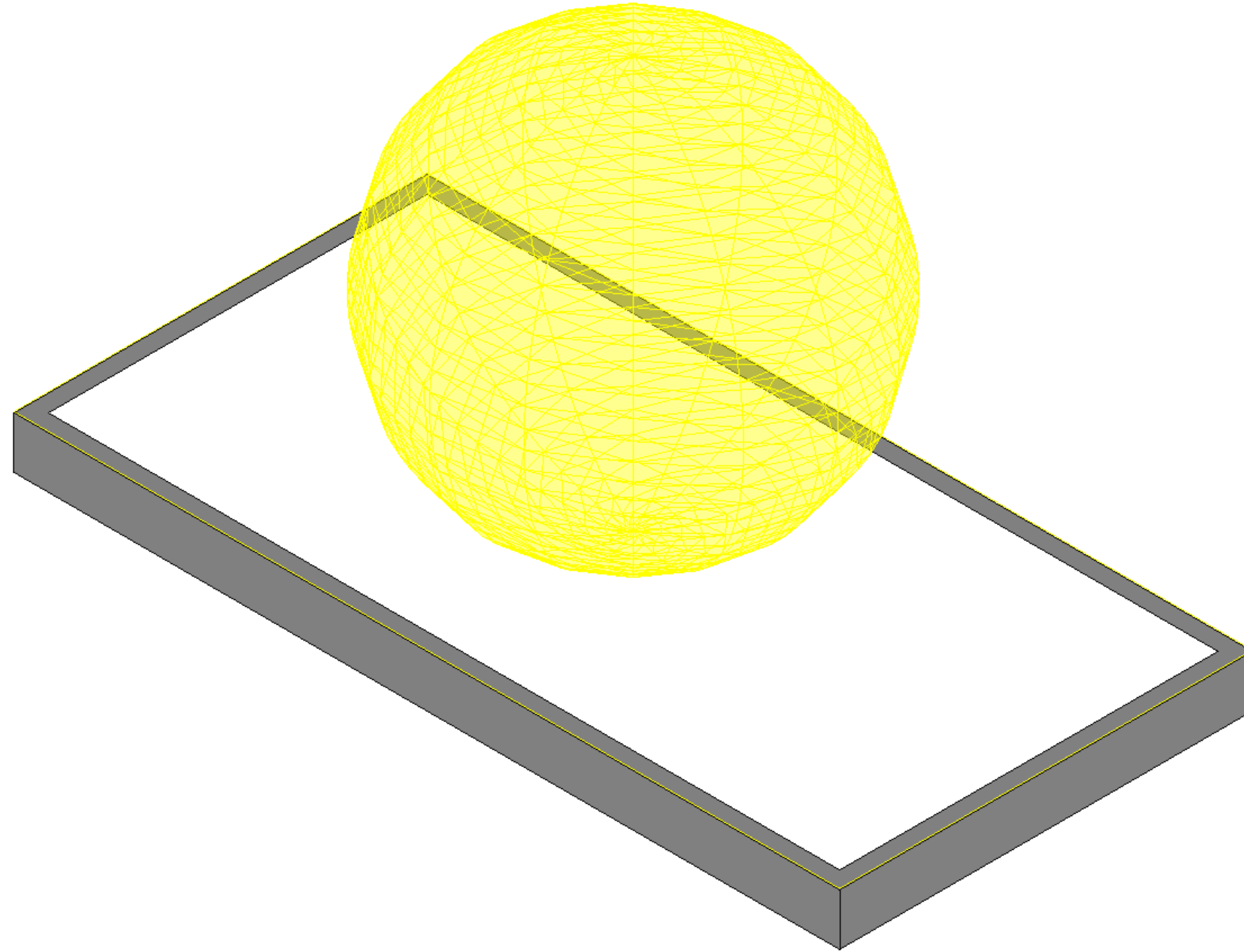
- Privately held practice with more than 800 design and engineering professionals in 29 offices worldwide
- Projects in a wide range of markets in more than 91 countries and all 50 U.S. states
- Celebrating 100+ years of design excellence



# The Basics

## Geometry and Photometry





# Lighting Fixture Families

REVIT:

- Geometry
- Parameters
- Connector
- ...

ELUMTOOLS:

- Photometry
- Photometry
- Photometry

# What Is Photometry?

Photometry is the science of the measurement of light, in terms of its perceived brightness to the human eye.

Data reflecting laboratory measurement of the performance of a luminaire, typically in the form of an IES file, is the basis for lighting calculations using a program such as AGI32 or ElumTools. These files are plain text, and it is possible to review their contents in any text editor. Importing these files into Revit or viewing them files with specialized software like Photometric Toolbox will display a 3D photometric web representing luminaire output.



# Measuring Photometry

Laboratories use a **goniophotometer** to measure the light emitted by a luminaire at different angles in fixed increments

- This measurement represents real-world performance rather than a simulation of luminaire output
- Photometric data also represents the geometry of the luminaire as mounted in the goniophotometer
- Mounting orientation is irrelevant to real-world performance, but has an impact on calculations
  - A 2'x4' luminaire and a 4'x2' luminaire might have the same measured output, but they are not directly interchangeable in Revit



# Flexible Lighting Fixture Families

What Are We Building and Why?





# Creating a Flexible Lighting Fixture Family from Scratch

## DON'T BOTHER!

ElumTools and Revit both come with template families to assist in the process of creating Lighting Fixture Families. Use one of these families or content that your office already uses as a starting point.

## KEEP IT SIMPLE!

As a family increases in complexity and specificity, it loses flexibility. A simpler, more flexible family can represent a wide range of luminaires, speeding the selection and calculation process.

## FOCUS ON WHAT'S IMPORTANT!

Different firms may have different requirements for families. Elements such as shared parameters, electrical connectors, and even materials may not be necessary. ElumTools requires photometric data... and that's it! Everything else plays a role in Revit modeling, renders, and calculations.

# What Do We Want from Our Lighting Fixture Family?

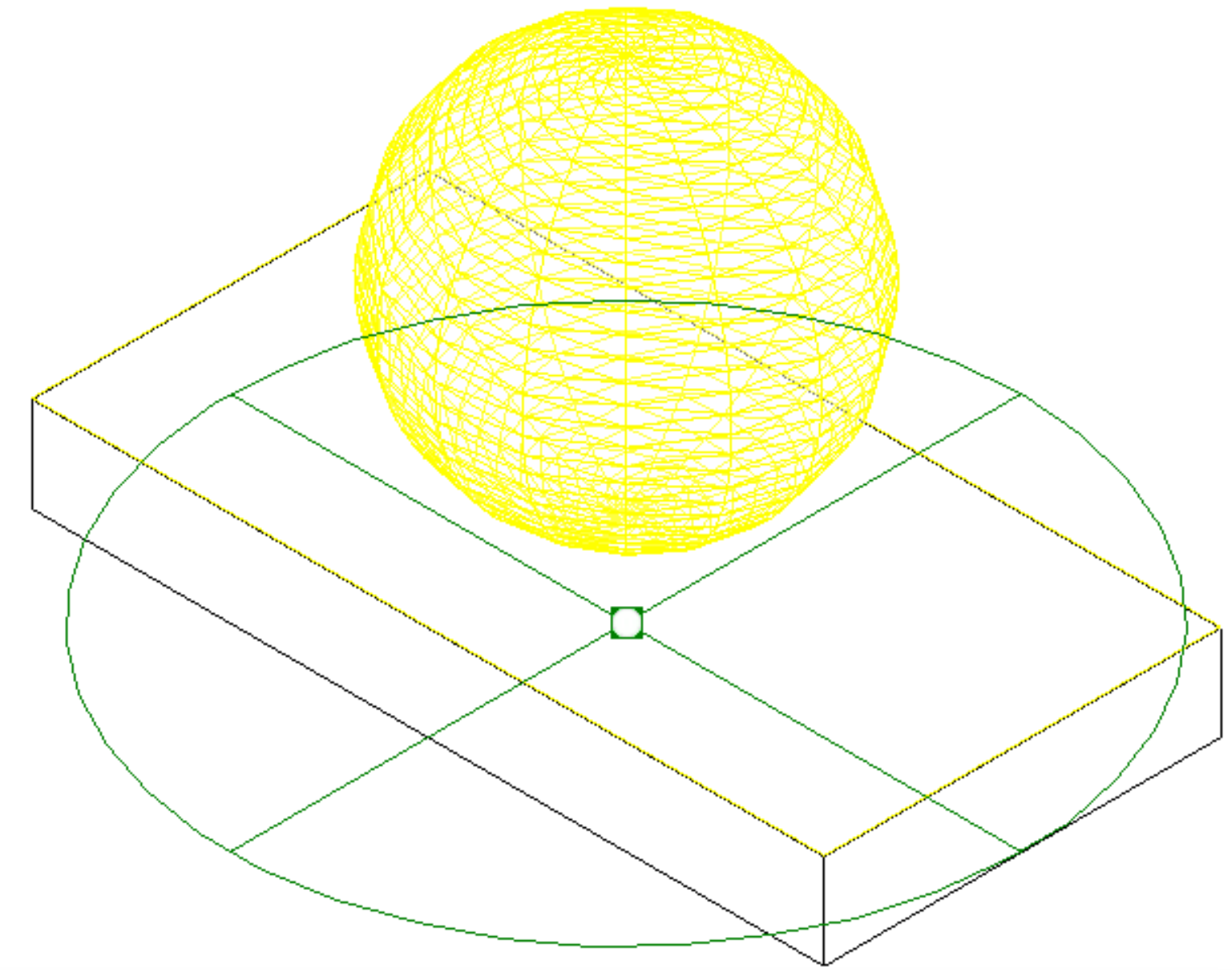
Before creating the Lighting Fixture Family, it is important to consider what will make this general-purpose family useful in the largest number of situations

- Flexibility – This family should be able to represent many different luminaires by varying parameters, geometry, and photometric data
- ElumTools Functionality – This family should contain photometric data for use in ElumTools calculations
- Revit Functionality – This family should function in a typical Revit workflow, allowing users to place, tag, schedule, and otherwise use the element normally
- Ease of Use – This family should contain data and parameters that allow it to function, but still be simple enough that users of all skill levels can use it confidently



# Components of the Flexible Lighting Fixture Family

- Geometry
- Family Parameters
- Type Parameters
- Connector
- Photometric Web (Nested Light Source Family)
- Type Catalog



Family Types

Type name:

Search parameters

Parameter	Value	Formula	Lock
<b>Electrical - Lighting</b>			
Calculate Coefficient of Utilization ( <input type="checkbox"/> )		=	
Coefficient of Utilization (default)		=	
<b>Electrical - Loads</b>			
Apparent Load	0.00 VA	=	
Load Classification	Lighting	=	
<b>Dimensions</b>			
Height	0' 5 3/4"	=	<input type="checkbox"/>
Length	4' 0"	=	<input type="checkbox"/>
Width	2' 0"	=	<input type="checkbox"/>
<b>Photometrics</b>			
Emit from Rectangle Length	4' 0"	= if(Photometric Web Rotation Angle	<input type="checkbox"/>
Emit from Rectangle Width	2' 0"	= if(Photometric Web Rotation Angle	<input type="checkbox"/>
Nested Photometric Web File<Lighti	14EN-LD2-18-UNV-L940-CD1-U	=	
Photometric Web Offset	Nested Light Source - Rectangular: Type TR11 - 1x4 Recessed Troffer LED 1800lm - 14EN-LD2-18-UNV-L940-CD1-U		
Photometric Web Rotation Angle	Nested Light Source - Rectangular: Type TR12 - 1x4 Recessed Troffer LED 2500lm - 14EN-LD2-25-UNV-L940-CD1-U		
<b>Identity Data</b>			
Nested Light Source - Rectangular: Type TR13 - 1x4 Recessed Troffer LED 3800lm - 14EN-LD2-38-UNV-L940-CD1-U			
Nested Light Source - Rectangular: Type TR21 - 2x2 Recessed Troffer LED 2500lm - 22EN-LD2-25-UNV-L940-CD1-U			
Nested Light Source - Rectangular: Type TR22 - 2x2 Recessed Troffer LED 3400lm - 22EN-LD2-34-UNV-L940-CD1-U			
Nested Light Source - Rectangular: Type TR23 - 2x2 Recessed Troffer LED 4300lm - 22EN-LD2-43-UNV-L940-CD1-U			
Nested Light Source - Rectangular: Type TR41 - 2x4 Recessed Troffer LED 4500lm - 24EN-LD2-45-UNV-L940-CD1-U			

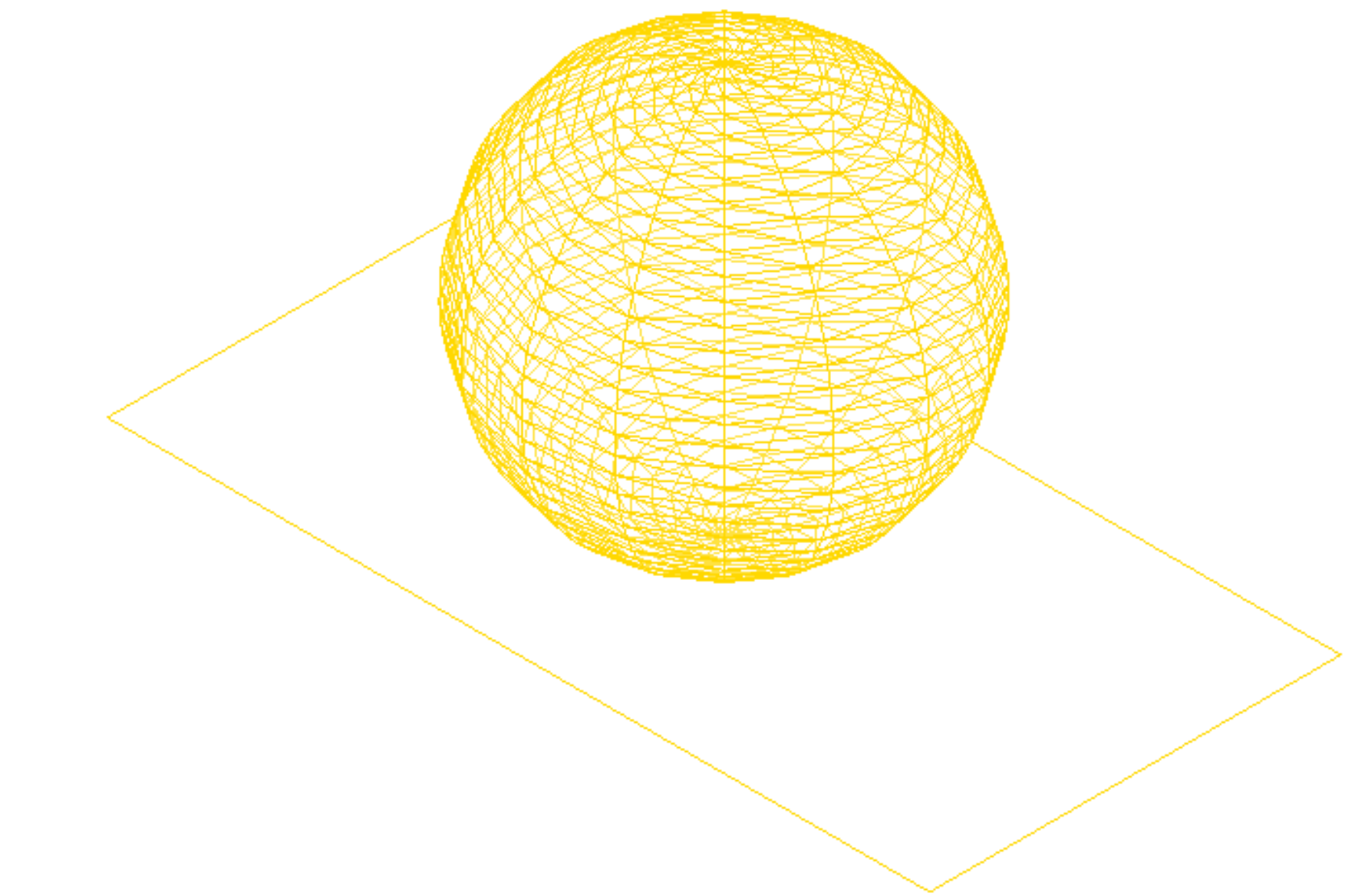
Manage Lookup Tables

[How do I manage family types?](#)

OK Cancel Apply

# The Nested Light Source Family

- Create a Lighting Fixture Family
  - Assign Parameters to make this a Work Plane-Based family that is not Always Vertical and contains a Light Source
- Define the Light Source
- Add Photometric Data and Types
- Nest the Light Source in a Lighting Fixture Family



Family Types

Type name: Type TR41 - 2x4 Recessed Troffer LED 4500lm - 24EN-LD2-45-UNV-L940-CD1-U

Search parameters

Parameter	Value	Formula	Lock
Wattage Comments		=	
<b>Electrical - Lighting</b>			
Calculate Coefficient of Utilization ( )	<input type="checkbox"/>	=	
Coefficient of Utilization (default)		=	
<b>Electrical - Loads</b>			
Apparent Load		=	
<b>Photometrics</b>			
Color Filter	White	=	
Dimming Lamp Color Temperature	<None>	=	
Emit Shape Visible in Rendering	<input type="checkbox"/>	=	
Emit from Rectangle Length	4' 0"	=	<input type="checkbox"/>
Emit from Rectangle Width	2' 0"	=	<input type="checkbox"/>
Initial Color	3200 K	=	
Initial Intensity	9.29 W @ 148.54 lm/W	=	
Light Loss Factor	1	=	
Photometric Web File	Type TR41 - 2x4 Recessed Troffer	=	
Tilt Angle	-90.00°	=	<input type="checkbox"/>
<b>Identity Data</b>			

Manage Lookup Tables

[How do I manage family types?](#)

OK Cancel Apply



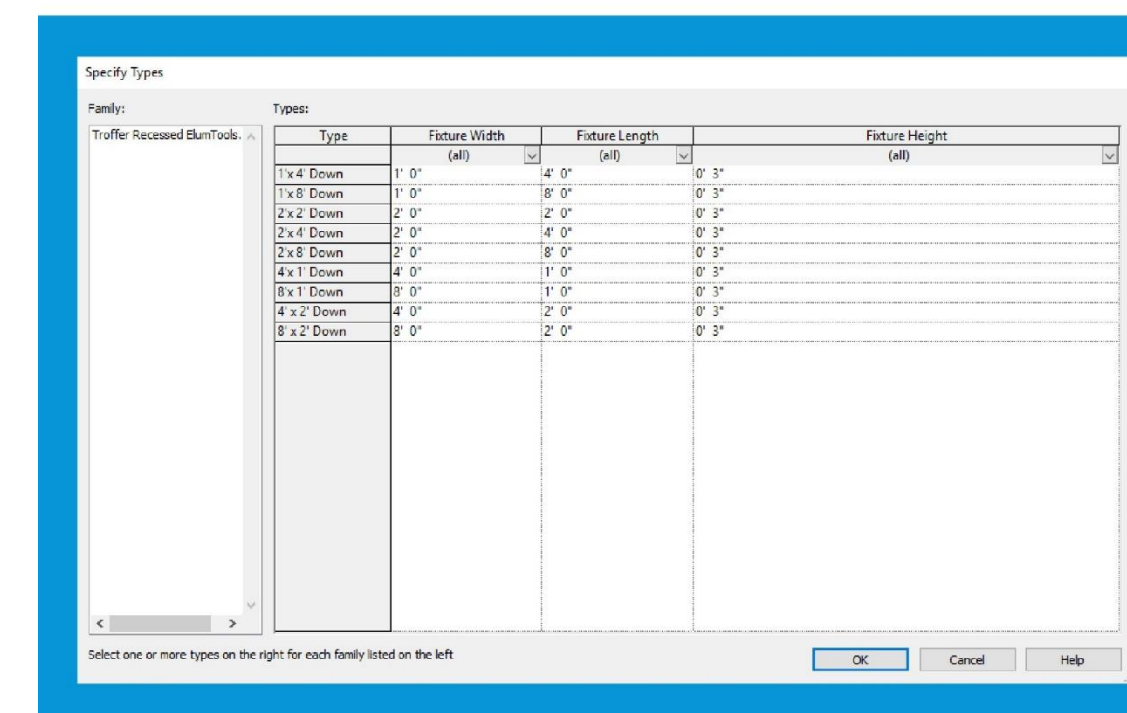
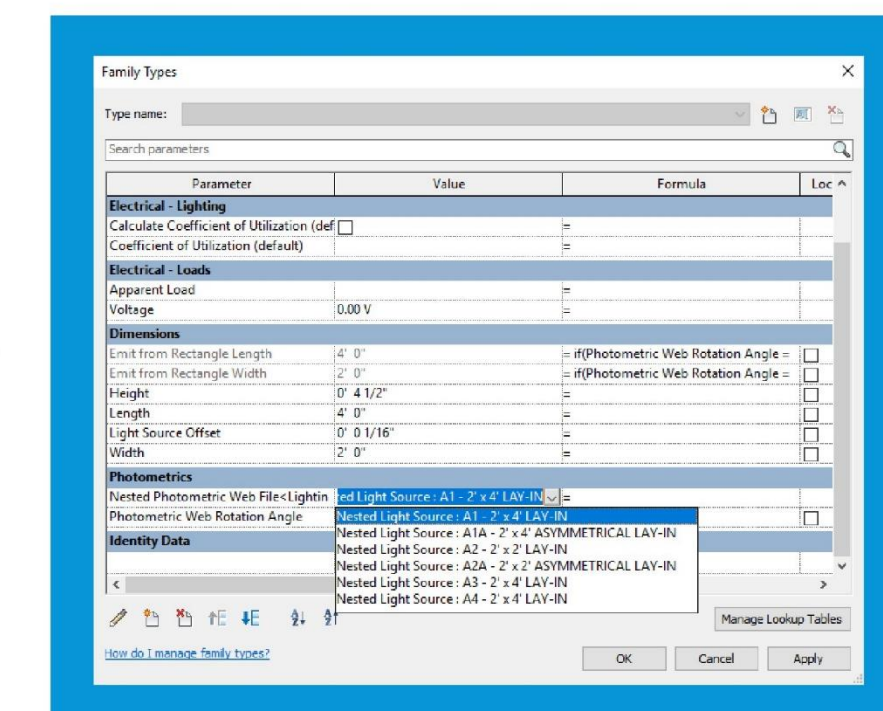
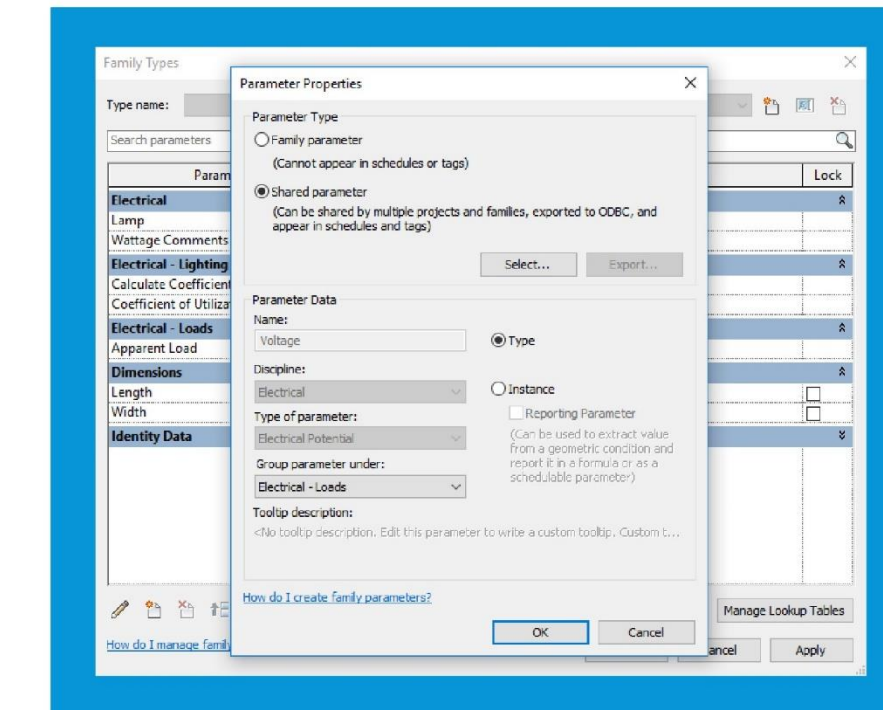
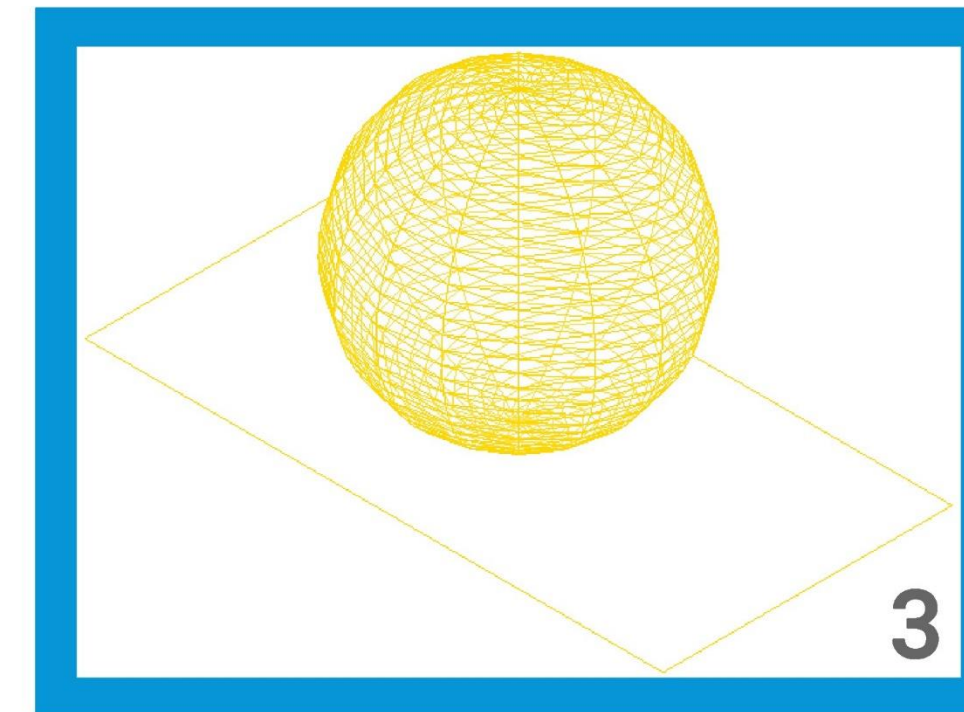
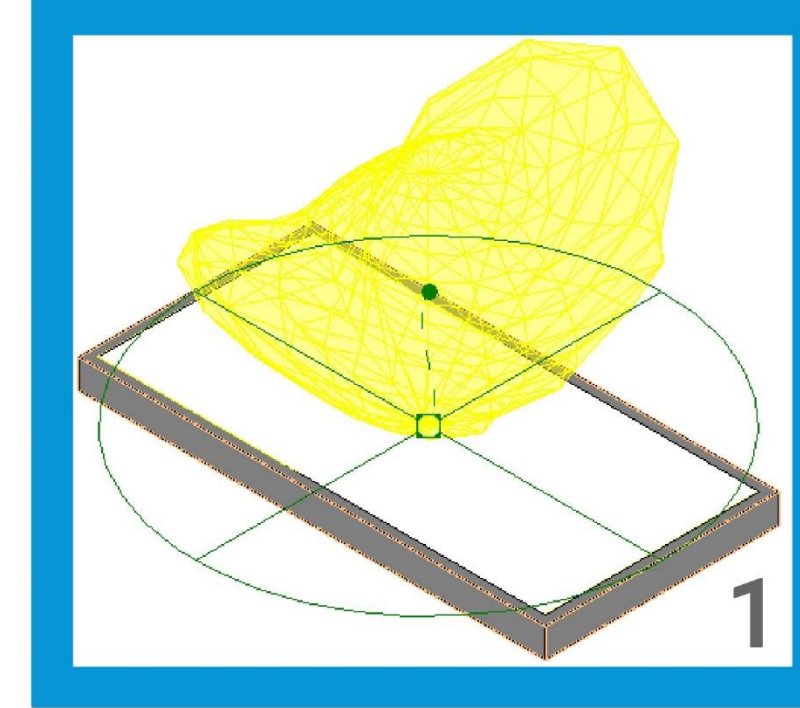
# LIVE DEMO





# Recap

- Begin with flexible geometry
  - Create your own
  - Use premade geometry
    - Autodesk Content Library
    - ElumTools Luminaire Families
    - Your company's content
- Add parameters and associate them with an Electrical Connector
- Add a Reference Plane for mounting the Light Source
- Insert the Nested Light Source Family
- Constrain and flex the Nested Light Source Family
- Manage Types with a Type Catalog





Thank You!





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