



## Revit Lighting Fixture Families

Tutorial: Creating a generic pendant light fixture family for use in a linked file (Revit 2009).

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### Goals

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1. Create a Lighting Fixture Family which includes
  - a. Face Hosted Dynamic Fixture Model
  - b. Attached Symbol
  - c. Emergency Parameter
  - d. Electrical Connection
  - e. Masking Region

Whether or not you create fixture families or download vendor's families, the concepts in this tutorial should help you understand the inside workings of families in order to make use of them easier.



## Starting a new family

1. Go to File → New → Family
2. Select a family template file.
  - There is a large list of template files to choose from. They are based off of the Component type (electrical equipment, Lighting fixtures, etc) and hosting type.
  - There are two general hosting types, Hosted and non-hosted. Non-hosted devices stay where you put them regardless of what happens to walls, ceilings, etc. Mechanical equipment is generally non-hosted (except ceiling mounted diffusers). Hosted devices move with their hosts ( for example, receptacles stay in the walls).
  - There are multiple types of hosted devices:
    - Hosted
    - Ceiling hosted
    - Wall Hosted
    - Floor hosted
    - Face hosted

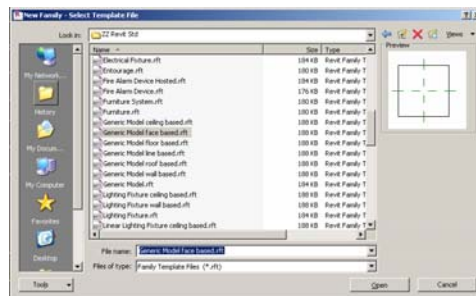


## Selecting Template File

• A Likely choice for a fixture hanging from the ceiling would be “Linear Lighting Fixture Ceiling Based.rft” template file

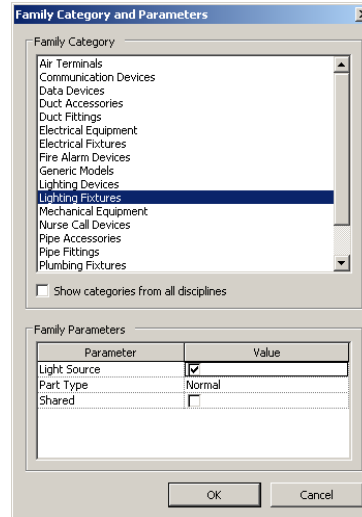
• **PROBLEM:** In a linked file, Revit doesn't know the ceiling is a ceiling, it only knows it's a “face”

• **Workaround:** Select “Generic Model face based.rft” template file. We will make it a light fixture later.




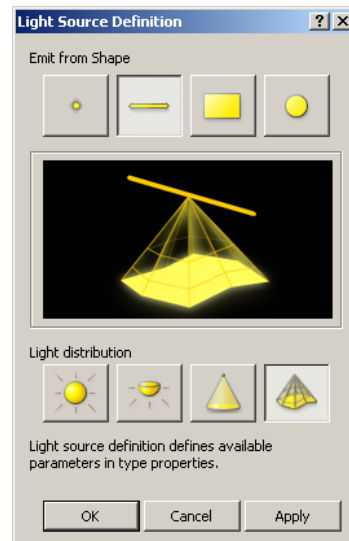
## Change from Generic Models to Lighting Fixtures

1. Go to Settings → Family Categories and Parameters
2. In the dialog, change the Family Category to “Lighting Fixtures”. Under “Family Parameters, make sure to check the “Light Source” Box.
3. You now have a face hosted device of the “Lighting Fixtures” category.




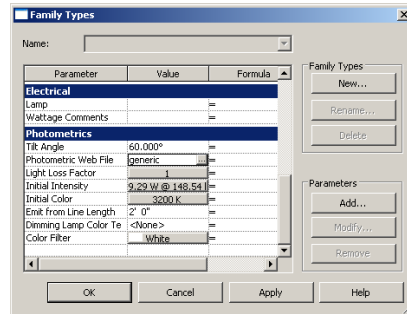
## Set up the Light Source

1. Select the Light source and click the “Light Source Definition” on the options bar. 
2. Select the emittance shape based on the light source to be used.
3. Light distribution, select “Photometric Web” (Far right icon)




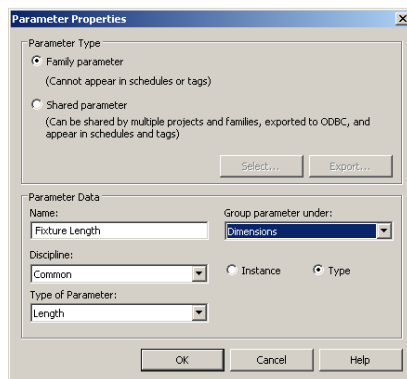
## Set up the Light Source (cont.)

4. Click on “Family Types” in the design bar. 
5. Scroll down to “Photometrics.” Select the appropriate .IES file by clicking in the box labeled “Photometric Web File.” (This can be changed later). Click Apply. You should see the distribution now.
6. The orientation will likely be incorrect. To fix it, first try adjusting the Tilt angle. If that doesn't get the desired results, you can rotate the lighting symbol.



## Set up the Family Parameters

1. To add a new parameter, click “Family Types”  in the design bar, and under “Parameters” click “Add.”
2. Dimensions – Create necessary parameters for the dimensions of your fixture. In this example, we are creating a rectilinear fixture, so we need a parameter for each dimension, Fixture Width, Fixture Length, Fixture Depth. Each parameter should be set up as follows. Under “Discipline” Select “Common.” Under “Type of Parameter” Select “Length.” Under “Group parameter under:” select “Dimensions.” Select the radio button next to “Type.” Hit OK.

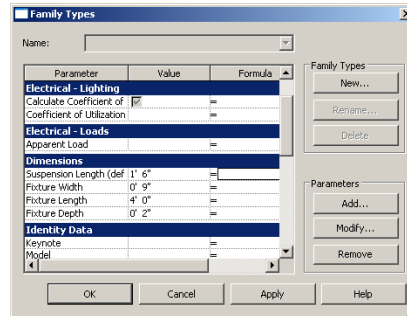


Note: In most cases, fixture dimensions will be a type parameter, since they will change from type to type, but not from instance to instance. In other words. If we want to edit a dimension, we want to change all the fixtures of that type without having to edit each fixture individually.





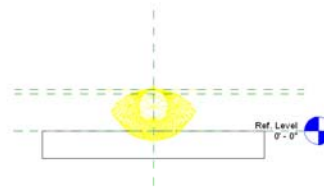
## Set up the Family Parameters (cont.)

- For a pendant, we need a suspension length. Create this parameter exactly as the dimensions with one exception. The suspension length could change from fixture to fixture, so this needs to be an instance parameter, not a type parameter. Select the radio button next to Instance. If this were a wall mount fixture, this parameter might be called "Offset"
- Enter in the default values for these parameters.
- Under "Photometrics," Set the "Emit from Line Length" equal to the fixture length by typing "Fixture Length" in the Formula column.




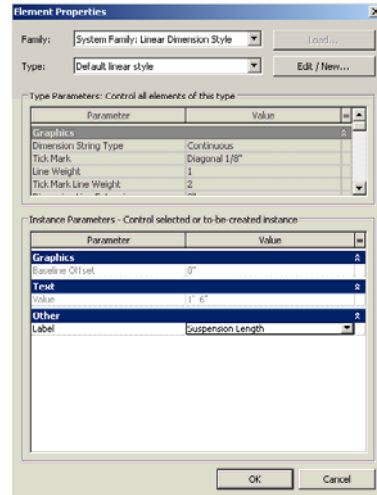
## Set up the necessary reference planes

- To ensure our light fixture is capable of being adjusted and not just static, we need reference planes. up Front View. Click "Reference Plane" on the design bar. 
- Draw a reference plane 1' -6" above "Ref. Level (or 1'-6" below ceiling if doing a ceiling hosted fixture.) Hit "escape" twice to finish.
- Select the reference plane and click the "Element Properties" button on the options bar. 
- Under Identity Data >> Name, name the reference plane "Fixture Bottom."
- Repeat the process again and draw a line 2" below the line you just drew. Name this reference plane "Fixture Top." (Note we are building this fixture upside down!)



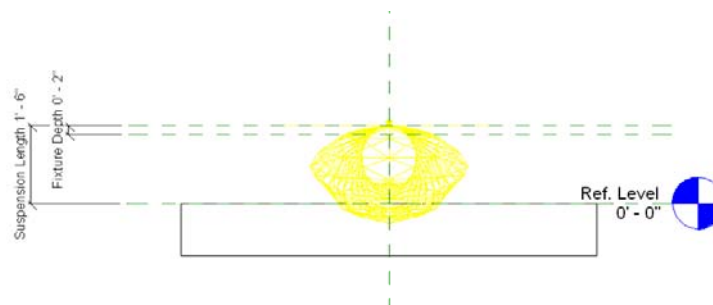
## Set up the necessary reference planes (cont.)

6. We need to make the dimensions dynamic. Select "Dimension" on the design bar  and draw a dimension from the Ref. Level to the top reference plane. Hit escape twice.
7. Select the dimension and click the "Element Properties" button on the options bar.
8. Under Other → Label, select "Suspension Length" from the pull down menu and select OK.
9. Repeat this process for the dimension between the top two reference planes. Set this distance to be "Fixture Depth".



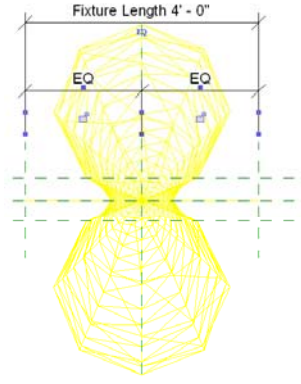
## Set up the necessary reference planes (cont.)

Your model should look similar to the following:



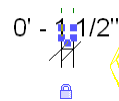
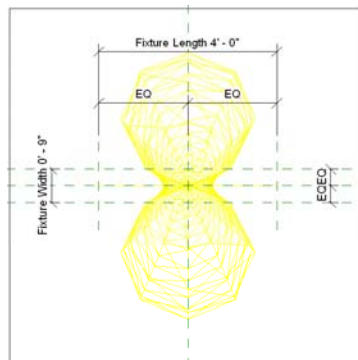
## Set up the necessary reference planes (cont.)

10. Go to the Ref. Level Floor plan. Repeat the process for the other two dimensions of the light fixture. This will take four additional reference planes. It is not necessary to name these reference planes unless you plan to use them for any extrusion references in the future. Set these dimensions as you did the "Suspension Length."
11. Make sure to center these reference planes with the existing reference lines. Ideally, you should use the default dimensions you set up earlier. To make sure the fixture stays centered if it is resized, we need to add some EQ dimensions.
12. For length, draw a dimension from the left reference plane, to the center, to the right. Above the dimension you should see a small "EQ". Click this.



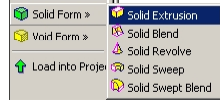
## Set up the necessary reference planes (cont.)


13. Repeat this process for the width dimension. It should now look something like this:
14. We will also need dimensions for the pendant cables. Create two more reference planes offset  $1\frac{1}{2}$ " from the Fixture Length reference planes towards the center of the fixture. Since these will not need to move with respect to the end, we can create a dimension and lock it by clicking on the padlock. Do this for both sides.



## Building the Fixture

1. Draw fixture body – Select “Solid Form → Solid Extrusion



2. The background will gray out and you will have different options on the design bar.
3. Click the “Set Work Plane” Button.  Select the radio button next to “Name” and look at the pull down menu. You should see “Fixture Bottom” and “Fixture Top” here if you named the reference planes earlier.

4. Select “Top of Fixture” and hit OK.


5. Click “Extrusion Properties” on the design bar. 

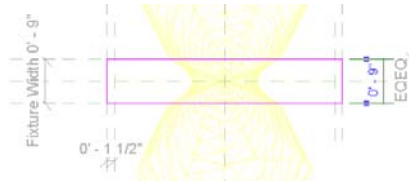
6. Set “Extrusion Start” to 0” and for “Extrusion End”, click the grey box in the “=” column. In the Associate Family Parameter dialog, select “Fixture Depth.” Hit OK.



## Building the Fixture (cont.)

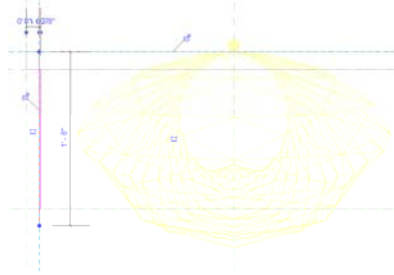
7. Draw the four sides of the fixture along the reference lines you created. You should have a pink rectangle. When you are finished.

8. When you are finished. Click “Finish Sketch” on the design bar.  If you look at your plan and front view, you should now have an extrusion that is constrained by all of the fixture defining reference lines you drew.



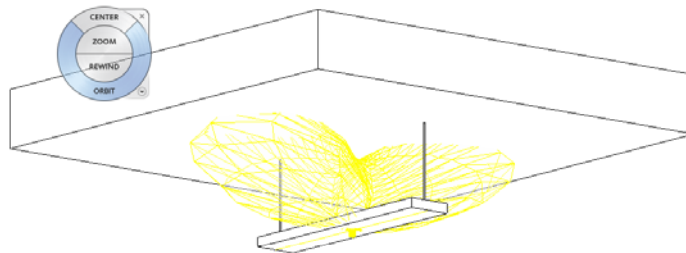
## Building the Fixture (cont.)

9. Create Suspension cables – Go into Front View. Click on “Solid Form → Solid Revolve” on the design bar.
10. Draw a slim rectangle (say 1/8” wide) with one long axis along the reference plane offset from the end of the fixture.
11. Select “Axis” from the design bar and draw a line along the reference plane you drew for the cables. It should look like the following.
12. When you are finished click “Finish Sketch” and you should have your cable. Use copy to create the second cable.
13. You may need to adjust the light source. You need to get it to adjust when the suspension length is changed and it cannot be inside the extrusion. I recommend placing it slightly above (below) the bottom of the fixture and dimensioning it to a reference plane, locking the dimension when finished.



## Building the Fixture (cont.)

14. Use these steps to create any other necessary details of your fixture model. For this example, your fixture should look like this:



## Adding a Fixture Symbol

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If we were to drop the fixture we just created into a model, we would see the actual fixture. This is not what we want. Instead, we want to see a symbol, just like we are used to in CAD. There are two methods to do this.

1. Draw Symbolic lines directly onto the model.
2. Create an annotation symbol and load it into the family (more typical).

The benefits of method #1 is that the symbol will scale itself with the fixture, and graphics control is easy. You cannot, however, add filled (hatched) regions for emergency symbols or whatnot.



The benefits of method #2 is that you can create one symbol for multiple fixture families. They can also be scaled but it takes a few extra steps. Filled regions are easy. The negatives are that sizing can get messed up with drawing scale and graphic control for text and filled regions is difficult!

Neither symbol will show up if you install the fixture on a tilted plane.

We will be using method #2 in this tutorial.


## Adding a Fixture Symbol (cont.)

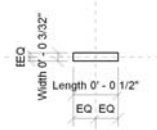
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1. First we need to hide the fixture model so that all we see is the symbol. Select the fixture and cables and go to "Element Properties" Under Graphic → Visibility/Graphics Overrides, click "Edit". Uncheck the box next to "Plan/RCP".
2. Next we need to make a new annotation family...




## Adding a Fixture Symbol – Annotation Family

1. Go File → New → Annotation Symbol and select the Generic Annotation template.
2. Go into Visibility Graphics → Object Styles and create a new Subcategory for lighting fixture symbols. Call it “Lighting Symbols” and set its line weight to 4.
3. Select lines  on the design bar and in the pull down menu in the options bar, select Lighting Symbols. Select the Rectangle drawing tool and draw a rectangle for your fixture outline.
4. Note that this annotation is sized how it will actually measured on a printed drawing. Assume for now you are drawing at  $1/8" = 1'$  scale. Draw a  $1/8" \times 1/2"$  rectangle for a  $1' \times 4'$  fixture. Center this rectangle on the reference planes.
5. Create two common-length-dimensions-type parameters called “Width” and “Length”.
6. Dimension the sides of the rectangle and set the dimensions to the appropriate parameters. Add EQ dimensions to each side to keep the symbol centered




## Adding a Fixture Symbol – Annotation Family

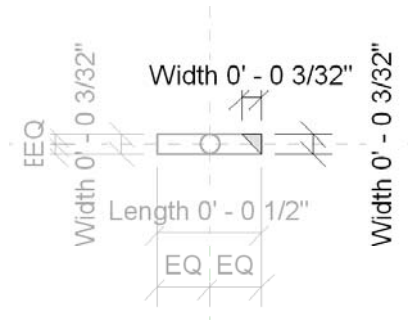
7. Add an Emergency Symbol. a new family parameter called “Emergency.” Click “Family Types” on the design bar and under parameters and add a new parameter, Discipline: Common, Type of Parameter: Yes/No, Group parameter under: Graphics. Since this can vary with the same fixture type (in the case of a central emergency system (generator/inverter as opposed to battery packs), make it an instance parameter.
8. For this symbol we will use a filled region.
9. Click the Filled Region  button in the design bar and draw your emergency symbol shape (Note: keep in mind that the symbol will show up mirrored in a face hosted fixture versus a ceiling hosted fixture due to the way the fixture is created and hosted).
10. Click on Region properties to set the fill region to solid using at the “type” dialog box at the top.




## Adding a Fixture Symbol – Annotation Family

11. Add dimensions as needed and assign them to the proper parameter .
12. Click Finish Sketch. 
13. Select the filled region, go into Element Properties, and click the small gray box to the right of the Graphics parameter "Visible." Associate this parameter with the "Emergency" parameter we just created. Now we can turn the emergency symbol on and off.
14. Load the symbol into the project by clicking the Load into Project button on the design bar.





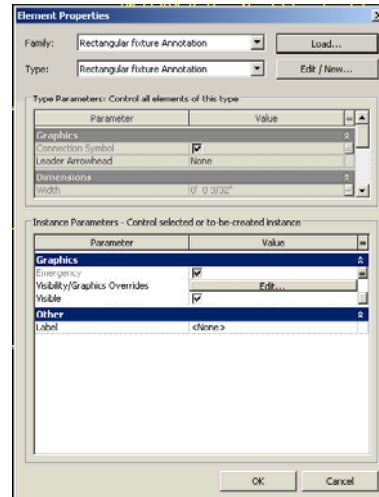
## Adding a Fixture Symbol (cont.)

1. Back in the fixture family file, click Symbol  on the design bar.
2. Select the Annotation in the Options bar pull-down and place it at the center of the fixture. It will NOT be the same size as the fixture model.
3. If you plan to keep the symbol static in size, then you are almost done. Skip to step 7 If you want it to change sizes with the fixture model, read on.
4. Create two new parameters (in the fixture family)
  - a. Name: "Symbol Length" - Discipline: Common - Type: Length - Group: Graphics - Type Parameter
  - b. Name: "Symbol Width" - Discipline: Common - Type: Length - Group: Graphics - Type Parameter
5. Select the fixture symbol, go into Element Properties, and click the "Add/New" button near the top. Click the gray box to the right of "Width" and associate it with the "Symbol Width" Parameter of the fixture family.
6. Repeat the process for "Length."

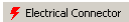


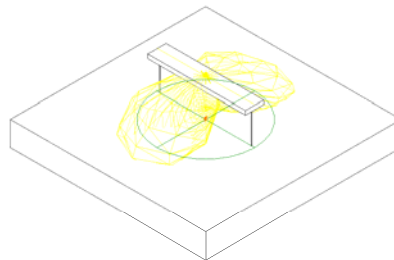
## Adding a Fixture Symbol (cont.)

7. We still need to control the emergency symbol through the family and not just through the annotation.
  - a. Name: "Emergency" - Discipline: Common – Type: Yes/No – Group: Electrical – Instance Parameter
8. Select the symbol again, click the small gray box to the right of "Emergency" (Annotation parameter) and associate it with "Emergency" (fixture parameter). Hit OK.
9. Go into Family Types and uncheck the box next to Emergency so the default instance will not be emergency.



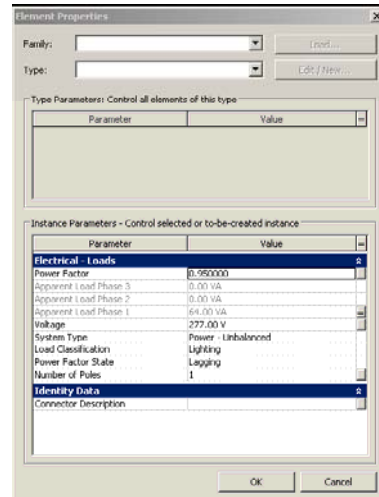
## Adding an Electrical Connector

1. Click on the "Electrical Connector" button on the design bar.
 
2. This is probably easiest to place in the Front view or 3D view. Click on the desired plane to place it (Ref. Plane for face hosted, ceiling for ceiling hosted). To place the connector.
3. Create one more parameter: Name: Ballast Voltage – Discipline: Electrical – Type: Electrical Potential – Group: Electrical – Type Parameter. Assign this a voltage (120V or 277V). It can be changed later.



## Adding an Electrical Connector

4. Select the connector and go into Element Properties.
5. Associate "Apparent Load Phase 1" with "Apparent Load."
6. Associate "Voltage" with "Ballast Voltage."
7. Change the Load Classification to "Lighting."
8. We are going to Leave the Connector Description blank. (see schedule tutorial.)



## Adding a Masking Region

1. Masking Regions will hide information and line work below the fixture (or above in an RCP). This can be desirable for architects compiling coordination RCP drawings.
2. Select the Masking Region  Masking Region button on the design bar.
3. In Plan View, draw the masking region along the reference lines of the fixture model. If you do this it will automatically resize.
4. Click Finish Sketch when done.



## Adding a Masking Region

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All Done!

Notes:

1. If you are making a ceiling hosted recessed fixture, make sure to cut a hole in the ceiling. This is explained in Revit's family creation tutorial. Face hosted families will not cut holes in the ceiling so they won't work well for renderings.

