



**3DXpert™ for SOLIDWORKS®**

# **Lattice Design**

## Uniformal Volume Lattice

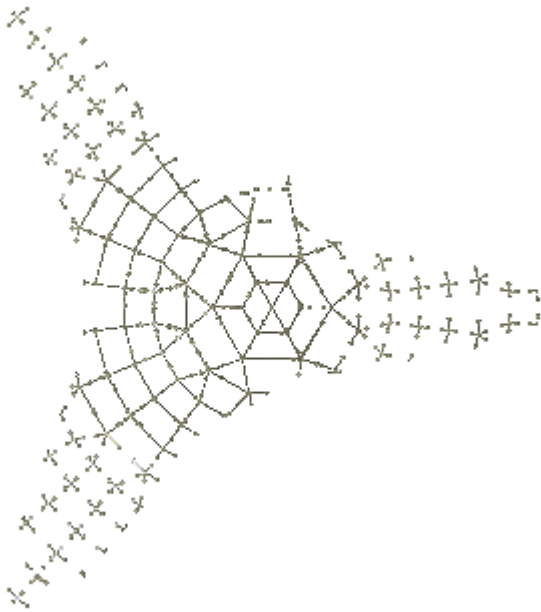
Tutorial\_V5 : 14,0200,1599,1024(SP2)

## Introduction

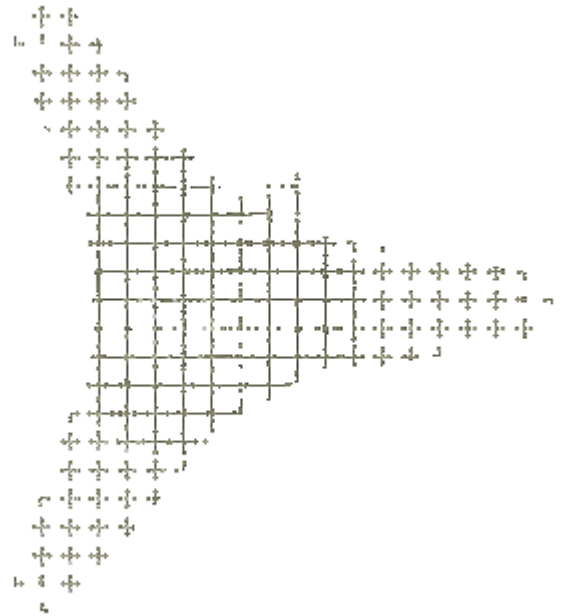
3DXpert for SOLIDWORKS includes tools for creating optimized structures, using Lattices and Infills.

Lattice is a structure of cells spread out in a defined volume. This enables to create an internal structure of the part (keeping its outer skin) that will save weight, material and printing time, while keeping the designed strength of the model.

3DXpert for SOLIDWORKS offers various types of lattices. This exercise discusses **Uniformal Lattice** type. The other Lattice types, will be discussed in a separate exercise called **3DXpert-Advanced Lattice-Exercise**. **Uniformal Lattice** type means that the structure and the size of the lattice's cell does not vary in the entire part's volume.



**Radial Lattice**



**Uniformal Lattice**





When working with a Standard license, you can create Uniformal Lattice, which you are able to slice and export to other software.

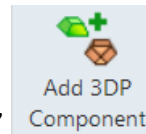
You can create additional Lattice types, however, in the Standard package, the additional Lattice types are available in Evaluation mode.

In Evaluation mode you can create, save, edit and view the additional Lattice types that you created, but you cannot slice or export them.

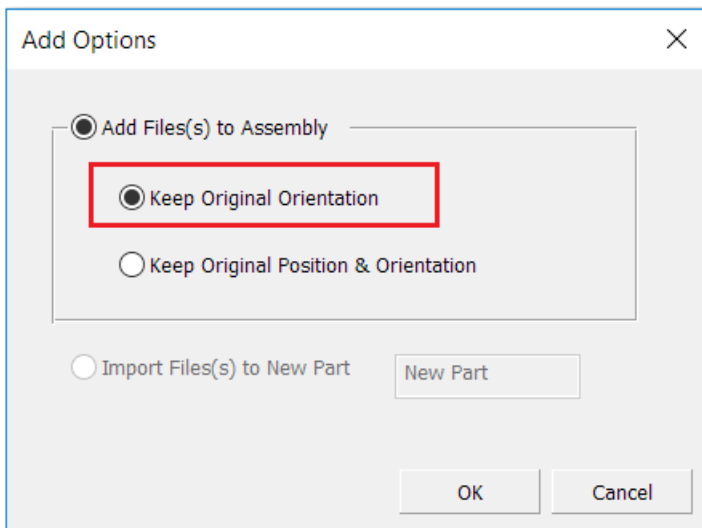
To enable slicing and exporting of the additional Lattice types, upgrade your 3DXpert for SOLIDWORKS to either Lattice Professional ADD ON or the Professional package.

<p>!</p> <p>Notice/ Remember</p>		Left mouse button name is " <i>pick</i> "
		Middle mouse button name is " <i>Exit</i> "

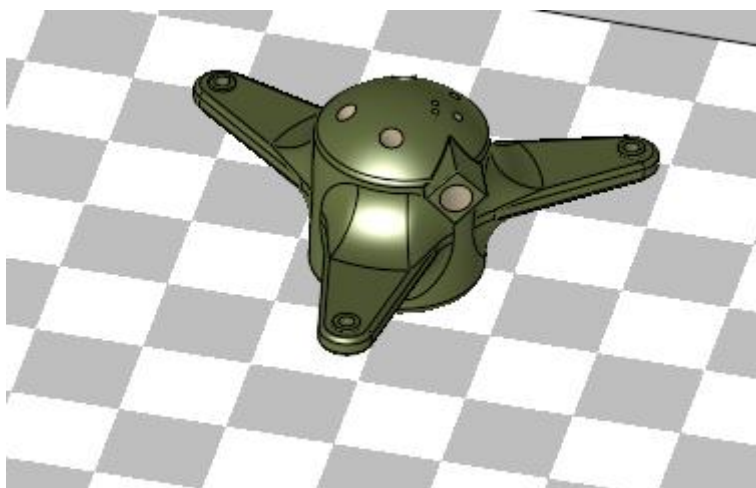
## Exercise



1. Open a new 3DP project and pick 'Add 3DP Component' tool.  
The 3DXpert for SOLIDWORKS explorer opens up. Browse to the part '3DXpert-Uniformal Volume Lattice-V1.elt' and pick the 'Select' button.
2. Pick the option 'Original Orientation' and then pick 'OK'.

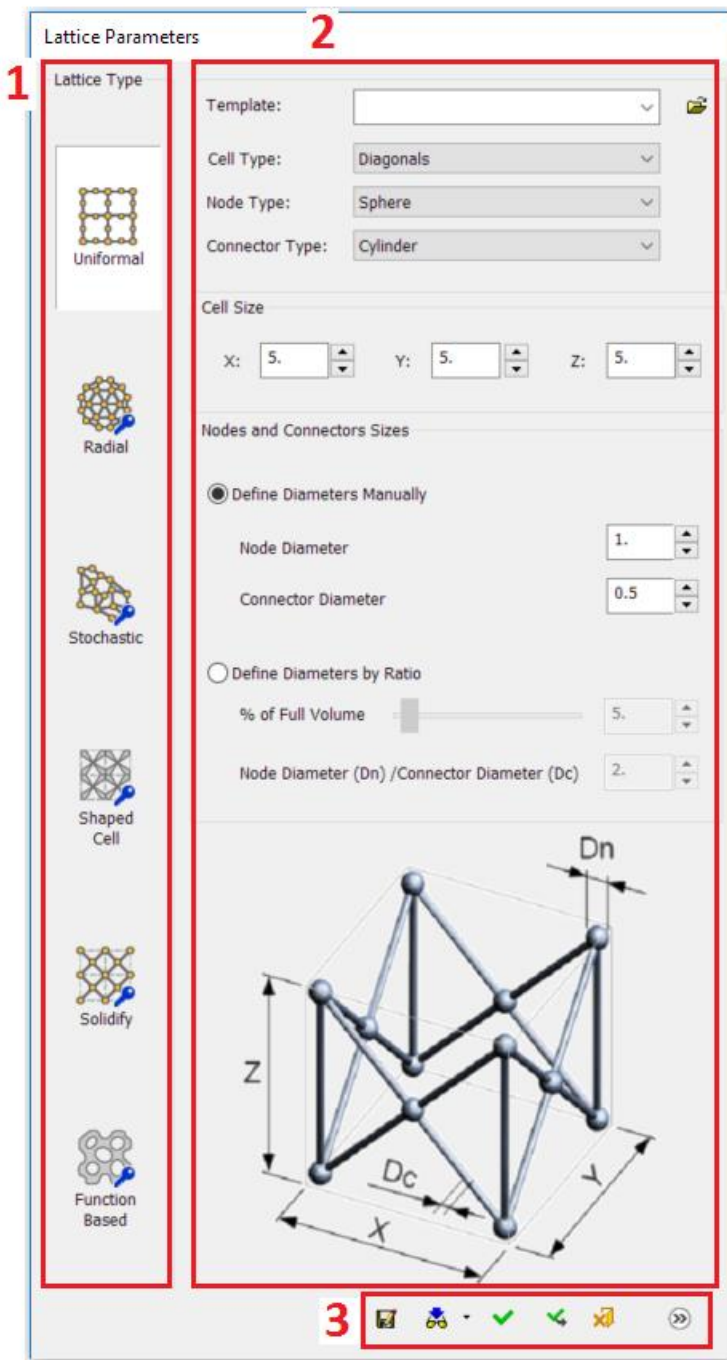


The part will be positioned on the tray:





- From the Guide pick the 'Create Lattice' button. Pick the part. The Lattice Parameters dialog opens up - let's review how the dialog is set:



- #1 - **Lattice Type** - in this section we define how the lattice cells are organized.
- #2 - **Cell Definition** - in this section we set the cell's definition and parameters like cell structure, size, node and connector types and size. A preview picture showing the cell structure is shown at the bottom of that section.

!

**Node:** The basic building block.

**Connector:** The string or face connecting nodes.

**Cell:** The building block of a lattice composed of nodes and connectors.

#3 - Action Buttons Bar - OK, Show Preview, Cancel etc...

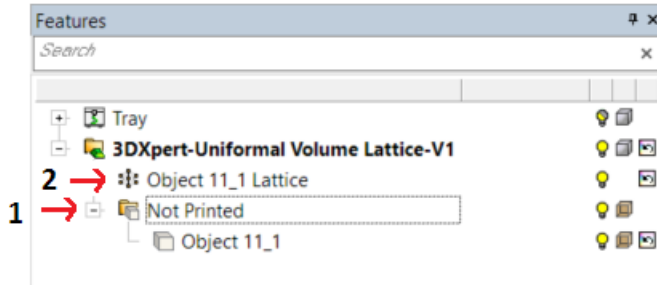
**!** As you can see, there are various lattice types. In this exercise, we will focus only the Uniformal Lattice type. We will discuss the other types on a separate exercise called **3DXpert-Advanced\_Lattice.docx**.

Keep the type as Uniformal, switch to 'Light Diagonal' cell type and keep all other settings as they are (as we can see in the image)

Pick OK (Either on 'Create Lattice' feature guide or on the Actions Bar)

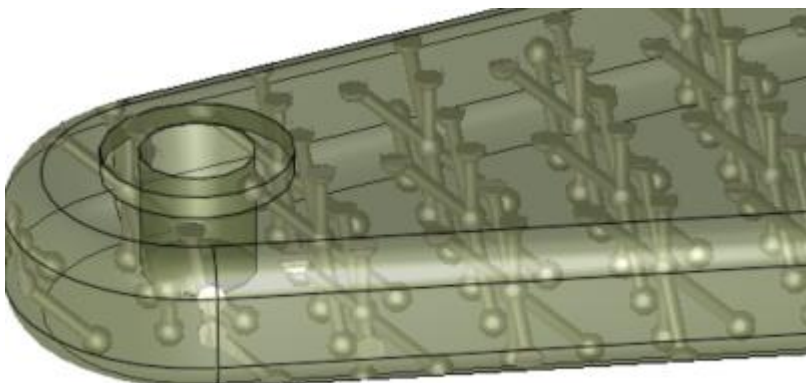


4. Observe the features tree: (Make sure 3DP Objects tab is active)

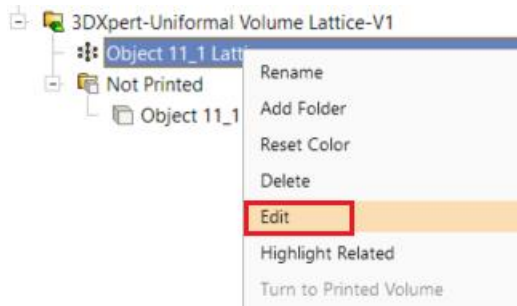


See that once lattice is created for the object, a new 'Not Printed' leaf is created, grouping the original object into it (arrow #1 in the image above). In addition, a new icon representing 'lattice' was created for the new created lattice (arrow #2 in the image above)

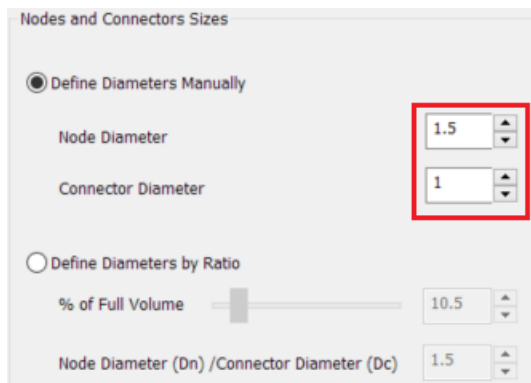
5. Zoom in the part. See that the lattice is very thin:



Right mouse click the Lattice from the features tree and pick 'Edit'



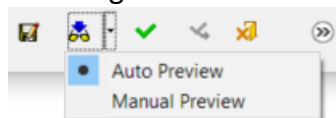
Change the node diameter and connector diameter to 1.5 and 1 accordingly:



See the preview – the lattice is now thicker:



You can always switch the Preview mode between Manual Preview and Auto Preview by selecting from the Preview dropdown list:

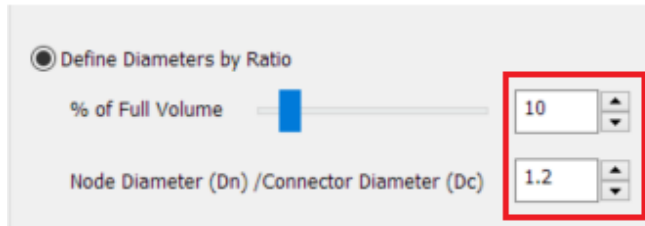


Auto – the preview dynamically changes on screen when any change in the settings is applied.

Manual – the preview changes only when picking the Preview button.

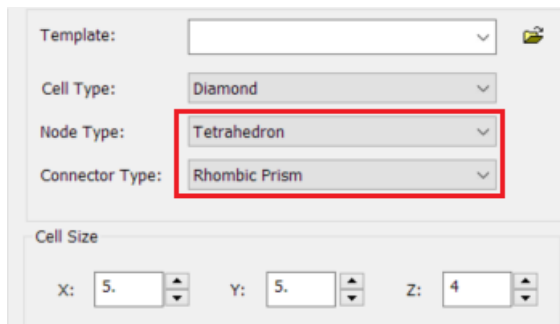
- Browse between the various cell types and see how the preview picture in the dialog changes. Switch to Diamond cell type and pick the option 'Define Diameter

by Ratio'. Set lattice volume percentage to 10% and Node\Connector size ratio to 1.2



Set back the manual size with the same dimensions - node diameter 1.5 and connector diameter 1.

7. Browse between the various Node and Connectors types to see how the lattice cell changes. For example, set node type to Tetrahedron and connector type to Rhombic Prism
- 8.



Hide the not printed object from the features guide:




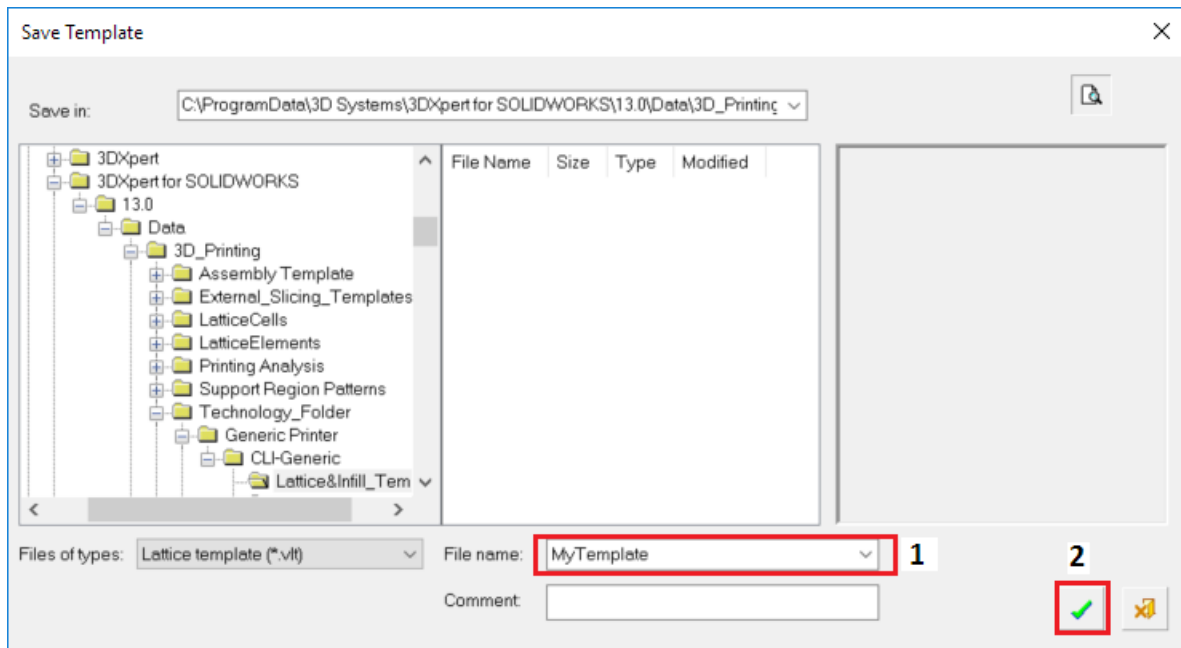
Pick OK on 'Create Lattice' feature guide and zoom in on the wing area to see the cell structure.



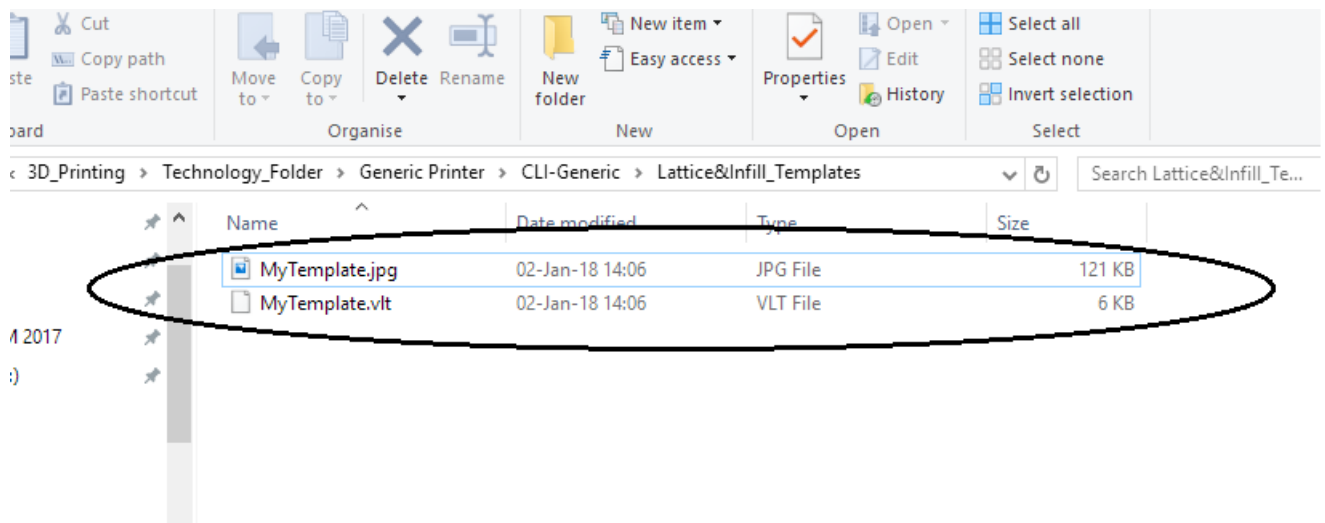
9. Edit the Lattice feature and from the Actions bar, pick the 'Save as Template' button.



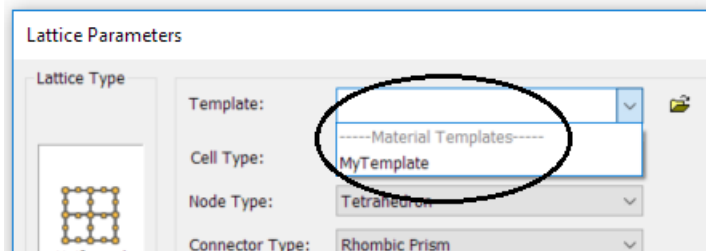
In the 'Save Template' dialog, add a name to the template 'MyTemplate' and pick Ok. 



The template was saved under Data\3D\_Printing\Technology\_Folder\Generic Printer\CLI-Generic\Lattice&Infill\_Templates:



In the Lattice Parameters interaction you can open the dropdown list to see the new template.



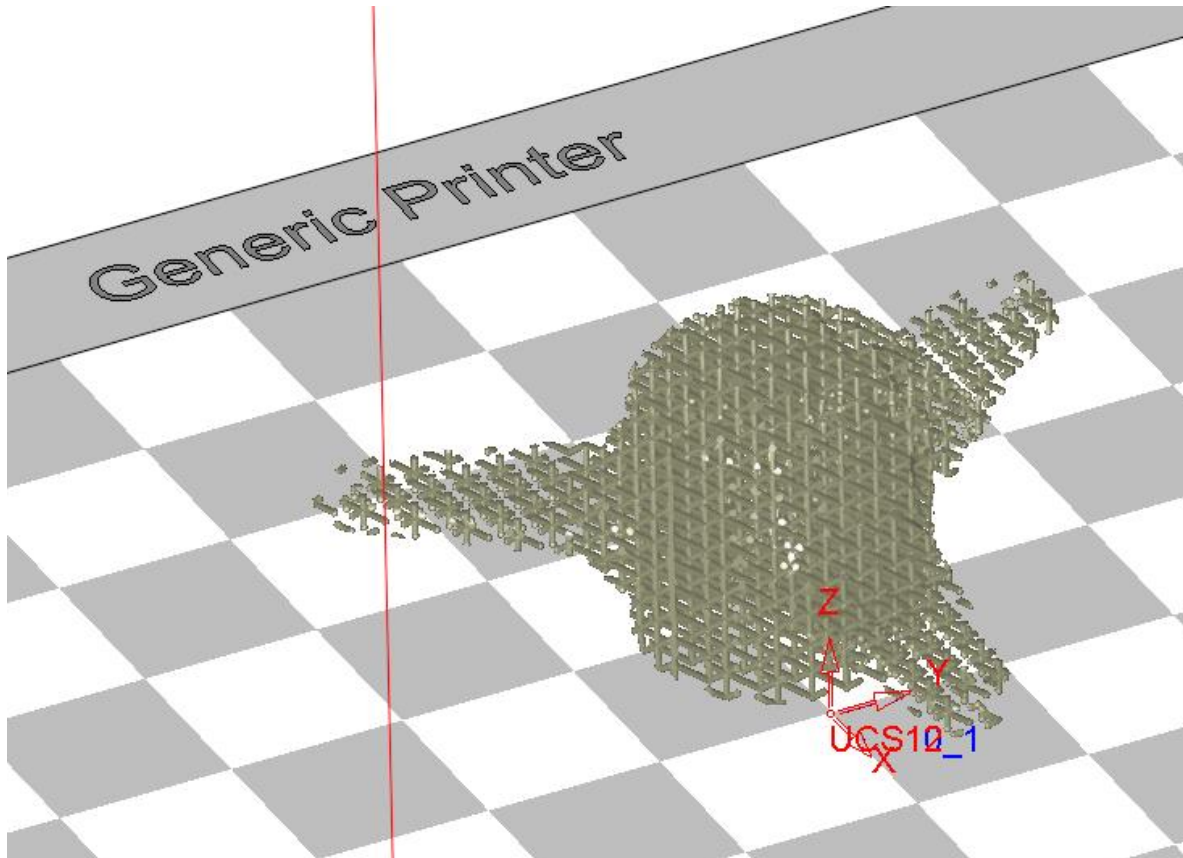
**!** You can re-use templates on other projects but this requires an upgrade to a higher-level license. With the standard license, you can only save a template.



10. Set again the following parameters:

Cell Type:	Light Diagonal
Node Type:	Sphere
Connector Type:	Cylinder

Pick the Ok button to exit from the tool.  
This is the result:



End of Exercise.