Heating and Cooling Load Analysis

Before you begin…

The following files are needed for this Let Me Try exercise:

For Imperial: **c04_tut3_analysis_rmp2015**
For Metric: **M_c04_tut3_analysis_rmp2015**

To access the files from your dataset:

- If you haven't downloaded the dataset yet, open your course homepage.
- Click on the link: **Click here to download the dataset for this course**.
- Save the course dataset to the C:\ drive on your computer.

Options for opening a Revit MEP project file(s):

- Begin by dragging it directly into the application or by using the **Open** command from the Application menu.
- Double click a Revit MEP file, but be aware that if you have more than one version of Revit MEP installed on your computer, the file will open in the **last version** of Revit MEP you used.

- Please ensure you save all your projects to your computer as directed by the *Let Me Try* instructions.

Please ensure you save all your projects to your computer as directed by the *Let Me Try* instructions.

In this exercise, you will perform the Heating and Cooling load analysis of the space model. Also, you will export the model to gbXML file format.

Opening the Project File

In this section, you will open the downloaded project.

1. Choose **Open > Project** from **Application Menu**; the **Open** dialog box is displayed.

2. In the dialog box, browse to your course dataset, then the folder
    Spacing,_Zones_and_Cooling_and_Heating_Load_Analysis and select the *c04_tut3_analysis_rmp2015 (*for Metric *M_c04_tut3_analysis_rmp2015)* file. Then choose the **Open** button; the project file is opened.

Specifying the Project Information

In this section, you will set the project information for the project.

1. Choose the **Project Information** tool from the **Settings** panel of the **Manage** tab; the **Project Properties** dialog box is displayed.

2. In this dialog box, choose the **Edit** button corresponding to the **Energy Settings** parameter; the **Energy Settings** dialog box is displayed.

3. In this dialog box, ensure that the **Office** option is selected in the **Value** field corresponding to the **Building Type** parameter.

4. Next, click in the **Value** field corresponding to the **Location** parameter; a browse button is displayed. Choose the button; the **Location Weather and Site** dialog box is displayed. In this dialog box, ensure that the **Location** tab is chosen by default and then select **Default City List** from **Define Location by** drop-down list, if it is not selected by default.

5. Now, select the **Indianapolis, IN** option from the **City** drop-down list.

6. In the **Location Weather and Site** dialog box, choose the **Weather** tab and then select the **Use closest weather station(INDIANAPOLIS)** check box, if it is not selected by default.

7. In the **Weather** tab, ensure that **-2 °F** and **1.0** values are specified in the **Heating Design Temperatures** and **Clearness Number** edit boxes, respectively.

8. Now, choose **OK**; the **Location Weather and Site** dialog box is closed and the selected option is displayed in the **Value** field corresponding to the **Location** parameter. Next, choose the **OK** button to close the **Location Weather and Site** dialog box.

9. In the **Energy Settings** dialog box, retain the default settings for the remaining parameters, refer to the image below, and then choose the **OK** button; the **Energy Settings** dialog box is closed. Again, choose the **OK** button to close the **Project Properties** dialog box.
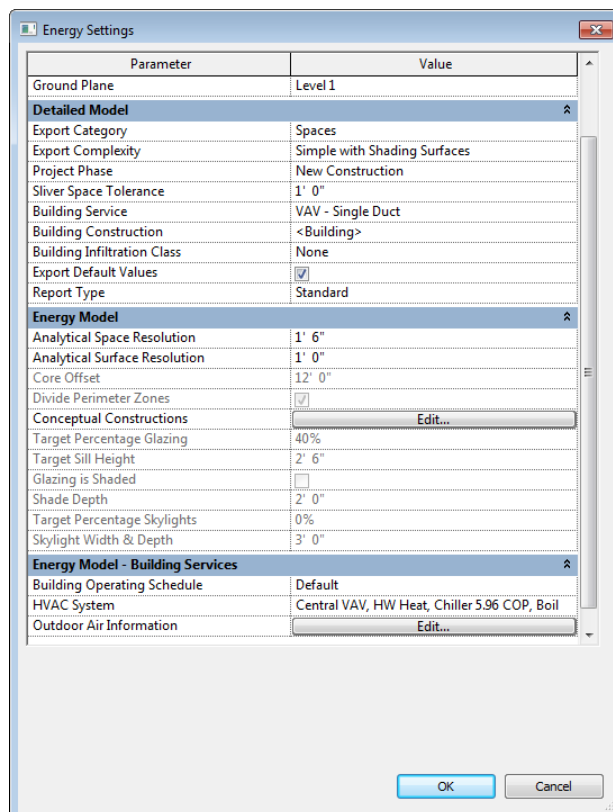
Verifying the Area and Volume Settings

1. Choose the **Area and Volume Computations** tool from the **Spaces & Zones** panel of the **Analyze** tab; the **Area and Volume Computations** dialog box is displayed.

2. In this dialog box, ensure that the **Computations** tab is chosen by default and then in the **Volume Computations** area, select the **Area and Volumes** radio button, if it is not selected by default.

3. In the **Room Area Computation** area, select the **At wall finish** radio button, if it is not selected by default.

4. Now, choose the **OK** button; the **Area and Volume Computations** dialog box is closed.

The Areas and Volumes option must be selected for a space to perform an accurate heating and cooling loads analysis.

Verifying the Building Information

1. Choose the **Heating and Cooling Loads** tool from the **Reports & Schedules** panel of the **Analyze** tab; the **Heating and Cooling Loads** dialog box is displayed.

2. In this dialog box, ensure that the **General** tab is chosen by default and then click on the **Value** field corresponding to the **Building Infiltration Class** parameter; a drop-down list is displayed.

3. Select the **Tight** option from the displayed drop-down list.

4. Click on the **Value** field corresponding to the **Report Type** parameter and then select the **Detailed** option from the drop-down list displayed.

5. Select the check box displayed in the **Value** field corresponding to the **Load Credits** parameter.

    After verifying and setting the building information, you will verify and specify the space information of the building.

Verifying the Space Information

1. In the **Heating and Cooling Loads** dialog box, choose the **Details** tab; the various options in this tab is displayed.

2. In this tab, ensure that the **Spaces** radio button is selected and then in the list box displayed below the radio button, click on the **Default** node and then expand it. Note that various settings and information for the **Default** zone are displayed below the list box.

3. Now, ensure that the **<Building>** option is selected in the **Service Type** drop-down list, and then choose the browse button next to the **Heating Information** edit box; the **Heating Information** dialog box is displayed.

4. In this dialog box, select the **Humidification Control** check box and then enter **15%** in the **Humidification Set** point edit box.

5. Choose the **OK** button; the **Heating Information** dialog box is closed.

6. Similarly, choose the browse button next to the **Cooling Information** edit box; the **Cooling Information** dialog box is displayed.

7. In the dialog box, select the **Humidification Control** check box and then enter **85%** in the **Dehumidification Set Point** edit box. Choose the **OK** button to close the **Cooling Information** dialog box.

8. Next, click on the **Zone A** node and expand it; the various spaces under it are displayed in an hierarchy, as shown in the image below.
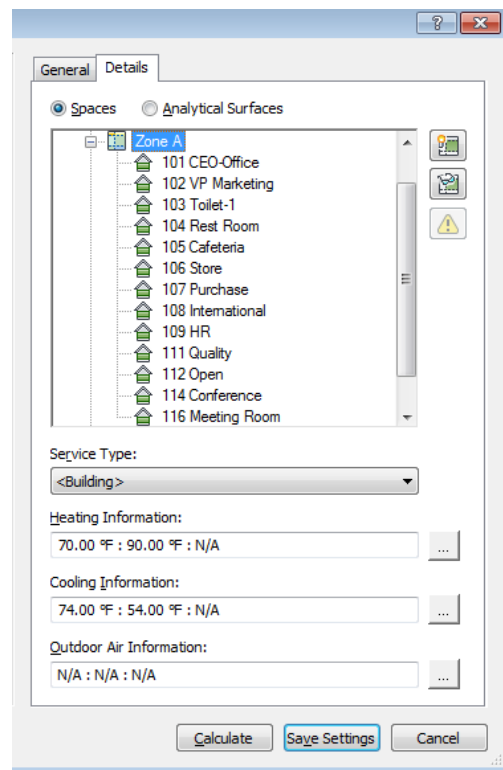
9. To view the spaces in **Zone A**, choose the **Highlight** button displayed on the right of the dialog box, refer to the image below; the various spaces are highlighted in the preview pane displayed in the left pane.
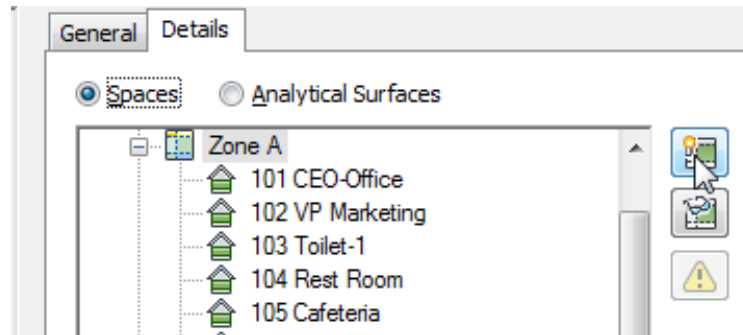

10. Similarly, select the **Zone B** node; the spaces in the **Zone B** are highlighted in the conceptual model, displayed in the preview pane. Now, choose the **Isolate** button displayed below the **Highlight** button in the **Heating and Cooling Loads** dialog box; the spaces in **Zone B** are displayed in isolation form the main conceptual model, in the preview pane, as shown in the image below.
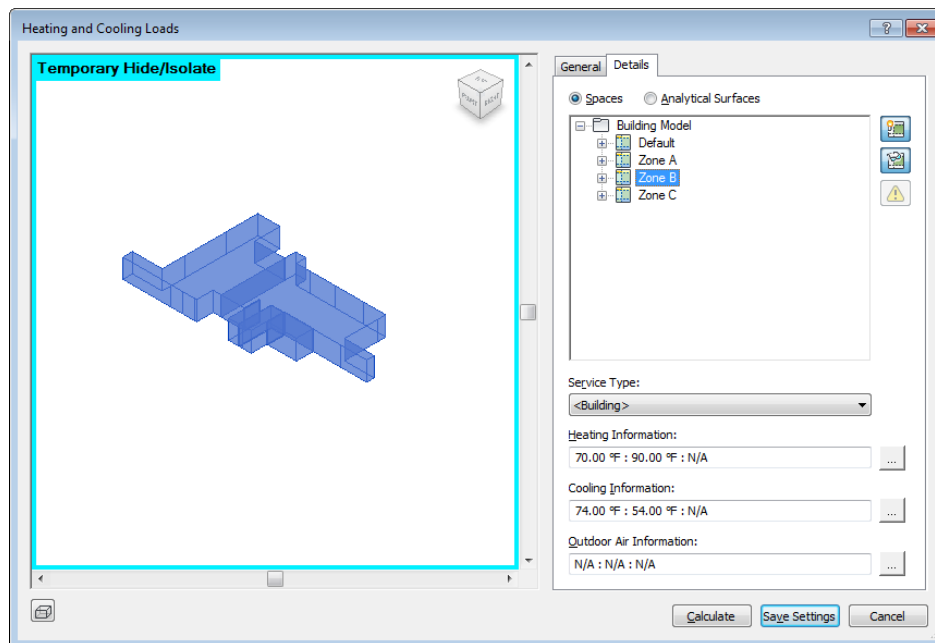
11. In the **Details** tab, select the **Analytical Surface** radio button and then choose the **Isolate** button again; the analytical model of the project is displayed in the preview pane. Now, choose the **Highlight** button; the analytical conceptual model without the space highlights is displayed in the preview pane, as shown in the image below. You can use the **ViewCube** tool in the preview pane to rotate the conceptual model and view it from all sides.
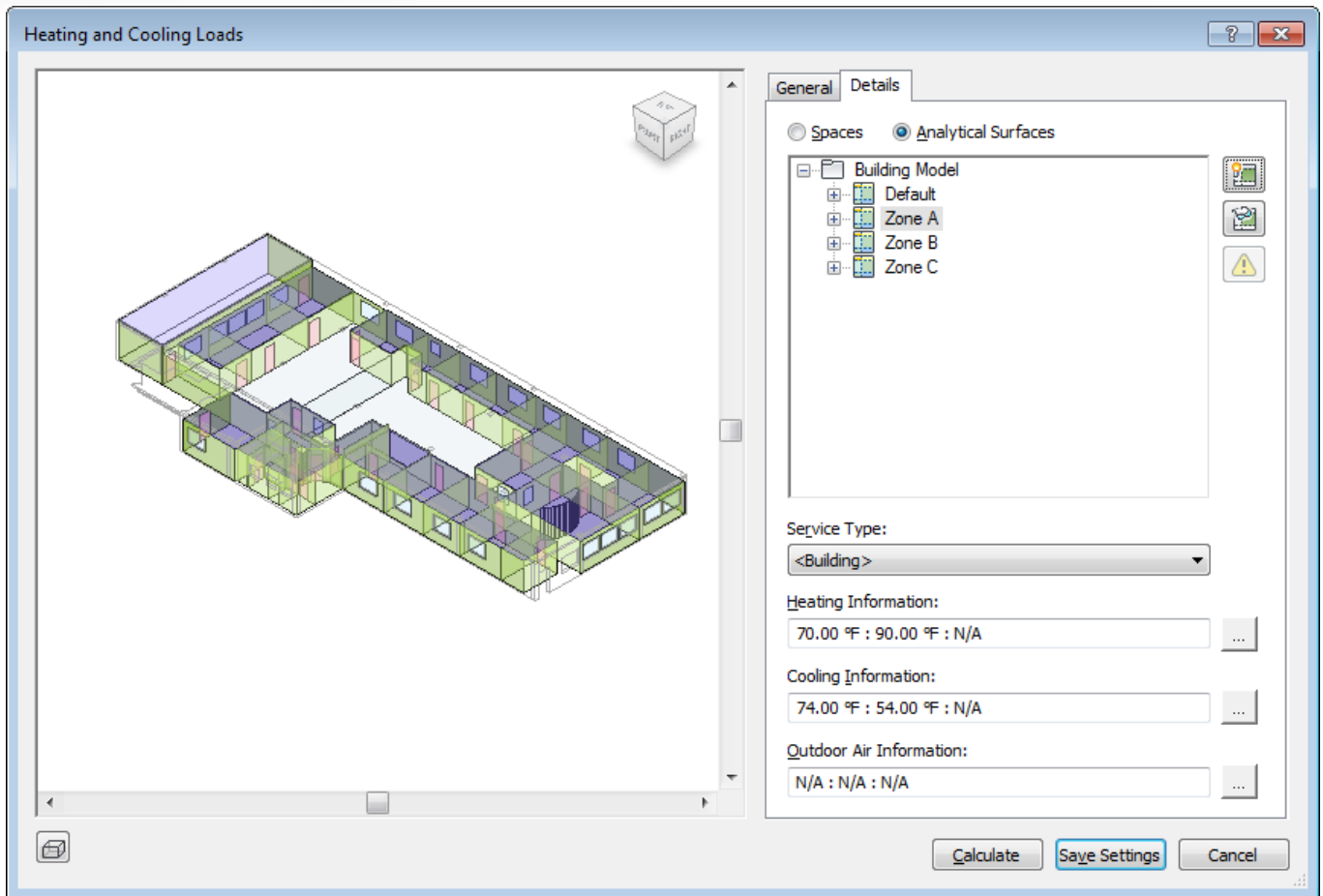
Tip: You can use the View Cube tool to spin, pan, and zoom the model to have a better view of the space.

Performing the Heating and Cooling Loads Analysis

1. In the **Heating and Cooling Loads** dialog box, choose the **Calculate** button; the heating and load analysis is performed and the report is displayed in the drawing window, as shown in the image below. You can scroll down and view the entire report.

Project Summary

Location and Weather	
Project	Project Name
Address	
Calculation Time	Tuesday, May 21, 2013 10:00 AM
Report Type	Detailed
Latitude	39.78°
Longitude	-86.15°
Summer Dry Bulb	94 °F
Summer Wet Bulb	80 °F
Winter Dry Bulb	-2 °F
Mean Daily Range	19 °F

Building Summary

Inputs	
Building Type	Office
Area (SF)	5,447
Volume (CF)	45,170.10
Calculated Results	
Peak Cooling Total Load (Btu/h)	121,035.6
Peak Cooling Month and Hour	July 2:00 PM
Peak Cooling Sensible Load (Btu/h)	115,736.0
Peak Cooling Latent Load (Btu/h)	5,299.5
Maximum Cooling Capacity (Btu/h)	121,065.9
Peak Cooling Airflow (CFM)	5,434
Peak Heating Load (Btu/h)	48,656.2
Peak Heating Airflow (CFM)	3,125
Checksums	
Cooling Load Density (Btu/(h·ft²))	22.22
Cooling Flow Density (CFM/SF)	1.00
Cooling Flow / Load (CFM/ton)	538.77

Also, notice that in the **Project Browser**, the load report is added as **Loads Report(1)** node under **Reports > Load Reports**, refer to the image below. You can click on the **Loads Report(1)** node to view the report whenever required.
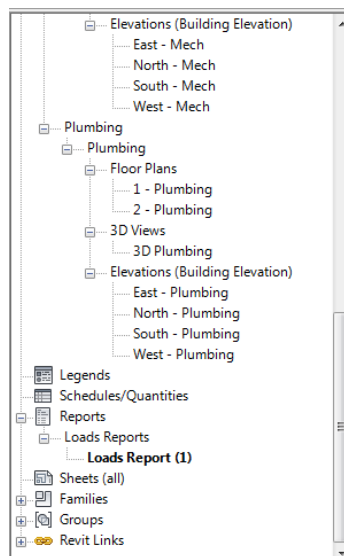
Revit MEP performs a heating and cooling loads analysis using the integrated heating and cooling loads analysis engine. In this analysis, various factors are analyzed including analytical and inner volumes of the spaces.

2. Review the loads report to analyze the project, weather, space, and zone information of the building model.

> **You must perform a new heating and cooling loads analysis each time you modify building, space, or zone information, or make any changes to the model, otherwise the loads report or schedules will not reflect your changes.**

After you have performed the load analysis of the model using the IES engine, you can export the model information to a third party software and compare the results. To export the model information to third party software, you need to create a gbXML file.

Exporting the Model Information to gbXML File

In this section, you will export the model information into gbXML file format.

1. Choose **Export > gbXML** from the **Application Menu**; the **Export gbXML Settings** dialog box is displayed.

2. Retain all the default settings in the dialog box and then choose the **Next** button; the **Export to gbXML -Save to Target Folder** dialog box is displayed.

3. Browse to the *C:\rmp_2016\c04* folder and type **c04_office-space-tut3-gb** (for Metric, **M_c04_office-space-tut3-gb**)in the **File name** edit box. Choose **Save**; the file is saved in *.xml* file format.

Saving the Project

In this section, you need to save the project and settings using the Save As tool.

1. To save the project with the settings, choose Save As > Project from Application Menu; the Save As dialog box is displayed as you are saving the project for the first time.

2. In this dialog box, browse to the C:|rmp_2016|c04 folder and then in the File name edit box, enter c04_Office-Space_tut3 (for Metric, M_c04_Office-Space_tut3)and then choose the Options button; the File Save Options dialog box is displayed.

3. Now, choose the **OK** button; the **File Save Options** dialog box is closed and the **Save As** dialog box is displayed.

4. In the displayed dialog box, choose the **Save** button to save the current project file with the specified name.

Closing the Project

To close the project, choose the Close option from the Application Menu.