Unit 5) Modeling the Design of the Building Envelope for Sustainability: Envelope Daylighting Exercise

Envelope Daylighting

Analysis type:	Software required:	Starting Point Dataset:
External Analysis	Revit® MEP 2008, IES <VE>™ toolkits for Revit MEP. Full IES<VE> Modules Required (FlucsDL licenses)	*Unit 5_i_Start.rvt* (adapted from *Convention Center Extensions.rvt*)

Daylighting is intricately related to heat gain in a building. To minimize heat gain, you can reduce the window area, but that also reduces the amount of natural daylight. It also forces you to replace the natural daylighting with electric lights, which are inefficient and, in turn, produce heat.
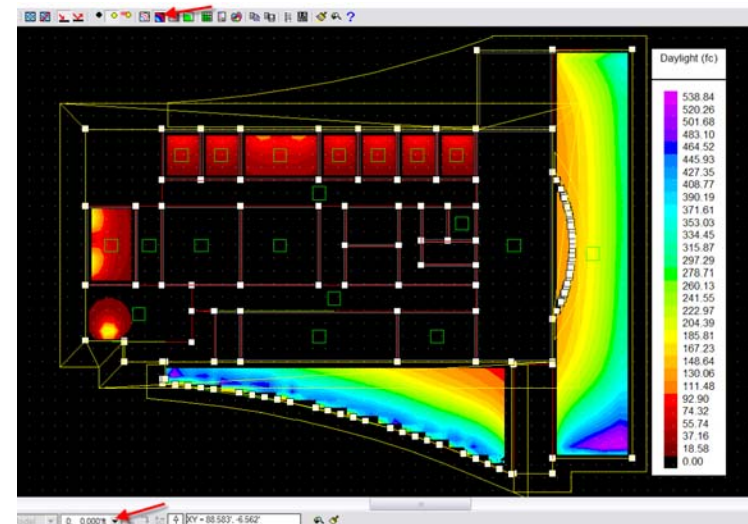
This exercise illustrates how to perform a daylighting analysis using the FLUCS component of IES <VE>.

This exercise consists of the following tasks:
- Exporting the building model to IES <VE> using Revit MEP.
- Running the calculations using FLUCS, the artificial/natural lighting design and analysis tool in IES <VE>.
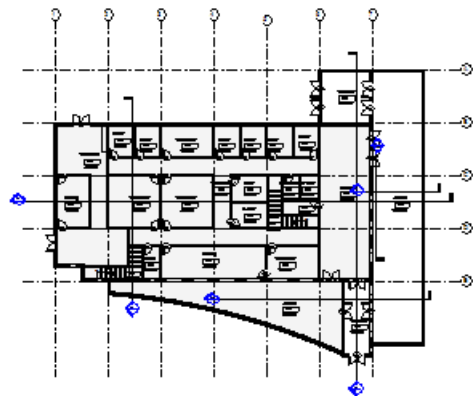
Before: *Unit 5_i_ Start.rvt*

After: *Unit 5_i_ Start.rvt* following daylight analysis using IES <VE>

1   ***Export the Building Model to IES <VE> Using Revit MEP***
Revit MEP software now has a direct, built-in link to IES <VE> that enables you to easily import data from the building information model to IES

<VE>. This particular Export tool is NOT located in the regular File menu > Export. Instead, it is located on the Revit MEP Mechanical Design Bar as a function of the Heating and Cooling Loads tool. To produce the graphics shown above, you will need certain Full <VE> modules, specifically the FlucsDL licenses.
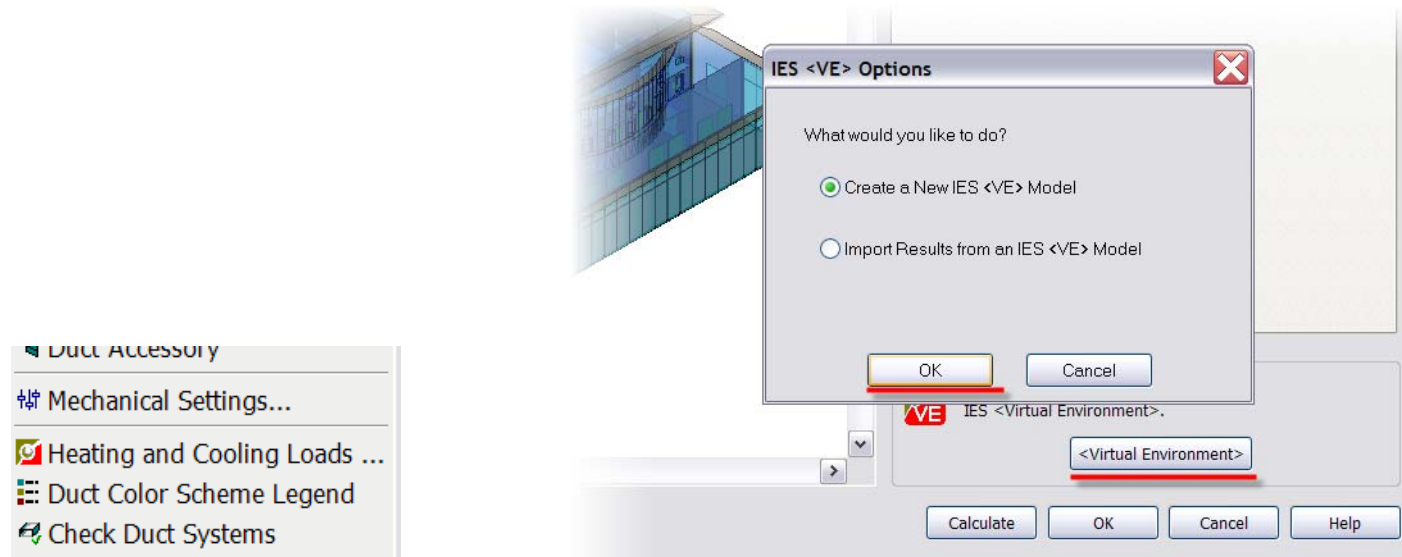
To export data, use Revit MEP to open the building you wish to analyze. On the Mechanical Design Bar, click Heating and Cooling Loads. Click Virtual Environment button. In the IES <VE> Options dialog box, click Create a New IES <VE> Model. Click OK. As long as you properly install and license the IES <VE> module, IES <VE> and the converted model should open.

2   *Run the Calculations Using the FlucsDL Daylighting Assessment Tool*

<VE> Toolkits

Sustainability Toolkit

- ASHRAE Loads Calculation | Change method
- ApacheSim: Dynamic Thermal Simulation
- FlucsDL: Daylighting Assessment (threshold=25 fc)
- Sun's-view movie | December

LEED Toolkit

- FlucsDL: LEED Daylighting Credit 8.1 Report (threshold=25 fc)
- (free license available until Oct. 2007)

Close
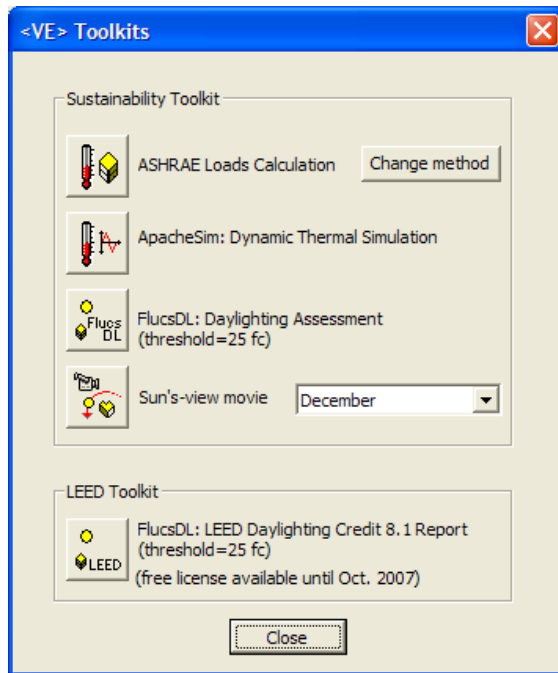
Threshold tables

Daylight simulation model data:

Project file: c:\docume~1\driver_d\locals~1\temp\sample~1\SampleModel.mit
Calculated at Saturday, July 28, 2007, 7:24 PM
Location: South Weymouth, Massachusetts (42.21N, 71.03W)
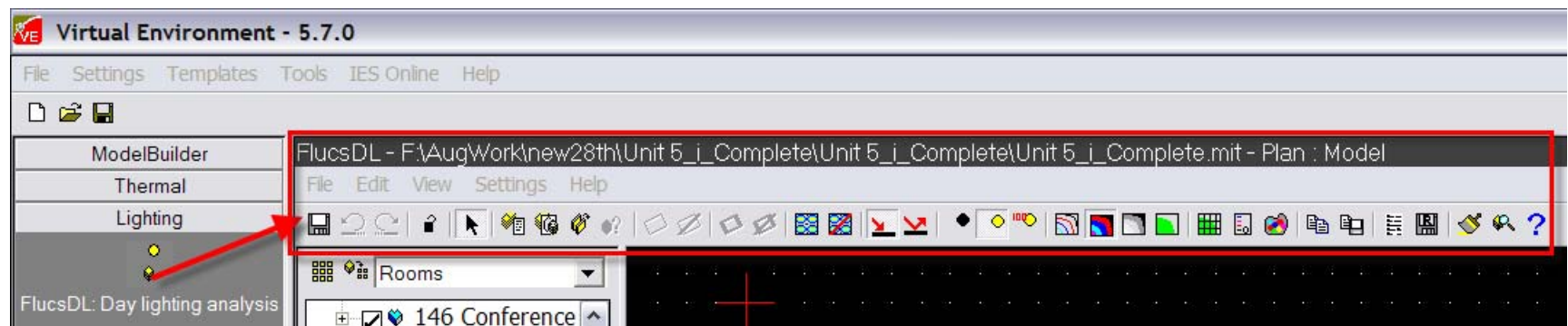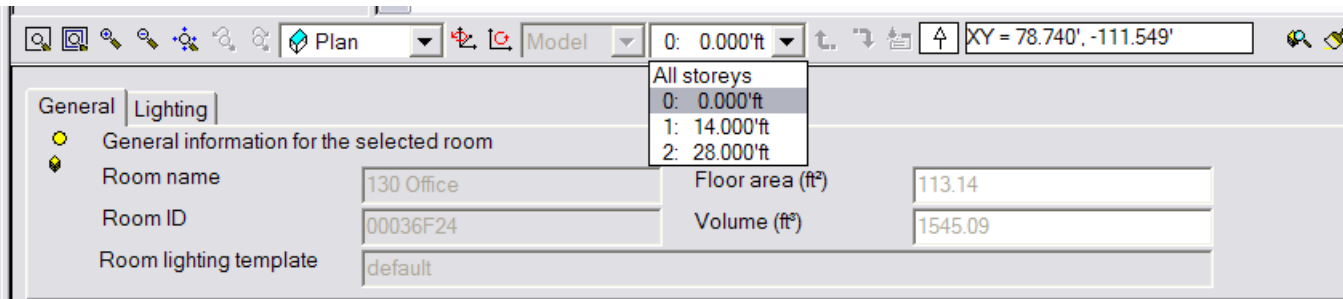Illuminance threshold = 25.000 fc

Rooms

Room ID	Room name	Floor area (ft²)	Percentage above threshold (%)	Average illuminance (fc)
0003671B	102 Atrium	2109.325	100.00	251.820
0003BD05	103 Room	1079.489	0.00	0.000
0003C8F5	105 Atrium	1289.880	100.00	296.247
00043557	105 Circulation	476.321	0.00	0.000
00043559	108 Circulation	388.227	16.33	21.253

Click FlucsDL: Daylighting Assessment to generate an HTML-based report (see above right) and to launch the FlucsDL toolbar in IES <VE>.
   To launch FlucsDL you need to quit the <VE> Toolkit and then choose the Lighting design bar and then choose the FlucsDL button.
   This will only work if you have a FlucsDL license

Notes   The FlucsDL tool is located on the Lighting design bar. Each time you launch an IES <VE> tool, the toolbar (highlighted in red below) immediately displays the corresponding set of tools.

Virtual Environment - 5.7.0

File   Settings   Templates   Tools   IES Online   Help

- ModelBuilder
- Thermal
- Lighting
- FlucsDL: Day lighting analysis

FlucsDL - F:\AugWork\new28th\Unit 5_i_Complete\Unit 5_i_Complete\Unit 5_i_Complete.mit - Plan : Model

File   Edit   View   Settings   Help

Rooms

146 Conference

Look for the viewing tools in the bottom portion of the window (see figure above).

To locate the default settings for units, click Settings menu > Preferences . Revit Architecture software does not automatically translate units when it converts the project to an IES <VE> model. For example, if the original file is set to imperial units and if the preferences are set to metric, then the exported model will have metric units.

3   **View the Daylight Graphically**
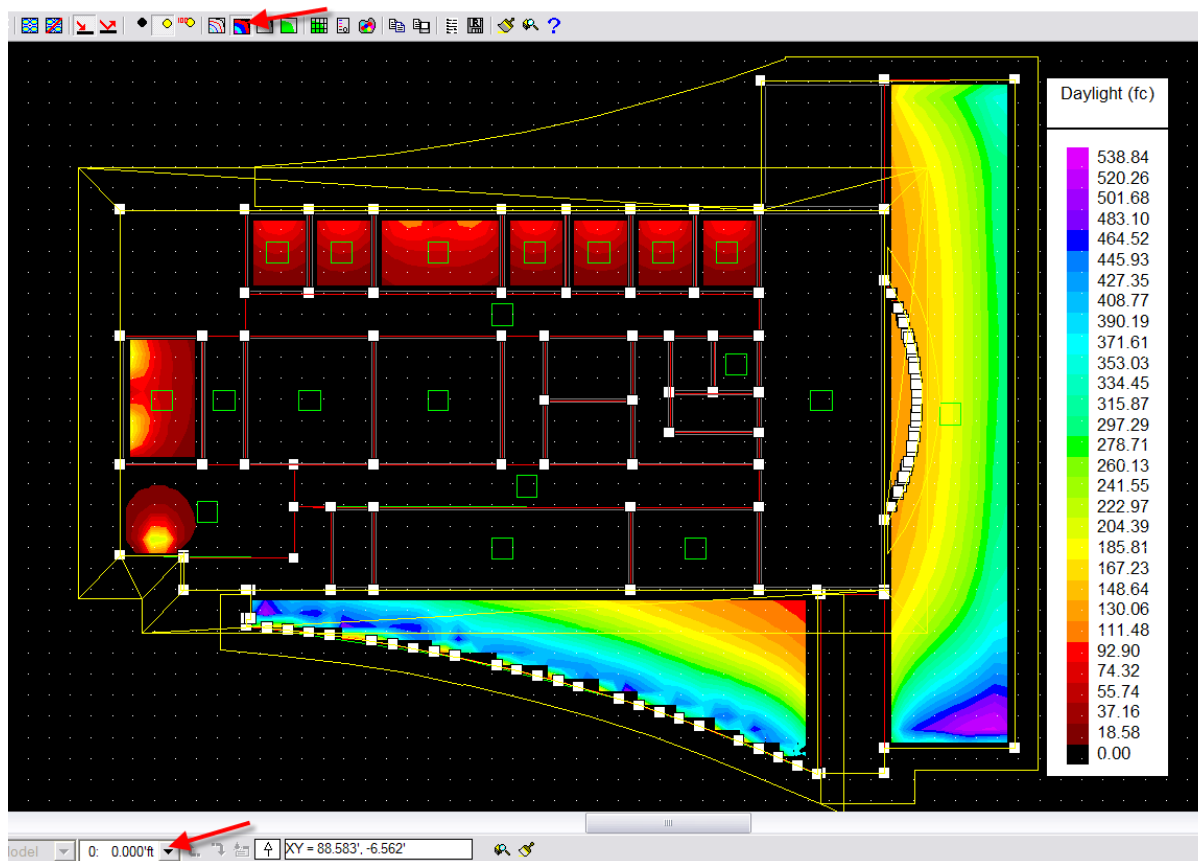
Select Plan from the list of views. Select Level 0 from the Storey list. Finally, select all elements in the view and pick the false color contour levels tool (see upper red arrow in illustration) above the model window.

Exercise complete. The IES <VE> model is also included in the Zip file for this exercise.