Title 24 2013 Compliance Software: CBECC-Com

"California Building Energy Code Compliance for Commercial Buildings"

Creating Model Geometry using the Detailed Geometry Approach

Detailed Geometry Approach: Required Software and Plugins

1. SketchUp 8.0* + OpenStudio Plugin (v1.4.0)

CBECC-Com uses SketchUp in combination with OpenStudio SketchUp Plugin to create and building geometry for input into CBECC-Com for simulation and compliance analysis. Please use the links below to download these supporting tools:

Download SketchUp: http://www.sketchup.com/download/all

Download OpenStudio Sketchup Plugin: http://openstudio.nrel.gov/downloads

Note: In order to download OpenStudio Plugin, you are required to setup a user account.

2. DXF Plugin for SketchUp 8.0

(Google Search Keywords: Free SketchUp DXF Plugin https://www.google.com/?gws_rd=ssl#q=free+dxf+plugin+sketchup)

3. CBECC-Com v3

http://bees.archenergy.com/software.html

* Note:

- SketchUp 8.0 is currently available free of cost but with limited capability for importing drawing files Alternatively you can also use the SketchUp 2013/2014 Pro versions
- Make sure to download the compatible version of OpenStudio when using SketchUp 2014

Objective: Create Spaces from DXF File

- 1. Review of useful SketchUp/OpenStudio Tools
- 2. Import DXF Floor Plan (exported from AutoCAD)
- 3. Assign to a Separate Layer
- 4. Create Single Line Floor Plan
- 5. Create OpenStudio Spaces

Training Module 1: Setting Toolbars in SketchUp



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Training Module 1: Useful SketchUp Tools



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Training Module 1: Useful OpenStudio Tools



Reference: <u>https://openstudio.nrel.gov/files/openstudio_interface_workflow-090_verA.pdf</u>

Training Module 1: Useful OpenStudio Tools



Training Module 1: Import DXF Floor Plan (using FreeDXF plugin)

Click on Plugins and from the drop down click on FreeDXF v0.57

Note: SketchUp Professional (Pro) version allows you to import DXF/DWG and other drawing formats and you would not need additional plugins



Locate DXF file location and click Open

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Plugin: <u>https://sites.google.com/site/jimfoltz/my-sketchup-plugins/freedxf</u>

Training Module 1: Import DXF Floor Plan (using FreeDXF plugin)

- Set options as shown below
- From the SketchUp menu bar click on

Camera > Standard Views > Top to view the file in 2D Plan view



Training Module 1: Assign to Separate Layer

***** From the SketchUp menu bar click on Window then Layers to display the Layer window

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Training Module 1: Assign to Separate Layer

Create a New Layer "Spaces" by clicking on the + and then select that layer to draw the spaces



Drawing on a new layer makes it easy to hide the other dxf layer that are not required. This can be done by unchecking the box in front of the respective layer names

Training Module 1: Create Single Line Floor Plan

Use the Line Tool to trace the floor plan



Note: To prevent creating replicas of walls in spaces that share walls, do not trace the shared wall twice while tracing adjacent spaces.

Training Module 1: Create OpenStudio Spaces

- Change View using Menu bar: Camera > Standard Views > Iso
- Select all traced spaces in the floor plan using the Select Tool



Training Module 1: Create OpenStudio Spaces

- Click on the "Create Spaces from Diagram" tool in the toolbar as shown
- Fill in the Floor Height (12ft) for the spaces in the dialog box that opens



Training Module 1: Create OpenStudio Spaces

3-D View showing OpenStudio Spaces



Training Module 2

Objective: Prepare OpenStudio Model for CBECC-Com

- 1. Surface Matching
- 2. Name Spaces
- 3. Add Fenestration
- 4. Add Shading
- 5. Export SDD XML file

Training Module 2: Surface Matching

- Click on the "Surface Matching" tool in the toolbar as shown
- After the dialog box opens click on "Match in Entire Model"

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Training Module 2: Name Spaces

- Click on the "Inspector" tool in the toolbar as shown to open the OpenStudio Inspector
- To name spaces select individual spaces by double-clicking on them, then rename them in the Inspector dialog box

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- **W** Use the Tape Measure tool to draw reference lines for the fenestration (window/door/skylight)
- To draw the fenestration) double-click on the surface on which it occurs. Then using the pencil tool draw the window/door/skylight.



Training Module 2: Window Schedule

Space Name	Window	Sill Height	Dimensions	Туре
Open Office South	W1	3'	44' x 4'	Fixed Window
	W2	3′	19' x 4'	Fixed Window
Lobby	W3	1'	11' x 8'	Lobby Window
	W4	1'	16' x 8'	Lobby Window
			4' x 8'	Exterior Door
Open Office North	W5	3'	26' x 4'	Fixed Window
	W6	3'	50' x 4'	Fixed Window
Private Office	W7	3'	11' x 4'	Fixed Window
Conference	W8	3'	4' x 4'	Fixed Window
	W9	3'	4' x 4'	Fixed Window
	W10	3'	4' x 4'	Fixed Window

Training Module 2: Add Shading

- Use the Tape Measure tool to draw reference lines for the shading
- To draw a shade click on the "New Shading Surface Group" tool. Then click on the model close to where the shade is to be drawn

Training Module 2: Add Shading

- Double-click on the Shading Group box everything else turns transparent
- Using the line tool draw the shade in an anti-clockwise direction

Training Module 2: Add Shading

View showing the completed Shade with the rest of the building model

Training Module 2: Export SDD XML File

To export the model to SDD XML file in the menu bar go to:

Plugins > OpenStudio > Export > Export SDD model

✤ A dialog box will open where you can specify the location and name of the XML file

Training Module 3

Objective: Import XML and Provide High Level Inputs

- 1. Open CBECC-Com and Load XML File
- 2. Organization of Envelope Tab
- 3. Enter Location
- 4. Enter Stories
- 5. Enter other Simulation Parameters

Training Module 3: Open CBECC-Com and Load XML File

- Open CBECC-Com and a dialog opens asking to either to "Open Recent Project" or "Select an Existing Project to Open". Select the latter option.
- Next in the Open dialog box browse to the directory where the SDD XML file is saved
- Then click on the file type drop down next to the Filename and select "SDD XML Project Files (*.xml)" from the drop down.
- Select and open the project XML file you had saved.

Training Module 3: Organization of Envelope Tab

Training Module 3: Organization of Envelope Tab (contd.)

Training Module 3: Enter Location

***** Double-click on Project to open the "Building Model Data" dialog box

Enter the location of the project using the required inputs

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Training Module 3: Enter Stories

- Double-click on Building (Medium Office) to open the "Building Model Data" dialog box
- Enter the number of Stories as required

Training Module 3: Enter other Simulation Parameters

- ***** Double-click on Project to open the "Building Model Data" dialog box
- Enter the Simulation Parameters as required on the various tabs Design Team, Exceptional Conditions etc.

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