**Assignment Week 6.**

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**Previous exercise:**

Heat exchange between the surface 1 and surface 2.

A1= 1,50 m2 T1= 298 K σ =5.67x10$^{-8}$ $\frac{W}{m^2 \cdot K4}$.

F12= 0,01 T2= 308 K ε1= ε2= 0,10

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$$Q_{1 \to 2} = \frac{A_1 \times \sigma \ (T_1^4 - T_2^4)}{1/\varepsilon 1 + 1/\varepsilon 2 - 1}$$

$$= \frac{1{,}50 m2 \times 5{,}67.10^{-8} W/m^2 \times (298^4 K - 308^4 K)}{1/0{,}10 + 1/0{,}10 - 1}$$

$$= \frac{8{,}505.10^{-8} W.m^2 \times (7{,}8.10^9 K - 8{,}9.10^9 K)}{0{,}1 + 0{,}1 - 1}$$

$$= \frac{8{,}505.10^{-8} W.m^2 \times -1{,}10.10^9 K}{19}$$

$$= \frac{-93{,}55 W.m^2 .K}{19}$$

$$= -4{,}92 W.m^2$$

**New exercise:**

1% of the case without shields= 0,0492 W/m$^2$

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$$Q = \sigma . \frac{(T_1^4 - T_2^4)}{\frac{1}{\varepsilon 1} + \frac{1}{\varepsilon 2} - 1 + ((\frac{1}{\varepsilon 1} + \frac{1}{\varepsilon 2} - 1). X)} =$$

$$-0{,}0492W = 5{,}67.10^{-8} W/K^4 . \frac{(298^4 K - 308^4 K)}{\frac{1}{10} + \frac{1}{10} - 1 + ((\frac{1}{10} + \frac{1}{10} - 1). X)} =$$

$$-0{,}0492W = 5{,}67.10^{-8} W/K^4 . \frac{-1{,}10.10^9}{19 + 19X}$$

$$-0{,}0492W . (19 + 19X) = 5{,}67.10^{-8} W/K^4 . -1{,}10.10^9 K^4$$

$$0{,}93W + 0{,}93X = 6{,}23.10W$$

$$0{,}93X = 6{,}23.10 - 0{,}93$$

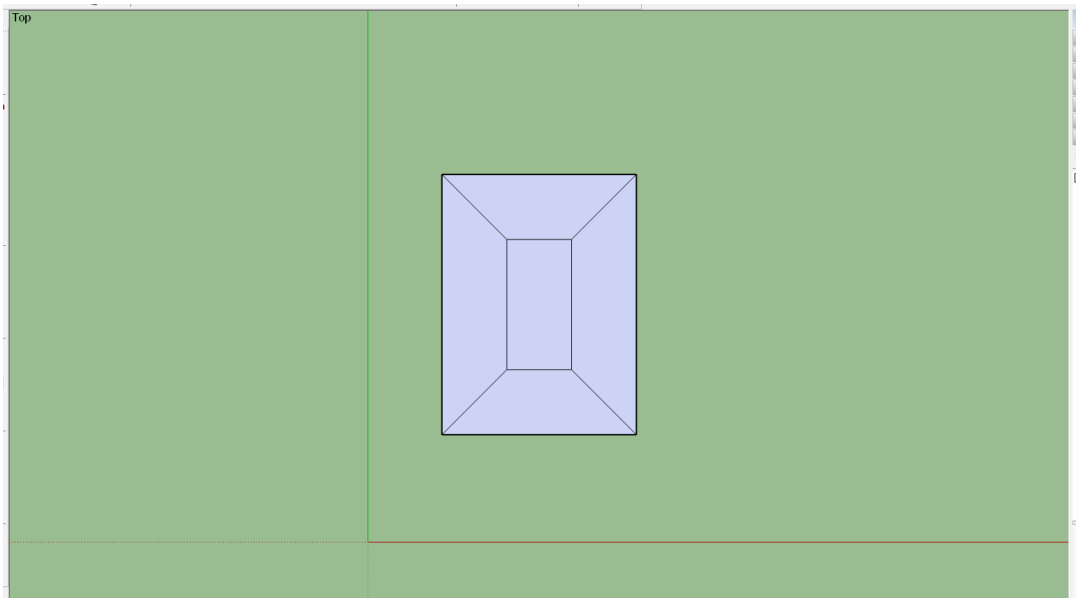
$$X = 5{,}3.10W : 0{,}93W$$

$$X = 5{,}7.10 = 57$$

We should add
57 shields.

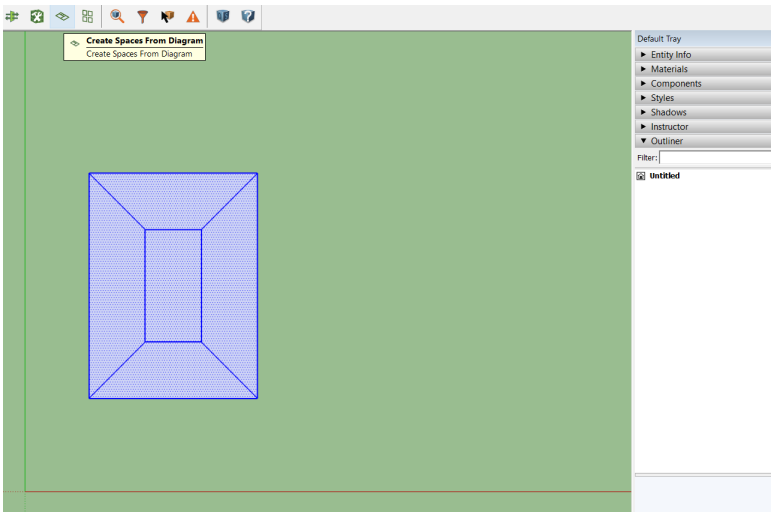
# 1. Geometry Creation

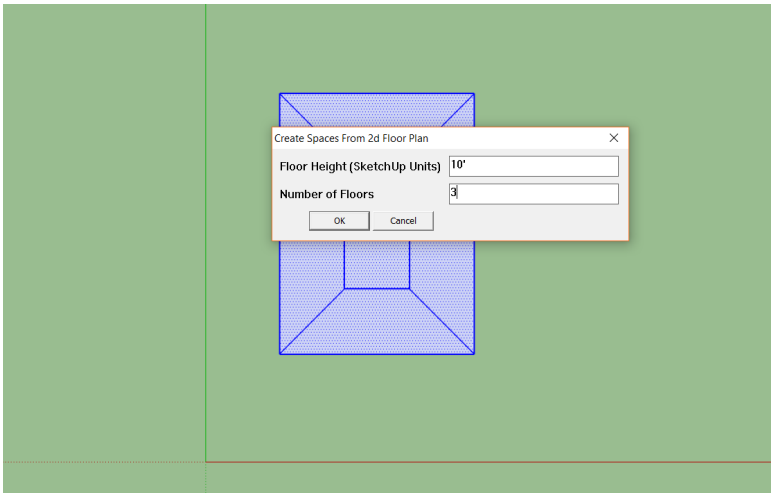
Create in Sketch up a 30m x 40m rectangle.



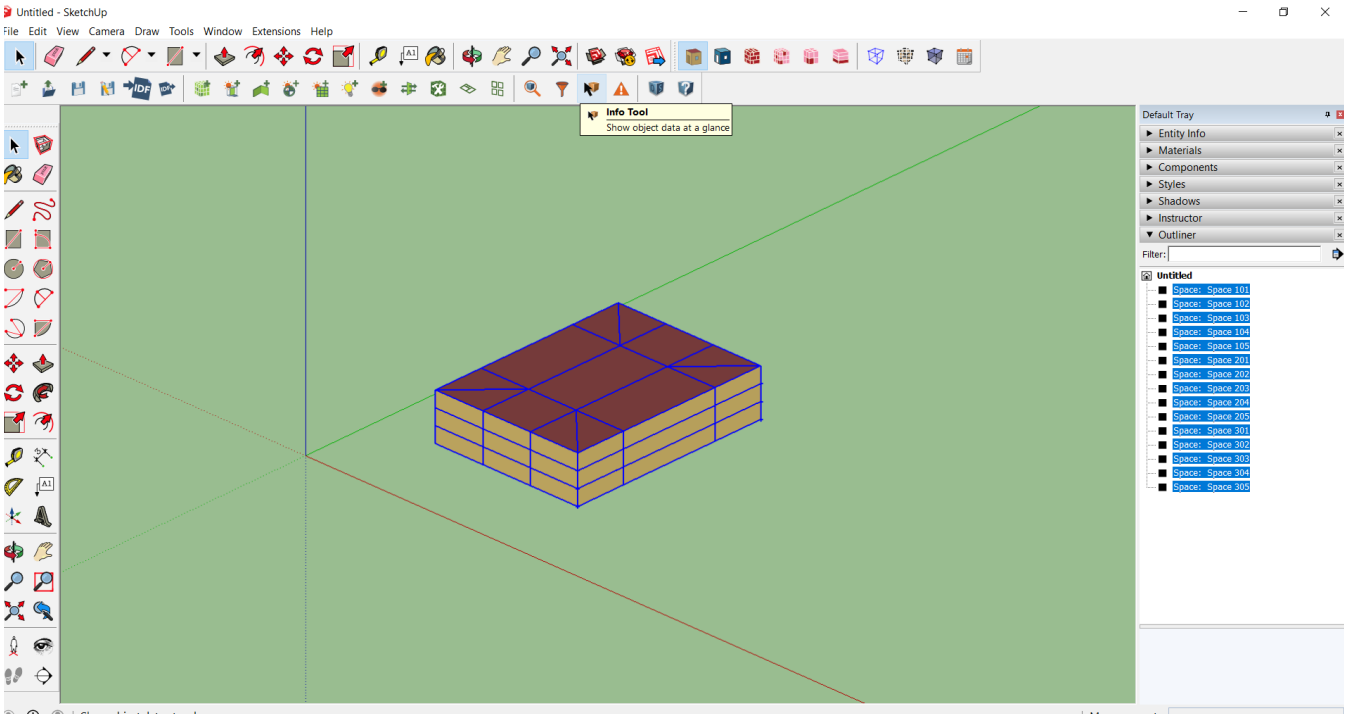

# 2. Spaces creation.

Using the Create Spaces tool we have to create 3 levels.



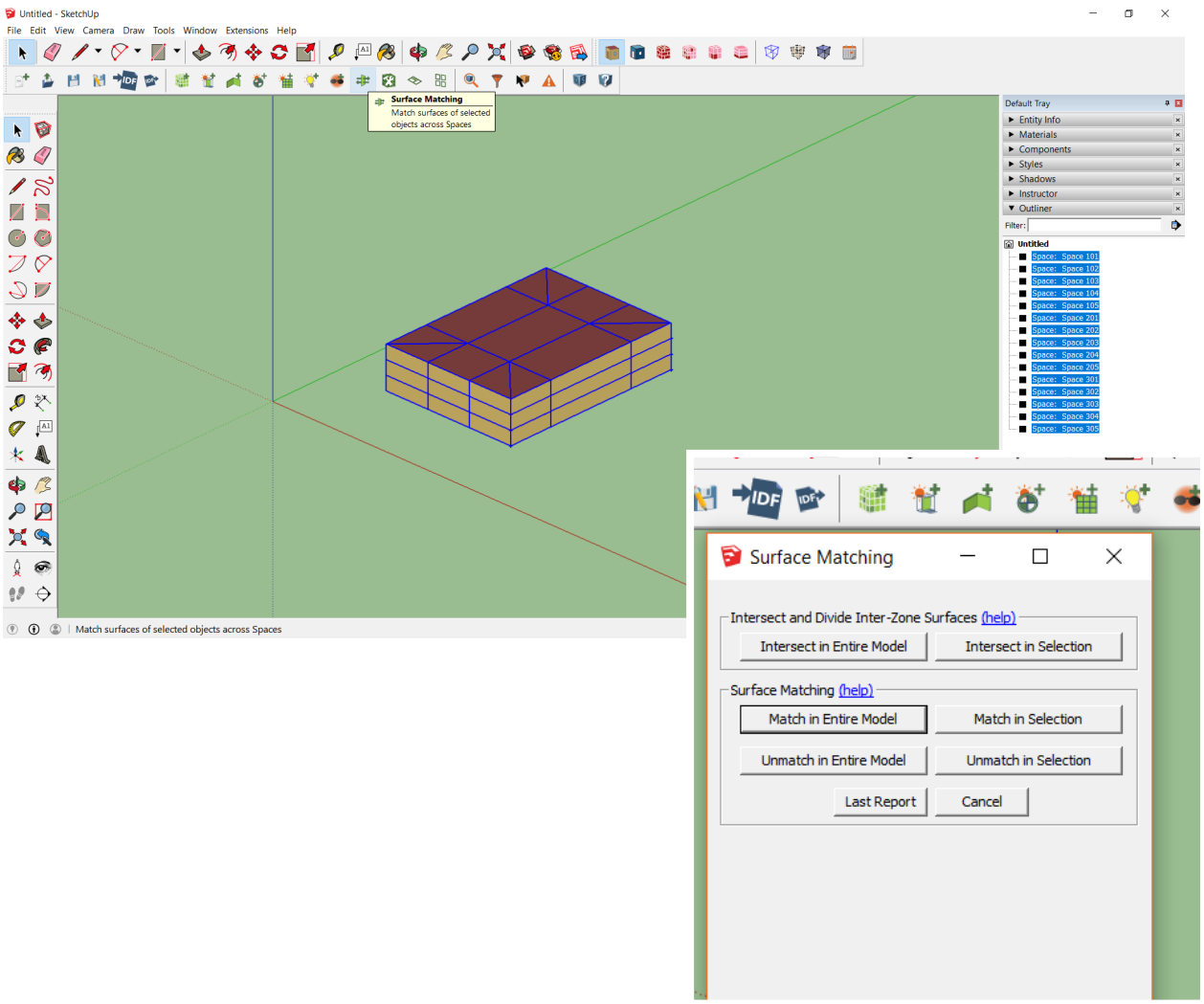



Creating the levels, new layers appear at the right side off the screen. Once the steps are complete, the file needs to be save as an OpenStudio model.

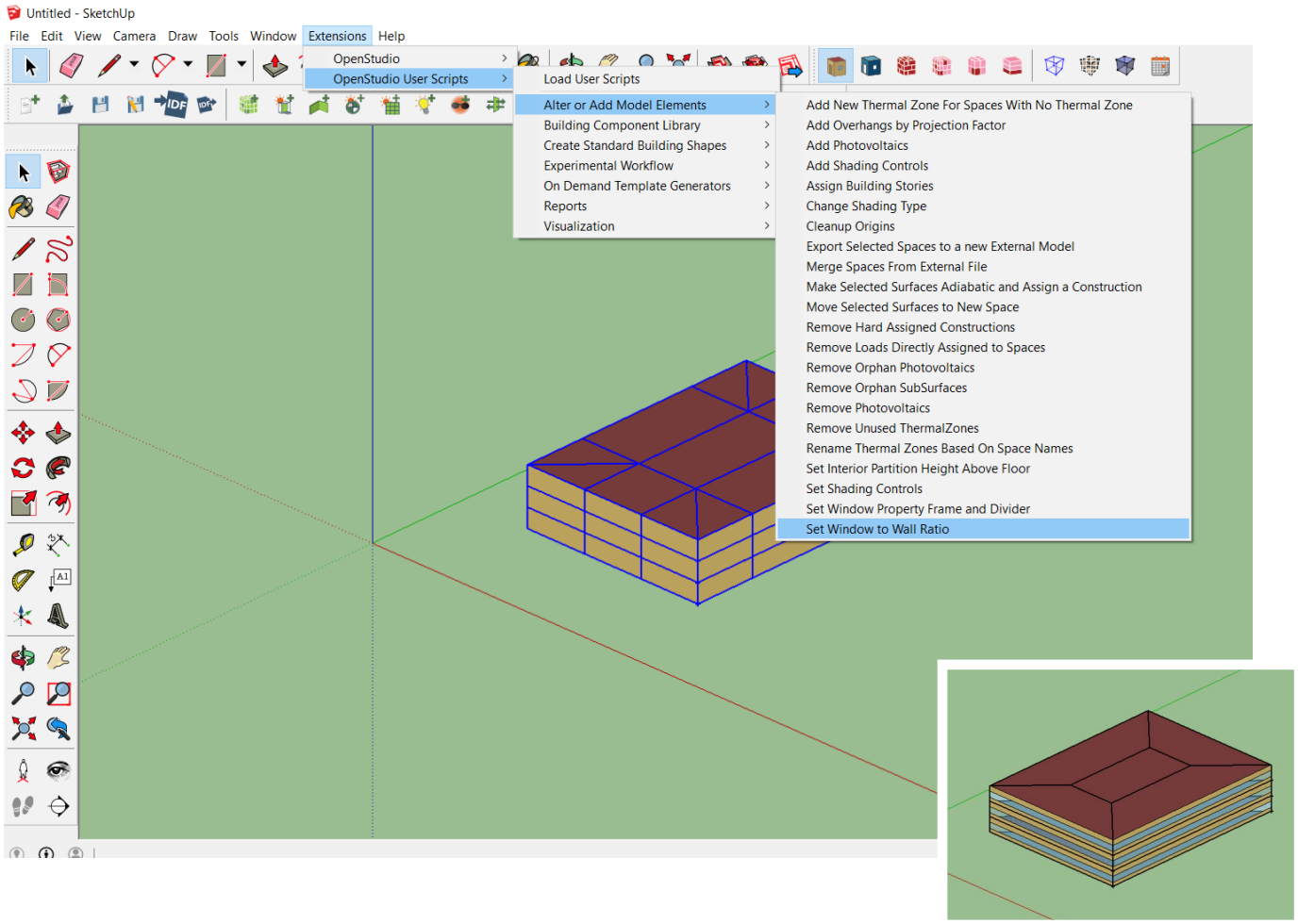



# 3. Match the model.

Using the surfaces matches tool we have to match the entire model. This step is mandatory to be able to create the windows.

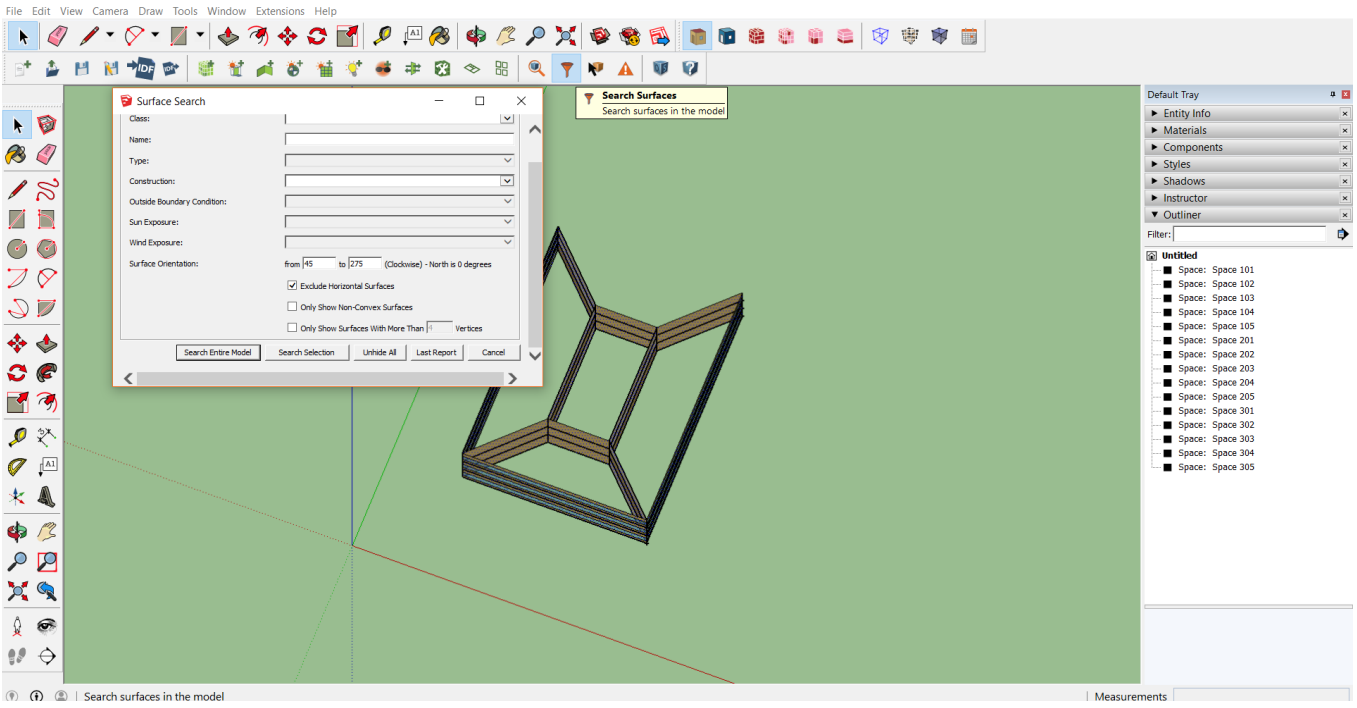


# 3. Windows placements.

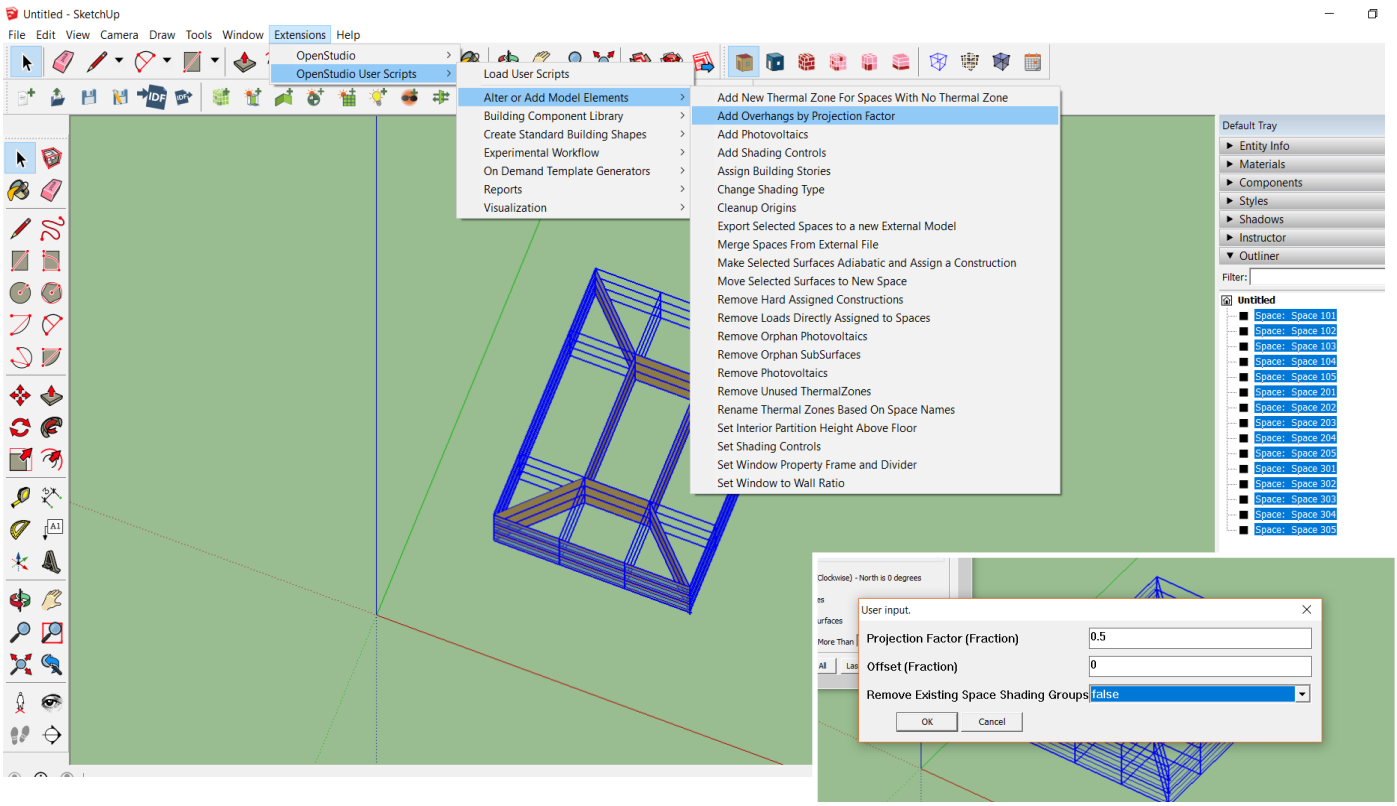



# 4. Selection.

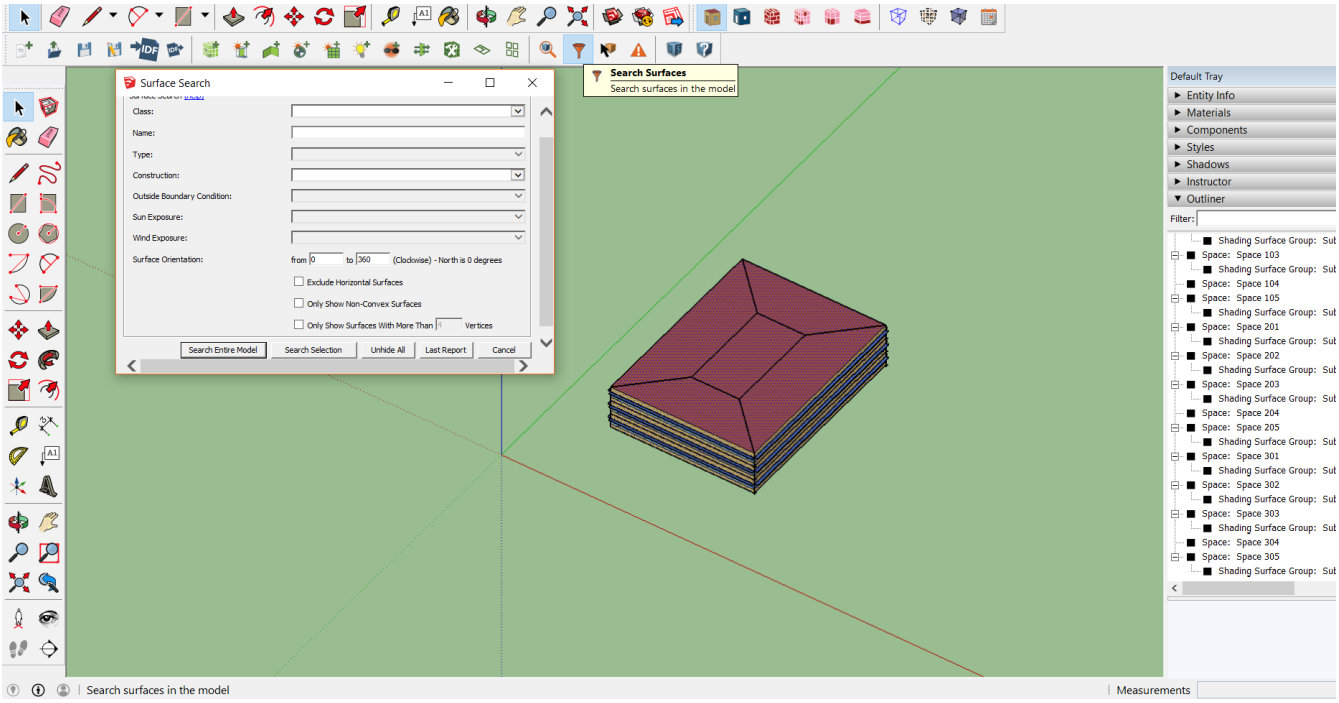
Using the Search Surfaces tool we have to select all the facades except the north one.



# 4. External shading addition.

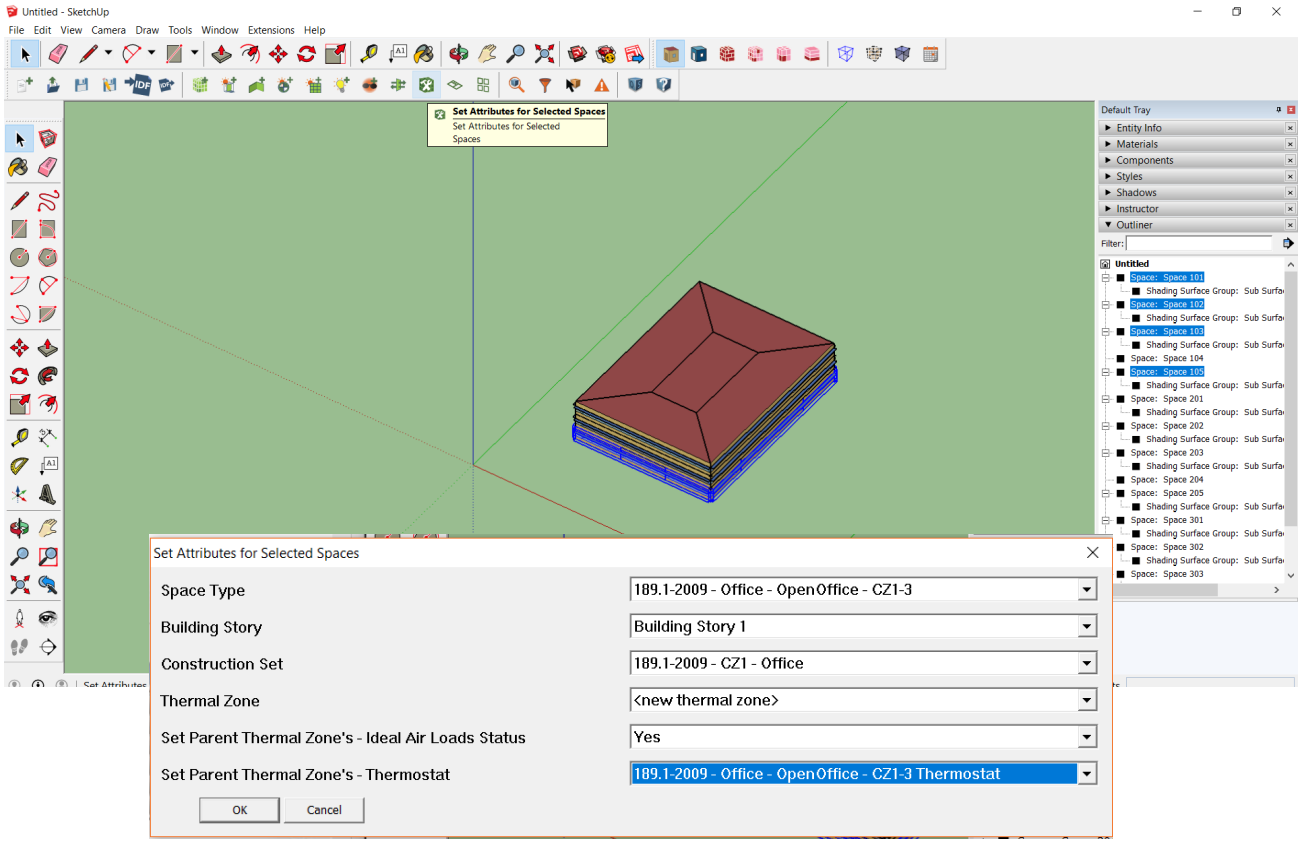


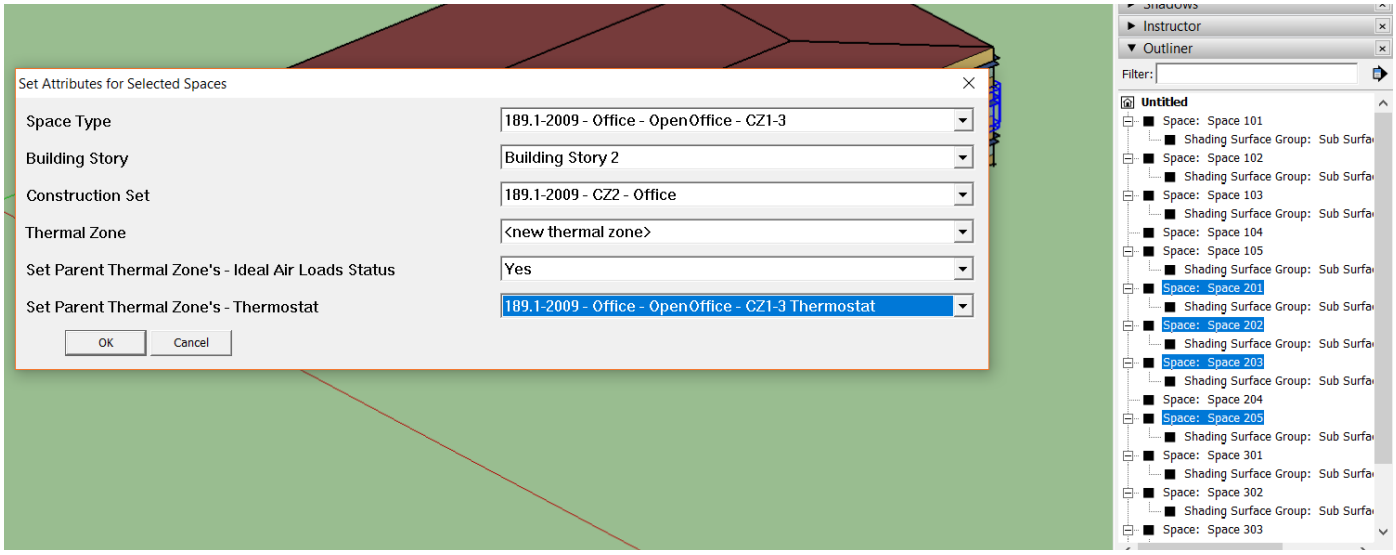

Using the search surfaces tool and applying 0 to 360 parameters we can visualize again the entire model.

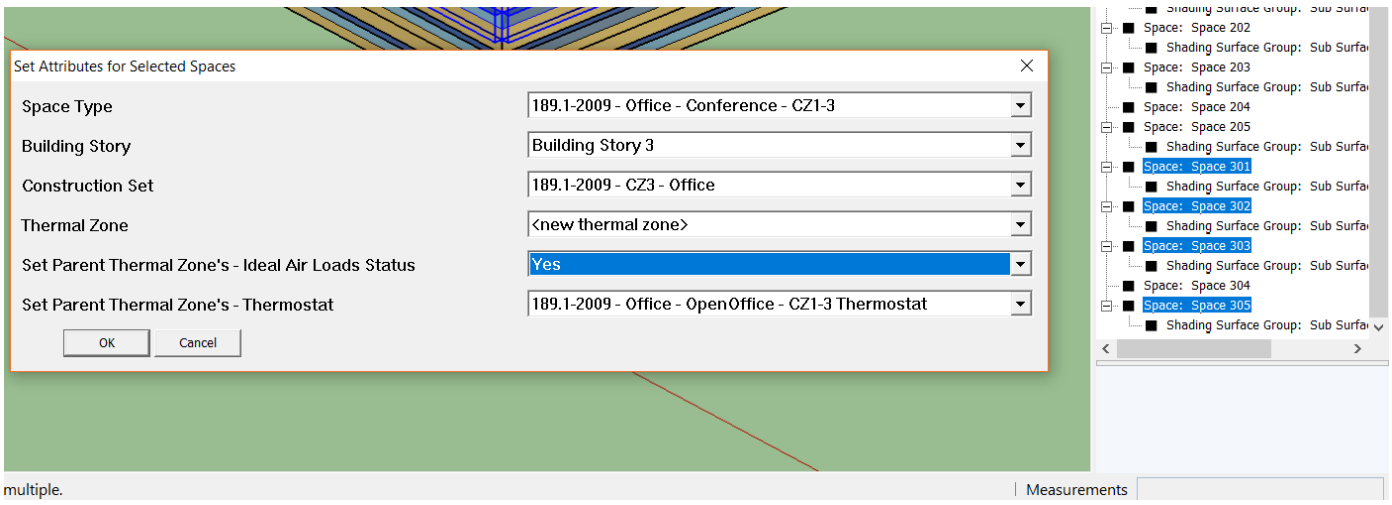


# 5. Adding of specifications.

Choosing each thermal zone, we have to add the specifications.

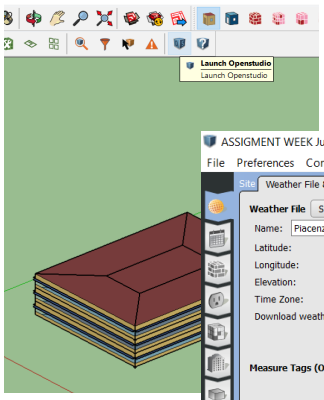


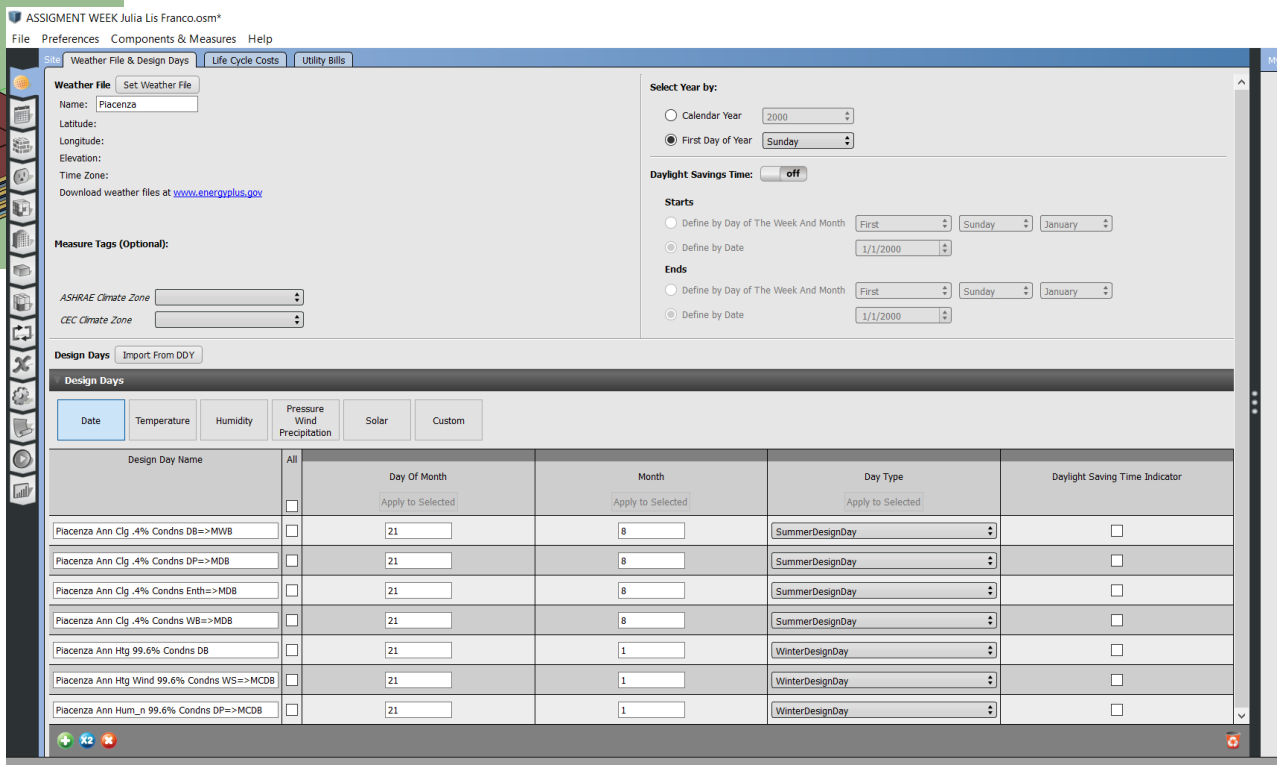



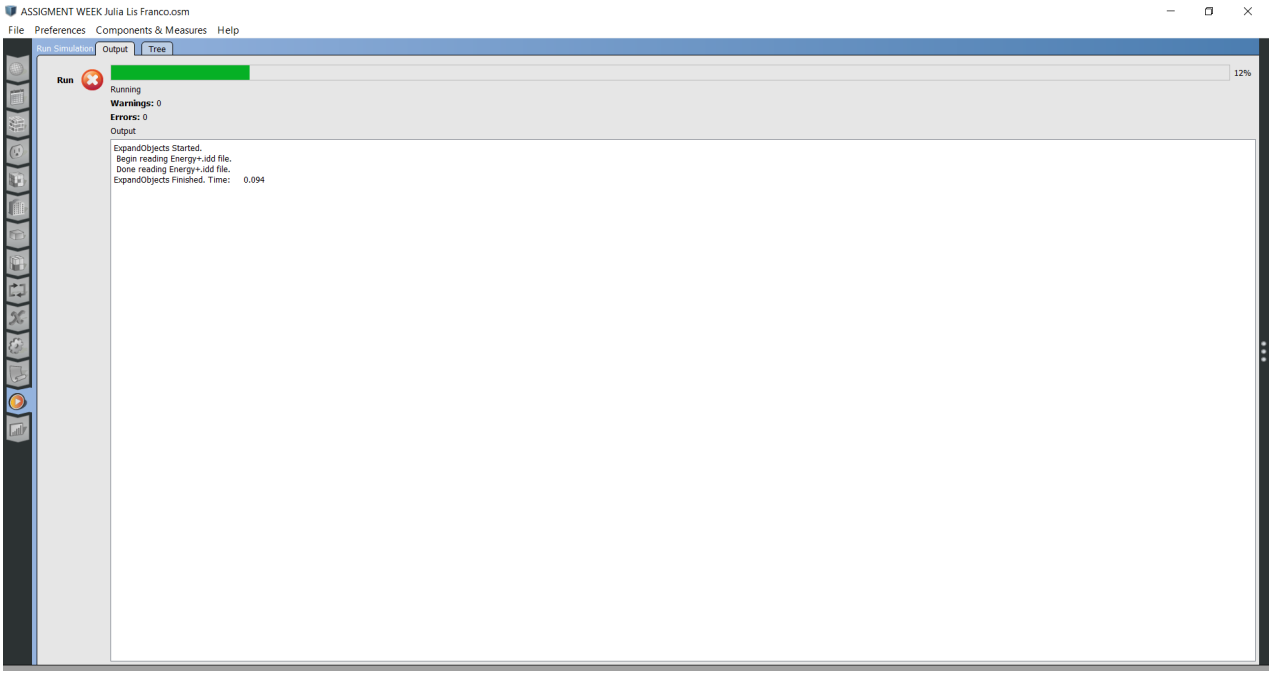



# 6. OpenStudio launching.

Launch open studio and add the weather conditions using the DDY file and run the model.



# 6. Result reviews.