

# WEEK 6

2019年11月12日 20:39

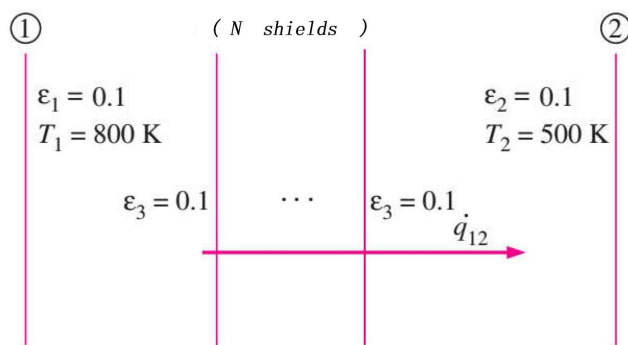
## Task 1

Considering the same example you solved in the previous assignment (radiative heat transfer between two parallel plates), how many shields with epsilon = 0.1 should you add in order to have the new heat transfer rate to be 1% of the case without shields ?

## Task 2

You should create a pdf file with screenshots of all of the steps we went through (clearly from your own file) and explain briefly the reason behind the use of each step (in your own words!)

### 1. RADIATIVE HEAT EXCHANGE BETWEEN THE TWO PARALLEL PLATES



- When  $\epsilon_1 = \epsilon_2 = 0.1$ , without shield,

$$R'_{total} = \frac{1}{0.1} + \frac{1}{0.1} - 1 = 19$$

$$\dot{Q}'_{12} = \frac{A\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1} = A * 5.67 * 10^{-8} * \frac{800^4 - 500^4}{\frac{1}{0.1} + \frac{1}{0.1} - 1} = 1035.82A \text{ W}$$

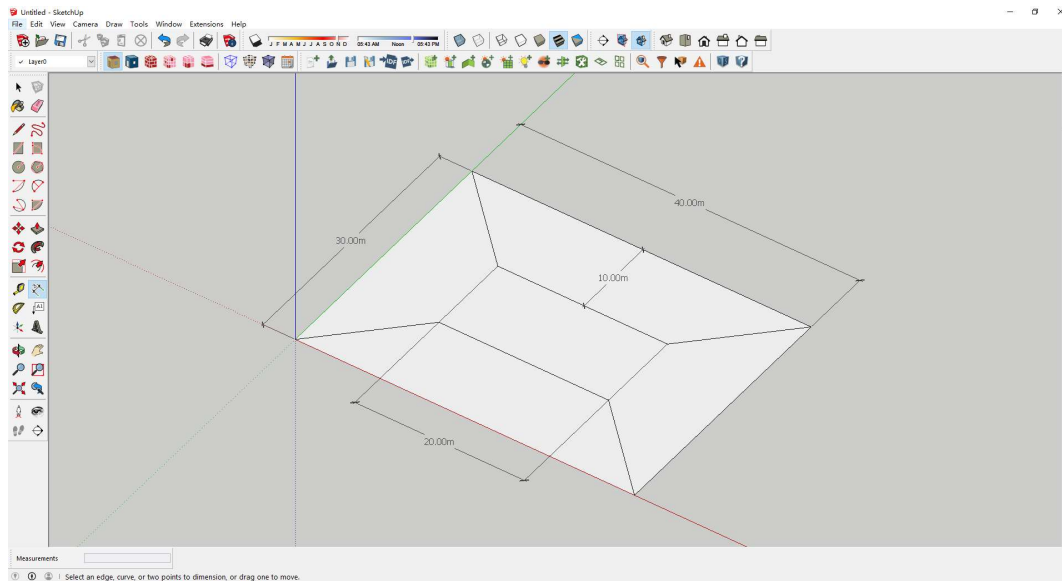
- When the new heat transfer rate to be 1% of the case without shields,

$$\begin{aligned} \dot{Q}_{12,N \text{ shields}} &= \frac{A\sigma(T_1^4 - T_2^4)}{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1\right) + N\left(\frac{1}{\epsilon_3} + \frac{1}{\epsilon_3} - 1\right)} = 1\% * \frac{A\sigma(T_1^4 - T_2^4)}{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1\right)} \\ &\rightarrow \frac{1}{(N+1)\left(\frac{1}{0.1} + \frac{1}{0.1} - 1\right)} = \frac{1}{100 * \left(\frac{1}{0.1} + \frac{1}{0.1} - 1\right)} \\ &\rightarrow N = 99 \end{aligned}$$

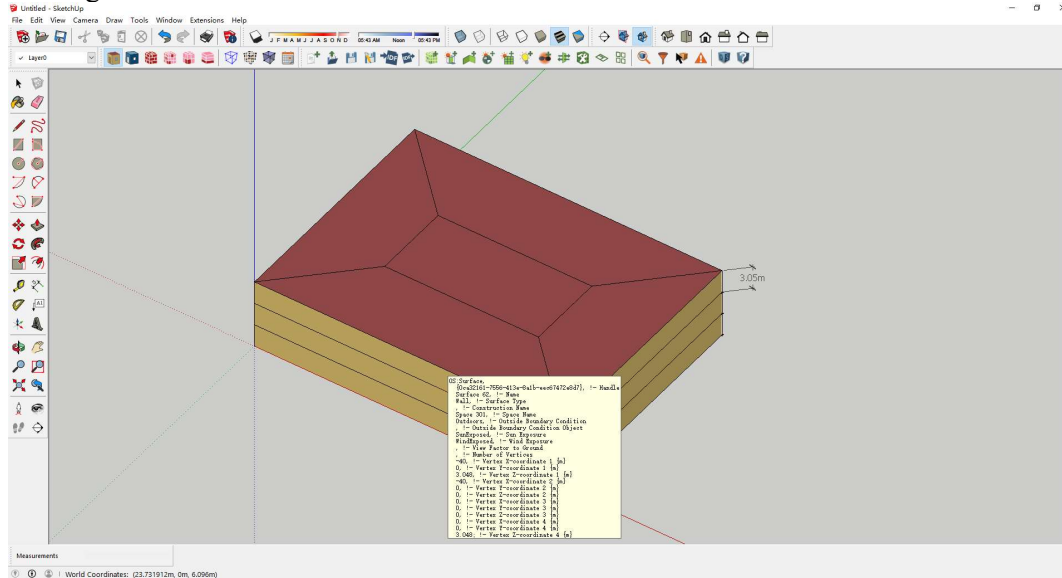
According to the value above, we need to add 99 pieces of shields with epsilon = 0.1 should you add in order to have the new heat transfer rate to be 1% of the case without shields.

## 2. OPEN STUDIO

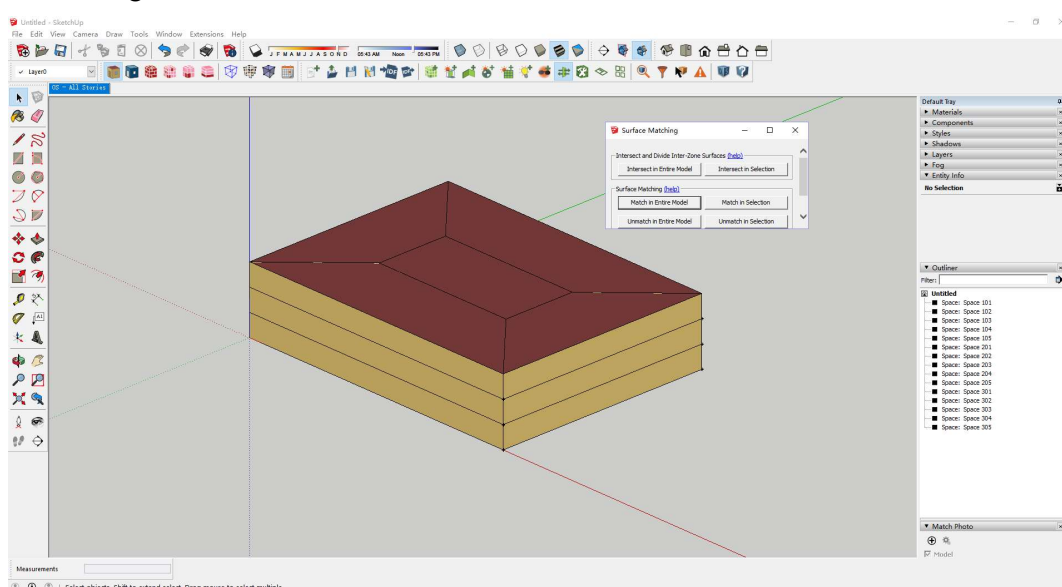
### 1. Making a roof diagram, and create a spaces from diagram



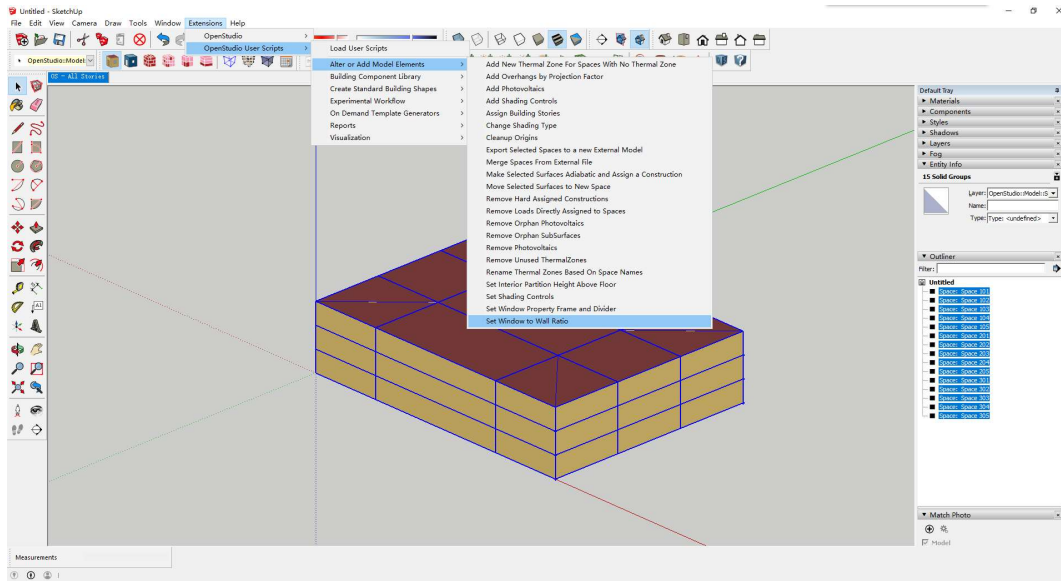
### 2. Using info tool to know all the conditions of each surface



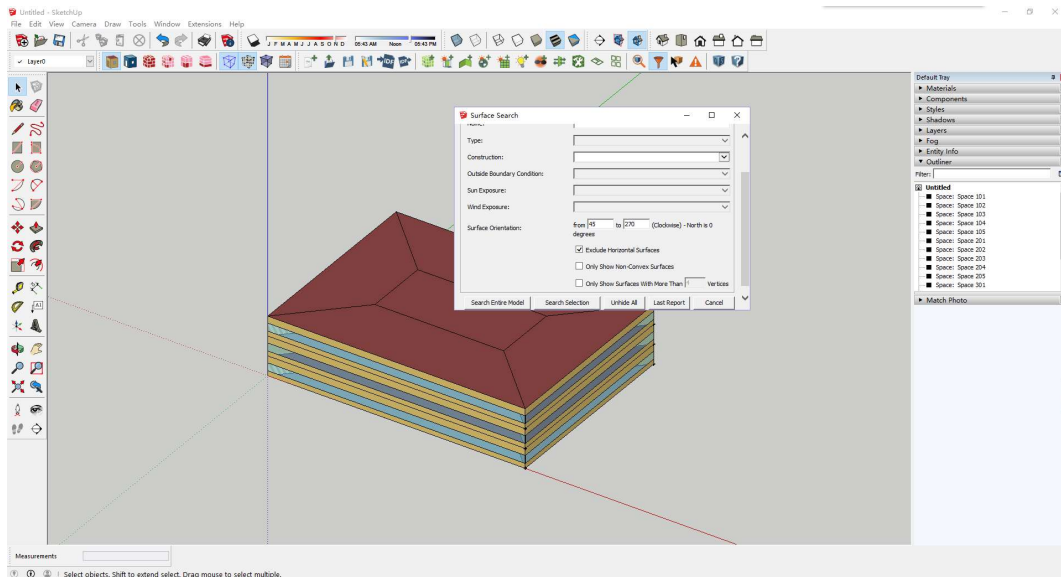
### 3. Matching all the surfaces of model



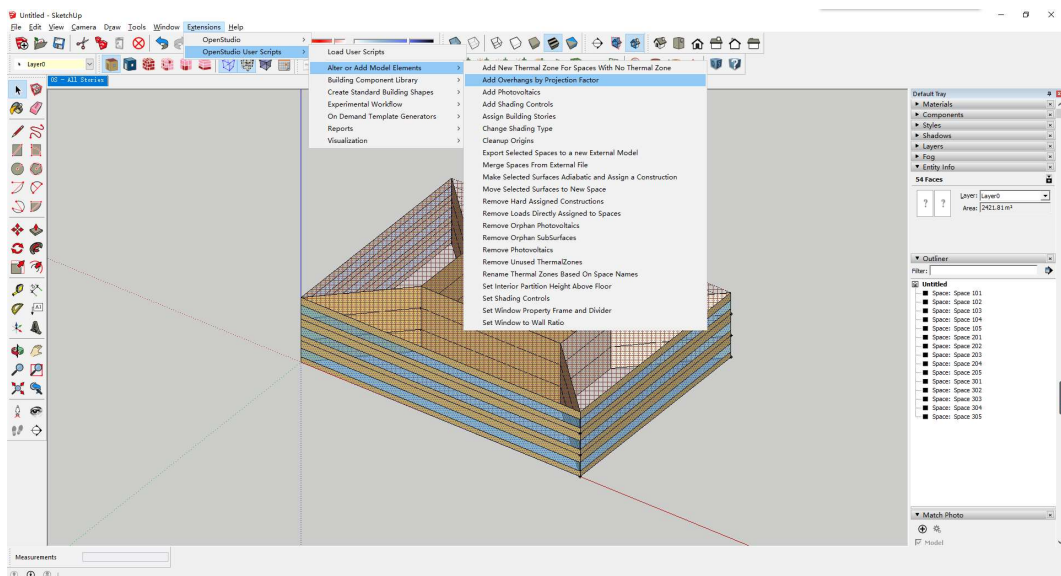
## 4. Adding the windows



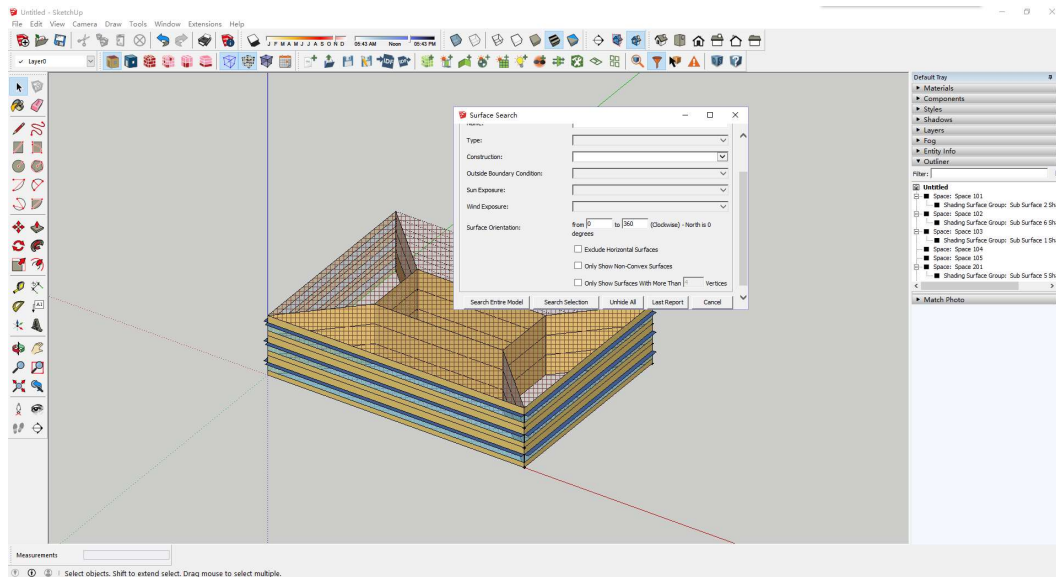
## 5. Selecting all surfaces excepting north



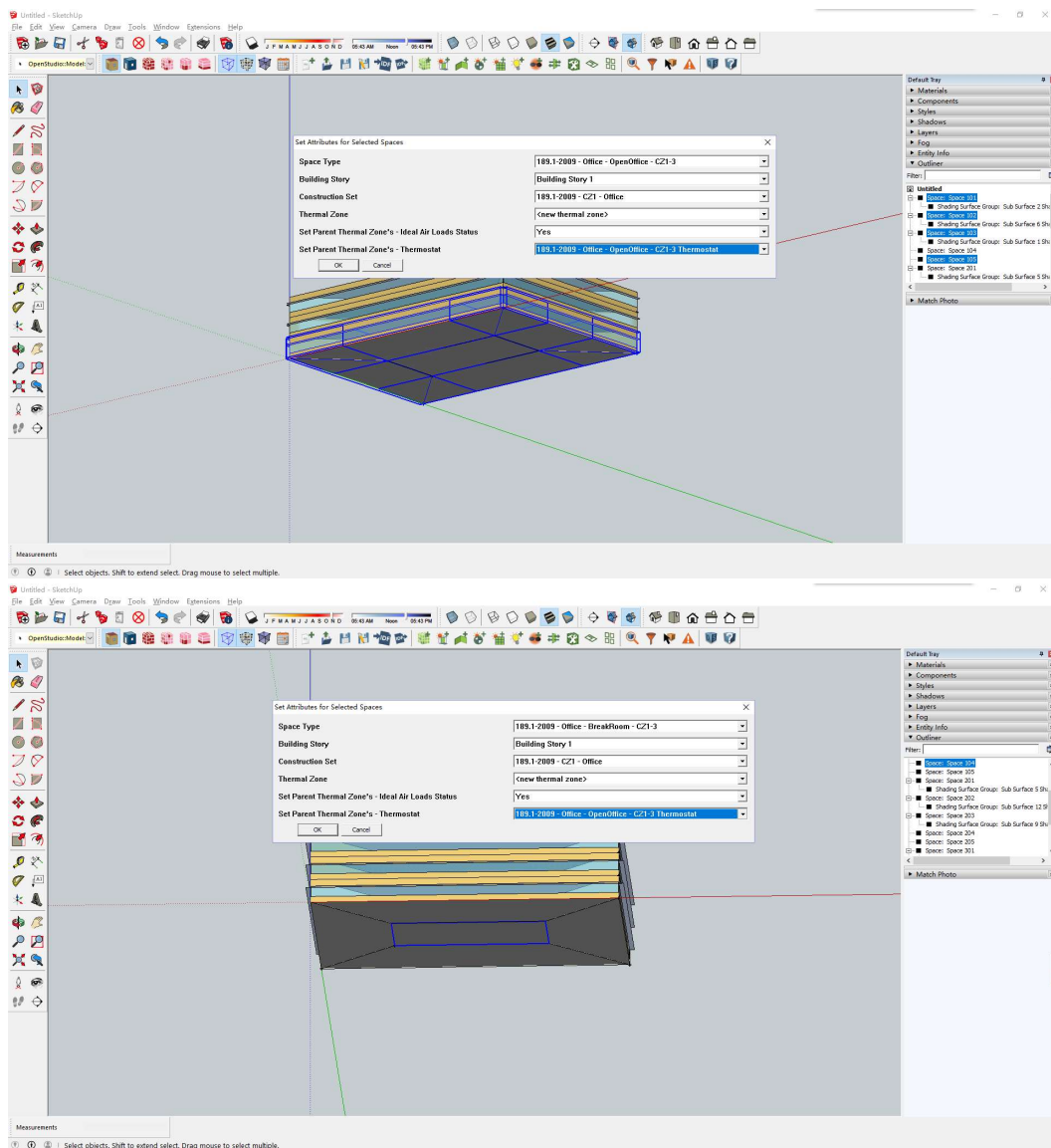
## 6. Adding overhang

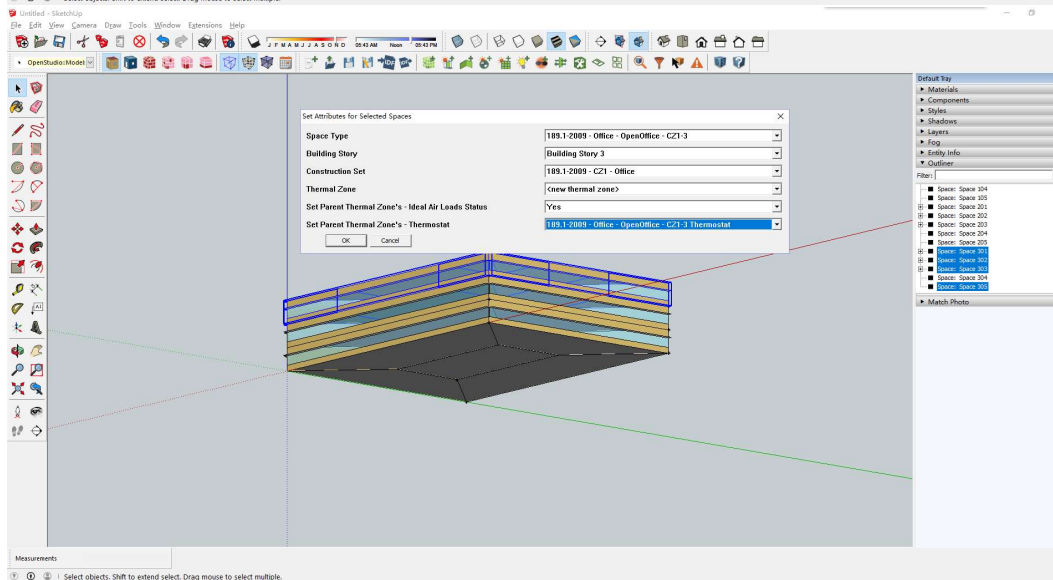
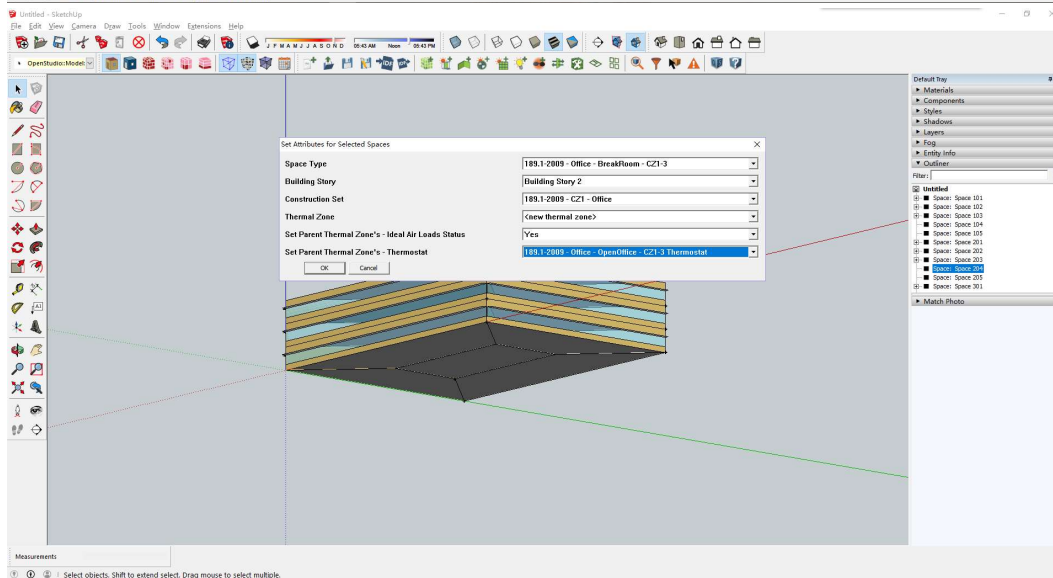
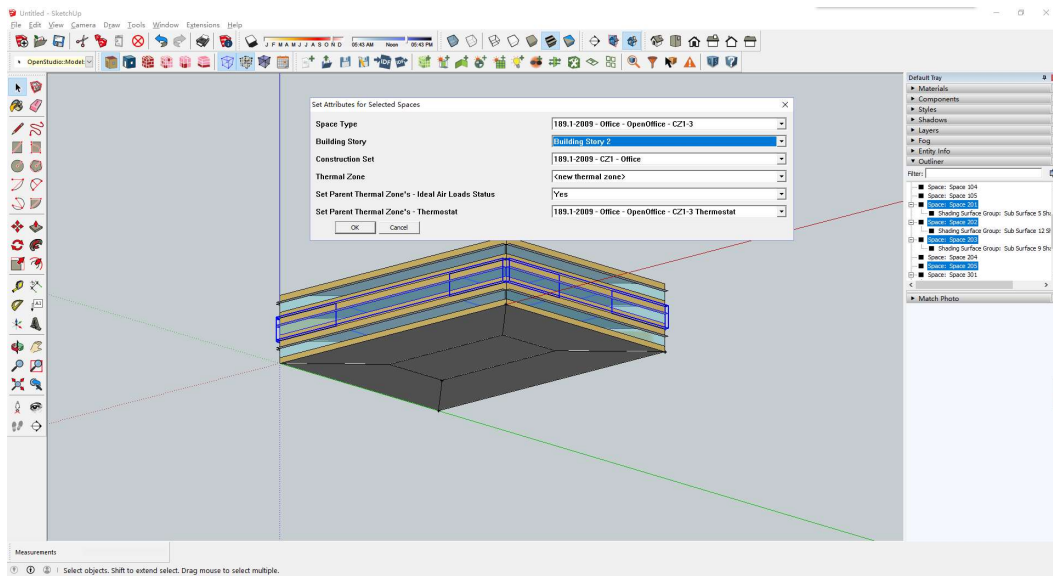


## 7.Back to all surfaces selection

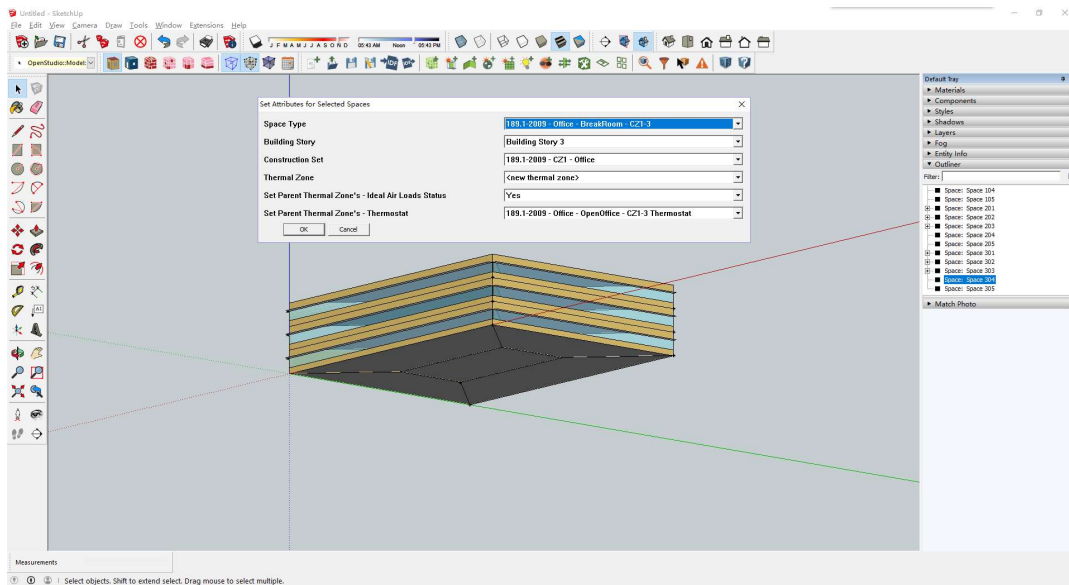


## 8.Adding specification of each layer (thermal zone)

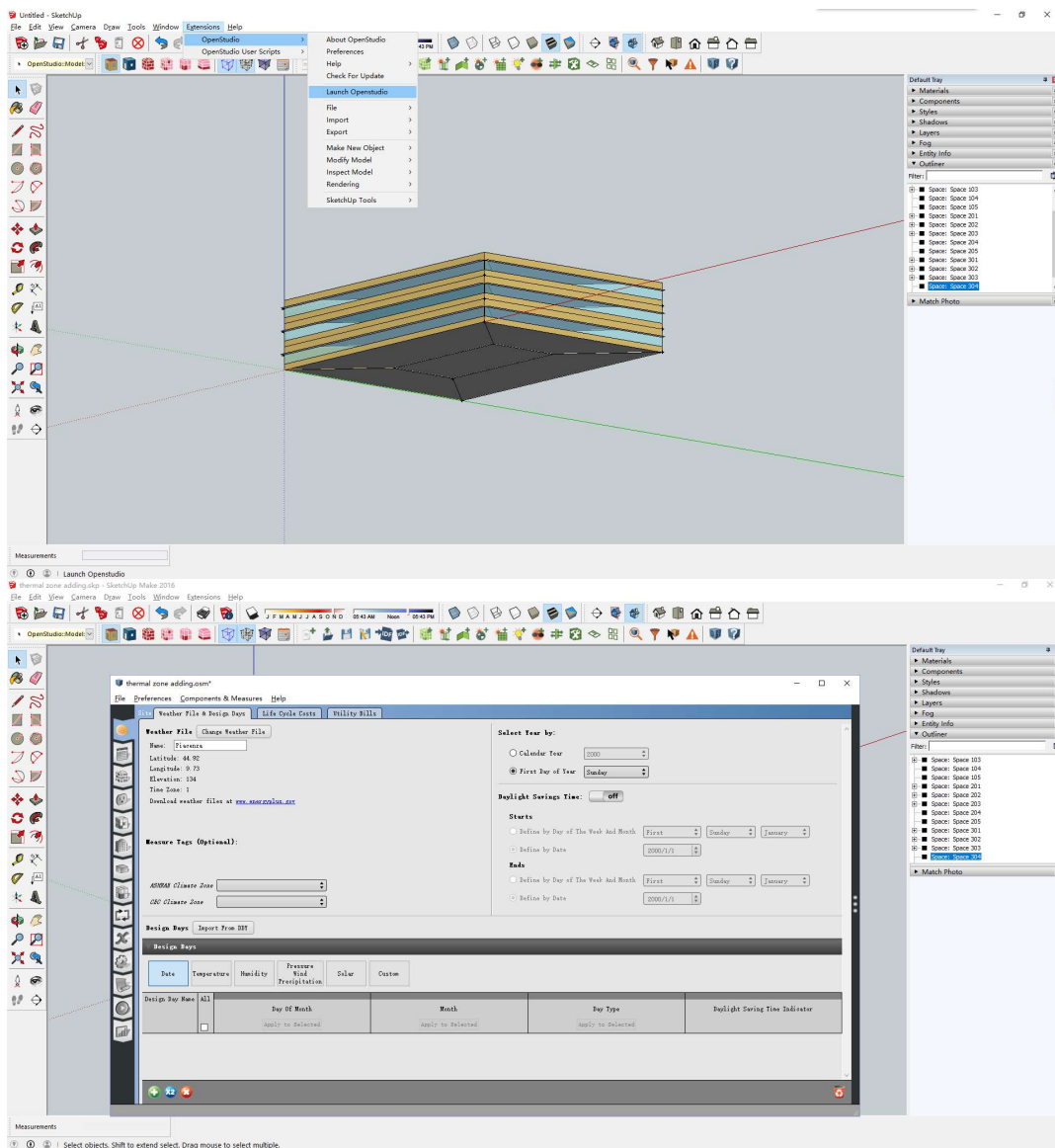




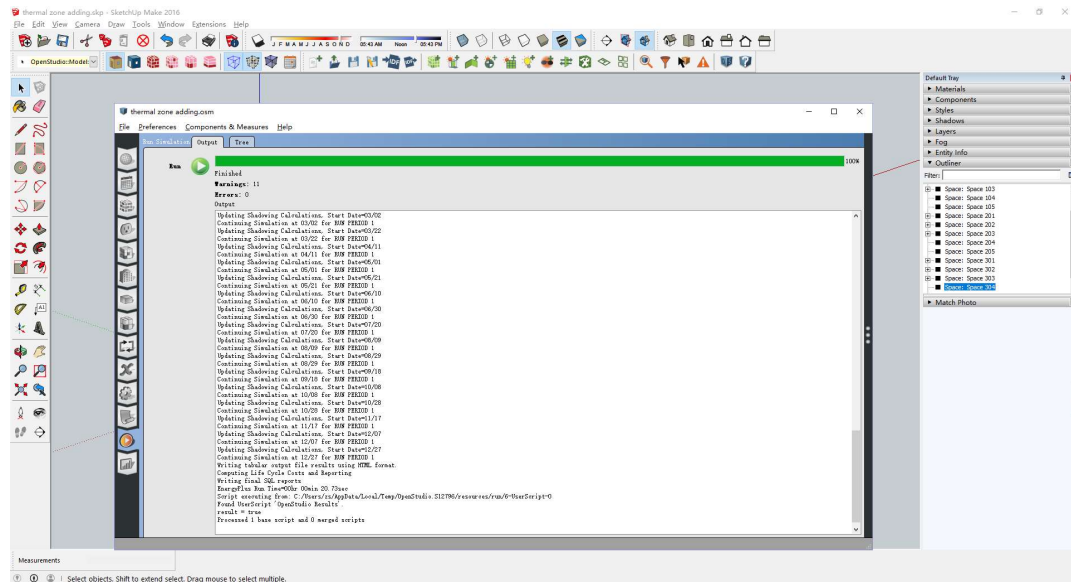




## 9. Launching Open studio, changing the weather data



## 10.running the model



## 11.Checking the energy result

