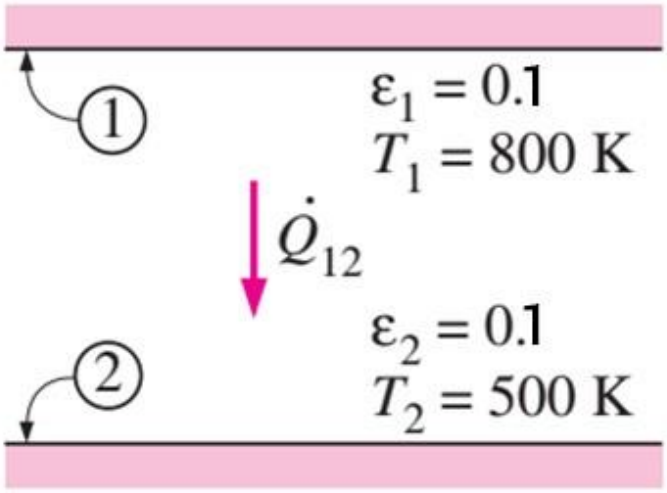
Task 1:



$$\dot{Q}N\ shield = \ 1\%\ \dot{Q}(no\ shield)$$

$$\dot{Q}(no\ shield) = 1.5 \times 5.67 \times 10^{-8} \frac{800^4 - 500^4}{\frac{1}{0.1} + \frac{1}{0.1} - 1} = 1553.72\ W$$

$$\dot{Q}N\ shield = \frac{A\sigma(T_1^4 - T_2^4)}{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1\right) + \left(\frac{1}{\epsilon_{3,1}} + \frac{1}{\epsilon_{3,2}} - 1\right)}$$

$$Q(n-shields) = A\sigma(T14-T24)/((n+1)[2\epsilon-1])$$

$$Q_{1-2(with\ 'n'\ shields)} = \left(\frac{1}{n+1}\right)\frac{A\,\sigma(T_1^4 - T_3^4)}{\left[\frac{2}{\varepsilon} - 1\right]}$$

Q with n shield= 1% Q without shield

Q with shield/ Q without shield = 0.01

$$\frac{1}{\frac{(n+1)\left(\frac{2}{e3}-1\right)}{\frac{1}{e1}+\frac{1}{e2}-1}} = 0.01$$

$$\frac{1}{\frac{19(n+1)}{\frac{1}{19}}} = 0.01$$

$$100 = n + 1$$

n=99

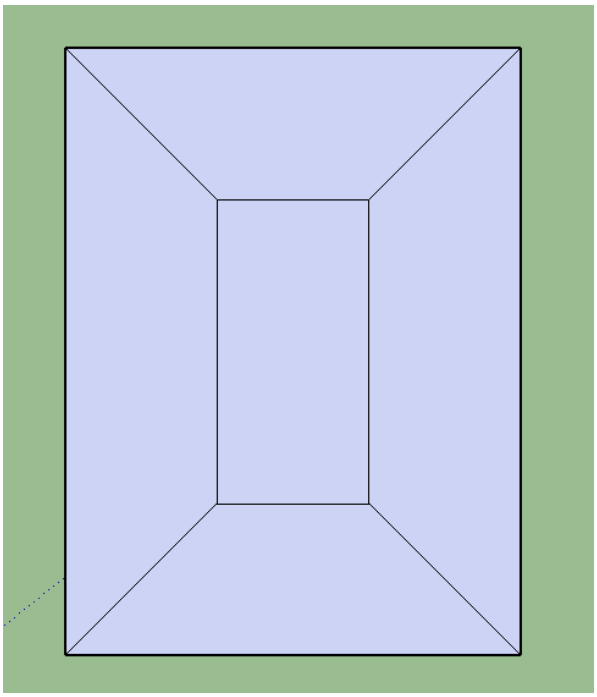
And hence the number of shield is 99 shields

Task 2:

The steps using sketchup and open studio.

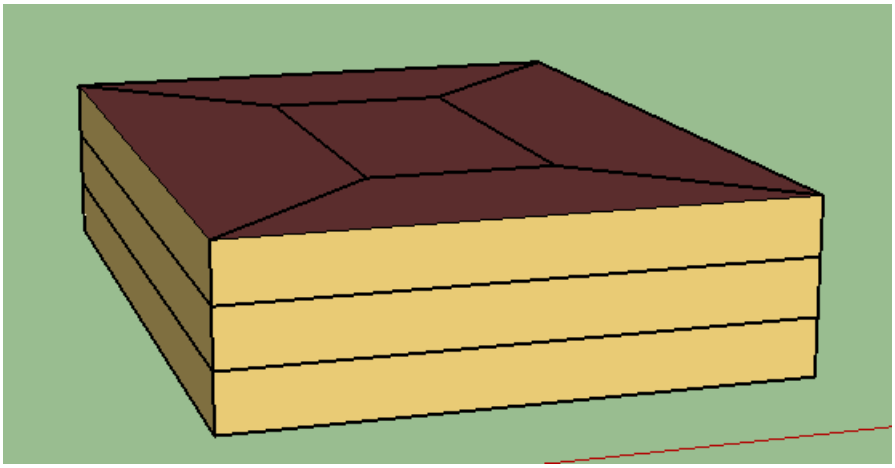
Step 1:

Creating a diagram with connected edges



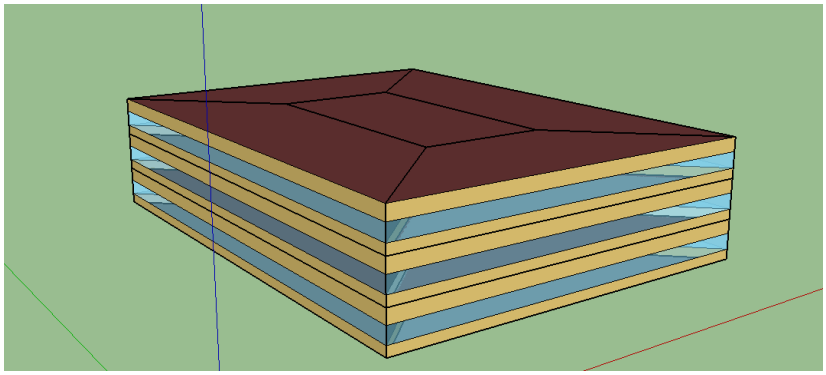
Step 2:

Creating spaces from diagram



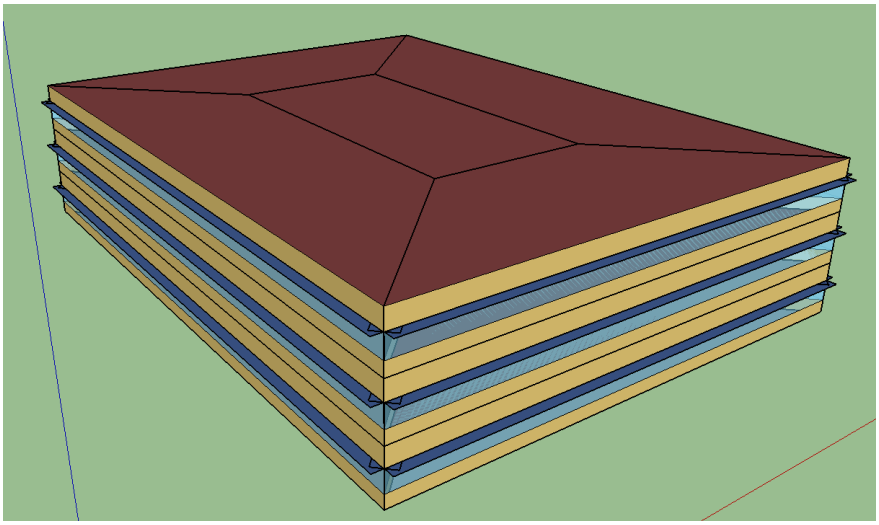
Step 3:

click on the surface matchig tool to create windows inn your building.



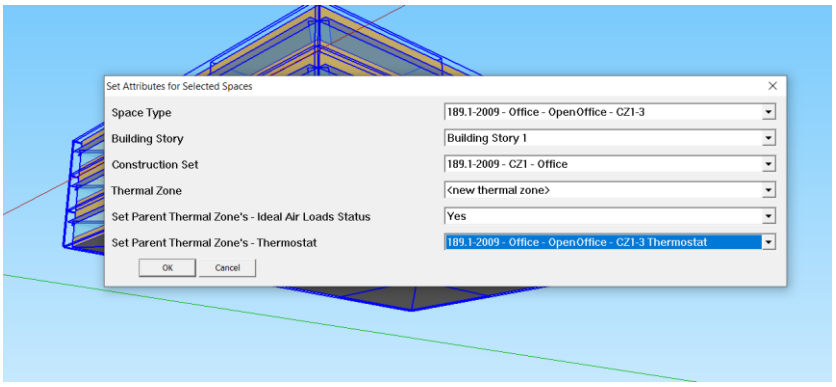
Step 4:

Overgang the external shadings



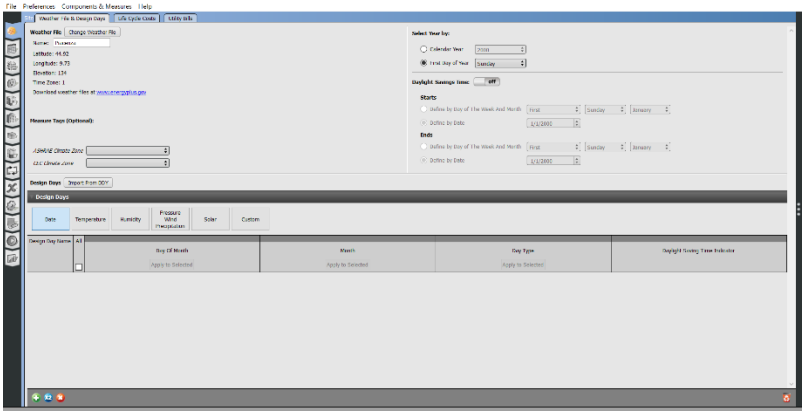
Step 5:

Add specifications to each thermal zone



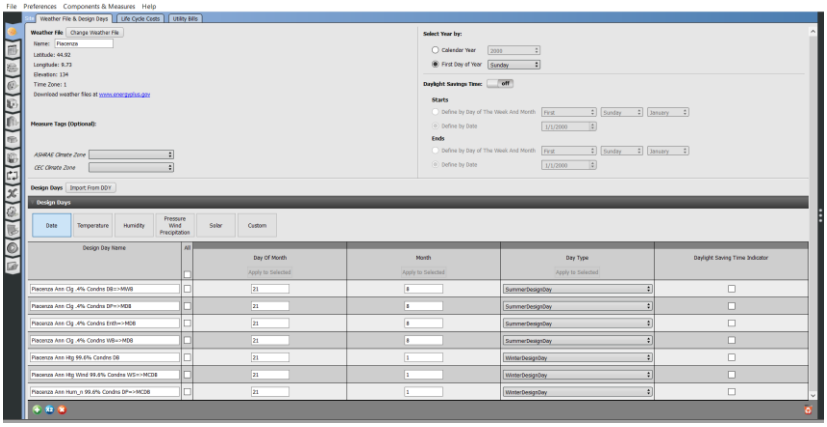
Step 6:

Launching open studio using sketchup and adding the weather data



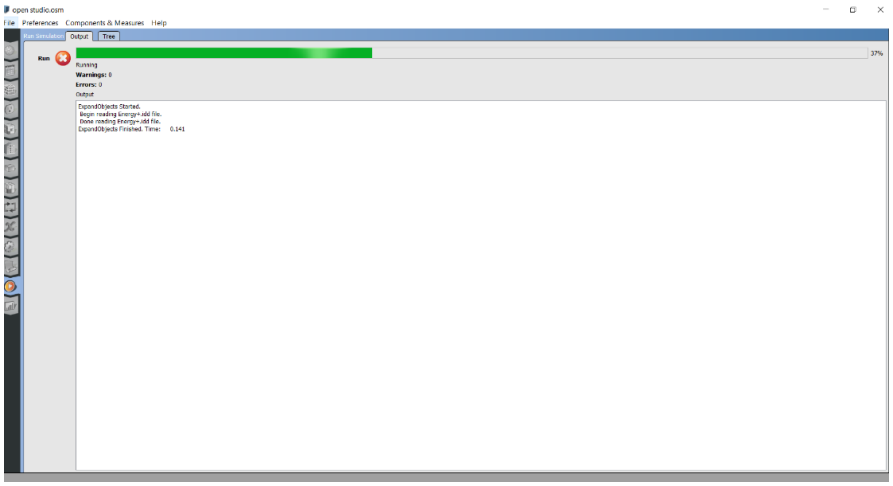
Step 7:

And design days



Step 8:

Running the model..



Step 9:

Reviewing the model summary in the last lab