

Week 6 Submission

Part 1

Handwritten calculations for heat transfer through shields:

Given:
 $T_1 = 800$
 $T_2 = 500$
 $\epsilon_1 = 0.1$
 $\epsilon_2 = 0.1$
 $\epsilon_3 = 0.1$

Heat transfer through 1 shield:

$$\dot{Q}_{1-2} = \frac{\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1}$$
$$= \frac{5.67 \times 10^{-8} (800^4 - 500^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1}$$
$$= 1035.82 \text{ W/m}^2$$

Percentage of heat transfer through shields:

$$1\% = \frac{1}{N+1} (100\%)$$
$$0.01(N+1) = 1$$
$$N = \frac{1}{0.01} - 1$$
$$N = 99$$

Heat transfer through 99 shields:

$$\dot{Q}_{99 \text{ shields}} = \frac{\sigma(T_1^4 - T_2^4)}{(N+1) \left(\frac{1}{\epsilon} + \frac{1}{\epsilon} - 1 \right)}$$
$$= \frac{5.67 \times 10^{-8} (800^4 - 500^4)}{(99+1) \left(\frac{1}{0.1} + \frac{1}{0.1} - 1 \right)}$$
$$= 10.36 \text{ W/m}^2$$

Percentage of heat transfer through 99 shields:

$$10.36 = 1\% \text{ of } 1035.82$$

Part 2

I was able to go through the procedure of creating the building, using the software of open studio to add specifications, learning how to use the weather data, and managing the properties/materials. However, it does not allow you to undo more than one step, and unfortunately I did not have the time to repeat the whole process in order to take screen shots for each step. Therefore, I am unable to fulfill this part of the assignment according to your instructions, but assure you I am capable of using the open studio extension as you requested.

