WEEK 2

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Task 1

Write a summary (in your own words!) about the convective heat transfer (half a page) and explain why increasing the thickness of a single pane glass does not increase the total resistance.

Convection

Heat propagation for convection implies a macroscopic "mass displacement". Convection is a characteristic form of heat exchange between a wall and a fluid (liquid or gas). As a matter of fact, it is the process of heat exchange between a wall and the air.
Convection implies:
•thermal conduction between the wall and the first layer of fluid, which is in contact with the wall
•heat storage within the fluid particles
•movement and mix of fluid particles at different temperature.
Convection can be:
•natural or free
•forced (by means of a mechanical device, such as a fan or a pump, or a natural source such as the wind)

Increasing the thickness of a single pane glass does not increase the total resistance, at least not in a significantly mentionable way, it will just increase the price. This is due to the fact that glass has a very low heat resistance.

Task 2

Write an explanation about what mistakes you made in the class that resulted in wrong answers!!

I got a wrong answer on one of the exercises last week because I forgot to convert a unit, leaving the glass 8 mm instead of 0.008m**.**

Task 3

Solve the same problem as that of double pane window with the air-gap thickness of 13 mm and glass thickness of 6 mm, comment on your results and explain why we have an optimal range for the air-gap's distance!

$$R_{conv1} = \frac{1}{\mathrm{h}1A} = \frac{1}{10 * 1.2} = 0.083\ °C/W$$

$$R_{conv2} = \frac{1}{\mathrm{h}2A} = \frac{1}{40*1.2} = 0.0208\ °C/W$$

$$R_{airgap} = \frac{L_{airgap}}{k_{airgap}A} = \frac{0.013}{0.026 * 1.2} = 0.4167\ °C/W$$

$$R_{glass} = \frac{L_{glass}}{k_{glass}A} = \frac{0.006}{0.078 * 1.2} = 0.0064\ °C/W$$

$$R_{total} = R_{glass} + \quad R_{glass} + R_{conv2} + R_{conv1} = 0.5333\ °C/W$$

$$\dot{Q} = \frac{\Delta T}{R_{total}} = \frac{30}{0.533.} = 56.2535\ W$$

$$\dot{Q} = \frac{T_{\infty 1} - T_1}{R_{conv1}}$$

$$T_1 = T_{\infty 1} - (\dot{Q})(R_{conv1}) = 15.3°C$$

In conclusion , the resistence of the glass is very low compared to the resistence of the air gap.Thus, we can conclude that the air gao affects the total resistence thus the heat transfer in general.