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WEEK 2

CONVECTIVE HEAT TRANSFER

- Convective heat transfer is the transfer of heat energy
- It happens through the movement of fluids
- In architecture: between the air outside and the exterior face of a wall or the air inside and the interior face of wall.
- It goes from the hotter body to the cooler body
- Depends on the temperature difference between two bodies, the wind velocity and the liquid gas flowing to the body

Kinds of heat transfer

Natural convection	Forced convection
↓	↓
Move natural with out the Help of an external force	Fluid moves because of en external force

Why incrising the thickness of a single pane glass does not increase the total resistance?
Because the constant of the heat of the heat transfer of the glass will be the same, and i wont affect much the result of the thermal conduction resistance of the interior and the exterior of the wall.

Consider a 0.8-m-high and 1.5-m-wide double-pane window consisting of two 6-mm-thick layers of glass (k= 0.78 W/m.°C) separated by a 13-mm-wide stagnant air space (k= 0.026 W/m.°C). Determine the steady rate of heat transfer through this double-pane window and the temperature of its inner surface.

Take the convection heat transfer coefficients on the inner and outer surfaces of the window to be h1= 10 W/m2 · °C and h2=40 W/m2 · °C, which includes the effects of radiation.

$$A = \ 0.8 * 1.5 = 1.2m2$$

$$R_{g_1} = R_{g_2} = \frac{L_g}{(K_g \times A)} = \frac{0.006}{0.78 * 1.2} = 0.006410\,°\frac{C}{W}$$

$$R_{airGap} = \frac{L_{airGap}}{(K_{airGap} \times A)} = \frac{0.013}{0.026 * 1.2} = 0.4166\ °C/W$$

$$R_{conv_1} = \frac{1}{h_1 \times A} = (\frac{1}{10 * 1.2)} = 0.0833\,°C/W$$

$$R_{conv_2} = \frac{1}{h_2 \times A} = (\frac{1}{40 * 1.2)} = 0.0208\,°\frac{C}{W}$$

$$R_{tot} = R_{conv_1} + R_{conv_2} + 2 \times R_g + R_{airGap}$$

$$= 0.0833 + 0.0208 + 2 * 0.006410 + 0.4166 = 0.5335\,°\frac{C}{W}$$

$$\dot{Q} = \frac{\Delta T}{R_{Tot}} = \frac{30}{0.5335} = 56.23\,W$$

$$\dot{Q} = \frac{T_{inff_1} - T_{s_1}}{R_{conv_1}} = \rightarrow 56.23 = \frac{20 - T_{s_1}}{0.0833} \rightarrow T_{S_1 = 15.3\,°C}$$

We have an optimal separation space between the two glasses because if it was higher the air will have the capacity to move and it wont be able to wok slowing down the capacity of heat tranfer between the two glasses.