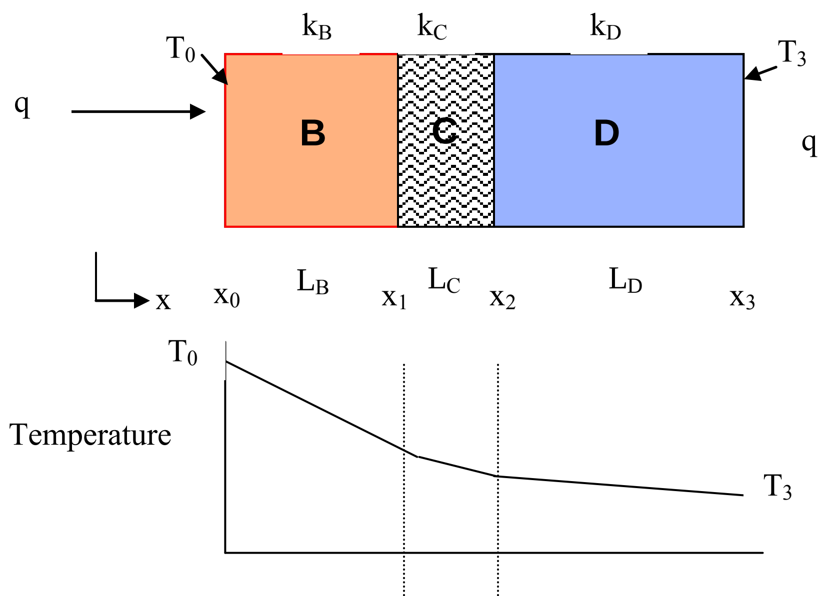
HEAT CONDUCTION IN MULTILAYERED SYSTEMS

COMPOSITE RECTANGULAR WALL (IN SERIES)



In a single layer, the rate of heat transfer is:

$$q = -kA\frac{dT}{dx}$$

Then

$$dT = -\frac{qdx}{kA}$$

or,

$$\Delta T = -\frac{q\Delta x}{kA}$$

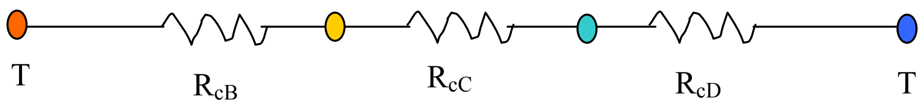
$$\Delta T_D = -\frac{qL_D}{k_D A}$$

$$\Delta T = \Delta T_B + \Delta T_C + \Delta T_D$$

$$T_0 - T_3 = -\frac{q}{A}\left(\frac{L_B}{k_B} + \frac{L_C}{k_C} + \frac{L_D}{k_D}\right)$$

In the preceding equation, for the conditions described in the figure where q is positive in the right direction and $T_0 > T_3$, L_B, L_C and L_D will be negative values, (x_0-x_1, x_1-x_2, and x_2-x_3). Therefore,

Using the Resistance Concept:



$$q = \frac{T_0 - T_3}{R_{cB} + R_{cC} + R_{cD}}$$

$$R_{cD} = \frac{L_D}{k_D A}$$

and

$$q = \frac{T_0 - T_3}{\dfrac{L_B}{k_B A} + \dfrac{L_C}{k_C A} + \dfrac{L_D}{k_D A}}$$