Heat Transfer Questions & Answers

You should always compute α using more fundamental properties k, c, etc, and never use α directly from the tables. This is because in the tables some solids have a range of c, k, etc, and not specific values. The value you choose for k and c at one point in your solution must be the same as those that are used to calculate α, or your solution will be inconsistent. I think I mentioned this in class already, so I'll give you just 0.5 point bonus boost.

Question by Student 201227127

Hi professor, I have a question about not infinite cylinder. in this case, use heisler chart with intersection between infinte cyl. and plane wall. but I think we must find biot and fourier number about cylinder. but in my lecture note, we find fourier number about infinite cyl. and plane wall, saparetely. When I calculate fourier number about total cylinder, Fo<0.2. but Fo in infinite wall and infinite cylinder are satisfied Fo>0.2 saparately. then Can't we use heisler chart about total cylinder?

You can still use the Heisler charts if $\text{Fo} < 0.2$. But keep in mind there will be a more substantial error on the term determined. In this case, the error is on the parameter $(T_0 - T_\infty)/(T_i - T_\infty)$. Thus, if your Fourier number is much less than 0.2, and you have no choice but to use the Heisler chart to solve the problem, you need to make a statement in your solution that there may be significant error on a certain term (don't just say there is error, specify on which term the error is high). I liked your question but it was sloppily typed with no uppercases at the beginning of sentences and some wrong uppercases in the middle of sentences. I'll give you 1 point bonus boost for it.

Question by Student 201600011

I have a question about the exercise 1 in design project. The first idea that came to me to solve this problem, is to write the temperature equation of the steal as a function of time : $T = 780 - [\frac{22t}{3600}]$ *and then substitute this equation into heat equation, substituting* T *in* $[\frac{d\rho cT}{dt}]$ *and with* $Q_{in} = 0$ *,*$Q_{out} = h(T - T_\infty)$ *and isolate* T_∞ *which is the temperature in the hooven that we are looking for. Is this method correct to solve this kind of problem? Thank you,*

Hm, I think you're on the right track, but some logical steps may be missing. In the question, it is stated that the steel can not be cooled faster than 22 degrees per hour. This means that the steel anywhere within the block (at the center, on the edges, and on the corners) can not be cooled faster than 22 degrees per hour. As we learned in class, you can use either the LCA (or a similar approach based

on a similar derivation with the same assumptions) or the Heisler charts to solve such a problem. First, you need to determine which approach is appropriate and why. Then determine which part of the steel will be cooling fastest and focus on that from then on.. I'll give just a 0.5 point boost here because the question is not really a question but more a verification of your solution.

Question by Student 201327557

Sir, I have question about design problem #2. Do I have to neglect interactions such as heat convection between each fins?? If my assumption is right, do I just multiply 10 for 10 aluminum fins??

You have to find the most accurate answer possible given the tools outlined in class. If we have seen a way to take into consideration the interaction of one fin's heat transfer on the other, then use such a way. I'll give you 0.5 points bonus boost here.

Question by Student 201327557

Sir, I got question about Design problem #3 just for curious. In class you mentioned APU that located on tail wing. I searched internet but I couldn't find anything about APU. What is APU and Why does airplane need APU??

You can read about it here:
https://en.wikipedia.org/wiki/Auxiliary_power_unit

Question by Student 201327557

Professor I have another question about fin efficiency. In my lecture note that derived fins assumptions are steady state, k constant, h constant, 1-dimensional heat transfer in x axis and $t \gg w$. I do not know why $t \gg w$ is needed.

I do not understand your question.. I don't think I mentioned that $t \gg w$.. Your questions don't sound genuine or are badly formulated. To give you more time to ask a proper question, I set the minimum interval between questions per student to 2 days.

The bonus boost has been added to the scoresheet for the midterm bonus. Check if it has been added correctly.