Heat Transfer Class Project

Heat transfer is a physical phenomenon which occurs in all situations where a temperature difference exists. It can be observed in micro-scale and in the scale of the universe, in the performance of complex technological systems and in the simple home equipment, it can be harmful and it can be utilized. Heat transfer is everywhere: find it and study it. Choose a problem where heat transfer plays a significant role (interesting for you, or which has a practical interest, or where interesting heat transfer methods can be applied), investigate it and share your knowledge. You can work individually or in a team of two investigators. You can use any help and consultations from any specialists (on your own expense). Do not simply recycle your Capstone work (it should be something beyond).

PowerPoint Presentation file NAME it: PROJECT2014-# in class roll-#in class roll.ppt

Presentation has to be informative as a poster presentation

Presentation should be submitted by 1:00 pm April 7, 2014 to CB-133

I prefer to have it on a CD or in a jump drive (will be returned to you).

Presentation has to be consistent with the requirements for the formal report:

Short summary of the project presentation:

- 1. Title, names (possibly team photo).
- 2. Introduction description of the problem and the objectives.
- 3. Heat transfer problem setup.
- 4. Solution and procedure.
- 5 Clear presentation and discussion of the **results** (may include demonstration and prototype).
- 6 **Conclusions** and **recommendations**.
- 7 **Appendix** (references, properties, derivation of equations, details of solution, photos, acknowledgments, etc.).

Your Project Presentation:

Quickly communicate the most important aspects of your project.

Clearly show your project's objective, solution, and impact.

Be professional and attract attention.

Be creative in what you use in the presentation. This could include photos, video, portions of drawing, etc.

List of some possible topics for heat transfer project (but your own problems and creativity are encouraged)

0. Energy saving projects are encouraged!!!

- 1. Explain some natural physical phenomenon with heat transfer.
- 2. Evaluate different methods of measuring the surface temperature of an object.
- 3. Investigate the performance of the modern two-pane windows (argon filled, coated glass, etc.) or double and single doors. Effect of reflective films.
- 4. Conduct a thermal analysis using Pro-E or some other engineering software.
- 5. Use thermal test equipment in room 110 (manuals can be obtained from Kevin in CB 154 ME check out room) to conduct heat transfer experiments:
 - investigate thermal conductivity of some materials;
 - measure convective heat transfer coefficient for fluid flow over an object;
 - measure the contact resistance between two metal surfaces; study the effect of pressure on the contact resistance;
- 6. Measure and predict the fin effectiveness of a car radiator or motorcycle engine cooling fin.
- 7. Measure and predict the overall heat transfer coefficient (and performance) for an insulating container.
- 8. Measure the overall heat transfer coefficient for a home ice cream freezer. Use the value to estimate the time o freeze ice cream. Demonstrate your results in class.
- 9. After obtaining permission from the builder, visit a new home under construction. Make the necessary measurements to enable you to determine the total thermal resistance value of one of the home's walls. If you were to improve the wall resistance to decrease the energy loss to ½ its current value, estimate how much more could have been spent on the better wall by looking at the present value of the energy savings over the next 20 years.
- 10. Model the periodical variation (daily, seasonal, annual) of ground temperature as a function of time and depth.
- 11. Investigate the performance of a greenhouse.
- 12. Investigate greenhouse effect.
- 13. Investigate the performance of any home heating equipment or a system.
- 14. Investigate the percentage of radiative and convective heat flux in a convectional oven.
- 15. Construct and investigate any solar heating system.
- 16. Find any interesting heat transfer problem in a movie or literature and investigate it.
- 17. Investigate heat transfer problems of any cooking process. Demonstrate your results in class.
- 18. Investigate any problem which can help to solve government problem to reduce the energy bill. It can be any energy conservation project or reduction of heat losses from a building.

- 19. Heat loss from a person, influence of activity, heating of exercise room, radiation effect on thermal comfort.
- 20. Heat transfer in conventional and microwave ovens.
- 21. Heat generation in hair dryer.
- 22. Heat conduction through the bottom of a pan in different heat transfer regimes (boiling).
- 23. Heat loss through chimneys.
- 24. Investigate the efficiency of incandescent light bulbs.
- 25. Investigate the performance of any heat exchanger.
- 26. Refrigeration and freezing of foods.
- 27. Cooling of electronic equipment.