Senior design project proposal – contact Dr. Marek if interested <marek_ka@mercer.edu>

Purpose: A viscometer is a device which measures the viscosity of a fluid. One currently in use for MAE 402L has an outer chamber in which water at a regulated temperature may be circulated, so that the test fluid will be maintained at that temperature during the test. However, the viscometer does not have a temperature regulated source to provide that water. Thus, the client wishes to have a suitable source designed and built.

Objective: Design and build a device which will provide forced water flow at a specified temperature to a viscometer.

Group composition: At least one mechanical and one electrical/computer student should be in the group. An industrial student for interface/usability/safety might be a good third addition.

Requirements:

- Design and build the device using a heating element or mechanism. The device should have set points between room temperature and an elevated temperature to be determined by practicality and safety considerations.
- Size a pump, water reservoir, and heating element appropriately for the flow needed in the viscometer. Apply insulation as appropriate.
- Develop a control mechanism to maintain reservoir temperature (particularly at exit point). Provide appropriate circulation. The heating element may need to be separate from the temperature regulated fluid (*i.e.*, using a heat exchanger).
- Develop a user interface which, at a minimum, sets the desired temperature and displays the current temperature.
- Explicitly design with regard to safety. Appropriate safeguards should be in place for AC 120V power, high temperatures, and hot flowing water near electronics.
- A method for transporting the water to the viscometer must be included as part of the project (appropriate size/type of hose and connectors).

Additional "stretch" goals:

- Add a cooling mechanism and extend the temperature range to below room temperature.