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MET350: Thermal Applications

Reflective Cover Letter

1. **Persuade, both your instructor and the institution, that your work meets the objectives for this course. Discuss your learning experiences in this course, including any details that are unique to your own learning process, especially as represented by the contents of your portfolio.**
   a. My work, especially the work I did on test 3, demonstrates that I have gone above the expectations and objectives for this course. For objective 1, I possess an understanding of the first and second law that I have applied to almost all processes/cycles in the course, starting from homework 1 all the way to the final assignement. The second law was especially prominent in work dating from the beginning of the heating and refrigeration section of the course as well as test 3. For the first law, I demonstrated it multiple times through applying it to devices such as mixing chambers, open and closed feedwater heaters, and flash chambers. On homework 3.3 , I utilized an approach to find the quality of vapor passed through a compressor of the ideal vapor compression cycle.

      Early in the course, we learned about and applied the state-finding procedure to Otto cycle, Diesel cycle, and Jet propulsion cycles. Test one reflects this well. The jet propulsion cycle was asked about on test 2 , and I applied the laws of thermodynamics to calculate its properties according to the procedure given in class. The Rankine Cycle was also important and I showed prowess in it through test 2, which was on the Rankine cycle with open feedwater heating.

      On test 3, I analyzed an HVAC system and calculated properties of the air as well as designing the associated vapor-compression refrigeration system. All of the work on test 3 shows that I understand the psychrometric chart, know how to utilize it, and understand vapor-compression refrigeration cycles.

2. Answer the following questions, using links or excerpts (visual, audio, or written from your ePortfolio to illustrate your answers:

1. **Where is your learning demonstrated in the course?**
    a. My learning is demonstrated on the homeworks and the tests, which showcase my attempts to apply the things I learned in the course. The homework was evidence of my practice and the tests were evidence of my ability to analyze a given thermodynamic system. I am particularly speaking about the HVAC system in test 3. It was a challenge, which I did singlehandedly, that demonstrates most aptly the learning I have done in this class.
2. **What areas did you feel you were most successful, or improved the most?**
    a. Without question, I improved upon understanding the relations between states and what the individual components of a cycle do. I was still rough around the edges from thermodynamics 1, which was because the processes were not interlinked as much as the cycles in Thermodynamics 2. This is due to the state-finding approach we utilized.
3. **How do you see this course's content intersecting with your field or career?**
    a. I will most likely have to use some concepts of thermodynamics in order to do successful work with fluids, such as using the tables for water to know whether cavitation would occur due to pressure drop in a pipe. Another example would be to apply the knowledge of the second law to heat transfer between two surfaces/ places.
4. **Have you been able to apply concepts you have learned in the course to what you do at work or in other courses?**
    a. We have been able to apply concepts from this class to the Fluid Mechanics class, but overall since there is a stark difference in the phase of fluids that we use, it is not very relevant to it. Fluid mechanics concentrated on isothermal fluids in the compressed liquid phase (though liquids were considered incompressible), and while we did have a few compressed liquids in our systems, the vast majority was vaporous air or water/R-134a.
5. **How, when, where and why you might use this information or skill in the future?**
    a. Hopefully, I will be able to use this information to assist in my (hopeful) internship over the summer.
6. **Do you think what you learn is important for your professional career?**
    a. I believe it is important. Thermodynamics is very important to understanding multi-phase and non-isothermal fluids, which is inevitably something I will come across in my career.
7. **If you were starting this class again, what advice would you give yourself to ensure that you had a successful semester?**
    a. I would tell myself to make sure that I didn't come late the first day the first test was given so that I did not miss the critical part of the reheater being taken out of the system.

3. Also answer the following questions:

1. **After taking this class, in what ways have you improved as an engineer? What brought about those improvements?**
   a. I have surely improved in my knowledge of processes and thermodynamic cycles such as the Rankine, Otto, Diesel, and vapor-compression ones. I have also learned to diagram better, as both were required to solve the problems on the homework and tests. The P-v and T-s diagrams assisted me with understanding why some processes worked the way they did.
2. **What was your biggest accomplishment in the course? Be specific with respect to your work and the topics you learned in the course.**
   a. My biggest accomplishment in the course was accomplishing the third test after unfortunate events. I stuck to it and test 3 turned out well.
3. **What skills did you master in this course? How are they reflected in the assignments (HW, tests, etc. Be specific.**
   a. I mastered P-v and T-s diagrams for most cycles, evident by simply viewing any of the homework assignments and/or the tests, in which they are always present. I mastered the state finding approach and this is evident throughout the entire semester's work as it was a crucial and critical part of the problem-solving process and alleviating many otherwise confusing questions.
4. **What do you feel are your strengths and weaknesses? Explain while making specific references to your work.**
   a. A strength of mine is an understanding of why the assumptions (about the processes that we use) work.

      For example, the pump approximation for temperature and enthalpy change between two stages of a cycle. We assume that the temperature is about the same because compressed liquids (which is what should be entering a pump), especially those with a high specific heat, do not warm up *noticeably* when being pumped. Additionally, we assume that most liquids are incompressible or have such little give that it doesn't do much for the specific volume. Thus, we can assume that specific volume 1 = specific volume 2. These assumptions simplify finding the enthalpy change between two stages connected by a pump, which isn't much of a change. For reference, consult homeworks on the Rankine Cycle and other pumped systems.

      However, a weakness of mine is that I am not good at working with isentropic efficiencies worse than 100%. I was not able to do this very well on any of the assignments it was requested on, if I was even able to do it. It never clicked to me.

How did you think about this course before you took it and how you think about it now that it is over? How many of your assumptions of understandings changed? Why?

I was a little afraid to take the course simply because the thought chaining all the concepts learned in thermodynamics 1 was a little intimidating to me. I had thought that cycles

would be painful or difficult, but they turned out to not be hard at all. I don't think that there is a big problem with them anymore, and what I mean by that is that I'm confident in my abilities. A lot of this is from practice, but a lot of it is also from the constant and consistent application of the state-finding method that Dr. Ayala taught us.