Co-op Job Summary

I worked in the Engineering department of Heller Industries. Heller Industries manufacturers solder reflow ovens which are used during the production of electrical circuits. Specifically, I helped diagnose problems found in the field and developed improvements for the ovens.

Training was mostly hands-on. There was some reading about how parts of the oven worked and also the various options available to customers. However, most of my training came from mentors who showed me various parts of the oven and explained the purpose, options, and flaws. I was also performing tests and working on the ovens from day one which accelerated learning. Personally, I feel an hour spent looking at drawings can be learned in 10 minutes by taking the assembly apart and seeing it up close. Due to the hands-on nature of the work, I learned very quickly which was good because I was often getting new and different assignments.

I worked on a variety of projects, some lasting a day while others were going for weeks. One of my first assignments was to help write the instruction manual of a new oven that had arrived right before I started. This helped me learn a great deal about technical writing and also the ovens. I had to learn how to carry out the various maintenance and repair procedures before I could write up how to perform them. Another assignment was taking vibration data from blower motors in one of the ovens and also the blower motors that had been returned by customers. The data would then have to be presented which led to learning a lot about Microsoft Excel. I also spent a couple of weeks working on improving the oven’s heating response when a circuit board entered a zone in the oven. This project consisted of testing ideas such as moving around the thermocouples and using different thermocouple forms. Also a lot of the testing consisted of adjusting the oven operating program’s PID settings so that
the oven would respond quickly both by physical improvements and computer control improvements. This PID testing was presented to a customer through emailed PowerPoints and also a conference call.

Additionally, I spent a month in Seoul, Korea where Heller Industries has one of their production facilities. During this time I observed the vendor who does the basic sheet metal cutting and assembly and then learned how to assemble the ovens once they came to the Heller factory. I spent a lot of the time actually building the ovens and then performing the numerous tests to ensure they were in fully working order before they were shipped. Also at this time, a prototype for a completely new oven was being built at the factory in Korea and I got to observe the process of constructing a prototype. This taught me a lot about the problems that occur when constructing something for the first time, the issues that can arise with vendors, and how to communicate and work effectively when in a foreign country.

This fall I learned a lot about engineering that is never covered in my classes. I learned about electricity, constructing circuits, and wiring because I had never had a class on those things. However, I also learned about things I had already studied but never fully grasped because there was no actual experience with it, such as PID settings. I had taken System Dynamics and learned the theory of PID controllers and did some problems, but it was all very abstract. By working at Heller, I learned the real world applications of PID controllers and also how to tune them relatively efficiently. There are innumerable examples such as this where I had learned the material in class, but never fully understood it until I used it every day on my co-op.
Job Summary

This work term I started off by doing a lot of editing of technical documents. These documents were mostly instruction manuals for how to perform various maintenance procedures and repairs on two new models of solder reflow ovens. These manuals needed to have clear and concise instructions with accompanying pictures and captions. I learned how to write directions that avoided ambiguity because although the instructions were clear to me, a reader who had never performed the procedure before would be confused. It is important to take a step back and read the manual from the point of view of someone with little knowledge of the machines.

The next part of my work term consisted of me working at the Heller Industries production facility in Shanghai, China. The first half of my time in Shanghai was spent testing and improving the zone temperature response for a customer. I ran tests for a few days with the help of the workers at the Shanghai factory. I further improved my communication with foreign coworkers by learning to simplify my English, speak slower, and use hand motions when possible. My results from the testing had to be put into excel sheets for CPK analysis and also into Powerpoints both for my superiors and also for the customer. This further refined my presentation skills as my tests had to be explained to an audience with a varied background of knowledge about the machines and my results had to be explained simply yet fully.

The other half of my time in Shanghai was spent benchmarking a completely new prototype and ensuring it met all of the specs it was designed to. I ran into a lot of obstacles through testing, much of
the equipment to carry out the tests did not work very well for our tests. Many times we would have to wait for another piece of equipment to come in. However, I learned that being in a foreign country and testing a new machine, these delays and snags are inevitable so it is important to always have plenty of things to work on. Therefore when one of the tests you are working on hits a temporary snag, you have other things to work on while you are waiting for supplies or equipment to be delivered. Eventually a fair bit of the prototype needed to be changed in order to meet the desired specs which required a lot of brainstorming with my coworkers in order to come up with an idea that would work well and be easy to implement at such a late stage. In the end the prototype came out working very well and was shipped out to the customer on time.

Overall, this work term has provided a lot of great learning opportunities and experiences. I have learned a lot of important skills and techniques. Additionally the experience in different situations will help me tremendously in my future engineering positions.