Coop 1st Term Summary

I worked in the Waterford Process Technology group for Momentive Performance Materials. This was the same group and position as the previous coop Pawan K. Process Technology works on process improvements, new processes, and introducing new products in the plant. Originally, I was going to carry on with the projects Pawan left, however after about a month I switched emphasis to NPI (New Product Introduction) support. In the end, I had two main projects. One was continuing, and then concluding, Pawan’s project to improve product shelf-stability. The other was the introduction of a new product from lab-scale equipment to the production equipment in the plant.

The work on the product shelf-stability had a large focus on statistics and data analysis. I would check when a group of products was being run in the plant; then go out to the plant and collect samples. I would take the samples back to the lab, process/test them, take measurements of the samples, and then analyze the data. I also did a DOE (Design of Experiment) to determine important factors in machine set-up/conditions. A DOE is a term used for a general structure of an experiment, emphasized in Six Sigma teaching.

My mentor gave me some informal training in statistics, and statistical analysis software. Using that, I would then analyze the measurements I had taken of the samples. The statistics computer program would indicate which factors produced a statistically significant response; revealing what we could change about the process to best improve the product characteristics.

In this project, I was also able to design some of my own test/experiments for the samples to help provide more insight into the fundamental driving forces of the phenomenon. Some of those tests I did do, though the results weren’t as clear as I would have hoped; partly because I identified a previously unknown experimental pit-fall. I enjoyed this project because it allowed me to see a project from beginning to end. I collected and measured samples myself, and then analyzed the data. Then I could consider the next steps, with my mentor. However, some of the experiments we had to cancel due to the arrival of my next project, the new product introduction.

For a new product introduction, there are a variety of tasks that need to be done. Many of them are paperwork and information management. Some of them are closer to “school-like” engineering. I worked on the project very closely with my mentor. He did the large part of the coordinating and directing information with many different people for much of the information management work. We worked together on many of the remaining tasks; and I did some of the tasks myself.

One of the items which I did a large part of the work was the MOC (management of change) form. The form is intended to require those working on the project to inform all affected persons or areas, by getting their signature. The list includes EHS (Environmental, Health and Safety), waste management, quality, regulatory, and production. Through communicating and collecting sign-offs, I got an exposure to the different areas. Each person would have questions or concerns that gave me an idea of their area.
Another item was preparing a feed tank for a flammable input to the product. OSHA and the Waterford Momentive plant have a set of standards that govern how chemicals must be handled. For flammable chemicals, those standards are stricter. At the beginning of the project, we had to figure out exactly what the requirements were; which mainly involved meeting and doing walkthroughs with EHS and other people. Once we had identified our plan, to use the particular feed tank, we had a hazards review to identify potential problems or dangers as a result of using the tank to feed that particular material.

To prepare the tank, one of tasks was to ensure that the new material could be handled by the system. This is where I did some school-like engineering calculations. I was responsible for doing the pressure drop calculation to determine if the installed pump could deliver the necessary flow rate of the new material. I also did some pressure drop/flow-rate calculations on some of the safety devices on the tank. This was one of the only times were I directly applied a formula/lesson from school. Much more common was the need to think like an engineer, rather than using specific formulas or calculations.

The NPI also involved an aggressive timeline and was considered an important project. Therefore, I learned a lot about project management. The lead product chemist involved, my mentor, and I had weekly status meetings on the project to identify the most important items. The chemist and my mentor coordinated with the Global team on the project. I was also introduced to Gantt charts as a way of planning out a project. As part of project management, I learned how to deal with stress. Because the project was important and had an aggressive timeline, I initially felt stressed when delays and new obstacles presented themselves. However, after a few weeks, I managed to reduce/eliminate the stress involved with the project.

In addition to my two main projects, I also had a few side projects. The two largest of those both started by a co-worker walking into my mentor’s office with a question, while I was there (my office was next to his). These mini-projects were things that I wasn’t necessarily assigned to work on; but did so because they were fun or interesting.

I could set my start and end dates for my assignment. I worked from the end of August until the week before school resumed in January. I did go home for a full two weeks over Christmas and New Years. I returned because my project was near completion, my apartment lease didn’t expire until the end of January, and I wanted more flexibility in the summer. In retrospect, it would have been more economical for me to lease my apartment until the end of December (save a full months rent); and then not work for the two weeks in January. I worked 19 weeks in this term and have 14 available in the summer. Depending on how things turn out, I may work more than my required 28 weeks.

I lived in a single bedroom apartment in a nearby apartment complex, Strawberry Ridge. The other coop lived in an apartment with other college students, in Troy. My apartment was considerably more expensive; largely because I lived in a single bedroom instead of sharing an apartment. Brought furniture from home in a trailer. When looking at apartments, those that were furnished seemed to be much more expensive. A pro of my apartment was that it was close to Momentive. My drive to work was only ten minutes; and I also biked to work a few days in the fall.
Coop 2nd Term Summary

In my second term I worked in the Global ChemOps Technology group for Momentive Performance Materials; I was still in Technology. The previous term, my project were focused on end products, but this term I was in a group that focuses on the chemical building blocks and intermediates for the products. This involved dealing with a lot more “classic” chemical engineering units, such as tanks, distillation columns, and reactors. I still sat in the same building and office, but I worked with different people and different areas of the plant.

My main project was looking at options for processing a waste stream. The project considered both the recovered value and the environmental impact of any new process. This differed from projects in my previous work term in that it was more long-term. I was only working on the conceptual stage of the project, where as last term I was more focused on the implementation step of new product introductions.

In addition to my main project, I also wrote a technical report on a project from my previous term. In the fall term, I did some support work on residence time distributions for a coworker’s project. My (previous) mentor and I thought that my work could be expanded into its own report. The TIS was partly theoretical focused; and I did calculations in Mathematica and Excel. Writing the report was a good secondary project for me to work on during lulls on my primary project.

For my main project, the first part was mainly learning about the process and the waste stream. My mentor gave me tours and reading material on the processes and equipment. I also read reports on previous projects dealing with the waste stream of interest. In addition, I worked on collecting data about the amount/volume of material that was passing through the processes per year. The volume information was stored in a database, but it wasn’t always in a usable form. I worked with Excel to retrieve, analyze, and store information from the database. I also looked up physical properties on some of the components in the waste streams.

After gathering information, my mentor and I came up with a few concepts for how we could process the waste stream. Part of this involved looking up information on different pieces of equipment, and trying to evaluate if they would be a good fit for the process. This involved looking at both the equipment manufacturer information, reading up on the general principles, and looking for academic analysis of the equipment in literature. We also looked up design information on processes Momentive already operated that were similar to the conceptual processes we were developing. Our concepts became more defined as we obtained new information.

Once the few major concepts were relatively well defined, I did some preliminary equipment sizing based on simple mass and energy balances. I did this in Excel, such that it was easy to vary the parameters; so as we obtained more information, we could update the size estimations. From this analysis, I was able to provide a reasonable guess at the sizes for the various vessels, heaters, coolers, and other equipment. We could compare the predicted sizing for the different process schemes we had developed, so that we could identify which schemes were most reasonable. In addition, the sizing allowed us to more clearly see the important parameters, and what things would need to be investigated
on a lab or pilot scale. A lab effort was being started co-currently with my work (at another site) that would be able to answer some of the questions.

The work this term differed greatly from that of my previous term. Because it was focused on a different area of the plant, I had to learn about that area. I also needed to have a more complete understanding of the area and the overall process; I needed to understand how the conceptual processes I was developing would integrate and fit into the overall process. In the fall term, I only focused on and really understood a small part of the area I worked in. There were fewer people that I worked with this term (compared to the previous). My group (those that have the same manager) itself was smaller than the previous term; and some were located globally (so group meetings always included a teleconference). I also spent very little time out in the plant. The fall work term was more task orientated, with a list of tasks that needed to be done before the next part of my project could proceed. This term, it wasn’t always as clear what should be the next task; I needed to decide the general direction in which to head. It was a different style of working than I was used to. The summer term was also shorter than the fall term; so it seemed that it was time to leave once I had gotten up to speed and actually moving with my project.

I was still working in the Technology department, so I imagine it was very different than if I had been a co-op in production/manufacturing. One similarity between the two terms is that I worked very closely with my mentor (different person this term). It was my mentor’s project as well as mine, so we worked collaboratively. Also, I was always able to get help or guidance on my individual parts of the project when I needed it. Like the previous term, I did give a final presentation to my group and others; unlike the previous term, the presentation was given over teleconference as well as with a local audience.

For housing this term, I did a short-term lease (they called it a sublet) with a student housing apartment complex (Campus Habitat) in Troy. I put off looking for housing quite a bit longer than I should have; so I paid more than I could have had I sublet directly from students. One advantage was that the apartment was furnished with a bed, a couch, a desk and chair, and two coffee tables; so I didn’t have to bring my own furniture. The drive to work was about 20 minutes with traffic (the traffic wasn’t bad and only added a little time).

Same as my last term, I wasn’t very efficient when at home with a television. I would have not gotten cable tv, except that I wanted internet and they were a packaged at the apartment. I did go camping or hiking with my parents two or three weekends. I also went hiking by myself; but I don’t necessarily recommend that because of the greater safety risk (nothing happened to me, but don’t go alone particularly if your not familiar with the area). I also visited with family in the area a few times. I did take a week off in the middle of the summer to go home for a family reunion (and to take a break). The summer co-op term did go by much faster than the previous term. Because of the number of weeks I worked in the fall, the summer work term was only about half as long.
On the first day, as soon as I came to work, I was trained and had to pass a test on safety procedures in the plant. It was very important to pay attention to the safety training, as unexpected situations tend to occur in chemical plants. Then they equipped me with steel-toed shoes, prescribed safety glasses, fire retardant lab coat, and a hard hat. As I was introduced to my supervisor, mentor, and other employees, I tried to keep in mind a few key things I learned from previous co-ops and in Cornell co-op workshops: be outgoing, introduce yourself to other employees, take initiative on projects, etc.

The Process Technology team in Momentive Performance Materials works on growth, productivity, capacity, and quality of new and existing silicone products and processes. As part of chemical-operations and process technology group, I was given two major projects that would improve productivity in existing programs. One focused on adjusting the process of an existing reactor so that the company can supply itself with an important intermediate instead of buying that material from a competitor. The second project was on a solvent recovery effort from wastes produced within the plant. Both of these projects required me to speak to many people including managers and leaders of different programs, production engineers, process engineers, chemists, and operators. By the end of my first week of work, I had already spoken to over 50 people at the Waterford Momentive site.

For my first project, the objective was to evaluate the quality of product after changing the feed ratio to a continuous reactor. There are three main feed streams to this reactor. Of those, one is a by-product returned to Waterford. The expected benefit of supplying internally is approximately $0.5MM to $1.2MM with a minimum cost avoidance of $50K from reducing railcar rental for storing the by-product material on site. However, a change in ratio of the feeds increases the likelihood of impurities in the intermediate material; this impurity may be an effect of corrosion or other unaddressed problems. The quality of the intermediate material was tested during the trial run to ascertain that they were in specification. The tests included basic lab analysis and some non-routine tests. The intermediate material is further treated in the plant to be used as reinforcing material for many silicone products. Some products produced in Waterford are sealants, rubbers, adhesives, etc. Once the trial material was treated, several representative rubber and sealant grades were made to see the effect of changing feed rate on the quality of final products.

In addition to the project on a continuous reactor, the second project is a long-term effort on solvent recovery. In order to reduce contamination after producing a certain product, solvents are used to clean out the reactor. Then solvents are transferred to the Waste Water Treatment Plant in Waterford to be incinerated. In order to avoid the cost of buying new solvents, my project was to evaluate the potential solvent recovery sites and characterize the streams at that location. The data collected will provide some information for upcoming projects on solvent recovery. When the samples were collected throughout the plant, I got to perform lab procedures that I learned in Organic Chemistry Lab. I also learned how to use Gas Chromatography-Mass Spectrometer to analyze all the components in the solvent samples.
For both of my projects, time was spent in plant, lab, and office settings. In my office, I researched on the processes of reactors and kettles involved in my project. Going out to the plant and getting a tour from either the production engineer or an operator helped me further understand the process. There were plenty of documents and previous experiments I could have read up on, but it was easier for me to discuss the matter with other engineers. Not only did they give me answers to my questions but also recommended different approaches I can take to solve a problem.

Although this was my first time working in an industry like this, I was given full responsibility on my projects and I got to experience the high and low of working life. I have always heard from previous co-ops and interns that one of the problems they've experienced was bureaucracy within the company. I never knew exactly what that meant until this co-op term. Due to how the company is structured, I had to go through a fairly complex process of approvals at different levels to complete each step of project procedure. Although I was not able to execute my trial plan until the second half of my work term, I was given more time to attend company meetings and training sessions offered by Momentive. I found the decision making process and the hierarchical system in a bigger company very interesting.

For housing, the HR at Momentive provided a list of near-by apartments. However, most of these were unfurnished or too expensive. I found my housing on Craigslist. I subletted a room in a house near Rensselaer Polytechnic Institute with other RPI students. There are many colleges near Momentive such as RPI, SUNY Albany, Russell Sage, and Siena—so looking for a housing near campuses would be the most affordable way to go. With the generous housing stipend, I was able to pay for my all my rents and utilities.

For transportation, although there is a regional bus system called CDTA, it is not very convenient. I bought a used car in Albany before the beginning of my work term. This seemed to be more practical since there wasn’t a bus stop near Momentive and most of the grocery shops were 5-10 minutes away by car.

Outside of work, I went shopping at several shopping malls that were within 20 minutes of where I lived—Crossgates, Colonie Center, Stuyvesant Plaza. When the weather was nice, it was also interesting to walk around in Troy downtown, Saratoga, or Albany. Momentive provided membership at a company gym for $15 a month, so I also spent my time at the gym. It was especially nice to live with other college students, because I got to attend some RPI events like concerts and exhibitions with them.

Overall, this was a very positive experience for me. I enjoyed working on a project where the result will benefit the company significantly. Everyone here was willing to help with everything and my supervisors were very supportive of my decisions on my projects and always gave me advice on how I can improve. One thing I hope to do differently for my next work term is to find smaller projects on my own and keep myself busy all the time.
The idea of internal and external collaboration raised interest in using technologies like blog’s and wiki’s within many companies. Momentive is also exploring such methods of communication to expand its capabilities. Unlike the first term, I worked with the Enabling Technology & Innovation (ET&I) team for my summer '09 Co-op. This is a newly formed team that promotes cross-strategic business unit (SBU) and cross-functional collaboration. The team’s goal is to develop an IT infrastructure to effectively share knowledge within the Momentive community.

Using the concepts of Six Sigma that I became familiar with in my first term of co-op, I started by defining the basis/problem/customer. Working in an IT-related field, I realized that my customer was Momentive. I interpreted one aspect of the IT infrastructure as an environment where all employees have access to relevant information regarding other employees of Momentive. In order to do this, I developed an organizational chart and personal profile for each individual on the company intranet. This way, there was a searchable set of skills that the employees have.

This co-op term, I was given an opportunity to experience the real working life. My work was not a “co-op assignment”, but the type of work that a full-time employee would be doing. I had to identify the problems and come up with the best solution. My main project and a couple minor projects were all defined in this way. Speaking with other employees was the key in many cases. Others had differing viewpoints and ideas that helped me identify areas where I can focus. It was also enlightening in a sense to hear the different approaches that IT, HR, and Technology groups would take. Although my job was not strictly chemical engineering-related, my work required me to use skills that all engineers possess—problem solving and optimizing the solution.

I expected to see more interns this summer, but given the current economic situation, not many interns were hired. Also, working experience in the summer, when everyone takes his or her vacation, was very different from the fall. Often, it was difficult for me to get in contact with some people.

For housing in this area, I contacted the students of RPI that I stayed with last co-op term. I subletted the same apartment from them. Momentive’s housing stipend helped in paying the monthly rent. Having a car here was very useful. Sometimes my work required me to travel between Waterford and the corporate headquarter in Albany. Although there is a public transportation available called CDTA, I find it inconvenient. In the summer, there are many events in Albany and surrounding areas that one can attend. My housemates and I enjoyed free live concerts on some weekends. When the weather was nice, I also liked going to the parks and lakes nearby.

Overall, my experience was positive and I enjoyed working in a more technology driven position. Figuring out my project from start to finish was a real rewarding experience and a great opportunity that not everyone will get before graduating college.