Job Summary

A. Co-op Work Assignment

For my first co-op term I worked in the CPDC (Chemical Processes Development & Commercialization) at Rahway, NJ. CPDC does work primarily around process development and applies it to a commercial aspect. In the scope of drug development, CPDC serves to bridge the gap between early development and mass production with the work we do in process development and scale up. The chemistry department will create the drug in their labs and pass the initial processing steps to CPDC where people in develop the processes in a safe, cost effective, and scalable mindset. All my coworkers were ChemEs that did work in both a laboratory and pilot plant setting.

I had several projects during my co-op term where some ran in parallel or in alternation, but they were all centered on the theme of milling. Milling is the process in which API (active pharmaceutical ingredients) are broken down into small fragments to increase the surface area of the drug crystals and increase bioavailability for effective drug absorption. There are various ways to do milling but my focus was exploring novel ways to execute media milling with beads in solvent based environments. In doing so my projects aimed to minimize or completely avoid API agglomeration, which is often associated with milling API to micron size and minimize bead shedding as well. Aside from my manager there were several engineers who had interest/ties with the projects I worked on and I often consulted with them. Whenever I had an inquiry I was never in shortage of a co-worker to ask as everyone was very receptive to questions.

The first few weeks of the co-op term had heavy emphasis on safety/general knowledge training via online modules. My manager gave me several research articles that gave me background knowledge in the technologies I was going to be working on and generally stepped me through the setups of my projects.

B. Assessment of Learning and Development

I worked primarily in a lab and not in a production plant as I originally envisioned, but I realized that what went on in the CPDC labs was core ChemE work from the root. What was developed and troubleshoot was applied later to the production plant. As previously mentioned, my work was laboratory focused and I felt properly prepared for my work based off my experiences in lab classes at Cornell. Working through these projects, I really learned to juggle between each task while maintaining careful records of my observations and how to present my findings in an organized fashion. Very often experiment did not proceed as planned and sometimes with disastrous results, but I learned quickly to be innovative in way to salvage data or find modifications to fix the experiment.
C. Life Out-side of Co-op

Merck does not provide housing for co-ops in the fall term which does add a slight challenge at the beginning of the term. I went through the internal network to search for possible housing at a co-worker’s house and rented a room. Since you don’t get your own place to live there is always a risk of running into complications at the place of residence. I highly recommend a car for work in NJ, but there is the option of the trains and in fact the Rahway Merck site is very close from the Rahway train station. There is not much going on in Rahway but NYC is a 40 minute train ride away and I did spend a majority of my weekends over there. CPDC itself is a very social department and had a picnic event and a holiday party during my term. Both were a great fun and the people in the department are very fun people.

D. Evaluation

I definitely enjoyed my fall co-op experience at Merck. I especially enjoyed working and developing cutting edge technology that may someday be used in a large scale setting. The department has a significant population of Cornell ChemE graduates so they certainly know how to push you but the experiences I’ve gained were all rewarding. I look forward going back for my summer term.
During the summer term of my co-op at Merck, I worked again in Rahway, NJ in Merck’s Merck Manufacturing Division (MMD) at the Chemical Process Development and Commercialization (CPDC) department. The department was primarily involved with the development and economic commercialization of small molecule active pharmaceutical ingredients. CPDC acts as a bridge between process chemistry and the Merck manufacturing plants. CPDC engineers are very involved in scale up, pilot plant, and technology transfers in the scope of small molecule pharmaceutical development and arguably one of the core groups in MMD.

My summer project was themed around API cake filtration and examining new way to effectively measure cake filtration properties. I was coming back to CPDC after completing my fall co-op term and as well as completing my junior year of Chemical Engineering so I felt ready for my project. In addition my supervisor provided plenty of literature to read before and during my internship and a consulted with a subject matter expert (SME) in the department additionally. I usually met with my supervisor at least one a day to go over the agenda and was free to consult him throughout the day if I had any questions. I was working with an additional supervisor who was overseas so I had weekly presentations/meetings via teleconference to go over the progression of my work. The other coworkers in the department were generally all approachable and happy to help if any problems arose.

My project specifically was looking at two bench top filtration techniques outlined in a reference journal article. One technique was found to be an effective approximation technique for time and material strapped engineers looking to characterize the filtration characteristics of API slurry. The other technique served to provide a time saving and accurate technique comparable to the current approach. There was some degree of modeling during my project and I got exposure to software like DynoChem. This project made good use of my chemical engineering knowledge and I saw the work I did had direct impact on the engineers in the department. In using my experiences so far I was able to gain industry-specific knowledge and get perspective on how chemical engineers solve problems in the space of pharmaceutical companies.

Summer housing was not provided by Merck this time unlike other years, but a summer housing stipend was given out to interns living outside a 50 mile radius from work. As a warning the summer stipend money is also taxed so plan accordingly. Even though the Rutgers dorms were not available for the summer, there were plenty of subletting opportunities from the local Rutgers students. I happened to find a Rutgers student who happened to be interning also at Merck but out of state so I rented out his room. The only downside was that I was living alone and there was little Merck intern comradery outside work because we all live far apart, but there were plenty of other interns to hang out in the New Brunswick area. New Brunswick is a college town so there is plenty to do, and NYC is an hour train ride away. Finding housing is really a matter of networking and putting the time toward finding a right place.
The best part of my co-op experience was the community in CPDC. These people were some of the smartest people I’ve met and they were all very open to talk. Merck strives to give very meaningful projects to the interns and I felt that I made impact by the end of my term. The less enjoyable part of my internship experience was mostly HR-related issues (i.e. not being proactive about helping the interns find housing, confusion about housing stipends being taxed, poorly coordinated distribution of paychecks, etc.) but I think they tried their best.