Job summary

My term was spent as part of the Aero and Heat Transfer group in the Generator Core Design team. This group dealt with the cooling and ventilation designs for the generators produced by GE Energy. Most of my work involved the heat exchangers used to remove the heat load from the gas inside the generators. My work was mainly done using Visual Basic programming in Microsoft Excel.

My work built on programs started by previous co-ops. Like those co-ops, I was given ownership of these programs – I was the only person making changes to the code during my rotation. The programs I worked on were significant to the business: eventually the finished products will be tools or algorithms that will be used daily. I enjoyed having this degree of responsibility in my position. I looked forward to coming to work when I knew that I would have a challenging task to work through using my own ideas.

At the start of my rotation, I had no experience in heat transfer and extremely limited exposure to fluids, which were the two main physical concepts I worked with during the semester. I learned about these concepts by reading company reports as well as textbooks. My assignment leader provided me with reading materials whenever I encountered a concept I had not worked with before, so I could learn enough about it to complete my task. I liked this approach because it allowed me to learn about these concepts while still working on my projects, instead of spending some days just to read.

One of the main programs that I worked on was a physics-based heat exchanger model. The program modeled the performance of the heat exchangers used to cool the gas within a generator. I learned about the methodology used to perform the analysis, and became acquainted with the code that previous co-ops had written. Once I was familiar with the analysis, I was given the responsibility of examining the performance of the model, determining where it had problems, and implementing solutions to these problems in the methodology and code. I met occasionally with my assignment leader to discuss the steps I should take next in the project, but I was mostly expected to seek solutions to the problems on my own, including deciding how to implement some new algorithms to analyze more complex systems.

From this co-op assignment I learned a great deal about the engineering profession. I was able to participate in a design review, which was focused on the technical work done to test and validate a product, as well as an operations review, which was focused on how the business will benefit from the work we are doing. From these experiences I learned about creating effective presentations to convey a specific message to the audience. Moreover, throughout my rotation I was supporting multiple different programs at any given time, so I learned about balancing the workload between projects like the other engineers working here.
This position helped both my personal and professional development. I became comfortable working with and communicating with other engineers. I also learned what it’s like to work in a professional environment, how to ask for help when I need it, and how to go about tackling new problems. I learned how to handle responsibility by being in charge of the main projects I was working on. I also learned to think about a project in terms of what is needed in the end and to work toward that goal instead of trying to do too much, because there will probably not be enough time to implement all the changes you can think of when modifying a program or process.

Overall, I was very satisfied with my first rotation at GE Energy. The physics analysis and problem solving work aligned well with my interests. I also appreciate that with the work I was given, along with the reviews and meetings that I participated in, I was able to get a feel for an engineering profession.
Co-op Work Assignment
In both its engineering and manufacturing functions, GE is organized into Centers of Excellence (COE). A typical “team” of employees can be identified by their COE. GE’s Greenville site had been dedicated to its gas turbine business (for coal or natural gas power plants), both design and manufacturing. A few years ago the plant also took on some Wind turbine design and manufacturing. The major components of a wind turbine are the rotor blades, the machine head, and the tower. At various global locations, GE performs the assembly of the machine head. At the Greenville plant, GE assembles the machine heads for its 1.5MW wind turbine line.

I work with manufacturing in the Packaging COE. The Packaging COE manages various gas turbine assembly processes but also contains Wind turbine (machine head) assembly. I am an intern with the wind division. My primary role is to assist with Lean initiatives for the wind division (Lean Manufacturing is a set of manufacturing principles developed by Toyota that took ground in the US at the end of the last century).

For the first week, I observed as the rest of the team performed a “Lean Work Out” on one of our assembly workstations. A Lean Work Out is a week dedicated to scrutinizing a manufacturing procedure to find ways to incorporate and enforce Lean Manufacturing principles on the process. At the end of my first week, I participated with all the GE Energy interns in a remote phone/Webex introductory presentation by the Human Resources co-op coordinator (we phoned in to hear a presentation while viewing the PowerPoint in a web browser). During the first week, I gained access to most of the web services I needed (most computer tools and databases are web based), including the drawing set for the machine heads. The second week completed my orientation, as I assisted with each step in the assembly of a machine head in order to learn the process.

My desk is in an office on the shop floor. My first task was to prepare for the next upcoming Lean Work Out that took place about halfway through the term. This consisted of taking detailed observations of various workstations, organizing those observations, and preparing documents that summarized the assembly operations.

I started the second half of my term by carrying out action items for the Lean Work Out (updating the documents that instruct the operators for their work). I was also tasked with making (soldering) prototype circuits (according to drawings) to be used for small electrical test procedures in the assembly. I hadn’t taken my circuits class yet, but the internet can be very resourceful. I helped obtain cost quotes for various custom equipment needs we have (including mobile carts with a +15 ton capacity), and met with local suppliers to discuss these needs. Part of this was looking into ways that we could establish a quasi-moving line in order to better structure the assembly process.
The other significant item I worked on was an Excel workbook that displays the machine head assembly process in an at-a-glance view. The workbook can be used to assess the effect of changes to the assembly process. Through this, I learned how to write programs in Excel through Visual Basic for Applications (VBA).

When a student receives an offer from GE, Human Resources pairs them with a Buddy. The buddy comes from one of GE’s two-year leadership programs, and having an intern “buddy” is actually part of their program to help them learn to be mentors. In any case, my buddy was helpful with answering some initial broad questions, but I did not talk with him much after that. One thing he was helpful with was putting me in contact with some leadership program employees who work at GE’s nuclear energy site. My desk is not near my manager’s desk, but the team meets every morning to discuss daily issues.

**Assessment of Learning and Development**

I attended an evening talk at GE about career paths. Various employees who’ve been at the company for ten or more years discussed the various positions they’ve held since college. The resonant idea from the talk was that to successfully advance one’s career, a person must have a broad foundation of experience. In this sense, my experience this term has been very valuable. For now, my plan is to pursue a career in the nuclear industry. I had hoped that I could work this term at GE’s nuclear energy site in Wilmington, NC. Being placed at the Greenville Gas Turbines site has given me a background in the growing energy field of wind energy and on the periphery has given me some context on the development of turbines.

Your work doesn’t have much value if you cannot successfully communicate it to others.

**Life Outside of Co-op**

During the summer before the co-op, Human Resources provided all the Greenville co-ops with a list of each other’s email address. They also provided us with a list of about 5 local apartment complexes. On campus, I had lived in one of Cornell’s cooperative houses. I was hoping to emulate that living arrangement by renting a large house in which all of the 10 interns could live together. I quickly gave up on that and searched for 2-bedroom apartments on apartments.com. I found an apartment complex about 1 mile from the GE site, and rented a 2-bedroom apartment there with one of the other interns (electrical engineering). An important factor was the availability of short-term leases. The complex waived our deposit and application fee, since GE is on their list of trusted employers.

The rent didn’t include cable/internet, furniture, or electricity. We rented furniture from a local company, and continued to furnish the house by going garage-sale shopping during the first weekend. We each pay an approximate total of $500/mo. GE provides a housing stipend of $600/mo, so we ended up making an additional $100/mo. I would not make that extra sum if I sought a 1-bedroom apartment. We split bills and keep a running list in our hallway to track “IOU”’s. My apartment-mate pays for groceries and cable, and I take care of the electric bill. We’ll sum up the IOU’s at the end and one person will hand a check to the other to settle the remaining balance. Early on we were paying each other back on the spot and that just didn’t make sense.
The Human Resources department encourages one of the interns at each of GE’s sites to take on the role of Social Ambassador. A returning intern assumed the role, and organized social activities and a weekly intern lunch. With his help, we organized two barbeques, an ice skating trip, a tour of the local BMW plant, and an unsuccessful paintball trip. He also encouraged us to participate in GE’s volunteering activities. We also had the opportunity to share a lunch with GE’s leadership-program employees (two-year starting jobs coupled with preparatory masters coursework).

The GE site is about 4 exits down the highway from the (small?) downtown city of Greenville. The city has grown tremendously in the last decade. This actually seems to be caused by large influx of New Yorkers (as a note, the city of Greenville has one of the highest numbers of engineers per capita in the US). The city is proud about offering free parking on weekends. On Saturday morning, Main St. is closed for a sort of farmer’s market. While the weather is nice, free live music is available from public areas along Main St. during some weeknights. The weekend nightlife in downtown Greenville is very active with a large number bars/restaurants/sports bars. Aside from downtown Greenville, the area has become heavily commercialized, and the GE site is down the road from a strip of Walmart, 3 grocery stores, a Sam’s, a Costco, and almost every other large chain (like Ithaca’s Rt. 13 but twice as crowded with constant traffic).

The downtown area has a small and inexpensive bus system, but transportation is almost exclusively by car. One of the interns is from Puerto Rico and actually purchased a car soon after she arrived here. She has managed to find someone to buy the car at the end of the term. I had chosen an apartment close to the GE site so that I could bike to work, but I only managed to do that for about a month.

GE has a substantial Volunteering program. Employees receive emails every so often about opportunities to volunteer. I helped mentor an elementary school FLL Lego Robotics team, which was running and had funded. On Saturday mornings, my apartment-mate helped build ramps for the elderly/disabled in the area. The site has a gym with a small membership fee and offers classes (yoga, etc.) regularly. In addition to that, the site has many athletic clubs (running, hunting, cycling, etc.). Affinity groups (African-American Forum, Hispanic Forum, Asian-Pacific American Forum, and Women’s network) often provide Lunch-n-Learn or other career-related talks (with food).

I learned that the evening after work isn’t as long as I would like it to be. I spent a good portion of my free time working through a reading list I’ve developed over the past year.

**Evaluation**

I think for an internship it is beneficial to work for a large company because it seems that there is much more to learn than from a small company. At first I reacted negatively to the size of the company, which seems to cause corporate messages to be filled with careful rhetoric. The company goes so far to protect intellectual property that employees are only to use flash drives if the information is encoded in some way. The company recently started a
company-wide "HealthyAhead" initiative to encourage employees to live healthier lives. Big companies are more concerned about preserving their image than are smaller companies.

However, a large company benefits from being well known. GE can achieve favorable terms with its purchases, and suppliers will easily trust GE. And while the process to make purchases might involve more red tape than for a smaller company, a big company just has more money. GE (Financial Services) funds the small companies. The secretary of energy Steven Chu visited the plant last month and answered questions from the local media. That's just something that wouldn't happen at a smaller company.

GE’s Internship Assessment program is as rigorous (involves as much paperwork) as Cornell’s. While Cornell’s program focuses on the learning achieved during the rotation, GE’s program focuses on the work the intern has accomplished. During the first two weeks of the internship, interns must work with their manager to develop a list of goals (concrete work objectives). Halfway through the term, the interns are to meet with their manager to discuss their progress toward these goals and to share advice.

During the final week of the internship, the intern has a 15-minute interview with Human Resources about the strength of the internship program and their desired location/position for their next rotation if the intern is hired back. The intern also fills out an online form that asks for similar information.

**Additional Info**
We had 3 paid holidays: Labor Day, Thanksgiving Day, and the day after Thanksgiving. Paychecks are mailed biweekly on Thursday, but I signed up for direct deposit. I retained about 75% of my earnings after tax.

I’ve used the terms *internship* and *co-op* interchangeably. GE makes less of a distinction between the two than Cornell does. Most of the other interns here are doing one of many rotations, and usually are doing so as part of a mandatory co-op program from their school. The other interns during my rotation came from Tennessee, Florida, Ohio, and Virginia.

GE’s offers are for one term only (fall, spring, summer). Thus, I am not guaranteed a position for next summer (receiving an offer for next summer depends on my GE evaluation and on GE’s need for interns).