Job Summary

In my second term of co-op at Applied Materials, I was placed in the Reliability Group under the mentorship of John Evans. This was a unique experience in many respects. I was not familiar with what reliability engineering was nor was my sole technical background in that area. I had the opportunity to be placed in a project with more independent responsibility than during my previous term. I was working with a professional that was not out of the new hire program but rather an expert hired for his specialty in reliability. I also believe that this opportunity was in part possible due to the extended work period that characterizes the co-op program.

The Reliability Group’s primary responsibility is to deal with issues related to dependability of a product over its life. This involves identifying issues that may arise out of material fatigue, electrical stress, or degradation due to continuous stress or load. Some of work done by the group includes setting up test stands to emulate prolonged use of a product, statistical analysis to characterize time to failure of a piece of equipment, or fault tree analysis. Within the company the group is responsible for all reliability issues and thus works with every product group at AMAT.

The primary project I had was to test the performance of a component over its life by inducing thermal cycles. Within this project, my focus was on designing a test stand, creating software controls, interfacing with hardware, storing the data, and ultimately automating the process. I also learned about seals, fittings, and other mechanical aspects while building the physical stand. Despite not all aspects of the project being in the field of my educational background, I found the overall experience very enriching. I was able to learn some technical skills outside my field in addition to finding a field that I would definitely consider working in as a professional.

Working at AMAT provided insight into the profession of engineering and the culture of companies. Learning about the structure of AMAT’s management provided an insight to different roles experienced personnel can take. This may range to a principal engineer who has a large influence on the technical side of a project to a high level manager who must juggle the challenges of limited manpower with the many company goals. I also saw company politics first hand during my internship although I will clarify that AMAT does a good job isolating interns from the issues that arise out it.

Interns (usually) are not involved in company politics and thus aren’t directly affected in terms of resources and personnel allocated to them. For example John was easy to contact with questions and opinions related to my project. My project also involved acquiring parts and
although interns do not have purchasing power, I had no issues securing assistance in ordering the parts or issues getting budget approval to do so. Most personnel outside of my project were helpful resources who were willing to help if time permitted. In addition, AMAT offers courses on a variety of technical topics taught by experts within the company. That was one aspect I found very positive of my experience at AMAT.

Personally I think this company prepares interns to be engineers working in industry. They make a good effort to provide interns with good mentors many of whom have been through the same internship program or have gone through the new hire program from college. The mentors are great resources and interns are much better set up for success because of it. In terms of my own individual development, working with John was a great opportunity as I got to learn about many of his experiences as a professional and was given a project with much more independence involved than I had before.

Housing tends to be difficult to find especially in the summer. I was lucky enough to stay with a relative during my first term, but it was not possible in the second term. If one wants to find housing in Gloucester, I would try to see if some of the bed and breakfast hotels there have monthly rates as that may be the best way to go about it. If you have a car and want to live further from work, there may be more options. As for transportation, there are two train stations very close to the office in Gloucester and easy access to a major highway. Trains go directly to Boston which is convenient for anyone who wants to go but doesn’t want to deal with hassle of finding parking space.

The best feature of the job definitely is the working environment that interns get to experience. From what I have experienced, you are put on equal ground as any other employee. Resources and other personnel that you work with are generally easily accessible and there aren’t many barriers involved in communicating with them. Many of the employees are concerned with helping you develop as a professional and all who I have met were willing to offer advice stemming from their own career. In addition I think the company provides a great perspective in an actual engineering environment.

The worst feature of my experience is that I was put in a situation where company politics involving with distribution of personnel actually affected my project. Since my project required knowledge in several fields of study, a lack of mechanical support definitely made it more difficult although an equally rewarding experience.
Kirubel Tsegaye

Job Summary

As a Co-op working at Applied Materials, my work was focused on understanding how the tools being manufactured responded to vibration. This was accomplished by performing modal analysis on machine components as well as measuring the steady state vibration environment (floors and walls). The training I received at the beginning of my Co-op was focused on the same topic. I was made to attend vibration training sessions which summarized the fundamental theories on the topic while also elaborating on the why it was important for the company. My supervisor/mentor also had lengthy impromptu meeting with me to get me caught up on the topic. I was also fortunate enough to have my cubicle close by his and I was encourage to bring my questions and concerns to his attention.

My Co-op work activity had significant overlap with some of the classes I took and projects I was involved in at school. Courses like MAE 2020, MAE 2120, MAE 3250, MAE 3260 had content in them that was quite relevant to the work I was doing. My project team experience was also of great use to me at work. For instance, modal analysis require an understanding of Frequency Response Functions and accompanying principles of system dynamics, all of which were covered in depth in 3260. I also benefited greatly from my FEA analysis experience gained in 3250 as well as in my project team. Having had more exposure to these topics outside of a classroom setting has given ample motivation to pursue a career in analysis.

Working full time on analysis has also shown me the sheer amount of work that goes into the development of a product. I now understand that a product goes through countless cycles of analysis and incremental improvement before it is made available to consumers. I also realized that the road to a successful product launch is littered with numerous dead ends and unforeseen problems. As engineers, it is our job to tackle these issue head on and not lose sight of our goals throughout the process. When we make a mistake, we should accept responsibility and not be afraid to say “I don’t know” when we don’t know the solution to a problem. I have made my fair share of mistakes and the only way I could rectify them was by mustering the courage to ask the help of more seasoned engineers who steered me in the right direction.

Life in Gloucester is very nice. The city has a lively art scene and most of the businesses are owned by the residents. The industrial park that Applied is operating out of is a few minutes from the heart of the city by car so commuting to work is a breeze if you live in the city. Housing was cheap during the fall but prices shoot up pretty quickly when summer comes along. Getting a room in a guest house is most ideal for someone doing a Co-op in Gloucester. I was staying at a place called Julietta House was 5 minutes away from the train station and supermarket and a 6 minute commute from work. Prices are a little but on the higher side but some people might find it worthwhile.

Overall my entire Co-op went smoothly and I was happy with the experience and connections I got from it. I am also happy with the attention that Co-op and Career Services gave to the Co-op students. I think this program has been the most fruitful aspect of my college career.
Kirubel Tsegaye  
Applied Materials  
Fall 2014

My Co-op internship this fall was with Applied Materials in Gloucester, MA. My supervisor on paper was Mark Amato but I worked more closely with Jack LoPiccolo on a day to day basis. As a mechanical engineer, the focus of my internship was vibration analysis and tool characterization. It was my responsibility to come up with a BKM (Best Known Method) for setting up and taking modal data for various components that go into the Ion Implanters. The internship required me to develop an extensive familiarity with various signal acquisition systems as well as hone my skills as a presenter.

Applied Materials was keen on beginning my training as soon as possible. We received safety training the first day of the Co-op. We covered a myriad of topics spanning from hazardous chemicals to data security. The subsequent weeks were also full of mandatory and optional training sessions both online and in person. We also have peer-to-peer training sessions where younger employees gave tours of the facility as well as answered any questions we had.

Once the major training sessions had passed, I began a more specialized training period that dealt directly with what was going to be doing. I was given scientific literature on the topic as well as a report on what the company has worked on thus far. I was also given some time to play around with the signal acquisition systems that I was going to be using for my work. During this period I was in close correspondence with Jack LoPiccolo who was the head of co-head of the Vibration team.

After I grew confident with my skills in data acquisition, I conducted modal analysis on a simple cantilevered beam and compared my results with a Finite Element Model to verify that the experiment was conducted properly. Once my results agreed with what the FEA produced I moved on the actual machine components that had more complicated boundary conditions and geometries. I started with uni-axial accelerometers for my analyses and moved on to utilize tri-axial accelerometers that, while more difficult to use, produced more relevant data. Throughout the process, I kept a close eye on the agreement of the Experimental Modal Analysis and Finite Element Analysis results as a sort of check and balance. Ultimately, I was able to characterize larger and larger portions of the ion implanter until all the sub-assemblies of interest had accurate modal data.

Virtually all of the work I did over the fall was directly related to my major and a few course in particular. My background in differential equations was of great help when dealing with FFT (Fast Fourier Transform). Courses like ENGRD 2020, MAE 2120 and MAE 3250 equipped me with the foundations of structural analysis that were put to use frequently over the course of the co-op. However, the course with the most significant connection with what I was doing this fall would be System Dynamics. Frequency Response Functions, Bode Plots and MATLAB Simulink were used on a day to day basis where I was working and my exposure to them through the course significantly reduced the learning curve I had to overcome.

Aside from the more technical knowledge I gathered this fall, I also got a lot of opportunities to improve my presentation skills. I would say this is the one aspect of the co-op that felt most foreign to me. As such, it took me some time before I was able to comfortably and confidently present my work to my colleagues. Fortunately, I was surrounded by enthusiastic and experienced professional engineers that gave me a lot of constructive feedback that I took to heart. By the time I gave my final presentation, I was significantly better at getting my point across clearly and succinctly. I was also much better at organizing my slides so that they convey important information without being too wordy or convoluted.