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ECE498 Internship
Summer Internship Report At Novelis
8/26/2024

Summer Internship Report At Novelis

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Submitted in Partial Fulfillment of the Requirement for the B.Sc. Degree,
Electrical and Computer Engineering Department,

Summer 2024

I spent this summer working as an electrical engineering intern at Novelis. This internship has further proved to me that I want to be an electrical engineer in the future. I've gained a lot of valuable experience in practical applications of electrical engineering throughout this internship. This experience has been amazing as I was able to get "hands-on" experience in electrical engineering that I would have never gotten from classroom instruction at Oswego. There are a few major takeaways that I got from my internship here. One is how the theory I've learned in class applies to real-world applications. Another is teamwork and how engineers collaborate to solve issues regarding reliability and sustainability. Also, I learned a lot about project management and the process of creating and finishing major engineering projects. Throughout my internship, I was able to complete all SMART learning objectives that I had made for myself. These SMART learning objectives have helped me further my understanding of electrical engineering. Overall, I'm happy I decided to take this internship position at Novelis.

The SMART learning objectives that I set for myself at the beginning of the internship helped me achieve a better understanding of electrical engineering through real-world applications. My first learning objective was to identify and reflect on the cold mill layout and functions to become familiar with the cold mill operations. I was able to accomplish this throughout my day-to-day activities by learning the layout of the machines. During a breakdown, I was able to become more familiar with how certain components function and how they work with one another. For example, throughout my internship, we encountered numerous issues with the radiation gauge that determines the thickness of the metal. This allowed me to learn more about radiation detectors and sources and how they function in a feedback system. This also helped me learn how different PLCs communicate since the gauge controller had its own PLC apart from the main drive PLC. Another learning objective was to be able to explain what

predictive maintenance is and understand different predictive maintenance technologies and how they function in a manufacturing setting. Predictive maintenance is maintaining equipment using data analysis and real-time monitoring to predict when maintenance is needed and when it should be performed. This prevents unexpected failures and minimizes downtime by performing crucial work before a failure occurs. An unexpected failure may cause secondary damage that can become more costly than the component that failed itself. The biggest predictive maintenance technology that I learned about was vibration monitoring. However, I also learned about other predictive technologies such as thermography, ultrasonic leak detection, and oil analysis. The most interesting predictive technology that I got to use was thermography. Thermography allowed us to look at the temperature of different electrical components to determine if they required replacement or not. One example of this was that in our main DC motor drive circuit, we had fuses that kept blowing unexpectedly, causing downtime. After conducting the thermography analysis, we determined that the cabinet the fuses were mounted in was hotter than all other drive cabinets and was not getting adequate cool air. We fixed this by adding a second panel fan into the cabinet and adding extra vents for the heat to escape. Using predictive maintenance, we were able to reduce downtime and improve production. Another learning objective was to understand the basics regarding vibration monitoring hardware and software, and apply it to my understanding of predictive maintenance. When I started my internship, Novelis was in the process of creating a vibration monitoring system for the main DC motors. This system will be able to monitor vibrations on the motors to be able to help determine if there is complications with the motor itself. Vibration monitoring starts with the initial vibration signal. This signal is produced using accelerometers mounted on the motor that measure the amount of acceleration acting upon the motor. This signal can be integrated to determine the

velocity signal and the position signal. Using the Fast Fourier Transform (FFT), we can determine at which frequencies the motor is vibrating. This frequency can then be related to different machine components and the required maintenance can then be provided. Another learning objective of mine was to work with the maintenance team to help install predictive maintenance sensors and to help with the calibration. During installation, I was able to work with outside contractors to install accelerometers for vibration analysis. I was not able to get "hands-on" with installing the hardware since the work was contracted, however, I was able to watch the process and learn the importance of proper mounting of equipment. My last learning objective was to use AutoCAD to develop layout and schematic drawings of sensors and equipment. Throughout my internship, I have completed a lot of drawings. At Novelis, many times the engineers become so busy that they are not able to update the drawings after completing an engineering project. Engineers will tend to write the changes on the drawings themselves and not update them in engineering records. I was able to make the changes from multiple projects in AutoCAD and reupload them into engineering records so that the drawings in records matched with the drawings on the floor. This is very important as it is crucial to have accurate schematic drawings in records in case of major breakdowns with equipment. Electricians and outside contractors use these drawings to troubleshoot during breakdowns. These learning objectives have helped guide my learning in the electrical engineering field.

From this internship, I have learned a lot regarding how engineers function, collaborate, and solve problems both independently and collectively as a team. The biggest takeaway I have from this internship is how the theory I've learned in class applies to real-world applications. The theory I found most interesting was how the FFT is used in predictive maintenance. We used the FFT for vibration analysis on motors and for root cause analysis on gauge issues. When having

issues with variation in the thickness of the metal, we use the FFT to help determine what the issue is. An example of this is when we used the FFT on the gauge signal, and we were able to determine the main frequency at which the gauge signal was oscillating at. We saw from the FFT of the signal that it was oscillating at 15.5 Hz. Using the speed of the sheet through the mill and the diameter of the work rolls, I was able to calculate the work roll frequency and found it to be 15.48 Hz. This means that the gauge variation was due to a work roll issue, meaning either a bearing or possibly an uneven work roll was causing issues. Mechanics were able to change out the work roll, and this solved the gauge variation problem. This is very interesting to me as I got to use multiple theories I've learned from class and apply them to the rolling mills at Novelis. Another major takeaway I got from the internship is the collaboration and teamwork it takes between engineers to solve and fix problems. Every morning, we had an engineering meeting where we would discuss all the problems that occurred the day before. Some of these issues were major and would create a long discussion on what the problem could be and how we could go about solving them. This was incredibly interesting to watch as multiple engineers would come together, each specializing in a part of the machine, to solve a bigger issue. I've watched projects overlap with both electrical and mechanical engineering and seen how they come together to solve issues. The last big takeaway from this internship is learning about project management. At the beginning of the internship, I was handed a project to work on and plan out during my time there. My project was to update a ground fault monitoring system for our DC motor drive circuit. This system measures the resistance to ground in all three phases of our main power transformers to watch for any sudden decreases in resistance. This system is designed to send a signal to the PLC when the resistance crosses a specific threshold and will cut power to equipment to prevent damage or harm to personnel. I was able to research, plan, and begin integrating this system into

the DC motor drive circuit. This project has allowed me to learn the process of developing an engineering project from the very beginning. I began by researching ground faults and devices on the market. I held meetings with the manufacturer's engineering teams to ensure proper connection and use of the devices bought. I also planned and developed schematic drawings of how these detectors will be mounted and connected. Electricians will use these schematics to properly hook up the monitoring device and allow for better monitoring and fault tracking of ground faults. I believe learning project management was a huge part of the internship as I got direct experience in handling projects during different situations.

In conclusion, this internship at Novelis has been very informative and rewarding. I was able to work on a multitude of different systems and learn applications of electrical engineering in the real world. By completing my SMART objectives, I have been able to further understand the application of theory from classes. My ground fault detector project will help contribute to Novelis's sustainability plan and help push for greater reliability in the cold mill. My updated drawings will help electricians and contractors be able to easily troubleshoot and diagnose problems with the equipment. I'm happy to share that I have been approved to stay at Novelis for part-time work throughout the semester. I hope to continue learning direct applications of electrical engineering as I begin to pursue my career as an engineer.