Jaymie Marie Velasquez
CHME 391 Industrial Employment

Summer 2015

My name is Jaime (pronounced Jay-Me) Marie Velasquez and I was born and raised in Santa Fe, New Mexico. I attended St. Michael's High School where I participated in Varsity Cross Country, Basketball, and Track & Field as well as National Honor Society, National Spanish Honor Society, and Concert Band. My mother Deanne teaches kindergarten and completed her master's degree in ESL (English as a Second Language) as a side project of hers when I moved away to college. My father Larry is a Civil Engineer retired from the NMDOT. He subsequently has dabbled in launching his own engineering LLC, tacked on a PTOE certification to his PE credentials, and is currently employed by Los Alamos National Labs. My sister Alicia is a recent graduate of Nursing School and has just passed her RN exam. Though it is likely quite apparent, my childhood experiences were diverse and many, and it is my family that has greatly influenced my love of learning, my eagerness to try new and exciting things, and especially feats that scare me or that seem impossible.

My path to Chemical Engineering has been a tangential adventure. What it amounts to is the undeniable fact that I have this incredible knack for being one of the luckiest people I know. Two years ago, I was a biology pre-med major taking Organic Chemistry, and as fate would have it I sat next to a group of obnoxious chemical engineers whose comradery was infectious, and whose humor might have been as corny and nerdy as my own. Once I investigated further and sat down with the department head, the small size of the program, sense of community, and obvious academic rigor/suicide had me sold. I can honestly say that joining the Chemical Engineering family here at New Mexico State University (NMSU) has been one of the best decisions I have ever made, personally as much as academically.

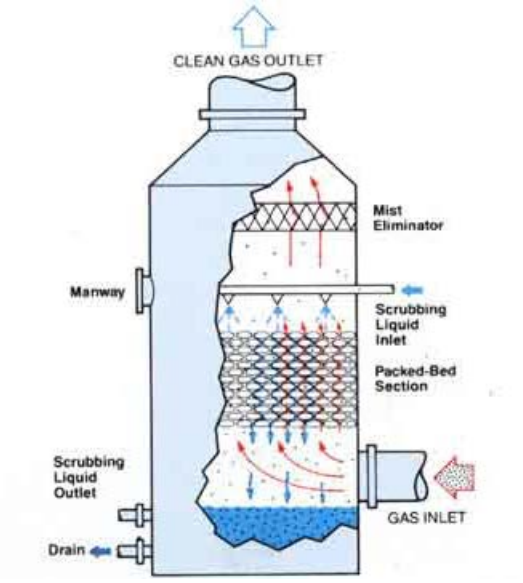
This fall I am a senior in the Chemical Engineering program at New Mexico State University, which means that I have successfully completed CHME 441, 307, 352L and 322L (Chemical Kinetics and Reactor Engineering, Transport Operations II, Simulation of Unit Operations and Instrumentation, and Transport Phenomena Laboratory). I am currently enrolled in CHME 452, 452L, 412, and 423L (Chemical Process Design and Economic Evaluation, Chemical Process Simulation, Process Dynamics and Control, and Unit Operations Laboratory), and am set to graduate this coming Spring.

This past summer, I worked as an undergraduate technical engineering intern at Intel Corporation Rio Rancho site in the Corporate Services Cleanroom Mechanical Module. As my second summer at the

site and with the company, there were many things that I was already accustomed to in terms of logistics and company values, but my placement in a new group was entirely different than my first internship in Ultra Pure Water Processing and Industrial Waste Systems.

The principal objective of my main project this summer was to qualify two exhaust abatement systems. In particular, I was tasked with analyzing and evaluating the processes and procedures in the Scrubbed Exhaust System (EXSC), as well as the Ammonia Exhaust System (EXAM). Essentially, I conducted a case study for each system to assess the procedures in place, and verify that they were truly the best methods in which to be operating, or if they were merely what had been adapted over time.

Essentially, exhaust abatement systems denote a process to take pollutants out of the air. Exhaust that is generated from factory tools is transported to the scrubbers via ductwork. Scrubbers are mechanical devices that perform chemical functions. They are "air cleaners" that are designed to clean/remove gas pollutants via absorption. The exhaust enters the scrubbers at the bottom from the ductwork, and the ascending exhaust contacts the descending liquid, absorbing contaminants. This happens by a process known as adiabatic saturation, which is when a dry or partially dry gas accepts liquid vapor without a net transfer of heat. This is useful in scrubbers because this causes a drop in gas temperature and an increase in flow water vapor content, recalling that the objective is to maximize the liquid to gas contact so that gaseous pollutants can be absorbed by the scrubbing liquid. The clean air is then pulled by fans out from the top of the scrubbers, where it goes to fans and is released to the atmosphere. The pollutants are concentrated in the liquid that collects in the sump that is discharged to the water waste system.



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It became apparent from day one of my internship that I had a learning curve that was approximately vertical. Although I had a basic conceptual and theoretical understanding of scrubbers from our separations class, I needed to learn an incredible amount regarding how the mechanical equipment worked in the system as well as all the environmental permitting that governs the process. I now understand from firsthand experience that to be successful in industry, an engineer of today is multidisciplinary, and learns whatever the project at hand entails. My studies may be concentrated in Chemical Engineering, however, this summer in order to be effective, I dabbled in Mechanical, Electrical, and Environmental Engineering too.

Initially, I focused on understanding the exhaust abatement systems on site, familiarizing myself with schematics of the ductwork, scrubber units, and fan networks leading up to the stacks where the "scrubbed" clean air is released back into the atmosphere. I spent an extensive amount of time out in the field, walking the systems after studying the schematics in order to better understand the translation between the diagrammatic representations of the system and the actual equipment. I also conducted research to investigate how similar industrial plants manage their exhaust systems, and cross referenced my findings with literature research. In this capacity, I learned real time about the subtle differences in the theory and concepts versus real world application and implementation.

One facet to my project that was perhaps the most important in terms of actual implementation was an assessment of the system from a stakeholder perspective, evaluating what the group does well as a team, as well as what can be improved to help the system run more efficiently. Again, it was reiterated to me just how imperative effective communication is to the success of any engineering project. If I had to choose one thing to take away from this summer, it would be to engage, engage, engage. Engage the other engineers whose systems interface with yours, both at the makeup stage, as well as at the waste phase. Engage Environmental Health, and Safety to ensure that the methods you seek to optimize or increase efficiencies are both safe for the workers on site, and within permitting limits, especially where exhaust is concerned. Lastly, one of the most important, engage the technicians. They are the personnel that work directly with the equipment day in and day out, and frankly know it's intricacies as well as the manufacturer's in some regard. They are one of the most valuable resources I encountered, and I am very grateful for the time that they took out of their day to show me valves, level sensors, controls, as well as answer all my questions.

Last summer in Ultra Pure Water Processing and Industrial Waste Systems, the projects that I was assigned were outlined and well defined. One fundamental difference this summer is that I was given a

problem statement as broad as the Sahara Desert regarding a real problem to which no one knew exactly how to proceed. A technical project this broad was difficult to approach, and I spent a good portion of the summer spinning my wheels about how I was going to go about attacking it. As an engineer, I realized that the ability and skill to evaluate the unknowns, constraints, and variables in a given system is perhaps the most important step in the whole process. My mentor, who has worked for 25 years in the Mechanical Group, taught me how the engineering thought process is as imperative to the overall success of the project as the data. I ended up narrowing the scope of my project due to time constraint (the original scope would have been a 2-3 year project), and focusing on rapid improvements that can be made without major cost, construction, or time investment.

What I came up with was to implement small rapid improvements in the short term that will hopefully result in standardizing the system in the long term. The design decisions and system modifications were evaluated from all different angles before they were implemented. From a controls standpoint, we were able to standardize the pH and conductivity set points in the system across all the different scrubbers, which is projected to get the units to behave more uniformly over time. Maintenance and calibration activities will also happen more often, and the hope is that they will be automated as much as possible in the next couple years. Additionally, I populated an excel spreadsheet detailing the instrumentation manufacturer and location at each scrubber unit so that the samples collected can be trending over time and placement.

What is ironic is that I have spent the last two summers dealing extensively with controls and P&ID's, not realizing that it is a large part of the senior level Chemical Engineering Curriculum. It has already been such an amazing experience to take what I have learned in the real world and come back and apply it to my textbooks. Needless to say that my experience this summer has turned out to be a great segway into my final year as a Chemical Engineering undergraduate.

This summer presented me with an opportunity to work in a different area of Corporate Services. It became apparent to me however, that the groups work together extensively regardless. The Electrical, Mechanical, and Chemical Engineering Groups collaborate routinely, and they all pull in Environmental Health and Safety to ensure all activities are safe for all parties and in compliance with the permits allotted to the site. Safety and environmental considerations govern every decision made to a process at Intel, including the exhaust systems I worked on. I came up with some great ideas, but the viable options had to survive a matrix that included system redundancy, maintaining emissions well under regulation, and process safety for the employees and community.

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This summer was a great opportunity to work not in silos, but in concentrated pockets that communicate well and contribute to an overarching objective of meaningful technology that enables people from all over the world to interface with their surroundings. Intel is committed to developing technology that enhances the human experience, and for the past two summers it has been an honor and a pleasure to learn and grow in such an environment.

Myself and other corporate services interns at a 3K Fun Run/Walk Event

Corporate Services interns designed and planned “Movie Night” for employees and their families themed, “Nerdy Superheroes that Save the World with Technology”. Above, we are dressed as the cast of Big Hero 6, one of the movies we showed.