

Memo

To: Dr. David Dixon
From: Mr. Joe Example
Date: 11/30/2010
Re: First Term Coop with Company X

First Term Experiences

I have been working as an engineering intern in the zucker department of the Company X plant in Scottsbluff, NE for three months. I have learned a lot about how a plant operates and have been able to apply some of the things I've learned in my Chemical Engineering courses such as Fluid Mechanics, Thermodynamics, and Chemical Engineering I. It is very exciting to be able to actually see what I've been learning for the past two years be put into real plant application. I will start by describing some of the projects I've been working on here at Company X. Then, provide an overview of my experiences, what I've learned, my plan for the next COOP term, and an introspective view on the balance of work and fun.

Projects

During my first week I was given the task of doing energy balances on all of the heat exchangers in the zucker department. This consisted of using a heat gun to read the temperatures of the inlets and outlets of the hot and cold streams of every heat exchanger. The data I collected was then sent to an analyst for further evaluation. This was a hard task for me because I didn't know my way around the plant, and all I was given were the equipment numbers of the heat exchangers and the P&ID's. I received help locating most the exchangers by the operating technicians and other workers in the plant. This was a good experience for me because it got me out into the plant right away, finding equipment and following streams.

The next project I started working on right away was trying to eliminate scale buildup in the evaporators. I have been told that scale, or evap stein, is a problem in most zucker plants because of the conditions in upstream processing. I worked with a chemist in researching scale inhibitor chemicals, writing a management of change document, getting this document signed by various authorities though out the plant, and ordering the equipment needed to introduce this chemical into our first effect evaporator. This project is just a trial run, and it will have to be closely monitored to evaluate the effectiveness of the scale inhibitor.

For the past two months I have been monitoring the pH of our reboiler condensate. Carbon dioxide builds up in our reboilers and reacts with the condensate to form carbonic acid. These acidic conditions cause a lot of corrosion to our reboilers. It has been my responsibility to open the reboiler vents to let out excess carbon dioxide when the pH is too low. Opening the vents not only releases carbon dioxide, but also steam, which results in a loss of energy and money. I am working on determining the actual amount of money we are wasting by venting the CO₂ and steam, and comparing it to other alternatives that could be used to raise the basicity of the reboilers.

I was given the task of improving our sterilizer system in zucker load out. Since we produce food grade zucker, we have to sterilize all of the load out lines. Our current system is highly operator dependent and inconvenient. The sterilizer system is basically a saturated steam flush of the lines, making sure to raise the temperature of all parts of the line to the correct temperature, then hold it there the required time. This system has the potential for back flow into the scale inhibitor barrel, because of the steam pressures involved. Also, the scale inhibitor gets very viscous in the cold winter months so the sterilization needs to be slowed down to accommodate this. Currently I am working on designing a new system that will be more efficient and convenient for our plant.

During the winter months, we often have problems with our air-controlled valves freezing. I am currently working on getting a deicer installed in our compressed air line to eliminate this problem. I have been in contact with contractors and vendors in order to come up with the best location for the dispenser and the best product to use.

One of the projects I had been working on quite extensively could not be executed. I had been looking on upsizing a pump in another area of the plant. Once I had the pump sized correctly, I met with an electrical contractor about an estimate for this project. Since the pump was being upsized from a 30 hp motor to a 100 hp motor, new wiring, a new starter, and a few other things had to be added. Usually this wouldn't have been a problem, but in this case the pump was on a backup generator that was already overloaded. Because of this, the pump is unable to be upsized until our generator problem gets resolved.

My coop is not limited to just equipment improvement projects--I also do evaluations on equipment in the plant. I've worked on monitoring pressure drops across heat exchangers to determine fouling, doing evaporator profiles to determine efficiency, and taking various samples and gauge readings around the plant. I have also had the privilege of giving tours to groups that tour the facility. I also enjoy when my coworkers give me short cost analysis jobs. For example, I was once told to take a sample of the CO₂ scrubber water to determine the amount of our product in it. I then calculated if it was more cost effective to send the water to the sewer or to send the scrubber water back into the system to recover the product; basically, determine if the earnings of the extra product overcome the cost to evaporate the extra water.

Experiences

During my coop there have been many positive experiences. I've enjoyed being able to see what working in a plant involves and what a chemical engineer actually does. I've been able to make many new friends in my department and other departments at the plant. I've learned what specific pieces of equipment in the plant do and how they work. There have also been some negative experiences during my coop. The main one is the frustration involved with being unknowledgeable in my department. I didn't know where things were, I didn't know how they worked, and I didn't want to keep bothering people with questions. Eventually, I got over this and most of my frustrations have been resolved. Another negative part of my job is the struggle to keep busy. I often find myself just sitting and waiting for things to happen with my projects when I feel like I should be doing something.

What I've Learned

So far, I've learned a lot during my coop with Company X. The process for project implementation is very long and requires extensive evaluation. I've learned the various steps that need to be followed in the project development process. I have also learned that people skills are very important in my job. I have to ask numerous questions and get advice and guidance from so many different people in order to do any task. At first, I was hesitant to pick up the phone and call a company about sizing a piece of equipment or a contractor about a piping or electrical estimate. Now, I am on the phone with some

company almost every day discussing projects I'm working on. I have also learned to be more patient while working here. It seems like I am always waiting for contractors and vendors to get back to me about bids and estimates. I've also learned that my coop lasts for a very short time so I may not get to see many of my projects actually implemented. Because of this, good record-keeping habits are needed so the next engineer to pick up my job will be able to clearly understand what I've done and what still needs to be done on a project.

Next Term

During the second half of my coop I hope to finish some of my projects. Although I have been working on a number of different projects, I have not been able to fully complete one yet. Because there are so many steps involved in carrying out a project, actually finishing one takes a long time. I would like to be able to walk through the plant and be able to point out some system or piece of equipment and be able to say, "I did that." I want to experience the satisfaction of improving a system and affecting the plant for years to come.

Beyond the Plant

Although I work more than I've ever worked in my life, I am still able to have some fun in my free time. This summer there were 30 interns/coops at the plant. This was an excellent opportunity for, as we like to call it, "networking". I was able to pick up golf as a new hobby while living in Nebraska. The interns also created both a sand volleyball and softball team in the YMCA leagues. The full time engineers often have get-togethers at their homes to which the interns are invited.

This summer has been a positive experience for me both at work and in my free time. I've had the opportunity to network with other engineering interns as well as full time engineers. I believe this experience has been greatly beneficial to my future professional career, and I look forward to the rest of the time I have here.