

EE/CprE/SE 492 WEEKLY REPORT 1

Start Date – End Date: 2/4-2/18

Group number: 27

Project title: 60 MW Solar Field and 34.5/115 kV Substation Design

Client &/Advisor: Black & Veatch advised by Ajarapu

Team Members/Role: Omer Karar, Madison Lakomek, Madissen Lawrence, Jacob Miller, Brooke Nelson, Ashton Randolph, Jenna Runge, Zachary Zimmerman

Weekly Summary

These past two weeks were mainly focused on the one line diagram and deciding which components should be placed into the substation. To do so, everyone researched the specific pieces of machinery that is found within substations and found examples of ones that would work for our voltage and current level. We also worked through relaying to try and figure out the best protection scheme for our project.

Past week accomplishments

- Researching Substation Components - All
 - Each member of the group researched examples of specific component types that can be used in the substation. These were actual components that can be purchased and work based on the substation voltage and current levels. The following were researched by the corresponding person: Current transformer (Omer), Voltage transformer (Jenna), power transformer (Jacob), switchgear (Brooke), lightning arrestor and motor operated devices (Ashton), batteries (Madissen), disconnect switches (Madison), and insulators (Zach).
- One line Diagram - Jacob
 - Placed transformers, circuit breakers, circuit switchers, bus work, etc.
 - Connected the relay locations with the locations of the components of the substations
 - Work with autocad to edit the initial design
- Relaying Scheme - Jacob, Omer
 - Researched SEL 351, SEL 311, SEL 411, SEL 487 relays and determined which should be placed where in the scheme- Jacob
 - Review initial scheme and discuss any difference we may have in our own ideas of what the relaying should be like - Everyone
- Start initial investigation on battery calculations - Ashton, Maddy
 - Realized that battery calculation correlates directly to which components and the number of components, such as relays, that are used so we must wait for the one line to be finalized to continue with this calculation
- ETAP Software- Everyone
 - Got the software approved by the University and Ajarapu and in the process of getting it installed into the senior design lab

Pending issues

As a group, we must finish working through the one line diagram this week to finalize the components that are going to be used in the substation. Jacob will work to update the drawing based on the relay scheme that the group finally decides on. As a group, we all must also continue to research how ETAP works and begin to learn what pieces of our design we can simulate with the program. In addition we have to completely finish our relay scheme and one line drawings before moving on to calculations.

Individual contributions

*this should be short and concise based on past week accomplishments. Instructions say do not include group meetings

Name	Individual Contribution	Hours in the Past 2 Weeks	Hours Cumulative
Omer Karar	Researched relay scheme, SEL 351, SEL 311, SEL 411, SEL 487 relay	6	6
Madison Lakomek	Researched disconnect switches, reviewed protection scheme, battery calculation research	6	6
Madissen Lawrence	Researched batteries for the substation. Recorded meeting minutes for the client meeting on 2/8.	6	6
Brooke Nelson	Researched switch gears for the substation. Recorded meeting minutes for the client meeting on 2/15.		
Jacob Miller	Researched and worked on the relay schematic as well as worked on one line.		
Ashton Randolph	Researched lightning arrestors and motor operated devices. Lead client meeting 02/16. Initial battery calculation	6	6

	investigation.		
Jenna Runge	Researched voltage / potential transformers, found examples for the project, and led meeting on 2/8.	7	7
Zachary Zimmerman	Researched insulators for the substation. Began looking into ETAP software and found a training course that could be helpful as we begin simulating our design.		

Plans for the upcoming week

(Please describe duties for the upcoming week for each member. What is(are) the task(s)?, Who will contribute to it? Be as concise as possible.)

Omer Karar- work and research for different types of relays used for overcurrent, differential, and feeder fault protection. SEL 351, SEL 311, SEL 411, and SEL 487 relays. Besides, look to find out how to use ETAP by reviewing the manual sheet.

Madison Lakomek- Work with Jacob to simplify the one line diagram to make our design only have one transformer. Begin looking at calculations for grounding and bus work. Look at ETAP manual to begin learning what the software can simulate.

Madissen Lawrence- Update the website to include progress made within the past few weeks, begin looking at calculations for the batteries. Look into the features of ETAP when the USB key arrives. Look into pricing for substation components.

Brooke Nelson- Begin looking into calculations for batteries. Look into ETAP manual. Research price estimates for components.

Jacob Miller- Finalize the relay schematic and one line. Look into the ETAP software.

Ashton Randolph- Begin preparing to begin future calculations for the battery, and cable trench calculation. Look into the ETAP manual so when the software is installed it can begin working soon.

Jenna Runge- Research different applications for ETAP for our project. Research price estimates for the parts we have chosen.

Zachary Zimmerman - Continue researching and learning about ETAP and the opportunities the software provides as well as coming up with a plan on what our team will use ETAP for.

Summary of weekly advisor meeting

The past two meetings with Ajarapu were spent discussing ETAP software and getting it installed into the senior design lab. He had to sign papers to get the process moving and we are

now waiting for ETAP to send the program to be installed into the lab. Ajarapu requested we all start looking into how ETAP works and what specific pieces of our design that we want to simulate with the program.