sdmay19-15: Capacitor Gun

Week 8 Report
October 29 - November 2
Client: Max Balzer
Faculty Advisor: Mani Mina

Team Members

Grant Larson — *Test and Report Engineer*
Max Balzer — *Meeting Facilitator and Production Engineer*
Bret Tomoson — *Projectile and Power System Designer*
Brett Nelson — *Safety Engineer*
Mark Fowler —*Test Engineer, scribe*
Zachee Saleng — *Engineer designer*

Summary of Progress this Report

We got almost all of our researching done and a parts list created. We just need the parts list to get approved so we can get it all ordered. Also, we met with Mike Ryan and he has a metal shop where we will be doing the machining of metals for the project. We also finished version 2 of the project plan.

Past Week Accomplishments

- Project plan and solenoid - Mark
    - Helped other members of the group find suitable parts to finish off our parts list.
    - Tssop to dip adaptor and looked into heatsinks

- Power losses and metal machining- Max
    - I helped find resistors with Bret to create a discharging circuit for the project. This will be used as a safety measure to redirect any leftover charge in the rails after it is fired.
    - I helped complete the parts list with the group so that we can order materials. I sent the parts list to Mani for approval so that we can send the list to Lee at ETG to get it ordered.
    - We are trying to find a grease to use to reduce friction and thus reduce the heat. I spoke with my dad who sells greases and he told me some ideas for types of greases to use.

- Finalizing parts list - Brett
    - Worked together as a Team to finish the parts list, clean it up and got it send to who we needed to
    - Learned the basic of Solidworks
        - Started to think of a model and will design it in Solidworks

- Finished the parts list, went over SolidWorks, - Bret
    - Finally finished the parts list and emailed it to Mani for approval and ETG for ordering.
        - Work was mainly done on finishing the charging circuit and also any supporting materials such as connectors and wires.
    - I went over SolidWorks basics with the team so that we can build a couple model designs of our test system and projectiles.

- Gathered dimensions to further final calculations for our design -Grant
    - Used our desired muzzle energy to calculate the current needed
    - Used the current to estimate the energy and velocity of the projectile

- Worked on the design parts. - Zachee
    - Worked on the Project plan.
    - Met with Mike to talk about different aspect of the material parts and set up a time that will meet to work on the project.
    - Research to figure out what should be the characteristic of the solenoids

---

Pending Issues

- The test projectile design must be rectangular or square so that it doesn't tumble in the barrel. This basically rules out a bullet unless we fit it with fins which will be left as a 2nd-semester goal.
- Mike underestimates the amount of current and heat we think our project will output. The plastic he recommended looks as if it will melt at a temperature we think we will reach.
- Build a SolidWorks model of test-design.
- Order the parts.
- Start building.

Plans for Upcoming Reporting Period

Finalize the parts list in order to actually order what we need to start building and testing. Using SolidWorks to model what we want the overall design of the small-scale model to be.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Grant Larson	Added more to the Project Plan. Helped with completing the parts list and	5	50

	researching high voltage resistant gloves. Began to learn SolidWorks to help realize our design virtually.		
Max Balzer	Most of the week was focused on completing the parts list so that we can get materials ordered. I helped Bret with creating and finishing the discharge circuit so that we can implement that as a safety measure to our project. I will continue working on finding a grease to use to reduce friction and heat within the barrel of the gun. This will solve a lot of our problems if the grease does in fact reduce friction and heat.	10	62
Bret Tomoson	I found a new charging circuit design and finished the parts list for it. I also added other parts to the list with the team. I went over a basic SolidWorks example so the team could build their own version of the test railgun over the week in preparation for the build dates.	20	68
Brett Nelson	During the week, I worked with the team to help finish the parts list. Once we had everything, we cleaned it up, made sure we had everything we needed. I also worked on the last lecture talk for the senior design lecture.	6	51
Mark Fowler	Finalized parts list	8	50
Zachee Saleng	Worked on the parts list, looking for different characteristics such as charge circuit and wires. Had meeting on area of professional responsibility. Navigate through install solidWorks for exploration.	10	54

Plans for the Upcoming Week

- In the coming weeks, we will be working on: - Zachee
    - Will be working on the design document.
    - Will create a design and dimensioning differents part of the design using SolidWorks.
    - We will produce multiple different sizes and shapes.
- Solidworks design - Mark
    - Create a design in SolidWorks for next meetings discussion on design
    - Send our design to Mike
- Calculating force and losses through the field - Max
    - Get our parts list over to Lee so that we can get them ordered.
    - Work with Bret and the group to finish a design in Solidworks that we can document as a final design.
    - I will talk to Mike to set up a time to come back to his shop to start machining and building the project.
    - I will continue to talk with my dad to find a grease that has high heat resistance and is also conductive that we can use.
- Work on designing a model - Brett
    - Become comfortable with using Solidworks
        - This will allow for designing a potential model of the design
        - Compare with the rest of the team and finalize a design model we will be working with
- Charging circuit design - Bret
    - Start modeling the railgun in SolidWorks.
    - Work on basic projectile designs.
    - Follow up on the ordering of parts and theory explanation to Mani.
- Create a complete formula sheet for all calculations to do with the Railgun - Grant
    - Write down how to easily find energy, current, and other variables given design dimensions

Gitlab Activity Summary

Nothing to report.