

Senior Design Weekly Status Report

sdmay19-15: Capacitor Gun

Week 7 Report

October 22 - October 26

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
 - Reviewed project plan comments from TA and fixed issues with our project plan along with the other group members
 - Looked into solenoids, needed to find one that had enough and was fast enough for our project.

- Power losses and metal machining- Max
 - I talked with my dad who sells grease and oil and he told me there is an electrically conductive and heat resistant grease we can use to coat our rails so that friction is hopefully minimized.
 - I set up a time with Mike Ryan to go meet with him at his metal shop. This was good because he has metal we can use and he will allow us to work with him on machining the metals for the project.
 - The team and I worked on revising the project plan to our version 2. Hopefully, we did all we needed to in order to document what we have done so far.

- Housing materials and project plan-Brett
 - Finalize the materials that will be used for the guard rails and the material that will be used for holding the rails together to allow an outer material to go around everything to make it safe.

- Worked on the project plan with the Team to complete it.
 - Used the previous version feedback to fix our mistakes from before.
- Worked on the parts list, discussed design ideas with Mike and the team - Bret
 - The parts list is constantly being updated with relevant materials.
 - The team met with Mike Ryan to discuss potential design ideas that would utilize common shop materials and design practices.
 - Started modeling of electrical systems in Multisim.
- 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 with team to determine new semester plan
 - Worked on design Document.
 - Research to figure out what should be the characteristic of the solenoids.
 - Worked on the parts list, specifically 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 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.
- 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	Completed Gantt chart for both semesters. Met with Mike Ryan and discussed our plan, how it was going to	8	30

	work, and how we were going to build it. Worked on revising the Project Plan and updated its information		
Max Balzer	I worked with Mike to get a time set up for us to get a meeting and we did. This was a big part because Mike agreed to help us machine the metals and we can use his metal shop to build it. We also needed a way to lube up our rails so we weren't shooting our projectile into a dry rail so I talked to my dad and there is a dielectric grease that should resist the heat generated and help reduce the friction in the barrel.	8	52
Bret Tomoson	Met with Mike to discuss design ideas. Set up a schedule for small-scale build completion and worked on the parts list.	12	48
Brett Nelson	Went through the project plan with the Team to complete it. Figured out the materials that will be used for the housing materials of the railgun. Help finalized the parts list.	7	45
Mark Fowler	Went to Mike Ryan's shop with the rest of the group to discuss with him what he could do for us and how he could assist us with our project.	8	42
Zachee Saleng	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.	8	44

Plans for the Upcoming Week

- In the coming weeks, we will be working on: - Zachee
 - Get our parts list finalized so that we can order materials on Monday.
 - Order materials so that we can get those here to start building.
 - We will produce multiple of different sizes and shapes and first test them on the smaller scale model.
- Finalize parts list, order material - Mark
 - Find a suitable solenoid to order
 - Mock up a schematic so we can show it to the shop for machining the parts we need. Also, present our material to Mani Mina to get approval for the parts we need to order
- Calculating force and losses through the field - Max
 - Get our parts list finalized so that we can order materials on Monday.
 - Work with Bret and the group to finish a design in Solidworks that we can document as a final design.
 - Order materials so that we can get those here to start building.
 - Talk with my dad and get the dielectric grease so that when all of the materials arrive I can send an email to Mike and set up a meeting time to build the project.
- Get everything ordered and lecture slides- Brett
 - Help finish the final parts list and get that approved to order the parts.
 - Work on the last set of technical talk slides.
 - Figure out the most technical challenge we faced.
 - Make a final design for the small-scale model.
- Charging circuit design - Bret
 - I will be working on final designs in Multisim for electrical components.
 - I will also be working with the team to go over Solidworks and how to model our project before we build it.
 - We will talk to ETG as a team to discuss ordering of parts.
- 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.
