

Project Management Assignment ME 476C

Reflection

Successes

Throughout this section, the team will identify major successes from the Fall semester and methods of teamwork which should be continued through the Spring semester. This list will briefly highlight the top contributions in teamwork.

- Team communication was always a top priority and as such, we were able to convey ideas thoroughly and respectfully
- The team had frequent meetings with all members
- Time management was a high priority, most assignments were turned in on time
- The workload was evenly distributed with all team members completing their assigned tasks
- All work was completed with high-quality, roughly A grade
- The team was well prepared for all meetings with lists of questions or tasks and agendas

Room For Improvement

This section identifies the areas that the team needs to improve. Improving these areas will allow the team to be more successful. This section also details the team's plan for how to improve these issues.

- Staying within Gantt Chart metrics and team-designated due dates
 - Plan of Action:
 - **1. Reference the chart more often (a weekly basis) to be reminded of necessary actions**
 - **2. Create the Gantt chart with a more realistic time frame for each of the tasks**
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- The team's timecards could be made more in-depth and accurate. Currently, the team tends to write most of the week's work on Monday, the day it's due.
 - Plan of Action:
 - **1. Write the working times each day work is done, not filling out the timecard in one sitting the day it is due**
 - **2. Remind other team members to fill out timecard before the end of meetings**

The bill of materials (BOM) is shown above. The materials with red next to their name are the ones that have not been purchased yet. The primary subsystems that need more planning before purchasing are listed below.

- The casing needs more design planning before purchasing parts
 - Plan of Action:
 - **1. Do pressure analysis for casing biased on data form strand burns**
 - **2. Finalize CAD to ensure all parts are necessary**
- The nozzle parts need to be verified before purchasing
 - Plan of Action:
 - **1. Check quality of parts in BOM to ensure they are up to spec**
 - **2. Check the budget to make sure the parts are within budget**

Manufacturing Plan

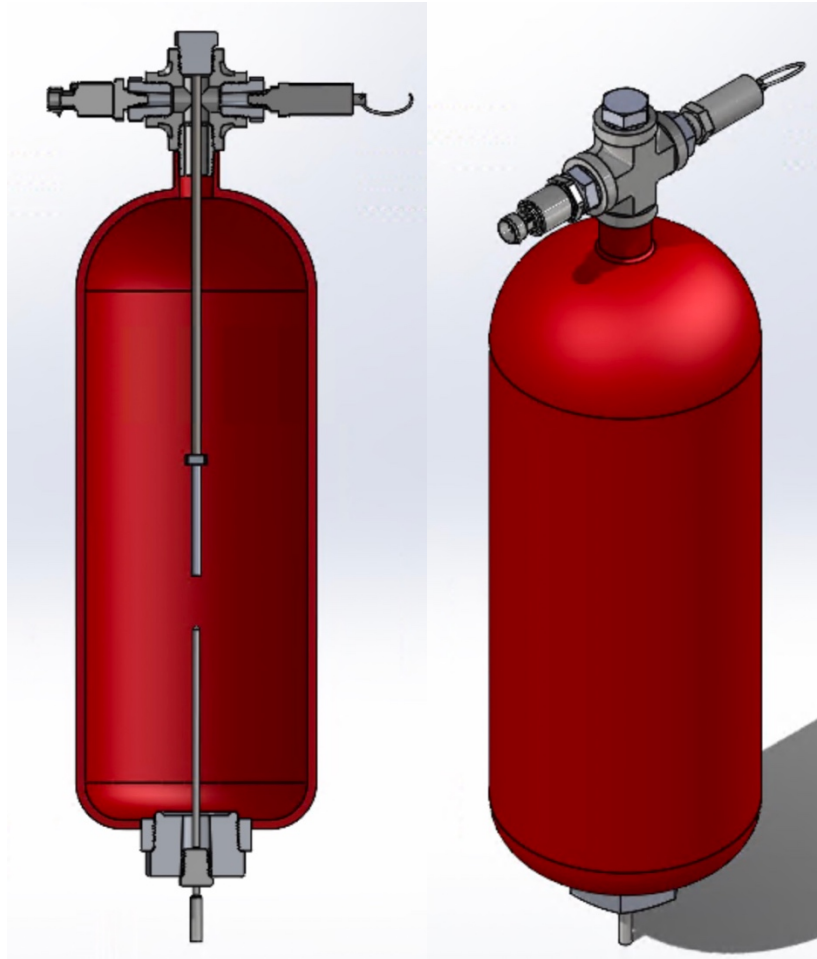
Motor Casing:

For the motor casing, there are certain products from the BOM which will be ordered early next semester to begin manufacturing the motor casing. Additionally, the snap rings which are listed in the materials for the motor casing will need to be modeled to ensure that the motor casing design is designed to fit the snap rings. The machining of the motor casing will incorporate the lathe and potentially the CNC in the machine shop.

Bulkhead

The bulkhead will be designed to fit into the motor casing. It will be manufactured using the CNC in the machine shop. Part of the team is certified to use this equipment which will allow us to be the ones to machine it.

Strand Burner:



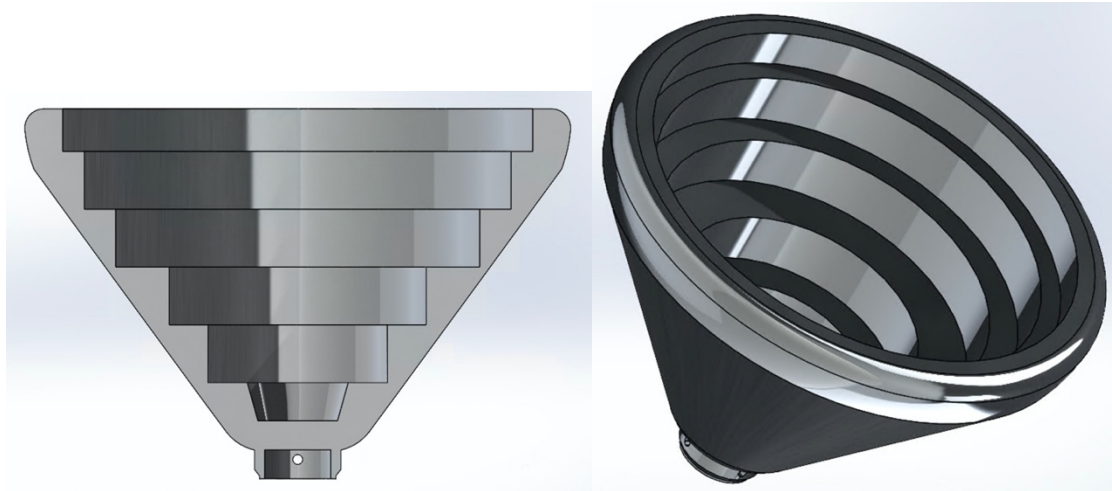
To manufacture the strand burner, the model must be created so it is known how each part goes together. This part has been completed (as seen above) so the next steps are to order the parts. Once those come, the building can commence. Multiple parts must be modified which will all be completed by the team. First, all three $\frac{3}{4}$ " NPT plugs must be modified. One must have a $\frac{1}{4}$ " countersunk hole into the bottom to hold the rod that goes into the vessel to hold the strand. The other two $\frac{3}{4}$ " NPT plugs have $\frac{1}{4}$ " NPT taps all the way through the part. This will secure the pressure relief valve as well as the pressure transducer. On the bottom of the vessel, a 3-inch diameter hole must be drilled to fit a ring adapter. This allows for more threads to be in contact with the plug. Once this happens, the adapter can be welded to the vessel. Next, a $\frac{1}{2}$ " NPT thread must be cut into the 2" NPT plug to fit the thermocouple. This is the extent of work we need to do with the strand burner. The manufacturing should take no longer than a day. All the materials used are made from thick steel to ensure pressure and temperature safety. The entirety of the machine work will be done in the machine shop.

75 mm Rocket Motor:

The 75 mm rocket motor body will be manufactured from casting grains of propellant using the 75 mm caps and mandrels which will be ordered in the first week of the semester. The propellant grains will then go into a casting liner which will fit into the motor casing.

Motor Holder for Test Stand:

The rocket motor holder will be made from a block of aluminum and be manufactured using the CNC and the lathe in the machine shop.



The motor holder for the test stand should be one of the easier parts to create. It will be made from a billet of aluminum round. The entire part consists of five concentric rings inside the actual part. Each one of the rings fits a different motor size. This operation will be done on the metal lathe in the machine shop. Lastly, four M2 threads must be cut into the bottom hole to fasten set screws to clamp onto the load cell nipple. These threads combined with the solid piece of aluminum before the concentric rings start will allow for minimal deformation of the holder. The process should take about a day, but due to how much material we must remove, this could easily turn into a day or two long projects. With the team working on it, we should be able to get this part done correctly and as accurately as possible.

Nozzle:

The nozzle will be made from copper with a graphite insert which encompasses the throat of the nozzle. The copper part of the nozzle will be made from a block of copper and use a CNC and lathe to machine. The graphite insert will need to be machined at a professional machine shop as the NAU machine shops CNC and lathe do not allow for graphite material.