ACTION ITEMS

TEAM: 23 Clean Room

Due Date:
Monday, February 11th, 2019 5:00pm

The following are the Action Items from last week:

Team Member: Katie Hoffman

Action Item	Date Due	Date Completed	Result/Proof of Completion
Research framing for the room	Feb. 5 2019	Feb. 5, 2019	Went to home depot and Mayorga's welding to see what material is available for the framing of the room. See Appendix A
Worked on Individual Tech analysis	Feb. 4, 2019	Feb. 10, 2019	Started on the Tech analysis paper. Appendix B
Continued working on the report edits	Feb. 4, 2019	Feb. 11, 2019	I worked on Section 3, 3.1, 3.2, 3.2.1, 3.2.2, 3.2.3, 3.2.4. Appendix C

Team Member: Daniel Marquez

Action Item	Date Due	Date Completed	Result/Proof of Completion
Continue attending Arduino for more insight	Feb 11 2019	Feb 6 2019	Have a code appendix D
Cut all the Aluminum framing for the hood	Feb 11, 2019	Feb 11, 2019	I worked on all of Section 6-6.3 appendix F
pressure transducer needs arduino board	Feb. 11, 2019	Feb. 9, 2019	researched the different types of arduino boards needed to create pressure transducer

Team Member: Hannah Reed

Action Item	Date Due	Date Completed	Result/Proof of Completion

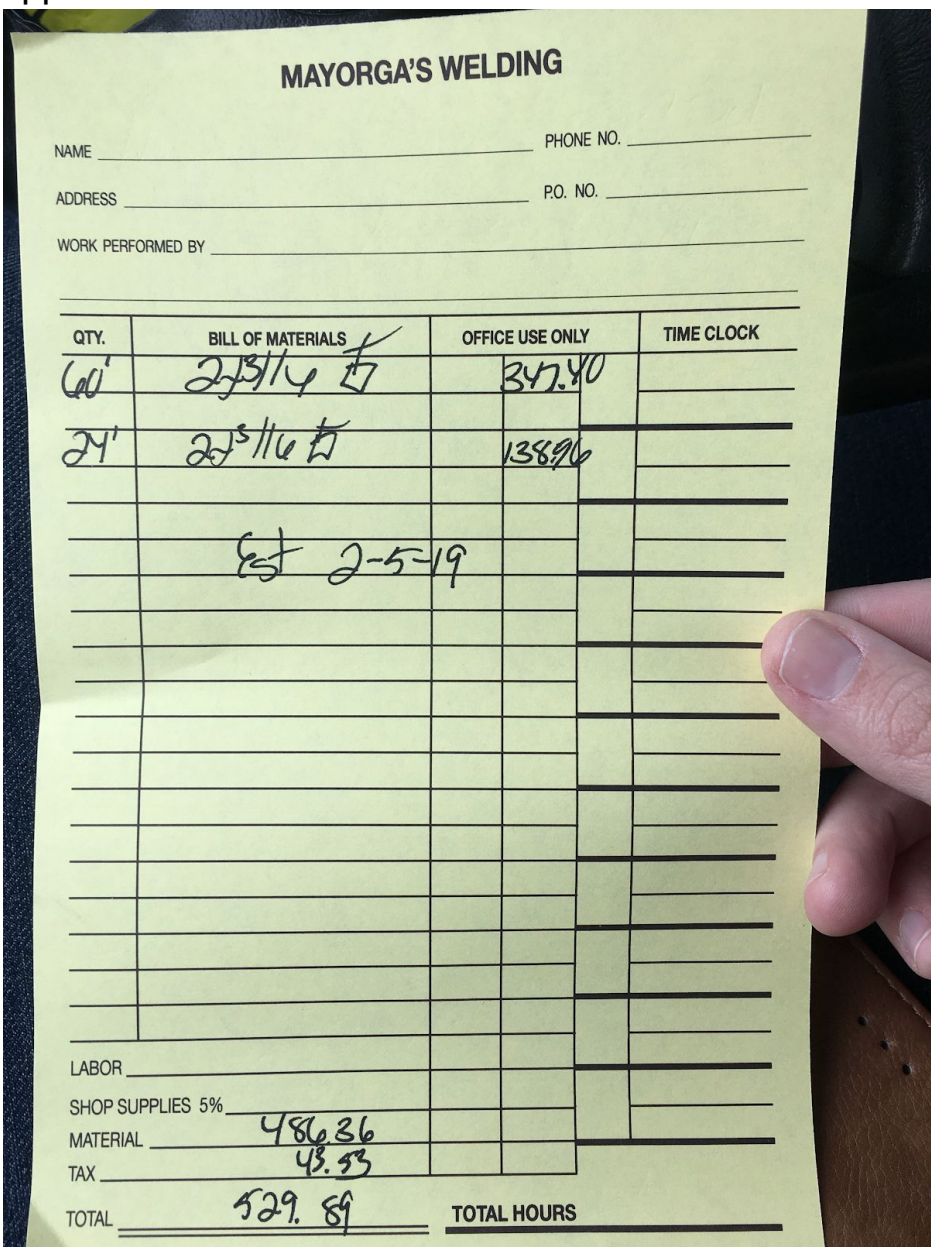
Update the team capstone website	Feb. 8, 2019	Feb. 8, 2019	Submitted for the team and already graded, 24/25 points.
Researched and found the 40 mil clear vinyl sheeting for the clean room	Feb. 11, 2019	Feb. 10, 2019	Updated the BOM with the cost and added the web address to view. https://www.fabric.com/Shopping/LoadCart.aspx?CartID=e63b2555-5bb2-4aa8-a408-29ae51f44917
Updated the hood CAD package to account for the design changes	Feb. 11, 2019	Feb. 10, 2019	Results emailed to Katie for use on her analysis.
Updated the grammar up to section 3.2 of the final report.	Feb. 11, 2019	Feb. 11, 2019	Did not get as much done as was intended, assigned more than I could complete in the given week, edits were made to the document, but most was fixing already edited sections for proper grammar.
Researched and found the correct power cord	Feb. 11, 2019	Feb. 11, 2019	Researched the cord and need to check home depot for a 14/3 gauge cord with no female end. They have it online, but would like to see if we can get it locally, and get a concrete price.

The following are the Action Items for next week:

Team Member	Action Items	Date Due
Katie Hoffman	1. Continue work on editing the Final Report (approx. 3 hours) 2. Work on Individual Tech analysis (approx. 2 hours) 3. Collaborate with team to figure out what our next purchase of materials is (approx. 1 hour) 4. Start working on requirements for the Hardware Review (approx. 2 hours)	1. Feb. 18, 2019 2. Feb. 18, 2019 3. Feb. 13, 2019 4. Feb. 15, 2019
Daniel Marquez	1. Continue editing final report (4 hrs) 2. Work on purchasing arduino board (1 hr) 3. Practice welding on the shop (3 hrs) 4. Talk to trevas on sponsorship for the boards (1 hr)	1. Feb. 18, 2019 2. Feb. 18, 2019 3. Feb. 18, 2019 4. Feb. 18, 2019
Hannah Reed	1. Find a topic for the individual analysis, and start research (3 hrs) 2. Start working on the Hardware review and compiling what has been done/what needs to be done for to complete the project (3 hrs) 3. Continue edits for the final report (2 hrs) 4. Find the power cord at Home Depot (0.5 hrs)	1. Feb. 15, 2019 2. Feb. 18, 2019 3. Feb. 18, 2019 4. Feb. 15, 2019

Appendix

Appendix A



MAYORGA'S WELDING

NAME _____ PHONE NO. _____

ADDRESS _____ P.O. NO. _____

WORK PERFORMED BY _____

QTY.	BILL OF MATERIALS	OFFICE USE ONLY	TIME CLOCK
60'	2 3/4 ☐	347.40	
24'	2 3/16 ☐	138.96	
	Est 2-5-19		

LABOR _____

SHOP SUPPLIES 5% _____

MATERIAL 486.36

TAX 43.53

TOTAL 529.89 TOTAL HOURS _____

Appendix B

I. Introduction

For this project, it was decided that a computational fluid dynamics analysis is to be done on the portable hood to determine if a positive pressure will result, to obtain a visual representation of the fluid flow within, and to obtain a visual of high and low points of the air flow given the chosen dimensions and the fan filter units (FFU). The analysis is crucial because it is one of the client's requirements that the hood has positive pressure continuously while in use. The company manufactures and analyzes minimal invasive microcatheter medical devices, used to treat aneurisms and other vascular defects in the brain. This project will benefit the client's research and development of their products by producing a clean low particle count work environment. There has to be positive pressure in both units to be considered a clean atmosphere, meaning that the particle count is low and HEPA certified.

II. Computational Fluid Dynamics Analysis

Computational Fluid Dynamics (CFD) is a software branch of fluid mechanics that generates solutions for fluid flows with or without solid interaction by using the mathematical model of the physical case and a numerical method to analyze the flow [1]. The software that will be used for this analysis is ANSYS that is supplied by NAU. For this analysis a solidworks model of the polycarbonate will be uploaded into a

III. Analysis of the Portable Hood

IV. Conclusion

V. References

[1] P.J.Pritchard, Fox and McDonalds Introduction to Fluid Mechanics, Wiley, 2014.

[2] "SimScale," [Online]. Available: https://www.simscale.com/docs/content/simwiki/cfd/whatiscfd.html. [Accessed 10 02 2019].

[3] "Fan Filter Unit, HEPA, 120V AC/60Hz, 2'x4', WhisperFlow," Terra Universal, [Online]. Available: : https://www.terrauniversal.com/product/6601-24-H [Accessed: 30-Oct-2018].. [Accessed 20 10 2018].

Appendix C

3.2.3 Existing Design #3: NCI 8'x8'x8' Portable Clean Room

NCI created a clean room, seen in Figure 3, that is very similar to the customer requirements needed for the clean room project. This portable clean room exceeds the size needed for the project but is portable. The main concern for this portable clean room would be if it could be carried out by three people or less,

as specified in the CR's. Due to the size of this clean room created by NCI this may not meet the requirements of portability for the clean room project. Nevertheless, the design can be used for creative idea generation for the clean room project.

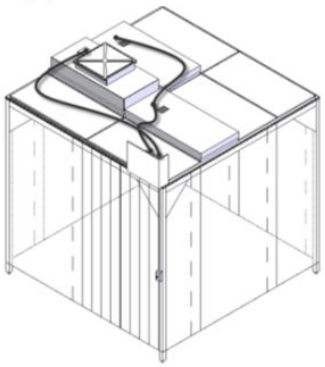


Figure 3. 8'x8'x8' Portable Clean Room [3]

3.2.4 Existing Design #4: Clean Air Products 6'x8'x8' Portable Clean Room

In Figure 4, Clean Air Products created a portable clean room related to the requirements our client. The dimensions exceed the required size needed, but it does meet the engineering requirement of being portable. The size of the room is important since it will be used in different sized areas. The concept of this clean room could be used as reference, since it meets some of the customer requirements needed for the clean room project.

katie.hoff4@gmail.com
Deleted: needs

katie.hoff4@gmail.com
Deleted: for our customer needs

katie.hoff4@gmail.com
Deleted: This requirement

katie.hoff4@gmail.com
Deleted: the room

katie.hoff4@gmail.com
Deleted: required by our client

katie.hoff4@gmail.com
Deleted: areas

Appendix D

PressureTranducer2019 - Notepad

File Edit Format View Help

```
const int pressure = A0;
const float offset = -40.676;
const float slope = 0.1759;

void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
  int p;
  float calp;
  p = analogRead(pressure);
  calp = slope*p + offset;
  Serial.print(calp);
  Serial.print(", (");
  Serial.print(p);
  Serial.println(")");
  delay(1000);
}
```

Appendix E

6 PROPOSED DESIGN – First Semester

The next process of design is to fabricate a prototype model of the hood and order the chosen fan filter units from Terra Universal due to the length of time that it takes to ship [5]. Then start purchasing the list of material from the Bill of Materials (BOM), in order to build the final design. To fabricate the frames for both the hood and the room NAU's machine shop in building 98C has all the required equipment to successfully build the design. Once the final design is fabricated measurements will be taken to verify that the customer's dimensions are met, a pressure test will be done to verify that positive pressure is obtained and sustained. As stated in the testing procedure section above, the pressure will be measured using pressure transducers, DAQ system, and LabVIEW program.

6.1 Implementation of Design

In order to implement the design, the team will work together with several resources that are available to us. The frame will be made and through the help of the machine shop, one of our teammates is recently certified for machining. This will prove to very helpful in the spring semester. In order to get more precise measurements for pressure distribution along the portable clean room, a group member has taken the task of learning CFD. Using the software ANSYS and creating a mesh out of the CAD file the team can create a more precise pressure distribution based on the geometry of the clean room. A Gantt chart (Appendix F) will be used to detail all the steps of the schedule for buying these materials. This will help with the manufacturing and the testing process since this will detail all the steps to create and finalize both the hood and the room.

6.2 Bill of Materials

The bill of materials (Appendix E) will be a comprised of the total amount of material needed to create both the clean room and the portable hood. Starting with the FFU which will have to be ordered online through a source that specializes in fan filter units. The framing will come partially from the machine shop and the rest of the frame will be ordered through Hhome Ddepot. The steel shear pins will also be bought through home depot along with the wheels for the portable room. Welding for this project will be covered through the help of the machine shop. The other materials like epoxy and polycarbonate cutting tools will be bought through the Hhome Ddepot.

6.3 Final Design Assembly View and Exploded View

Figure 19. Portable Room CAD Assembly

The Ffigure 169 above provides a detail assembly image of the proposed final design project. Showing the different components for the clean room like the adjustable legs and the shear stress pins, as well as the fan filter units.

Figure 1920. Portable Room CAD Exploded View

Figure 1920 displays an exploded view of the portable clean room for the final design project. The lines show the way the different are attached based on the starting point and ending points of the lines.

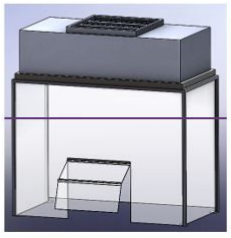


Figure 21. Portable Hood CAD Assembly

FThis figure 21 17 shows the portable hood design assembly for the final design project. This assembly shows the different components like the double hinge door, polycarbonate cover, as well as the fan filter unit.