

To: Dr. Oman and GTA Amy Swartz

From: Team 23 Clean Room

Subject: Hardware Review 2

Date: 3/29/2019

Introduction

This memo outlines the Hardware Review 2 (HR2), completed with Dr. Oman on Tuesday March 26, 2019 from 3:15pm to 3:45pm. The scope of the project has been changed to fully finishing the hood and manufacturing the frame of the room. The scope changed due to continuously exceeding the budget and time constraints. HR2 exhibits an overview of the materials in the team's possession, current finished parts, current ordering status, the updated CAD drawings for each system, a list of missing parts, and team member hardware responsibilities.

Photos of Materials



Figure 1. Welded Aluminum Frame for Hood

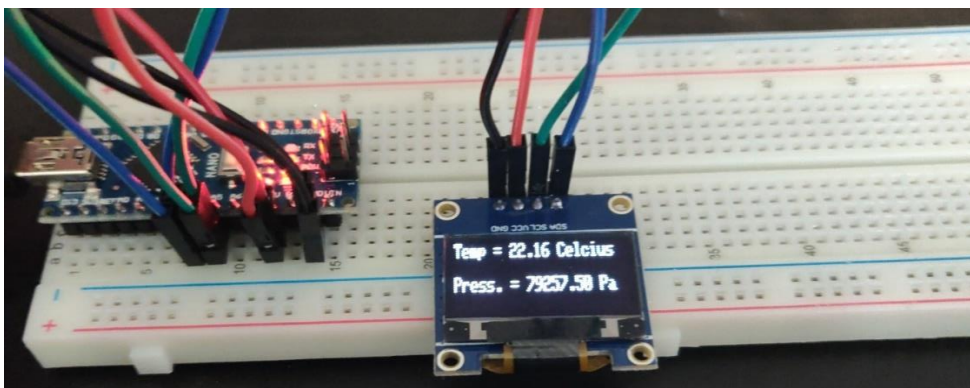


Figure 2. Arduino Board for Transducer

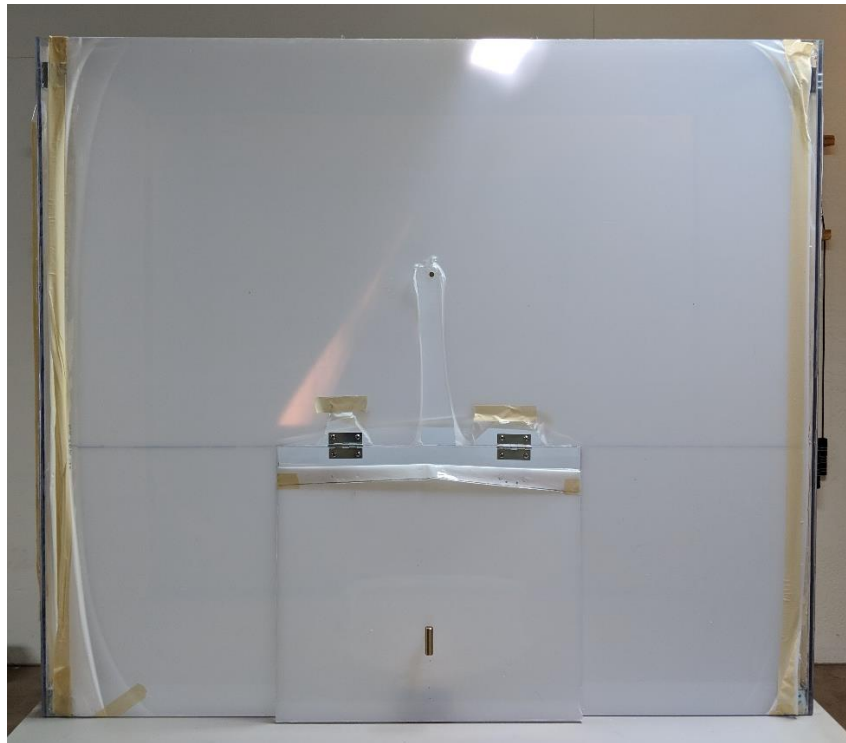


Figure 3. Polycarbonate Hood



Figure 4. Handle for the Hood



Figure 3. Corner Brackets for Hood Stability



Figure 4. Power Cords for the FFUs

CAD Designs



Figure 5. Room Frame CAD Assembly



Figure 6: Room Frame Disassembly CAD

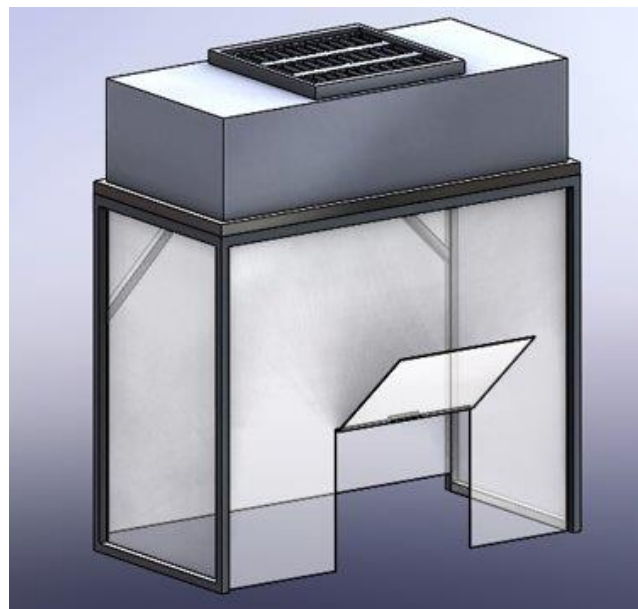


Figure 7. Clean Hood Cad Assembly

Evidence of Order Parts/Parts Missing

Currently all parts for the hood are purchased. The steel frame for the room had been ordered as seen in Figure 8 below. The next purchase for the room is to have the frame powder coated by Mountain Shine.

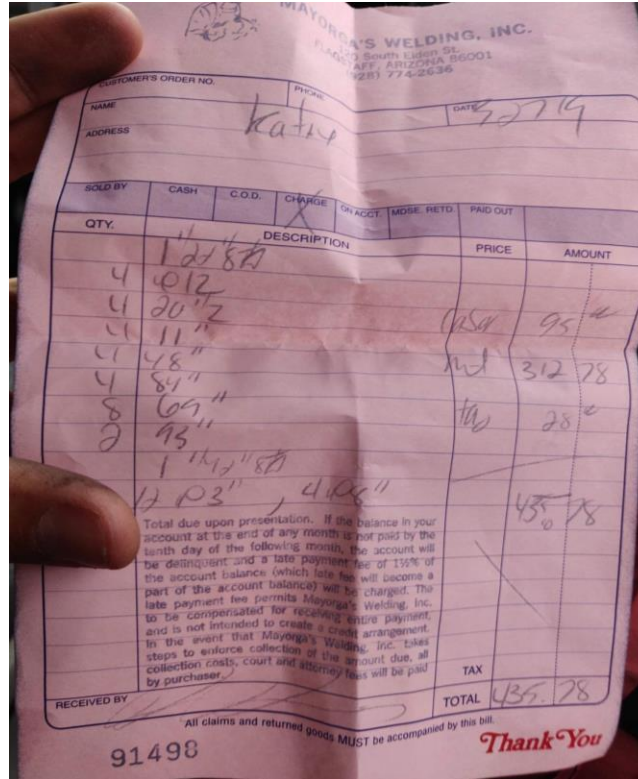


Figure 8. Mayorga's Welding Invoice on Steel Framing

In Figure 9 below all yellow highlights are parts the team still needs to assemble, the orange highlight shows an item still needing to be manufactured.

Bill of Materials Clean Dream Team								
Portable Hood								
Part #	Part Name	Qty	Description	Functions	Material	Dimensions	Cost	Total Cost
1	Aluminum Frame	6	Hood Frame - DONATED -98C	Supports Fan	Aluminum	1"X 1/8" thick - 5 - 6' length	\$-	\$-
2	Welding Aluminum Frame	1	Welding of the aluminum frame		Aluminum	1"X 1/8" thick - 5 - 6' length and 1 - 7' length	\$300	\$300
3	Polycarbonate	1	For 3 sheets Material For Hood	Creates covering for hood	Polycarbonate	48"x48"x1/4"	\$530.00	\$530.00
4	Cut Polycarbonate	1	Cut the polycarbonate	Is the inner shell of the hood	Polycarbonate	48"x48"x1/4"	\$240.00	\$240.00
5	Epoxy	5	seals the polycarbonate	creates a seal for no air to escape	Plastic	n/a	\$6.75	\$33.73
6	Rubber lining	1	cushions FFU to frame	to prevent air leakage between frame and FFU	Rubber	19/32" X 10'	\$16.74	\$16.74
7	Magnets	1	Holds door	Keeps door open for ease of adjustments within hood	Neodymium	1/2 diam.	\$4.76	\$4.76
8	Machine Screws	1	tightens hinges	secures the hinges	Zinc plated	32x1/2	\$3.54	\$3.54
9	Ardino	1	Test Pressure within Unit	To test Pressure within unit	N/A		\$36.89	\$36.89
10	Power Cord	1	Power the FFUs - 3 wire power tool replacement cord	Power the FFU	N/A		\$12.97	\$12.97
11	Hinges	1	hinges for hood	allows the hood door to open	Zinc plated	2-1/2"	\$1.97	\$1.97
							Total Cost Estimate:	\$880.58
Portable Room								
Part #	Part Name	Qty	Description	Functions	Material	Dimensions	Cost	Total Cost
10	Steel Frame and cutting	120	Steel - 110' - 1.5"x1.5"x1/8"	Framing for the portable room	steel	1.5"x1.5"x1/8"	\$435.78	\$435.78
12	White Powder Coat	120	Powder coat the steel frame	Protect the steel and to reduce particals released by the steel	Powder coat		\$750.74	\$750.74
17	Power Cord	1	Power the FFUs - 3 wire power tool replacement cord	Power the FFU	N/A		\$12.97	\$12.97
18	Heavy Duty Swivel Caster Wh	4	600lb capacity swivel caster wheels - DONATED	Allows for the portable room to be stationary and move	5 x 1-1/4 in nylon poly	Wheels - 5 x 1-1/4, Fran	\$-	\$-
							Total Cost Estimate:	\$1,199.49
							Overall Total Estimate:	\$2,080.08
							Total Budget:	\$2,000.00
							Remaining Budget:	(\$80.08)

Figure 9. Materials to be Purchased

Hardware Responsibilities of Team Members

Daniel

For most of the hardware that the team has come up with have been mainly implemented by the entire team. Given that we are a small team by comparison to other capstone we rely on working together to

accomplish tasks. The team has been communicating all the task needed to make the room and the hood. After the aluminum frame was cut, I was given the task to create the drawings for the work order to be placed. The order was then placed over break and completed over spring break. The polycarbonate was cut to specific sizes based on Hannah's drawings. I delivered the Polycarbonate to Palomino glass company and kept in contact with them in order to make sure the cutting process was correct. The polycarbonate was finished over spring break and Hannah was able to pick it up from Palomino glass. Another aspect of the project I worked was the pressure sensor this was created using Arduino code, utilizing Arduino board pressure sensor and LCD screen. A final responsibility for the hardware would be to weld the steel frame, this will be started as soon as the steel arrives to 98c.

Katie Hoffman

Most of the manufacturing of the hood has been completed as a team in 98C, as well as picking up the polycarbonate. When it comes to any research, pricing, and obtaining of certain materials the tasks are delegated evenly between each member. I performed most of the research and choosing of the Fan Filter Unit (FFU), as well as communicate with the client on the purchasing of the FFUs. I have gone to Mayorga's Welding to place the order on the steel frame for the room. Went to Mountain Shine to obtain a second quote after the redesign of the steel frame. The writing is usually split between members and each member is held accountable for completing any writing needed to be done. For future hardware Daniel will weld the steel frame, as a team we plan to assemble the hood together and test, and evenly delegate all remaining tasks as needed.

Hannah Reed

The team normally does most task together, but for the majority of HR2 the task for the project were delegated out to each member. Individually I drew up a schematic for the cutting of the polycarbonate to be sent to Palomino Glass company. I have completed the epoxying of the polycarbonate, this included picking up three pieces from the machine shop, and one piece from Palomino Glass company here in flagstaff. I purchased and added corner brackets to the assembled polycarbonate to add more stability and make the polycarbonate box more robust. I assembled the door to the polycarbonate box using the parts I purchased at the Home Depot that included hinges, a handle, and a magnet to hold the door up. I borrowed clamps and a T square from Coconino High School's engineering teacher in order to help in the assembly process. I purchased the power cords for the fan units at Home Depot that I also research earlier in the year. I drew a schematic of the hood frame and gave it to Daniel for him to use for the Aluminum frame work order. I created a new CAD for the room frame and the hood, which are both shown above. From the room frame CAD, I recalculated the total amount of steel (ft) needed to be ordered from Mayorga's, which was then handed off to Katie.