

Midpoint Presentation

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Project Description

- Our client is Aneuvus Technologies Inc., overseen by Dr. Becker. His company researches and manufactures microcatheters used in the brain.
- The project is important because it benefits the client's research and product manufacturing.

Project Description Cont.

- The original scope of the project was to design and build a portable clean hood and clean room.
- The new scope of the project is to design and build a portable clean hood and to fully design the portable clean room and manufacture the frame.
- The clean hood will be 24" x 48" x 40". It will fit over small equipment and output a positive pressure flow of clean air within the hood.
- The portable clean room is to be 72" x 96" x 84". It will be able to disassemble and reassemble, carried by 3 - 4 people, and output positive pressure creating a clean environment within.

Updates

- Aluminum framing is cut and a work order for welding is placed.
- Polycarbonate purchased and cut, ready to be assembled.
- All materials for the clean hood are purchased.
- Arduino board and pressure transducers are purchased.
- Redesigned the clean room.
- Scope of the project was re-evaluated.

Updates Cont.

- Figure 1 is Terra Universal 2'x4' WhisperFlow Fan Filter Unit.
- Figure 2 is the cut aluminum framing for the hood.



Figure 1. WhisperFlow

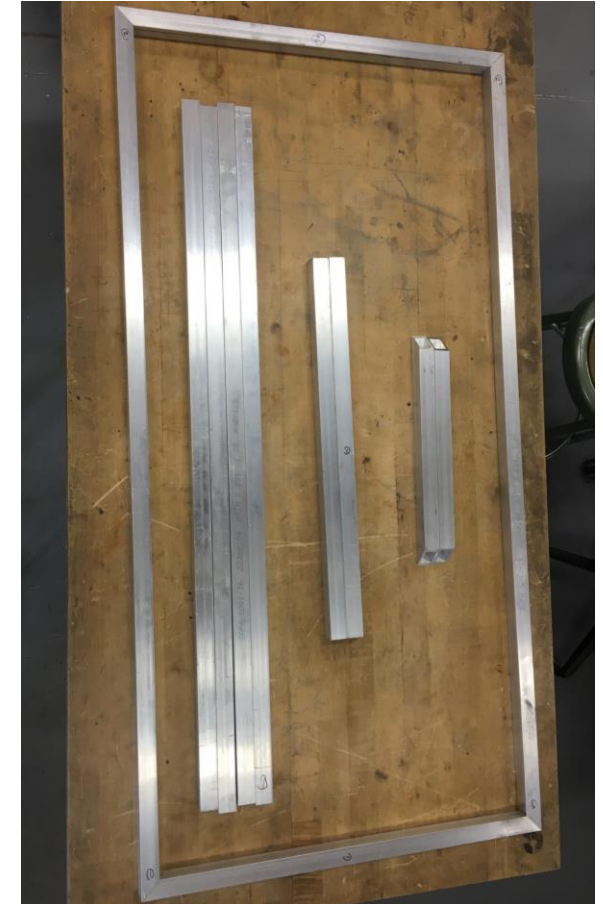


Figure 2. Cut Aluminum

Updates Cont.

- Portable Hood Fall design and Spring redesign.

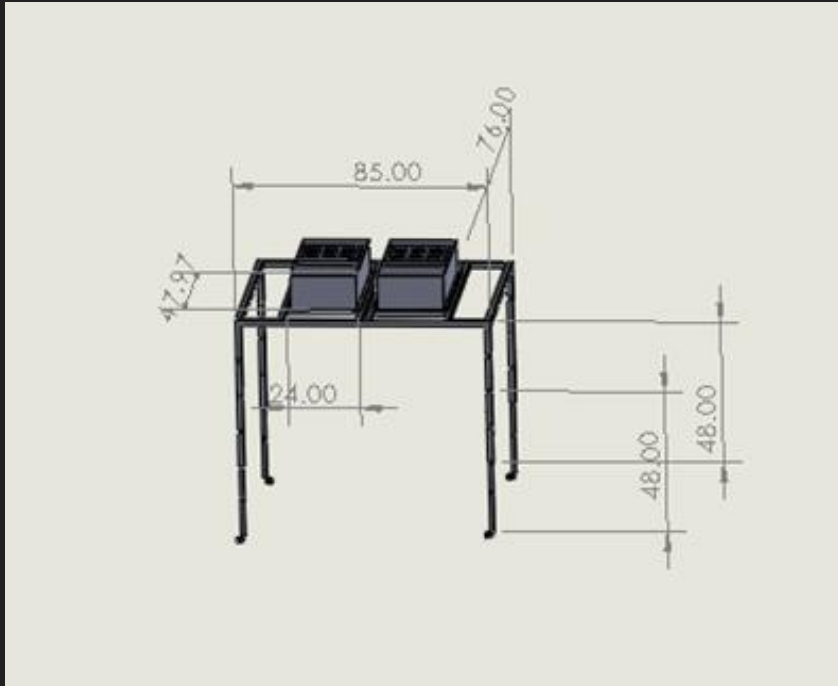


Figure 3. Room Fall Design



Figure 4. Room Spring Design

Updates Cont.

- Portable room Fall CAD design and Spring CAD design

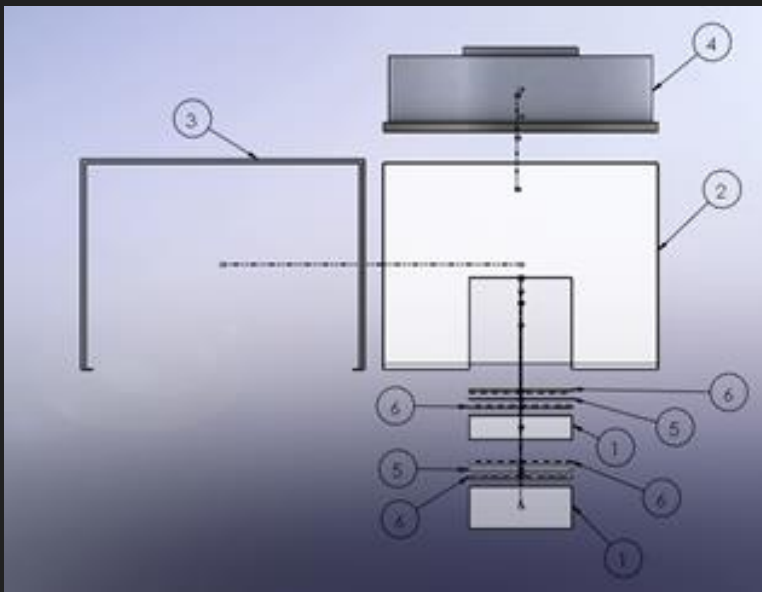


Figure 5. Hood Fall Design

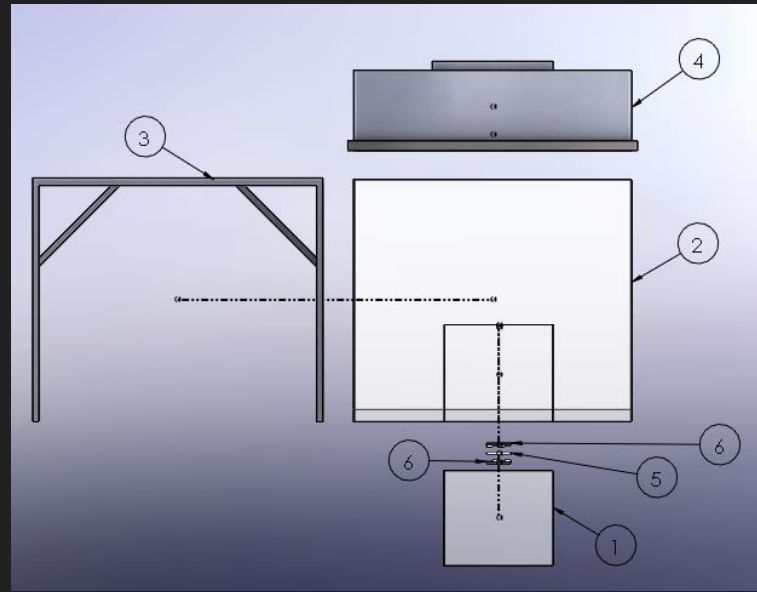
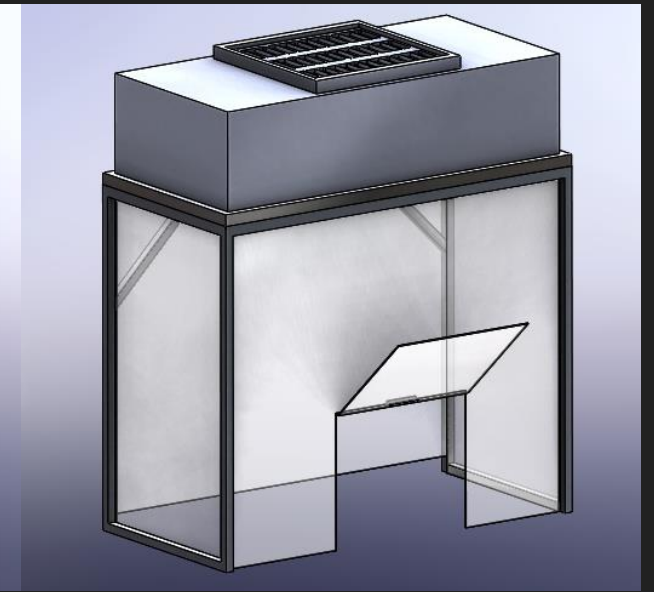
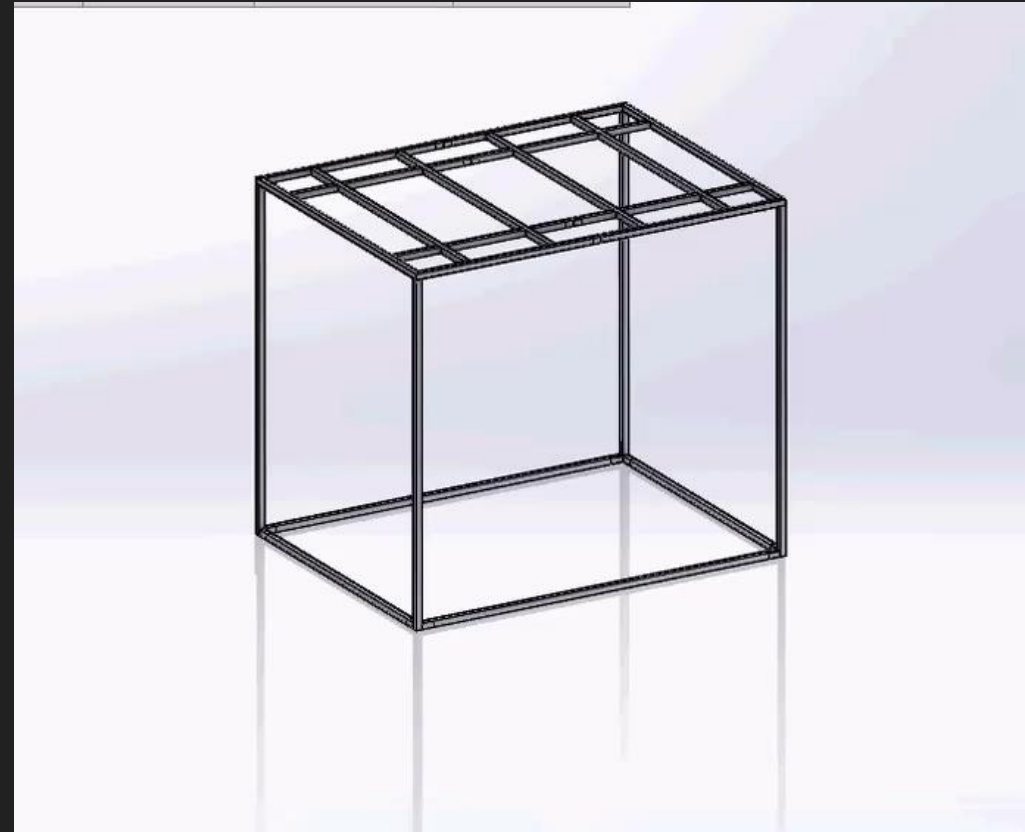


Figure 6. Hood Spring Design



Structural Analytical Analysis

- Met with Dr. Hewes and redesigned the structure for better stability
- Using 1.5" x 1.5" x 0.125" A36 Steel
- The deflection for the 72" beam was calculated to be 0.1459 downward
- The deflection for the 96" beam was calculated to be 0.0468 downward



CFD Analytical Analysis

- Computational Fluid Dynamics Analysis
- Visual representation of the flow through the polycarbonate
- Inaccurate solution

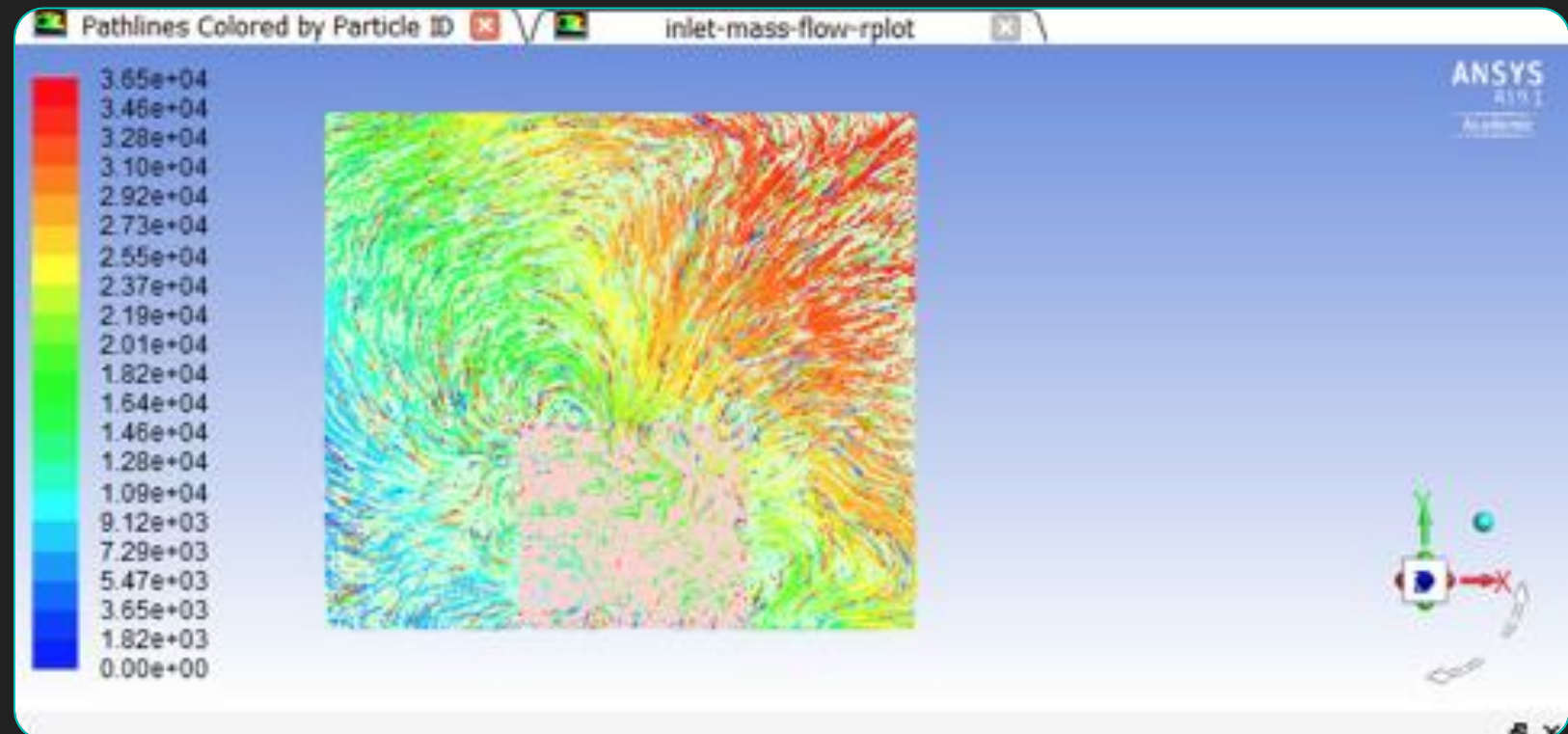


Figure 7. CFD Analysis

Arduino Analytical Analysis

- Pressure Transducer needed for room and hood validation
- Using Dead weight pressure transducer was calibrated
- This can be used to measure when there is a pressure drop within the rooms
- Allows users to know when the filters need to be replaced

Manufacturing

- Manufacturing for clean hood
 - Epoxy the Polycarbonate
 - Attach hinges
 - Attach rubber lining
 - Attach magnets

- Manufacturing for clean room
 - Purchase steel
 - Cut and weld steel
 - Powder coat steel

Testing the Design

- Assembling the entire unit and turn on the FFU.
- Arduino and pressure transducers will be programmed to read the pressure within the clean hood. This will verify the unit is producing positive pressure.

Budget

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	Polycarbonate	1	For 3 sheets Material For Hood	Creates convering for hood	Polycarbonate	48"x48"x1/4"	\$529.52	\$529.52
3	Cut Polycarbonate	1	Cut the polycarbonate	Is the inner shell of the hood	Polycarbonate	48"x48"x1/4"	\$240.00	\$240.00
4	Welding of the Aluminum Frame	1	Cost of welding of the Aluminum frame	Holds frame together	ALuminum	and 1 - 7' length	\$0.00	\$0.00
5	Epoxy	3	seals the polycarbonate	creates a seal for no air to escape	Plastic	n/a	\$6.75	\$20.24
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	Power cord	1	Power the FFUs - 3 wire power tool replacement cord	Power the FFUs	n/a	9ft - 14ga	\$12.97	\$12.97
10	Hinges	1	hinges for hood	allows the hood door to open	Zinc plated	2-1/2'	\$1.97	\$1.97
11	Ardriino	1	To test for positive air pressure	To test for positive air pressure	n/a	-	\$36.89	\$36.89
							Total Cost Estimate:	\$866.62

Portable Room

Part #	Part Name	Qty	Description	Functions	Material	Dimensions	Cost	Total Cost
12	Steel Frame	110	Steel - 110' - 2"x2"x1/8"	Framing for the protable room	steel	2"x2"x1/8"	\$2.97	\$326.70
13	Welding of the Steel Frame	1	Cost of welding the steel frame together	Holds the steel frame together	steel		\$0.00	\$0.00
14	White Powder Coat	110	Powder coat the steel frame	Protect the steel and to reduce particals released by the steel	Powder coat		\$671.19	\$671.19
15	Plastic Sheeting Roll	1	Plastic to Wrap Room	Creates covering for room	Plastic	54"x60'	\$313.73	\$313.73
16	DuraGrip Brand Adhesive Backed	4	Adhesion for plastic Wrap	Holds plastic wrao in place	Velcro	1"x75	\$31.25	\$125.00
17	Steel Joints	16	Joints to support Frame	Supports frame	Steel	n/a	\$8.50	\$136.00
18	Shear Pins	4	Holds legs in place	Help adjusting size of room	steel	2.75"x6"	\$1.76	\$7.04
19	Power cord	1	Power the FFUs - 3 wire power tool replacement cord	Power the FFUs	n/a	9ft - 14ga	\$12.97	\$12.97
20	Heavy Duty Swivel Caster Wheels	4	600lb capacity swivel caster wheels - DONATED - Becker Lab Aid	Allows for the portable room to be stationary and movable	5 x 1-1/4 in nylon polymer	Wheels - 5 x 1-1/4, Frame 0	\$-	\$-

Total Cost Estimate: \$1,579.66

Overall Total Estimate: \$2,446.28

Total Budget: \$2,000.00

Remaining Budget: (\$446.28)



Gantt Chart

Capstone: Clean Room Gantt Chart

1/28/2019 2/4/2019 2/11/2019 2/18/2019 2/25/2019 3/4/2019 3/11/2019 3/18/2019 3/25/2019 4/1/2019 4/8/2019 4/15/2019 4/22/2019 4/29/2019 5/6/2019 5/13/2019

