

Human Respiratory Mechanics Demonstration Model, Project 26

CLIENTS: Dr. Andrew Lokuta, Dr. Kevin Strang

TEAM MEMBERS: Lynn Murray (Co-Leader)
Kristen Seashore (Co-Leader)
Janelle Anderson (Communicator)
Chris Goplen (BWIG)
Malini Soundarrajan (BSAC)

DATES: 5/2/08 to 5/8/08

PROBLEM STATEMENT:

Currently, a basic balloon and latex membrane model is being used to represent the lungs and diaphragm, respectively, for classroom instructional purposes. While they demonstrate respiratory mechanics, the models have a short lifespan and do not display alveolar and intrapleural pressure changes. Further, current models do not accurately depict the anatomical scaling of the lungs with respect to the thoracic cavity.

Our goal is to design and build an adequate mechanical respiratory model for class instruction purposes. This model should demonstrate relative pressure differences between alveolar and intrapleural spaces. It must further demonstrate the expansion of the thoracic cavity from the rib cage as well as the diaphragm, thereby displaying a 3-D expansion. The scaling of the lungs relative to the size of the thoracic cavity enclosure should be more anatomically correct than the current model. The device must be portable and small enough to use with a document camera. This model should also incorporate BioPac® software to graph real-time pressure changes.

RESTATEMENT OF PREVIOUS WEEK'S TEAM GOALS:

This week we will present our prototype and testing results at the Poster Session on Friday. We will also set up the final client and advisor meetings to deliver the prototype and discuss the semester's results. All notebooks and the paper will be turned in, and the paper will also be submitted to the *Advances in Physiology Education* journal.

INDIVIDUAL GOALS FOR NEXT WEEK:

Lynn Murray: Finish editing paper and submit to *Advances in Physiology Education*, final client and advisor meetings.

Kristen Seashore: Fix prototype seals before delivery to clients, final advisor & client meetings.

Janelle Anderson: Finish user manual, final client and advisor meetings, graduate.

Chris Goplen: Final client and advisor meetings.

Malini Soundarrajan: Meet with client to hand over product.

SUMMARY OF ACCOMPLISHMENTS:

- The group presented our work and research to our advisors and clients.
- Chris finalized the website.
- Malini, Chris, and Lynn met to edit the paper.
- Janelle assembled information in a user's manual for the clients.
- All members completed their peer evaluations.
- All members finalized their design notebooks.

STATEMENT OF THIS WEEK'S TEAM GOALS:

This week we will be editing and submitting our paper. We will also have our final meetings with our advisors and clients. We will hand over our device to our clients for their permanent use.

PROJECT SCHEDULE:

We will have our final client and advisor meetings this week. We will finish our paper for submission to our advisors, clients, and *Advances in Physiology Education*.

DIFFICULTIES:

There were no difficulties this week.

ACTIVITIES:

Date	Description	Time
4-May	Kristen finished outreach paper, reviewed journal papers, and updated expenses	3 hrs
5-May	Malini, Lynn, and Chris met to edit the paper	1.5 hrs
5-May	Janelle finishing client and peer evaluations	.75 hr
5-May	Janelle made the user's manual for the clients	2 hrs
5-May	Kristen reviewed the user's manual	.5 hr
6-May	Chris updated the website	.5 hr
6-May	Malini updated her notebook	.5 hr
6-May	Malini updated the PDS report	.5 hr
7- May	Chris updated the website	.5 hr
7-May	Chris updated notebook	1 hr
8-May	Kristen updated notebook, completed peer and client evaluations	1.5 hrs
8-May	Lynn updated notebook, completed peer and client evaluations	1 hr

TOTAL HOURS THIS WEEK:	12.75 hrs
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PROJECT TIMELINE:

TASK	J.18	J.25	F.1	F.8	F.15	F.22	F.29	M.7	M.14	M.21	M.28	A.4	A.11	A.18	A.25	M.2
Project Design																
Research	X	X	X	X		X		X								
Prototyping					X	X	X	X		X	X	X	X			
Software				X	X	X	X	X		X	X	X	X		X	
Testing	X	X		X		X	X	X		X	X	X	X	X	X	
Final Design								X					X	X	X	X
Deliverables																
Progress Reports	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
PowerPoint								X								
PDS			X													X
Final Presentation															X	X
Design Report															X	X
Meetings																
Client			X								X		X		X	X
Team	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
Professor		X	X	X	X	X	X	X		X		X	X		X	X
Website		X	X	X	X	X	X	X		X	X		X	X	X	X

EXPENSES:

Description	Manufacturer	Part Number	Qty	Price (each)	Price (Tot)
8" outer diameter acrylic tube (thickness= 3/16")	McMaster-Carr	8486K837	1	\$41.40	\$41.40
5" outer diameter acrylic tube (t= 1/4")	McMaster-Carr	8486K583	1	\$25.65	\$25.65
5" inner diameter acrylic tube (t= 1/8")	McMaster-Carr	8486K582	1	\$21.35	\$21.35
Silicone Adhesive (3.0 oz)	McMaster-Carr	7587A37	1	\$3.37	\$3.37

Epoxy Adhesive (1.7 oz)	McMaster-Carr	7467A55	1	\$13.55	\$13.55
Hose clamps: (7/32")	McMaster-Carr	5388K14	1	\$4.68	\$4.68
Tube-to-tube Y fitting (3/8")	McMaster-Carr	53415K241	1	\$14.29	\$14.29
12"x12"Acrylic Sheet (t= .177")	McMaster-Carr	8560K211	4	\$5.05	\$20.20
O-ring (diameter = 5")	McMaster-Carr	9452K352	1	\$4.90	\$4.90
Rubber stopper with through hole (13/64"), size 7	McMaster-Carr	9545K33	1	\$11.05	\$11.05
Compound Pressure Gauge 0 to -30"Hg/0-15psi	McMaster-Carr	3941K53	2	\$9.37	\$18.74
Natural Latex (t= .008") by yd.	McMaster-Carr	85995K13	2	\$2.31	\$4.62
8" diameter acrylic tube (thickness= 1/4")	McMaster-Carr	8486K597	1	\$51.13	\$51.13
Polyurethane tubing: inner diameter 3/8" (t=1/16")	McMaster-Carr	5108K56	2	\$0.92	\$1.84
Helicoil (insert length =.138" thread #6-32)	McMaster-Carr	91990A219	2	\$6.36	\$12.72
Button head socket cap screws #6-32	McMaster-Carr	92949A146	1	\$6.53	\$6.53
Metal knob (1/4" -28 threads)	McMaster-Carr	6079K32	2	\$4.54	\$9.08
Piston O-ring (inner diameter = 4.125")	McMaster-Carr	9452K193	1	\$9.45	\$9.45
1/32" pure gum rubber sheet	Small Parts, Inc	PGRS-0031-F	1	\$8.55 + shipping	\$13.45

12"x12"Acrylic Sheet (t= .177")	McMaster-Carr	8560K211	4	\$5.05	\$20.20
15"x55" Polycarbonate Sheet (t= .25")	Midland Plastics	n/a	1	\$42.20	\$42.20
Polycarbonate Cement	Midland Plastics	n/a	1	\$8.02	\$8.02
Small #8 knobs	Dorn True Value Hardware	n/a	2	\$2.46	\$5.19
#8 nylon washers	Dorn True Value Hardware	n/a	4	\$0.07	\$0.30
#8 nylon wing nuts	Dorn True Value Hardware	n/a	2	\$0.65	\$1.37
Nylon hose clamps	Dorn True Value Hardware	n/a	2	\$0.50	\$1.06
Rubber stopper	Dorn True Value Hardware	n/a	1	\$0.13	\$0.14
9 pin D-Sub Male	Radioshack	2761427	2	\$1.99	\$4.20
9 pin D-Sub Female	Radioshack	2761428	2	\$1.99	\$4.20
9 pin SubD Hood	Radioshack	2761539	2	\$1.99	\$4.20
Autonics	Autonics, Inc.	PSA-C01	2 (one was donated)	\$120.00	\$120.00
Total					\$499.08

*New receipts have not been entered (5/1).