

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: 1/18/08 to 1/24/08

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:

At the end of the week, we will meet with our clients to get feedback on the prototype. We will also hand over the model to our clients, and discuss plans for continuing the project next semester.

INDIVIDUAL GOALS FOR NEXT WEEK:

Janelle Anderson: Research possible transparent membranes, test lung seam fusion, set up initial client meeting, research donor possibilities for alternative acrylic tube, and update notebook.

Malini Soundarrajan: Research new pressure gauges (both analog and digital), obtain BioPac® software manual from clients, and update notebook.

Chris Goplen: Research new pressure gauges (both analog and digital), fix the leak in the piston mechanism, and update notebook.

Lynn Murray: Research possible transparent membranes, test lung seam fusion, and update notebook.

Kristen Seashore: Research new pressure gauges (both analog and digital), and update notebook.

Team	X																
Professor	X																
Website																	

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
Total					\$ 308.20