Heated Diagnostic Radiology Examination Table

Week 13 – April 17th to April 24th, 2009

Team Members:

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Problem Statement

A frequent patient complaint is that current x-ray tables are hard and cold. A pad can be used to eliminate the first complaint; however the temperature of the table cannot be altered on standard tables. A heated exam table or attachment that has a temperature control to give patients added comfort during exams, needs to be developed. The materials used need to be radiolucent and may not obscure the body part being imaged. A mechanism must be implemented that eliminates the possibility of patient injury such as burn.

Last Week's Team Goals

i. Create several potential alternatives or variations to design in an attempt to eliminate contrast introduced by tubing, then retest.
i. Consider alternative heating strategies if tubing not feasible.
ii. Proceed in ordering and assembly of entire prototype

Summary of Accomplishments

i. Several variations to our tubing design were made and tested. Taking into consideration the previous round of testing, it was decided to inlay the tubing in particle board (the same material as the X Ray table) and another fabricated wood material. The wood was inlayed in both square and round grooves the width and

depth of the tubing and also threaded through holes bored directly through the particleboard. These changes were made with hopes of eliminating the vertical edge effects that were a known problem

ii. Promising results were found after initial testing with Dr. Peppler from the medical physics department here at the UW. It was observed that when the 3/8" polyethylene tube was inlaid in a square particleboard groove with wood glue, contrast was dramatically reduced. Unfortunately, the contrast was still present at an unacceptable level. Dr. Peppler advised us that our use different density materials would result in different levels of contrast with different amounts of X Ray energy. Dr. Peppler then suggested we look into a Madison based company by the name of Gammex. Gammex manufactures X Ray phantoms using materials that have radio densities equivalent to human tissue and water. Water could be run through this material without any contrast because of equivalent densities, unfortunately cost would be an issue. Dr. Peppler went on to suggest that we continue to search for a way to make the heating bed radiolucent at a unique energy for the purpose of a prototype.

iii. After initial testing with Dr. Peppler we went back to the drawing board. We made many more variations on our design to eliminate contrast before testing for the final time with our client. We used several different filler substances including, silicone, liquid nails, ALEX plus, wood putty, etc. The final testing showed that our tubing design would still be unacceptable. Because a full-scale prototype would not be usable in the clinic, our client asked that we make a small model of our design.

iv. We have finished the construction of our heating element, and the PVC junction between the heating tubes and the heater hose. We have also obtained two pumps that will be of possible use. We need to assemble the prototype.

This Week's Goals

i. Complete scaled down prototype.
ii. Complete poster for poster presentation.
iii. Begin working on final report.
iv. Prepare notebooks for submission.

Project Difficulties

The polyethylene tubing in our design introduces an unacceptable amount of contrast. We were not able to solve this problem after testing several variations on design. We will research a suggested alternative material (Gammex Company) and present the information on this in our report. Our client has suggested we build a scaled down prototype.

Activities

4.17.2009	Team: Constructed/tested (Dr. Peppler) alternative tubing designs.	4.5 hours
4.21.2009	Team: Advisor meeting to discuss project direction/problems.	.5 hours
4.21.2009	Team: Completed the preparation of tubing samples for testing.	2 hours

4.18.2009	Joel: Construction of PVC tubing junction.	.5 hours
4.18.2009	Joel: Began work on poster.	3 hours
4.22.2009	Joel: Final testing with client.	2 hours
4.18.2009	Joey: Construction of PVC tubing junction.	.5 hours
4.22.2009	Joey: Final testing with client.	2 hours
4.22.2009	Joey: Ordered padding for prototype.	.25 hours
4.18.2009	Paul: Construction of PVC tubing junction.	3.5 hours
4.19.2009	Paul: Purchased necessary PVC elbows.	.5 hours
4.20.2009	Paul: Completed PVC tubing junction and prepared additional samples with holes and grooves.	1 hour
4.22.2009	Paul: Obtained pump for prototype.	2 hours
4.22.2009	Paul: Purchased particle board for prototype.	.5 hours
4.23.2009	Paul: Updated website.	.5 hours
4.18.2009	Tyler: Construction of PVC tubing junction.	3.5 hours
4.19.2009	Tyler: Routered round grooves into samples for testing.	1 hour
4.19.2009	Tyler: Bought/collected supplies	.5 hours
4.20.2009	Tyler: Completed PVC tubing junction and prepared additional samples with holes and grooves.	1 hour
4.21.2009	Tyler: Purchased 3/8” router bit and prepared samples for testing.	1 hour
4.21.2009	Tyler: Contact Amit Nimunkar about hydraulic pump.	.25 hours
4.22.2009	Tyler: Final testing with client.	2 hours
4.23.2009	Tyler: Wrote progress report.	1 hour

Tentative Project Schedule

	January		February				March				April				May
Task	23	30	6	13	20	27	6	13	20	27	3	10	17	24	1
Project Research	X	X	X	X	X	X	X	X		X	X	X	X	X	
Brainstorming/Work on Design		X	X	X	X	X	X	X		X	X	X	X	X	
Prototype															
I. Ordering													X	X	
ii. Expected Shipping														X	
iii. Work on Design/Building										X	X	X	X	X	
iv. Testing						X					X	X	X	X	
v. Re-design													x	X	
vi. Re-test													X	X	
Deliverables															
i. Progress Reports	X	X	X	X	X	X	X	X		X	X	X	X	X	
ii. PDS		X	X	X	X	X	X	X		X	X	X	X	X	
iii. Mid-Semester Presentation						X	X								
iv. Mid-Semester Report							X	X							
v. Final Poster Presentation														X	
vi. Final Report															
Meetings															
i. Group	X	X	X	X	X	X	X	X		X	X	X	X	X	
ii. Advisor		X	X	X	X	X	X			X	X			X	
iii. Client		X				X							X	X	
iv. Semester Wrap-Up w/ Advisor															
Website	X	X	X	X	X	X	x	X		X	X	X	X	X	

Expenses: ***Expenses will be listed at project completion.***

Date:	Item:	Cost:	Comments: