

Heated Diagnostic Radiology Examination Table

Week 10 – March 27th to April 3rd, 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. Retest materials appropriately, document the new procedure.
- ii. Begin ordering tubing and other supplies.
- iii. If testing shows current materials will not work begin starting with PMMA.
- iv. Finalize heating and pumping units.

Summary of Accomplishments

- i. Joel has contacted Dr. John Vetter to schedule a time for us to retest our materials with a phantom. To make most efficient use of time we have decided to focus on our heating and pumping units while waiting to test the radiolucency of tubing materials.

- ii. Joey has been working to determine the required specifications of our pumping unit. Specifically, he has looked into the power required. With this knowledge we will be able to quickly order the proper pump for our device once the tubing layout is finally established.
- iii. Paul has continued to research radiolucency and has developed a Matlab program to estimate the relative radiolucency of different materials with different geometries. In the event that our current design proves to be too radioopaque with phantom testing, or introduces any kind of noticeable contrast, Paul's program will provide us with an idea of changes to be made and what changes will be effective.
- iv. Our heating unit must be inexpensive to balance the cost of our other components i.e. the padding material and the pump. After the group decision to use a tank-less water heating design, Tyler searched for possible methods of heating or heating elements. Tyler found a 20 ft, 100 Watt "Roof De-Icer" cord to be a potential candidate. Tyler built a simple heating unit prototype with the heating element. The roof de-icer has the added safety benefits of being outdoor weather resistant and completely insulated. When wrapped around a copper pipe the heating cord provides/transfers ample heat, the efficacy of this method for our purpose will need to be further tested.
- v. Joel has been working on the heating of the liquid and the expected dissipation of heat out of the tubing we are expected to use. With Joel's calculations we will be able to determine how much heat needs to be provided to the system for a comfortable amount of heat to be dissipated to the patient. Controlling the power absorbed by our heating element will be done with a potentiometer containing circuit. Testing will need to be done in the next week to determine the specifics of different materials.
- vi. All team members have submitted applications and are in the process of acquiring a student shop pass. This will allow us the opportunity to use the student shop in the development of our prototype.
- vii. The use of PMMA has been considered in the event that the currently selected materials fail the second round of testing.

This Week's Goals

- i. Retest tubing and padding for radiolucency with phantom and make adjustments to design as needed.
- ii. Develop a procedure for testing heating characteristics.
- iii. Test heat characteristics proposed heating unit, tubing, and padding.
- iv. Develop circuitry for control of heating unit.
- v. Finalize pump requirements, and order pump.
- vi. Order other necessary parts and begin assembling prototype.

Project Difficulties

N/A

Activities

3.29.2009	Team: Meeting to discuss heating, etc.	1 hour
3.30.2009	Joey: Determination of required pump specifications.	1.5 hours
3.30.2009	Joel: Heat transfer analysis.	1.5 hours
3.30.2009	Paul: Radiolucency work and development of Matlab program.	2.5 hours
4.2.2009	Paul: Updated website.	.5 hours
3.29.2009	Tyler: Search and purchase of heating element.	1 hours
3.29.2009	Tyler: Construction of basic prototype for heating unit.	.5 hours
4.2.2009	Tyler: Wrote progress report.	

Tentative Project Schedule

Task	January		February				March				April				May
	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				
Brainstorming/Work on Design		X	X	X	X	X	X	X		X	X				
Prototype															
I. Ordering															
ii. Expected Shipping															
iii. Work on Design/Building										X	X				
iv. Testing						X					X				
v. Re-design															
vi. Re-test															
Deliverables															
i. Progress Reports	X	X	X	X	X	X	X	X		X	X				
ii. PDS		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															
vi. Final Report															
Meetings															
i. Group	X	X	X	X	X	X	X	X		X	X				
ii. Advisor		X	X	X	X	X	X			X	X				
iii. Client		X				X									
iv. Semester Wrap-Up w/ Advisor															
Website	X	X	X	X	X	X	X	X		X	X				

