

MIDTERM REPORT – IPRO 314

DRUM TEAM MIDTERM REPORT

0.1 Revised Objectives

The Revised objectives of the Drum Team are to complete the second drum assembly, as well as varnish the cellophane holders, and the motor stands.

0.2 Results to Date

The Drum team started off the semester with one drum complete so, the plans for this semester included getting a second drum, as well as starting two cellophane holders and the stands for the motor. The first step was to go back to the wood shop and cut and prepare the wood for needed.

Most of the team was able to make it down to Missouri to get the wood cut and on the return of that weekend trip all of the wood for the second drum as well as the other wood parts was cut and ready to be assembled.

The completed drum was attached to the completed stand and basin for the photo shoot with the Chicago Sun Times. One of the drum team members was present to help with the assembly and while it was a nerve-racking day the drum, axel, and basin were all assembled and look great. The cellophane was also used to wrap around the drum and is holding up exceedingly well. The cellophane became hard and may not be very functional, but it should look good for the museum.

The drum team also met with Dr. VanNordwijk and Mr. Broers and was able to learn a few things about the drum that were not in the schematic drawings. The second drum will contain a 'stir bar' to allow for mixing of the dialysis fluid. It will also contain one rounded wooden slat, which the cellophane tubing will begin at.

0.3 Revised Task / Event Schedule

The drum team is currently trying to find a time when all of the members can get together to complete the second drum. The drum team will also be available for the final assembly of each replica. Because the final assembly depends on all of the components being ready the time line for this is unknown. The presentation to the museum will be occurring in the last week of April and so the final assembly will occur before then.

0.4 Updated Assignments

The remaining items to be completed by the drum team are only to varnish the cellophane holders and the motor stands as well the pieces of the second drum. Once the varnish has set the second drum will be assembled and then attached to the second frame. As the semester continues the drum team will complete its goals and then move on to help the other teams to finish up. All of the drum team members will be involved in the final assembly and presentation of the two drums.

0.4 Barriers and Obstacles

Meeting with Dr. VanNoorwijk and Mr. Broers, allowed the drum team to get all of the last minute questions it had about the drum answered. The only obstacles the team is currently still facing are those of scheduling the entire group to meet together for

assembly. This may be resolved by deciding to work on assembly in smaller groups or individually.

GLASS TEAM MIDTERM REPORT

0.2 Revised Objectives

The Revised objectives of the Glass Team are to complete the glass assembly and to finish ordering the parts for the remainder of the glass set up.

0.2 Results to Date

The Glass team was developed this semester to design and implement all of the glass pieces for use in the drum dialysis device. It was learned that glass cannulae as well as a glass clot catcher and some glass tubing would need to be used in the device. The team began to work with the glass tubing to create glass cannulae that were used to draw the blood from patients. The Glass Team also ordered a burette as well as some parts for the glass clot catchers.

0.5 Revised Task / Event Schedule

The glass team is currently trying to finish ordering the pieces for the glass clot catcher and the clamps to hold the burette, for the heparin. The glass cannulae also need to be finished up. The glass team also needs to order some glass tubing to attach to the tygon tubing being used.

0.4 Updated Assignments

The remaining items to be completed by the glass team are only to order the remaining pieces for the clot catcher, and finish the cannulae to the right size and shape..

0.6 Barriers and Obstacles

Meeting with Dr. VanNoorwijk and Mr. Broers, allowed the glass team to determine that there were a few glass pieces that were not included in the drawings, which needed to be included. We were also able to determine the correct size and shape for the glass cannulae.

Blood Pump Midterm Report

Revised Objectives:

Completing a first iteration of the blood pump is the most immediate objective of the blood pump group. Mounting and proving the physical compatibility with the rest of the artificial kidney and ensuring that the calculated rotational speed will produce the desired flow rate will follow the completion of the first iteration. Once revisions have been discussed and quantified, they will be applied to the blueprints for further machining and the two final products will be made in the shop. Parts that meet specifications will be saved from the first iteration to reduce time in the shop to produce the two final products. Final fitting and preparation will be conducted by the group as soon as possible to allow testing for wear of parts, determining if any parts need to be machined out of different material or to otherwise modified specifications.

Results to Date:

Due to the arrival of Dr. van Noordwijk, machine shop time was dedicated to the completion of the first axle, rather than working on the first iteration of the blood pump. All of the 3-D diagrams for use in the shop were modified to fit together so the final product will not be piece mail, but seamless as reasonable in accordance to the original design. Drawings were made to machine shop specifications for use in production. Dates have been set to achieve goals set by the group in a timely manner so that both blood pumps will be completed by the deadline.

Revised Task:

As mentioned before, the manufacturing schedule has been compressed because of the demands of having the axle completed for the first kidney before Dr. van Noordwijk visited IIT.

Updated Assignments

Organization of the group work has not changed and the focus is on getting the first iteration done to make any necessary changes for the final products. Group members have also become responsible for the organization of the website, which will help document the production of the final products. Organization of the material is being based on the idea that the material may be used by other groups in the future that endeavor to undertake a similar task. The 3-D modeling programs used to model the project are being investigated to find a way to export the data in a video for possible integration into a presentation for the museum and website.

Barriers and Obstacles

Obstacles the group has encountered include the schedule compression, a lack of understanding of Flash programming to make a presentation for the website and museum, and obtaining information from other groups in a timely manner. Adherence to a tight schedule will help overcome any problems associated with getting the blood pump machined. Alternative methods of presenting the 3-D models are being investigated, as well as outside help being sought for guidance in making a Flash presentation.

Heater Team**0.1 Revised Objectives**

The objective of the Heater team is to design, and buy a heater that can be used to heat the solution that will be used during the artificial kidney operation. The team also needs to design and construct the control for the heater.

0.2 Results to Date

The team has designed the layout of the heater, which easily consisted of finding and calculating the power of the heating element and measuring where the tub in order to find out the shape of the coils in the tub. The team was also able to contact about 5-10 companies in which we have gotten three quotes about the design that we have made. The control for the heater has also been designed and the team has made a list of all items needed in order to construct the circuit.

0.3 Revised Task / Event Schedule

The timeline has been changed somewhat because of unforeseen barriers. Currently the lowest quote, the team has, for the heater is for 300 dollars per piece. If the heater is ordered from the company with the lowest price it will take two weeks before it is shipped.

New Timeline:

By March 10, finalize order

By March 27, Order Shipped

0.4 Updated Assignment

Bob will continue through with the heater ordering

Andrew and Antonis will buy the parts needed for the heater control and construct it.

0.5 Barriers and Obstacles

Most problems the team faced were created by miscommunication between the team and the sales representatives of the companies contacted. These problems were about changes in quoted prices after the team had pressed for more details about the construction. Other problems the team faced involved the compromises that had to be made in order for the heater to look authentic while not going over budget or falling short of the specifications of the original.

MIDTERM REPORT *Coupling and Axle Group*

Revised Objectives:

It is the goal of the group to have produced a coupling and axle by the end of the semester. This coupling and axle should be modeled after the initial blueprints found in the Kolff book and toleranced to necessary precision in order to have the parts function as intended. The design will also be analyzed in respect to its biomedical significance. How and why it works.

Results to Date:

- Blueprints have been transposed into 3-D model in ProE, inventor, and 3D max
- 2-D plots have been created in INVENTOR and ProEngineer
- Research and speculation has been done on questionable features such as the cotton and Vaseline packing and the tube connections

- Research has been started on the biomedical functionality of the design

Updated Assignments:

Ryan: Machine shop visits and completion of any drafting/modeling

Grace: Helped out the drum group and went down to Springfield, Missouri, to help them finish up the last of their pieces in the woodshop. She will continue to help the drum group throughout the semester by helping them varnish and put the second drum together.

Abhi and Grace: Have been revising the supplemental written portion that will be given to the museum. With a draft from last semester, they met with Dr. Fagette to discuss and further revisions and additions that need to be made before it is presented to the museum. Abhi will be in charge of finishing up the last component of the paper (How dialysis works). Grace will be in charge helping Abhi with the research and will be revising and reformatting the paper from last term.

Stand and Basin Team

0.1 Revised Objectives

Stand and Basin Team

The objectives for the stand and basin team are to enamel each of the two basins and to prepare and paint the two stands. They will also complete two splash guards for each of the devices.

0.2 Results to Date

Stand and Basin Team

At the beginning of the semester the stand and basin team had two complete unpainted stand assemblies. These stand assemblies needed to have the corresponding basins made. As such two basins were contracted to be constructed from 1/8" steel. These basins were completed and are being prepared for enameling by team members. Each stand assembly is being sanded and prepped for painting while the angle iron frames have been extended and the rounded conduit pieces have been attached. The conduit legs for each frame has also been cut and attached and is pending painting and completion.

With the visitation of Dr. van Noordwijk and Charles Broers from the Netherlands last minute questions regarding overlooked details and finishes on the metal components were answered.

0.3 Revised Task / Event Schedule

Stand and Basin Team

Because of the pending deadline in April the stand and basin team has been making time through out the weeks to work on and complete the set objectives. Due

to the independence of each component there has been delegation within the stand and basin team to attend to and finish each different aspect of the project.

0.4 Updated Assignments

Stand and Basin Team

The updated assignments for the stand and basin team will be to enamel the two basins and paint the metal components including the stands. The splash guards will also be completed by the stand and basin team.