

Week 3 report:

Project update:

Due to Brandon's connections at Bausch and Lomb Surgical Branch we reached out to them to work with them for our senior design project. Brian McCary manager of Research and Development was contacted in an email inquiring about any interest in becoming a client. Brian responded that he was interested and had project ideas, but would have to discuss with the Branch Manager.

We received a response from Brian saying that he and B&L are very interested in becoming our client. He also gave us a run down on the project we would be overtaking. We would be developing "an in-line fluid de-aerator" with the restraints of: low flow; single use; capable of a 20ml/min flow rate; drop dissolved oxygen by 30%; cost less than 1\$ each when bought in quantities over 100,000 (low cost).

We also spoke on the phone with Marc Schmidt of Rawlings Sporting Goods regarding any project ideas he had for us to work on. He explained that the project he was informing us about was confidential and gave us a very simplified overview. Rawlings is working on a baseball glove for children between the ages of around 6-12. He wanted us to research grip strength, hand sizes and how the weight of the glove affects performance or fatigue of the player (reaction time, speed, etc.). He said that as of now this is all the information he could provide because most of the research and trials are confidential. We asked follow up questions regarding the project in terms of its complexity and feasibility – if it was 30 weeks worth of work. We could not estimate this ourselves because we didn't have much information about the exact nature of our project. We also asked if there was a way we could build a prototype at the end of the year based on our research. He replied that he believes the project is within the difficulty scope of the course if not slightly higher; and that Rawlings has the means to develop and prototype we imagine.

Comparing both projects we found ourselves drawn to Bausch and Lomb. Thus we informed them of our decision.

On Thursday 9/14 it was confirmed that we will be working with Bausch and Lomb. Our point person currently is Brian McCary. We have organized an in-person meeting at 3:30pm on Friday 9/15.

Project Background:

Overview:

Cataract is a disease that occurs when the lens of the eye toughens and becomes opaque. It can be caused by pervasive UV/sun exposure, old age, and genetics. According to the WHO it accounts for 51% of world blindness or 20 million people.

Treatment:

The most common and effective treatment is PHACO surgery. PHACO is a device that is essentially a needle tipped vacuum that vibrates ultrasonically. This vibration helps to very rapidly break tough cataracts whose pieces are sucked up by the PHACO needle. The lens is then replaced with an artificial one. Cataracts surgeries can take as little as 10 minutes to complete and as little as 2 days to completely restore someone's sight.

All machines capable of PHACO surgery have an I/A system of irrigation and aspiration, meaning vacuum to suck uptake cataract and to inject BSS to replace the fluid/cataract that is removed to keep the eye full.

Problem and us:

Due to the ultrasonic behavior of the PHACO needle, the fluid around the needle tip is commonly degassed causing bubbles to form which can obscure the surgeons vision, extend surgery time, and cause other complications. What we would be doing is developing a system that can be connected

to the tubing of the surgical machine to quickly de-gas the solution that is being pumped into the patient's eye to prevent bubbling from occurring. Not only would this affect the fluid, but also its bottling processes. Normally BSS is stored in glass bottles that can hold vacuum/low pressure areas because plastic bottles cause more bubbling.