

Graduated Bowman Probes

Date: September 11 to September 17, 2026

Client: Dr. James Law

Advisor: Professor Wally Block

Team:

Neel Srinivasan nsrinivasan8@wisc.edu (Team Leader)

Caden Robinson carobinson5@wisc.edu (BPAG)

Caleb White cfwhite@wisc.edu (BWIG)

Kenneth Sun kksun2@wisc.edu (BSAC)

Sudhi Chavadam chavadam@wisc.edu (Communicator)

Problem Statement

Bowman probes are the standard instrument used in interrogation of the nasolacrimal (tear duct) system in Ophthalmology. They are available in various sizes and provide tactile feedback to the surgeon when probing the canalicular/nasolacrimal system, allowing them to assess for strictures, discontinuities, obstruction, or other abnormality within its lumen. Probing is typically performed prior to the passage of implants such as nasolacrimal stents (eg. Crawford, Lacriflow, Nunchucku, Monoka), to confirm patency of the nasolacrimal system. Available probes on the market do not have any markings on them which may allow the surgeon to make measurements to points within the canalicular/nasolacrimal lumen (eg. a stricture at 30 mm distal to the punctum), which can be helpful in correlating with imaging findings, or for accurate clinical documentation and therefore inform management of nasolacrimal pathologies. We propose the development of such a stent with inscribed bands corresponding to millimeter markings which may be referenced during canalicular or nasolacrimal probing.

Brief Status Update

The team has had a second meeting with our advisor, Dr. Block, in which we outlined a planned course of action. After speaking with our clients Dr. Law & Dr van Landingham, the team agreed that new probes will require decreasing graduation spacing to 1 mm with distinguishable markings every 5mm as per request of the client. The team has arranged a meeting with Mr. Schumacher of Schumacher LLC. who has experience with laser marking on small scale applications such as lacrimal Bowman's probes. Mr. Schumacher has also expressed interest in the project, and has offered to mark 2 probes for free and then offer a price estimate. The team has also agreed that based on the reasonability of the price estimate, if necessary we will get in contact with Dr. Pfefferkorn's mechanical engineering lab to discuss improvements to previous

probe manufacturing. The team has also found STL files of the anatomical bone structure of the nasolacrimal duct that we plan to base our phantom off of. After meeting with the clients, the team has also reasoned that due to the longer review process, we should expect to be without IRB approval for this semester. However, the team will be involved in the application process.

Summary of Weekly Team Member Design Accomplishments

- Team:
 - Met with Prof. Block to discuss project goals, including laser manufacturing outsourcing, phantom features, and accuracy improvements
 - Met with clients to discuss new design requirements, opportunities, and outline the teams planned future steps
 - Met with Mr. Schumacher to discuss manufacturing processes and receive price estimates
 - Completed Product Design Specification(PDS)

- Neel Srinivasan:
 - Researched nasolacrimal duct tissue properties for phantom
 - Met with team & clients to discuss future steps for manufacturing, phantom requirements, and IRB
 - Researched IRB requirements, classifications, and timelines for graduated bowman probe approval in clinics

- Caden Robinson:
 - Worked on creating phantom specifications that compare our device to the nasolacrimal canals for the PDS
 - Researched possible materials used for the phantom

- Caleb White:
 - Found and worked with a 3D anatomical model of the lacrimal system using Blender in an attempt to generate a printable mold.
 - Met with the clients to go over general expectations and logistics regarding semester work and IRB.
 - Met with Mr. Schumacher, delivered probes, and went over a brief timeline of his work.

- Kenneth Sun:

- Added Phantom Competition to PDS. Specifically Nasal Lacrimal Phantom marketed for procedural education training.
- Sudhi Chavadam:
 - Researched various adult nasolacrimal system 3D anatomical models and began preparing bony structures using 3D slicing software
 - Began looking into flexible 3D printer filaments and structured filaments for soft tissue and bone tissue accuracy in phantom

Weekly/Ongoing Difficulties

N/A

Upcoming Team and Individual Goals

- Team:
 - 3D print anatomical bone structure of nasolacrimal duct structure
 - Continue correspondence with Mr. S on manufacturing probe graduations. Or look for manufacturing alternative options
- Neel Srinivasan:
 - Reach out to Prof. Pfefferkorn in the event Mr. S is unable to help with manufacturing or price estimate is too high
 - Work with team to form initial version of nasolacrimal duct phantom
 - Research methods to improve/maximize efficiency of testing protocols
- Caden Robinson:
 - Create the first prototype of the phantom once the anatomical bone structure has been printed
 - Decide if we want to continue with our current prototype manufacturing company
- Caleb White:
 - Get design file from Mr. Schumacher and verify graduation plan.
 - Continue work with blender and research feasibility of idea.

- Work with Sudhi to understand how we can combine our ideas.
- Kenneth Sun:
 - Begin research on ways the phantom material properties can be measured and tested to best replicate adult nasal lacrimal system values. How can we ensure our phantom is standardized and realistic to the actual anatomy?
 - Begin design matrix on graduation options for bowman probes. Includes manufacturing method and design options for differentiation of every 5mm for easier reading of depth.
- Sudhi Chavadam:
 - Create initial 3D print and look into silicone filling options for repeatable replacement of nasolacrimal ducts

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Meet with client	Sep 11, 2026	All	✓	✓
Product Design Specification	Sep 18, 2026	All		
Preliminary Presentations	Oct 2, 2026	All		
Preliminary Deliverables	Oct 7, 2026	All		
Show and Tell	Oct 30, 2026	All		
Poster Presentations	Dec 4, 2026	All		

Final Deliverables	Dec 9, 2026	All		
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Expenses

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link
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Component 1								
Component 2								
Component 3								
TOTAL:	\$0.00							