

Graduated Bowman Probes

Date: October 9 to October 15, 2026

Client: Dr. James Law

Advisor: Professor Wally Block

Team:

Neel Srinivasan nsrinivasan8@wisc.edu (Team Leader)

Caden Robinson carobinson5@wisc.edu (BPAG)

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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

This week the team is continuing research on necessary phantom components and working through fabrication logistics. The team has also scheduled a meeting with our medical student advisor as a part of the BME TECH program, which we believe will offer greater insight into our design and testing. The team plans to complete 3D printing components for probe testing, and will connect with Mr. Schumacher to revise probe options.

Summary of Weekly Team Member Design Accomplishments

- Team:
 - Continue research for phantom requirements, and items necessary for fabrication
 - Work on probe testing after meeting with Mr. Schumacher
 - Meet with medical student Jayden to update him on progress and receive guidance

- Neel Srinivasan:
 - Worked with Kenneth on 3D print file for uniformity testing improvements
 - Assessed probe manufacturing and phantom fabrication routes with team

- Caden Robinson:
 - Researched biomaterial choices for the inner material to be placed inside of the capillary tubing
 - Met with the med student Jaden

- Caleb White:
 - Ordered microcapillary tubing for phantom material testing and design iteration.
 - Continued communication with Mr. Schumacher and Joshua Alexander regarding laser parameters and test prints respectively, currently waiting for their availability.
 - Dove deeper into lamina propria specifically with regards to its contents and mechanical characteristics.

- Kenneth Sun:
 - Finished Graduation Uniformity SOP with steps to process graduation differences with Image J including proper scale micrometer setup and inclusion of 3d printed holder
 - Worked on CAD file for 3d printed bowman probe holder with Neel

- Sudhi Chavadam:
 - Began designing new thicker phantom model mold for 3D soft-resin printing
 - Researched shore hardness levels (00 - A) for nasolacrimal phantom accuracy
 - Met with Jayden Lee med student for BME TECH

Weekly/Ongoing Difficulties

N/A

Upcoming Team and Individual Goals

- Team:
 - Begin/complete ordering of phantom components and create fabrication protocol along with initial prototype
 - Begin probe testing
 - Finalize probe manufacturing with team based on Mr. Schumacher's information

- Neel Srinivasan:
 - Work with Kenneth on probe testing(uniformity, accelerated life, autoclave)
 - Help team members working on phantom design
 - Finalize 3D print for uniformity testing

- Caden Robinson:
 - Fabricate initial prototype out of the tubing
 - Test internal material to determine which one should be used for bioprinting

- Caleb White:
 - Decide upon laser parameters with Mr. Schumacher
 - Test microcapillary tubing tensile strength to determine adjacency to lamina propria
 - Test out PVA and FBS hydrogel for epithelial lining

- Kenneth Sun:
 - Begin getting data for probes that come back by doing a graduation uniformity test.
 - Draft SOP for other 2 probe tests with Neel

- Sudhi Chavadam:
 - Print out the phantom
 - Begin fabricating initial prototype

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		

Expenses

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