

Graduated Bowman Probes

Date: March 13 to March 19, 2026

Client: Dr. James Law

Advisor: Professor Monica Ohnsorg

Team:

Neel Srinivasan nsrinivasan8@wisc.edu (Team Leader/BPAG)

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Cole Miller ctmiller8@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

This week the team met with Hassan, a graduate student working in Prof. Pfefferkorn's lab. He showed the workings of the laser for which fabrication will be done and helped fabricate the first graduated prototype using regular oxidation methods. The probe has distinct 5mm markings and will be used at the Show and Tell as a proof of concept. The team has also continued to brainstorm probe holding fixture designs. Now having seen the laser stage layout, designs can be tailored to the specific laser and actual fabrication of the holder will be top priority in the coming days. The team has also been preparing for a show and tell on Friday where an elevator pitch will be given to the BME seniors, followed by feedback on designs and prototypes. Using given advice, design, fabrication, and testing methods will be improved.

Summary of Weekly Team Member Design Accomplishments

- Team:
 - Met with graduate student Hassan in Professor Pfefferkorn's lab
 - Created 1st Bowman's Probe prototype using oxidation markings
 - Prepared and practiced elevator pitch for Friday's show and tell

- Neel Srinivasan:
 - Met with team and Hassan to obtain an initial prototype using oxidation markings
 - Met with team to discuss future plans for fabrication and testing
 - Created cad files/designs to meet laser fixture design requirements
 - Worked with team to prepare elevator pitch for show and tell

- Caden Robinson:
 - Met with the team and Hassan to obtain initial prototype and parameters for the laser machine
 - Discussed fabrication of the holder and if its even needed
 - Brainstormed ideas for the elevator pitch for show and tell
 - Discussed what award the team will decide to go for at the end of the year

- Caleb White:
 - Met with Hassan of Pfefferkorn's lab and learned the workings of the 200W fiber laser.
 - Assisted in creating our first graduated prototype.
 - Brainstormed probe holder ideas now that we are aware of what the laser stage looks like.
 - Prepared for the senior show and tell by creating rough draft elevator pitches to ensure I can get my point across with brevity.

- Cole Miller:
 - Prepared for show and tell by drafting pitches to best explain our project
 - Practiced for Show and Tell with team
 - Continued to draft probe holder ideas based on newly learned information

Weekly/Ongoing Difficulties

N/A

Upcoming Team and Individual Goals

- Team:
 - Work on executive summary draft as a team, and figure out which design award we'd like to pursue
 - Obtain Ceramark and create a Ceramarked prototype, and then compare the different versions
 - Fabricate the laser fixture after receiving feedback from seniors during show and tell

- Neel Srinivasan:
 - Work with the team to fabricate laser fixture for future prototyping
 - Complete my sections and work with teammates to finish executive summary draft
 - Implement responses/feedback from show and tell into design/testing considerations

- Caden Robinson:
 - Use the Ceramark to create an additional prototype
 - Compare the properties of the two probes to determine which to fabricate with on the surgical grade probes
 - Perform autoclave testing and cadaveric testing

- Caleb White:
 - Use the CerMark products to test its capabilities for graduation.
 - Fabricate the probe holder so that consistent and accurate graduation can be done.
 - Use the seniors' suggestions at the Show and Tell to modify testing plans.
 - Refabricate the oxidized probe so that the markings are only gone over once.

- Cole Miller:
 - Work with team to improve upon initial prototype
 - Fabricate probe holder

- Apply advice received from show and tell to design.

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Meet with client	2/2	All	✓	✓
Product Design Specification	2/5	All	✓	✓
Preliminary Presentations	2/20	All	✓	✓
Preliminary Deliverables	2/25	All	✓	✓
Show and Tell	3/20	All	✓	✓
Poster Presentations	4/24	All	X	X
Final Deliverables	4/29	All	X	X

Expenses

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link
Component 1								
Set of Bowman's probes	A set of unmarked Bowman's probes used in duct procedures for the team to practice fabrication and testing	Premium Instrument	B0777N38SV	2/25/26	3	\$16.99	\$50.97	Link
Component 2								
CerMark 2 oz Aerosol Ultra	A 2 oz aerosol can of CerMark ULTRA Aerosol spray used for laser marking of various materials including metals and ceramics.	CerMark USA	CULTRA.A2	3/11/2026	1	\$17.00	\$17.00	Link
LMM6018 CerMark USA white	A small 2"x6" sheet of white tape used for laser marking definition on	CerMark USA	CLMM6018.S H2	3/11/2026	1	\$8.00	\$8.00	Link

sheet tape tape	typically metal surfaces.							
Component 3								
TOTAL:								\$75.97