

# Graduated Bowman Probes

Date: March 6 to March 13, 2026

Client: Dr. James Law

Advisor: Professor Monica Ohnsorg

Team:

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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 continued its fabrication plan for the set of graduated Bowman's probes. The team got in contact with Professor Pfefferkorn and was directed towards one of his graduate students, Hassan. The team has arranged to meet with Hassan on Monday, March 16th to tour the lab space, and get a better understanding of the machines and procedures we'll encounter during fabrication. The team is also working on creating a semester-long fabrication plan in order to keep ourselves on track with our goals.

## Summary of Weekly Team Member Design Accomplishments

- Team:
  - Worked on arranging meetings with Professor Pfefferkorn and his graduate students
  - Began brainstorming design and material ideas for fixture device
  - Worked on fabrication and testing plan for remainder of the semester
  
- Neel Srinivasan:
  - Researched viability of different materials that could be used in the laser bed machines
  - Researched chemistry behind ceramic coatings used in laser marking procedures
  - Worked with team to come up potential design ideas for fixture
  
- Caden Robinson:
  - Researched how different types of steel can affect the aerosol laser setting reaction
  - Created CAD file for potential apparatus used to secure the bowman probe while laser marking
  - Created prototype/testing protocols
  
- Caleb White:
  - Reached out to Pfefferkorn to get laser specs and coordinated meeting time with the graduate student Hassan.
  - Contacted Dr. Law, having him order the CerMark USA samples required for fabrication formula testing
  - Created a prototype design for the laser bed in order to keep probe graduation constant.
  
- Cole Miller:
  - Researched different materials to be used with the laser bed
  - Worked with team to create design ideas for fixture
  - Worked with team to create testing protocols

## **Weekly/Ongoing Difficulties**

N/A

## **Upcoming Team and Individual Goals**

- Team:
  - Prepare for show and tell by having a fixture model and potential probe ready to display and receive feedback
  - Finish fabrication plan
  - Meet with Hassan and Professor Pfefferkorn
  - Create design plans and fabricate fixture for laser marking procedure
  
- Neel Srinivasan:
  - Begin fabrication of fixture for laser marking procedure
  - Meet with team & graduate student to tour Professor Pfefferkorn's lab
  - Work with team to have a prototype of a laser marked probe ready for show and tell
  
- Caden Robinson:
  - 3D print the apparatus for the bowman probes
  - Create first prototype
  - Start cadaveric testing and autoclave testing
  
- Caleb White:
  - Begin prototype fabrication with the laser in Pfefferkorn's lab.
  - Receive opinions on materials and design for probe holders from Pfefferkorn and graduate students.
  - Work on the groups testing and fabrication protocols.
  
- Cole Miller:
  - Fabricate fixture for laser marking
  - Create first prototype with Pfefferkorn
  - Work on creating testing protocols

## 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	X	X
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
<b>Component 1</b>								
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	<a href="#">Link</a>
<b>Component 2</b>								
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	<a href="#">Link</a>
LMM6018 CerMark USA white sheet tape	A small 2"x6" sheet of white tape used for laser marking definition on typically metal surfaces.	CerMark USA	CLMM6018.S H2	3/11/2026	1	\$8.00	\$8.00	<a href="#">Link</a>

<b>Component 3</b>									
<b>TOTAL:</b>								<b>\$75.97</b>	

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**TOTAL:**

**\$75.97**