

Title: GVI: Straw Stamp and Slicer

Date: 11/20/2025

Client: Sarah Hanson, Brett Breidor, and Ben Goss

Advisor: Professor Justin Williams

Team:

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Problem statement

Currently, quality control procedures investigating quality of bull semen for artificial insemination are time and labor intensive. The process involves cutting and pushing bull semen through a small straw using a straightened paper clip, and transferring the contents to a 96-well plate. This process takes one hour, with 8-10 plates being processed per day. The purpose of the project is to optimize these quality control procedures by designing a straw slicer that should be able to cut 12 straws at a time. It should also have removable components for cleaning. Additionally, a straw stamper is needed to push bull semen out of the straws in bulk, avoiding cross contamination.

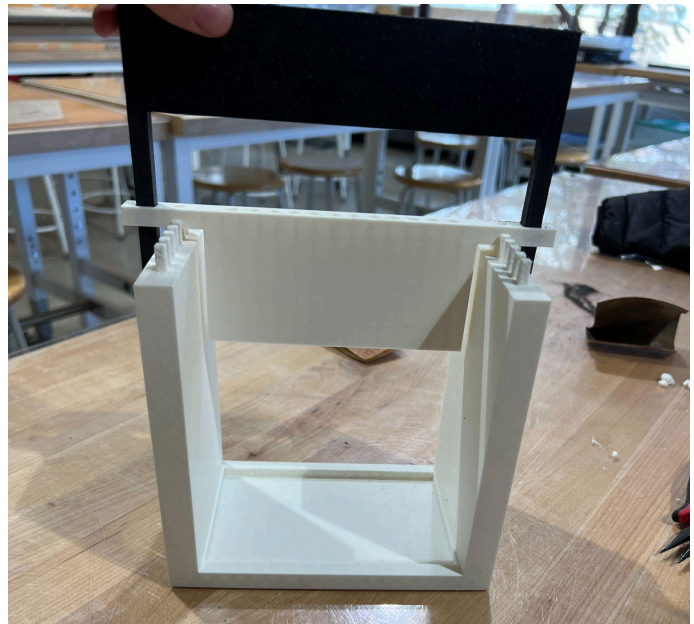
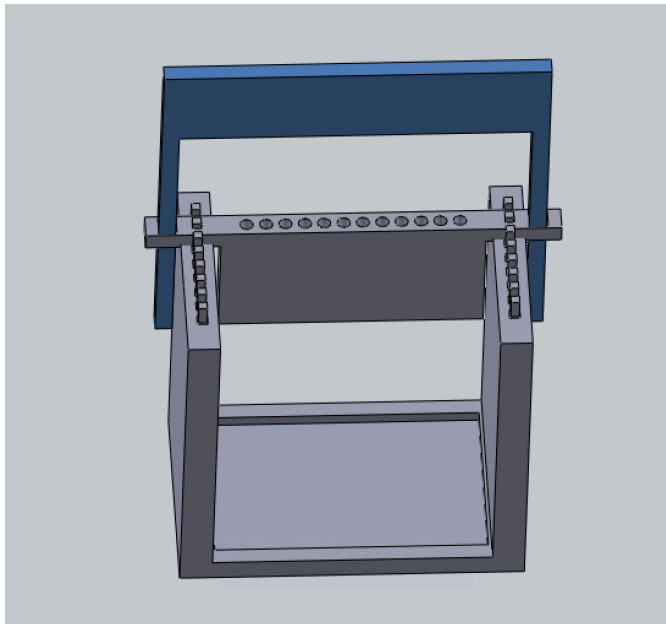
Brief status update

On Sunday, some of the team met to complete data analysis from the MTS data. Additionally, the frame, stamper, and compartments were reprinted according to the new dimensions. On Monday, the team met to decide on a “cover” idea for the knife-style slicer. We met with Dr. P to discuss using the plate reader and utilizing our fluorescent dye to complete cross-contamination testing. After, we completed serial dilutions with the dye and determined the correct concentration to use. We also determined that a papercutter may be an optimal solution for the slicer, rather than the knife.

Difficulties / advice requests

N/A

Current design



Materials and expenses

Note:

- Allocated \$50.00 in payment account through UW-Madison to use at Makerspace

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
Materials										
3D Print	ABS single compartment prototype, Ø 2mm straw hole	-	-	Makerspace	-	10/10/2025	3.81	\$0.05	\$0.19	https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0
3D Print	ABS single compartment prototype with Ø 2.5mm and Ø 3mm straw hole. Stamper rod holder prototype Ø 1.5mm	-	-	Makerspace	-	10/13/2025	16.23	\$0.05	\$0.81	https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0
3D Print	ABS 12 compartments together prototype with Ø 3mm straw hole.	-	-	Makerspace	-	10/22/2025	31.4	\$0.05	\$1.57	https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0
3D Print	MTS test fixture, updated single compartment prototype with smaller diameter hole, and well plate frame	-	-	Makerspace	-	10/27/2025	45.8	\$0.05	\$2.29	https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0
1mm Steel Rods	12Pcs 1 mm x 300 mm 304 Stainless Steel Round Rod, Metal Shaft, Stainless Steel Smooth Rods for Industry, Metalworking Hobbies and DIY Crafts (12, 1mm x	Lyrldir	-	Amazon	B0F8VG5HJV	10/27/2025	1	\$6.45	\$6.45	https://www.amazon.com/Lyrlidr-Stainless-Industry-Working-Hobbies/dp/B0F8VG5HJV/ref=sr_1_sspa?

	300mm)									
UV Detection Dye	Supercool UV Leak Detection Dye, 1 oz. Multi-purpose, Total Dye	TSI Supercool	672 264 016 525	Amazon	B008 PKV0 7O	10/27 /2025	1	\$7.46	\$7.46	https://www.amazon.com/UV-Leak-Detection-Dye-oz/dp/B008PKV07O?th=1
3D Print	MTS Test Fixture (updated diameter sizes)	-	-	Makerspace	-	11/6/ 2025	31.1 3	\$0.05	\$1.56	https://docs.google.com/spreadsheets/d/125EYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0
3D Print	ABS 12 compartments, base well plate frame, and stamper	-	-	Makerspace	-	11/10 /2025	212	\$0.05	\$10.60	https://docs.google.com/spreadsheets/d/125EYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0
3D Print	ABS 12 compartments reprint with smaller holes	-	-	Makerspace	-	11/17 /2025	31.2	\$0.05	\$1.56	https://docs.google.com/spreadsheets/d/125EYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=1

Major team goals for the next week

1. Complete all testing
2. Print final version of stamper, frame, and components using Nylon
3. Finalize slicer idea, including creating and printing “cover” piece

Next week’s individual goals

- Catie King
 - Start on final report and presentation
 - Write cross-contamination and sanitation test protocol
 - Finish testing
- Lydia Miller
 - Complete cross-contamination testing
 - Complete timed test

- Begin final report and presentation (split up sections, drafting)
- Megan Lee
 - Finalize dimensions and print in Nylon
 - Help with cross-contamination testing and timed test
 - Start sections of final report and presentation
- Janice Amornthanomchoke
 - Work on final report and presentation
 - Complete cross-contamination testing and finish protocol
- Varenja Vegesna
 - Complete cross contamination testing
 - Work on final deliverables
- Emma Stroshane
 - Work on final report and presentation
 - Update well plate dimensions and reprint
 - Create box/guard for slicer

Timeline

Week	Description	Status
9/8-9/12 Week 1	Weekly Team Meeting 1	Completed
	Client Meeting to answer questions/discuss project	
9/15-9/19 Week 2	Weekly Team Meeting 2	Completed
	PDS Draft Due 9/19	
9/22-9/26 Week 3	Weekly Team Meeting 3	Completed
	Design Matrix due 9/26	
9/29-10/3 Week 4	Weekly Team Meeting 4	Completed
	Preliminary Presentation 10/3	
10/6-10/10 Week 5	Weekly Team Meeting 5	Completed
	Preliminary Deliverables due 10/8	
	Decide on final design by 10/10	

10/13-10/17 Week 6	Weekly Team Meeting 6	Completed
	Review Preliminary Presentation Feedback	
	Submit IDR by 10/17	
10/20-10/24 Week 7	Weekly Team Meeting 7	Completed
10/27-10/31 Week 8	Weekly Team Meeting 8	Completed
	Show and Tell on 10/31	
11/03-11/07 Week 9	Weekly Team 9	Completed
11/10-11/14 Week 10	Weekly Team Meeting 10	Completed
11/17-11/21 Week 11	Weekly Team Meeting 12	Completed
11/24-11/28 Week 12	Thanksgiving Break (11/27-11/30)	
12/01-12/05 Week 13	Final Presentation on 12/5	
12/8-12/12 Week 14	Final Deliverables due 12/10	

Previous week's goals and accomplishments

- Design component to catch ends of straws after cutting edges
- Complete cross-contamination testing
- Choose method of holding straws in place while stamping

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Catie King	11/14 - 11/20	- Redesign/reprint	1	5	34.5

		- Dr. P meeting for microplate/microscope - Standard curve for fluorescein and microplate reader use - Slicer idea discussion - Data analysis on microplate reader results	0.5 1.5 1 1		
Lydia Miller	11/14 - 11/20	- Create solidworks model for knife cover - MTS data analysis - Discuss slicer/cover ideas and plan for cross-contamination testing - Serial dilutions and plate reader testing	3.5 1.5 1 1	7	35
Megan Lee	11/14 - 11/20	- Redesigning/reprinting - Serial dilutions and plate reader testing - Slicer testing - Discuss slicer ideas	1 1.5 1 1	4.5	37.5
Janice Amornthanomchoke	11/14 - 11/20	- Discuss possible slicer ideas and needed adjustments - Analyzed data from MTS testing	1 1	2	25.75
Varenya Vegesna	11/14 - 11/20	- Analyze data from MTS testing - Dr.P meeting - Help with serial dilutions	1 0.5 0.5	2	25.5
Emma Stroshane	11/14 - 11/20	- Discuss slicer ideas - Slicer testing - Updated well plate dimensions - Researched 3D printing with nylon	1 1 0.5 0.5	3	31.5