

Title: GVI: Straw Stamp and Slicer

Date: 11/13/2025

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.

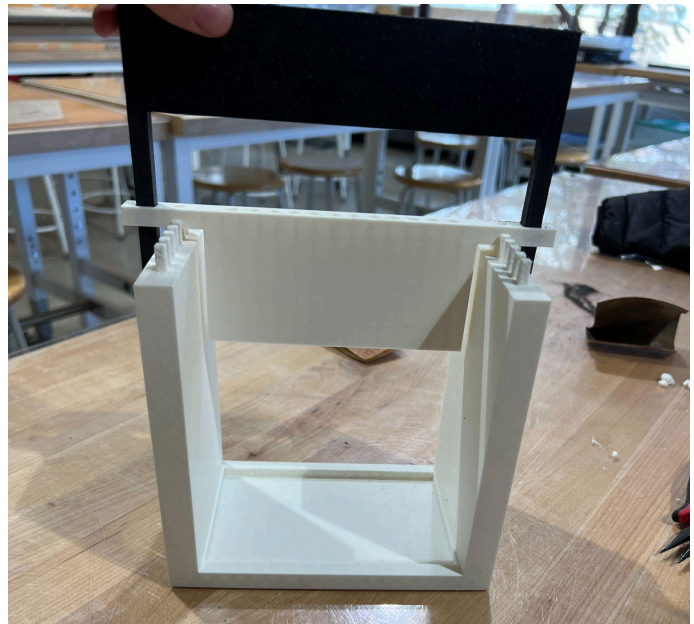
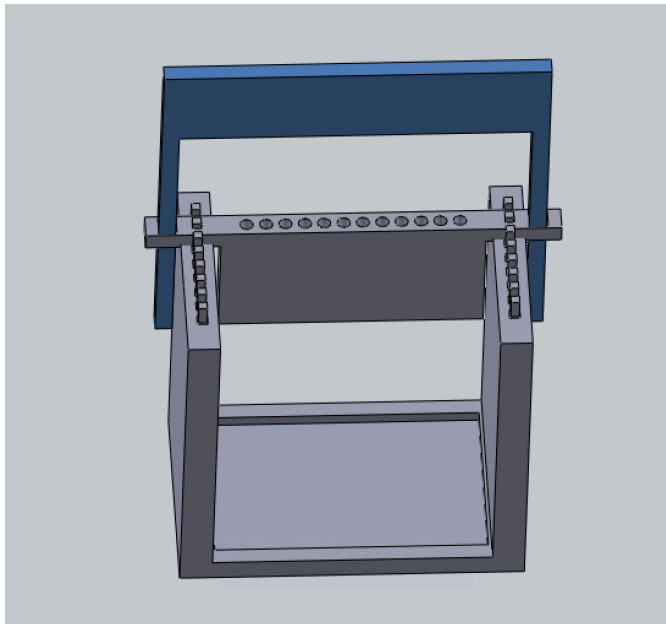
Brief status update

On Monday, part of the team met to redimension, redesign, and reprint the frame, compartments, and stamper. Holes and handles were added to the design so the stamper can be pushed down while staying aligned with the straws. After these were printed, we met on Wednesday to complete MTS testing. We used the custom testing fixture and attached it to the load cell to find the force needed to push the contents of one straw into the well plate. Additionally, we have tested out a cutting board style knife, however issues arose when the ends of the straw flew off after being cut so we are trying to find a possible solution for this issue.

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

Major team goals for the next week

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

Next week's individual goals

- Catie King
 - Start analyzing MTS data
 - Work on grippy part of compartments to hold straws
- Lydia Miller
 - Use SolidWorks to design a “gutter”-like component to catch ends of straws
 - Add component that utilizes friction to hold straws in place
 - Begin analysis of MTS data
- Megan Lee
 - Make final adjustments to compartments to take out rounded edges
 - Research ways to make straws stay in place
- Janice Amornthanomchoke
 - Continue testing the straws with the MTS data

- Figure out how process the MTS data
- Possibly begin sanitation testing
- Varenja Vegesna
 - Continue testing MTS straws
 - Discuss design ideas to catch the cut straws
- Emma Stroshane
 - Continue modeling something to hold straws while cutting
 - Test cutting straws again to see how the pieces fly off to analyze how to catch them
 - Brainstorm ideas to better hold straws in place in compartments

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	
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

- Use the new test fixture to perform MTS testing
- Determine if the chosen slicer has enough force to cut through all 12 straws
- Reprint stamper, frame, and compartments

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Catie King	11/7-11/13	- Remodeling stamper, compartments, and well plate holder - MTS testing	4 1.5	5.5	29.5
Lydia Miller	11/7-11/13	- MTS testing of individual straw to determine force needed to push contents into well-plate	1.5	1.5	28
Megan Lee	11/7-11/13	- Remodeled compartments to have holes	2	6	33

		for the stamper and well plate holder to connect to - Remodeled stamper to have handles which align with compartments - Added fillets to well plate frame - MTS testing to determine force needed to push out semen from the straws using our fabricated design	2 0.5 1.5		
Janice Amornthanomchoke	11/7-11/13	- Helped determine force to push out the semen with the MTS testing and discuss possible adjustment needed for the compartments and frames - Created designs for the attachment for the slicer to prevent the straws from launching	1.5 .75	2.25	23.75
Varenya Vegesna	11/7-11/13	- MTS testing of individual straw	1.5	1.5	23.5
Emma Stroshane	11/7-11/13	- MTS testing of individual straw using single compartment - Collaborated and modeled well-plate, compartment, and stamper to fit together with updated dimensions - Modeled holder to hold straws so only one person is needed to slice	1.5 2.5 0.5	4.5	28.5