

# **Title: GVI: Straw Stamp and Slicer**

Date: 10/30/2025

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**

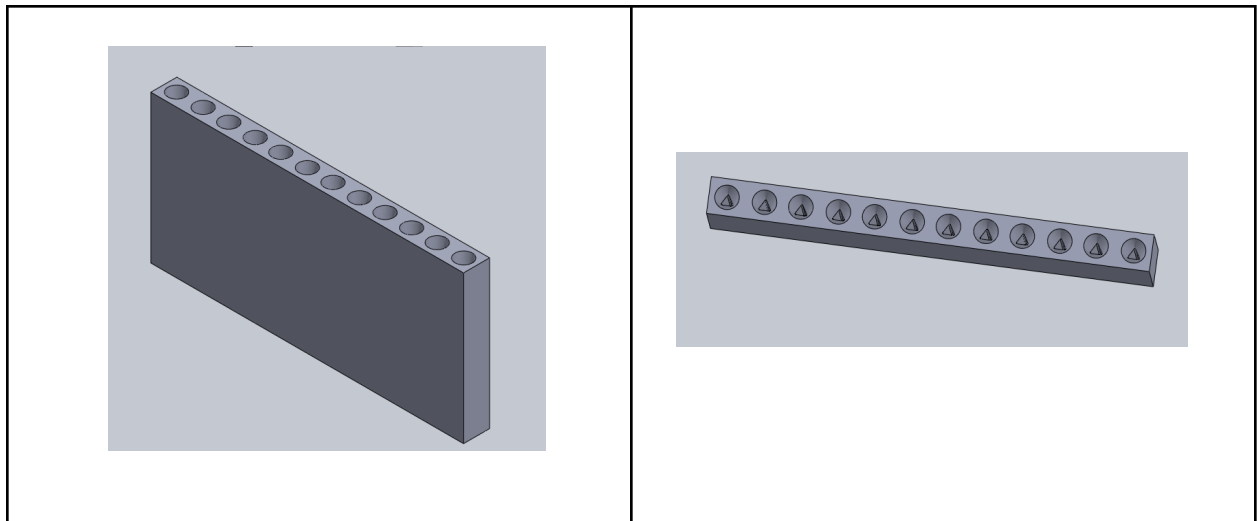
This week, we met to practice using the MTS machine with our current prototype of the compartment and straw. Through this trial run, we determined that making a testing fixture would be helpful to hold the rod in place during stamping. The testing fixture was created in SolidWorks and then 3D printed, along with another iteration of the compartment, and a frame prototype. We inquired about using a plate reader to detect fluorescence from UV fluorescein dye and plan to use this during contamination testing.

## Difficulties / advice requests

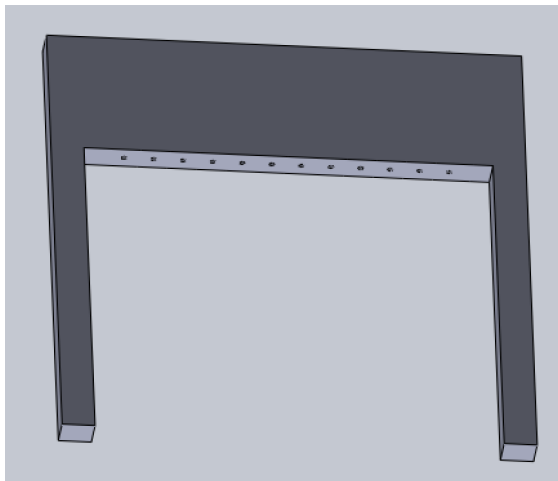
N/A

## Current design

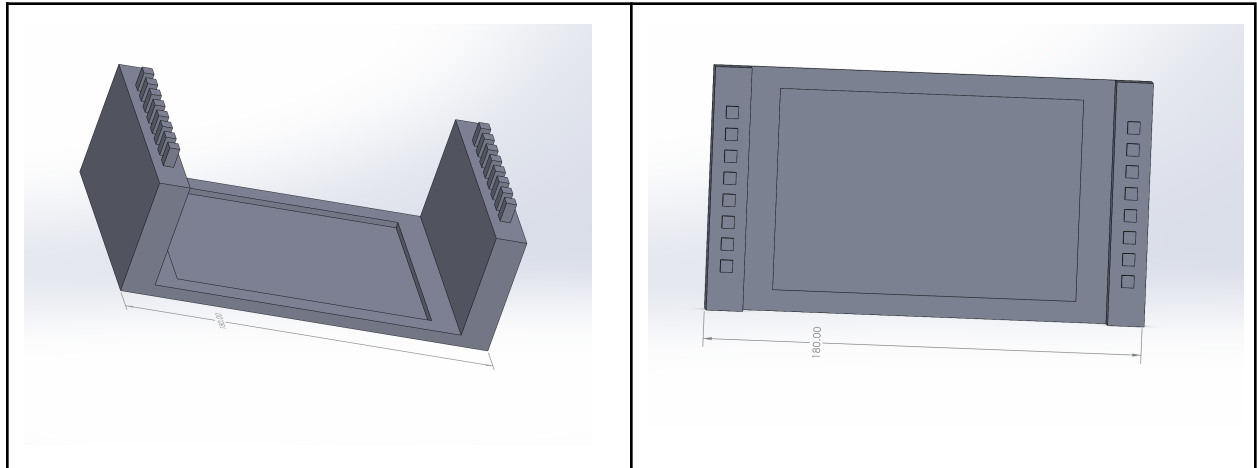
### Compartments



### Stamper



## Well Plate Frame



## Materials and expenses

Note:

- Allocated \$50.00 in payment account through UW-Madison to use at Makerspace
- Working with Makerspace to set up payment account if needed

| Item             | Description                                                                                                                                                     | Manufacturer  | Mft Pt#      | Vendor     | Vend or Cat# | Date       | QTY   | Cost Each | Total  | Link                                                                                                                                                                                                                    |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|------------|--------------|------------|-------|-----------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Materials</b> |                                                                                                                                                                 |               |              |            |              |            |       |           |        |                                                                                                                                                                                                                         |
| 3D Print         | ABS single compartment prototype, Ø 2mm straw hole                                                                                                              | -             | -            | Makerspace | -            | 10/10/2025 | 3.81  | \$0.05    | \$0.19 | <a href="https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0">https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0</a> |
| 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 | <a href="https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0">https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0</a> |
| 3D Print         | ABS 12 compartments together prototype with Ø 3mm straw hole.                                                                                                   | -             | -            | Makerspace | -            | 10/22/2025 | 31.4  | \$0.05    | \$1.57 | <a href="https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0">https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0</a> |
| 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 | <a href="https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0">https://docs.google.com/spreadsheets/d/125EWYr0aojDuu0BGfzzt-YhfGJA1wojkzE-Vt00tw_M/edit?gid=0#gid=0</a> |
| 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 300mm) | Lyrldir       | -            | Amazon     | B0F8VG5HJV   | 10/27/2025 | 1     | \$6.45    | \$6.45 | <a href="https://www.amazon.com/Lyrlidr-Stainless-Industry-Working-Hobbies/dp/B0F8VG5HJV/ref=sr_1_1_sspa?">https://www.amazon.com/Lyrlidr-Stainless-Industry-Working-Hobbies/dp/B0F8VG5HJV/ref=sr_1_1_sspa?</a>         |
| UV Detection Dye | Supercool UV Leak Detection Dye, 1 oz. Multi-purpose, Total Dye                                                                                                 | TSI Supercool | 672264016525 | Amazon     | B008PKV07O   | 10/27/2025 | 1     | \$7.46    | \$7.46 | <a href="https://www.amazon.com/UV-Leak-Detection-Dye-oz/dp/B008PKV07O?th=1">https://www.amazon.com/UV-Leak-Detection-Dye-oz/dp/B008PKV07O?th=1</a>                                                                     |

## Major team goals for the next week

1. Reprint frame, compartments, and testing fixture
2. Perform MTS testing
3. Perform contamination testing
4. Utilize feedback from show and tell to inform future design

## Next week's individual goals

- Catie King
  - Do MTS testing
  - Run some pilot studies for contamination test
  - Make final measurements for stamper
- Lydia Miller
  - Decide on final idea for slicer and order it
  - Execute MTS testing according to new protocol
  - Execute contamination testing according to new protocol
- Megan Lee
  - Research potential slicers
  - Perform MTS testing and contamination testing
  - Make the final frame
- Janice Amornthanomchoke
  - Continuing doing research for testing and materials
  - Perform MTS testing on straws
  - Perform contamination testing on frame and stamp
- Varennya Vegesna
  - Do research for final material
  - Execute MTS testing
  - Execute contamination testing
- Emma Stroshane
  - Fix measurements on 3D model testing fixture and reprint
  - Fix measurements on well plate holder and reprint
  - Collaborate to find final dimensions for the well plate frame, compartments, and stamper

## *Timeline*

| <b>Week</b>            | <b>Description</b>                                 | <b>Status</b> |
|------------------------|----------------------------------------------------|---------------|
| 9/8-9/12<br>Week 1     | Weekly Team Meeting 1                              | Completed     |
|                        | Client Meeting to answer questions/discuss project |               |
| 9/15-9/19<br>Week 2    | Weekly Team Meeting 2                              | Completed     |
|                        | PDS Draft Due 9/19                                 |               |
| 9/22-9/26<br>Week 3    | Weekly Team Meeting 3                              | Completed     |
|                        | Design Matrix due 9/26                             |               |
| 9/29-10/3<br>Week 4    | Weekly Team Meeting 4                              | Completed     |
|                        | Preliminary Presentation 10/3                      |               |
| 10/6-10/10<br>Week 5   | Weekly Team Meeting 5                              | Completed     |
|                        | Preliminary Deliverables due 10/8                  |               |
|                        | Decide on final design by 10/10                    |               |
| 10/13-10/17<br>Week 6  | Weekly Team Meeting 6                              | Completed     |
|                        | Review Preliminary Presentation Feedback           |               |
|                        | Submit IDR by 10/17                                |               |
| 10/20-10/24<br>Week 7  | Weekly Team Meeting 7                              | Completed     |
| 10/27-10/31<br>Week 8  | Weekly Team Meeting 8                              | Completed     |
|                        | Show and Tell on 10/31                             |               |
| 11/03-11/07<br>Week 9  | Weekly Team 9                                      |               |
| 11/10-11/14<br>Week 10 | Weekly Team Meeting 10                             |               |
| 11/17-11/21<br>Week 11 | Weekly Team Meeting 12                             |               |

|                        |                                  |  |
|------------------------|----------------------------------|--|
| 11/24-11/28<br>Week 12 | Thanksgiving Break (11/27-11/30) |  |
| 12/01-12/05<br>Week 13 | Final Presentation on 12/5       |  |
| 12/8-12/12<br>Week 14  | Final Deliverables due 12/10     |  |

## Previous week's goals and accomplishments

- Determine how to use UV fluorescents to test and quantify contamination
- Print stamper, frame, and compartments with necessary attachments for alignment and cohesive devices
- Begin MTS testing to determine forces to cut and stamp the straw

## Activities

| Name                    | Date        | Activity                                                                                                                       | Time (h)      | Week Total (h) | Sem. Total (h) |
|-------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|----------------|
| Catie King              | 10/24-10/30 | - MTS practice<br>- Research ultrasonic cleaner<br>- Contamination test research                                               | 2<br>0.5<br>1 | 3.5            | 22.5           |
| Lydia Miller            | 10/24-10/30 | - MTS practice<br>- Update testing protocols                                                                                   | 2<br>.5       | 2.5            | 24.5           |
| Megan Lee               | 10/24-10/30 | - MTS practice<br>- Research on slicers<br>- Update frame                                                                      | 2<br>0.5<br>1 | 3.5            | 25.5           |
| Janice Amornthanomchoke | 10/24-10/30 | - Research on Box cutter design for slicer device<br>- MTS practice                                                            | 0.5<br>1      | 1.5            | 20.5           |
| Varenya Vegesna         | 10/24-10/30 | - Research the nylon printers<br>- MTS practice<br>- Help Emma build additional 3D printed piece for MTS testing.              | 1<br>1<br>1   | 3              | 20.75          |
| Emma Stroshane          | 10/24-10/30 | - Create fixture for MTS testing<br>- Print well plate frame, compartment, and fixture<br>- Update design for well plate frame | 1<br>0.5<br>1 | 2.5            | 22.6           |

