

Snapshot Day #2: Fishing For Solutions

Team Members:

Cole Schierman

Craig Woodruff

Braden Comstock

Clint Hartz

Steven Sainsbury

Lead Instructor: Tao Xing

Mentor: Kevin Kruger

Client: Scott Williams



Problem

- Lack of an efficient way to collect fish feces on bottom of raceway, leading to re-suspension of particles and less productive farming



Objectives

- Design Needs To:
 - Remove feces from bottom of raceway without re-suspension
 - Be Durable
 - Be Easy To Use
 - Be Cost Effective
 - Be Simple
- Dimensions of Raceway
 - **Flume: 6in x 124in x 12in**
 - Actual: 18ft x 160ft x 4ft

Approach

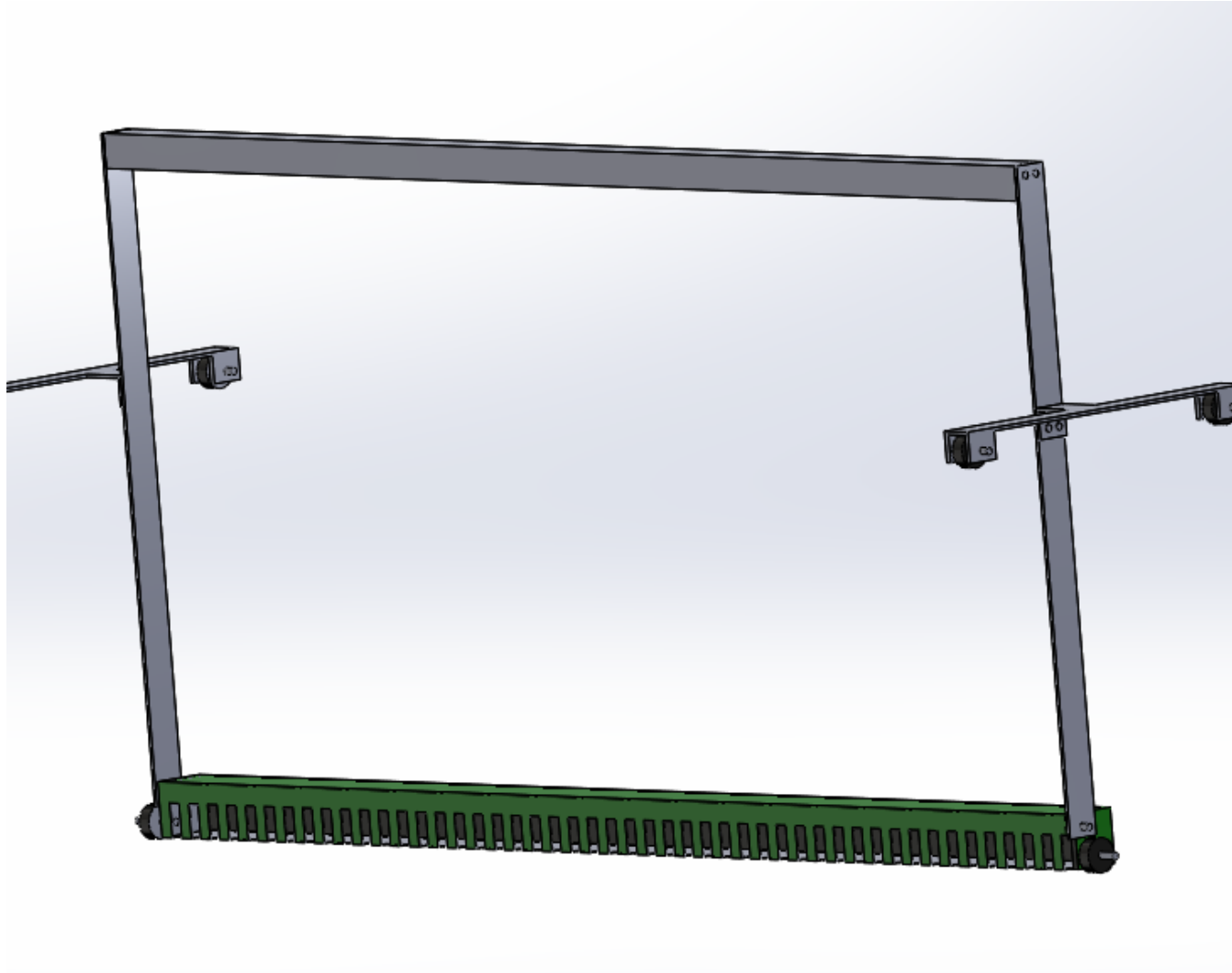
- Step 1- Conceptual Design:
 - Review Previous Group Designs
 - Brainstorm New Ideas
- Step 2- Analyze Designs:
 - Theoretical Analysis
 - CFD's
 - Solidworks
- Step 3- Develop and Test Designs:
 - Machine Shop
 - Flume Testing



Schedule

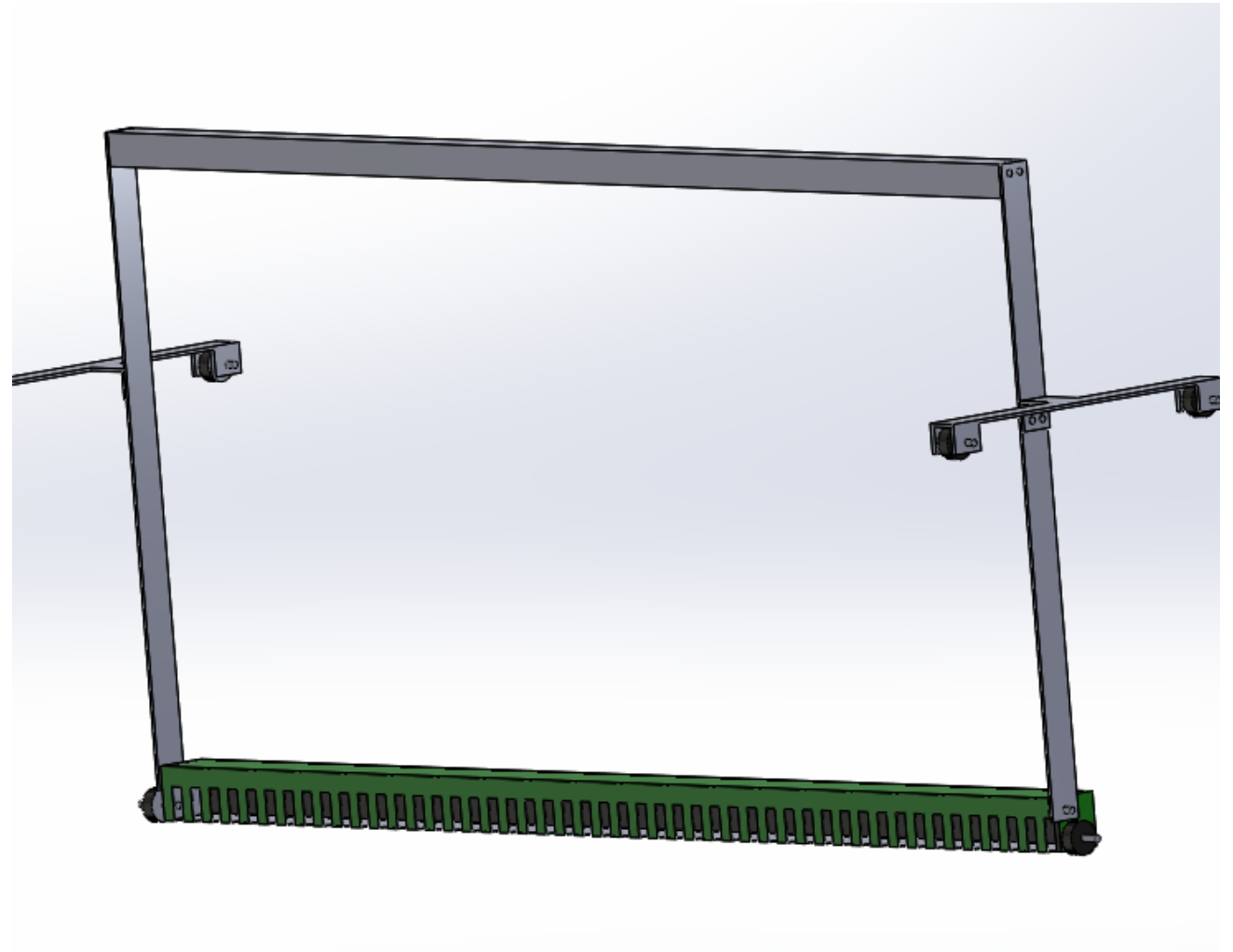
- October 31st- Finalize design alternatives
- November 4th-Mid-semester Wiki Page
- November 28th- Theoretical Analysis of Design Options
- December 12th- Update Client on progress
- January 21st- Assemble model for testing
- February 13th- Begin Building and Testing Preferred Design
- April 3rd- Wiki Page Development
- April 24th- Optimized System Design/Final Client Review
- May 2nd- Design Expo
- May 9th- Final Report

Overall Conceptual Design



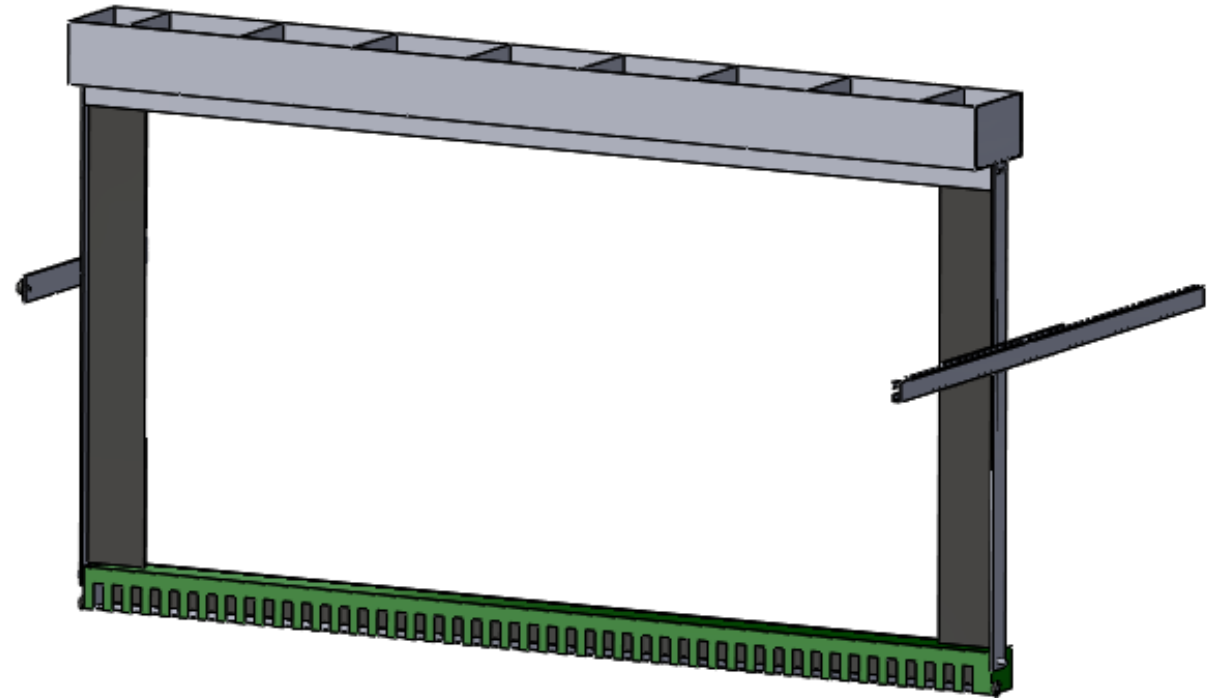
Conceptual Design #1a: Manure Extraction Frame with Pump and Track

- Pump will be attached to frame
- Cost
 - Potentiometer= \$10.00
 - Scrap Metal for Track Wheels
 - 12 ft. Angle Iron= \$30.00
 - 4 ft. U-Channel Al
 - (1/8in x 1/2in x 1/2in)= \$5.40
 - Ultra Corrosion Resistant Al Tubing
 - 3ft. =\$11.38
 - 6ft. =\$17.50



Conceptual Design #1b: Manure Extraction Frame with Pump, Track and Baffle System

- Track system
 - Control movement downstream
- Baffles
 - Side baffles will use pressure force of moving water to push the frame downstream

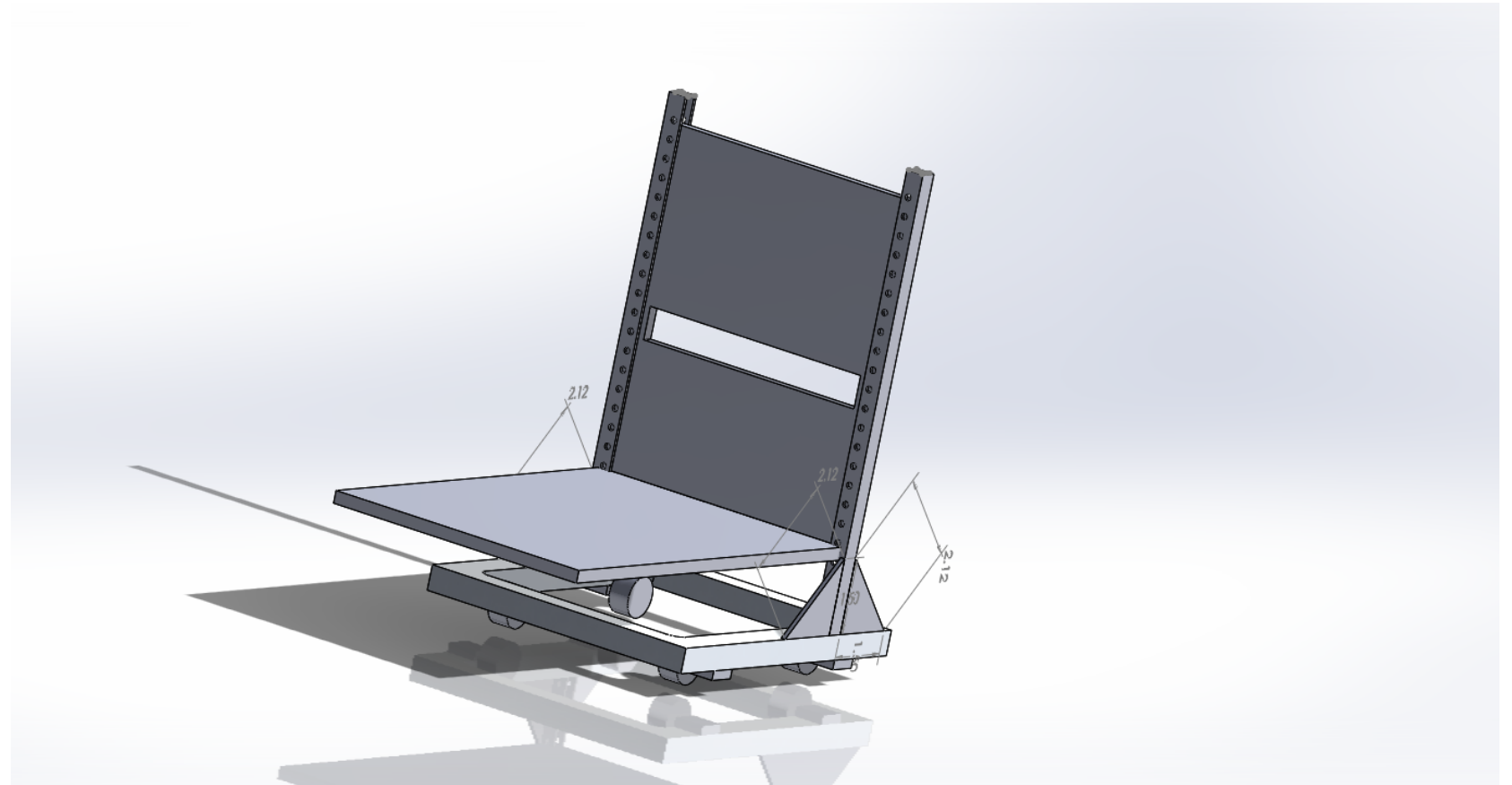


Conceptual Design #1: Pump Calculations

Power [of Pump]	Q [inside pipe]	D [p]	D[p]	V[p]	V[m]	D[m]
(hp)	(ft ³ /sec)	(ft)	(in)	(ft/sec)	(ft/sec)	(in)
0.016	0.022	0.083	0.996	4.000	2.008	0.5
0.047	0.087	0.166	1.997	4.000	1.002	0.5
0.095	0.196	0.250	2.998	4.000	0.667	0.5
0.161	0.349	0.333	3.998	4.000	0.500	0.5
0.243	0.545	0.417	4.999	4.000	0.400	0.5
0.344	0.785	0.500	6.000	4.000	0.333	0.5

Conceptual Design #2: Baffle w/ second jet

- Upper jet
 - Reduce re-suspension of particles
- Lower jet
 - Create larger water velocity to push particles downstream



* Idea suggested by Chance Sundquist

Remaining Challenges/Solutions

- Will the design be permanent or movable from raceway to raceway?
 - Depends on available funds and weight of the frame
 - If frame is permanent, then pump will be removable
- How to filter the effluent water?
 - Settling basin
 - Large filter
 - Pump straight to the QZ zone
- How to move the frame down the raceway?
 - Baffle-propelled downstream, motor used to go back upstream
 - Baffle-propelled downstream, lifted and carried back upstream
 - Motor used for downstream and upstream movement