

UPSTREET CRAFT BREWING

SPENT GRAIN DISPOSAL CART

Problem Identification:

- Current method require two employees to fill a garbage can and dump into a larger bin multiple times.
- This process is:
 - Inefficient
 - Costly - Involving two employees
 - Risk of workplace health and safety violations

Requirements:

- Evacuate 600 kilograms of spent grain (Figure 1) from the mash tun (Figure 2).
- Ability to be moved and operated by a single employee.
- Eliminate the need of lifting weights exceeding 50 pounds.



Figure 1 - Spent Grain



Figure 4 - Final Design CAD

Final Design Features:

- 12GA Stainless steel bin capable of holding a batch worth of spent grain (Figure 4).
- ¼" Stainless steel forklift plates for the bin to be elevated via a forklift above the spent grain storage bin.
- Spring loaded lever mechanism to release the door on the bottom of the bin and dispense the spent grain into the storage bin.
- Handle and heavy duty casters to ensure ease of mobility through the brewery.
- Rubber seal around the perimeter of the door to eliminate the possibility of leaks.
- Chains to stop the door at a desirable position will dispensing the spent grain.

Constraints:

- Must be no taller than 33" and wider than 35"
- Must not obstruct pathways, working areas, or fire exits.
- Must not use any materials that have the potential to absorb the liquids given off by the spent grain.
- Must complete the spent grain removal process and be cleaned within 15 minutes.



Figure 2 - Mash Tun (Left)



Figure 5 - Wooden Prototype Build

Decision:

- Move forward with a full scale wooden prototype (Figure 5) as unable to build the stainless steel bin due to concerns of cross contamination.
- Present client with build plan should they decide to move forward with the build in the future.

Preliminary Ideas:

- The Can Swing
- Conveyor Belt System
- Auger System
- Drop Bottom Bin
- Self Dumping Hopper

Project Design Class Project Presentation Spreadsheet

Project Name: Spent Grain Disposal Cart
Team: Connor McCardle, Bradley Norman, Chad Stewart, Nick Walker, Connor McCardle

Item	Quantity	Description	Unit	Cost	Total	Material
1	1	12GA Stainless Steel Bin	Bin	1,200.00	1,200.00	12GA Stainless Steel
2	1	1/4" Stainless Steel Forklift Plates	Plate	1,200.00	1,200.00	1/4" Stainless Steel
3	1	Spring Loaded Lever Mechanism	Mechanism	1,200.00	1,200.00	Spring Loaded Lever Mechanism
4	1	Handle and Heavy Duty Casters	Handle/Caster	1,200.00	1,200.00	Handle and Heavy Duty Casters
5	1	Rubber Seal	Seal	1,200.00	1,200.00	Rubber Seal
6	1	Chains	Chain	1,200.00	1,200.00	Chains
7	1	Welding	Welding	1,200.00	1,200.00	Welding
8	1	Paint	Paint	1,200.00	1,200.00	Paint
9	1	Assembly	Assembly	1,200.00	1,200.00	Assembly
10	1	Shipping	Shipping	1,200.00	1,200.00	Shipping
11	1	Installation	Installation	1,200.00	1,200.00	Installation
12	1	Maintenance	Maintenance	1,200.00	1,200.00	Maintenance
13	1	Warranty	Warranty	1,200.00	1,200.00	Warranty
14	1	Documentation	Documentation	1,200.00	1,200.00	Documentation
15	1	Testing	Testing	1,200.00	1,200.00	Testing
16	1	Final Review	Final Review	1,200.00	1,200.00	Final Review
17	1	Project Completion	Project Completion	1,200.00	1,200.00	Project Completion
18	1	Project Summary	Project Summary	1,200.00	1,200.00	Project Summary
19	1	Project Report	Project Report	1,200.00	1,200.00	Project Report
20	1	Project Presentation	Project Presentation	1,200.00	1,200.00	Project Presentation
21	1	Project Conclusion	Project Conclusion	1,200.00	1,200.00	Project Conclusion
22	1	Project Appendix	Project Appendix	1,200.00	1,200.00	Project Appendix
23	1	Project Bibliography	Project Bibliography	1,200.00	1,200.00	Project Bibliography
24	1	Project Glossary	Project Glossary	1,200.00	1,200.00	Project Glossary
25	1	Project Index	Project Index	1,200.00	1,200.00	Project Index
26	1	Project Table of Contents	Project Table of Contents	1,200.00	1,200.00	Project Table of Contents
27	1	Project Cover Page	Project Cover Page	1,200.00	1,200.00	Project Cover Page
28	1	Project Title Page	Project Title Page	1,200.00	1,200.00	Project Title Page
29	1	Project Abstract	Project Abstract	1,200.00	1,200.00	Project Abstract
30	1	Project Introduction	Project Introduction	1,200.00	1,200.00	Project Introduction
31	1	Project Background	Project Background	1,200.00	1,200.00	Project Background
32	1	Project Objectives	Project Objectives	1,200.00	1,200.00	Project Objectives
33	1	Project Methodology	Project Methodology	1,200.00	1,200.00	Project Methodology
34	1	Project Results	Project Results	1,200.00	1,200.00	Project Results
35	1	Project Discussion	Project Discussion	1,200.00	1,200.00	Project Discussion
36	1	Project Conclusion	Project Conclusion	1,200.00	1,200.00	Project Conclusion
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100	1	Project Index	Project Index	1,200.00	1,200.00	Project Index

Figure 3 - Cost of Materials Estimation



Figure 6 - Strength Analysis on Latch Cam

Analysis:

- Strength (Figure 6)
- Dimensional
- Sustainability
- Cost (Figure 3)