



Bag Handling Optimization



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Introduction

The Scenario: MilliporeSigma currently uses 2 lab technicians to perform sampling. This involves holding the bags, sampling the media and returning the bag to the holding bin.

Task: Develop a solution to improve the long-term efficiency and reduce the number of lab technicians by assisting them in the bag handling process.

Driving Question

“How can we make handling bags more effective and efficient than the previous method without causing cross contamination?”

Issues & Assumptions

Issues



Health and Safety
- Sterile lab environment
- Cross contamination



Material Cost and Manufacturability
- Easy and cost-effective to manufacture

Assumptions



Lab technicians running time studies will be roughly equal in experience and consistency

Risks

Performance



If product doesn't meet requirements, lab team will use original method

Health & Safety



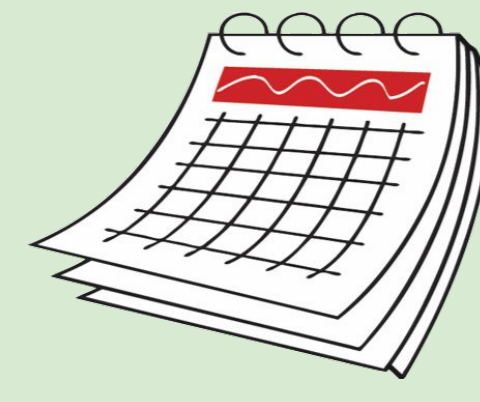
Bacteria contaminations and hazards

Cost



Inability to produce product cost-effectively

Schedule



Inability to meet specified deadlines

Indices of Performance

Time:

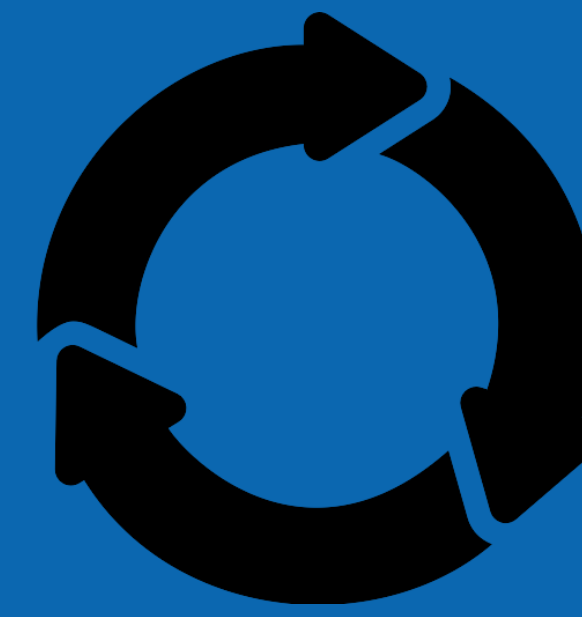
- Needs to be equal to or less than the amount of time it would take two people. Currently takes on average 51.26 seconds for 5 bags.
- Goal [One Technician]:** Take less than or equal to half of duration for two-person team. This would double the samples that can be taken in the original 51.26s with just one lab tech.

Material Strength:

- Can hold up to 6 kg of force (Factor of Safety[FS] 1.5)
- Bleach resistant and easy to clean (does not corrode or lose structural integrity).

Design Process

Time studies to validate and ensure lab technician buy in



Discussion and feedback surveys with lab technicians and project sponsor

Team brainstorming, designing, and prototyping

Improve long-term efficiency

Reduce time needed for testing

Reduce number of lab techs needed to 1

Make process similar with all bag sizes

Iteration: Initial v-stand



Ranking from lab technicians:

Intuitiveness: 4/5
Likeliness to use: 2.5/5
Comparison to 2-person method:
Overall not better

Lab technician recommendation: “The design is simple and easy to clean. If we are able to adjust the angle of the V to push up the liquid, I think this design would definitely eliminate the need for 2 people.”

Results

Final Deliverable: V-Stand Prototype

The final prototype featured an ambidextrous handle and ratcheting clamp, which functions to open and close the internal V. The internal V sits in the opening of the V-stand and is the mechanism that squeezes the sampling bags. The internal V is also modular, connected by magnets allowing it to function as a clevis.

Final Impact

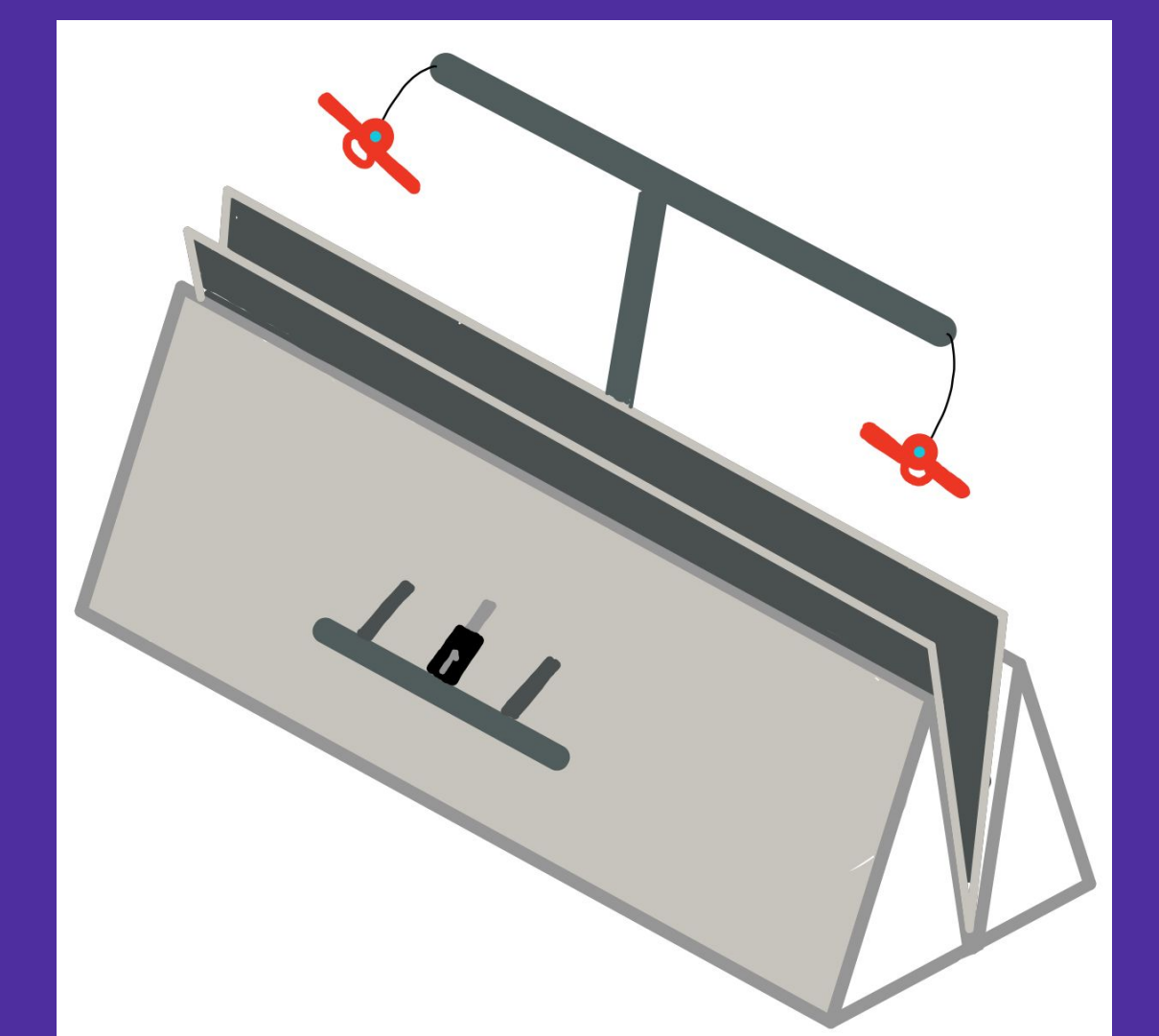
- V-Stand functions with a single lab technician
- V-Stand supports media filled bags to rest upright without spilling
- Ratcheting clamp brings media to an easier sampling level for



Future Recommendations

Due to time constraints our team ran into issues with the ratchet system and safeguarding spillage when sampling. The lab technicians must still hold the bag with one hand while the ratchet is closed in order to prevent spillage when the media level rises above the stand backing.

- Add hanging clips to V-Stand
 - Ensures that bags will not fall over when squeezed
 - Reduces chances of cross contamination and spillage
- Make prototype out of one material; aluminum or stainless steel.



Acknowledgements

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