



Post-Consumer Paint Processing Automation

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Introduction

Product care is a not-for-profit paint recycling company that is funded by several paint manufacturers of Western Canada by the Government of BC mandate. The paint cans recycled by ProductCare come in two main types, oil, and water-based paints.

Each type has an endstream quality associated with them, high quality or low quality . High quality paint being paint that is still mostly liquid and can be easily drained, and low quality paint being paint that has solidified too hard to be removed practically

ProductCare has a facility at Delta that processes these paints by categorizing them into types, quality, and colour. ProductCare subsequently drains the cans in appropriate tanks to be transported else where. This whole process is manually done by 8-12 workers.

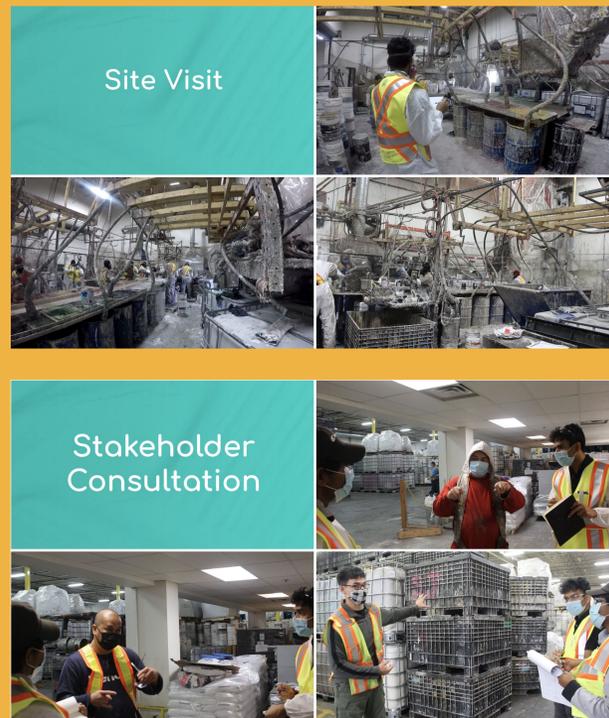
Currently, scooping out paint from paint cans is a highly labor-intensive process. The current practice has led to numerous wrist injuries, higher costs in terms of wages, and halts on paint processing due to labour shortages. This has been Product Care's primary rationale for seeking an engineering solution to this problem.

The main requirement of the project was to design a system that can process 4000 cans of high-quality paint per day with little modification to the existing setup.



As a preliminary step the team conducted a site visit of ProductCare's Delta facility to understand the existing process and interviewed the staff regarding the challenges involved with the operation.

Methods



Steps from our design process are mentioned below in the sequence in which they were executed. Significant time was spent in the first 5 stages due to the highly complex and systems-level nature of the problem and solution.

1. Site Visit
2. Stakeholder Consultation
3. Study of Existing Solutions
4. Formulation of Target Design Specifications and Evaluation Criteria
5. Concept Generation
6. Concept Selection and Design Iteration
7. Prototyping and Testing
8. Final Recommendations

These steps were critical to clearly define the problem, which was slightly distinct and more comprehensive than the initial proposition.

Results

Based on conclusions from our stakeholder consultations, concept generation, and evaluation We developed a prototype paint can emptying device constructed from over 95% reused/recycled material



Testing

- A labour speed test was conducted where five volunteers who were unfamiliar with the device were timed while operating the device over five loading and unloading cycles
- the average amount of labour required per paint can emptied was found to be 5.9 seconds
- The device was found to reduce the labour required per paint can emptied by 45% compared to emptying the paint can manually with a spatula
- Qualitative testing Suggested the device requires less less effort and a smaller range of maotion to operate compared to manual paint can emptying with a spatula
- further testing may be needed to verify these results

Conclusions

- No major existing solution in the market.
- The design eliminates the need of the motion of the workers
- The scaled version of the design will be able to process 4000 paint cans per day
- The large volume throughput decreases the amount of backlog
- The design does not require any changes in the existing setup
- Easy to load and unload the paint cans
- Does not require additional training to use the device
- Further development needs to be done for a field ready solution

Future plans

- Refine the current design to process more than 4000 paint cans per day
- Design a more compact design
- Improve the current process to accommodate low quality paints and oil-based pains
- Automatic loading and unloading of paint cans