

## Abstract

This engineering opportunity aims to improve the bulk soap dispensing experience at Karma Co-Op, a non-profit cooperative grocery store in Toronto, seeking to provide affordable and sustainable groceries and other household goods [1].

One example of Karma Co-op's sustainability initiatives is reducing plastic packaging waste by offering food and personal care items in bulk [2]. Both dry goods and soap are stored in large self-service dispensing devices around the store, and customers bring their own reusable containers to fill. However, Karma Co-op's current soap dispensing setup involves a pneumatic system that is complicated, error-prone, and difficult for first-time customers to use [3]. Moreover, it requires extensive clean-up and maintenance effort from the staff [4].

Several existing designs are advantages in some desired aspects compared to Karma Co-op's current system, but cannot fulfill the community's needs. While manually operated wall-mounted hand soap dispensers are simple to operate and require no electricity, they store and dispense too small a volume of soap with each use. Syringes are simple to use and understand in their liquid-pushing mechanism, but do not work as a standalone solution and are similarly much too small in scale. Water dispensers provide a platform for users to place their containers and a mechanism to collect spilled liquid, but its mechanism does not work for viscous fluids.

Given these challenges, there is a clear opportunity to design a bulk soap dispensing system that addresses Karma Co-op's needs, with the goal of improving usability, reliability, and maintainability. It would make the soap dispenser system easier to use for customers, require less tedious maintenance work from the workers, inspire other stores that also sell soap in bulk, and help Karma Co-op continue its environmentally friendly initiatives.

## References

- [1] "Karma Co-op," *Karma Co-op*. <https://www.karmacoop.org/> (accessed Mar. 26, 2025).
- [2] J. Wells, "Size matters: Bulk foods are going mainstream in US grocery stores," *Grocery Dive*, Mar. 29, 2017.  
<https://www.grocerydive.com/news/grocery--size-matters-bulk-foods-are-going-mainstream-in-us-grocery-stores/535284> (accessed Mar. 26, 2025).
- [3] D. Norman, *The Design of Everyday Things*. Massachusetts: MIT Press, 2013.
- [4] Interview with the grocery purchaser of Karma Co-op