Kitchen Trash Can with Assisted Bag Removal
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Abstract
Trashcans are often times unsightly and do not have features designed for aiding the trash removal process. This re-design of a trashcan makes taking out the trash easier by having a pressure relief hole to avoid vacuums and a scissor lift to help lift up the trash bag. However, these features will not take away from the overall aesthetics. During this project several challenges arose when trying to add the scissor lift without making the trashcan too large or heavy while keeping everything encased in the sleek frame work. Ultimately the design was able to fit all of the needed mechanisms within the shell.

Benchmarking
We looked around and found the simplehuman® 40 liter Slim Black Plastic Can to be the closest model to compare to our initial design plans. Upon benchmarking the simplehuman® trashcan, we quickly found some key areas we wished to improve on for our design including:
- The ability to stop the bag from falling into the can
- The ability to stop smell from leaking out into the environment
- Increased capacity
- Less suction during bag removal
- Easier bag removal
The results from our benchmarking tests and model analysis are listed in Table 1 of the technical binder.

Design Evolution
There were some differences between the final design and original concept. We originally wanted to have the wider dimension of the trash can in front making it easier to open the lid. After some debate, we decided to have the narrower dimension be the front so that it can fit into smaller spaces in the kitchen. We also wanted to include an intricate lid opening mechanism into our design but later came to the conclusion that a simple double lid design that stops the trash bag from slipping inside would be better. When brainstorming how to achieve the assistive lifting mechanism, we considered using a pulley system but ultimately chose to use a scissor lift instead. The design process is iterative, so our model changed along the way.

Final Design
The force required to open the benchmark lid by pedal is less than our model, but both forces are low enough to be depressed with ease. The lift assembly and lid initially need a larger force which decreases as the foot pedal is further engaged. The one area we were not able to compete with the simplehuman® can in was the overall weight of the trashcan. While our trash can weighs more, the added weight was found to stop the can from lifting off the ground during removal of an unusually large trash load, and since a trash can rarely moves after purchase, this seems to be a positive aspect. We were unable to properly test our damper versus the benchmark damper since our model is not fully functional with the materials we have.

Technical Analysis

Acknowledgements
We would like to acknowledge the following people for their contributions to our design project:

References
simplehuman®
US Patent Office:
Patent # 7,121,421 #7,922,024 #7,748,556

Appendix

Figure 1: Our benchmark (left) and prototype (right).
Figure 2: Our dual damper. SolidWorks model (left) and prototype (right).
Figure 3: Our final trash can design is shown with the lid open and the assisted lift mechanism fully extended (left) and the lid closed with the assisted lift fully compressed (right).

The final trash can design incorporated:
- Double lid to conceal and secure trash bag during use and storage
- Foot pedal operated scissor lift to aid in bag removal
- Narrow shape to allow trash can to fit more closely to counters or walls
- Dual damper to stop lid from slamming when opening and closing
- “Snorkel” hole to reduce suction force created during bag removal

Figure 3: Our dual damper. SolidWorks model (left) and prototype (right).