Objective

- Customer Requirements
  - Separate liquids
  - Low noise
  - Similar size to current trashcans
  - Limit user input
  - Limit processing time
  - Low maintenance

- Constraints
  - Noise < 50 dB
  - Same trash change time
  - Withstand 12.03 J of impact energy

- Uses standard trash bag

- Engineering Characteristics
  - Noise
  - Solid and Liquid capacity
  - Percent of liquid removed
  - Actuation mechanism
  - Processing time
  - Number of parts
  - Trash change time
  - Size (outer dimensions)
  - Trash bag accessibility

- Physics of System
  - \[ E = mgh = \frac{1}{2}mv^2 \]
  - \[ h = H - X \]
  - \[ E = 12.03 \text{ J} \]

Concept Generation

- Trash Drawer: Uses compaction and a grate to drain liquids.
  - + crushes cups for max liquid removal
  - - parts of lots and requires electrical power to operate

- Dehumidifier: Extracts moisture using refrigeration cycle.
  - + does not require any trash movement
  - - only effective on exposed liquids

- Separate liquids

Design

- Path of the trash through system
  1. Foot pedal (1) is activated to open top, trash is thrown in and liquid drainage starts
  2. Trash is moved 90 degrees in the circular enclosure by paddles (2), drainage continues
  3. Trash is moved another 90 degrees, drainage continues
  4. Trash is pushed into a cutout (3) in the enclosure and drops into the trash bag (4)

- Path of the liquid through system
  1. While trash is in the circular enclosure, liquid drains through the bottom plate (5)
  2. The liquid is collected by a catch pan, drains into a funnel leading to a liquid reservoir (6)

Prototype and Testing

- Liquid Removal Testing
  - Fast food cups filled with varying amounts of water are processed through the system
  - Target Value = 80%
  - Results:

- Range of Motion Test (Paddles)
  - Calculated degree of travel: 90 degrees
  - Testing procedures: Mark paddle position and measure degree travel after one actuation
  - Measured degree of travel: 90°± 10°

- FEA Testing
  - Applied a force of 1300N (about 300lbs) to top of frame
  - Max displacement = 1.129mm
  - Conclusion: Frame is structurally acceptable

Test Results and Future Work

- Brief Summary of our Design Process
  - Found an area of potential improvement for the current standard commercial trashcan
  - Researched the market and gathered information to determine CTQ characteristics necessary for our design
  - Developed concepts and selected one based on the previously gathered information

- Future Design Recommendations (commercialization)
  - Make the outside of the trashcan more aesthetically pleasing for customers (make more streamline)
  - Slim down some of the heavier parts (gears, rack, etc…)

- Process Reflection
  - Developing the list of customer requirements and constraints was very helpful in both concept generation and selection
  - Prototyping also proved helpful in our design finalization