

CLOTH DIAPER WASHER AND DRYER

Team: Brody Karhu, Zach Lemire, Hunter Kirk, Jaden Cook, MacKenzie Reigel, Taylor Leivestad, Steven Schimack, Jonathan Anderson

Client: Brody Karhu

Advisor: Ike Ruse

PROJECT DESCRIPTION

The goal of this system is to reduce the time and effort required for parents to clean cloth diapers by automating the washing and drying process. While disposable diapers are commonly used, they are costly and contribute significantly to landfill waste. Although many combination washer and dryer machines exist on the market, they are not designed to handle the unique waste conditions associated with cloth diapers. The proposed prototype is intended to reduce manual labor, improve sanitation, and provide a more convenient solution for maintaining reusable cloth diapers.

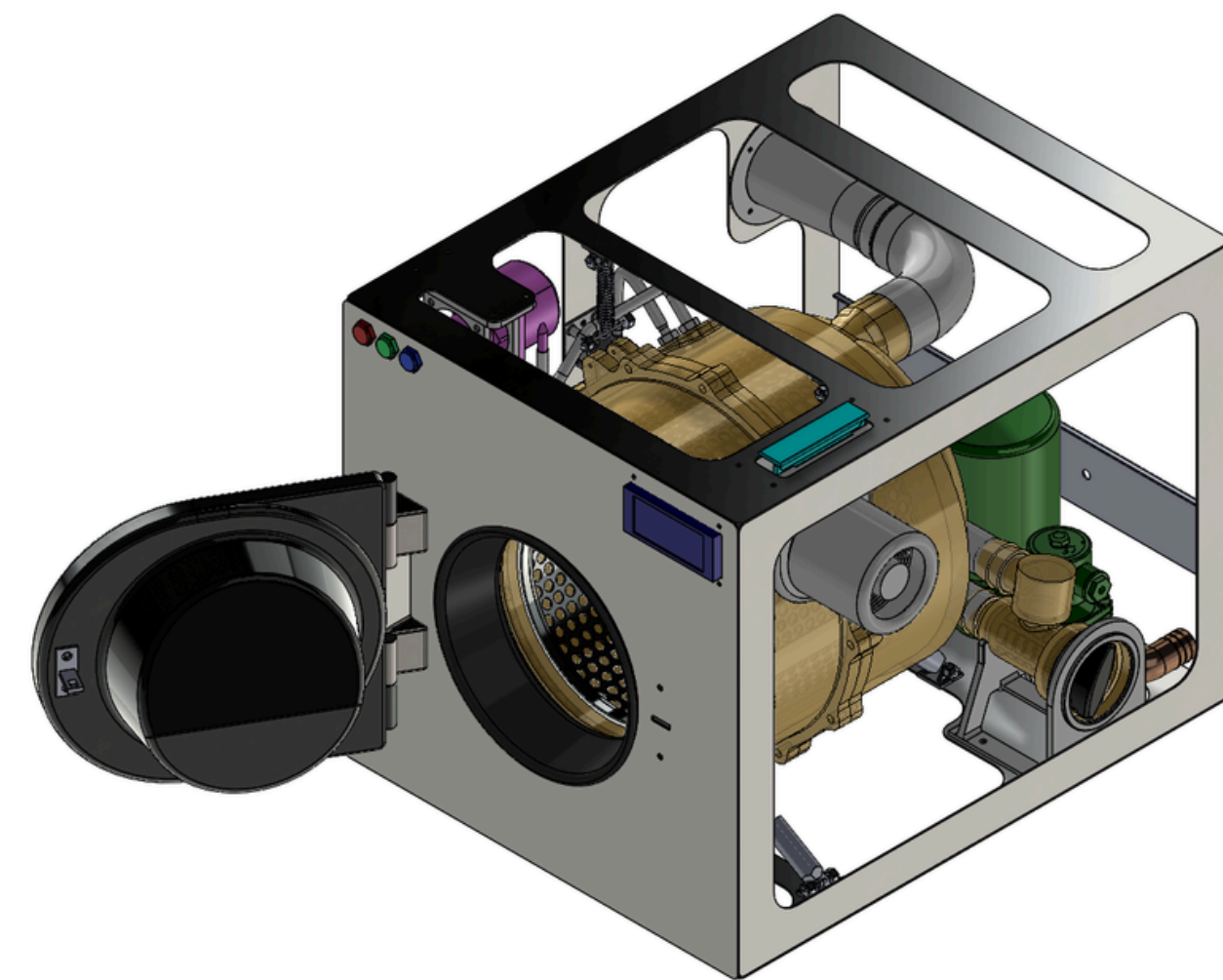


Figure 1. Full Cloth Diaper Washer/Dryer Assembly

DESIGN REQUIREMENTS

- Smaller than 16" x 24" x 16" so it fits on a countertop
- Wash/dry cycle time for one cloth diaper is under 1 hour
- Cloth diapers are visually clean and free of odor
- Plugs into a NEMA 5-15 outlet
- Connects to a 3/4" GHT hose fitting
- Unit does not walk/fall from the surface it is placed on
- Water sanitization > 160°F for at least 10 minutes
- Air temperature operates between 145°F and 155°F
- Unit weighs less than 70 pounds for easy transport
- Load settings for 1, 2, and 3 cloth diapers
- Drain trap to catch items larger than 0.125 cubic inches
- Noise emission is less than 75 decibels
- Automatically dispenses 30 mL of detergent per gallon of water

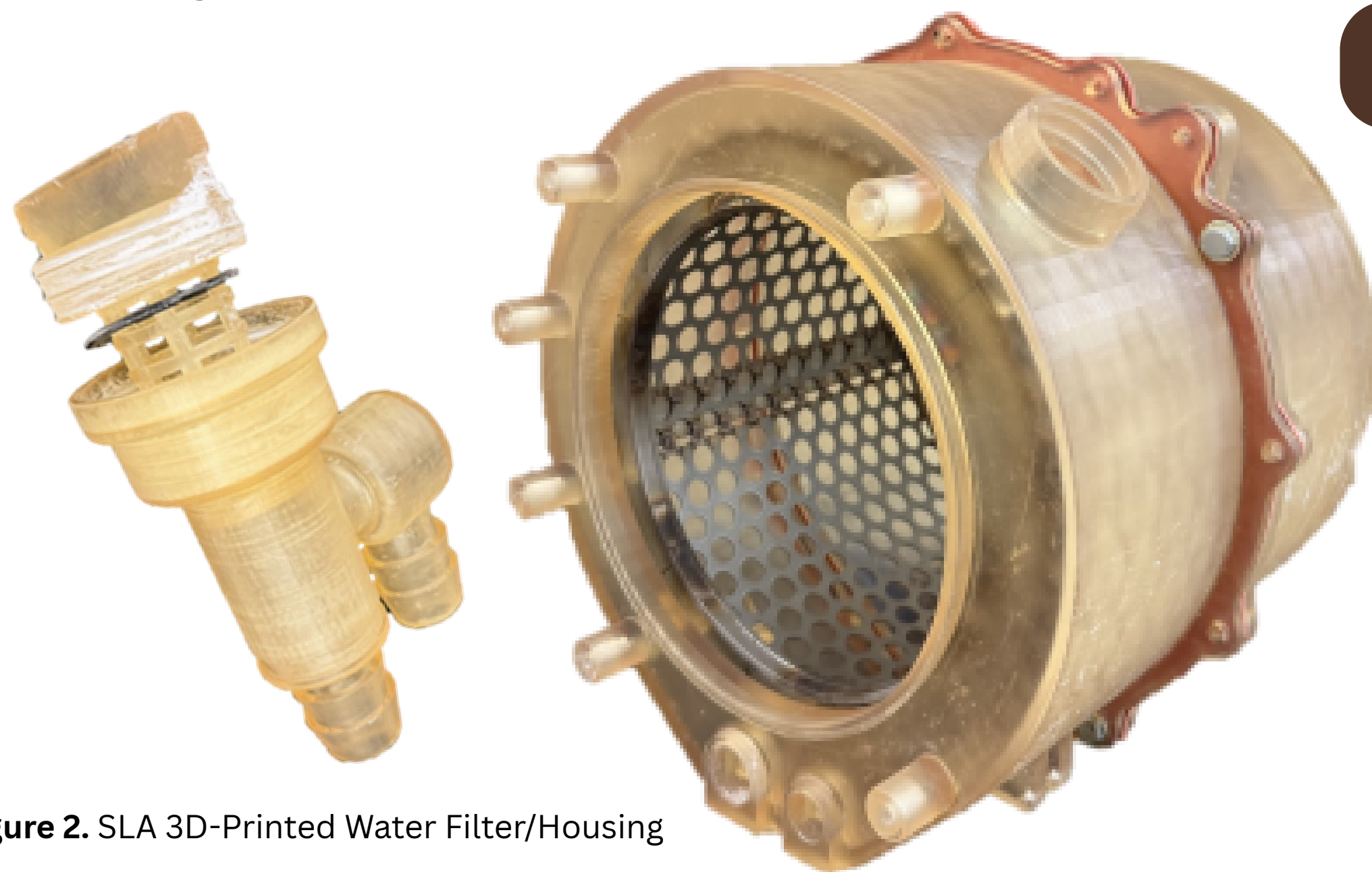


Figure 2. SLA 3D-Printed Water Filter/Housing

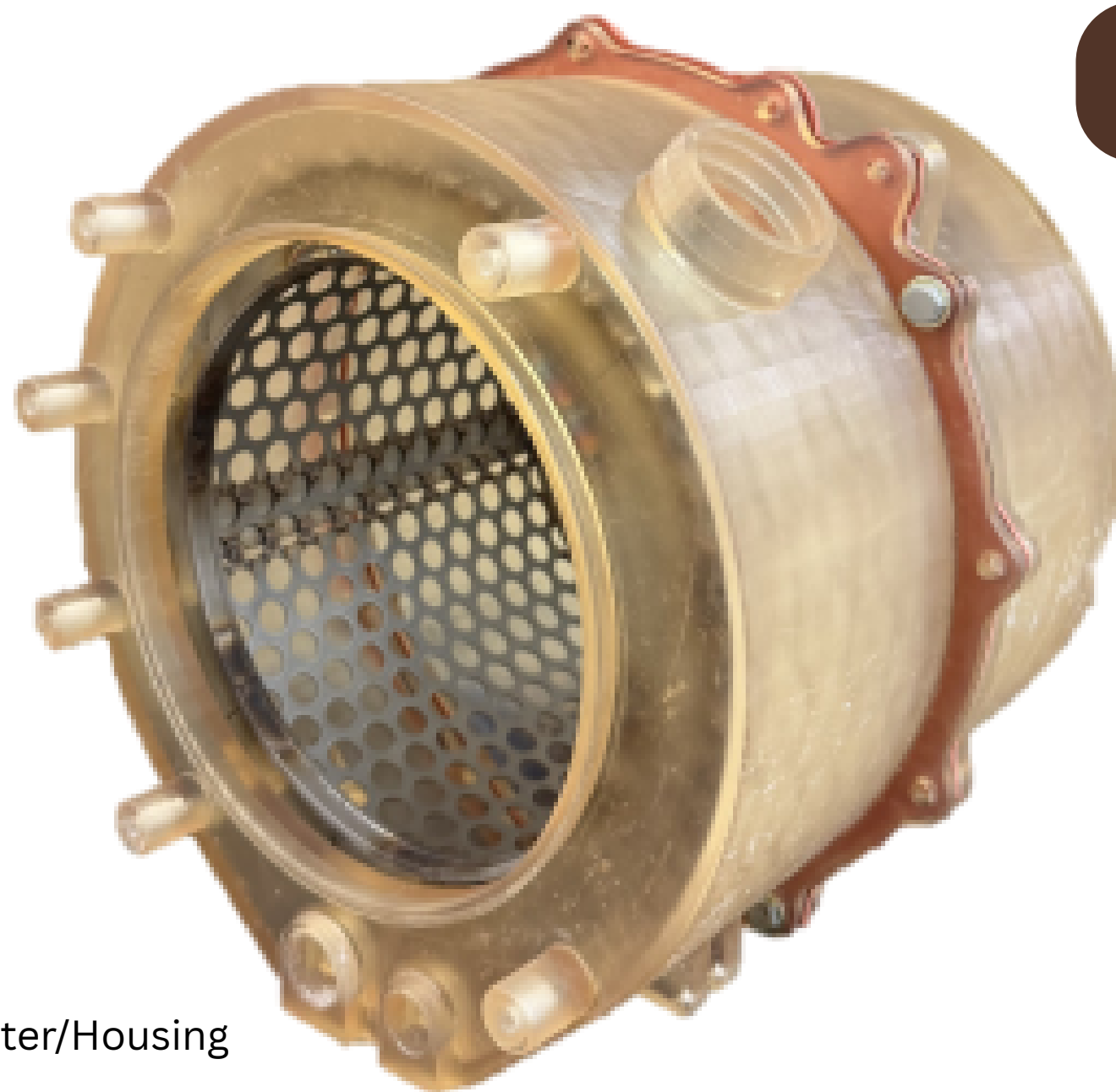


Figure 3. Manufactured Drum/Tub

DESIGN DECISIONS

- Non-Contact Water Level Sensor
 - Monitors water level in the tub without designing a completely closed system
- Transfer Pump
 - Able to handle wastewater
- Exhaust Fan
 - From the same component as the air heating element
 - Cost-effective
- Hall Effect Flow Meter
 - Easily tracks water quantity
- Peristaltic Pump
 - Compact and easy to use
 - Prevents future detergent build-up
- U-Shaped Frame
 - Alternative to angle iron for less weight
 - Easy mounting for brackets and components
- Motor Rotor
 - Custom FDM 3D-printed for design compatibility
 - Better for force distribution

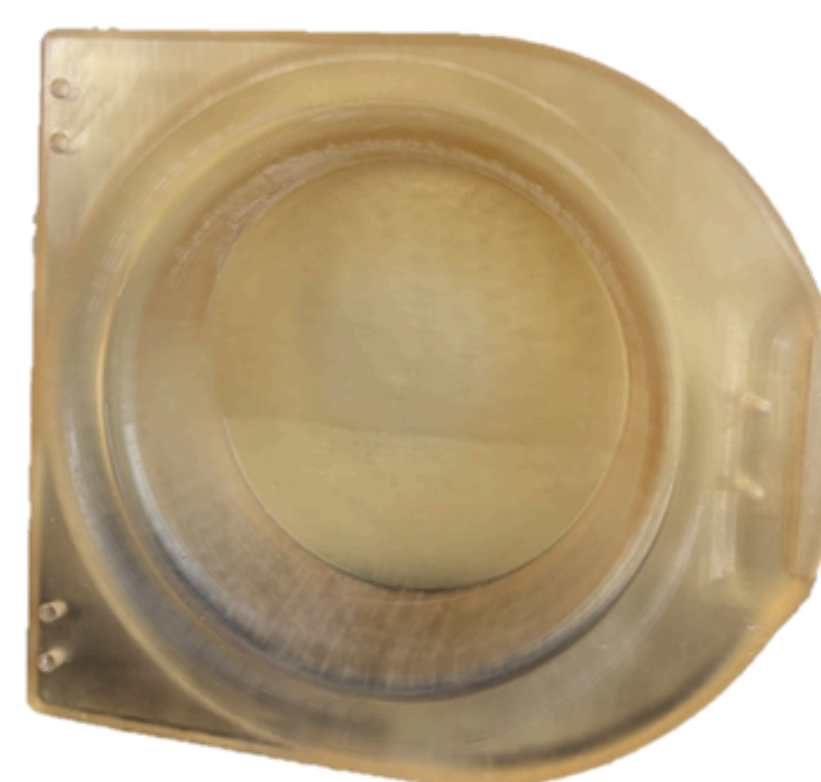


Figure 4. SLA 3D-Printed Door

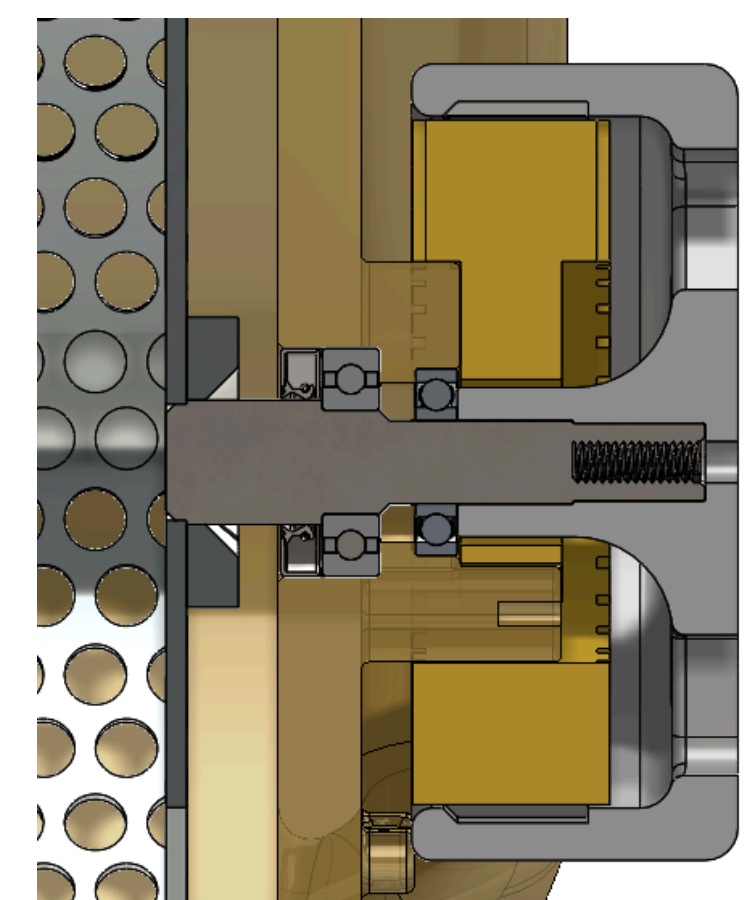


Figure 5. Motor Rotor

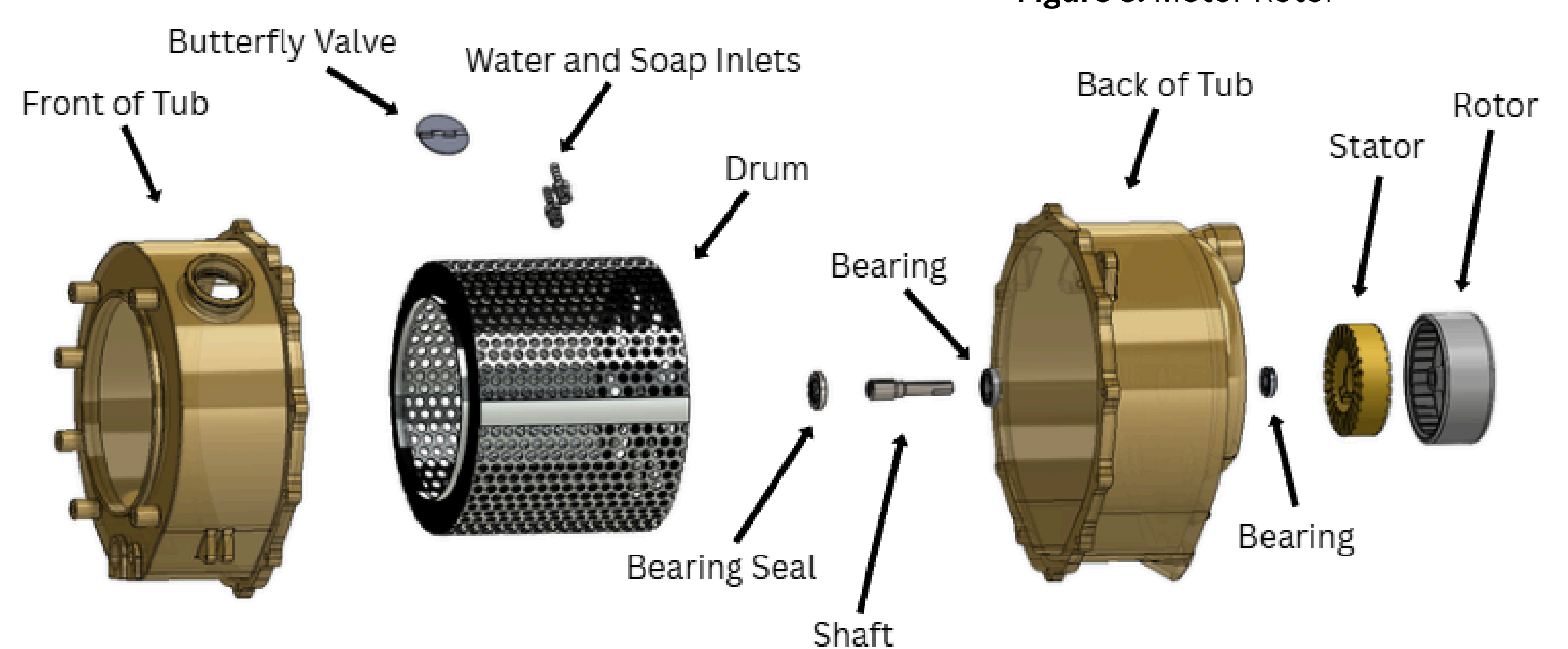


Figure 6. Exploded View of Drum/Tub