

MECH 08 - The Bath Bomb Press

What are Bath Bombs?

Bath bombs are a hard-packed mixture of dry and wet ingredients such as: baking soda, citric acid and essential oils.

It takes 40 lbs of force to compress the ingredients into a bath bomb.

Duckish bath bombs are cube shaped, apposed to the more common sphere shaped bath bombs.



[1]

Who are Duckish?

Duckish are a Natural skin care company that sells a variety of fully-organic bath and body products.

The Problem

As the demand for their bath bombs continues to increase, Duckish is looking to improve their production capabilities as their current method lacks efficiency and is physically taxing.

The Current Process²

- Mix Ingredients
- Scoop and measure out 118 g on scale and place in funnel
- Pack mixture from funnel to bath bomb mold (1 individual bath bomb)
- Use bath bomb press to compress one bath bomb (40 lbs of applied force)
- Remove mold from press and pop bath bomb out, place on curing tray

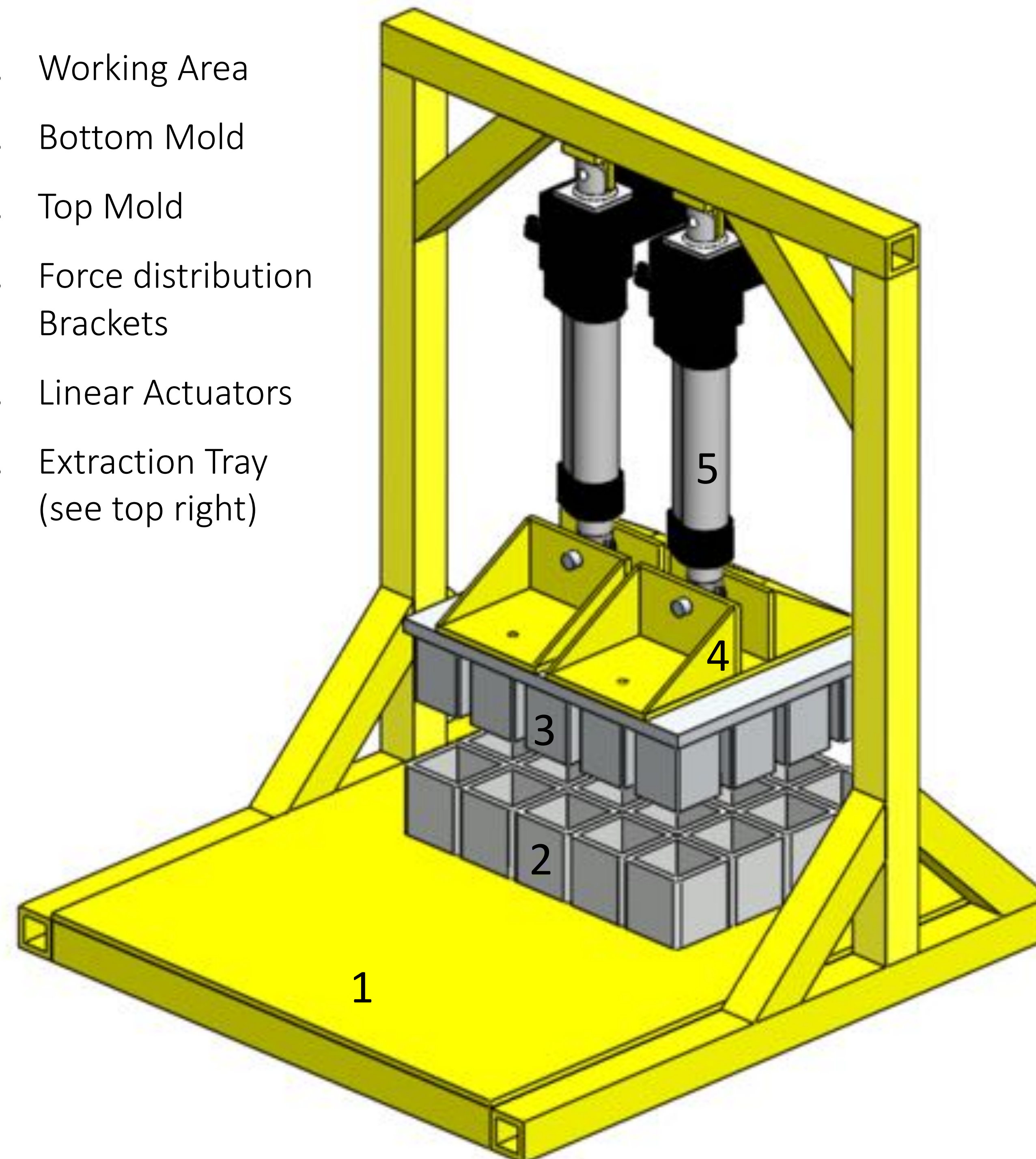


Time Summary of Current Process³

Task	Average Time Required (s)	Percentage of Total Time (%)
2. Measure	19.29	39
3. Pack	18.00	36
4. Press	6.36	13
5. Extract	6.07	12
Total	49.72	100

Design a device or devices to reduce the amount of time required to make bath bombs

- Working Area
- Bottom Mold
- Top Mold
- Force distribution Brackets
- Linear Actuators
- Extraction Tray (see top right)

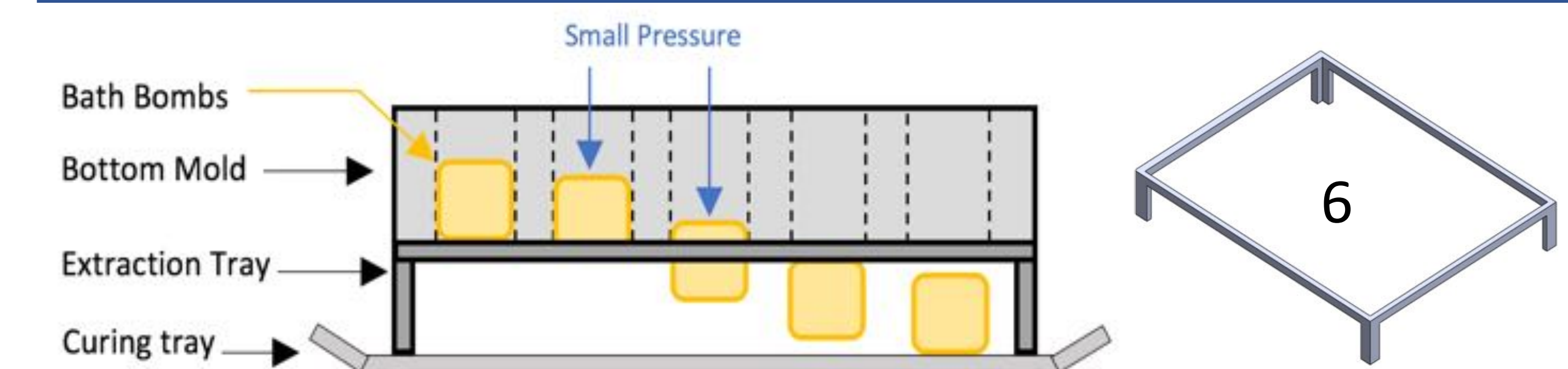


Validation and Testing

The design team ran several tests at the Duckish facility to determine:

- The height of the bottom mold required to produce bath bombs with a final mass of 113 g
- The force required to press a bath bomb
- The effects of evaporation on the final mass after drying

Extraction Method



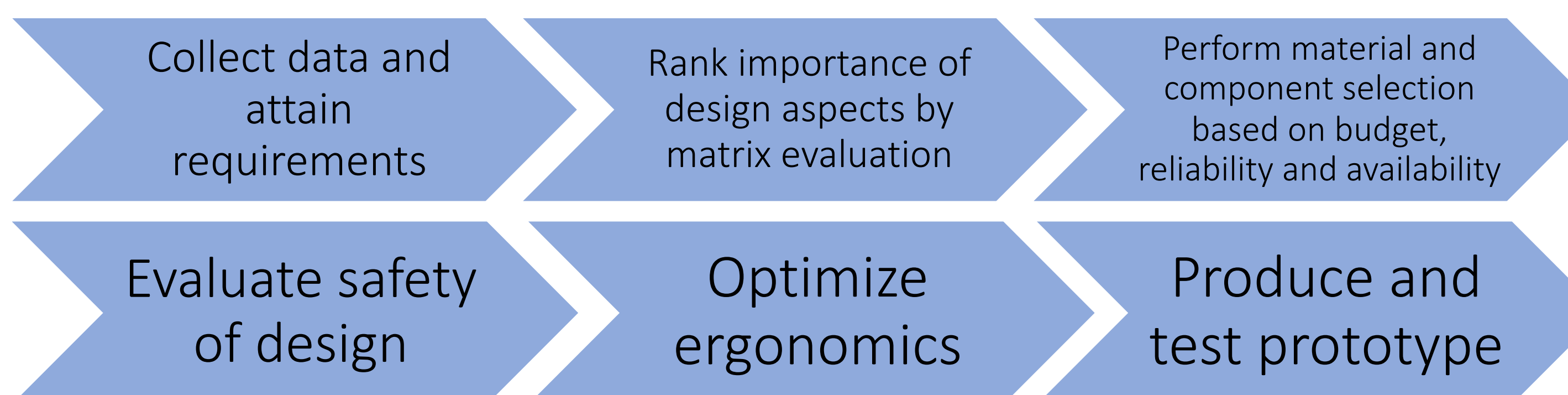
How to Use

- Place bottom mold on base-plate away from pressing mechanism in working area
- Pour Bath bomb mixture over bottom mold and spread evenly until flush with surface
- Slide bottom mold against back support and between side supports, it should now be aligned with the top mold
- Press the down switch to compress the bath bombs, press the up switch to remove the top mold
- Remove the bottom mold and place on-top the extraction tray and slide the bath bombs onto the curing tray

Design Features

- Capable of Pressing 20 Bath Bombs at once
- Does not require measurement of mixture for individual bath bomb weights, as the user simply spreads the mixture evenly over the bottom mold prior to pressing
- Two linear actuators provide a combined 1200 lbs of pressing force, controlled by up-down switch
- Steel brackets and top-plate distribute force evenly
- 45° bevel on the bottom mold and supports to ensure alignment
- Utilizes aluminum tubing for the molds and eco- friendly paint for the frame for safe skincare practices
- Includes emergency stop button and protective guarding to meet CSA and NS code

Design Process Used



Key Requirements

- The mass of a single bath bomb shall be $113.5 \text{ g} \pm 3 \text{ g}$
- The bath bombs shall not exceed a maximum of 50.8 mm by 50.8 mm with a height of 45 mm after the product has dried
- At no point during operation shall the noise exceed 80 decibels
- The bath bomb press shall be able to fit through a standard door.
- Operation of the mechanism shall not require the operator to exert a force greater than 5 lbs during the pressing portion of bath bomb production

References

- Duckish. (n.d.). Citrus Bath Bomb. Retrieved March 23, 2019, from <https://www.duckish.ca/collections/bath-salts/products/citrus-bath-bombs>
- Carolyn Crewe, Duckish, Interview. September 26, 2018
- Scott Flemming, Dalhousie University A simple time breakdown of Duckish's bath bomb process [Data file]. Retrieved September 26, 2018 from Carolyn Crewe.