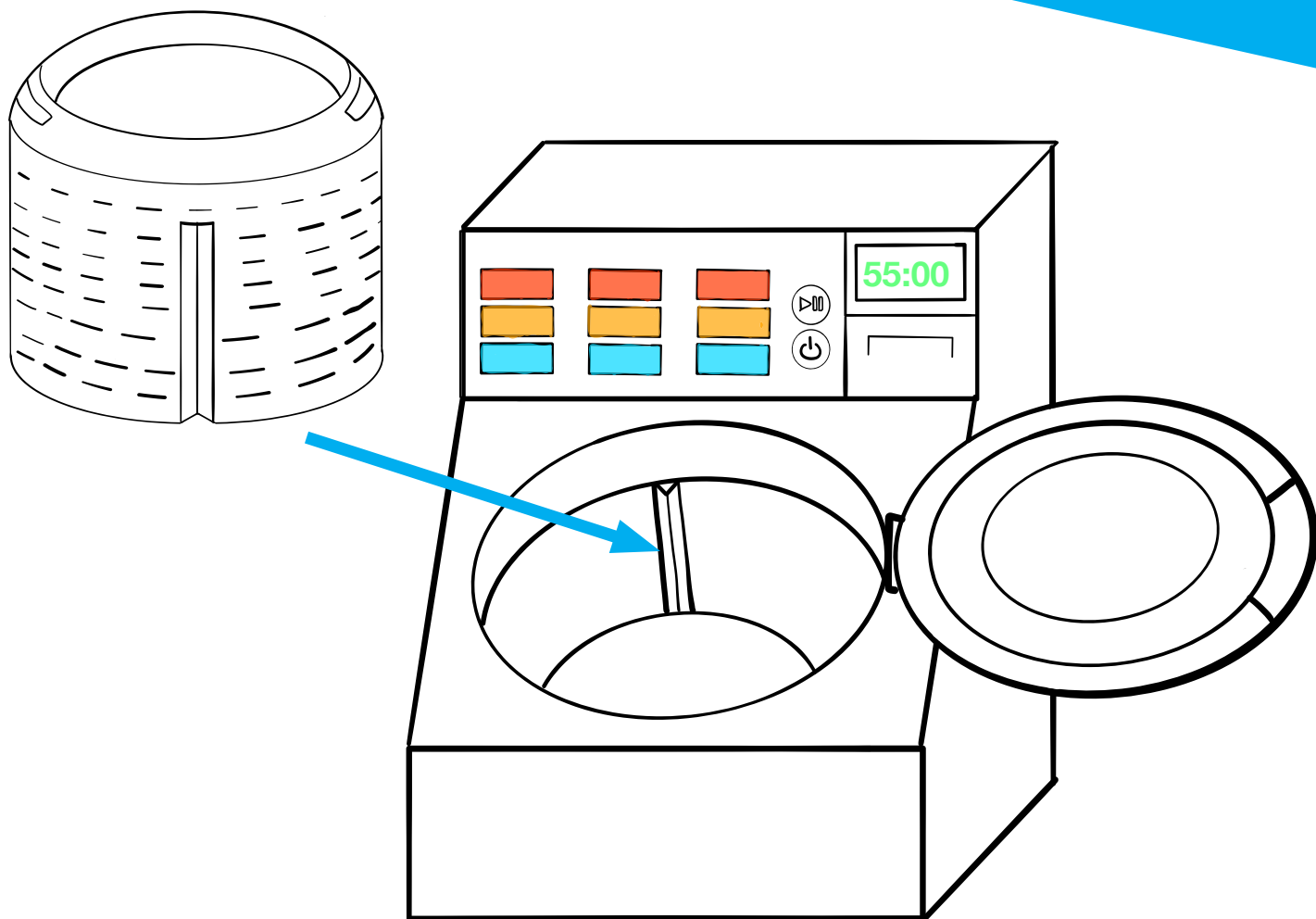
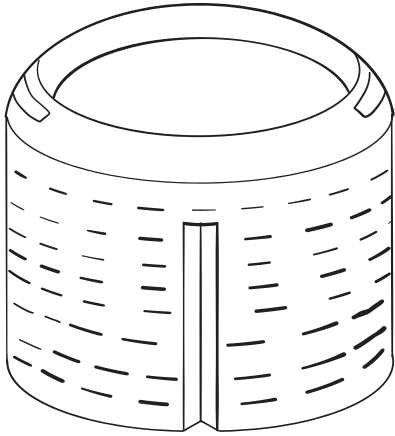


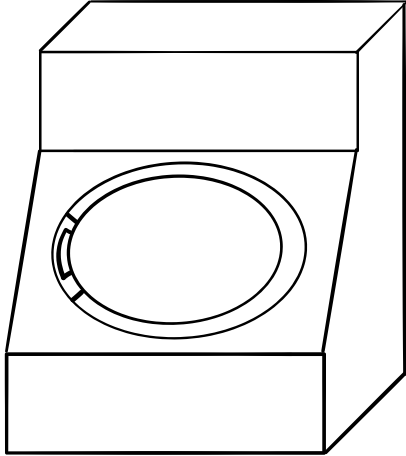
WASHER & DRYER WITH HAMPER DRUM



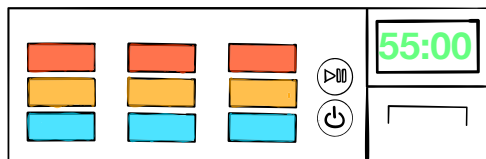
FINAL CONCEPT: COMPONENTS



1. HAMPER DRUM

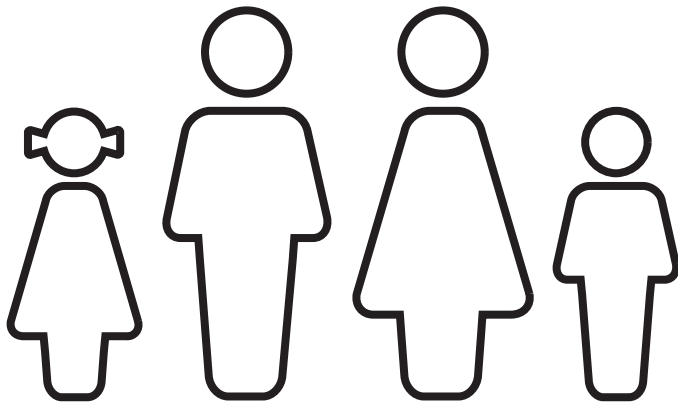


2. MACHINE



3. USER INTERFACE

PERSONA: HOUSEHOLD FAMILY



GENERAL ATTRIBUTES

- Busy 4-person family in a two-story house
- Each person manages their own laundry
- Each person washes their clothes about once a week
- Have a very range of wide range of clothing between the members (colors, delicates, hang-dry only, etc.)
- Rooms are upstairs in house and Laundry room is downstairs.

Before/After Hamper Drum Machines

SCENARIO

1. Mom decides to do a load of laundry
2. She must separate out her laundry (darks, whites, colors, delicates, etc.)
3. She moves the load of clothes into a laundry basket and brings it down to the laundry room
4. She loads the washing machine with clothes from the basket little by little
5. She sets the machine's settings, inserts detergent, and lets it wash
6. She takes out her clothes little by little and transfers them to the dryer
7. After the clothes are dry, she takes them out and puts them in the laundry basket one by one
8. She then brings the laundry basket upstairs and is done.

SCENARIO (REVISED)

1. Mom decides to do a load of laundry
2. She has her dirty laundry (darks, whites, colors, delicates, etc.) separated into different Hamper Drums organized by color
3. She brings one of the Hamper Drum down to the laundry room
4. She inserts the basket into the machine
5. She sets the machine's settings, inserts detergent, and lets it wash
6. She takes out the basket and transfers it to the Dryer
7. After the clothes are dry, she brings the Hamper Drum upstairs and then is done with the process.

1. HAMPER DRUM: IDEATION



Takeaways from User Research:

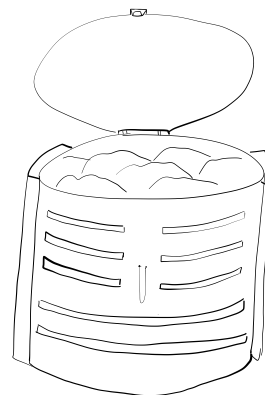
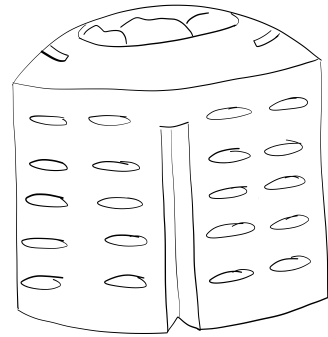
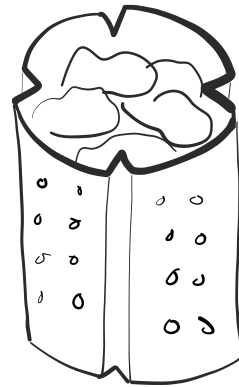
- Users may separate laundry into different loads according to type (darks, lights, colors, delicates, etc)
- Users may take out items of clothing for hang drying
- Users do not like to load/unload clothes from the washer/dryer
- Users transport their clothes to and from the washing machine in their hamper

I wanted to design around the friction of the laundry process.

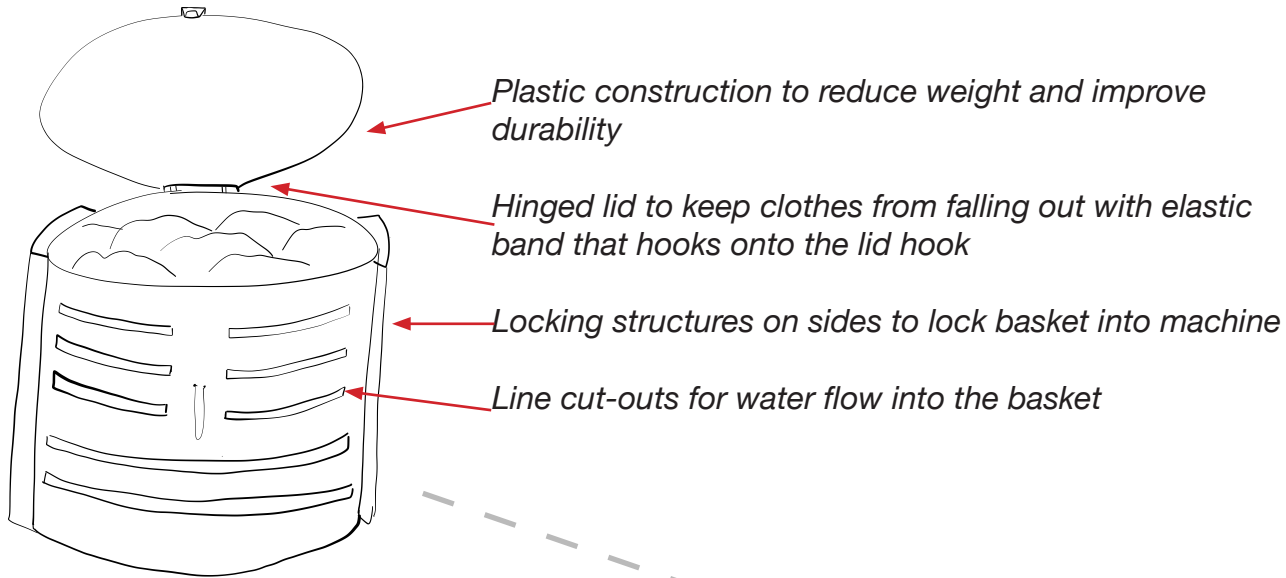
One of these many frictions is loading clothes in and out of baskets, machines, etc. So, one of the framing themes for designing the machine was the question:

“How might we design a laundry process that reduces the amount of steps we take?”

Moving clothes during the process is a large timesink, so I wanted to design around moving less items during the process. Could we somehow combine the object that holds our dirty clothes with the object that holds them while they are being cleaned?



1. HAMPER DRUM: REFINEMENT

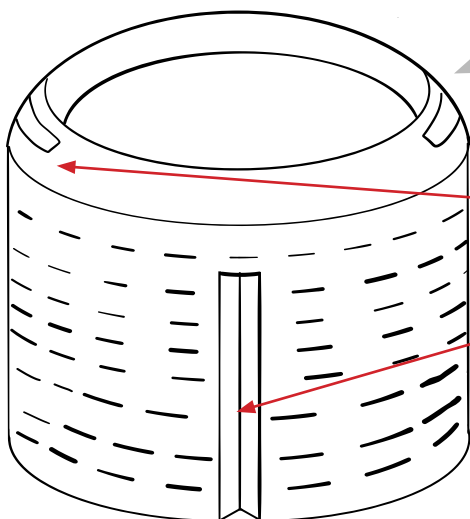
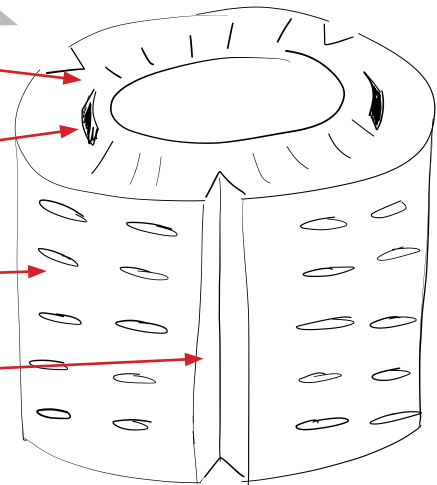


Replaces lid with thick rim on the top to prevent clothes from easily falling out. This reduces the moving parts. Also, it makes it easier to remove clothes to hang dry in between cycles.

Adds handles on top surface

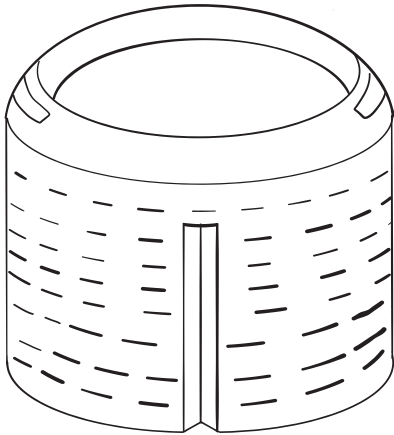
Smaller cutouts for stability

Replaces outward locking structures with inward locking divots, also replicating form/function of



1. HAMPER DRUM

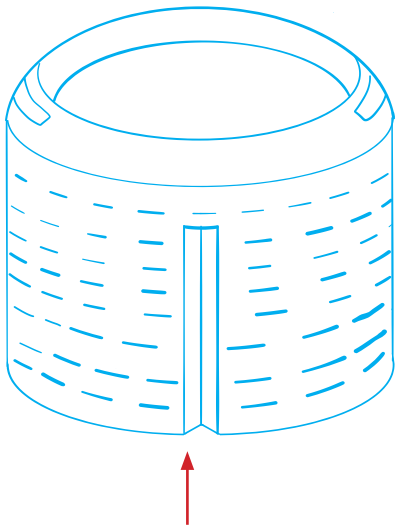
FINAL CONCEPT



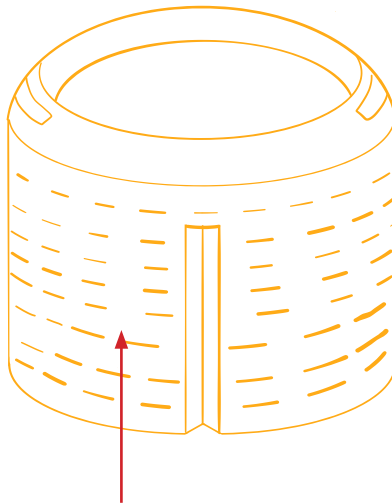
GENERAL PROPERTIES

- Modular washing machines drums
- Used as a hamper substitute
- Made out of heat-resistant plastic for weight and durability

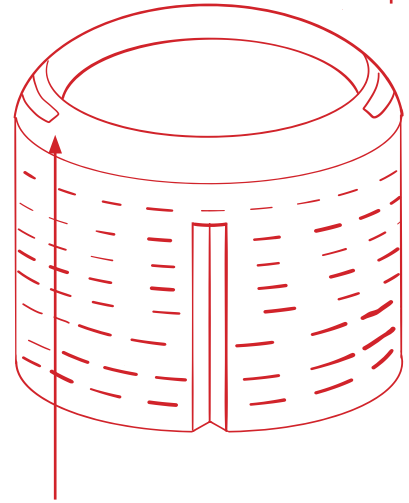
Multiple color-coded baskets as hampers to separate out different types of laundry



Three locking indents to lock into the machine



Slits for water flow around the basket itself



Handles at the upper rim of the machine

2. MACHINE: IDEATION

There are two conventional types of washer/dryer machines today:

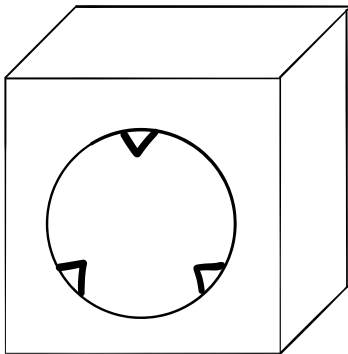
1. Front-Loading



2. Top-Loading

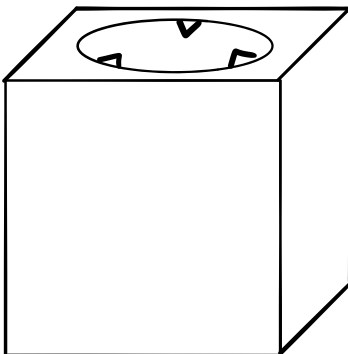


The core of the machine design relies on its form and ability to swap out the modular washer drum. However, as I conceptualized the machine, I found that the conventional forms were not optimal for this function.



Front-Loading Problems

The Front-Loading machine design highlighted problems when inserting the basket horizontally. For instance, there was a higher risk of clothing falling out of the machine. Also, there was more user friction in having to angle the basket horizontally and align the locking structures.

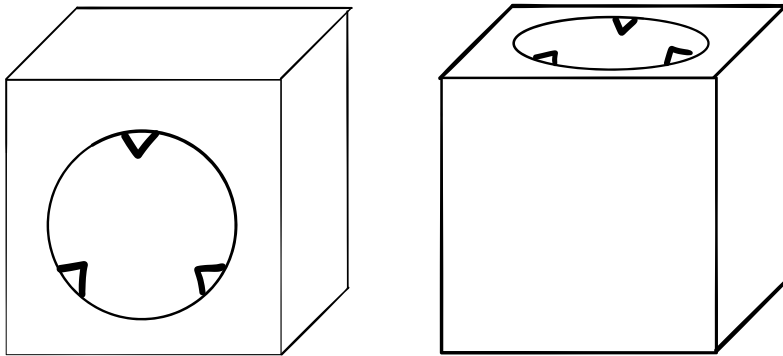


Top-Loading Problems

With the Top-Loading machine, there was a barrier in having to lift the Hamper Drum over the machine with all its weight. It would ultimately be difficult to lift the weight of the entire basket over the machine and then pull it out after the cycle is done. The angle is not optimal.

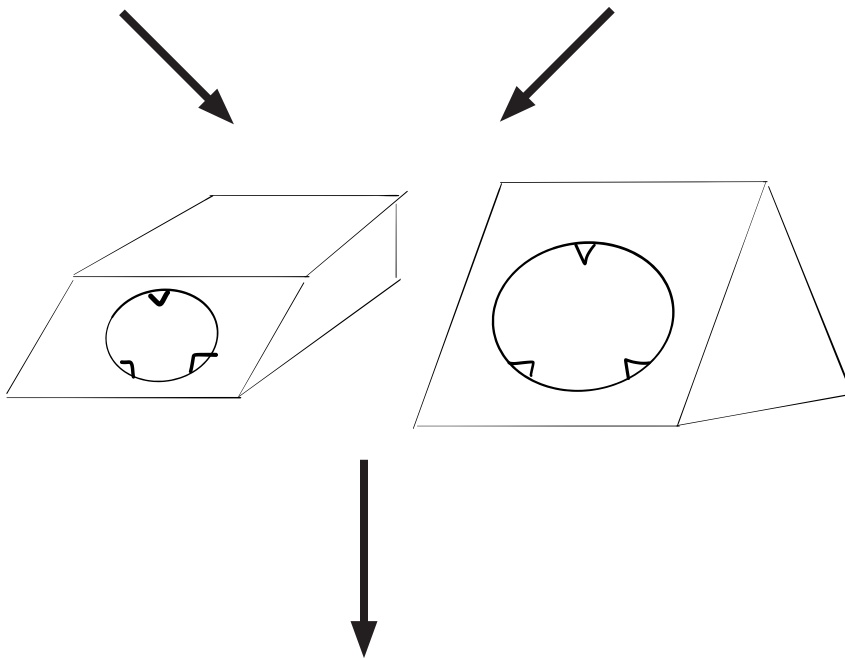
2. MACHINE: REFINEMENT

Is there a middle ground between Front-Loading and Top-Loading?



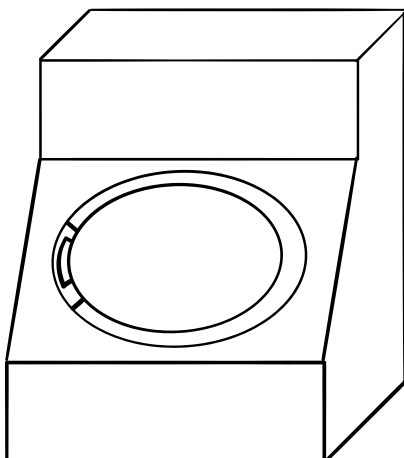
First Iterations:

The first concepts I worked with were horizontal/vertical loading with locking mechanisms for the interchangeable drum. However, for reasons highlighted above, this design was not optimal for the function.



Second Iterations:

I then worked with an in-between loading angle which would then lessen the disadvantages of each of the first iterations.

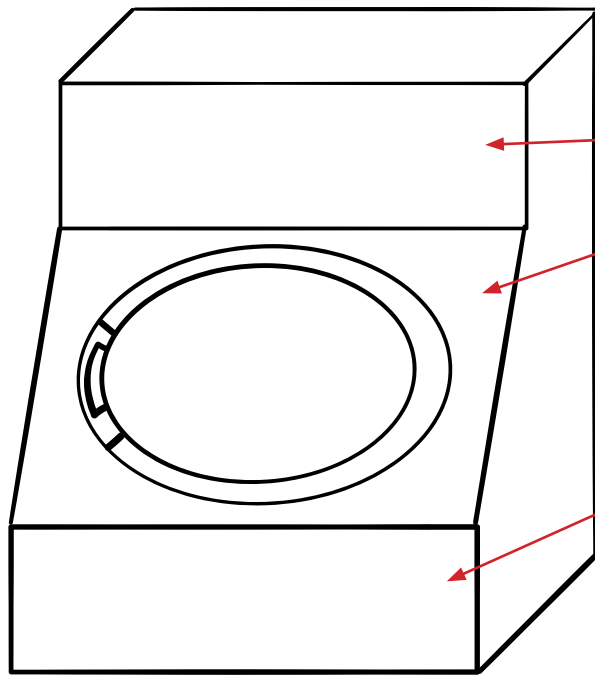


Final Design:

The final design then refines the shape discovered by the second iteration. It refines the ambitious angled shape to represent that of a more traditional washing machine shape.

A water-sealed door was added as I finalized the shape of the Hamper Drum. I decided that the machine would need the door to prevent clothes and water from spilling out and to be able to function without the hamper drum.

2. MACHINE: FINAL CONCEPT

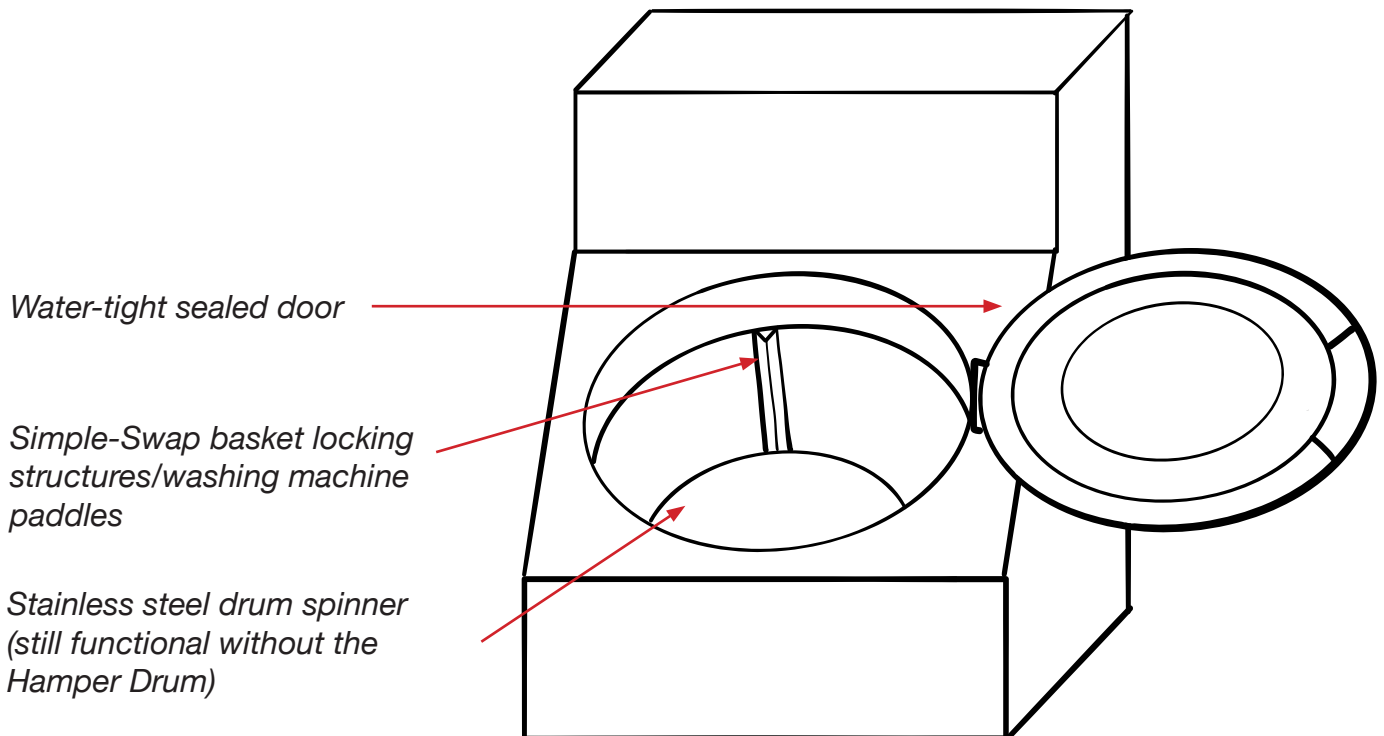


Headboard for control space

45° angle drum loader for easy loading and unloading of the Hamper Drum

Conventional washing machine form for intuition of use

Raised to more ergonomic height and for vertical height of drum



Water-tight sealed door

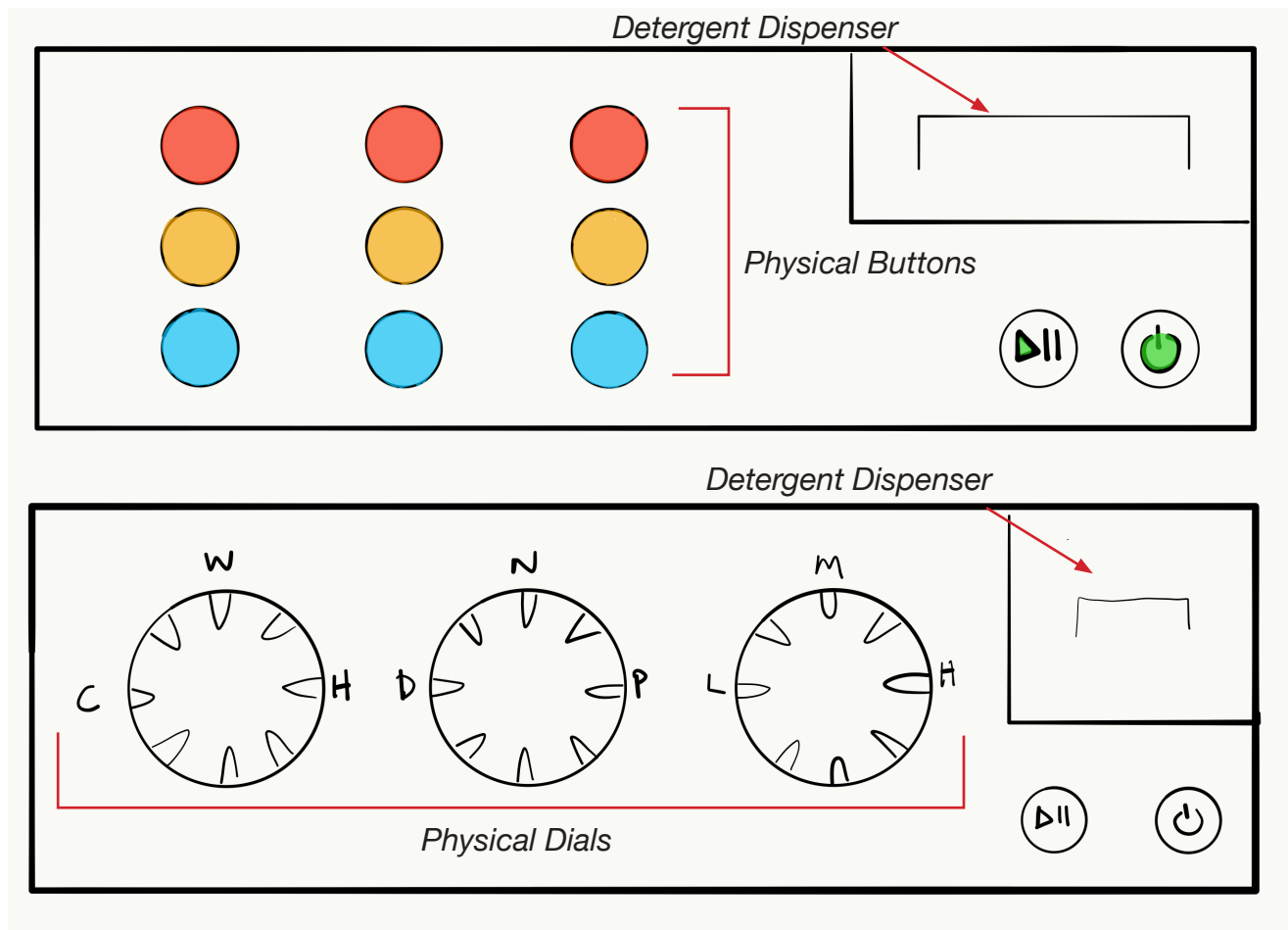
Simple-Swap basket locking structures/washing machine paddles

Stainless steel drum spinner (still functional without the Hamper Drum)

3. USER INTERFACE: IDEATION

USER RESEARCH TAKEAWAYS:

Users prefer physical controls over digital controls. From the users I interviewed, there was a consensus that physical buttons and knobs convey a better sense of reliability to the washer/dryer.



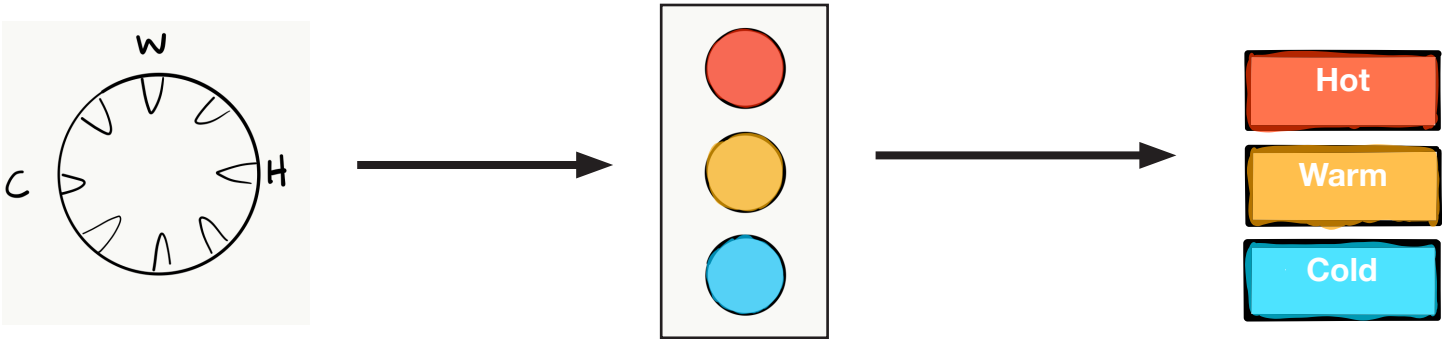
CONCEPTUALIZATION:

I thus tried to design around having a user interface that consisted of simple, intuitive hardware controls.

The decided to include the controls for the settings I found most common across all washing machines:

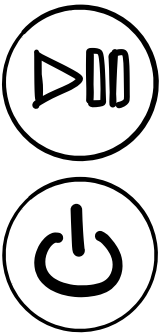
1. Temperature (cold, medium, hot)
2. Intensity of the Cycle (Delicates, Normal, Perm Press)
3. Soil level of the clothes (light, medium, heavy).

3. USER INTERFACE: REFINEMENT



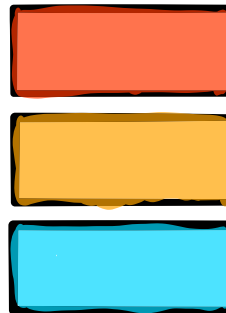
BUTTONS:

I chose to use the button layout for the interface because I found it to be the most efficient for selecting the number of options available. The knobs do not make sense for just three options. In this way, the interface is kept quick and simple with direct input and buttons.



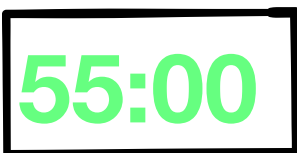
START/STOP & POWER:

In addition to the Temperature, Cycle, and Soil settings, I also included two simple buttons for powering on the machines and pausing the cycles. Two symbolic buttons achieved this simply.



COLORS:

I chose these colors to communicate the intensity of each option. Blue communicates calm and gentle, orange communicates medium intensity, and red communicates the most intense settings.



TIMER DISPLAY:

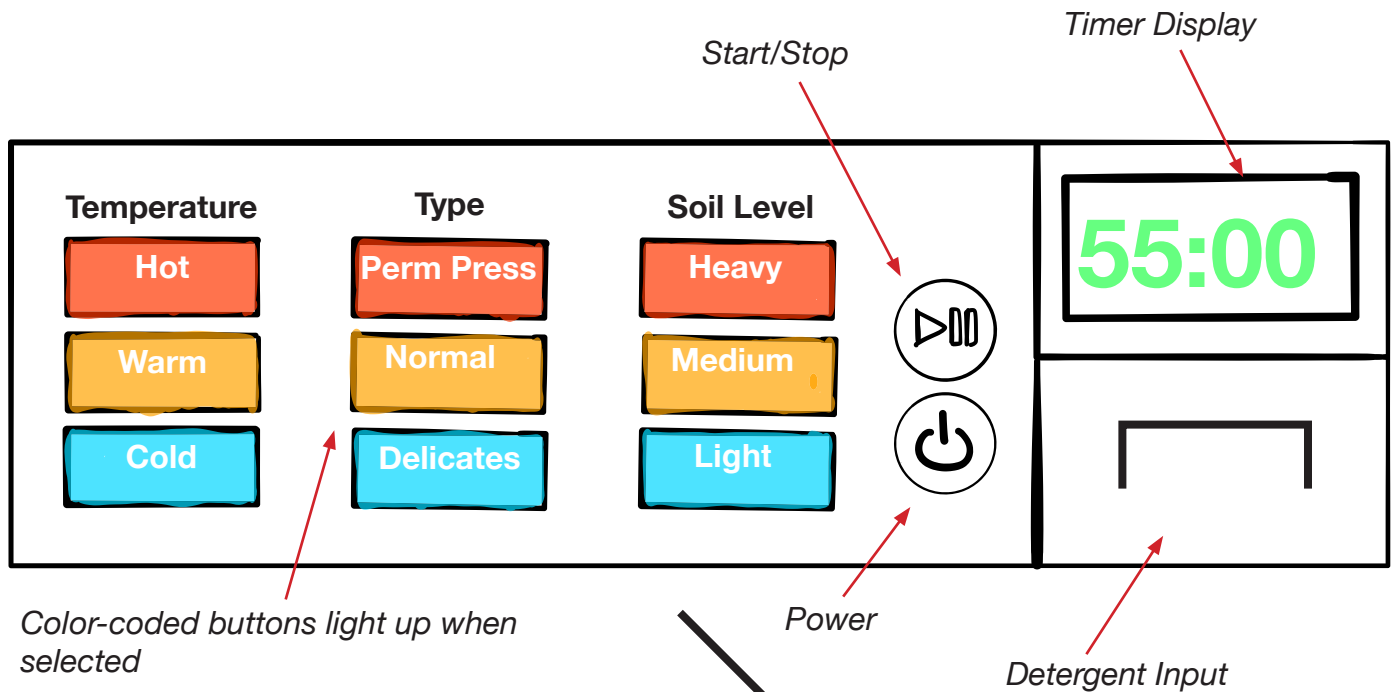
The timer display functions simply to show the time left in the cycle when using the machine. The numbers are colored green to highlight the display.



DETERGENT INPUT:

The detergent dispenser functions as a simple pullout rectangular tray that is in similar shape to those in home washing machines today.

3. USER INTERFACE: FINAL CONCEPT



OPERATION:

1. The user would press the power button to turn on the machine
2. The user would select one option from each category, denoted by the lighting up of the button selected in each column. (The timer prediction updates as different options are selected)
3. The user would then open the detergent slide-out to pour in the detergent
4. To then start the washing cycle, the user would then press the start/stop button.

