



1.4 Target Summary

Function Metrics

- Underlined functions and needs are critical targets/metrics

Function	Metric	Target
<u>Regulate Flow</u>	Can start and stop flow on demand	0.5 second start/stop button reaction time
<u>Mix Fluids</u>	Dispense different colored fluids and observe the solution	Dispense red and blue to get purple
Stabilize the Flow	Maintain a laminar flow	Have a Reynolds number less than 2300
Secure the Bottles	Load bottle into machine	4 - 750 mL bottles
Hold Mixers	Ability to have multiple mixers	Having 2 containers with 1 Liter of storage capacity
<u>Withstand Handling</u>	Machine works after transportation	Machine will travel in a vehicle 1 mile and then be tested again upon arrival
Display Machine Information/ Status	User interface displays what liquid is in each slot, or if the slot is empty	Displays if slot is empty or filled with a particular liquid
Check Initial Conditions	Machine verifies what liquid is in each slot	Machine will have drinks with selected liquids programmed into the menu.
<u>Convert Order to Mechanical Process</u>	Amount of time the machine takes to start dispensing from when the user inputs the order	1 second
Store Menu	Ability to save specific mix drinks	at least 20 drinks



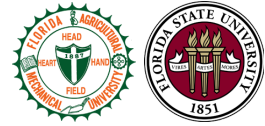
Options		
Need	Metric	Target
<u>Compact Size</u>	Ability to fit on a countertop while clearing the cabinets hung on the wall	12" x 18" x 16"
Universal Bottle Fitting	Ability to hold different bottles depending on the brand	Able to hold the 12 most popular brands of liquor in the U.S.
<u>Operation Time</u>	Amount of time it will take to make a drink	Drink will be made within 20 seconds or less

Table 2: Target and Metrics

Method of Validation & Critical Targets and Metrics

The critical metrics have been determined to be regulating the start/stop of the fluid flow, mix different colored fluids, withstand handling of transportation, machine is able to take input from a user and dispense fluids, be able to fit on a kitchen counter, and make a drink in a timely manner. These metrics were defined as critical because if a consumer is purchasing this novelty item for their kitchen counter it needs to be worth the investment. The machine should be able to make a drink in a time comparable to a human making a drink, while also performing the same minor tasks such as mixing the fluids. All the while the machine also needs to be transportable from one location to another.

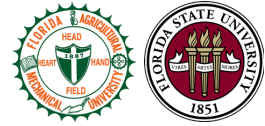
The critical targets have been determined to be the target corresponding to each chosen critical metric. These being: the reaction time of the start/stop button. This will be tested by doing multiple trials of starting/stopping the flow of the liquid until it is at the desired time of 0.5 seconds. The test of mixing fluids will be by dispensing two different colored fluids and



observing the solution , for example if red and blue were dispensed the desired color would be purple. To test if the machine can withstand handling it will be transported from one location to another via a vehicle, if the machine still functions properly then it is a success. The test if a user is able to input an order and the machine dispenses the fluid will be tested by having the user input an order and record the time it takes for the machine to begin the mechanical process. The target time for this measurement is 1 second. The test to see if the device will fit on a kitchen countertop will be placing the object on a countertop and see if it fits. Alternatively measurements of the machine could be taken and compared to the space available on the countertop. The ideal size of the device of the machine is 12” x 18” x 16” so it can fit under cabinets. Lastly the machine will be tested for the overall time it takes to make a drink. This will be tested by recording the amount of time it takes the machine to process and fully dispense an order from when they click start and the cup is full. The chosen target time is 15 seconds.

Derivation of Targets/Metrics

The team talked and researched online what they required targets and metrics should be. The team researched key performance indicators (KPI) for coffee machines and other beverage dispensers. Additionally, the team spoke with Dr.McConomy regarding some of the targets the machine should be able to do. From here we compared these targets and metrics to the particular functions of the device. The most important functions of the machine correlated to the critical targets and metrics that were discussed previously.



Discussion of Measurement

To validate the design of the machine we will need people to test the machine and give feedback. All the tests will have to be done at least 5 times, fluid dynamics are unpredictable in this complex of a situation. Additionally, we will need a scale to weigh liquids, the machine, and other components. We will need bacteria test strips or lab equipment to measure bacteria and mold growth within the machine itself. We will need a hot plate to see if foreign substances are being put into the beverage as it is being dispensed. The hot plate will be used to evaporate the liquid dispensed to see what solids form. The 12 most popular brands of liquor will be determined by the total number of bottles purchased. This data will have to be researched to find out exactly what bottles have to be able to fit into our machine. A stopwatch or other device to record time will be needed for multiple tests. Several of the tests do not have a particular form of measurement other than trial and error until a particular target is met, ultimately if we were able to meet the target then the metric was satisfied.