



Cultivated Cocktails



School of Engineering + Technology

Problem Statement

Cultivated cocktails is an alcohol distillery in Asheville NC, who specializes in the production and distribution of a variety of liquor and liqueurs. The current manufacturing methods in place require significant manual labor to assemble their final product. The aim of this project is to automate their bottling process in order to decrease necessary manual labor.

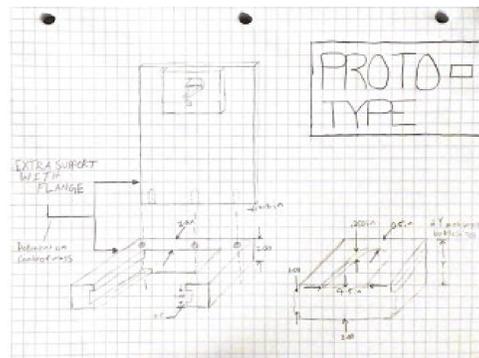
Requirements

The requirements of this project are based on creating a mechanical and electrical framework for a complex system based around an indexing table. Necessary Objectives include:

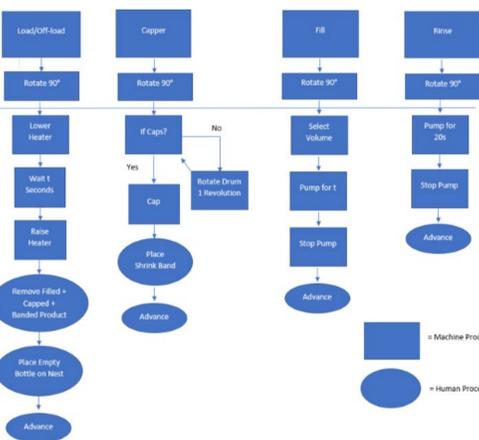
- Creation of system logic through programmable logic controllers (PLC's)
- Integration of a touch screen human machine interface (HMI)
- Bottle holding method allowing for multiple bottle types

Concepts

Shown below is the initial design for a bottle holding concept and a concept flow map



Initial mechanical design for the bottle holding system. It shows necessary design parameters and the bottle neck holding location as well as a replaceable base for different sized bottles.

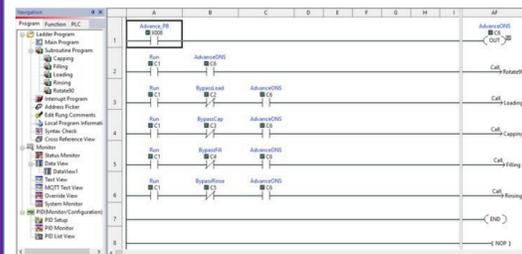


Initial Concept Flow Map used to govern the creation of the ladder logic in the final design. This is the general outline of processes that need to happen for the system to work as a whole

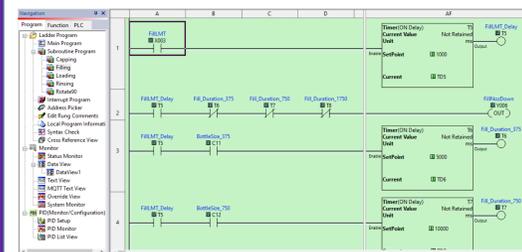
Electrical Design

Programmable Logic Controllers and Ladder Logic

All the logic within this system is driven through programmable logic controllers (PLC's). Ladder logic was developed to maintain an orderly operation. Shown below is the final design of the ladder logic used.



(Main Control Logic Program)



(Filling Routine Subsystem logic)

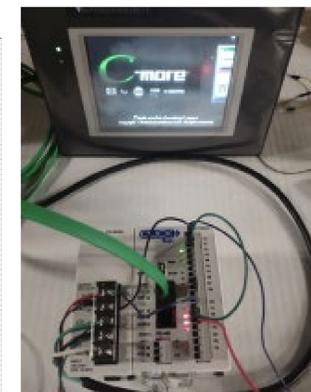
The Ladder logic consists of two main parts, the main control and each subroutine. The main is responsible for the logic of initiating every major subsystem according to given conditions. The subroutine is responsible for each subsystem's objectives.

Human Machine Interface (HMI)

The human machine interface is what an operator will encounter when operating this system. The display will allow users to bypass subsystems, display current bottle sizes, as well as keeping count of the number of bottles that have passed through

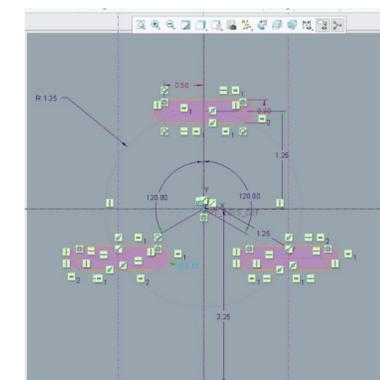


(Human Machine Interface wiring and Output display)



Mechanical Design

Mechanical Design in this project focuses on design for the bottle holding system. Shown below is the computer aided design (CAD) models and fabrication for the final design.



Incorporating changing bottle sizes was done through a shelf system where each bottle will sit on a shelf in order to raise the neck to the clamp. Shown below is the 3D printed shelf system.



Summary

In summary, we have met the goals outlined in the requirements section. Future work can be built from our logic framework, consisting of implementing and mounting each subsystem onto the indexing table.

Team & Acknowledgements

Team Members:
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