INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	*Cloister Honey*	**Date Submitted**	*02/02/2022*
Project Title	*Automating Volumetric Bench Top Piston Filler Operation* **(CLOISTER_FILLER)**	**Planned Starting Semester**	*Fall 2022*

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical	3	Electrical	1
Computer	1	Systems	

Company and Project Overview:

Cloister Honey is an apiary and honey production company selling hand-poured honey products nationally. We started keeping bees as a hobby in 2007 and turned it into a viable cottage-based business in 2010. The business has grown at a rate of approximately 30% per year. From its Charlotte base, which is 7 miles from the UNC Charlotte campus, Cloister supplies honey products nationally to retailers like Williams-Sonoma, Bloomingdales, Saks Fifth Avenue, Dean and Deluca and many more.

Cloister produces a variety of products a few examples are shown below:

Honey Trios

Brandy Infused Honey

Whipped Honey with Lemon Ginger

The products are made in small batches. Most of the products are sold in jars that come in three different sizes as shown in the below picture:

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The objective of this project will be to automate a portion of the filling line for these 3 different jar sizes.

NCMEP North Carolina Manufacturing Extension Partnership	This project is partially supported by a grant from the NC Manufacturing Extension partnership, an organization the helps to support business and job growth for NC companies. To learn more about the NC MEP, click on this link: https://www.ncmep.org/.

Project Requirements:

Cloister's original pouring/filling process was simple pouring from a gravity-based filler. In 2016, we moved our filling process from gravity pour to a Volumetric Technologies **Bench Top Piston Filler / Depositor**. The pneumatic filler/depositor's filling process is activated manually via foot pedal, manually pressed to complete a cycle, and can also be set for "automated" or "timed " fill. The Volumetric machine is 100% pneumatic powered.

Bench Top Filler (https://volumetrictechnologies.com/piston-filler-depositor-machines-3/bench-top-piston-filler/)

BENCH TOP PISTON FILLER

Ideal for startup bakeries and smaller operations, Volumetric Technologies **Portable Bench Top Piston Filler** is small in size and easy to operate. With numerous dispensing nozzles and other options to choose from, this quality machine is perfect for many applications!

Currently, the bottles are labeled by a manually fed labeling machine, it is then manually placed on a conveyor to be dated coded. The dated coded jars then transfer to another conveyor which inputs the infusing ingredient (if it is an infused product). It is then placed by hand to the dispenser location. A manual foot pedal actuates the flow of honey into the jar using the bench top pneumatic machine shown above. It is then moved manually to the capping operation. The objective of this project will be to design and build an automation device to move the jars from the infusing conveyer to the filling station and then on to the capping operation. The system will do the following:

1. Transfer the jar automatically from the infusing conveyer to the filling conveyor

2. Filling conveyor transports jar to filling station
3. Based on jar size, filling station automatically calibrates to required fill volume, then dispenses that volume to the jar
4. Filled jar is then transporter to a filled jar corral to await the capping operation

The Bench Top Filler can support the 3 different size jars (8oz, 6oz and 2oz) we use. We anticipate filling over 360,000 jars this year (current projection 300K - 2oz; 30K - 6oz and 31K - 8oz.). Automation system must incorporate current conveyors used for date coding and infusion and the bench top filler pneumatic equipment. Team will design controls and mechanical conveyance systems that will automatically determine system settings based on the jar size input.

Expected Deliverables/Results:

- Accommodate all three jar sizes.
- System accepts Jar manually loaded to the date code conveyer after labeling.
- Automate filling of jars by our Volumetric filler, via a control system and conveyor belt
    - Regulate the release of a single jar at a time
    - Once jar is released, automatically stop conveyor with jar aligned beneath the deposit nozzle
    - Prompt Volumetric filler to run a deposit cycle
    - Once honey is deposited, move filled jar, via conveyor, to next step in process
- Repeat cycle
- Easy cleanup required – simple wipe down.
- Determine the conveyor equipment needed to integrate with the designed system and existing systems.
- Develop and integrate control systems for newly designed and added equipment and existing equipment being integrated together.
- System must be easy to use and require short training cycles
- Instruction guide manual for system settings and use with various sized jars, providing instructions for how to reprogram for future sizes and needs.

Disposition of Deliverables at the End of the Project:

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Team members must be able to travel to Cloister's Charlotte location to be able to work with current equipment and perform testing and verification integration.
- Team members will get sticky ☺