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**Automatic Wine Pouching Machine**

Engineering Specification Document

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| **UCCS MAE Senior Design Team** | **Evergood Sponsor and Faculty Advisors** |
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**Project Specification Intent**

Evergood Adventure Wines (“Customer”) is a craft winery located in Palmer Lake. The company makes wine from lemons and is distributed to over 250 locations throughout Colorado. Evergood was launched in 2018 and is reliant on volunteers to pouch their best-selling and seasonally sold wine, Heart Warmer. However, over 6,000 units are projected to be sold in 2022 and the current volunteer pouching system limits the supply of this product, limiting sales and company growth.

Evergood has requested UCCS MAE Senior Design to create an automated wine pouch filling machine to decrease reliance on volunteers and increase output of wine pouches. The machine will be run by a small staff team to increase production output and efficiency. Current solutions only offer semi-automatic filling, so the goal of this project is to automate this process as much as possible.

**Project Requirements**

* Safety
* Compliant with FDA and ATF regulations
* Portable and easily maneuverable
* Durable
* User-friendly
* Low maintenance
* Able to fill different sized pouches
* Provides automated pouching process:
  + Secure pouch into position for filling
  + Open pouch with puff of N2 gas
  + Fill pouch to certain volume / weight with wine
  + Seal pouch with lid
  + Offload pouch

**Parameters and Target Values**

* **Organize by requirement**

**Material/Regulatory Specifications**

* The prototype will be able to withstand being cleaned using hot water (how hot will it require, standard tap temp?)and cleaner (type)
  + Prototype shall be waterproof below a determined height and water resistant above. (quantify)
* The prototype shall be able to withstand PBW (what is this?) or a similar cleaner used for sections that may come in contact with wine spillage
* The prototype shall be able to use both 750mL and 1.5L Astrapouch pouches
* The prototype shall have an Emergency off-switch

**Personnel Specifications**

* The prototype shall require only 1 user to operate
* The entire operation will require only 2 users for depalletization, labelling, loading, operation, and palletization

**Calibration Specifications**

* The user will be able to set the machine settings to match the pouch size
* The user will be able to manually calibrate the flow rate (to how precise – i.e. what is the tolerance?)(Maybe email Dr. George this doesn't seem like a feature we can use a tolerance with)
* The user will be able to calibrate the filling speed/flow rate to maximize efficiency – unclear what is meant by this. How will you measure max efficiency?

**Usage Specifications**

* \*Potentially take cap off of pouch?
* The machine will detect when a pouch is loaded and begin the filling process
* The machine will confirm a lid is attached before offloading the pouch
* The prototype will automatically open the pouch with N2 gas
  + A puff of gas will be released for a certain time duration to ensure full opening - quantify
  + Close to 3 psi or adjustable valve
* The prototype will fill within a percentage error of the target amount (from values below)
  + 750mL
    - Acceptable range: 2% or 735mL – 765mL
  + 1.5L
    - Acceptable range: 1.5% or 1.4775L – 1.5225L
* The prototype will have less than 1% spillage (no spillage is ideal) – how will you measure this?

**Additional Features – (user stories that are not required but can be added if time/materials allow)**

* The prototype shall apply sticky a label to the pouch
* The user shall be able to load multiple pouches at once
* The prototype shall wash the outgoing pouches – wash implies a liquid solution – air dry would also be a possibility???
* The prototype shall produce more than 250 pouches every 1.5 hours
  + Maximize flowrate and machine efficiency to maximize output

**Materials and Cost Requirements:**

* Maximize efficiency with cost (vague)

**Use of Additional Equipment**

* Prototype allows for wine source to be on the ground (as opposed to in the air on a forklift) – prototype does not require wine to be above ground level
* Prototype can use existing facility equipment: pump/pressure regulator & tank of gaseous nitrogen.

**Project Sponsors**

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**UCCS Design Team Representatives**

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