

Pollution Prevention in Food Product Development Extrusion Lab

Grace Beck

Chemical Engineering, Montana State
University

MTP2 Advisor & Supervisor: Wan-Yuan Kuo

Lab Background

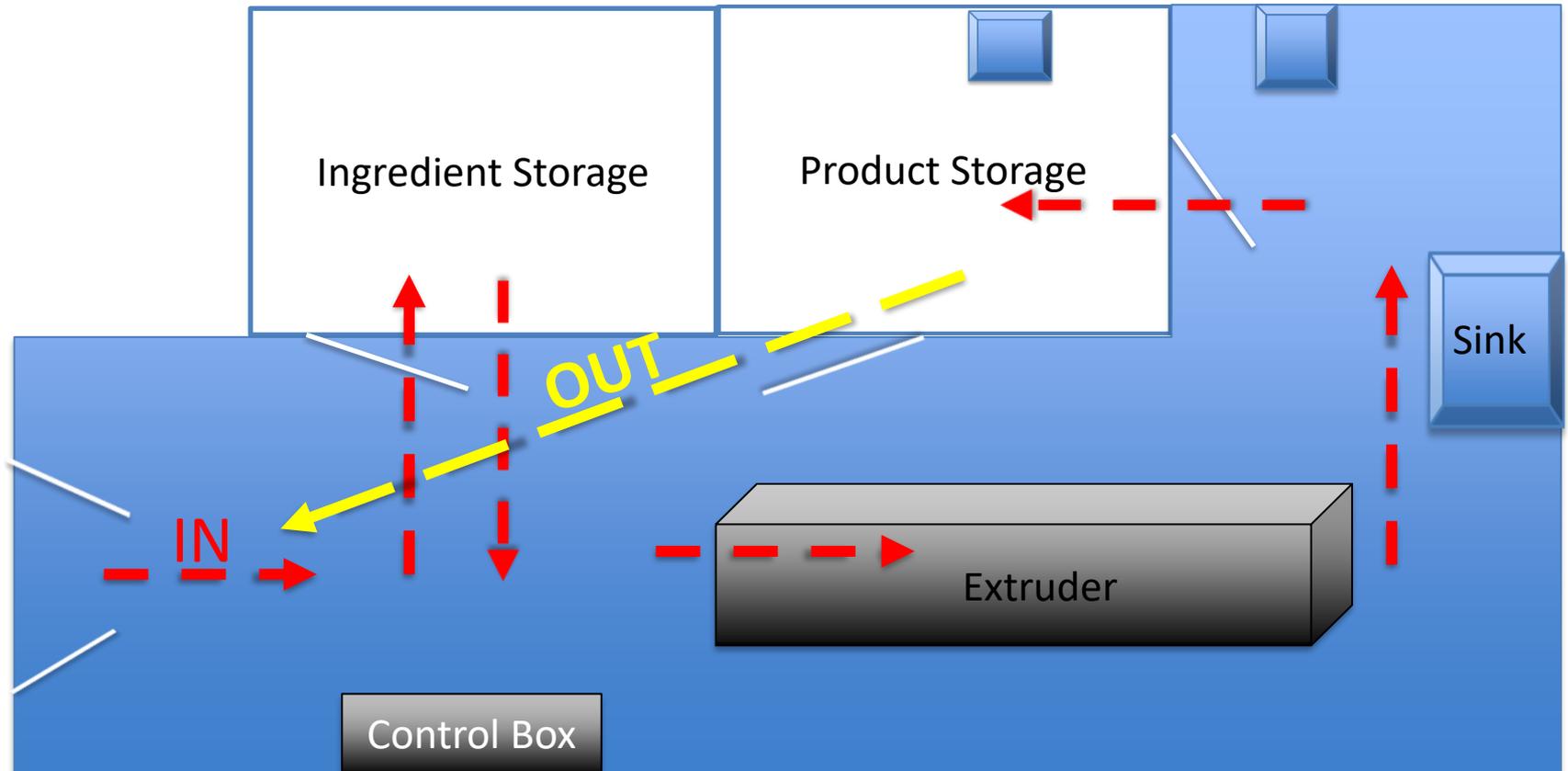
- Food Product Development Lab
- New extrusion lab
 - Pulse crop-based products



Project Overview

- Reason for approaching
 - To prepare to make our extrusion process as safe, efficient, and clean as possible in the future
- Goals
 1. Purpose areas in which we can decrease water and energy usage of extrusion process
 2. To establish framework to assess carbon footprint of each extruded product

Process Overview





Extrusion Process

Dry feed is fed through the top (brown bag) where it enters the barrel and is mixed in water by two screws. The screws push the material through the barrel as pressure and temperature increases until the material is pushed out of the die plate to expand and cool.

Finished Product



Twin Screws



Lab Layout



Approaches

Goal #1- Energy and Water

- Measure flow rates of all water sources
- Identify where water waste occurs
- Map out process flow and suggest alternative approaches
- Identify where energy wastes occur

Goal #2- Carbon Footprint

- Prepare CarbonScopes CleanMetrics system
- Identify all parameters needed to measure carbon footprint

Primary Recommendations

- Investigate energy usage
- Investigate cooling water waste
- Fix green hose
- Design a water efficient cleaning system
- Investigate start up method for extruder



Solutions

Recommendation	Approach
Fix green hose	Replace nozzle or hose
Investigate energy usage	Install electric meter
Investigate cooling water waste	Determine flow rates and times to find volume of water
Design a water efficient cleaning system	Test different cleaning procedures while measuring water usage. Identify the most effective and water efficient cleaning method
Investigate start up method for extruder	Create a timing system that minimizes the downtime before and after production
Investigate heat loss of barrel	Calculate a heat balance around the system
Design an efficient process flow	Test my purposed process flow

Links

eportfolio

[https://spark.adobe.com/page
/YEfuZvLVQSgLE/](https://spark.adobe.com/page/YEfuZvLVQSgLE/)

CarbonScope

[CleanMetrics LCA data input
s.xlsx](#)

Excel Sheet

[MTP2 Energy and Water.xlsx](#)

Personal Benefits

- I learned how to seek information from outside sources
- I incorporated concepts of my degree (CHEME) into preparing methods to evaluate the energy and water usage of the extrusion process

Acknowledgments

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Questions?