

Organic Farmers Growing  
in a Timeless Tradition



America's Only Gourmet Line  
of Heirloom Organic Lentils  
and Specialty Grains

LENTILS • CHICKPEAS • BARLEY

# MONTANA POLLUTION PREVENTION PROGRAM

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# EPA Pollution Prevention Program

- The MTP2 Program is dedicated to helping the state's small businesses, local governments and citizens use progressive, integrated pollution prevention (P2) strategies to increase productivity, while safeguarding our air, water, land and other natural resources by reducing pollution. MTP2 is funded by the U.S. Environmental Protection Agency.

**MTP2**



MONTANA POLLUTION PREVENTION PROGRAM

EMPOWERING BUSINESSES TO BE PART OF THE SOLUTION, NOT THE POLLUTION.



# Twin Brooks, SD Bozeman, MT



**2000-2021:** NorSwiss

Dairy, Inc

Summit, SD

**2020-2021:** Valley Queen

Cheese Milbank, SD

**2022:** B.S. Mechanical

Engineering Montana

State University

Bozeman, MT

**2022-present:** Montana

State University Food

Product Development

Lab



*Support research that develops demand for regenerative agriculture and crop diversification.*

# Focus Roadmap



## B-Corp

- Obtain access to past B-corp self-assessment
- Update assessment to current practices



## Packaging

- Practice J.I.T. on retail pack line
- Redesign retail labels for optional preprinted film
- Research solutions for bulk bagging
  - Reduce labor from 2 to 1 persons
  - Reduce physical demand of process



## Material Recycling

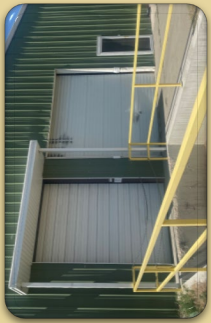
- Terracycle
  - Hair nets, beard nets, label backings, ear plugs



## Distribution

- Connect Timeless with Such Grp INTL
  - Save on freight costs
  - Reduce freight damage
  - Free up labor
  - Reduce inventory spoilage / pest infestation
- Study freight damage reports

# Focus Roadmap



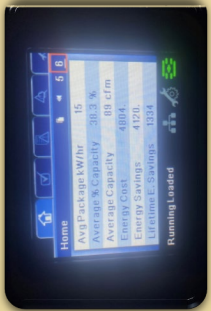
## Warehouse

- Perform psychometric analysis of building
- Investigate insulation, ventilation, and other passive heating/cooling options



## Color Sorter Room

- Research required temperature range for equipment
- Insulate room to prevent temperature swings
- Reprogram air conditioner



## Compressed Air

- Fix air leaks
- Create compressed air PM SOP
- Calculate energy savings before and after



## Lighting

- Install occupancy sensors on 3 light switches
- Replace 2 halogens with LEDs

# EXPANDING THE TIMELESS MISSION



- HOW?

- Pollution Prevention
- Community Engagement
- Education and mentorship

- B CORP CERTIFICATION

- Steps to achieve

1. Form B-Corp Team: Finance, HR, Operations
2. Review assessment
3. Implement “low-hanging fruit” practices
4. Retake assessment
5. Sustain practices – certification review every 3 years

- IMPACTS: Better serve the surrounding community, sustainable agriculture, Timeless Natural Food employees, and customers. Learn from global leaders in your industry. Increase visibility in the market.



Small Enterprise Guide

# LEAN MANUFACTURING 8 WASTES

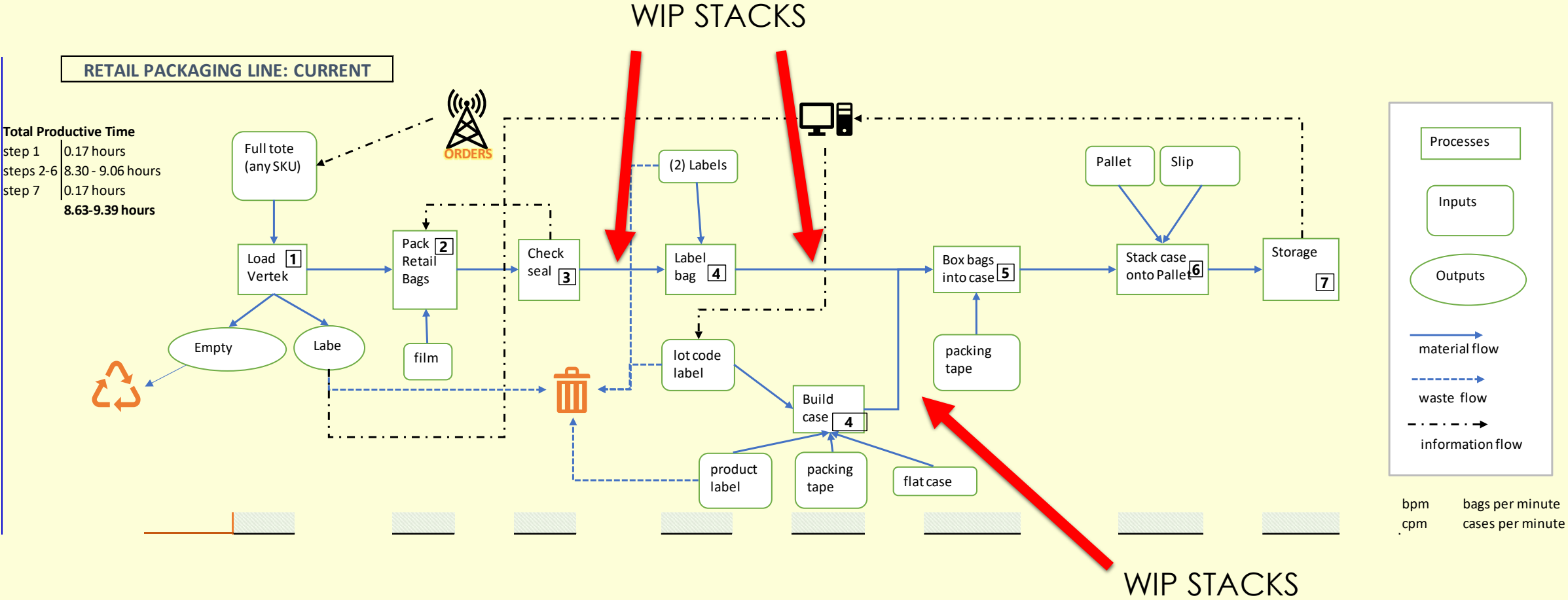
- **D**efects  
Weak process control, bad or unknown information
- **O**verproduction  
Making more earlier and faster than is required
- **W**aiting  
Unbalanced work, unplanned maintenance
- **N**on-utilized Talent  
Not using people's mental, creative, and physical abilities
- **T**ransportation  
Poor layout
- **I**nventory  
Poor forecasts, unbalanced workload
- **M**otion  
Non-standard work, poor layout, poor organization
- **E**xcessive Processing  
Doing more than required, just-in-case logic



# RETAIL PACKAGING



Current process is focused on completing one task at a time. This builds up inventory of WIP and additional time is spent handling unfinished product.



By running the vertek packer at 14-16 bpm, it takes at least a day to package a tote of product.

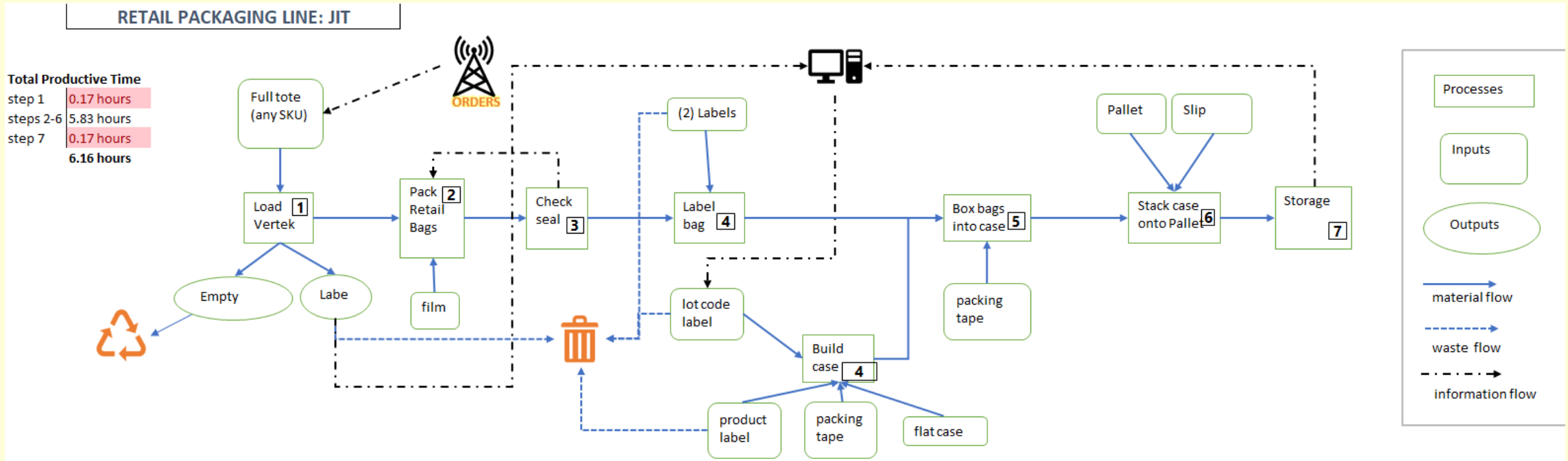


Just in time – receive goods as close as possible to when they are needed

Bags and cases should flow left to right

Information should flow right to left

Goal: once the step to the right is ready for the next bag/case, the step to the left should provide



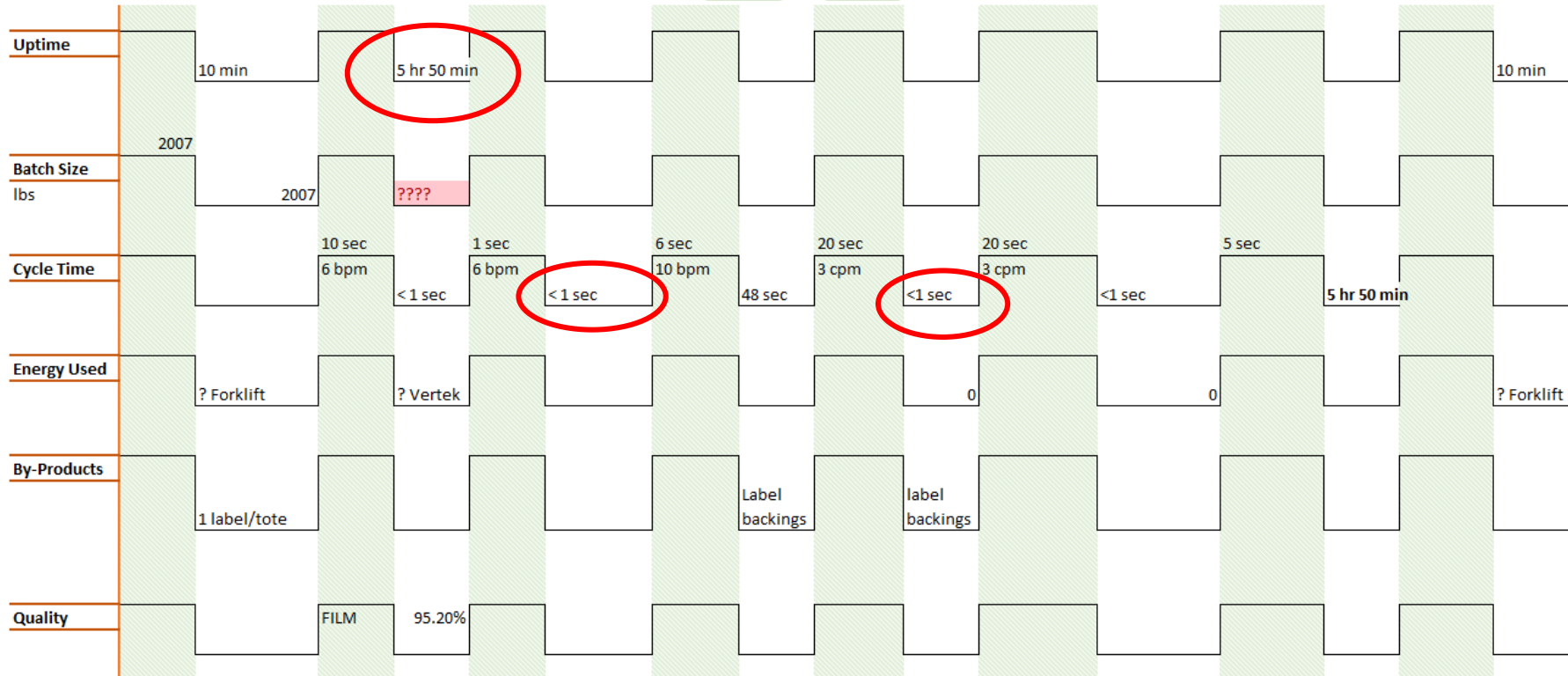
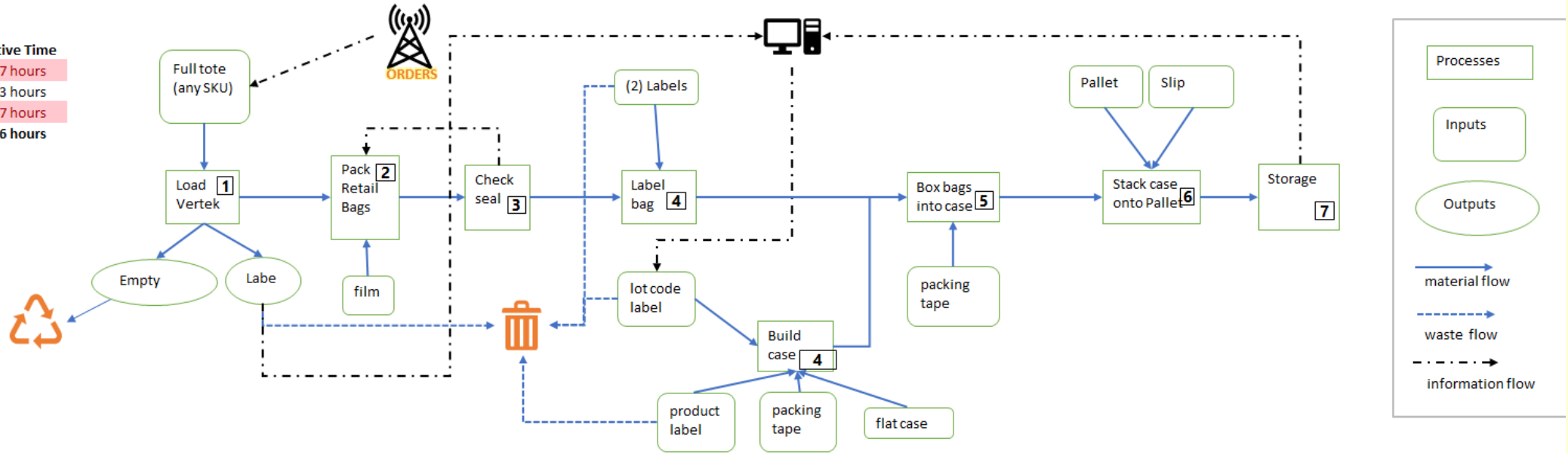
Slowing the Vertek packer to 6 bpm balances the flow of product such that single piece flow is achieved.

Even with reducing the speed of the Vertek, the time to package 1 tote is reduced by **3.23 hours** or 36%.

Does reducing the speed also increase the quality of seal on the package in turn reducing wasted film and product.

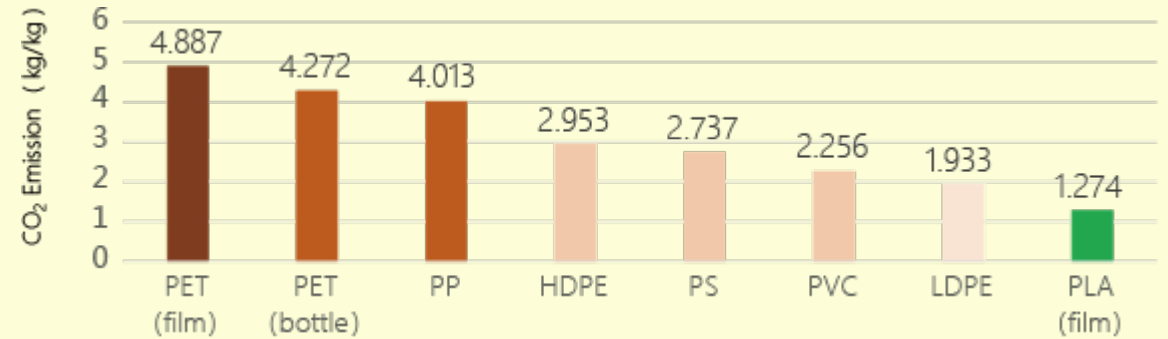
# RETAIL PACKAGING LINE: JIT

Total Productive Time  
 step 1 0.17 hours  
 steps 2-6 5.83 hours  
 step 7 0.17 hours  
 6.16 hours



# Preprinted Film

- Current PP film
  - PROS: universal
  - CONS: requires label application, prone to zippering, nonrecyclable
- Proposed preprinted LDPE
  - PROS: no label application, familiar to customers, lower CO2 emissions in production
  - CONS: nonrecyclable, more appropriate for flat stacking instead of vertical (doesn't stand up), product specific
- Proposed preprinted PET
  - PROS: no label application, good clarity, good tensile strength
  - CONS: product specific, higher CO2 emissions in production
- Proposed preprinted PLA
  - PROS: no label application, lower CO2 emissions in production, biodegradable
  - CONS: product specific, cost



# But preprinted film MOQs are too high

- Wide Web vs. Narrow Web
- Narrow Web allows for order to be split in SKU specific labels
- Cost = number of labels \* number of colors \* \$175 + film cost
- Lead time = 7-14 days
- 9 SKUS \* 3 colors \* \$175 = \$4,725
- But each product has a different density i.e. bag length
  - SKU specific bag design
  - Use bag design to your advantage

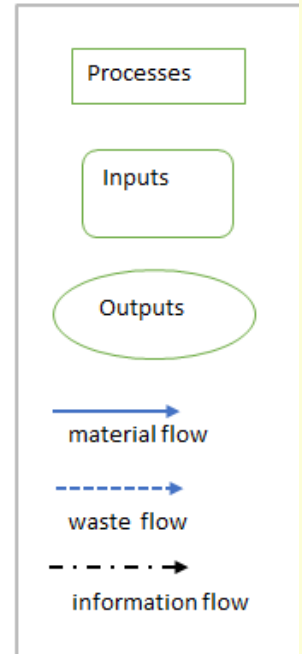
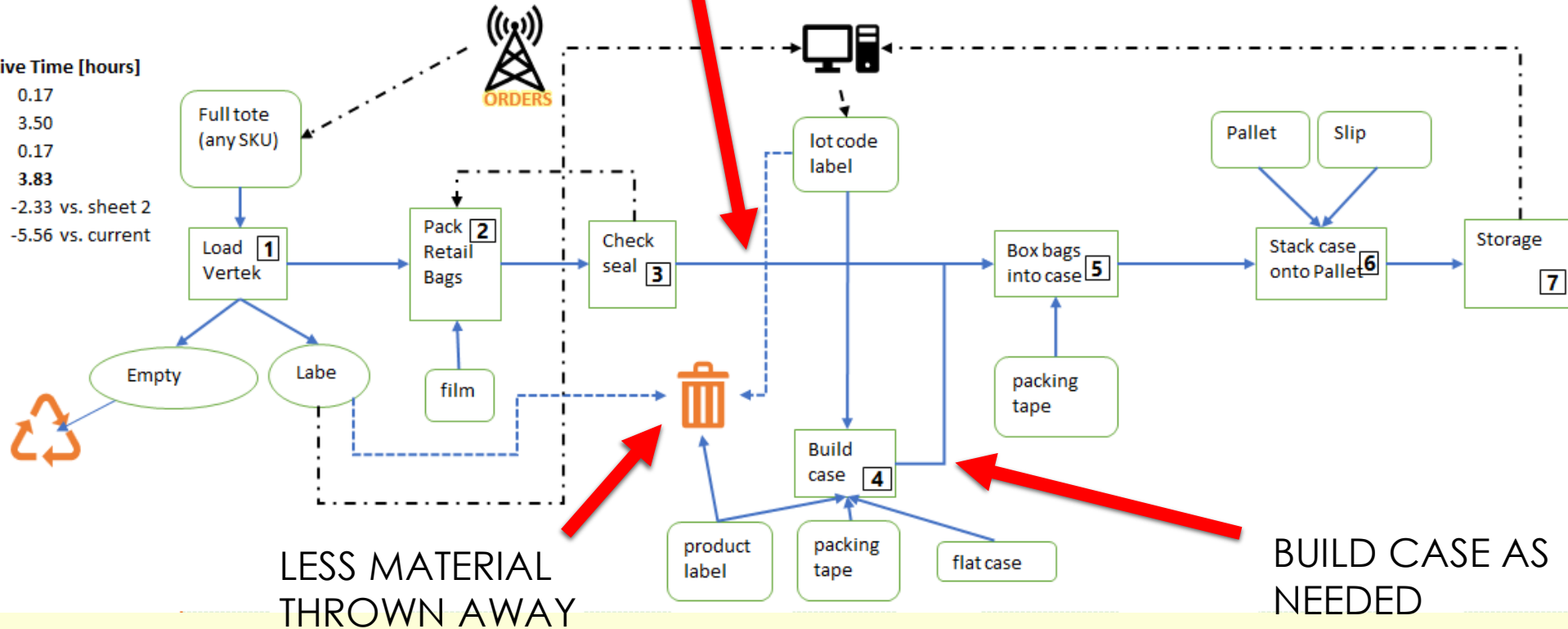
- By eliminating the need for label application, labor and supplies costs decrease

	PP film	labels	Preprint		cost of plates
quality	95.20%	99.00%			\$ 4,725.00
cost					
feet	5070				
impressions	5678	3500			
labor cost	\$ 40.00		\$ 40.00		
labor hours	5.83		3.5		
total cost	\$ 233.20		0 #DIV/0!		
weight					

# BAG LABEL STEP ELIMINATED

## RETAIL PACKAGING LINE: PREPRINT

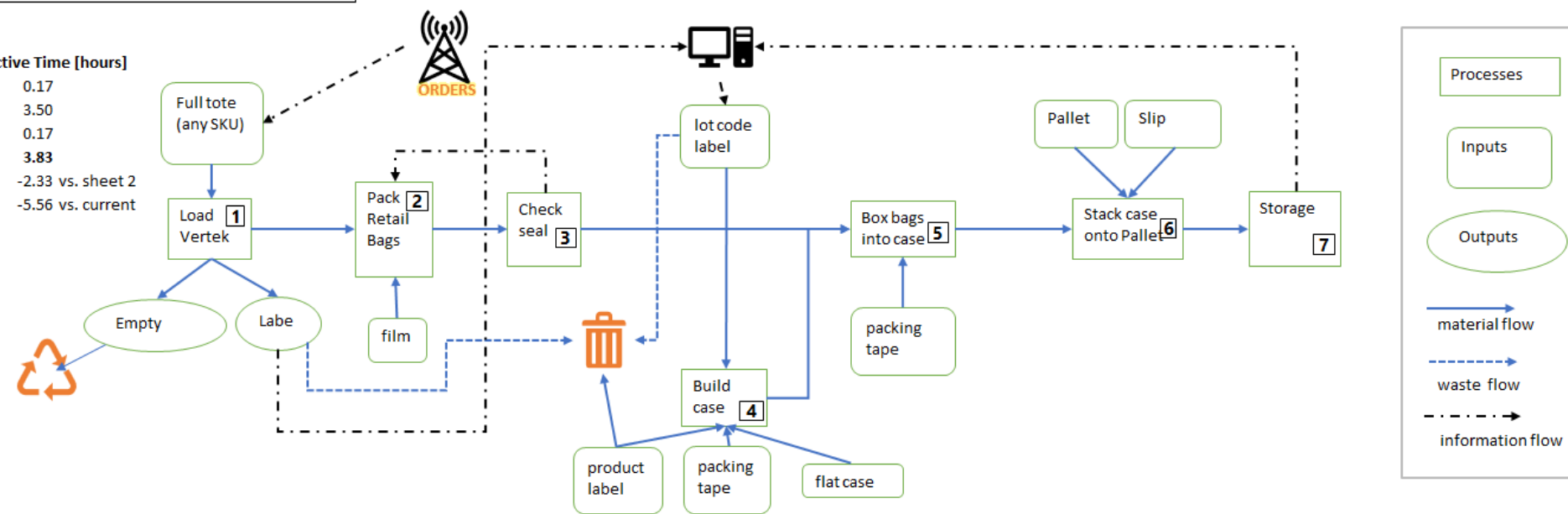
Total Productive Time [hours]	
step 1	0.17
steps 2-6	3.50
step 7	0.17
	<b>3.83</b>
$\Delta t$ [hours]	-2.33 vs. sheet 2
$\Delta t$ [hours]	-5.56 vs. current



By eliminating the labeling step, and running the Vertek at 10 bpm, the time to package 1 tote of product is reduced **2.33 hours** or 40%. The rate of fill of the Vertek can be adjusted to balance rate of building and packing cases.

# RETAIL PACKAGING LINE: PREPRINT

**Total Productive Time [hours]**  
 step 1 | 0.17  
 steps 2-6 | 3.50  
 step 7 | 0.17  
 3.83  
 Δt [hours] | -2.33 vs. sheet 2  
 Δt [hours] | -5.56 vs. current



<b>Uptime</b>	10 min	3.5 hr						10 min			
<b>Batch Size</b>	2007	2007	????								
<b>lbs</b>											
<b>Cycle Time</b>		6 sec 10 bpm	<1 sec	1 sec 10 bpm	48 sec	20 sec 3 cpm	<1 sec	20 sec 3 cpm	<1 sec	5 sec	3.5 hr
<b>Energy Used</b>	? Forklift	? Vertek				0		0			? Forklift
<b>By-Products</b>	1 label/tote					label backings					
<b>Quality</b>		FILM	95.20%								

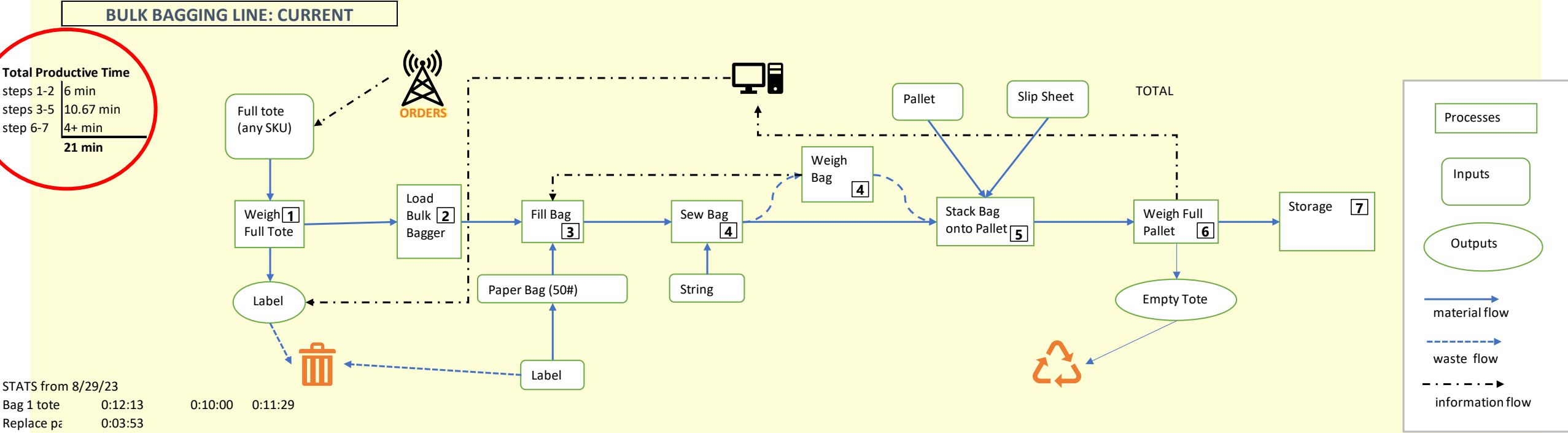


# BULK BAG PACKAGING

- Pain points:
  - Physically demanding
  - Time intensive
  - Bottleneck on sales
- Solutions are expensive?
  - Palletizer
  - Fully automated
- Zero cost solutions
  - Organization
  - Process layout



# 50% of bagging time is spent loading and unloading (NOT VALUE ADDED TIME)

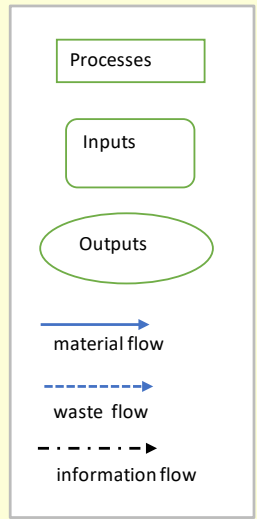
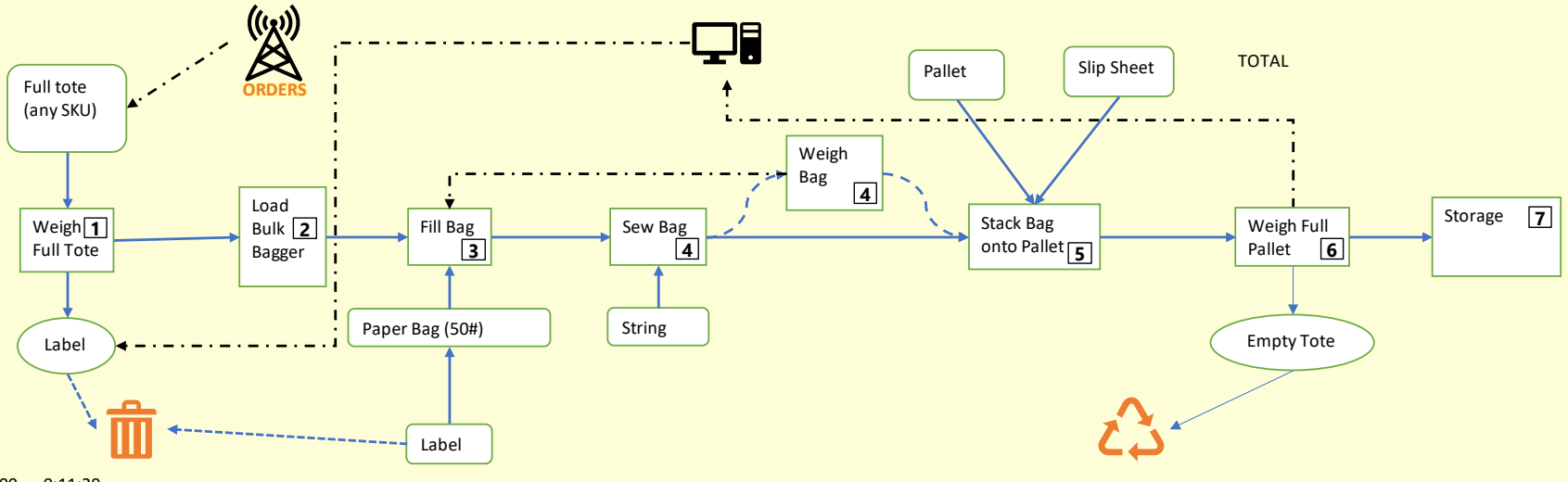


Additionally, tote unloading doesn't always align with full pallets. This causes the 10 minutes of start up/shut down time to increase because the forklift is being utilized as a pallet jack

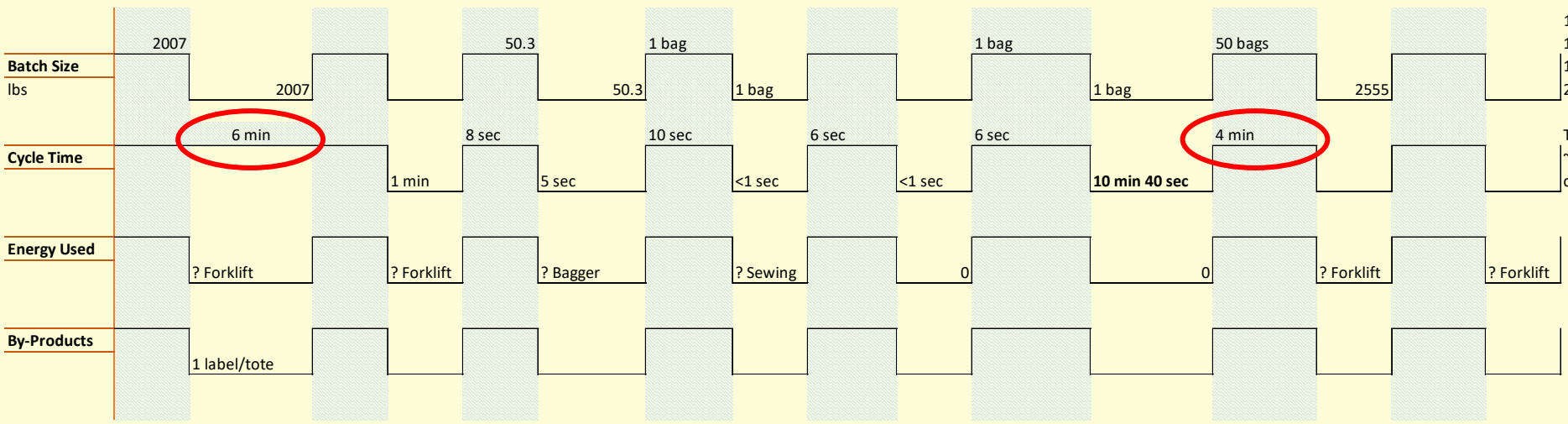
\*Tote unloading and loading is used as time to recover from heat/cold stress and physicality of bagging

# BULK BAGGING LINE: CURRENT

**Total Productive Time**  
 steps 1-2 6 min  
 steps 3-5 10.67 min  
 step 6-7 4+ min  
**21 min**



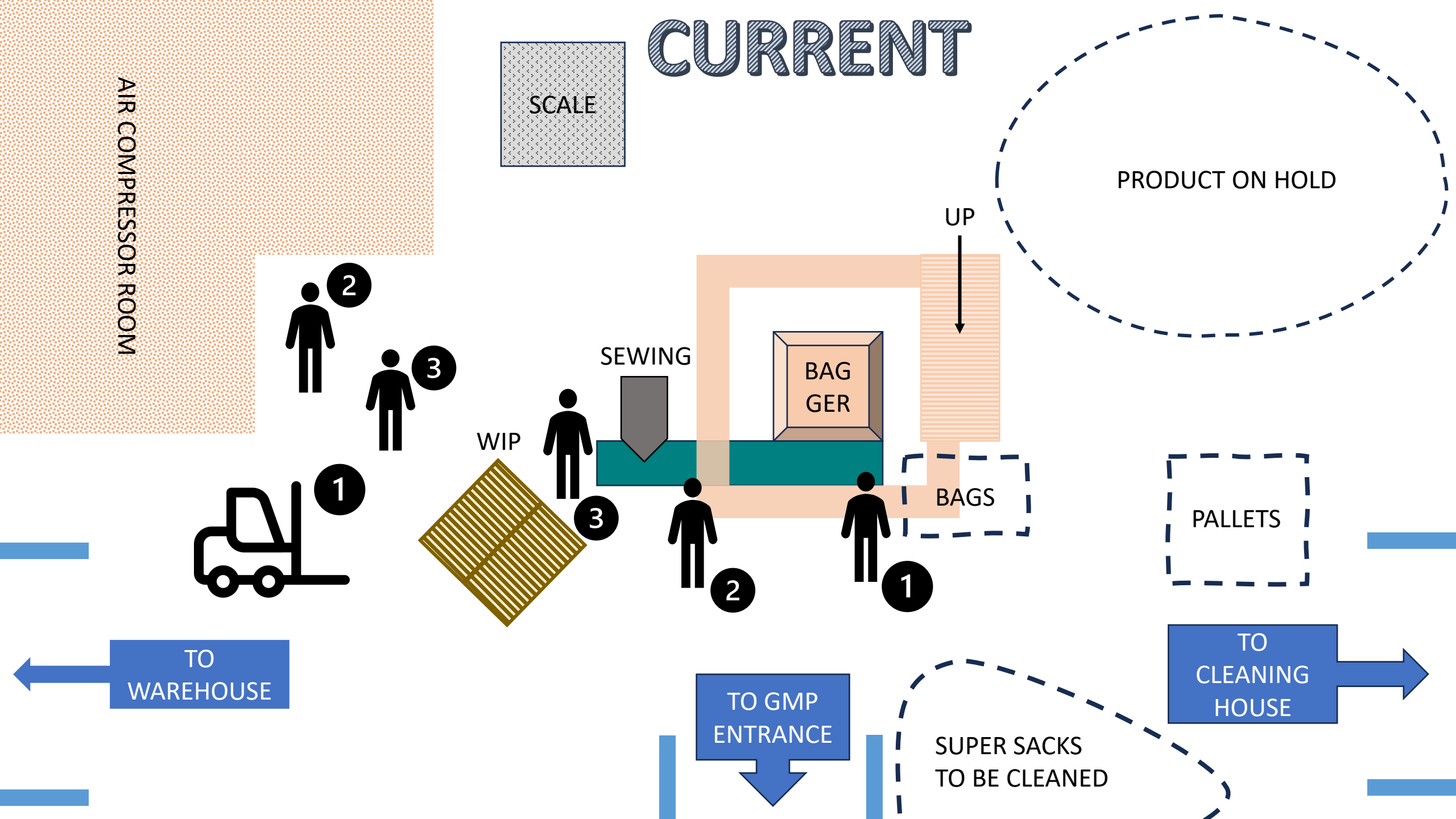
**STATS from 8/29/23**  
 Bag 1 tote 0:12:13 0:10:00 0:11:29  
 Replace p: 0:03:53



	THEORETICAL WEIGHT	ACTUAL WEIGHT	DIFFEREN CE
1 TOTE	2000	2007	7
1 BAG	50	50.4	0.4
1 PALLET	2500	2520	20
25 PALLET	62500	63000	500

**TOTAL TIME**  
 ~21 min  
 could be halved if bagging operated continuously

# CURRENT



SCALE

AIR COMPRESSOR ROOM

PRODUCT ON HOLD

UP

SEWING

BAGGER

BAGS

WIP

PALLETS

TO CLEANING HOUSE

TO GMP ENTRANCE

TO WAREHOUSE

SUPER SACKS TO BE CLEANED

2

3

1

3

2

1

# CURRENT PERSONNEL

## 1. DURING TOTE CHANGE / PALLET CHANGE

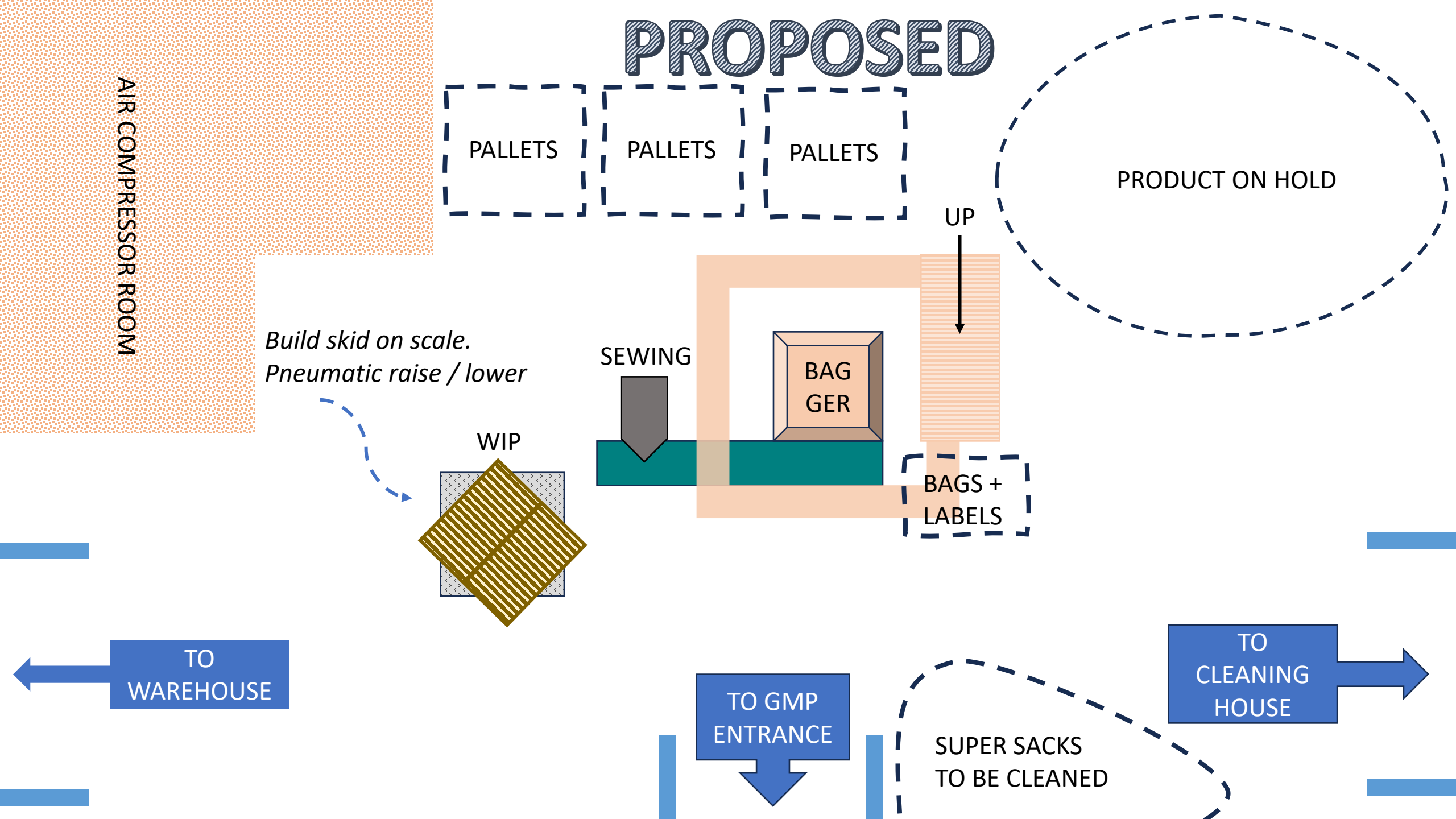
1. FORKLIFT OPERATOR
2. REMOVES OLD TOTE, HOOKS UP NEW TOTE, UNTIES NEW TOTE
3. REMOVES OLD TOTE, STORES OLD TOTE, HOOKS UP NEW TOTE

## 2. DURING BAGGING

1. GRABS EMPTY BAG, SITUATES UNDER BAGGER, HITS LEVER, MONITORS BAGGING SCALE
2. OPERATES CONVEYOR FOOT PEDAL, SEWS BAG SHUT
3. STACKS BAG ONTO PALLET, WEIGHS EVERY 10<sup>TH</sup> BAG

TOTES = 2000#, SKIDS/PALLETS = 2500#

# PROPOSED



# PROPOSED PERSONNEL

- 1 FORKLIFT OPERATOR
  - FOCUSED ON STAGING AND MOVING WHEN REQUIRED. CAN DO WAREHOUSE TASKS IN DOWNTIME
- 1 BAGGER
  - APPLY LABEL TO BAG, THEN FILL BAG, OPERATE CONVEYOR BELT
- 1 STACKER
  - SEW BAG, THEN STACK BAG, OPERATE SCALE, CHECK WEIGH EVERY 10<sup>TH</sup> BAG

TOTES = 2000#, PALLETS = 2000#.

ELIMINATE DOWNTIME TO CHANGE PALLET MID-TOTE

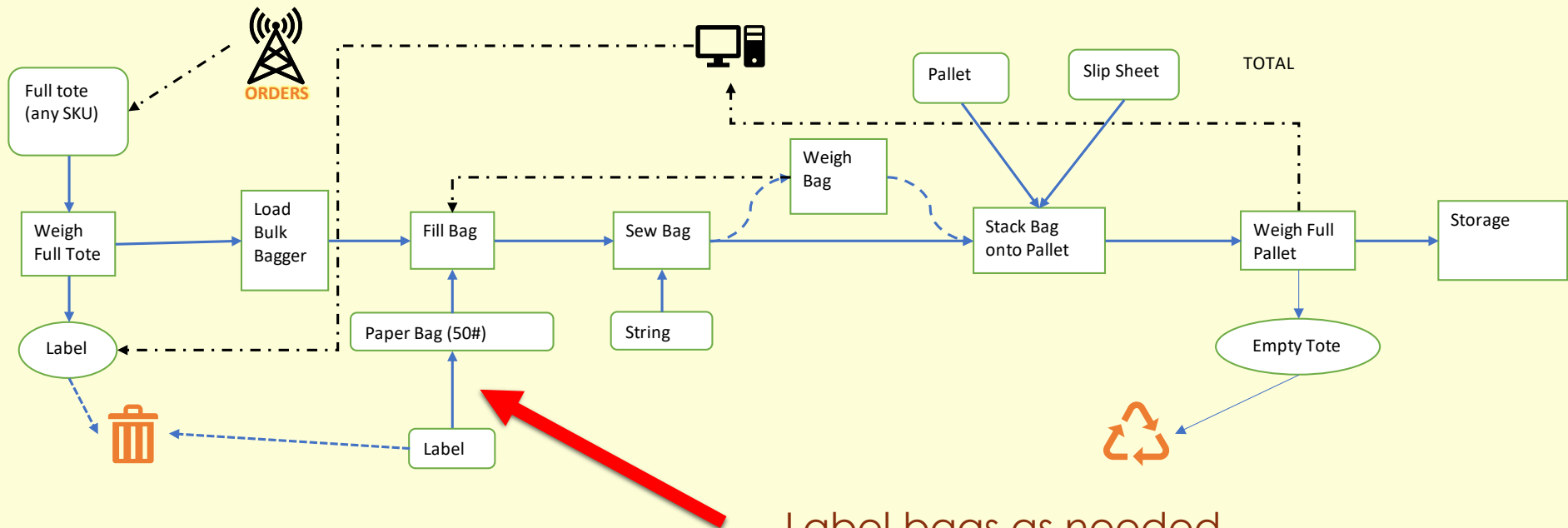
POSSIBLY IMPROVE FREIGHT OF PALLET

# Reduction in bagging time by 29%

## Data collected using 3 laborers

### BULK BAGGING LINE: PROPOSED

**Total Productive Time**  
 steps 1-2 3 min  
 steps 3-5 10.67 min  
 step 6-7 <1 min  
**15 min**



Legend:

- Processes (Green rounded rectangle)
- Inputs (Green rounded rectangle)
- Outputs (Green oval)
- material flow (Solid blue arrow)
- waste flow (Dashed blue arrow)
- information flow (Dashed black arrow)

Label bags as needed.  
 Eliminates the 30 minutes used to prelabel the bags

Does stacking pallets to 50, 50# bags actually save time and money?  
 Time=no, money=?, fewer pallets, less floor space on freight...more freight damage?



# Warehouse Passive Climate Control

- Pressure Louvers
  - increase airflow without compromising security
- Insulation
- Cool Roof / Shading

In order to make most energy efficient decision, air temperature and humidity measurements will need to be taken through the seasons

Ultimate goals: improve product quality and worker productivity

DOORWAY  
90 SQFT

DOOR  
21

AREA = 8082 SQFT  
VOLUME = 1,35,153 CU FT

**TIMELESS NATURAL  
FOOD  
WAREHOUSE**

REV.	DESCRIPTION	DATE

# Minor pollution prevention opportunities

- Lighting
  - Occupancy sensors in parts rooms, and color sort room
    - Reduce lighting from 10hours/day to 30 min/day
  - Replace T8 bulbs in parts rooms and bulk bagging area?
- Recycling
  - Terracycle
    - Packaging materials / label backings
    - PPE: hair nets, beard nets, ear plugs
    - Cigarettes
- Active Climate Control
  - Cletral Color Sorter environmental conditions
    - 5-35 \*C = 41-95\*F
  - Cost Risk analysis of running air conditioner continuously

Description	material	weight / year [lbs]
<b>White 2x4 Labels</b>	Silicon coated PP	82.56
<b>Kraft 2x4 Labels</b>	Silicon coated PP	0
<b>Kraft 2x4 Labels</b>	Silicon coated PP	0
<b>Pink 2x4 Labels</b>	Silicon coated PP	81.28
<b>Lot Code Labels</b>	Silicon coated PP	59.52
<b>Retail Labels</b>	Silicon coated PP	169.04
<b>Retail Case Labels</b>	Silicon coated PP	23.96
<b>Hairnets</b>	PP	5.85
<b>Bearnets (black)</b>	Nylon	4.14
<b>Earplugs</b>	PE foam, brass grc	2.67
<b>Total</b>		<b>429.02</b>

# Thank you

- Land Acknowledgement

- Montana State University is located upon the homelands of indigenous peoples: people with proud heritage, a vibrant present, and a bright future. We acknowledge the Assiniboine, Blackfeet, Chippewa Cree, Crow, Gros Ventre, Kootenai, Little Shell, Northern Cheyenne, Pend d'Oreille, Plains Cree, Salish, Sioux, Hidatsa, Mandan, Arikara, and the other indigenous nations of this region in the past, present, and future. We recognize that this rich human tapestry is central to our institutional mission of learning, discovery, and engagement.

- Montana Pollution Prevention (MTP2)

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