That Beautiful Bean Co.™

Food Safety in a Modern Low-Acid Canned Food Facility

From Hazard Analysis to Daily Verification

Bush Brothers & Company

AFDOSS 2026

That Beautiful Bean Co.™
That Beautiful Bean Co.™
That Beautiful Bean Co.™

Why Low-Acid Canned Foods are Unique

- Commercial sterility
- *Clostridium botulinum* as the defining hazard
- Scheduled processes and specialized regulatory requirements
- The significance of a hermetically sealed, shelf-stable product

Food Safety System is a Chain of Controls

1

Raw Materials

Control what enters

2

Product Preparation

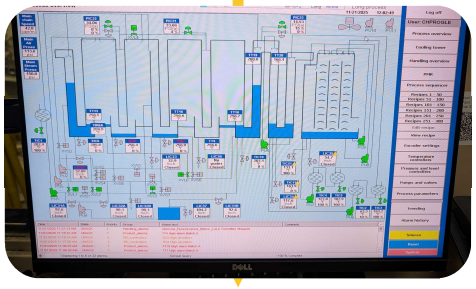
Maintain process assumptions

3

Fill & Close

Create a hermetically sealed container

A failure at any point can compromise the controls that follow



4

Thermal Process

Deliver the scheduled process

5

Cooling & Handling

Prevent recontamination

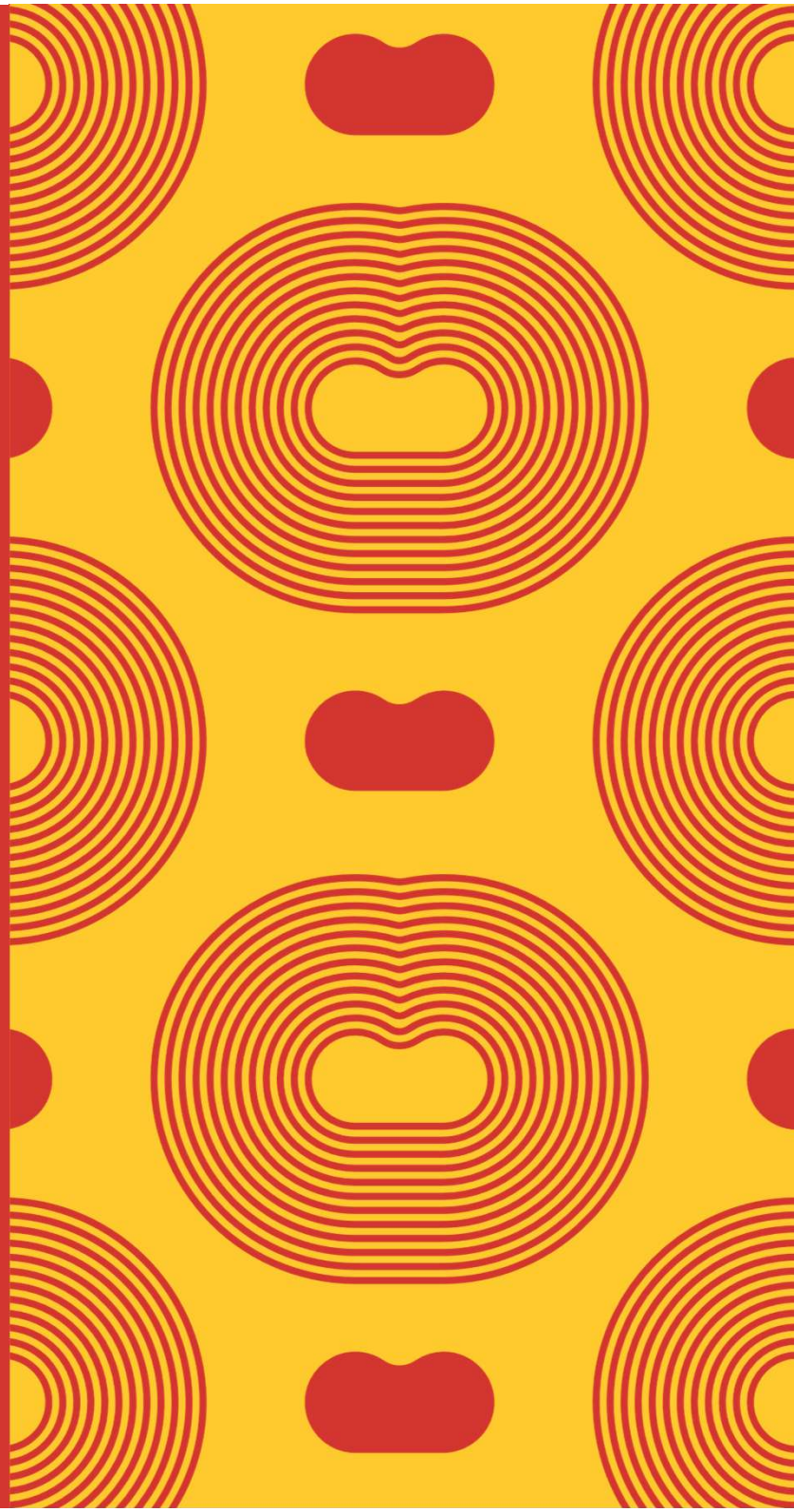
6

Verification & Release

Confirm the system worked

That Beautiful Bean Co.

Product & Process Determine the Risk



Beans are not a simple product to process

- Natural agricultural variation
- Hydration differences
- Different bean varieties, sauces, and container sizes

That Beautiful Bean Co.

A Simplified View of the Manufacturing Process

Receiving & Storage

Bean Rehydration

Brine & Sauce

Cooling & Warehousing

Thermal Processing

Filling & Closing

At Each Process Step, Answer Four Questions

Move through the process in order. At every step, repeat the same analysis.

RECEIVING → BEAN REHYDRATION → BRINE & SAUCE → FILLING & CLOSING→ THERMAL PROCESSING → WAREHOUSING

1 What hazard could occur here?

Biological • Chemical • Physical

2 How significant is the hazard?

SEVERITY × LIKELIHOOD
How serious? How reasonably likely?

3 What happens at this step?

Introduced • Increased
Reduced • Controlled

4 What manages the risk?

Prerequisite program • Preventive control
Process control / CCP

Then classify the control and define ownership, limits, and response.

That Beautiful Bean Co.

Not Every Important Control is a CCP

Controls differ in purpose and rigor—but every one must be actively managed.

EVERY CONTROL NEEDS

1. **A clear owner**
2. **A limit or expectation**
3. **A defined response**

The classification tells us how to manage the control—not whether it matters.

That Beautiful Bean Co.

Building the Hazard Analysis

Start With the Hazard, not the Control

A defensible conclusion follows the same logic every time.

1	2	3	4
DEFINE THE HAZARD	**ASSESS SEVERITY**	**ASSESS LIKELIHOOD**	**SUPPORT WITH EVIDENCE**
What could reasonably occur?	How serious would the consequence be?	What makes it likely or unlikely?	What supports the conclusion?

The hazard analysis should lead to the control—not the other way around.

Raw Material Hazards Begin Before the Beans Reach the Facility

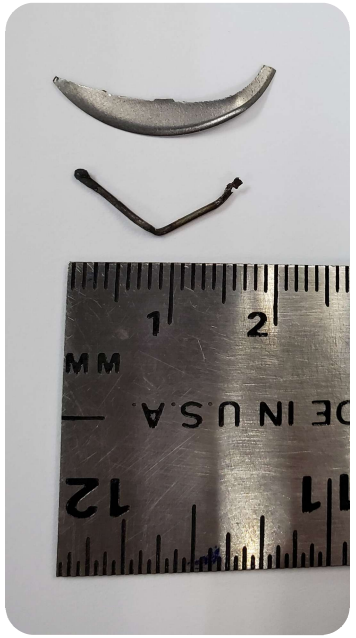
Risk begins with the crop, the supplier, and the conditions before use.

AGRICULTURAL FOREIGN MATERIAL

PESTICIDE & CHEMICAL CONSIDERATIONS

SUPPLIER CONTROLS

STORAGE: PESTS & MOISTURE



Physical Hazards Require Layers of Protection

PREVENT

Equipment condition
& preventive maintenance

REMOVE

Screens • magnets
• destoners

DETECT

Metal detection
& visual inspection

No single device catches everything—protection depends on the layers working together.

That Beautiful Bean Co.

BUSH'S BEST

Formulation and Preparation Affect the Scheduled Process

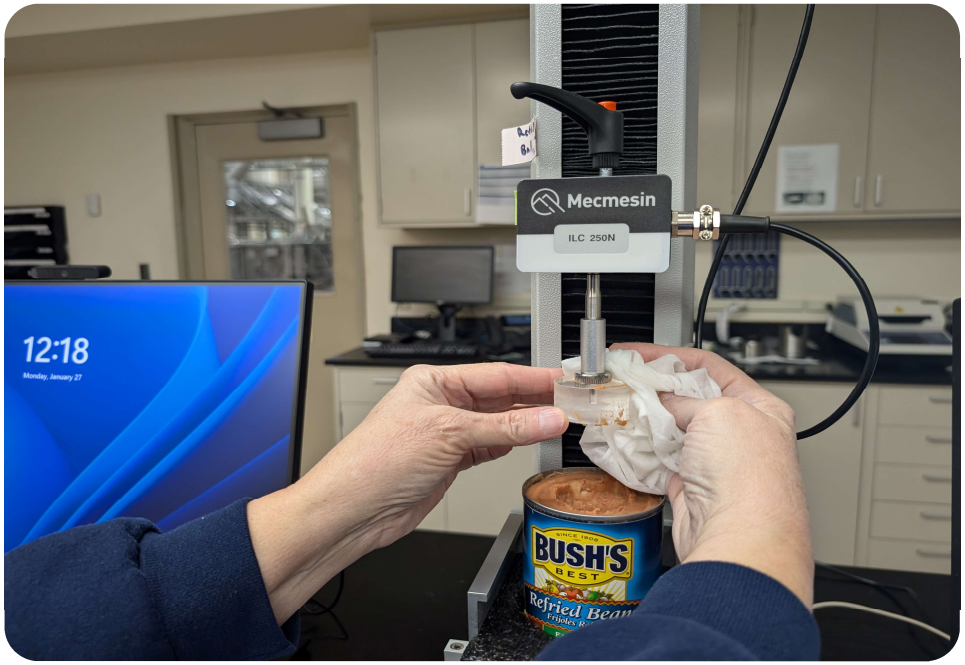
SOLID FILL WEIGHT

BEAN-TO-SAUCE RATIO

VISCOSITY

INGREDIENT OR FORMULA CHANGES

Each one can change the assumptions used to establish the scheduled process.



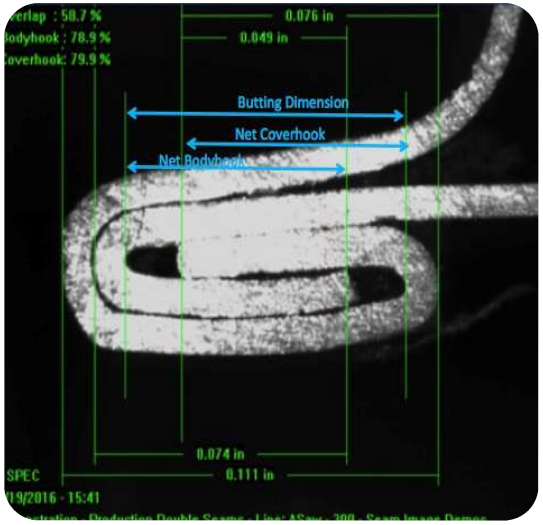
The Container is Part of the Food Safety System

The scheduled process only stays protective if the container remains hermetically sealed.

CAN & END CONDITION

DOUBLE SEAM FORMATION

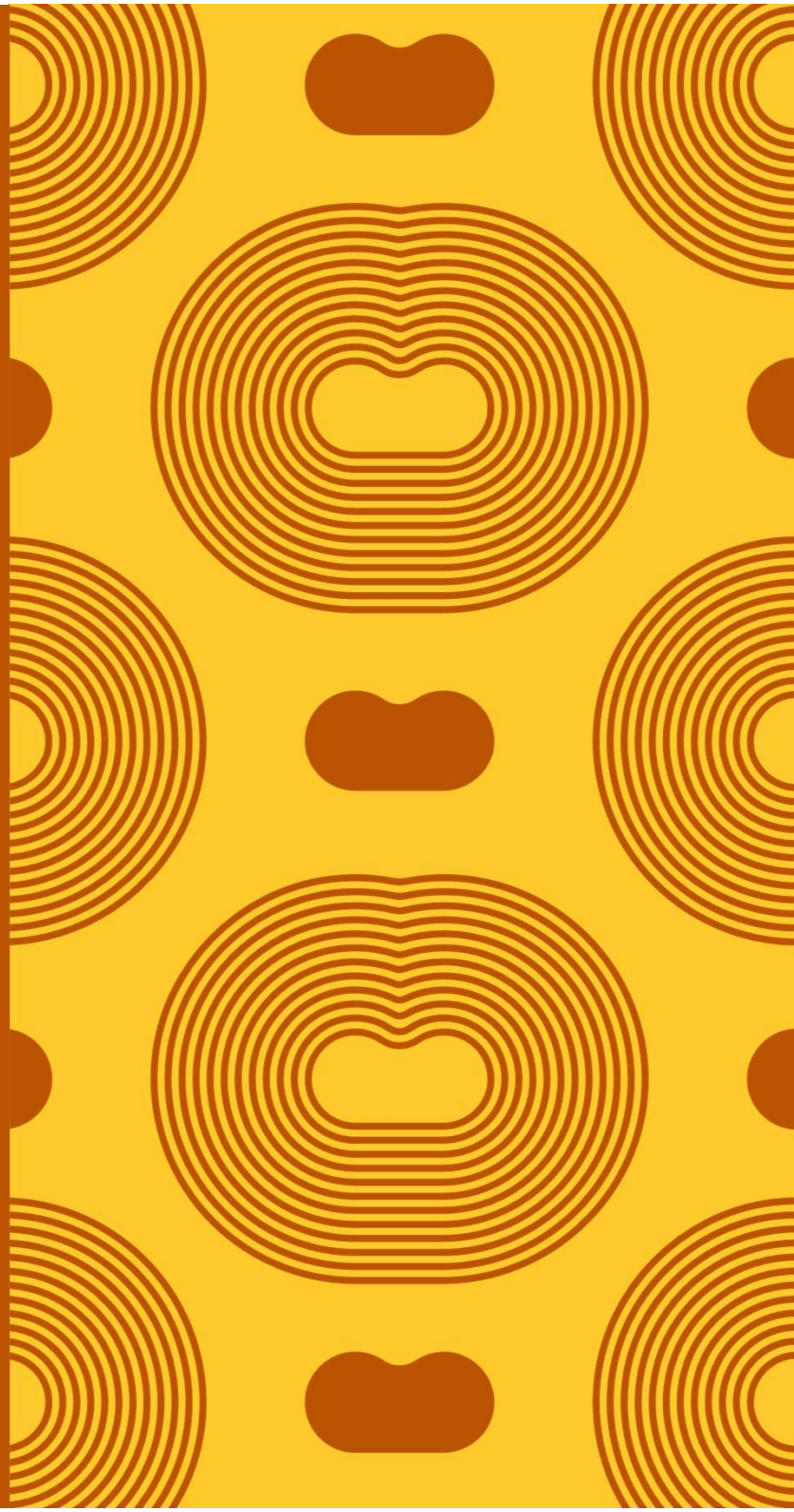
HANDLING DAMAGE



A safe thermal process cannot protect product in a compromised container.

That Beautiful Bean Co.

The Scheduled Process and Thermal-Processing System



The Scheduled Process Defines the Safe Operating Envelope

The scheduled process is valid only inside a defined set of assumptions and limits.

PROCESS ASSUMPTIONS

PRODUCT

CONTAINER

PROCESS EQUIPMENT

↓

SCHEDULED PROCESS
SAFE OPERATING ENVELOPE

↓

Change an assumption, and the scheduled process may no longer apply.

Process Establishment and Process Delivery are Different Jobs

The process authority defines the requirements; the facility proves they were delivered.

PROCESS AUTHORITY ESTABLISHES

- Scheduled process
- Minimum time and temperature
- Critical factors and limits

→

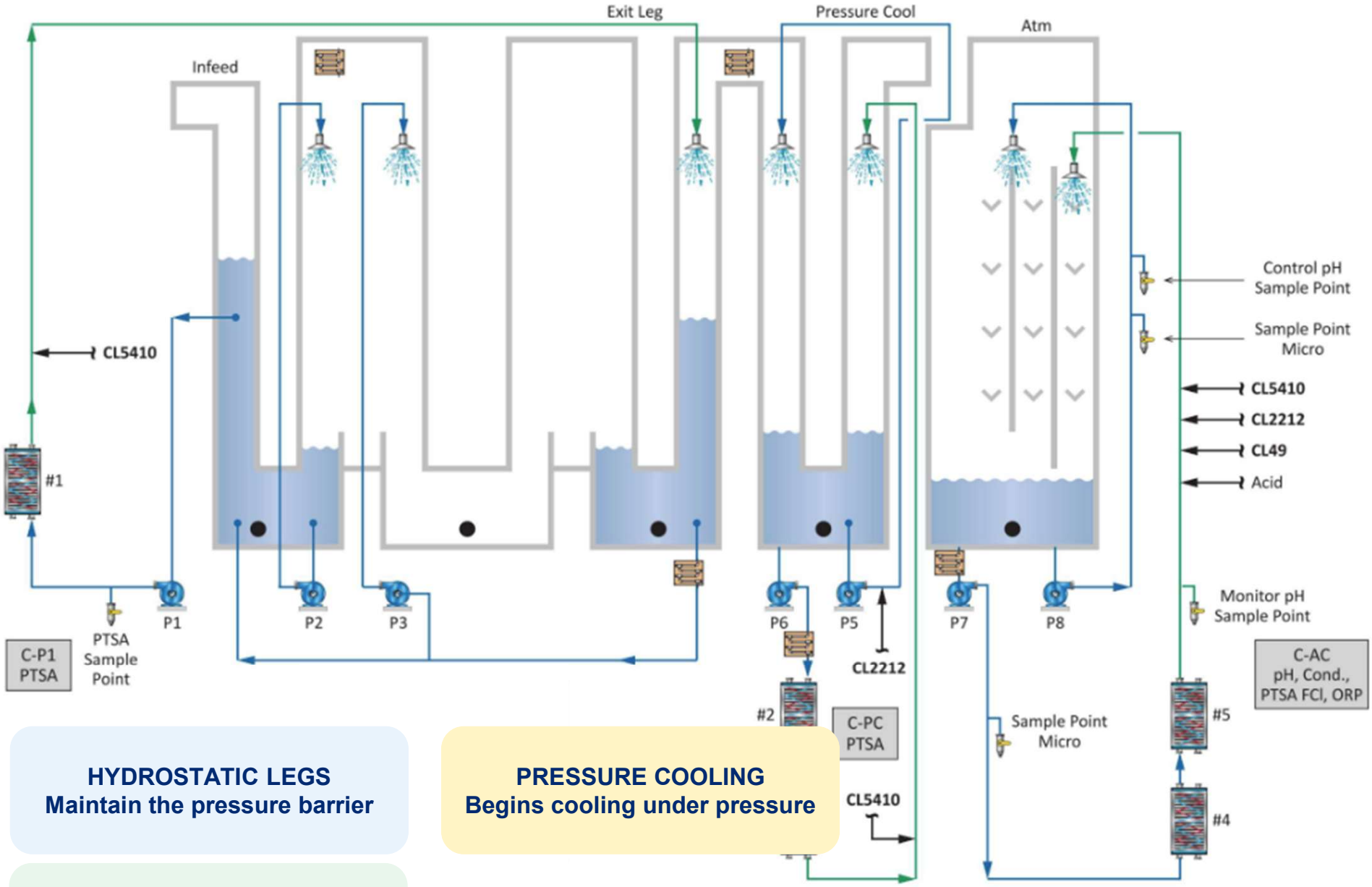
FACILITY DELIVERS

- Operates within the limits
- Monitors critical factors
- Responds to deviations

DAILY PROCESS RECORDS DEMONSTRATE DELIVERY

Establishment sets the standard. Execution and records prove compliance.

How a Hydrostatic Cooker Works



HYDROSTATIC LEGS
Maintain the pressure barrier

PRESSURE COOLING
Begins cooling under pressure

ATMOSPHERIC COOLING
Completes cooling before discharge

The Equipment Must Deliver What the Scheduled Process Assumes

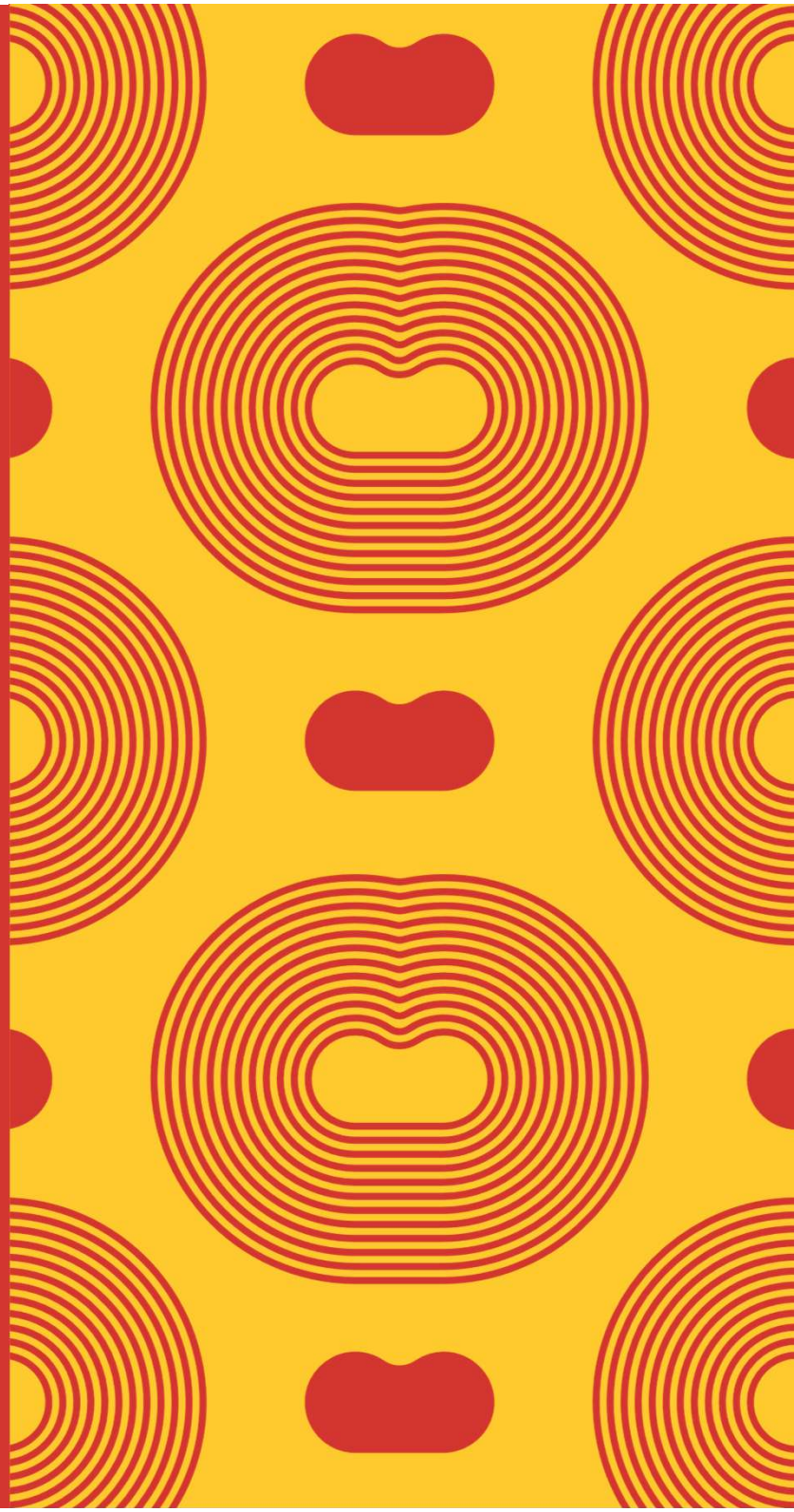
Each equipment condition protects a specific scheduled-process assumption.

CHAIN SPEED	Controls process time
TEMPERATURE DISTRIBUTION	Ensures heat is delivered throughout the system
CONTAINER ORIENTATION & SPACING	Supports consistent product exposure
INSTRUMENT ACCURACY	Makes monitoring and records trustworthy
UTILITIES & MECHANICAL RELIABILITY	Keeps process delivery stable

If the equipment cannot deliver the assumptions, the scheduled process was not delivered as designed.

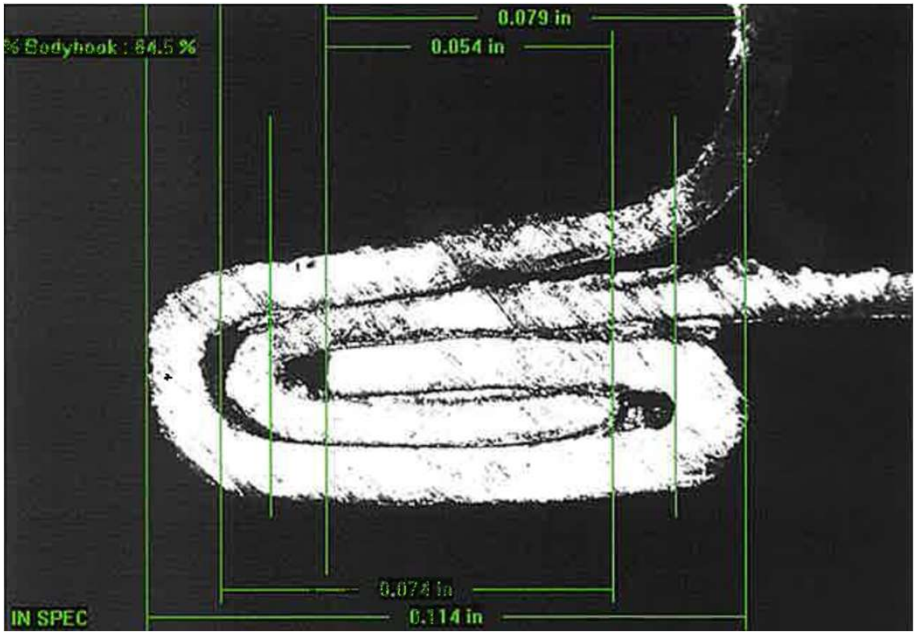
That Beautiful Bean Co.

Container Closure & Post-Process Protection



A Safe Thermal Process Cannot Compensate for a Failed Container

- Hermetic seal
- Double seam components
- Can-body integrity
- Damage before, during, after processing



That Beautiful Bean Co.

Seam Verification Combines Measurements and Judgment

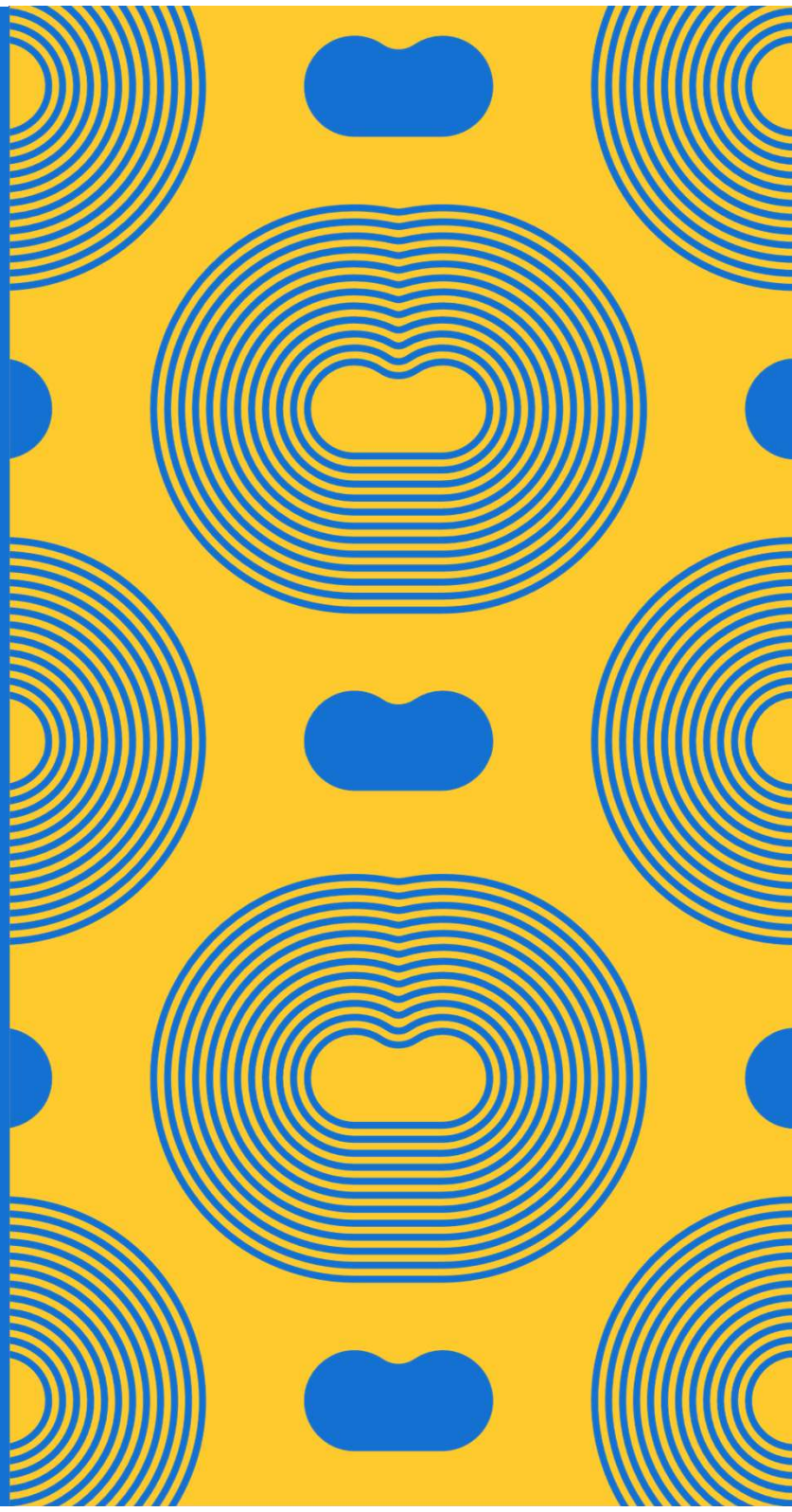
- Visual seam inspection
- Teardown measurements
- Frequency and sampling
- Response to abnormal conditions
- Trending versus checking a box

Cooling Introduces a Different Contamination Risk

- Container vacuum during cooling
- Cooling water quality
- Residual sanitizer control
- Post-process handling and wet container exposure

That Beautiful Bean Co.

Daily Verification: Proving the System Worked



Daily Verification Turns the Written Program Into Control

Complementary layers see different parts of the system—and make gaps visible.

OPERATOR CHECKS

Runs the process

Records critical factors

Responds to alarms

QA VERIFICATION

Confirms checks

Reviews exceptions

Escalates concerns

AUTOMATED MONITORING

Collects data

Flags conditions

Preserves visibility

Release Requires Evidence From the Entire System

Release is a conclusion supported by records from multiple control points.

- THERMAL PROCESS RECORDS
- CRITICAL FACTOR CHECKS
- SEAM RECORDS
- CODING & TRACEABILITY
- DEVIATIONS & CORRECTIVE ACTIONS
- REQUIRED HOLD / INCUBATION RESULTS

↓

PRODUCT RELEASE DECISION

No single record proves the system worked.

Trend the Process, not Just the Failures

Leading indicators reveal drift before it becomes a failure.

TREND THE SIGNALS

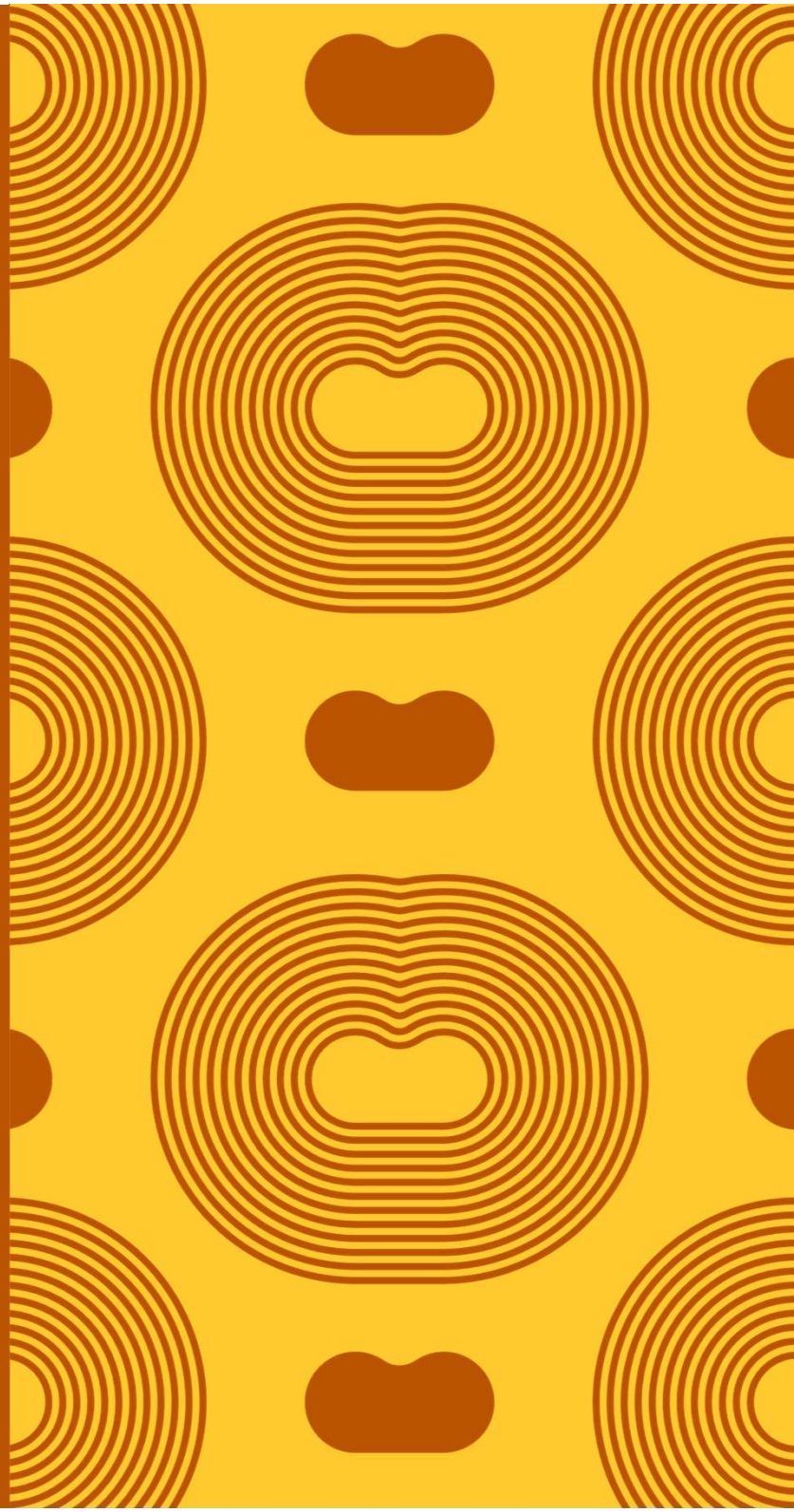
- Seam measurements
- Process deviations
- Container damage
- Instrument verification
- Cooling water results
- Consumer complaints

TECHNOLOGY ADDS VISIBILITY

- Automated data collection
- Alarms and exception reporting
- Vision systems

That Beautiful Bean Co.

When Something Goes Wrong



An Abnormal Result Is Only the Beginning

DETECT	DEFINE SCOPE	GATHER EVIDENCE	BRING THE TEAM
What was observed?	What product could be affected?	Records, samples, seams, handling, and cooling	QA, operations, maintenance, and process specialists

CONTAINMENT BEGINS IMMEDIATELY

The investigation begins after affected product is controlled.

That Beautiful Bean Co.

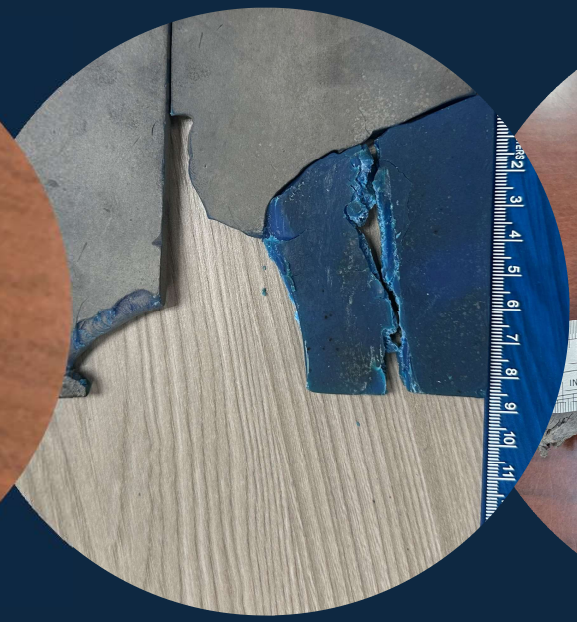
Case Study:
Polyurethane Foreign Material

That Beautiful Bean Co.
That Beautiful Bean Co.

History of Events

September 2022

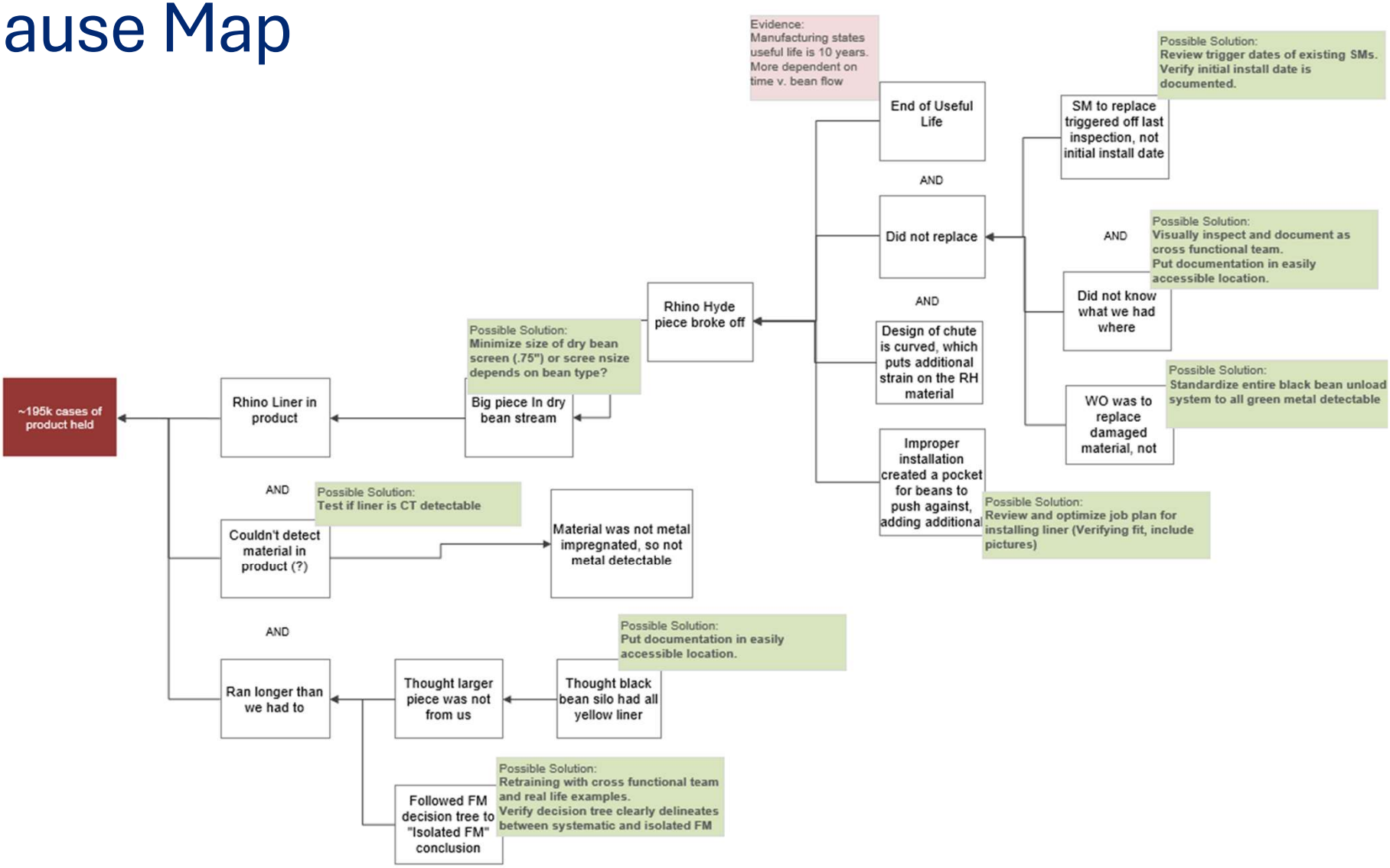
August 2023



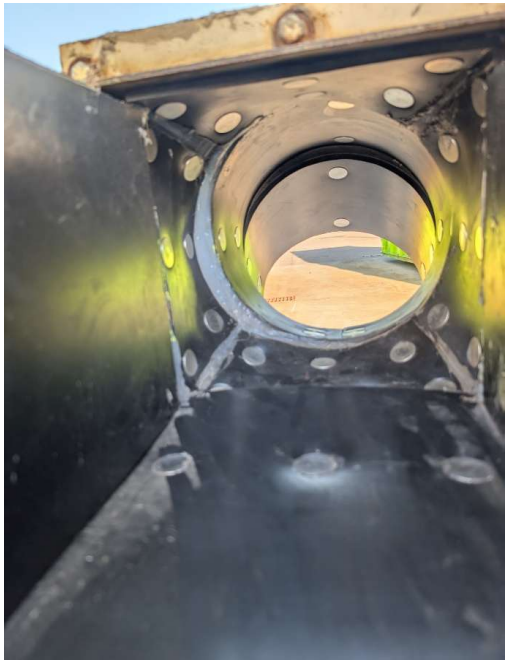
June 2025

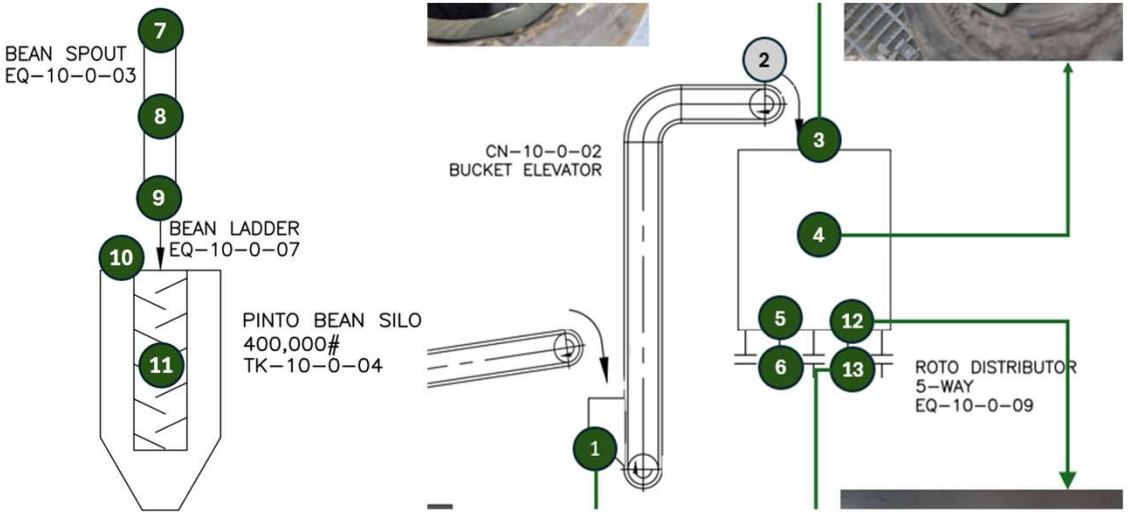
July 2025

Cause Map


~195k cases of product held
Rhino Liner in product
Big piece In dry bean stream
Possible Solution:
Minimize size of dry bean screen (.75") or scree nsize depends on bean type?
Rhino Hyde piece broke off
Evidence:
Manufacturing states useful life is 10 years. More dependent on time v. bean flow
End of Useful Life
AND
Did not replace
AND
Design of chute is curved, which puts additional strain on the RH material
AND
Improper installation created a pocket for beans to push against, adding additional
Possible Solution:
Review and optimize job plan for installing liner (Verifying fit, include pictures)
SM to replace triggered off last inspection, not initial install date
Possible Solution:
Review trigger dates of existing SMs. Verify initial install date is documented.
AND
Did not know what we had where
Possible Solution:
Visually inspect and document as cross functional team.
Put documentation in easily accessible location.
WO was to replace damaged material, not
Possible Solution:
Standardize entire black bean unload system to all green metal detectable
AND
Couldn't detect material in product (?)
Possible Solution:
Test if liner is CT detectable
Material was not metal impregnated, so not metal detectable
AND
Ran longer than we had to
Thought larger piece was not from us
Thought black bean silo had all yellow liner
Possible Solution:
Put documentation in easily accessible location.
Followed FM decision tree to "Isolated FM" conclusion
Possible Solution:
Retraining with cross functional team and real life examples.
Verify decision tree clearly delineates between systematic and isolated FM

Corrections





Preventative Actions

Part 1: System Review & Standardization

System Review & Verification

- Review trigger dates of existing SMs and verify initial install dates are documented.
    - SM triggers 5 years after initial install date
    - SM due date 1 year after trigger
    - Shelf life of material is 7 years
- Conduct a cross-functional visual inspection of the dry bean unload system and formally document findings.
- Centralize all documentation in an easily accessible location.

Standardization & Equipment Optimization

- Standardize the entire black and pinto unload system to green, metal-detectable components.
- Standardize navy unload system to black, metal-detectable components.
- Evaluate and minimize dry bean screen size. Screens are present:
    - After truck bean dump
    - After individual totes at bean hanger (7/8”)
    - Before interior dry bean elevator (1”)

Preventative Actions

Part 2 : Job Plan, Training, and Decision Support Improvements

Installation & Job Plan Optimization

- Review and optimize the liner installation job plan, including:
  - Verification of proper fit
  - Inclusion of clear photos and visual standards

Training & Capability Building

- Retrain cross-functional teams using real-life examples and system walk-throughs.
- Reinforce expectations for inspection, documentation, and escalation.

Decision-Making Clarity

- Verify the decision tree clearly differentiates:
  - Systemic vs. isolated foreign material events
- Ensure alignment across QA, Operations, Maintenance, and Sanitation.

Commercial Sterility Depends on the Entire System

Every layer protects the assumptions established by the scheduled process.

KNOW THE PRODUCT & SCHEDULED PROCESS

↓

CONTROL THE CRITICAL FACTORS

↓

PROTECT CONTAINER INTEGRITY

↓

VERIFY EXECUTION EVERY DAY

↓

RESPOND CONSERVATIVELY WHEN CONTROL IS UNCERTAIN

Commercial sterility is a system outcome.