

THE CHALLENGE



Implementing a New Packaging Line

The implementation of a new packaging line involving a PET bottle required nine new major unit operations and integration with the two existing unit operations to support extended shelf life and an aseptic production environment.



Meeting Stringent Requirements

The integration needed to meet the extended shelf life (ESL) requirements, although it can be time consuming and expensive.

Digital Twin Allows Rapid ESL Commissioning

Solution

Digital twin software eliminated risks and allowed the operations staff to write standard operation procedures (SOPs) before the packaging line was installed. Although emulation could not anticipate the difficulties of this new, hard to handle bottle, the empty bottle handling side of the line still required control changes. On the first day of startup, test bottles were filled with water that ran through the entire line—significantly shortcutting the timeline!



EXECUTIVE SUMMARY

▶ Beverage Manufacturer Uses A Digital Twin for Rapid ESL Commissioning

Client: Beverage manufacturer

Challenge:

Implementation of new packaging requiring 9 new major unit operations and integration with 2 existing in order to support extended shelf life and an aseptic production environment.

Solution:

Using Polytron's PolySimsm Emulation to create a digital twin allows team to anticipate and resolve issues before installation.

Results:

With risks and surprises eliminated before installation, manufacturer could hit the ground running on day one and saved days or perhaps even weeks of troubleshooting for operators.

New Package Line Integration

A world leading beverage manufacturer planned to introduce a new package design involving a PET (polyethylene terephthalate) bottle that would need to be filled in an aseptic environment supporting an extended shelf life (ESL).

The project manager recognized that integrating a new line to meet the stringent ESL requirements would be expensive and time consuming. The requirements include clean-filled bottles, HEPA filtration, and a Class 100 environment to help reduce bacteria and extend the shelf life of the product.

The project manager needed to find a guide who could help quickly implement the requirements and maximize profitability of the launch while lowering the company's risk. His search brought him to Polytron, and he selected the system integrator for its depth of experience in both ESL and aseptic packaging environments.

Facing the Challenge of a Complex Line

The new packaging line included nine new major unit operations and two existing operations. These various subsystems came from a variety of vendors and suppliers and needed to be integrated, so the system could work together as a whole.

To lower the risk and shorten startup time, strategies were put in place to:

- Introduce new lines
- Expand production capacity
- Consolidate facilities and operations

Emulation Lowers Project Risk and Provides Clarity

When it's time to update and upgrade operations, the manufacturer can face significant risks:

- Excessive production losses
- Poor financials
- Low yield
- High investment risk
- Poor quality
- Unplanned downtime
- Loss in market share

Unfortunately, there's no crystal ball for manufacturing, but Polytron does offer the next best thing: proven technology that delivers detailed insight into how new programming or design will perform in real time. Polytron's PolySimsm Emulation helps to anticipate and resolve issues before installation.

For 20 years, Polytron has successfully used simulation and emulation technologies to help diverse manufacturers expand and make major changes and decisions – without the stress and risk that comes with guesswork.

Emulation to the Rescue

Polytron created an emulation model – or “digital twin” – of the new factory line. This computer model enabled Polytron to use the PLCs to virtually test, debug, and adjust to optimize design and operation of the line. The manufacturer’s operations staff were able to conduct factory acceptance tests (FAT) – all before the new equipment was installed.

The digital twin gave the team the ability to eliminate risks and surprises at the actual installation, and the beverage manufacturer hit the ground running once construction was complete. With emulation, operations staff could even write standard operation procedures (SOPs) before the real line was installed.

Not a Silver Bullet

While emulation got the team close, it could not fully anticipate the difficulties of this new, hard to handle bottle. As a result, the empty bottle handling side of the line still required some control changes.

Also, the rinser was installed late, but since emulation eliminated the initial guesswork, the team could install, test and still start up as planned when the machine arrived.

Startup Success - Running Water Through the Line on Day One

The team was able to fill test bottles with water that ran through the entire line on day one with no control changes made for secondary packaging. Using emulation shortcut this timeframe by weeks! Getting started on day one also reduced time to market for the new product. Plus, it saved countless hours for service techs and operators, who normally would have spent days or weeks waiting to receive bottles and to start checking machines.

Versatility and Value

With PolySimsm you can program, test and tweak all system components before you ever lift a screwdriver to begin your new installation or make changes. The PLC appears to be running the line, but it’s just a perfect “emulation” of the line.

The possibilities are vast—from testing a ten year production forecast on your finished goods handling system today, to testing a new package size or format with no wasted time or product.

As you watch scenario unfold, you can identify and resolve problems before they occur. The result is the ability to achieve 95% of the debugging and verification process before a single item is installed on site. That contributes to benefits like competitive advantage, peace of mind, and a significant amount of time and money saved.



I recommend using emulation every time. It helped operators visualize how the line was designed to run and allow them to challenge the line with various ‘what-if’ scenarios. To duplicate this on the production line would have been more time consuming and costly”

-Project Manager

Ten Major Benefits of Emulation

1. Lowers overall investment risks 
2. Reduces on-site testing time and costs for shorter startup time 
3. Removes logic controls testing from the project's critical path 
4. Allows controls testing earlier in the project cycle 
5. Tests multiple scenarios without wasting materials 
6. Increases control system quality
7. Improves working conditions for controls engineer by safer testing
8. Improves operator training and minimizes disruption to existing production
9. Makes overall project duration simpler to forecast and budget
10. Allows 95% debugging and verification before installation

Unleash the Power of Emulation

In manufacturing, the key to success is to manage risk and eliminate the unknown to the highest degree possible. Emulation is a strategic tool that lets you troubleshoot and perfect engineering solutions in a safe digital environment.

About Polytron, Inc.

Since 1983, Polytron has been an industry leading system integration and engineering consulting firm delivering a broad spectrum of innovative manufacturing solutions. Polytron serves manufacturers in the food, beverage, consumer packaged goods, chemical, and life sciences industries across North America.

To learn more about Polytron, visit us online (www.polytron.com) or contact us (www.polytron.com/contact-us) to talk to a specialist.