



# Pilot Profiler<sup>®</sup> & Process Pilot+<sup>™</sup> with Virtual Navigator<sup>™</sup>

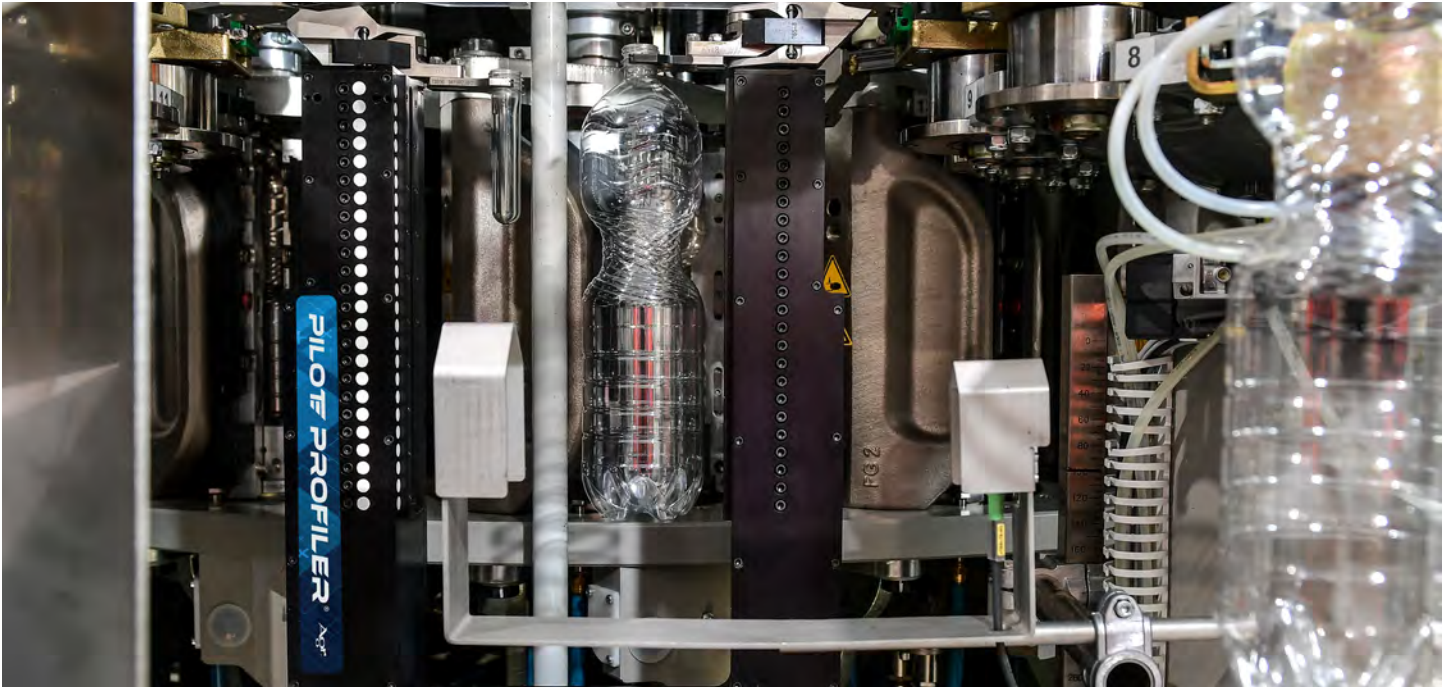
Powerful combination of material distribution measurement with automated blowmolder process control

- Improve product quality
- Optimize operational efficiency
- Realize full savings potential of lightweighting
- Manage variability in rPET and resin supply chain
- Increase overall profitability



# THE PILOT PROFILER® SYSTEM

On-line distribution measurement with laboratory accuracy



The **Pilot Profiler** in-the-blowmolder material distribution management system offers the most comprehensive method for wall thickness measurement and blowmolder performance control.

With its comprehensive measurement approach, the Pilot Profiler system provides a complete understanding of the bottle, including the base and finish areas. With this knowledge, container performance factors are continuously monitored on a per bottle basis. Given the close correlation of thickness distribution to section weight analysis, the implementation of a Pilot Profiler system in a blowmolder reduces the need for inefficient section weight analysis activities. Because the Pilot Profiler system identifies small changes in material distribution that affect bottle performance, such as topline and shelf-life, it offers manufacturers the ability to proactively manage the production process to a very fine degree – making it possible to eliminate distribution-related defects.

## **Total sidewall thickness profile**

Eliminate measurement location issues with a unique total sidewall “profile” approach to distribution monitoring. LED-based, miniaturized sensors permit configurations of up to 32 measurement locations depending on the size and shape of the container.

Sensors on the Pilot Profiler are positioned in a hermetically sealed, compact measuring unit that fits neatly inside of two-stage blowmolders. The symmetrical orientation and close proximity of sensors permit the Pilot Profiler system to effectively track and monitor material shifts throughout the sidewall. This combined with a per bottle sampling rate of over 1,000 (depending on container size and speed) measurements for each sensor detects even the slightest material movement, all in real-time.

## **On-line operation with laboratory precision**

The Pilot Profiler system incorporates a patented LED light technology for thickness measurement that offers low energy consumption and unprecedented measurement accuracy and repeatability – rivaling results found in laboratory-based systems. Based on Agr’s proven IR absorption measurement method, highly accurate and repeatable thickness measurement can be performed at production speeds on PET containers – regardless of shape, design and color.

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# Seamless integration into the blowmolder

The Pilot Profiler systems are designed to work seamlessly within your blowmolder, utilizing its timing signals and reject system without interfering with bottle production. Versions of the Pilot Profiler system are available for a wide variety of the most common blowmolders in use today.

## Importance of proper material distribution

Proper material distribution is critical to the manufacturing and performance of PET containers. By closely monitoring and managing material distribution during the stretch blowmolding process, the efficiency of the blowmolder and the performance quality of bottles produced can be maximized - saving time, energy and money. The key to accomplishing this is tied to the ability to accurately measure material distribution over the entire sidewall of the bottle.

- Measure material distribution on every bottle
- Improve throughput
- Detect process variations
- Reduce scrap
- Gain downstream efficiency
- Manage lightweighting process
- Reduce blowmolder downtime
- Identify blowmolder related issues such as mold, spindle, lamps, etc
- Reduce labor intensive section weighting



## Effortless and efficient material distribution measurement

The Pilot Profiler system provides material distribution management that speeds up production control while working effortlessly in most common blowmolders.

- Best precision for on-line thickness measurement in the industry
- No hardware job change required
- Over 32,000 discrete measurement points per container
- Non-destructive measurement on 100% of production



# PROCESS MANAGEMENT

## Providing critical information to produce your best product

The Pilot Profiler system provides a wealth of information that can be used to improve blowmolder efficiency and facilitate enhanced process management on a daily basis.

### For process management

Whether at setup and job change or during production, the Pilot Profiler system provides valuable, real-time feedback on the status of the blowmolder and quality of every bottle – shortening reaction times for detecting and solving production problems.

- Continuous feedback on thickness distribution
- Real-time data communication with blowmolder controls and other devices
- Multi-point feedback of material movement over the bottle sidewall
- Mold and spindle correlated thickness data
- On-going process reports identifying status and trends
- Seamless integration with Agr's Process Pilot+ automated blowmolder control system and Pilot Vision+ preform and bottle inspection systems

### For blowmolder management

Give operators with varying levels of knowledge and experience a common tool that can be used to provide immediate feedback for blowmolder adjustment and management. Operators can see results to all blowmolder adjustments within seconds, leading to more efficient operation and reduced costs. In addition, the Pilot Profiler system provides:

- Visual indications to help locate sources of problems
- Immediate feedback when a correction is made
- Reduced setup time and troubleshooting for job changes
- Faster learning curves for blowmolder operators
- Reduced scrap due to job change and routine operational adjustments
- Accelerated blowmolder troubleshooting
- Proactive management, eliminating rework and scrap
- Advanced diagnostics and targeted maintenance



# Add value to your production line

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## Effective tool for today's PET and rPET bottles

As bottles become lighter, the use of rPET increases and production speeds increase, proper distribution is absolutely critical. The Pilot Profiler's ability to monitor distribution with high accuracy over the total sidewall of a container makes it an effective tool to help ensure that even the lightest or 100% rPET container meet design specifications.

## Comprehensive information of bottle quality

The Pilot Profiler system continuously monitors the bottles produced, offering an efficient method to manage the blowmolding process. Unlike other methods, this system helps manage the blowmolder based on actual bottle quality, not arbitrary settings.

## Reduced laboratory testing

With the Pilot Profiler system, the need for time-consuming and wasteful indirect measurement methods, like section weight analysis, to determine material distribution in a container is reduced. This system provides a comprehensive approach, directly measuring the sidewall at all critical locations, in real-time on every bottle, and includes integrated shelf-life predictions.

### Available options

The Pilot Profiler easily adapts to any operation or production system, helping you meet quality, efficiency and lightweighting goals without disrupting your line.

- **Partial mold set:** Facilitates wall thickness and vision-based defect detection when operating with a partial mold set
- **Reject verification:** Confirms all specified rejects are removed from the line
- **Lightweighting**
- **Individual mold control:** Offers further optimization throughout the control of blow parameters for each individual mold station – minimizing mold-to-mold variation in thickness distribution



# PROCESS PILOT+<sup>TM</sup> WITH VIRTUAL NAVIGATOR<sup>TM</sup>

## The next level in automated blowmolder management

The Process Pilot+ incorporates the latest evolution in blowmolder control. This automated system manages blowmolder performance by eliminating issues that impact bottle material distribution. Virtual Navigator enhances the Process Pilot+ system with immediate feedback and tracking of blowmolder control along with Adaptive Learn and targeted maintenance features.

The complete Process Pilot+ system works automatically to manage and maintain the blowmolding process, without user intervention. This system incorporates sophisticated algorithms that analyze changes in material distribution and close the loop by adjusting critical blowmolder settings to maintain the proper thickness distribution for the bottles being produced. The result is an optimized blowing process that ensures consistent container quality and performance in spite of environmental, blowmolder or material variations that occur during the production process.

### Optimization through digitalization and automation

- AI-based Adaptive Learn
- Prompt when re-learn is needed
- Improved and consistent bottle quality while reducing scrap
- Real-time feedback on performance
  - Live, quantitative metrics for the control accuracy of Process Pilot+
- Targeted maintenance notifications when maintenance issues affect bottle results
- Enhanced M-RULE shelf-life prediction
  - Immediate feedback on shelf-life performance, allowing for proactive management of samples to meet desired shelf-life

The blowmolder can be controlled in a manner that best suits the production goals at hand. Process Pilot+ provides the ability to maximize line efficiency while producing PET bottles that are light, allow for high rPET content and support corporate sustainability initiatives.



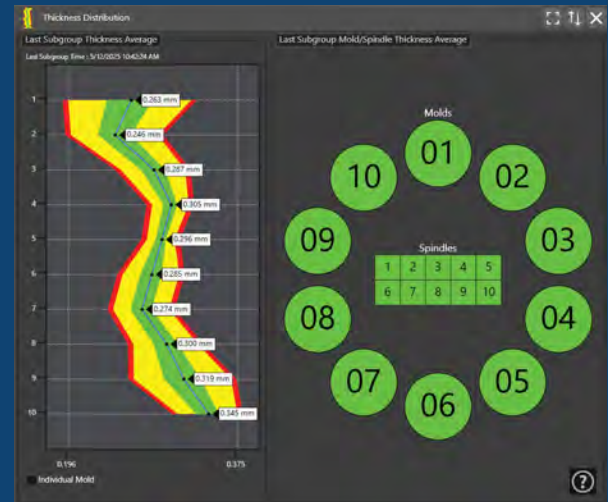
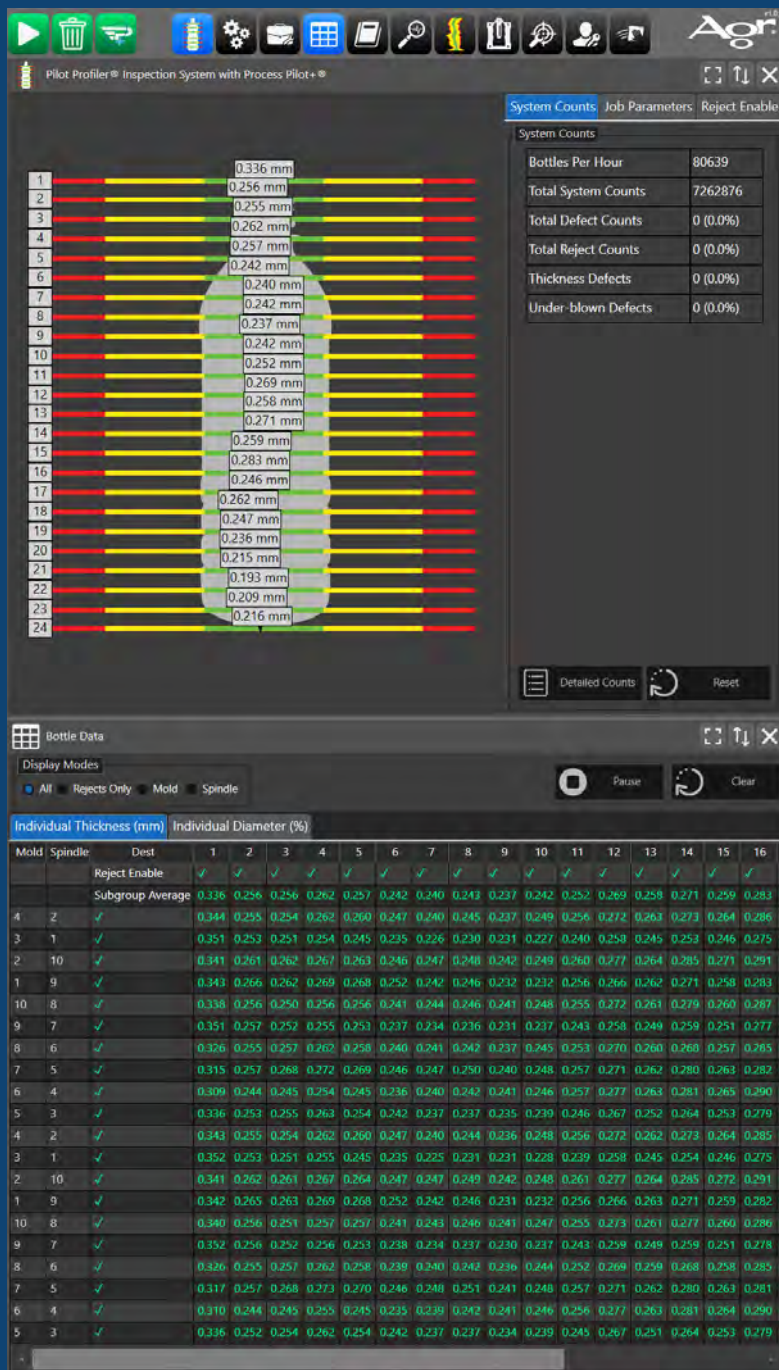


# USER INTERFACE

## Built with you in mind

The Pilot Profiler and Process Pilot+ with Virtual Navigator showcases a modern interface for clear, simultaneous views of live images, results and more – putting critical insights right where you need them.

- Information display sorting and searching
- Closed-loop data display, generated from source data
  - Flexible time frames
- Information on per-control learn validity
- Diagnostic collection and restorations
- 24" touch screen display (optional)
  - Multiple UI screens displayed simultaneously



## Large touch panel with swipe and zoom capability

- Flexible
- Intuitive
- Customizable
- Informative
- Innovative
- Quick access to key information
- Logs, statistics and diagnostics
- Historical data

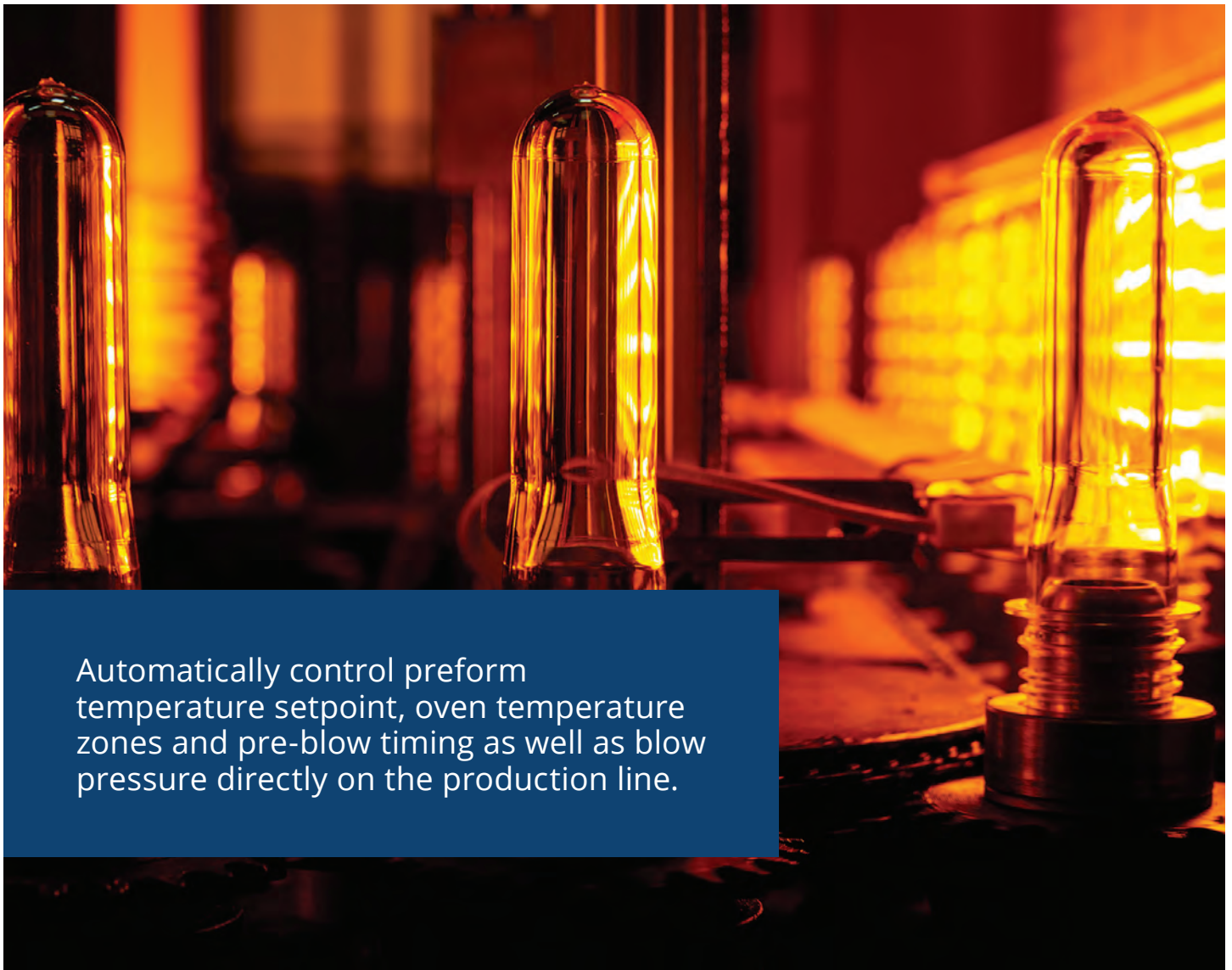
# THE ADVANTAGE OF AUTOMATION

## Have process data available at your fingertips

The Process Pilot+ with Virtual Navigator automated blowmolder control system provides a level of control that is unattainable by human operators. Working as virtual support, the Process Pilot+ makes the changes that would normally be handled by an operator. Unlike human operators, the Process Pilot+ system monitors operation 100% of the time for the slightest changes in material distribution and continuously adjusts the blowmolder to keep the process on track.

### Why Process Pilot+ with Virtual Navigator?

- 24/7 operation and management of blowmolder, with associated cost savings
- Multi-variable adjustments performed simultaneously
- Wall thickness control to microns – permitting maximum light-weighting and rPET usage, while maintaining desired performance characteristics
- Interface to all key blowmolder models including KHS, Sidel, Krones and Tech-Long – making it possible to have one control system, regardless of manufacturer
- Improved opportunities to optimize the process



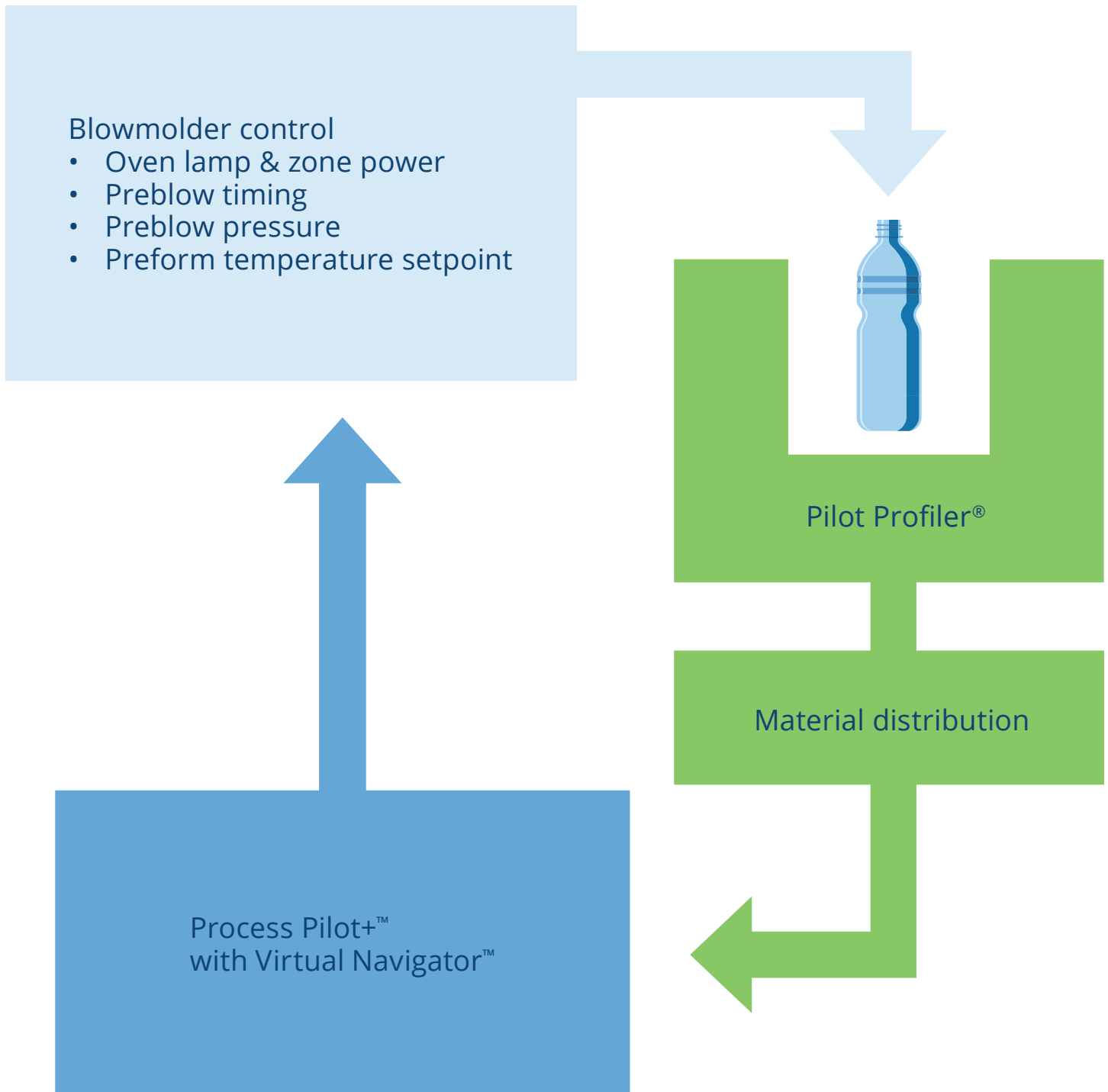
Automatically control preform temperature setpoint, oven temperature zones and pre-blow timing as well as blow pressure directly on the production line.



# IMPROVE OPERATIONS WITH TRUE CLOSED-LOOP CONTROL

Process Pilot+™ Family of Products

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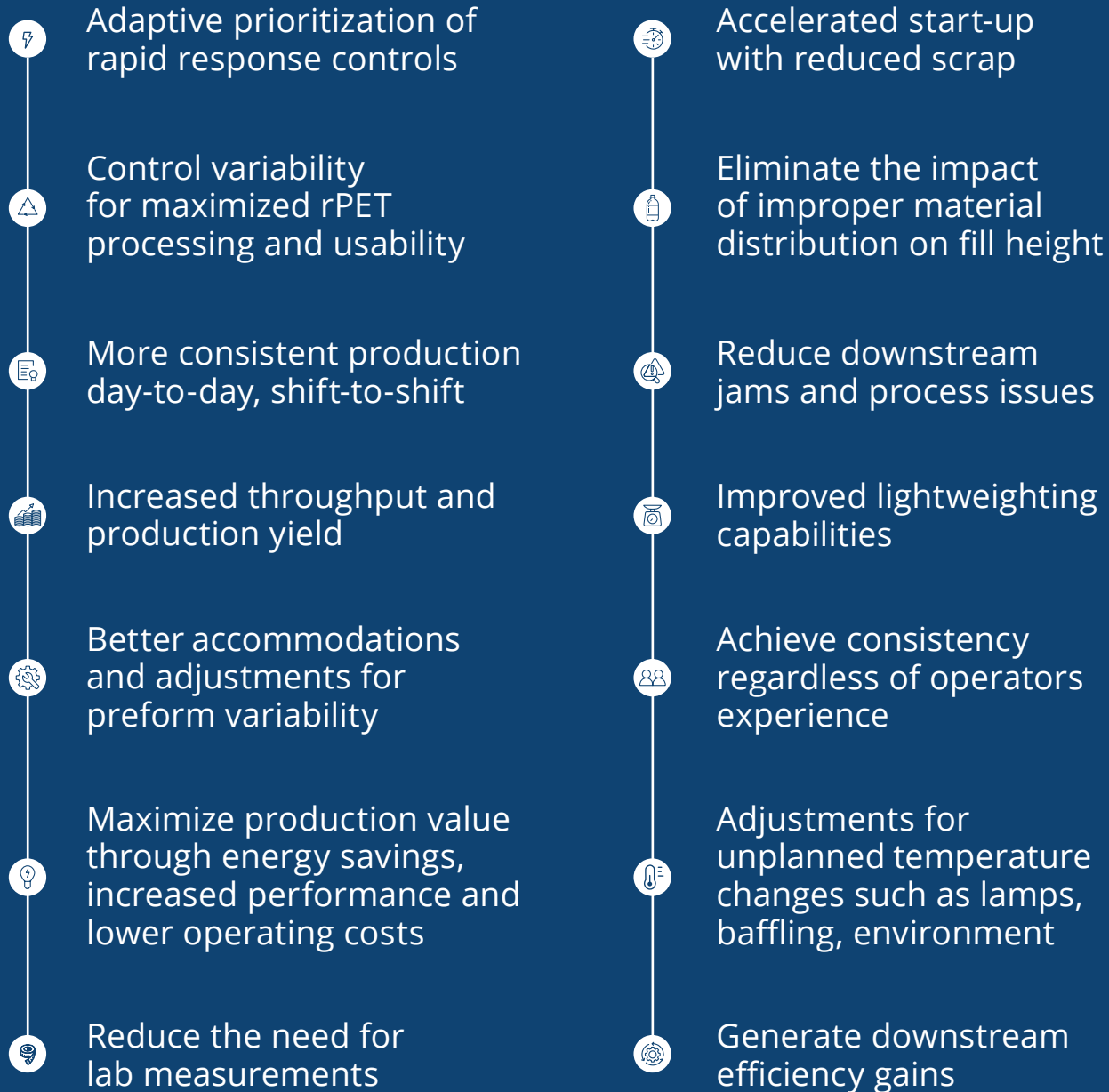


# BUILT-IN BENEFITS

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## Using smart & efficient response in every cycle

Many core capabilities make the combination of Pilot Profiler and Process Pilot+ with Virtual Navigator a versatile solution for any production environment – helping enhance quality, reduce variation and streamline operations. Together, these systems provide real-time control and actionable insight into the blowmolding process.



# PROVEN RESULTS

## See the difference

Efficiently using energy and raw materials with Process Pilot+ through temperature, pressure and material optimization provides the opportunity to achieve PET and rPET bottle lightweighting utilization goals. Now is the time to find real savings in:

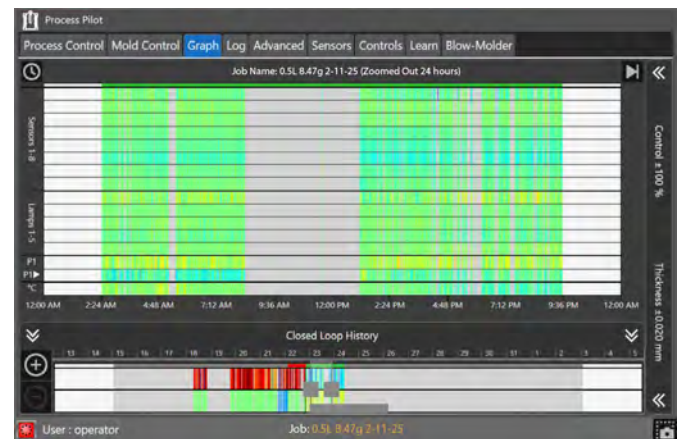
- Material
- Energy
- Productivity and quality
- Reduced scrap
- Overall cost
- Downtime
- Labor
- Quality

Material distribution is constantly monitored by the Process Pilot+ system. This system automatically compensates for regular and random events such as temperature fluctuation in and around the blowmolder, material variations, preform quality or other conditions common to blowmolding. Because the Process Pilot+ system dynamically adjusts the blowmolder operation to maintain proper material distribution, it is possible to maintain tight process control limits with unattended operation.

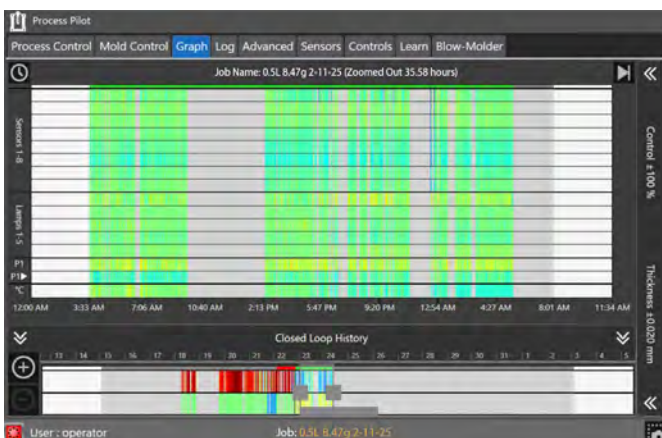
These examples show typical environmental fluctuations during an extended period of time.



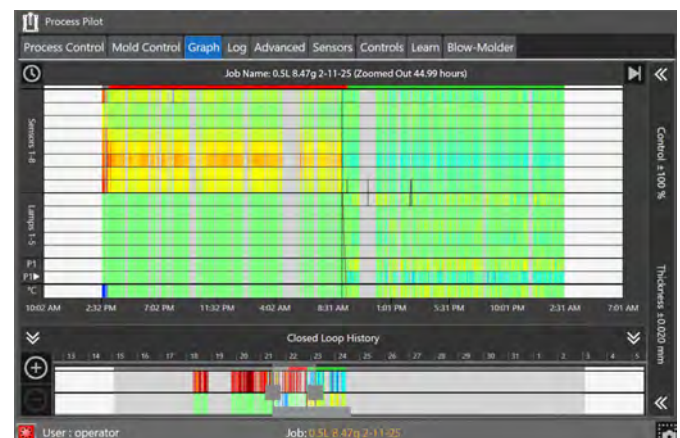
500mL container LEARN and then controlling with Process Pilot+



24hr graph of 500mL container running with Process Pilot+ controlling



36hr graph of 500mL container running with Process Pilot+ controlling



45hr graph of 500mL container running with Process Pilot+ OFF half the time and ON half of the time



# GET THE BEST VALUE FROM YOUR BLOWMOLDING OPERATION

Pilot Profiler® and Process Pilot+™ with Virtual Navigator™

## Optimized bottle performance

Make stronger, better performing containers through optimized material properties, while reducing energy costs and increasing yield and profitability



## Lightweighting with confidence

Aggressively light weight bottles, while proving the confidence that the material is distributed appropriately

## Downstream performance

Reduce downtime due to handling, filling, capping and labeling operations - improving overall line productivity and efficiency



\*Pilot Profiler®, Process Pilot®, and Process Pilot+™ are protected by one or more of the following approved or pending US patents or foreign counterparts thereof: US 10612909; US 7924421; US 8208141; EP 2067003; JP 5271908; MX 287563; CN 101578495; US 9539756; US 9868247; US 10183440; US 11155018; US 11597135; US 12145305; CA 2920885; EP 3033215; JP 6458085; MX 376596; US 11065804; US 11772317; US 12005626; JP 6868202; MX 379449; CN 111183012B; EP 3672777; US 11872743; EP 3911493; JP 7445994



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