

# 5 ways to improve packaging machinery with smart pneumatics



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**Today's packaging machines** are becoming better equipped with sophisticated automation systems that often include some type of pneumatics technology for actuation, filling, positioning, palletizing, depalletizing, etc. However, the digitalization and IoT benefits that can be realized from modern pneumatic systems are often overlooked.

The packaging industry has counted on pneumatics as a simple but reliable machine technology to package items from shampoo bottles and cereal boxes to egg cartons and cheese containers. In fact, most products on store shelves have interacted with pneumatics at some point, often in material handling. Even labeling applications can involve pneumatics.

Pneumatic systems are ideal because they tend to be a

very forgiving machine element and a low-cost way to add motion to equipment. Pneumatic components are relatively simple to diagnose and fix — quite different than many other complex components found on a modern packaging line.

Another advantage is that pneumatics can easily adapt to certain changes in the operating environment, such as a slight variation in temperature or humidity or the introduction of a new packaging material. Pneumatic actuators are more tolerant when it comes to grabbing new products or package sizes, even when components and materials aren't perfectly aligned on the machine. Contrast that with a complex servo system that can't adapt



*Intelligent pneumatic devices, like the Emerson Aventics AF2 airflow sensor, can provide real-time insights on air flow, while also capturing pressure and temperature data in the feed line.*

 | Courtesy of Emerson

as easily, causing issues that trigger downtime and expensive troubleshooting.

### **Improving machinery with smart pneumatics**


Pneumatics have long been considered a steadfast and cost-effective technology, especially when compared to all-electric solutions. Now, however, pneumatic systems are getting a fresh look from the OEM community as technology suppliers add intelligence to what were previously considered dumb devices.

In the past, it didn't make sense financially to monitor data from a low-cost pneumatic actuator; you simply replaced it when it broke and dealt with the downtime. However, in

reality, a \$100 actuator could be a pinch point to the entire machine. Today, as sensing technology has advanced, it is now easier to monitor these actuators and get actionable data without being cost prohibitive.

The challenge for technology suppliers, OEMs and end-users is to work together to create systems that deliver useful intelligence. For example, agreeing on key performance indicators (KPIs) upfront can help ensure consistent machine performance that aligns with expectations. But end-users might not communicate the critical KPIs they need to manage. One solution is for OEMs to stay involved with the end-



**The Emerson RXi2-LP industrial PC brings all sensor data together for accessibility, historian, visualization and analysis for primary product packaging machines or complete packaging lines. Real-time monitoring and diagnostics capabilities enable better OEE for the packaging line.**  | Courtesy of Emerson

Smart pneumatics can also make it easier to implement and track parameter changes to ensure consistency across production shifts. For example, a beverage manufacturer running three shifts might regularly run into situations where different operator adjustments are made from shift to shift. Now, at the start of each shift, an operator can easily reset the machine components to automatically align with established settings, saving time during shift changes.

### A good fit for packaging machines

Smart pneumatics technology is being used to help companies with digital transformation. It offers more efficient preventive maintenance as well as energy savings. In addition, smart pneumatics are scalable, whether it's a new machine or legacy equipment that needs a retrofit. Ultimately, success hinges on partnering with an experienced pneumatics technology provider that understands the specific algorithms and applications where pneumatics is used. They can provide smart pneumatic monitoring systems with those algorithms embedded upfront, providing ready-to-leverage data— so machine makers and end-users can improve OEE. **DW**

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acceleration and deceleration rates. The machine operator can use velocity to see if the action measures the same across time or if there are aberrations that require attention. Likewise, smart pneumatic technology can help monitor internal cushion wear to determine how aggressively the actuator is running into the cushion. Looking into data from these areas can review potential problems, such as worn cushions or misaligned pneumatic cylinder rods. The end result is scheduling maintenance accordingly to minimize downtime on the machine and keep OEE levels as high as possible.







For many OEMs, vibration monitoring serves as a starting point for IoT-enabled technology. The next level of smart pneumatics incorporates vibration technology built into the actuators. This technology has been used for some time in other areas, such as racing or

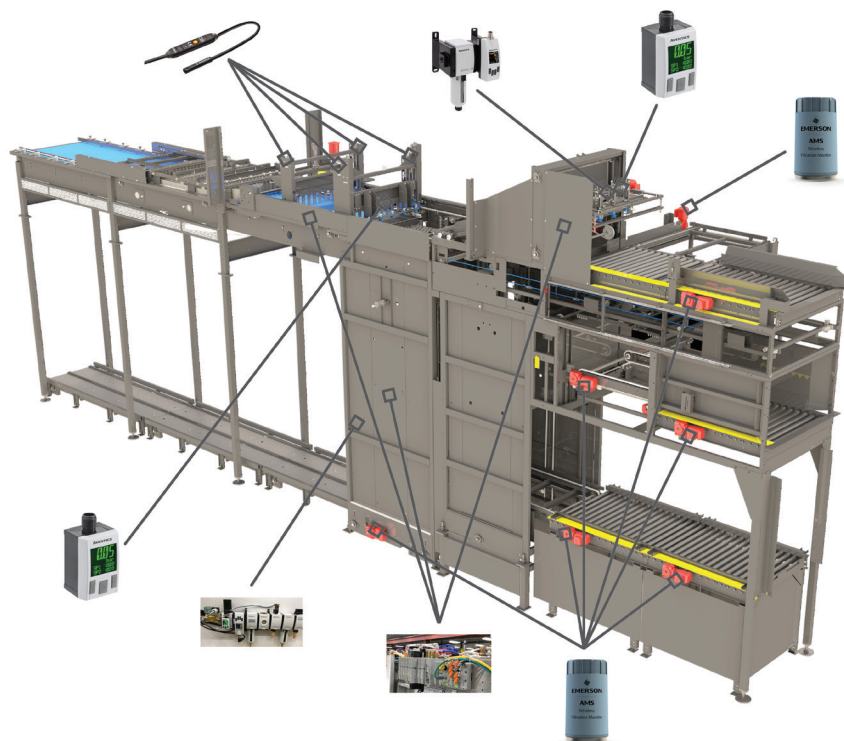
robotics, and is being leveraged to identify the characteristics of specific machine components.



### 5 Operator adaption parameter changes

Many users think increasing data generates new layers of complexity. However, when implemented properly, IoT-enabled components can simplify data into maximums and minimums to help operators adjust machine or sequence performance. For example, if a machine drops beyond 10% of its optimal range, the operator will see more than a basic notification that something is wrong. The alert can also provide the issue's location — like an indicator showing specifically which door of a car is ajar — saving time when troubleshooting to identify the specific problem instead of working down a time-consuming checklist.



	AF2-Flow/Pressure Sensor
	ST4-Cylinder Velocity Sensor w/IO-Link
	PE5-Vacuum/Pressure Sensor w/IO-Link
	AMS Vibration Sensor
	AF Series Flow/Pressure Main Supply Filter/Regulator
	G3 Valve Manifold Assy with I/O Link Master



 **Pneumatics used throughout a packaging machine**, such as a bulk depalletizer, can tie in with an overall automation system to provide comprehensive, actionable performance data to improve overall equipment effectiveness.  | Machine image courtesy of Busse/SJI Corp.

a half million or million cycles, and when that point is reached the valve is replaced, whether it's faulty or not. But a counter cannot account for changes, such as constant stopping and starting, that can significantly affect a component's life cycle. As a result, the component may fail unexpectedly and cause expensive, unplanned downtime.


Pneumatic sensors allow for better "real-use" data than a calculation based on numbers from a spec sheet. Now users can access data based on actual stroke and movement as well as speed. Sensors measuring speed are a recent innovation that can detect if actuators are pushed past a specific percentage — much like knowing the state of a car's brakes based on gently using the brake pedal or slamming on it.

#### **Actuator velocities, mechanical cushioning wear and vibration monitoring**

Measuring actuator velocity can also help ensure better OEE. With smart pneumatics, end-users can now measure the consistency of an actuator's




#### **Local dashboard for pneumatics applications:**

The system shows in advance when critical limits will be reached and provides users with key information for early intervention. Local data is recorded independently of the control and information is supplied via standard interfaces, whether in a local IT network or in the user's cloud solution.  | Courtesy of Emerson





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