

# Automatic for the people

Automation is often cited as key to the future of tire manufacturing, but how will it work and what opportunities does it represent?

By TRINITY FRANCIS Images BLACK DONUTS, CONTINENTAL, IDENTEC

The automation of tire production has the potential to unlock the highest levels of operational efficiency. Balanced with the cost investment to deploy new solutions, tire makers must consider how best to automate processes within the confines of each plant's individual specification.

As Pekka Vaittinen, director of automation and solutions at Black Donuts, explains, "Curing is the bottleneck of production. No matter how much equipment you have before curing or after curing, you cannot increase the throughput of the factory; you can only cure as many tires as you have curing capacity for."

The target, then, for manufacturers such as Continental Tire, is to "make its tire production lines more efficient, sustainable and ergonomic through automation", according to Dr Oliver Schramm, the company's head of circularity and innovative technology.

At Continental's Hefei facility in China, advanced automation technology has been introduced in the curing process, and autonomous forklifts support logistical movements. In the Czech Republic, the company's Otrokovice plant features a fully automated high-bay warehouse with capacity for 930,000 tires.

"The goal was to centralize local storage capacities in the area of Otrokovice, accelerate delivery and cut emissions. Robots and mobile stackers manage tire movement, powered by renewable energy," Schramm adds.

Given the uniqueness of each plant, tire manufacturers must work closely with technology suppliers to effectively integrate new solutions.

"Strong partnerships and continuous development efforts enable us to scale automation technologies efficiently and deploy them rapidly across our plants," Schramm says. "To ensure consistency and compatibility, suppliers align with our global specifications. Mutual learning, streamlined support and fast issue resolution strengthen our global strategy."

**Implementing AI would be a lengthy project but it would be beneficial"**

Pekka Vaittinen, Black Donuts



## Material tracking

Scope for automation solutions often depends on whether the site is greenfield or brownfield. However, Vaittinen believes advances in RFID technology can benefit both types of plants. "One of the things we want to work with is active RFID tags," he says. "Compound palettes, for example, would



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Dr Oliver Schramm, Continental Tire



### ① RISE OF THE MACHINES

Does automation spell the end for human workers?

A common accusation leveled at automation is that the end goal is to put people out of work. So far, the reality has been far more nuanced, with increases in automation targeted at making processes easier for human workers, or retraining staff to oversee automated machinery.

"Continental is committed to creating safe, ergonomic and futureproof jobs," Oliver Schramm explains. The tire manufacturer uses automation to complement, not replace, human expertise.

"While manual production remains critical for certain production steps or for specialized products such as racing bike tires, AI and automation already streamline repetitive tasks, allowing our employees to concentrate on more strategic and creative work or quality assurance and machine supervision.

"As the overall availability of skilled labor becomes increasingly scarce, technologies such as automated storage systems, driverless transport vehicles and autonomous mobile robots help Continental reduce physical strain, speed up intralogistics processes (which results in faster deliveries to customers and retailers) and ultimately safeguard the company's viability."

Increased use of automation is intrinsically linked to the financial benefit of doing so. If automated machinery is introduced to improve efficiency, reduce operator costs and maintain or exceed quality standards, automated systems need to be monitored to ensure these targets are met.

"When you invest in automation and reduce manpower on the shop floor, then you need to invest in knowhow on your systems at the same time," says Pekka Vaittinen at Black Donuts. "Automation changes how you work and the people who are working with it."

have active RFID tags that you can use to identify what the material is."

Black Donuts is working with Identec Solutions to identify projects that would benefit from Identec's Asset Agent active RFID technology.

"We use three types of frequencies, which have different purposes in the device," says Christian Aadal, global product manager for Asset Agent. "The RFID-type low frequency is almost like NFC.

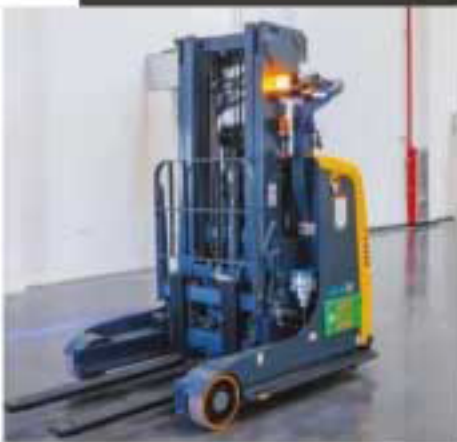
We have ultra-high frequency which is the backbone of transporting data from the device back to the server over long distances. And we have 2.4GHz, which is used for real-time location."

By geofencing areas in the factory, the active RFID can automatically notify the ERP or warehouse management system when the component has been collected from a storage area and delivered to the correct machine. In addition to accurate, location-based tracking, the system supports

tire makers in reducing material wastage.

Using a first-in, first-out system, data associated with the relevant RFID ensures materials are used in the correct order to prevent use of expired materials. Asset Agent uses a traffic light system, which blinks green for the correct material and date, orange if it's the right component or material but the wrong date, or red if it's the wrong material or past its expiry date. The flashing light can also make it easier for operators to quickly identify the right material, reducing the time it takes to search for the correct component.

"We also use short-range communication in the machine. If the material is incorrect or



**Top:** Continental's Hefei facility uses advanced automation technology.

**Middle:** Identec technologies utilize active RFID systems.

**Left:** Autonomous forklifts support logistical movements.

overdue, this prevents the machine from starting. If the manufacturer wants to start producing with that material, it needs a manual override by the operator because that would mean they are producing waste, which is what we want to avoid," Aadal explains.

On average, Aadal expects a mid-size plant to use between 3,000 and 5,000 transponders, which can be deployed within three to six months. "We have plants that have 1,500 and plants that have 12,000; it depends on whether they want to outfit all their carriers or maybe just the most critical ones."

The system has been integrated in eight plants so far, and Aadal says average factory output has increased by between 5% and 7%.

### Predictive maintenance and machine optimization

The shift to automated systems highlights the operational benefits of active systems – compared with passive solutions – and gives insight into new datapoints. While location data and associated information about a material are important for material tracking, machine vision is the key facilitator in automated quality control systems.

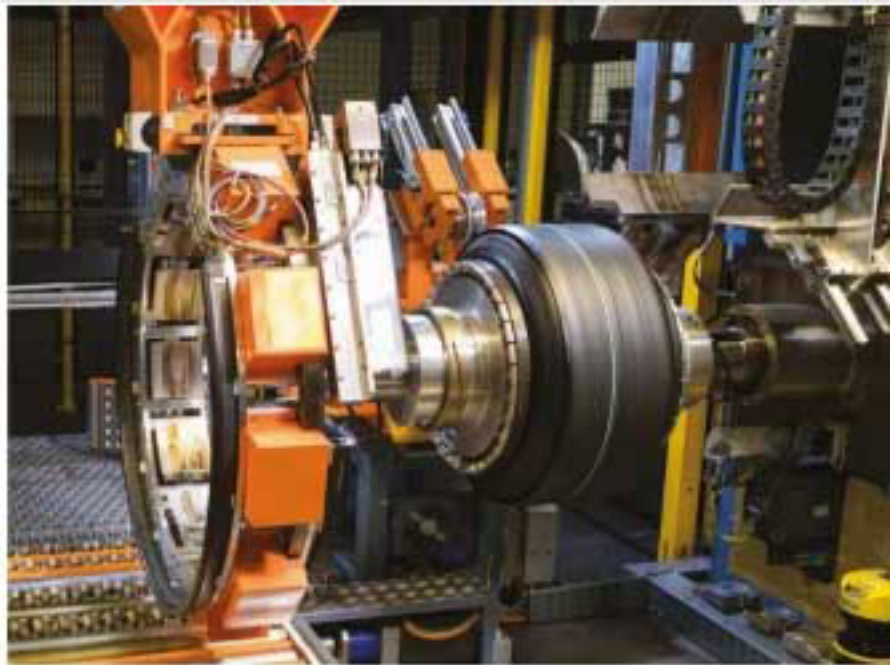
This is an area where Vaittinen believes there has been good progress toward automation. "It's more common to see quality-related automated solutions that collect more data and measurement points to assess quality," he says.

Tekna Automazione, for example, uses laser profilometry to inspect tires. If a defect is detected, the machine can classify it, generate an image and explain using reference points on the tire where such a defect is located. This technology means fewer human inspectors are required, and provides guiding information for the remaining inspectors to check potential defects more swiftly.

"It's very important that we store this information and it can be shared with the MES," says Michele De Stasio, chairman of the board of directors at Tekna Automazione. "Our dream is that the customer decides to analyze this data to identify where the defect is coming from in the production process."

This visibility opens up new possibilities for maintenance, which helps reduce waste by minimizing defects.

"Continental has also set a strong focus on predictive maintenance through machine vision," Schramm says. "It facilitates higher levels of automation by observing an area and detecting obstacles, enabling automated decision-making and measurement in product and process control.



## Using AI in the tire industry would be a breakthrough

Pekka Vaittinen, Black Donuts

"Furthermore, machine vision supports more dynamic applications by enabling flexible automation systems," he continues. "For example, it can correct misalignments or poor positioning of material carriers in production lines, ensuring smooth and precise operations."

However, Vaittinen adds, "I still see that maintenance is thought of too much at the cost level only and not the possibility that,

if you invest in maintenance, you get better operational efficiency and can keep your machines running."

"Something we're working on is using augmented reality to support maintenance work," says De Stasio. "The machine will be able to guide the maintenance worker through a repair to make sure it's running as it should."

"I think in the next five years many companies will have a problem with employing people to do in-house maintenance, so solutions like this could lower the skills needed to complete maintenance on complex machines."

In a similar vein, Identec is working on AI implementation to generate directions for operators. As Aadal explains, "We want to give travel directions for the operators so they can take alternative routes to save time. Even though it might be a bit longer, based on information on other movements in the factory we can advise the quickest route."

Despite automated options being available to tire manufacturers, Vaittinen stresses the challenge of deploying new automated systems in brownfield locations. However, he says, "Using AI in the tire industry would be a breakthrough in the coming years.

I hope tire manufacturers invest in AI as it would work hand in hand with other automation systems.

"Implementing AI would be a lengthy project but it would be beneficial to reduce scrap rate, improve quality and make production more energy efficient. I think AI will come through earlier in predictive maintenance, as other industries will be using AI algorithms in maintenance. So that's something that could come from other industries that would improve operational efficiency." ●

**Above:** Continental tire production in Korbach, Germany. The tire maker is actively investigating ways to utilize automation to streamline operations

**Below:** RFID-equipped systems can alert central operating systems about collection and delivery of parts

