

**BALLUFF**

 *innovating automation*

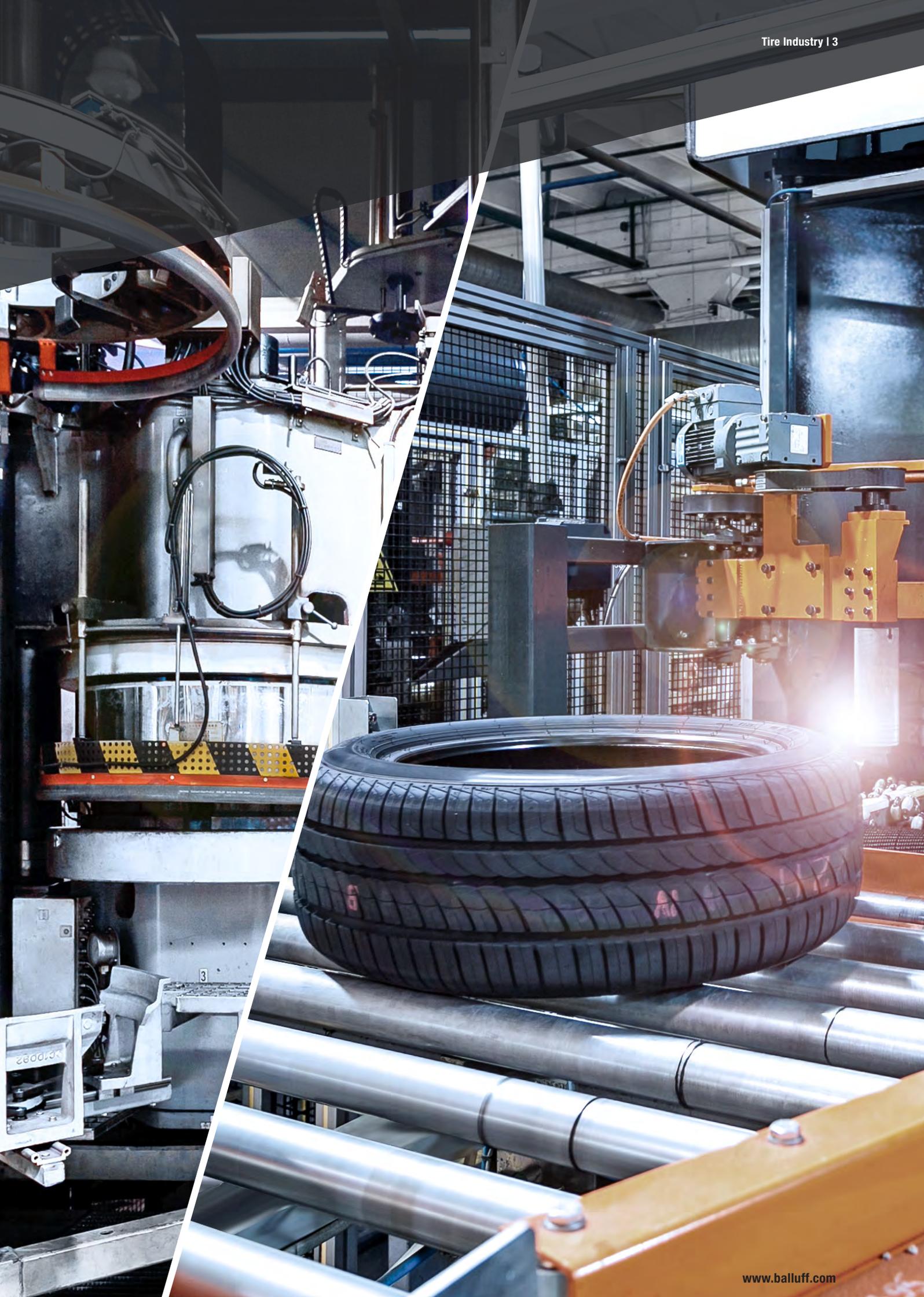
**HIGH PROCESS  
SECURITY  
AT EVERY STEP**

Tire Industry

Balluff and the tire industry

WE ARE AT HOME IN MANY  
DIFFERENT SECTORS





Balluff and the tire industry

# HIGH PROCESS SECURITY AT EVERY STEP



TIRE BUILDING



As a partner of the automobile industry for many years Balluff offers vast automation know-how to provide optimal support in your tire manufacturing. Our expertise has been gained in practical applications and is based on solid development experience. We can draw from a wide range of sensors, systems and networking using many different technologies. For example, we can offer you length measuring systems for precise monitoring of closing movements on vulcanizing presses, or vision and identification solutions that reliably meet and exceed the high requirements for traceability of tire components and of the end product.

With our solutions spectrum for tire manufacturing, you reliably manage every production step of this complex process. And with our expertise, you can simply and reliably implement an ever greater degree of automation, whether it's building a green tire or vulcanizing it at high temperatures and under high pressure. Balluff offers you high process security, and is at your side every step of the way. Contact us to learn how we can partner with you.



INTRALOGISTICS AND  
PROCESS MONITORING

VULCANIZATION



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**TIRE BUILDING**



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**INTRALOGISTICS AND  
PROCESS MONITORING**



Traceability guaranteed

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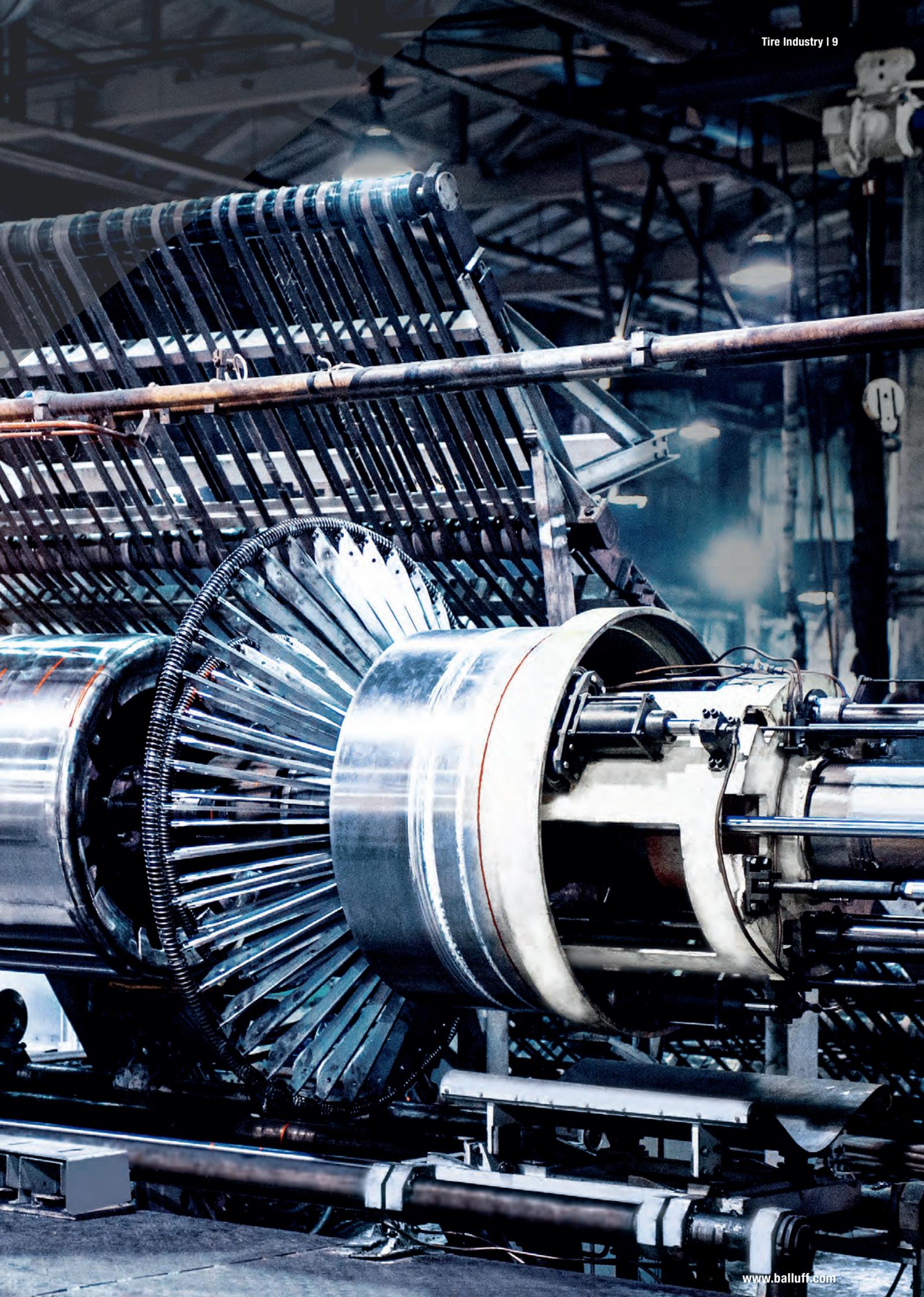
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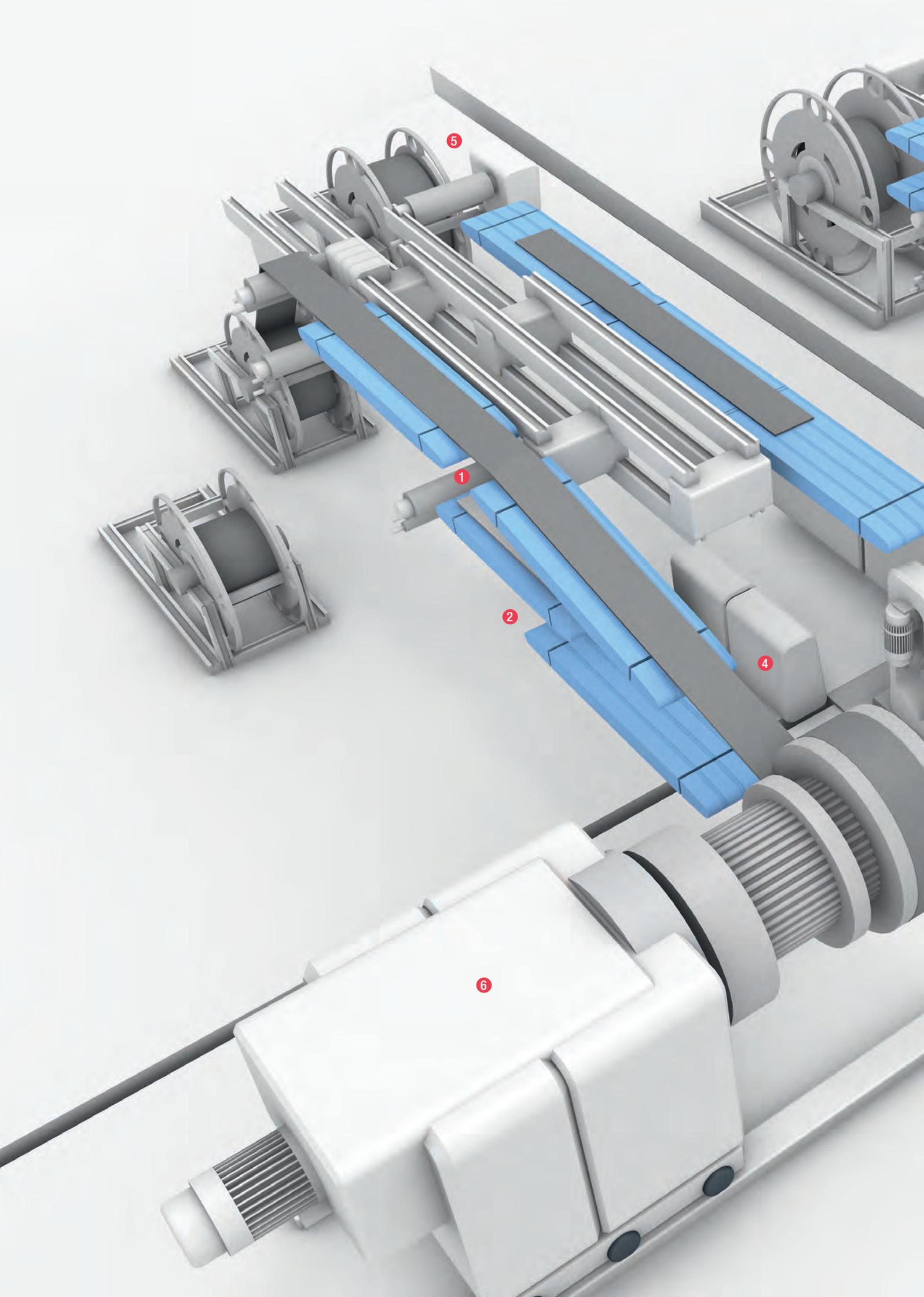
Tire building

# ENSURING HIGH TIRE QUALITY.

 *innovating automation*

Ensure the high quality of your tires and the smoothest of processes in tire building. To make sure these critical process steps are accomplished optimally we provide you with sensors you can use to perfectly equip your tire building machine. For example, to exactly position your sliders, our various solutions offer you a number of options. At the same time you enhance process security, preventing downtimes and ensuring continuous material provision and consistently high process speed so that each tire blank is efficiently and correctly constructed.





5

1

2

4

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# Solutions for the tire building machine

3

- 1 Control the process
- 2 Monitor material feed
- 3 Position the slider exactly
- 4 Ensure controlled movements
- 5 Guarantee material availability
- 6 Always keep an eye on operational status

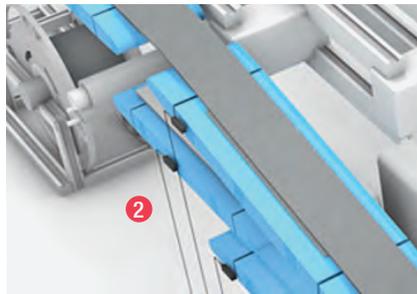


**CONTROL THE PROCESS**  
**With BOD photoelectric distance sensors**

Our photoelectric distance sensors monitor the liner sag to ensure correct material feed speed. By monitoring the process of tire building you are able to intervene in a timely fashion when problems arise. The time-of-flight technology of these sensors ensures stable and precise measurements regardless of the surface composition. Another advantage: the compact IP67 housing means the sensors can be easily integrated in tight spaces.

**Features**

- Stable measurements with high accuracy regardless of the material surface
- Foreground and background suppression
- Scalable measuring range
- Simple, intuitive operation with set-up buttons and display

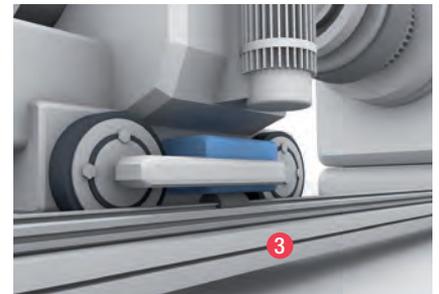


**MONITOR MATERIAL FEED**  
**With BSI inclination sensors**

Reliably monitor the tilt movements of the conveyor belt in the tire building machine using our inclination sensors. This ensures that the needed liners are reliably fed as soon the next process steps require it. The high 0.1° accuracy of our inclination sensors ensures exact feed. In addition, the non-contacting technology is wear- and maintenance-free, so that you have the benefit of high equipment uptime.

**Features**

- Continuous detection of rotary movements
- Compact form factor saves space
- Centering function for flexible installation



**POSITION THE SLIDER EXACTLY**  
**With BTL magnetostrictive linear position sensors**

To ensure that all the tire components on the tire building machine can be brought together into a green tire without wasted time, our magnetostrictive position measuring systems enable exact positioning of your sliders. Rapid construction of the tire components is ensured and travel movements are perfectly controlled.

Alternatively, you can use our magnetic encoders to determine the changing positions of the feed mechanisms with utmost precision.

**Features**

- Highly precise
- Time-saving since it can be used immediately after installation with no homing move
- Generous measuring lengths



**ENSURE CONTROLLED MOVEMENTS**  
**With BMF magnetic field sensors**

Our magnetic field sensors reliably detect the end positions of the piston in pneumatic cylinders to ensure proper motion of the tire building machine. These sensors check the piston position without contact or wear. This makes them especially durable. In addition, you can install the magnetic field sensors directly in the cylinder slot. This ensures they are held in a stable position and makes them ideal for flush mounting in space-critical applications.

**Features**

- Wide temperature range:  
-25...85 °C
- IP67 protection
- Easy to integrate with their short form factors

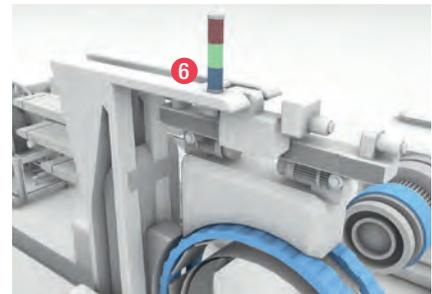


**GUARANTEE MATERIAL AVAILABILITY**  
**With BUS ultrasonic sensors**

Would you like to ensure that there is always sufficient material on the drums for the tire building process? Our ultrasonic sensors are ideal for accomplishing this. They measure the exact diameter of the rolls, whether the material is rubber, textile or steel. This ensures that new material is fed at exactly the right time before the machine runs out. Our ultrasonic sensors also feature an IO-Link interface. This lets you transmit diagnostic information – for example to the LED SmartLight stack light where you can view the current status at any time.

**Features**

- Available with IO-Link interface
- Any material, color or surface composition
- Insensitive to contamination
- Extremely precise, small blind zones



**ALWAYS KEEP AN EYE ON OPERATIONAL STATUS**  
**With the BNI SmartLight stack lights**

Use our SmartLight to visualize the current operating status of your tire building machine in detail and even represent progressions and trends. The SmartLight provides a flexible color spectrum you can individually define in the controller. Detect critical machine conditions and material shortages and respond to them in time to avoid costly downtimes of the tire building machine.

**Features**

- Visualize output signals from your sensors in detail
- No mechanical modifications, simple to set the parameters
- Flexible, individually definable color spectrum with various modes such as run light or segment mode, also displays trends

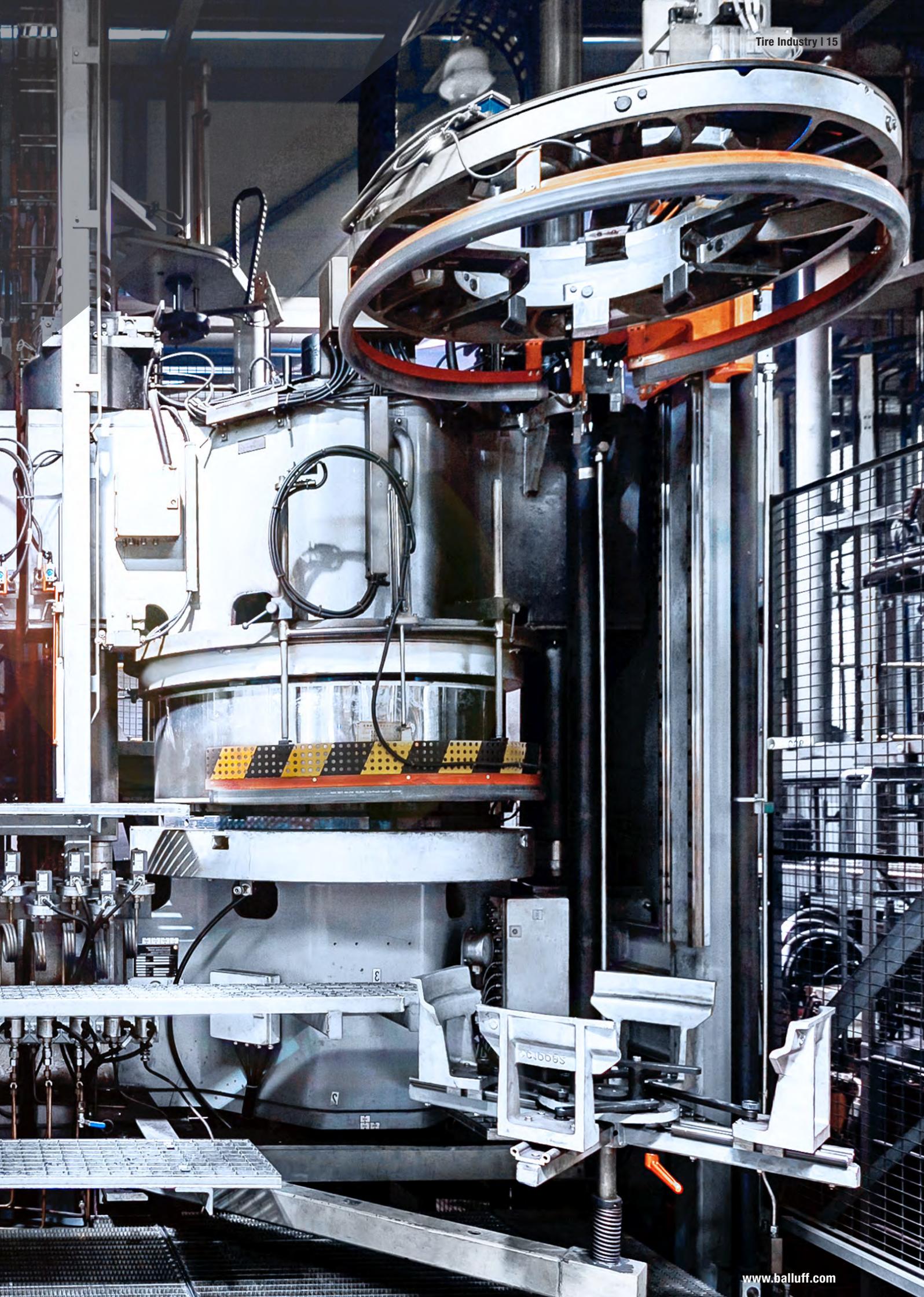
Vulcanization

# PRECISION FOR EVERY SINGLE STEP.

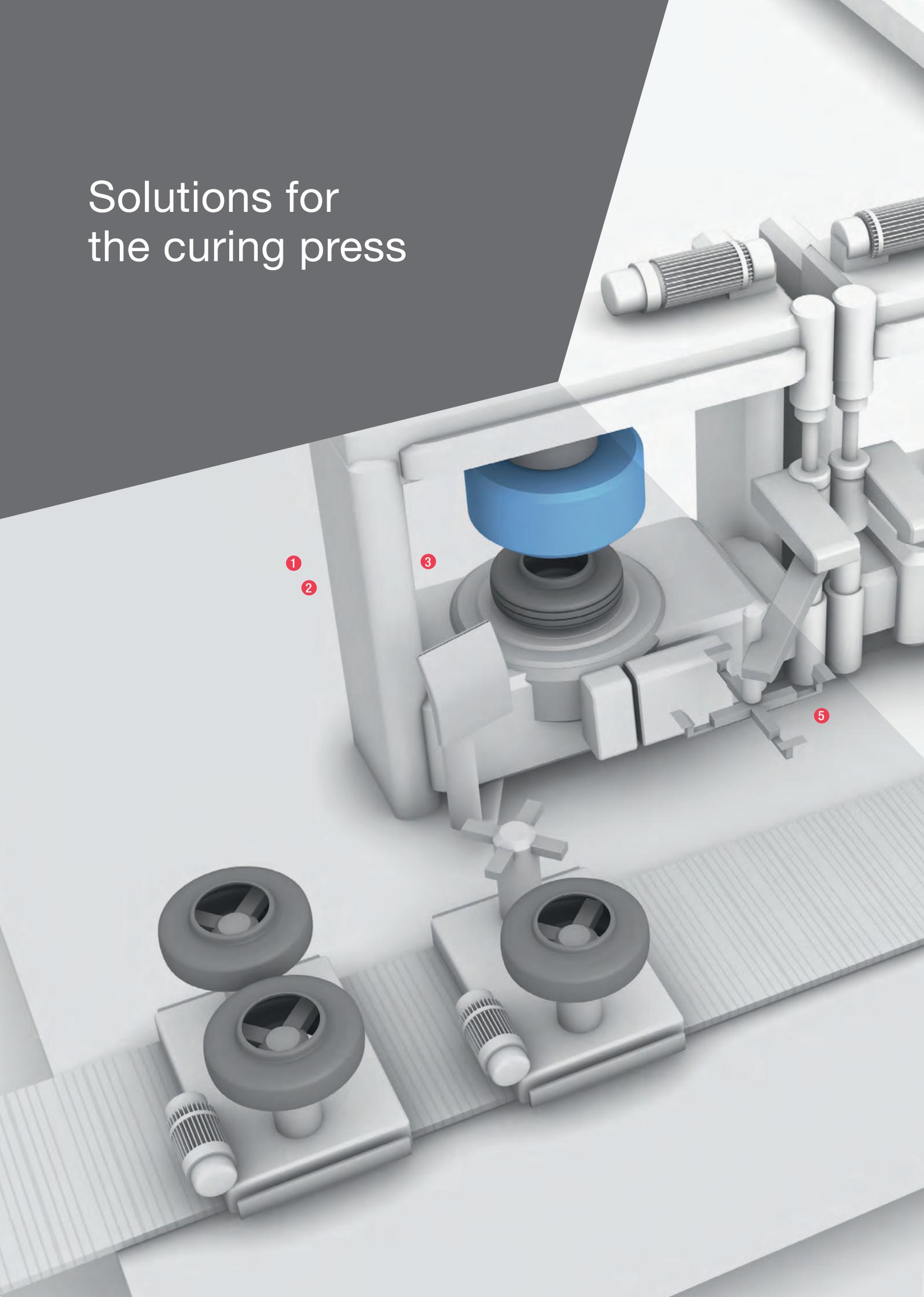
 *innovating automation*

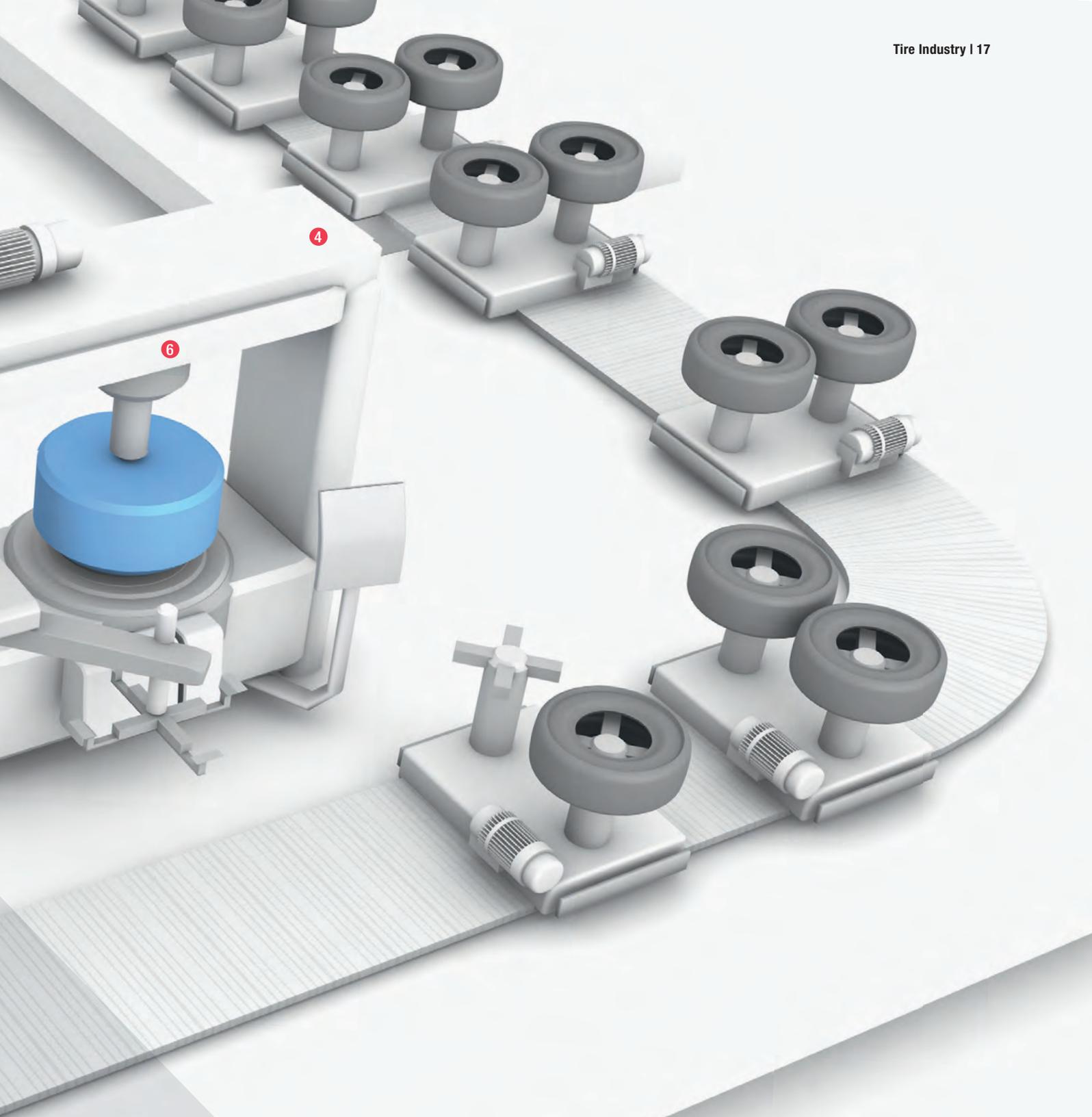
To ensure that the critical process of vulcanization of the green tire in the curing press runs properly, Balluff offers you optimal solutions for every single step. Each of these solutions contributes its part to process reliability.

You get the highest precision in forming the green tire under high pressure and at high temperatures, whether you use our ultrasonic sensors for detecting the tires in the press, monitoring the pressure of the pneumatic lines using our pressure sensors, or ensuring controlled closing of the presses using our magnetostrictive linear position sensors.



# Solutions for the curing press





- ① Monitoring vulcanization pressure
- ② Simplify connections and start lowering costs
- ③ Tire detection for process reliability
- ④ Detect vulcanization progress at a glance
- ⑤ Monitor position of the gripper arms
- ⑥ Reliable closing movement



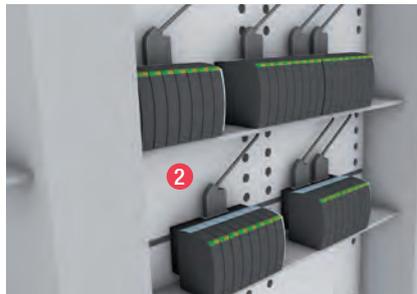
### MONITORING VULCANIZATION PRESSURE

#### With BSP pressure sensors

Pressure sensors from Balluff ensure reliable pressure monitoring during vulcanization and thereby contribute to process reliability. Our solutions can be installed in the hydraulic board or attached to the pneumatic lines. Available are both pressure transmitters and pressure sensors with display from which you read current values. Both sensor types feature reliable measurement technology. Their rotating housing enables flexible installation and their VDMA conformal programming ensures convenient operation.

#### Features

- Extended temperature range
- Stainless steel housing
- With IO-Link interface, can be installed right where the action takes place while taking up little space



### SIMPLIFY CONNECTIONS AND START LOWERING COSTS

#### With BNI IO-Link valve interfaces

All the pneumatic lines come together in the control cabinet. With our IO-Link valve interfaces you use a simple industry standard cable to connect decentralized valve terminals to the controller. This makes it easy to control the reliable movement of the pneumatic cylinders. You also simplify installation, since IO-Link needs only an unshielded 3- or 4-conductor cable. This minimizes effort and expense, saves cable and tube material, and reduces your costs.

#### Features

- Compact adapter housing, ideal for tight spaces
- For various applications, pin compatible with a wide range of valve terminals
- IO-Link means noise-immune signals



### TIRE DETECTION FOR PROCESS RELIABILITY

#### With BUS ultrasonic sensors

When loading and unloading the press with the help of grippers, you need to check whether there is already a tire on the gripper. This is monitored by our ultrasonic sensors. These contamination-proof sensors detect the tire without contact and without regard for its color or surface composition. In this way our ultrasonic sensors are critical in the trouble-free loading and unloading of the curing press. Bottom line: greater process reliability.

#### Features

- Diagnostics capability with IO-Link interface
- Unaffected by smoke or dust



**DETECT VULCANIZATION  
PROGRESS AT A GLANCE  
With BNI SmartLight stack lights**

Do you need to know what the current status of the vulcanization process is at all times? That is not a problem with the SmartLight LED stack light. Its color spectrum is individually definable and can be changed on-the-fly. All the sensor signals are collected by an IO-Link master module which controls the stack light. This lets you see at a glance when the vulcanization process should be finished. So that you can introduce the next process steps without wasting time.

**Features**

- Always be informed of progress and trends
- Individually definable, versatile color spectrum
- Display can be changed on-the-fly with no mechanical changes – thanks to IO-Link

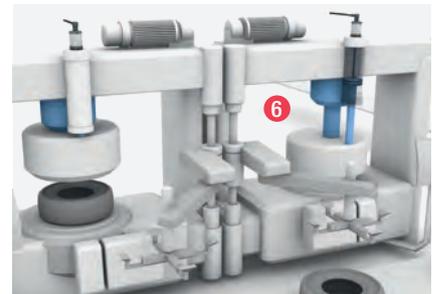


**MONITOR POSITION  
OF THE GRIPPER ARMS  
With BMP magnetic field positioning systems**

Balluff magnetic field positioning systems are ideal for monitoring the position of the gripper arms when loading and unloading the curing press. They reliably monitor travel of the pneumatic cylinders in the grippers. This means you can position different tire dimensions easily in the tire press, so that the next steps for vulcanization can be introduced. These contamination-proof sensors are non-contacting and therefore wear-free.

**Features**

- Impervious to contamination
- Very good electromagnetic compatibility
- Reliable results with application-specific linearity and repeat accuracy
- Wear-free
- With IO-Link interface



**RELIABLE CLOSING MOVEMENT  
With BTL magnetostrictive  
linear position sensors**

Our magnetostrictive linear position sensors guarantee you reliable and secure closing movement of the curing press. These repeat-accurate systems ensure precision and consistently high quality, even under high temperatures and strong vibrations, because our systems in the IP67 sealed aluminum housing are highly rugged. Good to know: They provide absolute measurement without the need for a homing move, for rapid and trouble-free startup.

**Features**

- Profile housing for easy installation
- Temperature rated
- Resistant to shock, vibration and contamination
- Available with a variety of interfaces

Intralogistics and process monitoring

# TRACEABILITY GUARANTEED

 *innovating automation*

We use our identification solutions to accompany you reliably through the entire process chain: from delivery of the raw materials to production of the semi-finished products to tire manufacturing and beyond. Each tire can be uniquely identified and every process step traced. This uninterrupted documentation supports a reliable process and helps you meet the requirements for traceability.

Our performance range includes industrial image processing, using SmartCameras, vision sensors and barcode readers. You also have access to various RFID solutions which are based on the wide spectrum of LF, HF and UHF technologies and a huge variety of data carriers, read/write heads and processor units. On this basis we are also able to handle any of your unique tasks for optimal results. Take advantage of our long years of automation expertise and contact us.





# Solutions for intralogistics and process monitoring



- 1 Detect tires on the conveyor line
- 2 Identify raw material
- 3 Verify each production step
- 4 Each manufacturing step is transparent
- 5 Uniquely identify, ensure organized storage

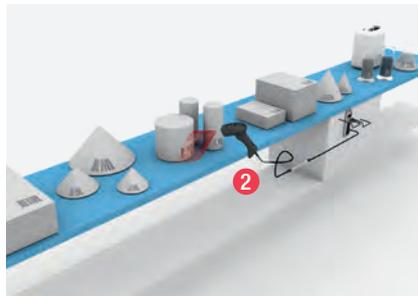


**DETECT TIRES ON THE CONVEYOR LINE  
With BOS retroreflective sensors**

Use our retroreflective sensors when removing the tire from the curing press after vulcanization without manual intervention. These sensors reliably detect whether there is another tire already on the conveyor just when one is being unloaded from the press. If not, automated unloading can start and the tire can be transported on to quality assurance. For greater process security you can use our retroreflective sensors for additional inspections at any desired location on the conveyor line.

**Features**

- Simple alignment thanks to generous mounting tolerances and long range
- Reliably detect objects regardless of their surface, color and material, even with shiny surfaces



**IDENTIFYING RAW MATERIAL  
With BVS HS-P handheld code readers  
and BNI RS232 converters**

Identify raw materials for the rubber mixture with 100% accuracy before they are added to the mixer. Our user-friendly handheld code readers handle this quality check with the utmost reliability. These portable, ergonomically designed readers help you to execute the first-in-first-out principle, remain true to the recipe and ensure all relevant quality criteria. Light in weight, they can read all common 2D, 1D and stacked barcodes.

Our RS232 converters also let you connect any RS232 device to an IO-Link terminal for enjoying all the benefits of IO-Link.

**Features**

- Reliable read confirmation with acoustic signal and LED indicator
- Intuitive aiming system using a highly visible laser marking frame
- Charge once – up to 30,000 read cycles using lithium ion rechargeable battery



**VERIFY EACH PRODUCTION STEP  
With BVS SmartCameras**

SmartCameras from Balluff ensure you of unambiguous identification of each tire at any point in time and for every single production step. They let you proceed to the following quality inspection with confidence.

The SmartCamera reads barcodes automatically and reliably, no matter whether they are in the form of a sticker, direct printed or laser etched. Orientation deviations in the barcode are not a problem, so that the conveyor can be loaded without loss of time and without regard to the tire position. The barcode must simply be located within the field of view.

**Features**

- Simple integration into the production environment through IO-Link
- Safe, customer-specific result management for the controller or for the server
- Robust, industrial-grade design



**EACH MANUFACTURING  
STEP IS TRANSPARENT  
With BIS industrial RFID systems**

Do you mark your tires using RFID data carriers? With Balluff you have access to a wide range of RFID solutions which can be individually adapted to your particular requirements thanks to the product variety. All the data carrier information is automatically read as objects on the conveyor pass by. Another advantage: every production step is consistently documented and can be read back at any point in time. This increases the quality of all process steps and thereby that of the produced tires, so that the scrap rate is significantly minimized.

**Features**

- Rugged and contamination-proof, ideal for harsh environments
- Transparent process since all the information about material, time and utilization is available at all times



**UNIQUELY IDENTIFY,  
ENSURE ORGANIZED STORAGE  
With BIS industrial RFID systems**

Use our RFID solutions for reliably identifying tires after quality inspection to allow organized storage of the final product.

UHF RFID lets you track each individual tire while loading on to the pallets. This simplifies later picking enormously and makes the process transparent.

**Features**

- Consistent and thorough documentation in real time
- Long ranges
- Automatic detection without manual scan processes

# INNOVATIVE SOLUTIONS FOR ALL REQUIREMENTS





CP -  
-PWR  
**BALLUFF**  
BISM

# PRODUCT OVERVIEW



Application	Products	Example	Functions, interfaces and properties
<b>TIRE BUILDING</b>			
Control the process	BOD photoelectric distance sensors	BOD001R	Highly precise, stable measurements regardless of the surface, range 30...200 mm, rugged and compact housing, scalable measuring range
Monitor material feed	BSI inclination sensors	BSI0019	High precision, continuous detection of rotary movements, space-saving with compact form factor, flexible mounting, measuring range -45...45°
Position the slider exactly	BTL magnetostrictive sensors	BTL1A64*	Measuring lengths up to 2300 mm, profile style, repeat accuracy ±0.002 % FS, non-contact and wear-free, insensitive to contamination, IP67
	BML magnetic encoders	BML08Z7*	Can be used right out of the box with no homing move, absolute position feedback in any orientation, measuring range up to 10 m
	BAM measuring tapes for magnetic encoders	BML059M*	Compatible tape, length 3.5 m
Ensure controlled movements	BMF magnetic sensors	BMF006U	Non-contact detection of the piston position, extremely short form factors available, flush mountable for space-critical applications
Guarantee material availability	BUS ultrasonic sensors	BUS004P	Available with IO-Link interface, non-contacting measurement regardless of material, color and surface composition, insensitive to contamination
Always keep an eye on operational status	BNI SmartLight stack lights	BNI007F	Flexible, individually definable color spectrum, detailed visualization of the output signals from sensors
<b>VULCANIZATION</b>			
Monitoring vulcanization pressure	BSP pressure sensors	BSP00YR	Protection to IP67, media temperature -40...+125 °C, Measuring range -1...2 bar, with display, additional diagnostics functions
Simply connect and start lowering costs	BNI IO-Link valve interface	BNI006N	Compact adapter housing, noise-immune signals with IO-Link
Tire detection for process reliability	BUS ultrasonic sensors	BUS004Z	Available with IO-Link interface, non-contacting measurement regardless of material, color and surface composition, insensitive to contamination and smoke
Detect vulcanization progress at a glance	BNI SmartLight stack lights	BNI0082	Visualize output signals from the sensors in detail and reliably, flexible and individually definable color spectrum, simple to parameterize
Monitor position of the gripper arms	BMP magnetic position sensors	BMP0002	IO-Link 1.1, wear-free, measuring range 128 mm
Safe closing movement	BTL magnetostrictive sensors	BTL0LU9*	Rod-style, measuring range up to 1800 mm
	BTL magnetostrictive sensors	BTL25TC*	Profile style, measuring range up to 2000 mm, repeat accuracy: ±5 µm

Application	Products	Example	Functions, interfaces and properties
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## INTRALOGISTICS AND PROCESS MONITORING

Detect tires on the conveyor line	BOS photoelectric sensors	BOS012C	Range 0...4 m, object detection regardless of its surface, color or material, also suitable for shiny objects, simple to align
Identify raw material	BVS HS-P handheld code reader	BVS001Y	Detecting 2D, 1D and stacked barcodes, Bluetooth 2.0 interface, drop protection $\geq 50$ drops 2 m on concrete
	BNI RS232 converter	BNI00C1	For bidirectional communication between RS232 and IO-Link, two digital inputs, high-quality, rugged IP67 stainless steel housing
Verify each production step	BVS SmartCameras	BVS0029	Barcode, 2D-, OCR identification, image resolution 1280 x 1024 pixels, LAN (Gigabit Ethernet), Profinet/Ethernet/IP, IO-Link interface
	BAM lens	BAM02FE	Focal length 16 mm
	BAE ring light	BAE000J	Homogeneous illumination from powerful LEDs, diffuser adapter available, versions with red light, white light and infrared available
Each manufacturing step is transparent	BIS industrial RFID systems	BIS01AW	Country-specific versions available, working frequency: 865...868 MHz
		BIS00NA	Various power classes and country variations available
Uniquely identify, ensure organized storage	BIS industrial RFID systems	BIS01AW	Country-specific versions available, working frequency: 865...868 MHz
		BIS00NA	Various power classes and country variations available

\* Please contact our Sales department to configure your product.

Additional products can be found on our website at: [www.balluff.de/go/product-finder](http://www.balluff.de/go/product-finder)



 *innovating automation*

**Balluff**

# OPENING NEW PERSPECTIVES

Balluff is one of the leading providers of high-quality sensor, identification, network and software solutions for your automation requirements. Family-run for more than 90 years, the company now employs more than 4000 employees in 38 subsidiaries with distribution, production and development sites worldwide, all working towards your success. Together with our branches, we guarantee the highest quality standards worldwide. This is how we empower you to always receive the best.

We give our all to provide top services for innovative solutions that increase your competitive edge. Through years of experience we bring the competence of a manufacturer and high personal engagement.

We live our motto 'innovating automation': we are automation pacesetters, developers and technological pioneers. In open interactions with associations, universities and research facilities, and in close contact with our customers, we create new industry solutions for automation. Innovative Balluff solutions prepare you for a successful future.

We keep the future firmly in sight. In everything we do. With sophisticated environmental management, we protect the environment and handle our resources carefully. This creates the best conditions for sustainable action, also for you.

You can always count on us, our products and our scheduling and delivery reliability. In the spirit of a good partnership.

## Global Project Management

# WE ARE EVERYWHERE FOR YOU

### **Always where you need us**

Wherever you are doing business, we will support you locally. We work closely with machine and systems builders, systems integrators, planning offices and maintenance engineers. Balluff has constructed a global network for you consisting of technical consulting, sales and after-sales services.

### **Project manuals and approval lists**

We provide you with custom tailored product data so your projects run smoothly.. You receive project-specific manuals and approval lists. And personal contacts from Balluff are at your side throughout the entire project.

### **Individual services**

If our services need to be even more personalized, we make this possible as well: with individual e-catalogs, application-specific product modifications, integrated software and system solutions and comprehensive logistics concepts.

Questions? Contact us. We are happy to help.



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# REFERENCES

The demands in the tire industry are high and getting higher. Our complete commitment is to the success of our customers. Future-focused technologies, market-oriented solutions and the expertise of an experienced manufacturer are what we draw on to increase your competitiveness. This is why companies worldwide trust in Balluff solutions for tire manufacturing.

We work together with such companies as



**MESNAC 软控**



**HERBERT®**  
PARTNER FOR TIRE TECHNOLOGY & SERVICE WORLDWIDE

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