

BALLUFF

 *innovating automation*

**PRECISION FOR
HIGH EQUIPMENT
AVAILABILITY**

Plastics Industry

Plastics Industry

WE ARE AT HOME IN MANY
DIFFERENT SECTORS



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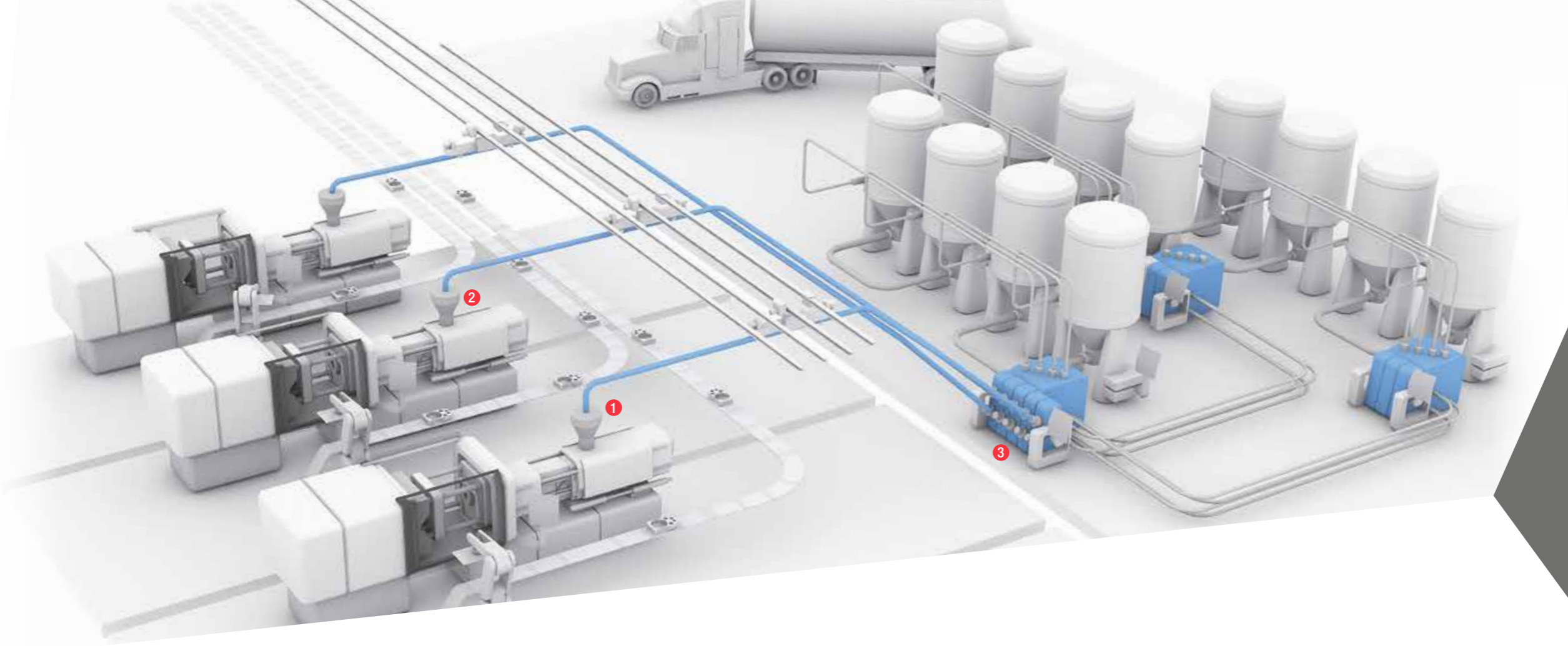
Material handling

HOW TO ACHIEVE AN OPTIMAL PROCESS

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To maintain an optimal material handling process it is important to continuously ensure the cleanliness of the plastic. Proper fill levels are ensured by our capacitive and ultrasonic sensors while industrial RFID handles unerring control of all the processes. This ensures that the paths taken by the granulate, fillers and reinforcing materials from the silos to the coupling stations, from the mixers to the injection molding machines run like clockwork. In different production lines and in every single batch. You achieve precise metering of new compounds in every new composition – fast, precisely and reliably.

While at the same time you increase feed efficiency, improve production quality and reduce complaints because RFID records all your process and product data. This continuous documentation even creates legal security.



Solutions for material handling

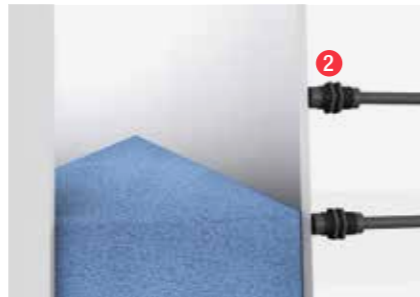


KEEP A CONTINUOUS EYE ON LEVELS
BUS ultrasonic sensors

Our high-resolution ultrasonic sensors don't miss a thing: they reliably monitor the level of granulates and powders in silos. The continuous and contact-free measurement technology is virtually immune to dust and dirt. The fill level can be output as needed by an analog signal or with two switching signals as min./max. values.

Features

- Non-contacting
- Detects even the smallest objects
- Cubic and cylindrical designs



LEVEL FEEDBACK FOR CONSTANT MATERIAL FEED
BCS capacitive sensors

To ensure constant material flow the min/max level must be detected continuously in the injection molding machine. This task is performed by capacitive sensors. Whether in the hopper in direct contact with the materials or through the outer wall, these fill level indicators reliably determine all the values.

Features

- For all materials
- Simple sensor replacement
- Miniature designs



FAST, RELIABLE CONTROL IN THE COUPLING STATION
BIS industrial RFID systems

To ensure the correct mixture of additives, dyes and granulates in the coupling station Balluff offers autonomous RFID systems. RFID identifies each coupling and only releases it if it is connected at the right location. This way you ensure that the right components are always used.

Features

- Rugged
- Quick and powerful
- Protection from improper filling



CONSISTENTLY EVEN GRANULATE FEED
BCS capacitive sensors


Dry granulate is essential for high-quality plastic parts. Our capacitive stainless steel sensors are resistant to high temperatures to ensure an even feed of the moist granulate into the dryer. They are heat resistant to 250 °C and reliably monitor all levels.

Features

- Stainless steel
- Sensor head made of PTFE

Injection molding

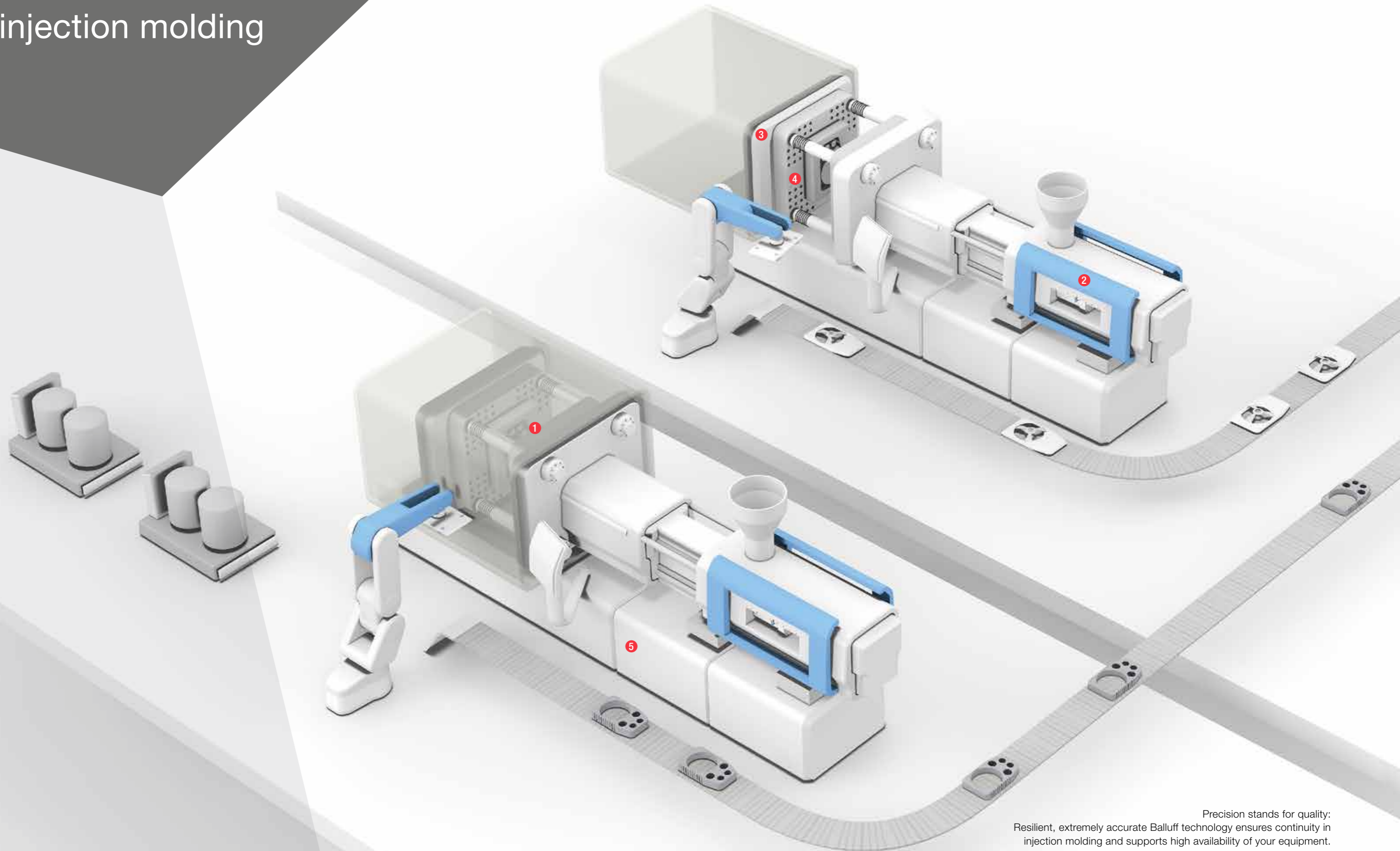
IN CONTROL OF EVERY DETAIL

 *innovating automation*

In high-precision injection molding every step has to be performed precisely from injecting the molding compound to ejecting the formed part. With our high-quality solutions you can reliably control every movement of the injection molding machine. Our inductive positioning systems provide rapid mold filling and our capacitive sensors check for completeness. Magnetic encoders ensure soft mold closing. Rugged pressure sensors integrated into the hydraulic cylinder ensure that the platens are properly closed.

You can rely on high repeat accuracy and durability thanks to our technology optimized through High Accelerated Lifetime Tests (HALT). The rugged design delivers extended run times and contributes to equipment up-time. Our quality means your precision. And failsafe performance means efficiency and economy.

Solutions for injection molding



Precision stands for quality: Resilient, extremely accurate Balluff technology ensures continuity in injection molding and supports high availability of your equipment.

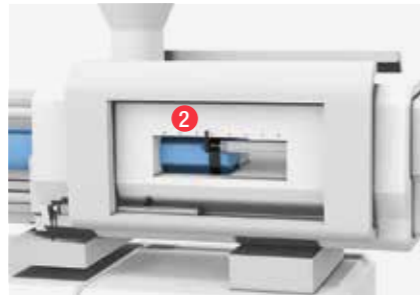


ENSURE GENTLE MOLD CLOSING
BTL magnetostrictive linear position sensors

With the help of a high-precision magnetostrictive linear position sensor from Balluff you can precisely monitor the closing motion of the platen. A gentle mold closure reduces wear and extends your mold's useful life.

Features

- Non-contacting and thus free from wear
- No homing necessary, immediately ready
- Resistant to vibration, moisture and dust



DETECT INJECTION MOVEMENT ON MOLDS
BIW inductive linear positioning systems

Our inductive positioning systems ensure that your molds are quickly filled. The high sampling frequency and repeat accuracy measure the travel of the injection axis precisely and reliably. You can exactly calibrate the injection profile, for example, to produce high-quality, thin-wall parts.

Features

- Fast: High measuring frequency of 32 kHz
- Non-contact position detection
- High repeat accuracy

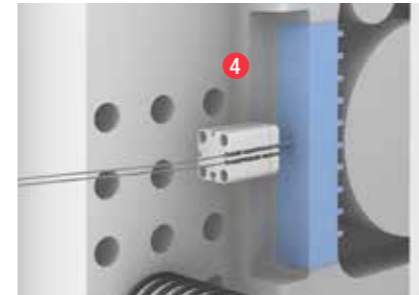


CONTINUOUSLY MONITOR TIE BAR EXTENSION
BAW inductive distance sensors

Inductive distance sensors from Balluff ensure continuous monitoring of the tie bar extension in the process. They are insensitive to contamination and provide optimal linearity as well as high repeat accuracy.

Features

- Distance-proportional, analog output signal
- Measuring ranges from 0.5 to 50 mm
- Measuring speed up to 40 m/s



DETECT THE POSITION OF CORE PULLS WITHOUT WEAR
BMF magnetic field sensors and BHS inductive high pressure sensors

Our magnetic field sensors are ideal for optimal adjustment of core pullers. These ensure that the core pull is at the required end position. They detect the position directly at the hydraulic block cylinder. Alternately you can also use high-temperature rated sensors.

Features

- Designed for tight mounting locations
- Can be fully integrated
- Low weight
- Wear-free position detection
- Two teachable switching outputs with up to eight switchpoints over IO-Link

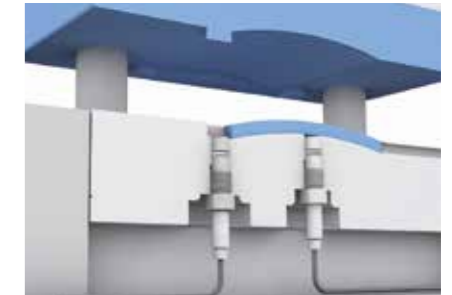


MONITOR PRESSURE
BSP pressure sensors with display

Perfect closure of the clamping plates requires the correct pressure. Reliable pressure monitoring in the hydraulic cylinder is handled by a rugged pressure sensor in a stainless steel housing. Equipped with IO-Link, the pressure sensors relay their values directly to the controller and thus let it readjust with precision.

Features

- Extended temperature range up to 125 °C
- Up to 600 bar
- Process-oriented installation
- Equipped with IO-Link



MOLD FILLING WITH MEASUREMENT
BCS high temperature and high pressure capacitive sensors and sensor amplifier for BCS capacitive sensors without internal amplifier

Our high-pressure and high temperature rated capacitive sensors reliably check whether the cavity is fully filled and the RTM (Resin Transfer Molding) is completed. They offer great mechanical stability, e.g. for lightweight construction and can be integrated directly in the tool. Their specially polished surface prevents plastics and composites from sticking.

Features

- Pressure rated to 150 bar
- Temperature-resistant up to 180°C
- Flush-mounted

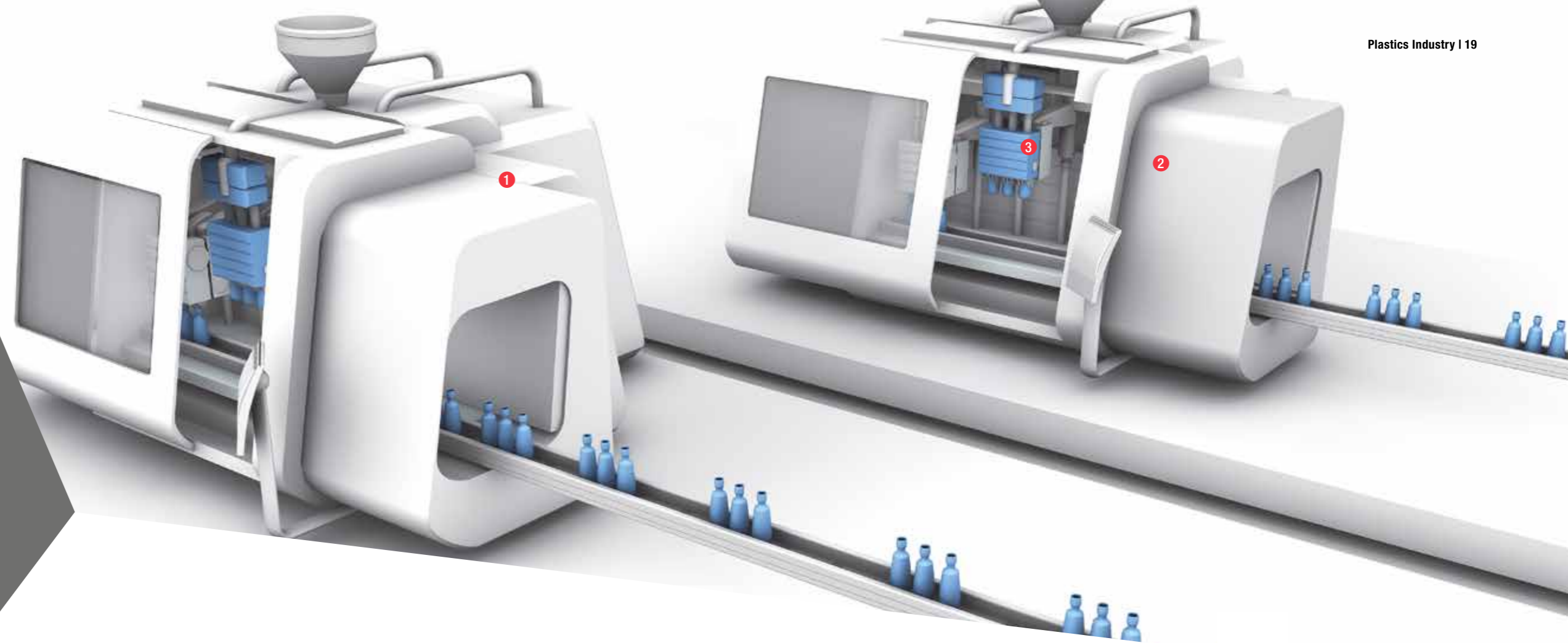
Blow molding

ECONOMY THROUGH OPTIMAL MATERIAL UTILIZATION

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When it comes to blow molding, Balluff offers you great precision for optimal material utilization. Our products ensure exact extrusion of the hoses and allow for the correct structure of multiple plastic layers. And we make it possible to reliably produce containers with acid-resistant inner walls, different wall thicknesses or in various colors. Our sensors provide an economical solution that guarantees the desired product quality because only exact processing of the individual materials lets you be sure that, for example, tanks containers or bottles have the requisite characteristics.

Solutions for blow molding



A BLOCK FOR GREATER TRANSPARENCY
BNI IO-Link block

The EtherCAT block from Balluff with IO-Link interface bundles the signals from a variety of standard sensors and passes them along to the controller. This solution simplifies the entire network structure and creates transparency down to the last meter.

Features

- 8 independent IO-Link ports
- Integrated display
- Automatic address assignment

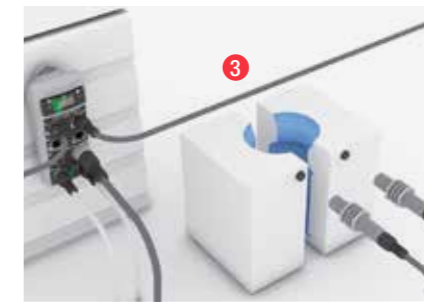


KEEP A FIRM GRASP ON ALL MOVEMENTS
BTL magnetostriuctive linear position sensors

Travel movements at the blow station are under control with Balluff BTL magnetostriuctive linear position sensors, even if there are vibrations. The high-precision measurement systems have an EtherCAT interface. Because of their contact-free and wear-free measuring principle, they contribute to long machine running times.

Features

- EtherCAT interface
- No homing necessary, immediately ready



RAPID TOOL CHANGES AND SECURE PROTECTION FROM COUNTERFEITING
BIS industrial RFID systems

Balluff industrial RFID enables fast and reliable mold replacement with the unambiguous association of mold halves through unique IDs. You also benefit from secure counterfeit protection. This solution allows for rapid size changes and facilitates a continuous process.

Features

- Flexible, non-contact data communication
- Fast and sturdy
- Counterfeit protection



BEVERAGE FILLING
BTL magnetostriuctive linear position sensors

The beverage industry uses stretch blow molding machines to produce bottles. If the bottles are filled immediately afterward, our high-precision SF fill level sensor controls the fill level during the process. On-site filling can save you transport distances and thereby minimize costs.

Features

- Ecolab, 3A approval, IP69K
- For aseptic processes
- Safe for sterilization (SIP) and cleaning (CIP)

Bonding and joining technology

A CONTINUOUS EYE ON EVERY SEAM

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When it comes to secure joining parts, whether of the same and different materials, both ultrasonic and vibration welding offer the best features. By using these welding techniques you ensure the best possible mechanical strength and sealing of the joined materials. To reliably inspect these first-class joining technologies we offer proven solutions. This applies as well to sensitive areas such as the foods industry or medical and electronics.

You can continuously compare the results during the process. Super-fast linear measuring systems give you precise feedback, while versatile industrial cameras take over visual quality control. Weld seams, sizes, distances, production steps – everything can be known at a glance. And our SmartCameras offer outstanding operating convenience.

Solutions for bonding and joining technology



RELIABLE ALIGNMENT OF THE WELDING HEAD BMP magnetic field positioning system

Our magnetic field positioning systems provide reliable position feedback. They check the welding head position without contact and fit in the tightest of spaces while improving process reliability and automation quality. Thanks to the modular design you can use them with a variety of cylinders up to 256 mm to cover the entire stroke.

Features

- Reliable position feedback
- Low temperature drift and very good electromagnetic compatibility
- Ideal for short strokes



VISUAL QUALITY CONTROL BVS SmartCameras

The SmartCamera checks all the parts including their production stages: are they complete and defect-free? Are the size, distance and position correct? And are they correctly aligned? The best part is all the steps can be easily taught.

Features

- Flexible use of analysis tools
- Simple to operate with user-guided tool teaching
- Optimized display of the results



Robotics and automation

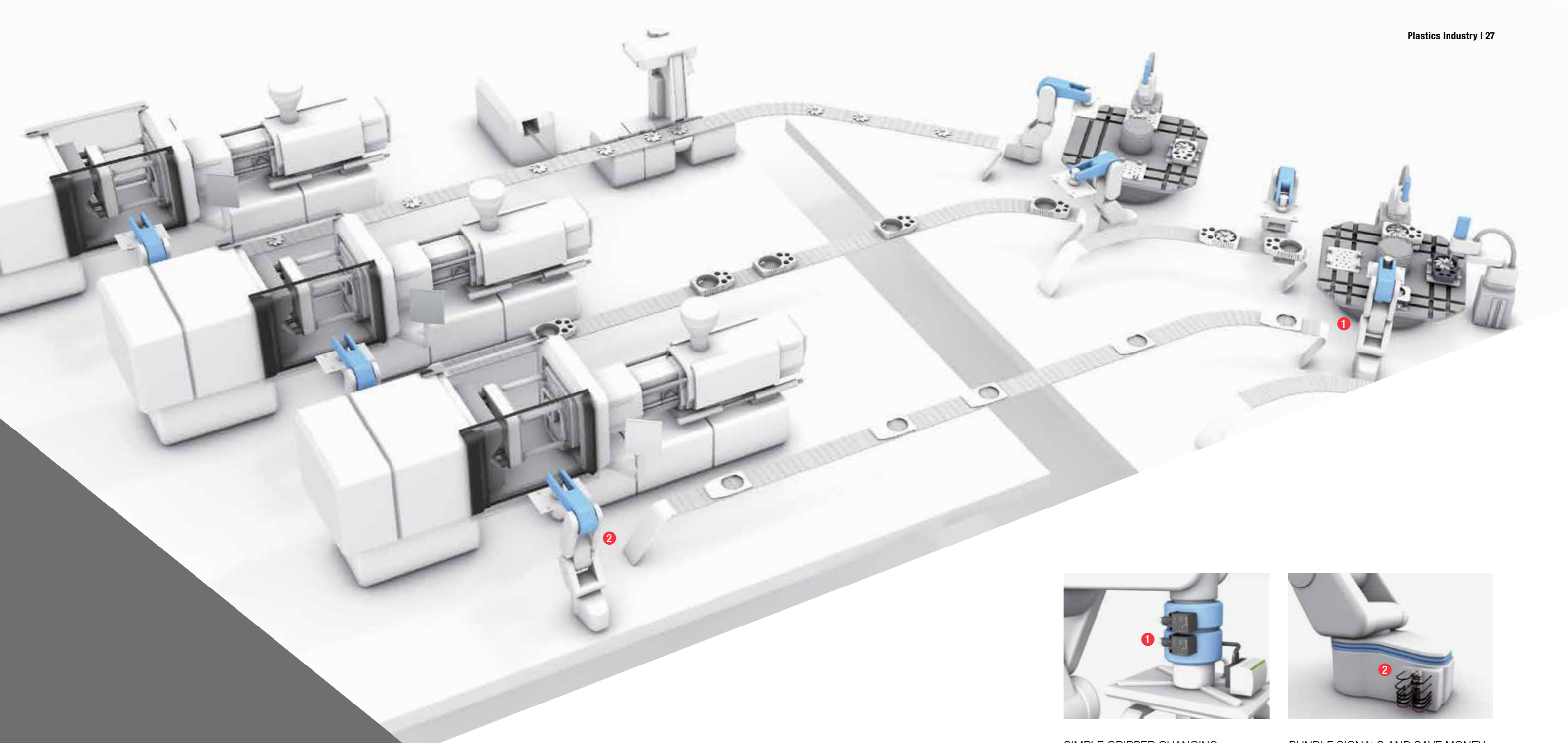
LEAN NETWORKS REDUCE COSTS

 *innovating automation*

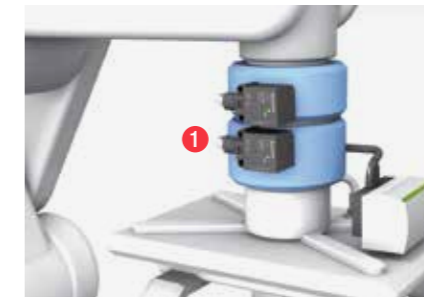
Robotic automation tasks are no longer necessarily associated with excessive installation costs and effort, maintenance, and parts replacement. With non-contact transmission of signals and power using inductive couplers, you can leave wear and cable breaks in the past. Use of these quick-disconnect units also makes you highly flexible.

By also using IO-Link you can significantly simplify your network topology. You reduce the installation costs and effort to a minimum while enjoying noise immunity. With this communication standard you can integrate all the sensors into the fieldbus level. And with IO-Link devices, continuous diagnostics and parameterization are possible using the controller. IO-Link reduces the number of devices and offers transparency down to the last meter. For a lean network structure simply connect your IO-Link devices to an IO-Link network block to bundle the signals. You also profit from huge time and money savings.

The Balluff IO-Link portfolio with masters, hubs and intelligent sensors offers an incomparably wide selection for such efficiency.



Solutions for Automation and robotics



SIMPLE GRIPPER CHANGING BIC inductive couplers

With the help of Balluff inductive couplers, the need for manual insertion of mechanical connectors when changing grippers is eliminated. The couplers send signals and power without contact, are easy to use and offer maximum flexibility. The quick-disconnect units can be changed in the gripper in just moments.

Features

- Long service life, no mechanical wear
- Plug-and-play
- Weight savings



BUNDLE SIGNALS AND SAVE MONEY BNI IO-Link blocks

Our IO-Link sensor hubs made of plastic or metal collect the signals from the sensors embedded in the gripper and pass them along in bundled form to the controller. The controller can be connected to a 16-port IO-Link master, which records the signals of up to 272 sensors. This reduces your wiring effort, saves weight and reduces cost.

Features

- Easy to install
- Central parameter setting
- Continuous diagnostics

Tool management

CONNECTED MOLD-ID – AUTOMATED TOOL DATA MANAGEMENT

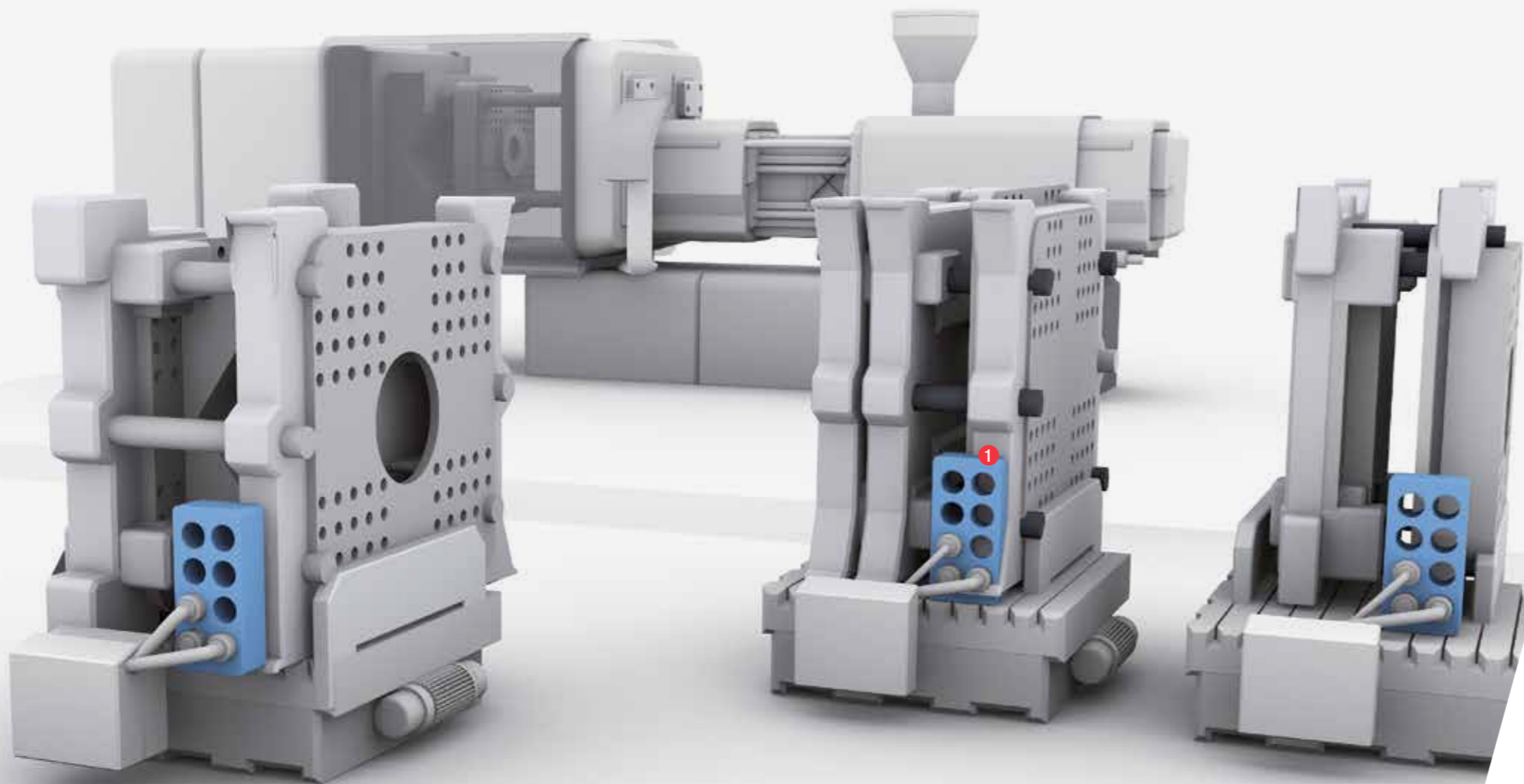


Connected Mold-ID enables optimal utilization of your injection molding tools. Now you can fully track their usage at any time because all the relevant data is automatically recorded and documented.

Your tools can be maintained based on their condition. By monitoring maintenance and upkeep you possess the fundamental information for optimizing your processes. Because automated data management ensures transparency, makes you flexible and increases efficiency connected Mold-ID creates the prerequisite for efficient tool life cycle management.



System solution Connected Mold-ID



OPTIMAL TOOL MANAGEMENT Connected Mold-ID

With automatic documenting of the mold utilization via RFID you can reduce unplanned downtime. A separate shot counter records all production cycles. All the data is stored on a data carrier either directly on the tool or on the multi-coupling. In this way you can see the mold condition directly on the machine and always keep an eye on the life cycle of the current mold.

Features

- Immediate information about the mold condition
- Mobile readout of the data using a RFID handheld reader
- Linking to the database
- Data analysis and transparency for all injection molding tools
- Optimal tool utilization
- Flexible, efficient injection molding production
- Condition based maintenance
- Asset tracking

Connected Mold-ID condition-based maintenance

Why Connected Mold-ID?

Connected Mold-ID from Balluff ensures condition-based maintenance of your tools without cumbersome and error-prone tool log books because Connected Mold-ID stores all the relevant data, such as drawing number, number of shots, last maintenance or service life, automatically on the mold itself. You can retrieve this data at any time and/or compare it with the data for other tools. This provides optimal utilization of your injection molding tools. With connected Mold-ID there is no more lack of planning ability and availability that results from manual tool handling.

Connected Mold-ID is based on Mold-ID, an autonomous system that uses RFID to record all the data and thereby document all the production cycles. This autonomous system lets you retrofit any individual machine – regardless of location or manufacturer.

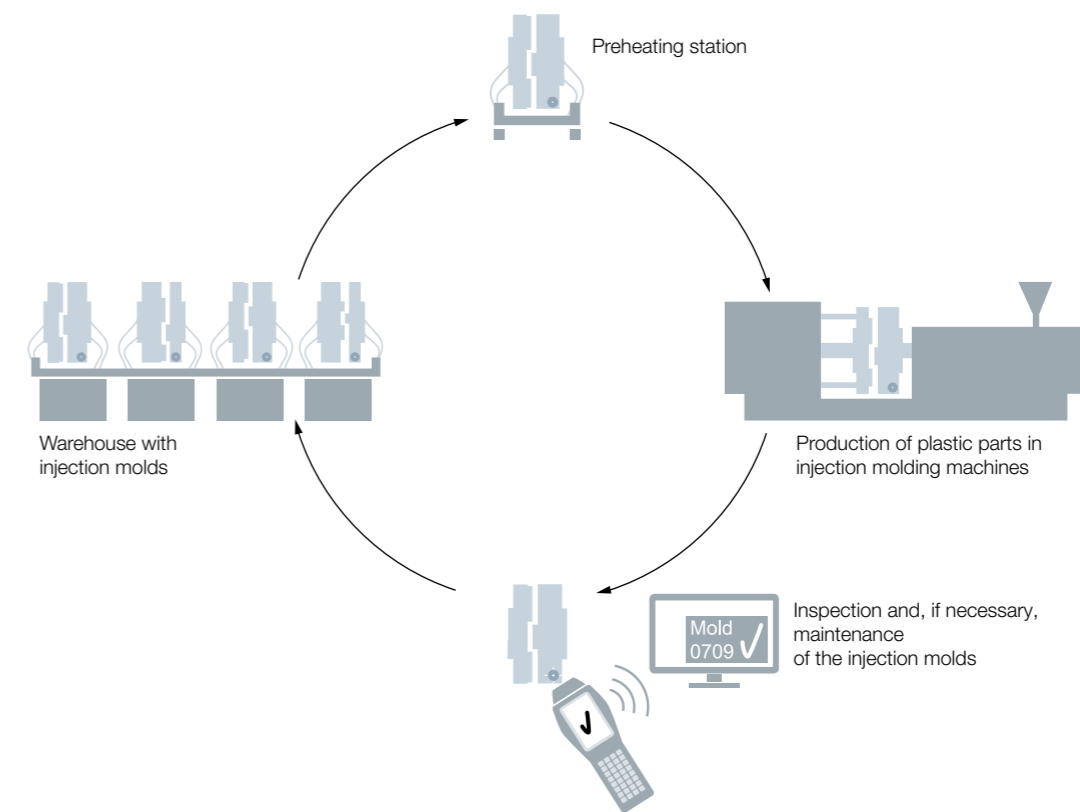
What Connected Mold-ID provides

- OEE (Overall Equipment Efficiency) is improved, i.e. less unplanned downtime thanks to
 - Permanent **counting** of the shots
 - Automatic documentation on the tool itself and in a database
 - **Visualization** of the tool condition
 - **Alert** to the operator when the next maintenance is due
- Transparency through the level of use of identically designed molds
- Overview of all molds currently running on the machines, through access to the systems over the company network via TCP/IP
- Mobile reading out of the documented mold data via RFID handheld, for example, during an audit or when selecting the correct mold

The most important benefits

- RFID and shot counters – Continuous, automated documentation of the tool life
- Consistent system solution – No more error-prone manual tool data handling
- Database offers planning security – Transparency for all injection molding tools
- Shot count and Mold-ID – The basis for efficient tool life cycle management
- On-premise solution – Data remains on the internal server
- Simple asset management – Data can be recalled at any time

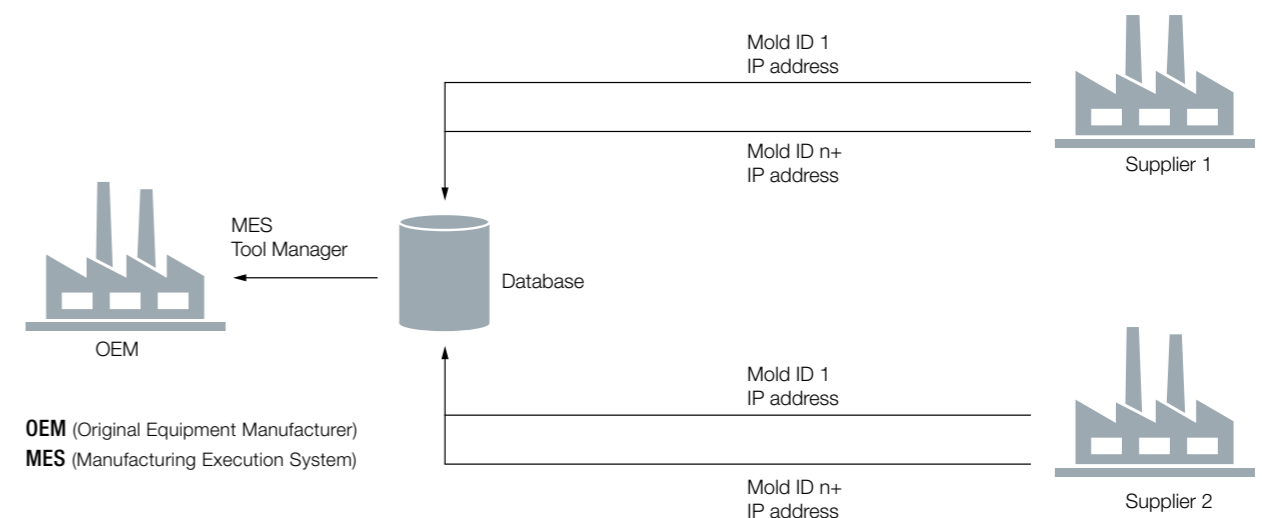
Typical mold cycle



How you integrate tools and asset tracking across different plants

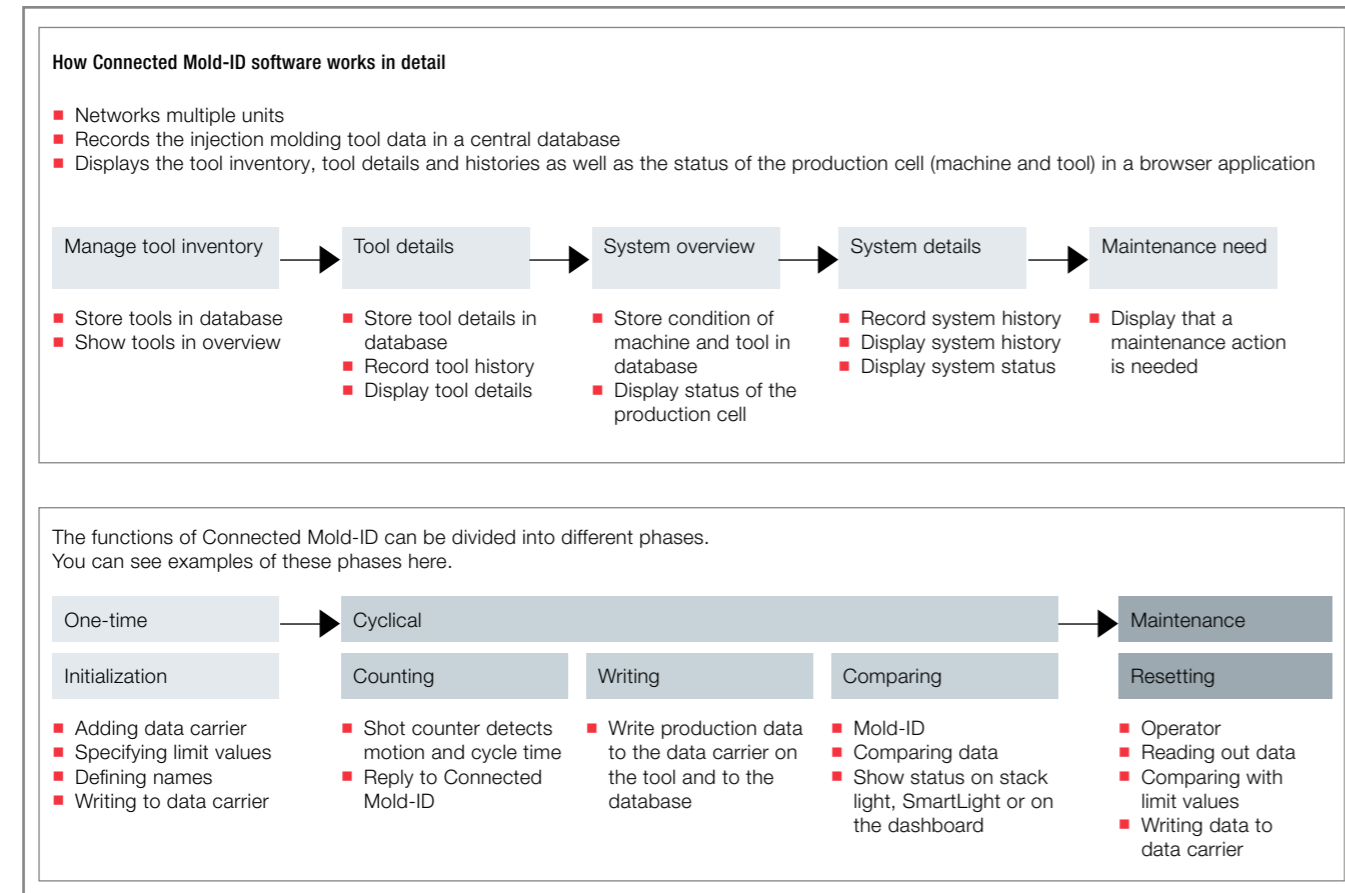
Many companies use their injection molding tools both at the main plant and in other production locations or at suppliers who are not connected to MES. In many cases you have only incomplete information about the location and condition of the tools, thereby preventing an overall view.

With Connected Mold-ID you have access to detailed information about all your tools. Horizontal integration is now possible in the context of the IIoT.



Connected Mold-ID – the system solution for tool management

In addition to condition based maintenance, Connected Mold-ID offers you tool management with automated tool documentation. This system solution lets you network multiple units together in software and manage the data in a database.



Connected Mold-ID software - overview

- Networks multiple units
- Records the injection molding tool data in a central database
- Displays the tool inventory, tool details and histories as well as the status of the production cell (machine and tool) in a browser application
- Recording of the production cycles by an autonomous system
- All data is available directly on the mold via RFID
- Access to the Connected Mold ID system using a standard web browser
- Optimal tool changes by visualizing inspection intervals on the equipment and in the software
- Overview of the entire tool inventory, tool details and machine inventory
- Recording of tool history



Components of the Connected Mold-ID system

<p>Unit</p> <ul style="list-style-type: none"> ▪ Compact process unit ▪ Web server ▪ Gateway to the company network ▪ Can be visualized using the SmartLight stack light 	<p>Shot counter</p> <ul style="list-style-type: none"> ▪ Record production cycles 	<p>SmartLight stack light</p> <ul style="list-style-type: none"> ▪ Visualize operating status ▪ Display directly on the machine 	<p>RFID reader</p> <ul style="list-style-type: none"> ▪ Communicates with data carrier 	<p>Data carriers</p> <ul style="list-style-type: none"> ▪ For each mold ▪ Variant depends on the ambient conditions
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Optionally you can integrate mobile terminal devices into the Connected Mold-ID system



Mobile terminal devices

- Read data
- Initialize data carrier
- Set limit values
- Password protection

Test the Connected Mold-ID

You can test the Connected Mold-ID yourself. Use the demo tool on the product page: www.balluff.com/en/de/productfinder/#/ca/A0018/cg/G1801/product/F180102/variant/MP10062274

INNOVATIVE SOLUTIONS
FOR ALL REQUIREMENTS



Product overview



Application	Products	Example	Functions, interfaces and properties
MATERIAL HANDLING			
Continuously keep an eye on the fill level	BUS ultrasonic sensors with analog output	BUS000E	80x80 mm, analog output 0...10 V, operating range 600...6000 mm
Fill level indicators for continuous material feed	BCS capacitive level sensors with media contact	BCS00NH	M30 x 1.5, preferred types (worldwide availability and applicability, good price/performance ratio), level detection, M12 connection
Fast and reliable control in coupling stations	BIS industrial RFID systems	BIS00YL	HF data carriers (13.56 MHz), data carrier, Ø 7.9 mm, memory capacity 112 bytes
		BIS013Z	HF read/write heads and antennas (13.56 MHz), read/write head, Ø 14,5 mm, for connecting to BIS V Processor Units
		BIS00U9	Multi-frequency processor unit BIS V (125 kHz), EtherCAT, connect up to four read/write heads, with IO-Link interface, other fieldbus versions available
Consistently even feed of moist granulate	BCS capacitive sensors with special properties	BCS00A1	M18 x 1, unshielded, high-temperature rated to +250 °C, please order sensor amplifier separately
	Switching amplifier for BCS capacitive sensor heads	BAE00L9	Standard version, narrow design, mountable on DIN rail, M12 connection
INJECTION MOLDING			
Ensure gentle mold closing	BTL magnetostrictive linear position sensors	BTL7-V50E-...*	Profile, with EtherCAT interface, measures up to 16 positions, stroke lengths up to 7620 mm
Detect injection movement on molds	BIW inductive transducer system	BIW1-A310-...*	Profile style, analog output 0...10 V, sampling rate typ. 32 kHz, stroke lengths up to 750 mm
Continuously monitor tie bar extension	BAW inductive distance sensors	BAW004M_	M12 x 1, analog output 0...10 V, Measuring range up to 3.5 mm, IP67
Detect the position of core pulls without contact	BMF magnetic field sensors for C-slot	BMF00JJ	Up to 8 switchpoints configurable via IO-Link
	BHS high-pressure rated inductive sensors	BHS0058	M8 x 1, switching distance 1.5 mm, pressure rated to 500 bar, 2 m PUR cable
Monitoring pressure	BSP pressure transmitter with display	BSP00YH	Measuring range 0...400 bar, analog output Analog, Voltage/Analog, current selectable 4...20 mA/0...10 V, IO-Link interface
Mold filling with measurement	BCS capacitive sensors with special properties	BCS013E	M12 x 1, length 38.5 mm, high-temperature rated to +250 °C, high-pressure rated to 150 bar, please order sensor amplifier separately
	Switching amplifier for BCS capacitive sensor heads	BAE00KH	Standard version, narrow design, mountable on DIN rail, 2 m PUR cable

Application	Products	Example	Functions, interfaces and properties
BLOW MOLDING			
A module for more transparency	BNI network modules for EtherCAT	BNI0077	EtherCAT-IO-Link-Master, 8x IO-Link 1.1, 16 x I/O, IP67, other fieldbus versions available
All movements firmly under control	BTL magnetostrictive linear position sensors	BTL7-V50E-...*	Profile style, with EtherCAT interface, measures up to 16 positions, stroke lengths up to 7620 mm
Fast mold changing and reliable protection against counterfeits	HF data carriers (13.56 MHz)	BIS004A	Data carrier, Ø 10 mm, memory capacity 2000 bytes
	HF read/write heads and antennas (13.56 MHz)	BIS013H	Read/write head, M12 x 1, for connecting to BIS-V processor units
	LF processor units (125 kHz)	BIS00U9	BIS V processor unit, EtherCAT, connect up to four read/write heads, with IO-Link interface, other fieldbus versions available
Filling beverages on site	BTL magnetostrictive linear position sensor for industrial hydraulics	BTL5-E17-...-SF-...*	FDA- and Ecolab certified, IP69K, analog output IP69K, analog output 4...20 mA, temperatures up to 130 °C (1 hr)
BONDING AND JOINING TECHNOLOGY			
Reliable alignment of the welding head	BMP magnetic field positioning system	BMP000N	Analog, voltage/analog, current selectable 0...10 V/4...20 mA, IO-link 1.1, repeat accuracy +/- 100µm, M12 pigtail, measuring range up to 96 mm
Visual quality control	BVS SmartCamera for machine vision	BVS002F	Image resolution 1280 x 1024 pixels, IP67 (with protective tube), storage capacity 4 GB, process interface Profinet, Ethernet/IP, TCP, UDP, digital interface 8 x input/output
ROBOTICS AND AUTOMATION			
Simple gripper changing	BIC inductive couplers for IO-Link signal transmission	BIC0070, BIC0071	40 x 40 mm, bi-directional version, working range 1...5 mm, with IO-Link interface
Bundle signals and save money	BNI IO-Link blocks	BNI0077	Network block for EtherCAT-IO-Link-Master, 8 x IO-Link 1.1, 16 x I/O, IP67, other fieldbus versions available
TOOL MANAGEMENT – CONNECTED MOLD-ID			
Automated tool data management	BIS industrial RFID systems	BIS0176 BIS0180	Data carrier, PPS plastic, IO-Link
		BIS0189 BIS018E	Read/write head with integrated processor unit, M18 x 1.5, IP67, working temperature up to +70 °C
	Network blocks for Ethernet/IP	BNI00CE	Compact processor unit, web server, gateway to company network, visualization with SmartLight stack light, rugged housing, IP67
	Handhelds	BIS M-87_-...*	Mobile reading and writing of BIS data carriers, with display and touch screen, WLAN optional
Connected Mold-ID	BAI CMI- ...* (configurable)		The management software for managing the Mold-ID data guarantees an optimal overview of the injection molding tool data, maintenance limits and your machine park.

* Please contact our Sales department to configure your product.
Additional products can be found on our website at: www.balluff.de/go/product-finder

A man in a white shirt is shown in profile, looking out a window. In his hand, he holds a small, glowing digital model of a factory building. The background shows a real industrial facility at dusk, with lights reflecting on the water. The scene is framed by a large, dark, geometric shape that points towards the headline.

Balluff

WE OPEN UP NEW PERSPECTIVES


Balluff is a leading supplier of high-quality sensor, identification and image processing solutions including network technology and software for all automation requirements. Family-run for more than 90 years, the company employs 3600 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 a consistent digital orientation of our company, the competence of a manufacturer and high personal commitment.

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. As a future-oriented company, we not only focus on the traditional areas of automation, but are also dedicated to developing holistic applications for an increasingly digital and connected world.

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.

 *innovating automation*

REFERENCES

The demands in the plastics industry are high and getting higher. Our complete commitment is to the success of our customers. Future-looking 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 plastics plants.

We work together with such companies as

ARBURG

震雄 CHEN HSONG

DESMA

Hennecke 
Polyurethane Technology

KAUTEX
MASCHINENBAU

Krauss Maffei
Pioneering Plastics

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