

**BALLUFF**

Optimizing  
productivity

# WE MONITOR YOUR MACHINES



**B** *innovating automation*

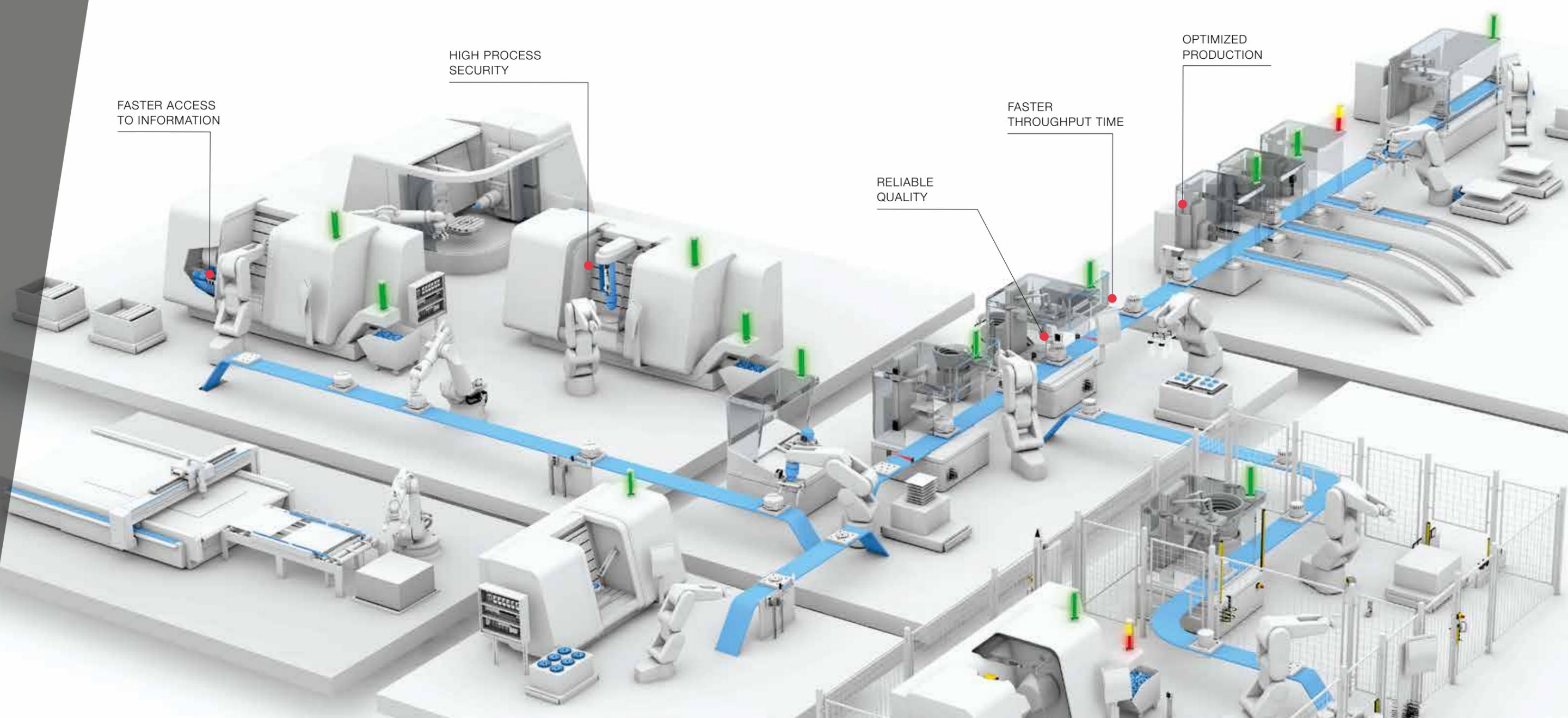
Always know your machine status

# CONTINUOUS AND LONG-TERM PRODUCTIVITY ASSURANCE

To implement predictive maintenance, repair or replacement work, information about the condition of the sensors, process chain and workpieces is essential.

Continuous condition monitoring of machines while they are running provides information in real-time and ensures proper control and utilization of the production processes. This lowers costs while at the same time optimizing productivity.

Machine monitoring enhances machine operation while also directly improving development and design. The monitoring function also enables personnel deployment to be optimized.



FASTER ACCESS TO INFORMATION

HIGH PROCESS SECURITY

RELIABLE QUALITY

FASTER THROUGHPUT TIME

OPTIMIZED PRODUCTION

## Products and systems with monitoring functionality

VIGILANT, PRECISE,  
EFFICIENT

The Balluff sensors developed for machine monitoring can be directly installed in the desired application or simply retrofitted. Balluff distinguishes between diagnostics-capable sensors and sensors for process monitoring. The former monitor their own condition, whereas the latter are designed for monitoring ambient conditions such as pressure or temperature.

For additional information, your personal Balluff contact is ready to help or contact us at [Monitoring.de@balluff.de](mailto:Monitoring.de@balluff.de).



INDUCTIVE SENSOR WITH IO-LINK INTERFACE  
BES04FK

- Distance detection using integrated ancillary function
- Short-circuit protected, non-contact, wear-free and insensitive to contamination



INDUCTIVE POSITIONING SENSOR  
BIP001M

- Precise displacement measurement using inductive positioning system with application-oriented repeat accuracy
- Simple to integrate in tool spindles thanks to compact form factor
- Detects long-term effects using additional temperature monitoring of the spindles
- Temperature monitoring to compensate for spindle expansion
- Versatile, with both analog and digital interfaces



CAPACITIVE SENSOR FOR LEVEL SENSING  
BCW0004

- Simple level monitoring when installed on outer walls of plastic tanks
- Precise signal processing together with BAE00LC switching amplifier
- Highly compact form factor and wide operating voltage range for ease of implementation
- Ideal for use in difficult environments thanks to PTFE housing



STACK LIGHT WITH ACOUSTIC MODE  
BNI0085

- Visualization of machine status in various modes (segment mode, runlight mode and others)
- Send important warning messages with addition of acoustic mode
- IO-Link interface for simple, flexible control



HEARTBEAT® POWER SUPPLY  
BAE00TM

- Decentralized installation for local control
- IO-Link interface for monitoring of the current consumption
- Diagnostics using Heartbeat® status indicator
- LEDs for indicating load/stress levels and lifetime
- All parameters can be incorporated into the overall system diagnostics



HEARTBEAT® POWER SUPPLY  
BAE00LJ

- For installation in the control cabinet
- Ideal for harsh environments, short-circuit protected and single-phase
- IO-Link interface for monitoring of the current consumption
- Diagnostics using Heartbeat® status indicator
- LEDs for indicating load/stress levels and lifetime
- All parameters can be incorporated into the overall system diagnostics



PHOTOELECTRIC MULTI-FUNCTION SENSOR  
BOS026R

- Added functions for monitoring: reduces the load on the controller, periodic acquisition of additional data using counter function and frequency monitor
- IO-Link for teach-in



PROFINET FIELDBUS MODULE WITH IO-LINK INTERFACE  
BNI005H

- Economical collection of sensor data using decentralized installation technology
- Monitor additional data such as counter function, temperature values (depending on sensor)
- Ethernet-based: faster than Profibus but can be combined



INDUCTIVE SENSOR WITH DIAGNOSTICS FUNCTIONALITY  
BES05F9

- Error detection using self-diagnostics
- Additional monitor output for informing the controller when an error occurs
- Non-contact, wear-free and insensitive to contamination



INDUCTIVE SENSOR WITH DYNAMIC SENSOR CONTROL  
BES03EL

- Ideal for object detection in metallic surroundings
- Warning message function when detection objects are not within the assured range
- Short-circuit protected, non-contact, wear-free and insensitive to contamination



IO-LINK SENSOR HUB  
BNI002Z

- Compatible with standard sensors and DSC sensors
- Simple installation for cost and time savings
- Highly rugged, ideal for use in industrial environments



MEDIA-CONTACTING TEMPERATURE SENSOR  
BFT0015

- Temperature monitoring of coolant/lubricants, hydraulic fluids and tempering liquids
- Visible temperature indicator for simple temperature detection



PRESSURE SENSOR WITH DISPLAY  
BSP008N

- Precise detection of levels using hydrostatic level measurement
- Pressure measurement in a variety of applications
- Digital pressure display



THERMAL FLOW CONTROLLER  
BFF0001

- Monitor the flow of process media such as coolants/lubricants or cooling water
- High process security in many different applications



RFID PROCESSOR UNIT  
BIS013W

- Flexible processor unit with capacity for four read heads (LF, HF, UHF)
- Tool identification and workpiece tracking with Profinet interface
- Condition monitoring and predictive maintenance using IO-Link



RFID READ/WRITE HEAD LF (BIS C)  
BIS005Z

- Improved tool identification (Tool-ID) with optimized housing geometry
- Monitor service life of machining tools
- Can be flush mounted in metal
- Connects to BIS013W with BCC0FCK connector



RFID READ/WRITE HEAD (BIS VM)  
BIS013Z

- Improved tool identification (Tool-ID) in metalworking with optimized housing geometry
- Monitor service life of machining tools
- Different form factors and dimensions for versatility
- Also suitable for applications in the field of workpiece tracking



INDUSTRIAL CONTROLLERS  
BAE00WC

- Monitor sensor data
- Fast, direct representation of production status as well as simple configuration of machine vision products or other sensors



MAGNETIC ENCODER SYSTEM  
BML06HC

- High energy efficiency and drive quality since the system is highly precise and dynamic
- Best control quality and optimal position feedback with real-time measurement



SECURE PROFISAFE I/O MODULE IO-LINK  
BNI0098

- Machine protection in one system accomplished by connecting the automation and safety technology using IO-Link
- Safe signal acquisition and communication
- Parameters set easily from central controller
- Secure information acquisition through direct transfer from master to controller

Injection molding

# PRECISE AND ROBUST FOR COMPLEX REQUIREMENTS

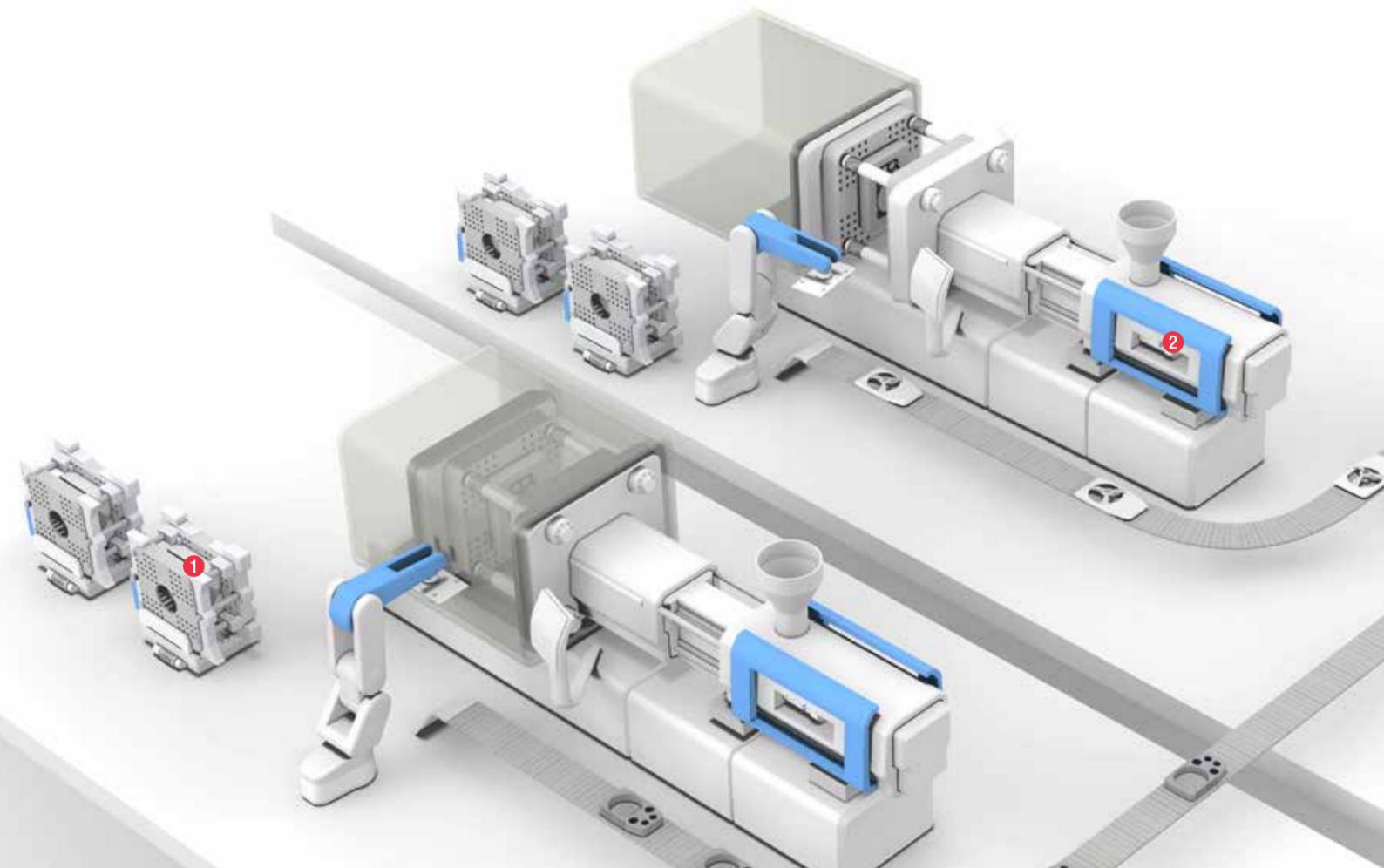


**1** MAINTAIN TOOLS BASED ON CONDITION

Injection molding is characterized by high expenditures for tools and a requirement for the most economical processes possible. Your tools need to be optimally deployed and utilized so they work efficiently and do not fail. This is where Mold-ID from Balluff comes in: the autonomous system enables condition-based tool upkeep without the use of cumbersome tool logs. It identifies every single tool including the wear parts and stores all the relevant information automatically so that it can be recalled at any time. This means Mold-ID is individually retrofittable regardless of manufacturer or location.

**2** MONITORING, DOCUMENTING AND OPTIMIZING INJECTION MOLDING PROCESSES

Injection molding subjects machines and their components to severe loads. Unexpected machine failures result in high costs. Machine monitoring from Balluff ensures consistently high quality and reduces downtime. Our pressure, flow and temperature sensors provide continuous monitoring, documentation and optimization of your injection molding processes. Their robust and extremely precise technology promotes maximum availability of your equipment, while their precision enables you to manufacture the highest quality products.



Machine tools

# THE HEARTBEAT OF METAL WORKING



**1**  
DECENTRALIZING INSTALLATION  
TECHNOLOGY

Traditional star wiring from the machine controller to the individual sensor is complex and costly. Fieldbus modules are significantly simpler and more economical to use. Designed for all commonly used fieldbus systems, they enable the use of many controller types using the same wiring topology. With IO-Link they are also ready for Industry 4.0 – the exchange of data across all production levels.

**3**  
MONITORING  
TOOL CLAMPING

Tools which are not perfectly located in the motor spindle cannot machine workpieces correctly or with consistent quality. Series BIP inductive positioning systems from Balluff provide the information for correct clamping of your tools. Combined with Balluff BSP pressure sensors, a second channel can also check the plausibility of the sensor signals in hydraulic clamping systems.

**2**  
RESISTING CORROSION

Coolants and lubricants that are used in machining are generally highly aggressive, attacking your machine and its components. Balluff sensors and connection technology reliably resists this harsh environment.

Tools and workpieces

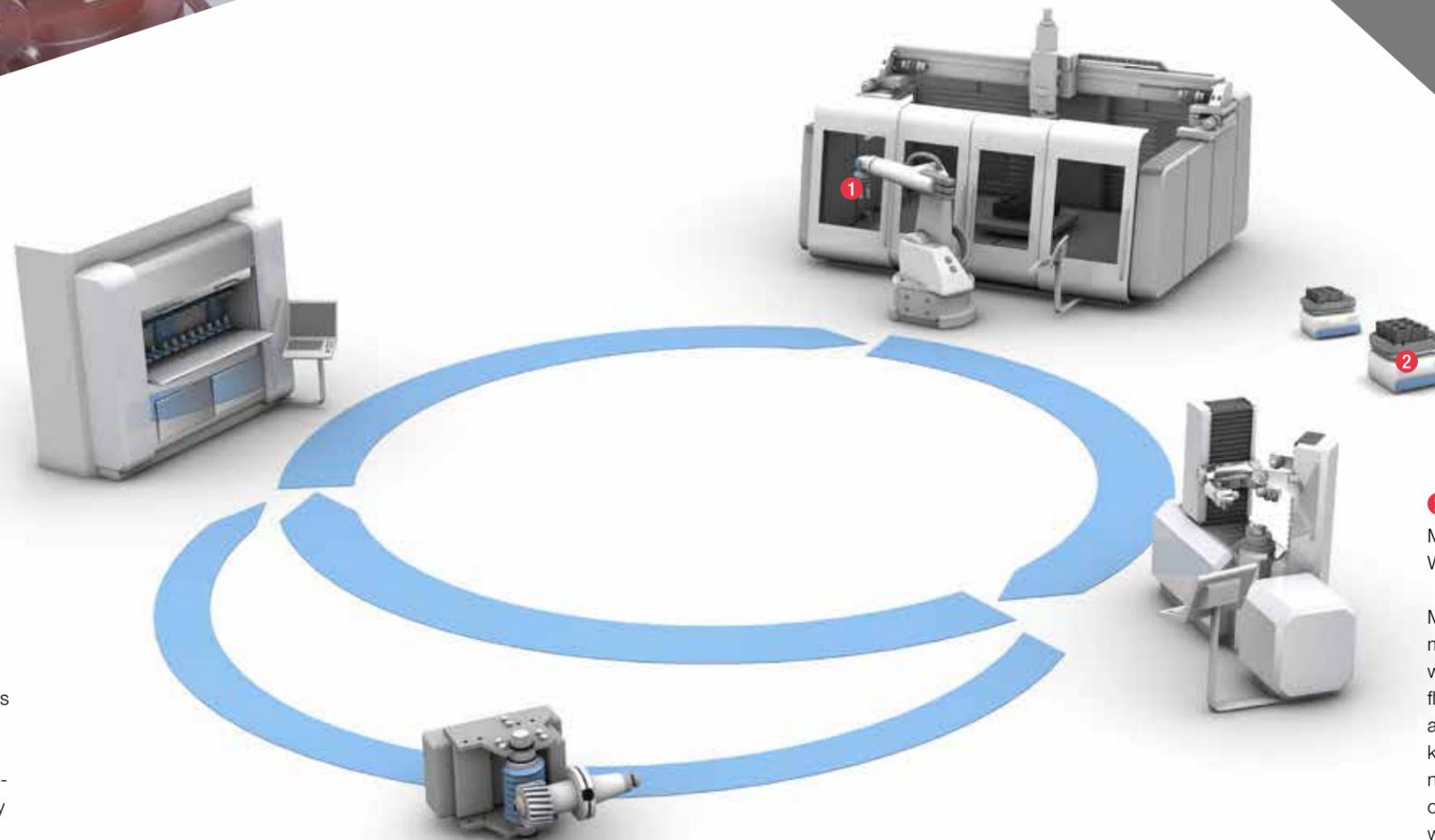
# HIGH MACHINING QUALITY AND OPTIMAL TOOL UTILIZATION

## 1 IDENTIFYING TOOLS IN THE MAGAZINE

BIS C RFID systems in low frequency or BIS M in high frequency from Balluff always provide the CNC controller in milling machines and machining centers with the correct tool data. Reliably identified and transmitted parameters form the basis for optimal tool management. Unlike with error-prone, manually kept tool logs, data is continually recorded when loading and unloading the tool so that continued use of the tool can be controlled. The actual tool dimensions are stored, for example, so that they can be automatically read into the tool table for the CNC controller.

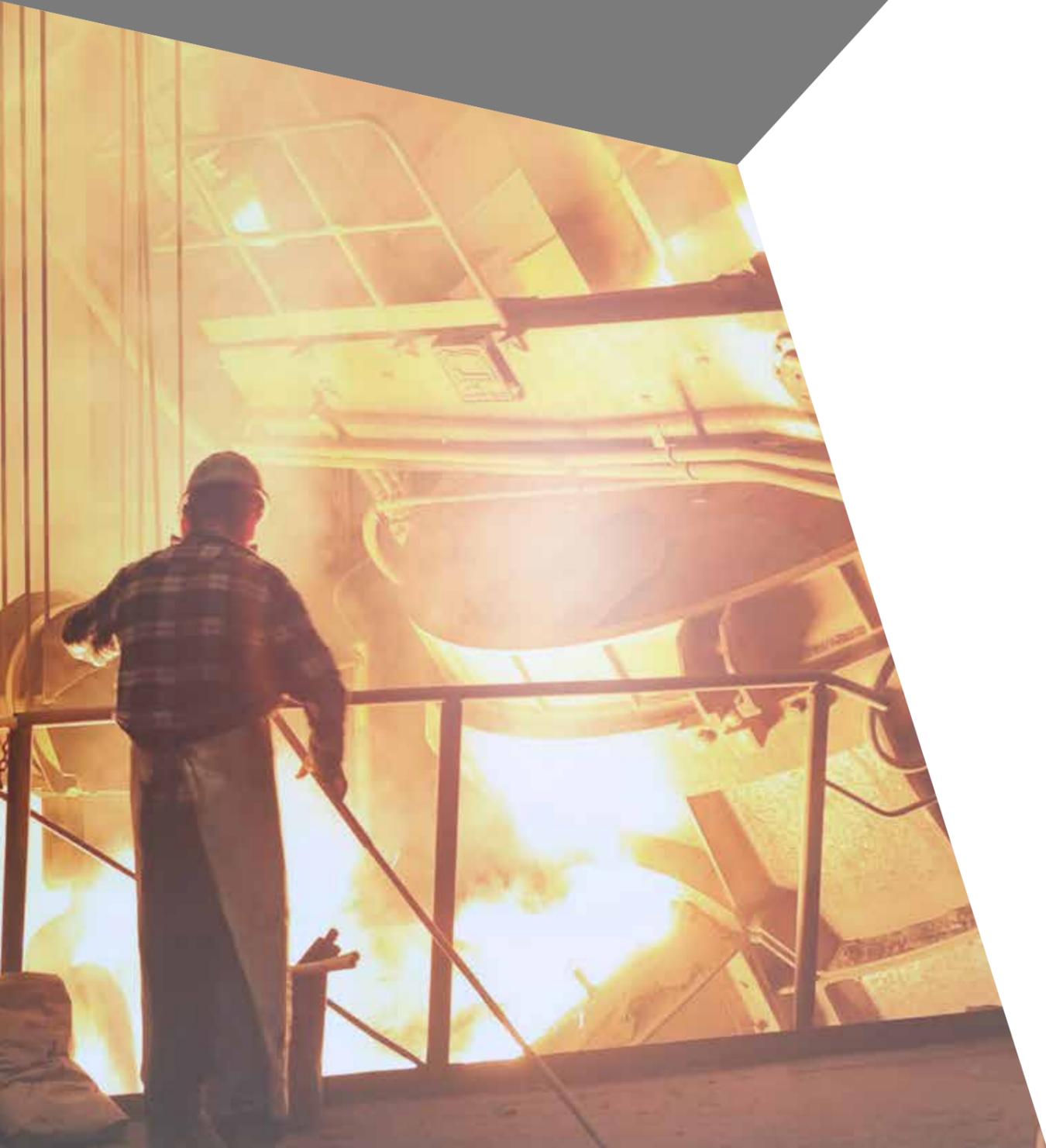
## 2 MATCHING AND TRACKING WORKPIECES

Modern manufacturing demands maximum transparency. This is the only way to meet the high requirements for flexibility and quality while keeping costs at a minimum. This is why RFID is a key technology for tool tracking. But it's not only the tools themselves that need optimal management; the finished workpieces also need to be uniquely identified, classified and tracked. Our 13.56 MHz HF system BIS M has been established as a standard. The system can read and write two-side coded corner tags or data screws attached directly to the pallet or workpiece.



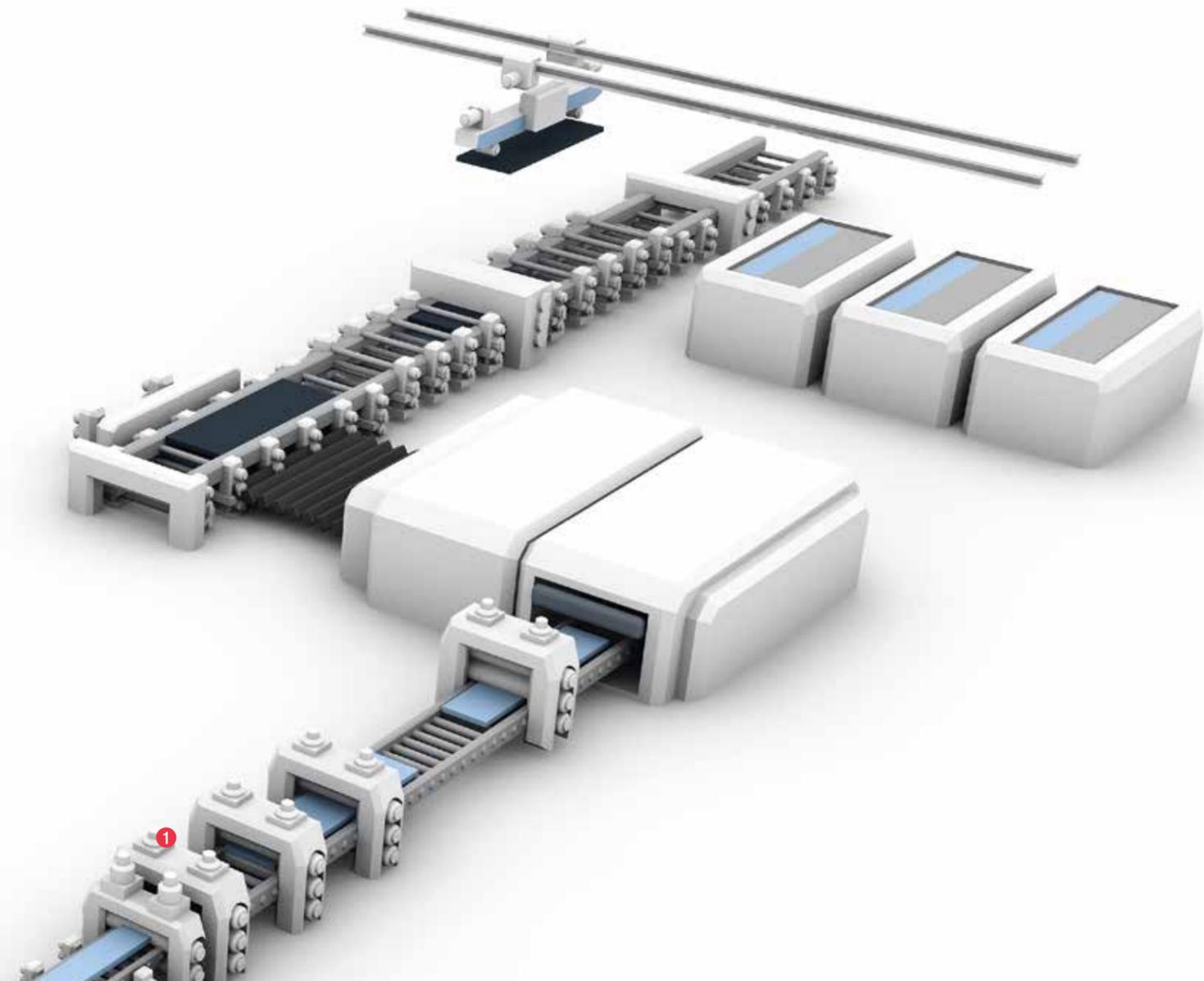
Metallurgy

# HIGH PROCESS RELIABILITY AND QUALITY



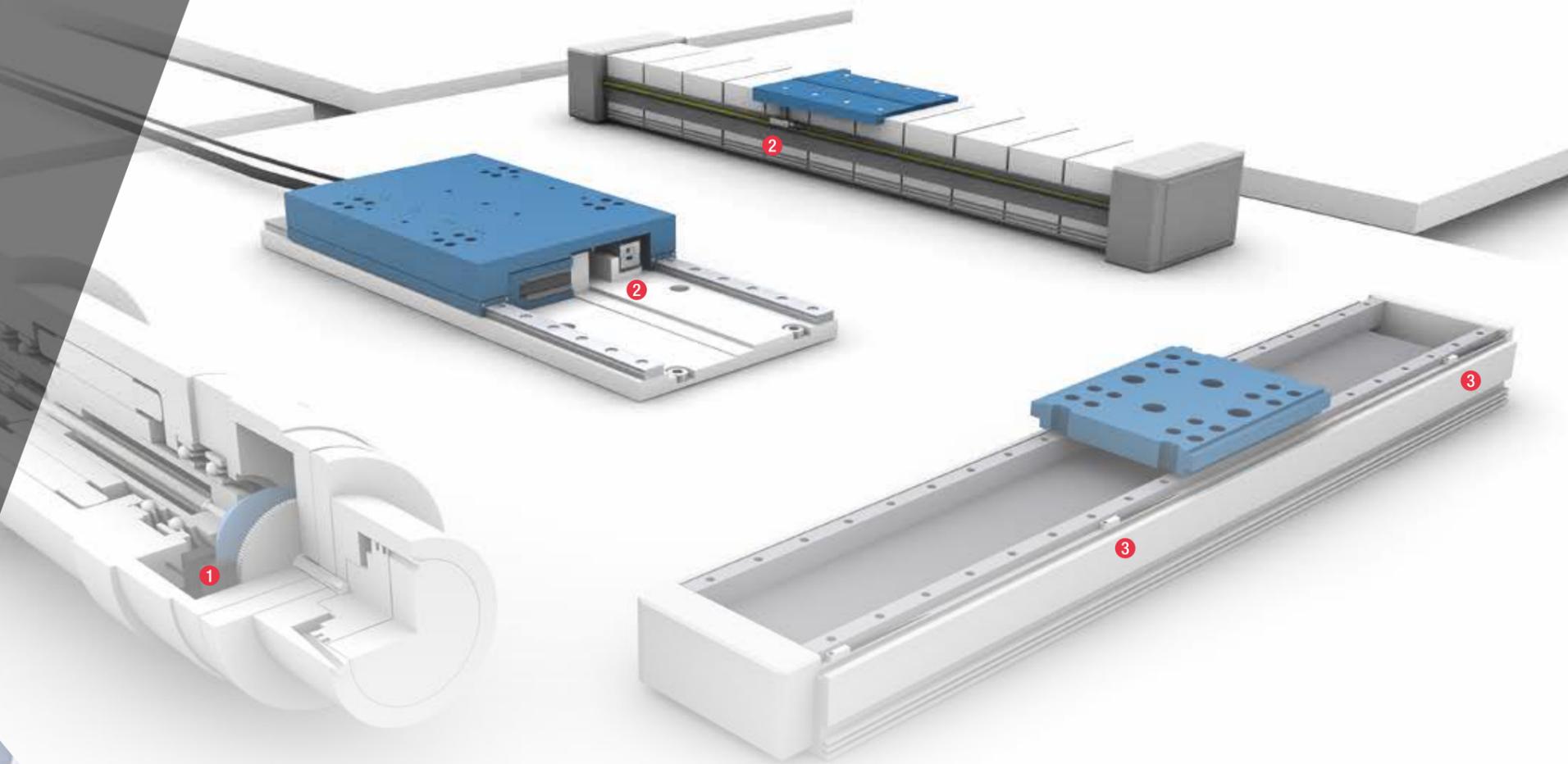
**1** QUALITY ASSURANCE AT THE ROLLING STAND

BIS M industrial RFID systems from Balluff enable automatic recording and identification of the rollers. RFID tags can be directly attached to individual rollers. This allows you to verify whether the right rollers are being used or if roller pairs actually match. Reworking of the rollers can also then be documented. The RFID handheld reader stores important information and is used for mobile communication from any location.



Drive technology

# HIGH ENERGY EFFICIENCY AND QUALITY



**1**  
MONITORING TOOL CLAMPING  
DISTANCE

By using the series BIP inductive positioning systems from Balluff you can perform clamping distance monitoring even when the clamping mechanism rotates. These systems detect the position of metallic discs which travel laterally past the sensor. We offer positioning systems for different travel distances to meet your precise needs. Data can be processed flexibly using IO-Link, switchpoints or the analog interface. An additional temperature output helps in reliable diagnostics.

**2**  
OPTIMAL POSITION FEEDBACK FOR  
LINEAR DIRECT DRIVES

The highly precise, dynamic and real-time capable BML magnetic encoder systems from Balluff provide optimal position feedback with the greatest possible energy efficiency for the best possible control quality – even in high-dynamic applications. Using the BML Configuration Tool also makes available many additional parameters and diagnostics functions, such as condition monitoring.

**3**  
DETECT END AND INTERMEDIATE  
POSITIONS WITH EASE

Inductive mini-sensors from Balluff detect end or reference positions in linear drives. Their small form factor lets you integrate them in locations that otherwise are too tight for sensors, and improves the power density of your drive units. The low weight of these non-contact, wear-free and contamination resistant sensors increases the dynamics.

## Factory Automation

SIMPLE NETWORK  
TOPOLOGY FOR HIGH  
SYSTEM AVAILABILITY

1

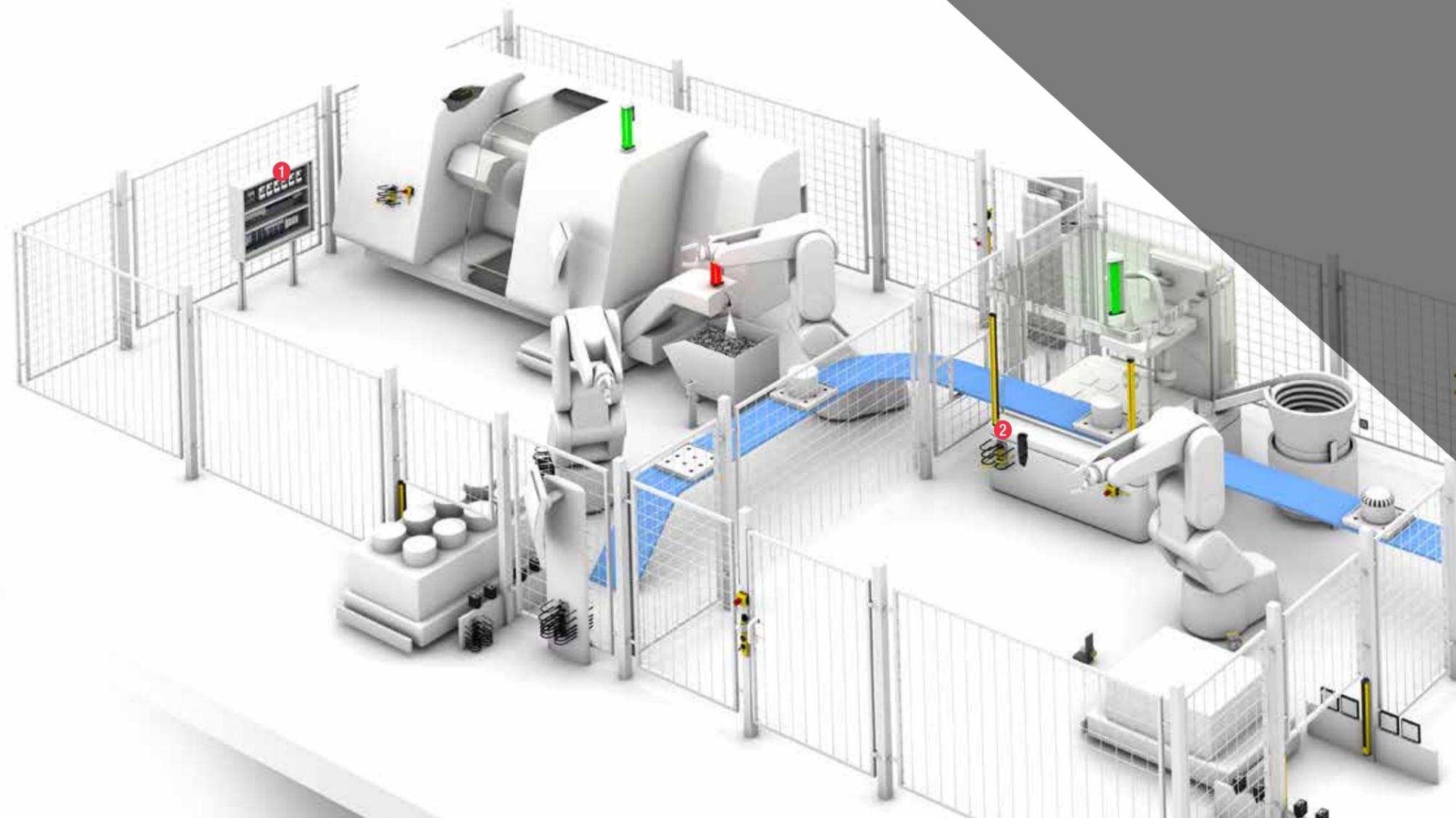
EFFICIENT AND RELIABLE POWER  
SUPPLY

Automation involves critical applications with high requirements for quality, long service life and diagnostics capability. This is why our Heartbeat® power supplies were developed: A Heartbeat® status LED tells you locally what the present load and utilization situation is, the degree of device wear as well as the remaining service life of the power supply. The IO-Link interfaces allow all the essential parameters to be read and evaluated in higher level diagnostics systems.

2

## SMART SAFETY

With this universal interface from Balluff you can integrate industrial safety technology easier than ever. The secure Profisafe I/O module is the first to join automation and safety technology via IO-Link. This combination provides machine safety in a single system: IO-Link provides both the sensor and actuator details and the safety information. The latter is sent directly through the master to the controller. Using Profisafe over Profinet guarantees safe communication with the controller.



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