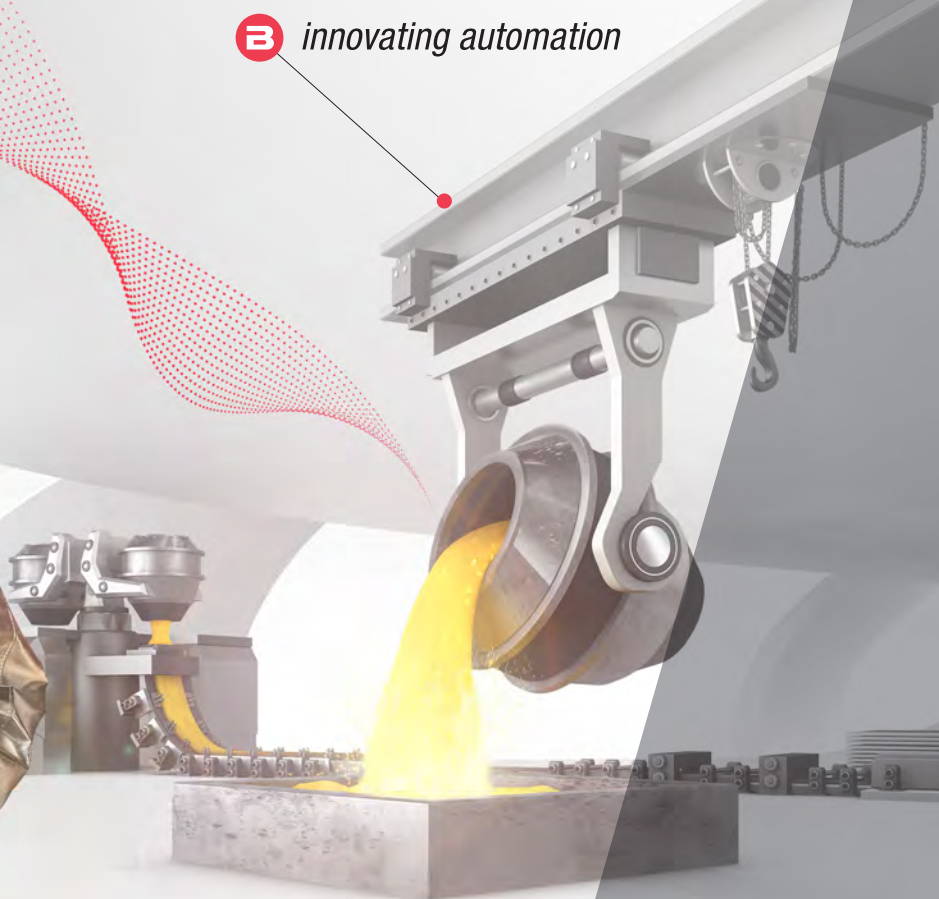


BALLUFF

 *innovating automation*



Steel and
metallurgical
industry

RELIABILITY AND FLEXIBILITY FROM A SINGLE SOURCE

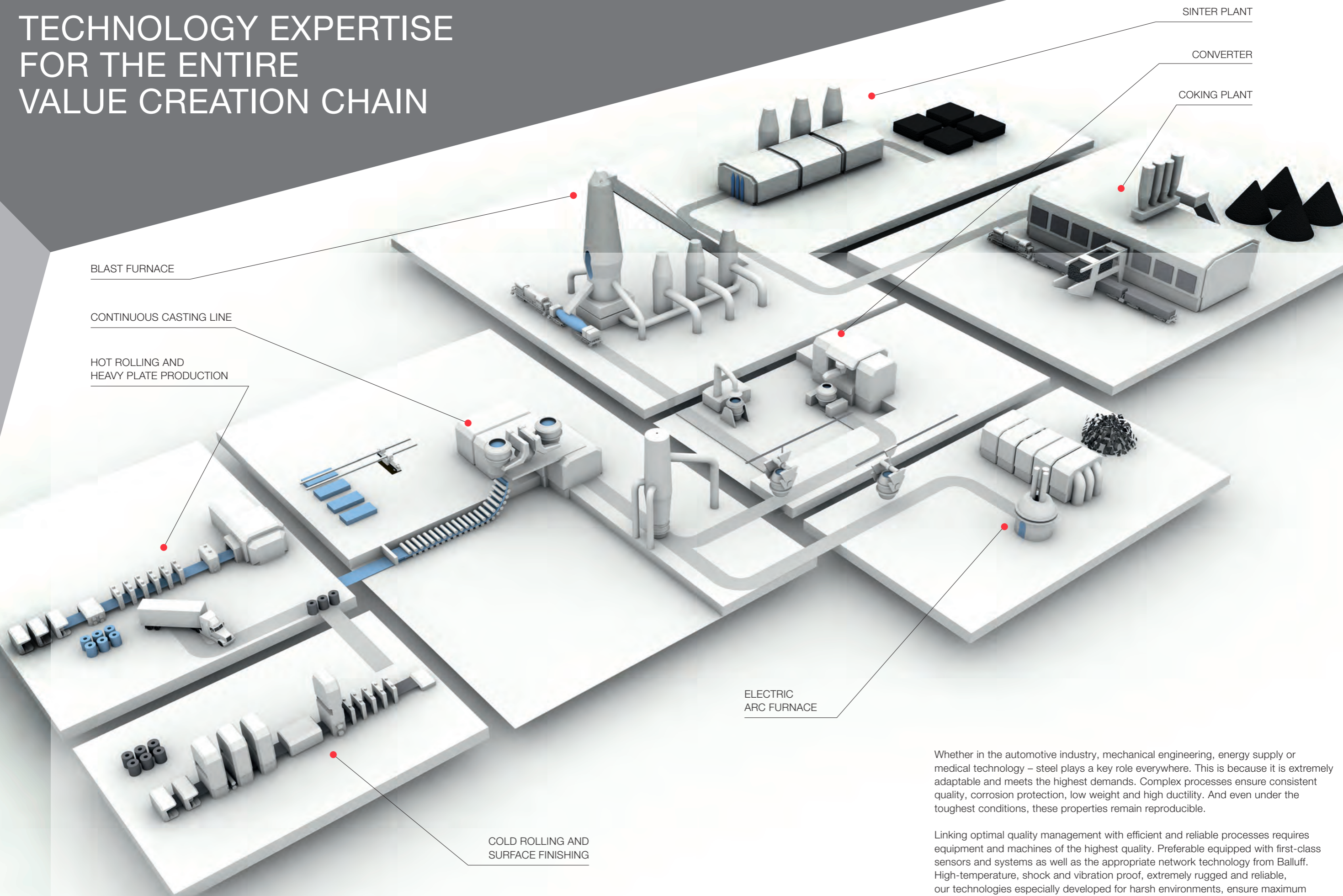
Balluff in the steel and metallurgical industry

WE ARE AT HOME IN MANY DIFFERENT SECTORS



Balluff in the steel and metallurgical industry

TECHNOLOGY EXPERTISE FOR THE ENTIRE VALUE CREATION CHAIN



SINTER PLANT
 CONVERTER
 COKING PLANT

BLAST FURNACE

CONTINUOUS CASTING LINE

HOT ROLLING AND HEAVY PLATE PRODUCTION

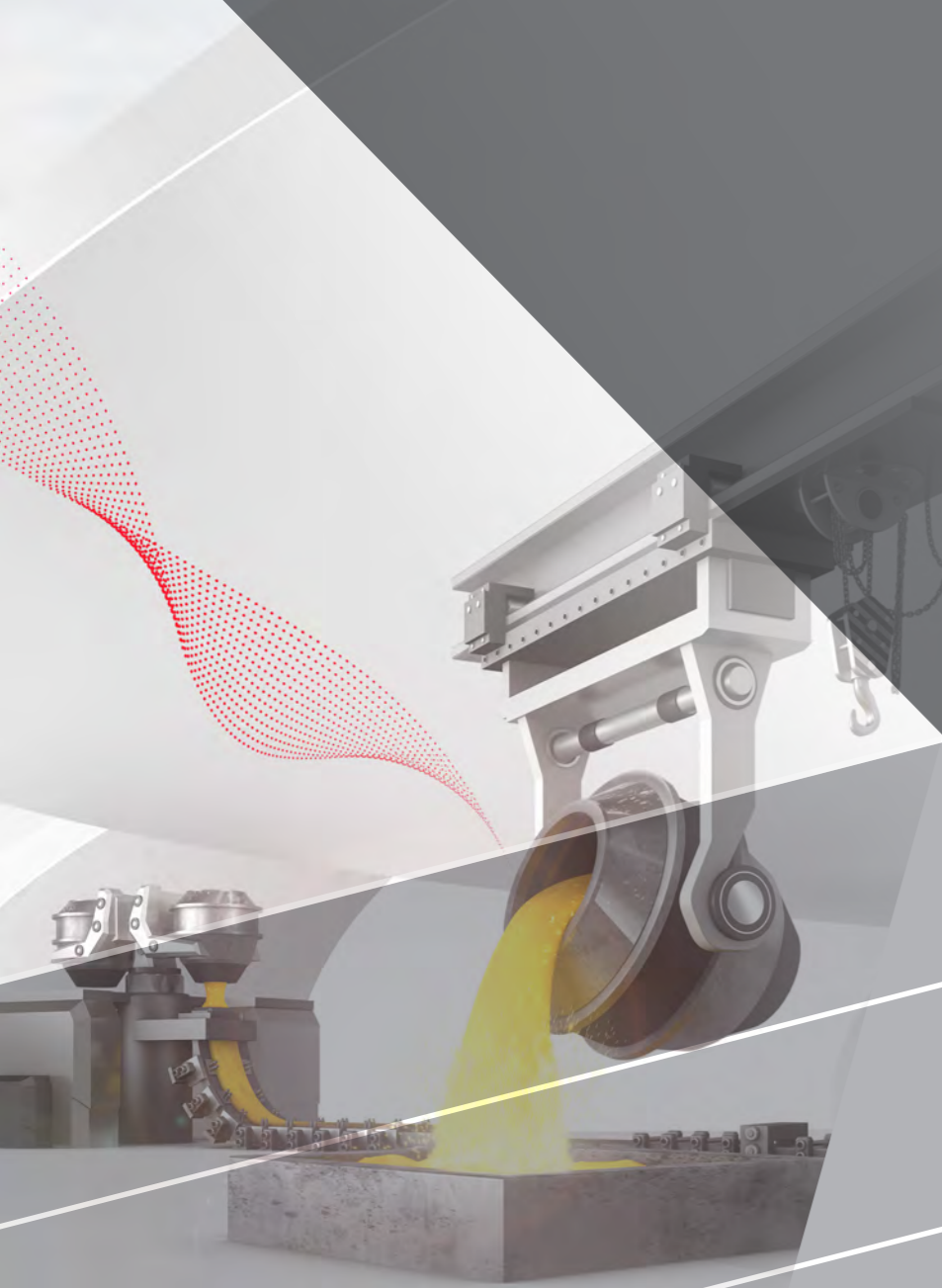
ELECTRIC ARC FURNACE

COLD ROLLING AND SURFACE FINISHING

Whether in the automotive industry, mechanical engineering, energy supply or medical technology – steel plays a key role everywhere. This is because it is extremely adaptable and meets the highest demands. Complex processes ensure consistent quality, corrosion protection, low weight and high ductility. And even under the toughest conditions, these properties remain reproducible.

Linking optimal quality management with efficient and reliable processes requires equipment and machines of the highest quality. Preferable equipped with first-class sensors and systems as well as the appropriate network technology from Balluff. High-temperature, shock and vibration proof, extremely rugged and reliable, our technologies especially developed for harsh environments, ensure maximum equipment up-time and machine performance in every phase.

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COKING MACHINES,
COKE OVEN BATTERIES AND
CONVEYING EQUIPMENT



Get off to the optimal start in steel production

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BLAST FURNACE AND
ELECTRIC ARC FURNACE



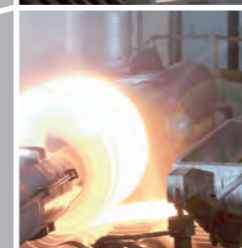
Continuously manage magnetic fields and high temperatures

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CONTINUOUS CASTING LINE



Maximum flexibility for various formats

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SURFACE FINISHING



Maximum precision for the finish

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Coking machines, coke oven batteries and conveying equipment

GET OFF TO THE OPTIMAL START IN STEEL PRODUCTION

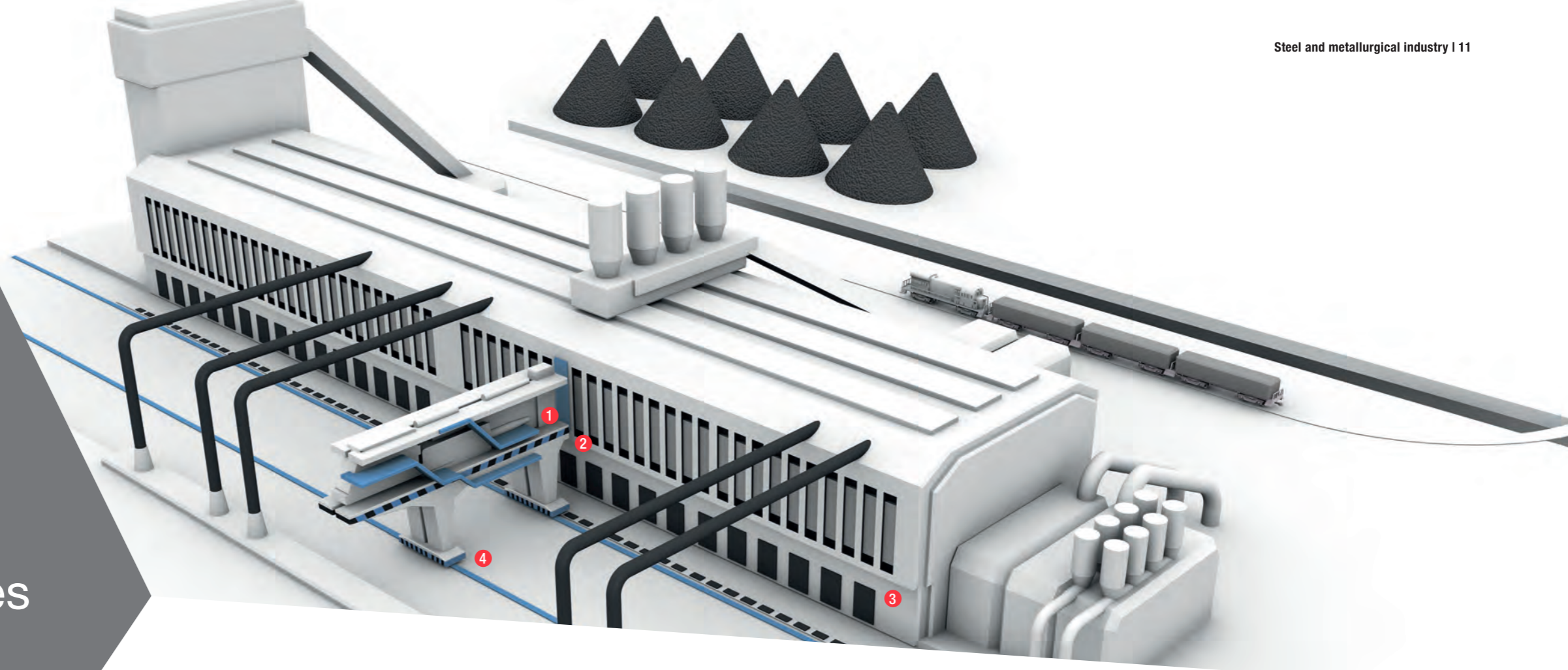
 *innovating automation*

No ifs or buts: the highest priority in a steel plant is an uninterrupted process. Meet these high requirements from the very start. Balluff provides you with highly reliable solutions for a wide variety of tasks pertaining to coking plant machines, the coke oven battery and conveying equipment.

Just where things get really hot is where our rugged magnetostrictive linear position sensor will get the job done at up to 100 °C. It reliably controls all movements during oven charging in the coking plant. The oven controller is monitored by an Ex protected position measuring system which is perfectly designed for the gas environment. And for tracking the relative positions of larry cars, pusher cars, and transfer cars at the coke oven battery, we offer our Industrial RFID, which boasts a large read/write distance, fast data transmission, high data integrity, and operates without line-of-sight contact.



Solutions for coking machines, coke oven batteries and conveying equipment



POSITION DETECTION AT THE PUSHER MACHINE
BES inductive sensors

Optimize the availability of your systems, reduce maintenance costs and increase the quality of your processes in harsh environments. Whether it's position sensing or end-of-travel detection on the pusher machine, our high-temperature rated inductive sensors ensure the best results in the hot zone up to 160 °C.

Features

- Protection rating IP69K
- Functional security, even in continuous operation
- No additional evaluation electronics needed

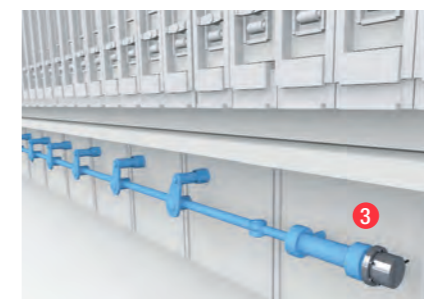


COKE OVEN BATTERY CONTROL
BTL magnetostrictive sensors

Regulating the oven control system under extreme conditions makes strict safety measures necessary. Here you can rely on a transducer which has been approved for hazardous areas. The magnetostrictive linear position sensor with explosion protection is optimally implemented if a gas environment requires high reliability – for example when regulating the oven control system.

Features

- Contact-free measurement system
- For measuring ranges between 25 and 7620 mm
- Available in various versions for equipment in Europe and around the world



MOVEMENTS AT THE COKE OVEN BATTERY
BTL magnetostrictive sensors

Would you like to enjoy the benefits of non-contact travel measurement even in high ambient temperatures? Then we recommend our magnetostrictive linear position sensor rated for up to 100 °C. From its protected position in the hydraulic cylinder, it controls all movements at the coke oven battery.

Features

- Rugged metal housing with IP67
- Can be equipped with PTFE cable up to 200 °C



CONTROL THE PUSHER CARS
BIS industrial RFID systems

At the coke oven battery, industrial RFID systems from Balluff enable data exchange in realtime to ensure correct and fully autonomous positioning of the larry, pusher and transfer cars. Any number of write-enabled data carriers are embedded in the floor and are read out via a read/write device without a direct line of sight.

Features

- Data exchange in real time
- Readout of the data carriers, even from a long distance
- Contact-free and therefore wear-free

Blast furnace and electric arc furnace

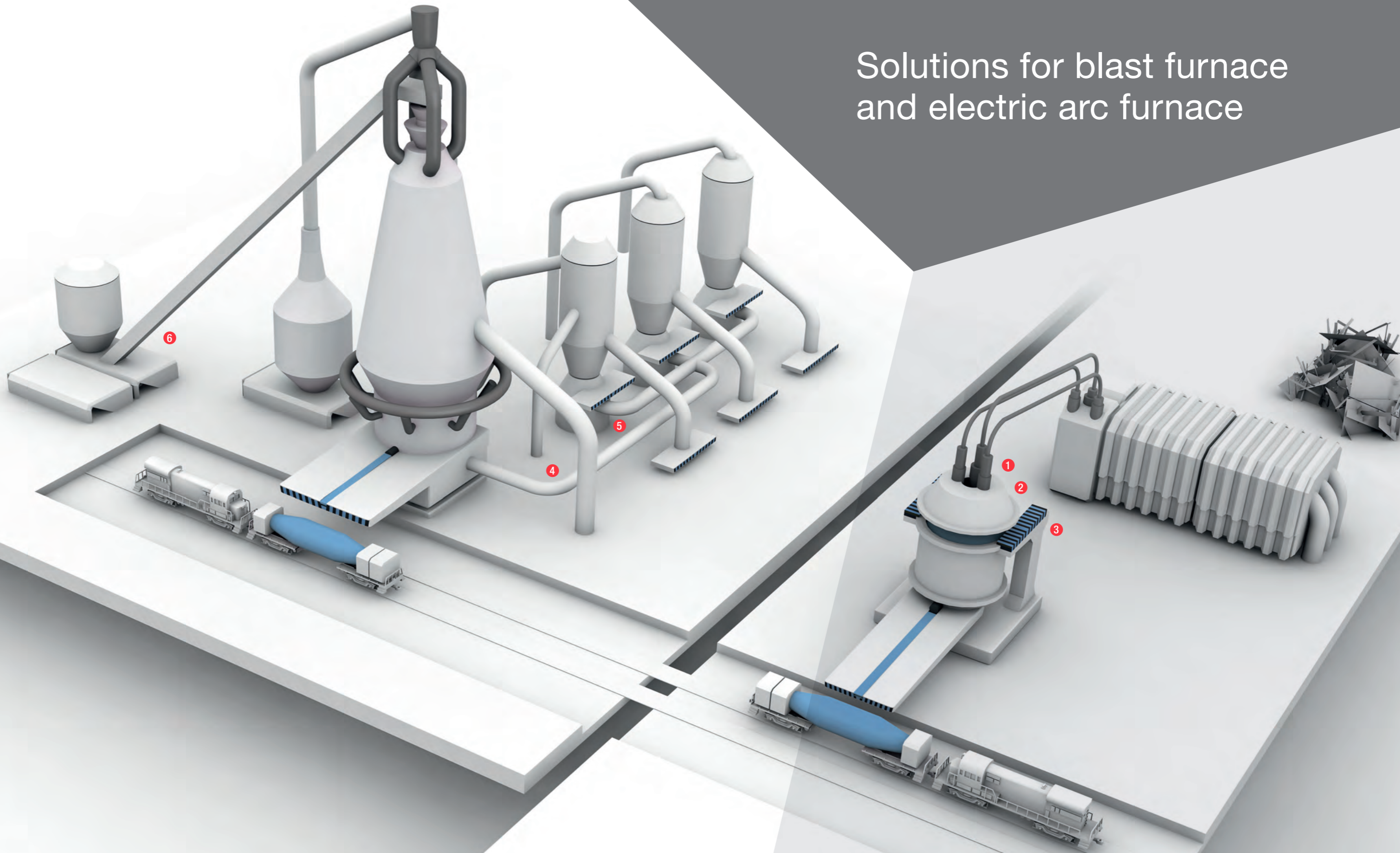
CONTINUOUSLY MANAGE MAGNETIC FIELDS AND HIGH TEMPERATURES

B *innovating automation*

At no other place in the steel mill is process reliability as important as at the blast and arc furnaces. For once it is commissioned, a blast furnace is used around the clock over the course of years – hardly possible without continuous water cooling and replenishment.

And just as critical to the process: absolutely reliable immunity to magnetic fields, safe inflow and outflow of gas when producing pig iron in the blast furnace, exact positioning of the electrodes in the arc furnace as well as controlling the conveying equipment. These are reasons enough to focus on every single detail.

Solutions for blast furnace and electric arc furnace



Balluff solutions take over control functions at critical positions: our pressure sensors reliably measure water and air pressure. Magnetostrictive linear position sensors or inductive standard sensors monitor flap opening for controlling air intake and exhaust in the blast furnace. And in the electric arc furnace weld-spatter-resistant and magnetic field-immune inductive sensors check the precise position of the electrodes before they are properly gripped, assisted by color sensors.

- 1 Electrode monitoring in the electric arc furnace
- 2 Assuring the correct electrode position
- 3 Measuring the inclination of the casting ladle
- 4 Pressure measurement for water cooling
- 5 Reliably regulating air and gas supply at the blast furnace
- 6 Level monitoring in silos and on conveyor belts



ELECTRODE MONITORING
IN THE ELECTRIC ARC FURNACE
BKT contrast sensors

Sensors for detecting color and contrast support the positioning of electrodes in the arc furnace. The sensor, which is protected in the gripper, checks whether it has been gripped correctly using color markings on the electrode – with absolute reliability and at various temperatures.

Features

- Software allows for simple configuration and visualization
- Any number of colors, even the slightest shades, can be detected and differentiated even with changing object temperature
- Rugged metal housing



ASSURING THE CORRECT
ELECTRODE POSITION
BES inductive sensors

Increase process quality through reliable position detection. Our inductive sensors stand out especially in the harsh surroundings of the steel industry. Weld field immune and insensitive to magnetic fields, they are extremely reliable in ensuring the correct electrode position at the arc furnace.

Features

- Contact-free and therefore wear-free
- Available in Ø 3 mm to 80 x 80 mm square dimensions



MEASURING THE INCLINATION
OF THE CASTING LADLE
BSI inclination sensors

Inclination sensors from Balluff with their extremely high accuracy of 0.1° offer the safety steelworkers need. They ensure precise location control of the cover or the casting ladle and continually guide the ladle as the pour is made. Their outstanding resolution provides extremely exact angle measurement even when rotational movement is involved.

Features

- High repeat accuracy and precision
- Rugged, compact metal housing
- Simple installation, no moving parts



PRESSURE MEASUREMENT
FOR WATER COOLING
BSP pressure sensors

Sensors with extremely low drift, such as the pressure sensors from Balluff, ensure efficient water cooling. They are ideal for use in the steel plant, where they ensure a long, stable pressure measurement process on blast and electric arc furnaces.

Features

- Protection class IP67
- Reliably monitor cooling water at the rolling stand or pressure at hydraulic drives at -40...+125 °C



RELIABLY REGULATING AIR AND
GAS SUPPLY AT THE BLAST FURNACE
BTL magnetostrictive sensors

Optimize your processes in pig iron production. And for valve and flap control on the blast furnace, use inductive standard sensors or magnetostrictive linear position sensors. These help you to regulate the intake and exhaust air. All magnetostrictive sensors with a bus interface have temperature measurement integrated into the electronics head for displaying a possible overheating of the measuring system.

Features

- Intake and exhaust air is reliably regulated
- Additional security: the temperature of the measuring system is monitored



LEVEL MONITORING IN SILOS
AND ON CONVEYOR BELTS
BUS ultrasonic sensors


Extremely reliable and precise under extreme conditions: this is how ultrasonic sensors from Balluff do their job. This makes them perfect for controlling the stack heights on conveyor belts as well as levels in silos. Unaffected by the harsh conditions in a steel plant, they detect objects made of many different materials and ensure you of reliable blast furnace charges even around the dust and dirt from burden material and coke.

Features

- Contactless detection
- Irrespective of color, transparency, reflection properties and surface finish on the object

Continuous casting line

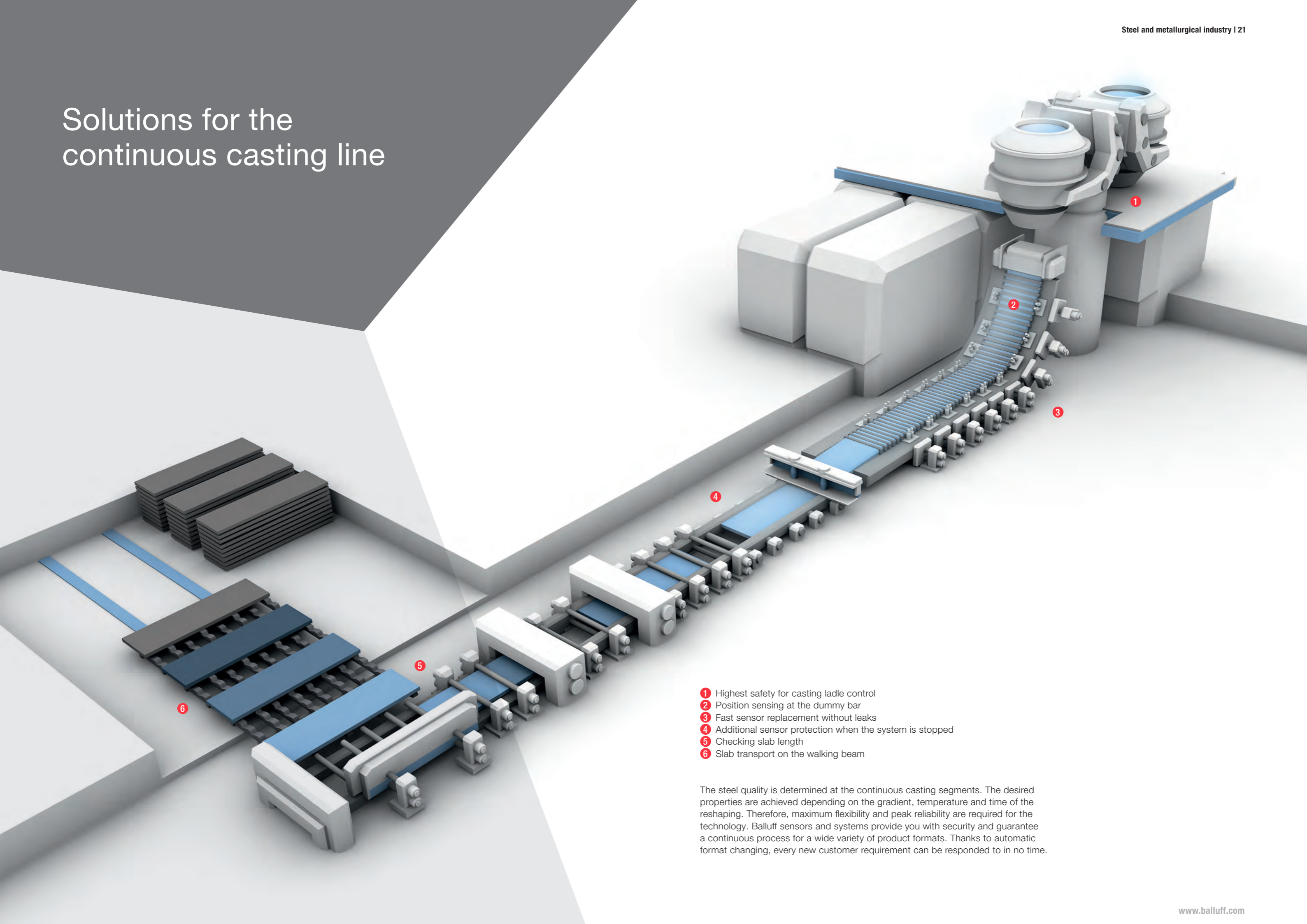
MAXIMUM FLEXIBILITY FOR VARIOUS FORMATS.

 *innovating automation*

As efficiency increases, so do the demands on continuous casting lines. Large forces, vibrations and shock have to be controlled in the continuous casting line: at the ingot mold movement for the homogeneity of the fluid metal or at the walking-beam for transport of slabs or billets. Comprehensive monitoring measures are, therefore, indispensable.

But the investment pays off, because only in this way can you prevent costly pouring interruptions before they happen, improve the quality of the product, and increase your offering variety.

Solutions for the continuous casting line



- 1 Highest safety for casting ladle control
- 2 Position sensing at the dummy bar
- 3 Fast sensor replacement without leaks
- 4 Additional sensor protection when the system is stopped
- 5 Checking slab length
- 6 Slab transport on the walking beam

The steel quality is determined at the continuous casting segments. The desired properties are achieved depending on the gradient, temperature and time of the reshaping. Therefore, maximum flexibility and peak reliability are required for the technology. Balluff sensors and systems provide you with security and guarantee a continuous process for a wide variety of product formats. Thanks to automatic format changing, every new customer requirement can be responded to in no time.



HIGHEST SAFETY FOR
CASTING LADLE CONTROL
BTL magnetostrictive sensors

The casting ladle movement requires peak reliability. And for safety reasons, all of this argues for multiple redundancy of the systems used there. Multiple redundant magnetostrictive linear position sensors provide up to three independent measuring systems in one housing to meet all the requirements for safe operation of your continuous casting line.

Features

- Two or three times redundant
- Various interfaces are possible
- Protection class IP67



POSITION SENSING
AT THE DUMMY BAR
BMF magnetic field sensors

Regulate your processes reliably from the very beginning. Our magnetic field sensors help you, among other things, in regulating the process start and give you the security that the position for the sprue on the casting line has been detected precisely and reliably.

Features

- More reliable than optical sensors since it withstands higher temperatures (up to +85 °C)
- More flexible than inductive sensors since it can be installed with a greater switching distance



FAST SENSOR REPLACEMENT
WITHOUT LEAKS
BTL magnetostrictive sensors

The Balluff Rapid Replacement Module allows you to quickly and easily replace magnetostrictive linear position sensors in hydraulic cylinders. Since the complete sensor unit is replaced together with the integral waveguide, the hydraulic circuit remains closed. This minimizes the risk of leaks and prevents dirt from entering the hydraulic system.

Features

- Dimensions are identical to those of the standard rod position measurement system
- For analog, SSI and DP/IP interfaces

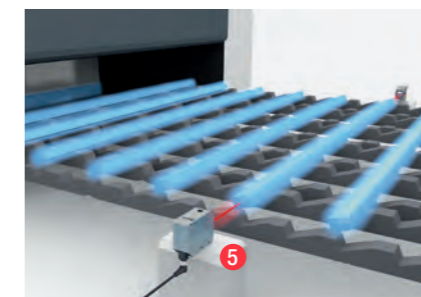


ADDITIONAL SENSOR PROTECTION
WHEN THE SYSTEM IS STOPPED
BOS photoelectric sensors

Protective enclosures for photoelectric sensors directly on the casting line are a sensible addition. The advantage: the sensors used do not have to withstand elevated temperature demands and are also able to handle temperature spikes should the system go down. Optional is a blower for preventing the buildup of dirt and contaminants.

Features

- Rugged, compact IP69K housing
- Optional with ATEX approval (Zone 22)
- Simple and quick to install
- Protective tubing for sensor cable available

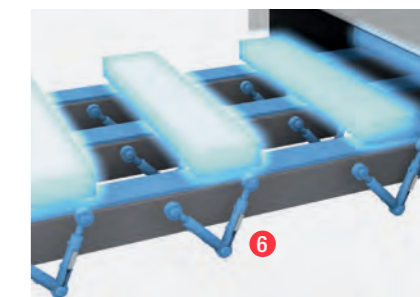


CHECKING SLAB LENGTH
BOD photoelectric distance sensors

Our photoelectric distance sensors are the optimum solution for measuring at the cooling section. There they check for the correct length of the cut slabs or billets with high precision. The exact length is monitored using the difference between two sensor results.

Features

- Independent of material and color
- Contact-free and therefore wear-free



SLAB TRANSPORT
ON THE WALKING BEAM
BSI inclination sensors

Precise location monitoring and continuous guiding of rotary movements are critical when transporting slabs. Inclination sensors are an outstanding solution to this challenge. On the walking beam they measure the deviation from the horizontal line on an axis by up to 360° – non-contact and with the highest precision.

Features

- Space-saving and rugged for use at -40...85 °C)
- No mechanical coupling needed in contrast to rotary encoders

Hot rolling and heavy plate production

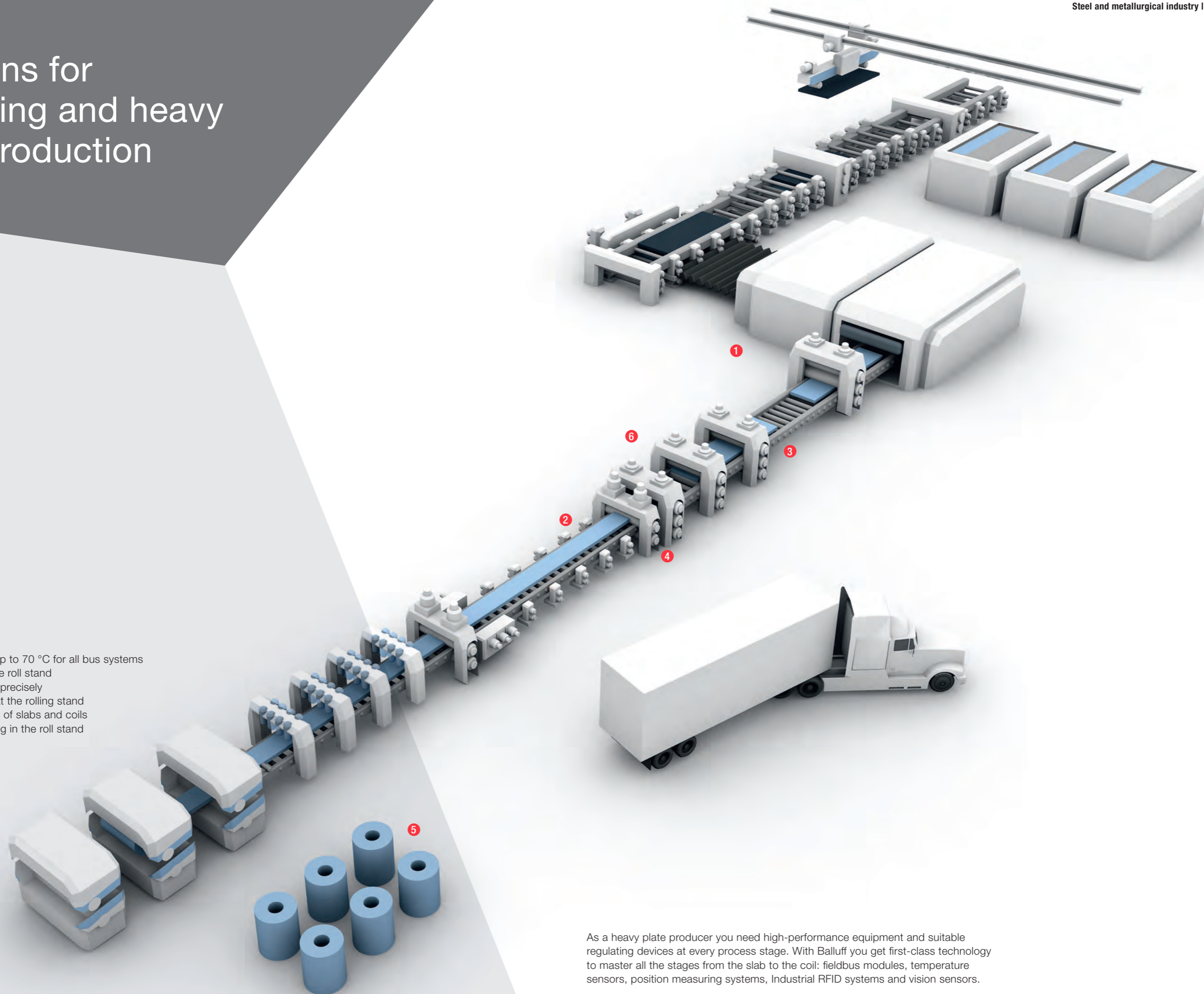
ENSURE RELIABLE PROCESSES CONTINUOUSLY.

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Hot rolling and heavy plate production are always associated with great forces. Shock, vibration and applied forces are typical here: for example, when rolling and cooling or cutting to finished dimensions along with the accompanying inspection steps. The equipment also needs to withstand moisture on the rolling mill caused by water cooling.

Solutions for hot rolling and heavy plate production

- 1 Fieldbus modules up to 70 °C for all bus systems
- 2 Slab guidance in the roll stand
- 3 Setting the roll gap precisely
- 4 Quality assurance at the rolling stand
- 5 Correct assignment of slabs and coils
- 6 Condition monitoring in the roll stand



As a heavy plate producer you need high-performance equipment and suitable regulating devices at every process stage. With Balluff you get first-class technology to master all the stages from the slab to the coil: fieldbus modules, temperature sensors, position measuring systems, Industrial RFID systems and vision sensors.

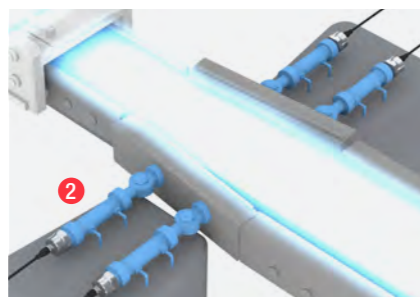


1
 FIELDBUS MODULES UP TO 70 °C
 FOR ALL BUS SYSTEMS
BNI network modules

Modules for use in steelworks with functional security up to 70 °C simplify your network topology. Regardless of which bus system you are using, our BNI fieldbus modules let you construct modular networks. And additionally available IO-Link versions make it possible to effectively and inexpensively wire all sensors.

Features

- Construct networks regardless of the controller manufacturer
- Protection class IP67
- Functionally safe up to 70 °C



2
 SLAB GUIDANCE IN THE ROLL STAND
BTL magnetostrictive sensors

Safely and reliably compensate the large forces that arise during forming. These position measuring systems in a mini-rod design – used in the hydraulic cylinder – are ideal for slab positioning and guidance. For this purpose, the systems check the setting of the side guides and accompany the starting product on its entire path through the roll stand.

Features

- Protected from harsh conditions due to integration into cylinder



3
 SETTING THE ROLL GAP PRECISELY
BTL magnetostrictive sensors

Our BTL magnetostrictive linear position sensor with IP69K protection is ideally suited for setting the roll gap with high accuracy. It withstands the extreme ambient conditions of the steel plant with absolute sealing integrity and, therefore, requires no additional protection from the continuous water cooling of the rolling stands.

Features

- Protection type IP69K
- Wear-free, long service life thanks to non-contact operating principle

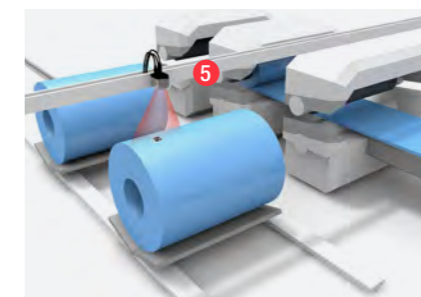


4
 QUALITY ASSURANCE
 AT THE ROLLING STAND
BIS industrial RFID systems

Prevent errors during the process using increased automation. With the Balluff BIS M Industrial RFID system, you can automatically record and identify all tools used. This lets you quickly check whether the correct rolls are being used or whether the roll pairs match. At the same time, reworking of the rolls is documented. This consistently prevents errors and allows you to perform maintenance at just the right time.

Features

- RFID handhelds for mobile communication right at the plant

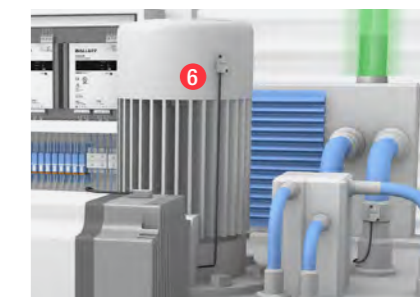


5
 CORRECT ASSIGNMENT
 OF SLABS AND COILS
BVS ID IdentSensors

Reliable reading is possible even under difficult conditions. Simply use barcodes and 2D codes to clearly identify coils and other products. The Balluff IdentSensor uses these codes to check whether slabs and coils are correctly assigned. Fast, reliable and independent of their position.

Features

- IO-Link or TCP/UDP interfaces
- SAMS functionality with condition monitoring signals
- IIoT product access via REST API and MQTT



6
 CONDITION MONITORING
 IN THE ROLL STAND
BCM condition monitoring sensors


Continuously monitor the condition of motors in the roll stand, such as for vibration. Balluff condition monitoring sensors enable automated monitoring in the roll stand, allowing you to avoid unplanned downtimes and system malfunctions. All you need to do is define limit values for pre-alarms and main alarms in order to generate warning messages for specific events.

Features

- Multiple measured variables in one system: Vibration (speed/acceleration), contact temperature, sensor self-monitoring
- Quick to connect and easy to integrate via IO-Link
- Compact design for limited space

Cold rolling and surface finishing

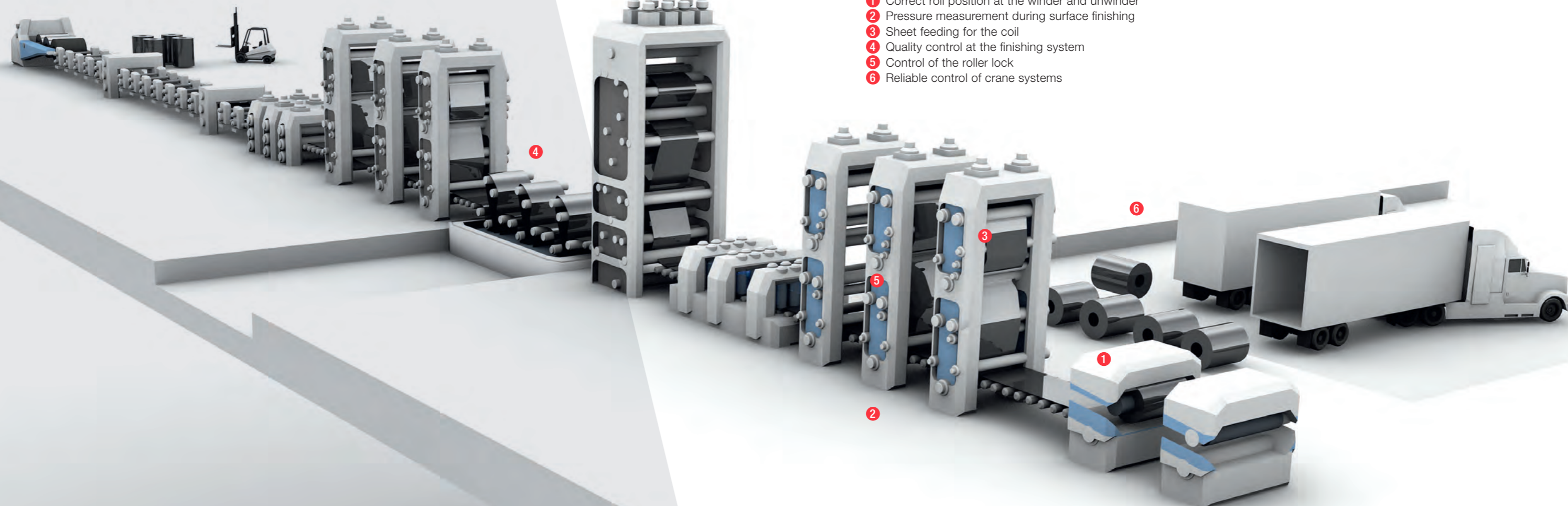
MAXIMUM PRECISION FOR THE FINISH.

 *innovating automation*

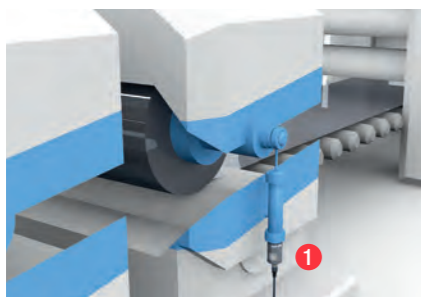
Before the steel leaves the plant, it needs to be finished as much as possible for future use: rolled into a sheet, wire or rail and surface finished. Even the slightest flaws here are irreversible and will be evident later on the product. The quality of the finish is, therefore, essential to the market success.

For cold rolling and surface treatment, Balluff provides highly precise products for best performance even in the final stretch – at the dancer roll, winder, coating system or quality control.

Solutions for cold rolling and surface finishing



In cold rolling and surface finishing, the highest quality standards are demanded of machines and sensors. It is crucial, among other things, to set the roller position on the coiler/uncoiler correctly with high precision, to inspect the sheet coating for quality defects, and to check correct roller locking. In these processes, magnetostrictive sensors, color sensors, and smart sensors from Balluff can make the decisive difference.



CORRECT ROLL POSITION
AT THE WINDER AND UNWINDER
BTL magnetostrictive sensors

Are you looking for a solution for optimal winding? Then our BTL magnetostrictive linear position sensors are the right choice. They are used wherever high reliability and accuracy are required, and also guarantee the highest precision when winding coils during cold rolling. For example by guiding the pressure roller as a function of the roll diameter.

Features

- Contact-free and therefore wear-free
- IP67 protection against contamination



PRESSURE MEASUREMENT
DURING SURFACE FINISHING
BSP pressure sensors

Functional reliability during surface finishing is guaranteed by our HCL-resistant BSP pressure sensors, because they enable reliable pressure measurement of process media even if they come into contact with aggressive media such as hydrochloric acid.

Features

- Acid-resistant process connection made of PVDF

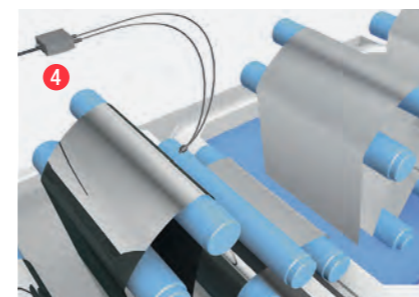


SHEET FEEDING FOR THE COIL
BUS ultrasonic sensors

BUS ultrasonic sensors from Balluff are precision all-rounders. They detect sheets on rolls and coils and regulate the correct material feed on the dancer roll according to the sheet sag. In this way they ensure the correct roller drive and that the sheet tension is always perfect.

Features

- Contactless detection
- Reliable under demanding requirements and harsh conditions

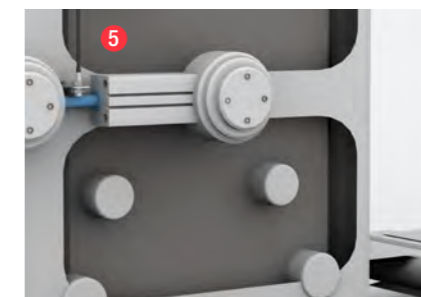


QUALITY CONTROL AT
THE FINISHING SYSTEM
BFS color sensors

Fulfilling your highest quality requirements: the BFS color sensor from Balluff is unrivaled in inspecting sheet and plate finishes. It detects even the slightest color nuances and reliably registers whether a sheet leaves the plant polished or unpolished. Even temperature fluctuations won't keep it from correctly and reliably distinguishing the finished pieces.

Features

- Distinguishes any number of colors
- Three digital outputs and a serial interface for performing evaluations (direct output of Lab color values)
- Large sensing distance up to 400 mm

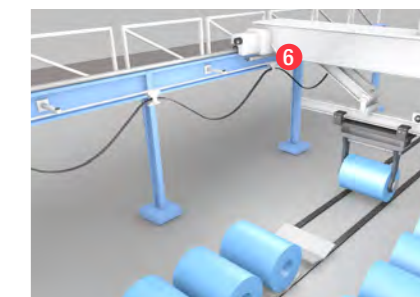


CONTROL OF THE ROLLER LOCK
BES inductive sensors with SAMS

The correct roller position must be ensured before starting a system. Inductive sensors from Balluff are perfect for checking the locking mechanism. Many of these have smart features. By installing a sensor variant with the Smart Automation and Monitoring System (SAMS), for example, you can generate additional data that helps to prevent system downtimes, reduce increasing cost pressure and improve process quality.

Features

- Precise status monitoring through condition monitoring
- Additional data on temperature, vibration and humidity
- Increase in OEE (Overall Equipment Efficiency) and associated cost savings



RELIABLE CONTROL
OF CRANE SYSTEMS
BTL magnetostrictive sensors

Continuous, accurate position monitoring is crucial for the automation of crane systems. Our long distance positioning system (LDPS) ensures this – even in harsh environments and over several hundred meters. It consists of a magnetostrictive position measuring system with a Profinet interface and several position encoders that are flexibly positioned along the travel path and read via a magnetostrictive sensor mounted on the crane.

Features

- Simple, flexible installation: no continuous rail required
- High accuracy at distances of several hundred meters
- Extremely robust against environmental influences
- Minimal maintenance required as it is contactless

INNOVATIVE SOLUTIONS FOR ALL YOUR REQUIREMENTS



PRODUCT OVERVIEW



Application	Product group	Example	Functions, interfaces and features
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COKING MACHINES, COKE OVEN BATTERIES AND CONVEYING EQUIPMENT

Position detection at the pusher machine	BES inductive sensors	BES021M	40 × 40 mm, PNP, NO/NC, range 40 mm, non-flush mounting, IP67
Coke oven battery control	BTL magnetostrictive sensors	BTL7-...-J-DEX-TA12*	Rod style, approvals for hazardous areas (CE, CSA, EAC, IECEx), non-contact, SSI, analog, Profinet, stroke lengths up to 7620 mm
Movements at the coke oven battery	BTL magnetostrictive sensors	BTL7-...SA262...*	Rod style, stainless steel, analog, stroke lengths up to 7620 mm, 100 °C, IP68
Control the pusher cars	BIS industrial RFID systems, HF 13.56 MHz	BIS011P	Processor unit, Profinet, IP65 (with plug connector)
		BIS00WL	Antenna, read/write distance 0...300 mm (with BIS00Y5), square antenna shape, IP65
		BIS00Y5	Data carrier, 112 bytes, IP67

BLAST FURNACE AND ELECTRIC ARC FURNACE

Electrode monitoring in the electric arc furnace	BKT contrast sensors	BKT000Y	12 × 50 × 42.5 mm, PNP, NO/NC, range 17...21 mm, robust metal housing
Assuring the correct electrode position	BES inductive sensors	BES02JZ	M12 × 1, PNP, NO, range 3 mm, magnetic field immune (AC/DC), weld immune, IP67
Measuring the inclination of the casting ladle	BSI inclination sensors	BSI0004	21 × 28 × 87.5 mm, fluid-based measuring system, 0...360°, simple installation, resolution ≤ 0.01°
Pressure measurement for water cooling	BSP pressure sensors	BSP00PL	Range 0...2 bar, PNP, IO-Link 1.1, media temperature -40...125 °C
Reliably regulating air and gas supply at the blast furnace	BTL magnetostrictive sensors	BTL7-E...-B-...*	Rod style, analog 4...20 mA, stroke lengths up to 7620 mm, IP67
Level monitoring in silos and on conveyor belts	BUS ultrasonic sensors	BUS0045	M30 × 1.5 (sensor head Ø 65 mm), PNP, NO/NC, range 600...8000 mm

CONTINUOUS CASTING LINE

Highest safety for casting ladle control	BTL magnetostrictive sensors	BTL7-E...-TB...*	Rod style, 2- or 3-fold redundant, analog, stroke lengths up to 7620 mm
Position sensing at the dummy bar	BMF magnetic field sensors	BMF001Z	Ø 10 × 32 mm, ambient temperature -40...85 °C, stainless steel (1.4571), IP69K
	BAM magnetic target	BAM01EL	Ø 25 × 15 mm, neodymium-iron-boron
Fast sensor replacement without leaks	BTL magnetostrictive sensors	BTL7-...-BN-...*	Rod style, leakage-free replacement of the sensor unit, various interfaces available, IP67
Additional sensor protection when the system is stopped	BOS photoelectric sensors	BOS026R	15 × 50 × 42.5 mm, 2 × PNP/NPN/push-pull, NO/NC, IO-Link 1.1, all-in-one: Diffuse, diffuse with background suppression, retroreflective sensor, throughbeam sensor
	BAM protective housing	BAM029L	84.1 × 107 × 124.5 mm, ambient temperature -5...90 °C, optionally cooled, max. 160 °C, min. 0 °C (water 8 °C, 2 l/min), ATEX
Checking slab length	BOD photoelectric distance sensors	BOD001Y	60 × 37 × 72.3 mm, analog, voltage 0.2...10 V, 2 × PNP/NPN/push-pull NO/NC, range 200...20000 mm, laser red light
Slab transport on the walking beam	BSI inclination sensors	BSI0002	Fluid-based measuring system, -45...45°, simple installation, resolution ≤ 0.01°

Application	Product group	Example	Functions, interfaces and features
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HOT ROLLING AND HEAVY PLATE PRODUCTION

Fieldbus modules up to 70 °C for all bus systems	BNI network modules	BNI005H	68 × 37.9 × 224 mm, Profinet I/O, ambient temperature -5...70 °C, 16 × PNP, type 3, additional interfaces 8 × IO-Link, IP67
		BNI008M	68 × 42.9 × 226 mm, Ethernet/IP, ambient temperature -5...70 °C, 16 × PNP, type 3, additional interfaces 8 × IO-Link, PPS, IP67
Slab guidance in the roll stand	BTL magnetostrictive sensors	BTL BNCA...C15A...*	Rod style, stroke lengths up to 4000 mm, analog or IO-Link interface, up to IP69K
Setting the roll gap precisely	BTL magnetostrictive sensors	BTL7-P511...BE/BF...*	Rod style, stainless steel, start/stop or SSI interface, stroke lengths up to 7800 mm, IP69K (with cable protection)
Quality assurance at the rolling stand	BIS industrial RFID systems HF 13.56 MHz	BIS01H2	Universal handheld base device with integrated NFC antenna
		BAM0421	Charging cradle, power supply unit
		BIS00YE	Ø 24.9 × 4.8 mm, installation metal-free (clear zone), storage temperature -40...220 °C
Correct assignment of slabs and coils	BVS ID IdentSensors	BVS0060	Standard barcodes and standard 2D codes, range 50...600 mm, 1280 × 960 pixels, IO-Link, TCP, UDP, MQTT, REST API
Condition monitoring in the roll stand	BCM condition monitoring sensors	BCM0001	Multiple measured variables in one device: vibration, temperature, humidity, ambient pressure, sensor self-monitoring, IO-Link 1.1, stainless steel, IP67/IP68/IP69K

COLD ROLLING AND SURFACE FINISHING

Correct roll position at the winder and unwinder	BTL magnetostrictive sensors	BTL7-S...-B-SA350-FA...*	Rod style, stroke lengths up to 7620 mm, SSI, ambient temperature -40...95 °C, PTFE cable up to 200 °C, IP68
Pressure measurement during surface finishing	BSP pressure sensors	BSP00YZ	Range 0...10 bar, switching output 2 × PNP/NPN NO/NC selectable, analog, voltage/current selectable 4...20 mA/0...10 V, IO-Link 1.1, media temperature -30...125 °C, process connection made of PVDF, resistant to aggressive media
Sheet feeding for the coil	BUS ultrasonic sensors	BUS006K	62.2 × 62.2 × 32.7 mm, range 600...8000 mm, analog 4...20 mA, IP67
Quality control at the finishing system	BFS color sensors	BFS000L	21 × 58.3 × 74 mm, range 400 mm (with optics), 3 × PNP/NPN, NO/NC, CIE Lab color space
	BFO plastic fibers	BFO00C9	Ø 6 × 25 mm, length 2 m, PMMA
Control of the roller lock	BES inductive sensors with SAMS (Smart Automation and Monitoring System)	BES05Y7	Ø 12 × 65 mm, quasi-flush, IO-Link 1.1, PNP/NPN/push-pull NO/NC, stainless steel, IP68, IP69K SAMS products with condition monitoring features can be found in our entire product range: www.balluff.de/go/sams
Reliable control of crane systems	BTL magnetostrictive sensors	BTL7-V50...-...SA447/479 LDPS*	Profile, Long Distance Positioning System (LDPS), Profinet Encoder Profile V4.1, application distance up to max. 1500 m,

* please contact our sales department to configure your product.

Modular control concepts

WHY IO-LINK IS THE FAST LANE



From parallel wiring to fieldbus protocol

The replacement of parallel wiring by fieldbuses was a major advancement. It successfully minimized the immense installation effort required with expensive copper cables and significantly reduced costs. But fieldbus protocols are not without their pitfalls, namely low signal strength and noise susceptibility.

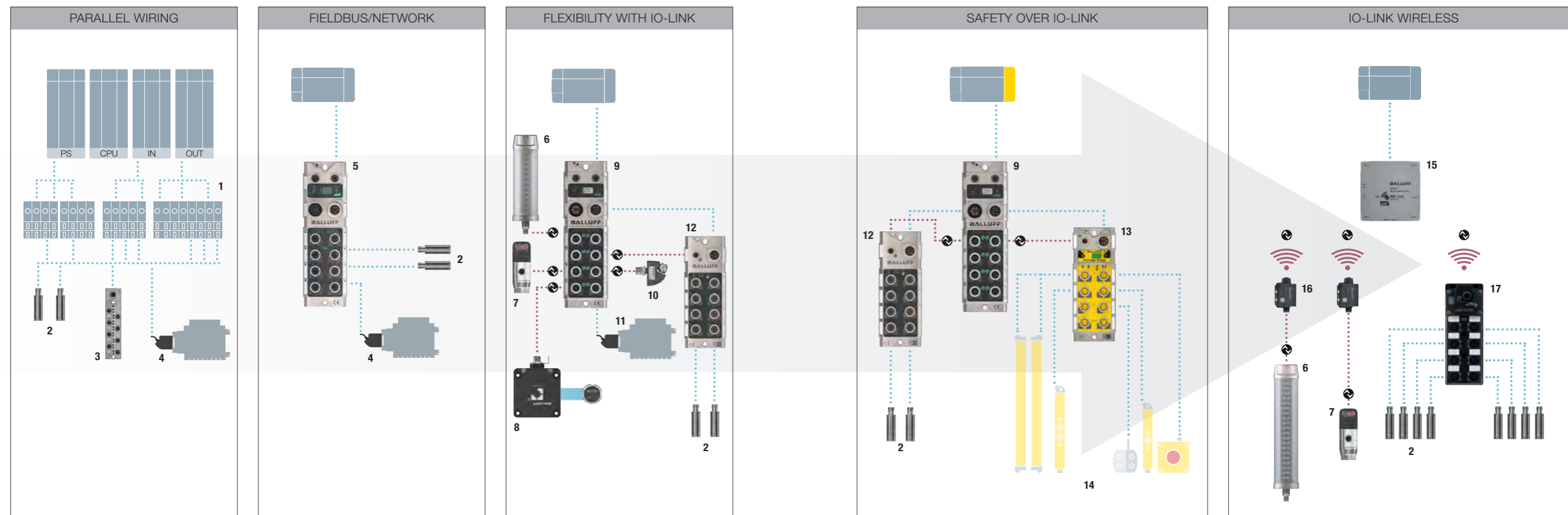
Universal, simple and flexible: IO-Link!

The weak points of the fieldbus protocols are a thing of the past with IO-Link. This is because the unshielded, three or four-core standard industrial cables are highly flexible and suitable for many bending cycles. They are easy to connect, extremely cost-effective and their connection is standardized with M5, M8 or M12 connectors. Therefore, with IO-Link, you can rely on a broadly established standard to integrate a wide variety of devices. IO-Link thus guarantees you extremely flexible control concepts. Due to this versatility, simplicity and performance, IO-Link can be described as the universal interface – the USB – of automation.

With IO-Link, however, flexibility goes much further. Because with Safety over IO-Link, Balluff offers you the first safety solution that can be integrated with IO-Link, which combines safety and automation technology in one system. Safety over IO-Link provides both sensor/actuator details and information, so that you can use the best of both worlds with our safety concept. the best of both worlds.

IO-Link: Now also wireless

Our wireless system consisting of master, hub and bridge is a new radio standard that meets the high demands of factory automation. The wireless master does not receive its data by cable, as is usually the case, but receives the sensor data from a bridge or hub by radio. This brings decisive advantages over a wired system – including simpler planning and installation, greater flexibility in design and mobility, and no wear and tear on connectors or cables. And that with the proven reliability and performance of wired IO-Link.



- 1 Terminal block
- 2 Sensors
- 3 Junction block
- 4 Valve interface
- 5 Fieldbus module
- 6 IO-Link SmartLight
- 7 IO-Link pressure sensor
- 8 Industrial RFID system
- 9 IO-Link master
- 10 IO-Link analog converter
- 11 IO-Link valve interface
- 12 IO-Link sensor hub
- 13 IO-Link safety hub
- 14 Safety components
- 15 IO-Link Wireless master
- 16 IO-Link Wireless bridge
- 17 IO-Link Wireless hub

Greater efficiency, lower costs

IO-LINK SAVES TIME AND MONEY.



Simple installation

To install IO-Link, in addition to the IO-Link master, you only need a standard industrial cable, which is universally applicable. You can therefore quickly integrate the intelligent communication standard into the world of fieldbus. So, even complex devices can be easily integrated. Particularly interesting: Digital communication ensures immunity to interference even without expensive shielded cabling. Analog signals are digitized without any conversion losses. Where classic data transmission was previously impossible or only possible with difficulty, the IO-Link Wireless standard offers a new, promising solution for the factory of the future.

Optimized machine availability

IO-Link enables fast fault-free sensor replacement and prompt commissioning. This enables you to significantly reduce downtime because the parameters of a replaced IO-Link sensor are automatically written from the IO-Link master or the controller to the new sensor. Commissioning, format changes and recipe changes can be performed centrally via the function modules of the control. This saves time and reduces the potential for errors to a minimum. Another advantage for you: IO-Link devices cannot be mistakenly swapped, since they can be identified automatically via IO-Link.

Demand-based maintenance

Continuous diagnostic data of the entire process extends your service intervals, since automatic readjustment via IO-Link means you need to maintain equipment and machines much less often. Predictive error detection is now also possible because the complete process parameters are continuously displayed in the control system.

More efficient operation

With IO-Link you can optimally position sensors in the machine directly at the workplace because accessibility of the sensors is no longer a factor. Process monitoring, configuration and error analysis of the IO-Link devices now takes place in the controller. This optimizes process time considerably. In addition, signal delays and distortions are reliably eliminated because digital data transfer ensures high signal quality.

Extensive application requirements can be easily achieved with IO-Link because you can use both binary and analog standard devices with IO-Link sensors/actuators at the same time.

STANDARD-SENSORS/
ACTUATORS

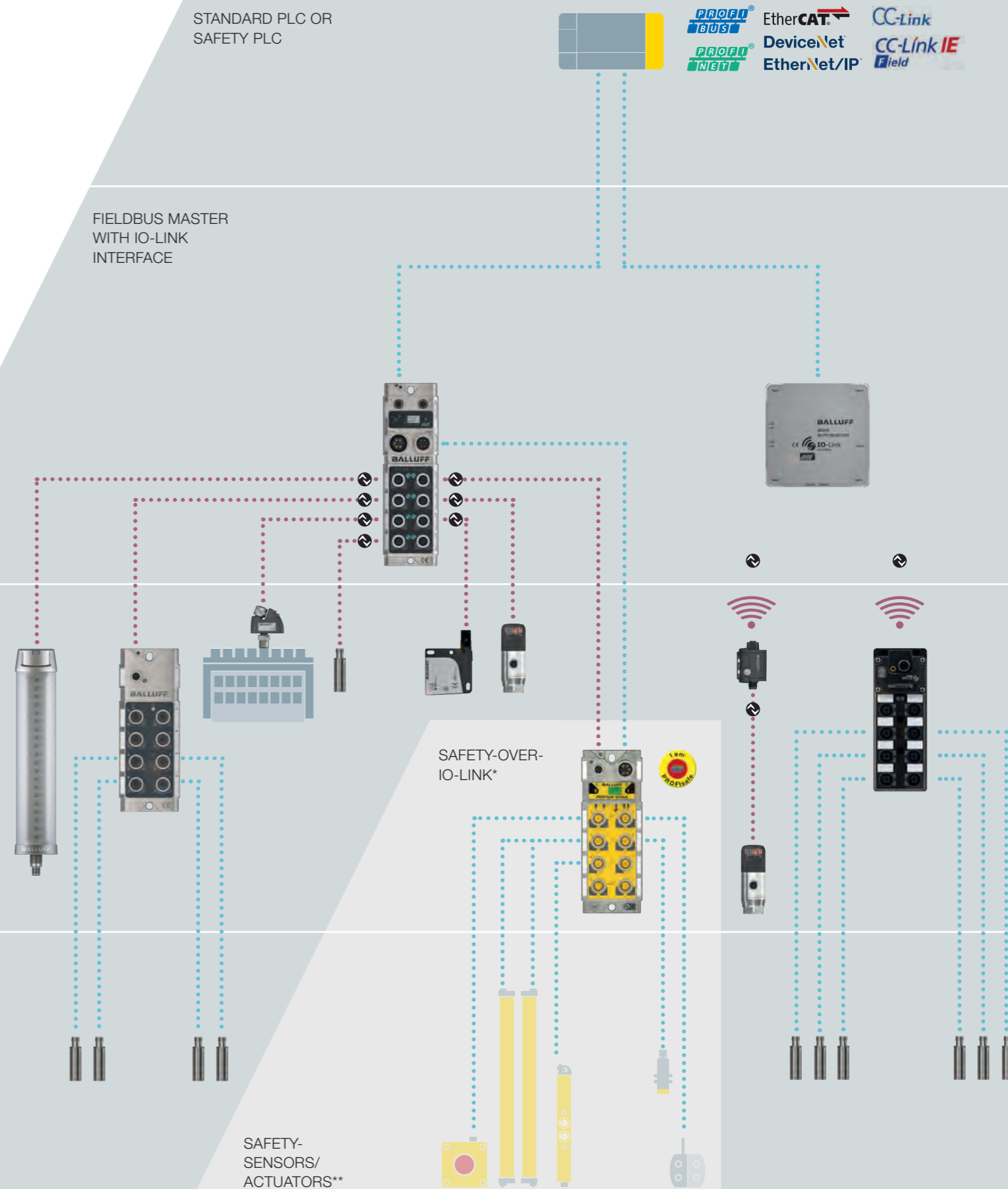
STANDARD PLC OR
SAFETY PLC

FIELDBUS MASTER
WITH IO-LINK
INTERFACE

IO-LINK
DEVICES

SAFETY-OVER-
IO-LINK*

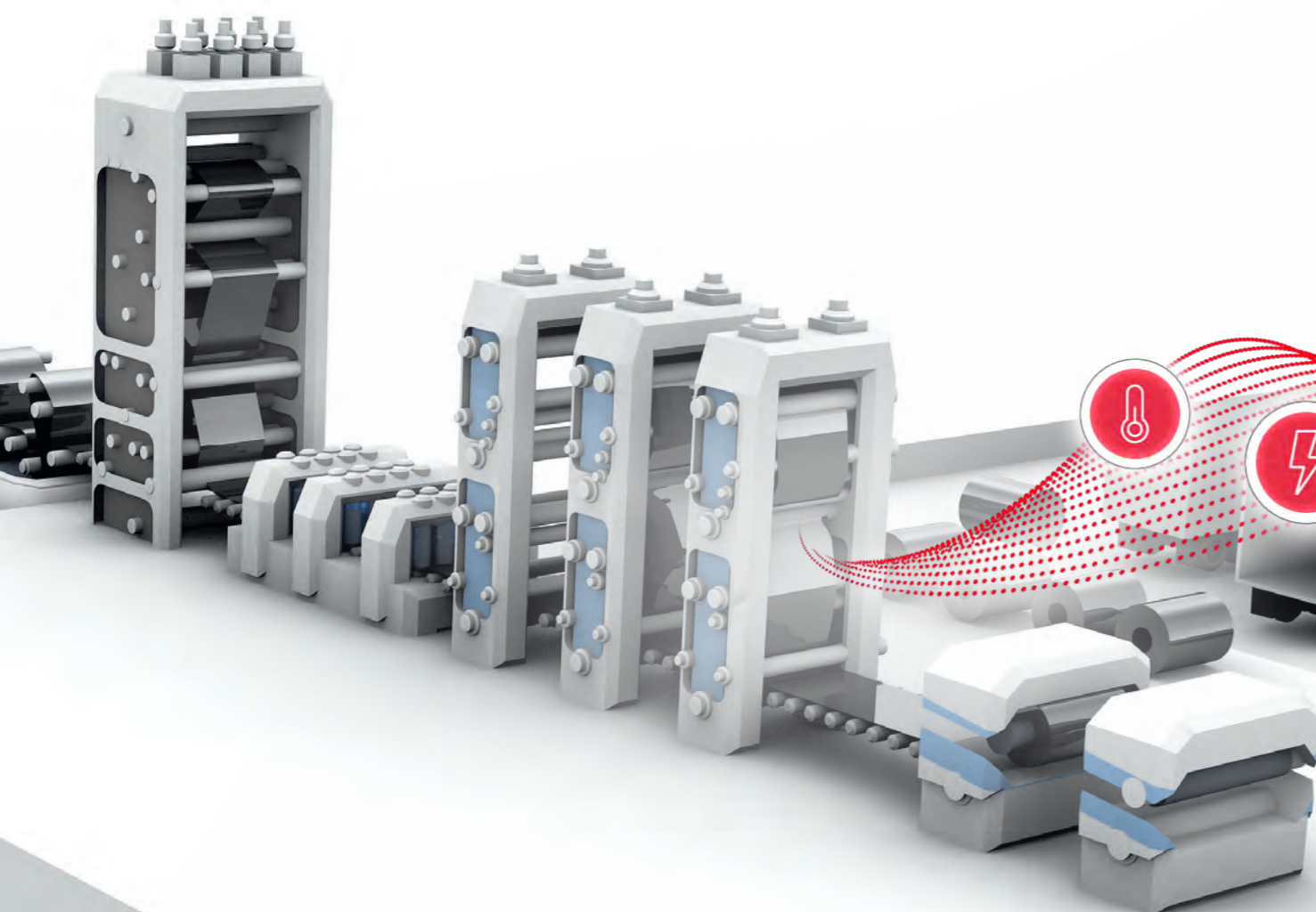
SAFETY-
SENSORS/
ACTUATORS**



* can only be used with PROFINET
** not in Balluff delivery program

An intelligent system for optimizing production

SMART AUTOMATION AND MONITORING SYSTEM



Look and feel

The universal operating and configuration concept of SAMS increases the flexibility and availability of your machine. Our products can be parameterized, configured and even taught using standard data profiles. This minimizes machine damage and production downtime resulting from incorrect handling. Even relatively untrained personnel quickly become familiar with these easy-to-use solutions and can avoid errors.

Machine condition and status

You always have an overview of the status of your machines and systems, as status messages allow faults to be quickly identified and localized (condition monitoring). All information is always uniformly and directly available to you – whether via the colored LED display on the device or on dashboards for further analysis. Because you now have an overview of every single sensor, every machine and your entire production, you can identify trends and plan replacement or optimum maintenance at exactly the right time (predictive maintenance).

Intelligent functions and distributed logic

Intelligent functions such as temperature monitoring, tilt detection, vibration monitoring, signal quality display and operating hour counters turn Balluff devices into data sources that you can leverage for the reliable operation of your systems. Each component can be localized distinctly within the system by means of a device discovery command and a corresponding LED flashing signal.

Data acquisition and software

The future of automation is increasingly networked and digital. The growing diversity of technology, both in private and industrial settings, raises the expectations of many users and the demands placed on industry. Benefit from our system solutions for a wide range of requirements in your production environment. Whether it's monitoring the condition of your machines, monitoring your production systems, or with systems for format change management.

- | | | | | | |
|--------------------------------------|----------------------|-----------------------------|-----------------------------|--------------------------------|--------------------|
|
Vibration |
Inclination |
Device temperature |
Moisture |
Current/voltage monitoring |
Signal quality |
|
Extreme environmental conditions |
LED diagnostics |
Operating hours counter |
Operating start counter |
Switch counter |
Signal speed |
|
Signal delay |
Device detection |
Pin setting |
Logic blocks |
Basic statistics | |

Balluff

YOUR PARTNER FOR SUCCESS IN AUTOMATION



innovating automation

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 100 years, the company today employs about 3900 employees in 38 subsidiaries within sales, production, and development locations worldwide, all of whom are committed to your success. Together with our representatives, we guarantee the highest quality standards in over 60 countries so that you always get the best.

We deliver innovative solutions to increase your competitive ability. Our consistent digital orientation drives our joint progress, and our innovative spirit factors directly into your success.

We adhere to our motto "innovating automation" as pacesetters of automation, refiners and new developers, and technical trailblazers. In our strategic incubation programs (SIPs), we develop new sustainable business models according to the lean startup principle. Open exchange with associations, universities and research institutes also helps us in this process. In this way, and in close contact with our customers, we create innovative industry solutions for automation. In doing so, we dedicate ourselves not only to the classic automation areas, but also to the development of digitalization and IIoT applications for an increasingly digital and networked world.

We have the future firmly in view in everything we do. We plan with foresight, handle resources carefully and offer you long-term prospects.

You can rely on us, our commitment and Balluff quality – all in the name of a mutually beneficial 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 for smooth running of your projects. 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.

 *innovating automation*

REFERENCES

The demands in the steel and metallurgical production 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 steel plants.

We work together with such companies as





www.balluff.com/go/contact

CONTACT OUR
WORLDWIDE
SUBSIDIARIES



Headquarters
Balluff GmbH
Schurwaldstrasse 9
73765 Neuhausen a. d. F.
Germany

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