



METAL AND STEEL INDUSTRY MINI MILL ROUTE

EFFICIENT AND OPTIMUM PROCESSES – AS WELL AT
STEEL PRODUCTION BY SCRAP RECYCLING.

SICK
Sensor Intelligence.

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Applications in focus

The application graphics shown are not binding, they are no substitute for the need to seek expert technical advice.

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TASKS IN THE METAL AND STEEL INDUSTRY

At the end, the quality has to be right. To achieve this, some things need to be observed. This includes the correct position and alignment of semi-finished and finished products on roller tables and the optimal distance between finished products in order to avoid damage. Flexible processes and interactions between humans and machines require safety technology. Protective facilities are necessary and not only secure danger zones but also optimize production. Time is money – this also applies here. Monitoring the flow and dosing of bulk materials optimizes the throughput and reduces maintenance times. The regulations for emissions monitoring and data transmission to the authorities are becoming increasingly more; this includes the steel industry. SICK delivers sensor solutions for almost every application so that reliable products are delivered to customers in the end.



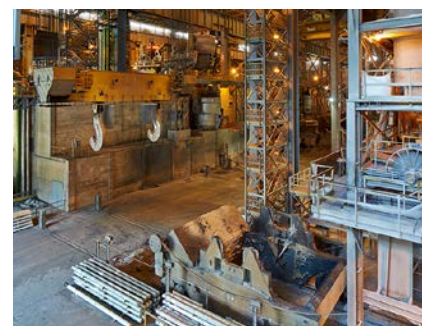
Security and protection

It's not just the protection of people that is important. Equally important are the protection of the plant and its machines from damage and loss. SICK offers solutions for collision protection, access control in risk zones and accident prevention within and outside of the production building.



Quality control

The product quality has to be consistently ensured in the production chain. Solutions from SICK ensure that the required quality level of finished products is achieved – from measuring the sheet thickness to galvanization, from profiling and adjustment to warpage detection.



Positioning

The encoder, laser scanner, distance and presence sensors from SICK make the highly precise alignment and positioning of semi-finished and finished products easier – even for ladle cars, transfer cars, industrial cranes, torpedo ladles. The sensors are available in different designs and with different interfaces.



Emission monitoring

Measurement systems either check to see if emissions standards are reached and complied with or only report limit violations. Operators in steel mills always trust the expertise of SICK when choosing appropriate solutions for dust, gas flow and exhaust measurement.



Monitoring and checking

Sensors from SICK not only assist in complying with the emission limit values, but also provide reliable data as verification for the monitoring authority. In addition, remote maintenance systems from SICK provide measuring convenience in daily operation and reduce maintenance costs.



Material flow optimization

Laser scanners measure the volume flow on conveyor belts. Encoder and presence sensors control the dosing process. Level sensors monitor silo contents and material discharge hoppers. Even the materials management benefits from sensor technology from SICK: the production efficiency increases.





Material handling processes

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① Detection of cold metal plates during automated handling

Damage-free, automated handling of metal plates, sheets and strips is a common, yet important task in metal producing and handling plants. The reliability of this operation affects both production and safety aspects. Regardless of the objects' surface color, reliable detection of the goods is the success factor. Robust, contactless ultrasonic sensors ideally offer a simple solution in harsh environments for reliable object detection during automated handling.



UM30-2 → p. 97



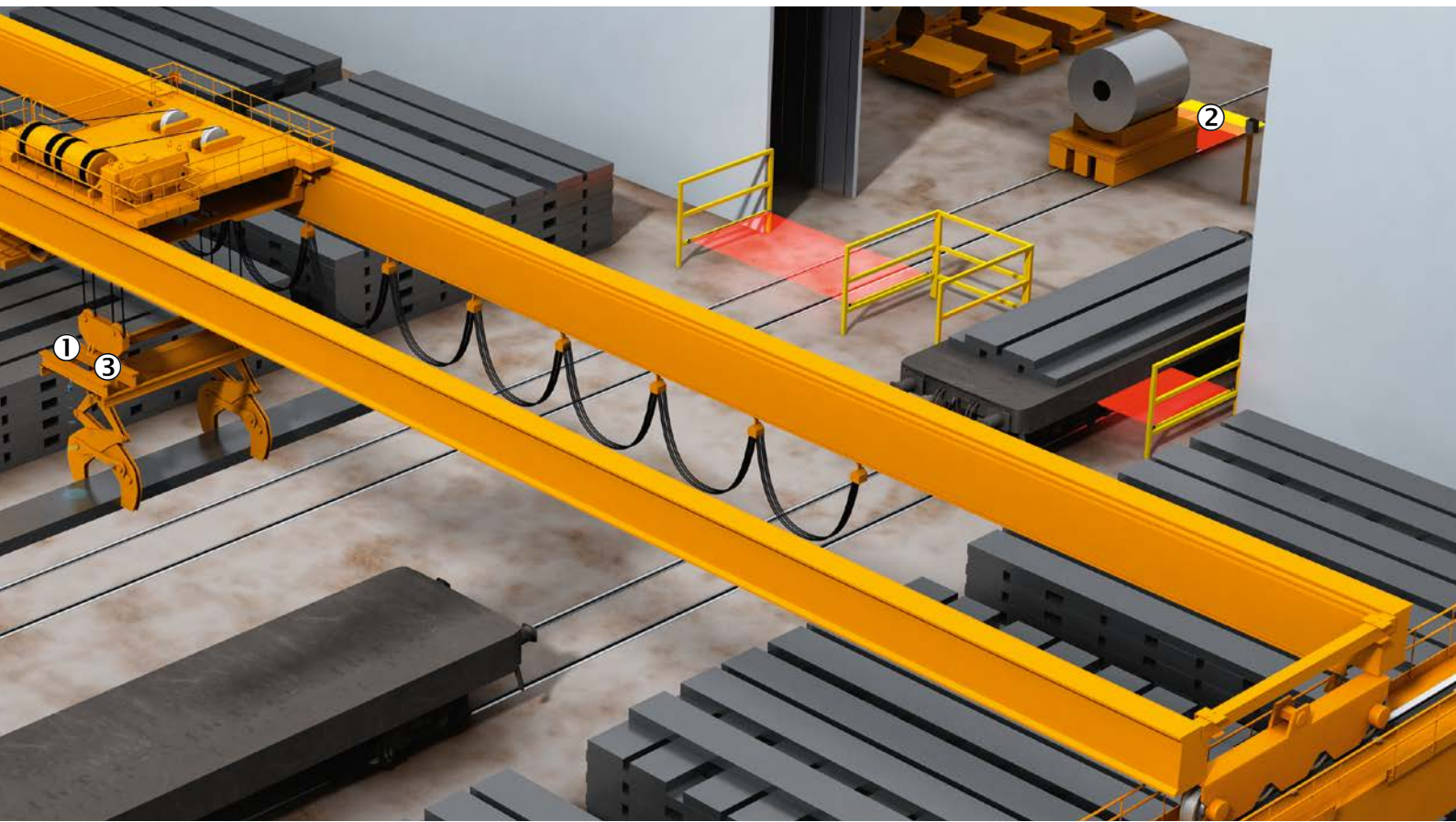
② Protecting of personnel from movement during automated handling process

Protection of factory personnel from automated transport vehicles is an important safety issue for all types of production and handling processes in a steel mill. A coil handling machine, equipped with S3000 safety laser scanners, detects obstacles in its path enabling the automated machine to quickly come

to a controlled stop before a collision occurs. The path can be cleared and the machine can automatically continue on its way thanks to the automatic restart function. This safety precaution protects physical assets as well as personnel crossing paths with the machine.



S3000 Standard → p. 77



③ Distance measurement for multiple slab handling during post production logistics

During automated handling of finished slabs, overhead machines require accurate distance-to-goods information in order to achieve proper gripper positioning. Reliable measurements ensure damage-free material handling process. The DT50-2 Pro distance sensor identifies the presence of objects and

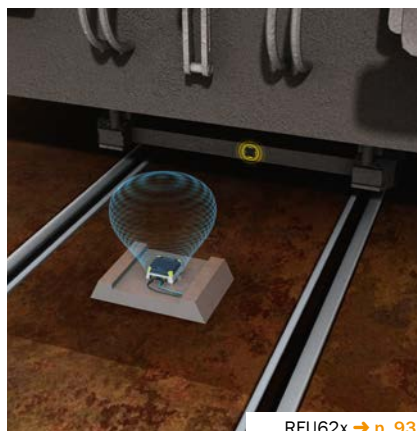
guarantees proper placement of finished products in the logistics area. Additionally, automated grippers, cranes and other overhead equipment also rely on mid-range distance sensors to prevent collisions between gantry cranes in the goods warehouse.



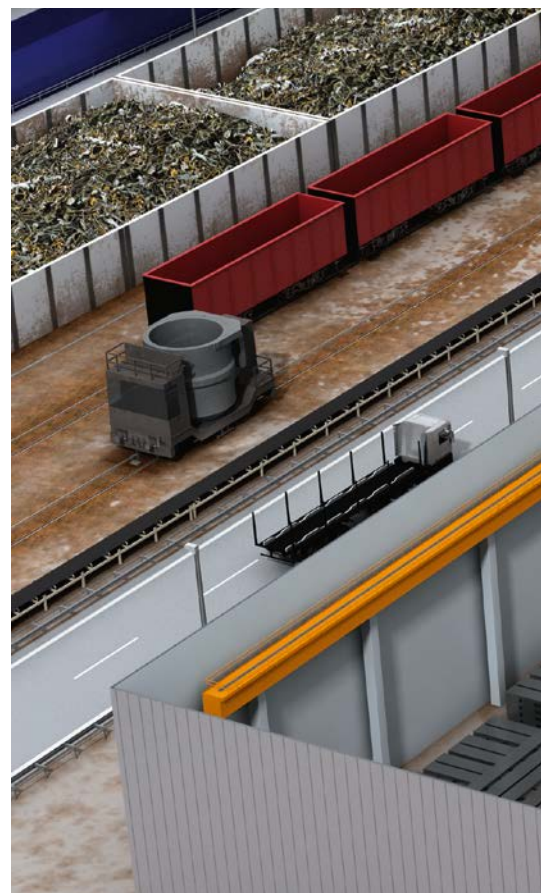
DT50 Hi → p. 93
DT50-2 Pro → p. 94

① Tracking and tracing products on automated vehicles within a plant

Tracking and tracing products loaded on automated transfer cars is an important task in industrial production processes. Radio Frequency Devices (RFD) offer a modular concept for flexible and cost effective solutions when tracking material on vehicles in automated areas. The RFU620 is an industry-oriented compact device with an integrated antenna making the sensor ideal for solving tasks in logistic automation areas. Whether in the steel mill or the warehouse, the RFU620 is an ideal solution for tracking goods outfitted with transponders.



RFU62x → p. 93



② Safeguarding entry and exit of automated sheet metal transport during logistics

Safeguarding the warehouse entry and exit points for automated transporters is essential in order to ensure a plant's perfect safety record. Humans should not enter areas where automated vehicles operate without devices to secure a

safe, controlled stop of a loaded vehicle. A horizontally mounted safety light curtain such as the C4000 Fusion, ensures the automated vehicle will safely brake when an obstacle presents itself.



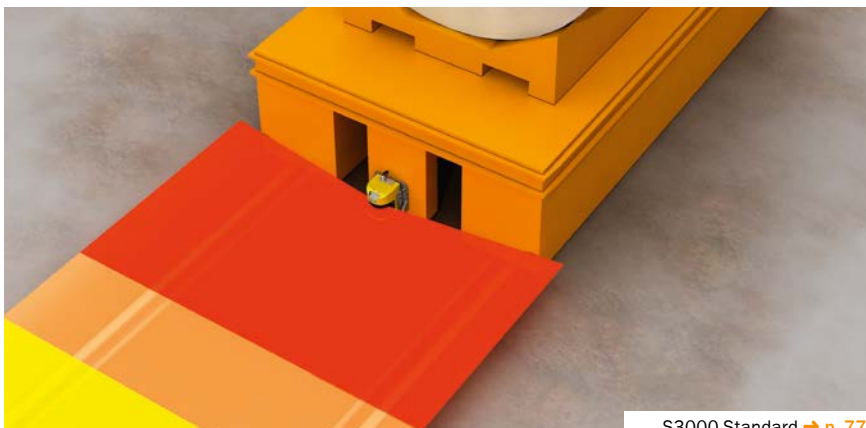
C4000 Fusion → p. 77



③ Safeguarding path of automated vehicles during post production logistics

Protection of factory personnel from an automated vehicle transporting and positioning finished coils is crucial. Even if the route is fenced, assurance of accident- and injury-free work areas is still necessary. Therefore, a safety

laser scanner, such as the S3000 with its 190 degree scanning angle and 7 m protective field range mounted on the vehicle and positioned to monitor the path, is an ideal solution to protect workers and the goods alike.



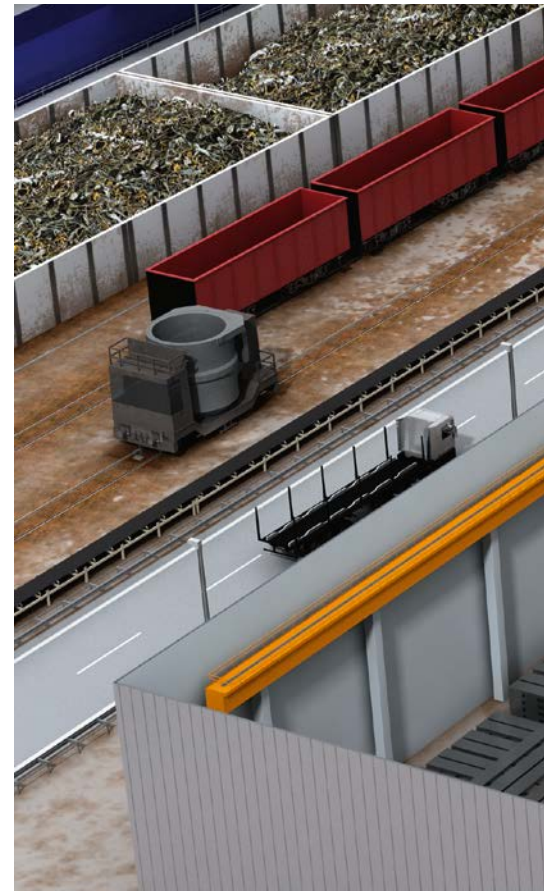
S3000 Standard → p. 77

④ Vehicle positioning during post production logistics

Correctly positioning automated vehicles during post production logistics can be difficult without the aid of a distance measurement sensor. Properly protected from the elements such as dust, heat, and accidental jostling, a DL-100Pro long range sensor can provide assistance to a vehicle when determining the position to allow loading and unloading of finished goods. To achieve precise positioning, the sensor uses time-of-flight technology to determine the vehicle's exact position and passes this information on to the automated vehicle's control system.



DL100 Pro → p. 94



⑤ Protecting of factory personnel during post production logistics

Humans and automated machinery work side by side in steel mills. Safeguarding the path of an automated transfer vehicle can be accomplished by outfitting the vehicle with two S3000 safety laser scanners - mounted front and back. These safety rated sensors detect upcoming obstacles or persons, allow-

ing the automated machinery to avoid an accident. Additionally, safeguarding physical barriers, such as a fence or gated area, with a guard locking device i110 Lock can help ensure that humans stay out of areas occupied by automated transfer cars and other moving machinery.



S3000 Standard → p. 77
i110 Lock → p. 79



① Outdoor crane positioning

Precise crane positioning can be achieved by using the rugged KH53 linear encoder. To properly determine the crane's x-axis, this non-contact, virtually maintenance-free linear measuring system mounted on the crane's column. This encoder determines the crane's absolute position by sensing the integrated magnets buried parallel to the rails on which the crane runs. This accurate linear encoder can measure up to 1,700 m at speeds up to 6.6 m/s. The KH53 is an ideal solution in harsh environments with superior background suppression and immunity to cross talk from other sensors.



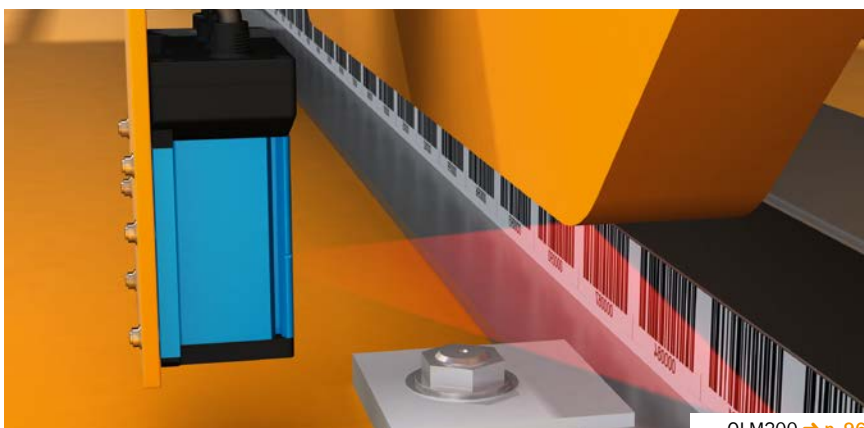
KH53 → p. 92



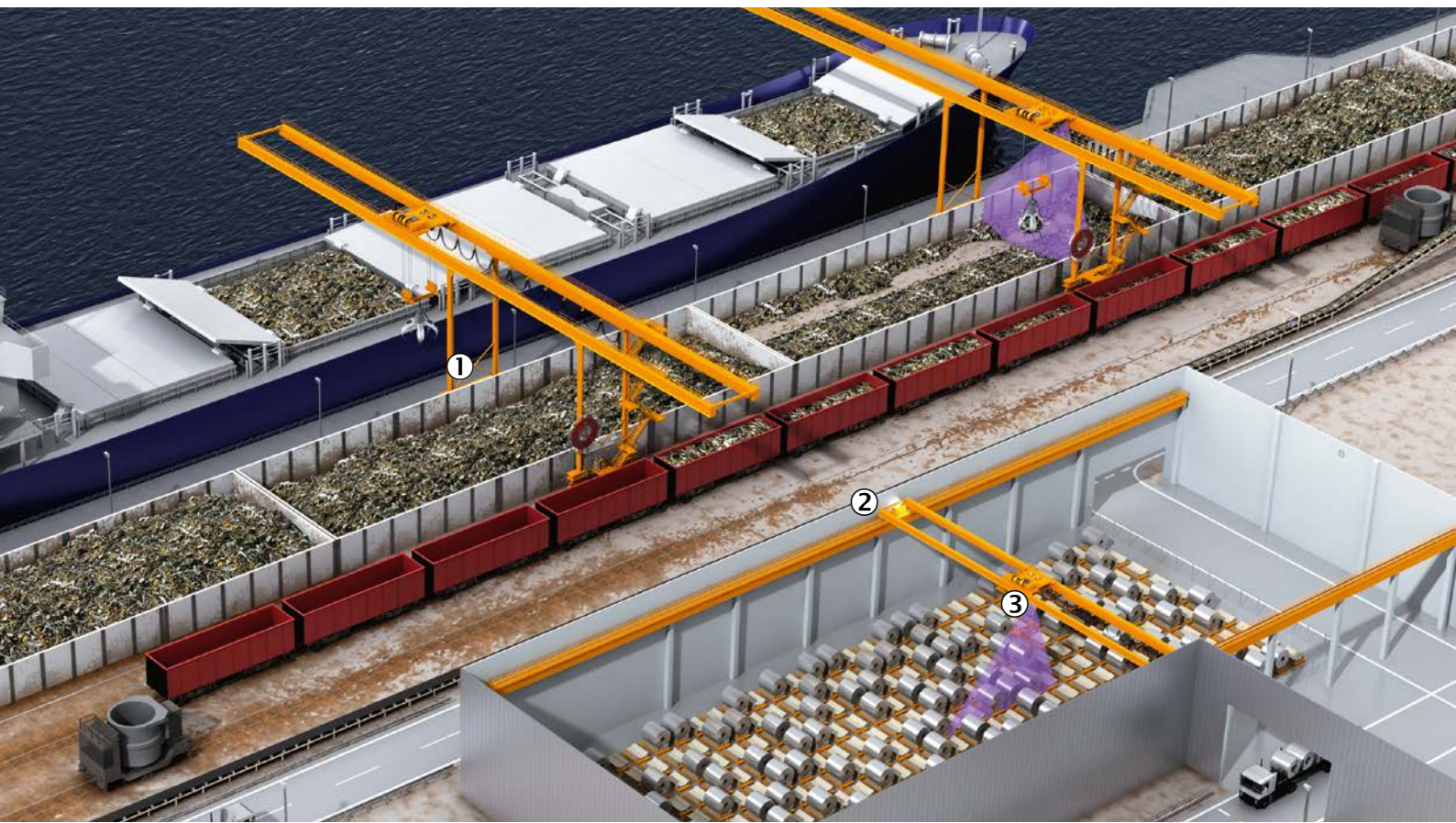
② Positioning of multiple indoor cranes

Positioning of multiple indoor cranes during material handling is an important task for ensuring proper positioning and avoiding overhead collisions. To best manage this process, an OLM200 linear measurement sensor determines the crane's current position using bar code tape mounted along the length of the

crane's track. The bar code tape can be placed along a curve, free roaming path, incline, decline or straight line. The OLM200 accurately determines the crane's correct position with an excellent repeatability of up to 0.15 mm – even if multiple cranes are on the same runway.



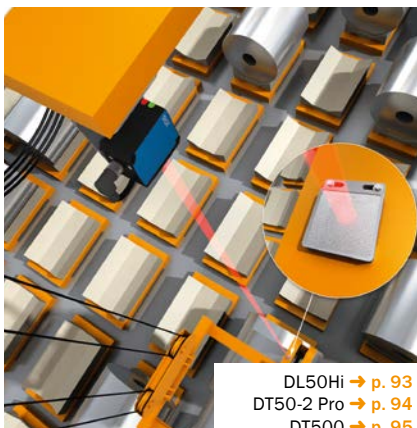
OLM200 → p. 96



③ Vertical positioning of cranes in stock yards

Vertical cranes are used in post-production warehouse for small items. These cranes retrieve parts by traveling vertically along shelving. To ensure proper retrieval, a mid range distance sensor, such as the compact DL50 Hi, helps properly position the crane. The sensor

delivers exceptional performance up to 50 m and its High-definition Distance Measurement technology provides excellent repeatability. A red laser light ensures precise alignment and its tough metal housing is ideal for the environment.



DL50Hi → p. 93
DT50-2 Pro → p. 94
DT500 → p. 95

④ Overhead crane trolley positioning

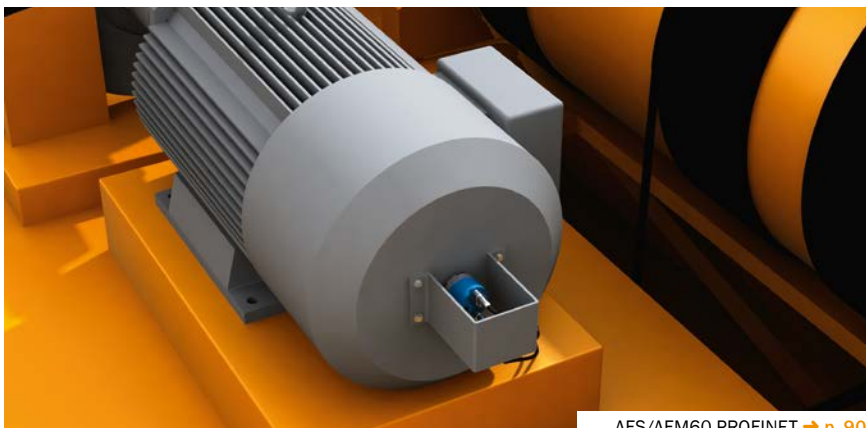
Proper overhead crane positioning in a warehouse or outdoor area is easily solved using a combination of encoders. While precise positioning of the crane's x- and y-axes can be managed with linear encoders, the z-axis positioning is solved using an absolute multi-turn encoder. The KH53 non-contact linear encoder is a rugged solution that determines the absolute position of an overhead crane. It can measure lengths of up to 1.7 kilometers and be used in the harshest environmental conditions, often present in steel warehouses. Additionally, KH53 linear encoders tolerate speeds up to 6.6 m/s.



⑤ Overhead crane gear positioning

Positioning overhead cranes can be accomplished using a combination of encoders. While precise positioning of the crane's x- and y-axes can be managed with linear encoders, the z-axis positioning is solved using an absolute multi-turn encoder. The AFS/AFM60 encoder is a

rugged solution that determines the absolute position of the overhead crane's gears. The absolute encoder measures infinite lengths by counting rotations and is used in the harshest environmental conditions, which are often present in outdoor areas of steel plants.



AFS/AFM60 PROFINET → p. 90



⑥ Detection of material on automated cranes in outdoor applications

Outdoor material storage facilities are common in steel plants. To help manage the outdoor storage facilities, 2D laser scanners provide a compact solution for reliable detection and distance measurement. Mounted on a moving crane, these scanners collect 2D contour and

volume data of raw materials or finished goods and enable the gathered information to be processed remotely. The scanners are ideal for material detection in outdoor warehouses and damage-free product management, while ensuring anti-collision of cranes and their loads.



LMS5xx → p. 97

⑦ Anti-collision of cranes during material handling

During the material handling process, multiple cranes are used. Without proper protection and warning systems, cranes on the same runway can collide with one another. Using time-of-flight technology, a mid range distance measurement sensor mounted on each side of each crane is able to reliably detect approaching cranes and stationary walls up to 50 m away. Reflective tape is affixed to each crane. Able to operate in temperatures up to +65 °C and with a tough die-cast metal housing, this sensor is ideal in logistics areas. Alternatively, long range distance or ultrasonic sensors can also solve this task.



Dx50 → p. 93
Dx100 → p. 94
UM30 → p. 97



⑧ Positioning of rail-mounted shuttles during the material handling process

Proper positioning of outdoor rail-mounted transfer cars and product shuttles during the material handling process is simple with the help of a linear encoder. The encoder's several magnetic heads are buried in concrete between the shuttles' rails while the encoder is mounted underneath the moving

shuttle. The non-contact, accurate measuring system identifies each shuttle's position on the track. Since the vehicles' track isn't necessarily straight, the linear encoder is able to reliably manage the track's curves. Outdoor vehicle positioning could not be easier.



KH53 → p. 92



⑨ Hydraulic pressure measurement during material handling

Steel plants' outdoor warehouse facilities often use mobile cranes to efficiently manage of finished product. Outdoor mobile cranes' gears require hydraulic fluid to ensure that the moving hinges are properly protected, lubricated and

functioning. However, this necessary hydraulic fluid requires constant pressure monitoring. This task is best done with a PBS pressure switch, which monitors pressures up to 600 bar.

ⓘ This graphic is not presented in the overview.



PBS → p. 100

⑩ Coil handling, positioning and management

Once steel coils are wound, they are ready to be relocated to storage areas or loaded on trains for transport to their final destination. This process requires proper, damage-free handling via an overhead crane. A 2D laser scanner is mounted on the crane above the coils where it uses laser pulses to continuously measure the height profiles of the stacked coils below. Using time-of-flight technology, the laser scanner reliably detects the coils' even when interfering factors such as smoke or dust are present.



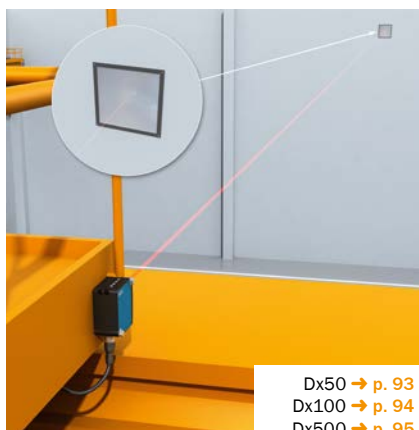
LMS511 → p. 97



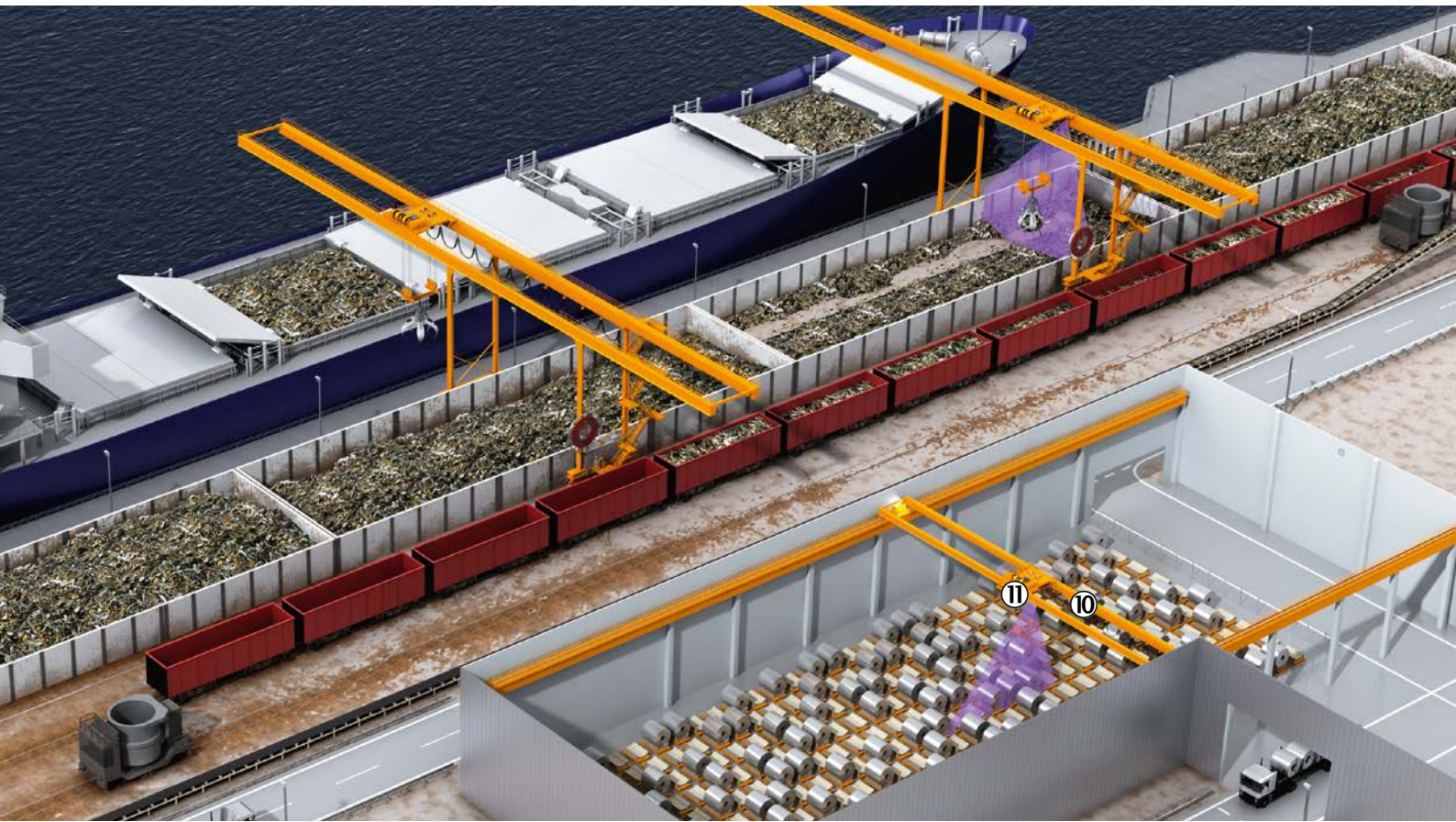
⑪ Proper positioning of overhead cranes inside storage area

Correctly positioning overhead cranes to manage, move and retrieve finished steel product is accomplished with mid or long range distance sensors with sensing ranges from 150 mm up to 300 m. Due to their highly reliable measurement capabilities, distance sensors accurately position overhead cranes.

Best of all, distance sensors have easy-to-understand setup and programming, ensuring they can be commissioned quickly. They offer the perfect combination of range, reliability, precision and price for this indoor material handling task.



Dx50 → p. 93
Dx100 → p. 94
Dx500 → p. 95



① Rotary valve operation during material handling

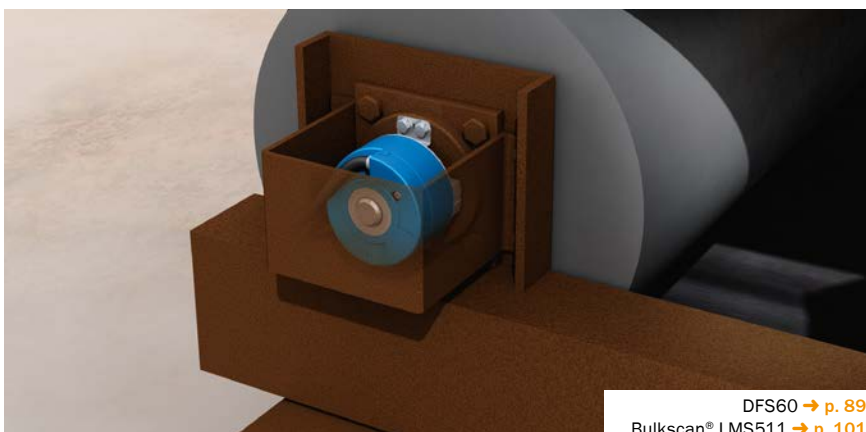
Although rotary valves are small parts in big steel plants, they play an important role in the material flow process which is vital for uninterrupted steel making. Discharging lump raw materials, dust or ash from silos, bunkers and hoppers or take-over points in conveying systems are typical locations for rotary valves. For proper functioning of all system parts, it is important to monitor the operation of the valve via axle movement control using inductive sensors or encoders.

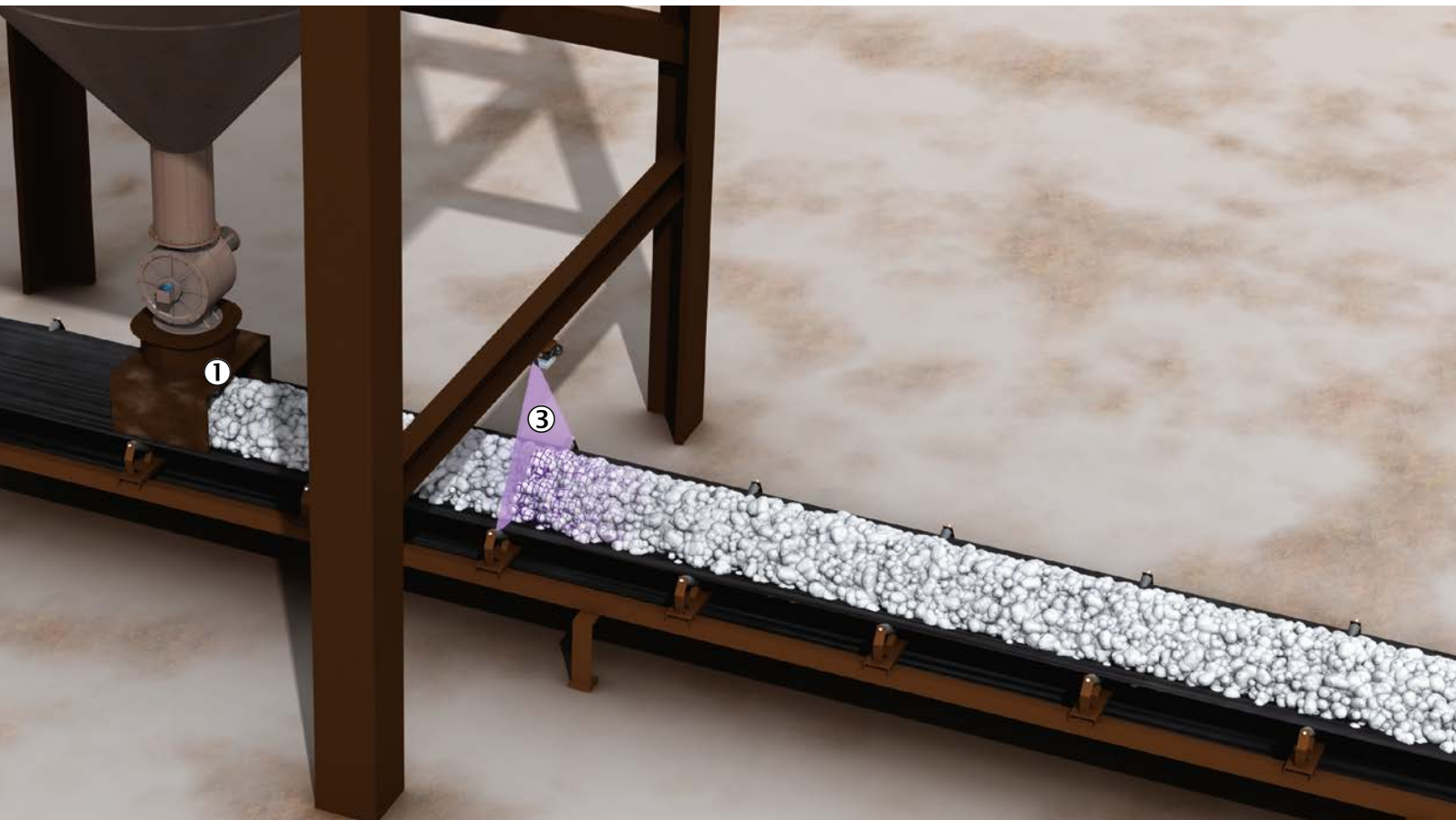


② Conveyor belt operation during material handling

Conveyor belts convey materials throughout a steel plant. From the unloading supply deliveries to filling intermediate bunkers. From transporting slag to the eventual shipping of finished goods. A conveyor belt malfunction can cause significant delays in production and involve major costs. It is therefore

necessary to control the operation of conveyors, as well as proper loading, unloading and positioning of goods. Such tasks require the reliability of a flow meter system Bulkscan® LMS511 complete with a rotary encoder. Zero contact, zero wear: a smart solution for conveyors.





③ Volume and mass flow measurement during material handling

Many bulk or lump materials used in the steel producing process are transported to various parts of the mill via belts. Before being used in the production process, most of those bulk materials are weighed. However, it is often important to know both the volume and the mass flow of the material before loading

it into trucks, ships or other vessels to prevent overfilling and to determine the actual amount used for accurate billing purposes. If the density (specific and/or bulk) is required, then 2D laser scanners, in addition to a weighing system, can deliver exact volume flow and the material density.



Bulkscan® LMS511 → p. 101

① Fire detection in carbon storages during material handling

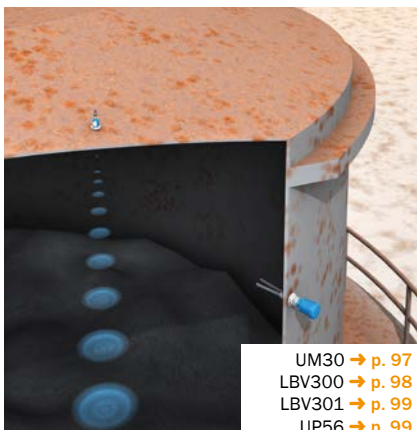
Different forms of carbon are often used in metal and steel production processes. The carbon is stored in silos or bunkers that have limited space depending on the filling grade. In case an inert silo or bunker is not used, an O₂ measurement technology can detect a potential fire risk and alleviate that risk by decreasing the O₂ content in the silo. Alternatively, a CO monitor can detect a fire by sensing an increase in the CO content. A combination of both technologies in one installation is possible and increases the overall safety level of the process.

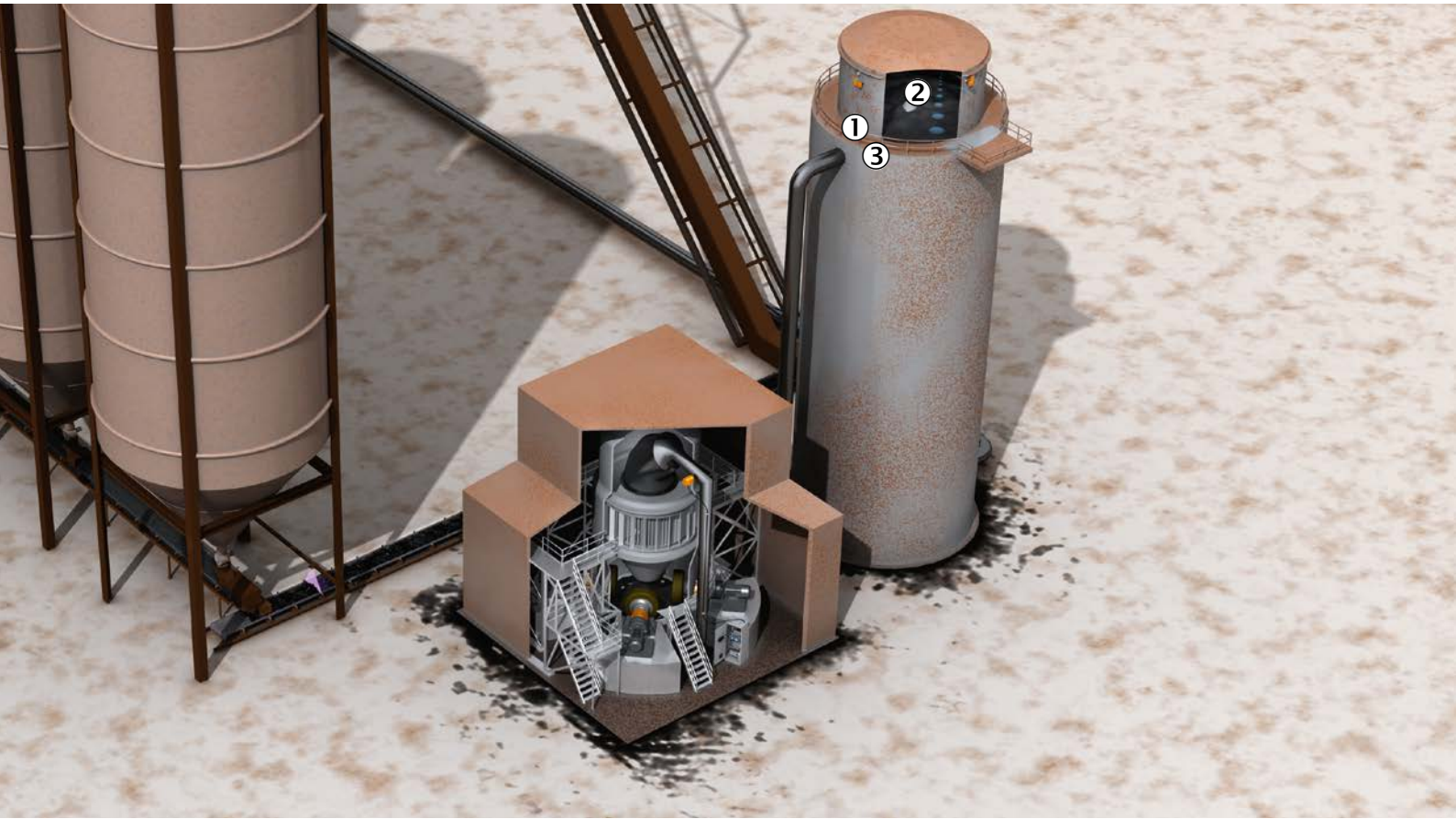


② Level measurement during material handling

Level control in storage facilities is vital to ensure trouble-free operation. Overfilling leads to spilling and waste. Spillage requires removal, which costs time and money and can be performed only when the process is stopped. Conversely, material shortage also causes problems.

Therefore, silos' material levels must be monitored. A vibrating level switch, such as a single rod or tuning fork, accurately measures the level. Alternatively, a non-contact ultrasonic level sensor can be installed to provide exact levels.





③ Inertization of carbon silo during material handling

Different forms of carbon are often used in metal and steel production processes. The carbon is stored in silos or bunkers that have limited space depending on the filling grade. In case an inert silo or bunker is not used, the TRANSIC100LP's O_2 measurement

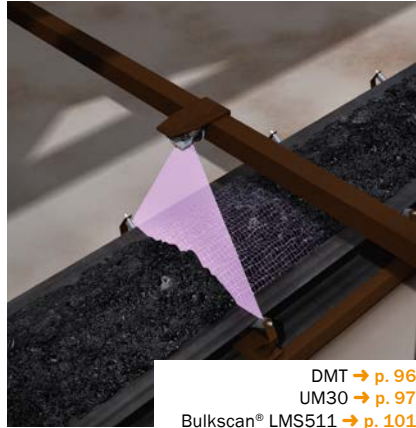
technology can detect a potential fire risk and alleviate that risk by decreasing the O_2 content in the silo. This technology increases the overall safety level of the material handling process and safeguards plant personnel.

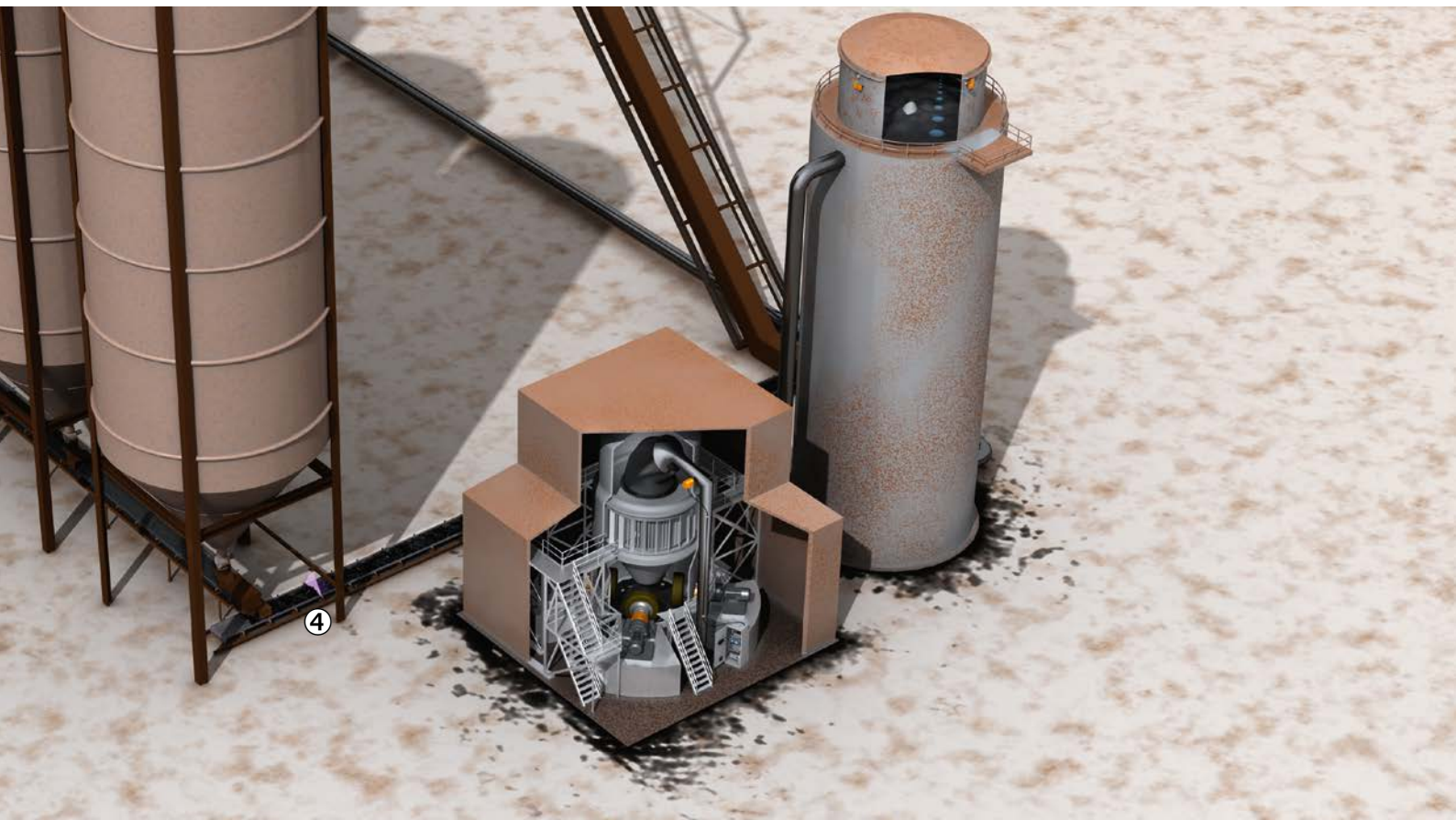


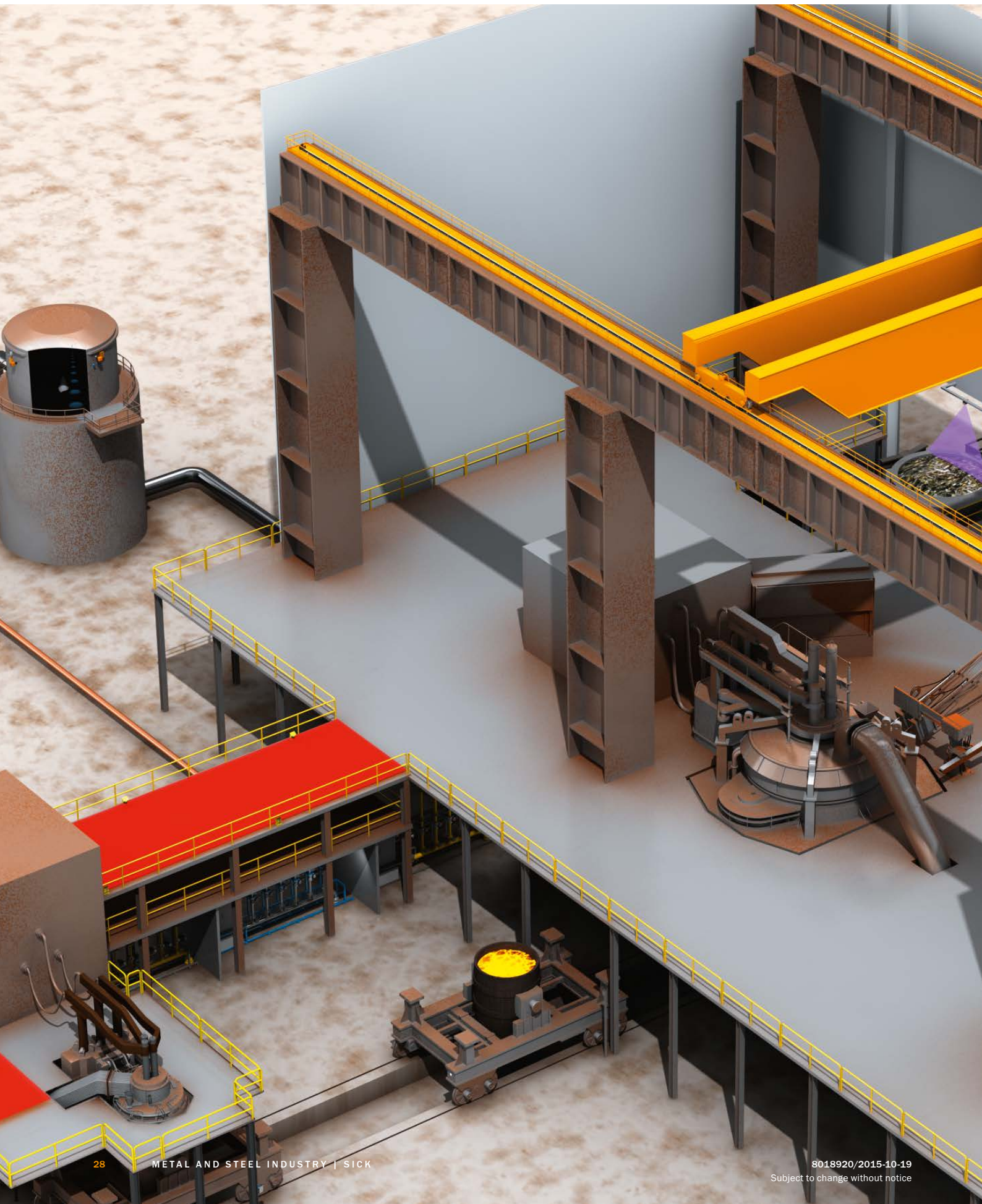
TRANSIC100LP → p. 79

④ Bulk material detection during material handling

Different bulk materials are used in the steel making process. Fill level information allows precise material management by avoiding conveyor belt blockages and hopper overflows, thereby avoiding waste, delays and additional costs. Sometimes, simple material level information is sufficient and can be achieved using optical distance sensors or ultrasonic sensors. If more information is requested, and the bulk material density is known, a complete 2D laser scanner solution can offer accurate volume and mass flow data.







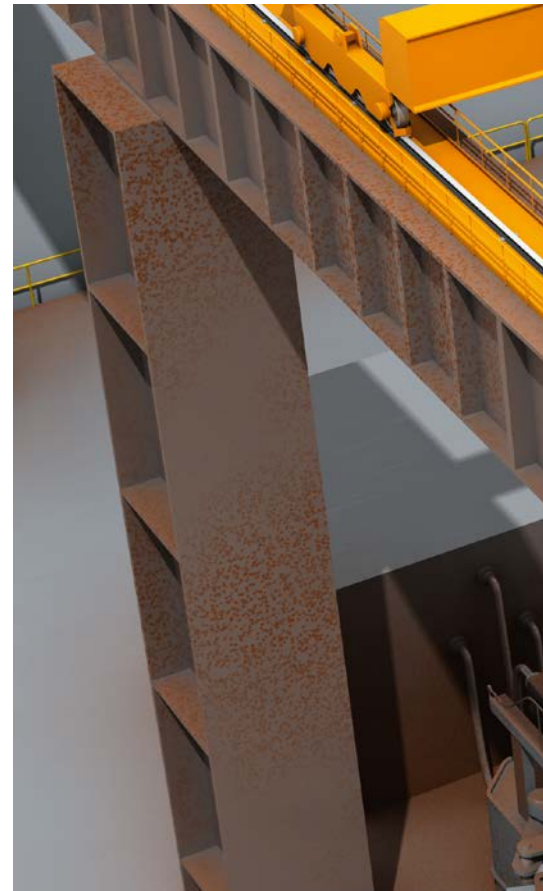


Electric arc furnace

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Scrap supply	
Focus 2	32
Furnace burner system	
Focus 3	36
Door lance, manipulator, robot, sample and temperature	
Focus 4	42
Ladle	

① Level control of material in loaded scrap bucket at electric arc furnace

When loading scrap into the bucket, it is vital that the loading sequence for different kinds of scrap is closely followed and that the bucket is not overfilled, which would lead to the electric arc furnace being overfilled as well, resulting in problems when closing the roof. Time delays caused by levelling and damage to the electric arc furnace lead to production postponement. Therefore, the charge volume must be controlled before the bucket is taken with the crane-hook. Measuring the scrap bucket's volume is achieved by using a laser scanner with time-of-flight technology.



② Collision awareness during scrap bucket transfer at electric arc furnace

Scrap buckets are transferred via vehicles that are both large and sturdy enough to manage a fully loaded bucket. This requirement calls for huge vehicles which must operate in harsh steel plant environments. Such vehicles are either remote-controlled or guided on tracks or on tires. In either case,

the large vehicles have vast areas with reduced visibility. A heavy duty time-of-flight laser measurement sensor heightens collision awareness and helps to avoid damages by obstacles in the vehicles' paths. Alternatively, collision prevention can be ensured using radar sensors, such as the RAS.



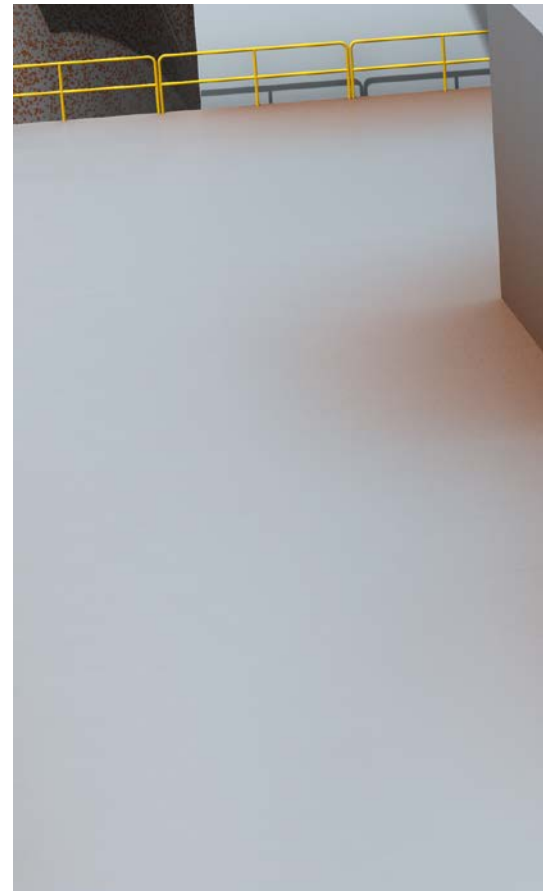


① Oxygen consumption at valve train burners at electric arc furnace

Modern electric arc furnaces use significant amounts of oxygen for metallurgical reasons, such as decarburization. In electric arc furnace processes, different so-called oxygen tools are used, such as side wall lance burners. The number of tools installed varies between three and six per furnace shell. In order to properly control and adjust the oxygen flow, each tool has its own valve train branch for oxygen where its flow rate, pressure and temperature are measured and closely controlled.



ⓘ This graphic is not presented in the overview.



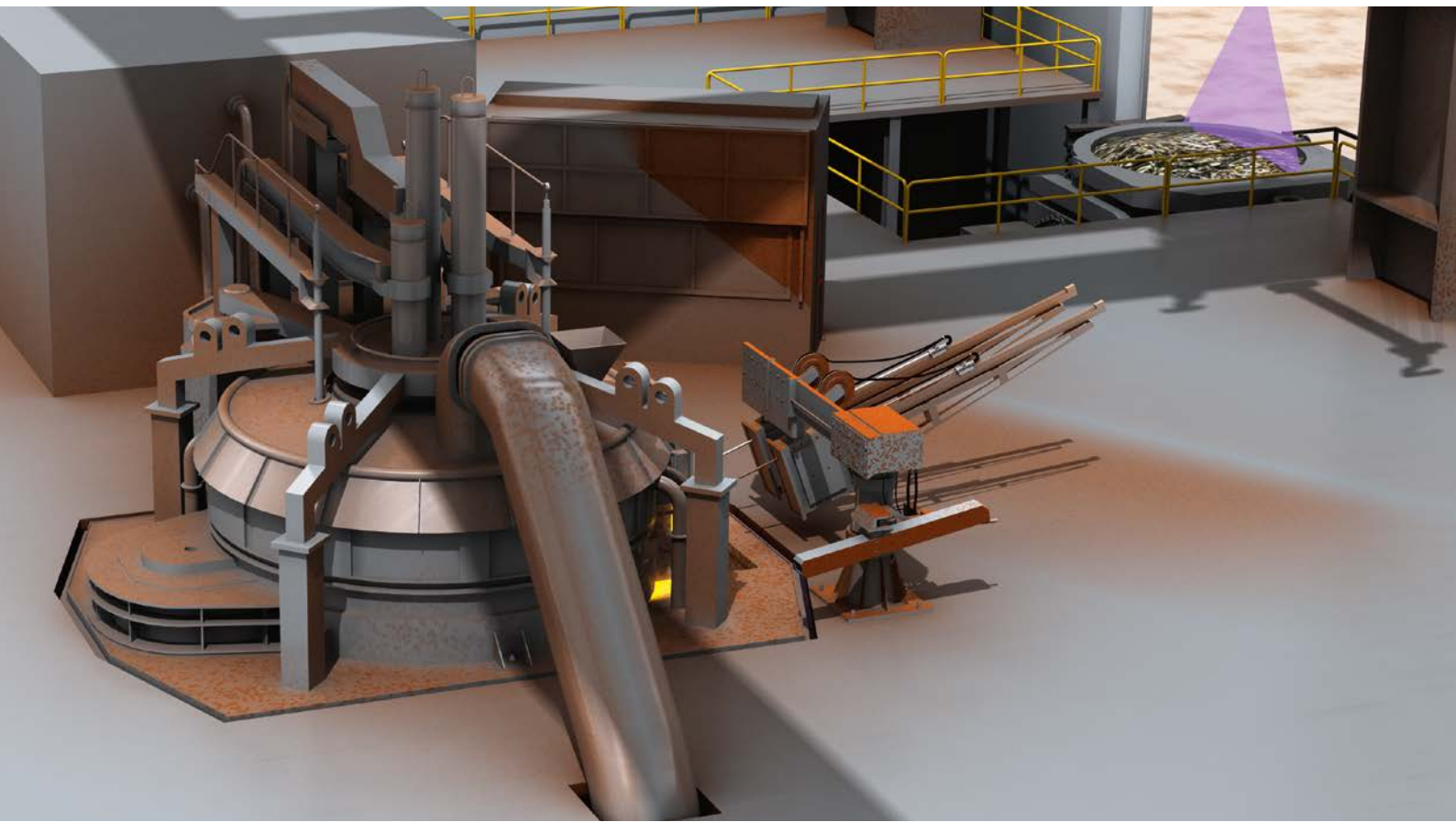
② Inertization of fuel and oil storage tanks at electric arc furnace

The energy input for an electric arc furnace is realized by electrical and chemical intake. The chemical input is mainly done by means of oxygen-fuel side wall burners, operated with different fuels such as LPG, LNG, oil, or kerosene. These fuels are stored in tanks which have variable space, which is usually

filled with an inert gas to avoid fires and explosions. The integrity of a tank's inertization is monitored by the TRANSIC100LP oxygen transmitter which is ideally suited for monitoring in moist and aggressive process gases and harsh environments.

ⓘ This graphic is not presented in the overview.





③ Natural gas consumption at valve train burners at electric arc furnace

Besides oil, most modern electric arc furnace side wall burners operate with natural gas as fuel. The number of installed burners varies between three and six per furnace shell with typical power consumption between 1,5 and 4 MW per burner, meaning a natural gas

flow rate of 150 to 400 Nm³/h. In order to properly control and adjust the burner flame and power consumption, each burner has its own valve train branch where the natural gas flow rate is closely measured and controlled by a FLOWSIC measurement control system.

ⓘ This graphic is not presented in the overview.



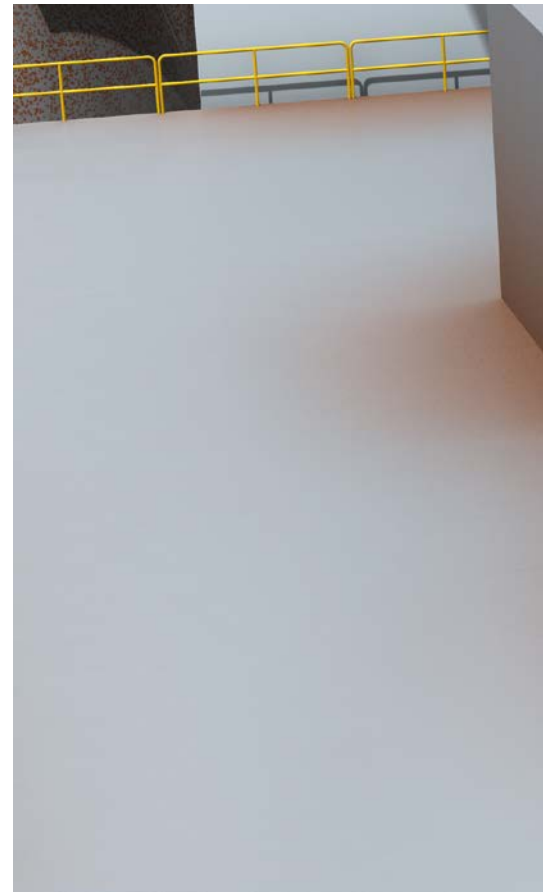
FLOWSIC500 → p. 88

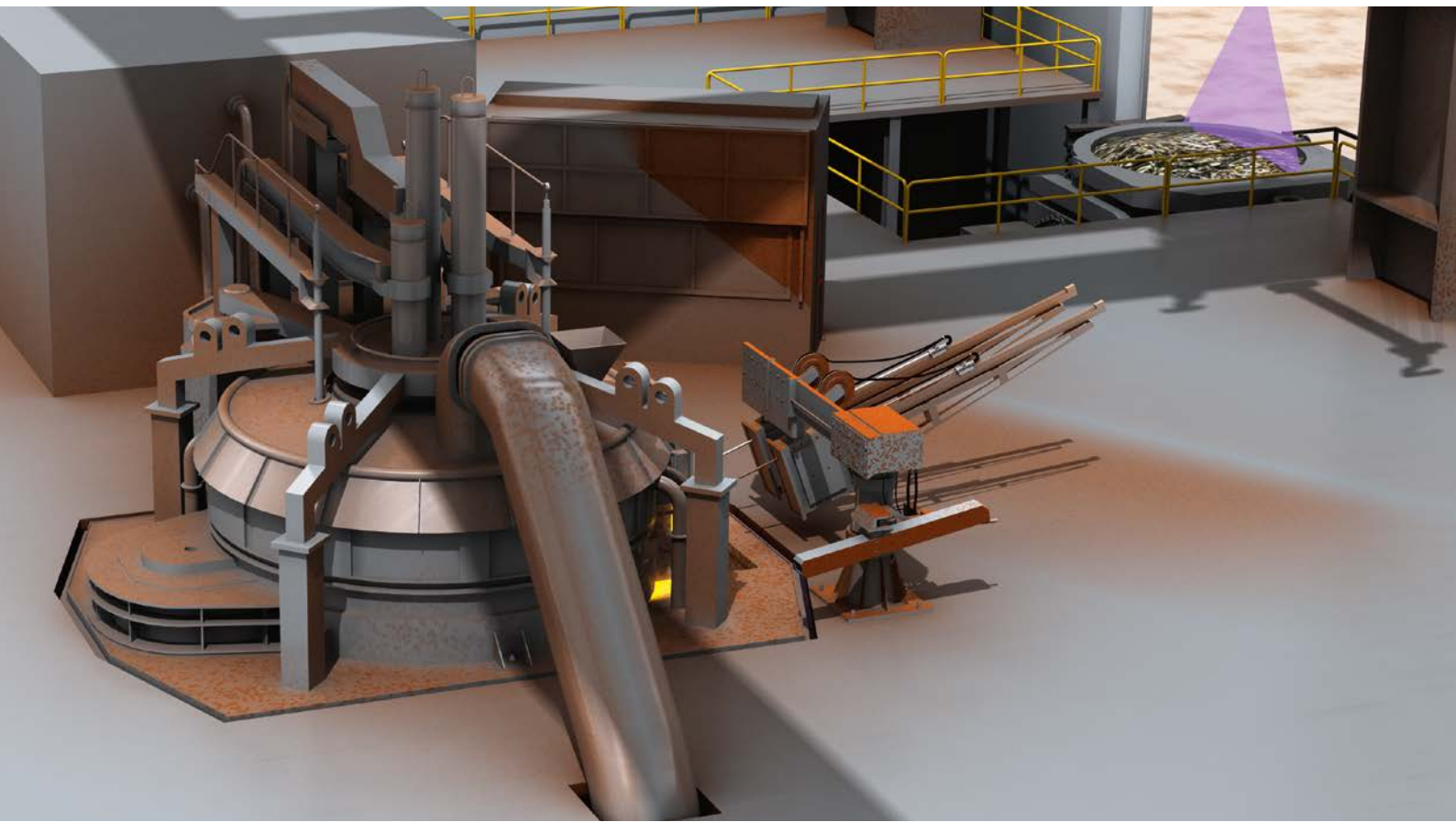
④ Liquid natural and petroleum gas consumption at valve train burners at EAF

Some electric arc furnaces' burner systems are operated with fuel generated from liquefied natural gas or liquefied petroleum gas. Each burner has its own control valve train for fuel gas and oxygen. The power for the valve train is controlled by the amount of fuel gas and oxygen fed to the burner. This task requires accurate fuel flow control by monitoring both the fuel's pressure and temperature so as to provide normalized consumption and operation data into the process controls. A flow meter, electronic pressure transmitter and temperature measurement sensor combine to accomplish this task.



ⓘ This graphic is not presented in the overview.





① Fire detection in carbon silo at electric arc furnace

Oxygen and powder carbon are injected into an electric arc furnace in order to create a foamier slag layer. The ensuing combustion of CO to form CO₂ supplies additional energy to the melting process. The carbon is stored in silos, with varying space availability. When an inert silo is not used, employed oxygen measurement technology can detect the risk of a fire by decreasing the silo's O₂ content. Alternatively, a CO monitor, such as the GM901, can detect the fire risk by increasing CO content in the silo. A combination of these two fire detection solutions is also possible.



ⓘ This graphic is not presented in the overview.



② Inertization of carbon silo with powder carbon for injection into furnace at EAF

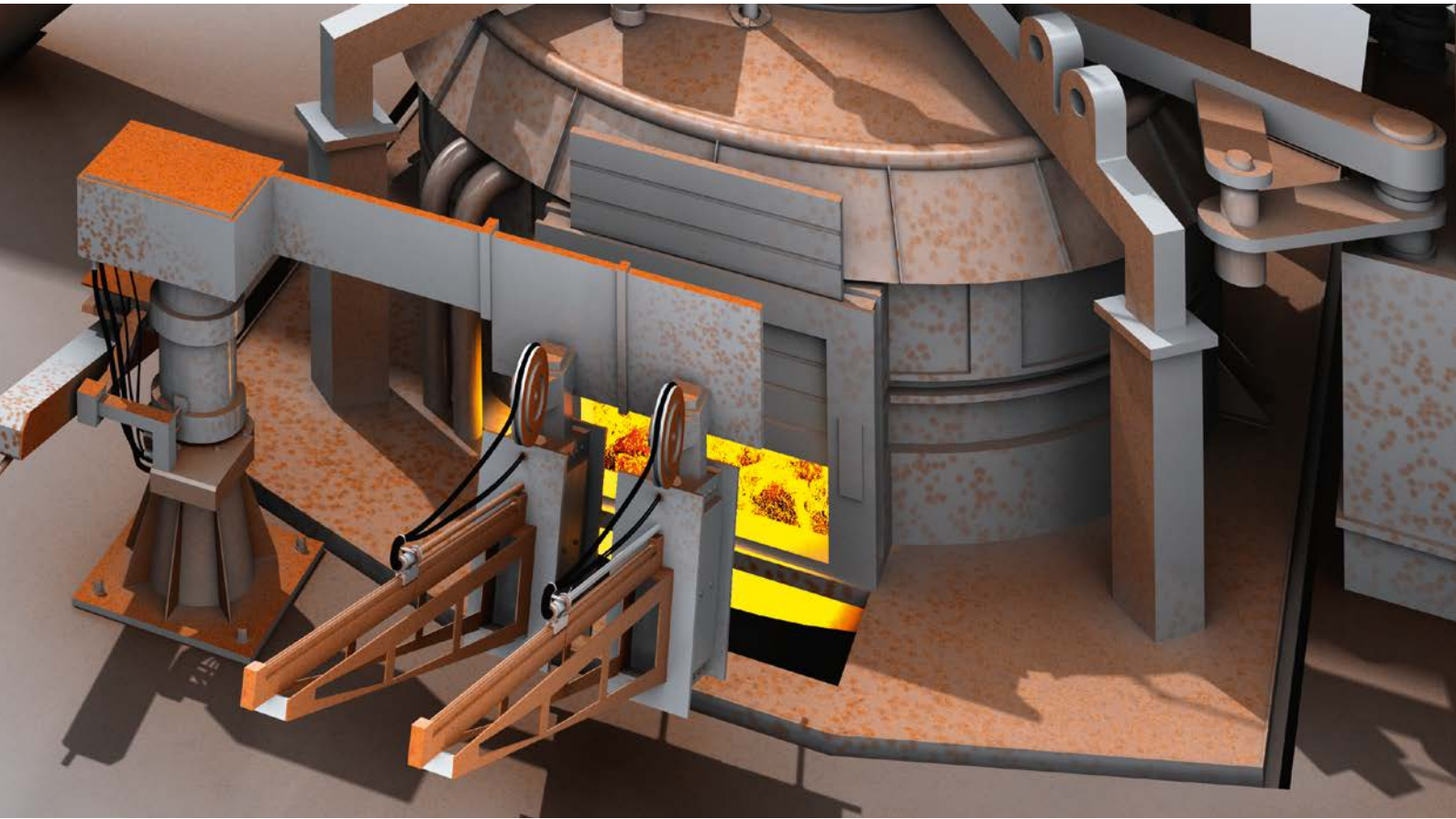
A frothy slag layer is created by injecting oxygen and pulverized carbon into an electric arc furnace. The subsequent conversion from CO to CO₂ delivers additional energy to the melting process. The carbon is stored in silos with varying space availability; inert gas fills the remaining space in the silo. There is a

fire risk when the inert conditions are not ideal and oxygen enters. The compact gas spectrometer, TRANSIC100LP oxygen transmitter, suited for oxygen monitoring in moist and aggressive process gases, measures the silo's oxygen content to properly monitor the inertization process.

ⓘ This graphic is not presented in the overview.



TRANSIC100LP → p. 79



③ Oxygen consumption during injection in furnace at electric arc furnace

Electric arc furnaces use significant amounts of oxygen for metallurgical processes, such as decarburization. Different oxygen tools are employed including the door lance. This lance installation features one or two oxygen lines, each with its own valve train branch

for oxygen in order to properly control and adjust the flow. Through a combination of sensors, the oxygen's flow rate, pressure and temperature are closely measured and controlled to optimize the metallurgical process.

ⓘ This graphic is not presented in the overview.



④ Carbon level in tank during carbon injection at electric arc furnace

Disturbances in the continuous carbon feed have consequences on production and finished steel quality. In order to not jeopardize steel making process optimization, it is vital to have sufficient carbon supplies at all times. Ensuring sufficient supplies requires knowing the amount of available carbon in the silo and noticing when the silo's material level becomes critically low so that the refilling process can be initiated. Either a non-contact ultrasonic sensor or a level detection tuning fork can monitor the carbon supply levels in the storage silo.



① This graphic is not presented in the overview.



⑤ Movement and position of temperature and sample lances at electric arc furnace

Lance manipulators are used for oxygen and carbon injection into the furnace as well as for sample taking and temperature measuring in the electric arc furnace by entering and exiting the furnace through the furnace door. The actual penetration depth of the lances in the steel bath, as well as the maximum in-

sertion and retraction positions, ensure proper execution of the position measuring task. A combination of an absolute encoder and inductive proximity sensor correctly identify the lances' actual positions in the furnace - even with the surrounding harsh conditions in the steel plant.

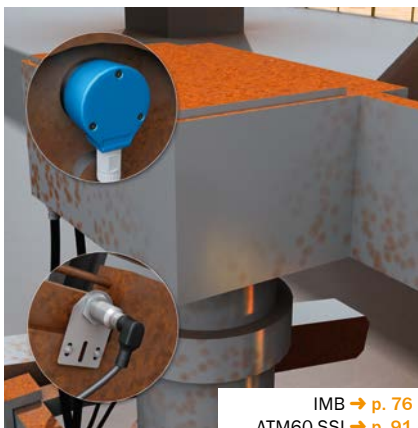




⑥ Movement and position control of oxygen and carbon lances at EAF

Lance manipulators rotate in total, can move up and down and actuate the lances and sample taking arms. Knowing the lances' actual depth penetration in the steel bath, as well as the maximum insertion and retraction positions, is essential information in order to ensure

optimal operation. The manipulators and the lances' actual positions in the furnace are identified and measured via a combination of absolute encoders and inductive proximity sensors. The steel plant's harsh environment is no problem for these robust and resilient sensors.



IMB → p. 76
ATM60 SSI → p. 91

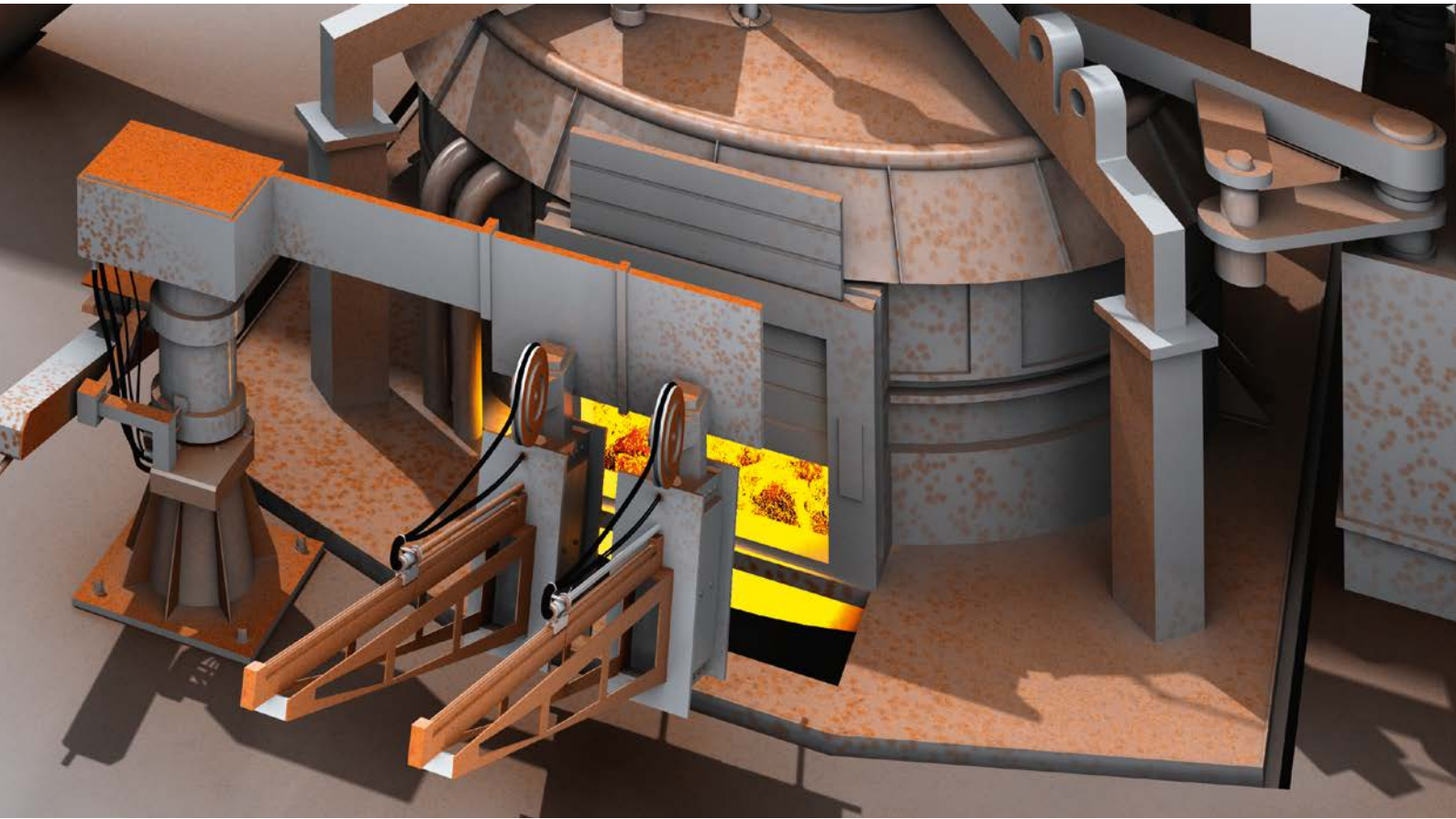
⑦ Access control of operating area at electric arc furnace

Automated systems measure temperatures, take samples, and inject carbon and oxygen into the electric arc furnace. These systems move in an area shared by people and other obstacles, causing a safety risk. An S3000 safety laser scanner monitors and safeguards the area's access, ensuring that people are not present in the area with automated systems. Safety rated laser scanners combine flexibility with maximum performance, ensuring area and access protection with a protective field range of up to 7 m.



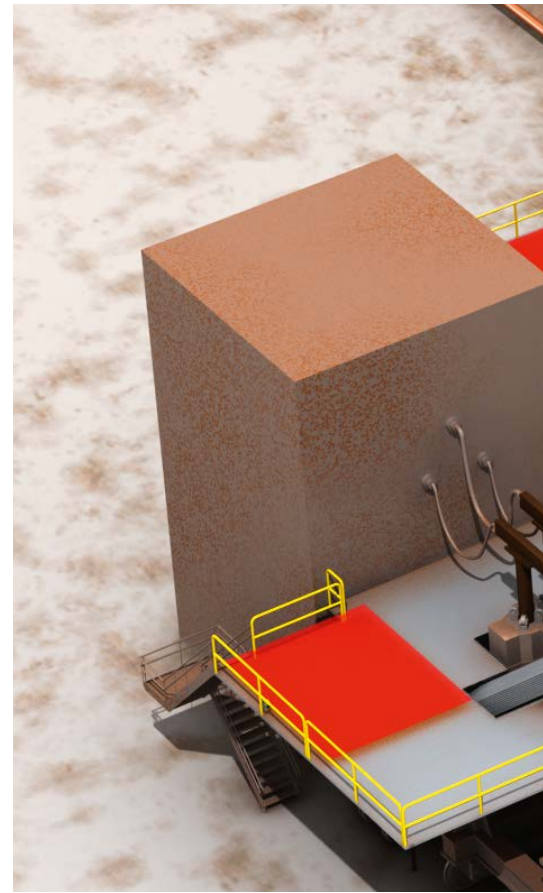
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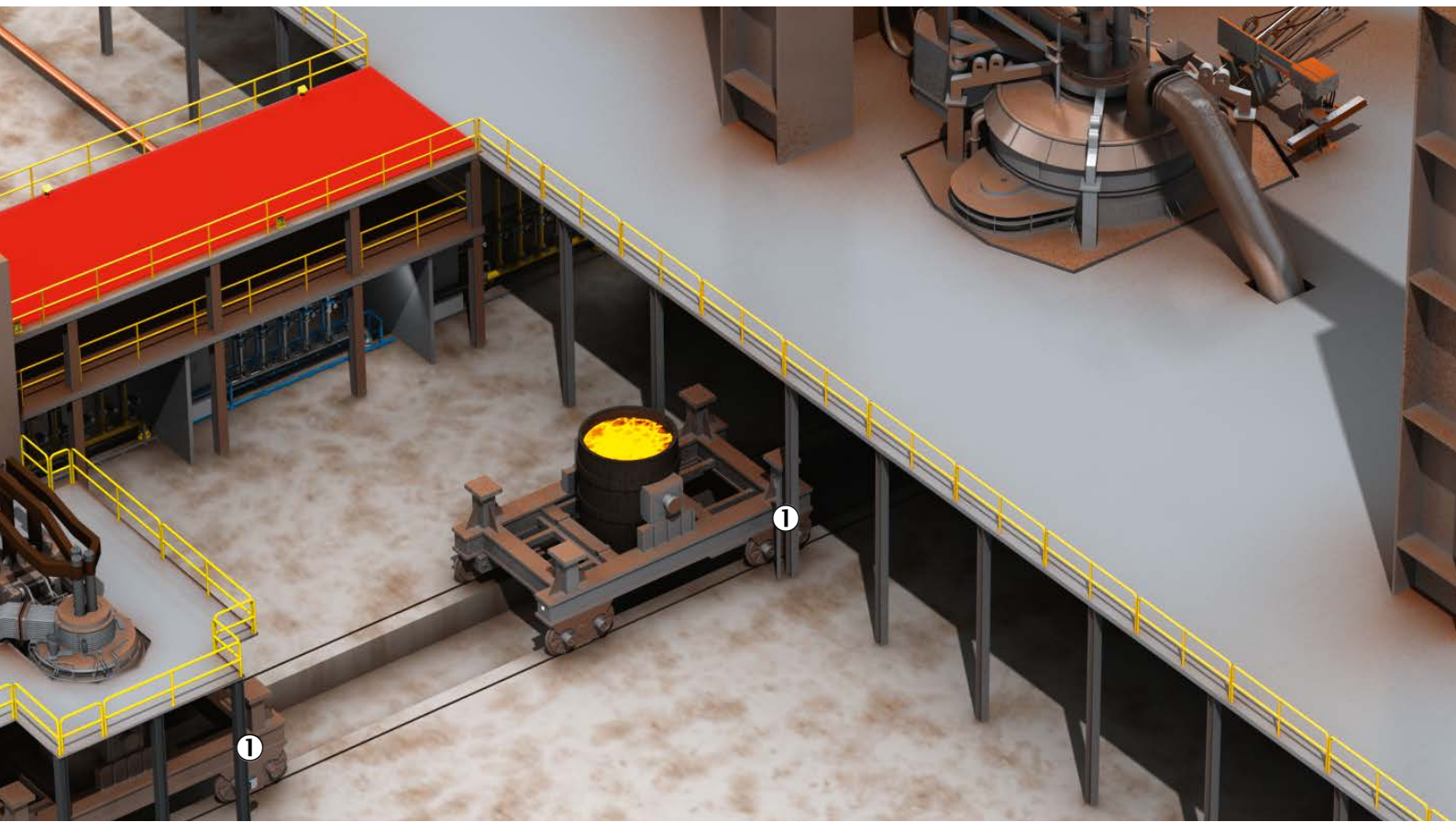


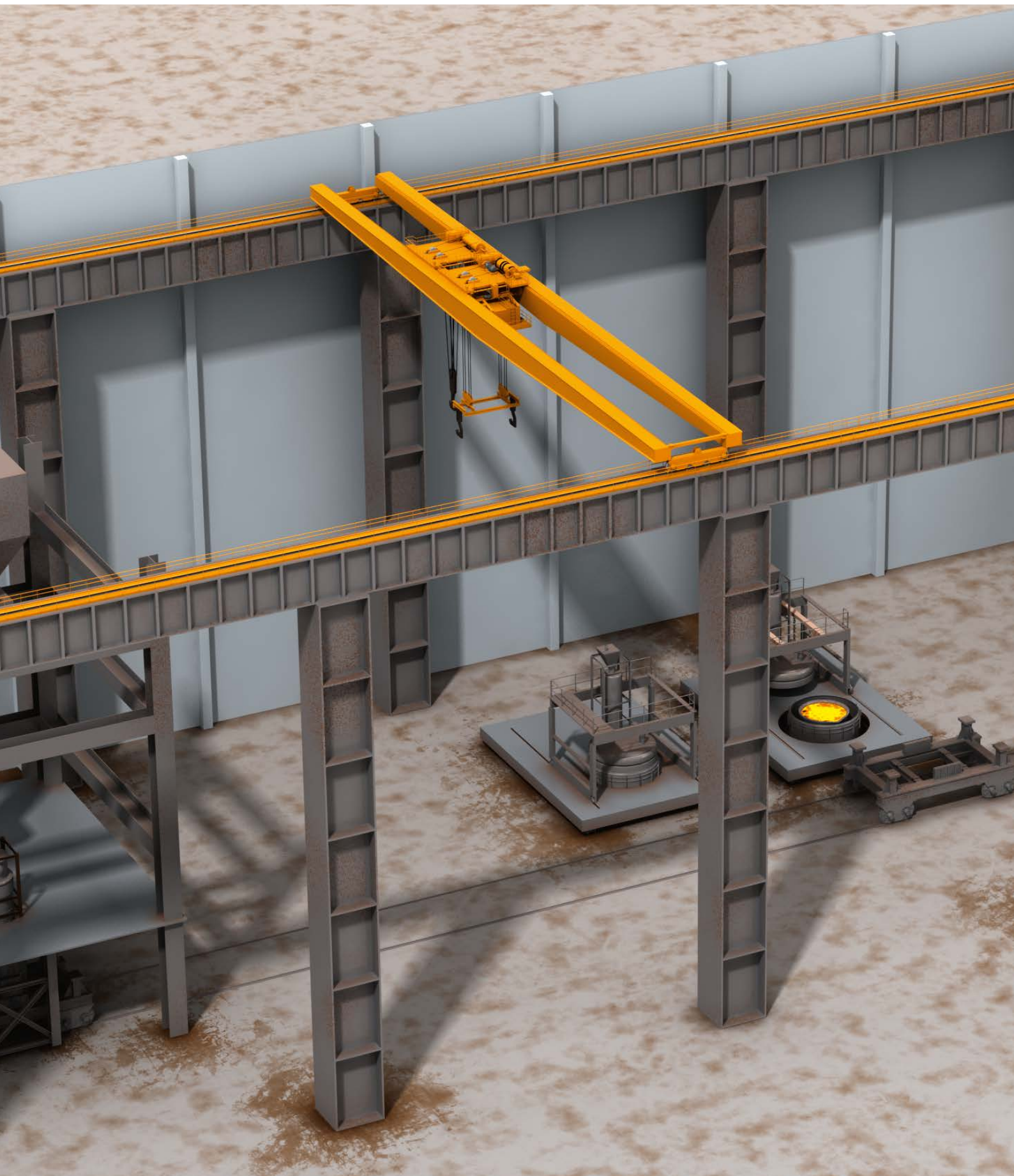


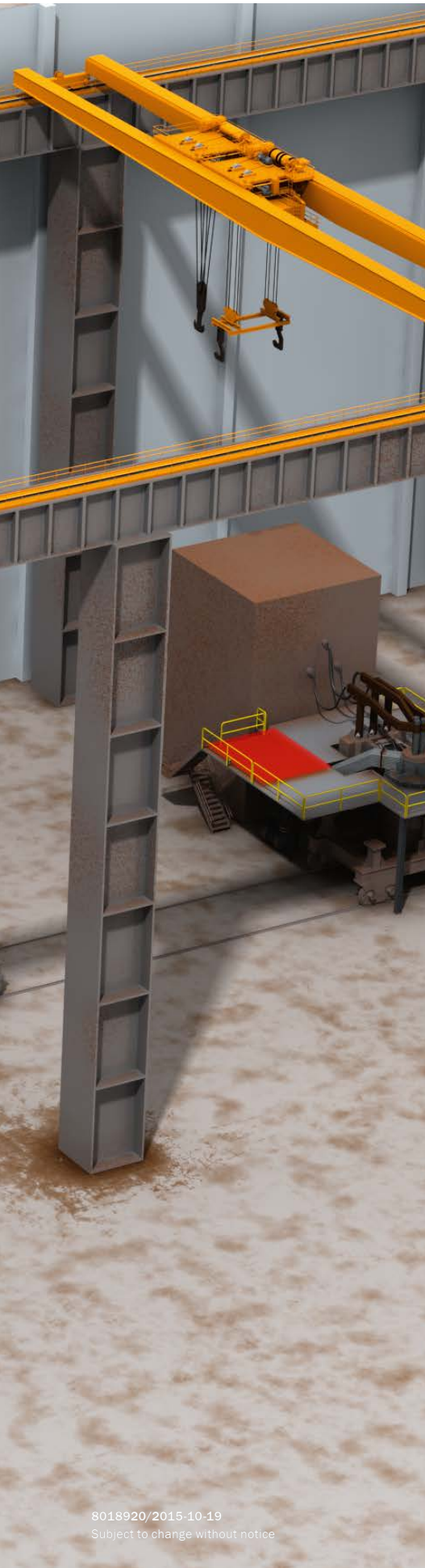
① Ladle presence detection of ladle car at electric arc furnace

Tapping should not be initiated when there is neither a ladle in the ladle car nor when a ladle car is not correctly positioned. Presence of a ladle and the ladle car can be checked by appropriate sensor detection equipment. Fulfilling this task is possible using a mid-range distance sensor with its robust metal housing, withstanding the electric arc furnace's harsh environment, thereby saving frequent replacement costs. Alternatively, a rugged photoelectric proximity sensor also withstands rough conditions in furnace area while reliably detecting the ladle's presence.









Secondary metallurgy

Focus 1	46
Ladle furnace	
Focus 2	50
Vacuum, Vacuum Oxygen Degasser/Decarborizer (VD/VOD)	
Focus 3	52
RH (Ruhrstahl-Heraeus) Degasser	

① Position of ladle furnace roof during second metallurgy process

The ladle furnace roof is lifted and lowered, depending on the process step. These mechanical movements are executed by cylinders and drives. Some processes can only be safely executed when the roof is in a defined position. An absolute or wire draw encoder together with a proximity inductive switch carefully monitor the roof's movements and positioning. These sensors are precise enough to accurately detect the roof's position, yet robust, which is important considering the inhospitable temperatures, vibration and mechanical shock present at the ladle furnace.

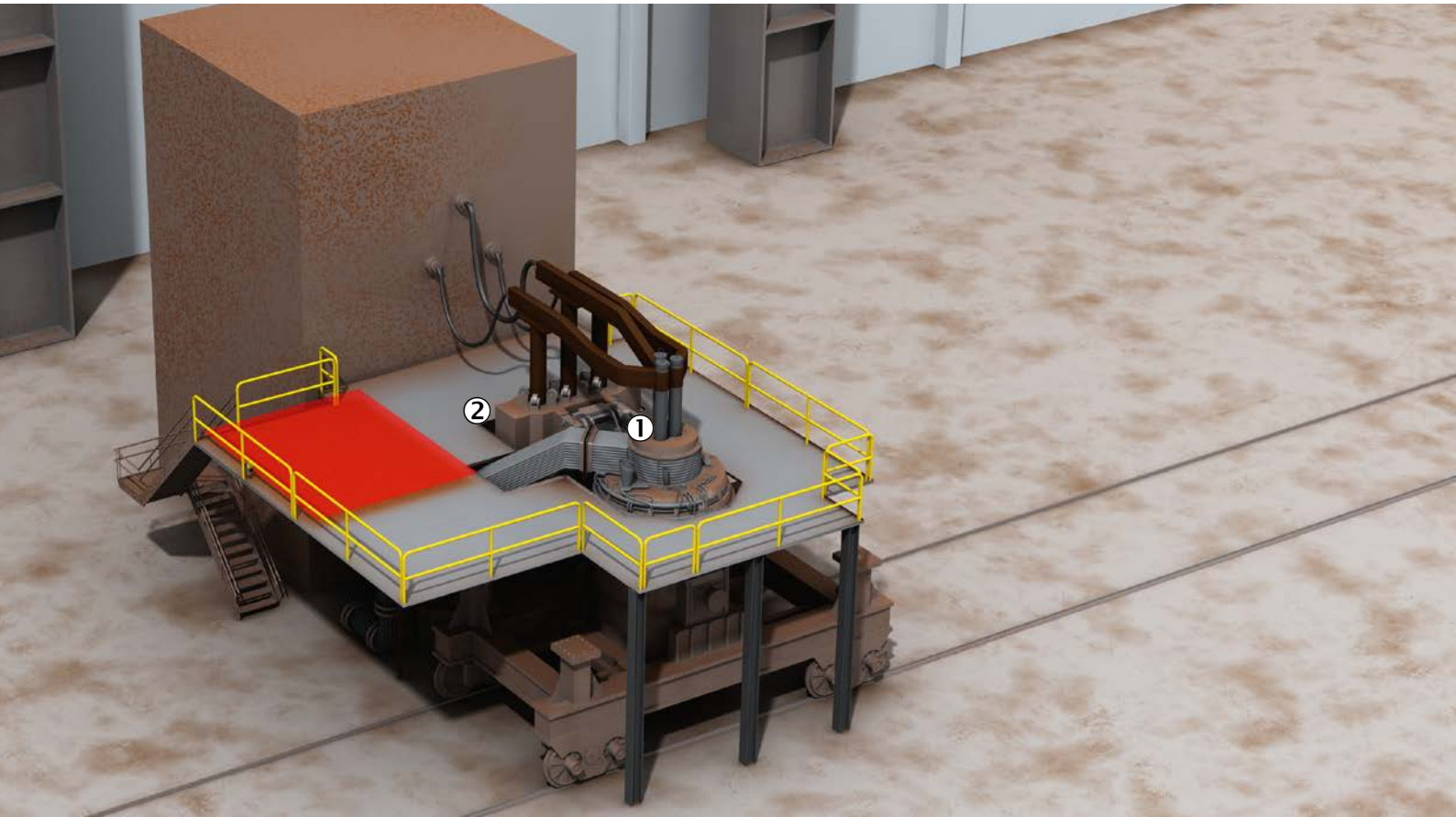


② Position of electrode arms and electrodes at ladle furnace

A ladle furnace's electrodes are hoisted and lowered by electrode arms. In some cases, the electrodes' position determines other movements or timing of subsequent steps, such as moving the ladle. Therefore, knowledge of the electrodes' exact position is imperative

for safe and efficient process optimization. A solution consisting of an inductive proximity sensor and wire draw encoder can detect the correct position of the electrodes and their arms and relay the information for optimum task performance.





③ Cooling water pressure and temperature at ladle furnace during secondary metallurgy

The ladle furnace's roof, off-gas duct, electrode arms and cabling depend on cooling water and its sufficient pressure and correct inlet temperature for problem-free plant function. Monitoring the cooling system is therefore required to achieve optimum operation. A resistance thermometer's rugged design

lends itself well to the ladle furnace's cooling system. Likewise, a universal electronic pressure transmitter's precise and robust measurement technology, compact dimensions and its quick and simple installation distinguish the PBT as an ideal solution for this monitoring application.

ⓘ This graphic is not presented in the overview.



④ Access control of operating area at ladle furnace during secondary metallurgy

A ladle furnace's operating platform poses risks for personnel. Heavy moving machines such as fork lifts, remote-controlled robots, automated manipulators and overhead cranes bearing heavy, suspended loads are present. Concurrently, operators may have limited visibility to the site. Collisions or other interference can lead to severe consequences for staff. Area access control is therefore highly recommended. Either safety scanners or alternatively robust entry-exit multiple light beam safety devices M4000 protect the site and ensure that hazards to plant employees are at a minimum.

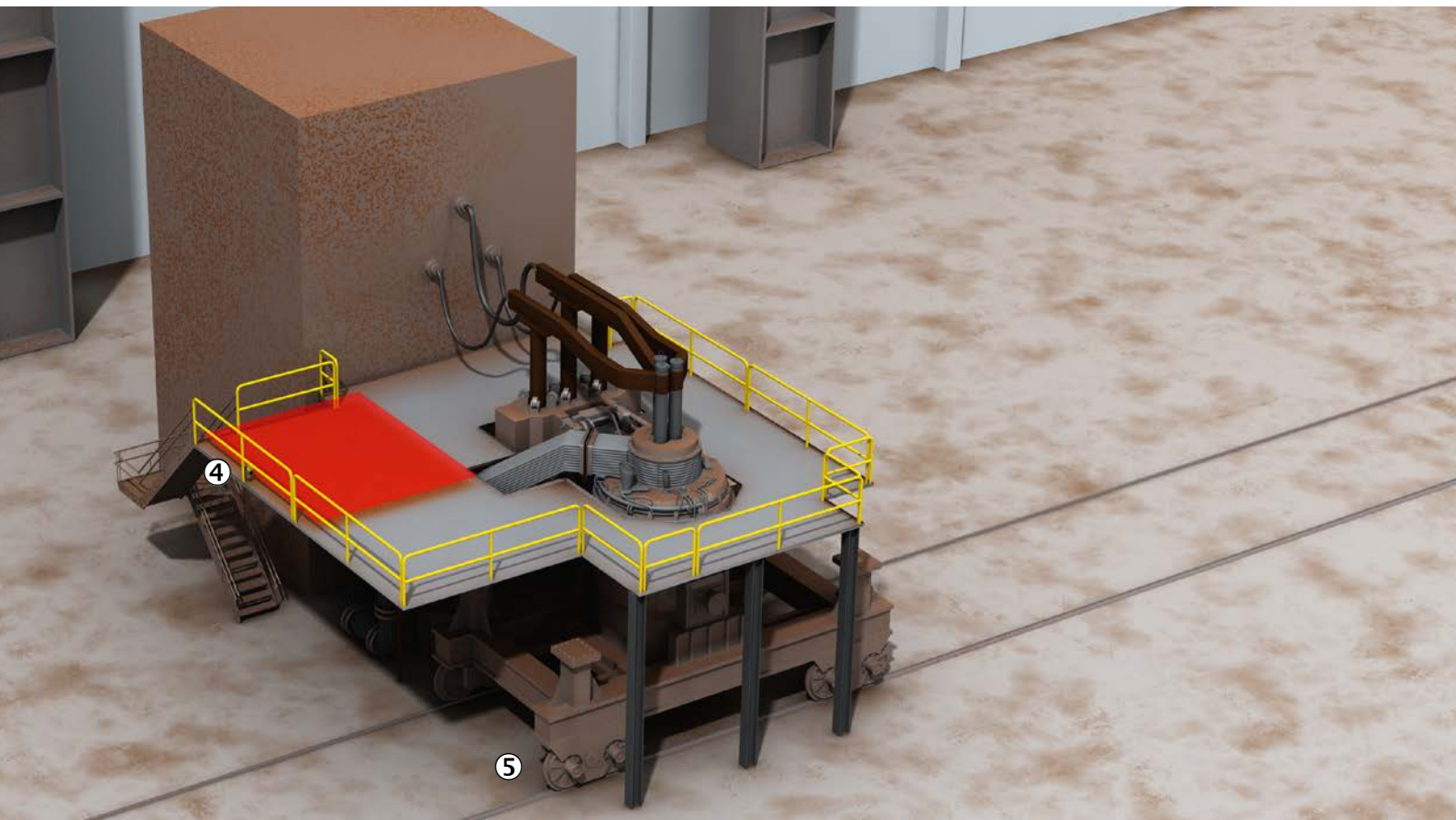


⑤ Ladle car position at ladle furnace during secondary metallurgy

Ladle cars transport ladles to different locations within the steel plant. The plant's central control room must know where individual ladle cars are and if they are correctly positioned at each location. Missing or improperly positioned ladle cars can lead to inefficiency and even catastrophic consequences. Track-

ing and exact positioning of the cars can be achieved with a combined solution of linear encoder and long range distance measuring device. Both sensors' rugged designs allow the solution to withstand the plant's high temperatures and harsh environment.





⑥ Nitrogen and argon consumption at valve train purging and stirring system

The ladle furnace fine tunes the steel's composition and temperature by adding alloys to achieve the desired steel grade. Electrical power input supplies the required energy to melt the added alloys and brings the steel on the correct temperature for continuous or ingot casting. Purging the steel ladle from the bottom

with inert gases allows homogeneous distribution of temperature and mixture composition. An ultrasonic FLOWSIC flow meter properly measures the gas flow allowing the precise control of the feed rate of this purging procedure to achieve optimal process efficiency.

ⓘ This graphic is not presented in the overview.



FLOWSIC600 → p. 89

① Cooling water pressure and temperature at vacuum degasser

Various parts of the vacuum degasser and vacuum oxygen degasser must be properly cooled in order to achieve problem-free plant operation. Sufficient pressure and correct inlet temperature throughout the entire secondary metallurgy process are essential. A universal resistance thermometer's rugged design and high-quality components offer long-term stability, accuracy and linearity. An electronic pressure transmitter's precise and robust measurement technology, compact dimensions and its quick and simple lend itself well to cooling system pressure monitoring applications.



② Roof position detection at vacuum degasser during secondary metallurgy

The roofs of vacuum degasser and vacuum oxygen degasser furnaces are lifted and lowered, depending on the process step. These mechanical movements are executed by cylinders and drives. Some secondary metallurgy processes can only be safely performed if the degasser roof is in a specific position. Therefore,

it is important to carefully and accurately monitor and control the roof's position. Robust - yet precise - sensors are required to accomplish this monitoring task since the conditions are challenging: high temperature, vibration and mechanical shock.





③ Nitrogen, argon and oxygen consumption at valve trains systems at vacuum degasser

The steel's composition is adjusted during the vacuum oxygen degasser and decarburization process. During this procedure, the steel is degassed and the carbon content is fine-tuned to achieve the steel's final grade. This is achieved by purging the steel ladle from the bottom by inert gases, such as nitrogen or

argon, and injecting oxygen via a lance. This process is performed through pressure reduction. An ultrasonic FLOWSIC flow meter properly measures the gas flow allowing the precise control of the feed rate of this purging procedure in order to achieve optimal process efficiency.

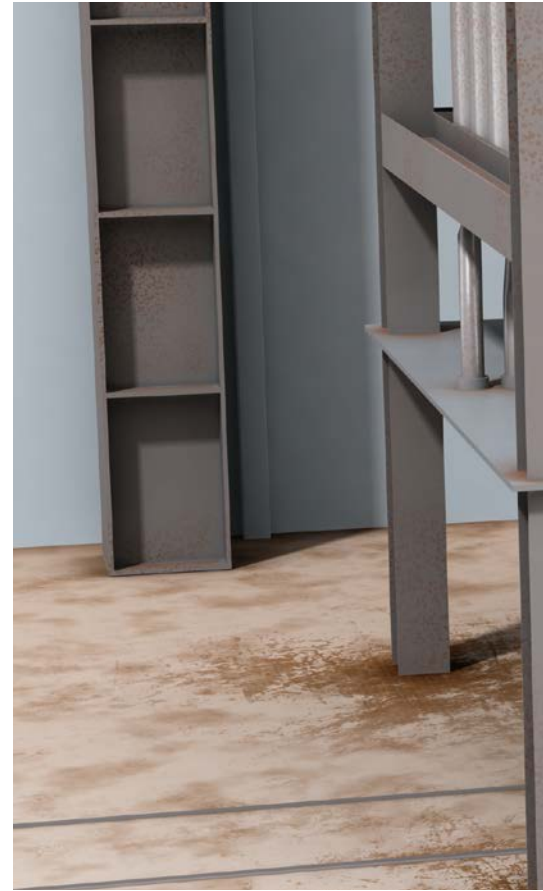
ⓘ This graphic is not presented in the overview.



FLOWSIC600 → p. 89

① Reactor vessel position detection at Ruhrstahl-Heraeus degasser

The vacuum vessel of a Ruhrstahl-Heraeus reactor is lowered and lifted to different positions, depending on the process step and level in the ladle. The lower part of the vacuum vessel is dipped and submerged into the liquid steel. During this process step, it is important to carefully monitor and control the vessel's position. A solution of a high-resolution absolute encoder and robust proximity inductive sensor using ASIC technology combine to offer a unique remedy to determine the vessel's exact positioning.



② Cooling water pressure and temperature at Ruhrstahl-Heraeus degasser

Trouble-free degassing and decarburization process at the Ruhrstahl-Heraeus furnace requires ample cooling water pressure and correct inlet temperature. Monitoring and controlling these two characteristics of the cooling water therefore requires a robust, yet precise,

pressure transmitter and resistance thermometer in order to detect any inconsistencies from the preset values. These rugged sensor solutions' accurate measurement technology and compact size lend themselves ideally to cooling water monitoring.









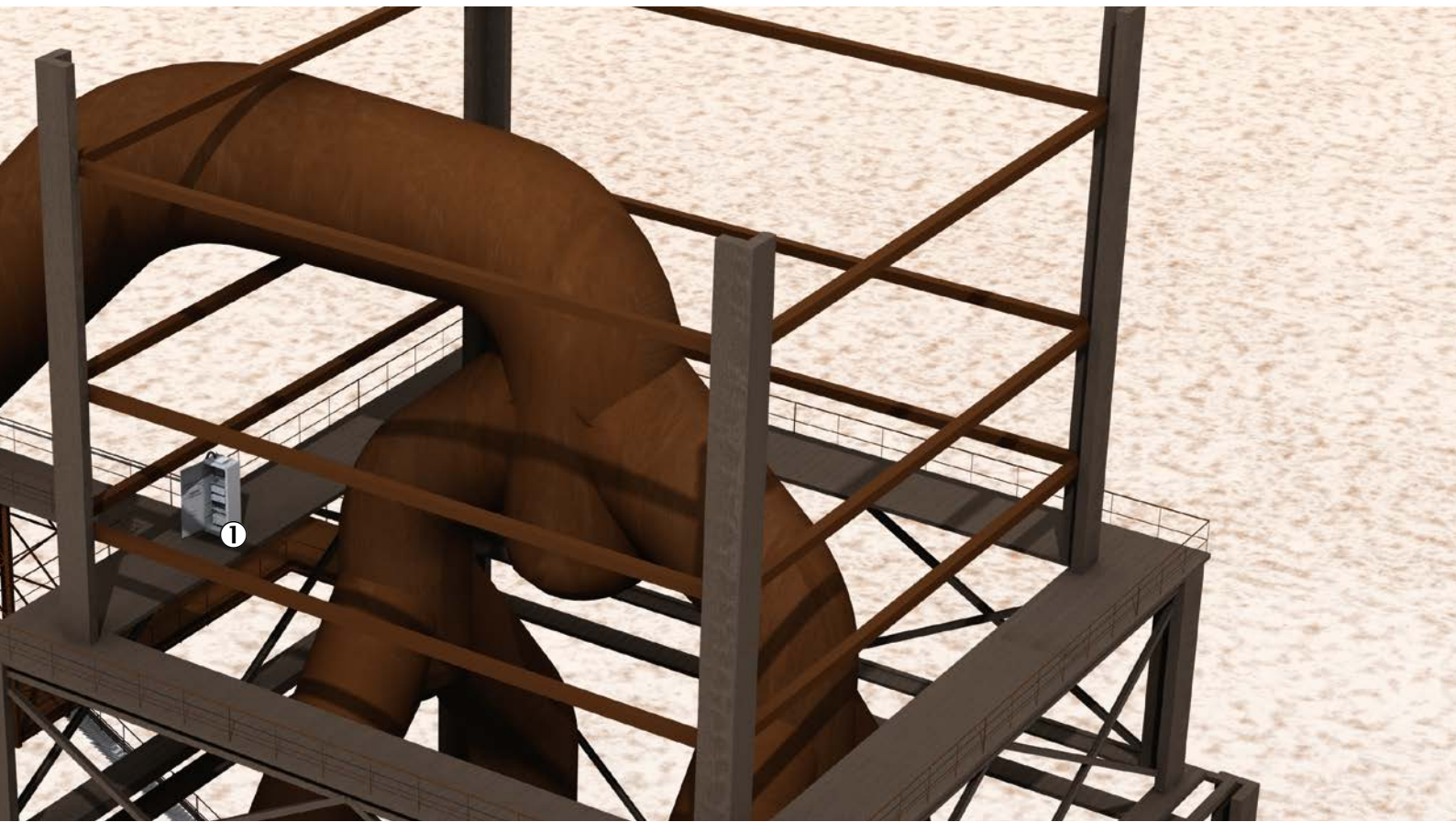
Off-gas system

Focus 1	56
Blast furnace	
Focus 2	58
Electric arc furnace	
Focus 3	60
RH (Ruhrstahl-Heraeus) Degasser	
Focus 4	62
Duct system	
Focus 5	64
Bag house monitoring	
Focus 6	68
Continuous emission monitoring system (CEMS) at the stack	
Focus 7	72
Main fans	

① Process control and optimization at top gas duct at a blast furnace

The composition of a blast furnace's top gas delivers valuable information about the plant's steel making process. The operation of the blast furnace, injection tuyeres for oxygen and carbon and the supply of raw material can be optimized by monitoring the blast gas composition, especially in terms of carbon monoxide, carbon dioxide, oxygen, hydrogen, methane and water. This optimization requires a measurement technology that can monitor all of these gases simultaneously, despite the harsh conditions that are present in the top gas duct.





① Off-gas flow measurement

The off-gas flow from a electric arc furnace is measured in order to monitor process progress. Combining exhaust-gas flow meters with gas analyzer equipment creates the possibility for total mass balance. The gas is either dry or wet depending on its saturation. The anticipated composition of the off-gas requires different approaches in terms of equipment used for monitoring tasks, making each application an individual choice. The FLOWSIC100 family of flow meters offers ideal solutions for emission monitoring and process applications.



ⓘ This graphic is not presented in the overview.

FLOWSIC100 → p. 87

FLOWSIC100 Process → p. 88

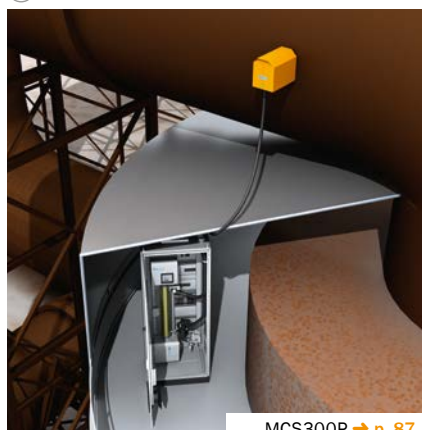


② Plant safety by monitoring O₂, CO, CO₂, H₂O, (H₂) in furnace exhaust gas at EAF

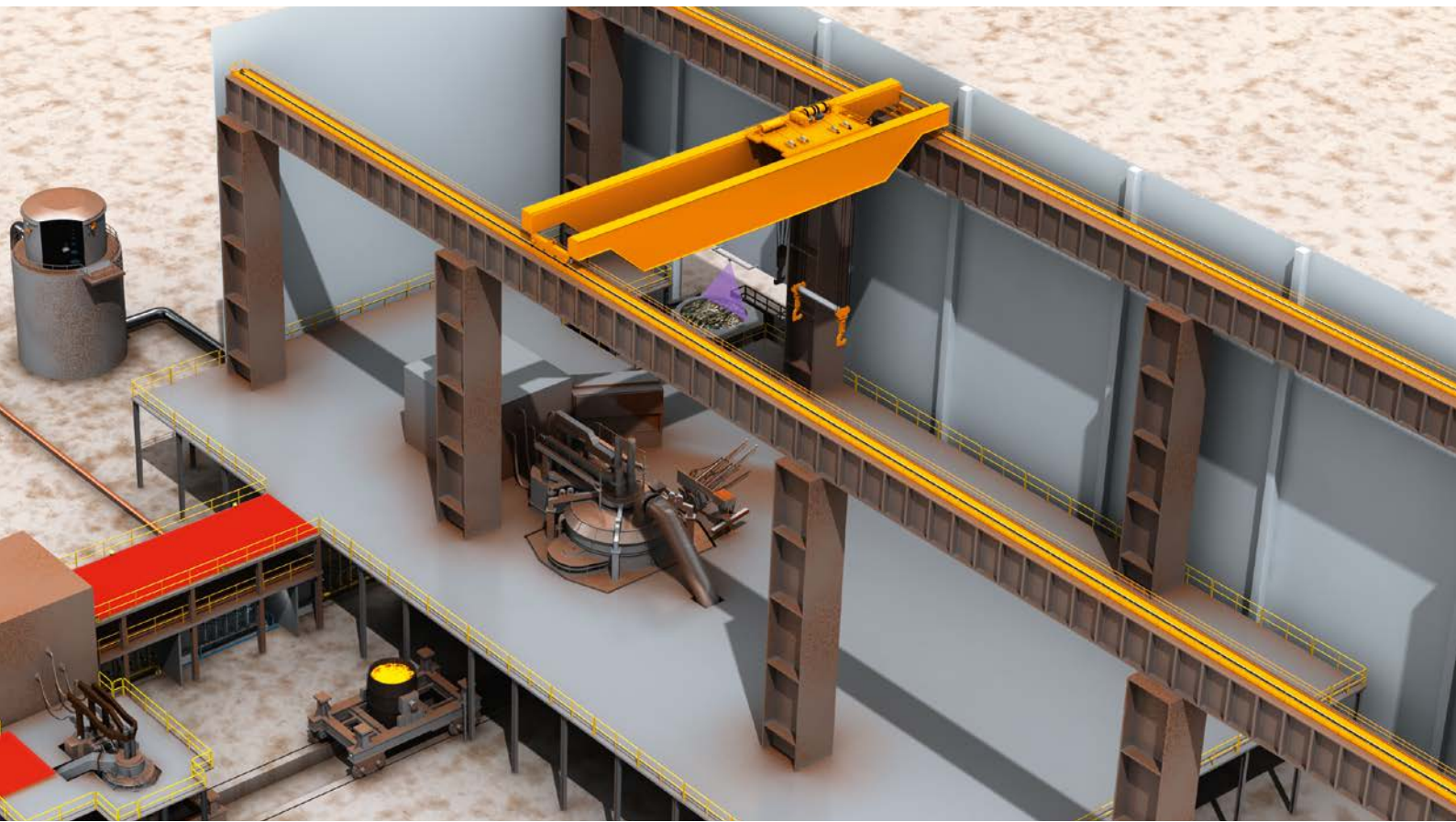
An analysis of the electric arc furnace's off-gas contains valuable information about the process. The exhaust-gas analysis can be used to detect leaks in the water-cooled parts of the furnace and the off-gas system. In addition to humidity detection, CO and O₂ content at the end of the water-cooled duct can

identify unexpected and dangerous CO concentrations, thereby avoiding any potential system explosions in the downstream off-gas. A MCS300P multi-component analysis system offers efficient, photometric monitoring and simultaneous measurement of six process gases providing plant safety.

ⓘ This graphic is not presented in the overview.

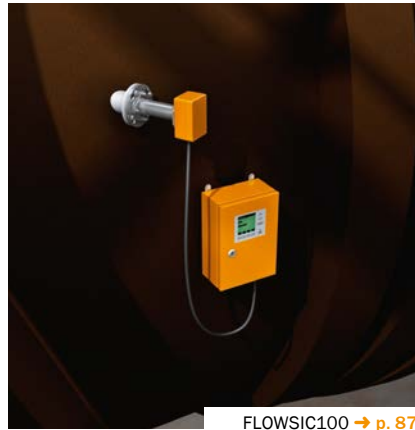


MCS300P → p. 87



① Off-gas flow measurement at Ruhrstahl-Heraeus degasser

The off-gas flow from a Ruhrstahl-Heraeus degasser is measured in order to monitor process progress. Combining exhaust-gas flow meters with gas analyzer equipment creates the possibility for total mass balance. The gas is either dry or wet depending on its saturation and on the type of vacuum pump used. The anticipated composition of the off-gas requires different approaches in terms of equipment used for monitoring tasks, making each application an individual choice. The FLOWSIC100 family of flow meters offers ideal solutions for emission monitoring and process applications.



FLOWSIC100 → p. 87

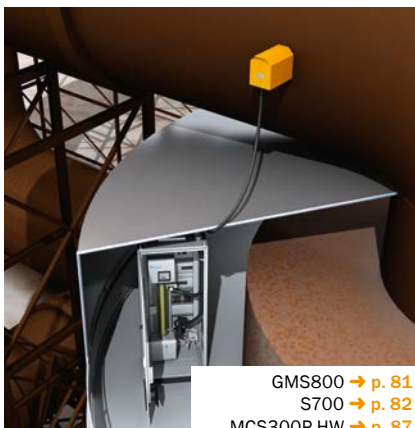
① This graphic is not presented in the overview.



② Exhaust gas analysis after vacuum pumps at Ruhrstahl-Heraeus degasser

Analysis of the Ruhrstahl-Heraeus degasser's off-gas composition offers information for the process. An on-line measurement system supports the calculation of the actual carbon content of the treated steel. Without such a system, the vacuum must be released, the degasser opened and a steel sample

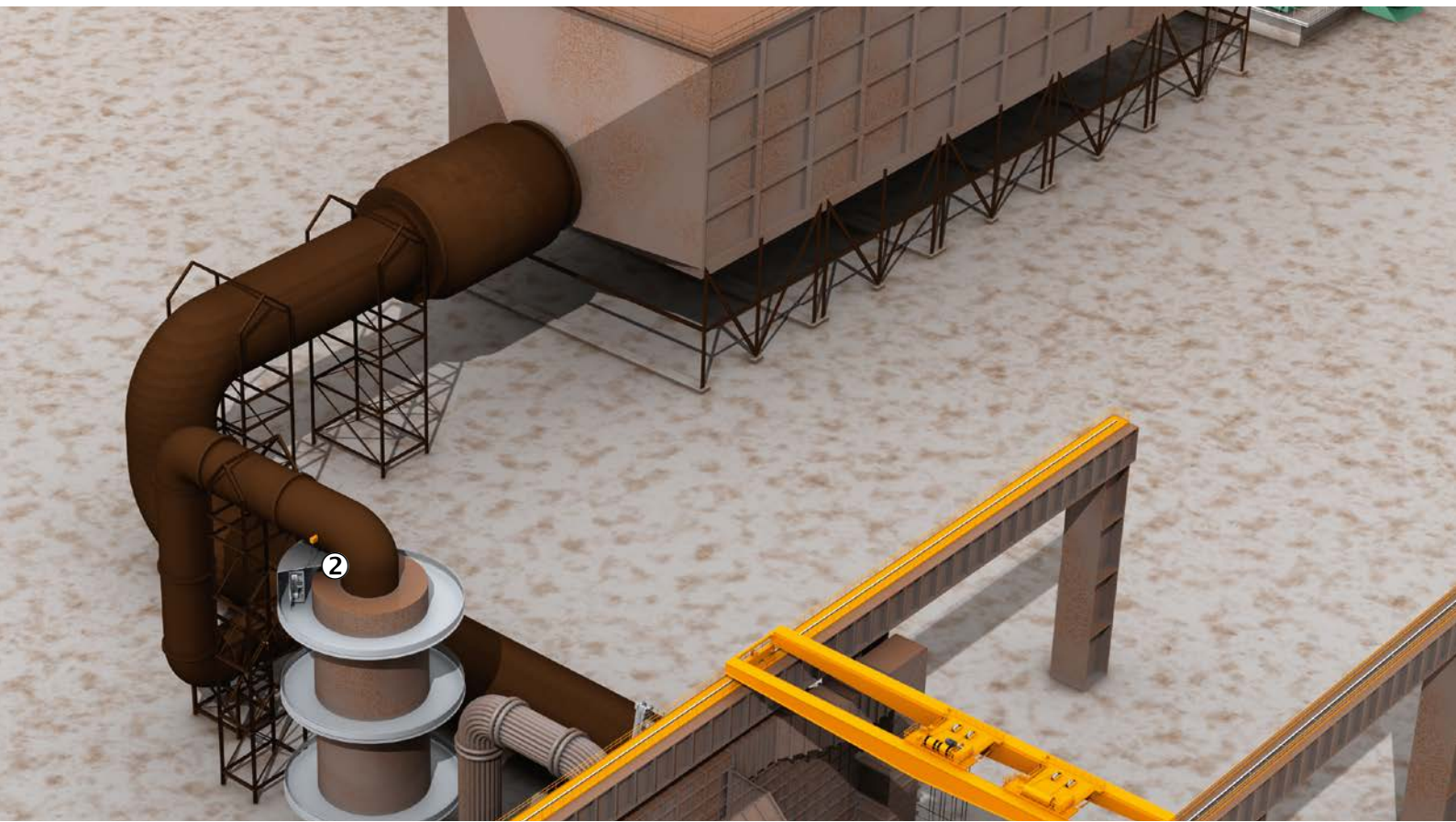
taken for analysis. This alternative sample analysis takes time and interrupts the process. If the carbon content is too high, the vacuum must be again applied, requiring more time. Therefore, employing either an extractive or in-situ gas analyzer system is the best solution for optimizing this step.



GMS800 → p. 81

S700 → p. 82

MCS300P HW → p. 87

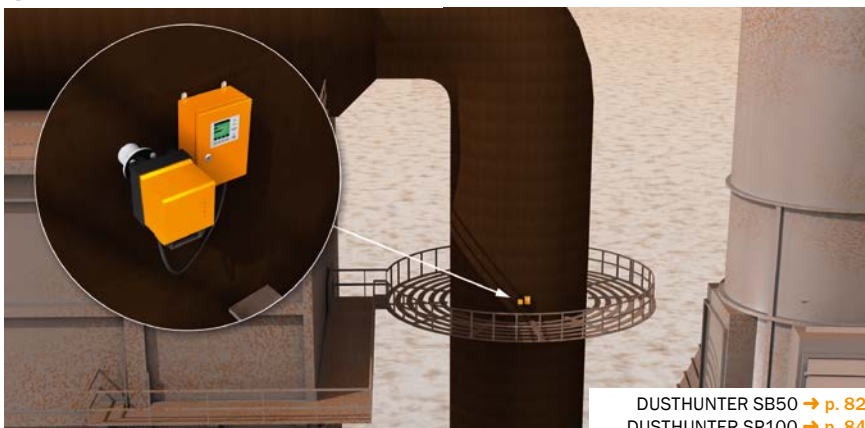


③ Particle measurement after filter for bag damage and fire detection

For vacuum degasser installations operated with mechanical pumps, dust must be removed before entering the pumps. Otherwise, damage occurs resulting in repair cost for the pumps and production loss. Therefore, the gas is cleaned by a filter equipped with filter bags. If the filter medium is damaged,

a dust monitor detects an increase in particulate matter, enabling counter-measures to be implemented in order to protect the pumps. A DUSTHUNTER dust monitor can also detect a fire in the filter house, since combustion products such as smoke also increase particulate matter levels.

ⓘ This graphic is not presented in the overview.



DUSTHUNTER SB50 → p. 82
DUSTHUNTER SP100 → p. 84

① Damper positioning at duct system

A steel plant's off-gas system can be quite complicated, especially if different exhaust points are combined. Every exhaust point has its own related process and by combining exhaust points, the exhaust rate changes. This means the performance of the entire off-gas system must be controlled to allocate and direct suction where it is required. This is done via dampers in the ductwork. Therefore, monitoring the actual position of the dampers is essential for optimally controlling of the off-gas system. Rugged inductive proximity sensors and encoders simplify this damper control task.



IMB → p. 76
DFS60 → p. 89
AFS/AFM60 SSI → p. 90



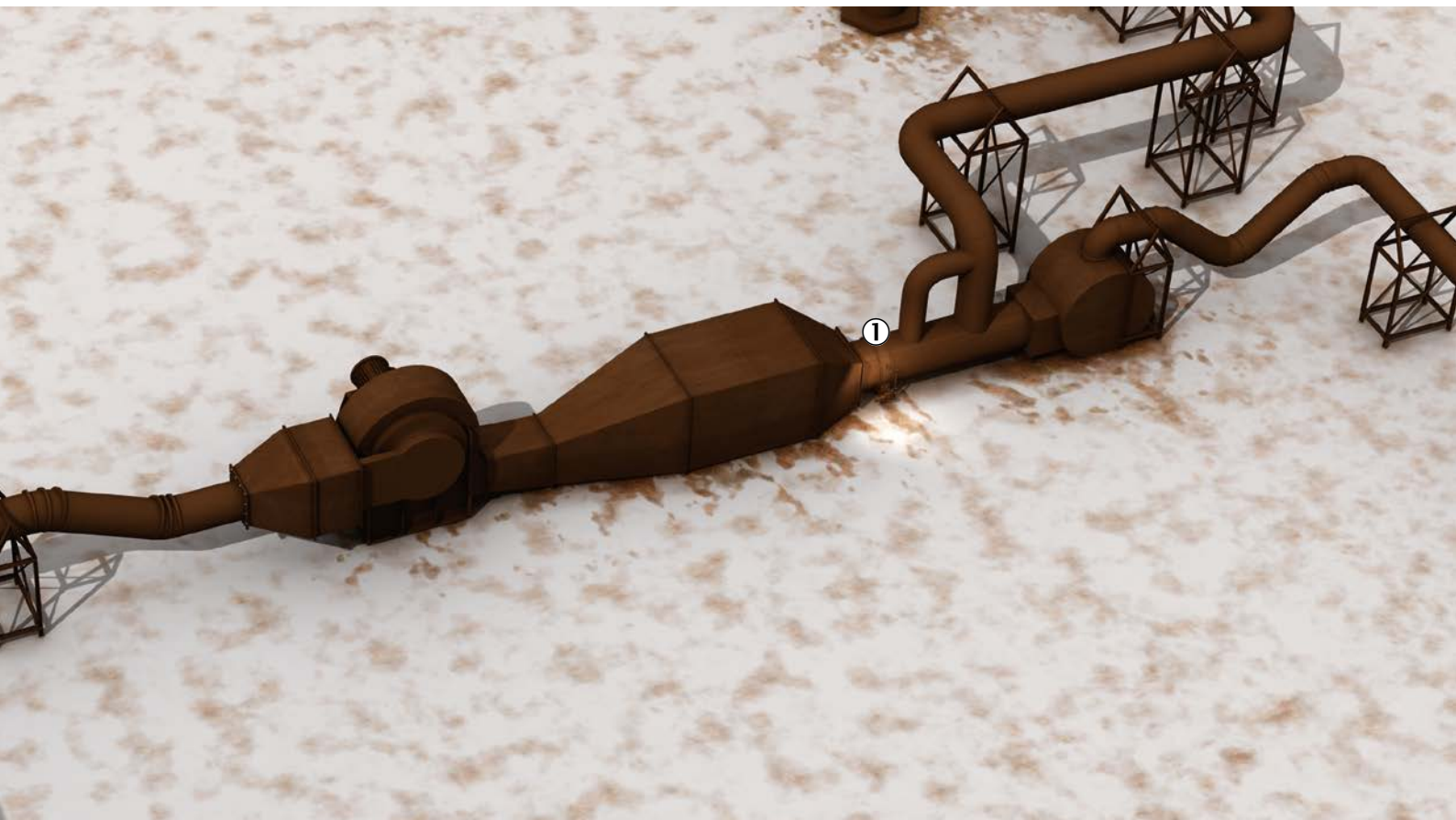
② Off-gas flow at duct system

Most processes in the steel industry have an exhaust rate that varies based on demand. Some are batch processes, others are continuous, but there is always a need to adjust the flow rate since even the continuous process ebbs and flows. Under these changing circumstances, repeatable conditions

on the exhaust side are beneficial for the processes, but require exhaust control by flow measurement. The best flow monitoring solution, in terms of easy installation, low operational costs and zero pressure drop, is ultrasonic measurement technology.

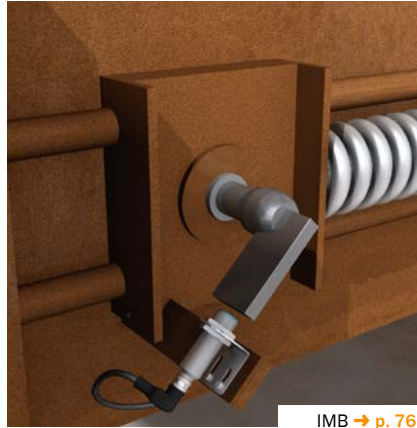


FLAWSIC100 → p. 87

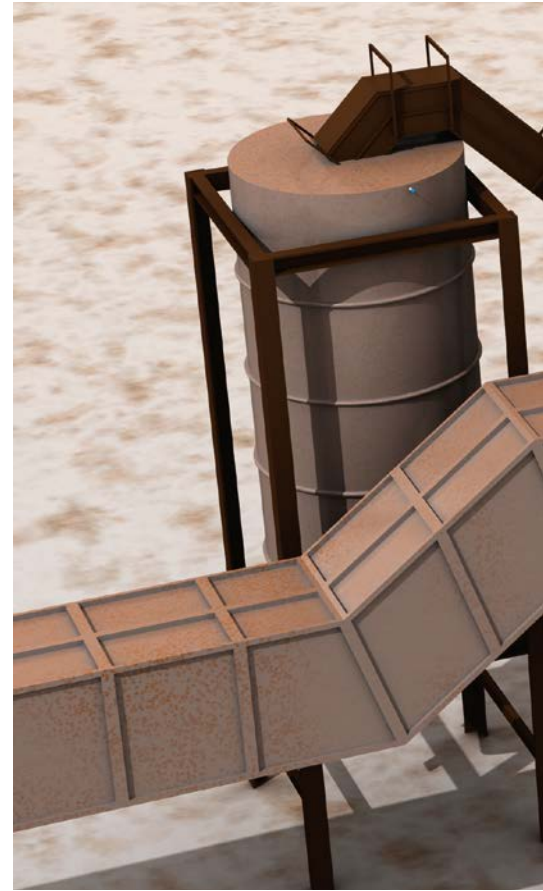


① Detection of correct lever positioning during dust extraction

The correct lever position on a machine in a dust extraction plant allows the operator to easily ensure that the machine is properly functioning and that the dust is being collected. A simple solution such as an inductive proximity sensor works perfectly in a harsh environment with dust, dirt and high temperatures. An added benefit is the proximity sensor's precise measuring range of 10 mm to 20 mm.



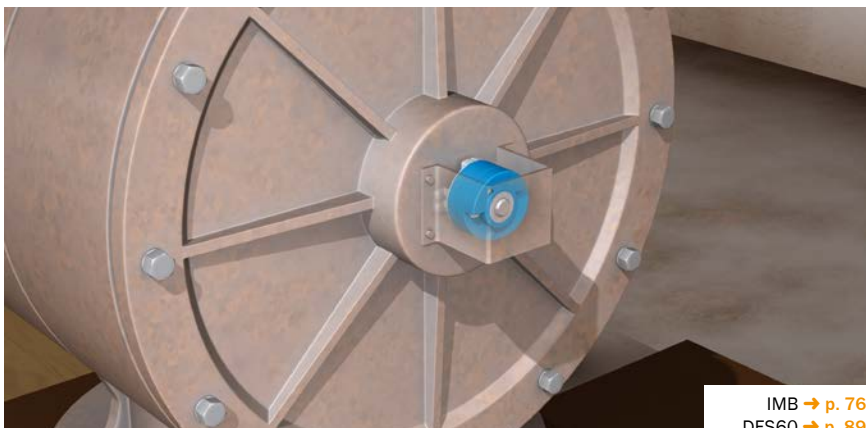
IMB → p. 76



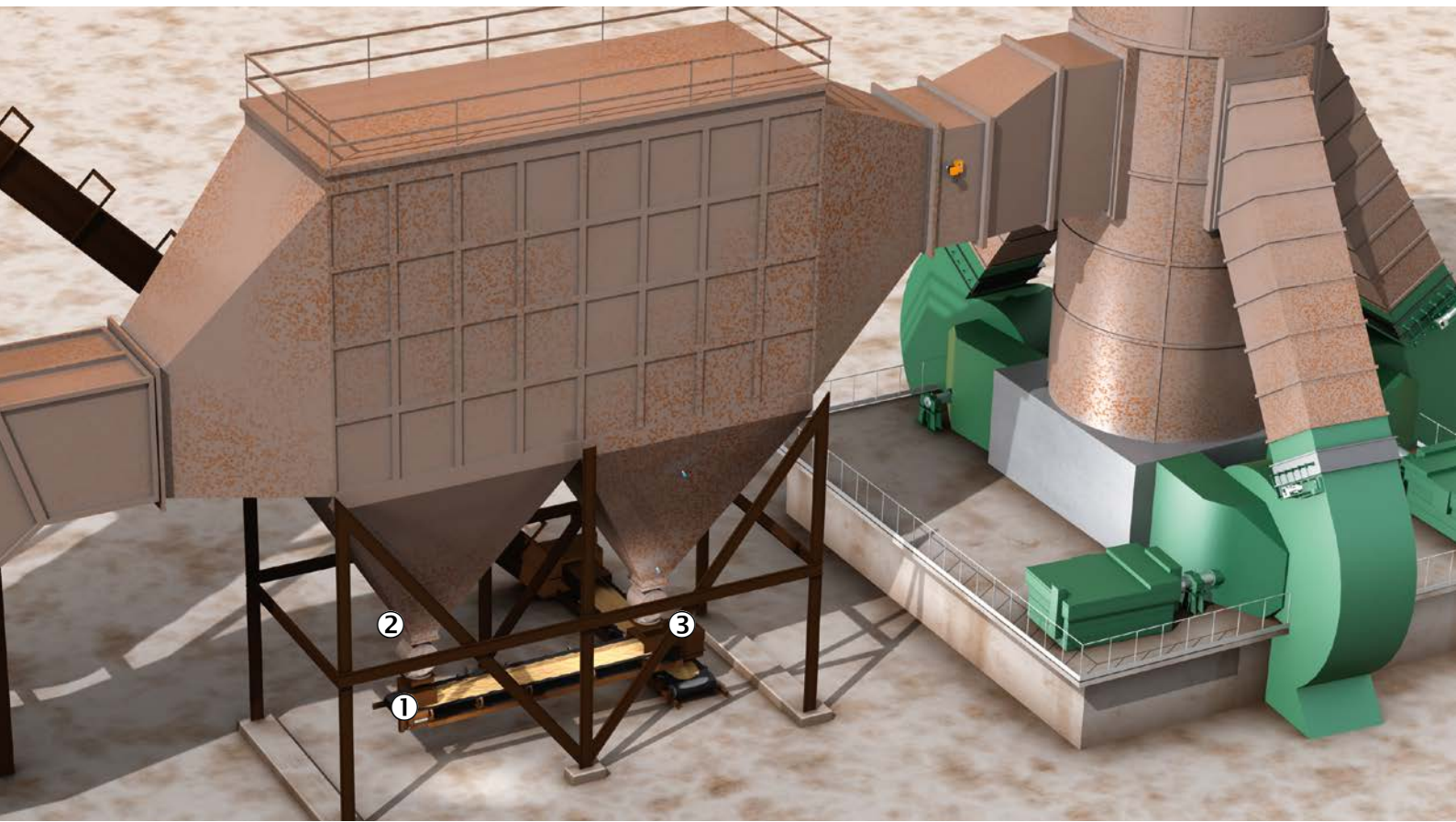
② Rotary valve operation at dust conveying system in the off-gas system

Rotary valves are small units in a steel plant, however, they play a big role in the material flow process which is vital for uninterrupted steel making. Discharging dust silos, bunkers and bag house compartment hoppers or take-over points in conveying systems are typical locations for rotary valves. To ensure all

system parts are properly functioning, it is crucial to monitor the operation of the valve via axle movement control using inductive proximity sensors or encoders. All solutions are rugged and precise enough to offer the accuracy required for proper valve monitoring.



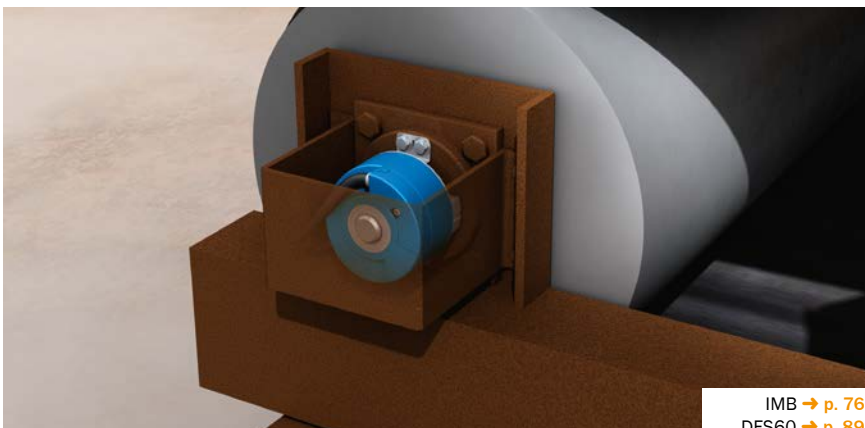
IMB → p. 76
DFS60 → p. 89



③ Conveyor belt operation at dust conveying system

In a baghouse, conveyor systems are used for discharging dust from hoppers or silos, load trucks or train cars and much more. They can be of different types: drag chain, screw, vibration or belt, but they are almost always pneumatically operated. All mechanical types

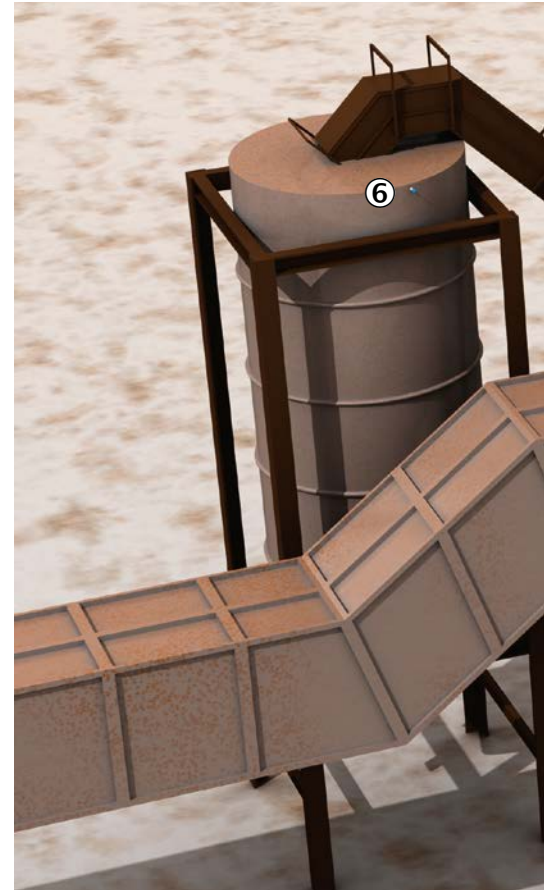
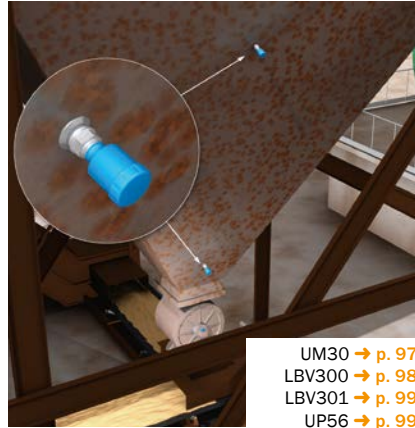
have drive and non-drive ends, and the supervision of the non-drive end offers reliable feedback to ensure the conveyor system is working properly. Either an inductive speed monitor or an incremental encoder can help aid in this conveyor monitoring process.



IMB → p. 76
DFS60 → p. 89

④ Clogging in a compartment hopper

Level control in compartment hoppers is fundamental in ensuring trouble-free bag house operation. Filling hoppers may damage hanging filter bags, which then require removal. This removal activity can result in process delays or even an interruption. All this process disruption not only costs time and money, but also often results in additional production delay to clean the mess. Therefore, control of clogging in the hoppers should be closely monitored. Ultrasonic level sensors or vibrating level switches can easily fulfill the requirements of this monitoring process.

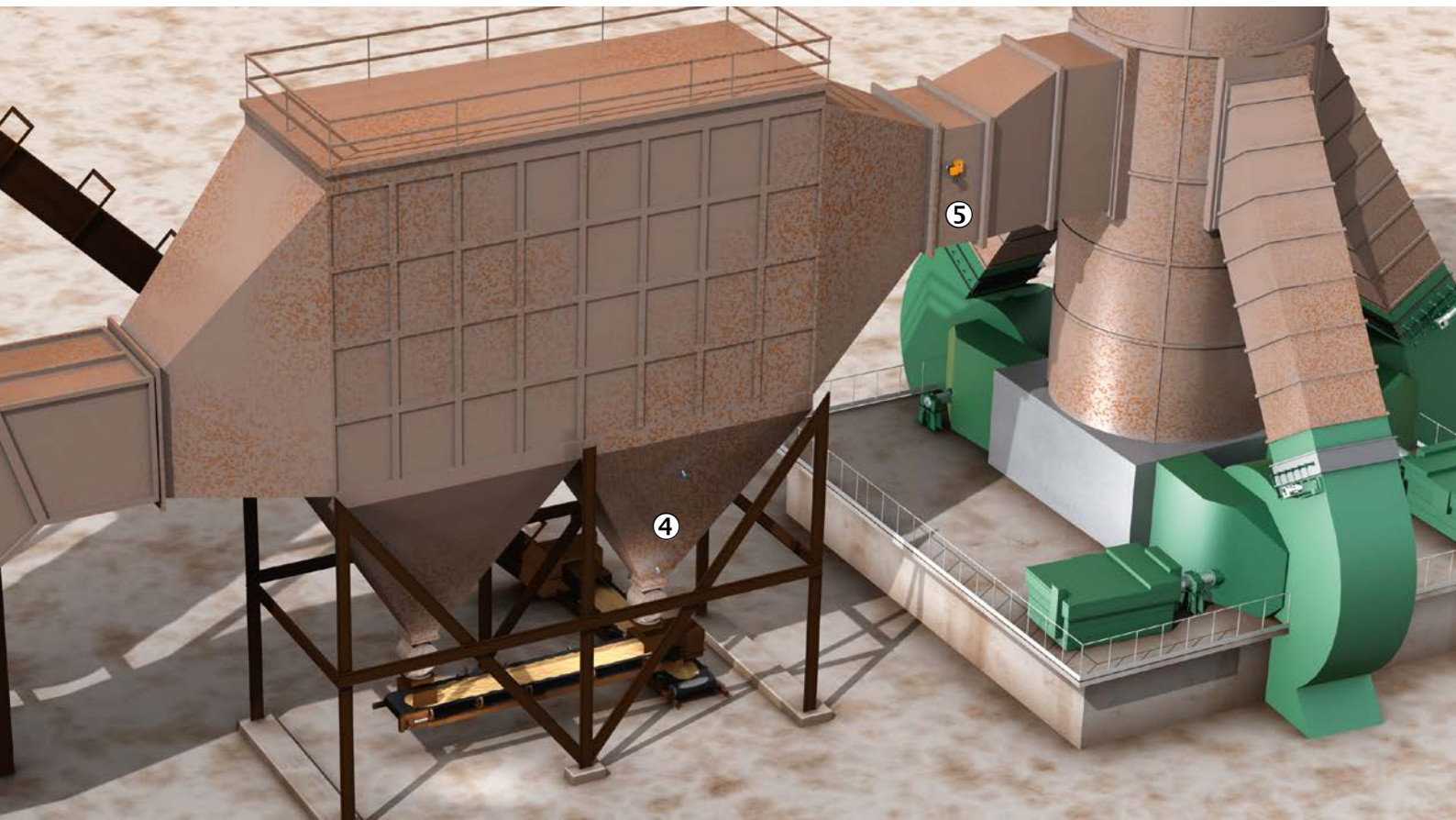


⑤ Broken filter bag detection at a dust collection duct in a off-gas system

Baghouse filters are equipped with several hundreds of filter bags. Even if only one filter fails, the emission limit for dust can be exceeded. Therefore, it is important to identify and replace the defective bag as quickly as possible. However, due to the size of the baghouse, this can be a challenging task. Even if the dust

leak is small, there is no indication of the emission infraction on the clean gas side. Sensitive dust emission monitoring equipment can be used to link the dust emission peaks with those bags in the cleaning cycle and help locate the broken bag for replacement.

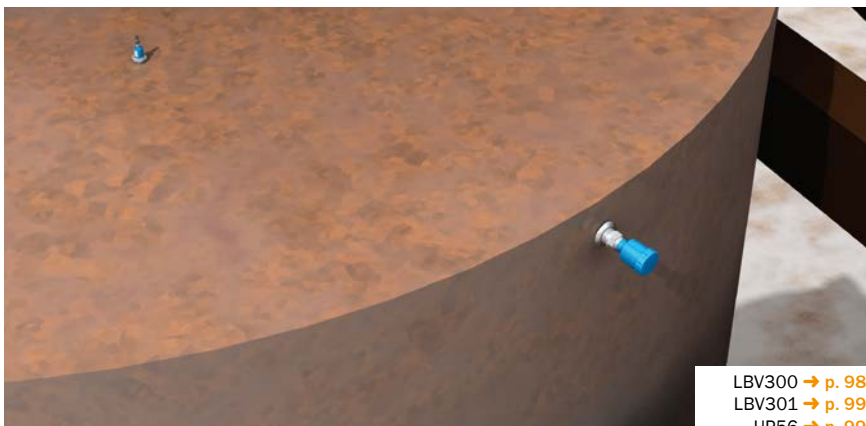




⑥ Dust silo filling level at a dust conveying system in the off-gas system

Level control in silos and bunkers is vital in ensuring trouble-free operation of off-gas systems. Overfilling of material may lead to excessive spilling, which then requires removal and results in process delays or even process stoppage. These delays cost time and money. Therefore,

it is necessary to precisely monitor raw material levels inside storage facilities to avoid costly consequences. Using either vibrating level switches or ultrasonic sensors, material monitoring can be easily controlled.



LBV300 → p. 98
LBV301 → p. 99
UP56 → p. 99

① Normalization and mass emissions

Transmitting emission data to authorities requires appropriate systems to deliver the information in a reliable way. Standards for this transmission must be defined so that they comply with regulations. Furthermore, these norms state how to transmit the data to the relevant recipients. Inclusion of temperature, pressure and humidity – plus oxygen content – allows for normalization of the measurement data in terms of standard settings, as well as in humid or dry conditions of the analyzed gas. Gas flow measurement monitors and dust emission systems supply the required mass flow data.



FLOWSIC100 → p. 87



② Dust emissions in off-gas systems

Steel plants are equipped with off-gas systems that are used to exhaust furnaces, factory buildings, etc. As the furnace dust loads and the buildings' exhaust rates increase, each requires a large filter system. In most cases, these two exhaust loads are mixed together

and the resulting treated gas amounts to several hundred thousand cubic meters per hour. Huge filters are therefore used in the exhaust process but these must be monitored by dust measurement devices to strictly adhere to the given emission limits.



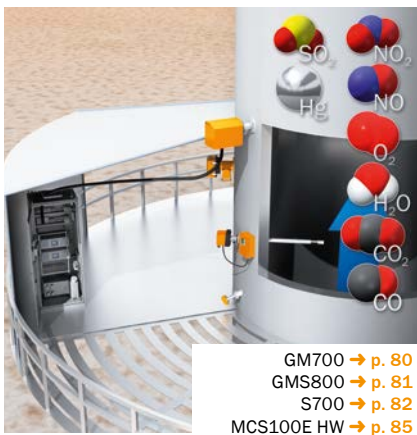
DUSTHUNTER SB100 → p. 83
DUSTHUNTER SF100 → p. 83
DUSTHUNTER SP100 → p. 84
DUSTHUNTER T100 → p. 84
DUSTHUNTER T200 → p. 85



③ Gas pollutant emissions

Based on the different iron and steel producing processes, there is a wide range of pollutants in a steel plant's off-gas systems. Some are based on organic chemicals (i.e. carbon and hydrogen based), while others are of a more metallic origin (such as mercury). Monitoring these pollutants requires

customized gas analyzer solutions where the sensors fit the gas matrix and the specific compounds to be monitored. The level of gas emissions and the measuring range both play important roles in selecting which gas analyzer system to use.



GM700 → p. 80
GMS800 → p. 81
S700 → p. 82
MCS100E HW → p. 85

④ Greenhouse gas (GHG) control

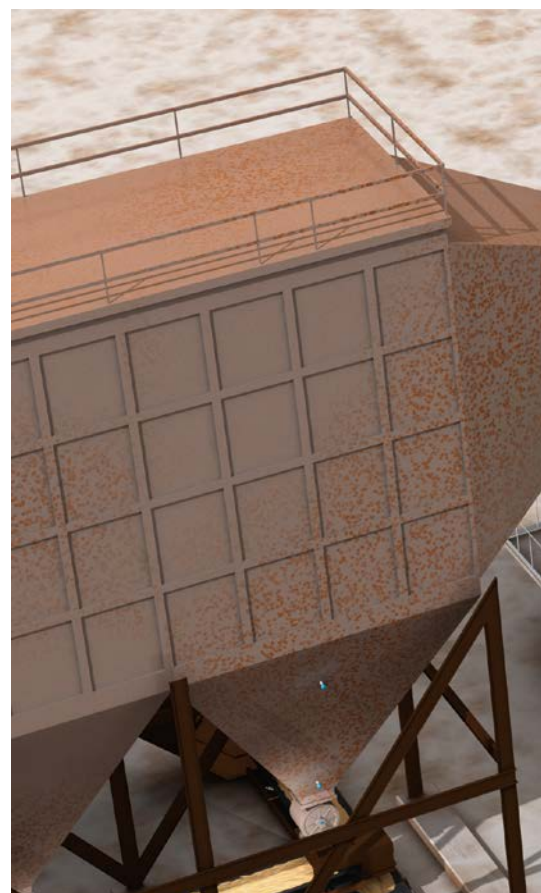
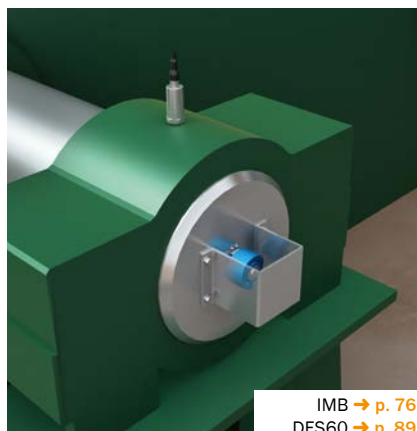
Greenhouse gas (GHG) emissions and CO₂ certificate trading will soon be a cost aspect for all those involved in the steel industry. Even today, some steel plants already participate in this system. Considering the volatility of material properties and the diverse mix of input materials, calculating emissions is a difficult-to-impossible task. The only accurate means is by measuring the actual GHG emissions, which produce accurate reports recognized by carbon trading authorities. Measure accurately; don't estimate.





① Fan operation (RPM) at impeller axis in the off-gas system

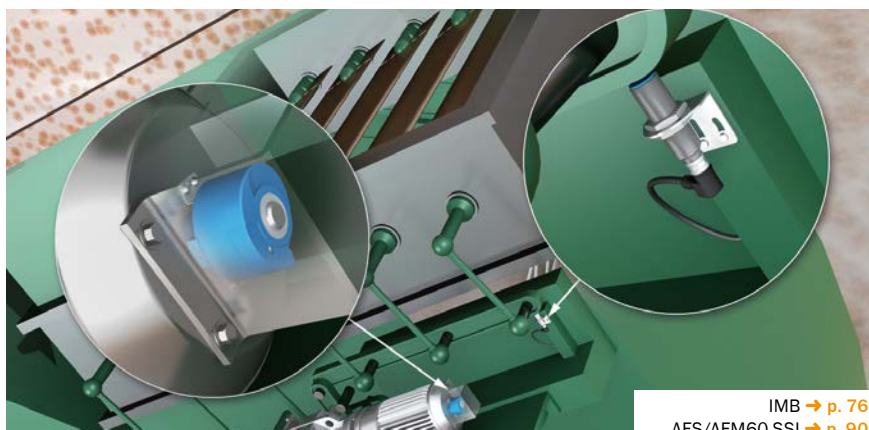
The steel making process depends on proper functioning of the furnace and melt shop's exhaust system. Fans, equipped with three megawatt rating motors, dissipate gases. Efficient flow control, customized to exact process requirements, results in optimized consumption figures. To achieve this adaption, flow control by variable motor fan speeds is an economical tool. For this optimization, the motor or fan impeller RPM measurement is required and a combined solution that includes an inductive proximity sensor and an incremental rotary encoder perfectly solves this control task.

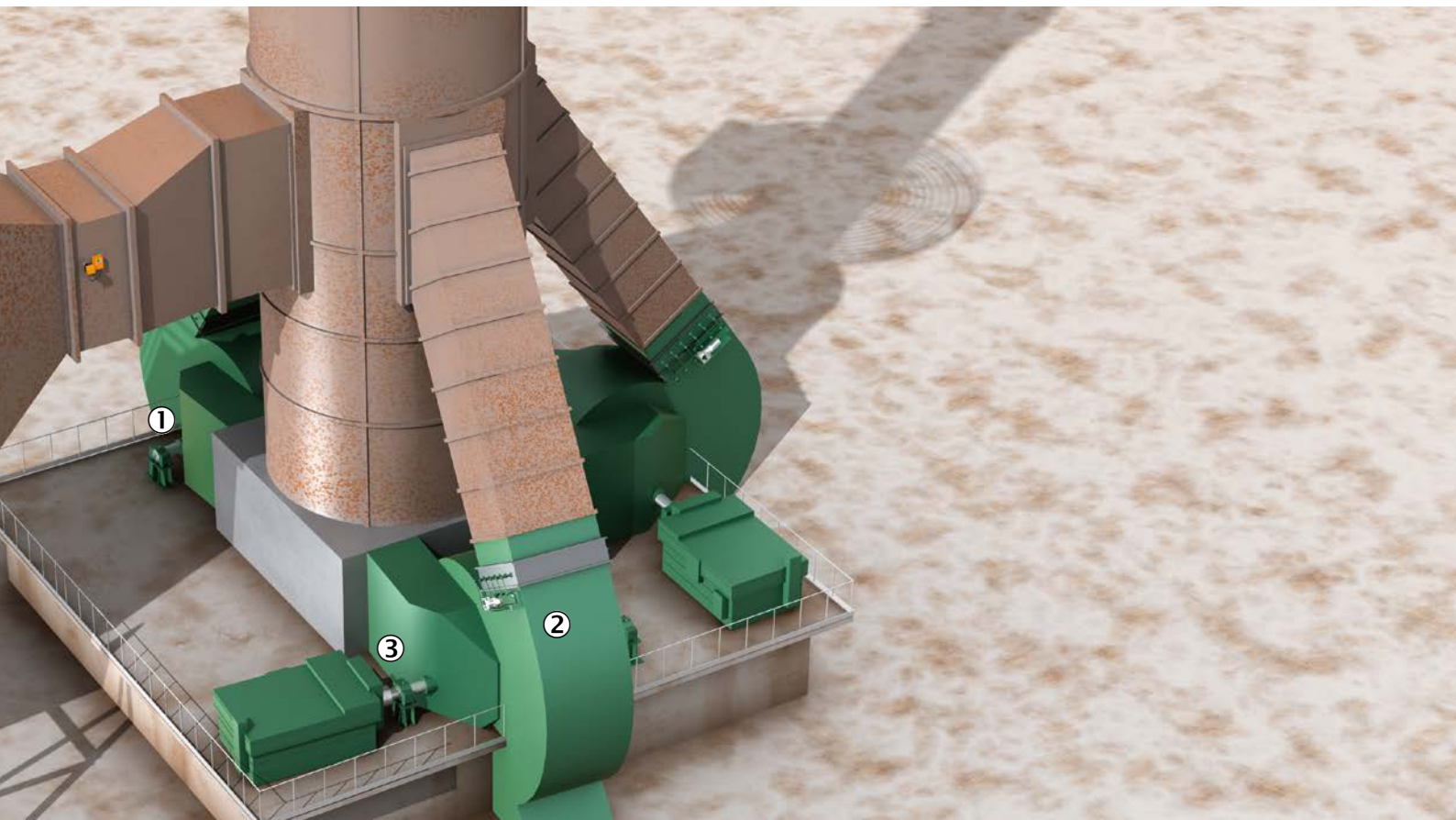


② Inlet and outlet damper position at main fans

Fans exceeding a certain size cannot be started simply by switching on the motor. When starting large fans that are common in steel mills, the motor's current can exceed defined amp tolerances. If this occurs, significant damage may result. Consequently, the fans are started while isolated from the off-gas

system ductwork. Once the fans have achieved normal speed, the dampers are opened. In order to achieve full control of the process setup, the dampers' end positions are precisely monitored via a complete absolute multiturn encoder solution.





③ Bearing temperature at main fans in an off-gas system

The bearings of main fan impellers often experience heavy loads and therefore require close monitoring. A blocked bearing can result in catastrophic damages and accidents. Bearings are usually cooled via a lubricant, which needs to be carefully controlled. The lack of

oil and resulting mechanical damage to the bearing can be detected easily by a rapid temperature increase. Temperature sensors measure the changes in the lubrication oil, allowing for corrective countermeasures to avoid equipment damage.



TCT → p. 102

PRODUCT OVERVIEW



Product overview

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Inductive proximity sensors

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Temperature sensors

TBT. 101

TCT. 102



W45 – At a glance

- Long sensing range with a high operating reserve
- Rugged metal housing
- Optional: Powerful front lens heating
- Optional test input, time delays and alarm output
- Variants for 10 - 60 V DC or 24 - 240 V DC / 24 - 240 V AC voltage supply

Your benefits

- Reliable continuous operation due to high operating reserves
- Very large sensing distance
- Rugged metal housing ensures a long service life in harsh industrial environments
- Front lens heating prevents condensation and frost for reliable operation in outdoor applications
- Multiple functions for simpler integration of individual systems
- Variants DC voltage and universal AC/DC voltage provides installation flexibility due to same housing

→ www.mysick.com/en/W45

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



Stainless Steel

IP 69K

IMB – At a glance

- Types M08 to M30
- Extended sensing ranges: 2 to 20 mm
- Electrical wiring: DC 2/3/4-wire
- Enclosure rating: IP 68, IP 69K
- Temperature range: -40 °C to 100 °C
- Rugged stainless steel housing, sensing face made of plastic (LCP)
- Visual installation aid, IO-Link-compatible
- Resistant to oils and cooling lubricants; suitable for use outdoors

Your benefits

- Straightforward product selection as fewer sensor variants are required – one sensor suits a whole range of applications
- Stable processes thanks to extended, highly precise sensing ranges enabled through the use of the latest SICK ASIC technology
- Reduced machine downtimes thanks to longer sensor service life, even in harsh working conditions
- Quick and easy installation thanks to visual installation aid and self-locking nuts
- High degree of flexibility and communication options thanks to IO-Link
- Easy to implement customer-specific variants within the standard product portfolio

→ www.mysick.com/en/IMB

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





S3000 Standard – At a glance

- 4 m, 5.5 m or 7 m protective field range
- 1 field set
- Configuration memory integrated in the system plug
- Interface (EFI) for reliable SICK device communication
- Selectable resolution for hand, leg or body detection
- Simultaneous monitoring of up to 4 protective fields
- Contour as reference for vertical applications
- Integrated external device monitoring (EDM)

Your benefits

- Large protective field range of 7 m enables a large variety of applications
- Safety technology – with no loss of productivity
- Quick recommissioning via configuration memory
- Modular expansions, low wiring effort and additional functions such as the simultaneous monitoring of up to four protective fields using a SICK safety controller via EFI
- Easy installation, commissioning and maintenance for stationary and mobile applications
- Decades of proven safety technology guarantee maximum reliability and availability – even under difficult conditions
- Simple alignment and reliable operation in vertical mode

→ www.mysick.com/en/S3000_Standard

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



C4000 Fusion – At a glance

- Type 4 (IEC 61496), SIL 3 (EN 62061), PL e (EN ISO 13849)
- Self-teaching, dynamic blanking for application-specific access protection
- Hand and area protection in dirty environments
- Multiple sampling
- Reduced resolution
- Fixed blanking
- Two virtual photoelectric sensors
- Integrated laser alignment

Your benefits

- Plant productivity is increased, since falling debris does not cause the safety light curtain to switch off
- Available: skids are detected, interference objects such as cables are blanked
- Cost-effective: No additional muting sensors or protective measures are required.
- Maximum access protection in automated material transport applications ensures the system reliably differentiates between people and material
- Easy integration and quick commissioning save time and costs since secondary sensors are not required
- Safe: also provides protection in areas where there is no object, unlike conventional muting solutions
- The integrated laser alignment aid enables time saving alignment of the sender and receiver

→ www.mysick.com/en/C4000_Fusion

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





M4000 Area – At a glance

- Type 4 (IEC 61496), SIL3 (IEC 61508), PL e (EN ISO 13849)
- Robust housing with three mounting grooves
- Wide scanning range, up to 70 m
- Resolution 60 mm or 80 mm
- External device monitoring (EDM), restart interlock, application diagnostic output, SDL interface
- 7-segment display
- Configuration and diagnostics via PC
- Beam coding for correct system allocation

Your benefits

- The wide scanning range allows the device to be customized according to the application
- Robust design with a high level of resistance to environmental changes ensures high machine availability, even under special ambient conditions
- Mounting grooves on three housing sides ensure more mounting flexibility and simplify machine integration
- Customer-friendly interfaces and status display simplify commissioning and maintenance

→ www.mysick.com/en/M4000_Area

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



M4000 Standard A/P – At a glance

- Type 4 (IEC 61496), SIL3 (IEC 61508), PL e (EN ISO 13849)
- Sender/receiver in a single housing, scanning range up to 7.5 m
- External device monitoring (EDM), restart interlock and application diagnostic output
- Standardized M12 connectivity
- 7-segment display
- Configuration keys for setting directly on the device
- Beam coding for correct system allocation
- Optional integrated: LED, AS-i interface

Your benefits

- Economical active/passive variants minimize the wiring costs and installation time
- Robust design with a high level of resistance to environmental changes ensures high machine availability, even under special ambient conditions
- Mounting grooves on three housing sides ensure more installation flexibility and simplify machine integration
- Customer-friendly interfaces and status display simplify commissioning and maintenance
- Fast start-up times due to easy configuration keys located directly on the device, without any PC
- Reduced downtime through 360° visible LED and diagnostics displays

→ www.mysick.com/en/M4000_Standard_A_P

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





i110 Lock – At a glance

- Narrow plastic housing
- Metal actuator head
- Rigid or mobile actuators
- Available with M20 X 1.5 cable entry glands or Flexi Loop-compatible M12 plug connector (depending on variant)
- Locked by spring force and magnetic force
- Lock and door monitoring

Your benefits

- Small design simplifies installation and makes it easy to mount directly on the guard door frame
- Flexible electrical connectivity due to three cable entry glands
- Improved diagnostics due to additional contacts for door monitoring
- Simple adjustment due to various actuators that are suitable for any door
- Different switching elements offer the appropriate solution for electrical installation
- Rugged metal housing provides increased machine reliability, even when the guard has a mechanical offset
- Flexi Loop now enables a safe series connection with enhanced diagnostics capabilities and minimal wiring effort.

→ www.mysick.com/en/i110_Lock

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



TRANSIC100LP – At a glance

- O₂ transmitter based on high-performance laser spectroscopy (TDLS)
- For use in potentially explosive atmospheres (FM, ATEX and IECEx approvals)
- Measurement directly in-situ or extractive using a sample gas cell (option)
- Designed for heavy-duty industrial applications
- Compact design and easy to operate
- Long-term stability
- No moving parts

Your benefits

- Measures in real-time directly in the process
- Easy installation and operation
- Self-diagnostics with maintenance display
- Low requirements for gas conditioning
- Low operating costs: no consumables and no purging gas consumption
- Rugged: reliable measurement even in contaminated gases

→ www.mysick.com/en/TRANSIC100LP

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





GM700 – At a glance

- High selectivity due to high spectral resolution
- Short response times
- No calibration required
- No moving parts: minimal wear and tear
- No gas sampling and conditioning required

Your benefits

- Unbiased measuring values due to in-situ measurement directly in the process
- Best application solution using probe or cross-duct type
- High reliability during operation
- Also applicable for harsh environment conditions
- Detection of fast and short-term process fluctuations

→ www.mysick.com/en/GM700

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



GM901 – At a glance

- Representative measurement across the duct
- Operation via evaluation unit
- Short response times
- Verifiable with gas-filled cuvette; gas testable probe with test gas

Your benefits

- Measurement results in real time due to in-situ measurement
- Fast and simple installation and commissioning
- Easy, user-friendly operation
- Economical due to low maintenance

→ www.mysick.com/en/GM901

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



GMS800 – At a glance

- 7 different analyzer modules: DEFOR (NDUV, UVRAS), FIDOR (FID), MULTOR (NDIR), OXOR-E (electrochemical O₂), OXOR-P (paramagnetic O₂), THERMOR (TC) and UNOR (NDIR)
- 4 different types of enclosures
- Gas module with sample gas pump and/or control sensors
- New enclosure type for easy and quick integration in analyzer cabinets
- Remote diagnosis via Ethernet with software SOPAS ET

Your benefits

- Approved according to EN 15267-3 and EN 14181
- Installations in Non-Ex-areas and Ex-areas (Zone 1 and 2 according to ATEX) possible
- Minimum service and maintenance work as well as easy reconditioning of existing installations due to modular design
- Adjustment without test gases via optional adjustment unit
- Minimal influence of ambient temperature through thermostatic controlled modules
- System solutions with turn-key analyzer cabinets
- Reliable measuring results by proven measurement technology
- Easy maintenance and repair due to replacement of complete assemblies or modules



→ www.mysick.com/en/GMS800

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.

**MCS300P – At a glance**

- Simultaneous measurement of up to 6 components
- Process cuvettes up to 60 bar and 200 °C
- Automatic sample point switching
- Integrated adjustment unit
- Safety devices for measurement of toxic or flammable mixtures
- Extended operation via PC and software SOPAS ET
- Flexible I/O module system

Your benefits

- Automatic adjustment without expensive test gases
- Integration in existing networks
- Integration of external parameters like temperature or pressure
- Suitable for potentially explosive atmospheres



→ www.mysick.com/en/MCS300P

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





S700 – At a glance

- 5 different measuring principles available
- Over 60 measuring components from which to choose
- 3 different enclosure versions for several application ranges
- Up to 3 analyzer modules in one enclosure

Your benefits

- Easy application-specific adaptation due to modular design
- Also suitable for hazardous areas Zone 1 and Zone 2 (ATEX)
- Automatic adjustment with test gas or calibration cuvette
- Integrated self diagnostics and watchdog functions

→ www.mysick.com/en/S700

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



DUSTHUNTER SB50 – At a glance

- For low to medium dust concentrations
- One-side installation
- Automatic check of zero and reference point
- Automatic compensation of background radiation, therefore no light absorber necessary
- For medium to large duct diameters

Your benefits

- Easy installation, commissioning and operation
- Measurement independent of gas velocity, humidity and particle charge
- Low maintenance due to self-monitoring

→ www.mysick.com/en/DUSTHUNTER_SB50

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



**DUSTHUNTER SB100 – At a glance**

- For very low to medium dust concentrations
- One-side installation
- Contamination check
- Automatic check of zero and reference point
- Automatic compensation of background radiation, therefore no light absorber necessary
- For medium to large duct diameters

Your benefits

- Easy installation, commissioning, and operation
- Measurement independent of gas velocity, humidity and particle charge
- Approved according to EN 15267
- Low maintenance due to self-monitoring

→ www.mysick.com/en/DUSTHUNTER_SB100

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.

**DUSTHUNTER SF100 – At a glance**

- For very low to medium dust concentrations
- Contamination check
- Automatic check of zero and reference point
- For medium to large duct diameters

Your benefits

- For difficult duct configurations and medium conditions
- Approved according to EN 15267
- Low maintenance due to self-monitoring and contamination check

→ www.mysick.com/en/DUSTHUNTER_SF100

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





DUSTHUNTER SP100 – At a glance

- One-side installation
- For very low to medium dust concentrations
- Automatic check of zero and reference point
- Contamination check
- Hastelloy probe available for corrosive gas environments
- For small to medium duct diameters

Your benefits

- Ideal for thick- or double-walled ducts
- Approved according to EN 15267
- Low maintenance due to self-monitoring and contamination check
- Quick installation – no alignment required

→ www.mysick.com/en/DUSTHUNTER_SP100

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



DUSTHUNTER T100 – At a glance

- For medium to high dust concentrations
- Integrated contamination check
- Automatic check of zero and reference point
- For small to large measuring distances

Your benefits

- Easy installation, commissioning and operation
- Measurement independent of gas velocity, humidity and particle charge
- Low maintenance due to self-monitoring
- Approved according to EN 15267

→ www.mysick.com/en/DUSTHUNTER_T100

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



**DUSTHUNTER T200 – At a glance**

- Integrated contamination check for sender/receiver and reflector unit
- Automatic self-alignment of the optical assembly
- Automatic check of zero and reference point
- For medium to high dust concentrations
- For small to large measuring distances

Your benefits

- Easy installation, commissioning and operation
- Measurement independent of gas velocity, humidity and particle charge
- Low maintenance due to self-monitoring and contamination check
- Approved according to EN 15267

→ www.mysick.com/en/DUSTHUNTER_T200

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.

**MCS100E HW – At a glance**

- Extractive measurement of up to 8 IR-active gas compounds
- Additional oxygen and total hydrocarbon analyzers as an option
- Gas paths completely heated
- Test gas supply at the gas sampling probe or at the analyzer
- Back-purging of gas sampling probe for cleaning of filters
- Fast sample gas exchange for minimizing adsorption and desorption effects
- Automated sample point switching

Your benefits

- Measurement of several gas components with one analyzer
- Heated gas paths enables measurement of difficult gases like HCl and NH₃
- Long maintenance intervals (typically 6 months) due to self monitoring of the analyzer
- Selective measurement of NO and NO₂ – no converter required
- QAL3 drift test according to EN 14181 with internal calibration filter wheel – no test gas required

→ www.mysick.com/en/MCS100E_HW

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





MEAC – At a glance

- Evaluations according to 1, 2, 13, 17, 27, 30, 31 BImSchV and TA Luft
- Analog and digital data collection saved at 5 s/1 min intervals with auto-backup
- Distributed visualization, operation in the network and automatic e-mail alarms
- Flexible data presentation also in process images
- Analog and digital data to the customer system at 5 s/1 min intervals
- Recording of QAL3 cycles

Your benefits

- Time savings through simulation mode for installation and functions checks
- Savings on service costs through flexible parameterizing interface for users, e.g for device calibration
- High availability through automatic synchronization service for data and parameters
- Parallel calculation of greenhouse gas emissions in the same system
- Fewer limit violations due to special CO evaluation
- User can draft own reports in MS Excel format, to which data are then added automatically
- Customer network can be used to connect to process control systems, no need for new cabling
- Continued use of existing data and parameters from earlier MEAC versions

→ www.mysick.com/en/MEAC

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



GHG-Control – At a glance

- In-situ solution for measuring CO₂ and N₂O emissions
- Direct measurement even with changing fuels and mixed fuels
- Measurement without converting from the dry to damp status
- Transfer of the greenhouse gas loads directly to the control unit

Your benefits

- Cost savings thanks to reduced effort recording greenhouse gases
- Lower costs for determining substance flows and fuel qualities
- Safety supplements for the calculation method are no longer an issue
- Only greenhouse gas loads that are actually emitted are reported and paid for
- Low operating costs thanks to minimal maintenance work
- Advice, development, and implementation provided by a single source

→ www.mysick.com/en/GHG-Control

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





MCS300P HW – At a glance

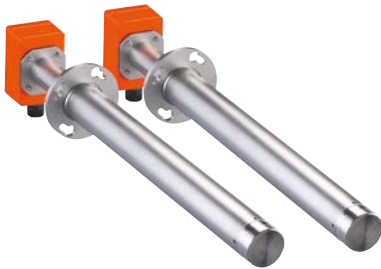
- Simultaneous measurement of up to 6 components plus O₂
- Sample flow control and sample gas pressure measurement
- Temperature of heated system components up to 220 °C
- Automatic sample point switching for up to 8 sample points (option)
- Automatic adjustment of zero and span point
- Integrated adjustment unit without span gas (option)
- Extended operation via PC and software
- Flexible I/O modules

Your benefits

- Economic, automatic adjustment without expensive test gases
- Easy remote control by integration in existing networks
- Automatic control of the complete measuring system and probe
- Low maintenance and reliable due to hot measurement
- In combination with probe SCP3000 also for measurements at high dust loads and high temperatures
- Short response time due to high sample gas flow

→ www.mysick.com/en/MCS300P_HW

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



FLWSIC100 – At a glance

- Rugged titanium transducers for high durability
- Corrosion-resistant material for application in aggressive gases (option)
- Integral measurement over the duct diameter with types H, M and S
- Probe type PR for economic installation from one side of the duct
- Automatic function control with zero and span point check

Your benefits

- Reliable flow measurement for ducts with small up to very large diameters
- High durability of the device
- Minimum operating and maintenance costs
- Accurate measuring results under difficult measuring conditions
- Measurement without pressure loss, therefore no influences on the process
- User-friendly operation via SOPAS ET software
- Reliable function monitoring due to enhanced diagnosis
- No purge air required for applications with gas temperatures up to 260 °C

→ www.mysick.com/en/FLWSIC100

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





FLWSIC100 Process – At a glance

- Corrosion-resistant transducers made of stainless steel or titanium
- Process pressure up to 16 bar
- Explosion-proof version for applications in Zone 2 (ATEX) available
- Hermetically sealed ultrasonic transducers
- Measurement without pressure loss, therefore no influences on the process
- Automatic function control with zero and span point check

Your benefits

- Reliable and accurate measurement also at low gas velocities
- No movable parts, therefore low maintenance
- Measurement independent of pressure, temperature and gas composition
- No influence on the gas flow due to contact-free measurement
- Approved for usage in hazardous areas Zone 2 (ATEX)
- User-friendly operation and device diagnosis via MCU control unit and SOPAS ET operating software

→ www.mysick.com/en/FLWSIC100_Process

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



FLWSIC500 – At a glance

- Cutting-edge technology: ultrasound
- Diagnostics and permanent operational check
- Durable and reliable without moving parts
- Replacable cartridge
- Straight inlet/outlet piping not required
- Overload-proof
- Optional integrated volume correction/data registration
- Battery or intrinsically safe power supply

Your benefits

- Ultimate measurement certainty and safety of continuous gas supply
- Reduction of installation costs due to integrated volume correction
- Simple installation, compatible with conventional technologies (turbine and rotary displacement meters)
- Minimal operating costs due to being nearly maintenance-free
- Easy recalibration due to straightforward cartridge replacement
- Reliable under dynamic load changes
- Self-sufficient operation

→ www.mysick.com/en/FLWSIC500

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





FLWSIC600 – At a glance

- High efficient ultrasonic transducers
- Direct path layout
- Intelligent self-diagnostics
- Compact, robust design
- Integrated log book and data logger
- Large measuring range 1:120
- Bidirectional measurement
- Low power consumption: <1 W

Your benefits

- Long-term stability, reliable measurement
- Low maintenance due to intelligent self-diagnostics
- Virtually immune to pressure regulator noise
- Ultrasonic transducers can be exchanged under operating pressure
- Wide application range

→ www.mysick.com/en/FLWSIC600

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



DFS60 – At a glance

- Compact installation depth
- High resolution up to 16 bits
- Optionally programmable: Output voltage, zero pulse position, zero pulse width and number of pulses
- Connection: Radial or axial cable outlet, M23 or M12 connector, axial or radial
- Electrical interfaces: 5V & 24V TTL/RS-422, 24 V HTL/push pull
- Mechanical interfaces: face mount or servo flange, blind or through hollow shaft
- Remote zero set possible

Your benefits

- Reduced storage costs and downtime due to customer-specific programming
- Variety of different mechanical and electrical interfaces enable the encoder to be optimally adjusted to fit the installation situation
- Excellent concentricity even at high speeds
- High resolution of up to 16 bits ensures precise measurements
- Permanent and safe operation due to a high enclosure rating, temperature resistance and a long bearing lifetime
- Programmability via the PGT-08 programming software and the PGT-10-S display programming tool allow the encoder to be adapted flexibly and quickly according to customer needs
- Programmable zero pulse position simplifies installation

→ www.mysick.com/en/DFS60

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





AFS/AFM60 SSI – At a glance

- High-resolution absolute encoders with up to 30 bits (AFM60) or up to 18 bits (AFS60)
- Face mount flange, servo flange, blind or through hollow shaft
- SSI, SSI + Incremental or SSI + Sin/Cos interface
- Programmable resolution and offset (dependent on type)
- Connection system: M12, M23 connector or cable outlet
- Enclosure rating: IP 67 (housing), IP 65 (shaft)
- Operating temperature: -30 °C to +100 °C (depends on type)

Your benefits

- Programmability of the encoders means less storage, greater machine availability and easy installation
- Precise positioning due to high resolutions
- Large selection of mechanical interfaces and electrical contacting possibilities: Suitable for all applications
- Suitable for applications with limited space requirements (extremely short installation depth of 30 mm)
- Very good rotation accuracy due to increased bearing distance
- One programming tool and software with automatic encoder detection for AFS60/AFM60/DFS60

→ www.mysick.com/en/AFS_AFM60_SSI

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



AFS/AFM60 PROFINET – At a glance

- High-resolution 30-bit absolute encoder (18-bit singleturn and 12-bit multiturn)
- Face mount flange, servo flange and blind hollow shaft
- Connection type: 3 x M12 axial plug
- PROFINET-IO-RT interface
- Less than 5 ms data update time
- Round axis functionality
- Alarms, warnings and diagnostics functions for speed, position, temperature, operating time, etc.
- Status display via 5 LEDs

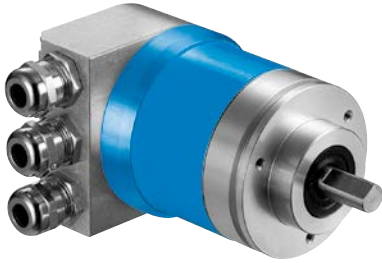
Your benefits

- Increased productivity as a result of intelligent diagnostics functions and rapid data transfer
- Increase in network reliability due to early error detection
- Simple installation with various configuration options
- Flexible, easy setup and high resolutions for various applications with binary, integer and “decimal point” values based on round axis functionality
- Maximum system availability through embedded switch technology
- Compact and cost-efficient design

→ www.mysick.com/en/AFS_AFM60_PROFINET

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





ATM60 PROFIBUS – At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: face mount flange, servo flange, blind hollow shaft and extensive adapter accessories
- Zero-set and preset functions via hardware or software
- No battery required
- Electrical interface: PROFIBUS DP as per IEC61158 / RS 485, electrically isolated
- Electronically adjustable, configurable resolution
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various connectivity options (3x PG, 3x M12)
- Less maintenance and a long service life reduce overall costs
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

→ www.mysick.com/en/ATM60_PROFIBUS

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



ATM60 SSI – At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: face mount flange, servo flange, blind hollow shaft and extensive adapter accessories
- Zero-set and preset functions via hardware or software
- No battery required
- Electrical interface: SSI with gray or binary code type
- Electronically adjustable, configurable resolution
- Rotary axis function (optional) also for non-binary resolutions (per revolution) and decimal numbers (number of revolutions)
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various connectivity options (cable, M23)
- Less maintenance and a long service life reduce overall costs
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

→ www.mysick.com/en/ATM60_SSI

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





BTF – At a glance

- Absolute wire draw encoders
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Measuring lengths: 2 m ... 50 m
- Very rugged system (dirt wiper, integrated brushes), highly shock and vibration resistant
- High-quality winding mechanism and wire input
- Interfaces: - ANALOG, SSI, PROFIBUS, CANopen, DeviceNet, HIPERFACE®
- High enclosure rating
- High resolution possible

Your benefits

- Reliable solution in harsh environments
- Long service life due to rugged industrial housing
- Quick and easy installation without the need for precise linear guidance
- Low integration and maintenance costs
- Customization option reduces storage costs
- No reference run necessary thanks to the absolute measuring principle
- Teach-in function enables fast commissioning

→ www.mysick.com/en/BTF

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



KH53 – At a glance

- Non-contact length measurement – maintenance-free, rugged, long lifetime
- High reproducibility (0.3 mm / 1 mm), high system resolution (0.1 mm)
- SSI and PROFIBUS interfaces
- Determination of absolute position
- Measuring lengths of up to 1,700 m possible
- Can be used in harsh environments
- High travel speeds of up to 6.6 m/s
- Distance tolerance between read head and measuring element: up to 55 mm ± 20 mm possible

Your benefits

- After installation, the system is immediately available and completely maintenance-free, which leads to time and cost savings.
- Reliable determination of position under harshest environmental conditions such as influences of dirt, dust, fog, shocks and vibrations
- High efficiency and productivity
- Savings on time – no reference run necessary on initial operation due to absolute position measurement
- Accurate positioning even with high mounting tolerances

→ www.mysick.com/en/KH53

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





RFU62x – At a glance

- Compact UHF RFID read/write device with integrated antenna for scanning ranges of less than 1 m
- Standard-compatible transponder interface (ISO/IEC 18000-6C / EPC C1G2)
- Supports industry-standard data interfaces and fieldbuses, as well as PoE
- MicroSD memory card for parameter cloning
- Extensive diagnostic and service functions

Your benefits

- Correct assignment and no overshoot thanks to the well-defined read/write range and intelligent filter functions
- Integrated process logic for remote solutions saves additional control and programming effort
- Can be easily integrated into industrial networks thanks to 4Dpro compatibility
- Firmware upgrades and industry-standard compliance ensure long-term reliability
- Minimum changeover times in case of failure thanks to cloning
- RFU62x can be mounted to metal directly – no loss of range
- Easy operation and installation with SOPAS ET user interface

→ www.mysick.com/en/RFU62x

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



Dx50 – At a glance

- HDDM™ technology offers best reliability, immunity to ambient light and price/performance ratio
- Measurement ranges of 10 m or 20 m directly onto the object or even 50 m on reflector
- Different performance levels depending on product and laser class chosen
- Different interfaces: switching, analog or serial interface
- Display with intuitive and consistent operating concept
- Robust die-cast zinc metal housing
- Operating temperature from –30 °C to +65 °C

Your benefits

- Wide measurement ranges up to 10, 20 or 50 m in combination with different interfaces allow an easy and fast integration in any production environment
- Highly reliable and precise measurement helps to increase process quality and stability
- High measurement or switching frequencies enable a fast material flow
- Dx50 product family is based on a common platform, offering multiple performance levels, making it easy to accommodate future changes
- Intuitive setup via display or remote teach reduces installation time and costs
- Temperature range from –30 °C to +65 °C allows for outdoor use without additional cooling or heating
- Up to 40 klx ambient light immunity – allows for use in optically challenging environments

→ www.mysick.com/en/Dx50

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





Dx50-2 – At a glance

- Measuring range up to 10 m on black targets and up to 30 m on white targets within a compact housing
- Output rate up to 3,000/s
- Repeatability: 0.5 mm to 5 mm
- Reliable, patented HDDM™ time-of-flight technology
- Withstands extreme temperatures from –40 °C to +65 °C thanks to rugged metal housing
- Shape comparison integrated in sensor
- IO-Link, analog and switching output
- Display with intuitive menu structure and easy teach option or WiFi for configuration with the SOPASair app
- Enclosure rating IP 65 and IP 67

Your benefits

- A wide measuring range and a compact housing increase the number of application possibilities
- Very high throughput thanks to a high measuring frequency
- Precise and reliable measurement regardless of object color improves uptime and process quality
- Withstands harsh ambient conditions thanks to ruggedness, a wide operating temperature, and ambient light immunity
- Integrated shape comparison for straightforward checking and sorting of objects
- Fast and easy commissioning via intuitive menu structure, easy teach option, WiFi, multifunctional input, or IO-Link saves time
- Full process control with IO-Link from commissioning to maintenance
- Three switching modes provide a simple solution for demanding applications

→ www.mysick.com/en/Dx50-2

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



Dx100 – At a glance

- Measuring range up to 300 m (dependent on type)
- Numerous fieldbus interfaces
- Pre-failure notification and diagnostic data available
- Display with intuitive menu and easy to see status LEDs
- Small, rugged metal housing
- 3-axis alignment bracket with quick lock system available as accessory
- Elongated holes for zero point adjustment when replacing devices
- SPEEDCON™ and standard M12 electrical connections

Your benefits

- Enhanced closed-loop behavior offers highest performance and productivity
- Operating temperature down to –40 °C ensures the highest reliability in cold storage warehouses and freezers (dependent on type)
- Numerous fieldbus and Ethernet-based interfaces offer the highest flexibility and fast communication for maximum efficiency
- Pre-failure and extensive diagnostic data allow for preventive maintenance, ensuring the highest machine uptime
- Small, rugged metal housing and SpeedCon™ compatible connectors ensure hassle-free installation – even in confined spaces
- 3-axis alignment bracket ensures fast alignment and easy exchange, reducing maintenance and setup costs
- Numerous accessories allow flexible use and guarantee high operation functionality

→ www.mysick.com/en/Dx100

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





DME5000 – At a glance

- Measurement range from 0.15 m to 300 m
- Very fast measurement cycles
- Highest accuracy, repeatability and system availability
- Illuminated LC display with diagnostic information
- Visible red light and bracket with springs for alignment
- Variety of interfaces: SSI, RS-422, PROFIBUS, HIPERFACE, DeviceNet

Your benefits

- Fastest measurement rate offers optimized integration into control loops for increased productivity
- Red laser light as well as adjustable mounting brackets (optional accessory) enable fast and easy alignment, ensuring on-time and cost-effective installation
- Multi-point self checks provide maintenance and replacement warnings increasing overall machine availability
- A tough, metal housing as well as heating and cooling accessories ensure reliability in rough ambient conditions
- User-friendly display with easy-to-use menu along with external PC/PLC programming offers fast and cost-efficient setup
- Multiple serial interfaces provide high-speed position output to the controller and high flexibility in application integration
- Integrated speed monitoring offers additional information for increased process reliability
- Highest degree of accuracy and repeatability ensures high machine availability

→ www.mysick.com/en/DME5000

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



Dx500 – At a glance

- Measurement range of up to 70 m on white targets and 30 m on black targets
- Very high accuracy and repeatability
- Red laser, Class 2
- Heated versions for cold store applications
- Tough, metal housing
- Serial interfaces as well as analog and digital outputs available
- Display for easy sensor setup

Your benefits

- Highest measurement precision, of the long range proximity sensors, ensures process stability
- Red laser light as well as adjustable mounting brackets (optional accessory) enable fast and easy alignment, ensuring on-time and cost-effective installation
- A tough, metal housing as well as heating and cooling accessories ensure reliability in rough ambient conditions
- User-friendly display with easy-to-use menu along with external PC/PLC programming offers fast and cost-efficient setup
- Serial interfaces as well as analog and digital outputs combined with optional accessories, such as a weather protection housing, offer flexible application integration

→ www.mysick.com/en/Dx500

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





DMT – At a glance

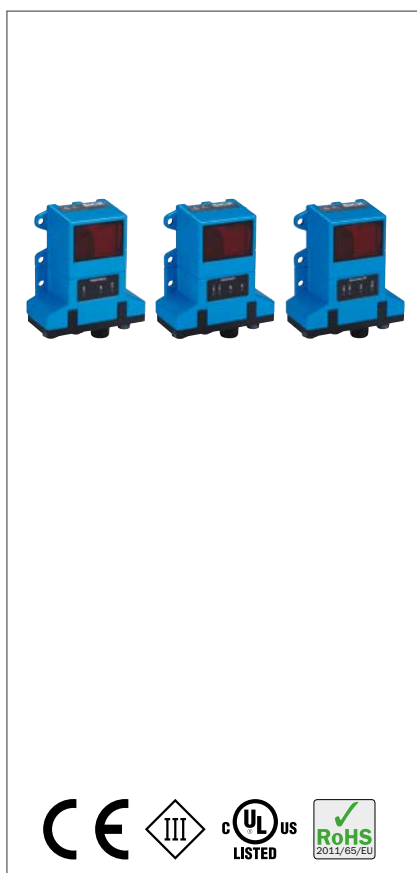
- Measurement range from 0.5 m up to 155 m on natural targets
- Excellent accuracy thanks to time-of-flight measurement
- Easy alignment thanks to pilot laser
- Freely programmable parameters
- RS-422, RS-232, PROFIBUS, analog and two switching outputs
- Near field blanking parameter for operation through a protection window
- Models with filter for measurement of glowing, hot metal (up to 1,400 °C)

Your benefits

- Extremely wide measurement range of up to 155 m on natural targets offers high flexibility in applications where range is key
- Supplementary visible alignment laser allows fast and easy alignment – even over long distances, offering fast and cost-effective installation
- Tough metal housing design for trouble-free operation in the roughest environmental conditions
- Non-visible, Class 1 IR laser for safe measurement and detection
- User-friendly software with an easy-to-follow interface ensures fast and cost-optimized setup
- Serial and analog interfaces as well as two digital switching outputs allow flexible use for varied applications
- Integrated filter option allows for direct measurement of 1,400 °C glowing, hot targets

→ www.mysick.com/en/DMT

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



OLM200 – At a glance

- Highly accurate non-contact bar code positioning system
- Movement speed of up to 10 m/s can be achieved
- Wear and maintenance-free thanks to camera technology
- Adjustable resolution as low as 0.1 mm
- Compatible with standard and SPEEDCON™ M12 plug connectors
- Output of position and speed data, as well as pre-failure notifications via fieldbus interfaces
- Large temperature range from –30°C to +60°C

Your benefits

- High travel speed linked to precise positioning increases system efficiency and improves throughput
- Camera-based system with no moving parts increases the sensor's service life, thus reducing lifecycle costs considerably
- Fieldbus interfaces (PROFIBUS, PROFINET, and EtherNet/IP) offer highest flexibility and easiest system integration, hence saving costs for interface converters and protocol adaption
- Status bit for pre-failure notification and preventive maintenance eliminates unpredicted machine downtimes
- The large temperature range from –30°C to +60°C offers reliable use in many applications

→ www.mysick.com/en/OLM200

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





UM30 – At a glance

- Integrated time-of-flight technology detects objects such as glass, liquids and transparent foils, independent of color
- Range up to 8,000 mm
- Display enables fast and flexible sensor adjustment
- Immune to dust, dirt and fog
- Available with combined analog and digital outputs
- Synchronization and multiplexing
- Adjustable sensitivity
- Three operation modes: Distance to Object (DtO), Window (Wnd) or Object between sensor and background (ObSB)

Your benefits

- Easy machine integration due to compact size
- Various setup options ensure flexible adaptation to applications
- Multiplex mode eliminates cross-talk interference for consistent and reliable detection and high measurement reliability
- Synchronization mode allows multiple sensors to work as one large sensor, providing a low-cost solution for area detection
- Display enables setup prior to installation, reducing on-site installation time
- Integrated temperature compensation and time-of-flight technology ensure high measurement accuracy
- ObSB-mode enables detection of any object between the sensor and a taught background

→ www.mysick.com/en/UM30

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



LMS5xx – At a glance

- Powerful and efficient laser measurement sensor for ranges of up to 80 m
- Outstanding performance in adverse environmental conditions due to multi-echo technology
- Up to IP 67 enclosure rating, built-in heater for outdoor versions, highly compact design
- Low power consumption
- Fast signal processing
- Multiple I/Os
- Synchronization of multiple sensors possible

Your benefits

- Superior performance in a vast range of applications
- Smallest sensor with highest accuracy in its class
- Comprehensive range of lines and models to suit all performance and price requirements
- Fast, reliable object detection in nearly any weather conditions
- Low power consumption reduces total cost of ownership
- Best price/performance ratio in this sensor class on the market
- Fast, easy commissioning due to SOPAS software
- Self-monitoring functions increase system availability

→ www.mysick.com/en/LMS5xx

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





RAS4xx – At a glance

- Optional and simple sensing range adjustment of up to 20 m
- High level of availability even with contamination and in poor weather conditions
- Simple mounting and adjustment
- Additional sender / receiver modules

Your benefits

- The resistant collision avoidance system and driver assistance made to work in a diverse range of applications under any weather conditions
- A configurable sensor even makes it possible to detect awkward objects in extreme situations
- Large sensing ranges and detection beams are ideal for detecting objects early to provide reliable collision avoidance even under high workloads
- Quick and cost-effective adaptation to local conditions
- Long maintenance cycles to provide high levels of availability
- No additional wiring is required thanks to high level of independence from interference signals

→ www.mysick.com/en/RAS4xx

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



LBV300 – At a glance

- Tough device design
- Several housing materials and electrical outputs available
- Immune to deposit formation
- Commissioning without filling
- Process temperature up to 250 °C
- Very high repeatability
- ATEX versions (1D/2D/1G/2G) available
- Tube-extended version (LBV330) up to 6 m and rope extensions version (LBV320) up to 80 m available for vertical mounting

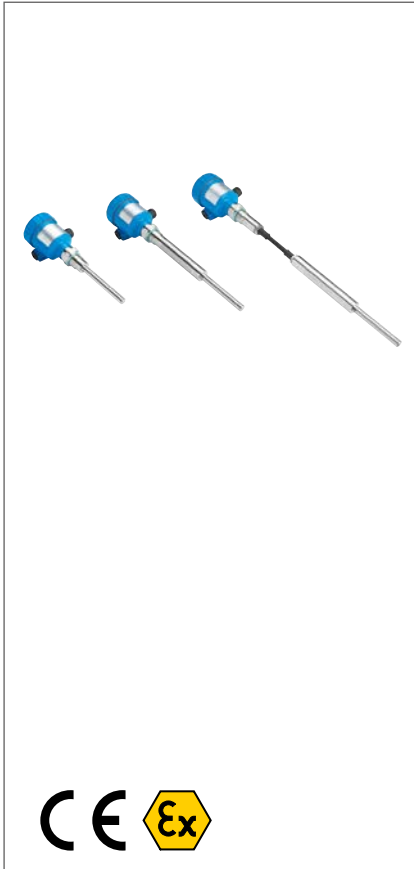
Your benefits

- Easy installation and commissioning, no calibration necessary
- Easy operation and integration, saves time
- Maintenance-free sensor, reduces downtime
- Testing in place possible – no mounting required, which reduces installation time
- Flexible and tough system for a multitude of applications
- Solutions for vertically mounted switches in difficult installation conditions and surroundings

→ www.mysick.com/en/LBV300

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





LBV301 – At a glance

- Compact sensor from 1 in threaded
- Monoprobe design prevents bulk materials from sticking and jamming
- Polished monoprobe for food applications
- Commissioning without filling
- Process temperature up to 250 °C
- ATEX versions (1D/2D/1G/2G) available
- Tube-extended version (LBV331) up to 6 m and rope-extended version (LBV321) up to 80 m available for vertical mounting

Your benefits

- Easy commissioning and no calibration reduce setup time
- Maintenance-free sensor, reduces downtime
- On-site testing – no mounting required, which reduces setup time
- Flexible and rugged system suitable for many types of applications
- Vertical mounting in difficult installation conditions

→ www.mysick.com/en/LBV301

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



UP56 – At a glance

- Non-contact level measurement up to 3.4 m operating distance / 8.0 m limit scanning distance
- Pressure resistant up to 6 bar (87 psi)
- Transducer protected by PVDF cover for increased resistance
- 3 in 1: continuous level measurement, level switch and display
- Analog output switchable between 4 mA ... 20 mA and 0 V ... 10 V
- Process connector thread G 1 and G 2
- IP 67 enclosure rating
- Easy to set parameters, also via connect+

Your benefits

- Non-contact measurement in pressurized containers – no wear over time
- Easy to set parameters, saving time
- Flexible measurement system for different container sizes – standardization and stock reduction
- One product for point level and continuous applications, reduces the number of sensors required

→ www.mysick.com/en/UP56

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





PBS – At a glance

- Electronic pressure switch with display for monitoring pressure in liquids and gases
- Precise sensor technology with stainless steel membrane
- Integrated process connections manufactured from high-quality stainless steel
- Pressure values indicated on display. Output states are indicated separately via wide-angle LEDs.
- Unit of pressure value in display can be switched
- Min/max memory
- Password protection

Your benefits

- Quick and easy setup and operation due to three large pushbuttons and clear display
- Perfect display readability and optimal cable routing due to rotatable housing
- No compromises: Individual solutions through a variety of configurations
- Universal application due to fully welded, highly durable stainless steel membrane
- Saves space and costs: no adapters required due to broad range of standard process connections
- Highly reliable due to application of proven technologies and high-quality materials, water resistance according to IP 65 and IP 67 as well as excellent overpressure safety
- Ultimate system availability: IO-Link enables fast, reliable parameter setting when changing over products

→ www.mysick.com/en/PBS

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



PBS – At a glance

- Pressure measurement ranges from 0 bar ... 1 bar up to 0 bar ... 600 bar
- Gauge, absolute, and compound measurement ranges
- A large variety of available process connections
- No moving parts: No mechanical wear, fatigue-proof, maintenance-free
- Circularly welded, hermetically sealed stainless steel membrane
- Output signal 4 mA ... 20 mA, 0 V ... 5 V or 0 V ... 10 V
- Electrical connection M12 x 1, L-connector acc. to DIN 175301-803 A or flying leads

Your benefits

- Compact size takes up less space
- Simple and cost-saving installation
- Available in a wide selection of configurations, enabling a perfect match to individual customer requirements
- Robust design enables higher reliability
- Excellent price/performance ratio

→ www.mysick.com/en/PBT

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





Bulkscan® LMS511 – At a glance

- Non-contact measurement of volume and mass flow of bulk material
- Laser pulses with high angular resolution ensure outstanding image resolution
- 5-echo pulse evaluation produces highly reliable measurements
- Offers non-contact belt monitoring
- Integrated center-of-gravity calculator
- Robust structure for harsh ambient conditions
- Can also measure at low temperatures thanks to integrated heater
- Compact housing with IP67 enclosure rating

Your benefits

- Maximizes conveyor throughput
- Reduces maintenance costs by preventing belt slippage
- Increases the conveyor belt's service life
- Reduces loading time
- Increases efficiency by optimizing belt capacity
- Simple installation
- Low maintenance costs
- Offers savings through minimized energy consumption

→ www.mysick.com/en/Bulkscan_LMS511

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



TBT – At a glance

- Pt100 element, accuracy class A according to IEC 60751
- Measuring ranges $-50\text{ °C} \dots +150\text{ °C}$ and $-50\text{ °C} \dots +250\text{ °C}$
- Wetted parts made from corrosion resistant stainless steel 1.4571
- Various mechanical adaptations and insertion lengths
- Pt100 (4-wire) or 4 mA ... 20 mA (2-wire)
- Cable gland M16 x 1.5

Your benefits

- Reliable operation through rugged design and high-quality materials
- Good long-term stability, accuracy and linearity
- Quick and safe installation
- Convenient system integration even in narrow installation spaces
- Optimal solutions for individual requirements

→ www.mysick.com/en/TBT

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.





TCT – At a glance

- Pt100 element, accuracy class A according to IEC 60751
- Measuring ranges $-50\text{ }^{\circ}\text{C} \dots +150\text{ }^{\circ}\text{C}$ and $-50\text{ }^{\circ}\text{C} \dots +250\text{ }^{\circ}\text{C}$
- Wetted parts made from corrosion resistant stainless steel 1.4571
- Various mechanical adaptations and insertion lengths, also available with thermowell
- Pt100 (4-wire) or 4 mA ... 20 mA (2-wire)
- Circular connector M12 x 1 (IP 67) or L-connector according to DIN EN 175301-803 A (IP 65)

Your benefits

- Reliable operation through rugged design and high-quality materials
- Good long-term stability, accuracy and linearity
- Quick and safe installation
- Convenient system integration through compact dimensions and industry-standard output signals
- Optimal solutions for individual requirements

→ www.mysick.com/en/TCT

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



WE DELIVER “SENSOR INTELLIGENCE.”

SICK sensor solutions for industrial automation are the result of exceptional dedication and experience. From development all the way to service: The people at SICK are committed to investing all their expertise in providing with the very best sensors and system solutions possible.

A company with a culture of success

Almost 7,000 people are on staff, with products and services available to help SICK sensor technology users increase their productivity and reduce their costs. Founded in 1946 and headquartered in Waldkirch, Germany, SICK is a global sensor specialist with more than 50 subsidiaries and representations worldwide. The people work with pleasure at SICK.

This is demonstrated by the accolades that the company is regularly awarded in the “Great Place to Work” competition. This lively corporate culture holds strong appeal for qualified and skilled persons. In SICK, they are part of a company that ensures an excellent balance between career progression and quality of life.



Innovation for the leading edge

SICK sensor systems simplify and optimize processes and allow for sustainable production. SICK operates at many research and development centers all over the world. Co-designed with customers and universities, our innovative sensor products and solutions are made to give a decisive edge. With an impressive track record of innovation, we take the key parameters of modern production to new levels: reliable process control, safety of people and environmental protection.



A corporate culture for sustainable excellence

SICK is backed by a holistic, homogeneous corporate culture. We are an independent company. And our sensor technology is open to all system environments. The power of innovation has made SICK one of the technology and market leaders – sensor technology that is successful in the long term.



“SENSOR INTELLIGENCE.” FOR ALL REQUIREMENTS

SICK is a renowned expert in many industries, and is entirely familiar with the critical challenges they face. While speed, accuracy and availability take center stage in all industries, technical implementations vary greatly. SICK puts its vast experience to use to provide with precisely the solution you need.

For applications worldwide

Hundreds of thousands of installations and applications go to prove that SICK knows the different industries and their processes inside out. This tradition of uncompromising expertise is ongoing: As we move into the future, we will continue

to design, implement and optimize customized solutions in our application centers in Europe, Asia and North America. You can count on SICK as a reliable supplier and development partner.



For your specific industry

With a track record of proven expertise in a great variety of industries, SICK has taken quality and productivity to new heights. The automotive, pharmaceutical, electronics and solar industries are just a few examples of sectors that benefit from our know-how. In addition to increasing speed and improving traceability in warehouses and distribution centers, SICK solutions provide accident protection for automated guided vehicles. SICK system solutions for analysis and flow measurement of gases and liquids enable environmental protection and sustainability in, for example, energy production, cement production or waste incineration plants.

For performance across the board

SICK provides the right technology to respond to the tasks involved in industrial automation: measuring, detecting, monitoring and controlling, protecting, networking and integrating, identifying, positioning. Our development and industry experts continually create groundbreaking innovations to solve these tasks.

→ www.sick.com/industries



SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

SICK LifeTime Services is a comprehensive set of high-quality services provided to support the entire life cycle of products and applications from plant walk-through to upgrades. These services increase the safety of people, boost the productivity of machines and serve as the basis for our customers' sustainable business success. LifeTime Services range from product-independent consulting to traditional product services and are characterized by extensive industry expertise and more than 60 years of experience.





→ www.sick.com/service



Consulting and design

- Plant walk-through
- Risk assessment
- Safety concept
- Safety software and hardware design
- Validation of functional safety
- CE-conformance check



Product and system support

- Installation
- Commissioning
- Start-up support
- Calibrations
- Telephone support
- 24-hour helpline
- SICK Remote Service
- Troubleshooting on site
- Repairs
- Exchange units
- Extended warranty



Verification and optimization

- Inspection
- Stop time measurement
- Machine safety inspection
- Electrical equipment check
- Accident investigation
- Initial verification
- Performance check
- Maintenance



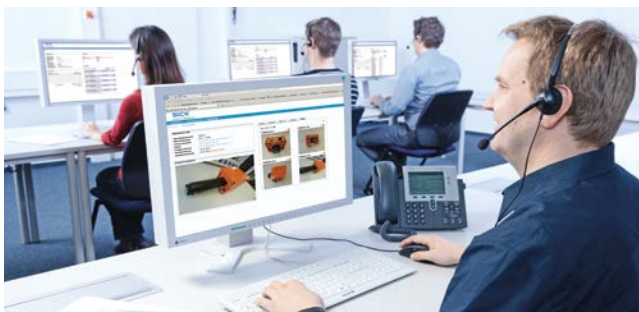
Upgrade and retrofits

- Upgrade services



Training and education

- Training
- Seminars
- Web training



VERSATILE PRODUCT RANGE FOR INDUSTRIAL AUTOMATION

From the simple acquisition task to the key sensor technology in a complex production process: With every product from its broad portfolio, SICK offers a sensor solution that best combines cost effectiveness and safety.

→ www.sick.com/products

Photoelectric sensors

- Miniature photoelectric sensors
- Small photoelectric sensors
- Compact photoelectric sensors
- Cylindrical photoelectric sensors
- Fiber-optic sensors and fibers
- MultiTask photoelectric sensors



Proximity sensors

- Inductive proximity sensors
- Capacitive proximity sensors
- Magnetic proximity sensors



Magnetic cylinder sensors

- Analog positioning sensors
- Sensors for T-slot cylinders
- Sensors for C-slot cylinders
- Sensor adapters for other cylinder types



Registration sensors

- Contrast sensors
- Markless sensors
- Color sensors
- Luminescence sensors
- Fork sensors
- Array sensors
- Register sensors
- Glare sensors



Automation light grids

- Measuring automation light grids
- Switching automation light grids



Opto-electronic protective devices

- Safety laser scanners
- Safety light curtains
- Safety camera systems
- Multiple light beam safety devices
- Single-beam photoelectric safety switches
- Mirror columns and device columns



Safety switches

- Electro-mechanical safety switches
- Non-contact safety switches
- Safety command devices



sens:Control – safe control solutions

- Safe sensor cascade
- Safety relays
- Safety controllers



Gas analyzers

- Gas transmitters
- In-situ gas analyzers
- Extractive gas analyzers



Dust measuring devices

- Scattered light dust measuring devices
- Transmittance dust measuring devices
- Gravimetric dust measuring devices



Analyzer solutions

- CEMS solutions
- Process solutions



Traffic sensors

- Tunnel sensors
- Overheight detectors
- Visual range measuring devices



Ultrasonic gas flow measuring devices

- Volume flow measuring devices
- Mass flow measuring devices
- Flow velocity measuring devices
- Gas flow meters



Identification solutions

- Image-based code readers
- Bar code scanners
- RFID
- Hand-held scanners
- Connectivity



Vision

- 2D vision
- 3D vision



Distance sensors

- Short range distance sensors (Displacement)
- Mid range distance sensors
- Long range distance sensors
- Linear measurement sensors
- Ultrasonic sensors
- Optical data transmission
- Position finders



Detection and ranging solutions

- 2D laser scanners
- 3D laser scanners
- Radar sensors



Motor feedback systems

- Motor feedback system rotary HIPERFACE®
- Motor feedback system rotary HIPERFACE DSL®
- Motor feedback system rotary incremental
- Motor feedback system rotativ incremental with commutation
- Motor feedback system linear HIPERFACE®



Encoders

- Absolute encoders
- Incremental encoders
- Linear encoders
- Wire draw encoders
- Safety encoders



Fluid sensors

- Level sensors
- Pressure sensors
- Flow sensors
- Temperature sensors



System solutions

- Customized analyzer systems
- Collision awareness systems
- Robot guidance systems
- Object detection systems
- Profiling systems
- Quality control systems
- Security systems
- Track and trace systems
- Functional safety systems



EASY INTEGRATION INTO YOUR AUTOMATION WORLD

Sensor integration with SICK is easy and fast for you: Our intelligent sensor solutions and safety controllers provide different integration technologies which allow easy access – from HMI, PLC, and engineering tools – to data from our sensors. In this way, we support you towards solving your application rapidly and easily and increase machine reliability with a continuous diagnostic concept.

PLC and engineering tool integration

Function Blocks	
IO-Link devices Level sensors Pressure sensors Presence detection sensors Distance sensors	Bar code scanners, Image-based code readers 1D und 2D
Vision sensors Inspector	RFID RFH6xx RFU62x, RFU63x
Absolute encoders AFS60/AFM60	Laser volume flowmeter Bulkscan® LMS511

Function blocks

The SICK function blocks quickly allow you to establish acyclic communication to our sensors within your PLC program. Additionally, complex and variable process data can be parsed into their individual information contents without programmer effort.

DTM (Device Type Manager)

FDT/DTM is a cross-manufacturer concept, with which configuration and diagnosis of devices from different manufacturers can be done with just one engineering tool.

TCI (Tool Calling Interface)

The Tool Calling Interface (TCI) makes it possible to call up a tool used to carry out parameterization and diagnosis of a field device via the existing communication infrastructure.

HMI integration

OPC server

OPC technology is used to exchange data between field devices and Windows-based applications. The SOPAS OPC server from SICK follows the OPC DA specification and thus can be used on Windows operating systems.



Web server

The SOPAS web server from SICK can be used everywhere, where a web browser is available. The web server is distinguished by its ability to both carry out pure data exchange and also to provide visualizations for the devices, which is a big advantage, particularly for vision sensors.

Fieldbus Communication Interface



Modbus®TCP

Our fieldbus and network solutions allow SICK sensors and safety controllers to be connected to all conventional automation systems. This guarantees an easy and fast access to the available data.

→ www.sick.com/industrial-communication

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- ✓ Direct ordering: submit even very complex orders in moments.
- ✓ View the status of quotations and orders at any time. Receive e-mail notifications of status changes.
- ✓ Easily repeat previous orders.
- ✓ Conveniently export quotations and orders to work with your systems.



SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.



Consulting and design
Safe and professional



Product and system support
Reliable, fast and on-site



Verification and optimization
Safe and regularly inspected



Upgrade and retrofits
Easy, safe and economical



Training and education
Practical, focused and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With almost 7,000 employees and over 50 subsidiaries and equity investments as well as numerous representative offices worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and additional representatives → www.sick.com