APPLICATION BOOK FOR ENCODERS AND INCLINATION SENSORS

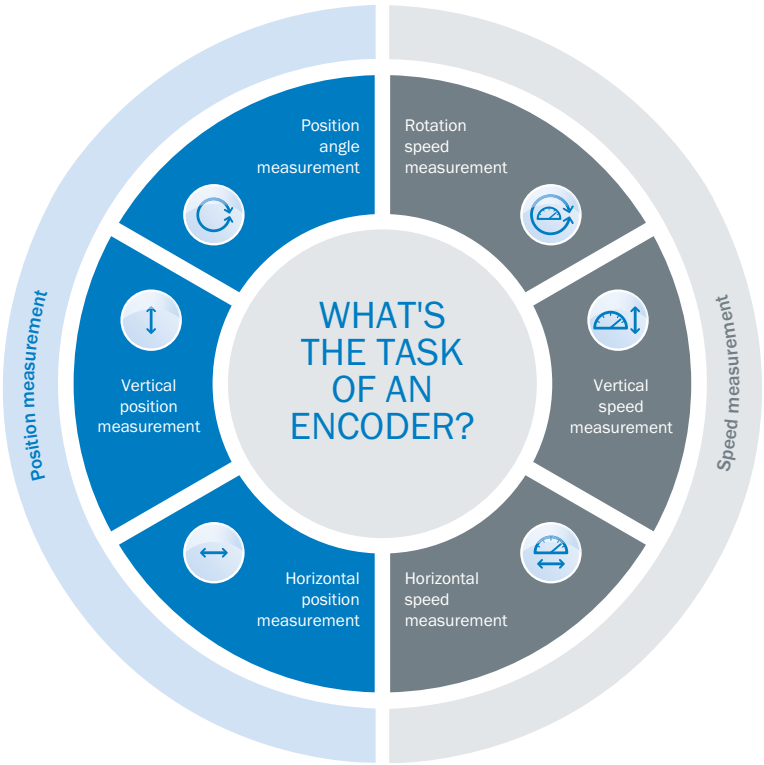
APPLICATIONS IN FACTORY-, LOGISTICS-, AND PROCESS-AUTOMATION

SICK
Sensor Intelligence.

Encoders

TYPICAL APPLICATIONS

This chapter describes typical applications for encoders. Arranged according to industry, you will find application examples with a brief description of the typical application as well as a product recommendation from our varied product portfolio. The encoder types suggested have already been used in the application, however they are to be understood first and foremost as examples. Depending on the control concept and the mechanical requirements of the application, other encoders can also present a better option. Should you need additional assistance with selecting one of our products, our encoder specialists around the world will be glad to advise you.



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APPLICATIONS OVERVIEW

	Incremental encoder								Measuring wheel encoder			
	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DFS60S Pro	DUS50	DGS34/ DGS35	DBV50	DKV60	DUV50	DFV60
Waste and recycling industry												
Calculating the conveyor belt speed of the bio mass belt in organic waste incineration					■							
Automotive and part supplier												
Speed measurement of belt for detecting circuit boards				■						■		
Height positioning of electrical overhead conveyor												
Speed measurement of electrical overhead conveyor				■		■						
Height positioning of scissor lift table												
Measurement of vehicle speed AGS					■	■						
Measurement of lift height AGS-fork												
Mining												
Calculating the conveyor belt speed and running direction					■							
Printing industry												
Controlling the print head on ink jet printers					■							
Speed measurement for synchronization of machine processes					■							
Height positioning AGS fork for storage bay assignment												
Detection of steering angle												
Electrical data												
Speed measurement of asynchronous motors	■			■		■						
Electronics and solar industry												
Height positioning of gripper for load-port feeding												
Monitoring the positions of wafer carriers												
Positioning of semiconductor chips in a bonding machine												
Collision awareness for automatically guided vehicle systems (AGS)					■	■						
Positioning a wire bonder												
Positioning of circuit boards under screen printing stencils												
Detection and identification of objects				■								
Monitoring and control of the saw-wire												
Port and crane industry												
Positioning of the traveling crane on a crane												
Monitoring of the crane winch						■						
Speed measurement on the crane drive				■								

	Absolute encoder (singleturn)				Absolute encoder (multiturn)							Wire draw encoder			Inclination sensor		Linear encoder			Page
	ACS36	AFS60	AHS36	ARS60	A3M60	ACM36	ACM60	AFM60	AHM36	ATM60	ATM90	EcoLine	Compact	HighLine	TMS 55/61/88	TMM 55/61/88	KH53	KH53A	TTK70	
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	Incremental encoder								Measuring wheel encoder			
	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DFS60S Pro	DUS50	DGS34/ DGS35	DBV50	DKV60	DUV50	DFV60
Wood industry												
Height positioning of crane gripper												
Crane positioning												
Height positioning of hold-down arm for round wood sorting												
Saw-wire positioning												
Length measurement of the veneer material												
Plastics and rubber industry												
Speed measurement of film				■								
Speed measurement of roller conveyor												■
CEP (courier, express, parcel and postal services)												
Speed measurement on the belt for ensuring equal object distances in a postal sorting system				■								
Speed measurement on the belt for speed control of the system												■
Storage and conveyor systems												
Speed measurement and positioning at the transfer car					■	■						
Speed measurement and positioning of a storage and retrieval system					■	■						
Height positioning of a storage and retrieval system												
Speed measurement and positioning of the x axis on a tote shuttle	■					■						
Positioning a pallet shuttle	■											
Height positioning of the scissor lift table												
Positioning of roller conveyor in the contour measurement of the pallet loading												
Positioning of the lifting unit of a storage and retrieval system												
Speed measurement of the positioning unit on a storage and retrieval system					■	■						
Measuring the conveying speed of a roller conveyor					■							
Warehouses and distribution centers												
Positioning of storage and retrieval system and transfer cars												
Material transport vehicles, factory and logistics automation												
Height positioning of a storage and retrieval system												
Speed measurement of an automated guided system for switching the characteristic diagram of a safety laser scanner				■		■						
Height positioning of the forks of an automated guided system												
Safe speed measurement of an automated guided system					■	■						
Detection of the steering angle of an automated guided system												
Height positioning of the forks of a narrow aisle truck												

	Absolute encoder (singleturn)				Absolute encoder (multiturn)							Wire draw encoder			Inclination sensor		Linear encoder			Page
	ACS36	AFS60	AHS36	ARS60	A3M60	ACM36	ACM60	AFM60	AHM36	ATM60	ATM90	EcoLine	Compact	HighLine	TMS 55/61/88	TMM 55/61/88	KH53	KH53A	TTK70	
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	Incremental encoder								Measuring wheel encoder			
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Metal and steel industry												
Positioning traveling cranes outdoors												
Overhead crane trolley positioning												
Overhead crane gear position												
Positioning rail-mounted shuttles during the material handling process												
Rotary valve operation during material handling					■							
Conveyor belt operation during material handling					■							
Controlling the rotary valve for carbon and sinter supply												
Monitoring the tilting position on the basic oxygen furnace					■							
Monitoring the position of the ladle furnace cover in secondary metallurgical processes												
Detecting the position of electrode arms and electrodes in the ladle furnace												
Determining the position of the vacuum chamber in a Ruhrstahl-Heraeus degasser												
Damper positioning in the duct system												
Positioning the oxygen cutting torch during continuous casting					■							
Monitoring the speed of steel rods in the hot rolling process					■							
Synchronization of drive motors in the hot rolling process				■								
Monitoring the width and diameter of coils in winding applications				■								
Mobile automation												
Leveling the excavator arm												
Detection of ring mount position												
Inclination sensors for positioning tasks on the mobile crane												
Wire draw encoder for support and boom positioning on the mobile crane												
Encoder for angle detection on the boom												
Monitoring the drilling angle												
Monitoring the drill feed and speed												
Measuring tree trunks on the harvester												
Measuring the incline of the driver's cab and chassis												
Determining the length of square bales												
Leveling the field-sprayer rod												
Aerial ladder positioning on the aerial rescue truck												
Encoder for angle detection on the aerial ladder												

	Absolute encoder (singleturn)				Absolute encoder (multiturn)							Wire draw encoder			Inclination sensor		Linear encoder			Page
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	Incremental encoder								Measuring wheel encoder			
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Determining the inclination of the aerial rescue truck cage												
Position detection in the aircraft tractor												
Positioning the quench monitor												
Food and beverage industry												
Position and speed measurement of the carousel of a bottle filling system												
Tire industry												
Speed measurement of rollers for loop control					■	■						
Speed measurement of roller conveyor for synchronization of the camera system				■								
Maritime												
Measuring the infeed of liquid fuel to engines												
Traffic systems												
Position determination at lock gates												
Freight train positioning												
Packaging industry												
Speed regulation of the conveyor unit for beverage cartons from filling systems for dairy products				■								
Control of the belt speed for primary packaging of meat products				■		■						
Fine positioning of the packaging film for bulk materials		■										■
Speed measurement of belt on packaging systems for individual products				■								
Positioning of the individual wire axes of the pallet handling robot												
Machine tools industry												
Adjustment of press stroke after tool change												
Height positioning of press stroke												
Height positioning of press stroke with absolute encoders												
Speed measurement of sheet coil during decoiling process				■		■						
Speed measurement of CNC portal for secure drive monitoring					■	■						
Height positioning of scissor lift table												
Height positioning of sheet metal storage												
Speed measurement for safety gate securing of the drilling machine						■						
Saw-blade positioning	■											
Speed measurement for access protection of the saw line						■						

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	Absolute encoder (singleturn)				Absolute encoder (multiturn)							Wire draw encoder			Inclination sensor		Linear encoder			Page
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	Incremental encoder								Measuring wheel encoder				
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Wind power													
Azimuth system: positioning of the gondola on a wind power plant													
Pitch system: adjustment of the rotor blades on a wind power plant													
Speed measurement of the rotor of a wind power plant					■								
Cement industry													
Speed measurement of the roller conveyor for palletizing cement sacks					■								
Detection of the number of windings on the stretch banding machine													

	Absolute encoder (singleturn)				Absolute encoder (multiturn)							Wire draw encoder			Inclination sensor		Linear encoder			Page
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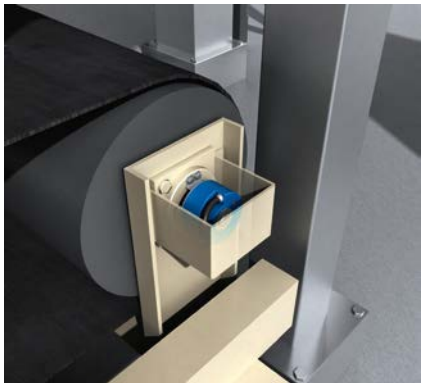
Calculating the conveyor belt speed of the bio mass belt in organic waste incineration



The conveyor belt speed at which the bio mass is transported to the shredder and then to the storage location is very important when it comes to controlling the material flow. The DFS60 incremental encoder calculates the speed and running direction of the belt. The DFS60 encoder can be configured either via a PC or with a separate programming tool, thus offering comprehensive programming flexibility for all industrial requirements.

Recommended products

DFS60

Speed measurement of belt for detecting circuit boards

The DBS60 incremental encoder transfers the position of the belt for synchronization of both sensor signals.

Alternatively, the belt speed can be taken directly on the belt using a measuring wheel encoder. This can reduce slippage.

Recommended products

DBS60 Core	DKV60

Height positioning of electrical overhead conveyor

The electrical overhead conveyor brings the car bodies to designated workplaces. The compact BCG wire draw encoder ensures that the defined height position is approached accurately. Eliminating the coupling between the wire draw encoder and suspension mechanism enables highly accurate positioning.

Recommended products

EcoLine

Speed measurement of electrical overhead conveyor

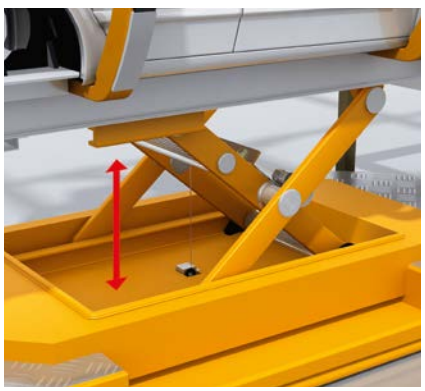
The electrical overhead conveyor brings the car bodies to designated workplaces. The speed is specified by the higher-level control; an incremental encoder determines the speed.

In case of requirements for secure speed, the DFS60S Pro assists with the realization of collision protection in combination with a safety laser scanner.

Recommended products

DBS60 Core	DFS60S Pro

Height positioning of scissor lift table



The compact BKS wire draw encoder measures the height of the scissor lift table accurately and forwards this to the controller of the scissor lift table via the SSI interface.

Recommended products

Compact

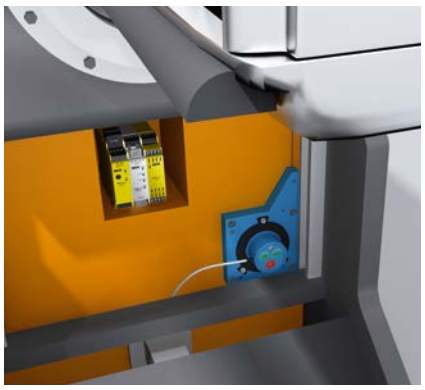
Measurement of vehicle speed AGS

The route of the automated guided system (AGS) is stipulated by the higher-level control system. The DFS60 incremental encoder determines the speed of the wheels of the AGS. This information is used to control the warning fields of the safety laser scanners.

Recommended products

DFS60	DFS60S Pro

Measurement of lift height AGS-fork



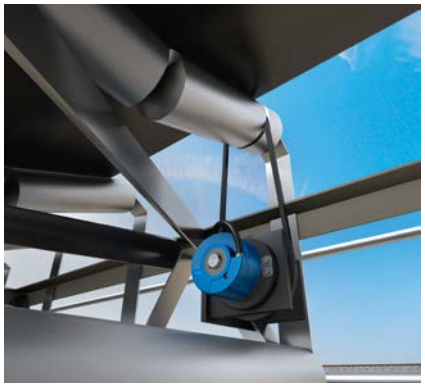
The BCG08 EcoLine wire draw encoder determines the fork lifting height of the automated guided system and forwards this to the vehicle controller.

The BCG08 EcoLine is available with different interfaces and can be integrated easily into all major industrial networks.

Recommended products

EcoLine

Calculating the conveyor belt speed and running direction



The belt speed at which mined materials are transported to stockpiles, ship loaders, and railroad loading facilities is of paramount importance. The DFS60 incremental encoder precisely calculates the speed and running direction of a belt. The DFS60 encoder can be configured either via a PC or with a separate programming tool, thus offering comprehensive programming flexibility for all mining requirements.

Recommended products

DFS60

Controlling the print head on ink jet printers

Certain digital printing machines fire individual ink droplets onto the paper per drop-on-demand and with the highest accuracy. The DFS60 incremental encoder uses a measuring wheel to detect the speed of the paper web. Its resolution of up to 65,536 pulses per revolution provides fast and high-precision control for this process. These encoders also control continuous ink jet printers.

Recommended products

DFS60

Speed measurement for synchronization of machine processes

The folding process, the adhesive joints and the paper travel must match exactly. The actual values in the process must also be compared to the positions of the drives. The extremely high resolution means that the DFS60 incremental encoder satisfies the requirements for accurate synchronization. The easy programming capability enables adaptation to special customer requirements.

Recommended products

DFS60

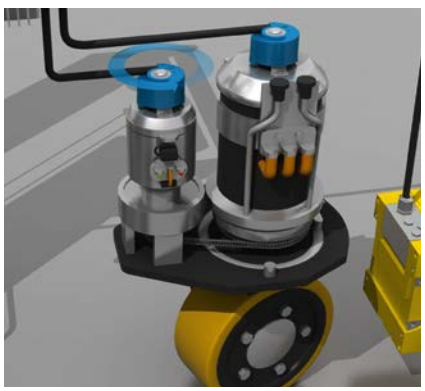
Height positioning AGS fork for storage bay assignment

The measurement of the fork lifting height on the AGS for the precise removal of print products from the bay is done with the EcoLine wire draw encoder.

Recommended products

EcoLine

Detection of steering angle



The CLV650 bar code scanner reads the bar code at the shelf and delivers the data to a central computer. This assigns the corresponding path to the automated guided system (AGS) to incorporate the paper roll into the production process as scheduled. This enhances the scan rate. The EcoLine wire draw encoder measures the lifting height at the AGS, while the AFS/AFS60 SSI absolute encoder takes care of steering control.

Recommended products

AFS60

AHS36

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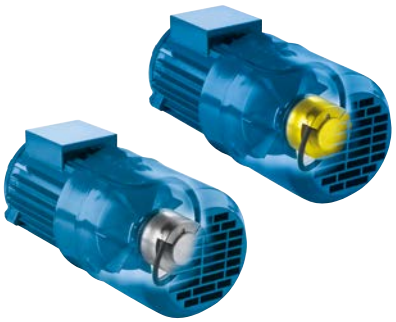
Speed measurement of asynchronous motors

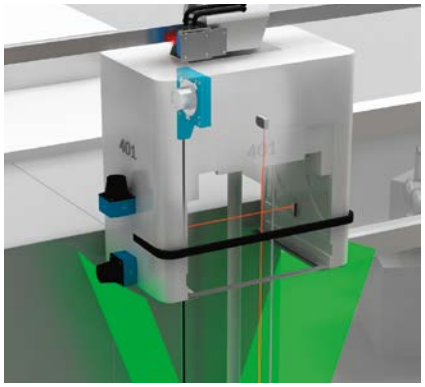


With asynchronous motors, the speed is measured with an incremental encoder. The DBS36 Core and DBS60 Core incremental encoders offer all the necessary features for this application at a competitive price. With speed information from the encoder, the speed of the motor is regulated by the controller, which means in many cases that the efficiency can be increased.
If safe speed monitoring is required, the DFS60S Pro safety encoder can be used for functional safety.

Recommended products

DBS36 Core DBS60 Core	DFS60S Pro

Height positioning of gripper for load-port feeding



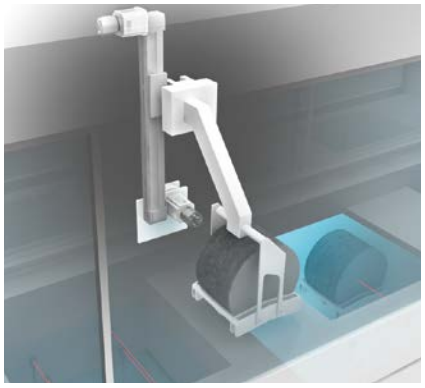
The risk of material breaks in expensive semiconductor wafers must be kept as small as possible. Therefore, the wafer box is monitored with sensors.

The Ecoline product family of wire draw encoders – lightweights at just 180 grams – provide the exact position of the FOUPs (wafer box) during lowering.

Recommended products

EcoLine

Monitoring the positions of wafer carriers

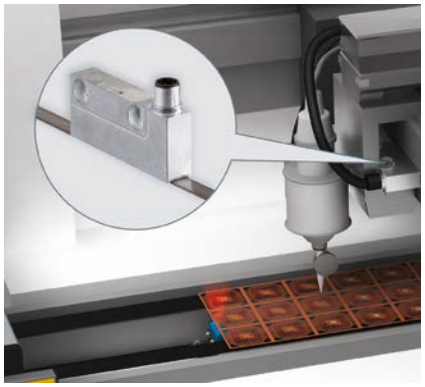


The position of the wafer carrier is determined reliably with absolute encoders: with the AFS60 Singleturn on the vertical and the AFM60 Multiturn on the horizontal axis. Thanks to SSI and industrial Ethernet interfaces, it is possible to integrate these into the machine controller easily and cost-effectively.

Recommended products

AFS60
AHS36
AFM60
AHM36

Positioning of semiconductor chips in a bonding machine



Semiconductor chips are placed in bonding machines at high speed, which assumes the greatest precision. The non-contact TTK70 linear encoder works with a precision in the µm range, thus enabling the precise positioning on the lead frames.

Recommended products

TTK70

Collision awareness for automatically guided vehicle systems (AGS)

Cleanrooms present a significant cost factor. With flexibly-equipped collision zones on automated guided systems – even at changing speeds – the workspace can be exploited optimally. SICK safety laser scanners adjust their protection and warning fields dynamically. The control data (direction and speed) is provided by two DFS60 incremental encoders, which are mounted on the AGS.

Recommended products

DFS60
DFS60S Pro

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Positioning a wire bonder

Temperatures are very high in the area around the bonding head, making fiber-optic cable systems the most effective for this application. With its 16 µs response time, the WLL180T works together with the LL3-TH fibers to supply the control unit with a precise signal for edge detection. The grippers of the wire bonder move the thin substrate carrier at a high speed. This is a process that requires maximum precision. The two read heads of the TTK70 linear encoder work with a precision in the µm range at a speed of up to 10 m/s, thus contributing to the increasing of machine throughput.

Recommended products

TTK70

Positioning of circuit boards under screen printing stencils

Screen printing machines can process circuit boards of all sizes; however for this, they need precise position data (± 10 µm). The TTK70 linear absolute encoder performs this task.

Recommended products

TTK70

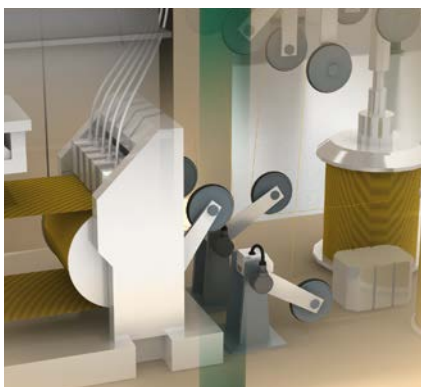
Detection and identification of objects

An innovative solution for detecting the leading edge of objects on belts is a fiber-optic sensor combined with fibers. This system supplies the position data of the detected objects quickly and reliably. The DBS60 Core incremental encoder relays the position of the belt, thereby ensuring the synchronization of both sensor signals.

Recommended products

DBS60 Core

Monitoring and control of the saw-wire



The precise use of saw-wires assumes the use of appropriate encoders. With the AFM60 absolute encoders from SICK, damage to wafers is minimized. The absolute encoders check the precise position of the saw-wire and transmit the data with the resolution required for this process.

Recommended products

AFM60

Positioning of the traveling crane on a crane

The KH53 is ideally-suited for positioning the traveling crane on the crane thanks to its good repeatability, large reading distances, and extreme robustness in case of shocks, vibrations, and weather influences of all kinds. With the position data of the traveling crane, it is possible to stack containers very precisely and with as little offset as possible.

Recommended products

KH53

Monitoring of the crane winch

The information for the safe speed and direction of rotation monitoring of the crane winch is generated by the DFS60S Pro safety encoder. This way, hazards due to excessive speed or acceleration can be prevented depending on the cargo.

Recommended products

DFS60S Pro

Speed measurement on the crane drive

The speed of the drive motor of a crane is measured with the DBS60 incremental encoder. This way, the speed can be controlled depending on the cargo and the travel path of the crane determined.

Recommended products

DBS60 Core

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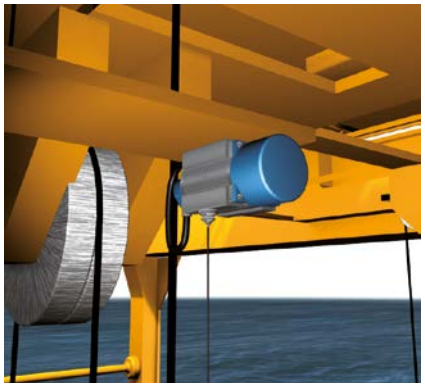
Height positioning of crane gripper

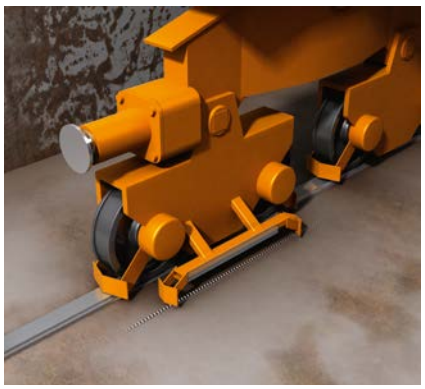


BTF13 wire draw encoders for high-resolution linear measurement lengths up to 50 m are used for height positioning of the crane gripper.

Recommended products

HighLine

Crane positioning

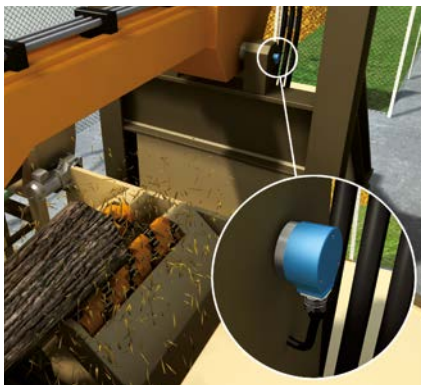


A non-contact KH53 linear encoder with a resolution of 0.1 mm and optionally for measurement lengths up to 38, 107, 354, and 1700 m is used for detecting the position of the crane portal. The KH53 is wear-free and is also ideal for harsh ambient conditions.

Recommended products

KH53

Height positioning of hold-down arm for round wood sorting



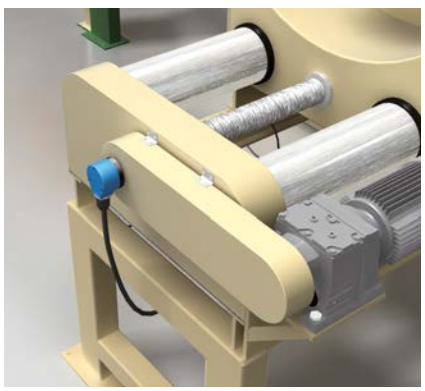
The height of the hold-down arm is detected with the ATM60 position encoder for determining the log diameter. The rotation time is calculated from this.

The ATM60 is extremely robust and reliable and has high shock and vibration resistance.

Recommended products

ATM60

Saw-blade positioning



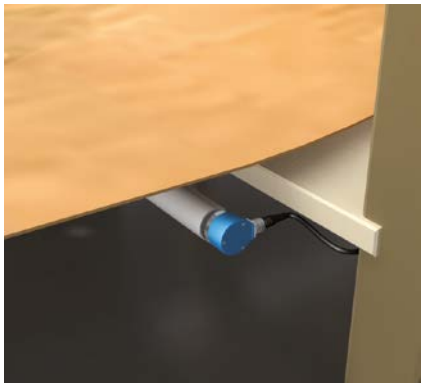
The positioning of saw-blades for setting to the thickness to be sawed is done with the ATM60 absolute encoder.

The ATM60 encoder signals the precise position of the saw-blades to the system control.

Recommended products

ATM60

Length measurement of the veneer material



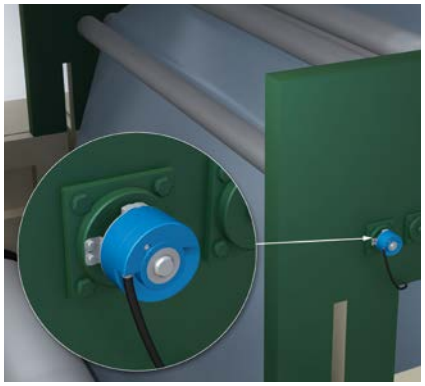
The length of the veneer material is measured precisely with the ATM69 absolute encoder. When the set length is reached, the veneer material is cut.

Recommended products

ATM60

8013466/2016-11-02
Subject to change without notice

Speed measurement of film

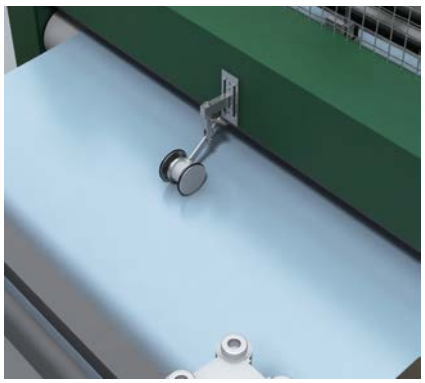


The DBS60 incremental encoder monitors the speed of the film sheet on a roller. This enables the film sheet to be wound up onto the coil at a constant rate.

Recommended products

DBS60 Core

Speed measurement of roller conveyor



The DFV60 incremental measuring wheel encoder uses a friction wheel to measure the exact feed speed of the extruded plastic panel. The measured value obtained is used to control the panel sizing saw downstream.

Recommended products

DFV60

Speed measurement on the belt for ensuring equal object distances in a postal sorting system

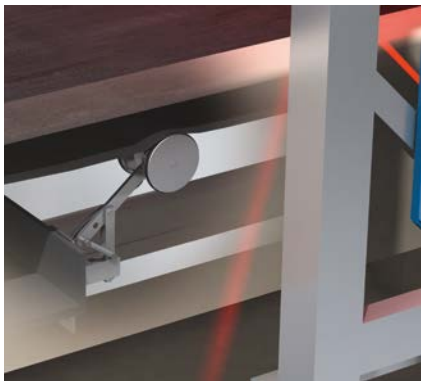
The leading edge detection serves to convey objects at a specified distance from the belts to the main sorter. The combination of high-resolution light grids and high-resolution encoders allows leading edge detection and the detection of additional object profile information such as the length.

The duration of the light grid interruption and the speed of the belt that is measured by the encoder provide information about the length of the objects. This information is required in order to accelerate or slow down individual belt segments so that the objects can be placed properly on the sorter.

Recommended products

DBS60 Core

Speed measurement on the belt for speed control of the system



The actual speed is a significant parameter for the precise control of a driven system such as a conveyor belt. Incremental measuring wheel encoders with a high resolution of up to 65,536 pulses per rotation supply the controller with precise signals for the speed.

Recommended products

DFV60

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Speed measurement and positioning at the transfer car

The measured values of the DFS60 programmable incremental encoder control the positioning and speed. With its high resolution, the DFS60 encoder ensures maximum repeatability.

There are numerous versions available to accommodate nearly all mechanical and electrical interfaces. The DFS60S Pro can help to realize safe speed and direction of rotation detection.

Recommended products

DFS60S Pro	DFS60

Speed measurement and positioning of a storage and retrieval system

The DFS60 incremental encoder supplies the value for controlling the positioning speed, acceleration, and delay. On entry into the protected area of the storage and retrieval system, it must be ensured that the storage and retrieval system is at a standstill or is being operated in manual mode at a reduced speed. The DFS60S Pro can help to realize these safety functions.

Recommended products

DFS60	DFS60S Pro

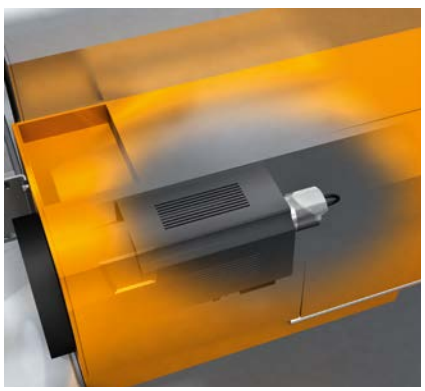
Height positioning of a storage and retrieval system

When it comes to the insertion depth, accurate measurements are crucial. A robust absolute encoder on the belt drive with a high resolution and excellent repeatability ensures precision. The availability of most common communication protocols make integration into the control architecture a breeze.

Recommended products

AFM60

Speed measurement and positioning of the x axis on a tote shuttle

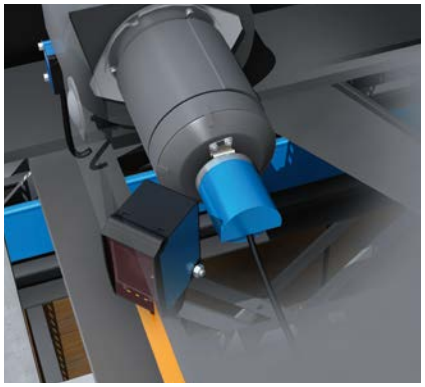


The DBS36 Core incremental encoder or the AHM36 absolute encoder supplies the value for controlling the positioning, speed, and acceleration. The encoder ensures that the positioning of the shuttle can be executed with precision. The DFS60S Pro can help to realize these safety functions.

Recommended products

DBS36 Core DFS60S Pro	AHM36

Positioning a pallet shuttle

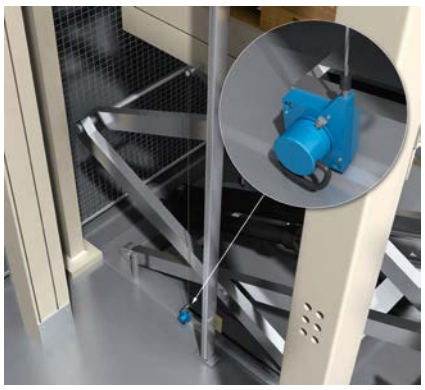


The shuttle is positioned by means of an incremental encoder mounted on the drive axis. Designs featuring a blind hollow shaft or a face mount flange with a solid shaft ensure flexible adaptation to the drive. They can even be used in cases where there is very little space available. Alternatively, an absolute encoder can also be used.

Recommended products

DBS36 Core	AHM36

Height positioning of the scissor lift table

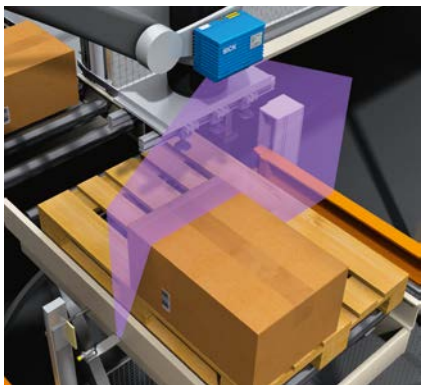


The scissor lift table is positioned using a high-resolution wire draw encoder with a teach-in function. The extremely reliable wire draw encoder does not require complex linear guidance, and can be integrated with ease both electrically and mechanically.

Recommended products

EcoLine

Positioning of roller conveyor in the contour measurement of the pallet loading

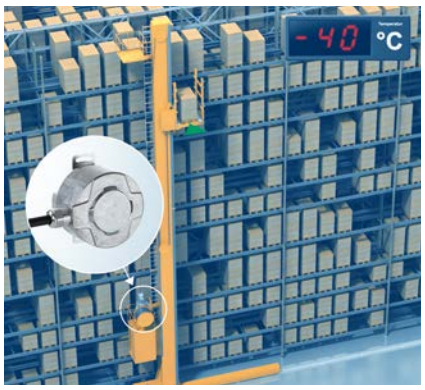


With both laser measurement and absolute encoders, an image and a position of the load can be determined, enabling the robot system to accurately pick up and transfer the material.

Recommended products

AFM60

Positioning of the lifting unit of a storage and retrieval system

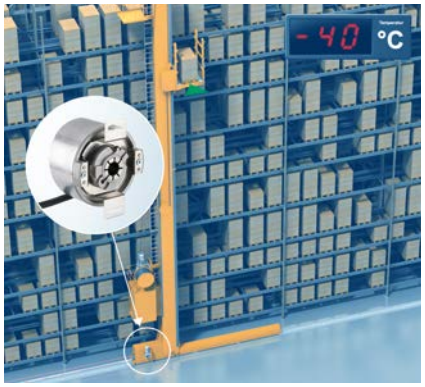


To avoid an unnecessary increase in enormous cold store energy requirements, it is important to ensure optimal storage and retrieval. Among other things, this depends on accurate and above all, reproducible positioning of the lifting unit. In addition to great precision, the AFM60 absolute encoder also offers a wide temperature range down to –40 °C, which makes it well-suited for use in cold storage.

Recommended products

AFM60

Speed measurement of the positioning unit on a storage and retrieval system



To avoid an unnecessary increase in enormous cold store energy requirements, it is important to ensure optimal storage and retrieval. Among other things, this depends on accurate positioning of the drive unit for efficient flow. This is realized thanks to the speed information that the DFS60 incremental encoder provides. With its high resolution and wide temperature range down to –40 °C, the DFS60 works precisely and reliably under even the harshest conditions.

Recommended products

DFS60	DFS60S Pro

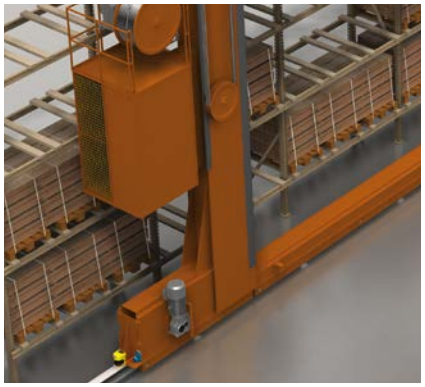
Measuring the conveying speed of a roller conveyor

The conveying speed is controlled using the measured values of a programmable incremental encoder. With its high resolution, the encoder ensures maximum repeatability. There are numerous versions available to accommodate nearly all mechanical and electrical interfaces.

Recommended products

DFS60

Positioning of storage and retrieval system and transfer cars



SICK absolute encoders fulfill the requirements for high-precision distance measurement devices for the precise positioning of transport units such as storage and retrieval systems, transfer carriages, and automated guided systems.

Recommended products

AFM60	AHM36

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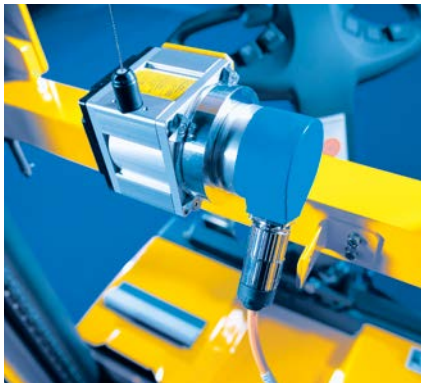
Height positioning of a storage and retrieval system



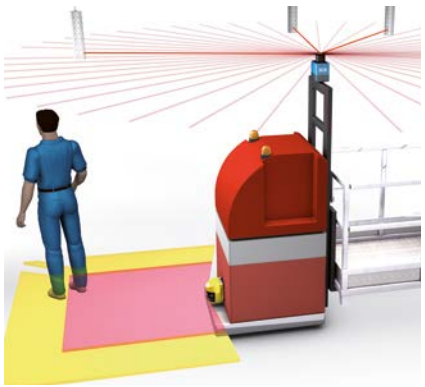
Wire draw encoders fulfill the requirements for the high-precision positioning of storage and retrieval systems.

These products are available in a wide variety of wire lengths and with different interfaces.

Recommended products

HighLine

Speed measurement of an automated guided system for switching the characteristic diagram of a safety laser scanner



For personal protection and collision prevention with other vehicles or materials on the floor, automated guided systems AGS are equipped on the fork side and on the back wide with safety laser scanners. The AGS is equipped with two drive units with one DBS60 Core incremental encoder apiece and determines the speed of the AGS. The encoder signals are compared to one another with a cross-comparison. The laser scanners use this information for switching depending on the speed of the protection and warning fields.

Recommended products

DBS60 Core

DFS60S Pro

Height positioning of the forks of an automated guided system

Positioning of the forks of the AGS is handled by constantly-measuring wire draw encoders. This way, the bays are approached at the correct height.

Recommended products

EcoLine

Safe speed measurement of an automated guided system

With automated guided systems (AGS), the SSM (safety speed monitor) or SLS (safety-limited speed) function monitors the speed on the wheels using the DFS60S Pro encoder and reduces it via the controller if necessary. Thanks to a central drive unit, with the DFS60S Pro and the Flexi Soft safety controller, it is possible to realize safe motion monitoring or warning field monitoring of the safety laser scanner.

Recommended products

DFS60S Pro	DFS60

Detection of the steering angle of an automated guided system

The motion direction of the AGS is measured with a Singleturn absolute encoder. The driving direction information serves to control the engine safety characteristics.

Recommended products

AFS60	AHS36

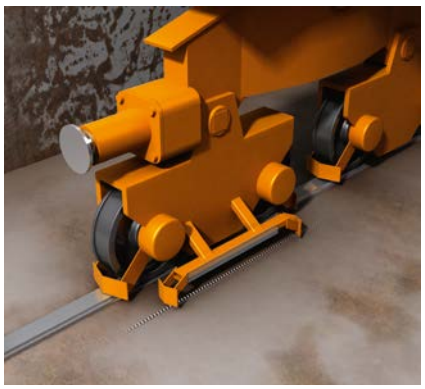
Height positioning of the forks of a narrow aisle truck

Using a BKS09 wire draw encoder enables the narrow aisle truck to accurately determine the position of the fork. The highly flexible steel wire is fixed to the fork's 'shoulder'. The driver sees the position of the fork on a display. This provides support when the height of the fork cannot be seen (man-below system).

Recommended products

Compact

Positioning traveling cranes outdoors

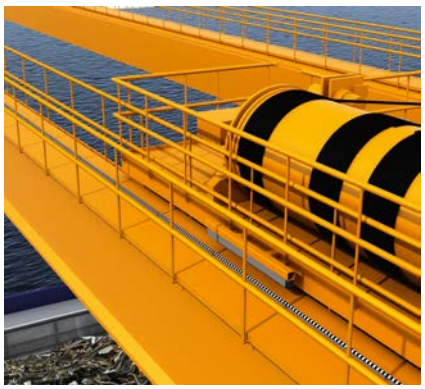


A rugged linear encoder can be used for precise positioning. The KH53 non-contact, virtually maintenance-free linear encoder is installed on the crane column to ensure that the X-axis of the crane is detected correctly. The encoder detects the absolute crane position by detecting the integrated magnets which are installed parallel to the crane rails.

Recommended products

KH53A

Overhead crane trolley positioning

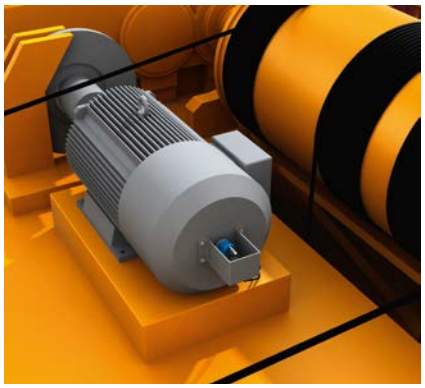


Combining multiple encoders makes it particularly easy to ensure the correct positioning of cranes in warehouses and outdoor environments. Linear encoders can be used for the precise detection of the X-axis and Y-axis on the crane, while a multiturn absolute encoder can be used for the Z-axis.

Recommended products

AFM60 KH53

Overhead crane gear position

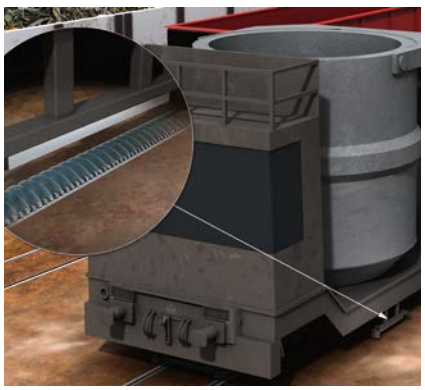


The AFS/AFM60 absolute encoder is a rugged, durable solution for detecting the absolute position of traveling crane gears and, hence, the position of the crane harness. Absolute encoders measure unlimited path lengths by counting revolutions. They can be used in the harsh ambient conditions found in outdoor areas at steel plants.

Recommended products

AFM60

Positioning rail-mounted shuttles during the material handling process

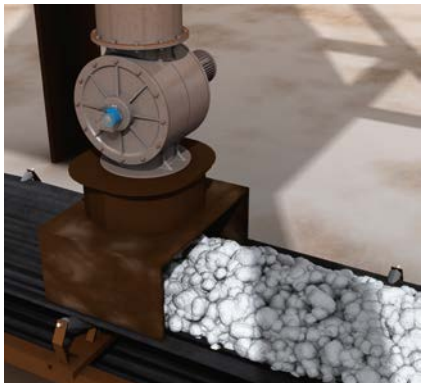


Proper positioning of outdoor rail-mounted shuttles during the material handling process is simple with the help of a linear encoder. The measuring element of the encoder is set in concrete between the rails. The encoder itself is mounted underneath the moving shuttle. This precise, non-contact positioning system identifies all shuttle positions on the rail. The rails do not need to be straight. The linear encoder can also handle elongated curves.

Recommended products

KH53A

Rotary valve operation during material handling

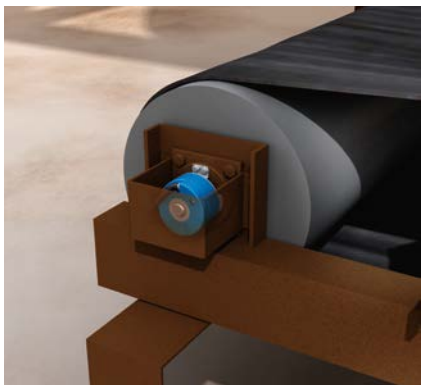


Although rotary valves are small parts in big steel plants, they play an important role in the material flow process which is vital for uninterrupted steel making. Typical locations for rotary valves include discharging positions for bulk materials, dust or ash from silos, bunkers and hoppers or transfer points in conveying systems. To ensure proper functioning of all system parts, encoders monitor the valve on the basis of the axle movement.

Recommended products

DFS60

Conveyor belt operation during material handling



Conveyor belts convey materials throughout all areas of steel plants. They transport raw material deliveries to interim storage facilities and then take steel products and slag to storage areas and to the dispatch points. A conveyor belt malfunction can cause significant delays in production and involve major costs. It is therefore necessary to monitor the operation of all conveyor belts, as well as the proper loading, unloading, and positioning of products. The Bulkscan® LMS511 laser volume flowmeter performs these tasks in combination with a DFS60 incremental encoder which provides the speed information.

Recommended products

DFS60

Controlling the rotary valve for carbon and sinter supply

Rotary valves control the carbon and sinter supply for the subsequent processing steps. The ATM60 PROFIBUS absolute encoder provides information about the position of the valve which is used to control the amount and speed of carbon and sinter when they are supplied to the subsequent processes. Their magnetic scanning system makes these encoders ideal for use in harsh environments.

Recommended products

ATM60

Monitoring the tilting position on the basic oxygen furnace

The vessel or shell of a basic oxygen furnace is mounted in a way that allows tilting movements. Depending on the process step during heating (e.g., tapping, de-slagging, charging), the shell must be tilted in different positions by means of hydraulic cylinders. To control the tilting processes, measurement equipment is used which precisely monitors all tilting maneuvers. The positive and negative tilting angles must be measured accurately and the maximum tilting positions must be defined and adhered to. An incremental encoder detects the shell's tilting position precisely.

Recommended products

DFS60

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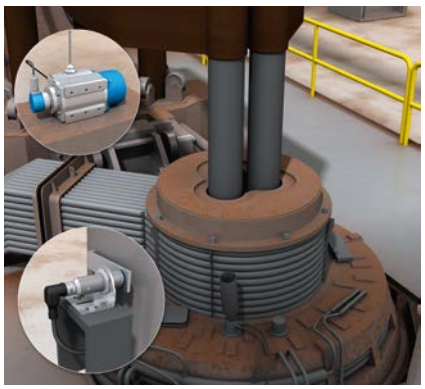
Monitoring the position of the ladle furnace cover in secondary metallurgical processes

Cylinders and motors raise or lower the cover of the ladle furnace depending on the process step. Certain processes can only be performed safely if the ladle furnace cover is in a particular position. An absolute or wire draw encoder monitors the movements and positions of the ladle furnace cover precisely in combination with an inductive proximity sensor. The sensors are rugged enough to withstand the high temperatures and strong vibrations and impacts in the ladle furnace.

Recommended products

AFM60	HighLine

Detecting the position of electrode arms and electrodes in the ladle furnace

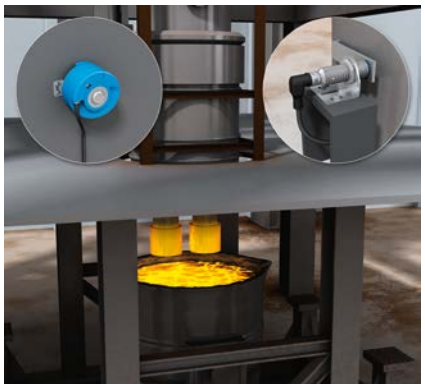


Electrode arms raise and lower the electrodes of a ladle furnace. In some cases, the position of the electrodes is crucial for other movements or for the timing of subsequent process steps such as the movement of the ladle. To ensure safe operation of a ladle furnace and to optimize the secondary metallurgical process, it is therefore necessary to know the precise position of the electrodes. Wire draw encoders detect the correct position of the electrodes and their arms and pass on this information to optimize the operating process.

Recommended products

HighLine

Determining the position of the vacuum chamber in a Ruhrstahl-Heraeus degasser



The vacuum chamber of a Ruhrstahl-Heraeus degasser is raised and lowered depending on the process step and fill level of the ladle. The lower part of the vacuum chamber dips into the liquid steel. Precise monitoring and control of the chamber position is crucial for this process step. AFM60 SSI high-resolution absolute encoders determine the exact position of the vacuum chamber.

Recommended products

AFM60

Damper positioning in the duct system

A steel plant's off-gas systems can be very complicated, especially if different exhaust points are combined. Every exhaust point has its own related process and by combining exhaust points, the exhaust rate increases. This means the performance of the entire off-gas system must be controlled to allocate and direct the exhaust rate where it is required. This is done via dampers in the duct system. Monitoring the actual positions of the dampers is essential for optimizing the control of the off-gas system. AFS60 rugged absolute encoders simplify this damper control task.

Recommended products

AFS60

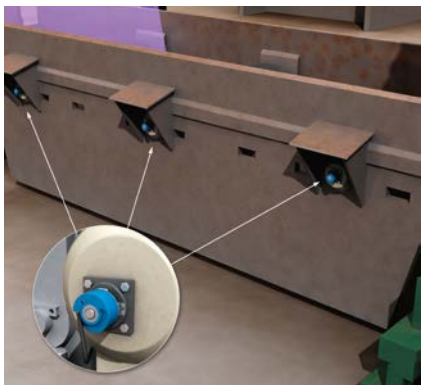
Positioning the oxygen cutting torch during continuous casting

Positioning the cutting torch during the continuous casting process is an important step in guaranteeing that each object is precisely cut to length. DFS60 incremental encoders enable accurate positioning of the cutting torch once the liquid steel has been cast. The encoders feature a metal code disc with high temperature resistance – an undeniable requirement for use in a continuous casting plant.

Recommended products

DFS60

Monitoring the speed of steel rods in the hot rolling process

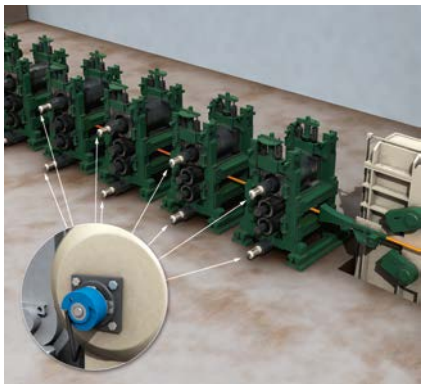


DFS60 incremental encoders monitor the motor of a rolling stand and therefore also the speed of the rolling mill train which transports the steel rods. Monitoring the train's speed helps to ensure product quality and to optimize the rolling process. The advantages of an incremental encoder include ruggedness, compactness, and programmability. The high enclosure rating, wide temperature range, and wide-set ball bearings make the DFS60 the ideal encoder for the rolling mill's harsh ambient conditions.

Recommended products

DFS60

Synchronization of drive motors in the hot rolling process



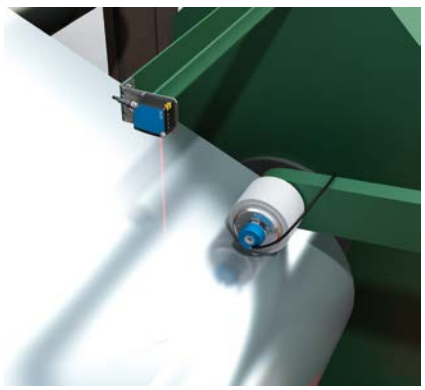
Synchronization of rollers and their stands during the hot rolling process is important in order to ensure consistent product quality. Production optimization is also attained via proper control of the rolling stands. Absolute and incremental encoders regulate the drive motors of the rolling stands during the hot rolling process, thereby synchronizing the speed at which objects pass through the rollers and stands. Benefits of these encoders include permanent and safe operation of the equipment due to a high enclosure rating, extreme temperature resistance, and a long bearing lifetime.

Recommended products

DBS60 Core

A3M60

Monitoring the width and diameter of coils in winding applications



During the finishing process, steel is wound into coils, which are monitored and measured to ensure that the diameter and width are correct before leaving the winding area. A combination of SICK solutions allows this task to be performed with ease. A laser scanner monitors the coil's width on the winding machine while an incremental encoder monitors the speed and motion of the winding machine.

Recommended products

DBS60 Core

Leveling the excavator arm

To optimize the work routine of an excavator, the absolute position of the moving parts in relation to each other must be known. The TMS/TMM 88 inclination sensors reliably detect this position by measuring the inclination of the upper and lower carriages and the excavator arm. AHS / AHM 36 absolute encoders on the respective arm joints can support the measurement.

Recommended products

AHS36	TMS 55/61/88
AHM36	TMM 55/61/88

Detection of ring mount position

Position detection between the upper and lower carriages by an absolute encoder is required for the ring mount in order to carry out semi-automated machine processes. With its compact size and rugged design, the AHS/AHM 36 absolute encoder is perfect for this task. Thanks to the absolute position detection, high resolution, and high repeatability, it can also carry out repeating work processes.

Recommended products

AHS36	AHM36

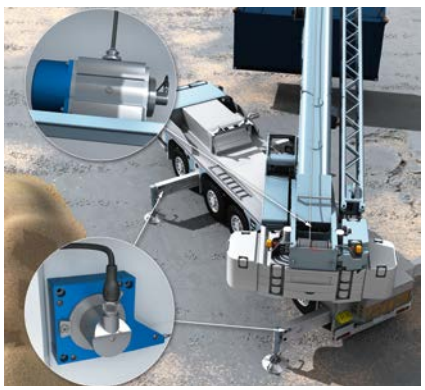
Inclination sensors for positioning tasks on the mobile crane

To avoid damage due to overload and overturning, sensor solutions for load torque restriction are used on the mobile crane. The TMM 88 2-dimensional inclination sensor, which can provide support during the automated leveling of the mobile crane, features compensated cross sensitivity and configurable vibration suppression. The TMS 88 1-dimensional inclination sensor detects the position of the boom. Its measuring range of 360° and the freely adjustable zero point allow flexible application in various installation situations.

Recommended products

TMS 55/61/88	TMM 55/61/88

Wire draw encoder for support and boom positioning on the mobile crane



A sub-function for the load torque restriction on the mobile crane is the position detection of the extendable support feet and the detection of the boom and crane arm position. The wire draw encoders from the EcoLine product family are perfect for support positioning thanks to their narrow shape. The wire draw encoders from the HighLine product family, with their rugged housing and measurement lengths up to max. 50 m, are the right solution for boom positioning.

Recommended products

EcoLine	HighLine

Encoder for angle detection on the boom

The angle and the position of the boom relative to the lower carriage must be known for a stable load torque restriction. The AHS/AHM 36 absolute encoder is suitable for this task thanks to its compact and rugged design and the CANopen interface.

Recommended products

AHS36	AHM36

Monitoring the drilling angle

Drilling units must be precisely positioned and adjusted to ensure successful drilling. The TMM88 inclination sensor determines the X and Y coordinates for this purpose. High accuracy across the entire measuring range, outstanding temperature stability, compensated cross sensitivity, and configurable vibration suppression make the TMM 88 the ideal solution for this challenging task.

Recommended products

TMM 55/61/88

Monitoring the drill feed and speed

It is important to know the exact drilling speed and position of the drill feed in order to ensure precise drilling. The AHS/AHM 36 absolute encoder, with its absolute position detection, dust resistance, and reliable, fully magnetic sensor technology, is suitable for this purpose. It can also be used for position detection in combination with a wire draw mechanism as a BTF wire draw encoder.

Recommended products

AHS36 AHM36	HighLine

Measuring tree trunks on the harvester

The rugged and highly compact AHS/AHM 36 absolute encoders determine the gripper position to measure the tree-trunk diameter. A further encoder determines the feed rate, thereby measuring the length of the trunk.

Recommended products

AHS36	AHM36

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Measuring the incline of the driver's cab and chassis

The TMS/TMM88 inclination sensor is used for reliable leveling of the driver's cab. Thanks to its efficient filter algorithms to suppress vibrations and its rugged design, it is particularly well suited for use in harsh ambient conditions. Its high accuracy over the entire measuring range and its outstanding temperature stability offer further advantages in such conditions.

Recommended products

TMS 55/61/88	TMM 55/61/88

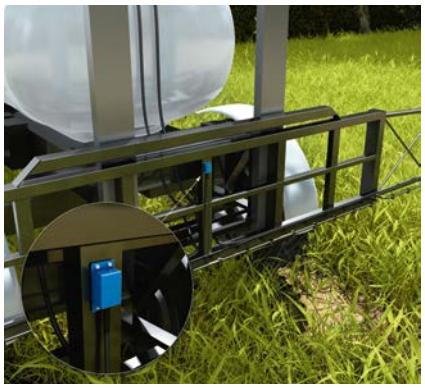
Determining the length of square bales

The compact AHS/AHM 36 absolute encoder can detect the bale length on square balers. By detecting the absolute position of the measuring wheel, the encoder determines the feed rate, and, by extension, the bale length. Thanks to its dust resistance and reliable, fully magnetic sensor, it is particularly well suited to this task.

Recommended products

AHS36	AHM36

Leveling the field-sprayer rod



The compact TMS/TMM 61 inclination sensor is used to level the rod. Thanks to the sensor, the rod inclination can be adjusted for different terrains, for example. The TMS/TMM61 is suitable for this precise leveling task as it offers high accuracy across the entire measuring range, outstanding temperature stability, compensated cross sensitivity, and configurable vibration suppression.

Recommended products

TMS 55/61/88	TMM 55/61/88

Aerial ladder positioning on the aerial rescue truck

Sensor solutions for position detection are used to enable repeatable movement sequences for the aerial ladder. Wire draw encoders from the HighLine product family determine the length of the extended ladder. With their rugged mechanics and very precise sensor technology, they achieve excellent repeatability.

Recommended products

HighLine

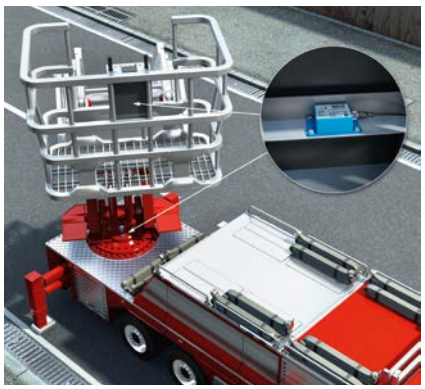
Encoder for angle detection on the aerial ladder

The angle and the position of the aerial ladder relative to the lower carriage must be known in order to carry out repeating movement sequences. The absolute encoders from the AHS/AHM36 product family are the right sensor solution thanks to their compact and rugged design and high repeatability.

Recommended products

AHS36	AHM36

Determining the inclination of the aerial rescue truck cage

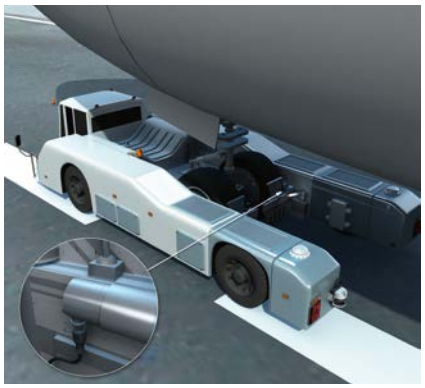


In order to transport people smoothly and horizontally, the TMM61 two-dimensional inclination sensor determines the inclination of the cage and sends this information to the higher-level control for regulation purposes. With its compensated cross sensitivity and configurable vibration suppression, the TMM61 enables precise, reliable positioning.

Recommended products

TMM 55/61/88

Position detection in the aircraft tractor



It is important to check the exact position of the nose wheel receptacle flap in the nose wheel receptacle. The singleturn version of the AHS/AHM36 absolute encoder is used for this purpose. It can also be used in harsh ambient conditions thanks to its rugged and reliable, fully magnetic sensor technology. Thanks to its small size, the encoder fits into even restricted installation spaces.

Recommended products

AHS36

Positioning the quench monitor

The absolute encoders of the AHS/AHM36 product family detect the joint position in order to realize automatic swivel movements of the quench monitor, such as the approach into attack position or automatic oscillation movements. Thanks to the high resolution, the design intended for harsh ambient conditions, and the compact construction, these encoders are particularly well-suited for this task.

Recommended products

AHS36	AHM36

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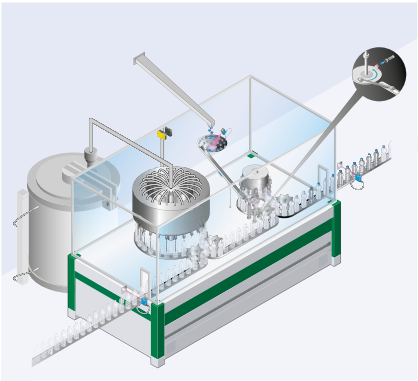
Position and speed measurement of the carousel of a bottle filling system



The precise position and speed monitoring is handled by an A3M60 absolute encoder. The encoder is connected directly to the carousel wheel via gear stages. The resolution per rotation depends on the number of filling stations. The number of encoder rotations depends on the gear translation. Thanks to the endless operating functionality of the encoder, individual resolutions can be configured quickly and safely. (Full scalability for binary, non-binary, as well as for non-whole-number rotations such as, e.g. 12.4 rotations)

Recommended products

A3M60

Speed measurement of rollers for loop control

DFS60 incremental encoders monitor the roller speed for loop control. The DFS60 encoders are highly durable and are available in a variety of mechanical and electrical versions.

DFS60 incremental encoders can be configured as required. Thus, the storage of different resolution variants is not necessary.

Recommended products

DFS60S Pro	DFS60

Speed measurement of roller conveyor for synchronization of the camera system

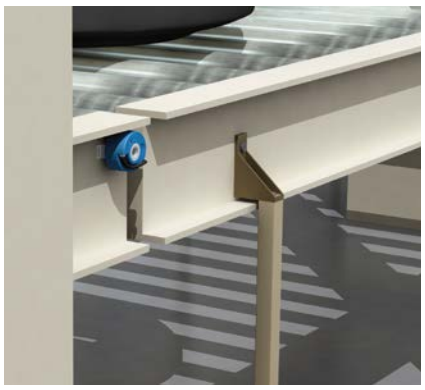
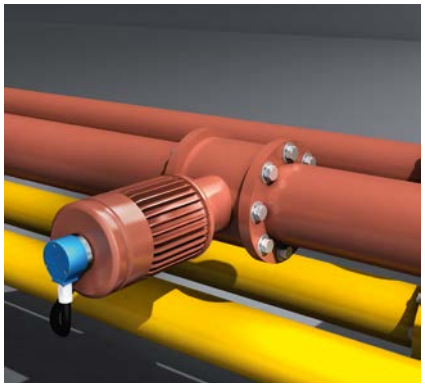


Image evaluation requires an undistorted image. The imaging technology obtains the information relating to the speed of the roller conveyor and the tire (which is required for synchronization) from the DBS60 Core incremental encoder.

Recommended products

DBS60 Core

Measuring the infeed of liquid fuel to engines

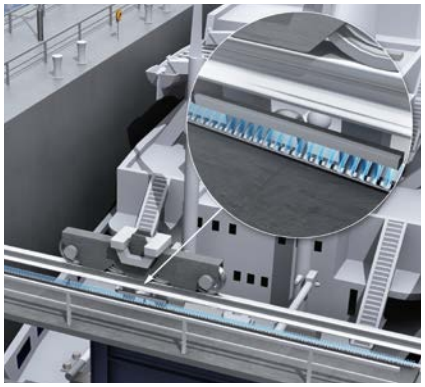


Each kWh of engine drive power requires around 200 g of diesel. This equates to around three tons of fuel per hour for an engine with 15 MW drive power. The ATM60 absolute encoder can precisely detect the aperture angle of the engine's inlet valve for fuel. The payback for this investment is just a few days.

Recommended products

ATM60

Position determination at lock gates

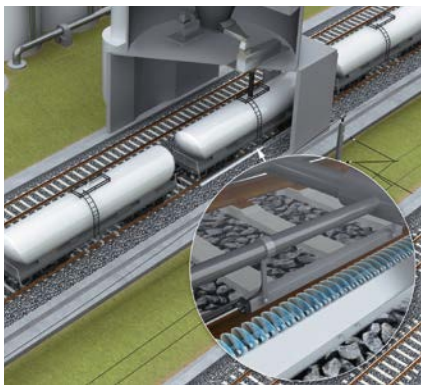


The KH53 linear encoder determines the position of the lock gate during the closing process so that it can be controlled optimally. Due to the non-contact technology, this system works wear-free and precisely even in a harsh environment.

Recommended products

KH53

Freight train positioning

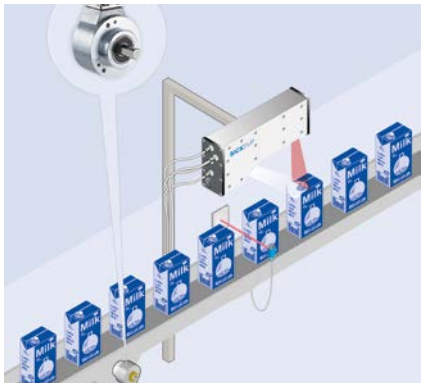


So that loading and unloading is done correctly, especially with automatic systems, freight trains must be positioned exactly. With a measurement length of max. 1,700 m, the KH53 linear encoder is especially well-suited for use on tracks. Due to the non-contact technology, this system works wear-free and precisely – even in case of vibrations of the train, contamination, and precipitation.

Recommended products

KH53

Speed regulation of the conveyor unit for beverage cartons from filling systems for dairy products

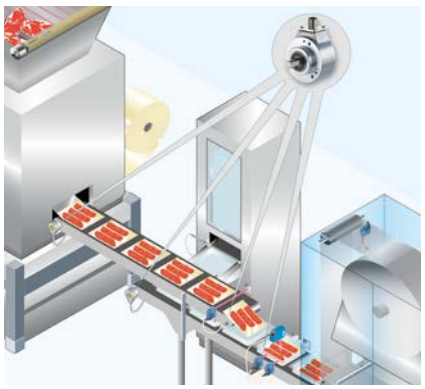


The DBS60 Core incremental encoder measures the speed of the belt. This information is required in order to control the camera for detection of the sealing lids depending on the speed.

Recommended products

DBS60 Core

Control of the belt speed for primary packaging of meat products



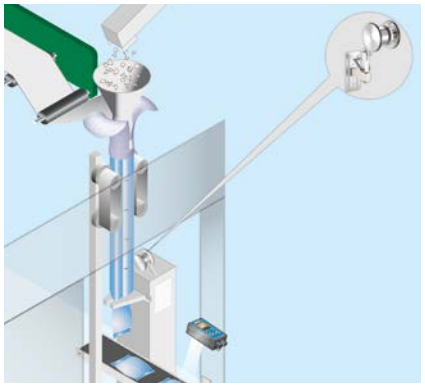
The DBS60 Core incremental encoder is used to regulate the speed of the belt. Both belts must be speed-synchronized in order to guarantee precise storage of the meat portions in the plastic trays.

Recommended products

DBS60 Core

DFS60S Pro

Fine positioning of the packaging film for bulk materials



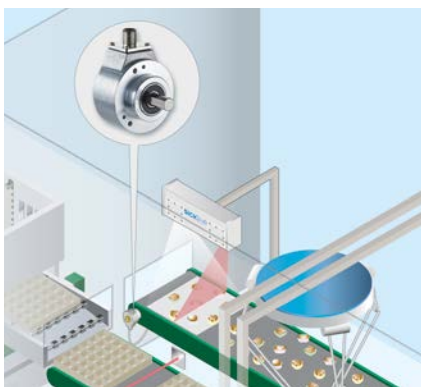
The DBS50 Core incremental encoder monitors the speed of the packaging film on a bag packaging machine. This measurement is required in order to control the fill quantity and cutting process. For slip-free speed measurement, an alternative is to use the DFV60 incremental measuring wheel encoder.

Recommended products

DBS50 Core

DFV60

Speed measurement of belt on packaging systems for individual products

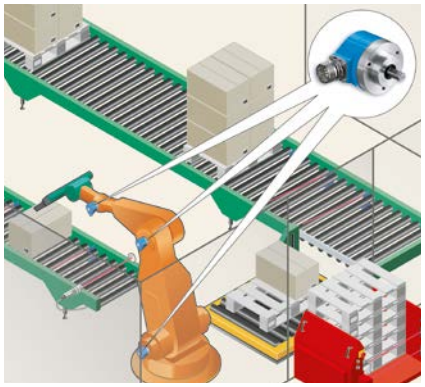


The DBS60 Core incremental encoder measures the speed of the belt. Pralines of different types are transported on the belt and sorted into the trays with a Pick & Place robot. The processes must be synchronized and the encoder provides the required process speed.

Recommended products

DBS60 Core

Positioning of the individual wire axes of the pallet handling robot



ATM60 Multiturn absolute encoders transmit the absolute positions of the robot's individual axes of rotation to the controller.

Recommended products

AFM60	ATM60

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Adjustment of press stroke after tool change

Once the tools have been replaced, the press stroke must be adapted using a primarily mechanical adjustment mechanism. The procedure for adjusting the height of the press stroke can be done automatically with the help of an electric drive and the AFM60 absolute encoder, which determines the precise measurement of the revolution at the gear.

Recommended products

AFM60	AHM36

Height positioning of press stroke

To determine the position of the press stroke, a BKS wire draw encoder is used. It reliably supplies signals for establishing the top dead center (TDC) and bottom dead center (BDC).

Recommended products

Compact

Height positioning of press stroke with absolute encoders

An ATM60 absolute encoder is mounted to the eccentric shaft on mechanical presses for the purpose of determining the position of the press stroke. It reliably supplies signals for establishing the top dead center (TDC) and bottom dead center (BDC).

Recommended products

ATM60	AFM60

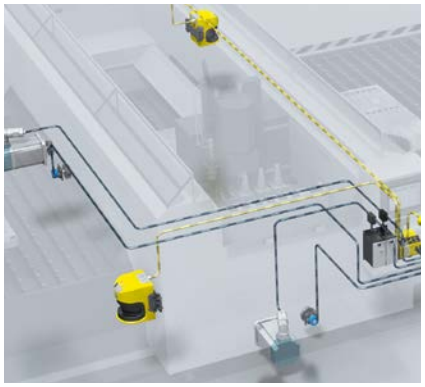
Speed measurement of sheet coil during decoiling process

To ensure a constant feed of material, the uncoiling speed of the sheet coil must be regulated. The distance sensor continuously measures the radius of the sheet coil throughout the entire unwinding process. The DBS60 Core incremental encoder uses a friction roller to measure the retraction speed of the sheet. If there is a safe stop of the upstream machine, this can cause a hazard due to the overrun of the sheet. Here, the DFS60S Pro safety encoders assist with the realization of the safety function.

Recommended products

DBS60 Core	DFS60S Pro

Speed measurement of CNC portal for secure drive monitoring



The movements of the CNC portal, which the worker cannot predict and which can be very rapid, represent hazardous points during the machining process. The modules of the Drive Monitor FX3-MOC safely monitor the electric drive system of the CNC plasma cutting machine in conjunction with the signals of the Flexi Soft safety controller. Depending on the performance level required or the drive used on the machine, it may be necessary to attach an additional incremental encoder (e.g., DFS60) and forward its signal to the safe control separately for evaluation purposes.

Recommended products

DFS60S Pro

DFS60

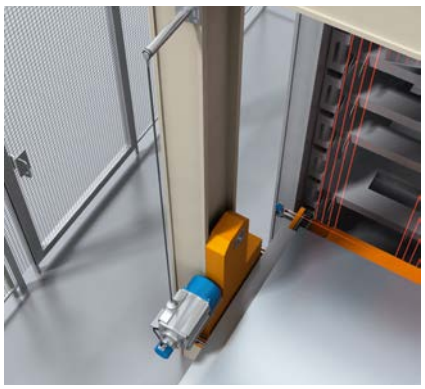
Height positioning of scissor lift table

Following machining, residual grids are placed on a scissor lift table. To ensure a smooth transfer, the height of the stack must be aligned with that of the machining table. The analog signal values of the EcoLine wire draw encoder are used to determine the lifting height. When the maximum load has been reached, the worker removes the stack of residual grids.

Recommended products

EcoLine

Height positioning of sheet metal storage

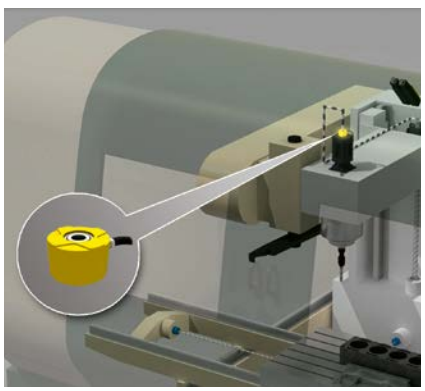


The material lift is used to move stacks of sheets from a transfer carriage or residual sheets from a vacuum nozzle to an interim shelf for storage. The BTF13 wire draw encoder signals the absolute height position of the material lift to the control. The bottom and top final positions of the material lift are monitored by inductive proximity sensors.

Recommended products

HighLine

Speed measurement for safety gate securing of the drilling machine



For stand-alone machines such as a drilling machine, the user is protected from the hazardous point by a safety door or hood. For set-up operation, the speed of the drilling arm and of the tool table must be monitored safely at reduced speed. Here, the DFS60S Pro safety encoders assist reliably with the realization of the safety function.

Recommended products

DFS60S Pro

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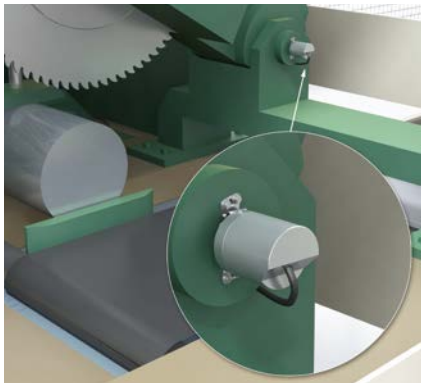
Saw-blade positioning



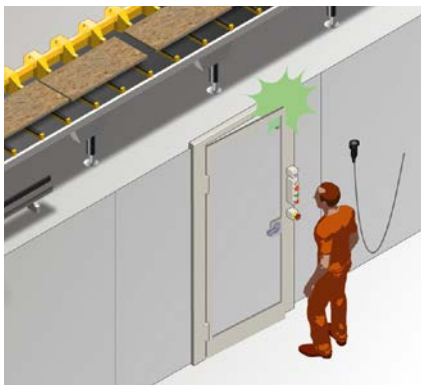
The height of the saw blade is automatically positioned for optimum control of the sawing process. The DBS36 Core incremental encoder supplies precise measurement values for this purpose.

It can be easily and directly mounted using the face mount flange or the hollow shaft and its universal cable outlet. Its compact size saves space.

Recommended products

DBS36 Core

Speed measurement for access protection of the saw line

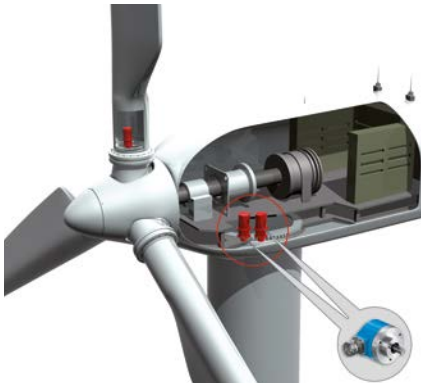


On the saw line, the operator is kept away from the hazardous point by a safety fence. In order to eliminate faults on the line, a safe standstill detection is necessary or for the maintenance and service mode, a safely-limited speed. The DFS60S Pro safety encoders assist reliably with the realization of safety functions.

Recommended products

DFS60S Pro

Azimuth system: positioning of the gondola on a wind power plant

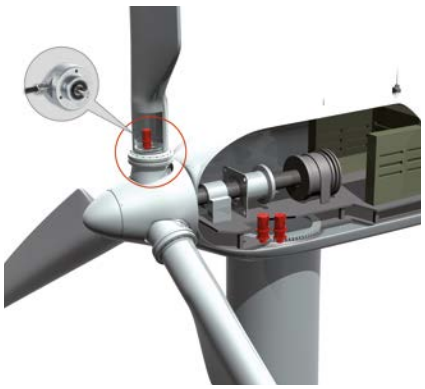


Depending on the change of the wind, the gondola must be aligned in the optimal wind direction. Thanks to the ATM60 absolute encoder, the correct rotation and function of the system is monitored, since precisely with strong winds there are very high forces and a malfunction of the gondola controller can result in high costs and downtimes.

Recommended products

AFM60	ATM60

Pitch system: adjustment of the rotor blades on a wind power plant



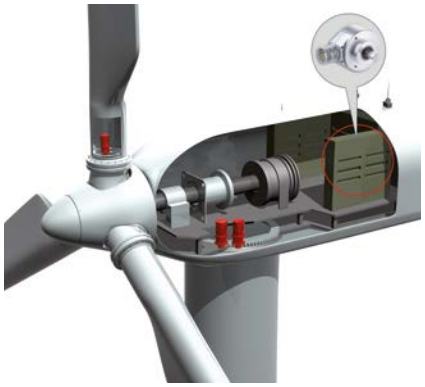
The adjustment of the rotor blades plays an important role in order to achieve as great a yield as possible of rotation energy. Depending on the wind strength and direction, the position of the rotor blades is adjusted accordingly. AFS60/AFM60 absolute encoders are used to set the rotor blades.

The advantage of these devices is their high resolution. In case of a power outage and after return of the power, the precise position value is output. A reference run as for incremental encoders is not required, which contributes to the safety of the application.

Recommended products

AFS60	AFM60

Speed measurement of the rotor of a wind power plant



Generally, incremental encoders are used to monitor the rotor speed. These are normally fastened to the hub of the rotor. The DFS60 incremental encoder is used around the world under the harshest conditions. Its stable construction with enclosure rating up to IP67 makes it a robust and nevertheless high-resolution incremental encoder. With through hollow shafts up to Ø 15,875 mm, the DFS60 family can be used universally. The safe detection of the rotor generator speed can alternatively be handled with the DFS60S Pro safety encoder.

Recommended products

DFS60	DFS60S Pro

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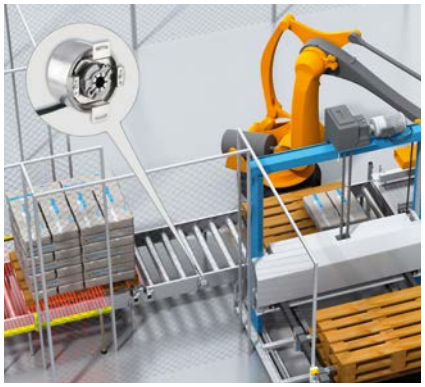
Speed measurement of the roller conveyor for palletizing cement sacks

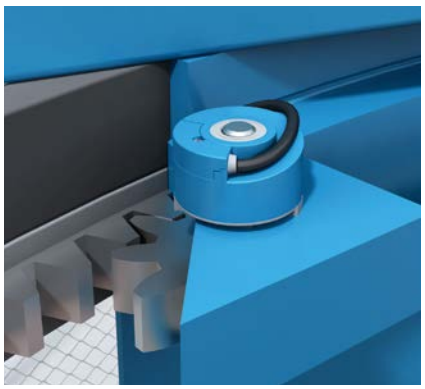


Automatic palletizers stack the filled cement bags onto pallets. The DFS60 incremental encoder monitors the transport speed of the pallets on the roller conveyor.

Recommended products

DFS60

Detection of the number of windings on the stretch banding machine



After the pallet has reached its position, the stretch film is secured to the pallet and wrapped using upward and downward movements of the film. The number of windings is determined via a gear wheel on the sprocket with an AFM60 absolute encoder.

Recommended products

AFM60

ATM60

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