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# LIFT-TRUCK

TECHNOLOGY INTERNATIONAL



**Interviews:**

Xavier Perramon, Ausa  
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Manitou

**Market reports:**

Global industrial forklifts  
Welding robotics

**Case studies:**

Bomaq B30 MP  
Kalmar Big Wheel



# Rough terrain trucks

The latest trends and advances for when the going gets tough

# The height of fashion

A WORLD WHERE FORKLIFTS CAN PRECISELY MEASURE HEIGHT, ANGLE, TILT AND SPEED, WHILE MEETING THE LATEST SAFETY REQUIREMENTS, WOULD BE UNTHINKABLE WITHOUT SMART SENSORS

**ON THE WEB**

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Whether it's forklifts, reach stackers or automated guided vehicles (AGVs), the idea of today's industrial truck sector without the integration of intelligent sensors is unimaginable. The absolute measurement of position, angle, tilt, speed and lifting height is increasingly becoming an integral part of intelligent industrial trucks.

In autonomous driving systems, intelligent sensors have always been used for the most important control functions. But for an increasing number of the vehicles that do require a driver, sensors are being used to support these too. There are several clear advantages in using sensor technology: you save time, you reduce human error, you improve productivity and, above all, you ensure an increased level of safety. Procedures can be automated, or useful information – such as lifting height, fork position or the tilt of the lifting mast – can be displayed to the driver. So in order to be able to implement these functions safely and easily, Siko has added new wire-actuated encoders, angle sensors and tilt sensors across its range of products.

**Lift mast height and cantilever detection**

New, redundant wire-actuated encoders have been recently introduced to the lineup, which meet the safety requirements in the whole system in line with SIL 2 and performance level d. The SG32, SG42 and SG62 redundant wire-actuated encoders have been introduced in forklifts and AGV systems to make them more reliable in measuring the height of the lift mast.

The Siko SG32, SG42 and SG62 wire-actuated encoders offer this improved safety by means of a special and completely redundant sensor technology, which is employed to measure the absolute position. Two completely separate sensor systems measure the absolute position and give it out separately as analog signals. With a measuring range of 3-6m, these wire-actuated encoders are best suited for measuring the



A fully equipped AGV – robust sensors from Siko measure and control all important movements such as speed, height, inclination and steering angle

absolute height of the lift mast on driverless transport systems. For forklifts, versions for up to 15m are available. All sensors are available with the redundant interface, potentiometer, analog current or voltage, as well as CANopen.

For vehicles that cannot be installed with a wire-actuated encoder for design reasons, Siko offers the innovative incremental IG-O encoder. The incremental encoder, IG-O, with its outstanding housing design, offers the operator many advantages when measuring the lift mast height. The encoder is integrated in a toothed belt wheel and can, as a result, be installed in a very small space. The existing gear belt can be used in combination with the IG-O encoder on the mast, so as to measure the height of the mast in a simple and cost-effective way. Extensive mechanical adaptations are completely eliminated.

**Angle and tilt sensors**

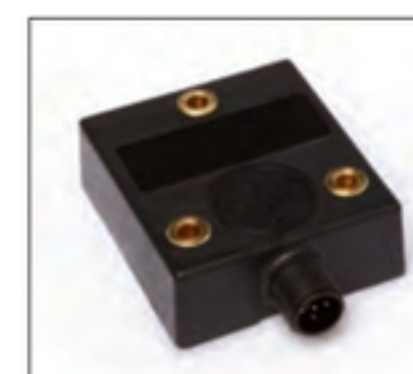
With its cost-effective, space-saving and robust angle sensor, Siko has developed the AH25S specifically for measuring the steering angle on driverless transport systems. An exact miniature angle sensor with a blind-hole hollow shaft was developed in close collaboration with customers. It is therefore very easy to assemble and, with its robust die-cast housing, it offers a real alternative to existing sensors made from plastic. Precision sensing gives absolute measurements over 360° with a resolution of 12 bits and provides the angle position over the analog interface with no time delay. Different analog interfaces can be selected, such as 4-20mA, 0-20mA, 0-10V and 0.5-4.5V. Special attention was given to the EMC compatibility of this sensor, so there is a specific part in the electronics that ensures the system works perfectly under adverse EMC conditions. This offers clear advantages over other sensors without a protection circuit.

For reliably detecting the tilt angle of the lift mast, as well as the whole vehicle, Siko offers two very robust inclinometers with its IK360 and IK360L tilt-angle sensors. The MEMS-based tilt-angle sensors boast a particularly robust design. Fully enclosed, with a high IP69K protection rating, they are available in two precision variants (0.1° and 0.5°) and as single-axis (0-360°) or two-axis (+/-80°) variants.

Siko completes its product range for industrial trucks with numerous other redundant and standard sensors, as well as encoders. Used millions of times over the years, its angle- and distance-measuring systems don't just contribute to making industrial trucks smarter; ultimately it is the users who benefit, as using intelligent sensors saves time, reduces human error, improves productivity and, above all, ensures an increased level of safety. iVT

*Mathias Roth is branch manager, mobile automation, at Siko GmbH*

FROM LEFT: Redundant wire-actuated encoder SG32 with a measuring length up to 3,000mm; SG42 redundant wire-actuated encoder with a measuring length up to 4,000mm; IK360 single-axis absolute inclinometer measures from 0-360°; miniature absolute analog encoder AH25S with a 12-bit [4,096] resolution over 360°



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