CASE STUDY

INCLINO SENSORS IN AERIAL PLATFORM FOR RAIL INFRASTRUCTURE

UNAFFECTED BY EXTERNAL INFLUENCES

To ensure the safety of its rail-infra aerial platforms, Koerts Techniek equips its machines with dynamic inclinometers from DIS. In real time, these sensors accurately measure the angle of the arm that supports the work platform. What's more, the angle measurement is unaffected by shocks and vibrations caused by moving the base vehicle.

Essential maintenance on rail infrastructure, such as overhead contact cables, is often performed from an aerial platform. This machine is essentially a bimodal road-rail vehicle carrying a movable boom, that in turn supports a work platform from which maintenance personnel can perform their work. For the safety of personnel, the aerial platform must be stable at all times, and that means: continuously monitoring the tilt of the boom.

Railway cranes

Since 2006, Koerts Techniek has specialized in the multifunctional adaptation of road-rail cranes for uses as diverse as hoisting, aerial platforms and earth-moving. Moreover, the company also develops and manufactures its own rail-infra machines, among which aerial platforms with these safe and steady work platforms. Koerts Techniek uses inclinometers from DIS to monitor work platform tilt. These sensors – a kind of 'electronic spirit level' – measure the tilt of the boom and send the measurements to a control system. This system uses the measurements to interpret the machine operator's commands, ensuring that the aerial platform never exceeds the safe operating limits.

According to Bert Koerts, who jointly owns and runs the firm with his brother Ed, "Inclinometers in themselves are nothing new, but what makes these dynamic variants special is the fact that the tilt measurements are not affected when the vehicle is driven on the rails while in use. After all, that's how our customers actually use our rail-infra platforms.

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Other types of sensors are susceptible to the motion of driving or other external factors that cause vibrations or shocks, and they then register faulty tilt readings. For the driver, this means constantly dealing with false alarms, or sometimes even an unwarranted system halt. Apart from the fact that this is irritating and causes delays, it can also lead to a kind of 'alarm fatigue': after you've had ten false alarms, how seriously will you take the eleventh?"

Dynamic inclinometer

To achieve this immunity to spurious angle signals, DIS has developed a new hardware platform based on a chip with MEMS technology. In this new sensor, MEMS (Micro-Electro-Mechanical Systems) combines the simultaneous measurement of acceleration and angle of inertia on three axes. This means that the angle that the sensor sends to the controller is already gyro-compensated, so that it is free of any influence from accelerations and shocks that have no bearing on the tilt of the boom. The measured value is sent as a separate CANopen/J1939 object per axis.

Bert Koerts:
"The measurements from these sensors, together with other data – such as the speed of movement of the aerial platform chassis, the height of the work platform, the wheel pressure and the wind load – are processed in real time. The system immediately knows whether or not the aerial platform is safe at that moment. Some of the data used by the algorithms is determined during trials. From testing, we know where the limits are."

Data logging

Thanks to redundant application of the dynamic inclinometer in the road-rail aerial platform, the product has achieved a Performance Level d. The control system also logs all measurements and data, with a minimum of one week retention. Bert Koerts: "In the event of a calamity, this data enables you to precisely determine what the circumstances were at the time of the incident. It is not only important for legal purposes; it's also relevant input for potential future improvements to the aerial platform."