Ready for Takeoff

Amusement park supplier Wiegand is implementing the future position measurement in two fairground rides with a system consisting of encoders and RFID read/write heads from Turck, connected to a Hima safety controller

The new solution from Turck and Hima impressed Workshop Manager Oliver Grothkopp

The fairground business, with its dedication to the amusement of other people, sounds like a very fulfilling profession. This was also what Josef Wiegand thought when he opened his first ski lift in 1963. For many years he followed the motto "Ski and toboggan well", before expanding his portfolio due to the fall in sales resulting from the lack of winter weather. Since that time the Hessen-based company, Josef Wiegand GmbH & Co. KG, patented summer toboggan runs and thus grew to be world market leader in this sector.
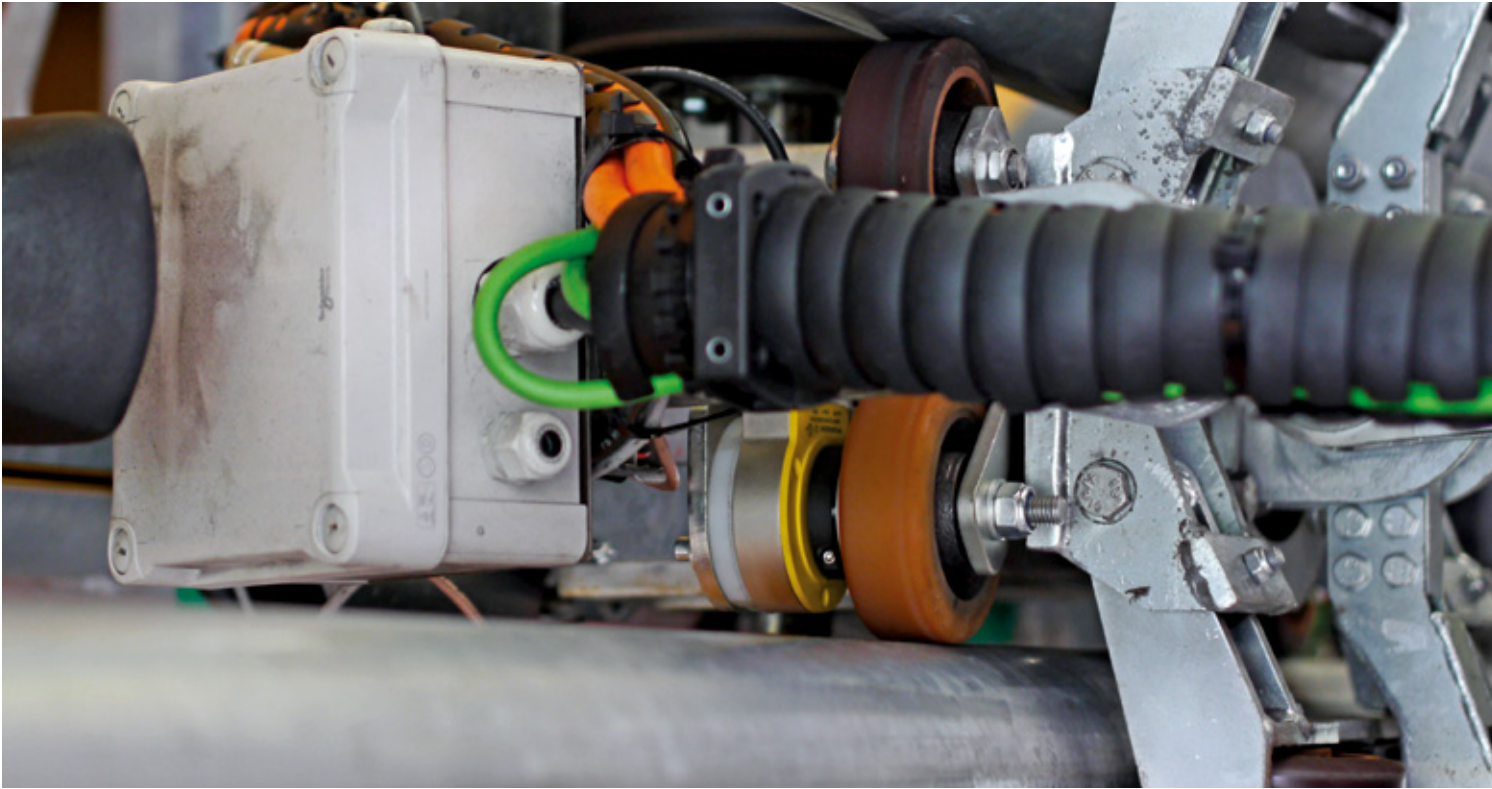
Whilst the portfolio of the company, headquartered in Rasdorf, initially consisted of standard summer toboggan runs, its current portfolio includes flying rides, water slides, Bobkarts and other types of toboggan runs. What was formerly a one-man company has now grown into a medium-sized family business with ten branches and 450 employees worldwide. Beside the planning and production of the amusement rides, Wiegand also handles the installation of its products worldwide. The water slides, for example, can even be found on large cruise liners such as the AIDA. If a fault occurs during a Mediterranean cruise, Wiegand fitters carry out the repair directly in situ. Wiegand has now introduced a few technical innovations to its flying rides, the so-called Wie-Flyers, and on its Bobkarts.

One controller, different options
The Wie-Flyer is a suspended gondola-shaped two-seater, in which the riders can control its speed as

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Wiegand, the Hessen-based amusement park supplier, previously used an encoder in its Wie-Flyers and Bobkart circuits that only offered limited performance in severe outdoor environments. After this was discontinued, Wiegand and its integrator ARI-contact came upon a permanently robust solution based on Hima and Turck products. Turck encoders, RFID tags and read/write heads will in future ensure safe movement for these fairground rides. Through the combination of incremental and RFID position sensing, the system reliably prevents any collisions. The controller of cooperation partner Hima was adapted here especially to the modules used.

required. They "fly" at speeds of up to 40 km/h through the bends of the suspended rail system as on a big dipper. The power for the flyers is supplied via a system integrated in the rails. An automatic distance control system is integrated in order to prevent collisions. This measures the position of the individual gondolas and lets them communicate between each other. In this way, the following gondola always knows the location the gondola in front. The gondolas are offered, in two different versions – either an open gondola, the so-called twin-seater or twin-flyer, in which the riders sit side-by-side, or a closed gondola, where the seats are arranged one behind the other.

The Bobkarts are electrically driven toboggans that run through a stainless steel track. They are supplied with energy via a touch proof conductor rail, which is run in a channel connected to the track. As with the

The Wie-Flyer track in Brotterode is equipped with RFID tags

Wie-Flyer, customers also control the speed of the Bobkart toboggan themselves. As the Bobkarts have the same controller as the Flyers, the same speed and rear-end collision prevention features are used.

However, the special feature of the Bobkarts is the fact that they don't need a hill. If the customer is only on a level section, the track functions just as well as on a slope. This was also the thinking behind the development of the Bobkarts, as they solve the problems of many amusement parks located on level ground. They can thus also be used in restricted spaces. The possibility to run the track in loops enables space saving and versatile designs.

In the previous design, Wiegand used optical encoders in its Wie-Flyers and Bobkarts in combination with a Hima safety controller. When the manufacturer discontinued the encoder, Wiegand looked for a suitable replacement for the positioning of its amusement rides. Added to this was the fact that the previous solution was very susceptible to faults and mechanical problems often occurred. "We were often called out to our customers to carry out repairs, even as far as China," workshop manager Oliver Grothkopp recalled.

Hima and Turck offer the solution
Wiegand, Hima and its integrator ARI-contact then started to search for an alternative solution. The controller manufacturer found the solution at Turck. Hima knew the requirements that the position sensing and safety system had to fulfill due to the previous collaboration. The system had to determine the position of the individual gondolas and control or restrict their speed on the basis of this information. Fail-safe position sensing also had to be guaranteed

»Hima found the Turck encoder to be a reliable solution.«

Andreas Meyne | Hima

The HIMatrix in the control cabinet coordinates the other controllers in the rides

even at high speeds. Besides position sensing via an encoder, RFID was also used.

"Hima found the Turck encoder to be a reliable solution," confirmed Andreas Meyne, project manager responsible at the controller manufacturer. The non-contact design of the QR24 encoder makes it particularly suitable for operation in harsh environments, since its operation is not impaired by vibration, humidity or contamination. The inductive measuring principle enables the design of positioning element and sensing unit to be combined in a fully enclosed and encapsulated unit.

Intensive development process

The position sensing solution using RFID and encoder enables the controller on board the gondola or kart to coordinate the position sensing. Turck developed a firmware specifically for its RFID read/write heads. Hima provided a function block for this that was specifically designed for Turck's RFID system. "This enables us to achieve a guaranteed read speed," said André Aßmus from system integrator ARI-contact.

The QR24-INCR incremental encoder transfers pulses to the controller, which calculates from this the actual speed of a gondola. The encoder is located on a guide roller in the upper section of the Flyer. If there is a deviation, or if the preceding Flyer is too close, the controller of the following vehicle initiates the rear-end collision prevention measures. Programmed tolerance values prevent any unnecessary intervention.

Controller: HIMatrix F35 034

The HIMatrix F35 034 controller used is an SIL3-certified safety controller with shortened reaction times consid-

erably below ten milliseconds. This makes it ideal for use in this project, which requires fast communication and reaction times. The controller is also compact and shock-proof, which enables use in any vehicle. The HIMatrix is also used centrally at Wiegand. As a controller is provided in every ride, a controller in the control cabinet takes over the higher-level network controller function.

Worldwide use

The Bobkart runs and other amusements rides from Wiegand are used worldwide. The Wie-Flyers have so far only been used on the testing grounds of the company in Brotterode, Germany. However another track has already been sold as a Twin-Flyer in Mexico City. They will be used here as an attraction in a shopping center. The Bobkart runs are already in operation at 20 sites, including in China, Japan, Kuwait, and Saudi Arabia, and also in German amusement parks, such as the Ravensburger Spieleland.