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NEXTSENSE

Digitalisation of Wheel Profile Measurement in Freight Transport

IGE Relies on Optical Measurement Technology from NEXTSENSE to Break New Ground in Wheel Profile Wear Measurement

For more than 30 years, the name IGE has been a household name in the European railway scene, and now the Internationale Gesellschaft für Eisenbahnverkehr is also one of the pioneers in modern analysis tools. Using NEXTSENSE optical measurement technology, it is replacing outdated wheel profile measurement instruments with new ones. User-independent measured values, more accurate results and operation at the touch of a button are a source of great enthusiasm among the workforce.

As one of the few private rail transport companies in Germany, IGE offers a wide range of services in the rail sector. Whether goods transport, special transport or tourist nostalgia train journeys, the operator takes its guests and above all its goods wherever there are railways in Europe. Day in, day

out, it has to deal with numerous foreign wagons that are loaded to the brim over Europe's rails. There is no question that the subject of security is very important here. Each wagon is carefully inspected by trained wagon masters before departure, with special attention paid to the wheels. This process takes two to three hours, depending on the length of the train and the condition of the wagons. Only wagons that pass this inspection will have their papers handed over to the train drivers for departure. If, however, there are defects of an operationally dangerous nature, the wagon will be parked and further action will be decided with the vehicle owner.

Stefan Gärditz, railway operations manager at IGE with responsibility for vehicle safety, summarises: *"The quality of the wagons is already very high, but there is still a risk that a train may not leave due to a lack of safety. We can only detect these defects and take the wagon out of service at an early stage if we carefully examine the wear and tear of the train wheels."*

Measurement of the Wheel Flange

To date, the wear of the individual train wheels has been checked manually with a calliper. The wagon master goes under the wagon and manually places the calliper on the wheel. As a rule, the wheel flange is measured; in cases of doubt, the experienced wagon master can also determine the hollow tread of the running surfaces with the naked eye.

"However, this manual method carries the risk of obtaining different results depending on who carries out the measurement. Time pressure and incorrect handling when using the calliper are the two most frequent sources of error," Gärditz describes the current situation.

With this approach, a certain continuity and comparability of results are almost impossible. In addition, manual measuring with the calliper is a physical strain that should not be ignored, especially for the older generation of wagon masters.



Figure 1: Stefan Gärditz in action with CALIPRI Prime



Figure 2: Contact-free measurement of the wheel profile



Figure 3: Colour-coded measured variables on the sensor

User-Independent Measurement Results

Dissatisfied with this situation, Gärditz became aware of NEXTSENSE's optical measuring instruments, which are based on a patented advanced development of laser light section technology. An algorithm corrects tilting and twisting of the measuring instrument, resulting in the same measurement result being obtained regardless of the respective user.

"I saw and tested NEXTSENSE's measuring instruments for the first time at a trade fair. It was immediately clear to me that we needed something like this at IGE. That's what I've always been looking for," says Gärditz

In particular, the CALIPRI Prime, a laser-based handheld measuring device guarantees user-independent measured values in the micrometre range when testing wheel flange wear (Figure 1). Within a few seconds, the camera/laser unit in the measuring device records the flange profile (flange height, flange thickness, QR size) of the wheelset. There is no need for any contact with the wheel profile, so there is no danger of tilted contact as is the case with conventional gauges (Figure 2). Depending on necessity, the wheel width, the hollow tread and rollover can also be determined and limit value violations can be colour-coded. Immediately after the measurement, the measured variables are displayed on the handy sensor and are available for digital transfer to a computer (Figure 3). As part of the Nextsense product portfolio, CALIPRI Prime is the attractive entry-level model that offers all the advantages of

optical measurement technology at a surprisingly moderate price.

Gärditz confirms that the introduction of a digital measuring device and doing away with old methods did not lead to resistance among the workforce: *"We haven't had any acceptance problems, even with our older colleagues the device has been received with enthusiasm. It's simply a great relief, be it because of the fast measurement at the push of a button, the much higher accuracy or simply the great physical relief of not having to climb under the vehicle anymore. But the best thing is that it even triggered a certain hunting instinct,"* laughs Gärditz. *"My colleagues are now using CALIPRI Prime to review their own assessment of profile wear. They check their own results. If the work is fun, then we've done everything right."*

Versatile Fields of Application

Even though the main purpose is the random profile measurement of freight wagons, IGE uses the handy measuring device in a variety of ways, for example, in training courses for wagon masters.

"There is always great amazement at the hundredths of a millimetre accurate measured values on the wheel flange," says Gärditz happily. Or in nostalgic train rides with the historic rail vehicles: *"During a ride like this, I recently had a case of a passenger wagon wobbling. At the next station, I took the measuring device out of my pocket and measured the wheel flange wear. In this way, we could quickly see that the wheels were fine and the problem was somewhere else,"* says Gärditz.

Paperless Future Prospects

IGE, which is growing rapidly, has a clear goal in mind: in the near future, each wagon master should be equipped with his own CALIPRI Prime, so that according to Gärditz "the error-prone manual measuring" can be avoided completely. His vision is that not a single sheet of paper will be needed for the entire documentation. In his imagination, each wheel should be assigned its own barcode, whereupon the individual measured values are transmitted digitally to the vehicle owner immediately after measurement. Apart from saving a considerable amount of time, this would probably prevent many sources of error from arising in the first place.

Looking at the product developments at NEXTSENSE, it can be said that his vision may soon become a reality. The company is already working on various software solutions to make handwritten documentation superfluous. With an app and a smartphone, for example, the measurement plan can already be managed today and data for identifying the vehicle, axle and wheel can be entered directly on the track (Figures 4 and 5). It will be interesting to see where the digitalisation of the maintenance of the wheel-rail system will take us.

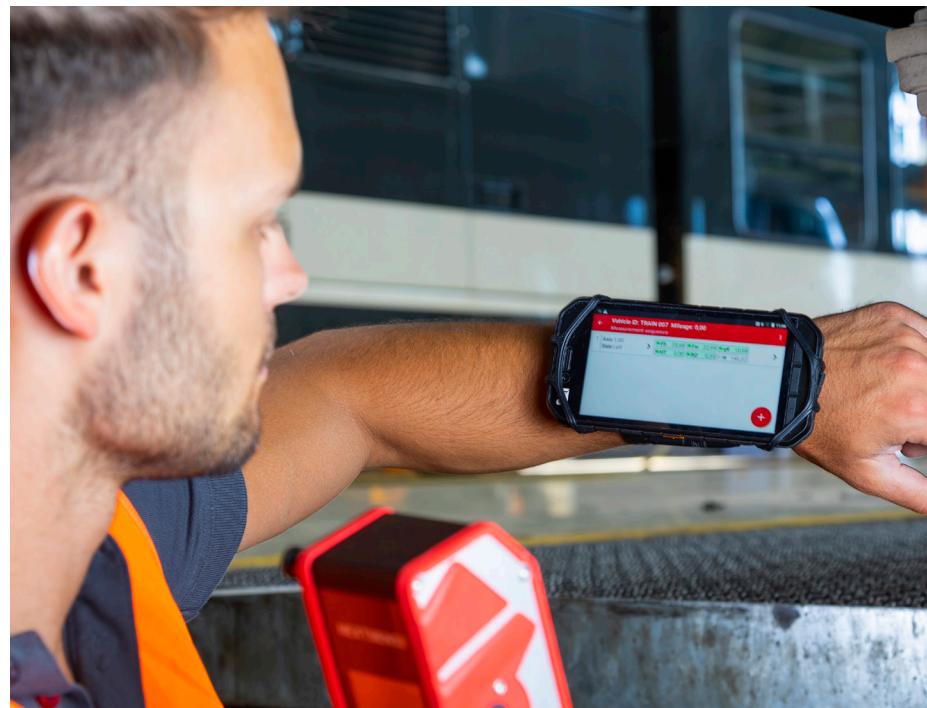


Figure 4: Easy operation with smartphone and app



Figure 5: View of the wheel profile as point curve



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