

**KISTLER**

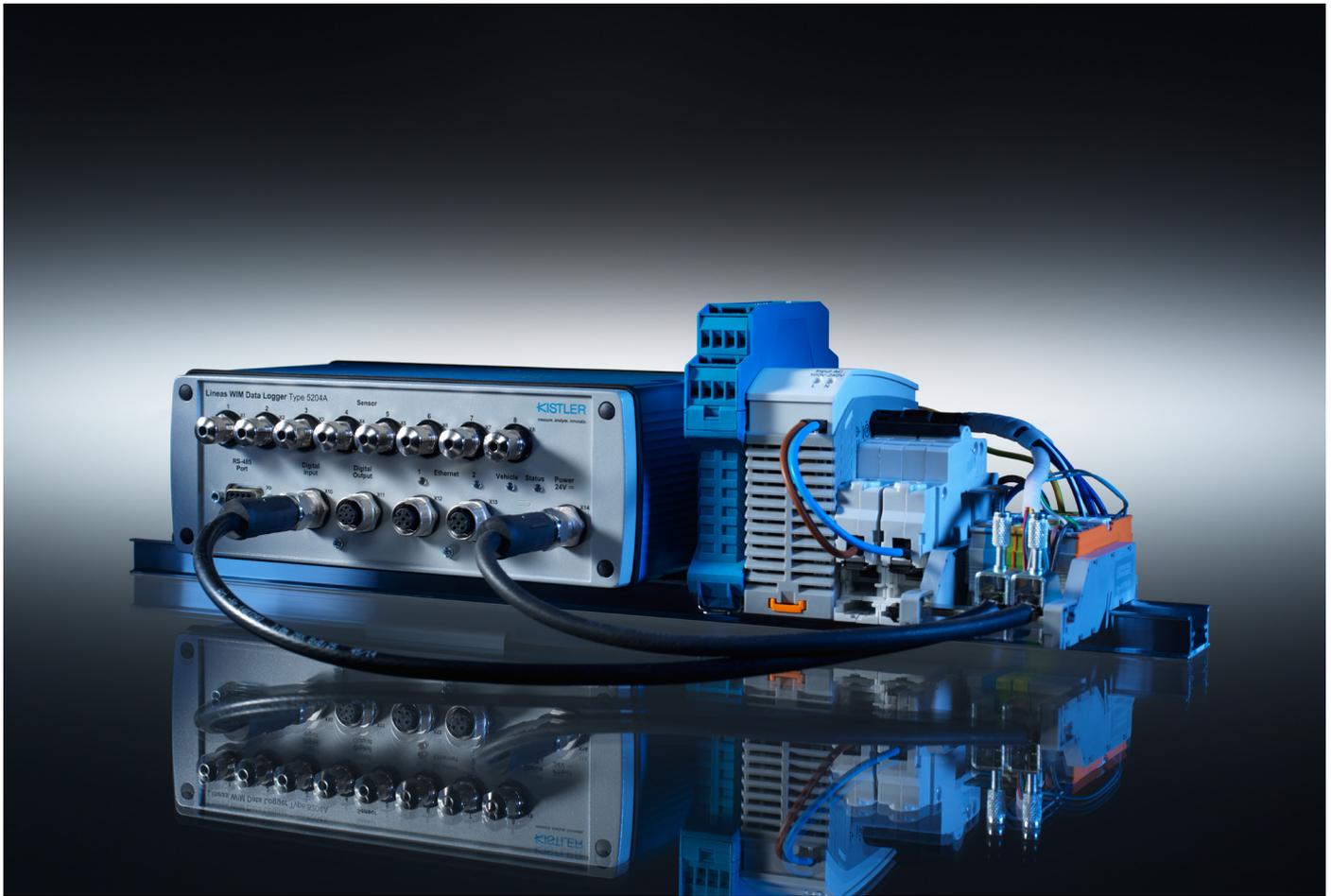
measure. analyze. innovate.

**The effective  
charging solution  
for overloaded  
vehicles**



## **1 500 Lineas WIM sensors for Hungary**

Kistler plays a key part in the nationwide  
Weigh In Motion network



Kistler's Weigh In Motion system helps detect and identify overloaded vehicles in real time – with certified accuracy.

**In 2016, the Hungarian government implemented an automated, legally binding measuring system to detect overloaded vehicles and directly enforce weight limits on roads all over the country. Kistler supplied 1 518 Linesas WIM Sensors to measure loads on vehicles moving at high speeds. Delivery, installation and calibration were completed within just one year.**

The worldwide increase in road usage is confronting governments, road owners and operators with the challenges of monitoring traffic and maintaining highways. These tasks are difficult, labor-intensive and critical – because frequent overloading of trucks can quickly damage roads. In response, growing numbers of authorities and operators across the globe are switching to automated solutions. Automated technology yields many benefits: for instance, it frees up local police forces to focus on important security tasks.

Weigh In Motion (WIM) technology is the solution of choice for traffic monitoring, weight enforcement and weight-based tolling. A well-established WIM system is the key to sustainably managing and protecting the road infrastructure. This was why, in 2014, the Hungarian Ministry of National Development decided to implement a nationwide WIM system based on

existing toll collection sites. The two-year preparatory phase included setting up the legal framework, issuing the tender for the technology providers and developing the entire software and back-office concept. Implementation began in 2016 with a pilot project across five sites.

The WIM system became fully operational in 2018, with 89 sites throughout Hungary – by far the largest European project of its kind in recent times. As well as Kistler's WIM sensors, the system comprises loop detectors, license plate recognition, laser scanners for vehicle categorization, signal processing end point devices, and the related central information system. To make the changeover easier for road users, direct weight enforcement was preceded by a transition phase when violators were only given an official warning but were not penalized.

**Weigh In Motion by Kistler: decades of accurate measurements at high speed**

Kistler, the market and technology leader for WIM applications, is globally renowned for the accuracy of its Linesas quartz WIM sensors that measure loads on vehicles moving at low to high speeds (see text box). Kistler was invited to join the project thanks to its relationship with ARH of Hungary, a world leader in optical measurement technologies. As a member of the winning consortium,

ARH supplied the cameras for the WIM system. Tomas Pospisek, Sales Manager Road & Traffic at Kistler EMEA, was responsible for sensor integration. As he explains, his remit covered management of all aspects of the project from day one: "Of course, we were very proud to be part of such a huge project. A mission of this size and complexity presented us with several challenges, but we were able to meet every deadline."

The project involved WIM sites of two different types: of the total of 89 sites, 62 are built for direct enforcement, while 27 are designed to preselect overloaded vehicles for later inspection by police staff in person. For direct enforcement, the measurement error must be less than 5%. At these sites, six Type 9195GC Kistler Lineas sensors are integrated into each lane to measure single axle loads and gross weights at speeds of up to 120 km/h. And at each preselection site, four sensors are installed to ensure maximum deviations of 10%. "The sensors were installed easily and safely in the road with the help of a proprietary grouting compound and a simple installation procedure," Pospisek explains.

Most of the 89 sites had multiple lanes, so the teams had to install sensors in over 200 lanes during 2017 – but they met this huge challenge with flying colors. "Five teams had to work in parallel to complete the job on time," Pospisek recalls.

#### **Outstanding calibration, production, and delivery performance**

Once the installation was completed, the next step was to calibrate them. "Kistler's WIM sensors are very robust, and they deliver reliable measurements with constant accuracy over decades. But, of course, they have to be calibrated beforehand," Pospisek emphasizes. Calibration had to meet local legal requirements. Three different vehicles, moving at three different speeds, had to pass each of more than 200 lanes at least 45 times to achieve the required accuracy for verification and certification by Hungary's National Metrology Institute.

"You can hardly imagine what this means in terms of logistics. You can't just turn around on the expressway – instead, you have to take the long route via the exits when you want to change direction. To cover all 89 stations, you actually need to drive thousands of kilometers all over Hungary. But at long last, we accomplished our mission – with great success," says a proud Tomas Pospisek. "Finally, I'd like to highlight our excellent performance as a supplier, meeting the customer's expectation for delivery of no less than 1 500 sensors in just a few months," he adds.

What are the main benefits of the new WIM system for Hungary? During the first months of operation in 2018, control of overloaded vehicles has already become more efficient. There have been fewer violations, and voluntary compliance with regulations has increased. Overloads of 50% or more were not uncommon in the past, so these improvements will slow down the deterioration of Hungary's roads – as well as reducing the numbers of accidents due to overloaded vehicles.

For more information about Kistler's WIM solutions, visit: [www.kistler.com/wim](http://www.kistler.com/wim).



Weigh In Motion (WIM) technology is the solution of choice for traffic monitoring, weight enforcement and weight-based tolling.



Most of the 89 sites had multiple lanes, so the teams had to install sensors in over 200 lanes during 2017 – a huge challenge!

#### **Cutting-edge technology for WIM solutions**

Lineas quartz sensors by Kistler reliably measure axle loads and vehicle gross weight under rolling traffic conditions. Key features:

- Accuracy of up to 2.5% GVW and long-term stability
- Precise measurements at both low and high speeds (10 to 250 km/h)
- Rugged sensor design for high durability over decades
- Insensitive to temperature fluctuations
- Certified to OIML R134, accuracy class 5, and compliant with COST 323 & ASTM E1218-09
- Proven performance worldwide, for 20+ years

Kistler offers Lineas sensors in three lengths (1.5 / 1.75 / 2 m) with two lengths of connecting cable (40 / 100 m).

**Biomechanics**  
Force measurement solutions for motion analysis, sports performance diagnosis, rehabilitation and ergonomics.

**Brake force measurement in the Rail transport sector**  
Simple and accurate for periodic brake force testing.

**Weigh-In-Motion**  
Measuring equipment for a wide variety of traffic data collection, enforcement and toll collection applications.

**Test & Measurement**  
Sensors and signal conditioning systems.

**Thermoacoustics**  
Measuring combustion dynamics in high-temperature environments.

**Cutting force measurement**  
Force measuring systems for machining.

Find out more about our applications:  
[www.kistler.com/applications](http://www.kistler.com/applications)

**Kistler Group**  
Eulachstrasse 22  
8408 Winterthur  
Switzerland  
Tel. +41 52 224 11 11

Kistler Group products are protected by various intellectual property rights. For more details visit [www.kistler.com](http://www.kistler.com). The Kistler Group includes Kistler Holding AG and all its subsidiaries in Europe, Asia, the Americas and Australia.

Find your local contact on  
[www.kistler.com](http://www.kistler.com)

**KISTLER**  
measure. analyze. innovate.