



KISTLER

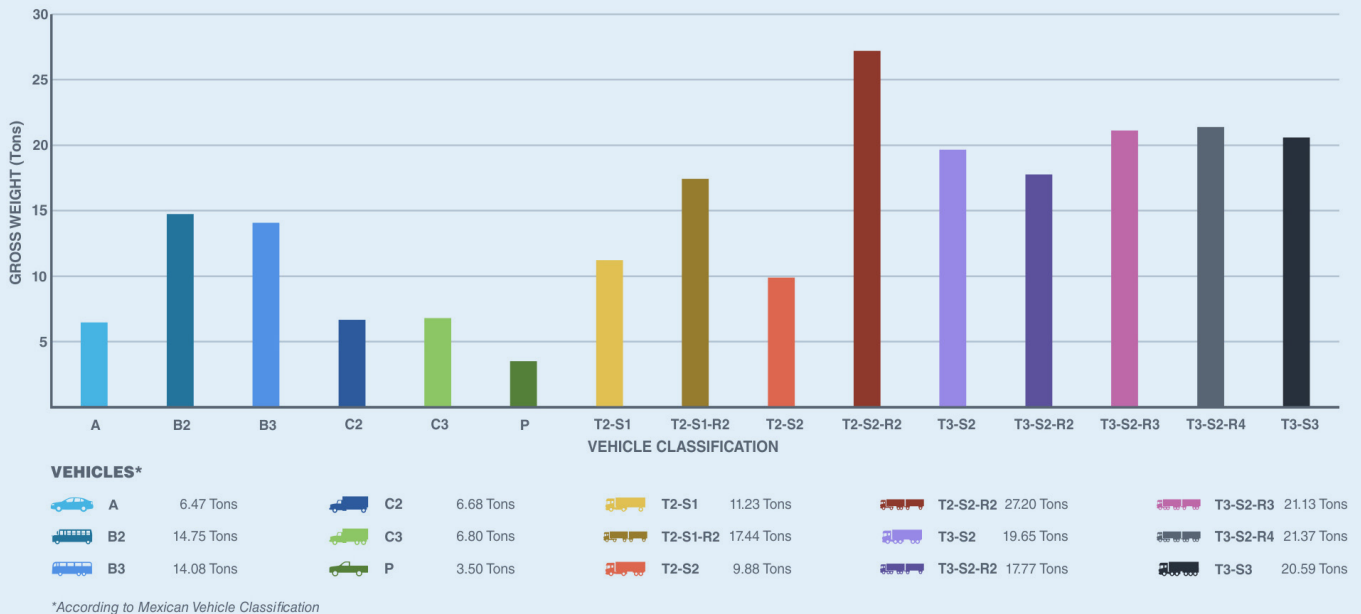
measure. analyze. innovate.

**To efficiently
protect bridges
against overload**

Overweight vehicles: access denied!

WIM systems by Kistler are helping to protect a bridge structure in Mexico

Average Gross Vehicle Weight by Vehicle Classification

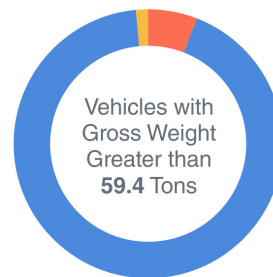


Weigh In Motion gives highway operators an accurate overview of vehicle types and payloads.

Bridges are sensitive components of the traffic infrastructure, and their lifetimes are limited. The accident at Genoa has made it clearer than ever before that they require more attention. Weigh In Motion solutions by Kistler offer an efficient way of monitoring bridge use and imposing restrictions when necessary – as illustrated by an application that is now operational in western Mexico.

A serious accident occurred on the El Carrizo highway bridge in January 2018 when a tanker full of diesel fuel crashed and caught fire. Fortunately, nobody was injured – but the road had to be closed for weeks to investigate possible damage to the bridge. With a central tower that is 226 meters tall, El Carrizo is currently the second highest bridge in North America. It is a link in the spectacular route that was opened in fall 2013 through the Sierra Madre Occidental, part of the North American Cordillera.

The route from Mazatlán to Durango is important in terms of tourism as well as commercial transport, and the new road has slashed the journey time from six or more hours to only three. But after the bridge was closed, trucks had to take a long detour through the mountains: this extended the driving time to eight hours until the route was fully re-opened to traffic at the end of August 2018. To prevent serious accidents in the future, two checkpoints with Weigh In Motion (WIM) technology have now been installed by SEMIC, who developed a customized hardware-software solution. Vehicles that exceed the permitted total weight are automatically preselected



Period: August-September 2018

VEHICLES*

T3-S3:	2 veh (1%)
T3-S2-R3:	8 veh (6%)
T3-S2-R4:	125 veh (93%)

*According to Mexican Vehicle Classification

Between August and September 2018, 135 vehicles exceeded the acceptable overall weight.

so they can be turned back at the toll plazas that were already in place. Kistler supplied the local contractors responsible for this project with the necessary technology: the Type 9835A WIM system, with four Lineas Type 9195GC41 WIM sensors and the WIM data logger Type (5204AC04).

Precision combined with simple integration

Carlos López is the CEO of SEMIC (Servicios Mexicanos de Ingeniería Civil), the company responsible for installing the technology. He comments: "The high accuracy of the Lineas sensors coupled with ease of integration into our systems: those were the factors that persuaded us to choose Kistler. We're highly satisfied with this solution because it meets our client's expectations perfectly."

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The entire installation and commissioning of the two WIM stations was completed in just three days during summer 2018.

CAPUFE (Caminos y Puentes Federales), the government-owned agency that operates the highway, commissioned SEMIC to set up an automated dynamic system to identify overloaded vehicles. The technical specifications were drawn up by Francisco J. Moreno and Andrés Araújo of CAPUFE's engineering department. López continues: "We found Kistler's data logger exceptionally convincing in terms of flexibility and user-friendliness. That made it relatively easy for us to meet CAPUFE's requirements."

Both measuring stations were set up near existing toll plazas. Coscomate, in the west-east direction, is located immediately in front of the toll plaza, while Mesillas is eight kilometers ahead of the corresponding toll plaza in the east-west direction. "Alongside logistical considerations, the condition of the road plays a major part in determining the optimum position for the sensors. Kistler assisted SEMIC with positioning the sensors so as to ensure maximum measurement accuracy," according to Jeffrey Rice, Kistler's Sales Manager Road & Traffic Americas. "Since 2018, we've been offering this service throughout the world as a way of maximizing our systems' performance for our customers." SEMIC, which assigned 20 of its total workforce of 100 to this project, also carried out extensive preliminary investigations to guarantee the performance of the WIM equipment. Parameters measured included suitable geometric characteristics and variance of traffic speeds, surface and structural pavement conditions to ensure the lifecycle of the investment.

Reliably detecting overloaded vehicles

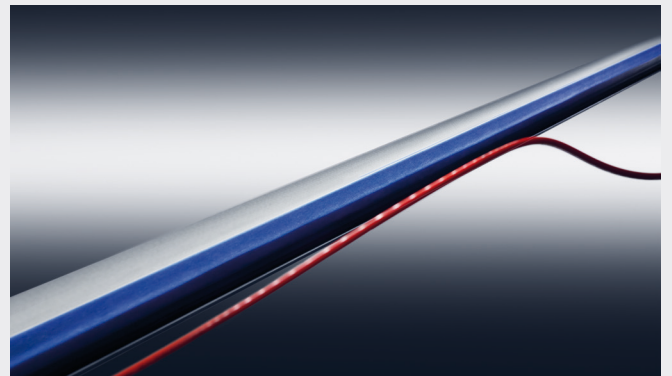
There are only single lanes on most of the route from the coast into the interior of the country, and traffic largely consists of heavy utility vehicles such as tankers and trucks – both with and without trailers –

traveling at average speeds of 90 km/h. Two Kistler Lineas sensors at each measuring station ensure that the axle load and total weight of every vehicle are determined accurately. The new WIM system delivers a precise analysis of route utilization by vehicle type, and it registers the axle load and total weight of all vehicles (see the graphic). In the period from August to September 2018 alone, the system identified 135 vehicles that exceeded the maximum weight of 59.4 tonnes.

Installation took place in summer 2018. "Once Kistler had trained our engineers while the first sensors were being installed, SEMIC was able to set up the second station entirely on its own. The setup of the data logger and the software-based evaluation unit went very smoothly," López recalls happily. These steps were followed by the calibration at the end of August, with the help of a three-axle 30-tonne truck. Official certification by a Mexican laboratory working in collaboration with Kistler's engineers was completed at the end of the year.

The final word from López: "Thanks to Kistler's systems, we successfully installed a fast, practical WIM solution that optimally meets the operator's requirements. In fact, the results were so convincing that we've already commissioned a second station at Cadereyta in the north-east of the country. More projects can be expected to follow in 2019 – and to implement them, we shall be opting for Kistler products again."

Robust, high-precision axle load measurements for over 20 years



For over two decades, Kistler's Lineas brand piezoelectric quartz sensors have been the worldwide solution of choice for installing dynamic weighing technology on roads and bridges, in harbors and on other infrastructure elements. Key features and benefits at a glance:

- Fast, simple installation in the road paving
- Quartz technology from our own crystal growing plant
- Measurements at different speeds (1 to 250 km/h)
- Wide weight measurement range (wheel loads of up to 15 t)
- Highly accurate measurements and long-term stability
- Rugged sensor design, long lifetimes
- Insensitive to temperature fluctuations
- Certified to OIML R134 (accuracy class D2)
- Compliant with relevant CE standards

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

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