

Weight of intellect

Used for vehicle weighing applications for years, the Lineas quartz sensors are way ahead of their time and are still at the heart of modern WIM systems in which charging by weight is becoming more prominent for toll agencies

The transport of goods by overloaded trucks creates a number of problems on the roads, including safety risks for all users, obstruction of traffic and considerable extra costs for additional maintenance and repair of affected roads, bridges and other infrastructure. A 10 percent overload increases pavement damage by 40 percent, so as transport by truck increases, these problems will only become more serious. Weigh-in-motion (WIM) systems can reduce such danger and damage.

Toll fees should also be based on vehicle weight: fees currently paid by the road users depend on distance driven and vehicle class. Vehicle class is usually based on the number of axles and vehicle height. As the pavement damage is proportional to the fourth power of the wheel load, toll operators have defined weight-dependent classes. This classification is based on the cost-by-cause principle, which seems fair. Penalties have also been introduced for overloaded vehicles.

There are many technologies available for vehicle weighing, including static scales and portable weight pads, WIM systems for low-speed (typically 5-15km/h) and WIM systems for high-speed (typically 20-150km/h). For tolling applications, static weighing cannot be considered: for manual toll collection, low-speed WIM systems are suitable, whereas for automatic toll collection, the high-speed WIM system should be used.

INTELI-WIM

The InTeli-WIM system provides reliable and accurate measuring data of wheel and axle loads, as well as gross vehicle weight, from low to high speed (5-150km/h). Installed in any kind of pavements (asphalt, open asphalt, concrete), the system is suited for tollgate areas where the speed of the vehicles is often low and not constant. The system also delivers a wealth of information about the vehicle, such as number of axles, length, class, speed, direction of motion, etc. Furthermore,



Kistler Lineas WIM sensors are used by toll companies to collect data for weight-dependent toll fees, statistics, maintenance planning and overload detection



InTeli-WIM provides accurate data of wheel and axle loads as well as gross vehicle weight

it provides all of the required weight information: individual wheel and axle weights, group axle weights, gross vehicle weight and weight violation. The system also generates a vehicle image with the processed data superimposed, which can be loaded from multiple locations via different interfaces, while a variety of reports can be generated according to application and needs.

HARDWARE

The hardware of the InTeli-WIM system comprises the sensors and charge amplifiers, a loop controller, industrial PC, road cabinet,

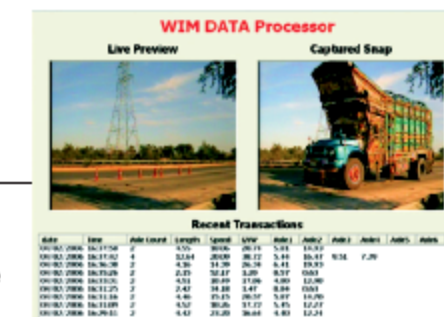
video camera and different toll equipment. The base component of the measuring chain is the Kistler Lineas WIM sensor, which is based on quartz technology and when connected to the charge amplifier has a perfect linear voltage response when loaded. Rugged and reliable, Lineas sensors are distinguished by their excellent accuracy, stability, long life and temperature independency. They cover all speeds from walking pace to highway driving. Importantly, Lineas is the only sensor, that can be reworked in the case of ruts or cracks appearing in the pavement.

A modular design means adaptation to the road width and surface is easy: for installation only a small intrusion is required. Lineas is secured in the road without frames or screws and is maintenance free and very safe.

WIM PROCESSOR SOFTWARE

The WIM processor software is a PC-based standalone package that performs the basic functions of vehicle detection and classification, weight calculation, data and image archiving and the transmission of the data to the remote location software. The software interfaces to Lineas sensors, loop detectors and video camera and was

Top shows WIM Processor software; the middle is a screenshot showing remote location software (truck selection); and the bottom image is a screenshot showing remote location software (vehicle data)



designed in a modular way. The basic module is a single-lane controller for a staggered or standard Lineas configuration with two loop detectors. This basic lane controller can be extended to any number of lanes. The image capturing is an additional part of the WIM system developed to show a live preview of the incoming traffic and to store a picture of the vehicle being weighed by the sensors. The processed data of the vehicle (all vehicle information) is superimposed onto the image of the vehicle and sent to the remote location software. These data can be loaded from multiple remote locations.

REMOTE LOCATION SOFTWARE

The remote location software is capable of connecting to the WIM processor software and retrieve the processed data for further analysis and archiving. Different reports can be generated according to the applications and to user needs. The most popular reports show traffic density and volume, overloaded vehicles, penalties collected and various other graphs and charts.

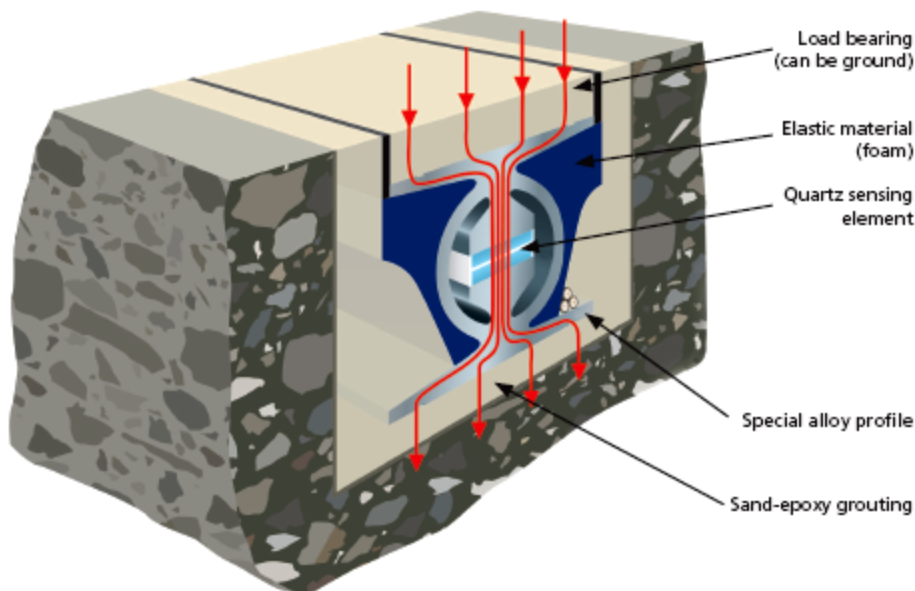
The screenshots show the remote location software especially developed for tolling and overload enforcement applications. In the

'truck selection window' the operator chooses the picture of the truck at the tollgate. Vehicle information and the calculated fee will then appear below the truck image.

While the system provides reliable vehicle information (weight, class, speed, etc) with on-line data transmission, many users can utilize the system simultaneously. For instance, traffic engineers and road authorities can use it for traffic control and statistics (on-line traffic volume, density, speed, class, etc), while the police can employ it as an enforcement tool for overload and speed detection. Toll operators, meanwhile, can use it for fee calculation based on weight.

WIM systems are the most efficient tools for all these applications. With regard to the cost-benefit ratio, WIM systems based on quartz sensor technology – distinguished by accuracy, durability and easy installation – are an appropriate and effective investment. The InTeli-WIM, a state-of-the-art WIM system, assures smooth operation, accurate vehicle data and long-lasting performance. ■

For more information, please contact Kistler Instrumente AG by email info@kistler.com or by Tel: +41 52 224 11 11. Alternatively, log on to the company's website at www.kistler.com



Based on quartz technology, Kistler's Lineas sensor can be reworked in the case of road damage