

Made to measure



Advanced weigh-in-motion technology is changing the way the loads of fast-moving vehicles are calculated

Words | **Aaron Van Heel, Intercomp Company, USA**

An increase in commercial vehicle traffic causes roadways to deteriorate at a high rate, particularly if vehicles are overweight. Research has shown that there is a fourth power relationship between the axle weight and the damage to roadways. For example, an axle that is 4,000 lb over the maximum legal weight does twice the damage to the roadway as a legal-weight axle.¹

The need to accurately measure the weights of vehicles as they are traveling along a roadway at high speeds has existed since the 1970s. At that time, the first, crude roadway WIM pre-selection systems were installed to work in conjunction with law enforcement downstream from the pre-selection scales.

The incentives to operate overweight vehicles are increased competition, high fuel prices and the ability to bypass enforcement due to hours of service, traffic congestion or weather. An accurate vehicle-weighing method is needed that is affordable and easily installed in major highways as well

as roads that are often used to bypass weigh stations. Intercomp's installations in North and South America and Europe demonstrate that the company's High-Speed Strip Scales are an accurate, reliable and cost-effective alternative to the piezoelectric sensors used for screening and data collection.

Built for speed

Intercomp's High-Speed Strip Scales comprise a strain gauge-based strip sensor developed for use in high-speed weigh-in-motion (HS-WIM) systems; it can weigh dynamically up to 80mph (129km/h). HS-WIM systems can automatically record and display wheel-load weights, axle weights, gross vehicle weights and other parameters, as needed. Violation codes and definitions can be customized by the user, enabling streamlined screening of traffic. The system is well suited for weight enforcement screening, monitoring bridge loads, toll roads, traffic data collection and conducting road research.

The minimally invasive in-ground Strip Scales are installed in grooves of less than 3in (75mm) in the pavement, keeping lane closures to a minimum. They are based on high-performance strain-gauge technology, and operate over a wide range of environmental conditions and roadway surfaces. The sensors are available in lengths of 1.5m, 1.75m and 2m, and can be configured in pairs with two, four or six strips per lane for an even greater sampling rate.

Although there are advantages and disadvantages to every method of measuring a load, there is a reason that precision scales use strain-gauge-based load cells. Unlike piezoelectric sensors, they function statically, which means they can be calibrated with static loads. They operate on the principle of measuring the change in resistance, as they are elongated, in relation to the strain of the base (load cell) material. Temperature compensation ensures that strain-gauge scales remain accurate over



the temperature extremes. In terms of accuracy, these scales exceed ASTM E1318-09 Type I, Type II, Type III and COST 323 A(5), B+(7) or B(10) requirements for high-volume data collection and screening for direct enforcement.

Better together

Intercomp's High-Speed Strip Scales can also be fully integrated into a 'virtual WIM' (V-WIM) system, integrating scales, cameras, sensors and traffic control devices. A roadside WIM server sends data to the cloud, enabling users' remote web access and control of all WIM-related functions

and devices. These systems work in tandem with commercial weigh stations or as a standalone device, screening for weight compliance and data collection. High-Speed Strip Scales can be used in a number of different configurations: integrating into existing systems, scales with an Intercomp WIMLOGIX controller, or a complete turnkey solution for a complete virtual WIM system.

Intercomp's High-Speed Strip Scales HS-WIM system is the result of more than 35 years of experience in using a scientific approach to load-cell design, scale design and algorithm development. The use of highly accurate load cells enables every subsequent step in the weighing process to take advantage of the initial high accuracy. The strain-gauge-based strip sensor combines the best attributes of a precision strain-gauge-based scale and the form factor of an in-road strip sensor. ■

Reference

1) M Hjort, M Haraldsson, J Jansen, 'Road Wear from Heavy Vehicles – an overview', Report 100, p18 (2008)

(Opposite, left and below)
Intercomp's High-Speed Strip Scales are a unique alternative to traditional sensor-based technology



Intercomp
advanced weighing technology by any measure

Weighing Systems for ITS & Enforcement

LOW-SPEED WIM HIGH-SPEED WIM VIRTUAL WIM PORTABLE WIM STATIC WHEEL LOAD

Weigh Stations • Sea Ports & Freight Terminals • Toll Stations • Data Collection

High Speed Strip Scales for Minimally Invasive Installation

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