

Wheel Impact, Skew Bogie Detector & Weigh In Motion



OVERVIEW

Dyna-WIM Technology is deployed to actively detect and alert users to wheel impacts, skew bogies, excessive lateral forces, and incorrect vehicle loading. In addition, the Wheel Impact Detector functions as a full in-motion weighbridge, providing all related mass and mass distribution data. The system is designed for operation at main line speeds, up to 160 km/hr.

Our retrofit technology means that Dyna-WIM is installed onto the existing track, and no rail cutting, or sleeper replacement is required. Installation is rapid and can be carried out safely between trains – full occupation is therefore not required.

Dyna-WIM is based on our microprocessor-driven T-Series family of products. These microprocessor-based systems are highly stable, boot instantaneously and operate fully automatically, without the need for user input. These low-power systems represent the next generation of condition monitoring equipment, providing identical performance to traditional PC-based systems, but with a much smaller, more efficient footprint. The microprocessor runs dedicated firmware, meaning that an Operating System is not required. With industrial components offering a much wider operating temperature range, traditional air-conditioned enclosures or buildings are not required. Being totally solid state, the T-Series systems have no moving parts such as hard drives or fans, thus reducing maintenance requirements and increasing reliability. Spares are small and easy to transport to remote locations.

Automatic Vehicle Identification (AVI) is supported and compatible with ATA, AAR and Gen-II type RFID tags and readers. AVI integration permits the unique identification of vehicles and assigning of measured parameters appropriately.

Optional digital I/O support allows for local interfacing to any peripheral trackside equipment that may be necessary.

DYNA-WIM FEATURES & BENEFITS

- Impact detection, lateral load measurement and weigh-in-motion provided by a single system.
- Support for Automatic Vehicle Identification via RFID (ATA, AAR, Gen-II).
- Fully automatic operation, including reporting and alerting.
- Retrofit technology requires no cutting of rail or replacement of sleepers – installation and repair procedures are therefore rapid and safe.
- Power-efficient microprocessor-based technology making Dyna-WIM an excellent candidate for solar powering.
- Ideal for harsh or remote environments.
- Compact footprint: a simple trackside cabinet houses all off-track equipment. A building is therefore not required.
- Stoppage and rollback compliance option.

DATA PRODUCED

Dyna-WIM produces two basic types of data, **Alerts** and **Train Measurements**.

Alerts

Dyna-WIM detects and raises alerts for the following parameters, each of which represents an **Alert Type**. Each Alert Type has one or more alert levels, which are remotely configurable.

- Wheel impact force.
- Static vs. dynamic vertical load.
- Wheel lateral force.
- Gauge spreading force.
- Skew-tracking bogie.
- Skew loading, end-to-end.
- Skew loading, side-to-side.
- Vehicle overload.
- Vehicle under-load.
- Axle overload.

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An **Alert Message** is generated for each monitored parameter that is out of range. The Alert Message contains the following alert information:

- Alert type.
- Alert severity, levels 1 to 3.
- Alert component. This could be wheel, axle, leading/trailing bogie, vehicle side, vehicle, or a combination of these.
- Alert value. The magnitude of the measurement, in calibrated units.

The Alert Message also contains following information, allowing for easy identification of the culprit train, vehicle, and vehicle component:

- Site identifier.
- Date and time of measurement.
- Direction of travel.
- Vehicle position in train, with Alert component location (see above).
- Vehicle number and class from AVI.
- Vehicle speed.
- Vehicle type (typically wagon or locomotive).

Train Measurements

While scanning for out-of-range parameters, Dyna-WIM performs several measurements on each wheel that passes. These wheel measurements are then used to generate the following output for each vehicle that moves over the system.

- The maximum wheel vertical force (impact) detected, per wheel.
- The maximum wheel lateral force detected, per wheel.
- Gauge Spreading Force, per axle.
- Total vehicle mass.
- Leading and trailing bogie masses.
- Left and right mass distribution.
- Vehicle number and class from AVI.
- Vehicle Speed.
- Vehicle type and axle count.

The following identification information is also provided to facilitate train identification.

- Site identifier.
- Date and time of measurement.
- Direction of travel.
- Number locomotives and wagons detected.

REPORTING MECHANISMS

The two types of data provided by the Dyna-WIM require have different reporting requirements.

- Real-Time** reporting, for the distribution of Alerts which, by definition, are time critical and must therefore be distributed immediately.
- Post-Process reporting**, for the distribution of Measured Data. This is a measurement summary and can therefore be distributed once the entire train has cleared the measurement site.

The following table outlines distribution mechanisms for Real-Time and Post-Process reporting.

	Alerts (Real-Time)	Train Measurements (Post Process)
Email ¹	Yes	Yes
Text Message ²	Yes	No
Radio Message ³	Yes	No
Windows Desktop App ⁴	Yes	Yes
Enterprise Integration ⁵	Yes	Yes
iOS App ¹	Yes	Yes

¹Distributed via the back-office.

²Requires a GSM modem, with SMS-enabled SIM/eSIM.

³Requires compatible radio.

⁴Using supplied DMT application, linked to SQL Server database.

⁵Via SQL Server database.

COMMUNICATION INTERFACES

The following communication interfaces are supported natively.

- Ethernet.**
- GSM: 4G/LTE/5G.**
- RS232 Serial (for radio communications)**

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Two views of the Dyna-WIM S System, including AVI

DYNA-WIM SPECIFICATIONS

	MODEL	
	Dyna-WIM	Dyna-WIM S
PERFORMANCE		
Speed of Operation ¹	≤ 160km/h	
Accuracy ¹	±2.0%	
Ambient Temperature	-20° – 55° C	
Track Temperature	-20° – 70° C	
FEATURES		
Weighing & Impact Sensors	26	26
Skew Bogie Sensors	–	2
Stoppage/Rollback Compliant	Optional	
Permanent Presence	Yes	
Process Integration	Yes	
Automatic Operation	Yes	
AVI		
Readers	Single / Dual Reader	
Supported Tag Standards	ATA / AAR / Gen-II	
COMMUNICATIONS		
Options	GSM Network, Ethernet	
POWER REQUIREMENTS		
Power Consumption	< 60W	< 75W
Power Supply	12/24VDC or 110/220VAC	
Backup Powering	True Online	
Backup Battery	12V Lithium	
Autonomy	~4 hours (untriggered)	
ENCLOSURES		
Equipment Enclosure	800 x 600 x 300mm Powder-Coated / Galvanised / Stainless	
Cover Plates	3mm Galvanised Steel Plate	

¹Higher speeds are supported with slightly lower accuracy.