



Accurately Weighing Africa



WIM 4000

SASCO SLOW SPEED CYBERNETIC
WEIGH-IN-MOTION SYSTEM

Completely Automated In-Motion Axle Weighing

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WIM 4000

Overloading regulations have been enacted across most African countries. Twenty-two African countries have agreed under the COMESA-EAC-SADC Tripartite Vehicle Load Management Agreement to both standardize permissible limits and seek to build, from national prosecution systems, a multi-national African overloading management system.

The Road Logistics Industry must now ensure that trucks comply with overloading regulations. This requirement relates to both total weight and axle weights.

Sasco is a market leader in the supply of a range of multi deck weighbridges, multideck and weigh-in-motion systems (WIM).

The Sasco range of WIM systems is highly accurate and uses the same proven base instrumentation WIM Deck.

The functionality of each system revolves around the degree of automation hardware integrated into that system, which determines the amount of human involvement required in the weighing process.

Large warehousing, distribution centres and other similar operations have high volumes of trucking flows requiring 24/7 real time access control and data on vehicle particulars, including dispatch and arrival weights, along with the requirement to comply with axle overloading regulations.

The WIM 4000 is the optimal solution to deliver exactly this information, using advanced cybernetic technologies, integrated into a completely automated weighing and access control solution, with the option of either a single direction or bi-directional configuration.

Attractions of Weigh-in-Motion

Weigh-in-motion (WIM) is a technology used to determine the weight of vehicles as they are moving. In contrast to traditional truck scales, which require vehicles to stop to be weighed, WIM systems are increasingly used for commercial vehicle weight enforcement, offering several advantages over conventional truck scales.

One of the main advantages of WIM systems is their speed and efficiency. Because vehicles do not have to stop to be weighed, WIM systems can quickly and accurately determine the weight of many vehicles. WIM, therefore, allows for more efficient commercial vehicle weight enforcement, eliminating the need for vehicles to queue up at traditional truck scales.

Secondly, in addition to their speed and accuracy, WIM systems also offer the advantage of being able to collect data on the weight and size of vehicles. This information can be used for various purposes, such as monitoring trends in vehicle weight and size and identifying potential safety concerns. Traditional truck scales do not have this capability.

Finally, WIM systems are also more cost effective than traditional truck scales, and because they do not require vehicles to stop, WIM systems can be installed in locations where traditional truck scales cannot, such as on bridges or at intersections. This allows for more comprehensive commercial vehicle weight enforcement without the need for expensive and time-consuming construction of traditional truck scales.



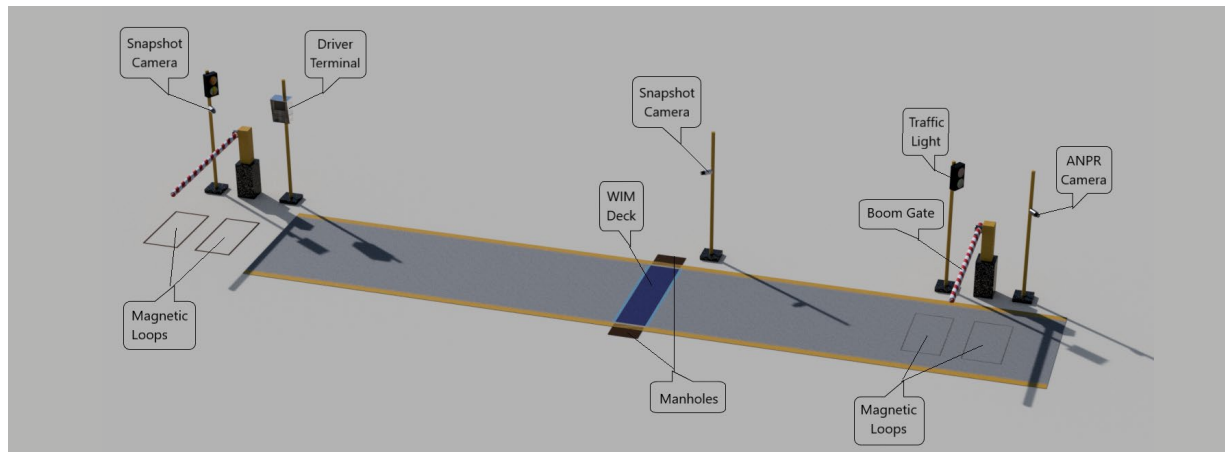
AI ENHANCED APNR DATA GATHERING INCLUDES MAKE AND COLOUR

Sasco's WIM Range

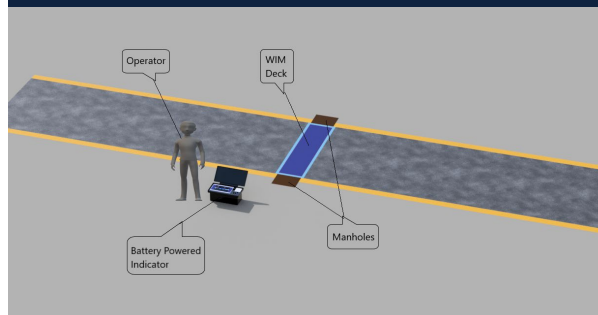
The capabilities of Sasco's WIM range include exceedingly accurate slow-speeding in-motion weighing of vehicles up to 5kmph right through to high-speed in-motion weighing of vehicles at up to 120 kmph, but with lower accuracy.

Through our wide range of solutions comprising Low-Speed Basic (WIM 1000), Low-Speed Advanced (WIM 2000), Low-Speed Ultra (WIM 3000), Low-Speed Cybernetic (WIM 4000), Sasco has pioneered the development of slow-speed road weigh-in-motion for the African market.

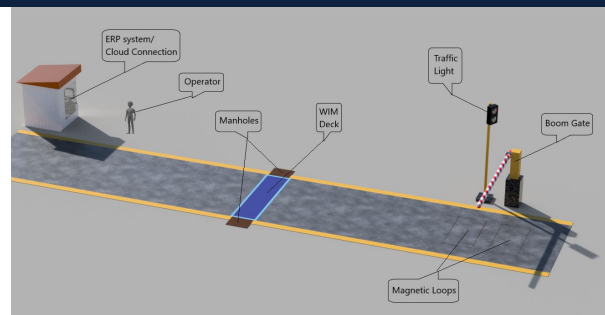
In addition to our range of slow-speed weigh-in-motion solutions, Sasco also offers a high-speed cybernetic (WIM 5000) weigh-in-motion system.



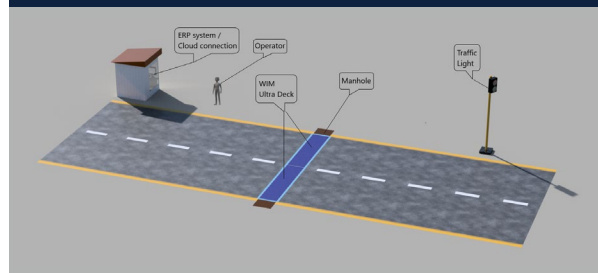
WIM 4000



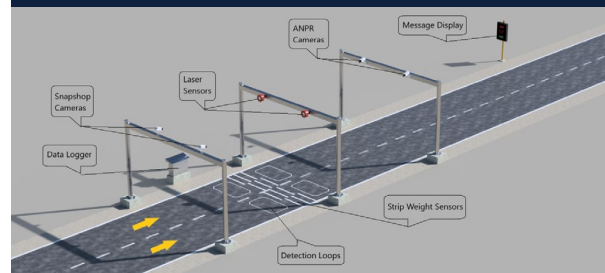
WIM 1000



WIM 2000



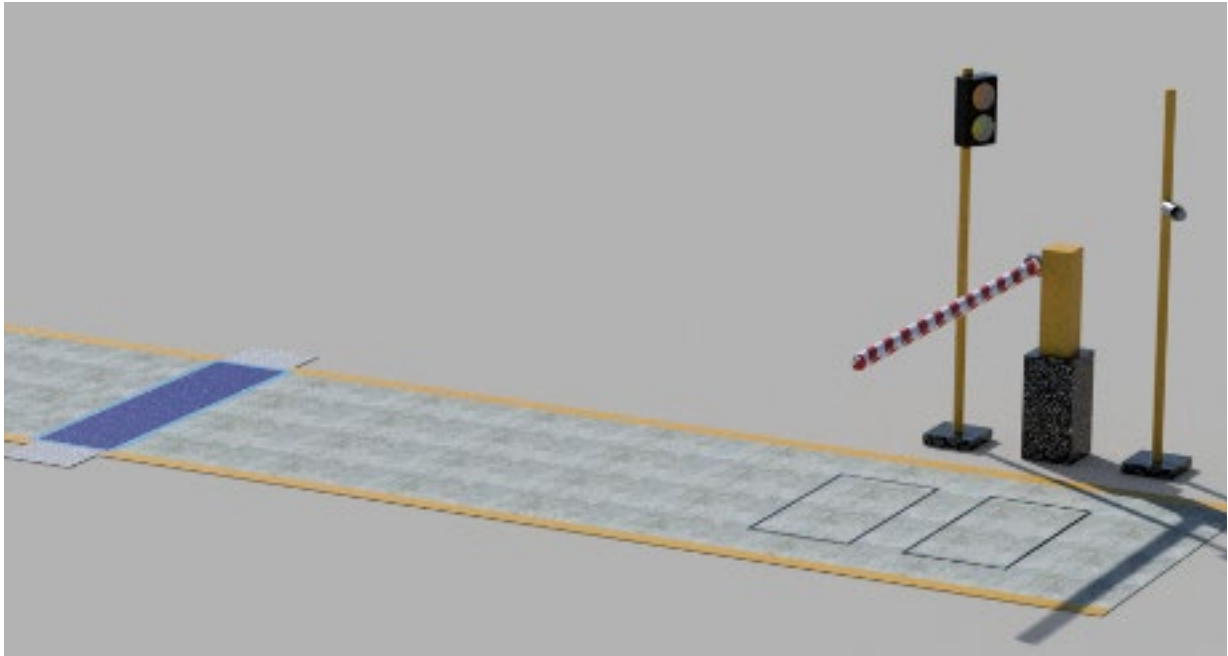
WIM 3000



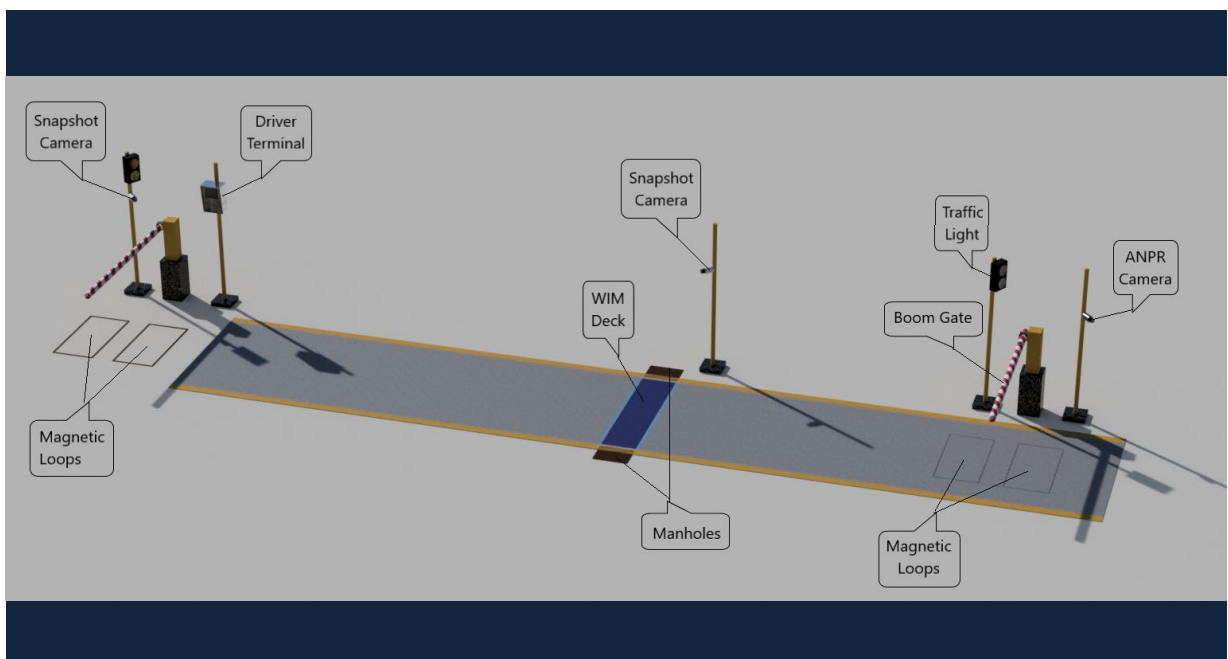
WIM 5000

WIM 4000 Overview

The WIM 4000 can be configured to deliver fully automated weigh-in-motion for either one direction or bi-direction traffic flows.



WIM 4000 ONE DIRECTION TRAFFIC CONFIGURATION



WIM 4000 BI-DIRECTION TRAFFIC CONFIGURATION

Proven Operational Accuracy

Under normal operating conditions, the accuracy of the WIM 4000 has been validated through parallel multi deck weighbridge cross testing to consistently deliver the following results:

EXCEPTIONAL TOTAL ACCURACY	PERCENTAGE ERROR ON TOTAL WEIGHT	PERCENTAGE ERROR ON AXLE GROUP
3 Kmph	<1%	<2.5%
5 Kmph	± 1%	<2.5%

Approach speeds in excess of 5 Kmph onto the WIM 4000 will impact the accuracy of the system.

WIM Deck

The WIM 4000 uses the Sasco WIM Deck.

The WIM Deck is a steel weighing deck approximating 3 sqm in size and is flush mounted in the ground. Therefore, the concrete civil works around the deck are straightforward but the WIM Deck approaches must be level for at least 10m on the approach side.

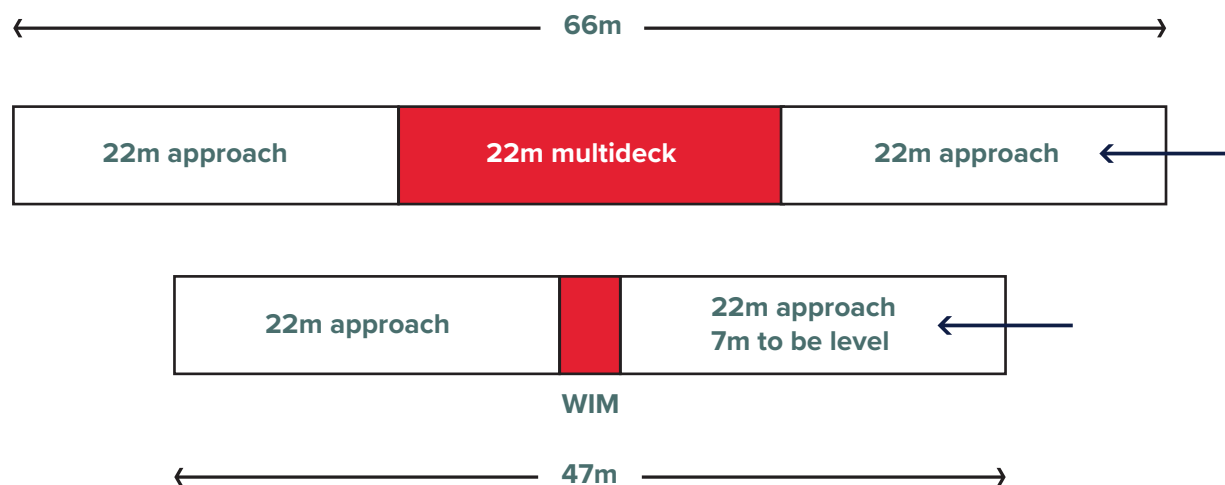


SASCO WIM DECK FLUSH MOUNTED IS JUST 2.9 SQM

The WIM Deck is highly robust and can accommodate axle loadings of up to 30T per axle which is exceptionally strong. Vehicles of any length can be weighed, and this is done in motion at speeds not exceeding 5 kmph. Once completed, vehicle total weight and group axle weight data is generated.

One of a number of advantages the WIM Deck has over multi deck weighbridges, is the amount of space required.

Taking a normal articulated truck length of 22m and the requirement for the truck to be straight when approaching the weighing device, the relative space requirements are as follows:



DD700 Indicator

The WIM 4000 uses the DD700 indicator.

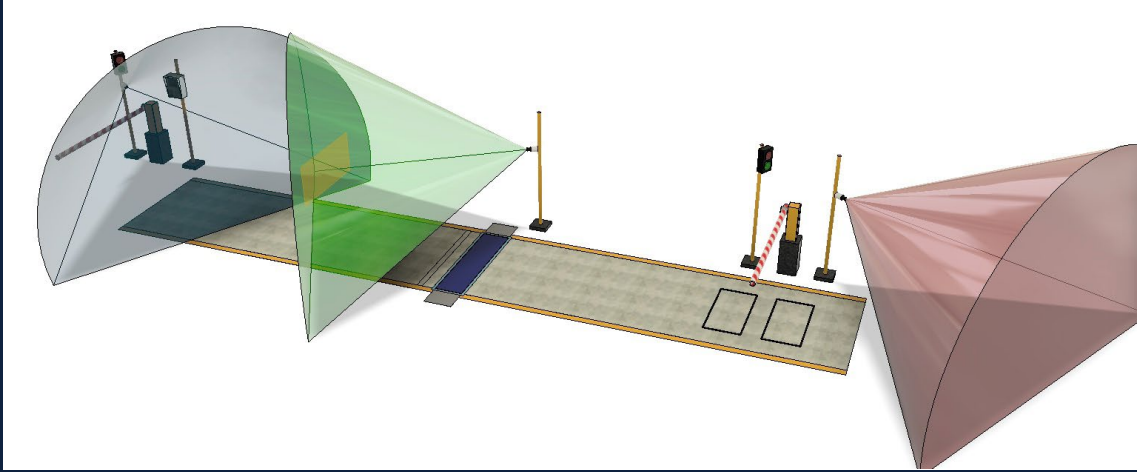


The specifications of the DD700 indicator are:

- USB host
- Full audit trail
- OIML approval
- 1 x RS232 serial port
- 1 x RS422 port
- NTEP 10 000 divs approval
- Two additional slot options
- Traffic device sequencing interfaces.
- Configurable memory storage for truck data
- Capacity to import and export CSV format data

APNR Camera Coverage

The APNR camera coverage on the WIM 4000 with a bi-direction configuration is wide offering complete recorded imagery of all vehicles driving over the system.

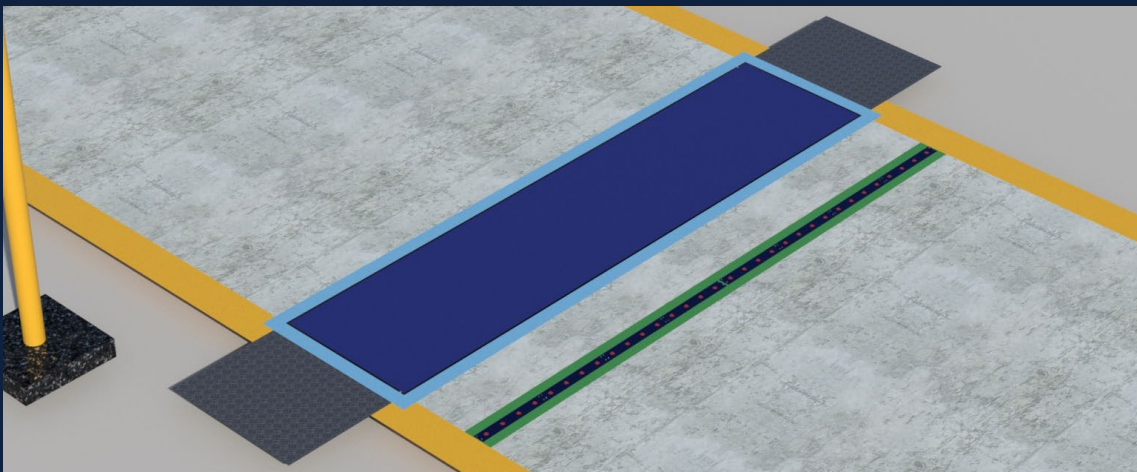


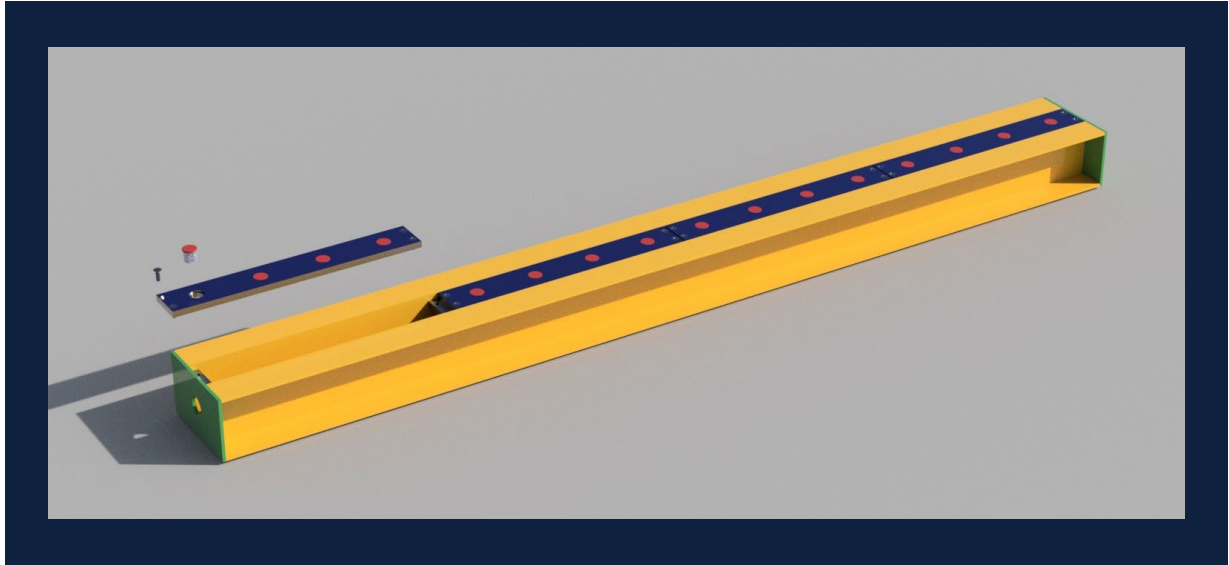
APNR AND SNAPSHOT CAMERA COVERAGE

Added Option of Tire Classification

For customers who wish to receive, in addition to total weights and axle weights, the legal permissible weights of vehicles and each axle group, it is necessary to determine for each axle the exact number of tires on each axle.

This requires the addition of the Sasco Tire Classification module which is fixed in the ground immediately in front of the WIM Deck.

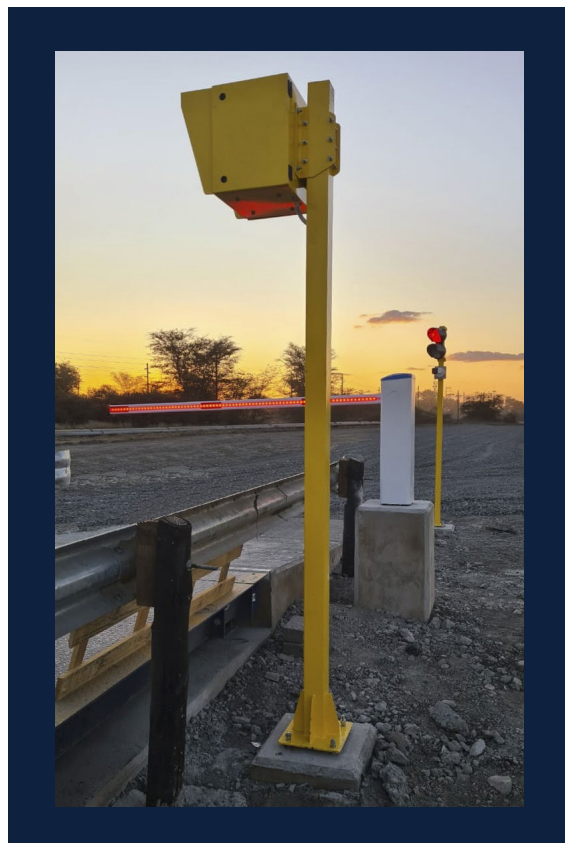




SASCO TYRE CLASSIFICATION MODULE

Added Option of the DT 3500

The DT 3500 is a driver terminal with built in printer that can accommodate a wide range of additional hardware devices including an intercom, RFID scanner, QR scanner and no touch sensors.



SASCO DT 3500 USED IN COMMUNICATION WITH INBOUND VEHICLES

Data Generation

The following data will be generated in relation to each vehicle passing over the WIM 4000:

- Time and date of weighing.
- Vehicle type.
- Vehicle color.
- Vehicle registration.
- Total weight.
- Number of axles.
- Weight of each axle.
- Average speed over the WIM Deck.
- Image of the complete vehicle.

If the WIM 4000 includes the Sasco Tire Classification module, the following additional information will be generated:

- For each axle the number of tires
- A unique vehicle configuration code defining the vehicle configuration.
- Permissible total weight.
- Permissible group axle weights.
- Comparison of total weight to permissible weights
- Comparison of group axle weights to permissible weights

The WIM 4000 operates using the ProWeigh+ software with all the integration functionality that ProWeigh+ offers:

- ProWeigh+ offers two distinct integration methods, the first being Business Connector which synchronizes data between your various WIM systems with a central database, from here it can then be integrated into a host of applications including ERPs such as SAP, Sage, and Syspro as well as reporting tools like QlikView and Microsoft PowerBI.
- The second method is Web Services which is a standardized messaging protocol which allows you to closely interact with ProWeigh to maintain and monitor various aspects of the software. This is well suited for large workflow-controlled environments.

Figure 1: Webservices

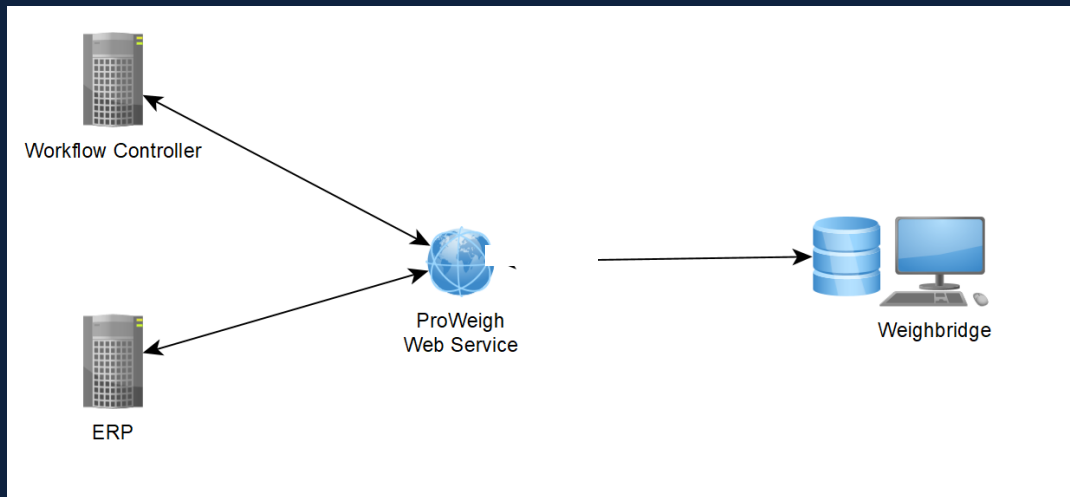
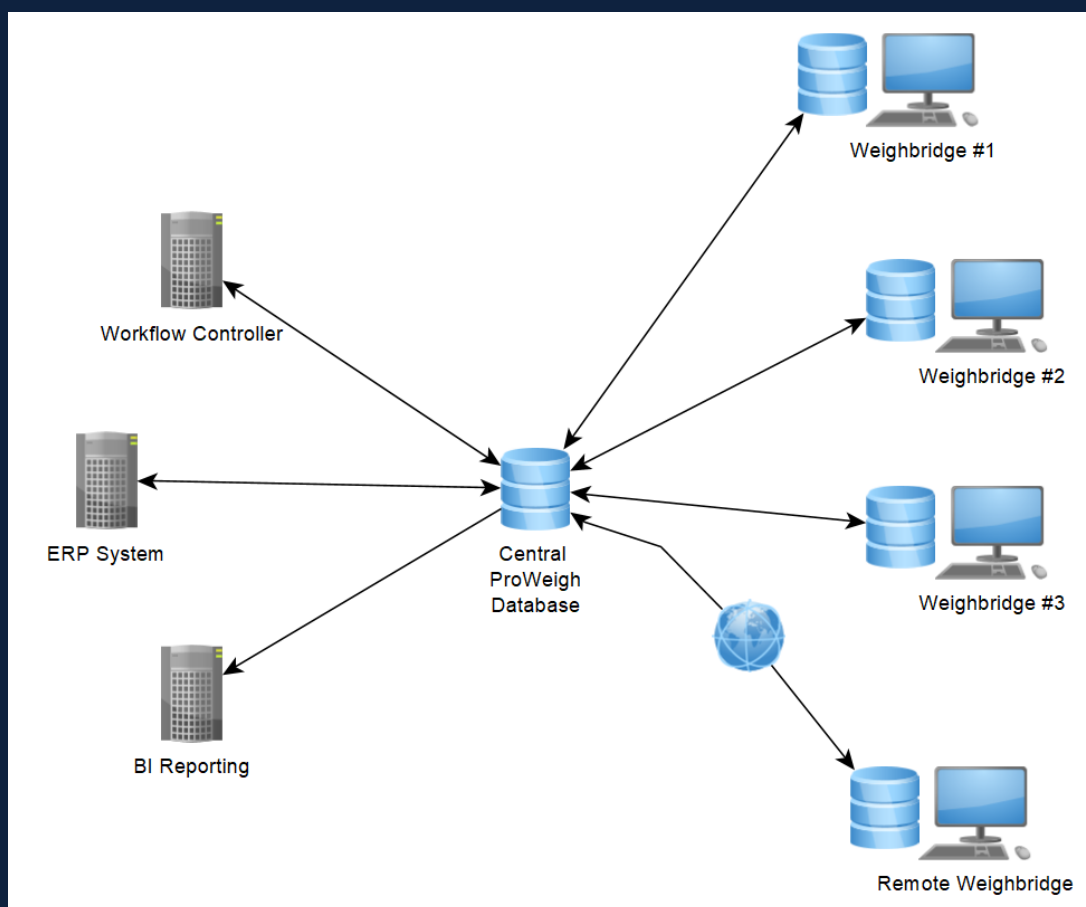


Figure 2: Centralised Database



WIM 4000 Application Example

Unmanned Exit Application

Company A's is owner and operator of a large distribution warehouse which handles the storage and distribution of cargoes for multiple customers. The facility operates 24/7 and numerous different haulage companies collect cargoes for delivery to numerous customers.

In terms of the operations the following points are important:

- All **Company A's** customers want to know the date and time of the dispatch and receipt of deliveries as well as the approximate cargo weight.
- In the case of all dispatch cargoes, **Company A** contracts with a variety of transporters and pays them a rate which is in part a function of the amount of cargo carried.
- From a compliance perspective **Company A** is required to ensure that insurance cover on route is not potentially compromised by departing vehicles being overloaded.
- Therefore, total weight and axle weights must be gathered and compared to the permissible weights for each departing vehicle.
- Access control is important and only detailed logs of all vehicles must be maintained.

The solution provided by Sasco was to install at the entrance gate and exit gate a WIM 4000 each with a DT 3500 and in the case of the outbound WIM 4000 one Sasco Tire Classification module linked using the ProWeigh Business Connector module to Company A's ERP system.

The combined WIM 4000 system therefore provided the following controls and data:

Inbound Trucks

- The truck approaches the entrance boom and the APNR camera reads the truck plate, color and make.
- Drivers presents delivery or collection documentation to the QR code scanner on the DT 3500.
- The QR code is scanned and if valid the traffic light turns green scanned, and the boom goes up.
- The truck then proceeds forward driving over the WIM to the distribution center.
- ProWeigh stores the following information: truck registration, truck make, truck color, front image, QR code number, total weight and time and date.

Outbound Trucks

The truck approaches the APNR camera, and the plate is read.

- ProWeigh looks up the arrival database and establishes that the arrival particulars of this truck are in the system.
- The traffic light turns green, and the boom goes up and the truck proceeds to approach the WIM.
- Enroute the truck drives over the Sasco Tire Classification module which identifies for each axle the number of tires.
- The truck then drives on over the WIM and stops opposite the DT 3500.
- The driver moves his hand in front of the no touch sensor and a weighing ticket is printed containing all the particulars for the vehicle including total weight, axle weights, and permissible weights.
- ProWeigh then stores the following information: truck registration, total weight, group axle weights, permissible weights and time and date.
- ProWeigh then computes the cargo weight based on the inbound weight and outbound weight.

ERP System Data Feed

ProWeigh then transmits the following data to **Company A's** ERP system:

- Truck registration
 - Truck make and model
 - Truck image
 - Delivery or collection
 - QR code number scanned
 - Empty weight
 - Full weight
 - Estimated cargo weight
 - Outbound Group axle weights
 - Permissible total weight (outbound)
 - Permissible group axle weights (outbound)
 - Time and date in
 - Time and date out
-

WIM 4000 Application Example

Fuel Station and Truck Stop Application

Company B is a fuel distribution group that owns fuel stations catering to both cars and trucks. Trucks are refuelled at a separate diesel-only area at the fuel station.

Company B has found out that truck operators in the proximity of one of their larger fuel stations are finding it challenging to ensure that their trucks are not overloaded before departing on long cross-border trips.

To attract more trucks to refuel at this fuel station, Company B decided to request that Sasco partner with them through the installation of a WIM 4000 with the added hardware, software and cloud connectivity needed to operate as a fully unmanned “Pay & Weigh” site.



In partnership with Sasco, a “WIM 4000 Pay & Weigh” was installed just after the truck refuelling bays. The outcome was that Company B’s fuel volumes have increased substantially as truckers now use the site to both refuel and weigh in a simple, seamless manner:

- When paying for the file, the cashier generates a specific weighing authorization voucher for the driver.
- This voucher contains details of the truck registration, owner, configuration of the truck trailer, and tare weight if he knows it.
- Using this voucher, the truck driver goes to the weighing system and scans the code; the traffic light goes green, indicating he must drive over the WIM and weigh, after which he stops and walks back to the driver terminal to collect his weighing ticket.
- Because his truck registration is also loaded on the Sasco Cloud, the truck owner also gets electronically a copy of this ticket.



WIM 4000 Technical Specifications

GENERAL WEIGHING HARDWARE	DETAILS
Deck width	0.76m
Deck length	3.2m
Required level approach	7m
Number of load cells	4
Load Cell approval	OIML
DD700 approval	OIML
Maximum weighing Speed	5 Kmph
Minimum weighing Speed	3 Kmph
Speed recorded	Yes
Weighing accuracy at maximum Speed	+/-99%
Weighing accuracy at minimum speed	>99%
Maximum number of axles	20
Manned or Unmanned	Unmanned
PC Required	Yes
Printer Required	No
Mains power required	Yes
Option of add on peripheral devices	Yes

WEIGHING SOFTWARE	DETAILS
ProWeigh	Version 4.6 or higher

AUTOMATION AND OTHER HARDWARE	DETAILS
Industrial Computer (Standard 1)	<ul style="list-style-type: none"> • CPU: Intel Core i5 (8th generation or newer) or • AMD Ryzen 5 {3000 Series or newer) • RAM: 8GB or Higher • Storage: 500GB or More • Network: Ethernet and Wi-Fi Serial • Port if serial communication needed. • USB: 4 ports minimum • Display Resolution: 1920 x 1080. • Operating System: Windows 10 or • Windows 11

WIM 4000 Technical Specifications

AUTOMATION AND OTHER HARDWARE	DETAILS
ANPR (Standard 1-2)	<ul style="list-style-type: none"> Automatic Number Plate Recognition Software. Camera: 4MP or Higher
Situational Snapshot Camera (2 with bi-directional configuration)	<ul style="list-style-type: none"> 2MP or Higher
Boom (Standard 1-2)	<ul style="list-style-type: none"> High speed. Low power usage. Boom with LED Break away arm. Battery backup. Manual override. Cabinet finish mild steel.
Traffic Light (Standard 1-2)	<ul style="list-style-type: none"> LED Honeycomb diffuser SABS approved
Other (Standard)	<ul style="list-style-type: none"> Networking Equipment 4G Router NVR Weighing Indicator Power Supplies
DT 3500 (Optional)	<ul style="list-style-type: none"> LED/LCD in built. Printer Optional intercom Optional RFID scanner Optional QR scanner Optional no touch sensor
Sasco Tire Classification Module (Optional)	<ul style="list-style-type: none"> 12 - 16 tyre sensors

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