



WEIGH-IN-MOTION



LENGTHENING  
THE LIFESPAN  
OF ROADS

**cross**<sup>®</sup>



[cross-traffic.com](https://cross-traffic.com)

# SYSTEMS FOR DETECTING OVERLOADED VEHICLES

## WEIGH-IN-MOTION



SIZE MEASUREMENT SENSOR

90  
3082

ADR  
RECOGNITION  
SYSTEM

LPR SYSTEM

← DIRECT ENFORCEMENT ← STATISTICS



PRESELECTION  
FOR ON-SITE  
SOLUTION  
OF OFFENCES

VMS



PRE-SELECTION →



COMPATIBLE  
WITH VARIOUS  
TYPES OF  
SENSORS



OVERVIEW  
CAMERA

CONTROL UNIT  
CROSSWIM

- ESAL CALCULATION
  - UNDERINFLATED TYRE DETECTION
- normal overinflated underinflated

### PROTECTION OF ROADS, FAIR TOLL SYSTEMS



## CONTROL UNIT

# CROSSWIM



## LENGTHENING THE LIFESPAN OF ROADS

# WEIGH-IN-MOTION



**LONGER LIFESPANS OF ROADS**

Overloaded lorries cause ruts, potholes, damaged edges and costly repairs, easily avoided by diverting them off motorways. CROSS WIM systems protect roads, extend their lifetimes and cut costs.



**IMPROVED DRIVING SAFETY**

Modern cars are safer, faster and more technologically advanced than ever before. Our technologies enable fast-running, well-maintained roads and optimal vehicle performance.

Imagine a world with fast-moving traffic on smooth motorways. No restrictions, no gridlock, no diversions. No endless repairs creating hold-ups. Safe roads with fair tolls.



**CHARGING FAIR TOLLS**

The amount charged to use a road should relate to the distance travelled and load carried by a vehicle. The toll fee ought to reflect that a fully laden lorry wears the surface more than an empty one.



**EASIER OPERATION AND PLANNING OF MAINTENANCE**

It pays to have accurate data on all aspects of traffic, making it possible to divert oversized vehicles, free up city streets and schedule roadworks and construction.

**CrossWIM is a cutting edge, high-speed and low-speed, weigh-in-motion system that meets the most demanding criteria for traffic detection and dynamic weighing. CrossWIM is used to gather traffic statistics and facilitates pre-selection, tolling, and direct enforcement.**

It was developed with an emphasis on accuracy, reliability and simplicity. It is suitable for basic, single-lane installations through to extensive, multi-lane environments with heavy traffic.

- Vehicle data (gross vehicle weight, axle load, wheel load, vehicle type/class, vehicle speed, gapped distances, vehicle dimensions)
- Measures the dimensions of vehicles (height, width, length)
- Detects multi-tyre vehicles
- Measures the speed of vehicles
- Road temperature measurement
- Highly accurate vehicle classification
- Detection of underinflated tyres
- Watchdog monitoring system
- Web API for integration of third-party data
- SQL database



**Compatible with third-party components**



**Modular system for every purpose**



**Compatible with various WIM sensors**

- Sensitivity from 0 kg in weight
- Traffic volume accuracy of 98%
- Classification accuracy of 95% (the average depends on the vehicle category)
- Communication options of 4G, 5G, LTE, TCP/IP, Wi-Fi
- 2x SSD disk in RAID 1 for data storage and 1x HDD for storing camera images
- Max. cable length to loop: 300 m; WIM sensor: 100 m
- Designed for operations in extreme climatic conditions (standardized switchboard versions: ARCTIC, TROPIC and DESERT)
- For less road interference, WIM can also be installed in a loopless version

## VEHICLE CLASSIFICATION

- Standard EN 8 + 1
- EUR 13, COST 323
- Option for expanded adaptation to specific national standards
- Custom categories to reflect specific customer/end-user needs and requirements



- Weighing sensitivity from 500 to 20 000 kg per axle
- Vehicle length measurement accuracy  $\pm 1$  m

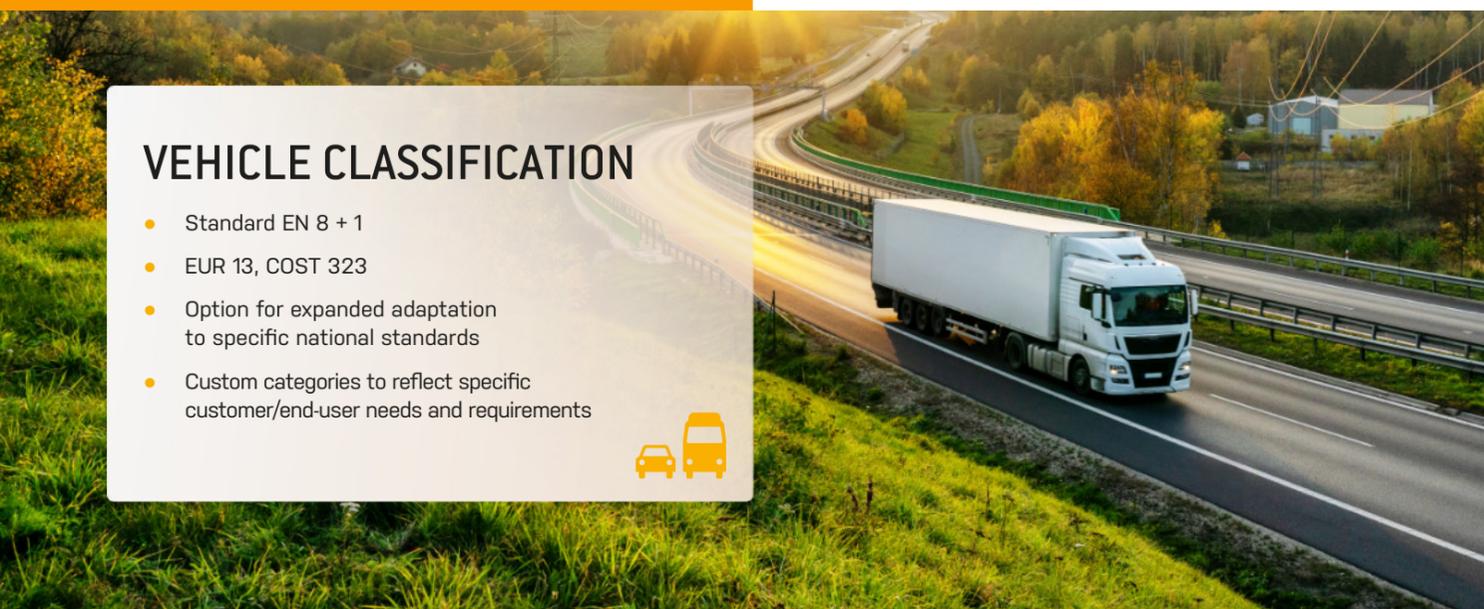
- Axle distance measurement accuracy  $\pm 0.05$  m
- Speed measurement accuracy  $\pm 3$  km/h

## HIGH-SPEED CROSSWIM

- Minimal recommended speed of 10 km/h for HS WIM

## LOW-SPEED CROSSWIM

- Speed range 1 - 30 km/h
- Speed and length measurements based on laser scanner technology (loopless solution)



# A MODULAR SYSTEM

CrossWIM is designed as a modular system and can be configured to deliver the precision required. The potential exists to combine various units and build stations suitable for particular applications, as described below.



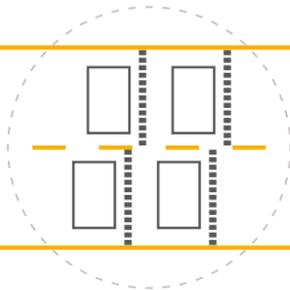
## OTHER CROSSWIM APPLICATIONS

- Monitoring the movement of lorries and weighing them at logistics centres and similar commercial premises
- Protecting city centres from overloaded vehicles
- Accurate statistical data for licensed users

## CROSSWIM STATISTICS

Weighing with accuracy of  $\pm 20\%$

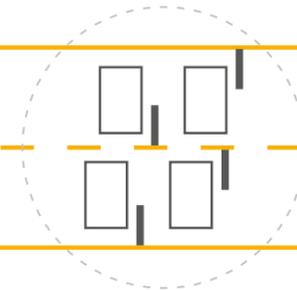
To measure traffic and to obtain a detailed overview of the traffic flow.



## CROSSWIM PRE-SELECTION

Weighing with accuracy of  $\pm 7.5\%$

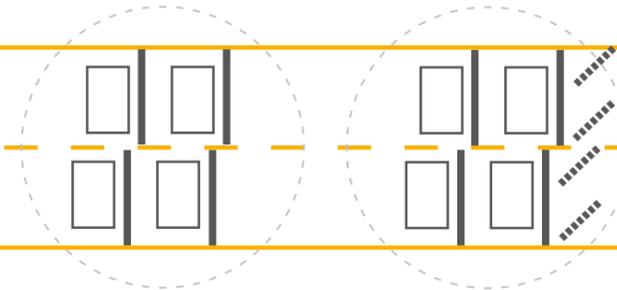
For more accurate traffic measurement, for weighing vehicles and their pre-selection for solving violations.



## CROSSWIM DIRECT ENFORCEMENT

Weighing with accuracy of  $\pm 5\%$

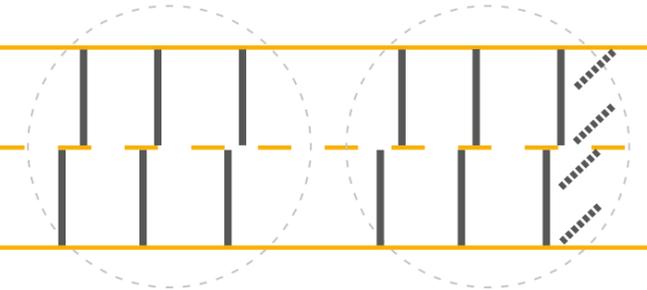
For accurate traffic measurement and automatic fines for overloaded vehicles.



## CROSSWIM LOW-SPEED

Weighing with accuracy of  $\pm 3\%$

For accurate measurement of vehicles travelling at speed from 1 to 30 km/h. With optional extended functionality of multi-tyre detection.



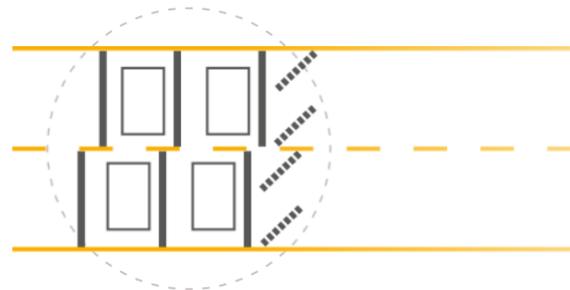
### TYPICAL INSTALLATION

- Two induction loops per lane
- Two rows of PIEZO sensors per lane
- Indicative measurement of speed, the number of axles, length of the vehicle, wheelbase and axle load
- Vehicle classification

### TYPICAL INSTALLATION

- Two induction loops per lane
- One row of QUARTZ or strain gauge sensors per lane
- Measurement of speed, the number of axles, length of the vehicle, wheelbase and axle load
- Vehicle classification

Weighing with accuracy of  $\pm 3\%$



### TYPICAL INSTALLATION

- Three rows of QUARTZ or strain gauges
- Measurement of the number of axles, wheelbase and axle load
- Optional diagonal sensors for detecting multi-tyres, axle widths, vehicle position relative to lane width
- Enhanced vehicle classification

### TYPICAL INSTALLATION

- Two induction loops per lane
- Two (or three) rows of QUARTZ or strain gauges
- Measurement of speed, the number of axles, length of the vehicle, wheelbase and axle load
- Optional diagonal sensors for detecting multi-tyres, axle widths, vehicle position relative to lane width
- Enhanced vehicle classification



VARIABILITY AND ACCURACY

# CROSSWIM

CROSSWIM is a unique weigh-in-motion system that is independent of the manufacturer and the technology of road weighing sensors. Variability is enhanced by accurate evaluation of temperature-compensated sensor signals, based on installed temperature sensors under the road surface.

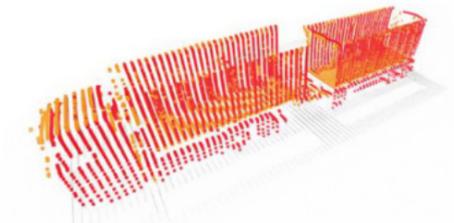
WEB INTERFACE

# CROSSWIM

Referred to as the Watchdesk, the input module of this online application provides an easily manageable console that displays data on vehicles that have recently passed by, giving a preview of them and indicating any violation. It is possible to view detailed information for each vehicle recorded, such as the number of axles it has and individual wheel load, total weight, dimensions of the vehicle, or tyre inflation level. The system is able to function in various languages, which it automatically sets according to the one running in the browser.



**CROSSWIM**



## SOFTWARE

- Real-time visualization of just passed vehicles, including shots from LPR and overview cameras
- Access to a vehicle database, including search and filtering options
- Detailed information of every recorded vehicle (e.g. total weight, wheel load and axle weight, indication of overloading, speed, validity of measurement)
- Traffic statistics (e.g. overloaded vehicles, vehicle classification, country of origin, weight and speed statistics)

- Display of measurement protocol in the case of an offence
- Data export to Microsoft Excel and PDF
- Management of user accounts, database and regional settings
- Web API for data integration
- Calibration, configuration, administrative and maintenance tools

## STATISTICS

- Vehicle categories
- Overloaded vehicles
- Weight-related statistics
- Speed statistics
- Time period selection
- Filtering by vehicle category or other parameters



PIEZOELECTRIC sensors



RoadTrax



Novacos



QUARTZ sensors



Kistler



Enviko



Strain gauge sensors



Intercomp



Dedicated U-Bed Profile for Intercomp and Enviko Sensor



Temperature compensation sensors



## TYPICAL ACCESSORIES



License Plate Recognition



Vehicle size measurement sensor



Variable Message Signs (VMS)



Overview cameras

DIRECT ENFORCEMENT

# CASE STUDY



Initiated in 2011, CROSS Zlín was the first organization in the Czech Republic and the world authorized to implement a high-speed weighing station for the purposes of direct enforcement. The station is equipped with a CrossWIM weigh-in-motion unit – a certified measuring tool for automatically weighing vehicles in motion to an accuracy of  $\pm 5\%$  for gross weight and  $\pm 11\%$  for individual axle weight.

Featuring an automatic ticketing system, the roads in question have benefited from a substantially higher level of protection against damage by overloaded vehicles, dramatically lengthening their lifespan and leading to significant cost savings on repairs.

"The Czech Republic was the first to introduce legal regulations that enable direct enforcement of violation by overloaded vehicles based on high-speed, weigh-in-motion scales."

SELECTED

# REFERENCES



More references



**Hong Kong**

CrossWIM for statistics. Total 2x 3L, 2 rows of loops, 2 rows of sensors for one-way traffic



**Hungary**

Motorway network, 106 CrossWIM stations



**Australia**

CrossWIM for 2L on Bruce Highway, Queensland



**Saudi Arabia**

Motorway network, pre-selection CrossWIM



**Thailand**

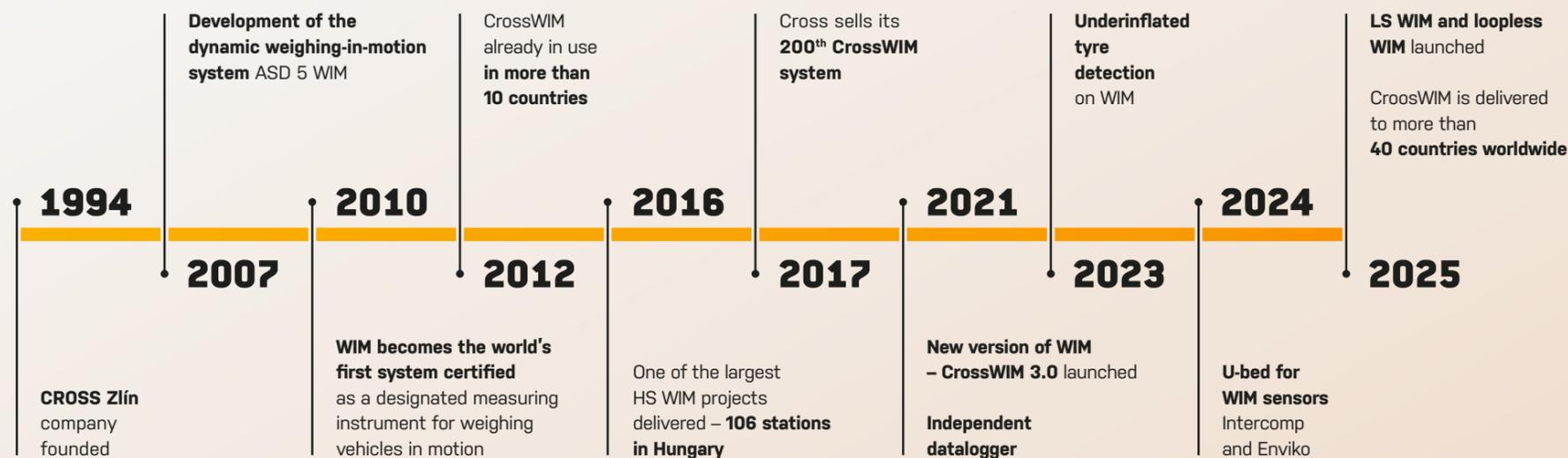
CrossWIM for pre-selection



**Czech Republic**

Complete motorway network

## DEPARTMENT MILESTONES





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