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Poster · May 2019
DOI: 10.1109/ICST.2019.8712098


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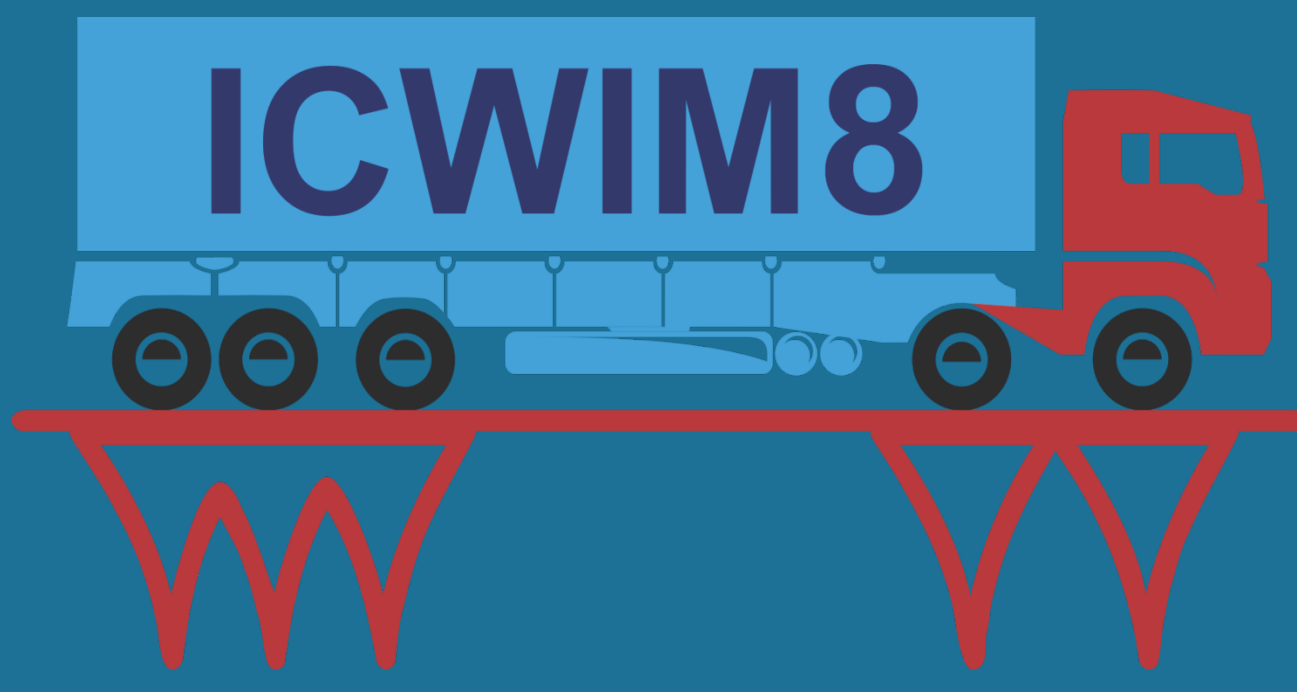
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Argentinian Technical Requirements and Evaluation of WIM Systems



Prague
May 19-23, 2019

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Introduction

In 2017, police inspectors conducted roadside inspections that included checking the vehicle's weight and ensuring compliance with transport regulations. They found a truck traveling with twice the permitted load [1]. This situation is not isolated or particular, but happens rather generally. Enforcement is critical, regulations on overloaded vehicles are adequate, however, the problem of persistent overloading stems from the inadequate enforcement of these regulations. This poster introduces some aspects of the draft requirements specification for Weigh-in-motion systems for direct enforcement in Argentina. The first draft document is based on OIML R-134 [2] recommendation as well as COST323 [3] and some newer experiences from countries like Brazil [4], Uruguay [5], Czech Republic [6] and The Netherlands [7].

Methods

Since 2016, several tests were carried out in order to evaluate, not only the metrological performance of different commercial WIM systems, but also the technical viability for the implementation of its use in Argentinian roads.

The assessment process was based on the test methods described in the International Recommendation OIML R 134-1:2006 "Automatic instruments for weighing road vehicles in motion and measuring axle loads - Part 1: Metrological and technical requirements - Tests".



Static measurements

Four different types of technologies for WIM sensors have been installed in this pilot-project by different commercial providers. Instrument "A": a strain gauge strip sensor. Instrument "B": a quartz sensor. Instrument "C": a bending plate sensor. And the last type, "D": a load cell sensor. Results for 100% of the measurements didn't meet the expectations. Installation problems and adjustment defects were the main roots of error.

Only one of the devices was able to correctly classify all of the vehicles. This aspect is very important in order to automatically set the maximum permitted load, which depends on wheel type (single, dual, superwide), and axle distance.

Tests were carried out in Larena toll station. The weighing station is a concrete platform with characteristics according to the requirements of the European Recommendation COST 323. The site was classified as "excellent".



Weighing station

Requirements

"Argentinian Technical Requirements for Weigh-In-Motion" draft, points out a system accuracy classification table. Table 1 describes all classes and the maximum permitted error (MPE). F type devices can be useful in a first stage of implementation and will allow incipient technologies to be used. The MPEs are defined for in-service verification. Type approval and initial verification requires half of the MPE. The maximum admitted values of scale interval d for each instrument class are specified in Table 2. Vehicle classification accuracy is vital for direct enforcement.

Accuracy Class	d (kg)
A	≤ 10
B	≤ 20
C	≤ 20
D	≤ 50
E	≤ 100
F	≤ 200

Table 2: Scale interval

Software and hardware security requirements were also included in the proposal, source code inspection is mandatory. Authentication, Integrity and Non-repudiation of data are also required for consistent data transfers so digital signature algorithms are suggested.

Conclusions

The proposed technical requirements for WIM systems in Argentina includes test suites similar to OIML for the two axle rigid truck but for all trucks. Since argentinean axle group classification depends on axle distance and wheel type (single, dual, superwide), the specification states that the system must be able to measure the axle distance with a maximum permitted error of 10%. Defined WIM classes are feasible and useful in argentinean actual context.

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Class	MPE / DMP (%)					
	A	B	C	D	E	F
Total Mass	3	5	7	10	15	20
Load per group of axles	5	8	11	15	20	25
Axle load	7	10	15	20	25	30

Table 1: Accuracy Class

