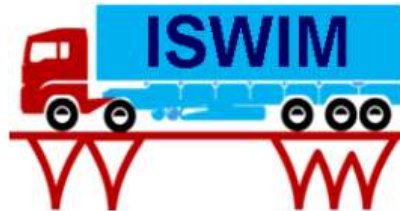


Weigh-In-Motion Systems for Direct Weight Enforcement

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#SaudiIntermobility



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Weigh-In-Motion Systems for Direct Weight Enforcement

Content

1. Introduction
2. Why?
3. How?
4. Examples
5. Key Take Aways



Weigh-In-Motion Systems for Direct Weight Enforcement

Introduction

- Scope
 - Direct Weight Enforcement
 - In-Road WIM
 - High Speed WIM
- Objective
 - Share experience
 - More standardization
 - Not a new standard



Weigh-In-Motion Systems for Direct Weight Enforcement

Why?

- Why Weight Enforcement?
 - Damages to road infra
 - Traffic safety
 - Unfair competition
- Limitations of Traditional Enf.
 - Expensive in operation and staff
 - Limited effect in area and time
 - Limited capacity and efficiency



Weigh-In-Motion Systems for Direct Weight Enforcement

Why?

- Advantages of Direct Enf.
 - 24/7 operation
 - 99% detection
 - Lower costs
 - No disturbance of traffic flow
 - Data also for other applications
- But
 - Needs careful implementation



Weigh-In-Motion Systems for Direct Weight Enforcement

How?

- Objective
 - Guarantee of each WIM measurement used for enforcement
- 3 Key Elements
 - Legal Acceptance
 - System Certification
 - Data Quality Control

Overall objective: Each WIM measurement used for direct enforcement is legally accepted!

Key elements for successful implementation	Legal Acceptance (Enforcement Authorities)	System Certification (Legal Metrology)	Data Quality Control (Operator)
Project Phase	Preparation	Implementation	Operation
Role in Process	<ul style="list-style-type: none"> • To provide legal basis for application 	<ul style="list-style-type: none"> • To provide proof of performance from day 1 	<ul style="list-style-type: none"> • To provide proof of every day performance
Key Requirements	<ul style="list-style-type: none"> • Measurement accuracy and reliability • Operational procedures • Maintenance and calibration of WIM • Determination of sanction 	<ul style="list-style-type: none"> • Standard test procedure with 3 levels of tests <ul style="list-style-type: none"> • Type approval • Initial verification • In-service verification 	<ul style="list-style-type: none"> • Continuous performance stability tests <ul style="list-style-type: none"> • Weighing accuracy • Detection of trends • Confidence level of measurements
Guide reference	<ul style="list-style-type: none"> • See chapter 5 	<ul style="list-style-type: none"> • See chapter 6 	<ul style="list-style-type: none"> • See chapter 7



Weigh-In-Motion Systems for Direct Weight Enforcement

Legal Acceptance

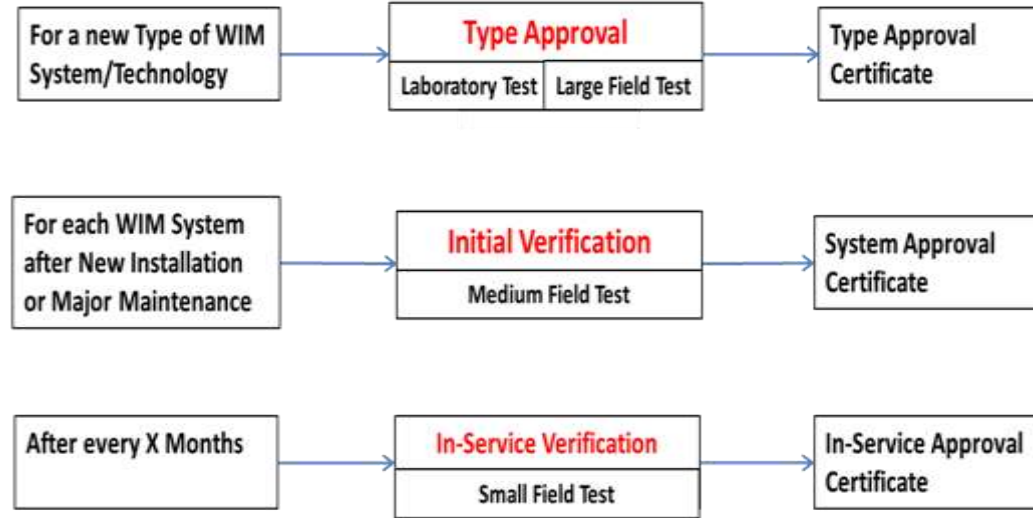
- Metrological Requirements
 - Traceability of measurements
 - Accuracy in MPE
 - Right balance
 - Immunity to disturbances
 - Use of (inter-)national standards
- Organization
 - Authorities involved
 - Procedures



Weigh-In-Motion Systems for Direct Weight Enforcement

System Certification

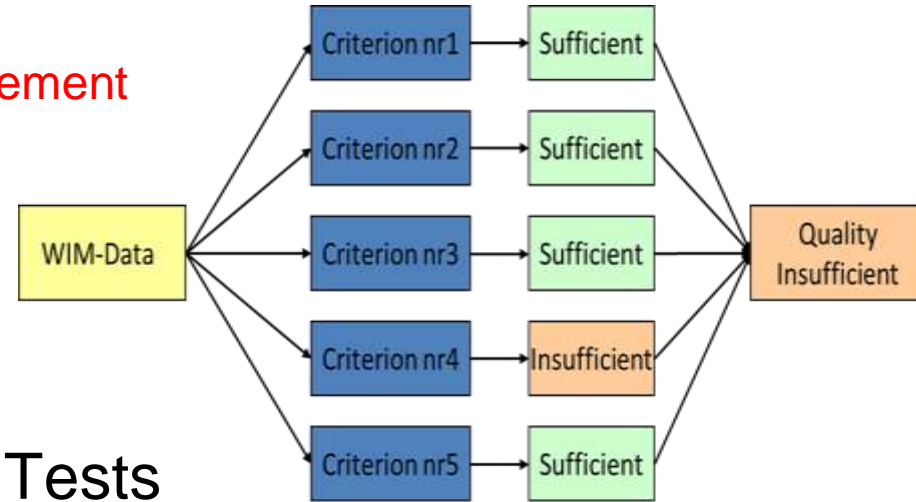
- 3 Levels of Testing
 - Type Approval
 - Initial Verification
 - In-Service Verification
- Test Procedures
 - Laboratory Tests
 - Field Tests
 - Size & Frequency



Weigh-In-Motion Systems for Direct Weight Enforcement

Data Quality Control

- In-service Accuracy
 - Guarantee of each WIM measurement used for enforcement
- Performance Stability
 - Variation over time
- Measurement Accuracy
 - Reference vehicles
- Measurement Confidence Tests
 - By WIM system





Weigh-In-Motion Systems for Direct Weight Enforcement

Examples

- Czech Republic, Since 2011
- Hungary, > 120 systems, 2018
- Brazil, Road Concessionaires, 2022
- USA, New York City, 2023
- South Africa, Technology Trials, 2025



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Questions?

Weigh-In-Motion

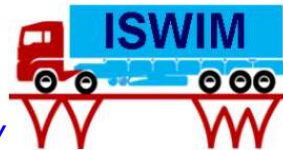
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ISWIM

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9-13 May 2027 in Ljubljana, Slovenia



ICWIM10
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Moving Forward Together

Connecting Heavy Vehicles and Weigh-In-Motion