

Weigh In Motion data from Speed Enforcement Sensors

The WIM ATK project

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Content

- Introduction
- Sensors
- Field tests
- WIM ATK project
- Some results

The Demand for WIM Data

- Real time data
- Control of heavy vehicles (Traffic safety, competitiveness)
- Historical data
- Road planning, design and construction
- Road maintenance
- Bridge applications
- Cost-benefit analysis / Environmental factors

Some Terms and Definitions

- Static weight: The vehicle has to stop at a weight station
- (Low speed WIM: The vehicle is weighed while driving at 5-15 km/h)
- High speed WIM: The vehicle is weighed while driving at the desired speed
- V2I communication: New technology has made it possible to retrieve weight from sensors on the vehicle



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Overload

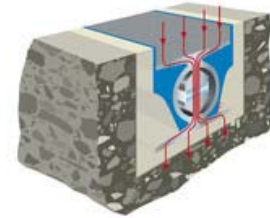
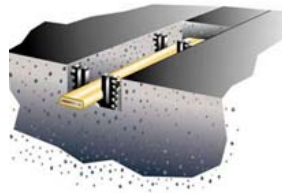


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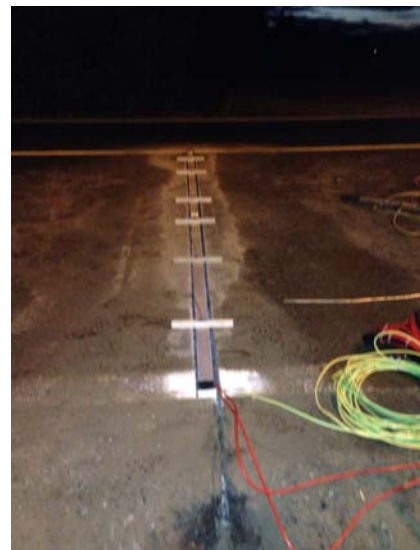
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Sensors / Equipment

- Piezoelektric cables
- Lineas Quartz sensors
- Bending plates
- Bridge WIM
- Strain Gauge Strip sensor
- Single load cell
- Vector sensor



Kistler- Lineas Quarts Sensor



Bending Plates



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Field tests 2011-2016



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Field tests 2011-2016

- Several field tests of piezo based WIM and Lineas Quarts based WIM where WIM data was compared with static weight
- V2I test where weight data was retrieved directly from sensors in the vehicle

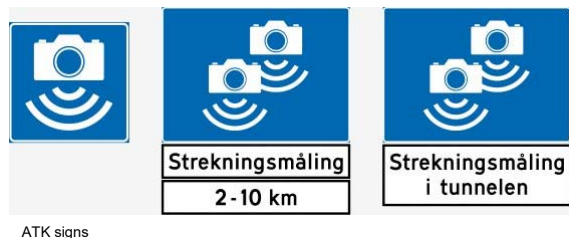


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The Norwegian Speed Enforcement System (ATK)

- Used for speed enforcement in Norway
- More than 250 units across the whole country
- Operated with piezo electrical cables
- Weight data is collected but not further utilized
- First tests with ATK data in 2016. Promising results



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ATK Units

- Consist out of a camera unit and two piezo electrical cables

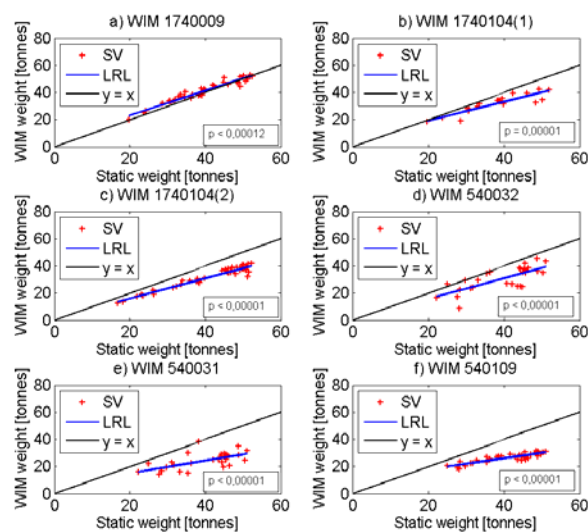


Piezo electrical cables PATK E18 Dørdal



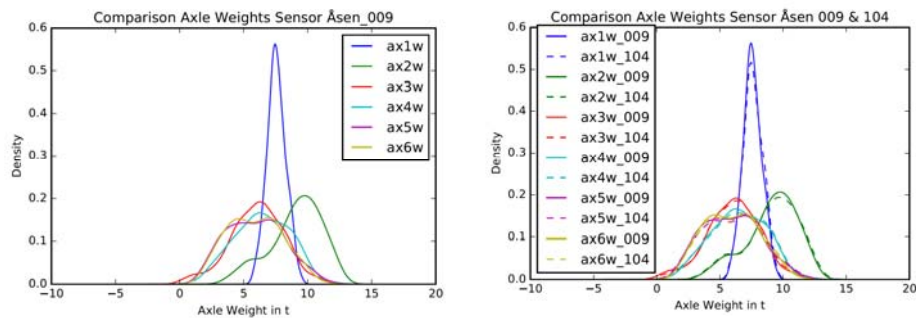
Camera unit PATK E18 Dørdal

First Results 2016



Quality Indicators

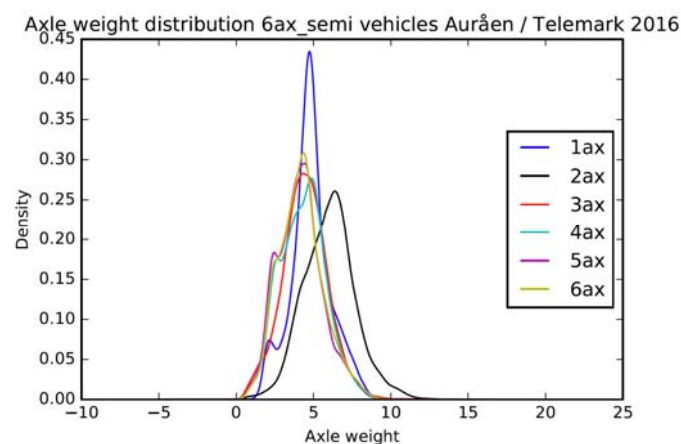
- Relative stable weight of the 1st axle of 6 axle vehicles
- Used as a quality indicator for a ATK unit



Axle weight distributions for 6 axle vehicles on SATK E6 Åsen / Nord-Trøndelag

Field Test 2017

- Axle weight distribution of 6ax semi trailer at PATK Auråen E18 Telemark



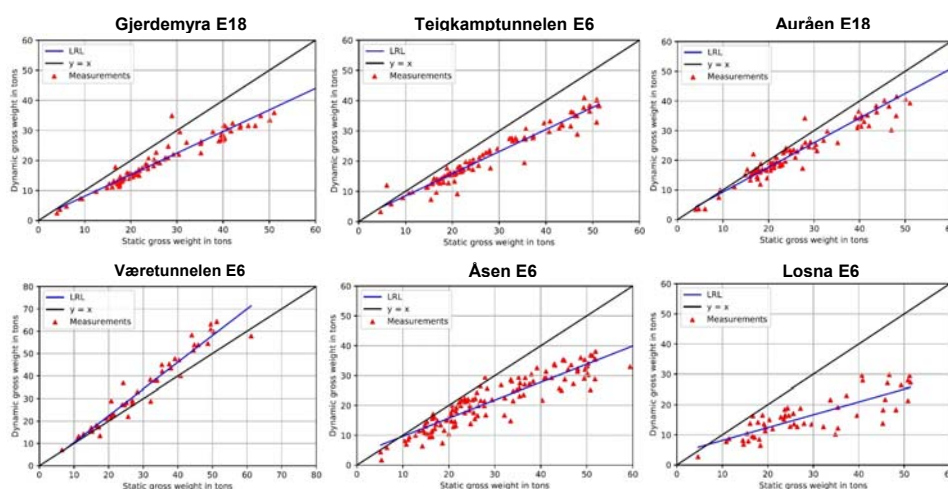
Characteristically Vehicle Class



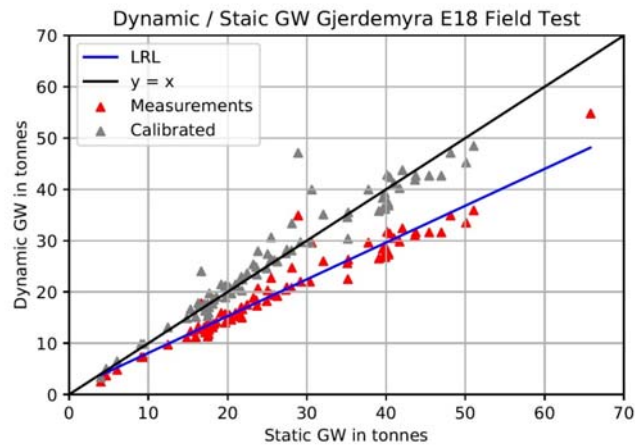
- 7 tons as stable quality indicator
- Introduced by van Loo & Lees (2015)
- Test with Kistler Verdal / N-Trøndelag (E6) 2016

	All 6ax			SEMI		
	Mean in t	STD in t	N	Mean in t	STD in t	N
Kistler Verdal E6	6.998200	0.988884	76 559	6.944768	0.866792	36 454

Overview Results Field-tests



Gjerdemyra E18 Telemark

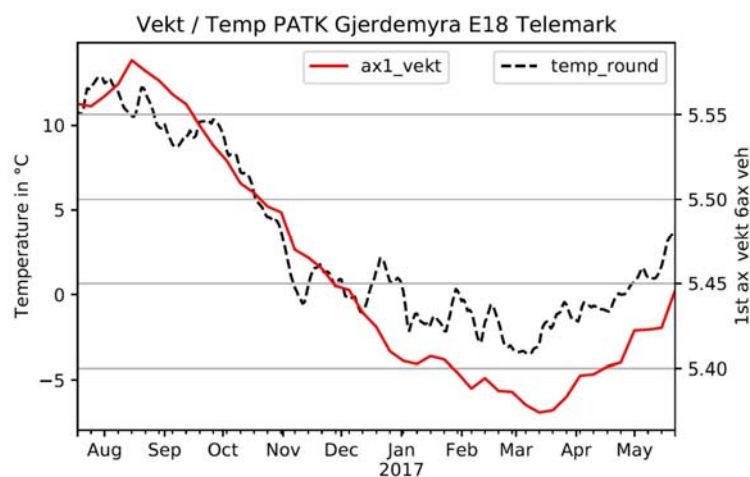


Criteria	n	Mean error	SD error	AC
Field test	85	-24,8%	8,3%	D
Calibration	85	-2,2%	9,0%	D

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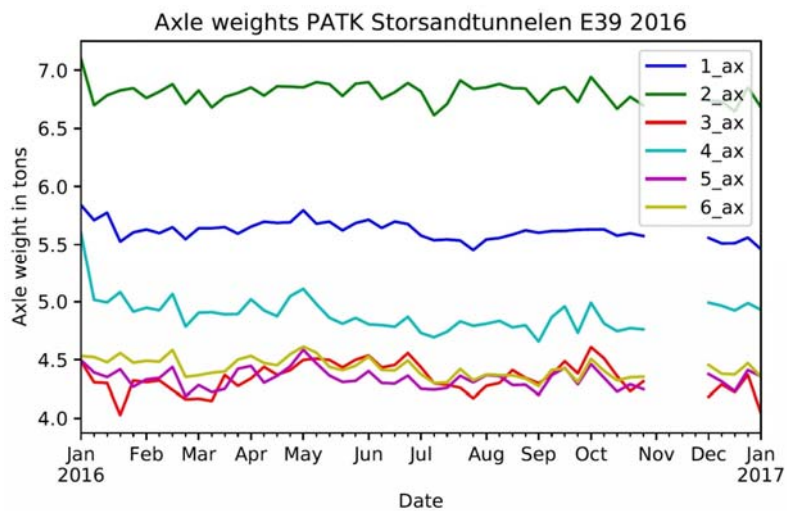
Gjerdemyra E18 Telemark



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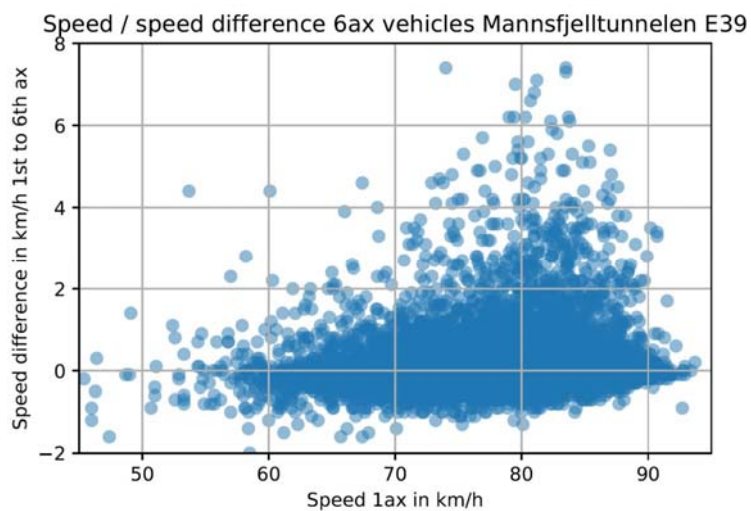
Storsandtunnelen E39 Sør-Trøndelag



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Mannsfjell E39 Trøndelag



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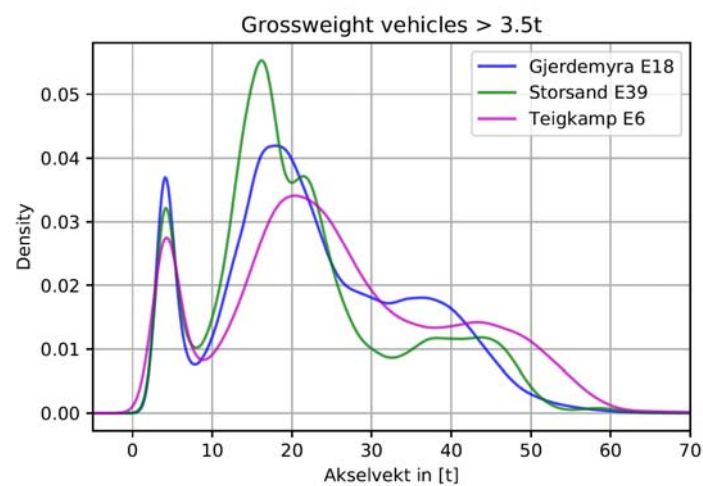
Axle Configuration



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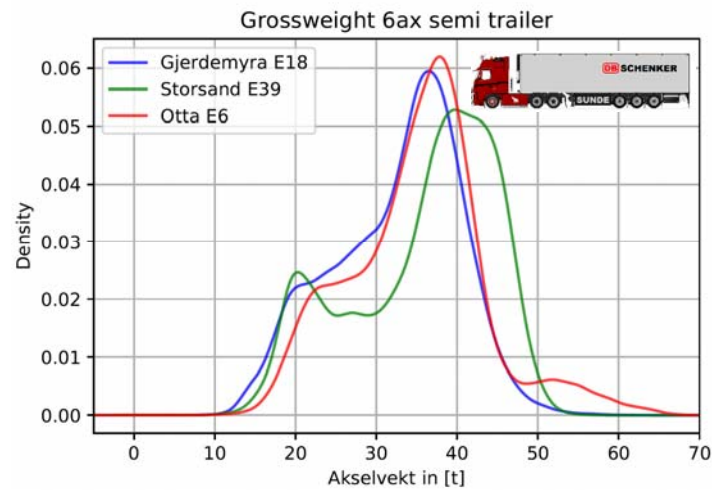
Gross Weight Vehicles > 3.5t



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Gross weight semi 6ax



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Thank you for Your attention!

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