

# TSD Acceptance Testing in Australia

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## Pavement Evaluation 2014

September 15-18, 2014 ▼ Blacksburg, Virginia

# TSD acceptance testing in Australia

- TSD specs
- ARRBification
- Historical deflection testing
- Acceptance testing
- Acceptance trials





# The ARRB TSD

- Manufactured by Greenwood Engineering (Denmark)
- 8<sup>th</sup> in the world – 1<sup>st</sup> into Australasia
- Arrived into Australia January 2014
- 5 year contracts with 3 member organisations:
  - Queensland Transport and Main Roads (TMR)
  - Roads and Maritime Services, New South Wales (RMS)
  - New Zealand Transport Agency (NZTA)
- Commenced collection in Queensland in April 2014

**ONE DOES NOT SIMPLY**

**ACQUIRE A TSD**

imgflip.com

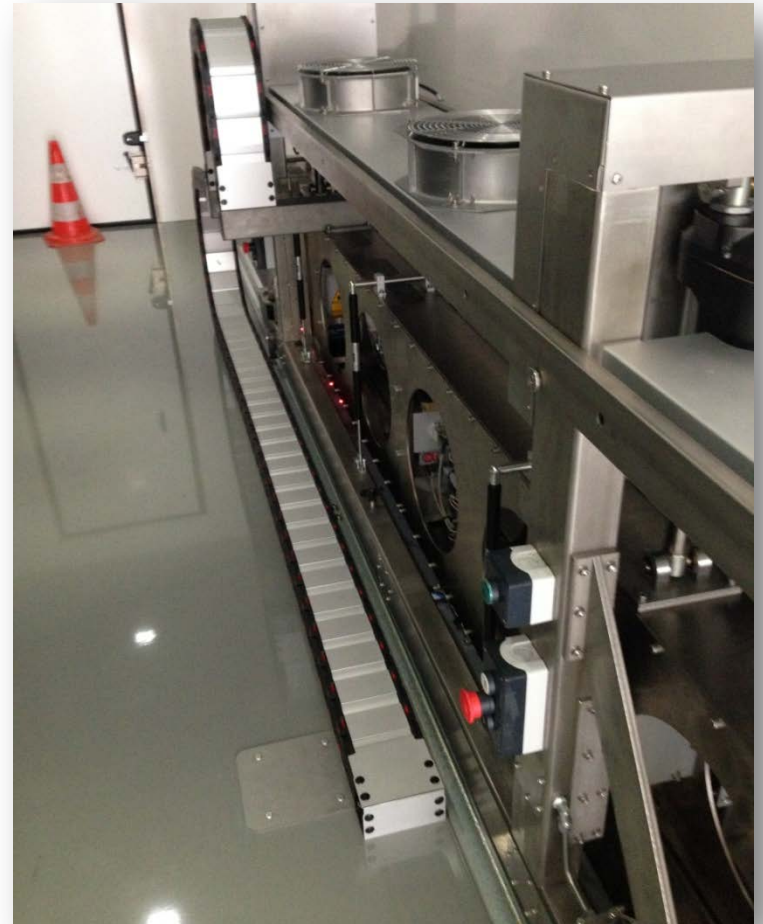
# The Journey





# Specs

- 7 Doppler Lasers:
  - 100mm
  - 200mm
  - 300mm
  - 450mm
  - 600mm
  - 900mm
  - 3500mm (reference laser)
- Operates at 80km/hr
- Trailer is 11250mm long



# Adjusting laser position



# Specifications

- Operates with a consistent 10tonne load
- Single axle prime-mover (Mercedes Actros)
- 2 ballast loads
  - Large (pictured)
  - Small (behind the rear axle)
- 2 ARRB Staff operating at all times
  - 1 driver
  - 1 operator





# ARRBification

- Running a complete Hawkeye System
- 5 cameras (3 forward, 2 rear)
- 5 laser profiler (texture, roughness)
- Automatic Crack Detection (ACD) – also used for rutting
- Gipsi-trac (cross-slope, gradient)



# History of Australian deflection testing



# History of deflection testing





# History of deflection testing



# Issues with past systems

- Static or slow operating speed
- Safety issues
- Reduced coverage
- Expensive

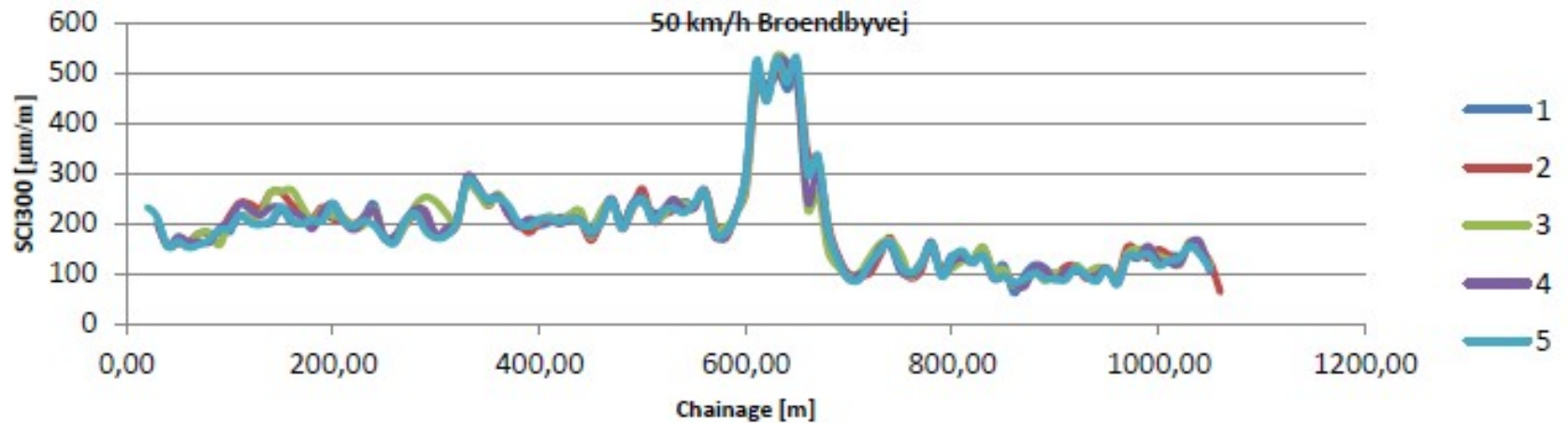


# Highway speed



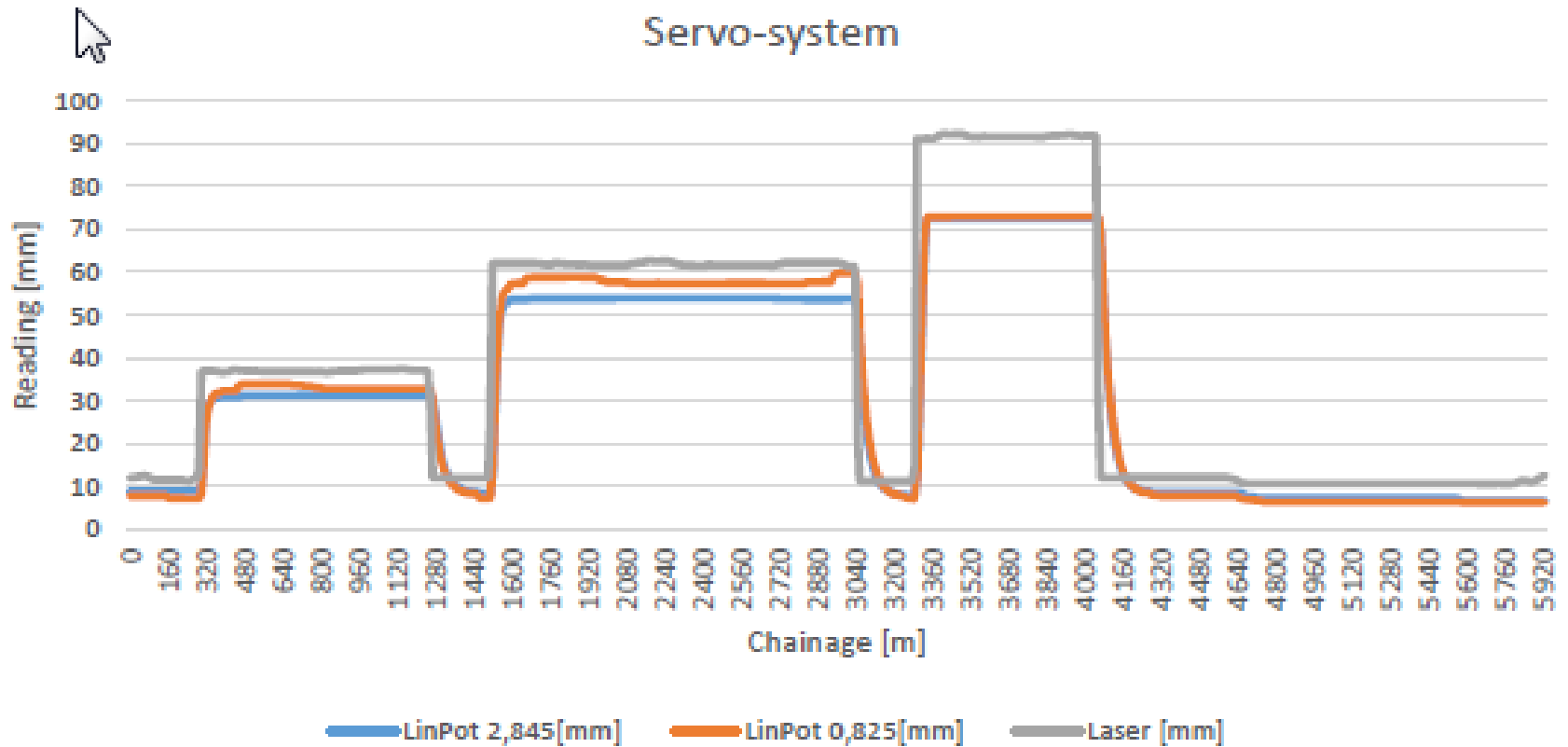
# TSD FAT

- Denmark





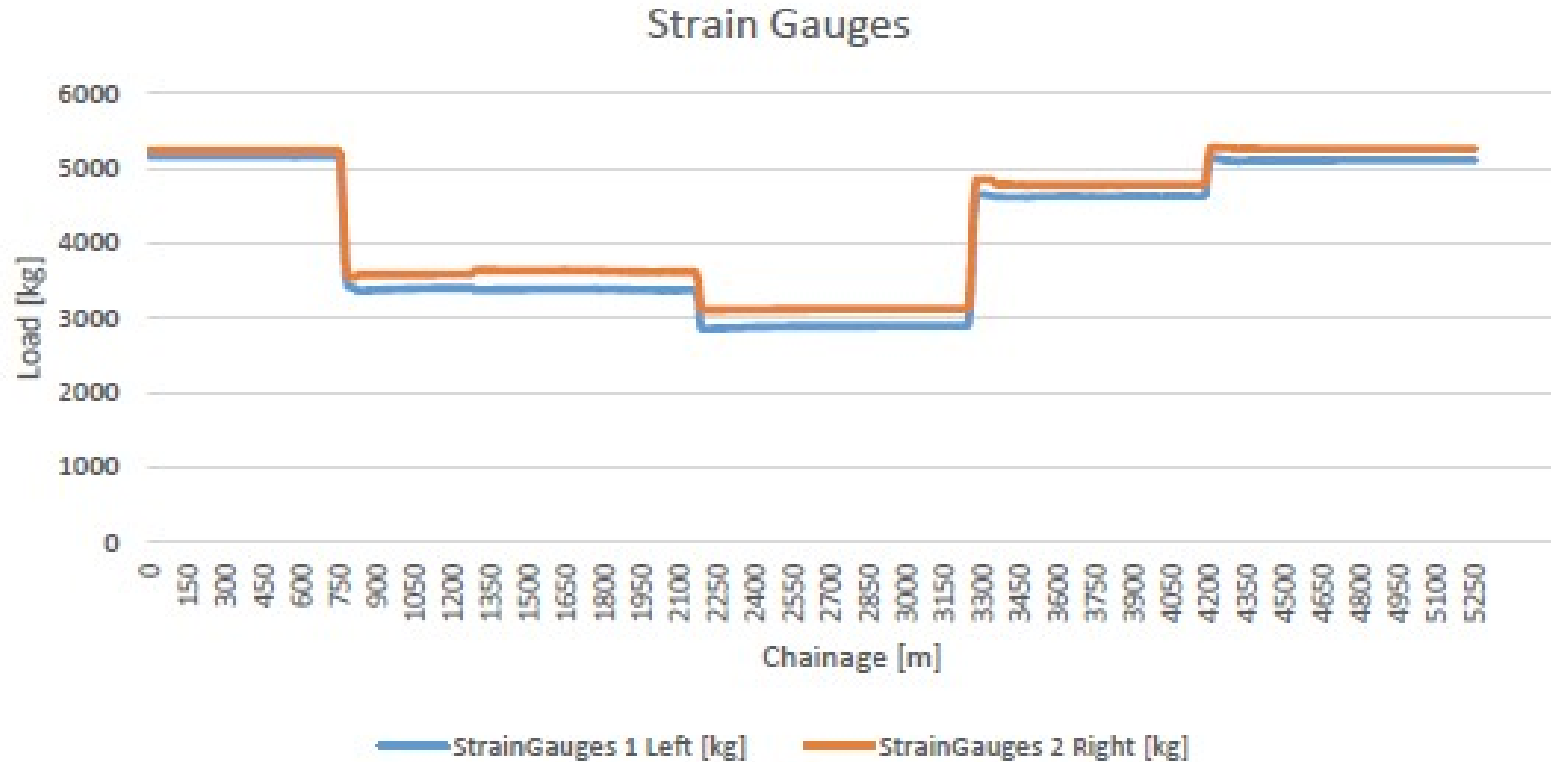
# Servo system



# The measurement beam



# Strain gauges



# Weighing the TSD

Rampage National Pty Ltd  
ABN : 49 111 801 828  
Corner Greens Rd. & Hammond Rd  
DANDENONG, VIC. 3175  
Commonwealth Public W/Bridge No PW-0432  
Ph (03) 97920664 Fax (03) 97920668

National Measurement Act 1960  
National Trade Measurement Regulations  
2009 (Division 3.2)

TICKET NO 4409

DUPLICATE | DUPLICATE | DUPLICATE |

Date Ticket issued 21/02/2014 14:48

Goods measured : NIL  
Marks & Brands on goods measured :  
WSJTKS115DTJ20632

Place of despatch of goods measured :  
DANDENONG  
Destination of goods measured :  
DANDENONG

Registered no. of  
no.'s of vehicles measured : BX43XV

Name of driver of vehicle : ROBERT  
Carrier : Cash

Date and Time

Tare Mass Only: 22920 kg 21/02/2014 14:48

Deck Weights

1st Deck : 5720kg  
2nd Deck : 7280kg  
3rd Deck : 9920kg

**REGISTRATION PURPOSES ONLY**

GST : \$1.55  
Total Inc. GST : \$17.00

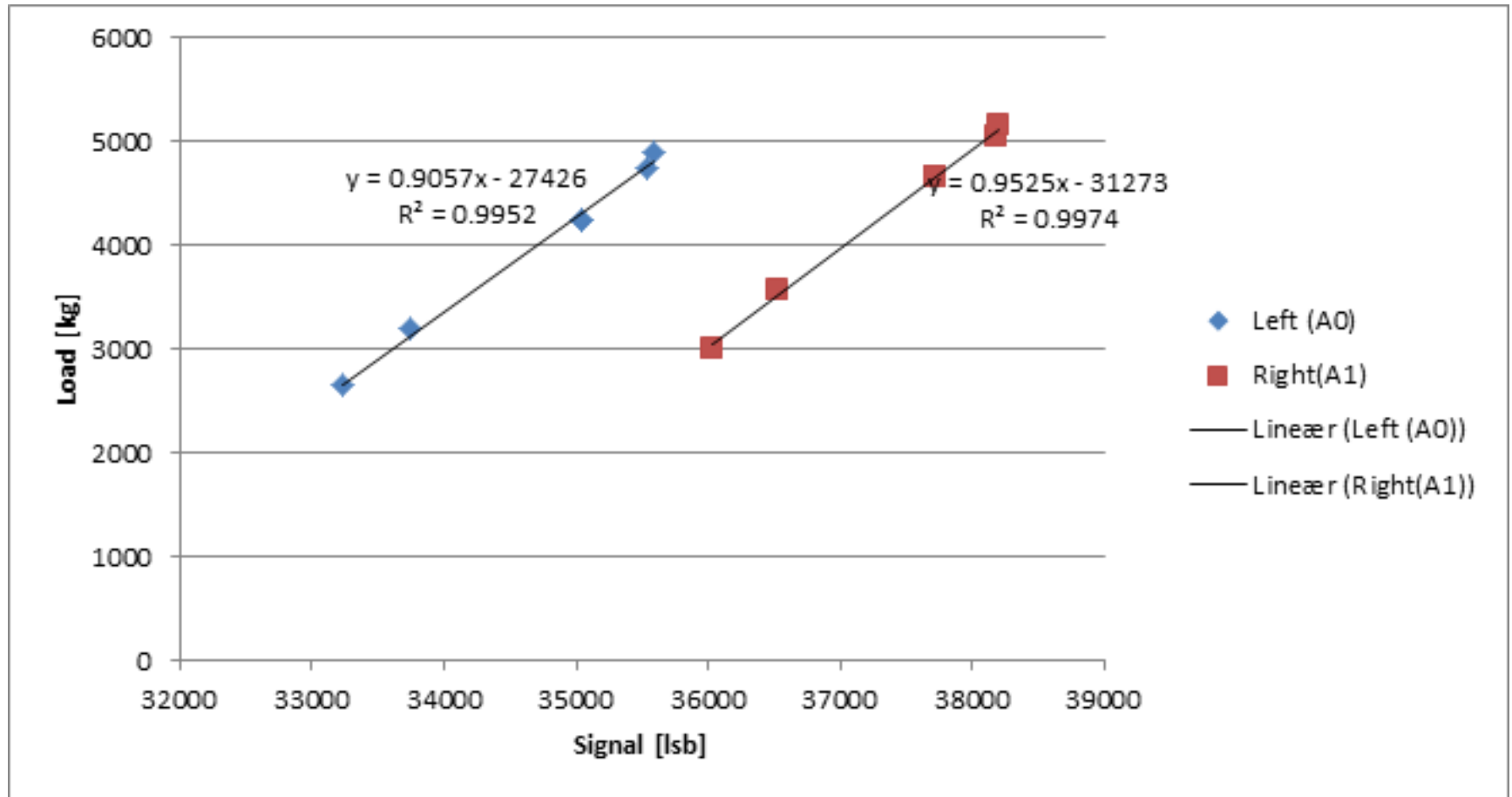
Operator's Name

Operator's Signature

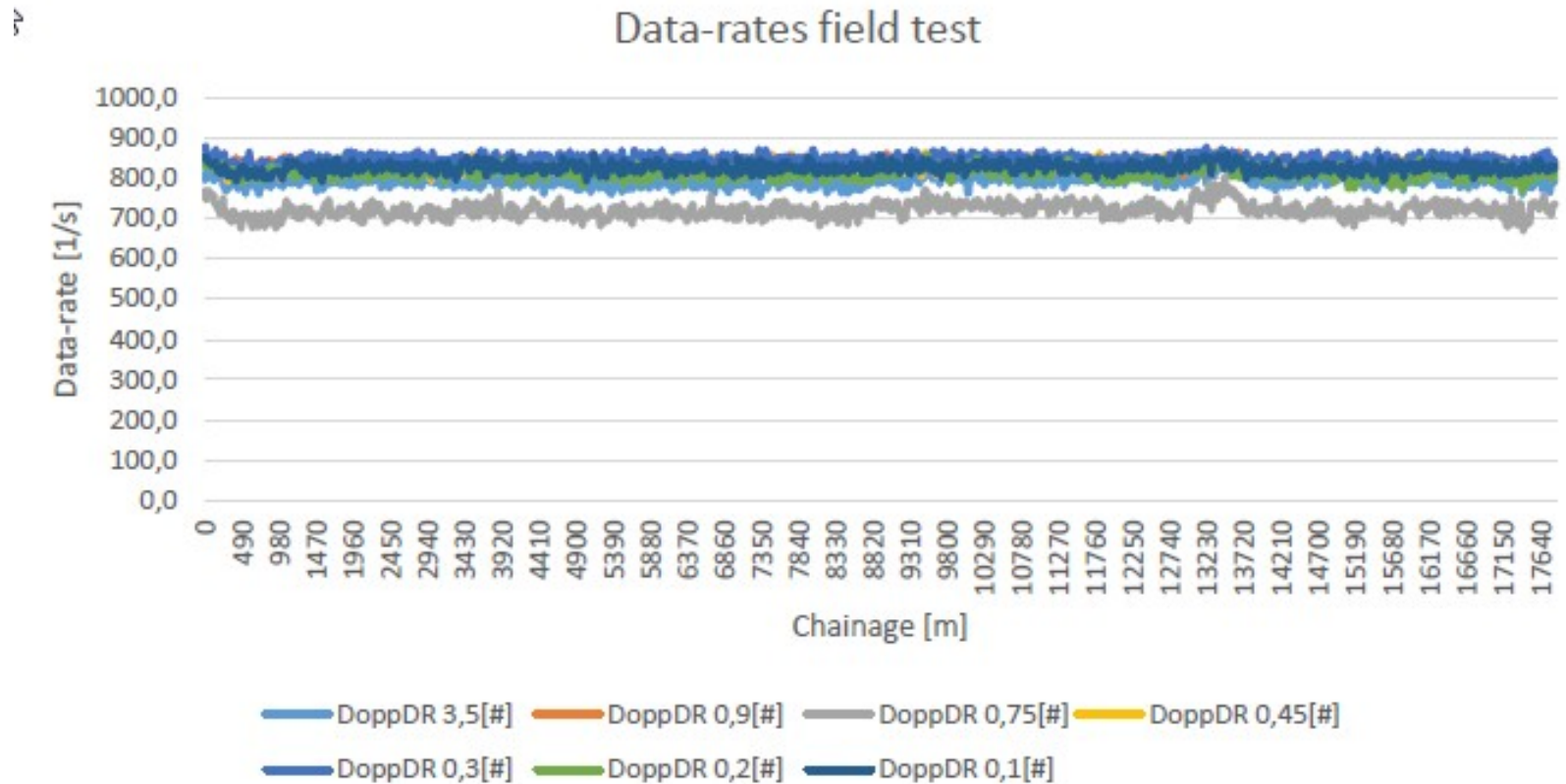
Payment Method: CASH



# Strain gauge adjustment

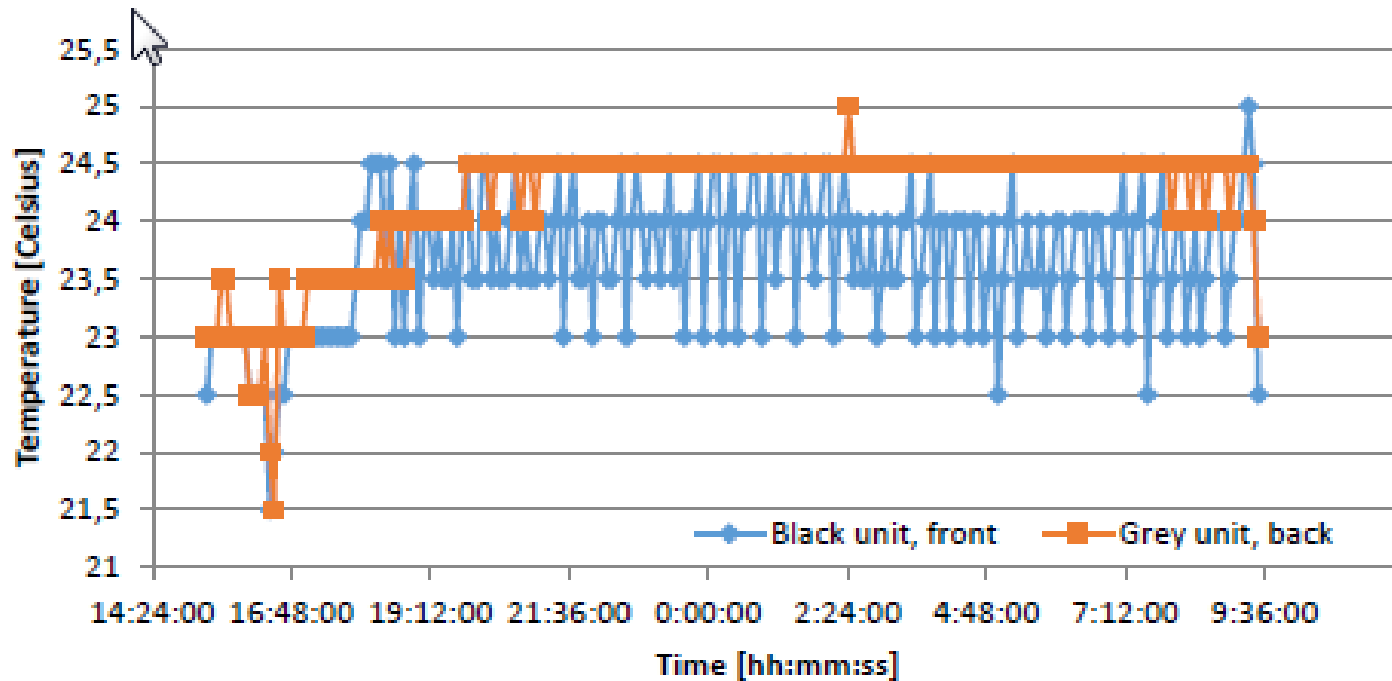


# Data rates

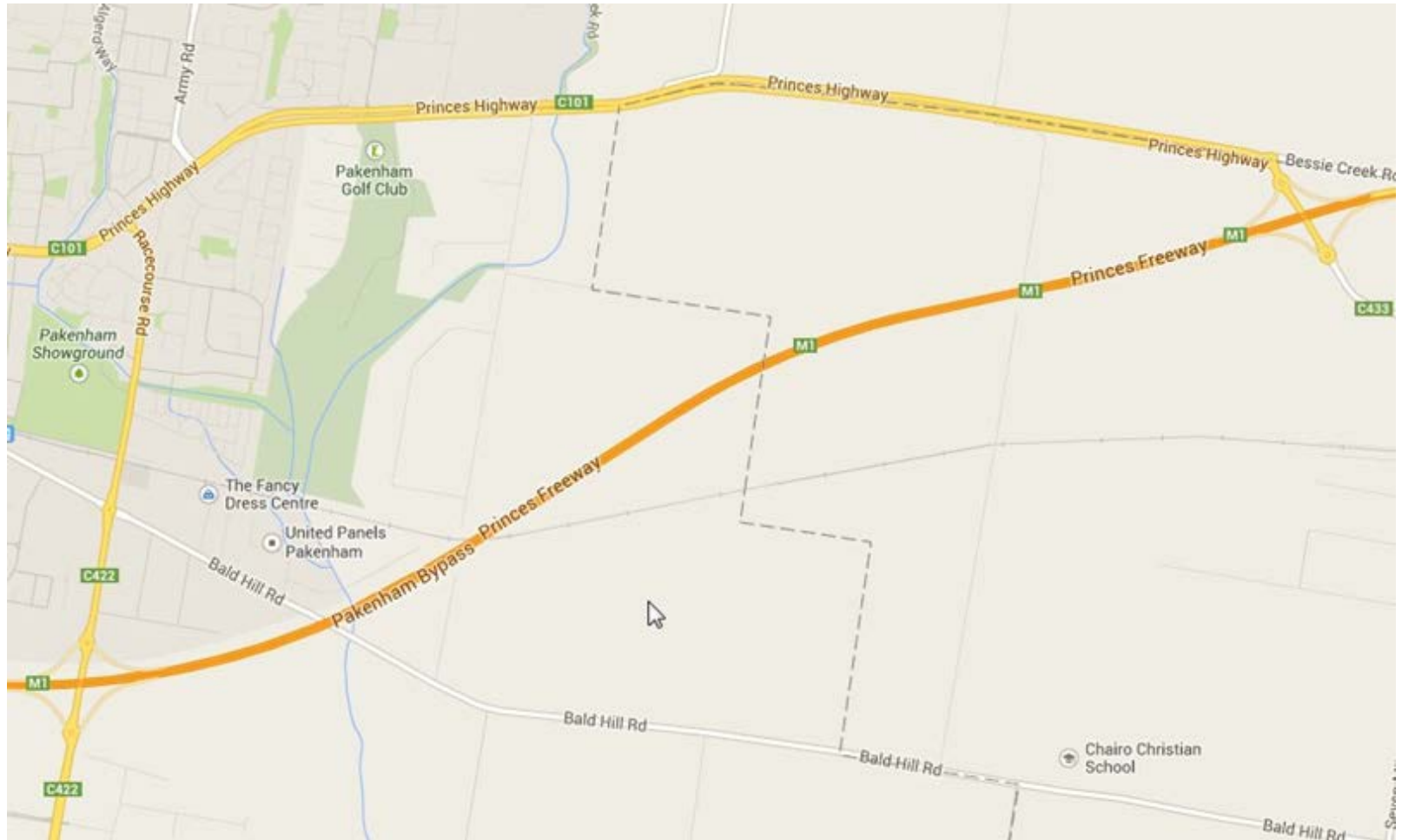


# Temperature

Temperature in trailer



# Nar Nar Goon Loop





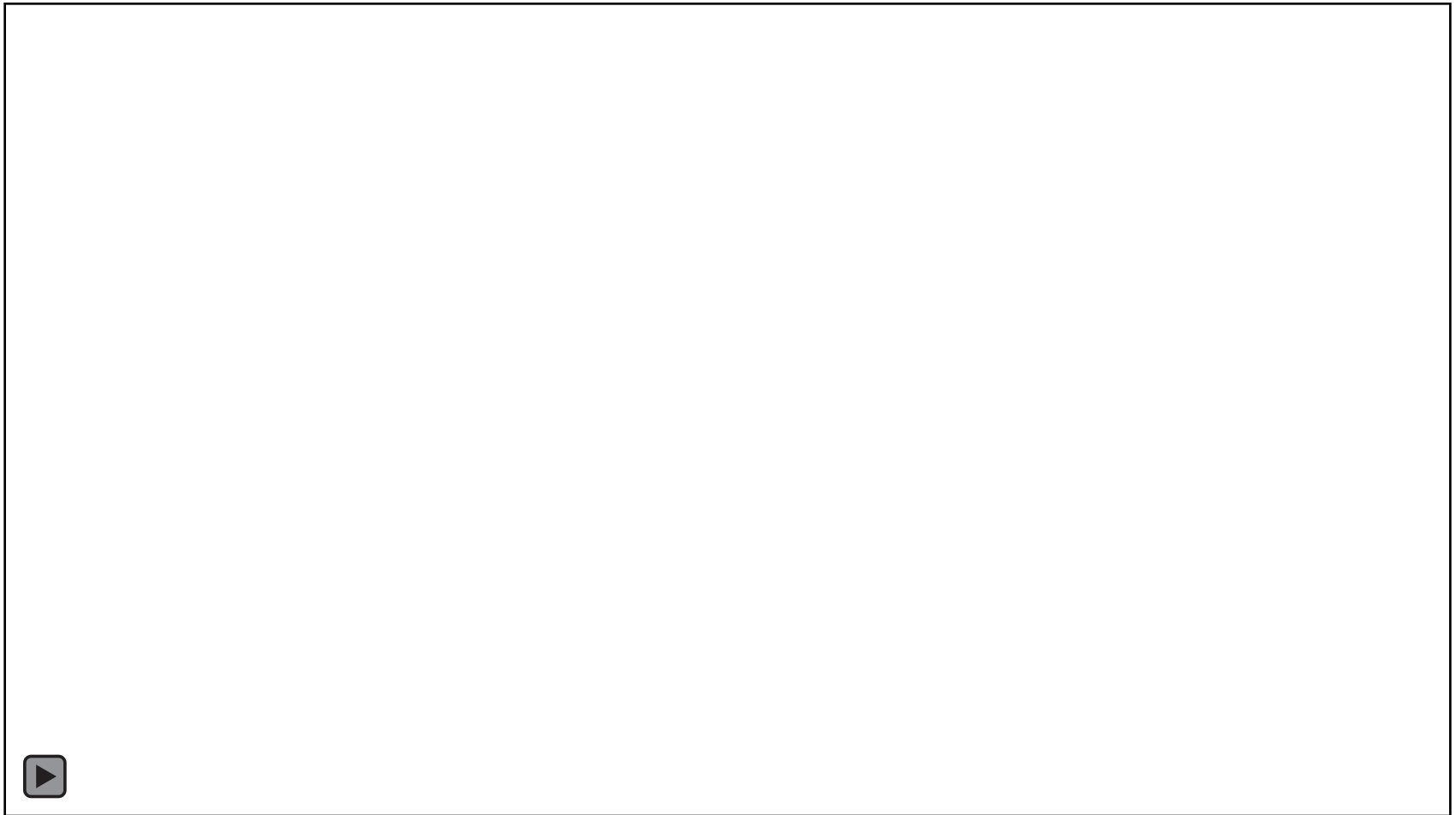
# Distance measurement



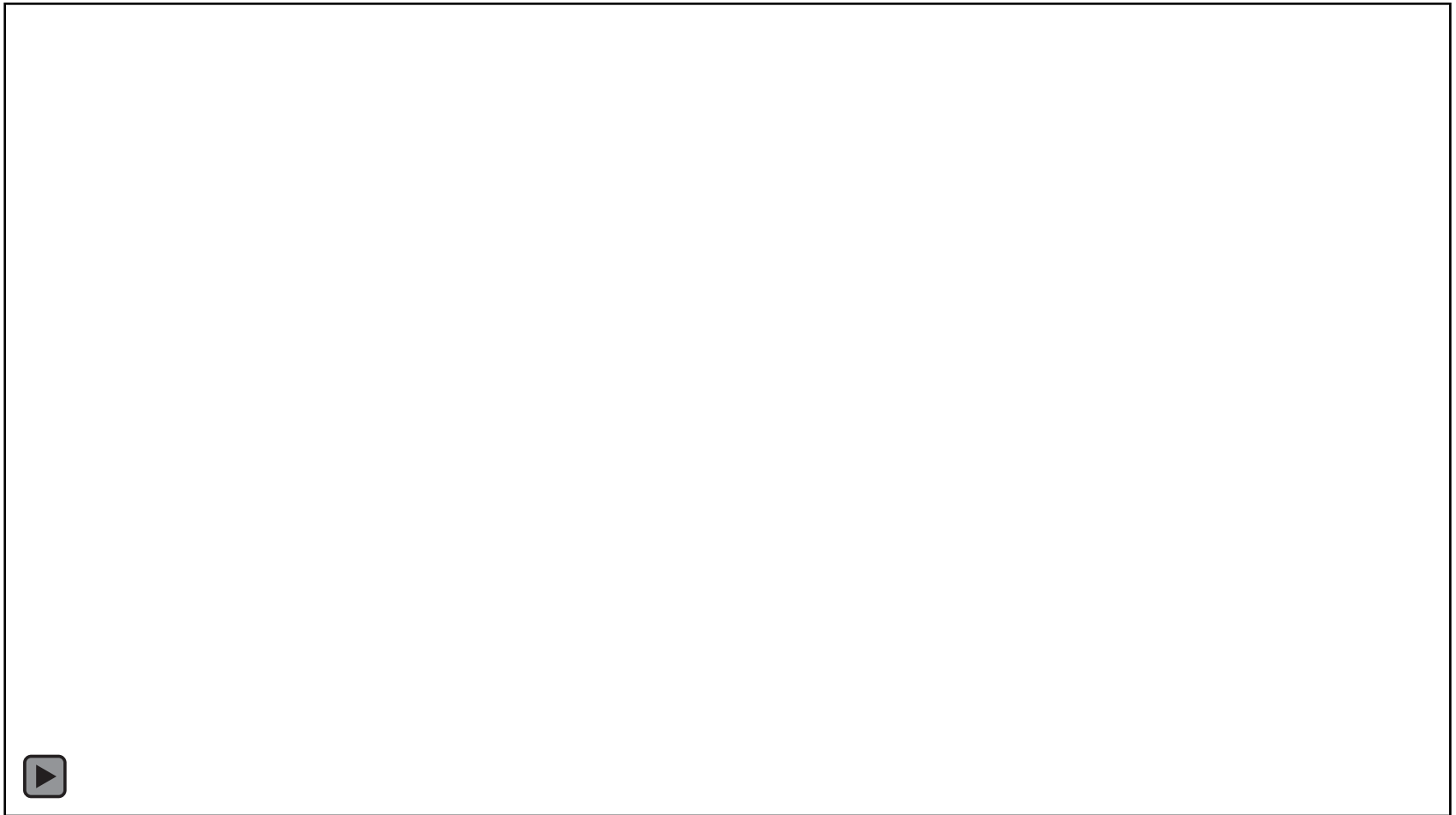
# Some problems



# The wheel in action



# The wheel in action





# Calibration

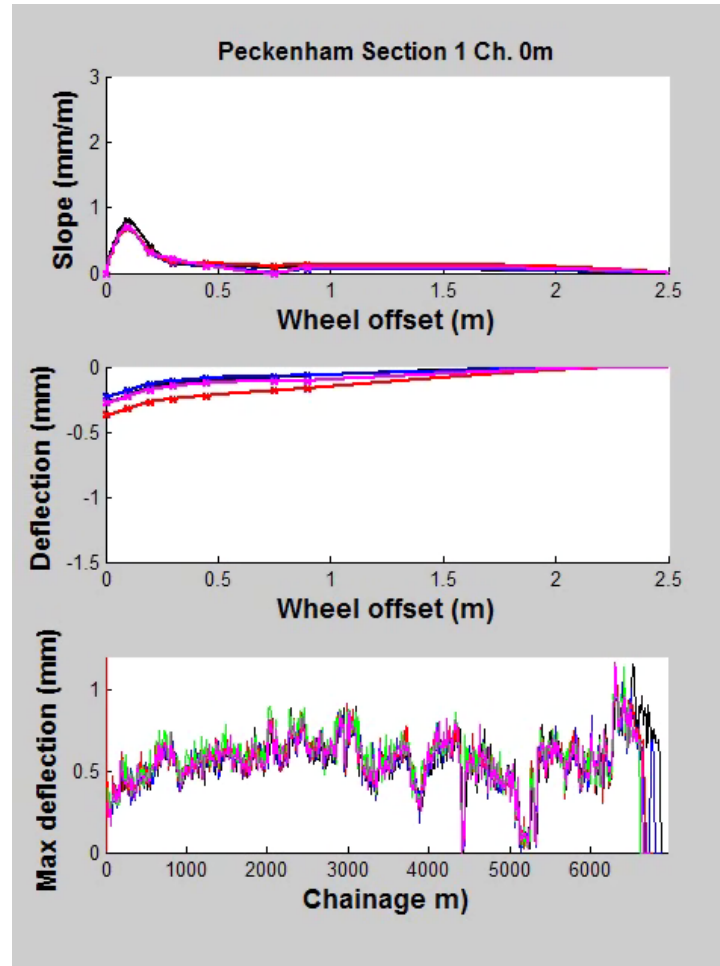
Finding a section of road that is:

- straight
- flat
- 1,500 m long

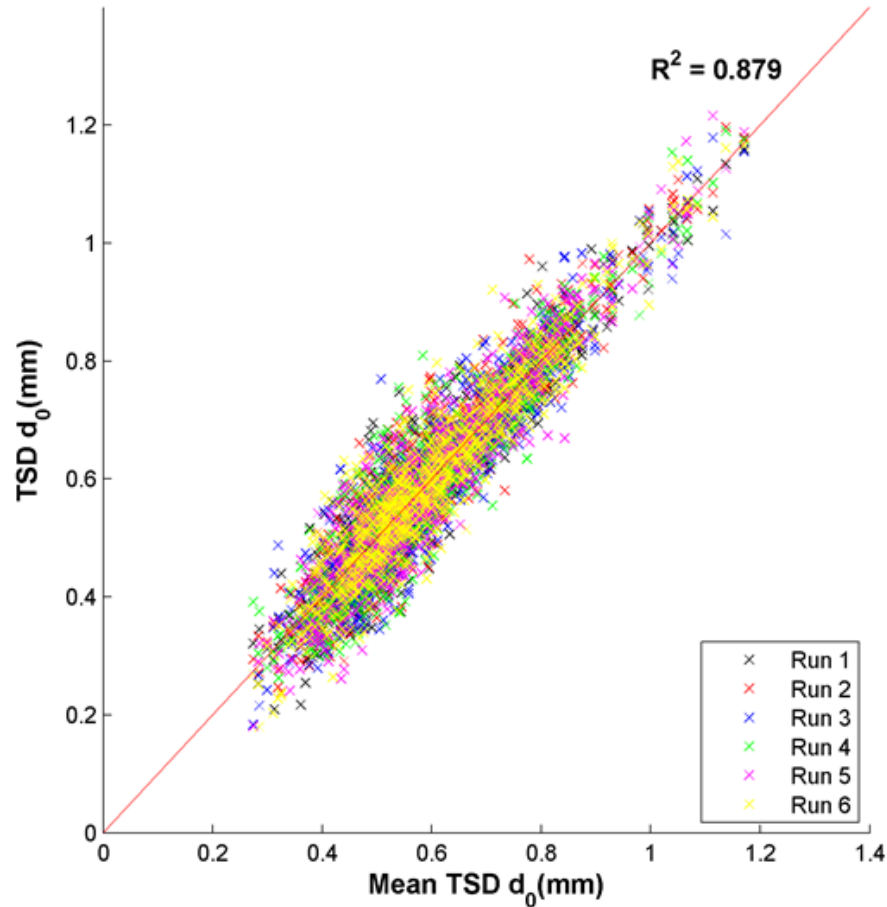
is harder than you might think!



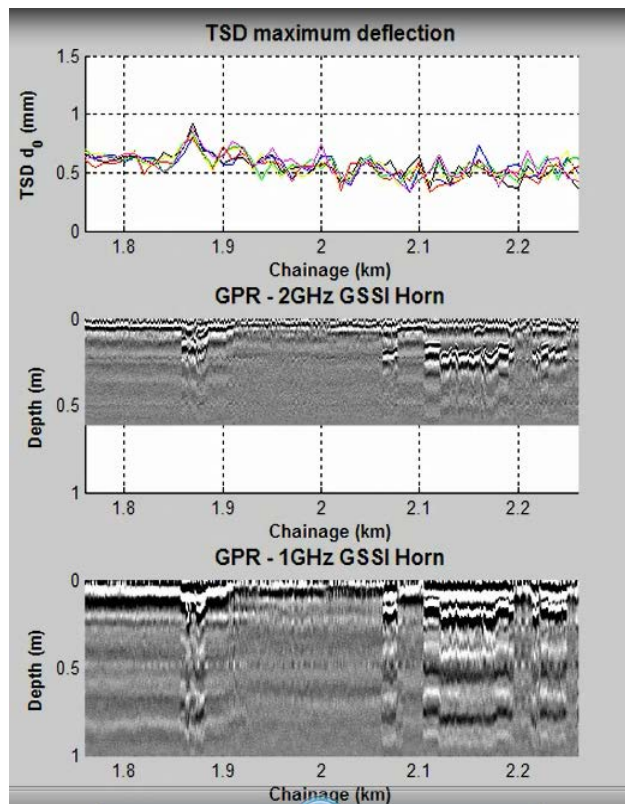
# Repeatability



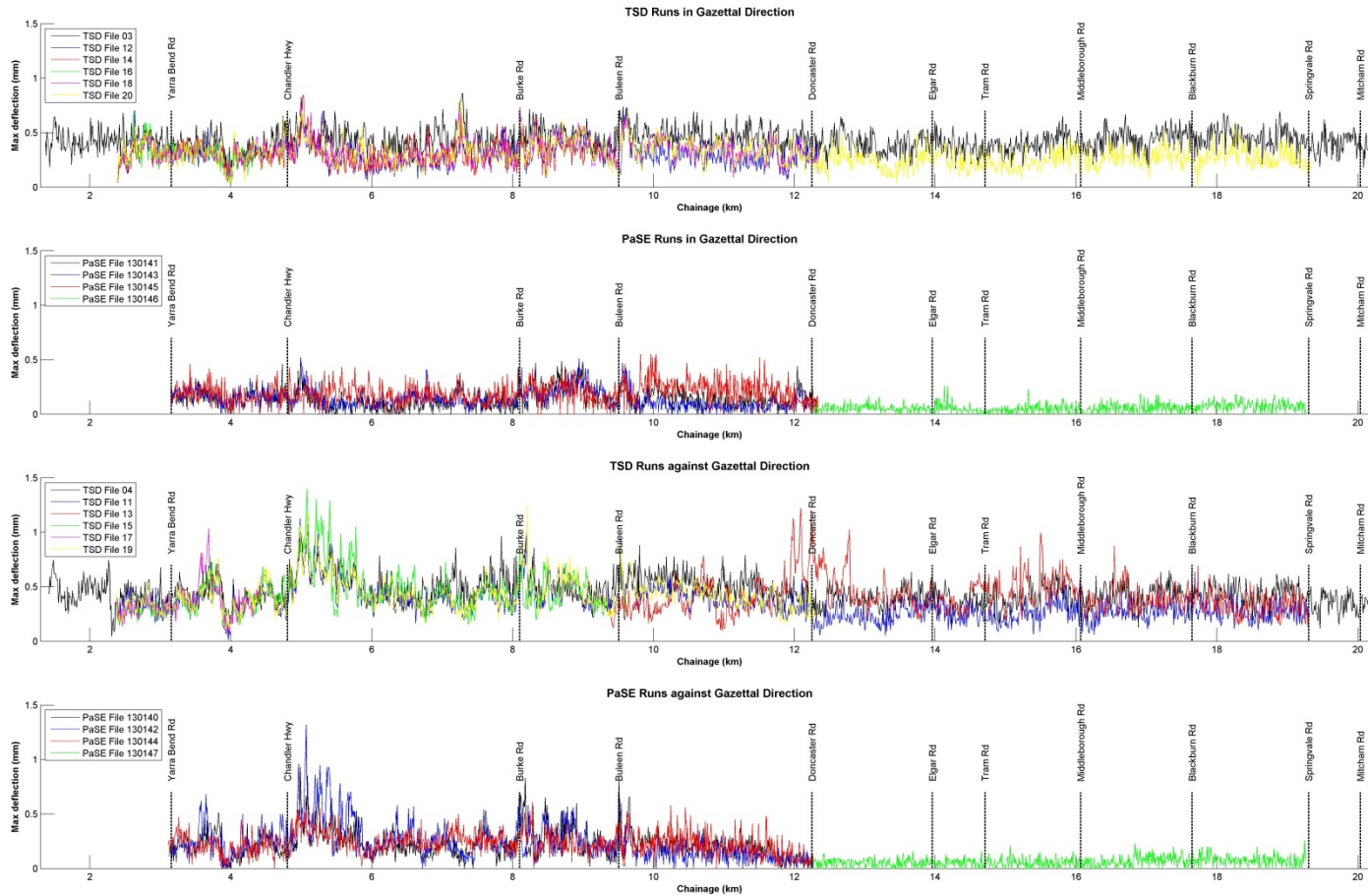
# Internal repeatability



# Comparison with GPR

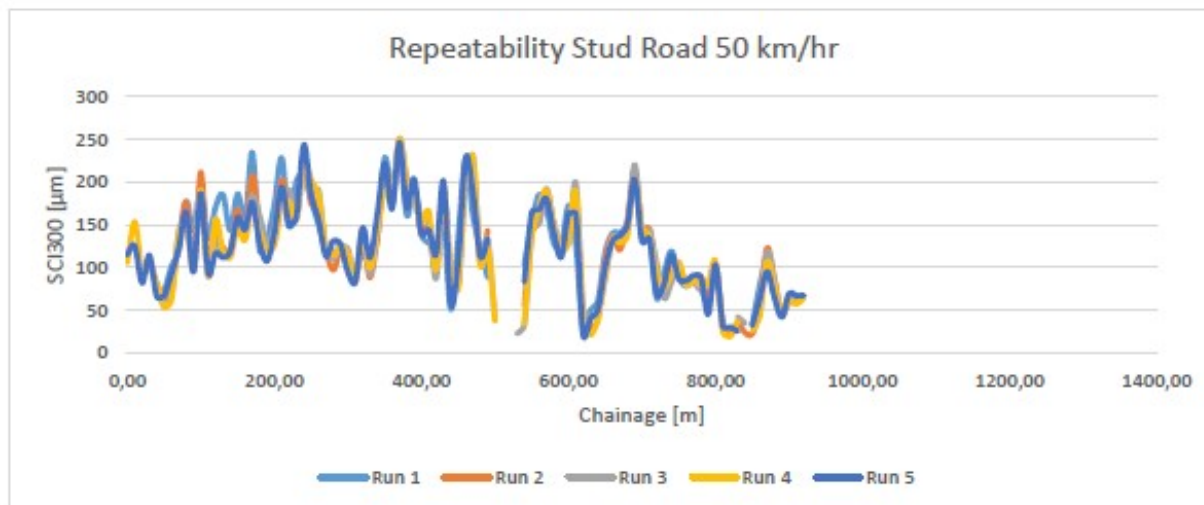
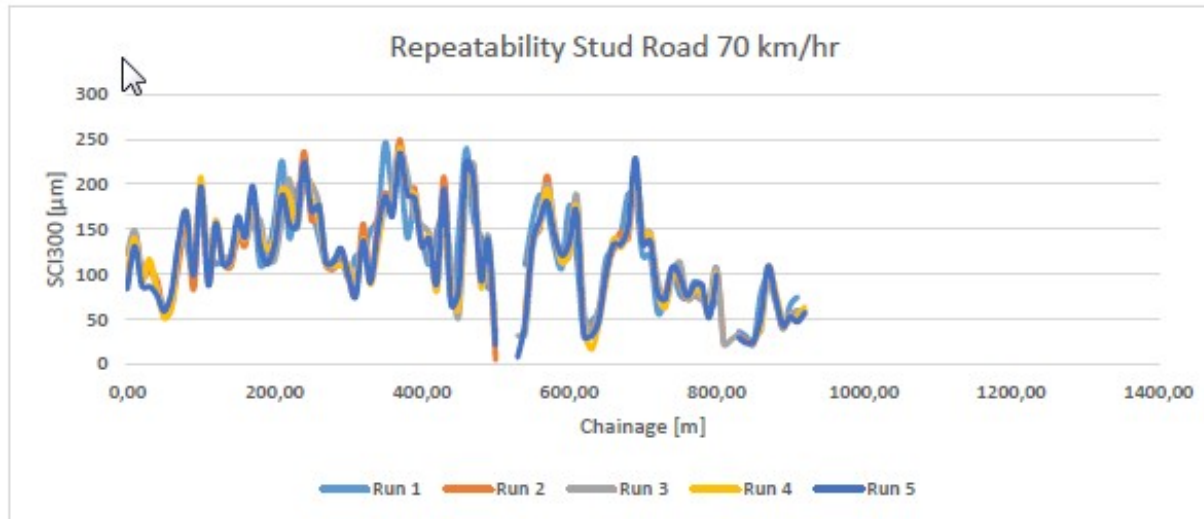


# Eastern Freeway

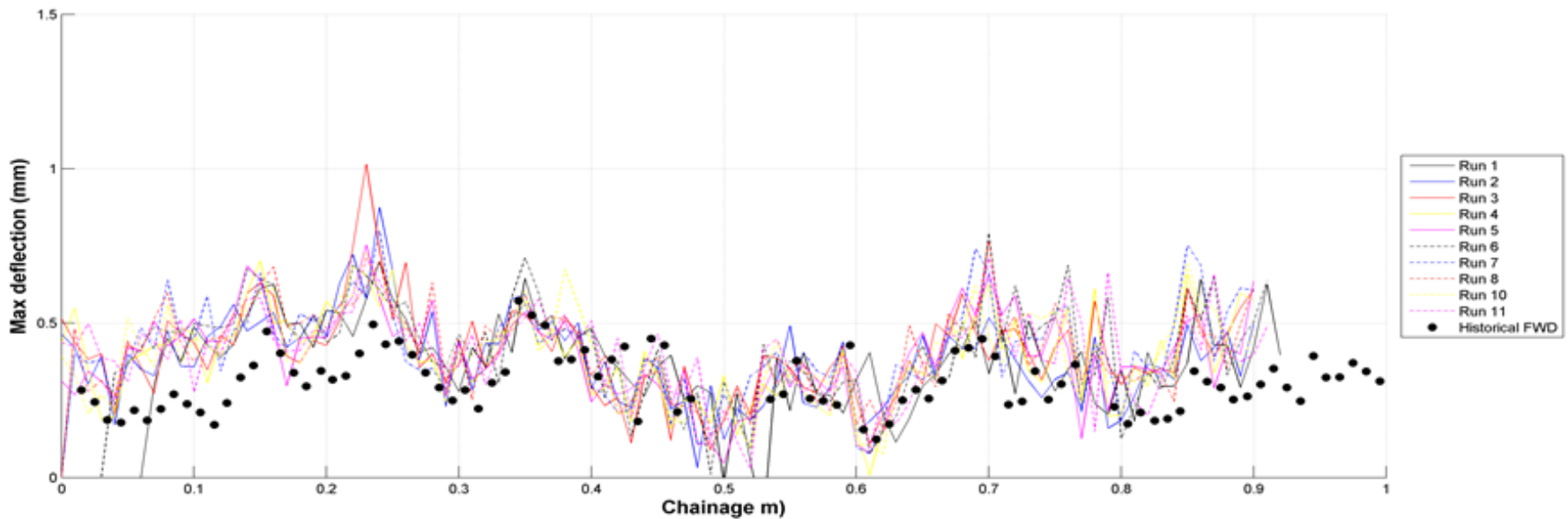




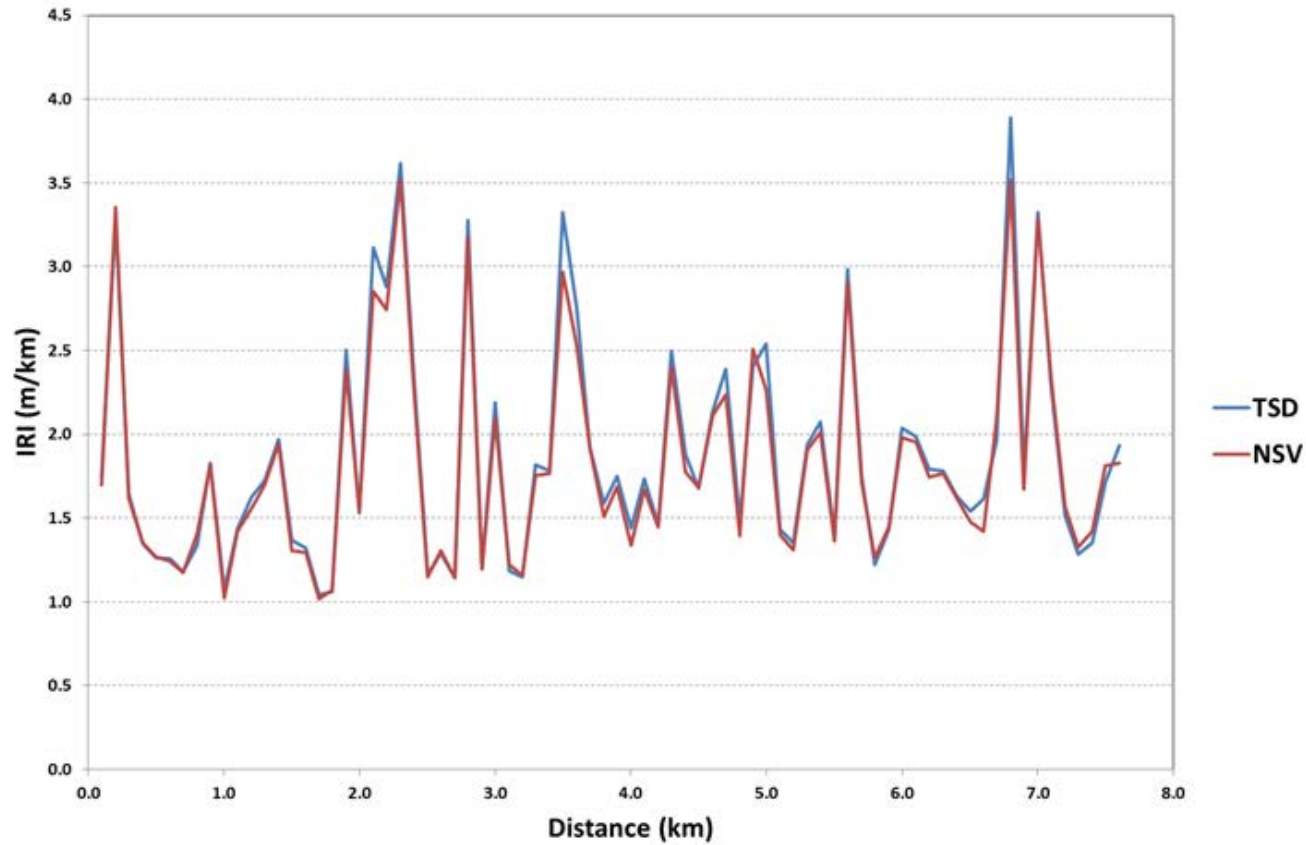
# Stud Road LTPP site



# Comparison with FWD

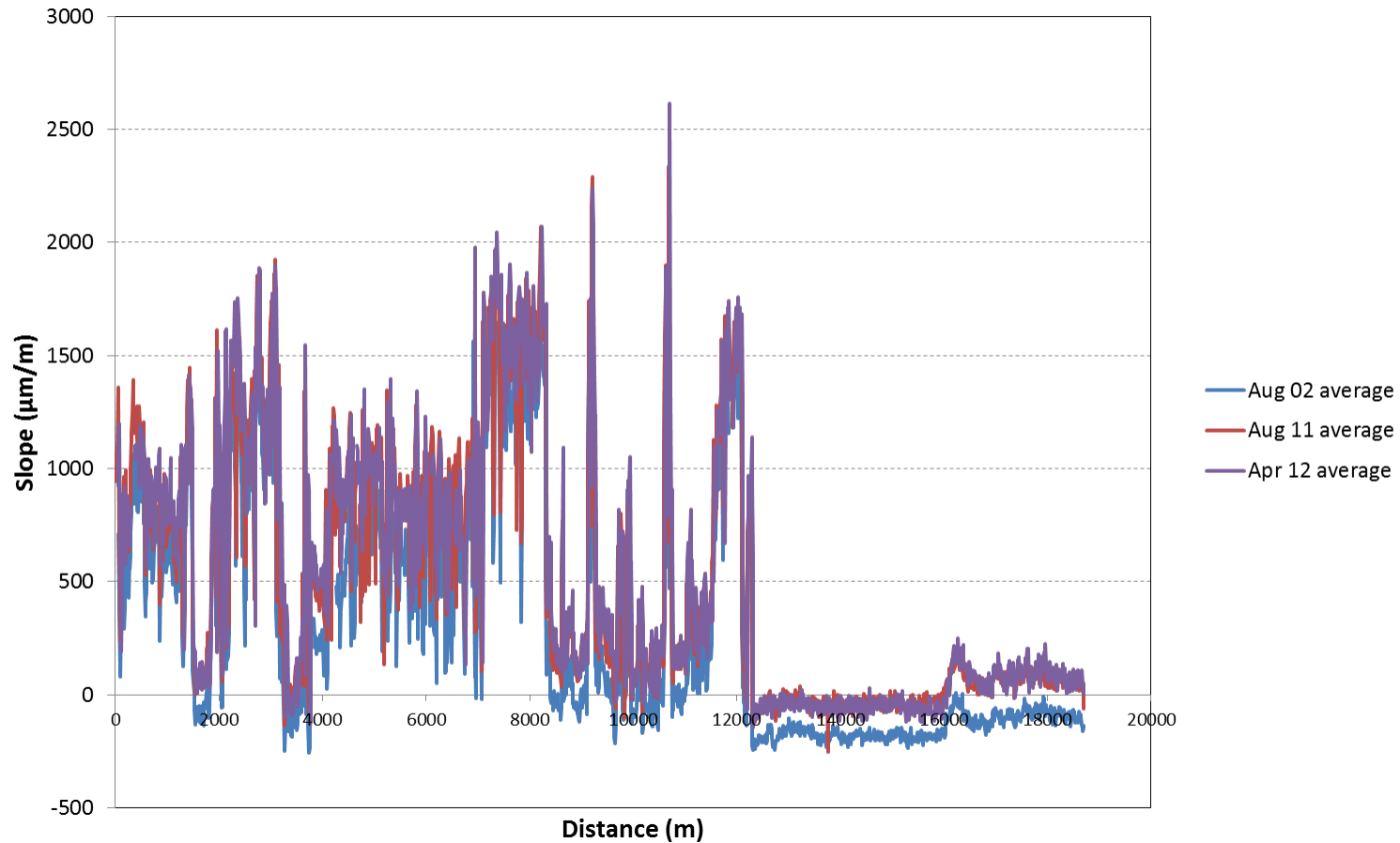


# More than just deflection



# QLD benchmarking site

Deception Bay repeat runs - D200mm slope values



# Thank you



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