

# DYNATEST RAPTOR

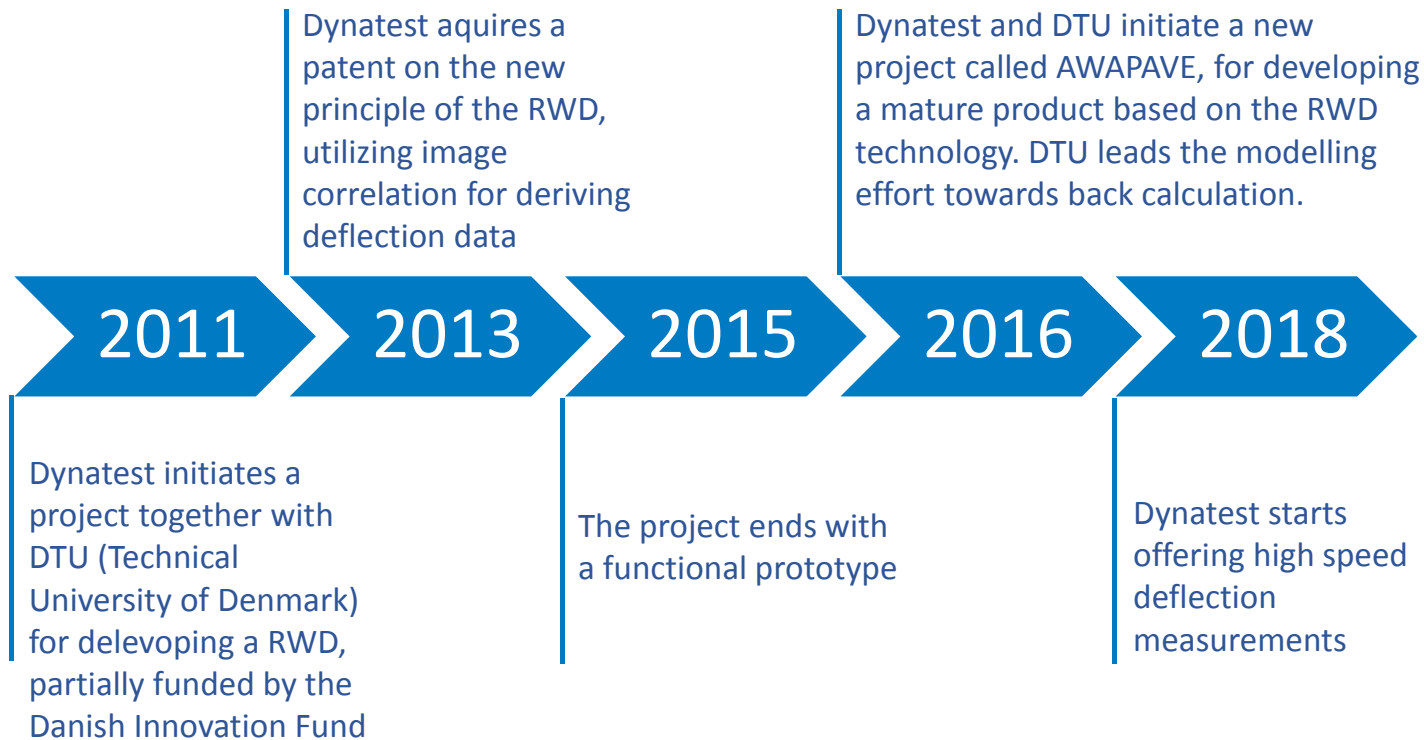
Rapid Pavement Tester

Structural and Functional Pavement Evaluation at  
High Speed

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## Project Timeline





Trailer length = 9.5m

Total length = 13m

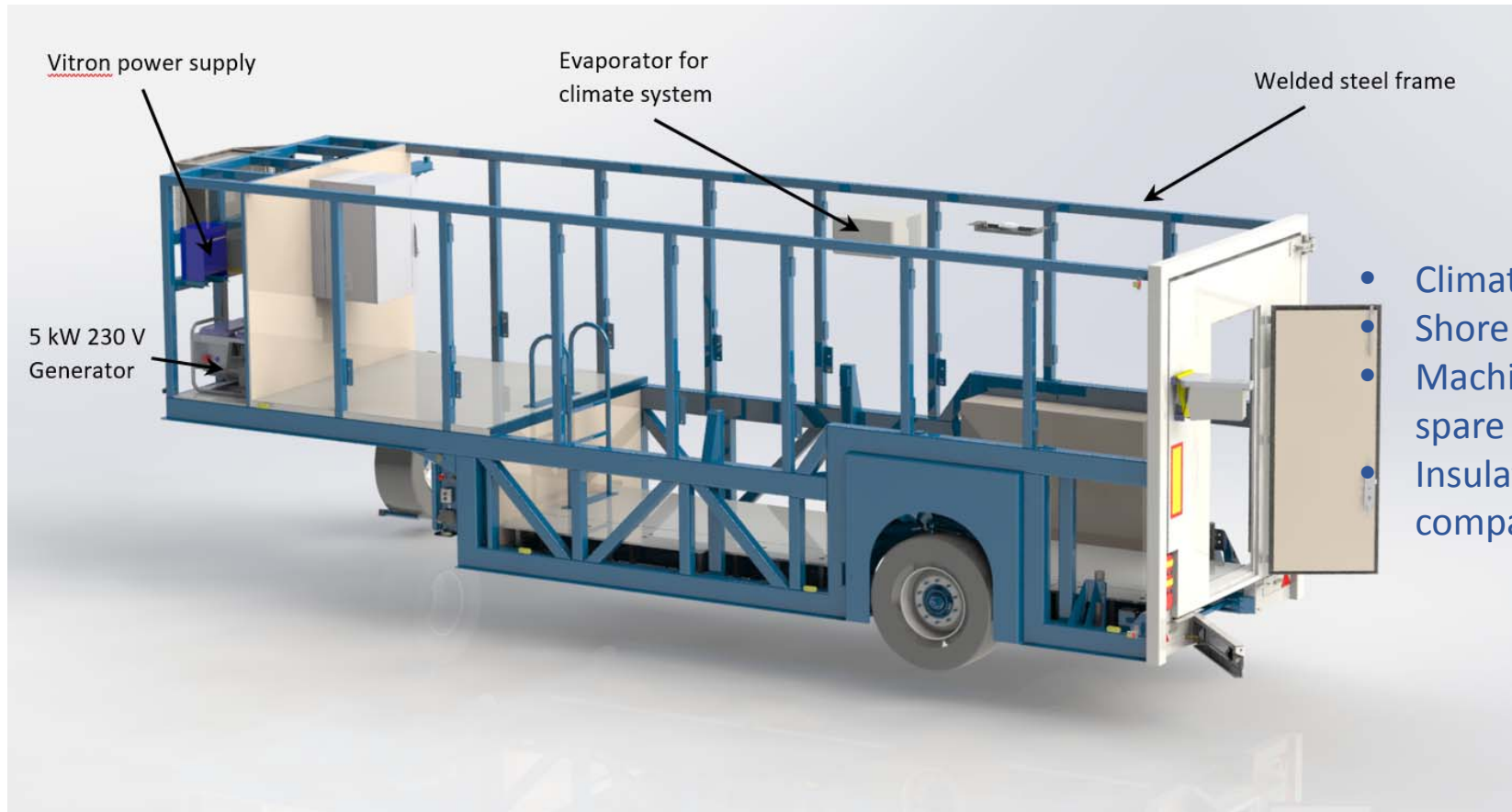
Width = 2.5m

Height = 3.15-3.55m



- Structural and functional testing of roads
- Road friendly air suspension – higher loads allowed
- Easy loading of ballast
- Low center of gravity
- Shift beam to either side
- **Integrated calibration system**

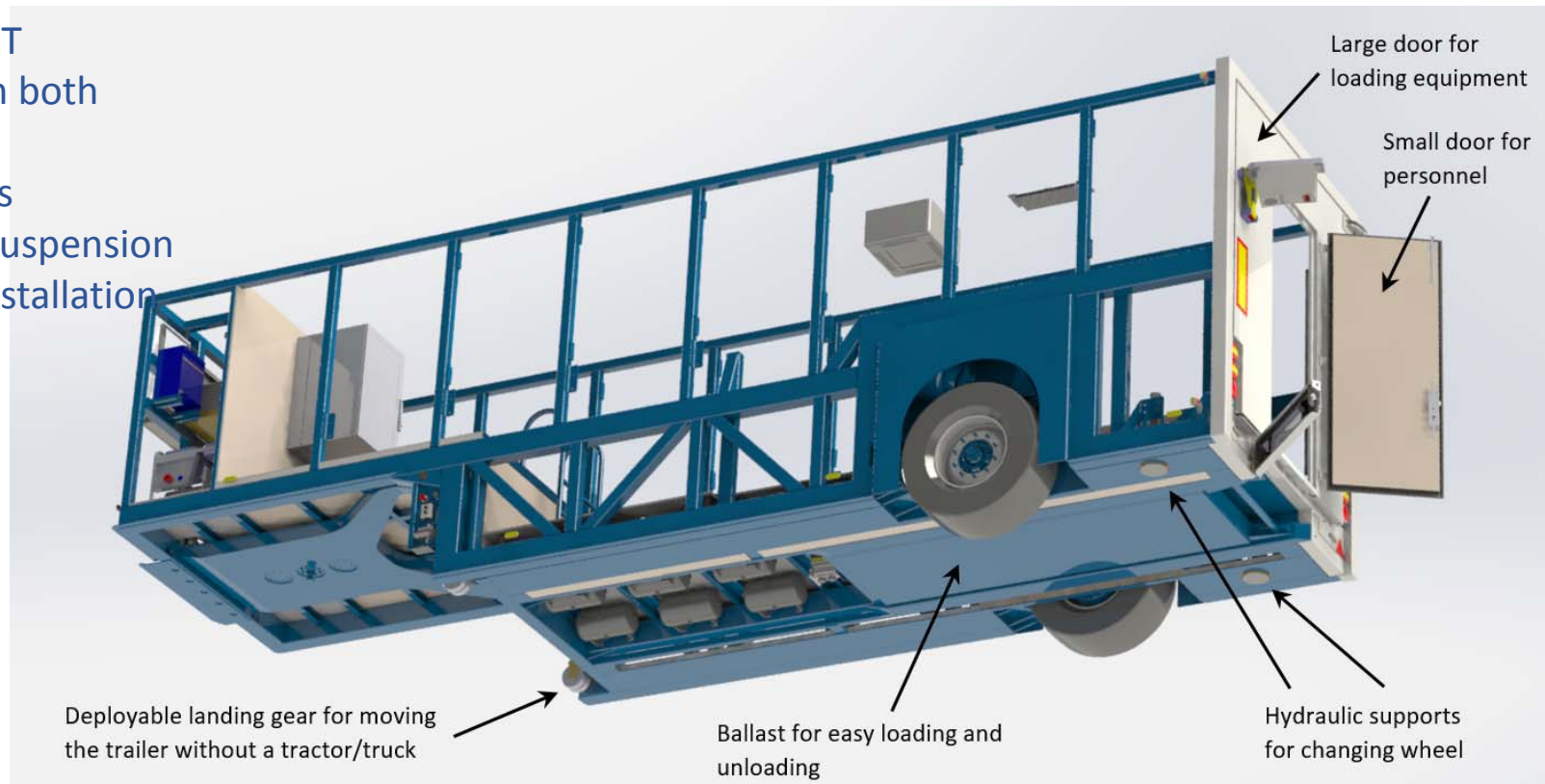
# Mechanical Design



- Climate system
- Shore power
- Machine room for spare wheel etc.
- Insulated compartment

# Mechanical Design

- Load range 6 to 10 MT
- Integrated encoder in both wheels
- Strain sensors in axles
- Load cells on wheel suspension
- Prepared for LCMS installation



# RAPTOR #1 During Fabrication



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## RAPTOR #1



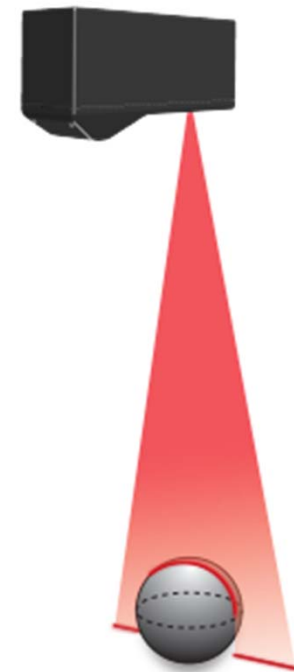
# RAPTOR #1



# Laser Based Surface Profilers

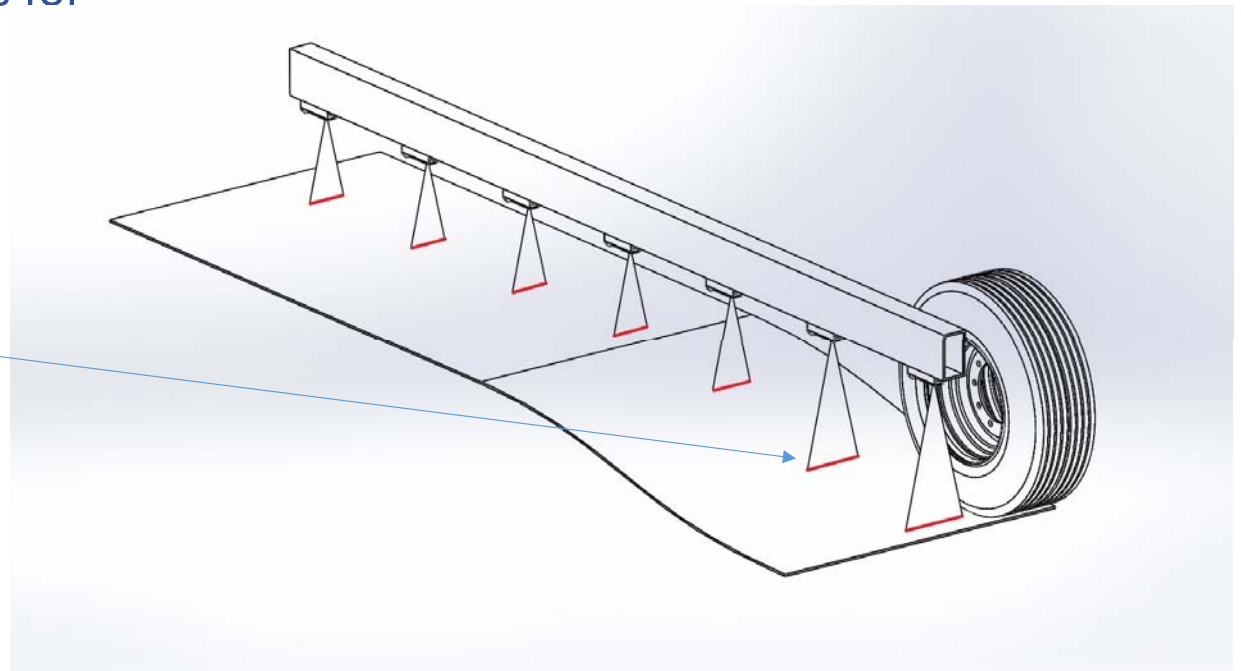
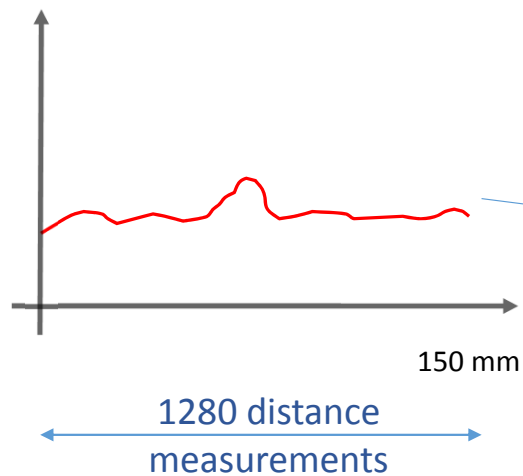


Gocator Lasers – 4kHz



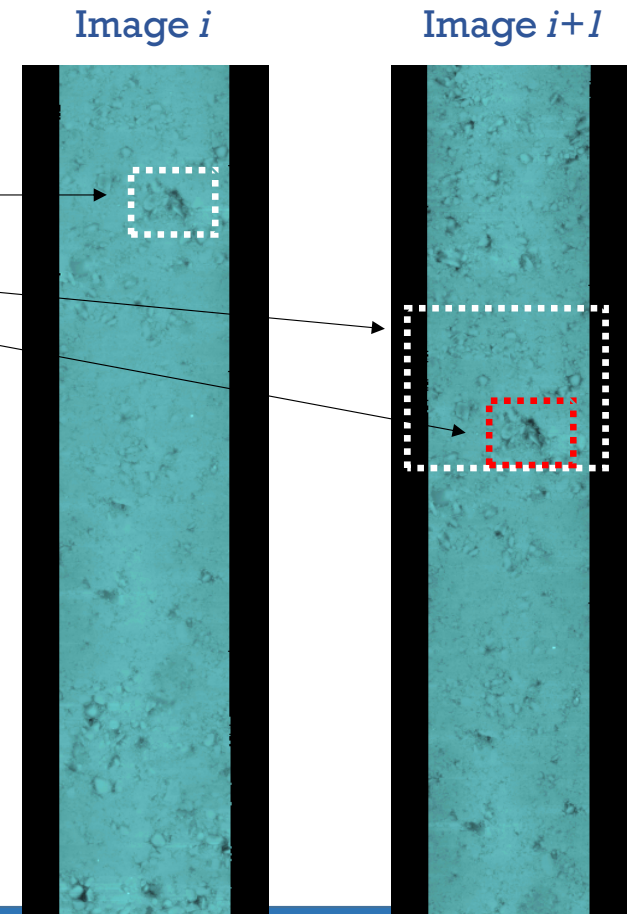
# Laser Based Surface Profilers

Image scan from several lasers for image correlation

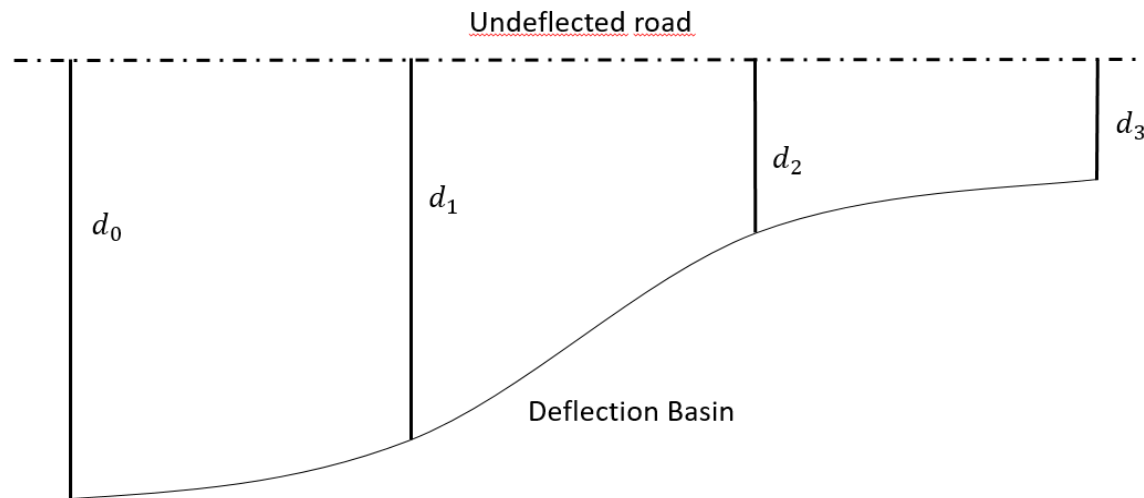


# Image Correlation

- Define template in image from Gocator  $i$
- Define search area in Gocator  $i+1$
- Normalized cross-correlation finds best match
- Calculate deflection - Harr algorithm or other

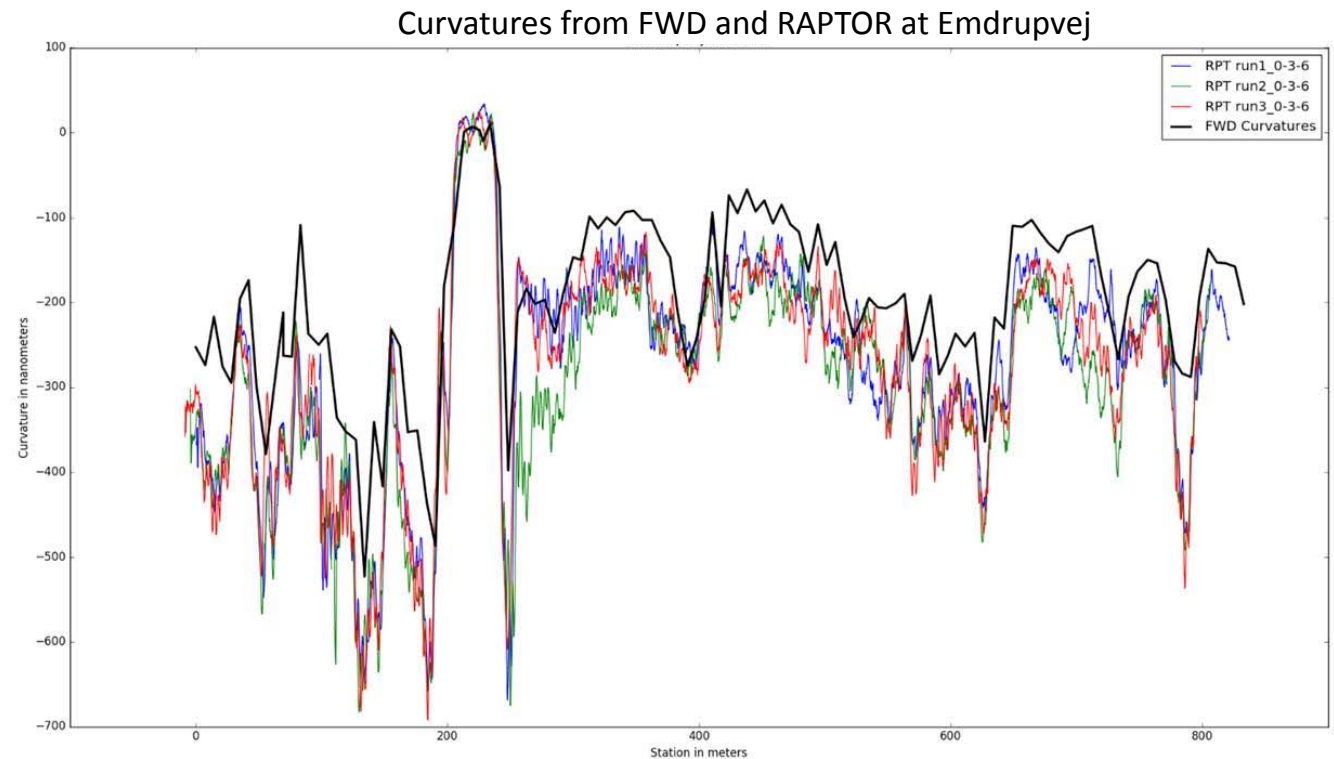


<u>Deflections</u>	<u>Slopes</u>	<u>Curvatures</u>	<u>Curvature difference</u>
↓	↓	↓	↓
$d_0$	$S_1 = d_0 - d_1$	$C_1 = S_1 - S_2 = d_0 - 2d_1 + d_2$	$CVD = C_1 - C_2 = d_0 - 3d_1 + 3d_2 + d_3$
$d_1$	$S_2 = d_1 - d_2$	$C_2 = S_2 - S_3 = d_1 - 2d_2 + d_3$	
$d_2$	$S_3 = d_2 - d_3$		
$d_3$			



# Measurements

- Shadow testing
  - 100 km of various pavements
  - Measured with RAPTOR and FWD
  - Measurements performed on same day
  - Data is correlated
- Data validation
  - 3 repetitions
  - Curvatures compared



# Measurements



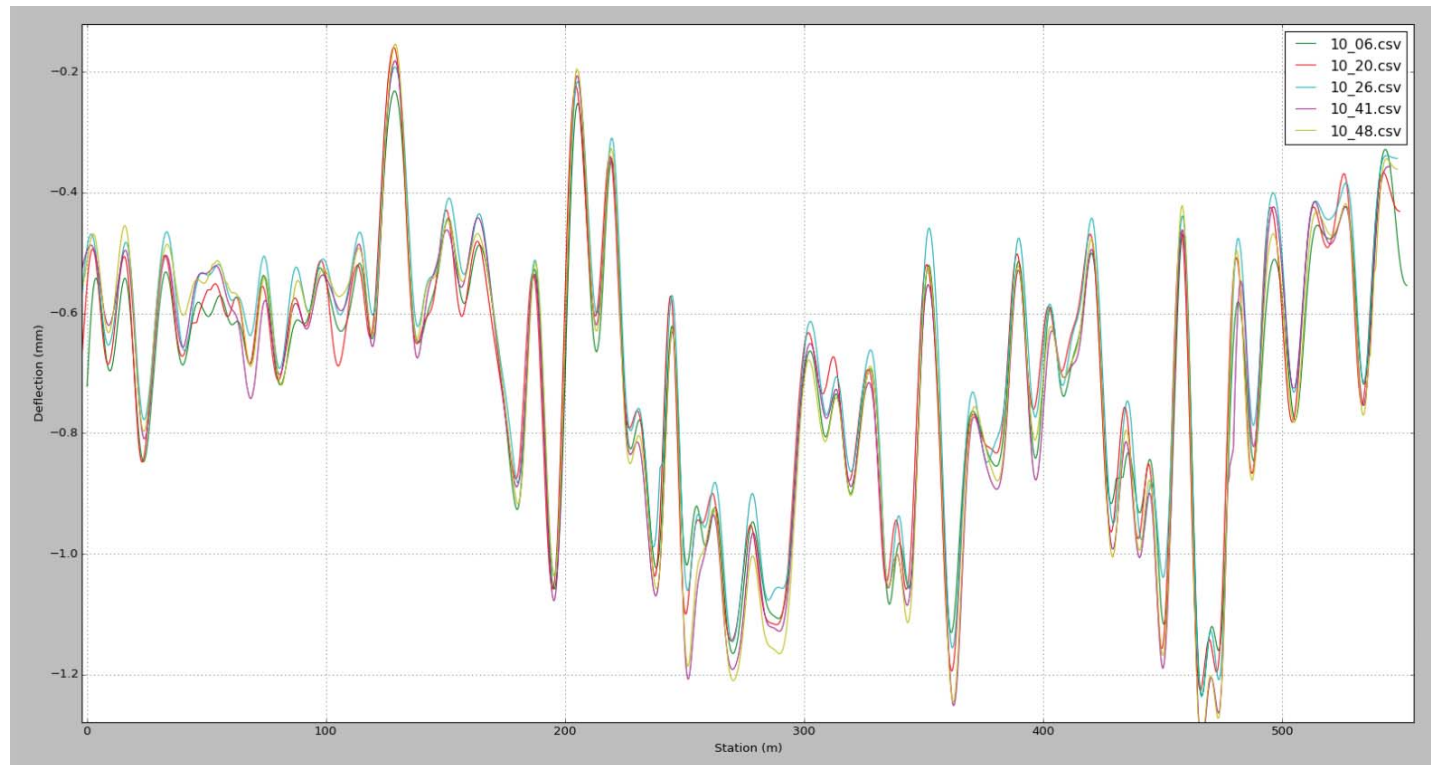
Center deflection

5 repetitions

2 different speeds  
- 25 kph and 40 kph

550 meter stretch

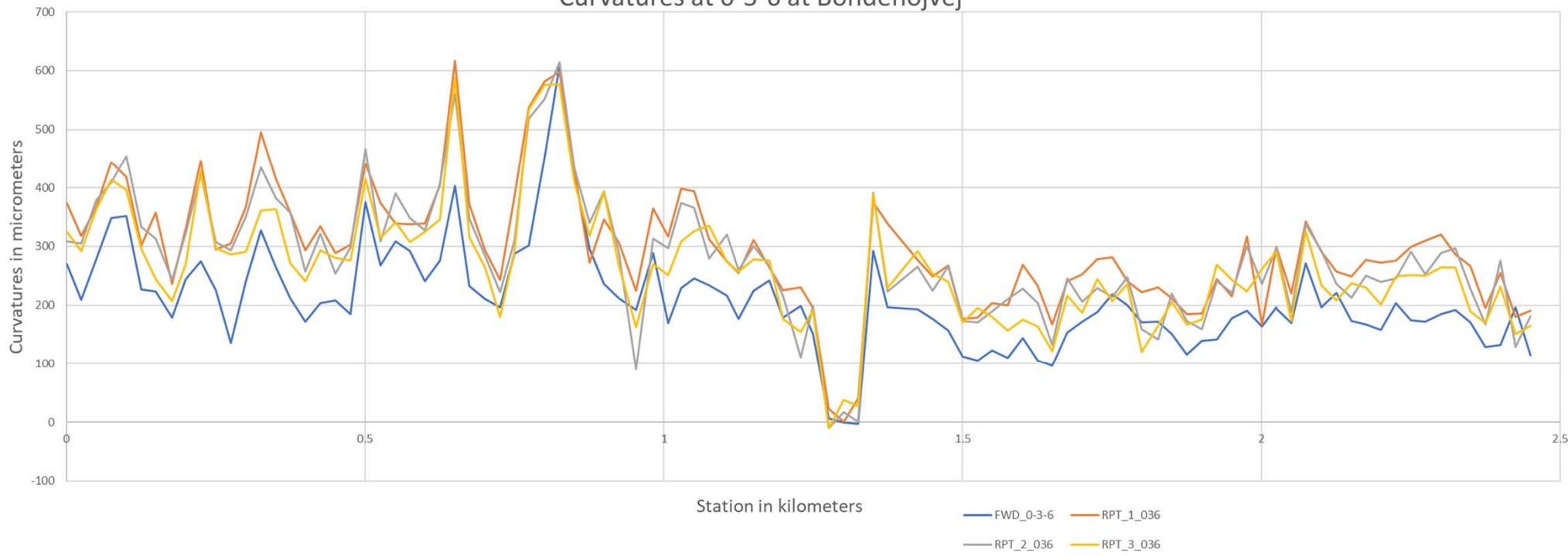
10 meter average





# FWD Vs RAPTOR

Curvatures at 0-3-6 at Bondehojvej



## Upcoming tasks

- Rigorous testing in Denmark
- Presentation at TRB 2018
- Target mid-2018 for RAPTOR delivery to USA
- Further validation and testing in the USA
- Consulting services with RAPTOR

# Thank You



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