INFRABEL
Right On Track

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What next?

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What next: focus on….

Railpad 1.0->2.0

- More silent rolling stock -> need for more silent track
- Better “maintenance” grinding is needed
- Higher Track Decay Rate or rail damping is needed

  -> A new type of railpad was developed and is currently installed on the Belgian network

TDL (Track Dynamics logger)

- More silent track -> OK , but where is the track silent or noisy or vibrating so where exactly is action needed
- Depends on a lot of parameter: roughness, TDR, welding's, discontinuities, switches, bridges, tunnels,…

  -> A new 12 channel monitoring systems on 4 measurement trains

Railpad: Requirement for Noise cancelling

WHY FOCUS ON THE RAILPAD?

- Dominant component in contact with rail (+ isolat
- Unused potential to add damping

GOAL

- Not by extreme stiffening (distribution of forces in ballast)
- Maximum of damping restrict " pin-pin"mode of rail

IDEAL NOISE REDUCTION RAILPAD

- Soft to distribute axle forces at low frequencies (axle passage)
- High damping at high frequency (1000Hz) to damp rail vibration & noise emission

1000 Hz →

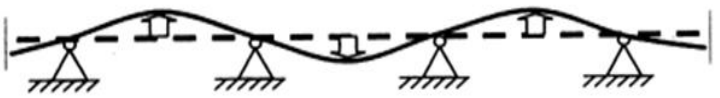


Fig. 1. Pin-pin vibration mode (first mode).

Test locations

L59 Belsele (passenger & freight)

L50A Varsenare (passenger trains)

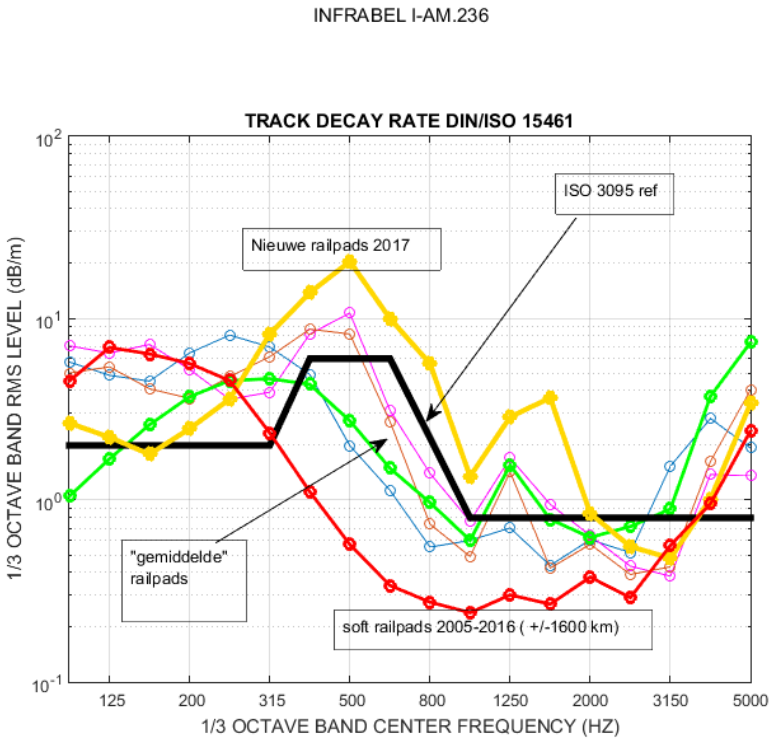
L27A Antwerp (freight)

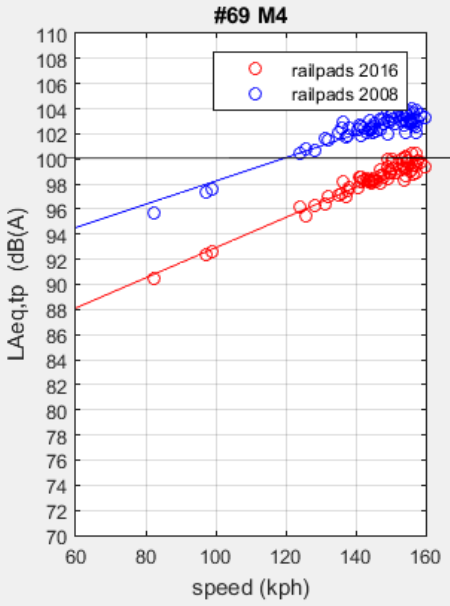
L27A Schaarbeek
(TDR qualification site)

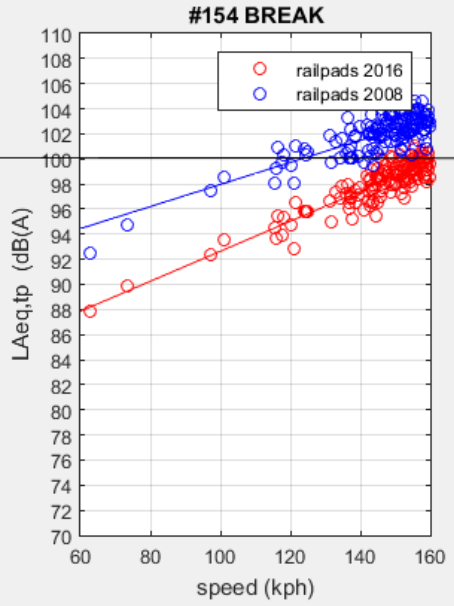
L50C Dilbeek (passenger)

Railpad 2.0: Technical specification L63 (version 2016)

- Beside stiffness also damping is included
- Requirement on damping:
  - TDR EN15461 on standard Infrabe track
  - Protection of forces into sleepers (EN13146/3)
  - Measurement of accelerance in track: modal damping at PIN-PIN mode




#69 M4
railpads 2016
railpads 2008
LAeq,tp (dB(A)
speed (kph)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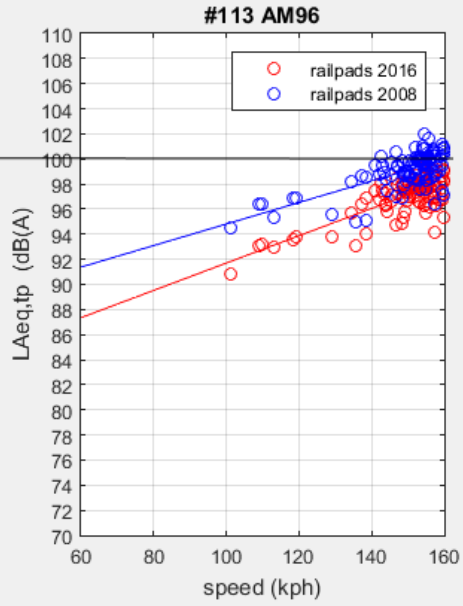
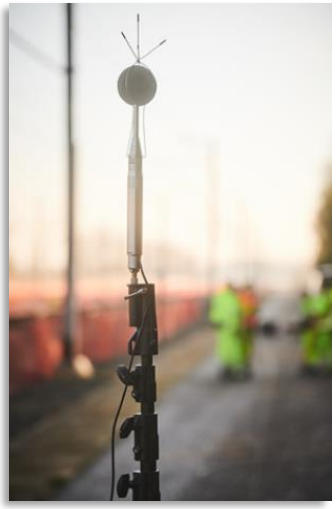
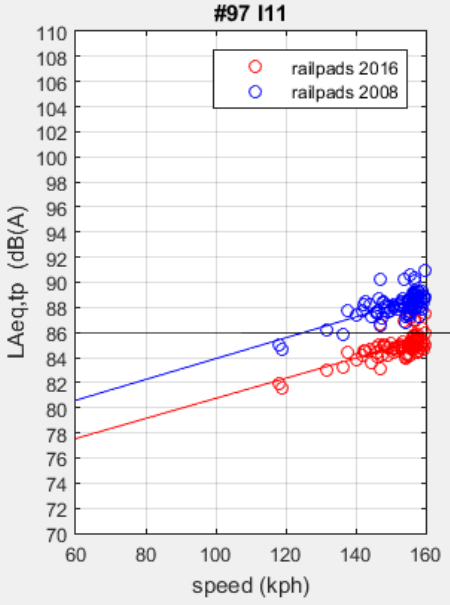
railpads 2016
railpads 2008
LAeq,tp (dB(A)
speed (kph)


#113 AM96
railpads 2016
railpads 2008
LAeq,tp (dB(A)
speed (kph)

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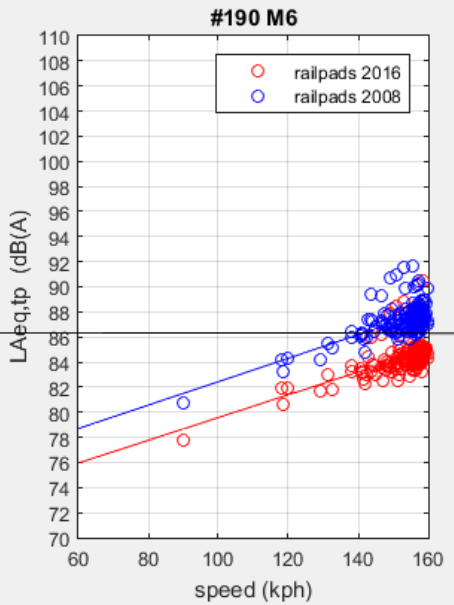
railpads 2016
railpads 2008
LAeq,tp (dB(A)
speed (kph)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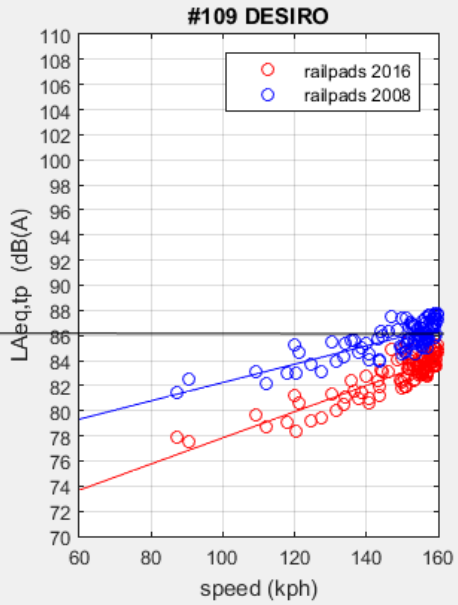
railpads 2016
railpads 2008
LAeq,tp (dB(A)
speed (kph)


#109 DESIRO
railpads 2016
railpads 2008
LAeq,tp (dB(A)
speed (kph)

Conclusion Railpad 2.0:

- Today a first supplier is qualified
- Qualification of two other suppliers is ongoing (first test = TDR in track)
- Installation of railpad 2.0 ongoing:
  - 2017 about 40km
  - Installed when complete track is renewed
  - Full speed from 2018: 100 -150- 200-…km/year
- Trying to change pad also when rail is renewed

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TDL (Track dynamics logger)

- Upgrade of a 2011 version: 1 train
  - 4 accelerometers
  - 2 microfoons
  - 1m position precision
  - Network 2 times a year

Towards

- TDL 2018 version: 4 measurement trains
  - 8 accelerometers
  - 4 microfoons
  - 10cm position precision
  - Network 8-10 times a year

TDL (Track dynamics loggers)

- **Project ongoing**
  - Development and hardware selection (N&V & Position)
  - Automatic measurement
  - Automatic on-train processing
  - Transfert to fix servers
  - Parameter extraction versus track quality
  - AI & Deep learning techniques
  - Trend analysis /predictive maintenance
- **Input for**
  - Asset management, component detection
  - Wheel railnoise calculation
  - Noise mapping
  - Action plans

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Conclusion TDL

- **Actual Status**
  - Installed and “auto”- active in 2 trains
  - Copy/paste by the end of 2019 in 2 others trains

- **From 2020 on till ….**

Continuous and automated use for

  - Asset management, component detection
  - Noise mapping
  - Action plans
  - Nearly as-is acoustical status of the tracks for a whole network.

Thank you for your attention!!

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