

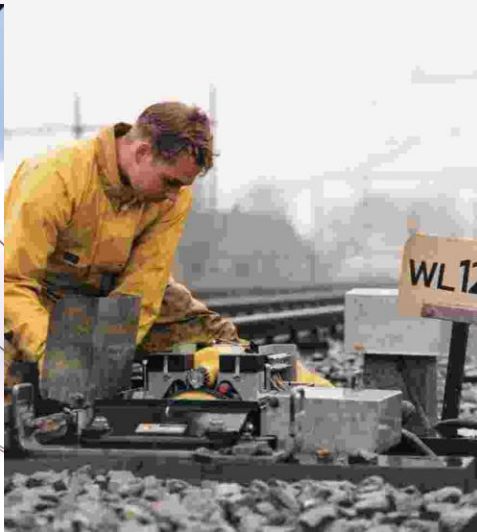
RFID-tags in the track

ProRail

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The train as information-channel to **what, where** and **how** of track-assets



Video

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Why RFID-tags in the track?

What

- **RFID-tags** on important assets: crossings, pair of switches, insulation joints, expansion devices, housings, etc.

Where

- **Tagreaders** on regular trains: frequent inspections and automated identification and location of tagged assets.

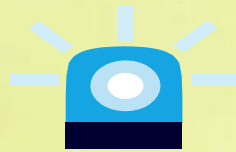
How

- **Sensors** on tags inform about status of assets: temperature, raitension, insulation, adjustments, etc.

Are we in control?

24/7

- **When** trains are running: equipment in tunnels, axle-load sensors, hotbox, etc



2x/wk

- **On** running trains: axle accelerometers, RFID-tagreaders, etc.



2x/jr

- **Between** running trains: ultrasonic tests, geometry, turnout measuring, etc

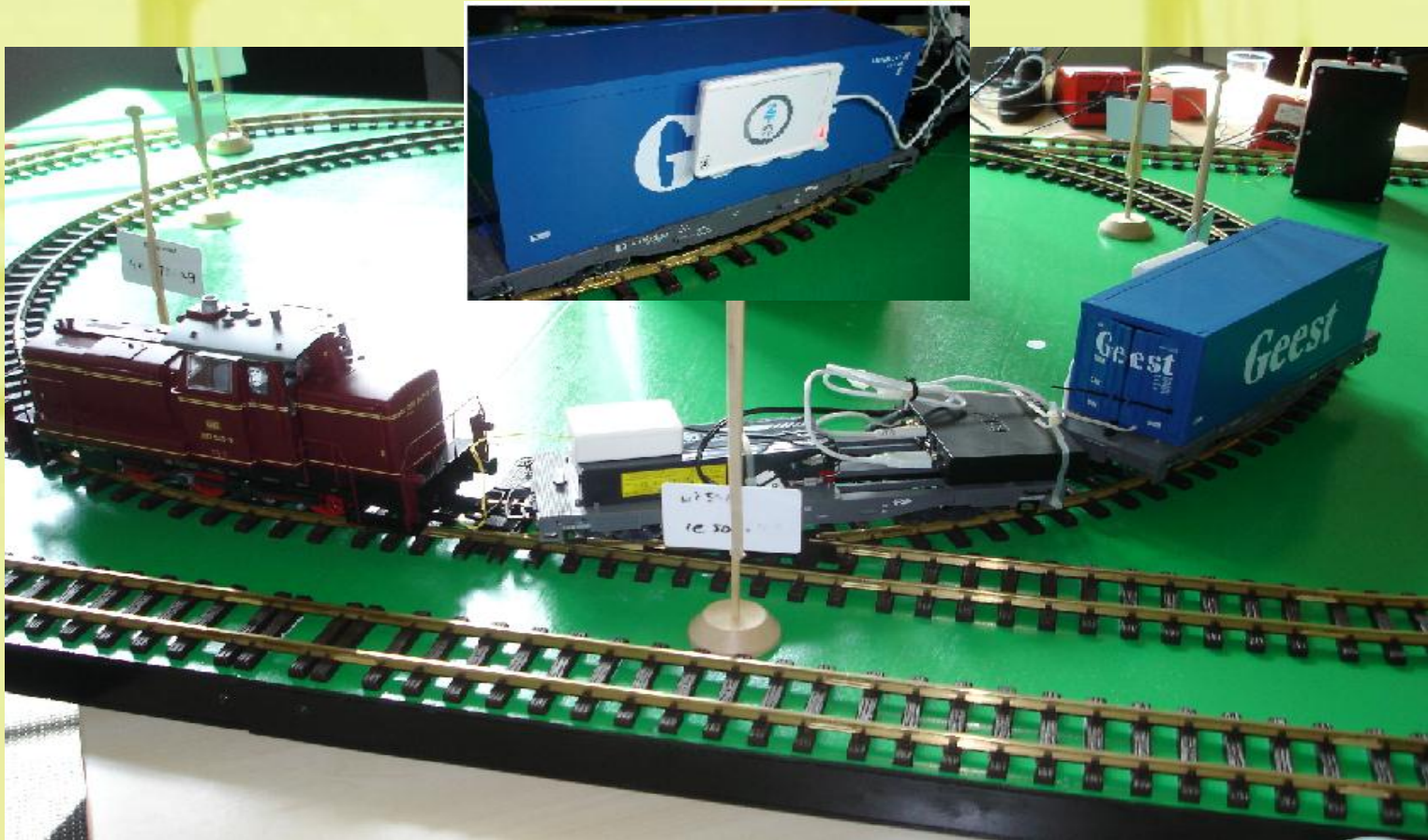


x jr

- **No** running trains: inspection of bridges, end of life evaluation switches, etc.

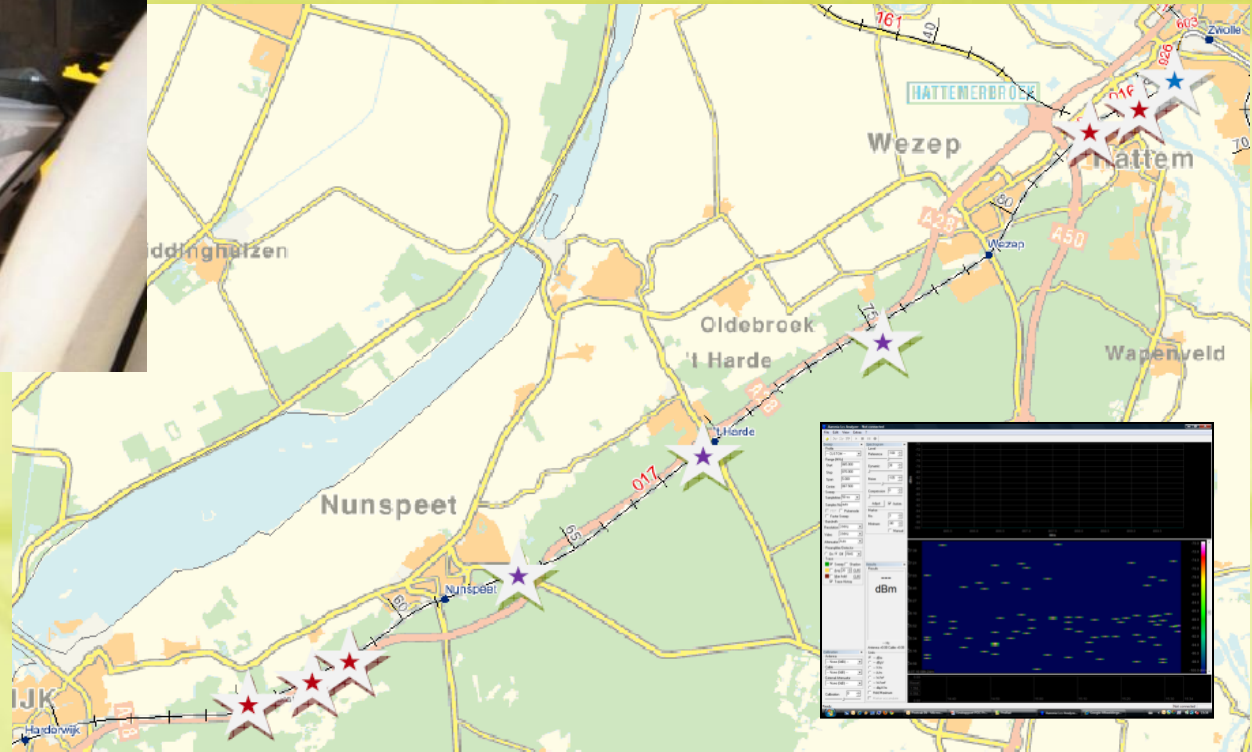


RFID Demo track: inspire and demonstrate



Proof of Concept

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- 5 level crossings
- Plain track
- River bridge Zwolle
- 2 turnouts



Tag positions

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Results Proof of Concept **ProRail**

- Different type of tags

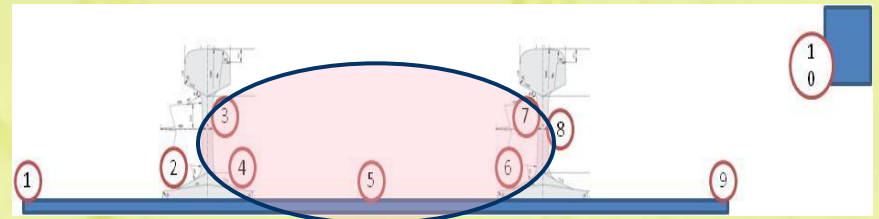
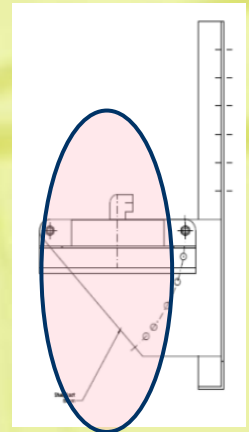
Rijlabels	Aantal van unieke label aanduiding	Max.score	Hirate
hc 1	26	208	48%
hc 2	9	72	15%
hc 3	9	72	21%
hc 4	10	80	19%
hc 5	8	64	11%
label 1	34	272	56%
label 2	10	80	29%
label 3	10	80	30%
label 4	10	80	18%
label 5	10	80	15%
Eindtotaal	136	1088	34%

- Different orientations

Rijlabels	Aantal van unieke label aanduiding	Max.score	Hirate
x	92	736	43%
y	14	112	22%
z	30	240	14%
Eindtotaal	136	1088	34%

Conclusions Proof of Concept

- RFID is technically feasible in the track environment
- Tags at various positions can be easily read with great speed
- A lot of “room for improvement”
 - *Reader angle*
 - *Reader Location*
 - *Additional antenna reader*
 - *Orientation tags*
 - *Tag positions*
 - *Tag alternatives*



Preparation of a Pilot

- Simple line with closed circulation of rolling stock
- Test for a longer period with real-life conditions: weather, maintenance, etc
- Investigate on improvements RFID data capturing
- Together with subcontractor VolkerRail / Inspectation
- Observe frequent changing objects and processes:
 - *Inspection of railtemperature to prevent buckling*
 - *Marking rail-defects and reparations*

Imagine possible applications

- Locating components in / on / off the track and capture of additional information
- Registration status product / project
- In/out warehouse and location; adequate asset management
- Various RFID sensor applications and condition-based maintenance
- 1-1-relationship between drawings, schedules and physical world, even by augmented reality
- Who did what, where and how and which parts where used?
- Simple counting/collecting of passed megatons
- ...

Needed: a platform on regular trains

- 1.0
 - *Differentiate between right or left rail*
 - *Automated localisation of tagged assets, linear*
- 2.0
 - *Automated localisation of tagged assets, cross section*
 - *Integrated front view-camera*
- ...

Invitation: joined development of this platform

Tomorrow: presentation Demo track at lunch

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Thank you for your attention

Any questions?

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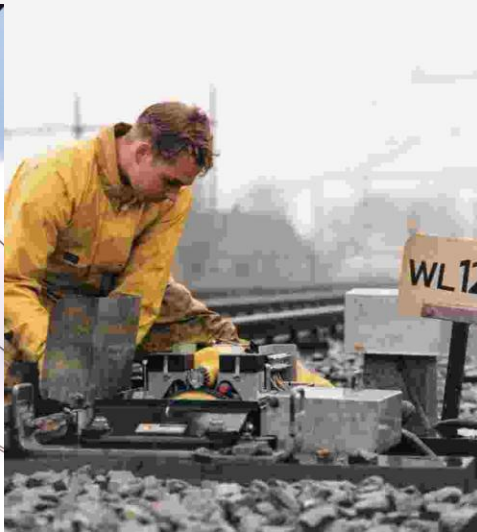


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Back up slide

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Application of RFID-tags

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