Condition monitoring S&C

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**Intelliswitch
Symposium 2017
Arne Nissen,Uhjsp
2017-08-29**

Content

Need for condition monitoring

Existing way's to monitor

New way's to monitor

Condition data → Information

Information → Decision and follow up

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Need for monitoring

Monitoring is done to make decisions

- "Daily" maintenance – Adjustment, cleaning, small component replacement
- Planned maintenance - Larger replacement, tamping, grinding, surface build up welding
- Time of reinvestment
- Management indicator

Existing way to monitor

Close visual inspection - Short term planned maintenance (6x)

Maintenance inspection - Long term planned maintenance (1x)

S&C service - "Daily" maintenance (13x)

Movement of switchblade - "Daily" maintenance

Trafikverket has no installation

Strukton has about 20 S&C monitored in Gothenburg

Installation is planned in the autumn

Measure time/current/energy to move switch blade

Trafikverket has a system to read each movement (down to 0,1 s), DS-analys, but is not measuring electric current

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Existing way to monitor

Track geometry measurement - Planned maintenance

"Local" failures of Point machine, crossing, after long sleeper

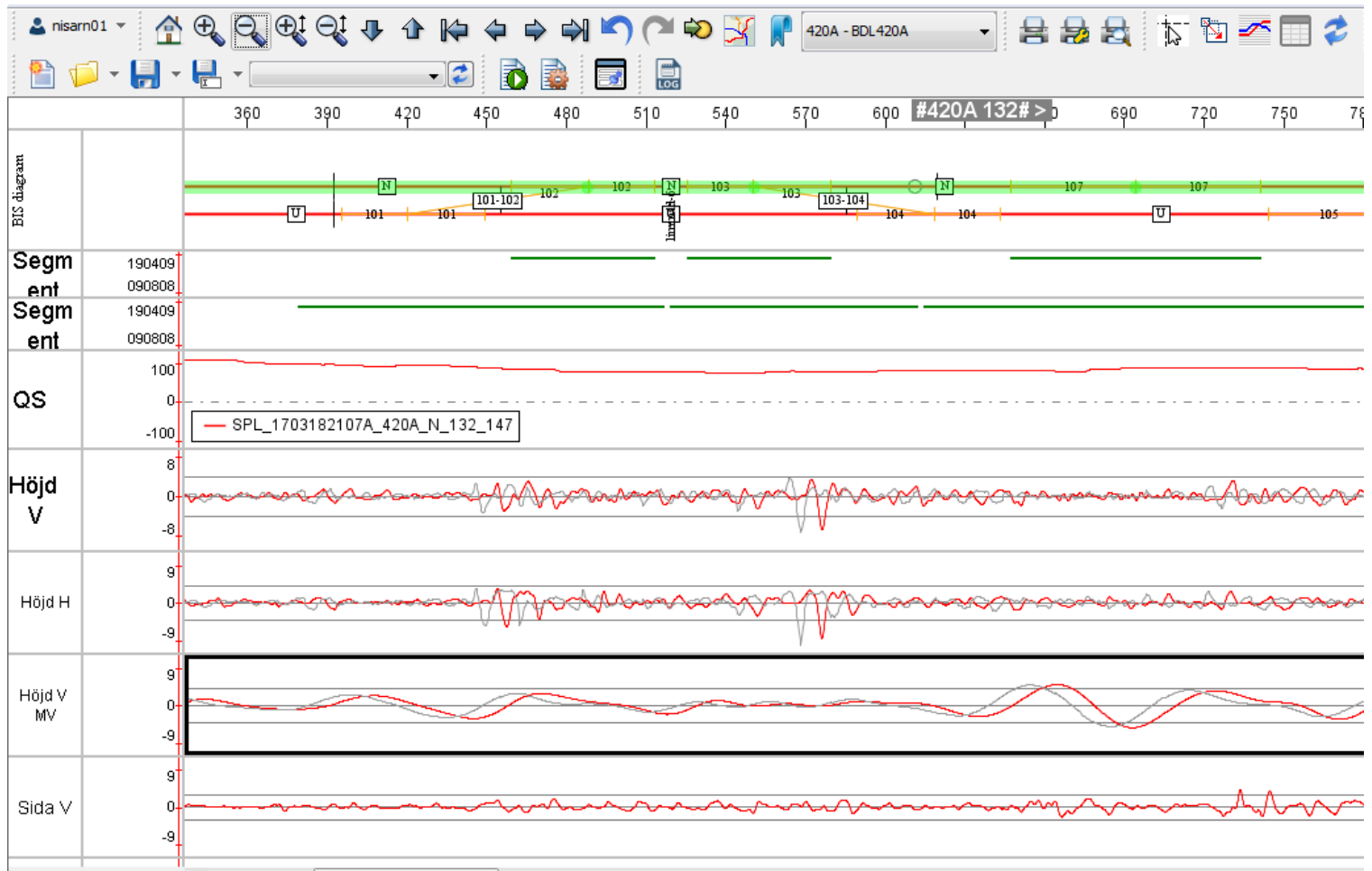TRAFIKVERKET

Existing way to monitor

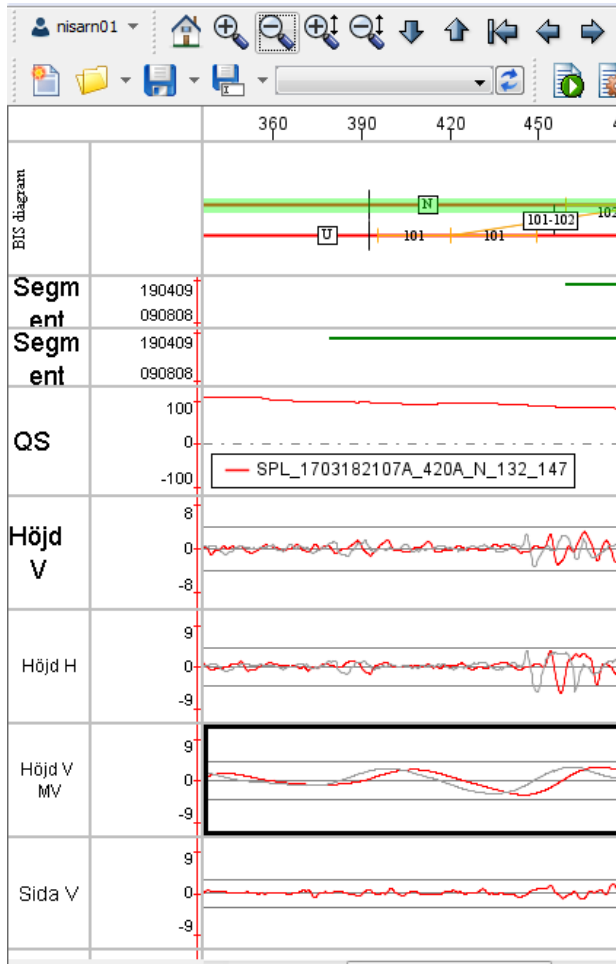**Track geometry measurement** - Optram

To find and follow a specific S&C

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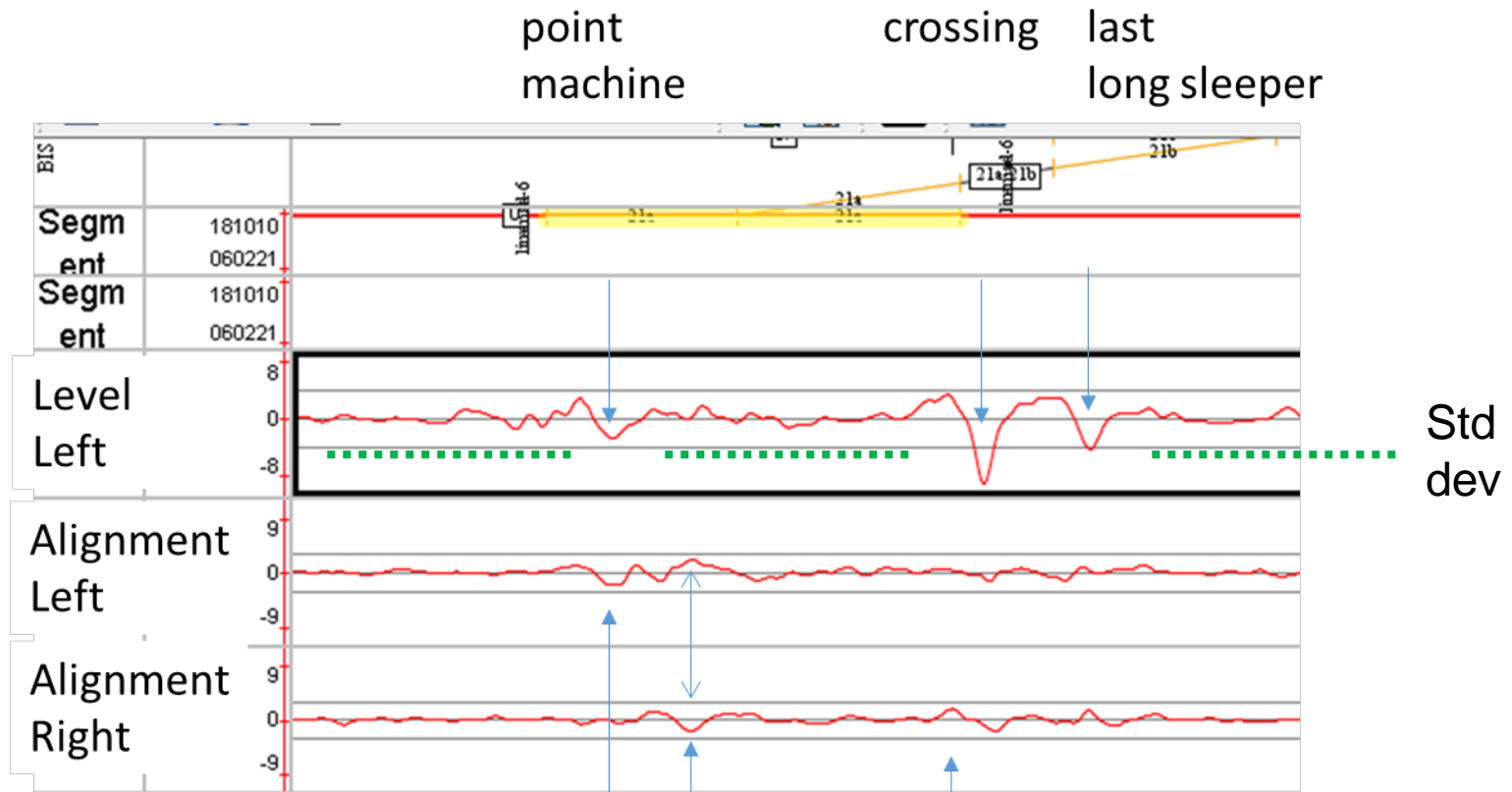
Existing way to monitor

Track geometry measurement - Optram

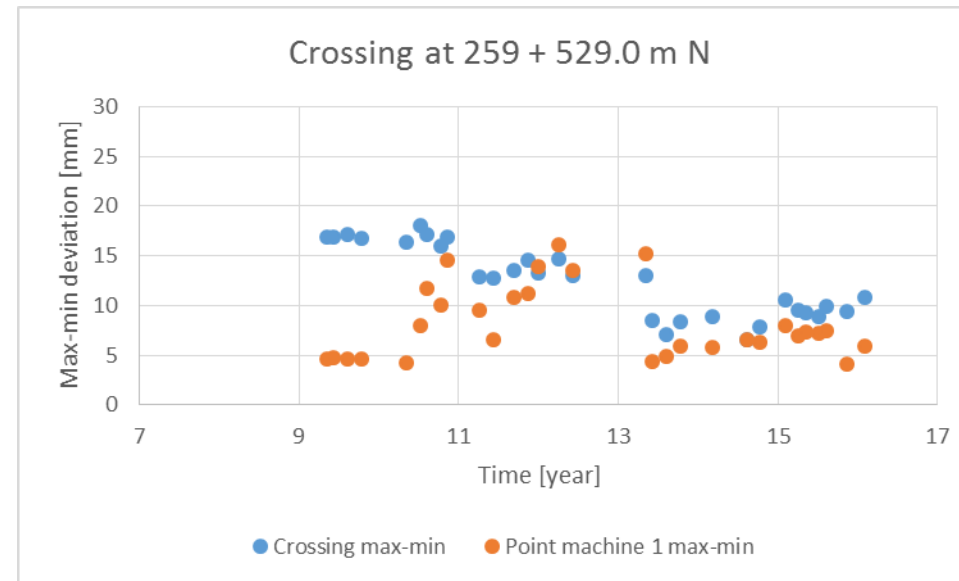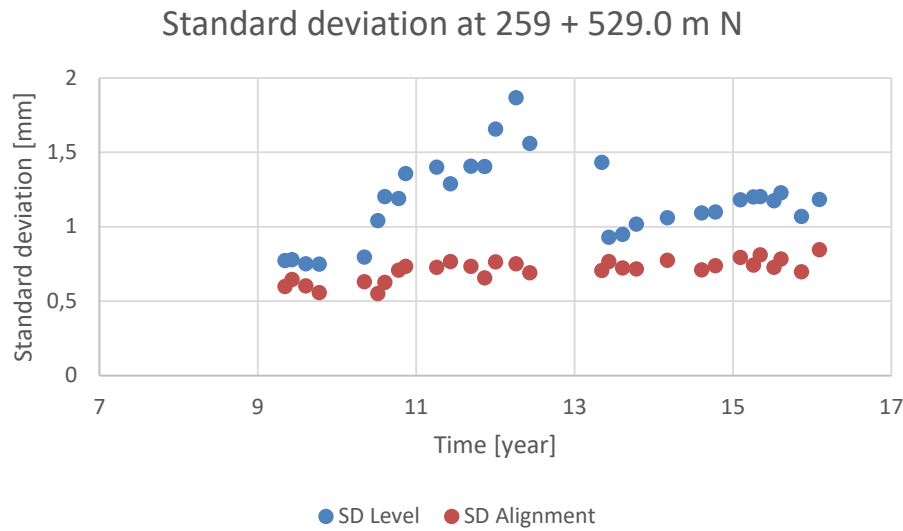## To find and follow a specific S&C


```
estSegments1 = event.Filter(estSegments, fil_UIC60_760)
estSegments0 = event.Filter(estSegments, fil_notUIC60_760)
estSegments1 = event.SetAttribute(estSegments1, "Driv1", 1.2)
estSegments1 = event.SetAttribute(estSegments1, "Driv2", 8.5)
estSegments1 = event.SetAttribute(estSegments1, "FKS", 41.6)
estSegments1 = event.SetAttribute(estSegments1, "Korsning", 47.4)
estSegments1 = event.SetAttribute(estSegments1, "BKS", 54.2)
estSegments1 = event.SetAttribute(estSegments1, "Långsliper", 62.3)
```

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Existing way to monitor
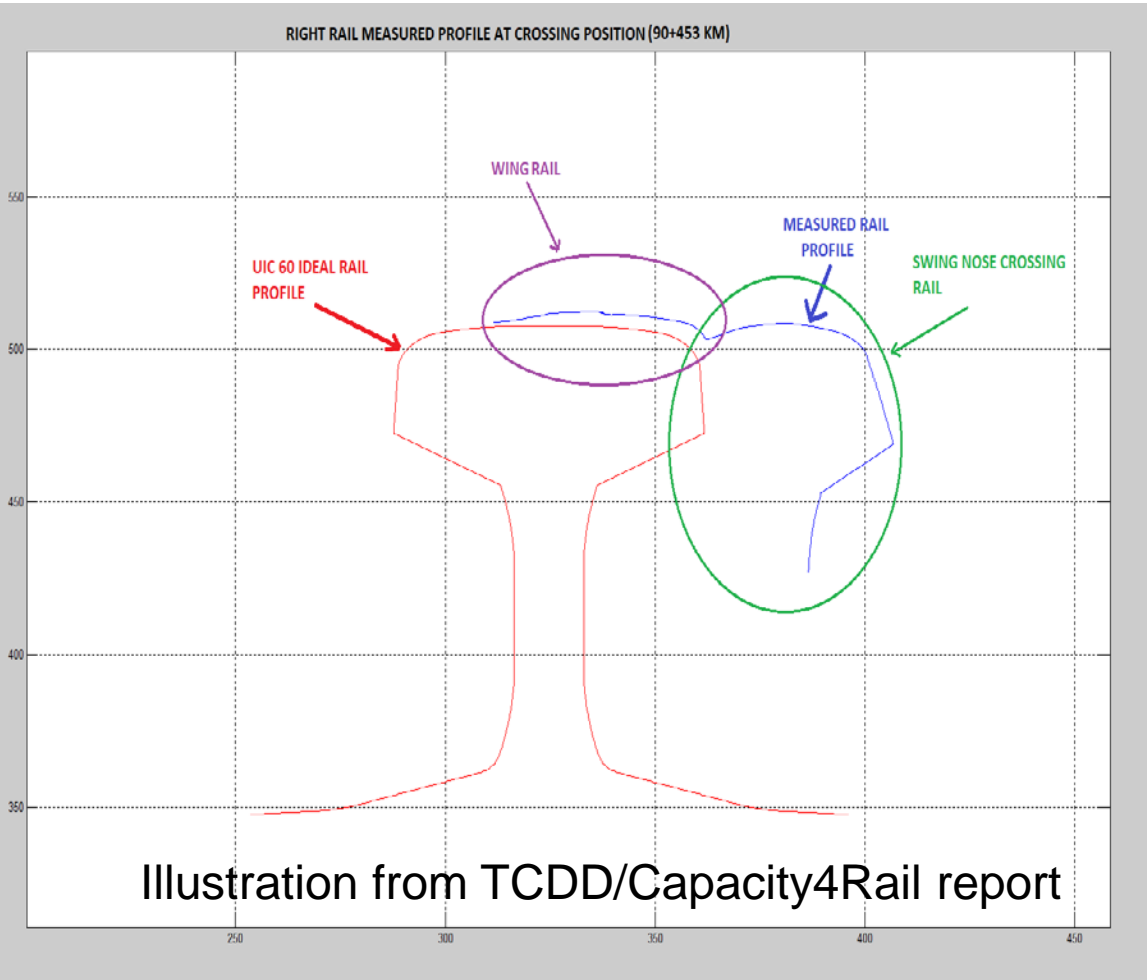
Track geometry measurement - Planned maintenance

"Local" failures of Point machine, crossing, after long sleeper

Standard deviation at 259 + 529.0 m N

Crossing at 259 + 529.0 m N

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Existing way to monitor

Rail profile measurement - Planned maintenance

RIGHT RAIL MEASURED PROFILE AT CROSSING POSITION (90+453 KM)

WING RAIL

MEASURED RAIL PROFILE

UIC 60 IDEAL RAIL PROFILE

SWING NOSE CROSSING RAIL

Illustration from TCDD/Capacity4Rail report

Spacing
Today   100 cm
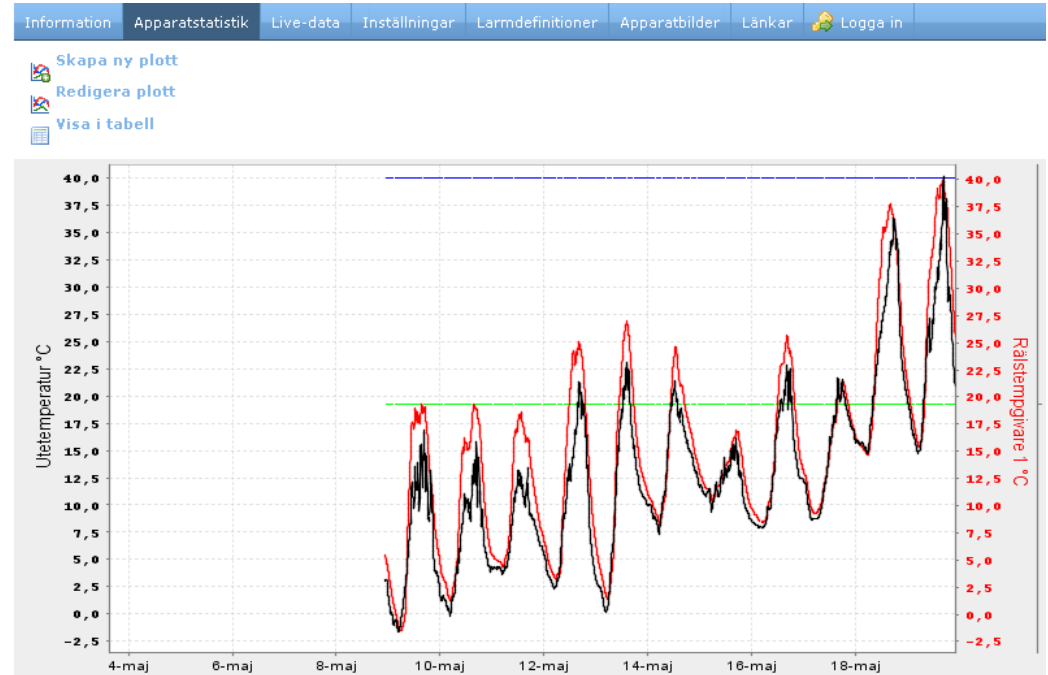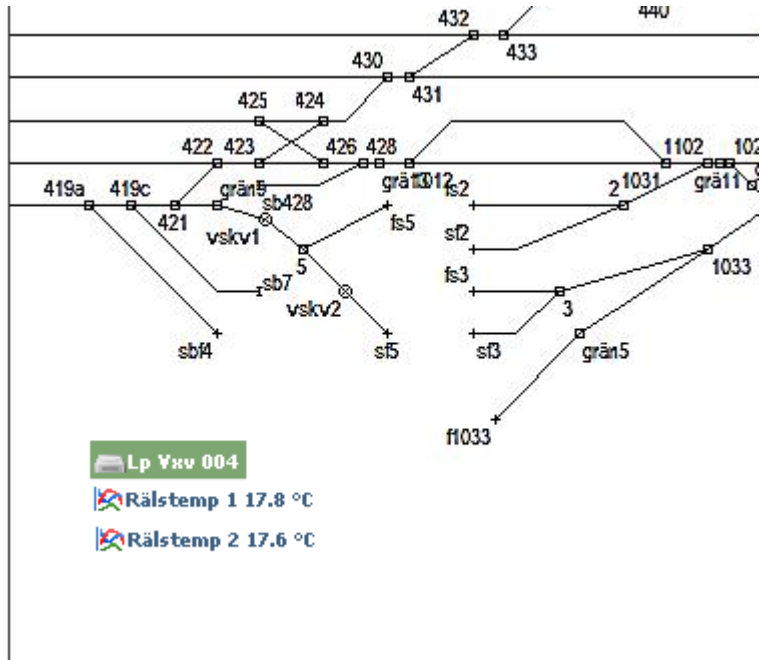With SIM 10   2 cm
Tomorrow   1 cm

Longitudinal profile

Break off

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Existing way to monitor

Switch Heating control - Planned maintenance

Temperature both in air and in rail

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Existing way to monitor

Visual inspection by camera – "Daily" maintenance and planned maintenance

SIM10 is the measurement inspection wagon which is on trial 2017-2018 by the initiative of Strukton

Visual inspection is still done by persons , but behind screens

Request to minimize need of visits to the S&C for safety inspections

Material flaking in a switch

http://www.eurailscout.com/services/switch/
visual-switch-inspection-/
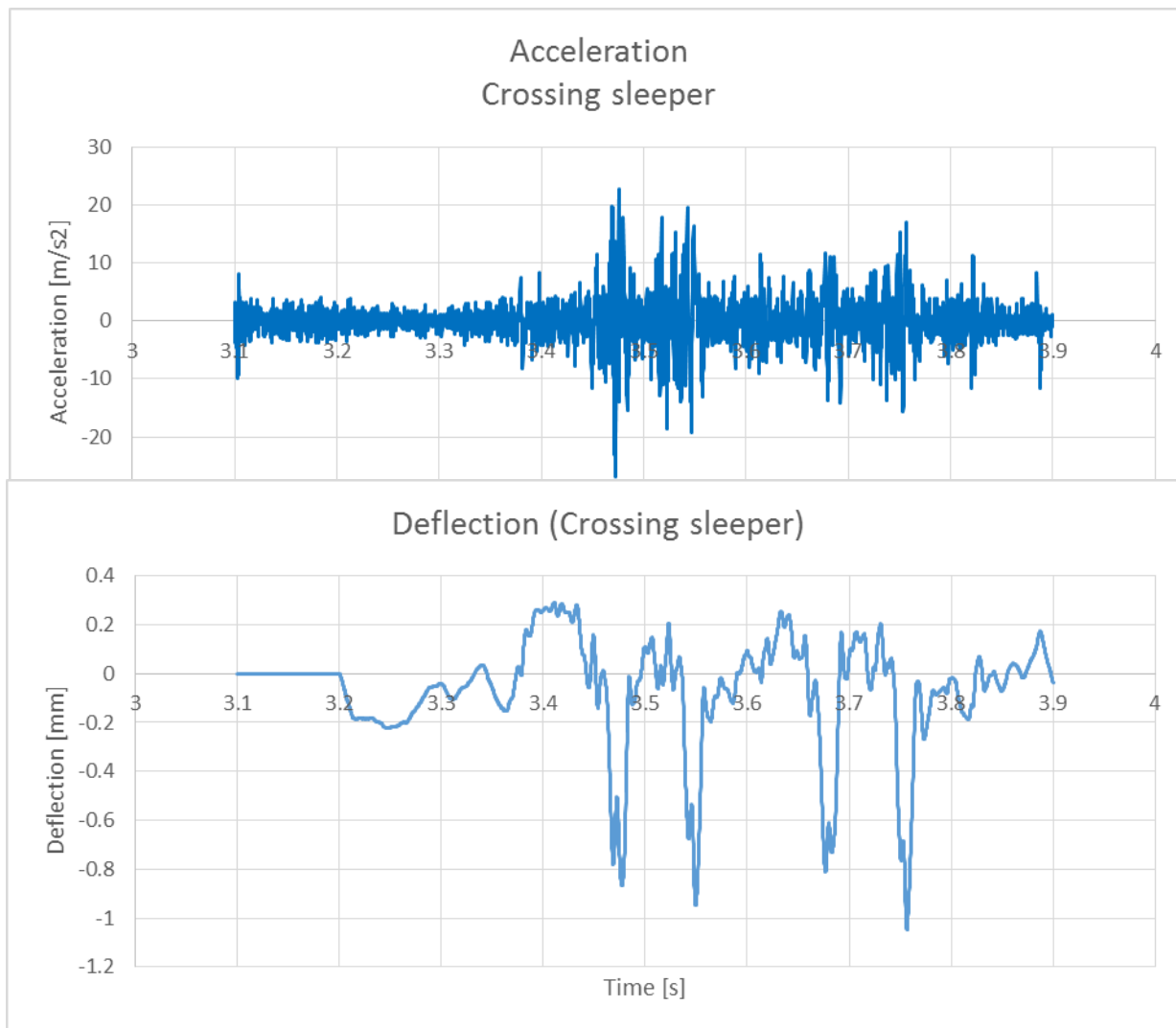
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New way to monitor

Acceleration of sleepers
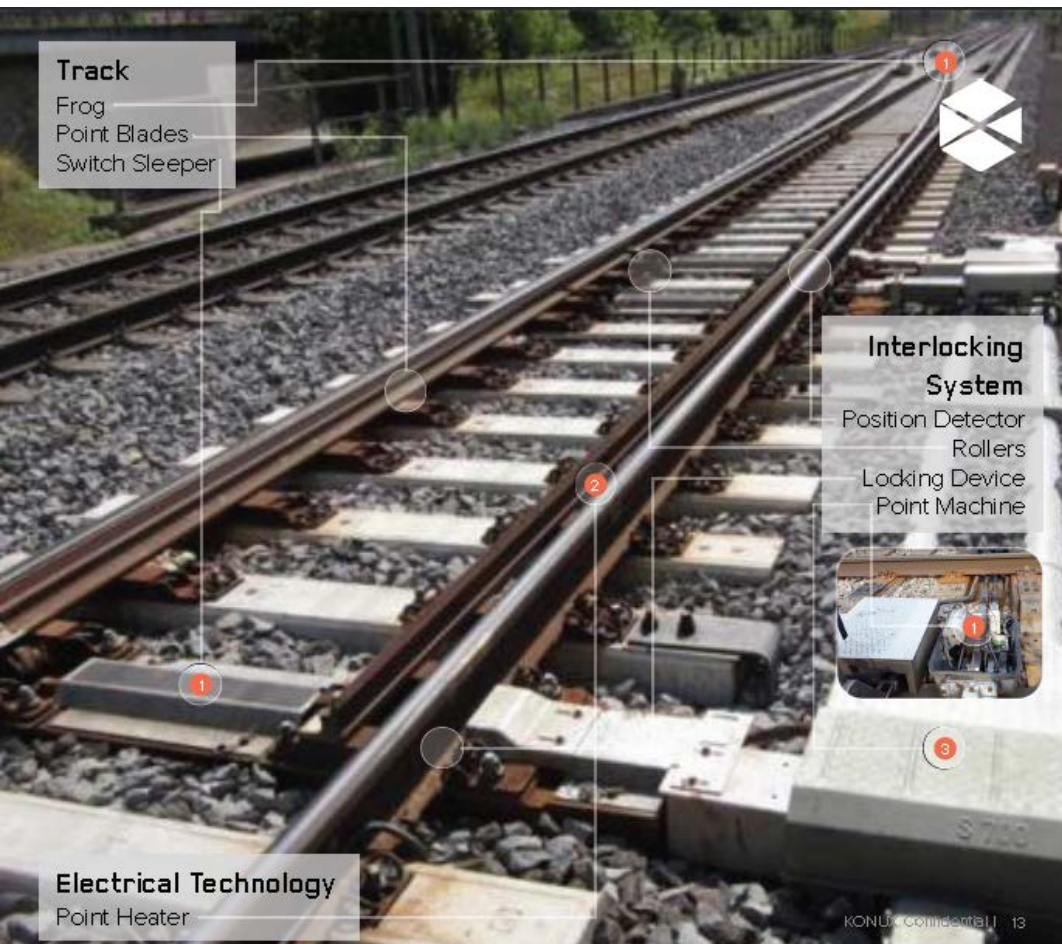
Technology available on the market.

A number of research project is done

Which maintenance can be foreseen?

- Crossing repair
- Tamping
- Ballast cleaning

New way to monitor

Acceleration where to measure?
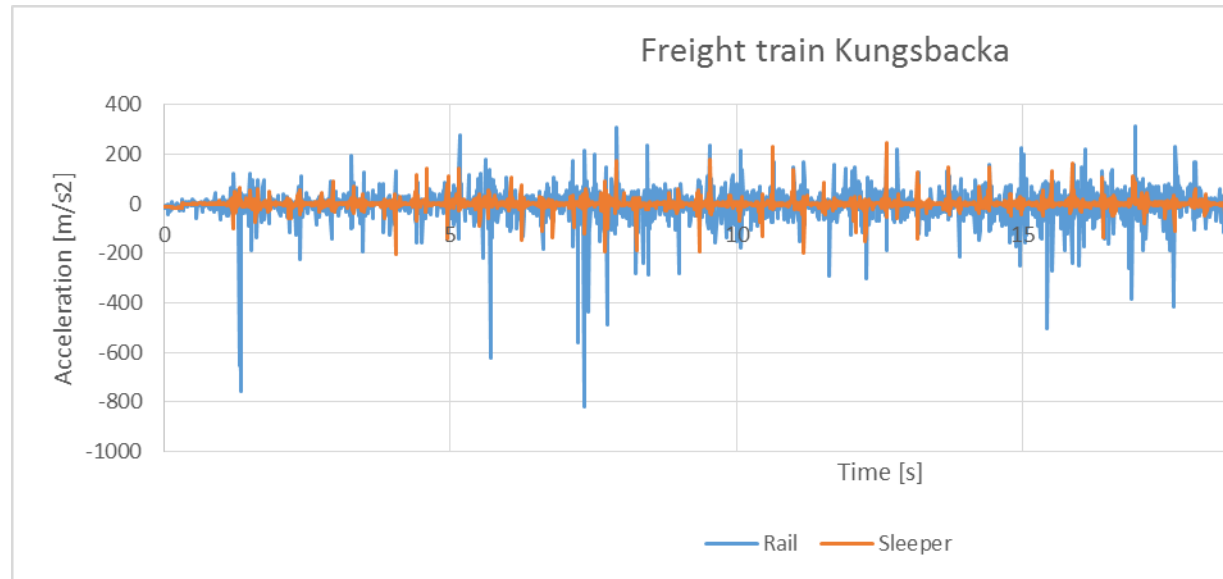

Konux accerelerometer

New way to monitor

Acceleration of rail

Technology available is not on the market.

Less research

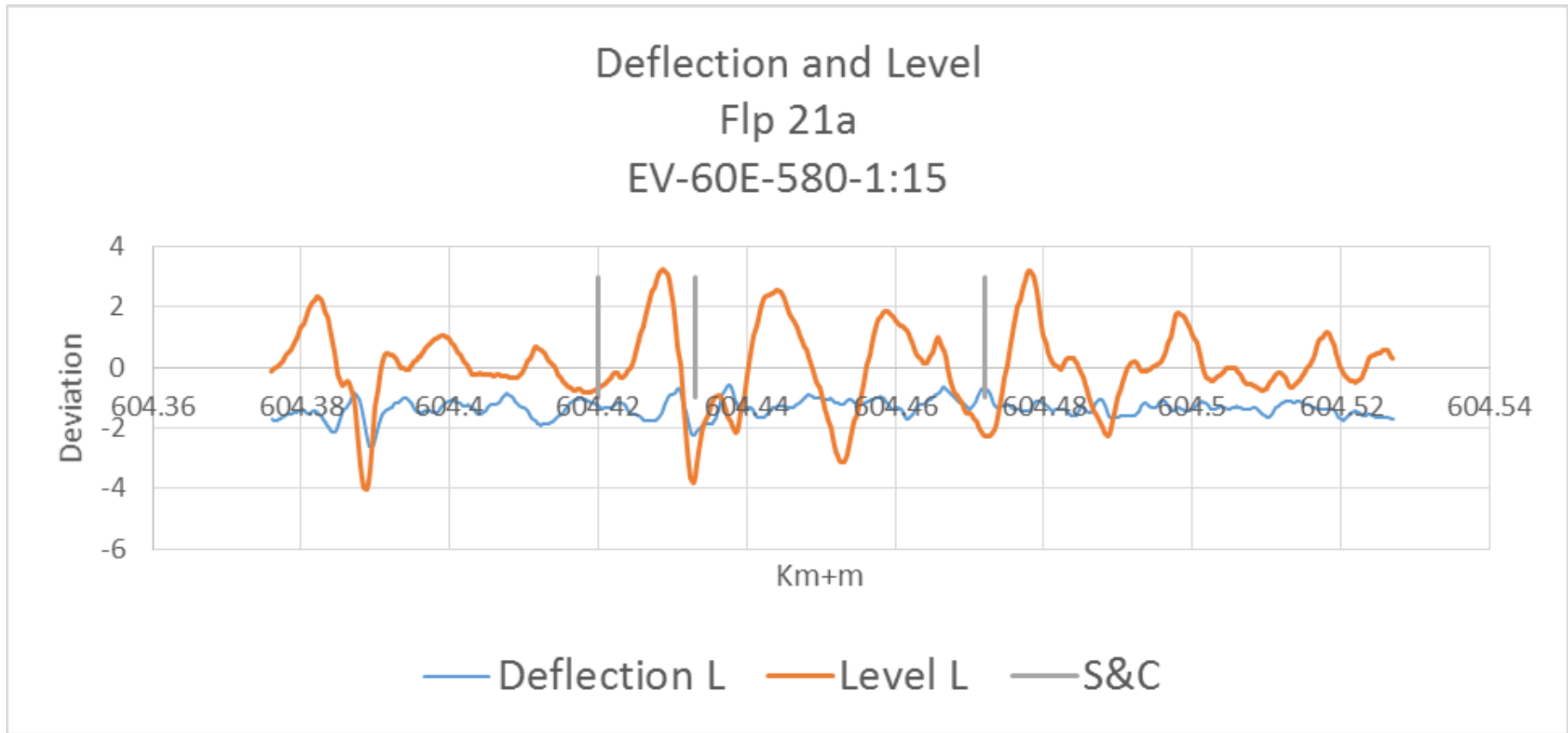Which maintenance can be forseen?

- Crossing repair

Draw backs
Lower long term reliaility
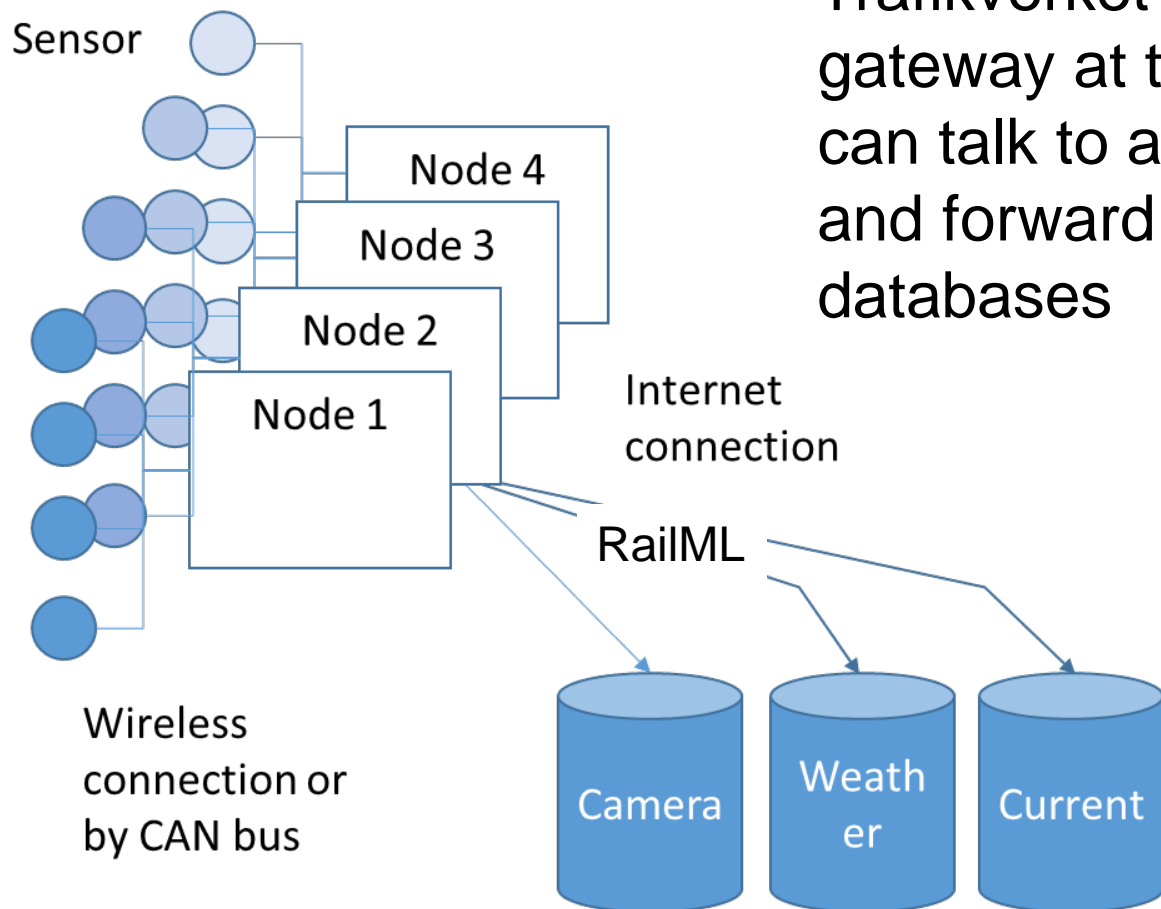Low weight (battery capacity) or cable solutions

Freight train Kungsbacka

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Stiffness measurement

Stiffness measured at 100 km/h by measuring both loaded and unloaded axle in the same wagon

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Condition data → Information

Condition data is today stored into separate databases and kept separate

Trafikverket vision is to enable a gateway at the S&C cabinet that can talk to a number of sensors and forward the data to the databases

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Condition data → Information

Data collection should be separated from the analysis if we are going to work with multiple data sources for the analysis (unless the IM wants to do all this by themselves)
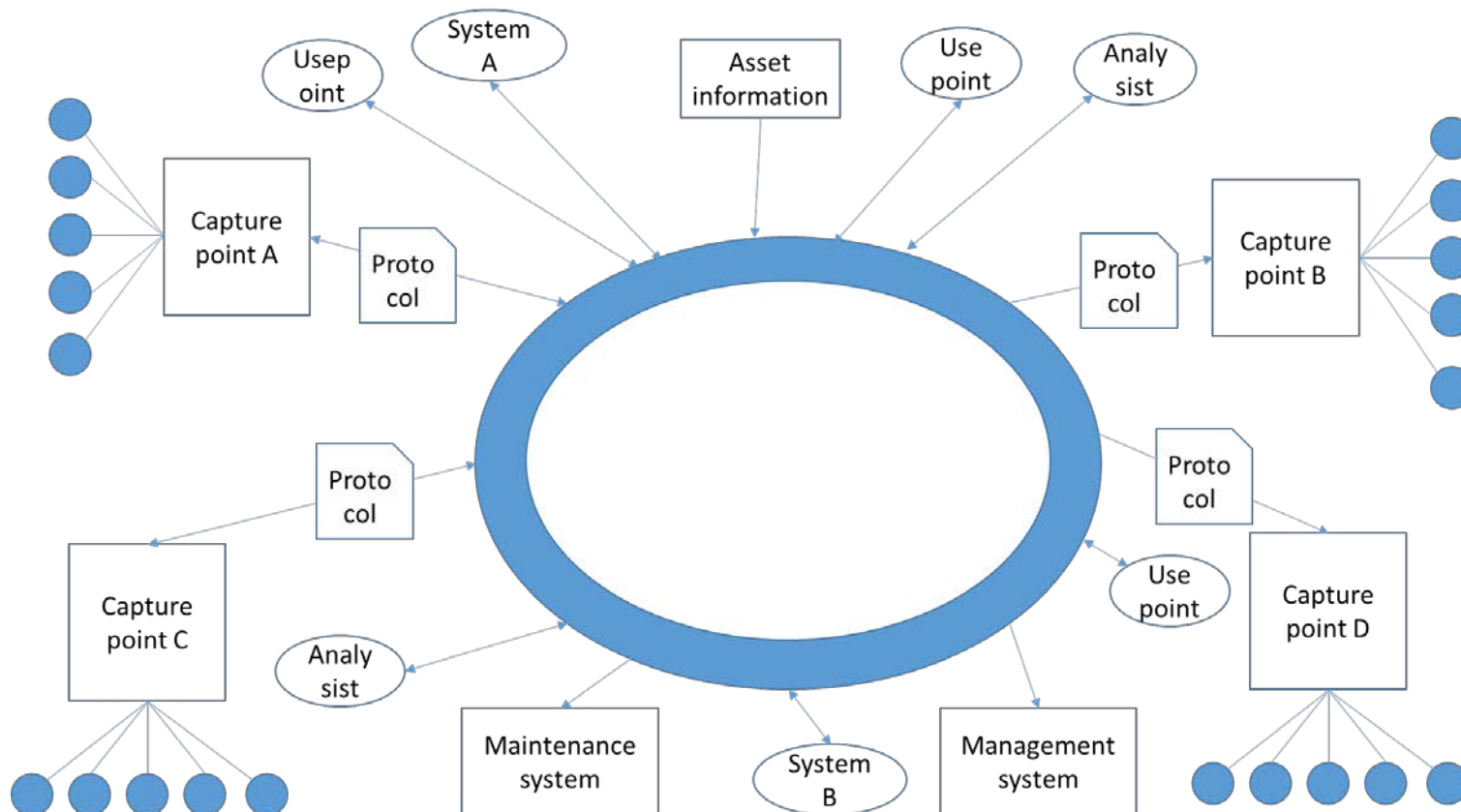
# Introducing a new generation of S&C

- 60E-generation   Started 2009 within the Innotrack project
- First installation   2014
- Today   Inclined rail

                                    Elastic pads

                                    USP

                                    Sleeper integrated point machine

                                    Thicker switch blade

Steel and sleeper has worked out fine

Introduction of new point machine to be solved during 2018

60E (Easyswitch) Antal fel/vecka (alla spårväxlar i hela landet)
55 st aktiva spårväxlar (nhsp)
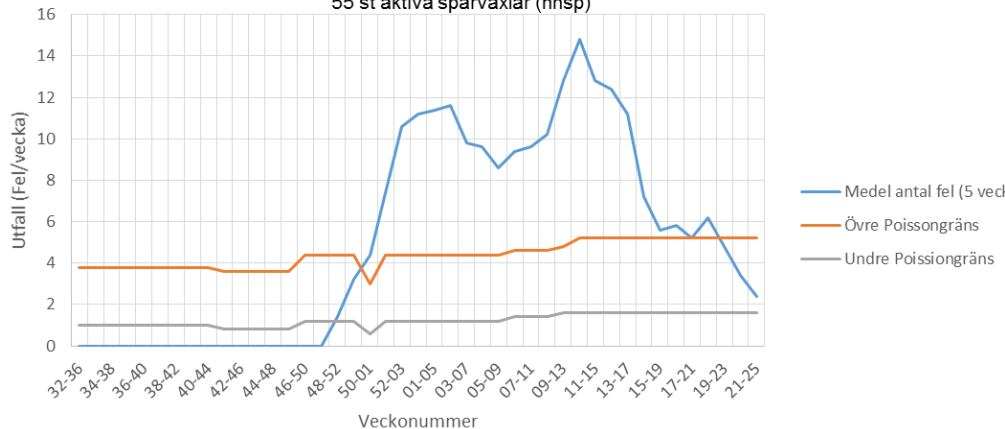
60E (JEA driv) Antal fel/vecka (alla spårväxlar i hela landet)
86 st aktiva spårväxlar (nhsp)

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