NGT Taxi – A Diagnostic Approach to Vehicle Maintenance in Remote Areas

Railway Diagnostic and Monitoring Conference, 2024, April 18

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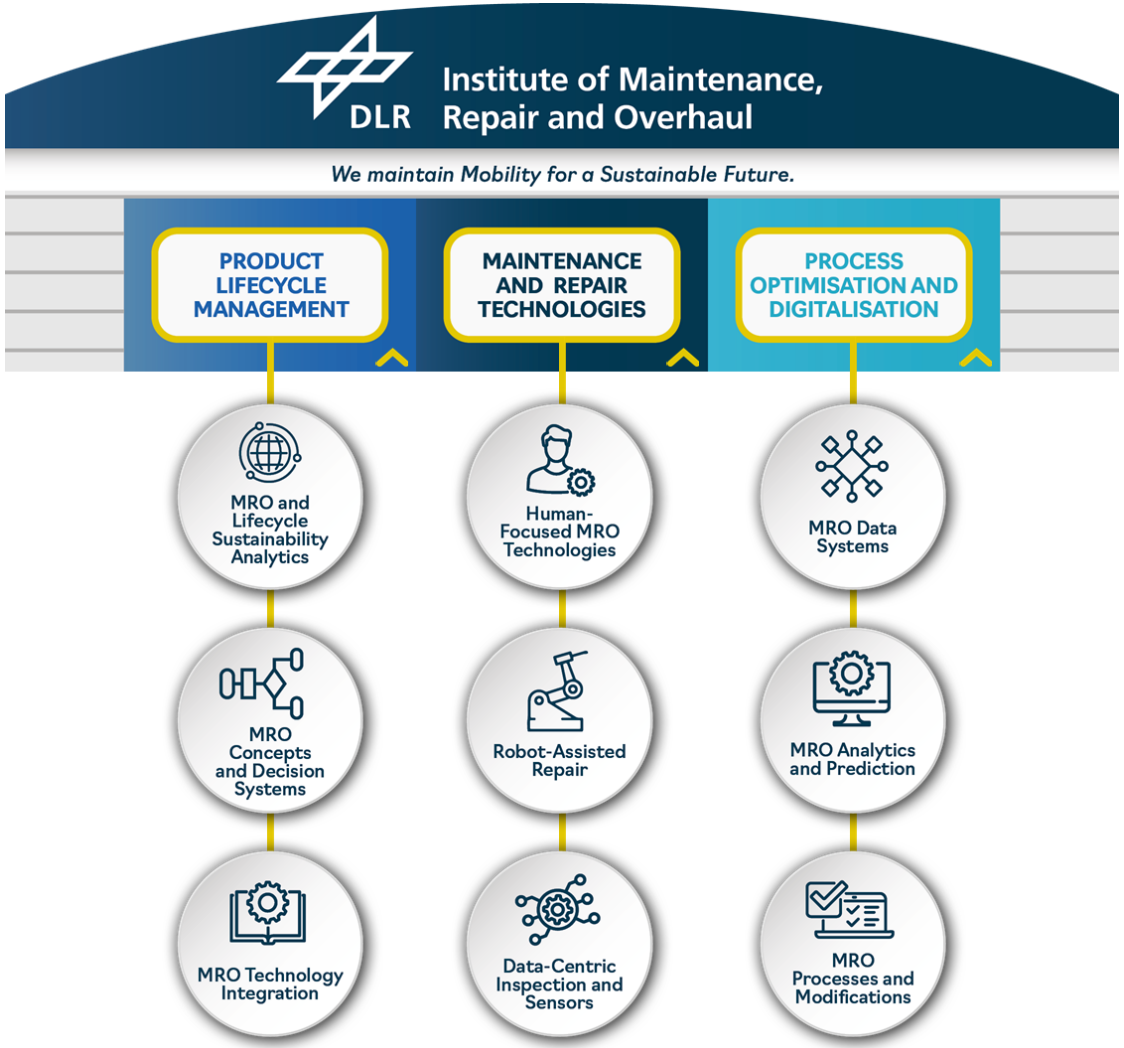
DLR Institute of Maintenance, Repair and Overhaul

Key facts about the Institute DLR-MRO

- Part of the German Aerospace Center
  - 55 institutes at 30 locations
- DLR is focussing on Aeronautics, Space, Energy, **Transport**, Security and Digitalisation
- DLR-MRO was founded in June 2017
- Located at ZAL TechCenter in Hamburg-Finkenwerder
- 50+ Employees

Working Focusses of Institute MRO



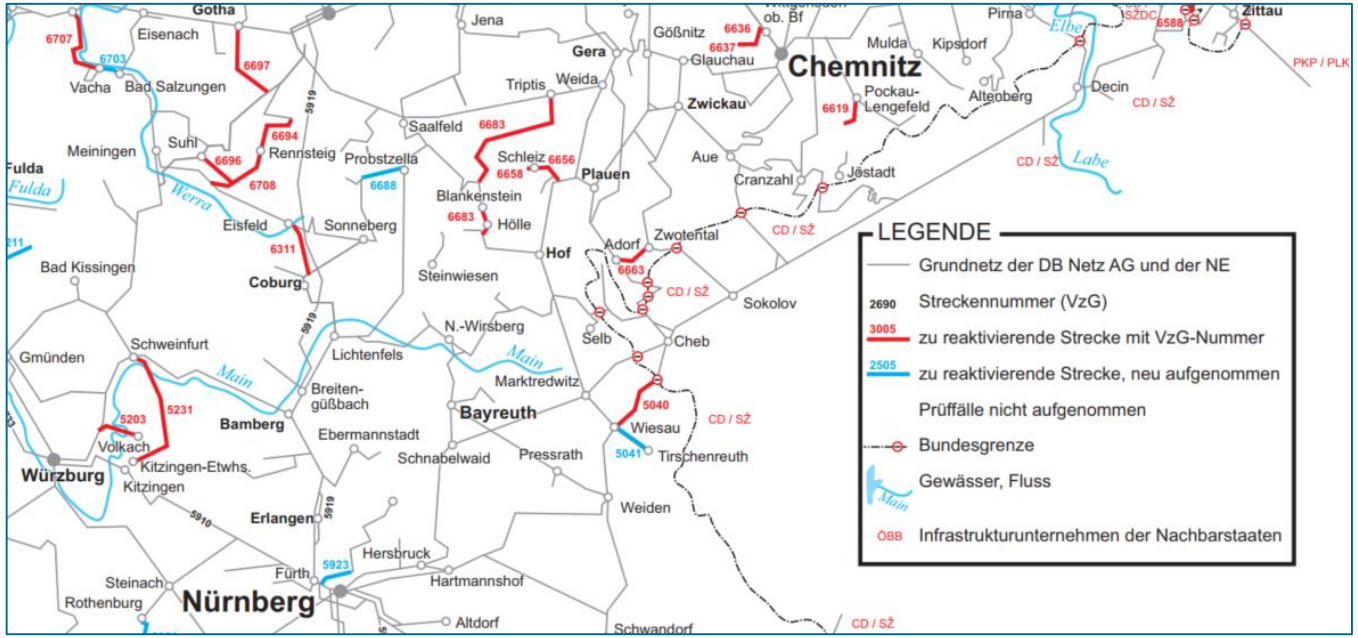
DLR Railway Research Program (Next Generation Train)

- **NGT Link** (Seven-car double-deck inter-regional Train)
  - **NGT HST** (Highspeed Train)
    - **NGT Cargo** (Highspeed Freight Train)
      - **NGT …** (Selfpropelled Bogey, Virtual Coupling, etc)
        - **NGT Taxi**:

2027:
TRL 6+

Branch Lines and Re-Activated Railway Tracks

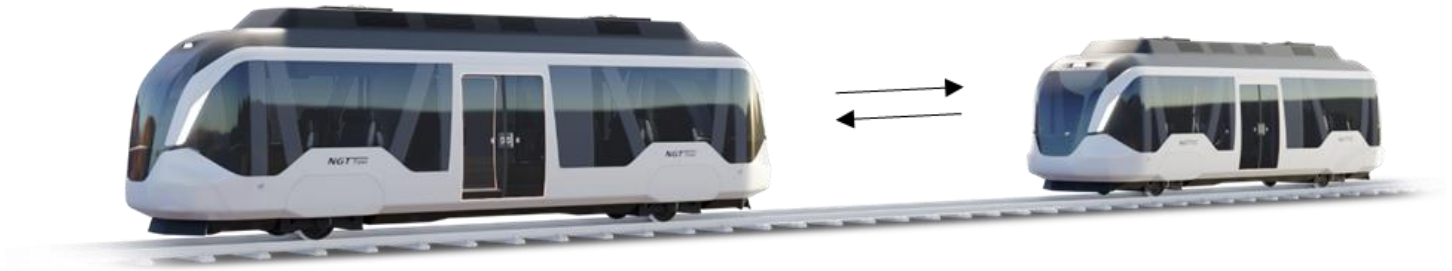
- Exclusive branch lines with strict, infrastructural separation from conventional lines
- Appr. 200 Re-activation Tracks in G for low Intensity Passenger Traffic
- Mixed operation with mainline vehicles
- Integration into (local) transport system



Source: VDV: Auf der Agenda: Reaktivierung von Eisenbahnstrecken, 4/2020

NGT Taxi

- Automated operation (if needed)
- 24/7 operational service
- Scheduled/on-demand (depending on time of day)
- Flexibility by using virtual coupling



Maintenance challenges of an exclusive Branch Line Operation

Daily Checks and Visual Inspections

- No Driver (Automated Operation)
- No Rail Vehicle Hall (Limited Operation Cost)

Operational Maintenance

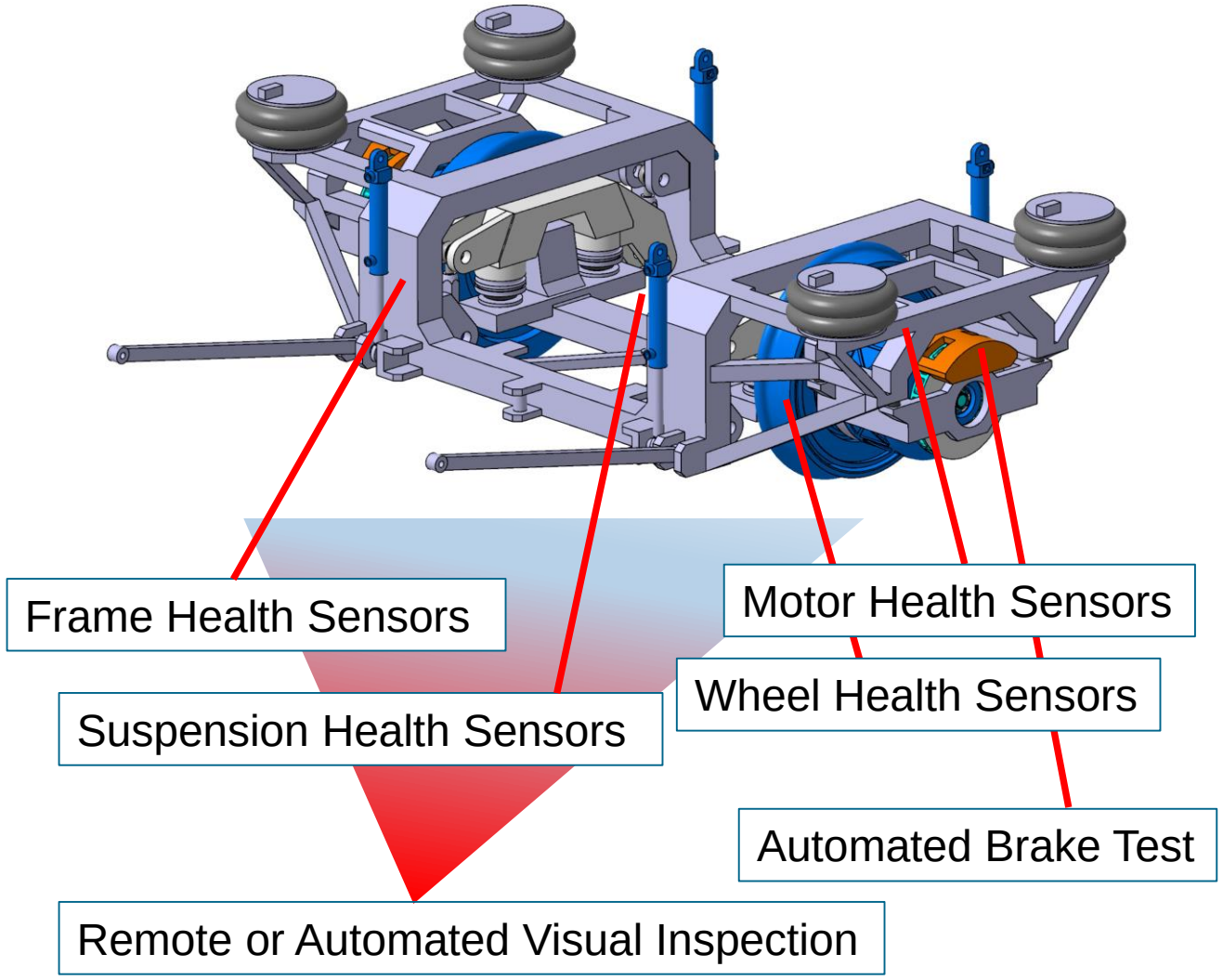
- No Line-connected Maintenance Work Shop (Limited Operation Cost)
- No Switch to Main Line
- Switch to Main Line, but restricted Operation Certification of Branch Line Vehicle NGT Taxi
- Switch to Main Line, but Distance to Third Party Maintenance Shop

Source: Openrailwaymap.org

Bgr.-Nr. CDS	Baugruppe	Einzelteil/ Art der Arbeit	tgl. V/A	IS 1 15 Tkm	IS 2 30 Tkm
		Lager austauschen			
02.03.04	Radreifen	Prüfen des Übergangs-widerstandes			X
02.04.01	Anlenkung	Sichtprüfung der Gehäuse,Lenker und Lenkerbefestigung		X	X
		Besichtigung		X	X
02.04.04	Abhebesicherung	Sichtprüfung		X	X
		Sichtprüfung der Abhe-besicherungen			X
02.05.01	Spurkranz-schmierung	Kleinstsiebfilter reinigen			
		Fettstand prüfen	X	X	X
		Funktionsprüfung	X	X	X
		Sprühdüsen prüfen			X
		Sprühdüsen einstellen			
		Sprühdüsen tauschen			
		3/2 Wegeventil tauschen			
02.05.02	Sandung	Sichtprüfung	X	X	X
		Füllstand des Sandbe-hälters prüfen	X	X	X
		Funktionskontrolle	X	X	X
		Sandrohr Höhe prüfen			
02.05.04.01	Radsatzwendege-triebe	Ölstand prüfen		X	X
		Sichtkontrolle und äußere Kontrolle		X	X
		Ölwechsel beide Kammern			

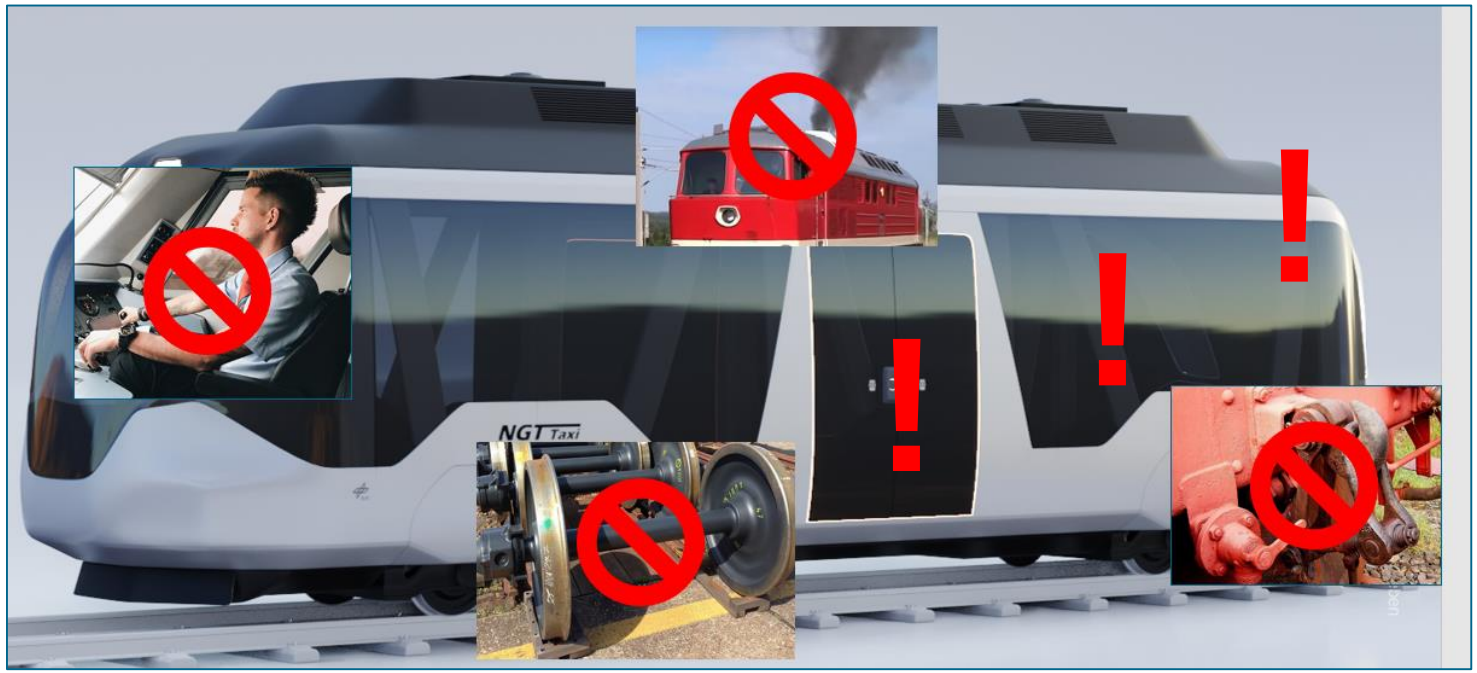
Source: Stadler Regio Shuttle RS Wartungs- und Inspektionshandbuch (Ausgabe 02)

NGT Taxi – Overall Diagnostic Approach –
Sample: Loose Wheel Set



- Each sensor has to comply with standards -- extension of EN 50155
- Each data collection system has to underdo failure test procedures -- extension EN 50129
- Each sensoring procedure has to undergo failure investigation -- ??
- Each procedure has to be approved by EBA (or sub-national railway authority)

NGT Taxi – Overall Diagnostic Approach – !!Each and any component!!



- DIN 272xx
- DIN 6701
- DIN 12663
- DIN 15273
- DIN 25003
- DIN 31051
- DIN 43101
- DIN 50126
- DIN EN 54-1
- DIN EN 286
- DIN EN 1326x
- DIN EN 13306
- DIN EN 13715
- DIN EN 15085

- DIN EN 15153
- DIN EN 15313
- DIN EN 15380
- DIN EN 15654
- DIN EN 17023
- DIN EN 17095
- DIN EN 45545
- DIN EN 50123
- DIN EN 50155
- DIN EN 50206
- DIN EN 50657
- DIN EN ISO 527
- DIN VDE 0119-206
- DIN VDE 0119-207
- DVS 1614
- VDV 827

A	B	C	D	E	F	G	H	I	J
Nr. der Norm	DIN	EN	ISO	VDE	VDI	DVS	sonst.	Bezeichnung	Ausgabe
27202-10	x							Zustand der Eisenbahnfahrzeuge - Fahrzeugaufbau und Sondereinrichtungen - Teil 10: Messen Fahrzeugaufbau	2019-06
27203-1	x							Zustand der Eisenbahnfahrzeuge - Fahrgastraum - Teil 1: Einstiegtüren - Bauart: Drehtüren	2012-03
27203-2	x							Zustand der Eisenbahnfahrzeuge - Fahrgastraum - Teil 2: Einstiegtüren - Bauart: Drehfalttüren	2012-03
27203-3	x							Zustand der Eisenbahnfahrzeuge - Fahrgastraum - Teil 3: Einstiegtüren - Bauart: Schwenkschiebetüren	2012-03
27203-4	x							Zustand der Eisenbahnfahrzeuge - Fahrgastraum - Teil 4: Einstiegtüren; Bauart: Schiebetüren	2012-03
27203-5	x							Zustand der Eisenbahnfahrzeuge - Fahrgastraum - Teil 5: Einstiegtüren - Bauart: Schwingtüren	2012-03

!!etc.!!

NGT Taxi – Vehicle Concept

- Automized driving rail vehicle with locally emission-free propulsion system
- Vehicle concept adapted to the operation purpose
  (mixed operation with conventional trains/ operation on separated, exclusive lines)
- Passenger capacity
  - Minimum 20 passenger (reactivation lines)
  - Maximum 70 passenger (active secondary lines)

- Multi-modularity vehicle concept for cost-efficient production and economically priced vehicles
  - Capacity → vehicle length
  - Strength, crashworthiness
  - Train control system
  - Drive and propulsion architecture
  - Interior compartment
  - Target: each and any component predictive maintained

NGT Taxi – Maintenance Cost Effects on Revitalisation of Passenger Railway Operation

Imprint

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