

Testing and production of Coradia Max - Alstom's winning combination of capacity and accessibility

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ALSTOM

• mobility by nature •

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ALSTOM

Working in LHB / Alstom Salzgitter
Engineering since May 1996

Except 2012-2019 in Kassel
as Director of German Railway Standardisation
Board et al







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Introduction Coradia Max



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Coradia Max™ high-capacity – General description

Coradia Max offers an **intelligent balance** between **cost-efficient operation design** and **maximized passenger capacity** allowing operators to choose the configuration to suit their operations and commercial strategy

- Modular train for both **regional** and **intercity** operation, sharing **common core technology** with Coradia Stream
- The **motored single-deck car** represents the most **efficient way of integrating traction** also providing **optimized accessibility** for mobility impaired persons whilst the **double-deck cars offer the higher capacity.**
- Possibility to add or remove intermediate cars within the train
- Able to operate under the **main European power supply systems**
- **Different interior layouts** (seat arrangements, luggage, bicycle racks)
- PRM area with **fully flat-floors and level boarding** in the single-deck center cars

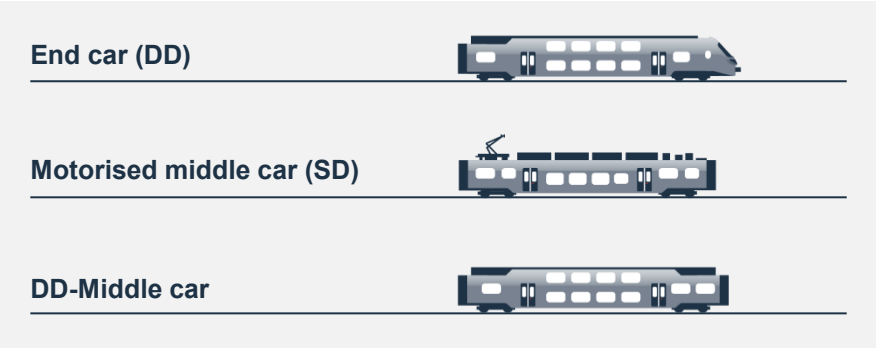


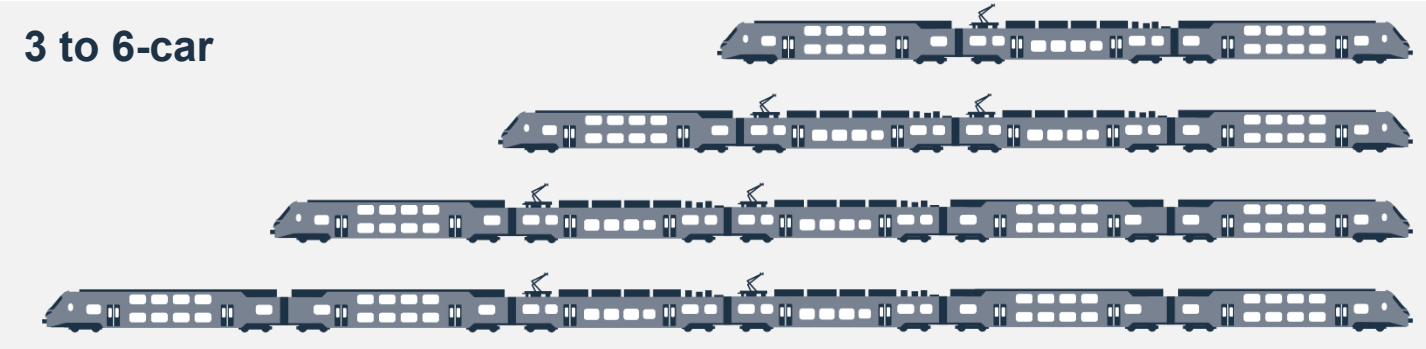


Coradia Max - a state-of-the-art solution with optimized accessibility and efficiency

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Coradia Max™ high-capacity – Vehicle concept





Some key features

- Unit formation from 3 to 6 cars, with lengths from 80 - 159m
- Conventional architecture, 320 – 700 seats
- 160 km/h (Regional) or 200 km/h (Intercity) maximum speed with option for pressure protection
- Motorized single deck intermediate cars for 1.5kV DC, 3kV DC, 15kV 16 2/3 Hz and 25kV 50 Hz power supply
- Level boarding at all entrances of the train either at 550 mm or 760 mm platform.
- Cantilever seats for flexible layout and ease of cleaning
- ERTMS and ATO (GOA2) for increased operational efficiency

The optimal mix of single-deck and double-deck cars for trains from 3 to 6-car

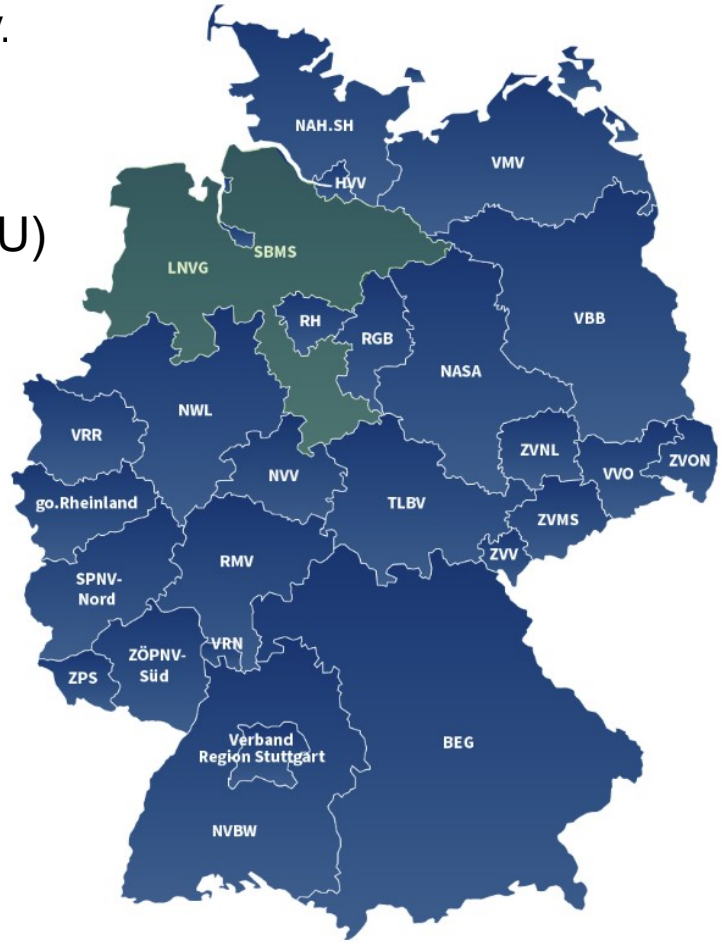
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LNVG

- LNVG is one of 28 public transport authorities (PTA) in Germany.
- Their vehicle pool model was one of the first in Europe.
- Next tender to come: Battery trains to replace Diesel Trains (DMU)



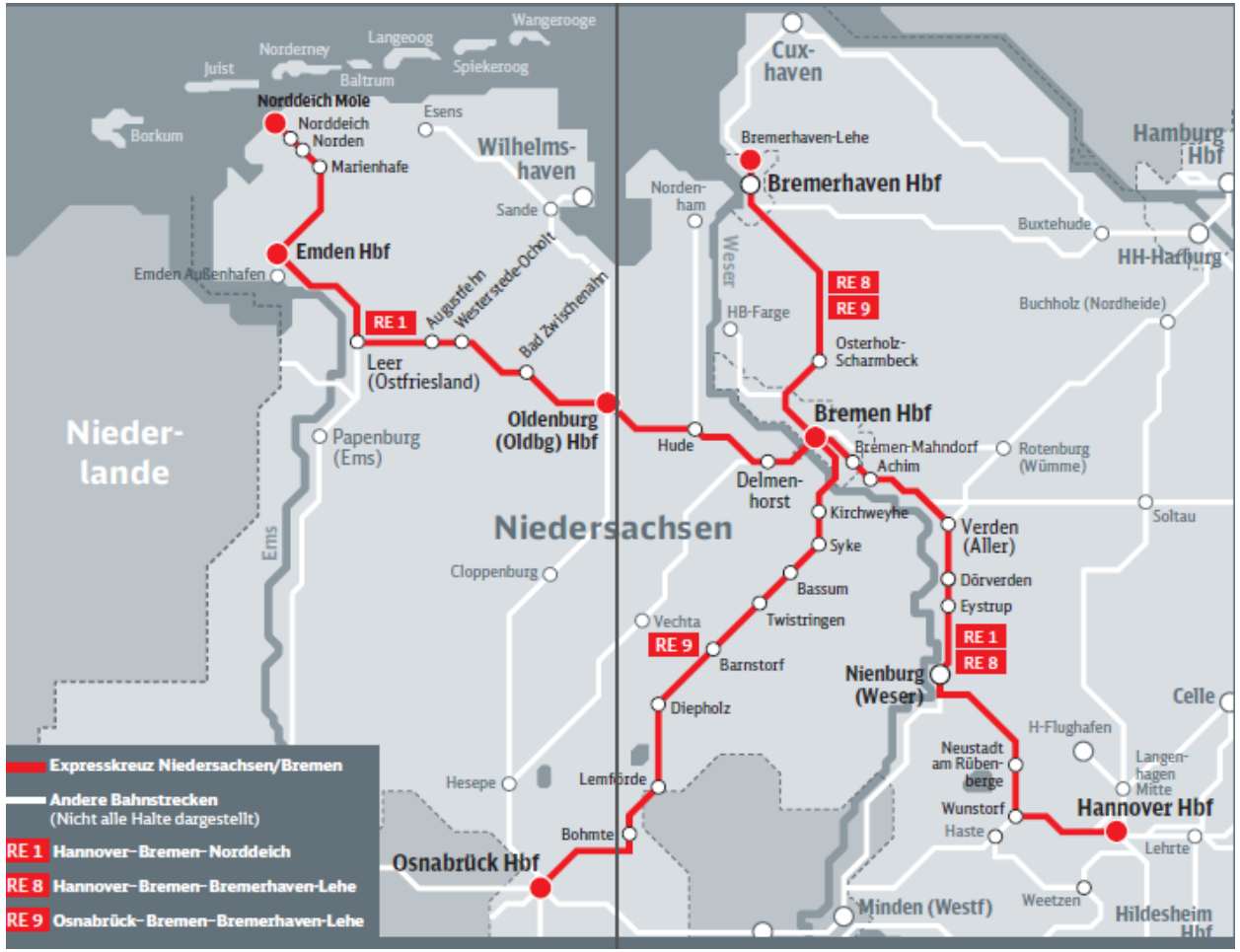




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Contract overview of LNVG Dosto II

- LNVG modernizes its double deck fleet for northern Germany
- Key aspects
  - Variability
  - Extremely low noise emission
  - Low energy consumption
- The Rolling Stock order is combined with 30 years of maintenance, depot to be built in Bremen
- Contract value RS: 420m
- Contract value SER: 356m



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LNVG DoSto II – Vehicle Concept

3-car trainset ET3



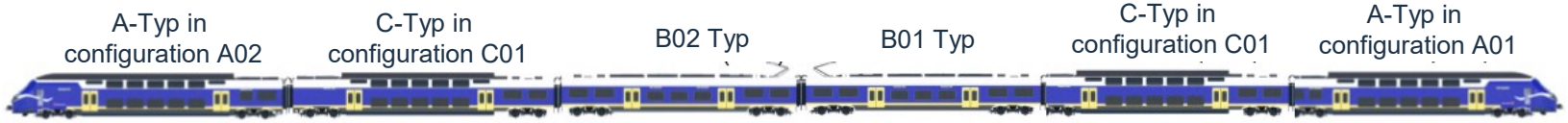
4-car trainset ET4



5-car trainset ET5



6-car trainset ET6



Criterion	Comment
Target Network	- Expresskreuz Bremen / Niedersachsen
Gauge Profile (EN 15273-2)	- DE3 / GI2 acc. EN15273-2
Top Speed	- 160 km/h
Track Class	- D4
EN50125-1	- Temperature Class T1, Height Class A2, Snow Class S1
Classification acc. to TSI SRT	- Category A
Automatic Train Protection System	- PZB 90 (& LZB 80) as STM solution - ETCS Level 2 Baseline 3: SRS Unisig ≥ 3.6.x
Traction Concept	- Single deck middle cars, electrically driven (2 bogies per car)

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Universal toilet B01 car



B2 car



Multifunctional area B1 car

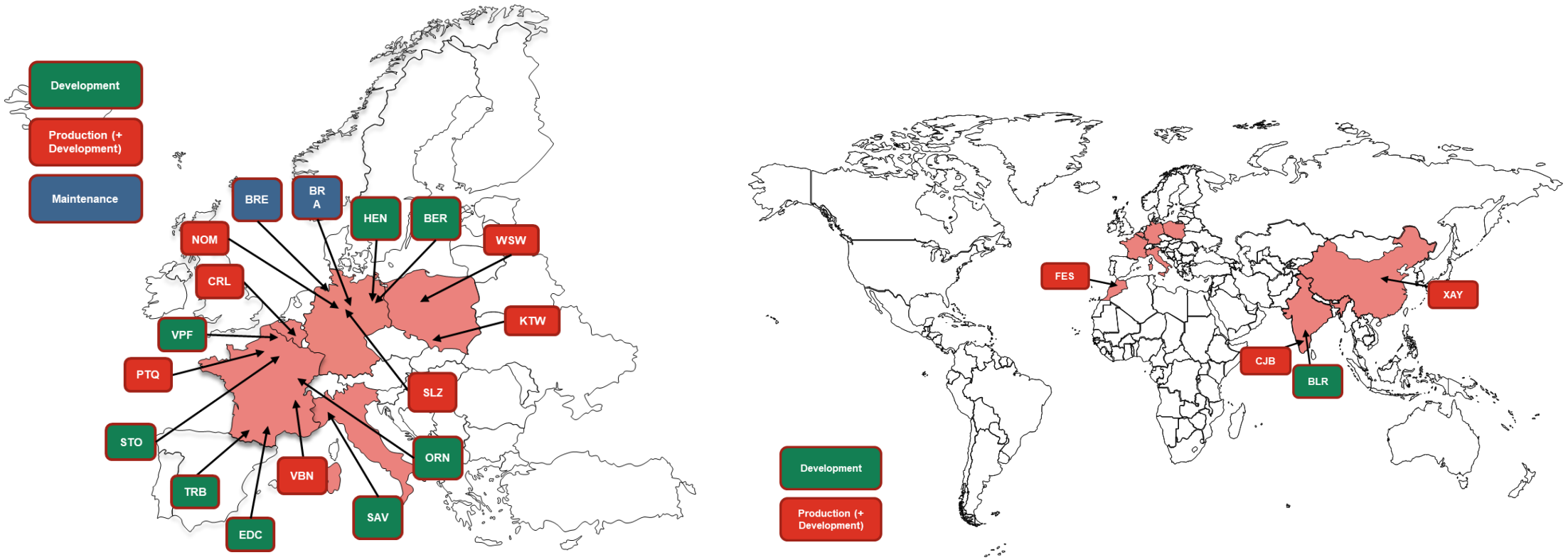


2nd class seats upper deck A01 car

Interior impressions

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Contributing Alstom Sites in Europe and Worldwide



Global footprint

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Products to be designed & delivered (Base order including 1st and 3rd amendment)



- **70** +144 opt DD Cars „A01/A02“ (not motorized)



- **34** +156 opt DD Cars „C01“ (not motorized)

Salzgitter Production



- **35** +72 opt SD Cars „B01“ (motorized, WC, ETCS cabinet)



- **21** +82 opt SD Cars „B02“ (motorized)

Katowice Production

Total **162** +458 opt Cars

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Delivery of prefitted ceiling



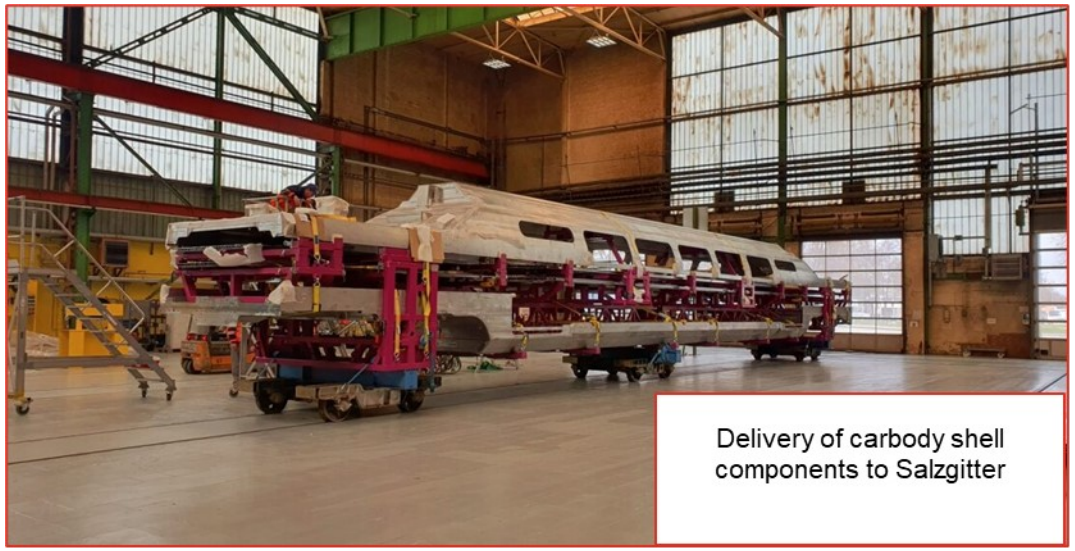
Insertion of ceiling in carbody



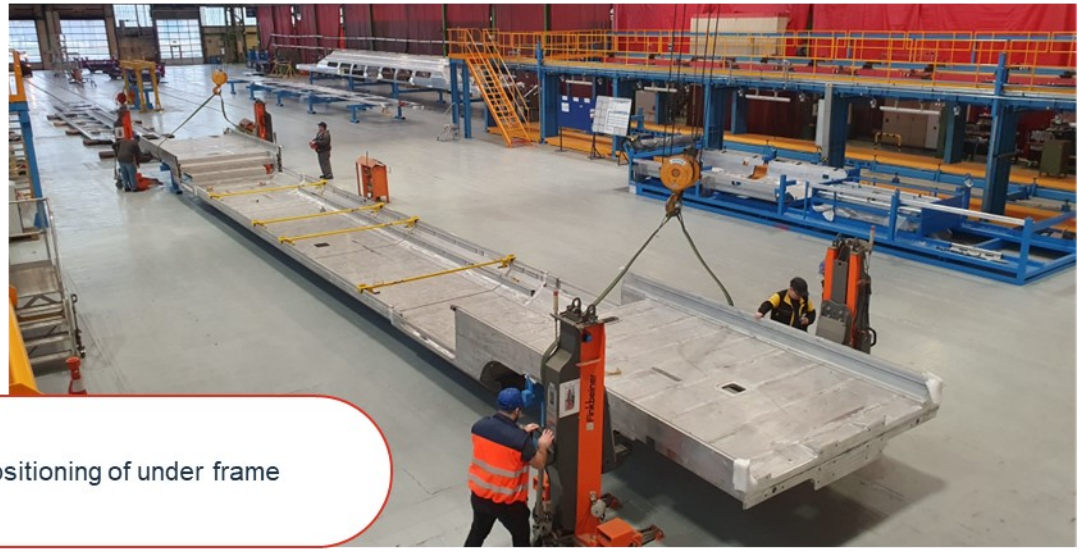
Production line

Single deck car production

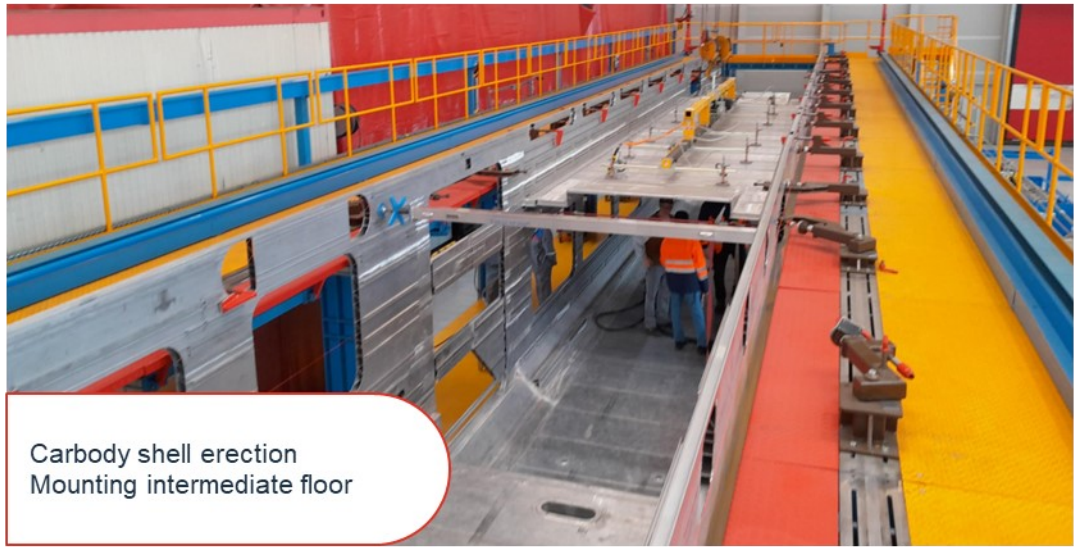
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Delivery of carbody shell components to Salzgitter



Positioning of under frame



Carbody shell erection
Mounting intermediate floor



Roof mounting in cathedral

Double deck car body production

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Production line



Put on Bogies

Double deck car production

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Train assembly in Salzgitter

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LNVG DoSto-II – Car based authorization
Relevant definitions

- TSI Loc&Pas, sect. 2.2.1 Definition „unit“

  (a) A ‘unit’ is the generic term used to name the rolling stock which is subject to the application of this TSI, and therefore subject to ‘EC’ verification.

  (b) A Unit may be composed of several ‘vehicles’, as defined in point (3) of Article 2 of Directive (EU) 2016/797, Article 2(c); considering the scope of this TSI, the use of the term ‘vehicle’ in this TSI is limited to the rolling stock subsystem as defined in Chapter 1.

- (EU) 2016/797, §2 (3) Definition „vehicle“

  (3) ‘vehicle’ means a railway vehicle suitable for circulation on wheels on railway lines, with or without traction; a vehicle is composed of one or more structural and functional subsystems;

- TSI Loc&Pas, sect. 2.2.1 Definition „predefined formation“

  (f) A ‘predefined formation(s)’ is a train formation(s) of several units coupled together, which is defined at design stage and can be reconfigured during operation.

- TSI Loc&Pas, sect. 2.2.2 A (2) Definition „trainset“

  (2) Self-propelling thermal or electric passenger trains
  A Trainset is a fixed formation that can operate as a train; it is by definition not intended to be reconfigured, except within a workshop environment. It is composed of only motored or of motored and non-motored vehicles.

! Reconfiguration acc. to slide 5 is part of the „regular operational concept“, eventhough it cannot be performed on the network !

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LNVG DoSto II
Single Unit and Multiple Unit combinations

1 Authorization step nZ1
- ATP = PZB / LZB

2 Authorization step nZ2
- ATP = PZB / LZB

3 Authorization step nZ3
- ATP = ETCS L2

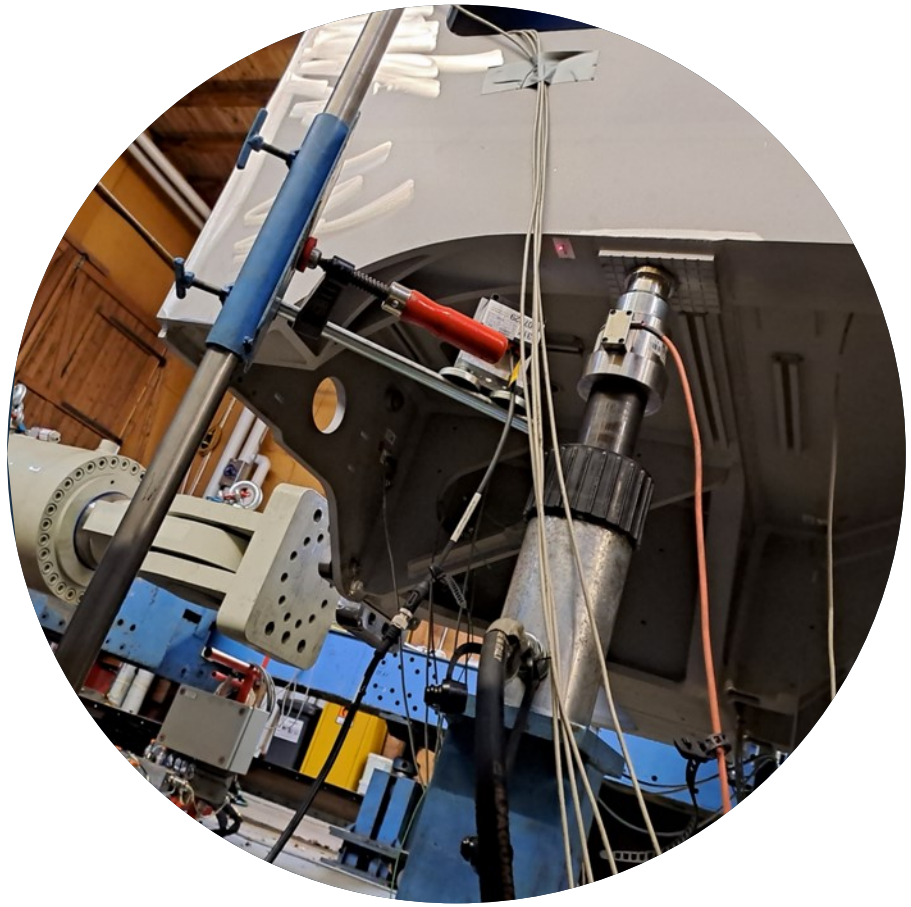
** Authorization step nZ3E
- Contractual Placeholder

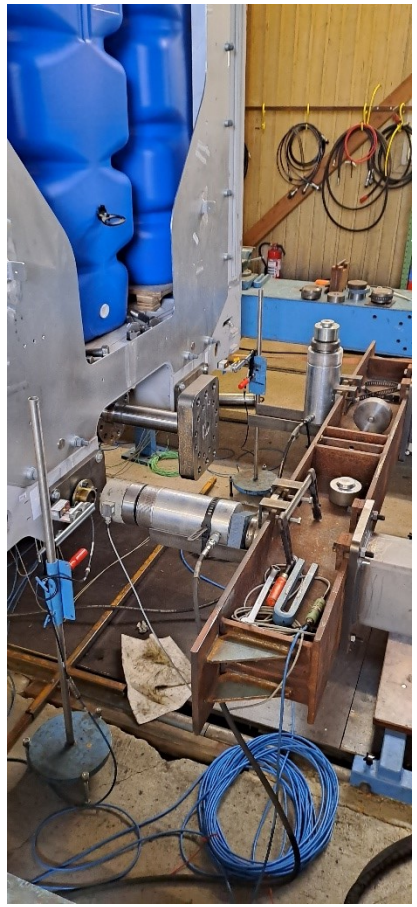
Einfachtraktion / Single Unit Operation		Doppeltraktion / Double Unit Operation			
		ET3	ET4	ET5	ET6
2	ET3	ET3+ET3 3		ET3+ET5 2	ET3+ET6 3
3	ET4		ET4+ET4 3		ET4+ET6 3
2	ET5			ET5+ET5 3	ET5+ET6 3
1	ET6				ET6+ET6 3

Dreifachtraktion / Triple Unit Operation 3	
Remark: Sequencing of ETs is only example and may be changed by customer during service (e.g. ET3-ET5-ET3 // ET5 –ET3-ET3)	ET3-ET5-ET3
	ET3-ET5-ET5
	ET3-ET5-ET6

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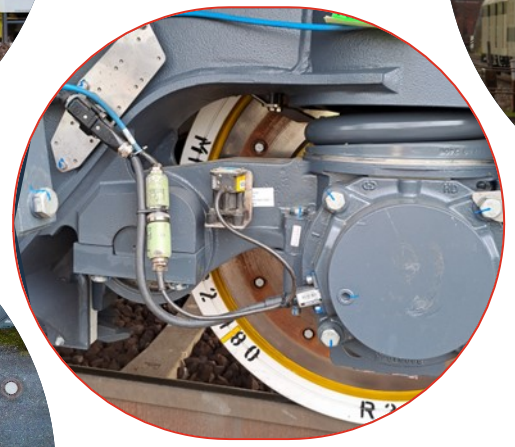


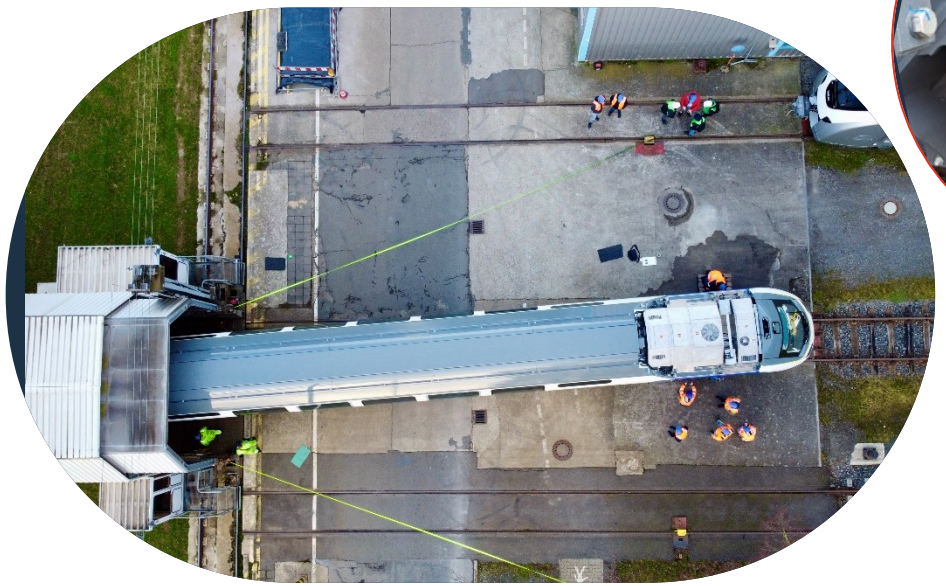
Carbody shell compression test

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- Static sway test
- Bogie rotation test
- Safety against derailment
- Running dynamic test
- Stability tests

in different load conditions

Running dynamic tests with an ABC configuration – without own traction and braking

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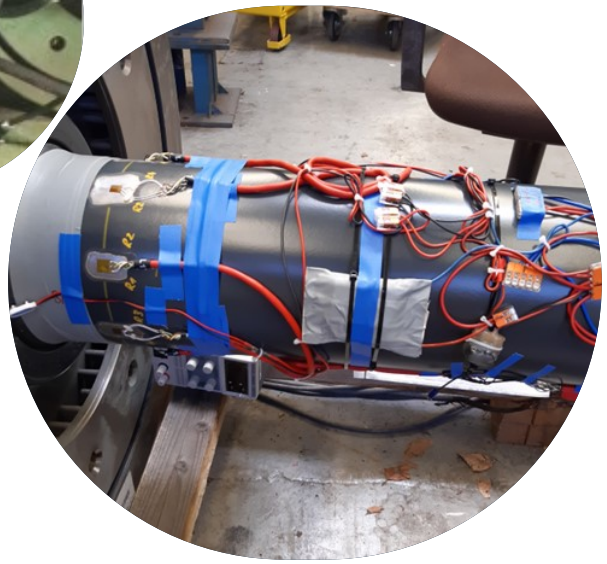
Preparation of bogie frames and wheelsets for:

On track force measurements wheelset oscilattion tests









Preparation of bogie frames and axles

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Summary

- Coradia Max is a platform, which gives answers to different needs, including 30 years service contracts.
- The aim is to have a high carry over, including tests performed on LNVG project.
- The award of recent contracts shows the success of the platform.



Luxembourg

CFL

- To operate in cross-border traffic Luxembourg – France – Belgium.
- 1435 mm track
- 34 EMU
- Vmax 160 km/h



Germany

DB Regio

- Commercial Service on Main-Weser & Kinzigtal
- 1435 mm track
- 46 EMU
- Vmax 160 km/h



Germany

Baden Württemberg

- Commercial Service on "Digital Node Stuttgart"
- 1435 mm track
- 130 EMU
- Vmax 200 km/h



Germany

LNVG

- For Expresskreuz Bremen concession
- 1435 mm track
- 34 EMU
- Vmax 160 km/h



Germany

NAH.SH

- For railway passenger transport in Schleswig-Holstein
- 1435 mm track
- 42 EMU + option
- Vmax 160 km/h

Germany

- For operation of lines between Hamburg and Rostock
- 1435 mm track
- 18 EMU + option
- Vmax 160 km/h



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