

# Alstom Transport @ MIIT Services

February 10, 2015

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Operational Director, Services, CIS



МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ  
УНИВЕРСИТЕТ ПУТЕЙ СООБЩЕНИЯ  
(МИИТ)



**ALSTOM**

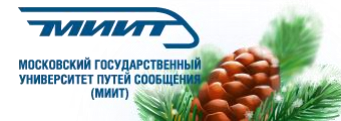
*Shaping the future*

# Agenda

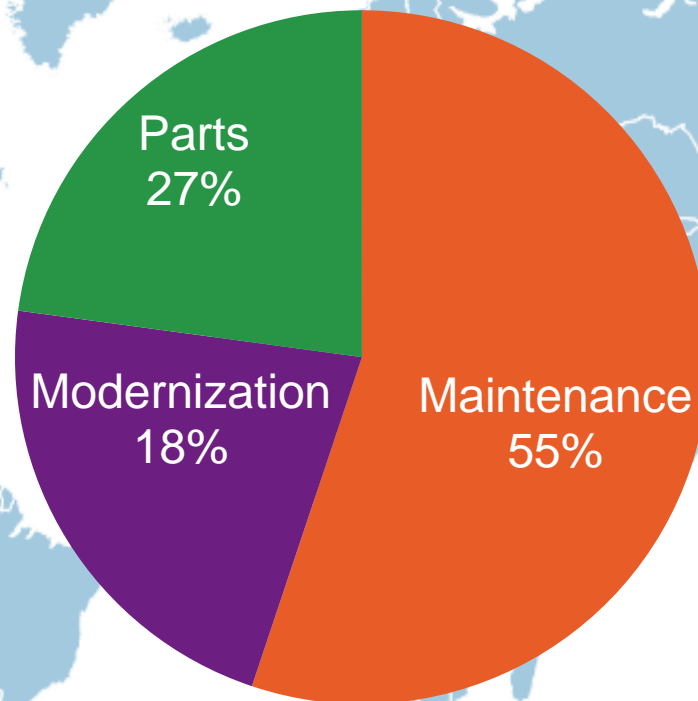


- **General introduction**
- Maintenance services
- Support services
- Modernization services
- Parts & Repairs
- Russia and CIS service map
- VHST Full Service (Nola depot)
- HST Service (Virgin Pendoilino, Allegro approach, Crossborder difficulties)
- Components service – EP20, 2ES5

# Alstom Transport Services 2013/2014

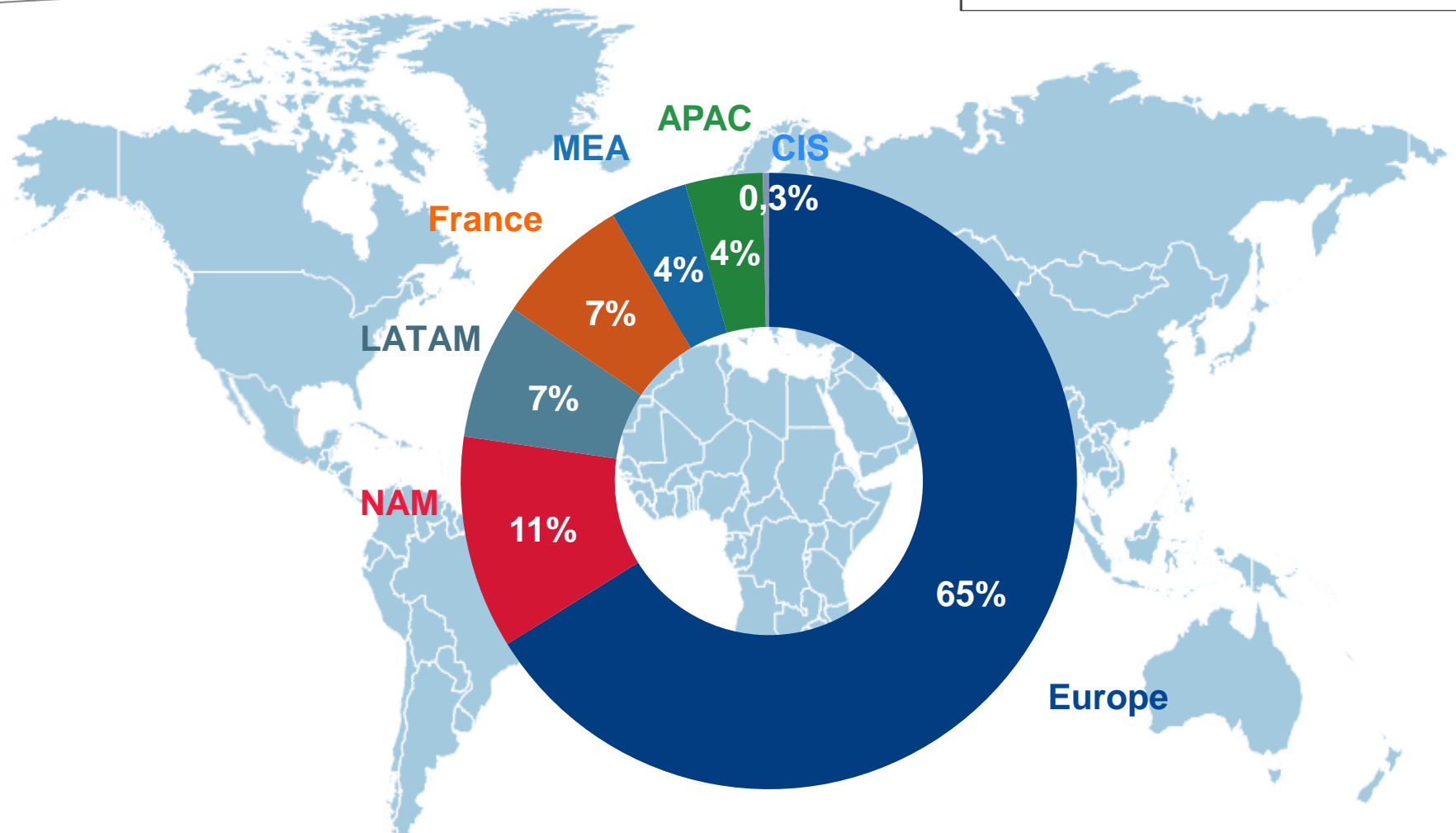


2013/14 Total Sales € 1.1 bn



Support Services not yet accounted separately

# Alstom Transport Services per Region 2013/2014



2013/14 Total Sales € 1.1 bn

## 4 areas of expertise dedicated to performance

- **Maintenance services:** expertise in supply chain and industrial organization, backed by a strong system engineering competency, proven through outstanding train availability
- **Support services:** competencies developed for out-sourced maintenance are also available as support to existing operations.
- **Modernization services:** life time extension, improvement of performances, energy consumption and comfort
- **Parts & Repairs services:** day to day support for operators in parts management, repairs and technical assistance

**7,000**  
EMPLOYEES

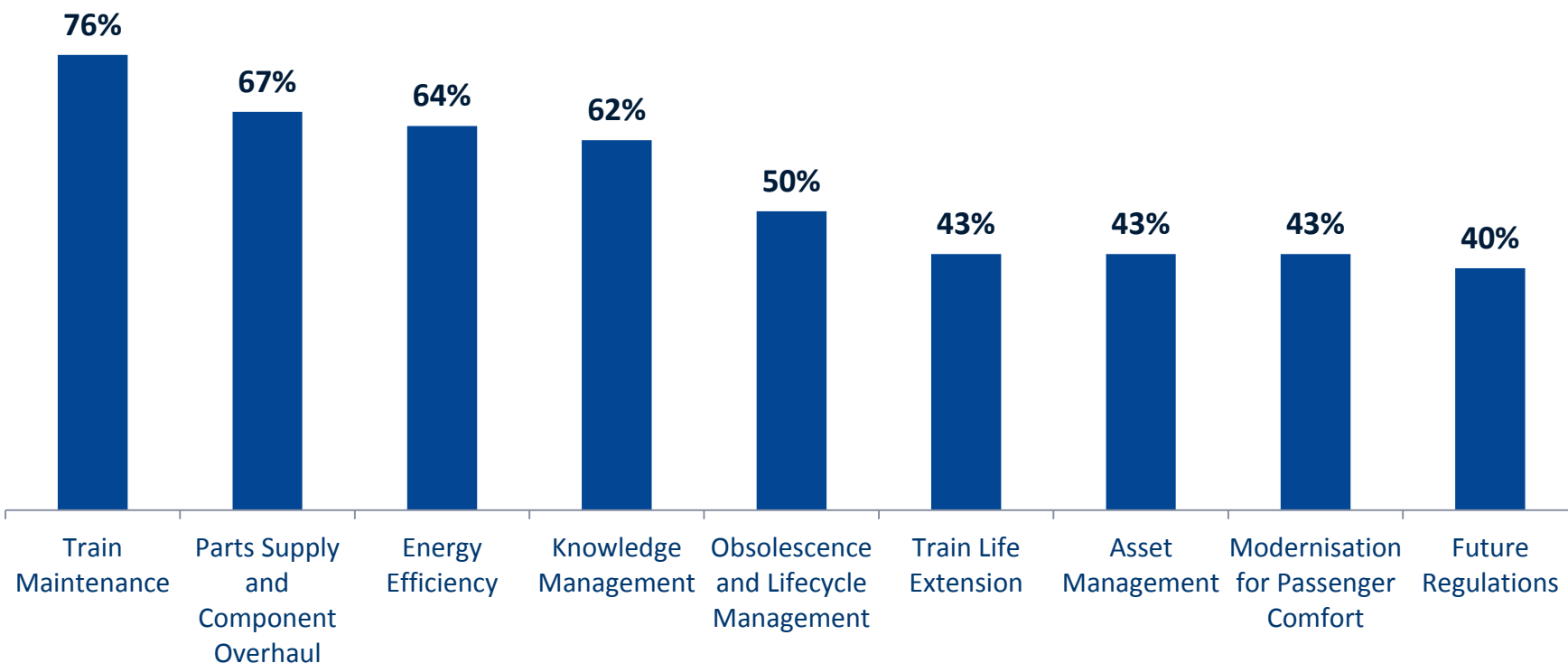
**100**  
SITES

**1,4 M €**  
ANNUAL  
TURNOVER

To address specific needs, Alstom can provide a full range of engineering services supported by new design and innovations.

# Key Customer insights

“Beyond maintenance and parts supply, energy efficiency, knowledge management and obsolescence were the themes of most interest “



Source: Alstom TLS Customer Needs review, 42 client interviews, May 2013

# Key interview insights



## Your issues :

- Shift to new maintenance model
- Managing **aging fleet** is a growing headache
- ROI energy efficiency models
- **Obsolescence** is a growing risk
- Operators and Lessors want '**solutions**', not just single propositions
- Leveraging Rolling Stock Manufacturers global knowledge



## Our Service commitment :

- Maximize the useful life of the trains to optimize the investment **within a period of 30/40 years**
- Reliability for your satisfaction: **Objective zero interruptions**
- Availability for maximum efficiency **100% of the trains must be operating**
- Flexibility and attractiveness of service offers
- Optimum cost



**Tube Lines**  
**Stewart Mills,**  
**Operations Director, UK**



*“The Northern Line for me is probably the most complex line in the entire underground, it’s also the biggest line in Europe .Some years ago it was a misery line and has come out of that to a position of one of the most reliable line on the London Underground. But also is recognized as one of the lines that performed well during the Olympics.*

*I relate to an entire team who’s done a fantastic job. It was about reliability to be the best it’s ever been, availability to be the best it’s ever been. And actually the way we work together to be the best it’s ever been.*

*I think the way you developed that depot and engaged the people is to your credit and clearly obvious in terms of time and effort that Alstom’s has put in to make it a better fleet*

Source : Interview April 2013, London

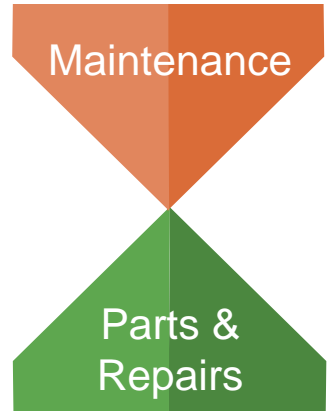
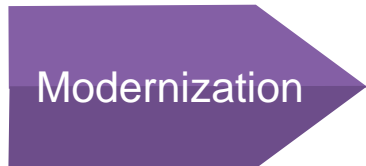


# Transport Service Product Offering



Accident Repair    TSSSA    Core Service    Full Service    ECM

Energy Savings  
Modernization  
Traction  
Diesel upgrades  
Hybrid locomotives  
Bogie  
Train Control  
Signaling  
Passenger Experience  
Accessibility



Training  
E-documentation  
Obsolescence  
Asset Management  
Expertise support  
Depot Design  
Recycling  
Integrated Fleet Support



Spare Parts    Repairs    Availability Service    Overhaul    Test benches

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# Maintenance services



**8,200 CARS**  
CURRENTLY  
MAINTAINED

**100**  
MAINTENANCE  
DEPOTS

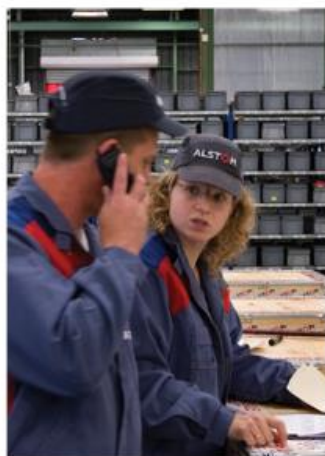
**20 %**  
OF CARS  
MAINTAINED  
BUILT BY  
OTHER  
MANUFACTURER

# Maintenance Solution

## A complete solution for maintenance on Alstom and non-Alstom rolling stock



**Accident  
Repair**



**TSSSA**



**Core Service**



**Full Service**



**Entity in  
Charge of  
Maintenance**

On average Maintenance contract duration 15 years



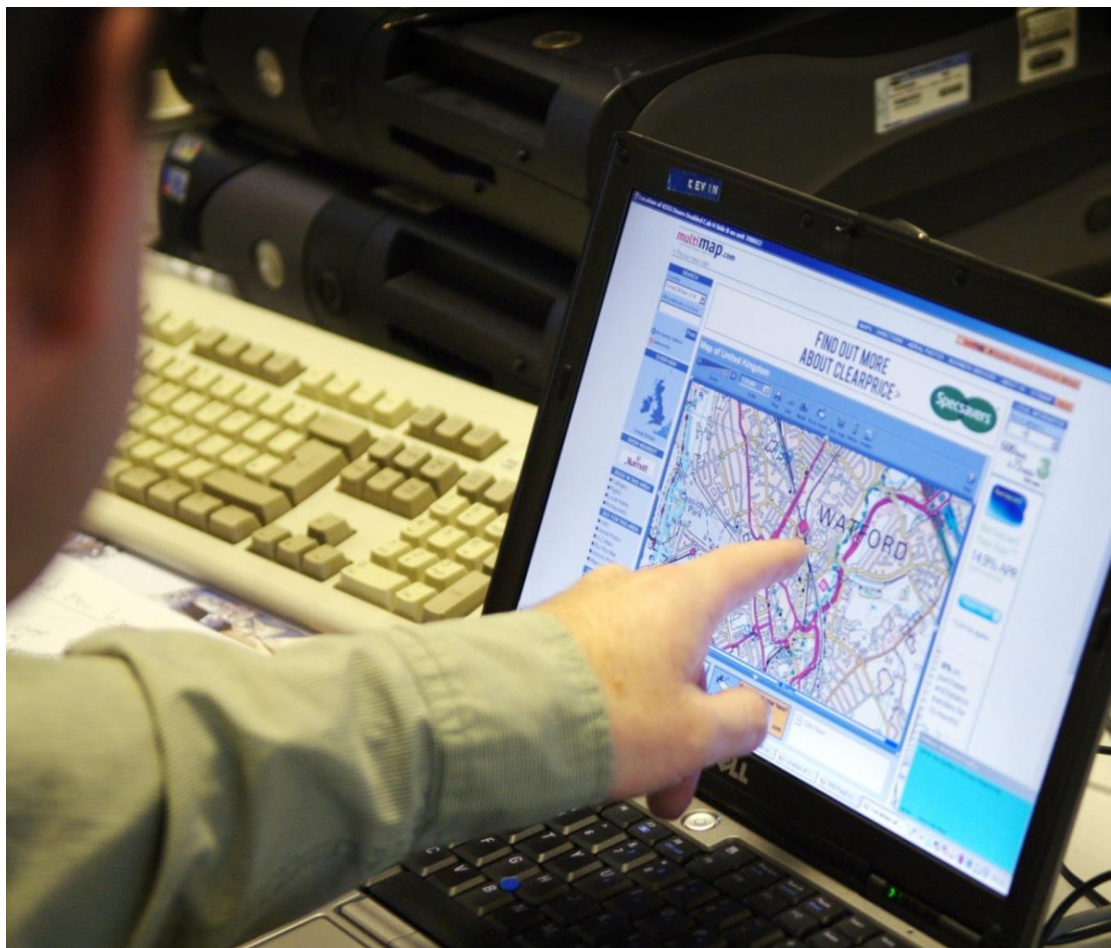
- **A complete solution for maintenance on Alstom and non-Alstom rolling stock**
- **Proven experience** on all types of rolling stock (high speed, regional or urban passenger trains or with freight trains)
- **Optimized maintenance operations** that guarantee highest train availability and train service reliability. Obsolescence risk solution
- Maintenance execution in synchronization with operations
- **Fleet** management support

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# Support services



**150**  
Trainers  
EXPERTS

**80**  
Technical  
topics for  
Training

**60**  
Illustrated  
Catalogues

# Support Service Portfolio



**Training**



**E-Documentation**



**Obsolescence**



**Asset Management**



**Expertise  
Support**



**Depot Design**



**Recycling**



**Integrated Fleet  
Support**



# Support Services for operational efficiency



- Return on Experience is made available through **tools and processes**
- These services can support adapted to customer needs, **punctually or throughout the project life**
- Consulting Services benefiting from Alstom's hands-on experience as OEM and maintainer

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# Modernization services



**20**  
ADDITIONAL  
YEARS OF  
LIFE

**40%**  
REDUCTION  
IN ENERGY  
CONSUMPTION

**In-House  
DESIGN  
&  
STYLING TEAM**

# Modernization Solutions



**Energy Saving  
Modernization**



**Traction**



**Diesel and  
Hybrid**



**Bogie**



**Train  
Control**



**Signaling**



**Passenger  
Comfort**



**Accessibility**

- **Proven engineering:** Huge gains in efficiency proven in customer projects.
- **Experience and expertise:** Years of experience in modernizing all types of rolling stock; Alstom and other manufacturers.
- **Integrated design & styling:** In-house dedicated team to create tailored designs.
- **Proactive, knowledgeable support:** Manufacturer and service provider perspective used to optimize the scope of modernization projects

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# Parts & Repairs



**600,000**  
REFERENCED  
TRAIN PARTS

**13**  
INDUSTRIAL  
REPAIR  
WORKSHOPS

**5**  
LEAD  
SERVICE  
CENTERS

# Parts & Repairs – Alstom Offering



Spare parts



Repairs



Availability  
service



Overhaul



Test benches

Supported by PartsFolio™ e-business  
solution



- **Parts supply:** Supporting efficient maintenance operations with adapted parts supply models from spot quotations to long term availability contracts with guaranteed lead times and availability levels
- **Repairs & Overhauls:** Repairing and reconditioning of Alstom and non-Alstom components using our Lead Service Center (LSC) expertise and the worldwide Repair center network
- **Test benches:** Tools used by Alstom maintenance teams can be made available to third parties

# PartsFolio™ e-business solution



## Spare parts ordering

## Repairs process

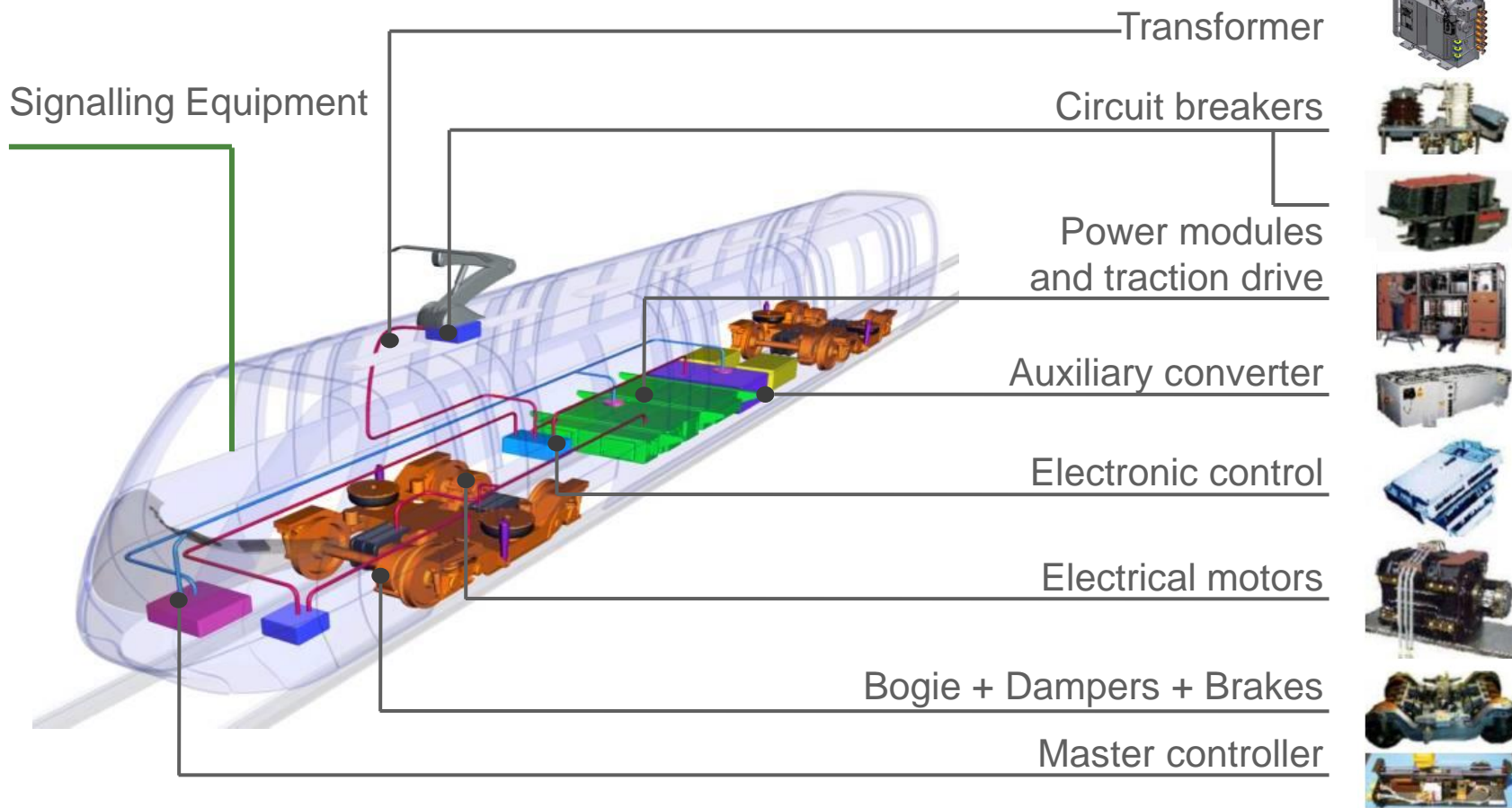
## Illustrated parts catalog / Documentation

- Reports
- Tracking
- EDI<sup>1</sup>

# Easy and transparent parts ordering and repairs management

1 Electronic Data Interchange – Direct to customer ERP

# Repairs & Overhauls



# Recent references

**2011**  
Availability Service (Parts)  
5x5-car Class 180 DMUs  
First Great Western, UK

**2012**  
Modernization  
7 hybrid Loco  
Germany

**2014**  
Full Maintenance  
20 Pendolino trains & 7 car unit,  
Poland

**2012**  
Availability Service (Parts)  
20 Citadis 302  
Brest Tramway, France

**2013**  
Availability Service (Parts)  
432 Cars, Nanjing Metro Line 1&2  
China

**2012**  
Availability Service (Parts)  
27 Citadis 302  
Madrid Tramway, Spain

**2012**  
Maintenance  
27 Loco  
KTZ Loco, Kazakhstan

**2012**  
Modernization  
86 vehicles MBTA Light Rail  
USA

**2014**  
Maintenance  
11 Citadis  
Dubai Tramway, UAE

**2013**  
Modernization  
53 vehicles  
Baltimore Light Rail, USA

**2012**  
Modernization  
27 Electric Loco E1300/50  
Morocco

**2012**  
Maintenance  
7 Electric Loco  
BB 36000 Loco, Morocco

# Transport Services – Experience matters



- **15%** market share in rolling stock services
- **20 years** of delivering train **availability**
- **100** depots, factories & repair centres
- **7,000 employees** delivering performance daily

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# Russia and CIS service map



- **Competence Center**
- **Service Point**
- **Planned Service Point**

## Russia Service Points

- **EP20 components service** (*Moscow depot Sortirovochnaya*)
- **Locomotive components overhaul** (*Novocherkassk, RailComp production site*)
- **2ES5 components service** (*Severobaikalsk*)
- **Allegro maintenance** (*service of Allegro trains performed by Russian Railways on the base of Finlyandskaya depot in Saint-Petersburg and by VR in Helsinki*)

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# VHST Full Service: AGV for NTV



[Video 01\\_Clip\\_NTV\\_V\\_RUSSE.wmv](#)

# VHST Full Service: Nola depot - Overview



## Customer

**NTV** – Nuovo Trasporto Viaggiatori / Leasint

## Main scope of contract

### Maintenance Global Service contract:

- Execution of Preventive, Corrective and Overhaul Maintenance Intervention on 25 AGV Trains (+10 trains in option)
- **30 years** from start of Commercial service (28/04/2012)

## Depot

### Nola, Italy (30km from Napoli)

- Depot purchased to NTV through MSF in 06/2012 (last instalment 06/13)
- Depot concession until 12/2080
- Depot fully equipped with 5 rail tracks covered
- Surface: 140 000 m<sup>2</sup>; Covered surface: 30 000 m<sup>2</sup>

# VHST Full Service: Main milestones



<b>Date</b>	<b>Milestone</b>
<b>26/11/2007</b>	<b>Contract signature</b>
01/09/2011	Nola Depot acceptance
06/03/2012	Train acceptance
<b>28/04/2012</b>	<b>Start of Commercial Service</b>
29/06/2012	AT owns 100% of Depot
13/03/2013	25th train delivered
30/03/2013	21 trains in revenue service
30/06/2013	Depot Last Cash instalment to NTV
<b>12/03/2015</b>	<b>End of last train 24months Contractual Warranty</b>
<b>01/04/2018</b>	<b>2d phase (RL cycle: 3 Mkm)</b>
<b>28/04/2042</b>	<b>Contract end</b>
<b>31/12/2080</b>	<b>Nolat depot end of concession</b>



# VHST Full Service: Scope of Activity



## Description of activities covered by the contract

- **Maintenance Global Service contract: Execution of Preventive, Corrective and Overhaul Maintenance Intervention on 25 AGV Trains (+10 train options)**
- **30 years from start of Commercial service (28/04/2012)**
- **Maintenance main cycles phases:**
  - **1<sup>st</sup> maintenance phase:**
    - ES cycle: 7,5 kkm
    - V1 cycle: 30 kkm
    - VL cycle: 375 kkm
    - VG cycle: 750 kkm
    - GVG cycle: 1500 kkm
  - **2d maintenance phase:**
    - RL cycle: 3000 kkm
    - RG cycle: 6000 kkm

Activity	AT Scope
Preventive Maintenance	Yes
Corrective Maintenance	Yes
Revision/repairing components	Yes
Spare parts management (inc capital spares)	Yes
Train internal cleaning	<b>No</b>
Depot maintenance including depot equipment	Yes
Helpdesk	Yes
Online Rescue (support to rescue to be provided by AT)	<b>No</b>
Supplementary services (vandalism, improper use, accident, modification)	<b>No</b>
Periodic re-training of NTV personnel	Yes
Documentation updating	Yes
Functional verification of Nola depot	Yes
Depot facility management (Depot deal = Addendum 3)	Yes
Change in norms	<b>No</b>
Onboard equipment (AT to manage onboard equipments purchased by NTV)	<b>No</b>
Mid life renovation (15years)	<b>No</b>

# VHST Full Service: Scope of Activity



## Performance Criteria

Criteria	Target	Penalties	
<b>Availability</b>	21 trains out of 25 in revenue service	Daily penalty: <ul style="list-style-type: none"> <li>• 1° unavailable train: 10k€</li> <li>• 2° unavailable train: 15k€</li> <li>• 3° and following unavailable train: 25k€</li> </ul>	Yearly Cap: <ul style="list-style-type: none"> <li>• Y1 1M€</li> <li>• Y2 2M€</li> <li>• &gt;Y3: max(3M€; 10% yearly paid services)</li> </ul>
<b>Reliability</b>	Target FPMK: <ul style="list-style-type: none"> <li>• Delays &gt;10' FPMK=8</li> <li>• Delays &gt;30' FPMK= 5</li> <li>• Of which: Rescue: 0,3</li> <li>• Comfort: 10</li> </ul>	Monthly penalty per extra FPMK point: <ul style="list-style-type: none"> <li>• Delays &gt;10': 28k€</li> <li>• Delays &gt;30': 80k€</li> <li>• Of which rescue: 80k€</li> <li>• Comfort: 28k€</li> </ul>	

# NTV fleet main figures

**25 trains delivered to NTV since 13/03/2013**

**21 trains in revenue service since 30/03/13**

As end of July 2014:

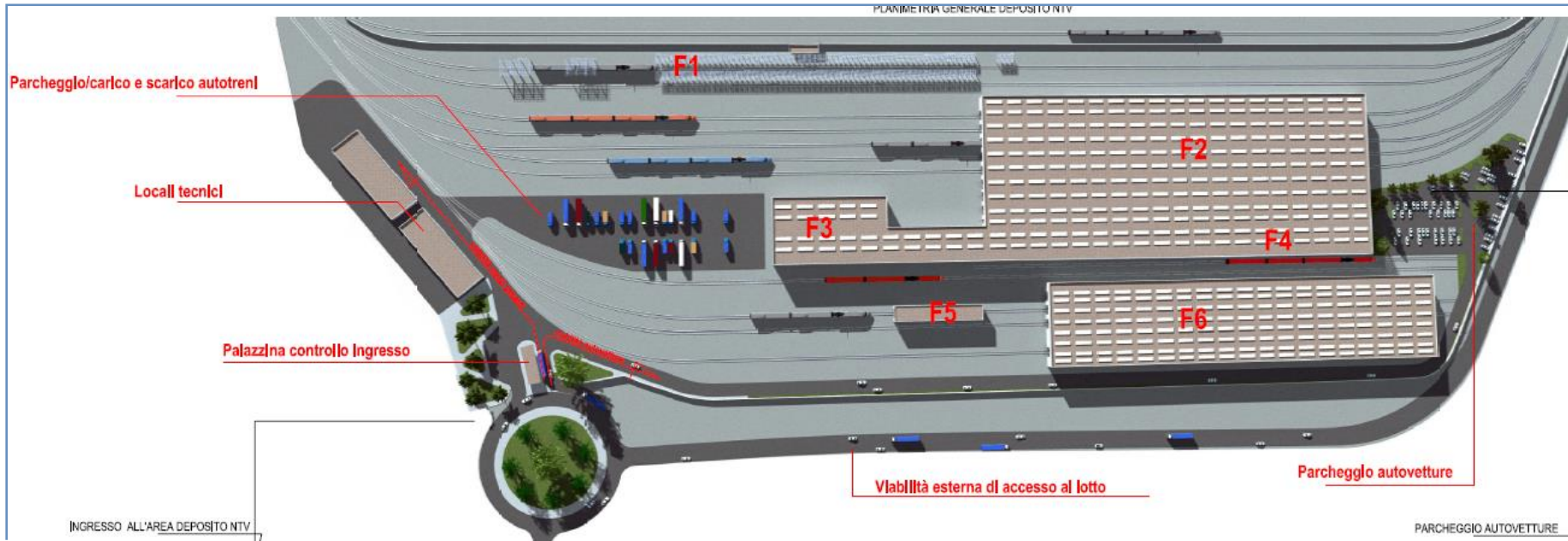
Mileage	Cumulated	Monthly	Monthly Profile
Fleet	25,2Mkm	1Mkm	<b>1,1Mkm</b>
Train	1,1Mkm (max)	42kkm	<b>45kkm</b>



- **Annual forecast** / train: 487,000 km
- **Average trip**: 687km (1534 trips from 04/13)
- **Commercial service**:
  - Italo passengers: **12,2M (since 28th April 2012 till today)**
  - Load factor (average): **51%** (Record: **27k passengers/day**)

# Nola Depot: Facility description

## Depot map

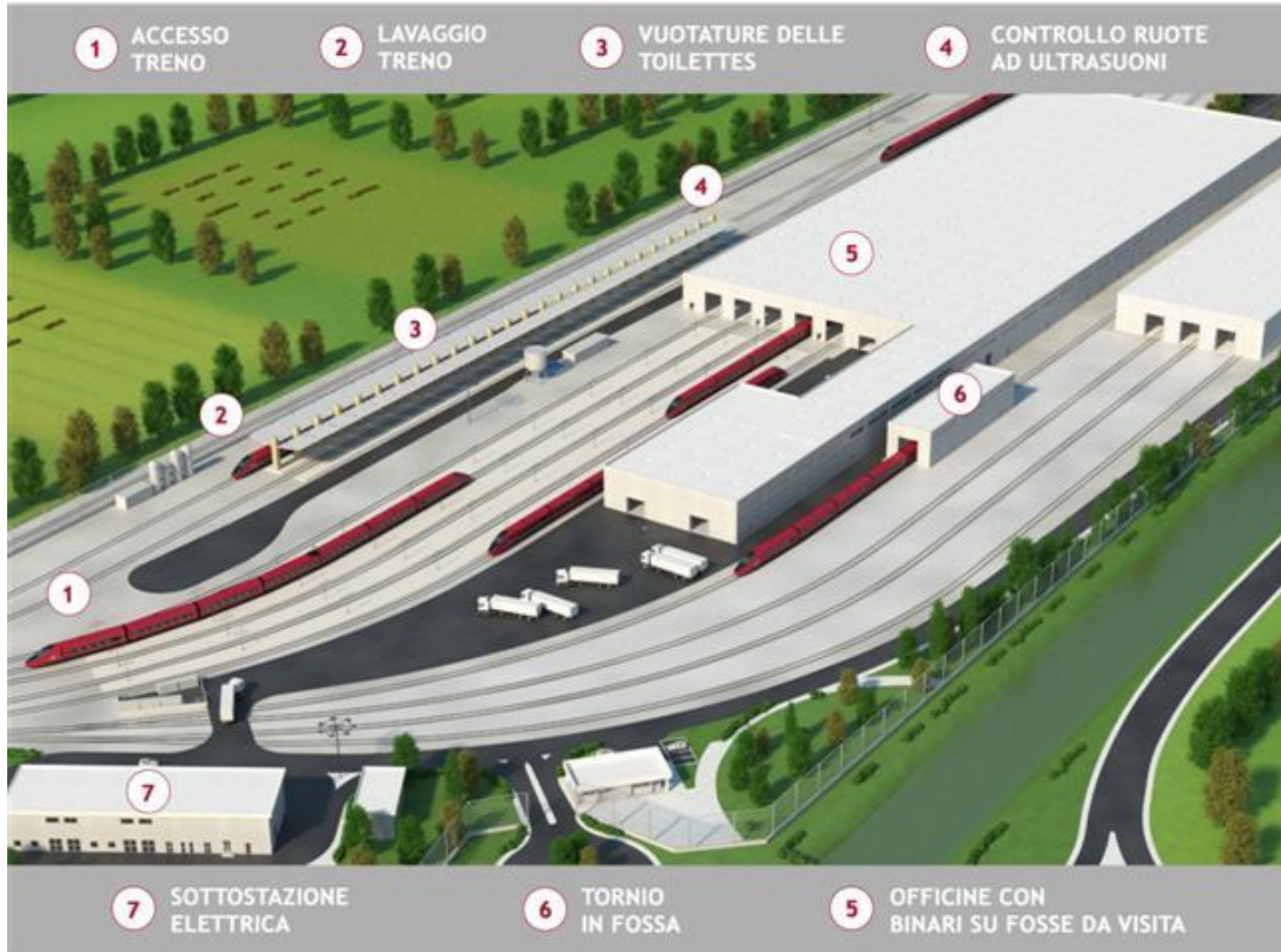


- Location: Boscofangone, peripheria of Nola, Napoli province (interporto Campano)
- Total surface: 140 000m<sup>2</sup>
  - Current covered surface: 30 155 m<sup>2</sup>
  - F6 building: not built yet (Phase 2)

AREA DEPOSITO NTV	140.000 mq
AREA FASE 1	110.000 mq
Area Fase 1 al netto delle superfici coperte	79.845 mq
AREA FASE 2	30.000 mq
Area Fase 2 al netto delle superfici coperte	19.190 mq
AREA INTERPORTO	45.100 mq
AREA OPZIONALE ASTA DI MANOVRA	18.500 mq

AREE COPERTE - FASE 1	
F2 Capannone Manutenzione	17.250 mq
F3 magazzino	3650 mq
F4 Officine (p.t. 4600mq) + Uffici (1°p. 3600mq)	4600 mq
Centrale tecnica - sottostazione elettrica	1.700 mq
Deposito Inflammabili	60 mq
Lavaggio treni	450 mq
Ispezione ruote	315 mq
Reparto manutenzione e sanificazione toilette	1.480 mq
F5 Tornitura ruote	450 mq
Guardiola ingresso	200 mq
<b>Totale aree coperte fase 1</b>	<b>30.155 mq</b>
AREE COPERTE - FASE 2	
F6 Capannone Revisione	10.810 mq
<b>TOTALE AREE COPERTE</b>	<b>40.965 mq</b>

# Nola Depot: Main Tools and Equipments





# Nola Depot: Control Room



- 24h/day 7/7
- Daily Planning of maintenance activities: corrective and Preventive
- Service Orders management
- Customer Interface
- TrainTracer center to keep under control all the fleet during commercial service
- Trains movement management
- Help desk

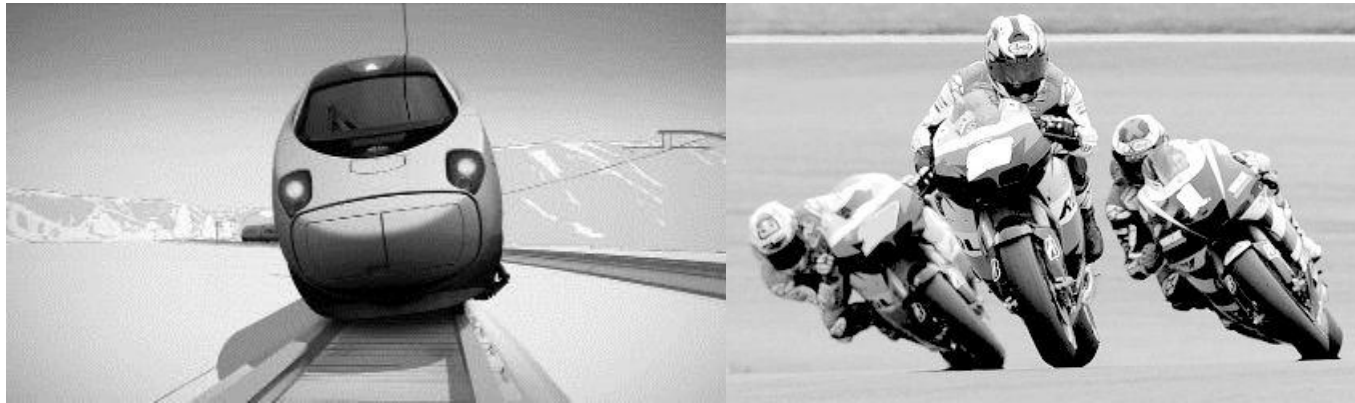
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# Pendolino tilting: Fast in curves like a motorbike

**The optional tilting system reduces travel time on existing lines**



ALSTOM tilting technology PENDOLINO+TILTRONIX™:

- ✓ **Speed gain in curve up to 30%**
- ✓ **Track friendly bogies**
- ✓ **Optimal passenger comfort**

The success is based in a design of a train that can run in curves at enhanced speed, in which the Tilting System is integrated to improve passenger comfort.

# Pendolino tilting

## Highest speed gain in the market

### Tilting characteristics:

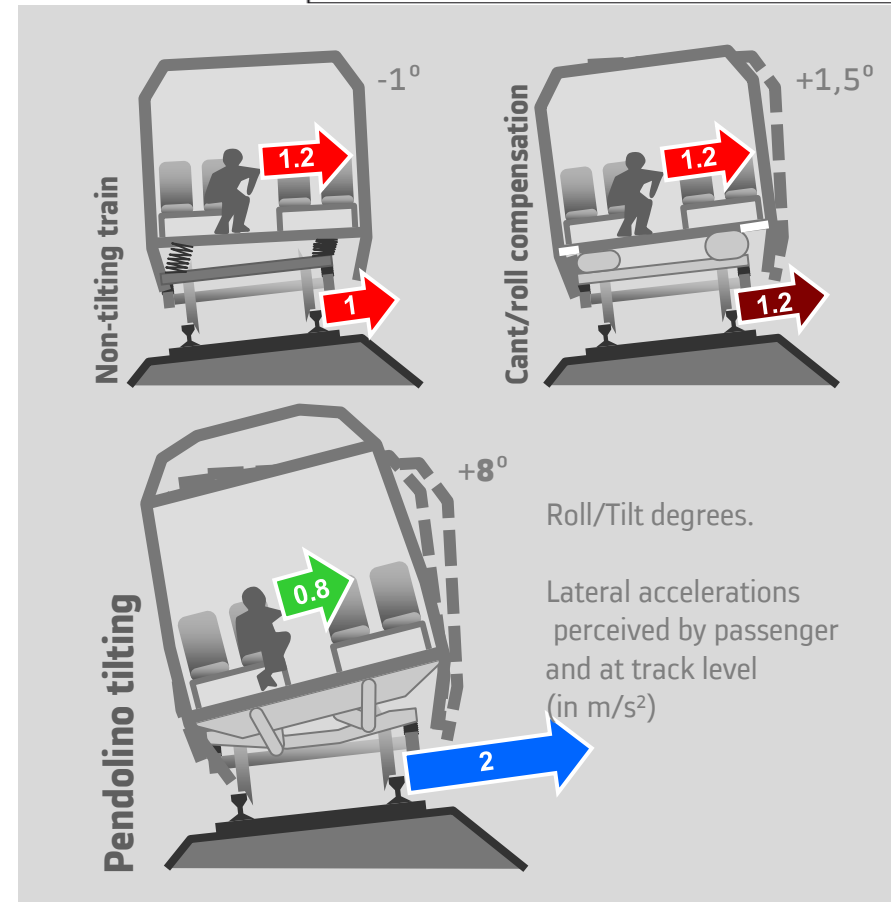
- ✓ Up to **8°** tilting angle
- ✓ Up to **2 m/s<sup>2</sup>** track n.c.a.
- ✓ Up to **30%** speed gain in curve
- ✓ Active actuators with electronic control
- ✓ Completely onboard equipment
- ✓ Self centring safe mode
- ✓ 2 complete curves in case of electric loss

### Lateral acceleration compared to non-tilting:

- ✓ 33% less passenger felt → **better comfort**
- ✓ 100% more at track level → **higher speed**

### Intrinsic safety in respect to the overturning with self centring effect obtained by:

- ✓ Relative position of the centre of gravity versus the tilting centre of instantaneous rotation
- ✓ The geometry of tilting mechanism

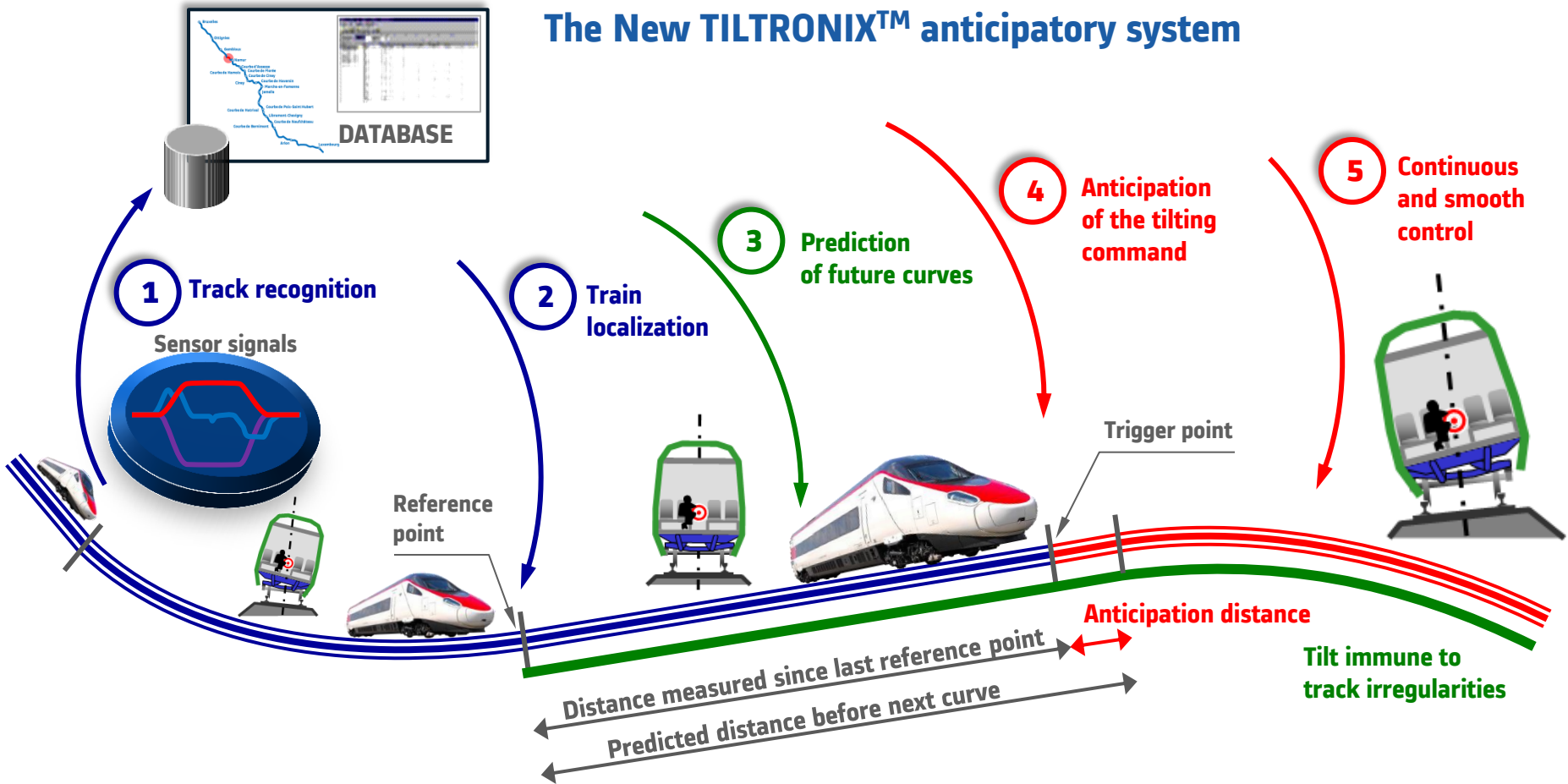


# Pendolino tilting: Optional anticipative control



## Curve prediction without infrastructure devices

### The New TILTRONIX™ anticipatory system



# HST Service: Pendolino Virgin



# HST Service: Pendolino Virgin - Overview

## Key figures

- Fleet :** 56 tilting Virgin Pendolino trainsets  
35 x 11 cars and 21 x 9 cars
- Speed:** 220 kph (operating at 200 kh)
- Mileage:** 17,5 million vehicles miles per year  
317000 miles per train in average
- Availability:** 50 from 56 trains/24 hours/7 days per week



Alstom © MIIT 2014/2015 – Gerard Dos-Santos



## West Coast Traincare Centre

- Service:** Level 1 – Level 5
- Surface area:** 146000 m2
- Employees:** 242 employees work at 24/7 operation  
As well as the 13 Pendolino trains arrive to the depot each night for service, the site receives approximately 26 other trains (Bombardier Voyager trainsets, Class 57 locomotives of Virgin Trains, Class 323 fleet for Northern Rail)

## Alstom Remote Maintenance Solution



Train GPS Position - Train Status - Train Events - Variables status

- Install remote maintenance in design phase
- Used by Alstom until end of warranty phase
- Customer access: Operator/Maintainer
- Service Offer: remote maintenance after the end of warranty phase

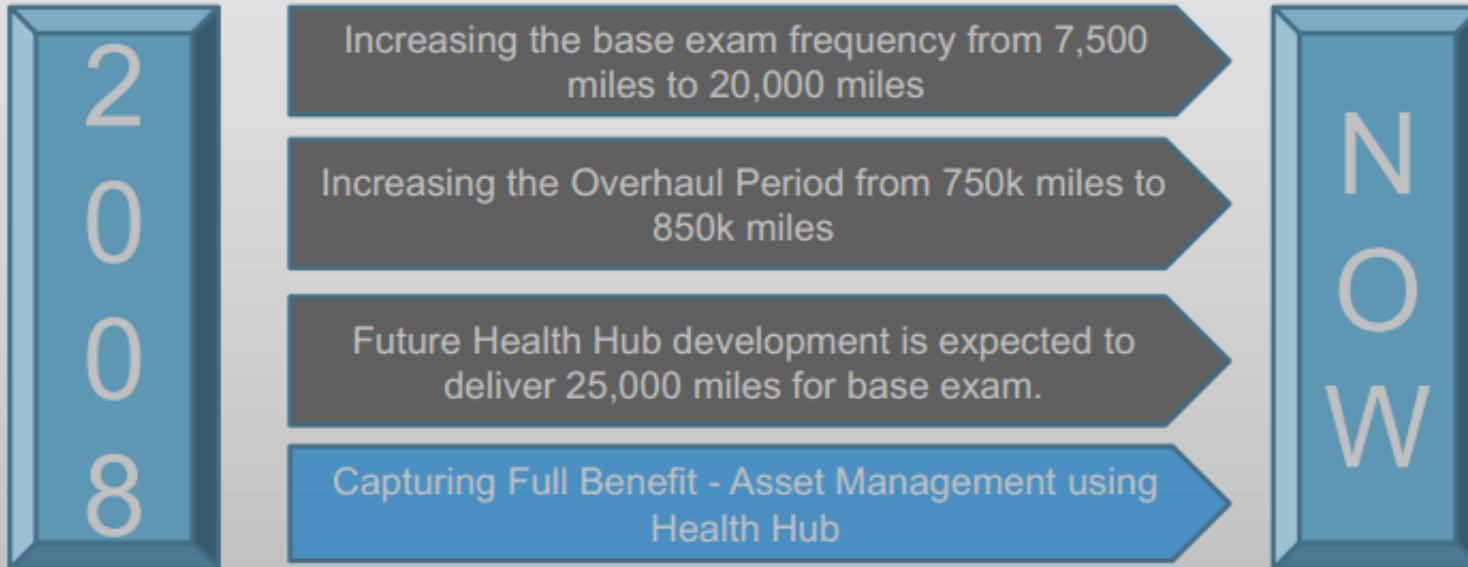




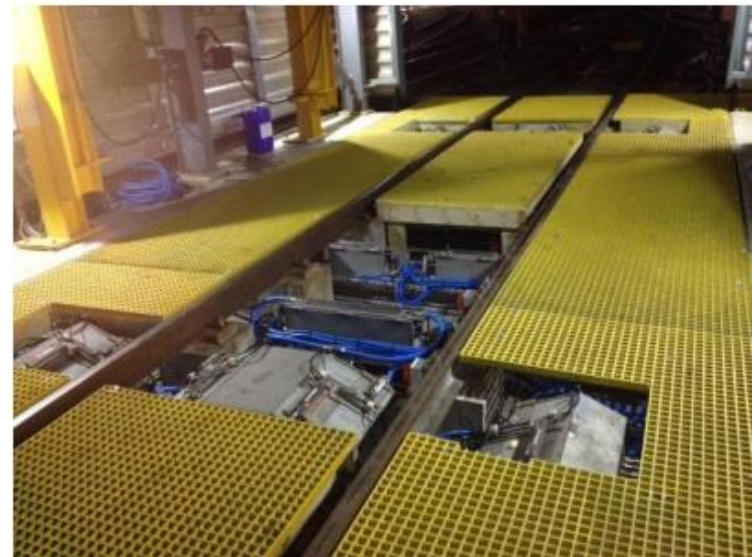
# HST Service: On-going optimisation



An extensive programme of sampling and condition monitoring was undertaken, leading to further development of the maintenance schedule. This has led to:



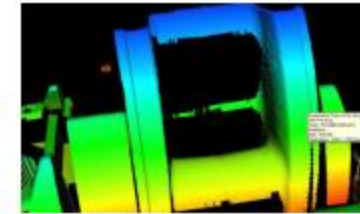
# HST Service: Pendolino Virgin – Train Scanner



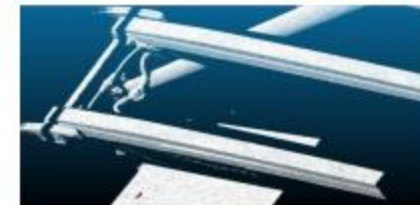
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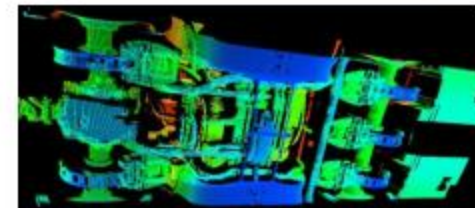
## Results



Brake Pad



Pantograph Carbons

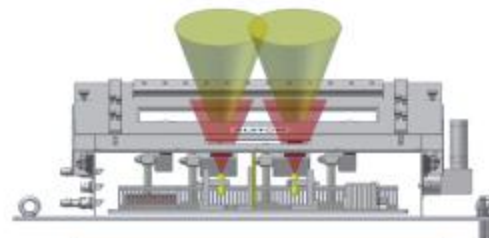


Underframe Inspection

## System Hardware



Installation Manchester

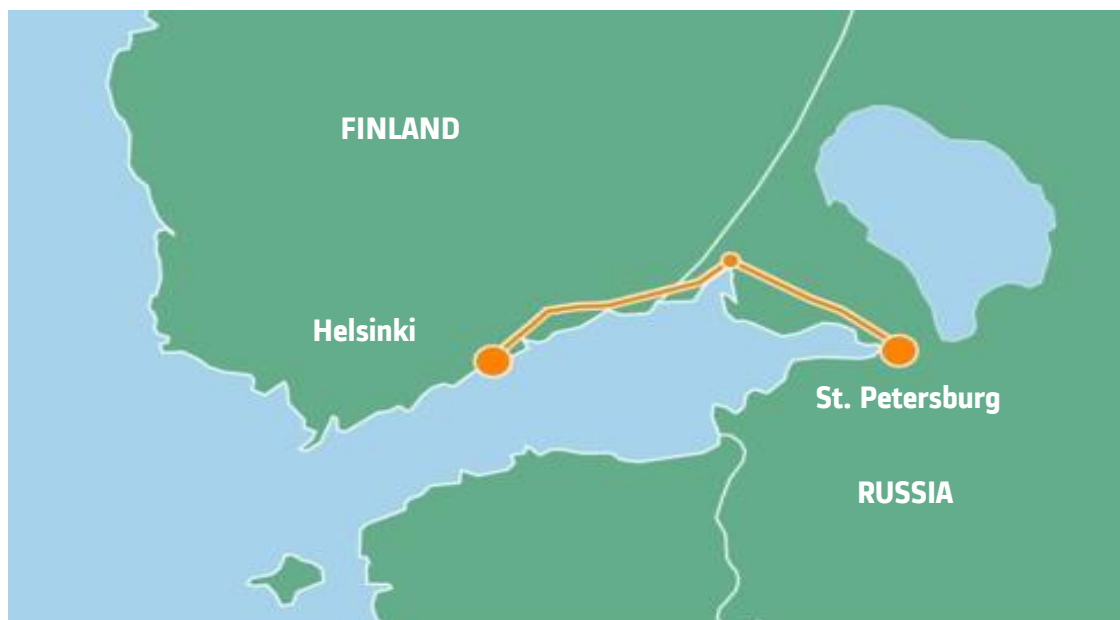


Hardware Design

# Allegro: Pendolino for St. Petersburg - Helsinki



**St Petersburg - Helsinki: distance 417 km**



- **Travel time reduced from 5,5 hours down to 3,5 hours**
- **Border control carried out in train during service**
- **Previous operations involved loco-hauled trains with change of loco and driver at border, and lengthy border control process**
- **Operator: Karelian Trains**



# Allegro: Wide gauge and winterized

## The right solution for Russia and northern countries

### Designed for Russia and northern countries:

- ✓ Wide gauge bodyshell
- ✓ Winterized solutions:
  - Resistance to very low temperatures (up to  $-45^{\circ}\text{C}$ )
  - Protection against snow
  - Protection against specific climatic conditions (iced rails, flying ice blocks, ...)
- ✓ Certification in both Russia and Finland
- ✓ Pendolino tilting technology

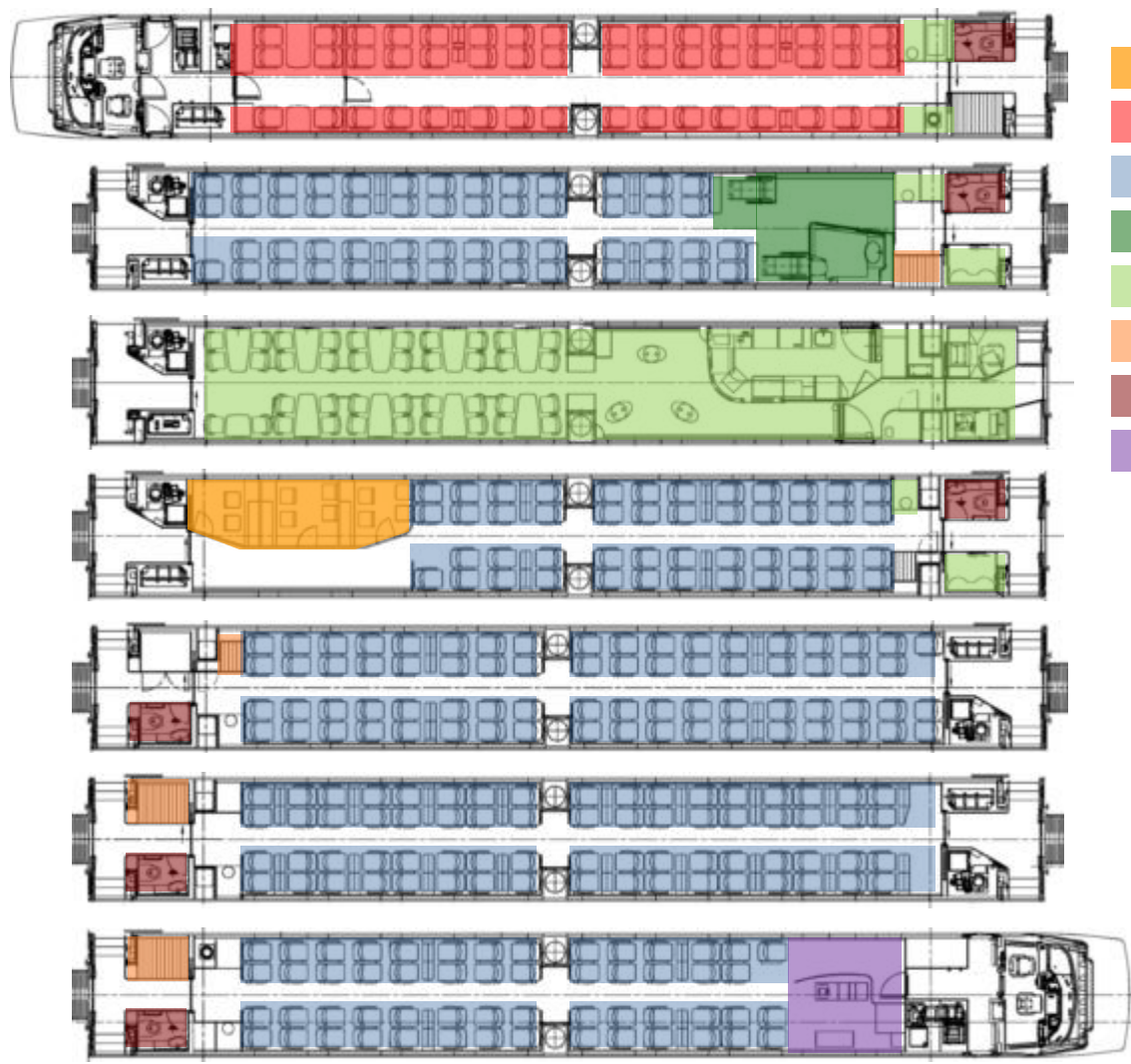


# Allegro: Main characteristics

- **Number of Trains:** 4
- **Contract / Commercial service:** 2007 / 2011
- **Train composition:** 7 cars (M-M-T)-(T-T-M-M)
- **Multiple operations:** 2 trains
- **Supply voltages:** 25kVac 50 Hz / 3kVdc
- **Tilting System:** Hydraulic
- **Trainset length:** 184,8 m
- **Bodyshell width:** 3200 mm
- **Passengers capacity:** 345 + 2 disabled
  - 1st class 48
  - 2nd class 297 + 2 wheelchairs
- **Traction equipment:** 4 IGBT 6.5kV traction converters
- **Traction power at rims:** 5500 kW
- **Maximum service speed:** 220 km/h
- **Climatic conditions:** -45°C / +40°C
- **Winterisation:** Yes



# Allegro: Interior layout



- Custom/Border/Checking
- 1<sup>st</sup> class
- 2<sup>nd</sup> class
- PRM/Accessible wheelchair area
- Special (Bar/Restaurant/Catering/Vending/Staff)
- Luggage
- Toilet
- Play area

➤ <b>Total seats:</b>	<b>342+2</b>
➤ <b>1st class:</b>	<b>48</b>
➤ <b>2nd class:</b>	<b>297+2</b>

# Allegro: High comfort & long distance interiors





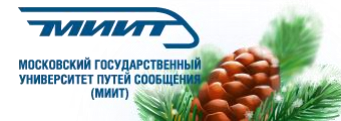
# Allegro: High comfort & long distance interiors



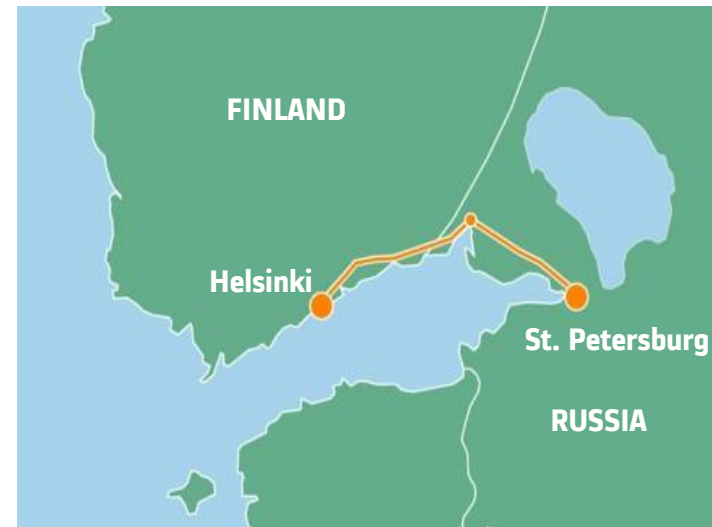
# Allegro: High comfort & long distance interiors



# Allegro: Cross-border maintenance approach



- Alstom scope :** coordination activities, components delivery
- Service depot:** Helsinki belongs to VR  
St.-Petersburg belong to RZD
- Service provider:** VR is responsible for full maintenance and outsource maintenance activity within territory of Russia to RZD



*KarelianTrains*  
**Train owner**



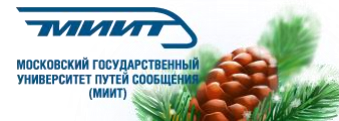
**Operator/Maintenance provider**



**Operator/Maintenance provider**



# Agenda



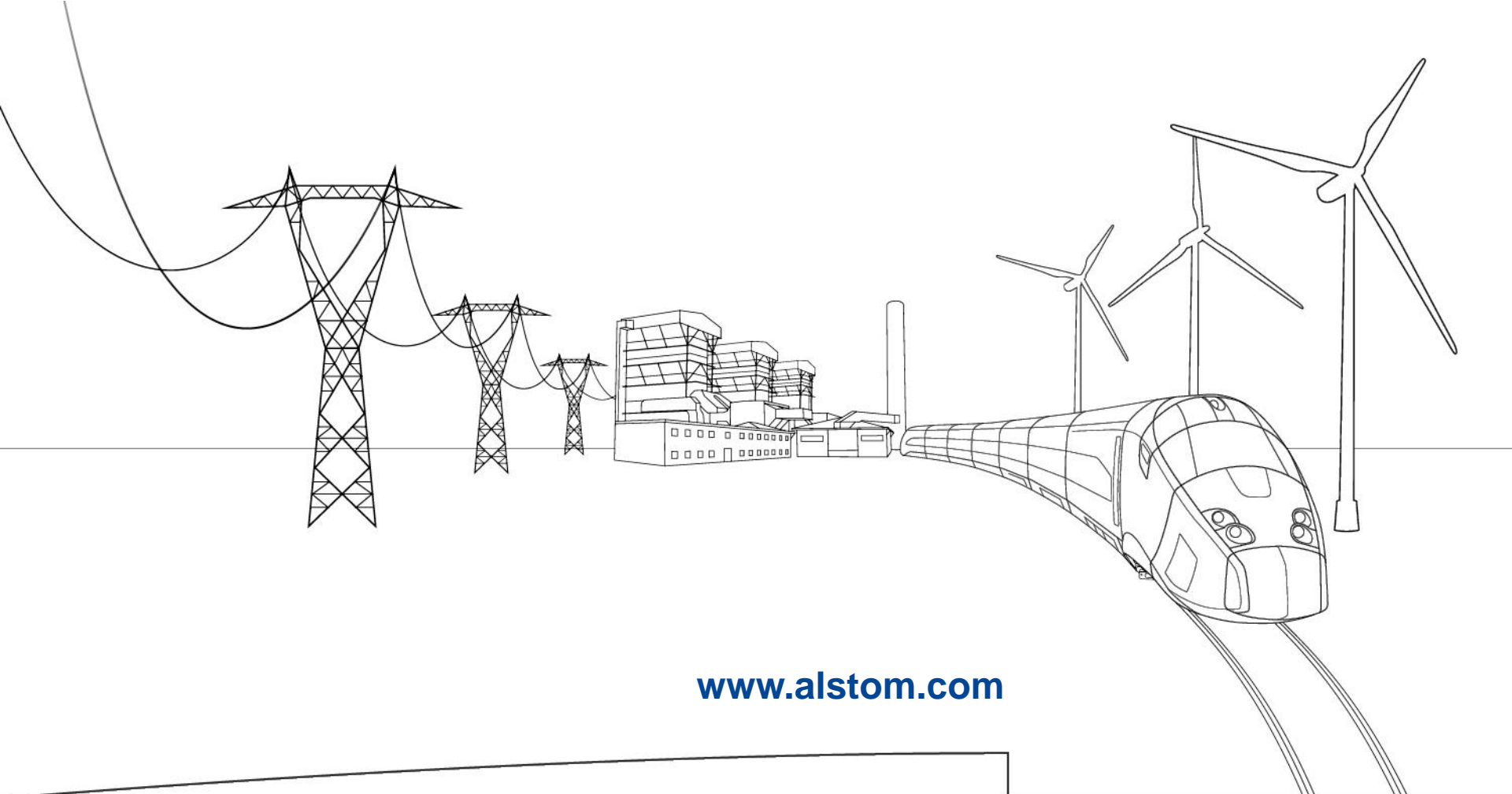
- General introduction
- Maintenance services
- Support services
- Modernization services
- Parts & Repairs
- Russia and CIS service map
- VHST Full Service (Nola depot)
- HST Service (Virgin Pendolino, Allegro approach, Cross border difficulties)
- **Components service – EP20, 2ES5**

# Components service – EP20, 2ES5

**E-locos are produced by NEVZ (TMH production site).**

**Alstom is responsible for components maintenance.**





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