

# The AGV, incorporating cutting-edge technology

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# The AGV: Automotrice Grande Vitesse

## New single deck high speed train

- Developed as a platform
- Based on TSI requirements
- Focussed on Europe
- Easily adaptable to wide gauge
- Four voltages
- Modular design

## ... using new technologies...

- Articulated trainset
- Distributed power
- Permanent magnet motors and IGBT
- Optimised anti-crash system
- Composite material

## ... extensively validated



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# The AGV: A new single deck high speed train platform

## Development based on TSI & EN

- First train developed after issuance of Technical Specifications for Interoperability of 2002 and 2006  
(High Speed, Tunnel, Reduced Mobility People)
- Using EN standards

## A train for Europe

- Traction system developed for the 4 voltages
- Gauge allowing running on all interoperable lines
- Signalling equipment built around the ERTMS and incorporating all main national ones

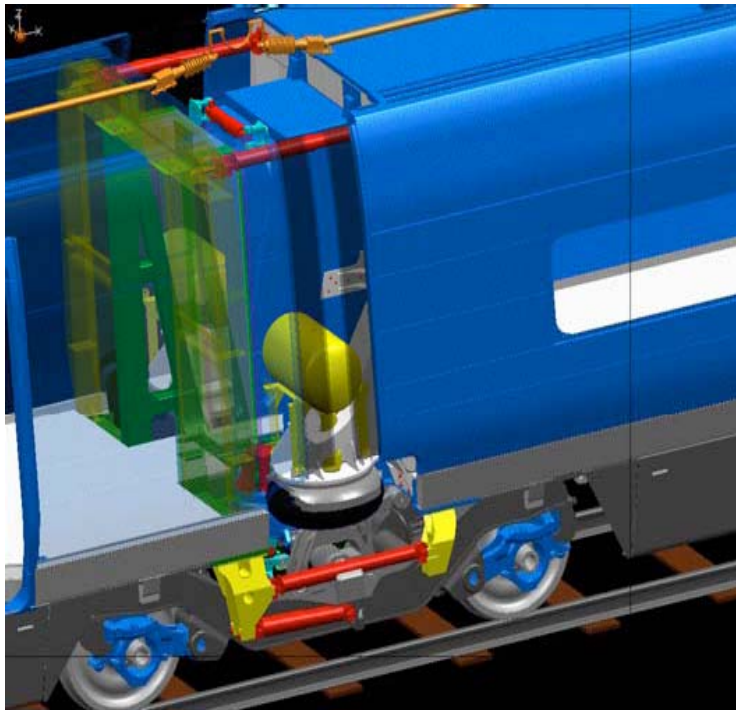
## Easily adaptable to wide gauge

- Wide gauge specificities already taken into account



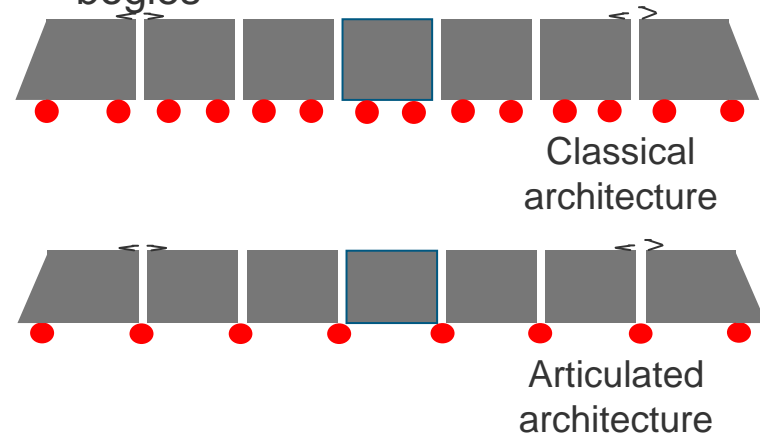
# Based on an articulated architecture

## Bogies positioned between the cars of the train



Position of power bogie on the AGV

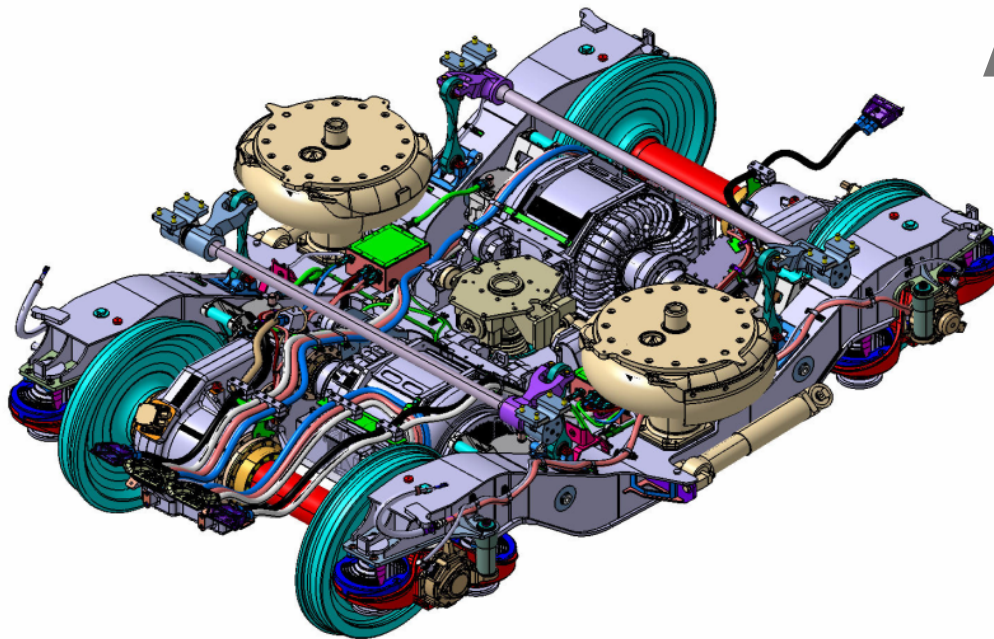
Position of the bogies



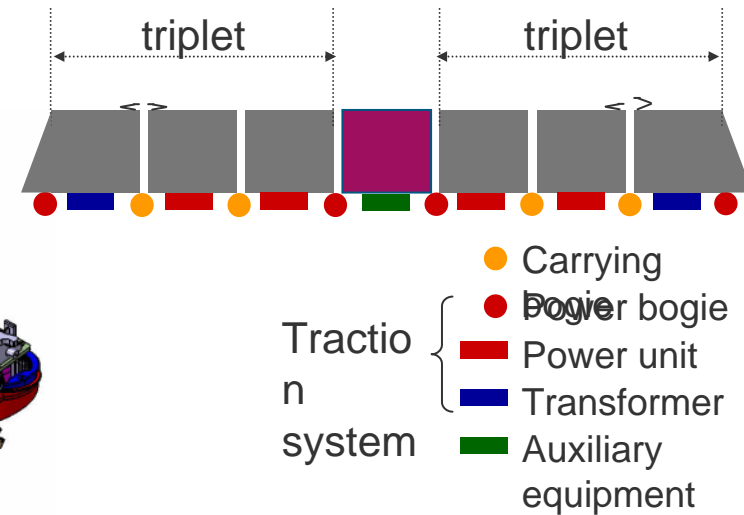
- Safety: trainset rigidity
- Comfort: less noise and vibrations

# Based on distributed power

## Traction systems distributed below floors of cars



Motor bogie on the  
AGV



- 20% more space for passengers
- Power of the train maintained independently to the number of cars



# Powered by synchronous permanent magnet motors

A power ratio of 22.6 kW per tonne

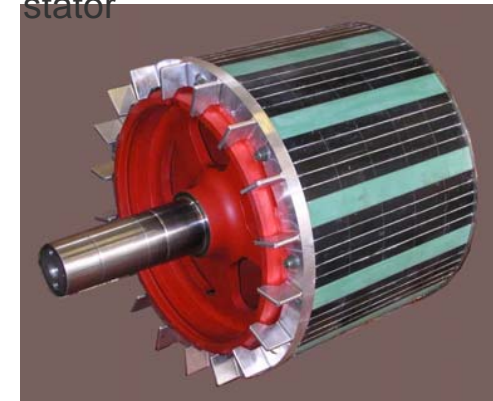


- Power/weight ratio: more than 1 kW/kg
- Efficiency ratio: 98%

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Permanent magnet motor stator



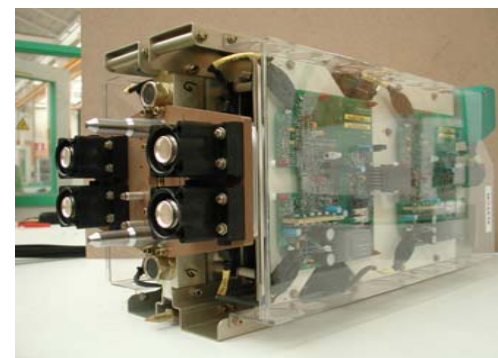
Permanent magnet motor rotor

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# Traction system with highly integrated IGBT

Able to run under 4 voltages through all Europe



Compact IGBT module

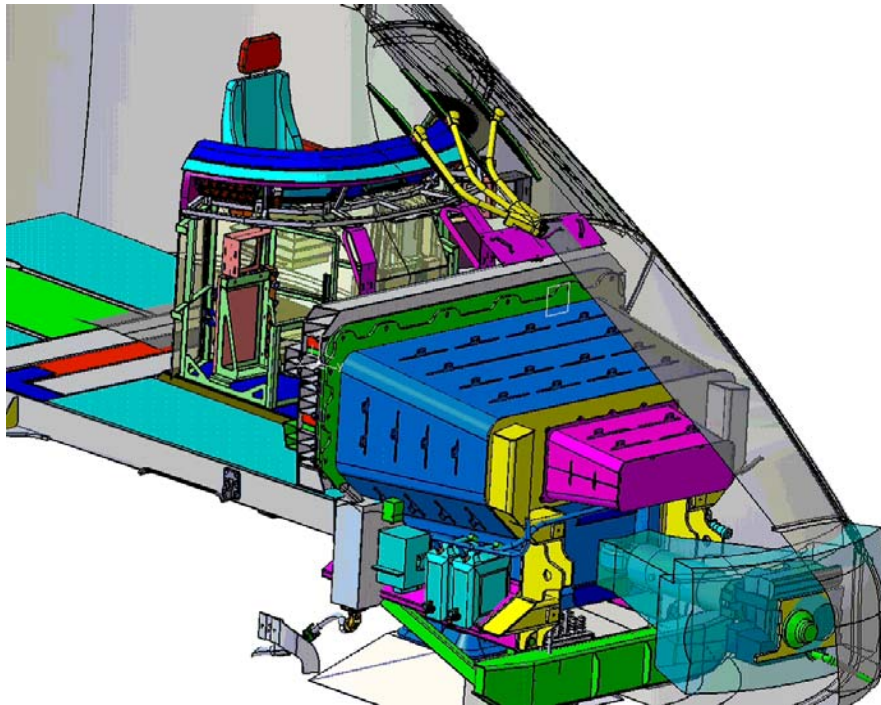
- ONIX™ 6.5 kV power modules
- 3600 V power bus

- Designed to run under 25 kV / 50 Hz - 15 kV / 16.7 Hz - 3 kV DC – 1.5 kV DC
- Full power built-in regenerative braking



# Safety: European Union interoperability crash standards

## Highest levels of passive safety



A crash-proof driver's cabin without deformation

Frontal crash modules can absorb a shock of over 4.5 MJ





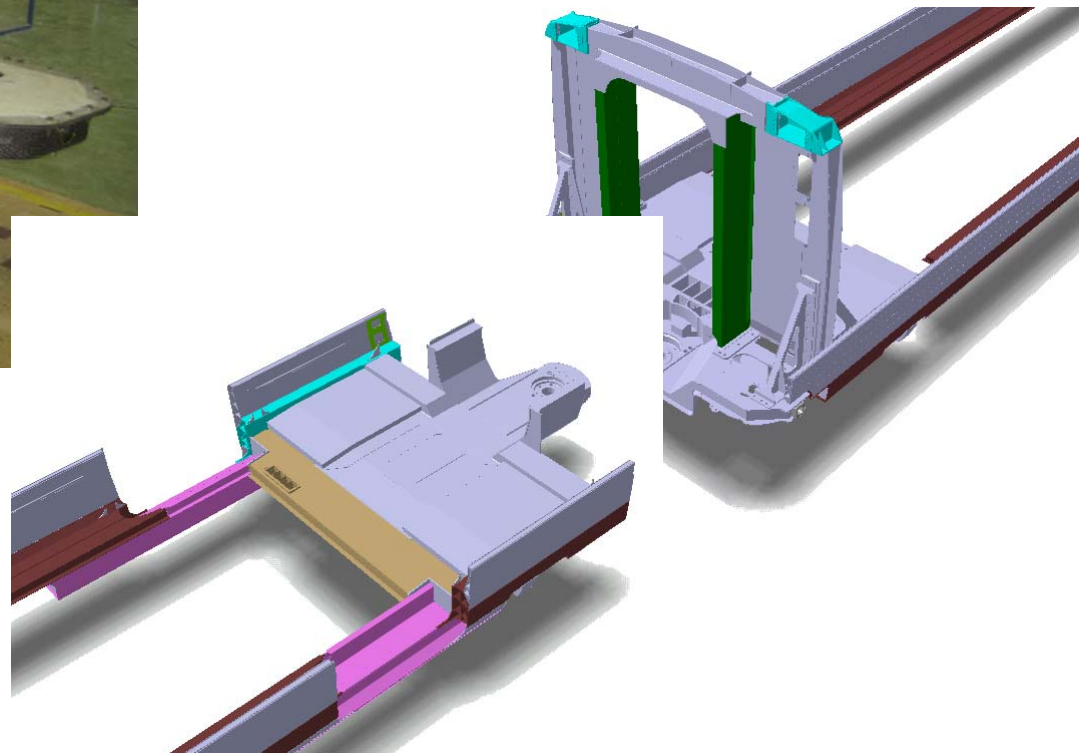
# Lightweight: use of structural composite

## Lightest European very high speed product



Carrying end cross beam in composite

- 70 t lighter than competitors
- Fully validated through fatigue tests



# Validation: a must for new technology introduction

## Validation on test benches ...

- Permanent magnet motors in Ornans
- Complete traction system in Tarbes
- Composite beam in Vitry
- HVAC duct system in La Rochelle
- Train aerodynamic in Nantes
- TCMS on train simulator in La Rochelle

## ... and real train...

- Complete traction package and two motor bogies on V150 record trainset at up to

574.8 km/h

... to deliver a reliable and validated train to our Customers

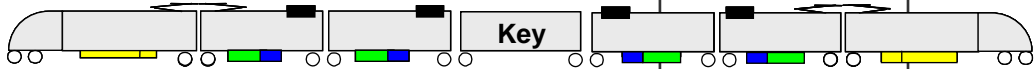
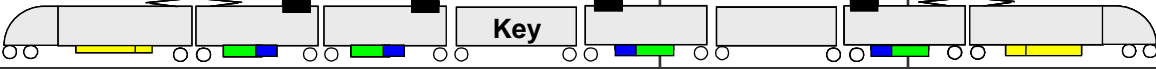
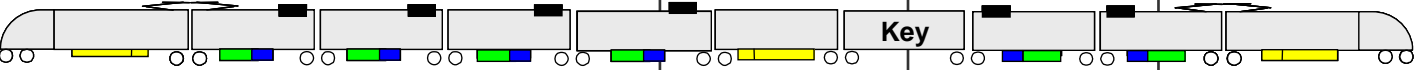

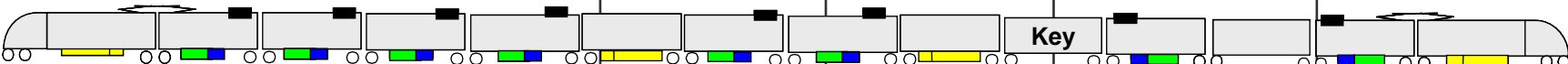


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# Modularity: offering a broad range of trains

## From 7 to 14 trainsets

Trainset configuration	Train	Length (m)	Std capacity	High density
<b>300 kph</b> 	<b>AGV 7</b>	<b>132</b>	<b>245</b>	<b>312</b>
<b>300 kph</b> 	<b>AGV 8</b>	<b>149</b>	<b>321</b>	<b>378</b>
<b>320 kph</b> 	<b>AGV 10</b>	<b>183</b>	<b>374</b>	<b>462</b>
<b>360 kph</b> 	<b>AGV 11</b>	<b>200</b>	<b>446</b>	<b>510</b>
<b>360 kph</b> 	<b>AGV 14</b>	<b>252</b>	<b>593</b>	<b>654</b>
<b>Seat Pitch (mm) 1<sup>st</sup> Class</b>			<b>980</b>	<b>-</b>
<b>2<sup>nd</sup> Class</b>			<b>920</b>	<b>900</b>



# Designed with environmental concerns in mind

## Reducing impact on the environment

98% of easily recyclable materials

Aluminium, steel, copper and glass

Able to produce its own electricity

Up to 8 MW of power feedback  
into the grid

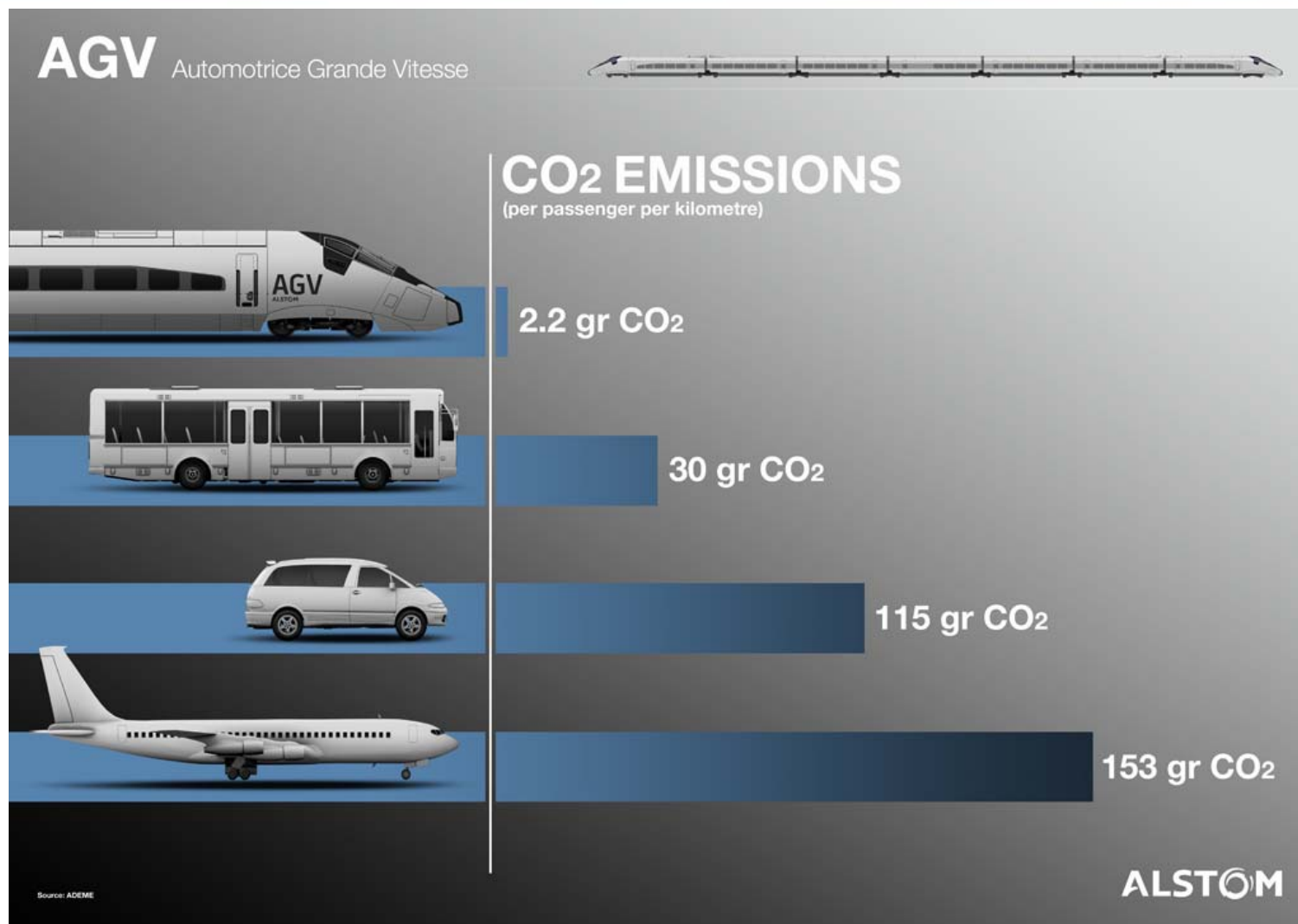
Aero-acoustics to reduce noise

Same noise at 360 kph  
than competitors at 300 kph

70 tonnes less than competitor  
models

15% reduction in energy consumption

# Designed with environmental concerns in mind



# Developed by Alstom, for its customers

## Reducing operating costs

Less bogies than conventional trains

15% reduction in maintenance costs

Specific wheel design

15% more lifetime than other trains

Modularity of trainsets

Fine-tuning for trains' circulation,  
train fleets and railway hubs



# Alstom's offer

## A single and double decker full range



### Double Deck Platform

- High traffic
- 500 to 1200 seats
- 320 km/h



### AGV Platform

- Diversified traffic
- 250 to 650 seats
- Up to 360 km/h



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