

Experience in the construction  
of the HS trains and the newest  
train AGV

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## The Alstom Products Range



# The High Speed in Alstom

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## Pendolino and High Speed EMUs An International success

Daily running at 200-250km/h commercial speed

In revenue service at 250 km/h starting from 1988

Successful service in 11 different countries

More than 200 millions km revenue service

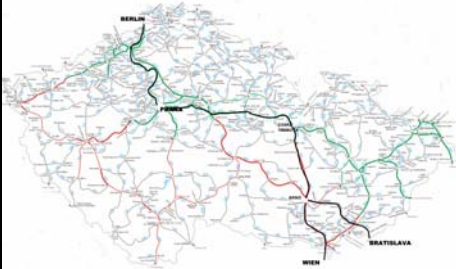
More than 400 trainsets sold

World wide service proven family

Unmatched expertise and know-how in High Speed



## CDT680 Pendolino for CD



- ✓ Commercial service: 2005
- ✓ Omologation: CD, DB, OeBB
- ✓ Fleet: 7 trainsets of 7 vehicles each
- ✓ Traction equipment: 2 traction units
- ✓ Traction motors: 4 on each unit
- ✓ Hydraulic tilting system
- ✓ Max speed 230 [km/h]
- ✓ Line voltages 3kV dc  
15kV 16 2/3 Hz  
25 kV 50 Hz
- ✓ Continuous power 4 [MW]
- ✓ Total length 185,3 [m]
- ✓ Total number of seats 333

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## New Pendolino Family







The New Pendolino Family has been developed in order to answer to the new market demands:

- ✓ Passenger needs:
  - ✓ Comfort and safety
  - ✓ Advanced on board facilities
- ✓ Railway Operators:
  - ✓ Maximise passengers capacity
  - ✓ Brand identity & Performances
  - ✓ RAMS & LCC design oriented
- ✓ Regulatory Authorities:
  - ✓ Interoperability (TSI)



Why the New PENDOLINO?

## New PENDOLINO Family

Trainset configurations	Overall length [m]	Min Transport capacity	High Density capacity
	108,8	216	292
	135,0	272	318
	161,2	352	406
	187,4	432	494
	213,6	512	582
	239,8	568	638
Seat Pitch [mm]:			
1 <sup>st</sup> Class (Vis a Vis/Unidirectional)		2000 950	2000 950
2 <sup>nd</sup> Class (Vis a Vis/Unidirectional)		1900 900	1900 870

- ✓ Regional or intercity operation
- ✓ Different power supply
- ✓ Tilting and Conventional
- ✓ Max Service speed: 200 ÷ 250 Km/h
- ✓ Modular design
- ✓ Interoperability (TSI)

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## New PENDOLINO® for TI & CIS

### NP for TI: 12 Trains, 7 cars each

- ✓ Contract signature: 03/2004
- ✓ Tilting Train
- ✓ 250 km/h max speed
- ✓ Dual voltages (25kV/3kV)
- ✓ 4 motor and 3 trailer vehicles
- ✓ Homologation on RFI network
- ✓ Delivery from June 2007



### NP for CIS: 14 Trains, 7 cars each

- ✓ Contract signature: 03/2004
- ✓ Tilting Train
- ✓ 250km/h max speed
- ✓ Three voltages (25kV/15kV/3kV)
- ✓ 4 motor and 3 trailer vehicles
- ✓ Homologation on RFI/SBB/DB networks
- ✓ Delivery from December 2007

## New Pendolino Brand identity



**GIUGIARO**  
DESIGN  
Designing the Future

## New PENDOLINO Interiors



## New PENDOLINO Interiors



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The Very High Speed in Alstom

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## Available products on the market / V > 270 kph

Alstom: more than 560 trains sold / 6600 cars produced



**EUROSTAR**  
France, England



**THALYS**  
Belgium, France, Holland & Germany



**TGV Duplex**  
France



**TGV Korea**



**TGV East**  
France, Germany, Luxembourg,  
Switzerland

Daily operating  
speed:  
300-320 kph

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## Alstom's experience



### Significant world record

- May 1990: **515.3 kph**
- June 2001: Calais – Marseille  
**1067 km in 3 h 29 min** → average speed 306 kph
- Over **2000 km** of test runs at speed beyond **500 kph**
- April 2007 : **574,8 kph**

### Unmatched return on experience

- **The largest fleet**, more than 560 trains operated at 300 kph & 320 kph
- Spread over the largest variety of networks, in **9 countries**
- Over **2,5 billion kilometers** cumulated (more than 60 000 times the earth circumference and 6 500 times the moon-earth distance)
- More than **1,5 billion** passengers travelled
- Zero fatalities

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## The AGV concept

### Build on the TGV's benefits

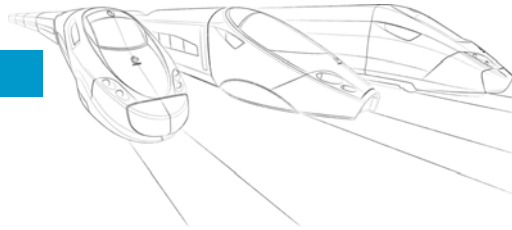
- Articulated train
- Weight optimisation

### To offer more...

- Modularity / Capacity
- Speed
- Comfort
- Availability

### ...and less

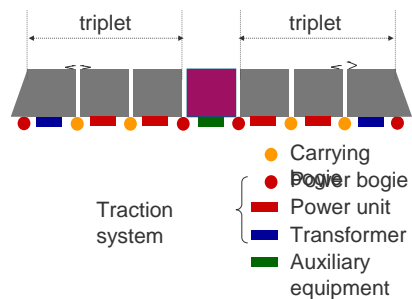
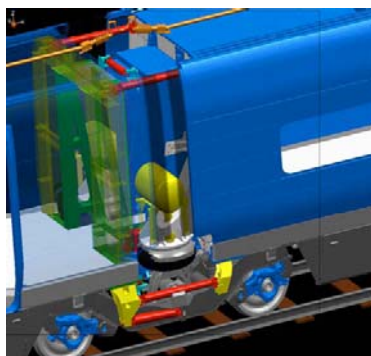
Operation cost  
Power consumption  
Investment per seat



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## Articulated trainset based on distributed power

### Traction systems distributed below floors of cars



Articulated trainset -> 20% less bogies vs traditional configuration

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# Articulated trainsets

## Benefits



- **Safety:** rigidity of the trainset. No "accordion" effect in the case of a derailment.
- **Comfort on board:** rolling noise and vibrations are reduced and restricted to the area between cars
- **Energy consumption:** reducing the number of bogies reduces weight and improves aerodynamic resistance
- **Cost:** fewer bogies means lower maintenance costs  
(a bogie accounts for 35 to 40% of the cost of

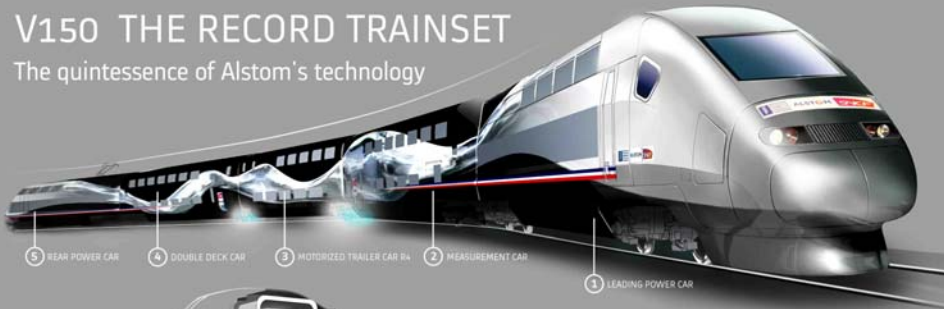
## Benefits

### Modularity: offering a broad range of trains

Trainset configuration	Train	Length (m)	Std capacity	High density
300 km/h 	AGV 7	132	245	312
300 km/h 	AGV 8	149	321	378
330 km/h 	AGV 10	183	374	462
350 km/h 	AGV 11	200	458	510
350 km/h 	AGV 14	252	593	654
Seat Pitch (mm) 1 <sup>st</sup> Class			980	-
2 <sup>nd</sup> Class			880	880

# V150 THE RECORD TRAINSET

The quintessence of Alstom's technology



## Alstom's traction system for the AGV™

- A Power convector
- B Synchronous motor with permanent magnets
- C Gear box

TOTAL POWER:	19,6 MW	LADEN LOAD:	268 T
POWER CAR RATING:	7,8 MW	LENGTH:	106 m
TRAILER COACH R4:	4 MW		

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[www.alstom.com](http://www.alstom.com)

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