

A high-speed train, likely a Shinkansen, is shown in motion within a large, arched tunnel. The train is white with a dark front section. A thick, red, curved graphic element sweeps across the bottom and right side of the image, partially obscuring the train and the tunnel floor. The text "Bombardier DMU, EMU and High Speed Rail Technologies" is overlaid on the upper left portion of the image.

Bombardier DMU, EMU and High Speed Rail Technologies

Presentation for Cascadia Rail Week, May 28, 2009

BOMBARDIER

Bombardier – Overview

- **Corporate office based in Montréal, Canada**
- **Workforce of some 59,800 people worldwide as at January 31, 2008**
- **Revenues of \$17.5 billion US for fiscal year ended January 31, 2008**
- **More than 96% of revenues generated outside Canada**
- **Listed on Toronto Stock Exchange (BBD)**

© Bombardier Inc. or its subsidiaries. All rights reserved.

Bombardier Transportation Products and services

A full spectrum of railway solutions

Rail Vehicles	Transportation Systems	Services	Rail Control Solutions	Transit Security Solutions	Propulsion & Controls	Bogies
						
<ul style="list-style-type: none"> • Light Rail Vehicles • Metros • Commuter Trains • Regional Trains • Intercity Trains • High speed Trains • Locomotives 	<ul style="list-style-type: none"> • Monorail Systems • APM Systems • GLT Systems • Light Rail Systems • ART Systems • Metro Systems • Intercity Systems 	<ul style="list-style-type: none"> • Fleet Management • Operations & Maintenance • Material Solutions • Vehicle Refurbishment • Component Reengineering 	<ul style="list-style-type: none"> • Integrated Control Systems • Automatic Train Protection and Operation: wayside and onboard • Interlocking systems • Wayside Equipment • Services 	<ul style="list-style-type: none"> • Train-based broadband network • Sensor Systems • Security Systems Recording • Security System viewing and event management 	<ul style="list-style-type: none"> • Traction Converters • Auxiliary Converters • Traction Drives • Control and Communication 	<ul style="list-style-type: none"> • Portfolio to match entire range of rail vehicles • Full scope of service over the lifetime of a bogie

© Bombardier Inc. or its subsidiaries. All rights reserved.

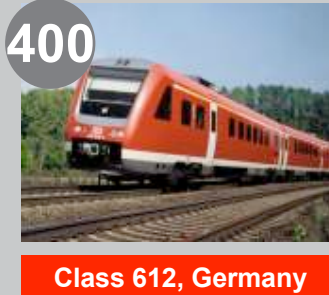
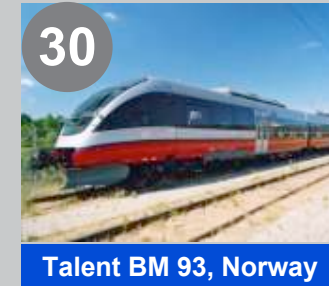
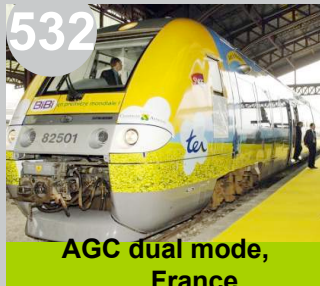


Bombardier Diesel Multiple Units

Over 3,400 Bombardier-Built DMU's are in Service Today

BOMBARDIER

Diesel Multiple Units - Product Portfolio



Service experience in a wide power range with all kind of transmissions



- diesel-hydraulic
- diesel-mechanic
- diesel-electric
- Hybrid vehicle with electric and diesel-electric power transmission

BOMBARDIER

Diesel Multiple Units

TALENT Germany and Canada



- Customers: DB AG, Euregiobahn, Connex, Arriva PEG, ATI, Regiobahn, Eurobahn, MTNA Canada

- 768 cars sold
- 226 3-car trains
- 45 2-car trains

▪ Train	2-car	3-car
▪ Length	34.6 m	48.8 m
▪ Width	2.95 m	2.95 m
▪ Height	3.85 m	3.85 m
▪ Power	2x315 kW	2x315 kW
▪ V _{max}	120 km/h	120 km/h
▪ Floor height	800/960 mm	590 mm
▪ Seats	98	137
▪ Standees	100	150
▪ Weight	57.5 t	74.5 t
▪ Door width	1.3 m	1.3 m
▪ Acceleration	1.1 m/s ²	0.85 m/s ²

© Bombardier Inc. or its subsidiaries. All rights reserved.

Diesel Multiple Units

AGC dual-mode



- Customer: SNCF, France
- 532 cars sold
- 133 4 car trains

- Train 4-car
- Length 72.8 m
- Width 2.95 m
- Height 4.02 m
- Power 2x588 kW for diesel
1300 kW electric
- V_{\max} 160 km/h
- Floor height 590 mm
- Door width 1.3 m
- Seats 192 - 206
- Tip-up seats 12 - 16
- Standees 227
- Weight 170 t
- Acceleration 0.47 m/s² diesel mode
0.66 m/s² 1.5 kV DC
0.67 m/s² 25 kV AC

© Bombardier Inc. or its subsidiaries. All rights reserved.

Bicycle Area



© Bombardier Inc. or its subsidiaries. All rights reserved.

Access for Disabled Passengers



Movable step



© Bombardier Inc. or its subsidiaries. All rights reserved.

A high-speed train, likely a Bombardier EMU, is shown in motion within a tunnel. The train is white with a dark front section. The tunnel has a curved, ribbed ceiling. A large, stylized red graphic, resembling a thick, curved line or a stylized 'B', frames the bottom and right sides of the image. The text 'Bombardier EMU and High Speed' is overlaid on the upper left portion of the image.

Bombardier EMU and High Speed

BOMBARDIER

Products and services

Commuter / Regional Trains

Commuter Trains



Class 481
(Berlin, Germany)



Class 474
(Hamburg, Germany)



EMU M-7
(New York, USA)



EMU SPACIUM 3.06
(Paris, France)



Class 424-426
(Germany)



CP 2000
(Portugal)

Regional Trains



AGC
(France)



ITINO
(Germany, Sweden)



NINA
(Switzerland)



TALENT (Germany, Norway,
Austria, Canada, Hungary)



TALENT 2
(Germany)



REGIO-SWINGER
(Germany, Croatia)

Double Deck Trains



BiLevel Coaches
(Canada, USA)



DD-Coaches (Germany,
Denmark, Israel, Luxembourg)



DD-EMU
(Netherlands)

Products and services

Intercity / High Speed Trains

Intercity Trains



ELECTROSTAR EMU
(UK)



TURBOSTAR DMU
(UK)



CONTESSA EMU
(Denmark/Sweden)



Voyager DEMU, (& Meridian)
(UK)



REGINA EMU
(Sweden)



ICN EMU,
tilt (Switzerland)



I11Coach
(Belgium)



Airport Express
(Norway)



ICE T EMU,
tilt (Germany)

High Speed Trains



ICE 3 EMU
(Germany/Netherlands)



Acela Express
(USA)



ZEFIRO

© Bombardier Inc. or its subsidiaries. All rights reserved.

Products and services

Locomotives

TRAXX AC



TRAXX P160 AC
(Deutsche Bahn)

TRAXX DC



TRAXX F140 DC2
(Angel Trains)

TRAXX MS



TRAXX F140 MS
(Angel Trains)

TRAXX DE



TRAXX P160 DE
(LNVG)

Other Projects



**High speed Powerhead
AVE S-102 (RENFE)**



TRAXX F140 AC
(SBB Cargo)



TRAXX F140 DC
(RENFE)



TRAXX F140 MS
(SBB Cargo)



E464
(Trenitalia)

REGINA Train family for Intercity operations



Product family	<i>Regina*</i>	
N° cars per unit	2	3
Max. speed (km/h)	250	250
Track gauge (mm)	1435	1435
N° of seats	167	272
Max. N° of standees	74	110
Length of unit (m)	53.9	80.5
Max. axle load (t)	18.5	18.5
Power source (kV)	15 (AC)	15 (AC)
Max. traction power (kW)	1590	2120

© Bombardier Inc. or its subsidiaries. All rights reserved.

- Electric Multiple Units for Intercity and Interregional applications.
- Already in service for several operators in Sweden.

The top of the slide features a dark banner. On the left, the word "DESERT" is in yellow. In the center is a large, stylized "X" made of yellow lights. To the right of the "X" is the word "PRESS" in white. On the far right of the banner is a sleek, white high-speed train.

DESERT

PRESS

DesertXpress is a private interstate high speed passenger rail system that will provide a new, reliable, high capacity link between Southern California and Las Vegas

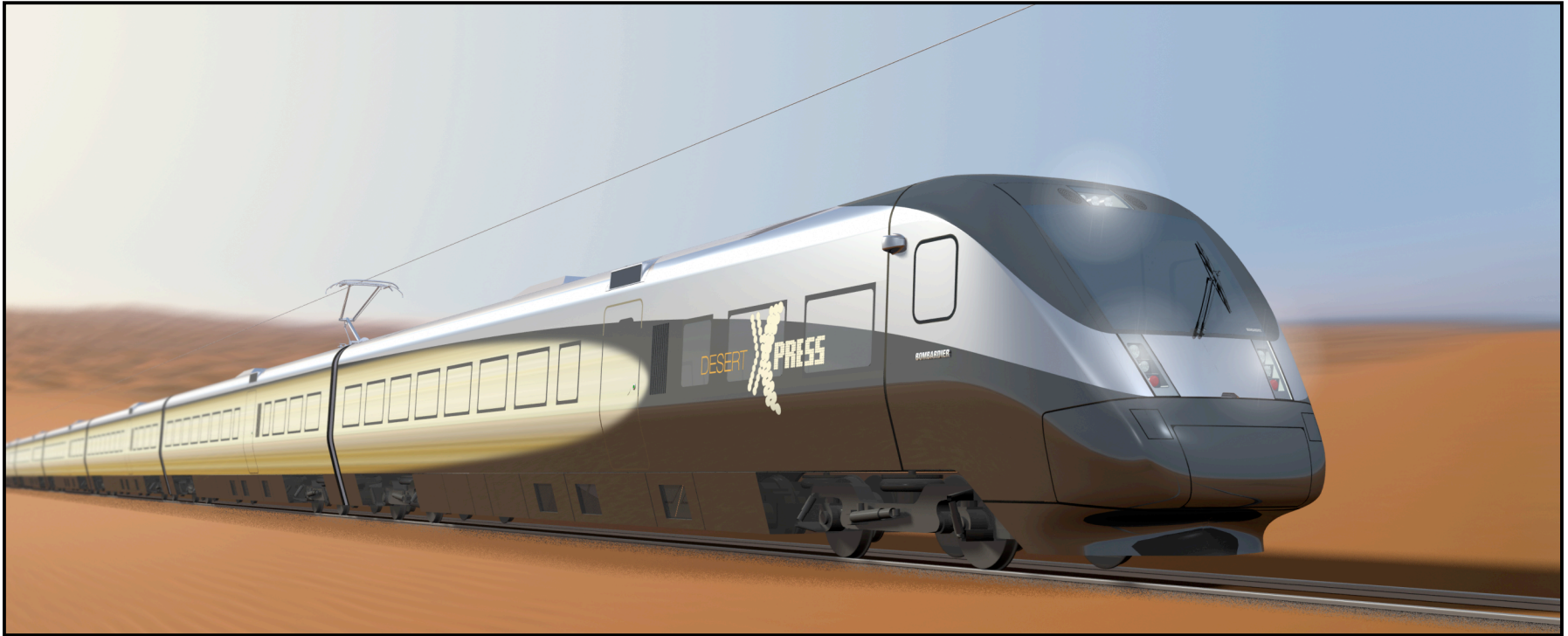
The DesertXpress Corridor



Technology Overview

- DesertXpress will utilize state of the art, proven and reliable technology
 - **new European multiple unit rolling stock**
 - **a modern train control system**
 - **exclusive, high quality, grade-separated new double tracks following the I-15 alignment**
- The system will be designed and constructed to enable speeds up to 150 mph
- 150 MPH high speed train technology, most likely using EMU trainsets based upon trains currently operating in Sweden and China, completes the trip in 80 to 84 minutes
- 10-car trains depart every 20 minutes on peak, hourly off-peak

DesertXpress Trainsets



© Bombardier Inc. or its subsidiaries. All rights reserved.

A high-speed train, identified as the Zefiro, is shown in motion within a tunnel. The train is white with a sleek, aerodynamic design. The tunnel's interior features a series of curved, ribbed structures that create a sense of depth and speed. A prominent red swoosh graphic curves along the bottom of the image, framing the train. The overall composition is dynamic and modern.

Bombardier Very High Speed - *ZEFIRO*

BOMBARDIER

◁ Our reference site ▷

Bombardier is one of the most experienced suppliers of high-speed trains. We delivered almost 850 trains and vehicles for high-speed and very-high-speed applications worldwide.

43% ACELA USA

12% ETR500 Italy

17% THALYS F/GER/B/NL

18% TGV France

20% EUROSTAR France

100% BM71 Norway

100% REGINA Sweden

100% X2000 Sweden

100% XinShisu China

100% CRH1 China

27% ICE-T/ICE-TD Germany

48% ICE3 Germany

49% ICE1/2 Germany

40% AVE S-130 Spain

40% AVE S-102 Spain

80% ICN Switzerland

100% ZEFIRO China



ZEFIRO Very High Speed trains

The **ZEFIRO** products cover a wide range of products:

ZEFIRO products

ZEFIRO 250

- Coaches
- Sleeper
- 8 car train
- 16 car train

ZEFIRO 300

- UIC carbody coaches
- Wide carbody coaches
- 8 car train
- 16 car train

In cooperation with AnsaldoBreda for selected markets

ZEFIRO 360

***ZEFIRO* 250 – The world's first high-speed sleeper train**

The *ZEFIRO*250 will be the first high-speed sleeper train worldwide operated up to 250 kph.

- As the successor to the reputable CRH1 EMU, *ZEFIRO* 250 will be operating in China from 2009, delivering very high levels of operational performance for overnight services.
- The train's interior design and fittings will set new standards of comfort in overnight travel because the *ZEFIRO* has been designed to achieve highest comfortable level.
- Designed to meet high reliability, efficiency and flexibility with Bombardier's proven systems and components.

Inc. or its subsidiaries. All rights reserved.



ZEFIRO 300/360 – The key features of the new VHS product platform

- **DESIGNED FOR 360+kph (224+mph)**
- **TRANSPORT CAPACITY:** high flexibility in design of interior layout and a seating capacity ranging from 450 to 600 passengers (8 car UIC equivalent)
- **HIGH RELIABILITY:** the new VHS trains will provide highest reliability by clearly focussing on using service proven solutions and technologies
- **HIGH PERFORMANCE AND AVAILABILITY:** intelligent redundancy concepts with a high degree of traction availability without significant performances reduction in case of fault
- **LAYOUT AND WEIGHT:** open tube design to maximise the available interior space for passengers and the possibility of evolutions by adding features due to low axle loads

The Exterior Design

The *ZEFIRO* trains set a new standard with a strong and powerful design



The Interior Design – 1st class



The Interior Design – 2nd class



ZEFIRO 350 Very High Speed Trains



© Bombardier Inc. or its subsidiaries. All rights reserved.