



OVERVIEW OF BOMBARDIER TRANSPORTATION in INDIA

**DELIVERING WORLD CLASS PRODUCTS
LOCALLY**

We move India – Strategic commitment



The railways in India have a strong tradition dating back over 160 years and the country continues to recognise the importance of rail to its economic growth.

Bombardier is proud to be part of the evolution of mobility in India. After more than five decades of investment, Bombardier capabilities cover the complete range of railway vehicle and equipment manufacturing, technology, software and customer service competencies.

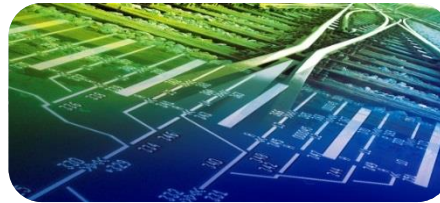
we are a key partner in delivering the country's requirements for the production of metros, electric multiple units and locomotives, advanced IGBT propulsion systems, bogies, signalling systems, as well as state-of-the-art 'madeinIndia' trains to neighbouring markets in the region.

BOMBARDIER TRANSPORTATION

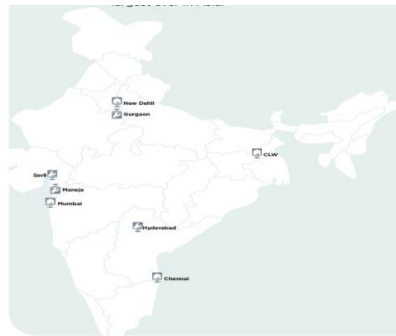
Committed to India



Maneja Site, Vadodara



Rail Control Solution Centre,
EAPD Centre and IS India hub,
Gurgaon, Delhi NCR



Savli Site, Vadodara



Engineering Centre and Bogie
Technical Centre, Hyderabad

1. Presence in India

- Registered and Corporate office in New Delhi
- Railway Vehicle Manufacturing Site in Savli, Gujarat – Established in 2008
- Propulsion and Control Site in Maneja Vadodara, Gujarat – Established in 1997
- Rail Control Solutions Centre in Gurgaon, Delhi NCR – Established in May 2014
- Rail Control Solutions EAPD Centre in Gurgaon, Delhi NCR – Established in Nov'15
- Engineering centre in Hyderabad, Andhra Pradesh in JV – Established in 2003
- IS/IT hub in Gurgaon, Delhi NCR – Established in November 2015
- Bogie Technical Centre, India – Established in January, 2016
- TCMS Centre, India – Established October, 2016
- India Engineering Centre – Established April 2017
- Project offices in New Delhi, CLW, Chennai and Mumbai (Supports Indian Railways, DMRC & MRVC projects)

2. Over 2000 employees in India

3. Key Partner to Indian Railways and Mass Transit operators in India

BOMBARDIER TRANSPORTATION

Projects successfully contributed and delivered - INDIA



Delhi Metro Rail Corporation (DMRC)
614 MOVIA metro cars delivered and
162 cars to be delivered
(Four orders in 2007, 2009, 2011 & 2015)
\$1.02billion

Mumbai Railway Vikas Corporation (MRVC)
Propulsion and controls for 72 commuter
trains of 12 cars each for Mumbai
(Nov 2011) \$214M



CITYFLO 350 signalling
for DMRC line 5 & 6
(October 2007) \$43M



CITYFLO 350 signalling
for DMRC line 5 & 6 Extension
(April 2013) \$47M



CITYFLO 650 CBTC signalling
for DMRC line 7
(September 2013) \$60M



450 commuter cars, Bogies and Propulsion
for Queensland Rail
(January 2014)
Export Order from Bombardier Transportation Australia



Bogies for Adelaide rail cars
(June 2012)
Export Order from Bombardier Transportation Australia



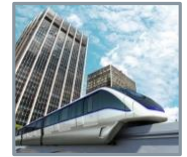
Bogies for Riyadh Metro
(March 2015)
Export Order from Bombardier Transportation Mexico



Indian Railways
Agreement to design and Build
Electric Locomotives with
technology transfer (WAP5 &
WAG9) in **1993**
Continuous Propulsion and Control
Systems supply for electric
locomotives



Bogie frames for Sao Paulo
Monorail - Export order from
Bombardier Transportation Brazil
(July 2013)



Bogie frames for Victoria rail cars
(June 2013)
Export Order from Bombardier Transportation
Australia



Western Railways & Central Railways
Traffic Management System Mumbai
(WR - Nov 2002) - \$3M with maintenance
(CR - June 2008) \$6M



BOMBARDIER TRANSPORTATION

Foreign Direct Investment in India

Investment

Investing in India for over 50 years in manufacturing facilities, proven technologies, local engineering , building local supplier base and most important local talent

- **INR 2.3 billion investment** for setting up recent state-of-the-art facility at Savli, Gujarat in 2007-08
- In the **last two decades**, invested around **USD 100 million** overall in setting up and expanding at our two manufacturing sites, Rail Control Solutions Centre (signalling) and an engineering centre

Indigenisation

- Our investment has **attracted** other **world class suppliers** and **specialist sub-contractors to India** making our **local content and sourcing** around **70%** from India itself. Created around 2000 direct jobs and 5000 indirect jobs

Developing Local Talent and Skills

- With all our **employees fully trained** in **specialized manufacturing processes**, our **sites in India** have evolved into **truly global production and engineering hubs**, **meeting consistently high international quality standards**.

Local Capabilities and Expertise

- Bombardier is the **first foreign multinational company** with the capacity to **manufacture complete railway vehicles in India**

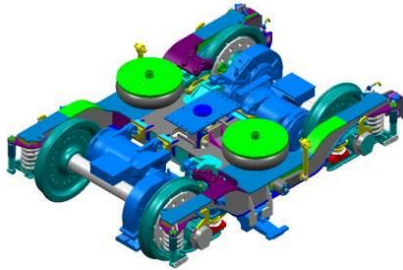


Bombardier is actively collaborating in the Indian Government's 'Make in India' program.

Our Focus on Indigenization

Bombardier Savli Site

Major Investment



Bogies

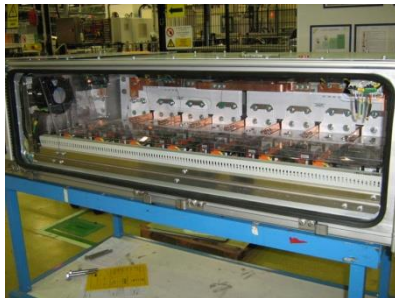


Car body/ Final assembly & Testing



Bombardier Maneja Site

Expansion



Converter



Aux Converter



Contactor Box



Filter Box

Indian Vendors

Expansion



Traction Motor



Transformer

- HVAC
- Brakes
- Couplers
- Interiors

Focus to suit to local market, by use of more local people in administration, supply & employment, etc.



Local to export market



FLEXX Bogie for projects in Delhi, Adelaide, Victoria, Sao Paulo, Queensland and Riyadh



Equipment and Components for projects in Delhi, Mumbai and Queensland



Delhi MOVIA metro car



Queensland Rail commuter car

In the last 10 years

Local Content: 0 to around 70%
Local Market to Exports
Direct Jobs: 2000
Indirect Jobs: 5000
Local Skill Enhancement
Local Suppliers meeting global standards
Global Suppliers setup Indian sites

Make in India for India



Delivered Traffic Management System for Mumbai Suburban Western and Central Railways and delivering signalling solutions for Delhi Metro Line 5& 6 with extensions and Line 7

DELIVERING THE BEST URBAN MASS TRANSIT SOLUTIONS FOR INDIA'S CITIES



578 metro cars manufactured and delivered from Savli site for Delhi Metro. Manufacturing activities started for additional 162 metro cars to Delhi Metro



Delivered more than 1200 Bogies to Delhi Metro and will deliver around 330 more Bogies to Delhi Metro for 162 car order



Transfer of Technology for Bombardier's WAP5 and WAG9 electric locomotives in 1993 and continuous Propulsion and Control Systems supply to Indian Railways for tractions and communication devices



Delivered Propulsion and Non Propulsion equipment for Mumbai suburban trains








- Savli site in Gujarat began exporting Bogies to Australia from 2012, to Brazil from 2014 and to Mexico for a project in Saudi Arabia in 2015.
- In 2016, Savli started delivering 75 complete commuter trains from India to Australia for Queensland Rail project
- Maneja, Propulsion manufacturing site in Gujarat, exports equipment for Australia project and is engaged in engineering activities for our projects in Germany, Switzerland, China and United Kingdom
- Bombardier Transportation Engineering Centre India (BTECI) sourcing all global projects of the company for more than a decade
- Our Signalling centre and IS/IT hub in Gurgaon, Delhi NCR along with TCMS India centre in Vadodara are supporting projects locally and globally

Bombardier developing MASS TRANSIT in India with its metro cars and signalling systems – Delhi Metro



- Only 19 months to deliver 1st metro car to Delhi Metro (including the construction of a new green-field site in Savli, Gujarat India)
- Delivered 614 metro cars and over 1200 Bogies to Delhi Metro in a short span reaching a target of producing one metro car per day
- Received order for 162 metro cars in June 2015
- Large allocation of resources: over 150 Bombardier engineers from 18 nationalities
- Propulsion equipment for the metro cars supplied for Maneja, Gujarat, India
- Bombardier achieved an indigenization level of approximately 70% in terms of subsystem indigenization
- Bombardier is Delhi Metro's largest contractor for signalling and train control solutions
- Delivering signalling solutions for Delhi Metro Line 5& 6 with extensions and Line 7 (In all, 130 kms)
- From 2007, Bombardier has received orders worth more than USD 1.2 billion from Delhi Metro for metro cars and signalling solutions

Evolution of Bombardier Propulsion and Controls in India

| 1989-2001 | 2007-2008 | 2009 | 2011 | 2014 |
|--|---|---|--|--|
|  |  |  |  |  |
| <ul style="list-style-type: none"> ■ Obtained Transfer of technology for High Power Propulsion (HPP) equipment's of WAP5 and WAG9 Electric Locomotives to Chittaranjan Locomotive Works (CLW) in 1993 ■ Set-up of Maneja propulsion and equipment site in 1997 ■ Formation of Bombardier Transportation India Limited in 2001 | <ul style="list-style-type: none"> ■ Awarded Delhi Metro RS2 contract & delivered propulsion equipment for over 600 metro Cars ■ Entry into Medium Power Propulsion (MPP) | <ul style="list-style-type: none"> ■ Introduced next generation IGBT (Insulated-Gate Bi Polar transistor) based propulsion equipment for Electric Locomotives manufactured by Indian Railways at Chittaranjan Locomotive Works (CLW) | <ul style="list-style-type: none"> ■ Awarded Mumbai Railway Vikas Corporation Phase II project for the Mumbai Suburban transport (project funded by World Bank) | <ul style="list-style-type: none"> ■ Awarded Queensland Rail project. Vehicles, Bogies and Propulsion equipment to be delivered from India to Bombardier Transportation Australia |

Rail Control Solutions in India

Delivering Innovative Rail Solutions for *30 years*

1987

Entered India with Relay based Interlocking

2002

First ever highly sophisticated **Traffic Management System** for the Western Railways in Mumbai

2008

Post the successful delivery of Western Railways **Traffic Management System** project, **Central Railways** in Mumbai awarded a similar contract

2013

Awarded first driverless signalling solution for **Delhi Metro's Line 7**; ground breaking **CBTC system**

2015

Opened **Mukundpur Depot** for commissioning **Delhi Metro Line 7**
Received **Completion certificate** for **Central Railways TMS**
Commissioned line for Delhi Metro **Line 5&6 extension**
Plans to set up **EAPD** centre in India

1992

Pioneered the introduction of the first ever jointless audio frequency track circuits, **EBI Track 200** (TI21)

2007

Responsible for the train control and signalling system of two line sections (**Line 5 and 6**) on the **Delhi Metro**, covering 38.6 km.

2013

Responsible for the train control and signalling system of two extension line sections (**Line 5 and 6 extensions**) on the **Delhi Metro**, covering 35 km.

2014

Rail Control Solutions **India office** – Dedicated India RCS team supporting local customers

2016

Commissioned line for **Delhi Metro Line 5&6 extension**

Reflecting the quality of our technology and commitment to India, Bombardier is now the largest contractor for signalling and train control solutions for Delhi Metro Rail Corporation (DMRC) with 130 kms in service or in process of delivery

Bombardier Transportation – Transfer of Technology

State-of-the-art railway technologies in India

Partner of Indian Railways - Passenger and freight locomotives

- **Long-standing relationship** with Indian Railways
- Comprehensive technology transfer agreement for **Bombardier’s WAP5 (High Speed locomotives) and WAG9 freight locomotives**, in partnership with Chittaranjan Locomotive Works (CLW) in West Bengal in 1993
- The contract also provisioned for **training of Indian Railways’ representatives in Switzerland** to ensure continuity of quality and maintenance
- Currently, around 200 locomotives are in operation with Bombardier technology by Indian Railways



WAP 5 Locomotives



WAG 9 Locomotives

WAP 5 is the name of a class of **High Speed electric locomotives** produced and used by [Indian Railways](#). WAP-5 can deliver 6,000 hp (4,500 kW) at peak and has [regenerative braking](#) as one of its notable features. Variant of Swiss lok 2000 and german DB class 120.

WAG-9 is a type of [electric locomotive](#) used in [India](#). It is the most powerful freight locomotive in [Indian Railways](#) fleet.

Our Solutions to Improve Public Transport

PROVEN TECHNOLOGIES MOVING MILLIONS ACROSS THE WORLD



MOVIA metro car



ZEFIRO high speed trains



INNOVIA Monorail

In addition to Rolling Stock, Bombardier also support India with **Turnkey** projects by local manufacturing of **Propulsion** equipment and **Bogies** along with supplying **Signalling** systems and **Servicing** the transit systems to improve life cycle costs. Aventura platform transfer of production going on currently.



INNOVIA APM for Urban and airport transportation



FLEXITY trams and Light Rail Vehicles (LRT)



PRIMOVE e-mobility solution



TRAXX Electric locomotives



Intercity and Commuter Trains

BOMBARDIER TRANSPORTATION FUTURE INVESTMENTS AND LOCAL MANUFACTURING

Indian Railways Projects

- Electric Locomotives for Kanchrapara EMU's
- ✓ Setting up of a manufacturing unit in Kanchrapara, West Bengal
- ✓ Local Content – Manufacturing of EMU's, Propulsion Equipment, Bogies, Supplier Base, Skill Development, Engineering, Equity Investment and Maintaining the fleet

High Speed Train projects

- ✓ Bombardier is interested to provide Rolling Stock, Bogies, Propulsion and Signalling Solutions for high speed trains operating at 300 kms/hr

Intercity / Regional Trains

- ✓ Bombardier is interested to provide Rolling Stock, Bogies, Propulsion and Signalling Solutions for semi high speed trains operating between 160-200 kms/hr

Mass Transit Solutions

- ✓ Bombardier is interested to provide Rolling Stock, Bogies, Propulsion and Signalling Solutions for various Metro, Monorail, Light Rail Transit systems



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BOMBARDIER TRANSPORTATION

Socially Responsible Corporate



Final 13 winners of “Smart Transportation” competition



Employees at clean-up drive in Vadodara

- Calendar Competition for Indian young artists: Themes – Smart Transportation, The Future of Mobility and Women Hold Half the Sky
- Terry Fox Cancer Marathon for cancer research in India
- Vadodara Marathon in Gujarat to provide education to underprivileged kids
- “Saksham” project promoting employment through vocational training for around 350 disadvantaged people in Delhi
- Developing and upgrading infrastructure near Bombardier’s Engineering Centre India (BTECI) including sanitation facilities
- Maneja Site in Gujarat supporting education needs of underprivileged children of a local community centre
- Supporting Clean India Movement - Our 250 employees and their families collected trash bags of waste and, after the cleaning activities, our employees walked around the city with banners and posters urging the citizens of Vadodara to keep the city clean.
- Employees at Gurgaon office in Delhi NCR donate woolen clothes in winters to needy people

BOMBARDIER

the evolution of mobility