ROLLING INTO NEW INDIA

RRTS trains - Transforming regional mobility at higher speeds

ncrtc

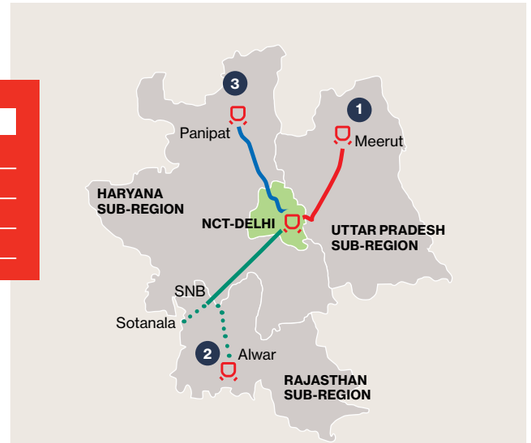
ALSTOM
• mobility by nature •

India's first Regional Rapid Transit System

The Regional Rapid Transit System (RRTS) trains will reduce travel time, enabling passengers from Meerut to reach Delhi in less than 60 minutes. Daily ridership is expected to be around 800,000 passengers.

> Moving people faster
> Growing local economies
> Reducing congestion and pollution

National Capital Region (NCR)
Area: Approximately 55,000 km2
Contributes 7% to India's GDP
Delhi accounts for 50% of NCR's GDP
250,000 vehicles of transient nature



National Capital Region

The National Capital Region Transport Corporation (NCRTC) is a joint venture of the Government of India and the State Governments of NCT Delhi, Haryana, Rajasthan and Uttar Pradesh. NCRTC has the mandate to implement the RRTS across the National Capital Region. In its first phase, it will build a 383-km long network of high-frequency commuter rail lines to connect Delhi with cities and urban centres in adjoining states to support balanced and sustainable urban development through better connectivity and access.

Delhi-Ghaziabad-Meerut RRTS

On 8th March 2019, the Hon'ble Prime Minister of India laid the Foundation Stone of India's first Regional Rapid Transit System (RRTS) between Delhi-Ghaziabad-Meerut. The construction work on the corridor is in full swing. The 17-km priority section of the corridor is targeted to be commissioned by 2023 and the entire 82-km corridor will be opened for public by 2025.

RRTS phase 1

In addition to Delhi-Ghaziabad-Meerut, under RRTS Phase-1, NCRTC would also offer world class regional commuter transit services on the Delhi-Gurugram-SNB-Alwar (198 km) and Delhi-Panipat (103 km) corridors in future.

Interoperability and multimodal integration

Interoperability and multimodal integration are at the core of the RRTS project. All the three prioritized corridors of RRTS, converging at Sarai Kale Khan RRTS station, will be interoperable, helping commuters travel from one corridor to another without changing the train.

RRTS stations will be seamlessly integrated with metro stations, railway stations, bus terminals, and airports. RRTS network will be integrated with all lines of the Delhi Metro. While RRTS will act as a backbone for regional transportation, Delhi Metro lines will complement by providing feeder & dispersal services.

> 82-km long corridor with 25 stations
> 30 six-car trains for RRTS services
> 10 three-car trains for Meerut local transit services
> Design speed - 180 kmph

ncrtc
गति से प्रगति

Designed for safety and security Alstom embeds its Health, Safety and Environmental (HSE) preventive culture into everything it does to not only meeting, but to exceed all appropriate regulatory standards.

State-of-the-art modern commuter RRTS trains

Many features onboard the state-of-the-art, modular train is being developed from the vision of transforming the future of regional commute for passengers in India. The advanced, eco-friendly design will bring significant efficiencies through incorporation of energy saving technologies, including the modern lightweight carbody, reliable bogies, efficient propulsion system and regenerative braking. Outstanding ergonomics, safety and comfort, low life cycle costs and high recyclability also contribute towards making these new regional commuter trains an attractive sustainable choice to promote public transport thereby reducing traffic congestion and air pollution significantly. The modular design of the train offers great flexibility to meet varying capacity needs. NCRTC can choose from configurations of six or nine car trainsets for RRTS. The diversity of this design provides the widest operational choice for NCRTC in India.

The semi-high-speed aerodynamic trainsets will be self-propelled on electric traction

The RRTS train is designed keeping in mind high acceleration and high deceleration that the train needs to undergo at high speeds with stations at every 5-10 km

Design inspiration from Delhi's iconic Lotus Temple

The Lotus Temple was designed and built to keep the monument sustainable with natural sources of light and air circulation to keep the building cool. This beautiful heritage site inspired Alstom's engineers and designers to create lighting and temperature control systems to enhance the passenger experience and reduce energy consumption

The train is designed in accordance with the latest standards on safety and security and provides optimal crashworthiness in accordance with EN 15227 C-II standards. The fire protection has been implemented in accordance with EN 45545 standards. The use of suitable materials, combined with technology for timely detection and reporting of fire sources, ensure a very high level of safety. The trains are also equipped with fire extinguishers, fire and smoke detectors, a CCTVmonitoring system and external cameras. The passenger emergency communication unit is installed within the train near the passenger entrance/exit doorways.

Turning dreams into reality

The RRTS corridors will operate one of the fastest train in India with a design speed of 180 kmph.

It will be implemented in phases between the cities for regional commute. The network will fulfill the dream of Indians to travel on one of country's most techno-logically-advanced, semi-highspeed trains fully made in India for India.

Realising Hon'ble Prime Minister's vision for "Make in India"

Alstom will design, build and maintain the RRTS trains in accordance with India's vision of 'Aatmanirbhar Bharat' and to the 'Make in India' guidelines with the trains manufactured at Alstom's state-of-the-art Vadodara sites in India. Savli site will produce the bogies and carbodies, as well as undertake final assembly and testing of the trains. Maneja site will manufacture the propulsion systems and electricals. The Train Control & Management System (TCMS) will be delivered from Alstom's Vadodara centre and the rolling stock is being designed at the Global Engineering and Technology Centre in Hyderabad. Local teams will provide maintenance services for RRTS trainsets.

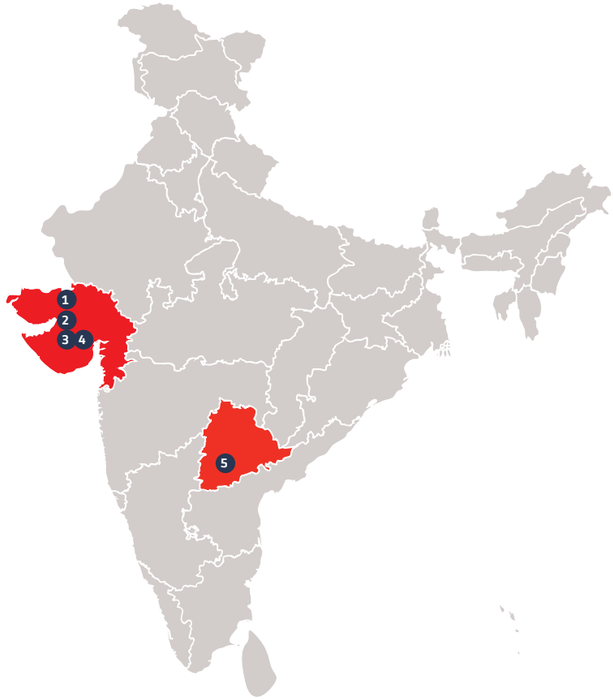
Alstom's partnership with NCRTC to supply 100 per cent locally manufactured trainsets with high local content will deliver the 'Make in India' promise in its truest sense. Alstom also advocates India's 'Vocal for Local' theme and its long presence in India will ensure the delivery of rail solutions for India's rail operators from within India itself.

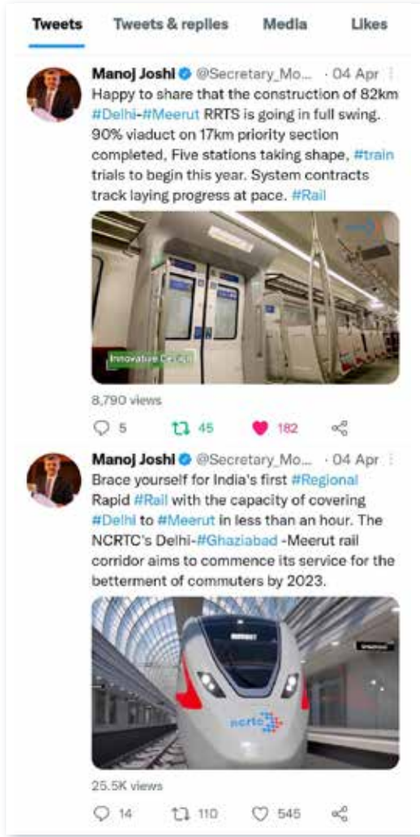
Alstom's scope

NCRTC awarded the contract to Alstom to design, build and deliver 210 regional commuter and intracity transit trains with comprehensive maintenance services for 15 years for the Delhi - Ghaziabad - Meerut RRTS.

Alstom will deliver 30 trainsets of six-cars each for RRTS and 10 train sets of three-cars each for local transit services in Meerut. NCRTC has a provision to exercise an option to procure an additional 90 cars and a further two years of maintenance.

Manoj Joshi, IAS
Secretary, Ministry of Housing & Urban Affairs
Government of India





1 Alstom's Savli site near Vadodara will be the manufacturing site for the new RRTS trains

2 Alstom's Maneja site in Vadodara will provide propulsion control and electrical systems

3 4 Alstom's Channi and Atladara site in Vadodara will deliver Control Monitoring System

5 Alstom's engineers and designers are designing the RRTS locally in Hyderabad

Enhancing passenger experience

Passengers today expect travel that is accessible, comfortable and convenient. The new RRTS trains will feature a two-by-two seating configuration to optimize comfort, inclusivity and passenger flow. The interior design of the ultra modern RRTS trains has taken into consideration ride comfort, as well as physiological and psychological comfort for all passengers, including families, individuals and specially-abled people.

Trains are accessed through bi-parting sliding plugin doors leading to the aesthetically pleasing interior. Dynamic lighting with illumination control, adequate legroom and ergonomically designed seats improve comfort.

A powerful, reliable and adjustable air-conditioning and climate control temperature system creates a pleasant environment in both summer and winter.

Physiological comfort is achieved with the provision of mixed seating, zone concept, ease of passenger flow (avoiding crowding), grab handles / poles, overhead luggage racks, vending machine dedicated space in premium class, considerations for specially-abled people and easy-to-clean supportive cantilever seats.

The pleasant curved design, color selection, material selection, real time information provision, USB charging for mobile / laptop, as well as safety and security measures ensure the psychological comfort for all passengers.

"These energy-efficient coaches with exceptional ergonomics and low life cycle costs will contribute towards making India's first RRTS futuristic and sustainable. Clubbed with state-of-the-art commuter centric features, RRTS is going to transform the way people travel in NCR while setting up a new benchmark for similar future projects."

Vinay Kumar Singh
Managing Director
National Capital Region Transport Corporation (NCRTC)

Energy efficient trains

High-performing technologies including ALSTOM* FLEXX* bogies and the ALSTOM* MITRAC* propulsion system will reduce maintenance costs and increase energy efficiency, as well as meeting the highest environmental standards. Alstom's innovative Train Control Monitoring System (TCMS) technology, as well as its predictive and condition-based monitoring features, will enhance the fleet's efficiency by providing extensive ground-to-train diagnostics.

The traction and auxiliary converters are designed using the latest Insulated Gate Bipolar Transistors (IGBT) technology in order to minimize the use of heavy

magnetic components. The new design is equipped with the most efficient regenerative braking system feeding energy back into the trains.

To minimize the energy cost towards air-conditioning, the car doors are equipped with knobs allowing doors to open only when the passengers request by pressing it.

Salient features

Universally accessibile: Dedicated wheelchair & stretcher space with safety restraints, ramp

Safety: CCTV, fire & smoke detector, intercom, fire extinguisher, exterior camera, door status indicator

Passenger information: digital route map, infotainment display, speakers

Comfort: air-conditioning system, cantilever cushioned seat, adequate leg room, draught screen, lighting with dimming control

Access: mix seating arrangement, wide door and gangway, optimized aisle width with grab handles and rails for standee, overhead luggage rack

Exterior: streamlined aerodynamic cab profile with coupler cover

Seamless Connectivity: onboard WiFi, USB charging for mobile / laptop

Exclusive for premium class

Reclining cushioned seat with head rest, foot & arm rest

Vending machine provision

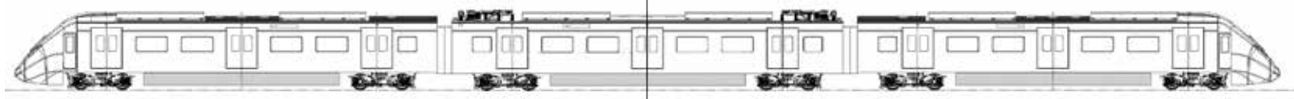
Sun visor for passenger window

USB charging for mobile / laptop for each seat row

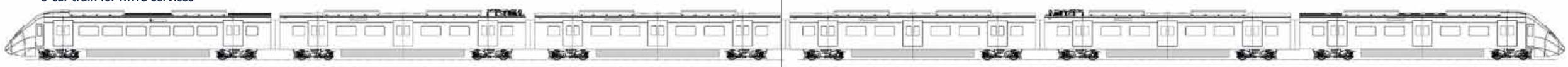
Passageway sliding door

Designed for passenger information
Keeping the passengers informed about punctuality and connections is a key success factor for operators. The train is designed for modern visual and audio announcements which orients passenger with information including next stop, final destination, estimated time of arrival as well as delays and emergencies if needed. The system can be adapted to meet specific individual route requirements through numerous pre-defined variants.

3-car train for Meerut local transit services



6-car train for RRTS services



Regional commuter and intracity transit trains

Ergonomic and comfortable seating

The seat pitch is designed to maximize legroom and seats with headrests and arm rests for optimal comfort. In business class, the recline feature will allow passengers to adjust their seat for improved comfort. The driver's seat is also ergonomically designed and each driver can adjust the driver's seat to meet their own comfort needs.

Universally Accessible

Each driving car has designated space for wheelchair users located near to the train doorway for easy access. Additional safety features include the grab rail, wheelchair accessible intercom and an optional motion preventive restraint. Interior space is further optimized as a tip-up seat is also provided in case the wheelchair space is not in use.

Illuminating with efficiency

LED lighting is energy efficient while providing good quality lighting, offering both variable and automatic illumination adjustment. The LED units are fully sealed, and they have a long service life. They contribute to weight and energy savings, and require no maintenance resulting in cost savings in maintenance and cleaning.

Vending machine

An automatic vending machine will be installed in the business class area to provide packaged foods, snacks and refreshments for passengers.

Vehicle data	
Type of vehicle	Electric Multiple Unit
RRTS Trains	6-car train set (extendable up to 9-car)
Meerut Local Transit Service	3-car train set

Technical characteristics	
Power distribution: propulsion system	67% powered
Vehicle operation	Automatic Train Operation (ATO)
Braking	Regenerative brakes
Bogies	Standard gauge (1,435 mm)
Carbody	Stainless steel roll formed walls and roof structure
Windows	Double glazed, tempered safety glass
Doors	Bi-parting plug-in sliding doors

Performance and capacity	
Maximum design speed	180 km/h
Brake rate (service)	1.0 m/s2
Seats per RRTS / MRTS trainset	400* / 190*
Capacity 6 car set (RRTS)	1,750-1,790* (seating + standing)
Capacity 3 car set (MRTS)	900-925* (seating + standing)

* Approximate value

At Alstom Transportation, we focus on developing enviroment-friendly products that stand the test of time by operating efficiently for decades to come.

France, Europe, Middle East & Africa
Alstom
48, rue Albert Dhalenne
93 482 Saint-Ouen-sur-Seine Cedex – France
Telephone: +33 1 57 06 90 00

Latin America
Alstom
Virgilio Wey Street, 150
Água Branca
05036-050 São Paulo/SP – Brazil
Telephone: +55 11 3617-8000

Asia Pacific
Alstom
No.66/02, Embassy Prime,
B Wing 3rd floor,
C V Raman Nagar,
Bangalore – 560 093
Karnataka – India
Telephone: +91 80 4641 2400

North America
Alstom
641 Lexington Avenue – 28th floor
New York, NY 10022 – USA
Telephone: +1 212 692 5320

www.alstom.com

ALSTOM
• mobility by nature •