

Present Situation and Future Prospect of High Speed Railway in the World

“Concepts and Challenges for the Growth of HSR in India”

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*A Presentation By
National High Speed Rail Corporation Limited, New Delhi*

*Brijesh Dixit,
General Manager (Depot & Machines)*

Structure of the Presentation

- HSR – A complex system
- The need for HSR in India
- MAHSR – Challenges and Solutions
- Issues for the growth of HSR in India

- ❖ HSR – A complex system
- ❖ The need for HSR in India


HSR- A Complex System

- Many stake holders
- Many sub-systems
- Integrated operation
- Long lifecycle



The Need for HSR in India

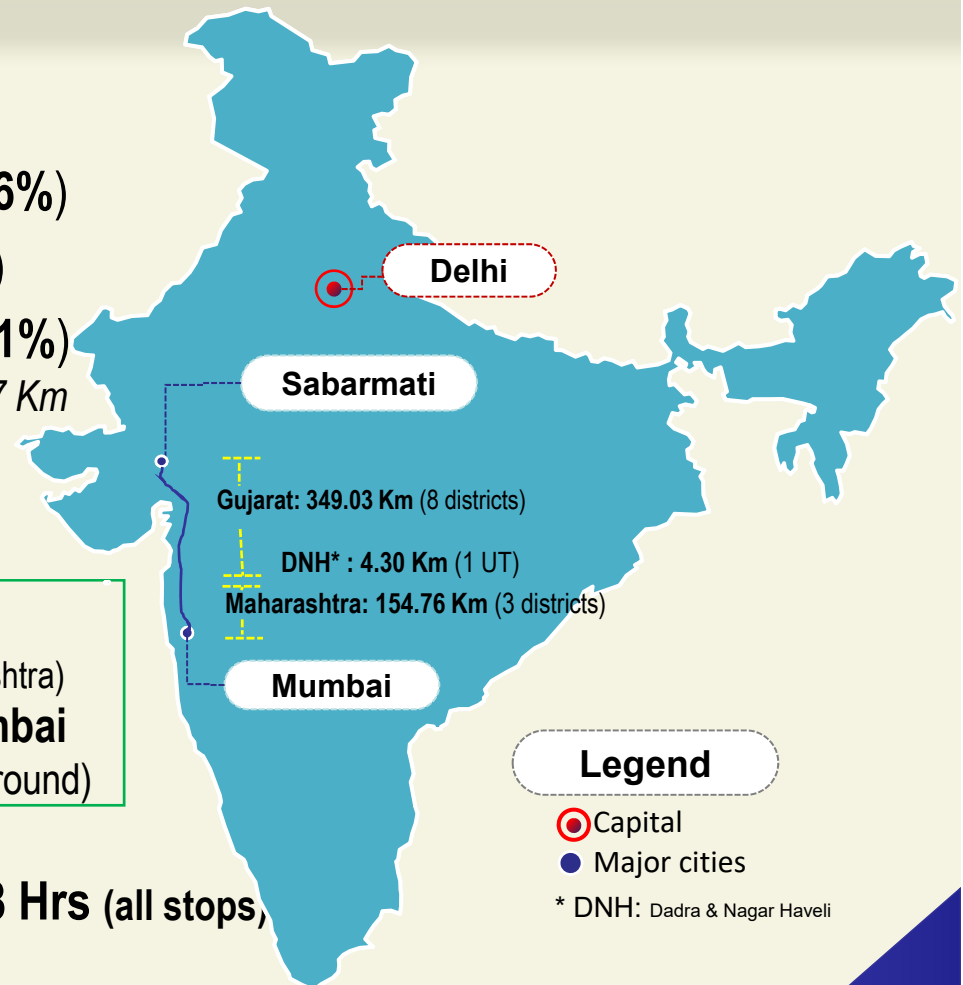
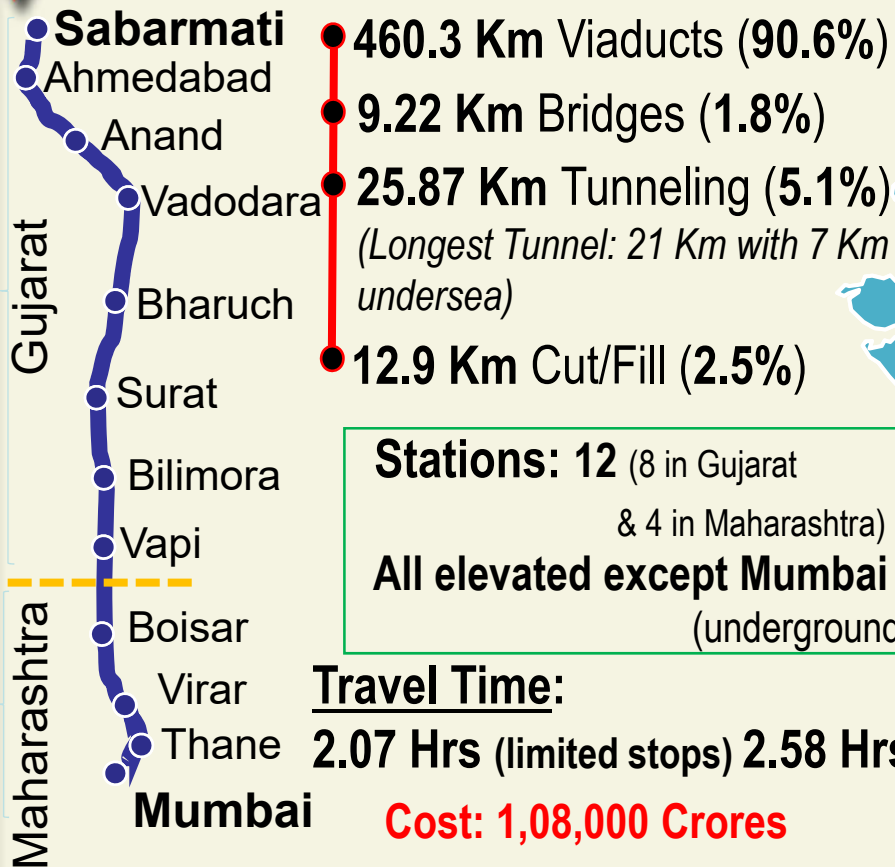
- ❖ India has witnessed rapid economic growth in recent years
- ❖ Rise in demand for transport infrastructure and services.
- ❖ HSR has the potential to be the backbone of India's progress and economic development.
- ❖ **HSR:**
 - ❖ Can boost economic growth through Infrastructure development, Job creation, Industrialization, Urbanization, TOD
 - ❖ Is Energy Efficient / Eco friendly
 - ❖ Can support Make in India
 - ❖ Can bring about technological transformation and Human Resource development
 - ❖ Will have spin off benefits, etc.



❖ MAHSR – Challenges and Solutions

MAHSR – An Overview

Total Length: 508.09 Km



MAHSR – Challenges & Solutions

- ❖ MAHSR is the **first ever HSR project** in India
- ❖ **Short implementation time span of 6 years.**
- ❖ For speedier execution, Project sub-divided into 26 contract packages
- ❖ **Also use of innovative technologies**
- ❖ **Aerial Lidar Topographic Survey with DGPS** technology used for the first time in a Railway Project in India.
- ❖ **Underwater static refraction technique** adopted for Geotechnical Investigation of undersea rock

MAHSR – Challenges & Solutions

- ❖ **>85% of the alignment on viaduct / tunnel** –
Reduced land requirement, improved safety
- ❖ Station area development (TOD) & Multi-modal integration (MMI).
- ❖ Construction over existing stations and running track of IR (**Long span steel bridge - 220m long at Vadodara**).

MAHSR – Challenges & Solutions

- ❖ **Environmental Considerations**
 - Rolling Stock, OHE, Track designed for environmental conditions that are different from Japan.

- ❖ **Power supply works (long gestation period)**
 - Simulation studies completed and power supply applications submitted even before invitation of bids.

Talent Acquisition / Retention

❖ Constraints

- Getting the right blend of experience and energy
- Compensations / promotions are subject to Government regulations.
- Language Barrier

❖ What is being done

- Talent pool available on IR and Highway/Metro projects being tapped.
- A dynamic organizational structure with **competitive monetary benefits, well defined growth path and challenging work environment** is being created.

O&M Phase

- ❖ **Hand holding required at least for a few years**
- ❖ **Unlike in Japan the concept of Partner / Group Companies does not exist on MAHSR as of now.**
- Regular interaction with the Japanese consultants in deciding the O&M structure and the number of personnel required.
- “Champions” to lead the Project in the O&M Phase - extensive training planned in Japan with OJT.
- A new High-Speed Rail Training Institute under construction at Vadodara



❖ **Some issues for the growth of HSR in India**

- **Developing Uniform Standards for HSR**
- **Make in India**
- **Capacity building in R&D / HRD**

Developing Uniform Standards for HSR

Will lead to:

- Interoperability
- Issues of Vendor / Technology specificity get tackled
- R&D and Technology proliferation
- Creation of Maintenance hubs
- Boosting Make in India – larger volumes

Specifications of MAHSR- Rolling Stock, Track, Power Supply, Signaling

Rolling Stock – A Comparison

	Japan	France	Italy	Germany	Spain	South Korea	Taiwan	China	MAHSR
Rolling stock	EMU	loco	loco/EMU	loco/EMU	loco/EMU	loco	EMU	EMU	EMU
Car Body Width (mm)	3,350 - 3,380	2,814 - 2,904	2,750 - 3,000	2,950 - 3,020	2,830 - 2,960	2,904 - 2,970	3,380	3,200 - 3,380	3350
Max Axle load (t)	<=13.1	17	17	<=16	<=17			<=17	<=14.8
Max. operation speed	320 km/h	320 km/h	300 km/h	300 km/h	300 km/h	300 km/h	300 km/h	300 km/h	320 km/h
Power/seat (kw/seat)	13.13 (E5)	23.47 (TGV-R)	16.67 (AGV)	18.65 (Velaro403)	21.84 (5103)	24.24 (KTX-II)	10.37 (700T)	20.00 (CRH380 A)	13.44 (approx.)
No. of seats/Train length (No./m)	2.87 (E5)	1.87 (TGV-R)	2.24 (AGV)	2.14 (Veloro403)	2.01 (5103)	1.8 (KTX-II)	3.25 (700T)	2.36 (CRH380 A)	3.03
Body-material	Aluminium	Steel	Aluminium	Aluminium	Aluminium	Aluminium	Aluminium	Aluminium	Aluminium

MAHSR – based on E5 Shinkansen

Gauge/SOD - MAHSR

**MAHSR Car Dimensions - based on E5 Shinkansen.
SOD is liberal and comparable with global standards.**

❖ Loading Gauge

- Shinkansen: 3400 mm (250 mm wider than TSI), (2 + 3) seating arrangement possible.

❖ Car Height / Floor height

- Shinkansen – 3850 mm / 1300 mm - PF can be constructed at the same level of floor of Rolling Stock.
- TGV – 3420 mm / 1020 mm – Lower PF

❖ Structure Gauge

Shinkansen : Width – 4400 mm, Height – 6540 mm

Allows operation of Double decker (E4) – High passenger capacity

MAHSR Track Structure

MAHSR uses Continuously Welded Rail (CWR) on 'Slab-Track' (ballast less).

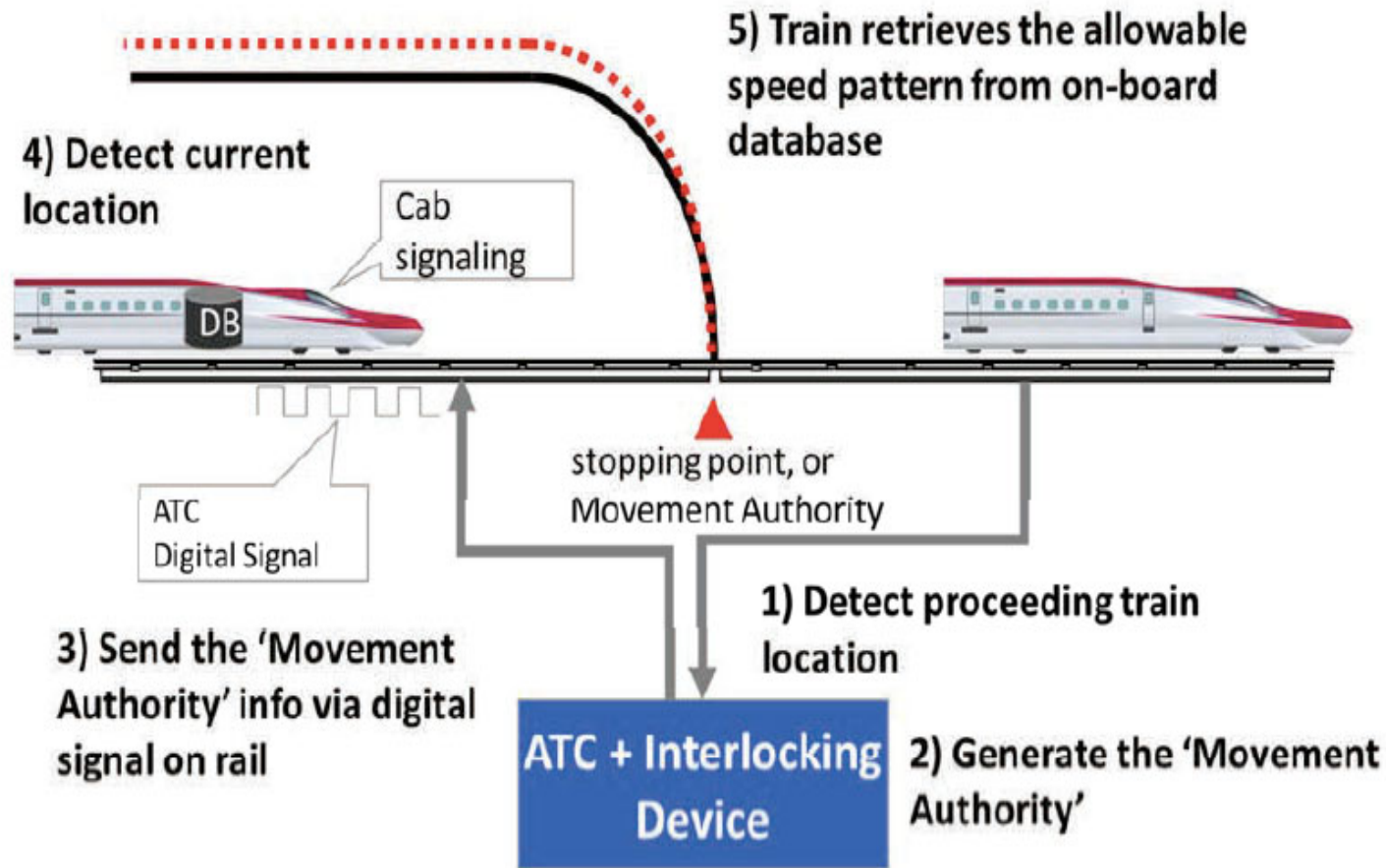
- Can accelerate the pace of construction
- Can be manufactured indigenously - cost reduction.

MAHSR - Power Supply

MAHSR - 2X25 kV System with AT

- ❖ Adopted by all the leading countries including Japan
- ❖ Lower line voltage drop, lower currents, lesser neutral sections, etc.
- ❖ Heavy compound catenary
- ❖ Robust - proven to withstand heavy winds, ambient temperature, earthquakes, etc.
- ❖ Highly reliable
- ❖ Suitable for Japanese and European rolling stock

MAHSR Signaling System



MAHSR based on DS-ATC (Shinkansen)

Safety

Disaster Prevention Systems for

- ❖ Earthquake
- ❖ High Rail Temperature
- ❖ Heavy Rain
- ❖ Heavy Wind Speed

planned on MAHSR

System needs integration with the signaling, train control and communication.

Make in India

Make in India will further the proliferation of HSR in India

- ❖ MII through technical collaboration in public sector/private sectors as well as through technology transfer.
- ❖ Indian can offer several advantages:
 - **Competitive labour rates** and technically qualified manpower
 - Besides HSR, **opening up of a huge market** – Metros, IRs own upgradation, etc.
 - Can serve as an **export base**
 - **Facilitating policies of the Government**

Make in India - MAHSR

MAHSR Project has “**Make in India**” as one of its objectives.

A Task Force (DIPP and JETRO) created for the purpose

Four sub-groups (Rolling Stock, Electrical/S&T, Civil and Track) with representatives from MLIT, METI and NHSRCL

Sector specific meetings of Japanese manufacturers with prospective Indian manufacturers held to facilitate “match making.”

Items/sub-systems to be ‘made in India’ have been agreed to for Track Works, Civil Works, Electrical including S&T and Rolling Stock.

Capacity building in R&D / HRD

HSR - Multiple technologies. Necessary not only to absorb these technologies but also to innovate and further improve upon them.

- ❖ Collaboration between educational / research institutes & the Government.
- ❖ Research tie-ups with institution & universities of eminence.
- ❖ Involving Industry and Academia.
- ❖ Developing education and training programs for human resource development.

Capacity building in R&D / HRD

- ❖ Railway Research Centres in select universities for carrying out fundamental research.
- ❖ An **Innovation Trust** has been contemplated under the aegis of NHSRCL to further R&D on HSR
- ❖ A new High-Speed Rail Training Institute is under construction.
- ❖ So far about 300 officials of IR / NHSRCL have been trained in HSR at Japan.
- ❖ 20 officers of Railways are being sent for Masters program in Japanese universities every year.

Roadmap for the Growth of HSR in India

- ❖ Based on experience gained on MAHSR, to develop uniform standards / common functional platform for HSR.
- ❖ Build capacities for R&D, Technology assimilation and HRD.
- ❖ Promote Make in India.

-----and above all to imbibe a culture of Professionalism, Meticulous planning, Team work and Safety consciousness.



Thank You