

Indian Railways — Riding on Technological Excellence

THE Indian Railways was established 185 years ago in 1837. Initially, trains were used for freight transport or transportation of construction material such as granite for road-building or stones to build dams — these railway tracks were dismantled after the projects were completed.

India's first passenger train, 170 years ago, ran for 34 kilometres, carrying 400 people between Bori Bunder (Mumbai) and Thane. Its thirteen carriages were hauled by three locomotives — *Sahib, Sindh and Sultan!* Since then, the Indian Railways has made significant strides, growing to become the fourth largest national railway system in the world — with a total route length of 68,043 km and running track length of 102,831 km. In 2020, the Indian Railways carried around 8.086 billion passengers and in 2022, transported 1418.1 million tonnes of freight.

Among the finest examples of technological excellence and ingenuity displayed by the Indian Railways are the mountain and hill railways of India built on some of the most treacherous terrains. This includes the most recent and the world's highest railway bridge over River Chenab — providing the much-needed connectivity between Kashmir and the rest of the country.

Therefore, on the occasion of India's National Technology Day 2023, *Science Reporter* decided to focus on the technological excellence that has come to define the Indian Railways — with technology inputs aimed at improving the safety, efficiency, and overall passenger experience. In recent years, the technological advancements in Indian Railways have been marked by a digital transformation by leveraging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data Analytics. These also include digital services like e-ticketing, online reservation, and mobile apps for booking tickets.

Modern and advanced signalling systems — enabling real-time monitoring of trains — are gradually replacing the traditional signalling systems. Train protection warning system has been implemented to prevent train accidents due to human error. The government has also committed to electrifying India's entire rail network and become a “net zero (carbon emissions) railway” by 2030.

The Indian Railways is also working on developing high-speed trains like the Bullet Train, which will significantly reduce travel time and improve the passenger experience. The Vande Bharat semi-high speed trains have already seen the light of day, with almost 15 trains operational in the country. *Science Reporter* brings a special interview with Shri Sudhanshu Mani, former General Manager, Integral Coach Factory (ICF), who led the Train 18/Vande Bharat Express project, the first ever indigenous semi-high speed train of India, from concept to delivery.

We do hope our readers will enjoy reading the issue.

Hasan Jawaid Khan

DIRECTOR
Dr Ranjana Aggarwal

EDITOR
Hasan Jawaid Khan

ASSOCIATE EDITOR
Sonali Nagar

ASSISTANT EDITOR
Meher Wan

LAYOUT & DESIGN
Manender Singh

PRODUCTION
Ashwani Kumar Brahmi
Arun Uniyal
Anil Kumar

BUSINESS DEVELOPMENT
Neelu Srivastav
Kanika Malik

COVER DESIGN
Manender Singh



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For Editorial Queries: Ph.: 91-011-25848702; **Email:** sr@niscpr.res.in; **Fax:** 91-011-25847062

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