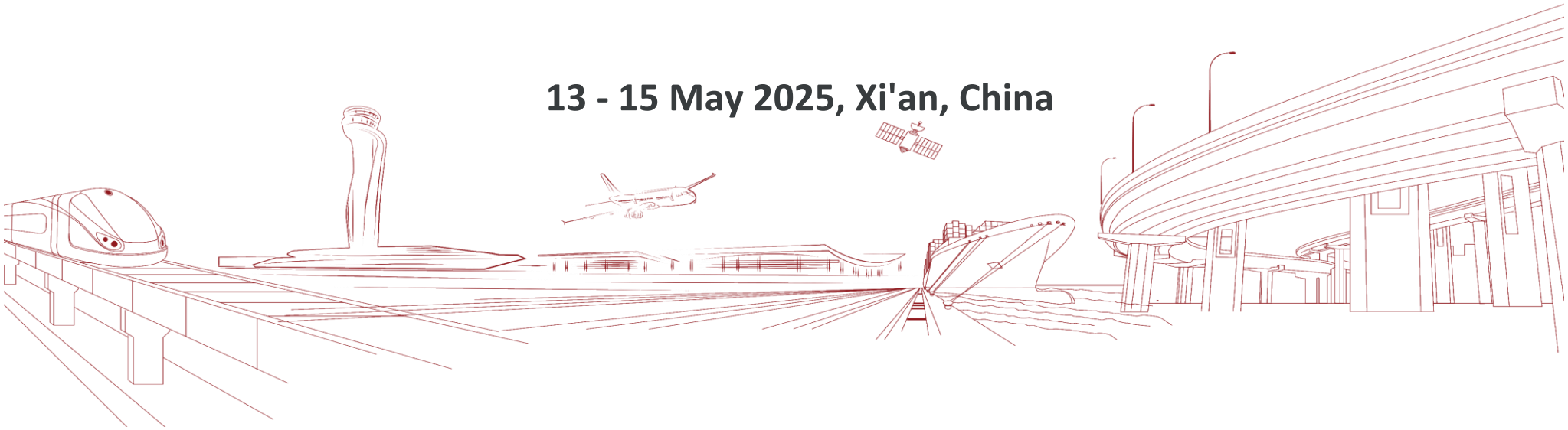
Rail digitalization strategies and policies of Türkiye

13 - 15 May 2025, Xi'an, China



TURKISH STATE RAILWAYS (TCDD) has started to use the Capacity Management System and the Profitability and Cost Performance System.

HAVELSAN, Turkish company that provide high-tech solutions in command control, simulation, robotics, and cybersecurity, leveraging its capabilities and opportunities gained in the fields of information technology and advanced technology, has developed these two systems, which will accelerate TCDD's digital transformation and enable it to reach the highest level in the field of information technology.



- With the Law on the Liberalization of Turkish Railways, TCDD has been reorganized.

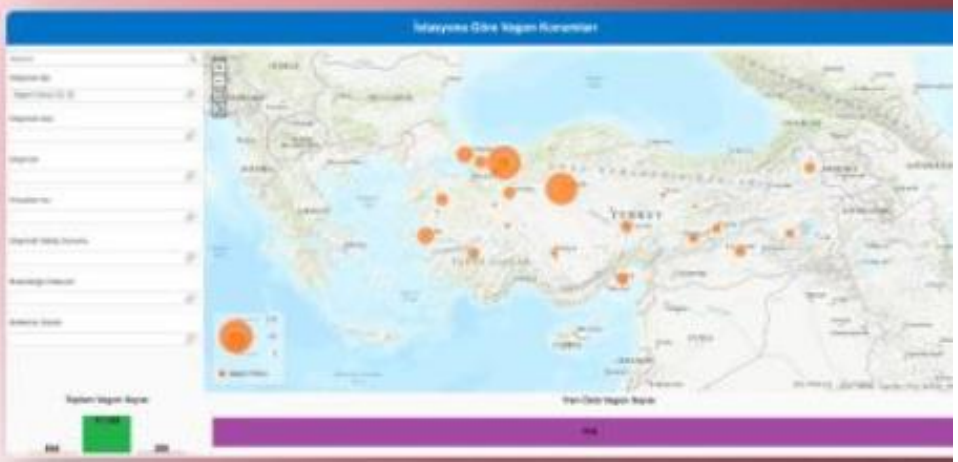
- The need for a complete, accessible, and traceable platform where all railway transportation companies can submit their infrastructure capacity requests is met by the TCDD Capacity Management System developed by HAVELSAN.

- Developed under the consultancy of HAVELSAN and put into service, the TCDD Capacity Management System is an end-to-end application enriched with modern and user-friendly Fiori interfaces.

TCDD Profitability and Cost Performance System

- Integrated and comprehensive solution to monitor costs and conduct timely profitability analyses in the institutions of Turkish State Railways (TCDD) and TCDD Transportation Inc.
- Developed by HAVELSAN.







Wi-Fi Service

- Free Wi-Fi service is provided at 63 train stations including Ankara, Istanbul, Eskişehir, Konya, Sivas, Malatya, Kars, Erzincan, Batman, Mardin, Diyarbakır, and Van.

- Daily Access of 2,576 users

  So far, a total of 124,713 users have benefited from this service.

- In line with TCDD's digitalization vision, aim to expand Wi-Fi service to all stations and terminals.



- To continuously monitor railway infrastructure and manage maintenance processes more effectively, predictive maintenance systems are also being expanded.

- Railway vehicles equipped with special sensors detect possible cracks and fractures in the rails, subsidence, and faults in electrification systems in advance, allowing for intervention before failures occur.

- Thanks to Automatic Train Inspection (ATI) system, operational continuity is increased while costs are significantly reduced.

Automatic Train Inspection (ATI) system

- The system is developed by Scientific and Technological Research Council of Türkiye (TÜBİTAK) Rail Transportation Technologies Institute (RUTE).

- The developed Train Recognition System received the European Railway Clusters Initiative (ERCI) Innovation Award in 2023.





The OTMI Development Project includes the development of the following systems:

- Train Recognition System
- Pantograph Inspection System
- Wheel Flange Defect Detection and Load Measurement
- Brake Disc, Pad, and Lining Measurement
- Wheel Profile Measurement
- Wheel Surface Defect Detection
- Axle-Bearing, Wheel and Disc Temperature Measurement

Monitoring Center

The Eryaman Monitoring Center, established to enhance safety on the railways and manage operations without interruption, continuously monitors the HST lines. At this center, critical infrastructures such as tunnels, bridges, culverts, and viaducts are being controlled 24/7 through smart cameras and sensors.

At the Eryaman Monitoring Center, analysis systems instantly scan natural disasters like wind, floods, and earthquakes to assess risks. Additionally, with remote monitoring technology, when any issue is detected on the lines, the relevant teams are quickly informed, minimizing response time. The condition of structures such as bridges, culverts, and tunnels in the railway infrastructure and superstructure is continuously analyzed, and maintenance processes are optimized through early warning systems.

- Digitizing real estate and expropriation processes using an open-source coding system with internal resources.

- The level of use of digitalization and big data applications in decision-making processes and operational activities will be increased.

1. Systems necessary for archiving information and documents in both physical and digital environments will be developed.
2. Applications that will create institutional memory, enhance learning, and promote information sharing between departments will be implemented.
3. All kinds of experiences, knowledge, documents, and other materials acquired, experienced, or produced by the institution will be archived.

- Work on creating a digital inventory of railway infrastructure and vehicles will be completed, enabling the monitoring of maintenance/repair and track requests, thereby increasing the efficiency of operational activities.

- The use of digital technologies such as artificial intelligence, autonomous systems, cloud computing, and big data analytics, as well as green technologies, will be expanded.

- Technological capabilities and investments in new-generation energy and transportation systems, such as hyperloop systems, will be increased.

Future Railway Technologies: Autonomous Trains and Digitalization

Autonomous trains and AI-based signaling systems will become widespread in the coming years. Thanks to AI-supported energy management systems, our trains will achieve maximum efficiency with minimal energy consumption. This will both reduce carbon emissions and lower operating costs.

To enhance the passenger experience, personalized services will be supported by AI-based systems. Smart assistants and chatbots will analyze passengers' needs and offer the most suitable travel plans. Passenger comfort will be enhanced by digitalization.

High Speed Railway



REPUBLIC OF TÜRKİYE
MINISTRY OF TRANSPORT AND INFRASTRUCTURE

