DIGITAL TRANSFORMATION. END-TO-END DIGITAL TECHNOLOGIES. “RUSSIAN RAILWAYS” HOLDING COMPANY

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Xi’an, China, 2025

RZD today

Place in the world

1st — **By traffic density**

2nd — **By cargo turnover**
1/4 of the global cargo turnover

3rd — **By operational length**
85 thousand kilometers

4th — **By passenger turnover**
1.2 billion passengers per year

30 % — Share of passenger carriage countrywide

127 mln — Passengers of long-distance trains in 2024

>126 ths km — The total length of Russian railways

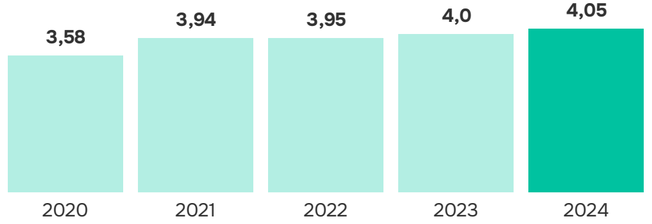
1 mln — Employees in the holding company

1,1 % — Of those employed in the national economy work for the “Russian Railways” holding company

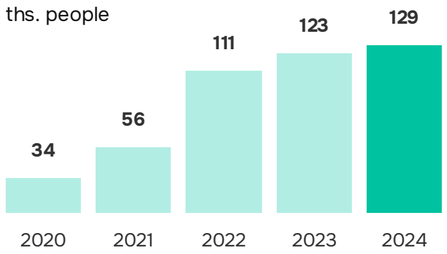
400 bln ₽ — Taxes and insurance premiums

OUR ANSWER — DIGITAL TRANSFORMATION OF JSC “RUSSIAN RAILWAYS”

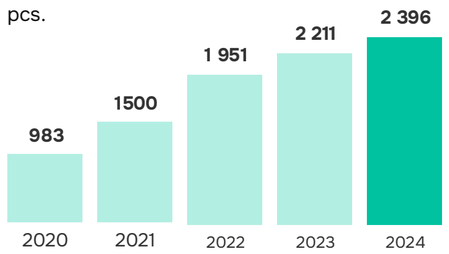
4,05 Assessment of digital maturity in JSC “Russian Railways” in 2024



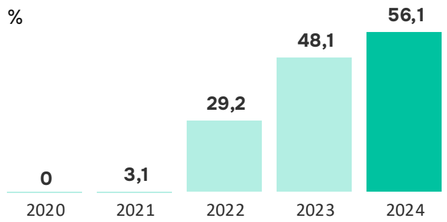
Users of the corporate messenger Express



Number of robotic operations in the Main Computing Center



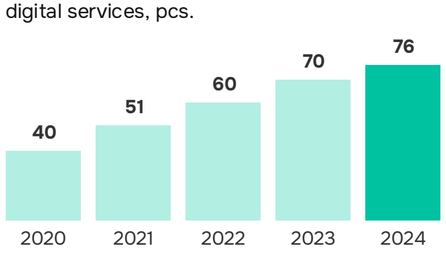
Share of requests processed by AI (chatbots) and software robots



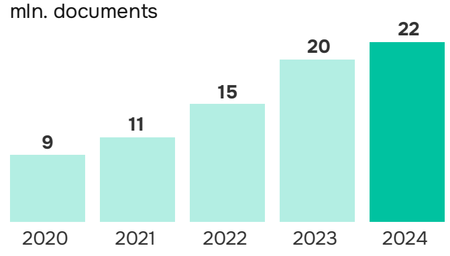
Assessment parameters

- Digital Transformation Strategy
- Clients
- Digital solutions
- Data
- Digital Channels and Ecosystem
- Business model
- Human resources and digital culture
- Digital Transformation Management Model
- Infrastructure and toolset

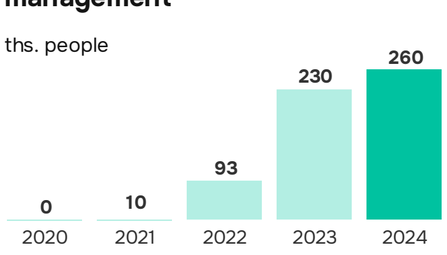
“Russian Railways” employee service portal



Legally significant electronic document management



Number of participants in electronic HR document management



7

Digital Platforms are being implemented in JSC “Russian Railways”

72,4%

Share of services for cargo shippers in electronic form

89%

Share of partners interacting with Russian Railways electronically

PRIORITY DIGITAL TECHNOLOGIES

- **Internet of Things (IoT)**
- **Intelligent Systems (AI/ML)**
- **Virtual and augmented reality (AR/VR)**
- **Big Data**
- **Distributed ledgers (BLOCKCHAIN)**
- **New data transmission technologies** (including quantum communications)
- **Digital Twins and Simulation**

Predictive Analytics

Systems integration

Data normalization

Development of Artificial Intelligence Technologies

50+	Projects at various stages of implementation
33	Projects using AI have been implemented
8	Projects of the Industrial Competence Center (ICC) “Railway Transport and Logistics” (possible implementation)

Application areas for AI

- Rail Traffic Management
- Operation and Maintenance of Infrastructure Rolling Stock
- Human Resources Management and Occupational Health and Safety

COMPUTER VISION SYSTEMS

Video surveillance

Automatic decoding of the video recording results of the railway track state



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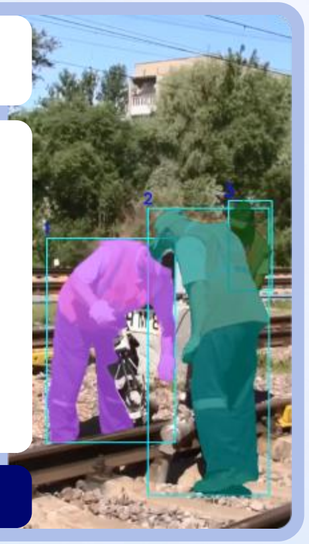
Labour norming

- 35 recognition objects
- Automatic detection of operation time



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Unmanned trains "Lastochka"

Is being tested



up to 20 %

The capacity of stations on the Moscow Central Circle will increase

up to 3 min.

Traffic interval will reduce

Intelligent commercial wagon inspection

Inspection of rolling stock when moving along the tracks. Informing about damage to rolling stock and deviations from regulations.

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Video analytics of technological processes

Video stream processing to monitor compliance with safety regulations

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Train driver assistance Hardware and Software System

Informing on infrastructure landscape, obstacles on track, signals, signs, marks



Mobile application LK GRUZ 2.0 (ЛК ГРУЗ 2.0)

Wagon number and the locking and sealing device number recognition

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SPEECH RECOGNITION AND SYNTHESIS. NATURAL LANGUAGE PROCESSING

Voice assistants and “smart” chat bots

Including the virtual consultant "Viko" («Вико»)

56%

Of requests from clients and users of information systems are processed

by 3–5 times

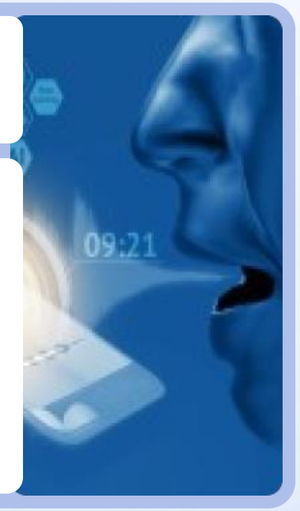
The processing time for requests is reduced



Train driver voice notes service

- Fixation
- Processing
- Transmitting

Everything in a personal account



Meaningful analysis of technical rules and regulations

Assistance in the development, updating of documents, in identification of doubling and contradictions in them

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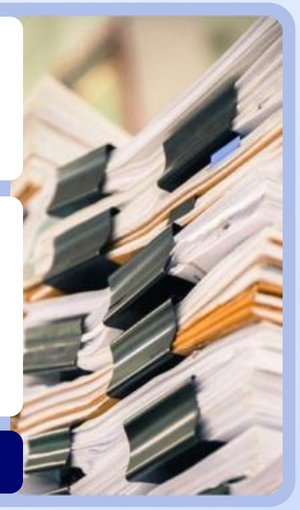

Digital Railway Station. Performance Control Module

Receiving information from the locomotive shunting signaling system, transmitting messages to the station's interactive diagram

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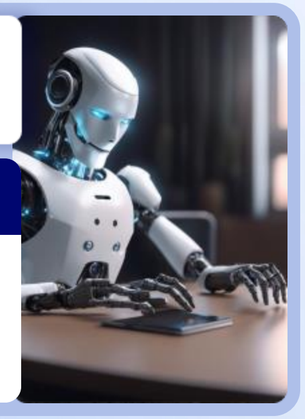
Employee Recruitment Management

8+ ths.

Initial interviews are conducted by a voice robot per month



DECISION INTELLIGENCE

Modeling and forecasting of passenger traffic flows

Taking into account parameters when determining locations of future stations, transport hubs. Modeling the consequences of projects implementation



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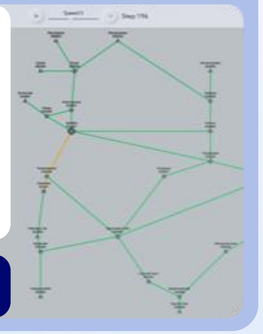
Construction of forecast train schedules

Based on simulation modeling

Formation of a daily variational freight train schedule



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Monitoring the pre-failure condition of freight rolling stock units

Evaluation of the results of electronic diagnostics of units and parts of freight wagons

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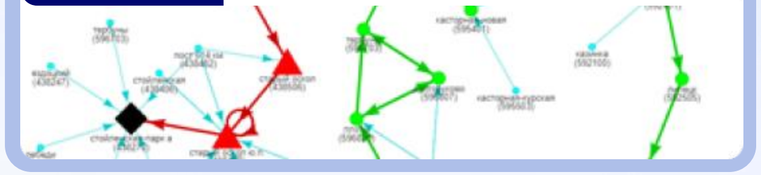
Determining the causes of the train schedules disruption

10

Categories of services and facilities provides information support to specialists in the train schedules analysis



Diagnostics and monitoring of the technical condition of rolling stock for suburban traffic

- Passenger seat occupancy
- Lighting
- Humidity
- Air cleanliness



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Forecasting the volume of cargo transportation

In detail “station - station” for a month, a quarter, and a year

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AI BENEFITS FOR RAILWAY SAFETY

Monitoring and diagnostics of track conditions in real time



Reducing human factors and related errors



Automatic detection and response to emergency situations



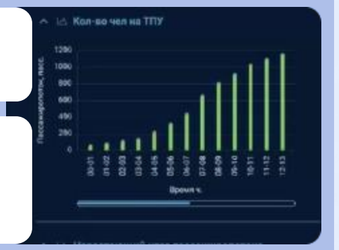
Improved coordination and collision avoidance



ROUTE OPTIMIZATION AND RAILWAY TRAFFIC MANAGEMENT IN JSC “RUSSIAN RAILWAYS”

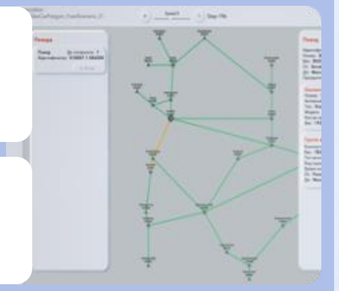
AI provides

Big data analysis



Allows to predict traffic, improve routing management, and distribute traffic flows

Automatic route distribution



Allows to increase the speed of freight and passenger delivery

Ultra-fast transportation



Traffic management reduces train delays, shortens travel time

Project examples

Digital predictive macro model of the train traffic flows



Ensures the formation of optimal train traffic schedules

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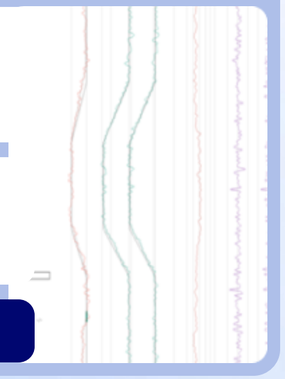
System of complex diagnostics and monitoring of railway infrastructure



Analysis and forecasting of railway infrastructure facilities state

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ARTIFICIAL INTELLIGENCE SYSTEMS

Automated systems with AI

АС «Мониторинг НПА»	АПК ЭЛЬБРУС	АСУ ПРИГ
Виртуальный консультант	Доверенная среда локомотивного компл.	АСУТ НБД-2 НП
ДМ ЗИ	ЭЛЬБРУС-М	АС АНПШ
СДО ИОС ОТ	Ядро ЕКП ТД	ФРД-CV
АСКМ НП	ЕК АСУИ СДМИ	АС Прогнозирование
ЕИС НД	ЦЖС МП	АСУ ПП
ЦЖС МИ	АСУ СПС	ЕК АСУТР - ЦИСОВ

In development

- Monitoring the pre-failure condition of freight wagons
- Recruiting and retaining employees
- Prediction of track superstructure degradation

Main AI technologies used

- Computer vision systems
- Integrated systems for diagnostics of infrastructure facilities, recognition and classification of driver comments
- Intelligent decision support in various areas
- Natural Language Processing
- Speech analysis and synthesis
- Data processing

33 AI Systems Launched in Russian Railways

51 Technical inspection point equipped with intelligent means

THANK YOU FOR YOUR ATTENTION!

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