

Digital transformation

EVRAZ digital transformation strategically addresses customer focus and asset development

2019
initiatives

MAIN DIGITAL TRANSFORMATION INITIATIVES

Digital transformation: priorities

Advanced analytics

Expert systems

Production reporting

Production control rooms

Digital asset management

EDI and paperless workflow

Mobile solutions

Video analysis

Through-process quality control

Autonomous equipment

Production planning

- Primary priorities
- Secondary priorities

The foundation for applying contemporary digital technologies is the high-quality basic automation of technological processes. At its production facilities EVRAZ is implementing a programme of projects to increase the level of basic automation and make its production capacity digital ready.



Ideation sessions

To search for innovative technology-based solutions, EVRAZ employs 'design thinking', a core element of which is ideation sessions. During these, teams of various employees work to find solutions to current tasks, including by harnessing digital technologies. In 2019, the Group conducted 10 such sessions: in all Russian divisions, the trading unit and several subdivisions. From them, new ideas were prioritised and plans to develop and implement them were devised, and some projects are already under way.

Results in 2019

32 projects implemented

15 projects under way

63 projects being considered

2020

Plans and priorities



Agile approach

In 2019, EVRAZ made a major leap forward in using flexible methodologies for developing software and executing IT projects. Such approaches aim to increase internal customer satisfaction and reduce project delivery time. Within the Group, the 'agile' culture is promoted among both IT specialists and people in business subdivisions, and its effectiveness is clear from the results delivered by combined project teams encompassing product owners, 'scrum masters' and experts in various areas. Over the last year, 10 initiatives were implemented in accordance with agile principles.



Advanced analytics

In 2020, EVRAZ is planning to launch a range of advanced analytical projects that are expected to have an overall effect of US\$10-12 million. The aim is to optimise technological processes in all production areas using expert systems based on machine learning models. Each system is designed to improve product quality and quantity.

In addition, as part of the programme, a Data Science competence centre and a technological IT platform will be established to process data.



New digital solution development centre

The Group is also planning to open an additional digital competence centre in Novosibirsk. When choosing the location for the new facility, the main factors were considered: maturity of the IT personnel market, number of quality higher educational institutions, convenience of location and transport links to EVRAZ main production units. Among other things, the centre will focus on advanced analytical and machine learning technologies.



Read additional information on key projects in 2019 on the next page.

Our goal

As part of its digital transformation drive, EVRAZ is positioning itself as a company that plays a more active role as a catalyst for digital innovation. This goal foresees implementing digital transformation programmes and creating innovative ecosystems that bring together external partners and internal resources.

KEY DIGITAL TRANSFORMATION PROJECTS IN 2019

Siberia division (EVRAZ ZSMK)



Expert system based on machine learning

Theme (area)	Machine learning
Category	Steel
Project status on 31.12.2019	Launched
Effect	<ul style="list-style-type: none"> • Lower production costs • Higher productivity • Reduced labour expenses

Products high in rhomboidity from continuous casting machines are rejected, or they need to be processed further (grinding, etc) before being dispatched to the customer. A visual inspection for rhomboidity is conducted at the final stage of casting, when it is too late to rectify.

Inbuilt machine-learning algorithms analyse the array of operational data collected to identify hidden patterns indicating rhomboidity. Software predicts existing rhomboidity in real time in the casting mould (where the shape of the final cast is formed). The system informs the continuous casting machine operator of the optimal casting speed needed to keep rhomboidity within acceptable limits.



System for mathematically modelling production

Theme (area)	Mathematical optimisation
Category	Steel
Project status on 31.12.2019	Launched
Effect	<ul style="list-style-type: none"> • In 2019, the overall economic effect was more than RUB1.4 billion

A system has been developed and implemented to optimise all metal production units with a view to maximising EBITDA. The system uses mathematical models for all facilities and calculates the end-to-end economic effect given existing restrictions and possibilities for changing the composition of raw materials and semi-finished products. It uses non-linear optimisation methods and GAMS modelling system to identify the global optimum based on 79,000 variables that occur monthly.



Monitoring and diagnostic system for rolling mill equipment

Theme (area)	Predictive maintenance
Category	Steel
Project status on 31.12.2019	Pilot project completed
Effect	<ul style="list-style-type: none"> • The upgrades have confirmed the feasibility of using modern equipment monitoring and diagnostic systems • They have also created a foundation for establishing information exchange with enterprise asset management systems

In the testing zone of EVRAZ ZSMK's rail and beam shop, in the hot-rolling mill, the existing automated process control systems have been upgraded to the level of an equipment control system: a monitoring and diagnostic system. The aim is to transform the company's asset maintenance function from a reactive model to a preventive (giving the possibility of planning servicing) and predictive (giving the possibility of forecasting condition) one. Additional functionality has also been introduced:

- Monitoring equipment operation data
- Monitoring images and operator actions by camera
- Digitalising specialist experience and knowledge

Coal division (Raspadszkaya coal company)



Production and occupational safety management centre

Theme (area)	Data collection and visualisation systems
Category	Mining
Project status on 31.12.2019	Launched
Effect	<ul style="list-style-type: none"> • The new display presents all of the required information in a full and digestible manner • It gives the option of viewing data from previous shifts • It also enables management decisions to be taken more quickly • Productivity is increasing as a result

In the control room at Raspadszkaya, the video display wall, featuring 19 video panels with analytical information, has been upgraded. It gives information about the air and gas monitoring equipment (data about methane levels in mines); longwall operations (data about the position of mining equipment and reasons for downtime); the positioning system in mines; a summary of the planned and actual mining, throughput and shipment; efficiency indicators; conveyor belts (data about downtime); and the Kuznetskaya beneficiation plant. Videos of shipments and data from underground cameras can be viewed. Executives and managers have access to a web portal and mobile application that enable them to efficiently monitor key occupational safety and production indicators.



Tagging system for personnel identification and tracking in underground coal mines

Theme (area)	Data collection and visualisation systems
Category	Sales
Project status on 31.12.2019	Launched
Effect	The introduction of the tracking stations has made it possible to positively identify our miners. We can track personnel movements underground in real time. This also provides an additional inspection point to ensure that miners have duly received PPE and undergone medical examinations.
	Alexey Chervyakov, HSE Director at Raspadskaya

After the pilot project was completed at the Osinnikovskaya mine in 2018, the system was rolled out to all of Raspadskaya's other underground mining operations.

The system consists of specially designed stands containing readers:

- Access card reader (for descent and ascension)
- Cap lamp tag reader
- Portable gas analyser reader
- Control unit, computer and monitor to visualise tagging process

This allows the employee to independently link their cap lamp tag to their data (from their access card). In the future, without this linked tag, access to the mineshaft will be blocked for the employee.

In addition, miners are checked to ensure that they have personal protective equipment (PPE) and have undergone a medical examination. This system is integrated with the access control and underground personnel positioning system.

Urals division (EVRAZ NTMK)



Predictive maintenance system using vibration diagnostics data

Theme (area)	Predictive maintenance
Category	Steel
Project status on 31.12.2019	Pilot project completed
Effect	"The installation of the condition monitoring system in the testing zone paves the way for reducing labour spending on diagnostics and integrating with the EAM system as part of the transformation of maintenance services under way at the company."
	Andrey Ermakov, Head of the Central Electrotechnical Laboratory

In the testing zone of EVRAZ NTMK's wheel and tyre shop, an automated system for monitoring equipment condition has been introduced. It creates a single IT environment for maintenance teams and a foundation for transitioning predictive equipment maintenance. A permanent vibration diagnostics system has been installed that:

- monitors and diagnoses defects in the main production equipment in real time
- conducts continuous diagnostics of equipment in various technological regimes under loading conditions
- provides remote access to diagnostic information to several specialists simultaneously in real time removing the need for inspections and checks



Model for calculating optimal steel temperature

Theme (area)	Machine learning
Category	Steel
Project status on 31.12.2019	Launched
Effect	<ul style="list-style-type: none"> • The model has increased productivity by boosting output by 47,152 tonnes a year

Before the introduction of the system, to ensure an effective temperature for secondary steel processing, operators in the continuous casting plants nos. 1-4, used the maximum permissible temperature given in the technological manuals, as well as experience gained from previous runs. This was insufficient for casting steel at maximum permissible speeds. As a deliverable of this project, a model was built to calculate the optimal production temperature for the casting ladle from the secondary steel processing section. The model was developed based on a production efficiency audit.



Transition to paperless document processing at companies

Theme (area)	Electronic document processing
Category	Sales
Project status on 31.12.2019	Four projects launched
Effect	<ul style="list-style-type: none"> • Labour expenses have been reduced by 4.7% of the worktime fund of production personnel • Document processing time has been decreased to 80% of the previous level • Monitoring procedures have been streamlined, while transparency has increased and the number of errors has been reduced

HR directives regarding employee transfers and appointments are now created using a master template in a single web system (instead of three information systems previously). Both inventory ordering for production and quality certificates for end products have been moved to electronic format, with digital signatures and storage in an electronic archive. A digital version of the labour safety manual has been created. To introduce electronic signatures of users, a EVRAZ corporate registration centre has been established. Another 10 types of documents are being developed. The ultimate aim is to end the use of paper documents in full.