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TECHNOLOGY MOTION KNOWLEDGE

#2 (39) 2022

CORPORATE MAGAZINE

DIVERSIFICATION IN BUSINESS

TMK'S MACHINE-BUILDING DIVISION OFFERS COMPLEX ENGINEERING SOLUTIONS

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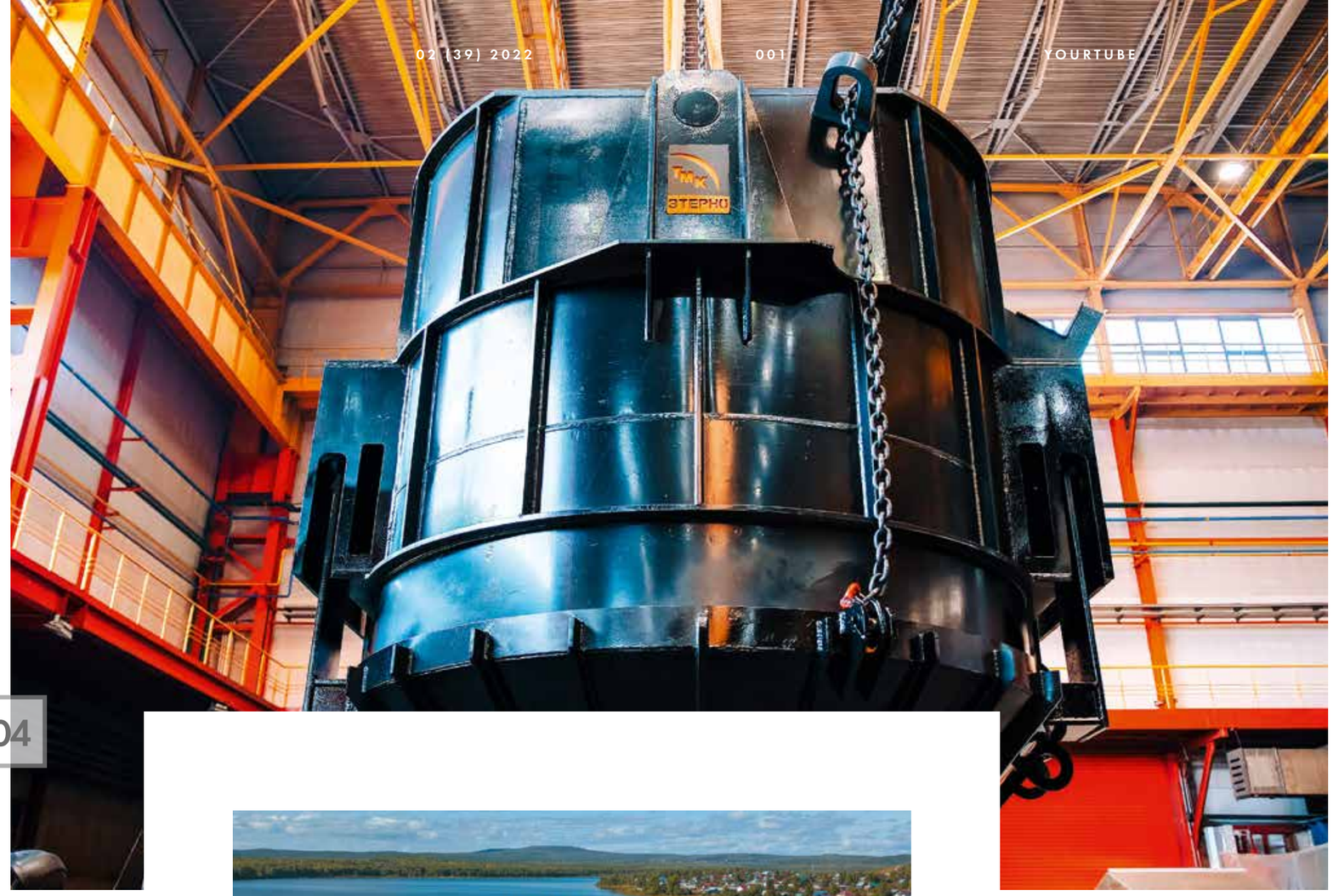

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JOINING FORCES FOR AN UPGRADE

ETERNO has supplied equipment to upgrade the steelmaking facilities at Volzhsky Pipe Plant (VTZ) in an example of cooperation between TMK plants. The enterprise manufactured a custom-made ladle car for steel, including full-cycle development of design documentation.

A recent addition to its heavy engineering product line, the new piece of equipment is designed to move the ladle along the rail track from the electric arc furnace to the ladle furnace, where the steel is treated to achieve certain technical parameters. At over 8 meters long, 6.2 meters wide, and weighing 62 tonnes, the ladle car is made of structural low-alloy steel and equipped with an electric motor, a gearbox and strain gauges. The ladle car will ensure that liquid metal can be moved reliably during various process phases at the required heat weight.

Denis Makienko, Deputy CEO and Director for Machine-Building Business Development at TMK said: "Drawing on the synergies from production capacities, equipment capabilities, and ETERNO employees' professional skills and extensive engineering experience, we are well-positioned to successfully engage in challenging projects for the metallurgical industry. Through the cooperation we foster between our plants, four TMK enterprises have already carried out upgrades using ETERNO products."

Golden quality mark

Orsky Machine-Building Plant (OMZ) has won the National Brand (3rd Millennium) – Quality Mark of the 21st Century competition. After deliberating over all aspects of the plant's products, the competition's expert panel awarded the plant's products a gold award for their quality.

OMZ's competition entries included BT-100 gas cylinders, which are used in gas storage facilities at natural gas fueling stations, as well as BT-52 gas cylinders, which are used to store and use compressed natural gas as motor fuel and are fitted to vehicles and agricultural machinery. The plant now has the right to put the golden quality award label on its products for the next two years.

VYSOTA 239 AMONG TOP 20

The building of the Vysota 239 electric-weld pipe shop at Chelyabinsk Pipe Plant has been ranked one of the Top 20 Buildings of Russia. The list, compiled by the popular magazine Afisha Daily, ranks extraordinary buildings that change the look of their cities.

The shop's building was built in 2010 and has repeatedly been included in various architectural rankings. For example, in 2015, Vysota 239 ranked ninth among CMMS Software Insight's Top 25 Most Beautiful Factories in the World.

Sturgeon tradition

As part of a project to replenish local aquatic biological resources, employees from Taganrog Metallurgical Plant released over 28,000 Russian sturgeon fry into the Sea of Azov.

The plant has been implementing this project in cooperation with a private fishing business for three years running under a contract with the Azov–Black Sea Territorial Administration of the Federal Agency for Fishery. Sturgeon fry, whose average weight reaches 2.5 grams, are released into a natural water body in early summer when the conditions are just right for this species of fish to adapt to their natural habitat.

SHUTTERSTOCK/FOTODOM

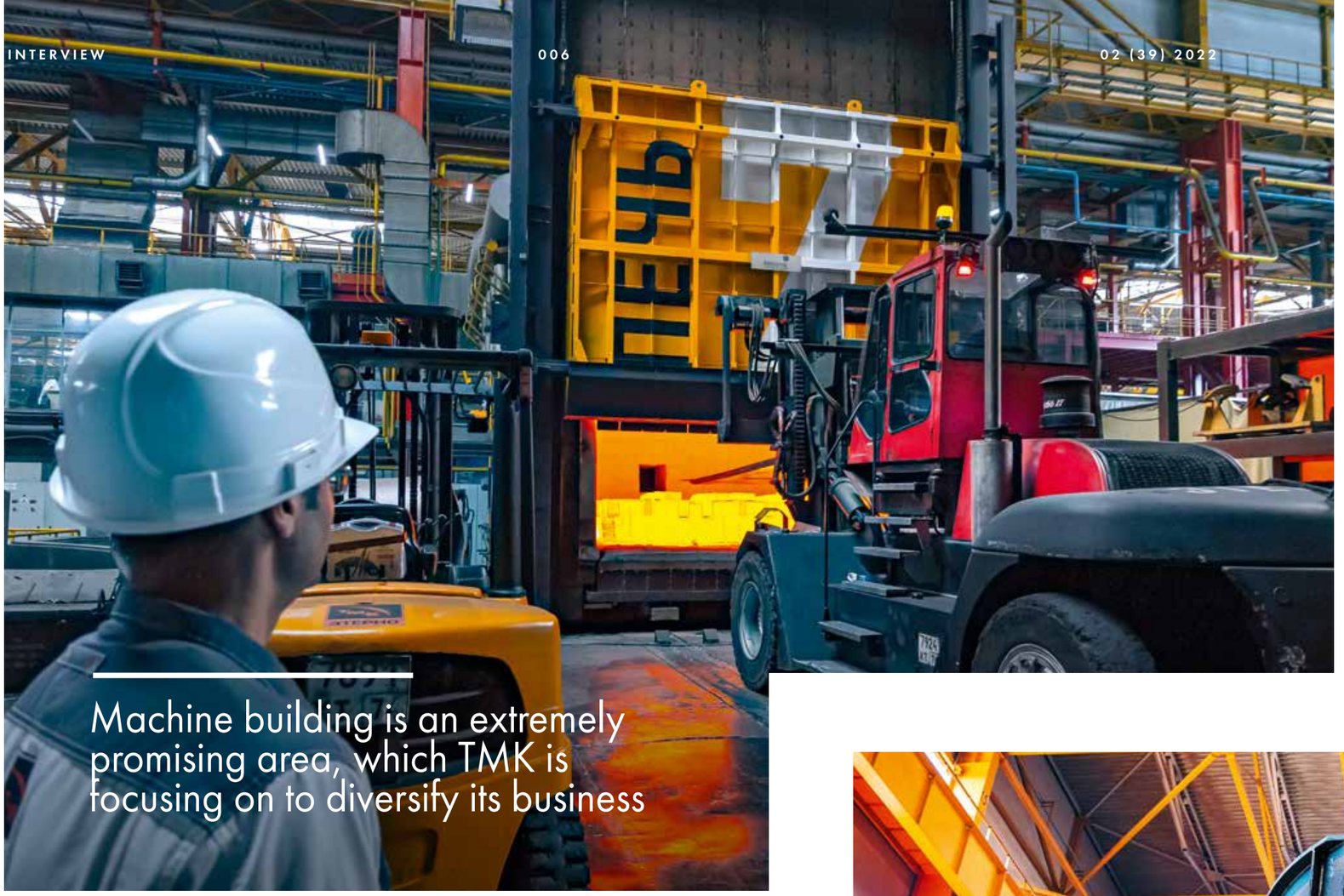
OPTIMIZED ENERGY CONSUMPTION

Pervouralsk Pipe Plant (PNTZ) has connected two more facilities to its autonomous thermal power plant (TPP): the cylinder shop and the plant's treatment facilities. The plant was able to switch the facilities from external power supply sources to self-generation thanks to a comprehensive effort to reduce the amount of compressed air used at the plant. As a result, energy consumption was cut down by 1.5 MWh, with the energy savings redirected to other processes. These energy-efficiency initiatives will save the plant up to RUB 30 million annually.

The plant's autonomous 14.3 MW TPP runs on natural gas and is equipped with a modern catalytic cleaning system, which captures 95% of nitrogen oxides and 90% of carbon oxides in exhaust gases. The TPP generates about 20% of PNTZ's total demand for heat and electricity.

THE INTEGRATED SOLUTIONS DIVISION

IN SEPTEMBER LAST YEAR, TMK LAUNCHED ITS MACHINE-BUILDING DIVISION. THE NEW DIVISION'S PORTFOLIO ALREADY INCLUDES SEVERAL DOZEN SUCCESSFUL ENGINEERING SOLUTIONS FOR THE DOWNSTREAM OIL AND GAS INDUSTRY, METALLURGY, PETROCHEMISTRY, INFRASTRUCTURE CONSTRUCTION, AND OTHER TECHNOLOGY-DRIVEN INDUSTRIES. **DENIS MAKIENKO**, DIRECTOR FOR MACHINE-BUILDING BUSINESS DEVELOPMENT AT TMK, SAT DOWN WITH US TO TALK ABOUT THE DIVISION'S GOALS AND DEVELOPMENT PROSPECTS.



Machine building is an extremely promising area, which TMK is focusing on to diversify its business

Mr. Makienko, why did the Company decide to set up a machine-building division?
This decision had been building for quite a while. As TMK integrated new production assets such as ETERNO, SOT (Pipeline Connecting Bends), and RAZ (Rakityansky Valve Plant), it became clear that these assets did not fit into the existing business management system. They do not manufacture actual pipes but offer products related to their operation, mainly for trunk pipelines. The products' lifecycles, development processes, sales channels, and business management principles are all fundamentally different from those of pipe solutions.

In 2021, a strategic decision was made to create a division that would unite the Company's various assets, production facilities and engineering capabilities in a single organization to capture synergies from combined operations, set up new distribution channels and address a host of other challenges.

Machine building is an extremely promising area, which TMK is focusing on to diversify its business while strengthening its innovation engine, with the Company's engineers designing custom-made products, previously unavailable on the Russian market, from scratch.

TMK has been consistently ramping up cooperation between plants. ETERNO's engineering capabilities and production capacities play a key role in this process. To date, ETERNO has produced over 100 steel ladles of various types and designs, which have been supplied to TMK's own plants as well as to other steelmakers. The company's order book also includes several dozen implemented engineering solutions for a new line of custom-made heavy engineering products.

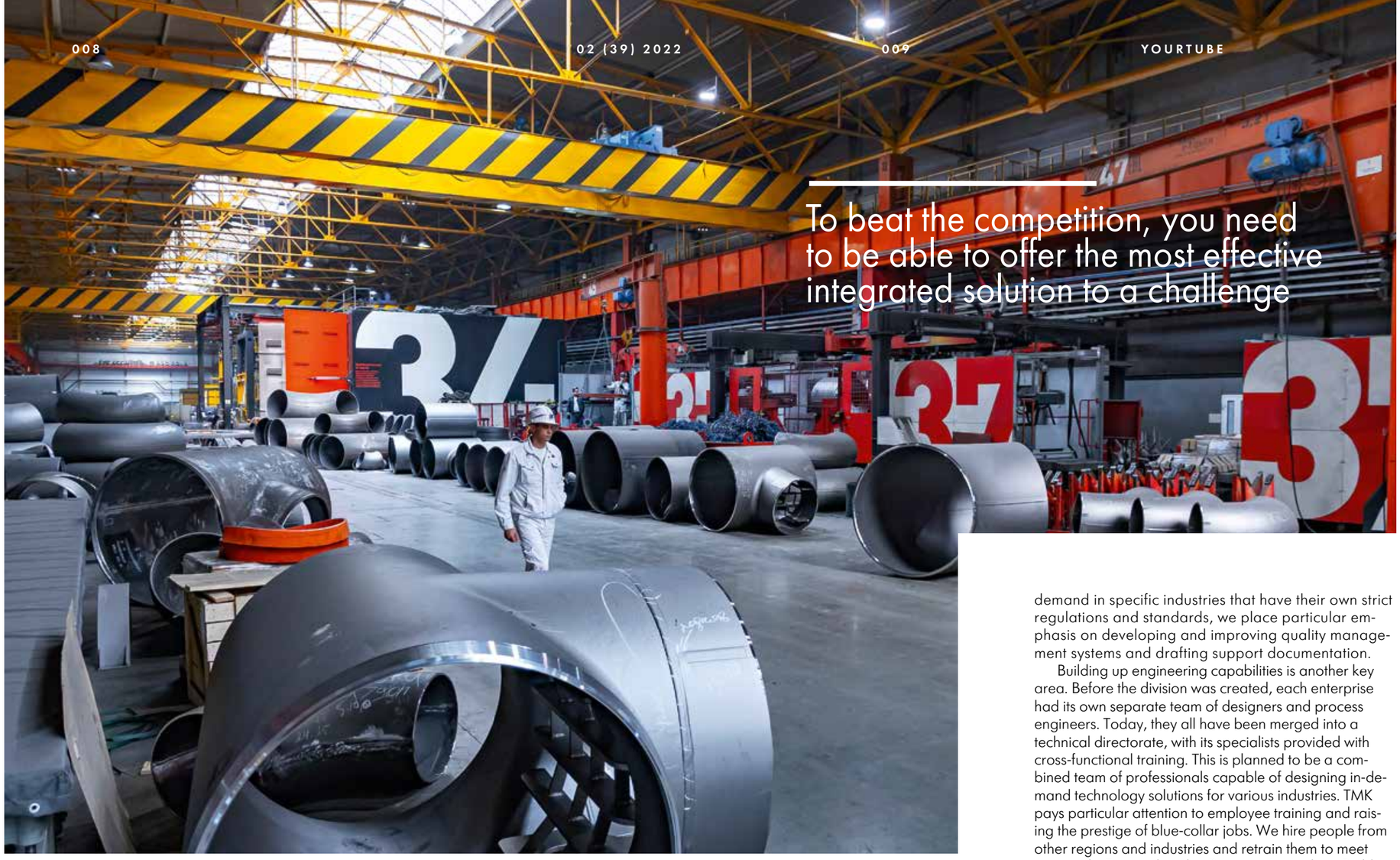
Over 3 x – the increase in asset performance after being combined into the Machine-Building Division

What top priorities needed to be addressed?
A large set of formal tasks that underpin the division's existence and operation. They include building a new organizational structure, staffing and budgeting. Over the past year, we successfully addressed all of these. The development strategy for the new TMK division was also taking shape during that period. We were trying to determine what place the division currently has in the market, what place we want to take, and what we can offer our customers. Answering these questions helped us flesh out the division's development strategy, and we are already starting to roll it out.

What types of products is the division ready to offer?
Our specialists have operationalized dozens of engineering solutions for steelmaking facilities, including scrap buckets, ladle cars for steel and hot metal, ladles, basic oxygen furnaces, blast furnace shells, and so on. Steel ladles of various configurations and weights have become a key product for the new heavy engineering product line. The division's enterprises have already produced over 100 ladles for metallurgical businesses across Russia and other CIS countries. The division also fulfills orders needed for technological modernization

Industries using the division's solutions

- Petrochemicals
- Metallurgy
- Machine building
- Energy
- Agriculture
- Housing and utilities



To beat the competition, you need to be able to offer the most effective integrated solution to a challenge

programs across TMK facilities. For instance, we have supplied ladles to TMK-YMZ (Yartsevsky Metallurgical Plant) and Seversky Pipe Plant, both part of TMK. We contribute to multiple oil and gas projects, for which we do not simply supply components necessary for construction, such as pipes, supports, bends, insulation, and associated peripheral equipment, we also play a key role through our design units, which engineer complex and unique products for the customer to address their challenges in a comprehensive way that doesn't waste management resources and time. This approach significantly increases our operating margins, as customers are willing to pay a premium for such cooperation. For example, at last summer's INNOPROM exhibition in Yekaterinburg, the division presented a pipe assembly unit at the Company's booth – a product highly sought-after by customers for the construction of process pipelines. We are talking about a technically complex structure, which is assembled directly on-site. While previously we offered all the components separately, customers now have access to an out-of-the-box solution, significantly saving on time and installation costs, which is crucial for large infrastructure energy facilities.

How do you see the division's competitive advantages?
Our potential customers, large infrastructure and oil and gas companies, think in terms of project management. It is important for them not to just buy products but to complete a project or launch a particular facility on time so that it operates properly. To beat the competition, you need to be able to offer the most effective integrated solution to a challenge, from design to commissioning. The division's operations are driven by this principle. A dedicated project management unit has therefore been set up within the division. The project-based approach implies a greater number of stakeholders and the need to coordinate engagements between functions within the Company, as well as full control over subcontractors' activities. Design documentation needs to be developed for each project, agreed with the design organization and regulators, and relevant products need to be manufactured, supplied and installed. Projects that involve designing a new product need to be aligned with leading R&D organizations and regulators; new production standards or specifications need to be developed and followed up on with actual production, several iterations of approvals at each stage, and so on. Ten to fifteen external organizations and most internal functions are involved in this process. As we built the new organization, we were able to get involved in several major projects and successfully complete them. I can confidently say that combining enterprises into a division has driven multiple synergies and has at least tripled growth in performance.

What are your next steps?
The next step is to launch new products for our customers in the market. Most of the technical solutions for consumers address the same challenges: operating at pressure, in aggressive environments and at high temperatures, and as such, they can be unified and standardized. For the final product to be in demand in specific industries that have their own strict regulations and standards, we place particular emphasis on developing and improving quality management systems and drafting support documentation.

Building up engineering capabilities is another key area. Before the division was created, each enterprise had its own separate team of designers and process engineers. Today, they all have been merged into a technical directorate, with its specialists provided with cross-functional training. This is planned to be a combined team of professionals capable of designing in-demand technology solutions for various industries. TMK pays particular attention to employee training and raising the prestige of blue-collar jobs. We hire people from other regions and industries and retrain them to meet our needs. Even today, the Company's Machine-Building Division is a major player in this market, able to compete for the best talent and exciting projects. We are involved in a number of ongoing programs with South Ural State University and Ural Federal University. We also participate in cross-industry and specialized industry events to attract successful teams. There are many high-caliber professionals in the market right now, and we need to spark their interest with promising projects.

What principles guide your work?
My colleagues know my key principle: "A victory is always shared by a team, and a defeat is always the fault of the coach". You can't do everything by yourself. The key role of a manager is to pick the right people, put them in the right places and keep them interested in the job. We need to communicate where we want to get to, and these goals need to be sufficiently ambitious. The key thing in our business is not iron or machines but people. Therefore, my task as a manager is to bring them together to achieve ambitious goals and provide them with opportunities for development. **YT**

010

ETERNO

Focus

Manufacturing stamped and welded pipeline parts, tanks and vessels, as well as metallurgical and non-standard equipment

ASSETS OF TMK'S MACHINE-BUILDING DIVISION

Product mix

- Stamped and welded pipeline parts, bends, tees, reducers, and heads
- Tank and vessels
- Split tees
- Heavy engineering solutions: converters, steel ladles, scrap buckets, ladle cars for steel, hot metal and slag, and other metallurgical equipment
- Piping systems, circulating water pipelines, miter elbows
- Custom engineering solutions
- Metal structures custom-made for customers and designers from the construction industry

One of Russia's leading manufacturers of stamped and welded pipeline parts with diameters from **530 mm to 420 mm**

The enterprise's annual capacity is **10 000 tonnes** of own products

Industries

- Petrochemicals
- Metallurgy
- Machine building
- Energy

SOT (Pipeline Connecting Bends)

Focus

Bends and assembly units, and small and medium-diameter connection elements

Product mix

- Hot and cold bends
- Sharply bent pipe, miter elbows
- Assembly units of any complexity and configuration
- Reducers and blanks
- Transition rings
- Metal structures (supports and piles)
- Anti-corrosion coating services

Industries

- Petrochemicals
- Energy
- Construction and utilities

One of Russia's leading manufacturers of hot bends with diameters from **159 mm** to **1,420 mm**

RAZ (Rakityansky Valve Plant)

Focus

Pipelines, longitudinally welded pipe, connection elements, and assembly units for pipelines

Product mix

- Bent pipe
- Tees
- Piping systems
- Hydraulic snubbers
- Support and suspension systems
- Pipe with diameters from 377 mm to 1,620 mm
- Other products (reducers, blanks, nipples, pup pieces, and flanges)

Industries

- Heating
- Machine building
- Oil and gas

The company can produce **1.2 ktpa** of seamless, welded or stamped and welded parts across more than **1,000 size classes**

PRESS FOR EXCELLENCE

TAGANROG METALLURGICAL PLANT (TAGMET) HAS PUT INTO COMMERCIAL OPERATION A NEW PRODUCTION AREA FOR A PIPE END UPSETTING PRESS. THE PROJECT WILL EXPAND THE RANGE AND OUTPUT OF TAGMET'S IN-DEMAND DRILL PIPE.

A state-of-the-art press was added to TAGMET's pipe end upsetting equipment stock, comprising three more units at the plant's rolling shop. The new piece of equipment is used for upsetting drill pipe ends with an internal upset transition zone length of more than 170 mm instead of the upset lengths of up to 100–125 mm achieved with the presses used previously. With the newly introduced design of upset pipe ends, the enterprise can now offer drill pipes that meet the latest requirements of both TMK's internal standards and international standards.

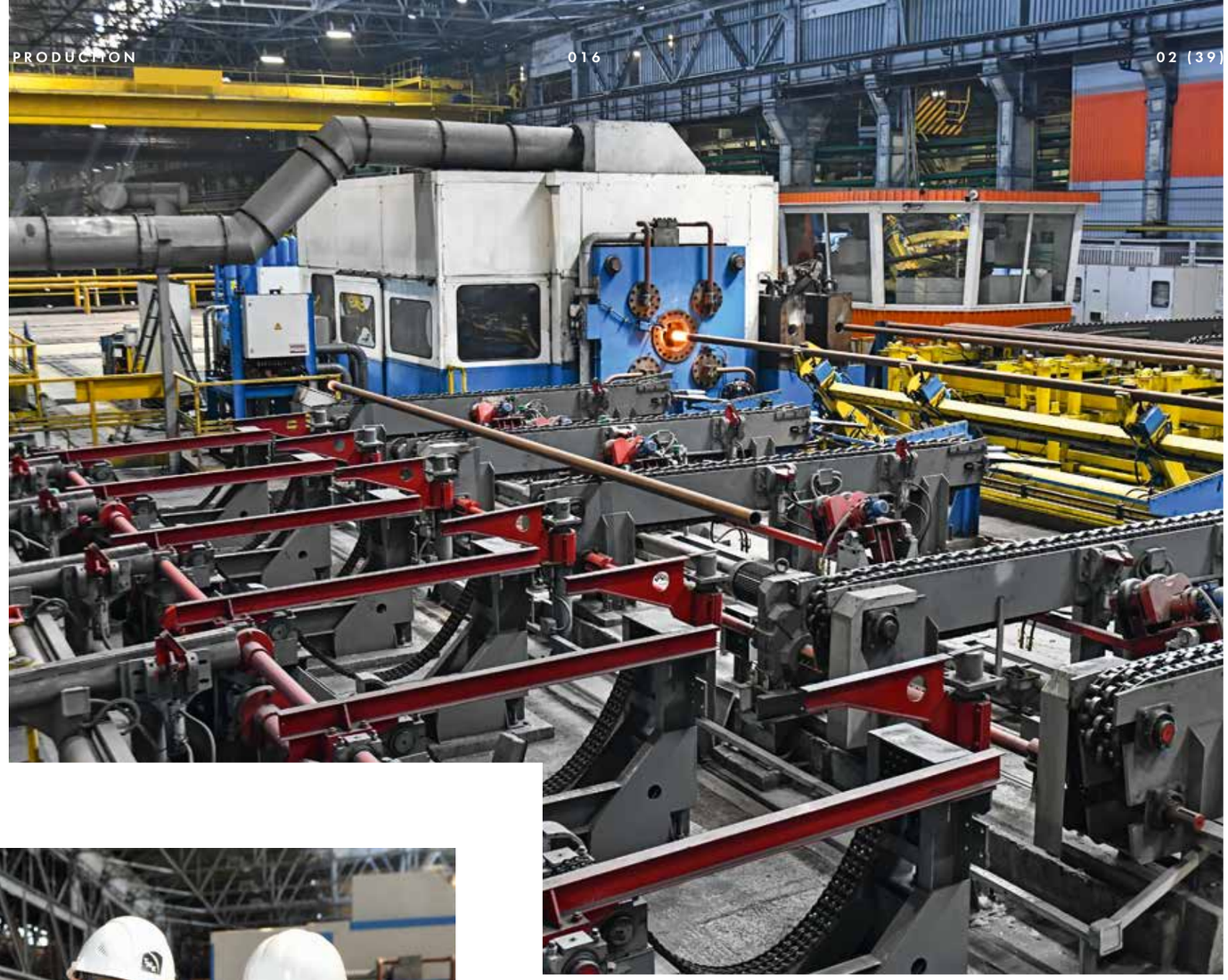
This major technical project was delivered without interrupting ongoing pipe-rolling production processes.

The commissioned production area, occupying a total 3,060 sq. meters, houses not only the 6,000 kN press but also handling equipment, roller belts and automated stacking lines.

The new equipment is used for upsetting drill pipe ends with an internal upset transition zone length

of more than **170** mm

3,060 sq. m – the total size of the newly commissioned production area



The press was commissioned as part of a large-scale project to revamp the finishing facility of TAGMET's pipe-rolling shop

Boris Pyankov,
Technical Director of TMK:

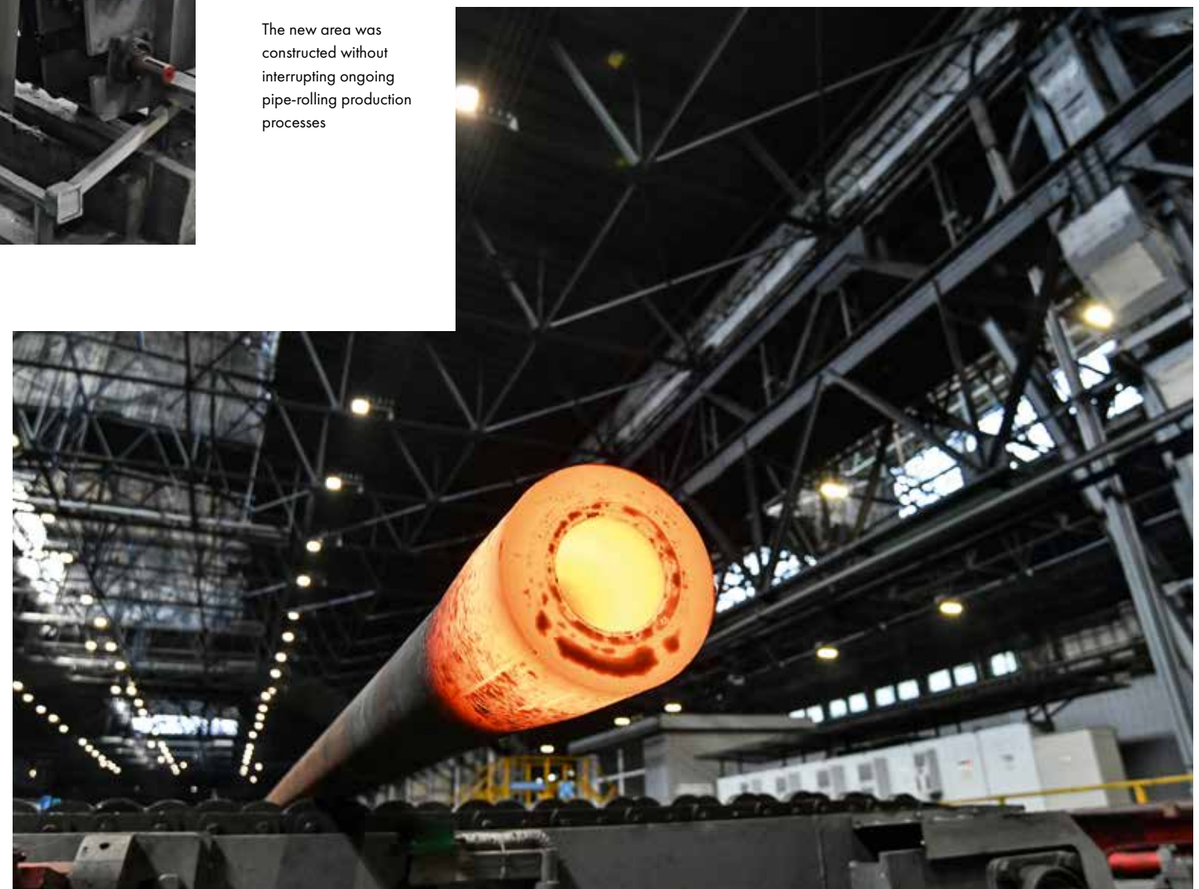
"The upsetting press at TAGMET was installed as a core part of the strategic drill pipe production development program at the enterprise and the Company. This project is aimed at aligning the upset geometry with all customer requirements. By upgrading the finishing facility, we were able to avoid losing our share in the drill pipe market as customer requirements shift in pipe end upsetting. It is worth mentioning that the new equipment has a higher production capacity than the existing presses. The project team's performance was, of course, highly instrumental in the project's success."

The press was commissioned as part of a large-scale project to revamp the finishing facility of TAGMET's pipe-rolling shop. Since this CAPEX project started in 2014, the core equipment of the finishing facility at the pipe-rolling shop has been retrofitted: the pipe and coupling threading machines were replaced, the coupling production area was expanded and upgraded, and automation and power supply systems for the project were built and installed.

Upgrades of the finishing facility are ongoing. Plans include installing post-weld heat treatment equipment at the line that produces drill pipes with weld-on tool joints. Another upgrade will be a UV-coating unit for the Casing No. 5 production line: at the moment, preparations are underway to build its foundations.

"The upgrades will enable the plant to introduce a new range of drill pipes that meet the most stringent technical requirements. That will serve as TAGMET's sizable contribution to the TMK production program," noted Sergey Bilan, TAGMET's Managing Director. **YT**

The new area was constructed without interrupting ongoing pipe-rolling production processes



CLEAR BLUE WATER

CHELYABINSK PIPE PLANT (CHELPIPE) HAS LAUNCHED THE CONSTRUCTION OF AQA BALANCE, AN INDUSTRIAL AND STORM WATER TREATMENT FACILITY. SCHEDULED TO BE COMMISSIONED IN 2023, THE FACILITY WILL COMPLETE THE SINGLE CLOSED-LOOP WATER TREATMENT SYSTEM AT THE ENTERPRISE.

Valentin Tazetdinov, Managing Director of Chelpipe, pours pure water into the flask to be placed inside the facility foundation stone

"TMK places a particular focus on preserving water resources as part of its environmental activities," said TMK CEO Igor Korytko (on the left) during the ground-breaking ceremony in Chelyabinsk

As the key part of the official ground-breaking ceremony in Chelyabinsk, a capsule with clean water was laid in the foundations, symbolizing an important milestone in upgrading the plant's water use systems.

"The Chelyabinsk Region is rich with water. Our task is to preserve this valuable resource and reuse it as much as possible," said Sergey Shal, Deputy Governor of the Chelyabinsk Region, at the ceremony. "As one of the region's majors, Chelpipe plays an important role in this. The first stage of the treatment facilities launched at the plant has already made a significant contribution to improving the environment. The project that begins today will mark another important step towards our common goal."

CLEAN PROFILE

The wastewater treatment facility is being built on the site of the former Metal Bed Frame Shop No. 9. The AQA industrial and storm water treatment facility will occupy a total of 3,800 sq. meters, including a building with an area of 1,800 sq. meters and a height of up to 14.5 m to house process equipment and offices for the plant's dedicated units.

During treatment, wastewater will pass through a system of horizontal-flow sedimentation tanks, an industrial and storm water tank, flotation units, and sand and coal filters. Storm water and industrial effluents will be cleaned of petroleum products, suspended particles, organic pollutants, heavy metals, and salts. The treated water will be reused in production processes, and any excess water will undergo additional treatment to comply with the quality standards for category 1 fishing reservoirs before being discharged into the nearby Lake Shelyugino. The facility is scheduled for commissioning in 2023. Before the launch of construction, the new technology underwent industrial tests at the enterprise. For more than a month, a pilot unit with a capacity of 5 m3 per hour – a smaller version of the future system – had been operating in parallel to the existing industrial and storm water treatment facilities launched in 1976. The tested treated water was fully in line with target parameters.

STAGE TWO

"TMK places a particular focus on preserving water resources as part of its environmental activities,"said TMK CEO Igor Korytko during the ceremony. "Chelpipe already operates AQA Crystal, a facility that treats effluents from the industrial etching of pipes. Now we are moving on to the next stage, commencing the construc-

Water quality standards for category 1 fishing reservoirs, which AQA Balance will meet, are several times more stringent than requirements for drinking water. For example, the maximum copper concentration threshold is set at 1 mg/l for drinking water and only at 0.001 mg/l for fishing waters.

10 000 m^3 – the volume of the industrial and storm water tank at AQA Balance

330 m^3 of treated water per hour – the facility's maximum capacity

tion of the AQA Balance facility, which will treat industrial and storm waters. As a result, the enterprise will have in place a single closed-loop water treatment system. Through this new project, we are taking another step towards a balance between industry and nature, and this aspiration is reflected in the new facility's name."

AQA Crystal, launched at Chelpipe in 2020, serves two operating sites: the industrial etching facilities of Rolling Shops No. 1 and No. 5. These high-tech units perform multi-level treatment of acidic discharges, including flow equalization, chemical treatment, sedimentation, filtration, reverse osmosis, and other processes. The facility treats 600 m3 of acidic discharge every day, reducing concentrations of iron by 6,000 times, suspended particles by 35 times, sulfates by 100 times, and chlorides by 50 times. After going through all treatment stages, process water is fed back into the production cycle of the enterprise. CAPEX for Crystal's construction amounted to RUB 750 million.

A project worthy of recognition

The AQA project, consistently implemented by TMK in Chelyabinsk and Pervouralsk (PNTZ operates the AQA Genesis facility), won the Construction and Operation of Treatment Facilities category. In 2022, TMK was named a winner of the annual ECOTECH-LEADER National Environmental Technology Awards.

BALANCE OF NATURE

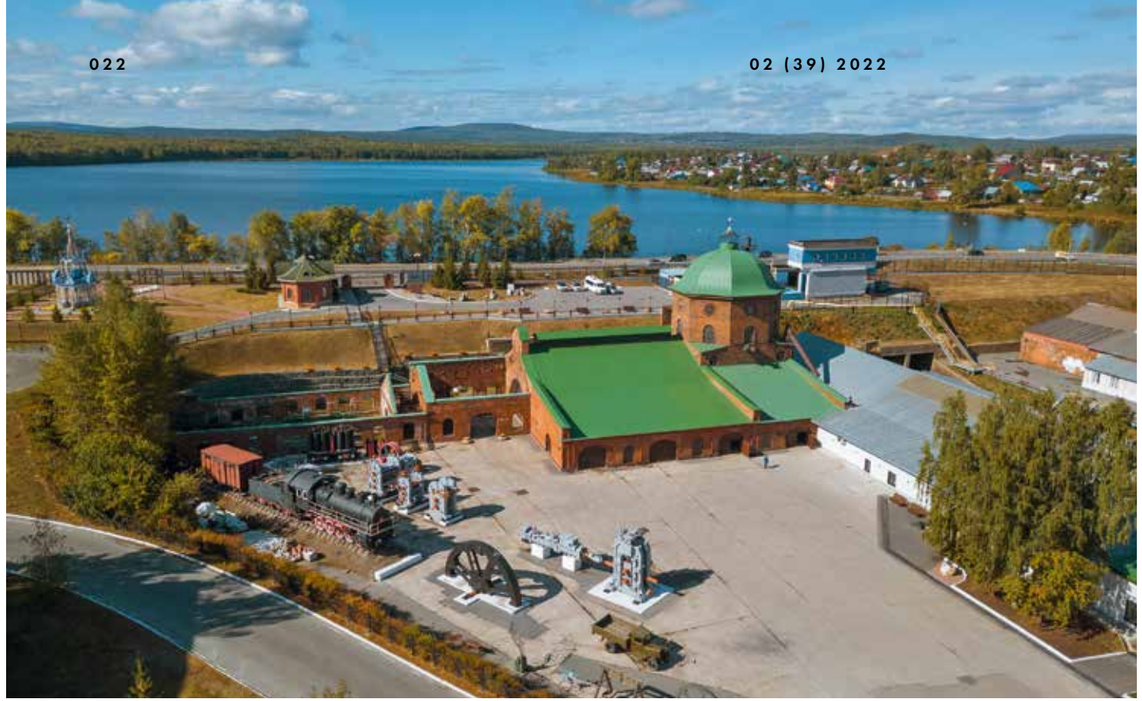
The AQA Crystal and AQA Balance wastewater treatment facilities form Chelpipe's single closed-loop water treatment system, which completely eliminates discharges of untreated wastewater into surface water bodies. The main environmental benefit comes from preserving local lakes, which are a crucial part of the ecosystem in Chelyabinsk and the Chelyabinsk Region. TMK is committed to sustainability, investing in local development and environmental protection, and this project clearly illustrates it. Chelpipe will also reap long-term economic benefits due to reduced water consumption.

"TMK has signed several multilateral environmental agreements with the Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor), as well as with local and regional authorities," says Galina Golubkova, Chief Environmental Engineer at Chelpipe. "In 2016, we signed a document to reduce acidic discharges into Lake Shelyugino, and we achieved its targets in November 2020 as AQA Crystal was commissioned. As soon as AQA Balance is constructed, the plant will fulfill all of its commitments to reduce its environmental footprint." **YT**

AQA Crystal and AQA Balance make up Chelpipe's single closed-loop water treatment system

19TH CENTURY METALLURGY AND MODERN ART FUSE TOGETHER AT TMK'S RECENTLY RENOVATED SEVERSKAYA DOMNA MUSEUM COMPLEX IN THE URALS – A MUST FOR TOURISTS AND ADVENTURERS ALIKE.

MODERN ART BRINGS THE PAST ALIVE AT TMK'S OLDEST FACTORY



The Severskaya Domna museum complex has preserved its original 19th century factory

In the early 18th century, under the reign of Peter the Great, geologists found deposits of iron ore near the tiny village of Polevskoy in the Ural Mountains, which form the geographical divide between Europe and Asia. Unbeknownst at the time, the discovery would eventually transform the settlement and the lives of its inhabitants and make the surrounding region a global economic juggernaut well into the 21st century as cast iron and steel became critical components of every industry from energy to construction.

You can experience that history today at the Seversky Pipe Plant's Severskaya Domna museum complex, which recently reopened after a massive refurbishment that saw the addition of an extra 1.2 thousand square meters of new high-tech exhibition space within the original brick building (which dates back to 1842). "We have no future without our history," said Alexei Shmykov, First Deputy Governor of the Sverdlovsk Region, at the opening ceremony this summer. "We've always honored the memory of the founders of industry in the Urals here in the Sverdlovsk Region. Today a new chapter in local history has begun, and Severskaya Domna will be not just an example of preserving that history, but a beacon of industrial tourism, an exhibition center and a place for the younger generation to learn about the region's industrial potential."

"My task in doing this reconstruction was to delicately match the modern style of the painting to the existing historical frame," explained Alexei Antonov, architect of the project. "I chose the grunge style, which allowed me to treat the factory's heritage with the utmost delicacy. Classic vintage elements coexist with practical modernity. The interior is filled with complex technical solutions, which we managed to weightlessly fit into the overall style."

The festivities were accompanied by an art exhibition called Communication Pipe, which featured over 50 paintings and graphical works dedicated to the theme of dialogue, from the Yekaterinburg-based Sinara Art Gallery. Attendees were also treated to a show called Domna Speaks and Shows, which was projected onto the brick walls of the building, and a new painting exposition by local art legend Alexander Remezov.

While the original factory dates back to the 1730s, the newly renovated museum complex occupies a building originally constructed in 1842 and contains a blast furnace from 1860. "The preservation of our industrial heritage is part of TMK's corporate culture," explained TMK CEO Igor Korytko. "When we created this museum in 2009, we set high goals: to preserve the history of metallurgy and make it accessible to everyone. This reconstruction has significantly expanded the possibilities of the original museum complex and made it a part of a new tourist route called Metallurgy through the Ages: from a Hammer

The museum's reconstruction included an additional 275 sq. m of exhibition space

Local art legend's Alexander Remezov's works are currently on display at the museum

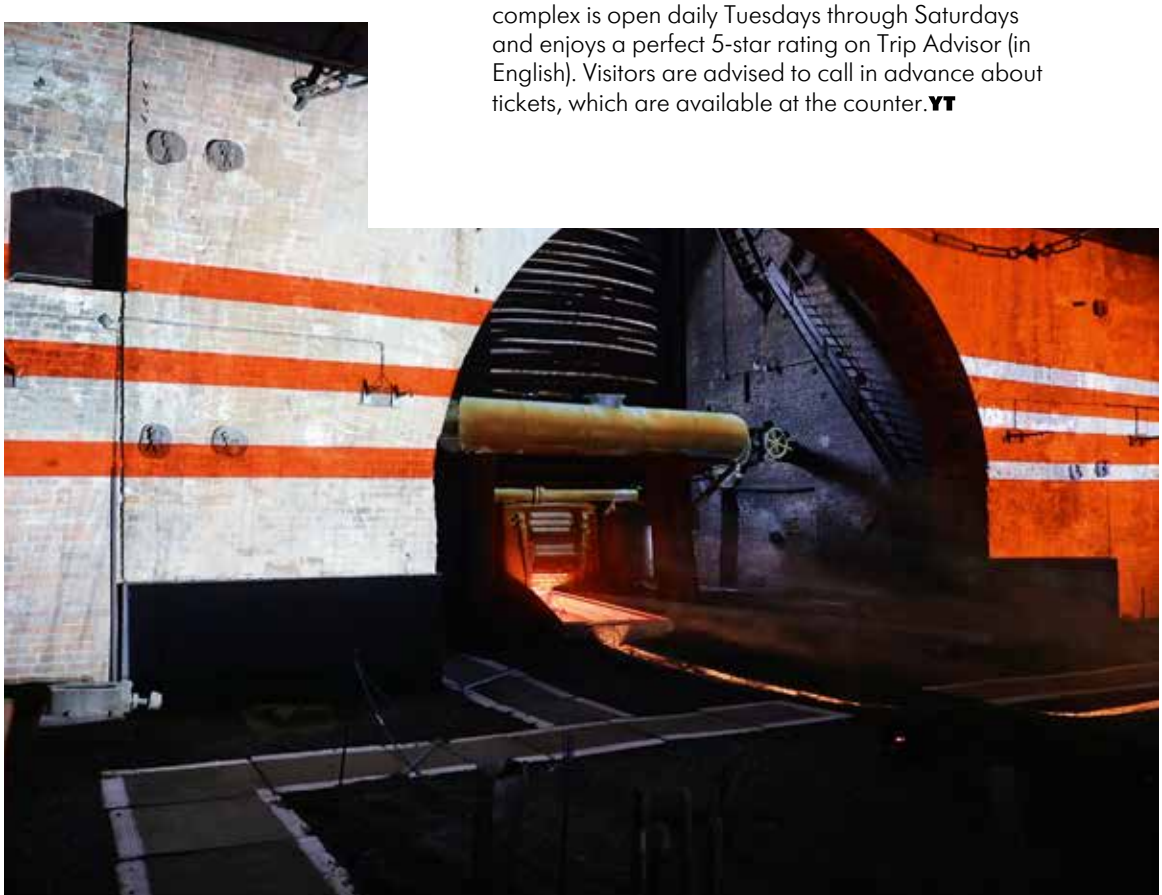
to a Digital Plant. Visitors get the chance to see both Serversky Pipe Plant's current production facilities and its historical roots and we expect the route to become a major attraction for industrial tourism in Russia."

"We dedicate the reconstruction of this museum complex to the 350th anniversary of the birth of the great reformer Peter the Great," added Seversky Pipe Plant Managing Director Dmitry Markov at the ceremony. "This was a large and complex project for us that lasted two years. Thanks to the renovated facilities, we'll be able to take industrial and business tourism at the plant to an entirely new level."

The Severskaya Domna museum complex occupies an area of over 8,000 square meters and includes two historical buildings, an open-air exposition and a chapel. The heart of the Severskaya Domna museum complex is the blast furnace, a masterpiece of 19th century Ural industrial architecture. Local preservationists were able to keep the furnace, the only of its kind on display in Europe, largely intact, which means visitors are treated to a near complete picture of the iron smelting production process as it was in the 19th century.

The museum complex has participated in the Ural Industrial Biennial of Contemporary Art since 2017 and became the filming location for a major historical TV series in 2019. Every year 2-3 thousand visitors attend the nationwide Night of the Museums event at Severskaya Domna and the complex has hosted over 100 thousand guests to date. Today the museum complex is open daily Tuesdays through Saturdays and enjoys a perfect 5-star rating on Trip Advisor (in English). Visitors are advised to call in advance about tickets, which are available at the counter.**YT**

Attendees were treated to a show called Domna Speaks and Shows, which was projected onto the brick walls of the building



Your Dependable Tool for the Energy Transition

Improving and developing effective and innovative solutions is TMK's key focus in the energy transition.

TMK is offering the energy market two new pipe solutions: the Sputnik H and C lineups for the production, transportation and storage of hydrogen and its by-product, carbon dioxide.

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