YOURTUBE

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CORPORATE MAGAZINE

BUSINESS TEAMS UP WITH SCIENCE

TMK'S R&D CENTER CELEBRATES 5TH ANNIVERSARY

14

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COVER PHOTO

"The Source," a 3D artwork by St. Petersburg-based artist Denis Patrakeev depicting metal in motion that's simultaneously cooling from a very high temperature, a commonality of the production process at steel plants. The object is located inside the main atrium of TMK's R&D Center.

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ADVANCING SOLUTIONS FOR THE ENERGY TRANSITION

New standards for steel pipes and hydrogen transportation and storage cylinders, developed as part of the national standardization program, were shaped by research conducted at TMK's Research Center, according to Igor Pyshmintsev, TMK's Director for Research Development, who presented at the Russian Energy Week forum.

TMK is spearheading innovative projects related to the energy transition, particularly in hydrogen transportation and storage. The company's Research Center laboratories are focused on developing new materials to address critical issues like hydrogen embrittlement and metal degradation caused by hydrogen exposure, especially in high-strength steels. This research has led to the creation of the first three technical standards for hydrogen transportation and storage products: seamless pipes, steel pipes, and storage cylinders.

Based on this research, TMK also introduced two new lines of pipe and tubular products tailored for the hydrogen economy: the Sputnik H series, designed for hydrogen production, distribution, transportation, and storage, and Sputnik C, intended for facilities involved in CO_2 capture, distribution, transportation, and storage.

AI TO REDUCE DOWNTIME

Seversky Pipe Plant (STZ) is developing a downtime management system that utilizes AI and big data analytics to predict critical equipment conditions. This solution will enable real-time monitoring of equipment health and allow for proactive maintenance and repair scheduling, ensuring uninterrupted operation. The goal is to boost manufacturing productivity and shorten order lead times, giving the company a competitive edge. This initiative is part of TMK's broader Digital Production program, aimed at automating key components of production systems at its pipe plants. The system will leverage data from the automated production management system, which collects real-time information on production processes. STZ is collaborating with engineers from other TMK enterprises, who are pursuing a master's degree in Information Systems and Technologies in Metallurgy at Ural Federal University under the federal Advanced Engineering Schools project, to develop the solution.

New beginnings in conservation

In late summer, employees of the Volzhsky Pipe Plant (VTZ) and Taganrog Metallurgical Plant (TAGMET) released over 30,000 Russian sturgeon fry into local rivers. This biodiversity restoration effort, part of the regional initiative Protect! Save! Replenish!, aims to revitalize the Volga-Caspian and Azov-Black Sea ecosystems.

Since 2019, TAGMET has contributed to the release of more than 140,000 sturgeon fry into the Don River. VTZ, which joined the initiative two years ago, has released 17,000 fry in total, reinforcing its commitment to environmental conservation.

Carbon farm project shows early progress

The Volzhsky Pipe Plant (VTZ) has entered the next phase of its research and development initiative to establish a carbon farm. This phase involves monitoring the growth of trees already planted and assessing early results. Launched in 2022, the environmental project has seen over 11,000 trees and bushes of various species planted across pilot plots to identify which species are most effective at removing pollutants from the soil and absorbing carbon dioxide and other greenhouse gases, thereby reducing the plant's carbon footprint.

Experts from Bauman Moscow State Technical University's Innovative Technology Center, collaborating with VTZ environmental specialists, are now studying carbon dioxide absorption by the plants and the expansion of the seedlings' root systems. They are also conducting a comprehensive soil analysis across the pilot plots. The data collected will guide the next steps in the project's development.

GOING FOR GOLD

In partnership with the Russian Football Union (RFU), TMK hosted the TMK: Football Lessons sports festival in Chelyabinsk, attracting over 800 participants, including teachers, coaches, and young soccer players from sports schools and clubs, as well as children of TMK Group employees.

This TMK-sponsored event, held for the third consecutive year, featured RFU ambassadors and football legends. Among the guests were European Championship bronze medalists Diniyar Bilyaletdinov and Igor Semshov; Ruslan Pimenov, two-time Russian champion and Super Cup winner; Elena Terekhova, two-time Russian champion and Russian Cup winner; Alexei Gasilin, a Euro Under-17 and Euro Under-19 winner and Russian Premier League silver medalist; and Boris Nikonorov, FIFA Beach Soccer World Cup champion.

During the two-day festival, these football stars led workshops for young players and training sessions for physical education teachers and coaches from sports schools.

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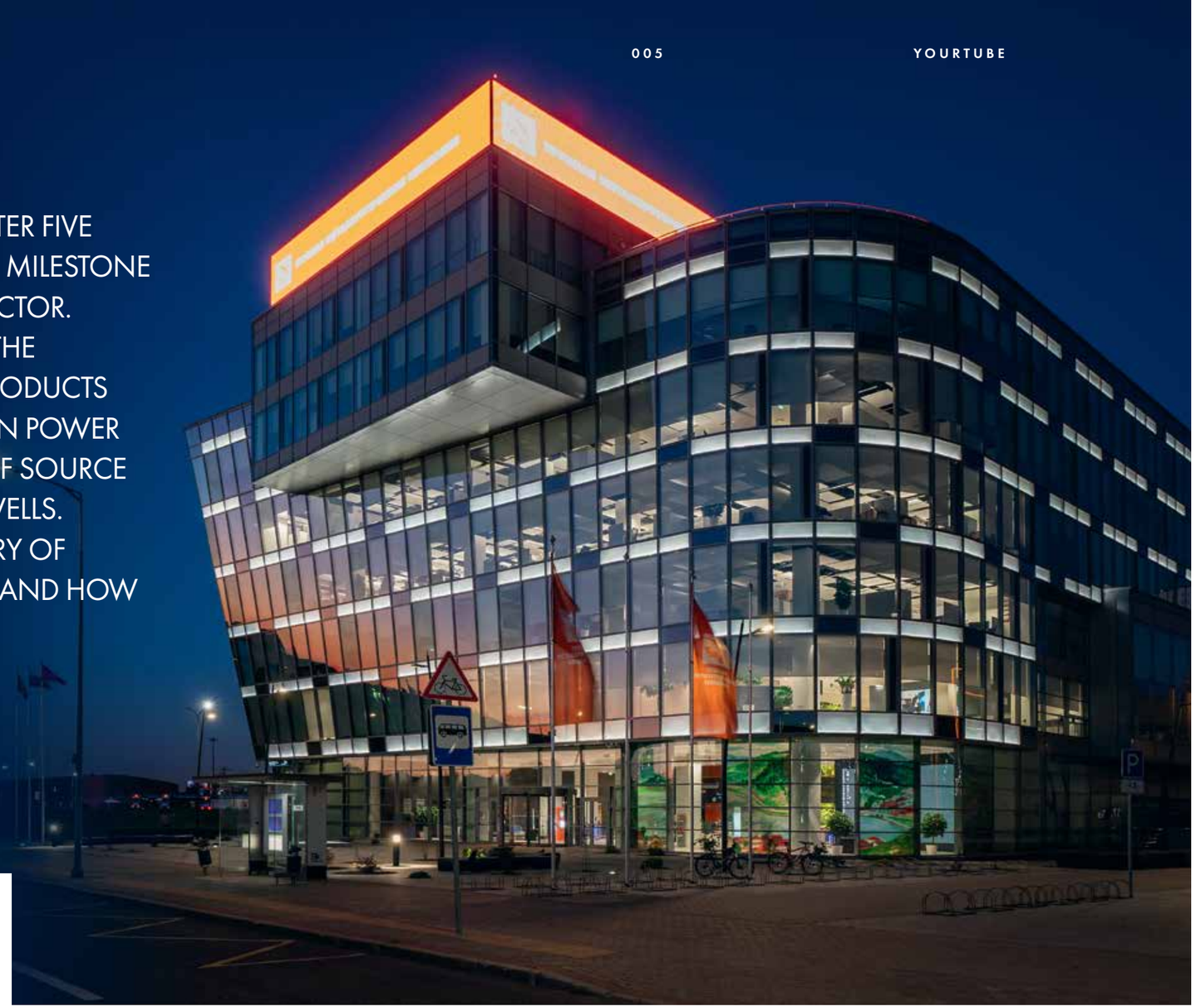
WHERE FEW HAVE DARED TO GO

THE LAUNCH OF TMK'S R&D CENTER FIVE YEARS AGO WAS AN IMPORTANT MILESTONE FOR RUSSIA'S METALLURGICAL SECTOR. IT HAS SINCE BROUGHT TMK TO THE CUTTING EDGE OF HIGH-TECH PRODUCTS IN EVERYTHING FROM HYDROGEN POWER TO THE THERMAL STIMULATION OF SOURCE ROCKS IN HARD-TO-REACH OIL WELLS. YOURTUBE BRINGS YOU THE STORY OF TMK'S BIG BET ON INNOVATION AND HOW IT'S PAID OFF.



The R&D Center's building was constructed with the highest environmental standards in mind

R&D plays a pivotal role in any manufacturing company, serving as the engine that drives innovation and leads to better, faster and more cost-effective products. TMK's management always believed that investing in a strong R&D department would offer the company a competitive edge, and today the company has become one of very few pipe manufacturers in the world to operate an in-house R&D platform and test benches for new types of products.

CONSOLIDATING EXPERTISE

TMK first overhauled its R&D department back in 2007, when it acquired the Russian Research Institute of the Tube & Pipe Industries (RUSNITI), the largest industry-specific R&D Center in Russia. The Institute's experts became the core of the company's R&D, working on strategic business objectives such as improved production efficiency, better quality products and a wider range of services to offer customers.

Guided by TMK's business objectives, RUSNITI started coordinating the activities of R&D teams across TMK plants. New

The foundation stone laying ceremony at the construction site of TMK's R&D Center's building was held in Moscow in 2015. The Center's location in Russia's innovation cluster has unlocked a wide range of opportunities for collaboration and synergy with other companies. The building also hosts TMK-Premium Service (a developer of designs for high-tech threaded connection lineups for OCTG products) and TMK2U Corporate University's campus.

The prototyping laboratory specializes in the production of pilot samples of premium threaded connections for further research of their properties using physical modeling methods

divisions set up at the Institute included Materials Science, Heat Treatment, Process Modeling, Seamless and Welded Pipes, Development of New Pipe and Cylinder Designs, Threaded Connections and Coating Solutions, as well as a Scientific and Economic Analysis Unit.

The launch of the R&D Center in Moscow in 2019 was an important milestone toward enhancing TMK's research and development activities. The Center combined its efforts with RUSNITI to lead the company's R&D practices. This move brought the company's materials science and research expertise to a whole new level. The Center's integrated capabilities have helped to step up the development of new materials, designs and connection solutions for increasingly complicated hydrocarbon production conditions as well as other applications.

Currently, the R&D Center's building occupies an area of 16 thousand sq. meters. The facility operates eleven research laboratories to study the physical and chemical properties of metals and analyze metal condition and structure. It also houses Russia's first integrated set of test benches built for testing new products – high-strength pipe connections for hard-to-recover oil and gas reserves. These facilities can be used to test full-scale pipe specimens, manufacture prototypes, and check whether products are ready for certification tests. Before the launch of the R&D Center, such tests were only available abroad and were costly, bureaucratic and time-consuming.

The facility was the first to conduct full-scale pipe specimen tests in Russia

TURNING UP THE PRESSURE

TMK's scientists conducted the first tests at the R&D Center in 2021, when the team verified TMK UP CENTUM premium threaded connections'

The R&D Center has unique benches. The first one is used to test tensile or compression strength of pipe specimens with diameters of up to 762 mm and has a load capacity of 3,000 tons. The second one is used to test specimens with diameters up to 406 mm and has a load capacity of 1,800 tons. During tests, pipe temperatures can reach 350 °C at a maximum internal and external pressure of more than 2,000 bars, exceeding all existing requirements for oil and gas tubular products by a wide margin. The test benches also support bending tests, with a maximum bending angle of 20 degrees for a 30-m specimen.

> 400 specialists

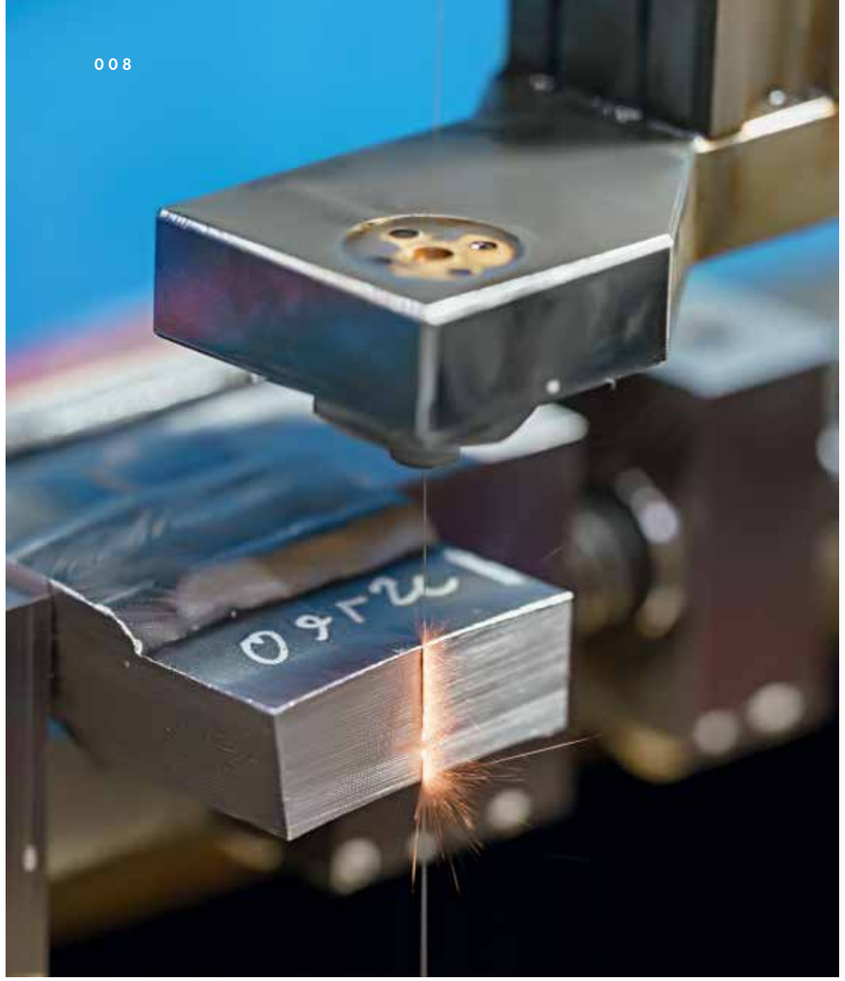
11 laboratories

3 test benches

Igor Pyshmintsev,
TMK's Director for Research Development, CEO of RUSNITI, the R&D Center and TMK's Research Center:

"In an age of rapidly advancing technologies and unprecedented challenges faced by the metals industry, it is critical that researchers and engineers have all the necessary resources required for designing and quickly launching high-tech products in the market. The creation of the R&D Center was a turning point for TMK and the wider industry. It was Russia's first platform for comprehensive research and development of next-generation high-strength pipes and solutions for application in aggressive environments and extreme climates and geology.

The Center's launch has gained us a leading position in manufacturing such products and supplied the country's extraction companies with fully Russian-made solutions."



operational properties in line with international standards.

The tests were the culmination of extensive preliminary activities run by the R&D facility's experts to prepare test benches for testing, ensure equipment operability, select the necessary materials and refine the test methods. They also made a prototype of the connection itself.

They confirmed the reliability of premium connections under extreme conditions by physically simulating the behavior of the products under high mechanical loads and elevated temperatures. The test program consisted of several phases spanning more than a month. Researchers kept the test specimen at 290 °C for 120 hours and subjected it to thermal cycling between 40 °C and 290 °C while applying internal pressure exceeding 70 bars combined with axial tension and compression.

THE CUSTOMER COMES FIRST

TMK focuses its research on the needs of its key customers, namely, energy companies requiring tech-enabled solutions to their efficiency.

The company offers proprietary tubular solutions for highly reliable applications, leveraging various strengthening treatment methods and new coatings while improving premium connections and enhancing steel and alloy properties.

But it's not enough to just meet the needs of customers today; TMK has to also anticipate what its clients may need in the future, and be the first on the market to offer it. That's why TMK's R&D team has signed collaboration agreements with all the key players on the market, as well as leading research institutes, the Russian Academy of Sciences and major universities.

"The industry we work in is R&D-intensive, and we are only addressing a small fraction of the objectives that we face using our in-house capabilities. Although our technologies and products rely on the ideas compiled by a great number of our colleagues, we need to understand that it is consumers, or specifically their R&D units, that set objectives for us. It may seem that we have achieved perfection today, but tomorrow we need to be even better, stronger, and more reliable," highlighted Igor Pyshmintsev. TMK is enhancing the equipment fleet of its R&D Center to expand its range of tested products and address new customer requests.

INNOVATION FOR THE FUTURE

Building digital capabilities is a key focus area for the research conducted by the R&D Center. In 2019, TMK set up a digital center of excellence, TMK R&D Digital. Its specialists engage in designing and deploying new digital tools and technologies.

Its latest developments include digital twins of rolling mills, pipe quality monitoring and assurance systems, smart manufacturing-execution systems, application programming interface (API) services and advanced analytics solutions.

TMK's R&D efforts also extend into the green revolution: the company is currently developing next-generation products for the production, transportation, storage and use of hydrogen in the energy sector. The company set up a dedicated unit to study the behavior of various materials when interacting with hydrogen under different conditions. And these efforts have already yielded results: TMK recently unveiled its Sputnik H (pipes for the production, distribution, transportation, and storage of hydrogen) and Sputnik C (intended for CO_2 capture, distribution, transportation, and storage facilities) range of products for hydrogen energy.

Last year, TMK successfully tested casing pipes made using laser-hybrid welding of longitudinal seams for high-pressure gas pipelines. This globally unparalleled technology was first developed at the Chelyabinsk Pipe Plant, with TMK now scaling the project and preparing it for commercialization.

TMK's R&D focus areas:

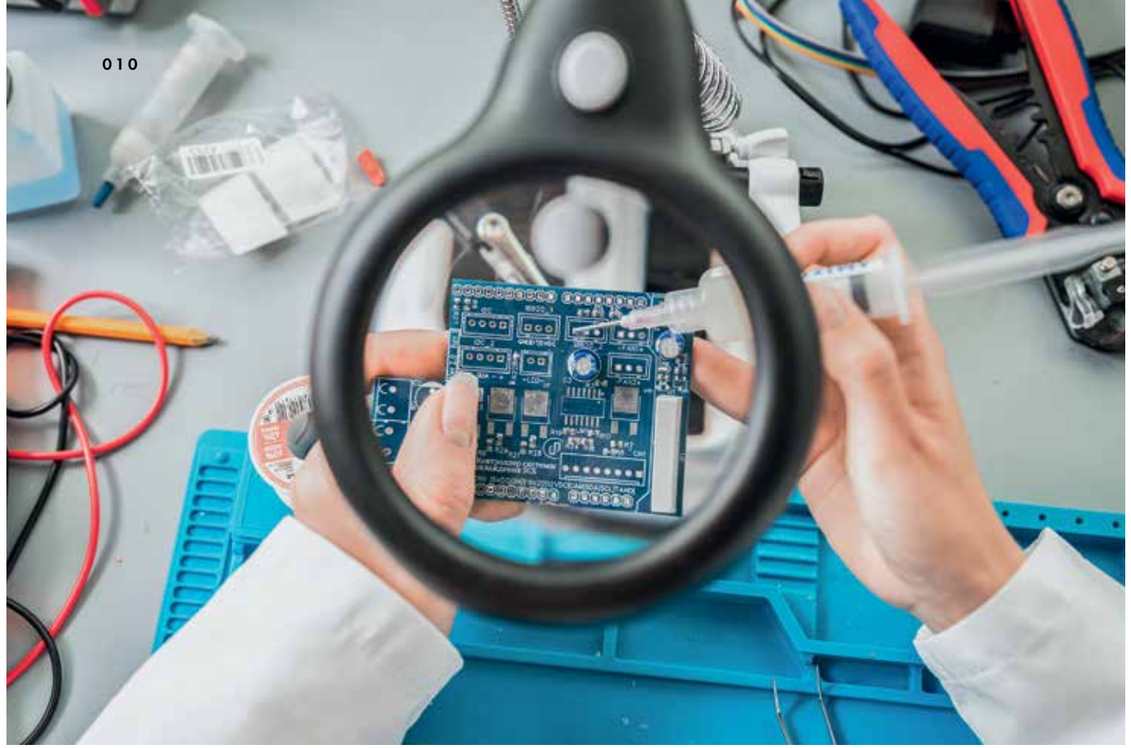
- materials science
- seamless pipe production technology
- welded pipe production technology
- design
- digitalization

Electrical discharge machining prepares a specimen for mechanical tests

Scientists can observe a product's metal microstructure using transmission electron microscopy

The R&D Center's engineers are currently developing both stationary and mobile hybrid welding facilities for trunk pipeline welding applications. The technology's advantages include high strength and minimal deformation. TMK has already applied for certification of its welding technology, including through field tests.

TMK's R&D priorities also include looking for energy-efficient and economically viable methods of producing hard-to-recover oil reserves. One such solution is high-temperature thermal and chemical stimulation of reservoirs, with supercritical water heated to 450 °C and injected at 400 atm. This technology is considered to be an effective method to enhance oil recovery many times over. However, the market does not yet have equipment to support the implementation of this solution at temperatures above 350 °C.



Teamwork lies at the heart of innovation at TMK

The facilities allow engineers to create electronic components for smart systems

Mechanical testing can be conducted using a unique three-zone testing machine

To tackle this challenge, the R&D Center's specialists are developing a downhole solution for thermal and chemical stimulation of source rocks. The first elements of this solution have already been tested on the R&D Center's test benches. The Center's engineers are planning to create full-scale prototypes for pilot tests on real wells.

PEOPLE POWER

"When TMK's R&D Center was launched in Moscow on September 23, 2019, it employed some fifteen researchers and started testing the equipment's first stage, including bench tests for threaded connections," recalls Pyshmintsev. "Our team has already grown to 250 people, with every TMK plant having its own researchers and engineers, and close to a thousand people working at laboratories and in technical units, responsible for the manufacturing of new types of products. Another 40 people work across various areas at the center of excellence."

In 2022, as new assets were integrated into TMK, the corporate R&D structure was also transformed and the R&D planning framework updated. Some of the R&D Center's units were spun off into TMK's Research Center. The Research Center has three separate branch offices – in Moscow, Yekaterinburg, and Chelyabinsk – where it consolidates the activities of researchers and developers. The R&D Center and RUSNITI have retained some functions, such as supporting research and providing research and technology services.

Digital capabilities are a key focus area for the R&D Center

"I believe that we have successfully managed to implement the concept of an R&D Center, which is enabling us to provide a full range of services for both internal and external customers," says Pyshmintsev. "This is in line with the company's objectives to accelerate the development cycle and launch production of new types of threaded connections as well as new materials and solutions. TMK's R&D Center has been operating for only five years, but has achieved a lot during this short period of time. Our greatest achievement is that we have built a competent and efficient team where everybody supports each other. We feel that our efforts are valued – by the company, industry and our country." **YT**

TMK'S RESEARCH CENTER

THE COMPANY'S R&D CENTER FEATURES MODERN LABORATORY EQUIPMENT AND TEST BENCHES TO DEVELOP MATERIALS, TECHNOLOGIES AND NEW HIGH-PERFORMANCE SOLUTIONS.

MATERIALS SCIENCE

The facility's research laboratories were designed to explore and develop new materials with increased strength and reliability, including those made of special steels and alloys.

Testing composition
Researchers use optical emission and X-ray fluorescence spectrometry methods to determine the chemical composition of bulk samples as well as powders, solutions, and other materials with great accuracy.

Testing properties
Machines that run tension/compression and impact tests help with the study of the combination of mechanical properties of new materials. Tests are carried out in a wide range of temperatures, from –196 °C to +1,200 °C.

Testing structure
Tests are conducted at three scales: macro, micro, and nano. The center's laboratories are equipped with light and electron microscopes complete with extensive analytical capabilities.

Over **100** test pieces were welded by TMK specialists in 2023

SEAMLESS PIPE PRODUCTION TECHNOLOGY

The seamless pipe department runs tests to improve a wide range of technologies and equipment and also launches the manufacturing of new products.

- **screw rolling laboratory;**
- **longitudinal rolling laboratory;**
- **drawing and pressing laboratory;**
- **process modelling laboratory.**

WELDED PIPE PRODUCTION TECHNOLOGY

TMK has been developing laser-hybrid welding technology for many years. A major advantage of this technology comes from focusing the laser beam on a small spot at a low heat input, which enables the thermal impact area to be reduced and, accordingly, ensures the entire length of the welded joint has high-quality mechanical properties.

More than **50** types of threaded connections of various size classes have been developed and manufactured

DIGITALIZATION

The TMK R&D digital center of excellence is focused on deploying artificial intelligence, digital twins and other high-tech solutions.

TEST LABORATORY

The lab conducts physical and mechanical, metallographic, physical and chemical and full-scale testing of threaded connections in accordance with regulatory requirements.

High-precision equipment for new threaded connections drastically speeds up time to production.

DESIGNS

The Prototyping Laboratory. Focuses on prototyping premium threaded connections whose properties are then tested using physical simulation methods.

The Reliability Testing Laboratory. Develops new types of premium threaded connections for OCTG products and improves existing solutions

The Physical Simulation Laboratory. Conducts tightness testing of premium threaded connections for casing and tubing as well as tests simulating various modern hydrocarbon production technologies.

Test benches enable:
- simulation of complex loads/stresses on casing/tubing and connections;
- axial tension and compression up to 3,000 tons as well as transverse bending up to 20° per 30 meters;
- internal and external fluid or gas pressures of up to 2,000 atmp;
- test temperatures between –60 °C and +450 °C.

ACCELERATING INTO THE FUTURE

TMK IS LEVERAGING ITS IN-HOUSE RESEARCH AND DEVELOPMENT (R&D) CENTER TO SOURCE INNOVATIVE SOLUTIONS FROM EXTERNAL STARTUPS. SINCE LAUNCHING ITS CORPORATE ACCELERATOR PROGRAM IN 2021, TMK HAS INTEGRATED 25 INNOVATIVE PROJECTS INTO ITS OPERATIONS, GENERATNG SIGNIFICANT FINANCIAL BENEFITS WORTH MILLIONS OF DOLLARS.

Entering the business world often presents individuals with a challenging choice: safety or freedom. They must decide between following a secure corporate path or taking the plunge to pursue entrepreneurial aspirations.

While corporations and startups are traditionally viewed as distinct career paths, there are emerging opportunities to enjoy the benefits of both. Many organizations today are bridging the gap between these two realms by establishing corporate accelerator programs. The corporate accelerator model serves a dual purpose: it supports entrepreneurs in developing innovative products while simultaneously fostering growth within established corporations. More specifically:

- Corporate accelerator programs are sponsored by established organizations that set the objectives, such as pursuing emerging trends or creating channels for corporate venture capital (CVC) investments.
- They offer funding, mentorship, and office space for a predetermined period, much like seed accelerators.
- These programs typically have limited intakes and collaborate with a select number of companies. Some may not even require external funding from private venture capitalists or angel investors.

That's why corporations the world over have realized the benefits of in-house corporate accelerator. TMK is no different: by collaborating with innovators, the company unlocks access to new technologies while providing startups with financial support and the infrastructure needed to pilot their projects. The model fosters a mutually beneficial relationship where startups gain investment opportunities, and TMK gains access to cutting-edge products and new market avenues.

FOCUS AREAS FOR INNOVATION

Julia Shadrina, Director for Innovative Development at TMK's R&D Center, outlined the key focus areas for proposals: "We are interested in new technologies and materials for the pipe industry, digital products for manufacturing, environmental aspects of metallurgical processes and hydrogen energy, including hydrogen transportation and storage solutions." Each year, the accelerator program emphasizes these topics and collaborates with various partners to implement the most promising projects in TMK's production sites.

With a portfolio boasting over 1,500 projects, the accelerator aims to deploy innovations that can deliver economic benefits and exhibit potential for scalability. In recent years, the R&D Center has developed its own portfolio of innovations that have undergone improvement and are currently in the scaling phase. Notable projects include virtual reality (VR) training at the Volzhsky Pipe Plant (VTZ), a wastewater biological treatment system at the Seversky Pipe Plant (STZ), the adoption of digital employee passports at TMK NGS in Buzuluk and an additive manufacturing project at the Chelyabinsk Pipe Plant (CHTPZ).

Igor Pyshmintsev,
TMK's Director for Research Development, CEO of RUSNITI, the R&D Center and TMK's Research Center:

"We seek breakthrough solutions and new talents to shape the future of the metals industry. Our R&D Center, equipped with advanced testing and laboratory facilities, provides a platform for developing promising startups, while TMK's plants act as launch pads for successful collaborations."

REVOLUTIONIZING TRAINING WITH VR

Starting in 2023, VTZ has implemented a VR training simulator designed to train operators of high-tech production equipment. This innovative hardware/software solution immerses employees in a realistic operating environment via VR glasses, allowing them to practice equipment settings and quality monitoring without risks associated with real-world operations.

TMK's accelerator teams collaborated on the simulator's development, resulting in the deployment of two units—one at VTZ and another at TMK Pipeline Solutions. Future plans include developing a similar training simulator for specialists engaged in manual ultrasonic thickness gauging.

ADDITIVE MANUFACTURING: A COST-EFFECTIVE SOLUTION

At CHTPZ, the adoption of additive manufacturing is changing the landscape for replacing non-working tools. Utilizing a 3D modeling solution from the accelerator program, CHTPZ scans

Corporate accelerator boasts more than

1,500 projects

25 solutions have already been deployed at TMK's production sites

existing parts and prints mockups that serve as blueprints for production. This reverse engineering approach often proves far more cost-effective than purchasing new tooling for imported equipment.

With the help of 3D modeling, CHTPZ can manufacture parts for rolling mills, cutting machines, and auxiliary equipment. In one instance, the new technology allowed the plant to replace tool holders in cutting machines and create cutter holders for a sizing mill. While many metal parts are produced by third-party manufacturers using 3D-printed mockups, CHTPZ is also capable of producing some plastic components in-house, such as couplings with polyurethane elements designed to protect machinery.

PRIORITIZING SAFETY AND COMPLIANCE

At TMK NGS-Buzuluk, the company is preparing to launch a comprehensive system for digitizing employee training and knowledge assessments in occupational health and safety. This new platform will streamline audits, control procedures, health checks and the issuance of personal protective equipment, significantly minimizing risks associated with workplace accidents.

Igor Krasnobayev, Managing Director of TMK NGS-Buzuluk, stated, "Digital transformation will not only enhance our employees' safety but also improve our overall production efficiency." The enterprise is also introducing digital employee IDs to maintain a comprehensive record of equipment authorizations and health check certifications for each employee.

These projects progressed through several stages, beginning with the preparation of terms of reference to address production needs. Following an analysis of the open innovation market, TMK's R&D Center identified 30 potential projects, ultimately selecting six for initial commercial deployment. Technical activities are currently underway through collaboration among TMK NGS-Buzuluk, the R&D Center and the software maintenance company responsible for the 1C accounting software at the enterprise.

TMK encourages all employees to submit innovative ideas through the Idea Exchange system

> TMK's experience shows that it is important for developers to work closely with industrial enterprises

EMULATING NATURE FOR ENVIRONMENTAL SOLUTIONS

STZ has recently completed field-scale tests of a novel effluent polishing technology that mimics natural self-purification processes. Developed by a startup through TMK's accelerator, this solution enhances the existing wastewater treatment system by adding a bio-activator derived from chlorella plankton. These freshwater microalgae effectively absorb biogenic nutrients, inhibit the growth of blue-green algae, and release oxygen, thereby reducing bottom deposits by an estimated 20%.

Elena Podgornykh, Head of Environmental Safety at TMK, reported promising early results from the new technology. The accelerator allows STZ to evaluate pilot projects at minimal costs, providing crucial insights before committing to further development and scaling.

ENSURING PRACTICAL INTEGRATION OF INNOVATIONS

TMK's experience underscores the importance of close collaboration between developers and industrial enterprises. Julia Shadrina emphasized, "Startups need to understand that their innovations will be utilized in real-world settings and should seamlessly integrate into our continuous production processes." Often, external developers discover that their products require further refinement after observing the level of automation and digitization at TMK's facilities.

To bridge this gap, TMK educates startups on its production processes. The TMK2U Corporate University has developed a course, Technology for Non-technical Professionals, designed to educate young scientists on the various stages of production processes and the equipment utilized. TMK also offers training at its plant education centers and participates as experts in competitions like INDUSTRIX and Green Tech Startup Booster, evaluating entries for opportunities to implement innovative ideas.

AN ENVIRONMENT FOR CONTINUOUS INNOVATION

TMK's Corporate Accelerator is just one avenue for driving innovation from external sources. In 2022, TMK-Premium Service launched the TMK-Premium Service Pilot Track platform to assess and test startup projects relevant to premium pipe services, high-tech threaded connection development, and business process optimization, targeting major oil and gas companies.

TMK's commitment to innovation also extends to its employees. The annual Horizons forum showcases the Youth Technology and Application Conference (see p. 28), where employees present ideas to enhance production processes. The economic benefits derived from initiatives chosen at this conference exceed $10 million annually.

Furthermore, TMK encourages all employees to submit innovative ideas through the Idea Exchange system. In 2023, over 55,000 suggestions were submitted, with more than 45,000 implemented, often yielding significant economic impacts with minimal investment. **YT**

Since 2023, VTZ has been using a VR training simulator to train operators of high-tech production equipment

A STORY SPANNING THE AGES

THREE MAJOR TMK PLANTS ARE CELEBRATING ANNIVERSARIES THIS YEAR. THEY PLAYED A CRUCIAL ROLE IN THE HISTORY OF THE REGION AND REMAIN ESSENTIAL TO THEIR COMMUNITIES TO THIS DAY. FROM FIGHTING NAZIS TO INSULATING PIPES AND TREATING WASTEWATER, YOURTUBE BRINGS YOU THE UNLIKELY STORIES OF THESE INDUSTRIAL GIANTS IN THE URAL MOUNTAINS.

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.

That is how the story of Seversky Pipe Plant (STZ) began 285 years ago in January 1739. The first manufactured products originated from what was then known as Seversky Plant's bloomery (an ancient type of furnace used for smelting iron from its oxides), likely for military purposes. Later on, puddling and wrought iron production came to replace bloomery smelting, and in the second half of the 19th century, two blast furnaces, two open-hearth furnaces and a rolling mill were put into operation at the plant.

STZ is one of the Urals' oldest enterprises. The plant's success story, which spans nearly three centuries, testifies to the high-class workmanship of its employees throughout the ages

In the 20th century, blast furnaces replaced open-hearth furnaces, and in 2008, they gave way to the modern technology of smelting in electric arc furnaces. The installation of a state-of-the-art electric arc furnace was the final step in setting up an advanced steel making facility at STZ, which had earlier launched a ladle furnace and a continuous caster. With the launch of a new rolling mill in 2014, the plant was able to boost its annual output of high-tech seamless pipes used in particularly harsh environmental conditions.

STZ remains the oldest TMK plant and one of Russia's most tech-heavy enterprises producing a wide range of seamless and electric-welded pipes used across the machine-building, energy, utilities and construction sectors of the economy.

The plant's history goes hand in hand with the development of the city of Polevskoy. For hundreds of years, STZ has been the city's stronghold of stability, inextricably linked with the destinies of generations of Polevskoy residents through involvement in local social and public life. The factory, like all TMK plants, prides itself on the many local families with dynasties of workers that go back generations.

NEITHER SNOW NOR RAIN NOR HEAT

While no TMK plant can match STZ's age, other production facilities have a history that's no less fascinating (albeit, shorter). Sinarsky Pipe Plant (SinTZ) came into being 90 years ago on April 1, 1934, when the enterprise's mold casting shop released its first products. The plant was built from scratch in just three years and evolved into a major production facility during World War II. It produced rolled, drawn, and electric-welded pipes, cold rolled steel bands and heat-treated springs.

The exact site for the future plant was chosen for logistical reasons: it was in close proximity to the Sinarskaya railway station. Today, the plant's vast grounds can only be seen in their entirety from a high elevation, covering an area of over 311 hectares.

Seversky Pipe Plant is the largest enterprise in Polevskoy

SinTZ is one of the largest high-tech seamless steel pipe manufacturers in Russia, comprising five production shops. The bulk of the plant's output is represented by line pipes, drill pipes, casing, and tubing (with solutions for the oil and gas industry accounting for 70% of total production volumes). The plant also produces cold-deformed pipes, including from alloy carbon steels, and precision pipes from stainless steel.

SinTZ's team is particularly proud of its insulated tubing production facility, which produces various designs and size classes. The unique technology was operationalized in 2010. Insulated tubing is intended for oil fields located in the Far North, where it is used for the thermal recovery of heavy, viscous oil, with the steam temperature inside the tube reaching up to 350°C. The solution's specific design prevents permafrost from thawing around the well.

The plant, which remains the city of Kamensk-Uralsky's largest enterprise, pays particular attention to socially significant projects, contributes to creating a comfortable urban environment and provides support for local culture and sports.

Sinarsky Pipe Plant operationalized insulated tubing manufacturing technology in 2010 and later started the production of 13Cr steel insulated tubing

Insulated tubing is used in steam injection techniques for oil recovery

FIGHTING NAZIS

Pervouralsk Pipe Plant (PNTZ) had its first pipe designed in the drawing shop on May 13, 1934. Less than a year later, the plant started producing hot-rolled pipes. By 1941, the plant's products were being shipped all across the Urals, Siberia, the Far East and Russia's central regions.

After the outbreak of World War II, PNTZ's facilities were converted for military purposes. It was virtually the only pipe plant able to fully cover the needs of the country and its defense industry. Throughout the war, PNTZ employees became skilled at manufacturing 129 new types of products that were vital for the armed forces.

After the war ended, PNTZ refocused on peacetime needs. One by one, new shops were opened, while plant employees set new production records and helped rebuild the country from the ruins of war.

In more recent history, the OCTG Finishing Center and the Iron Ozone 32 electric arc furnace shop were completed in 2009 and 2010, respectively, and were a breakthrough for Russia's metallurgical sector. Currently, PNTZ has almost all basic technologies for the production of steel pipe and cylinders, including pipes with premium threaded connections. The plant operates nine main production shops: the electric arc furnace shop, three hot-rolled pipe shops, two cold-deformed carbon and alloy steel pipe shops, an electric-weld pipe shop where pipes are manufactured by electric resistance welding, the OCTG Finishing Center, and a gas cylinder shop, as well as over 20 auxiliary shops.

As a responsible member of the local community, PNTZ takes its social commitments seriously. This year, the plant sponsored a new healthcare center in cooperation with the city's main hospital, helped install street lighting on the hospital grounds and build access roads to the ER unit. Plant employees annually plant trees and clean up waste in the city.

TMK is strongly focused on water conservation and water treatment initiatives

SinTZ supports cultural and sporting activities in Kamensk-Uralsky and organizes camping events

GOING GREEN

All three plants, STZ, SinTZ, and PNTZ, actively care for the environment, engaging with local communities to roll out new environmental protection practices in line with TMK's policies. These include reducing the plants' carbon footprint, using resources efficiently and managing industrial waste.

SinTZ uses a unique technology that physically reduces the volume of high-moisture waste coming from the plant. Its environmental experts separate waste using geotextile containers in which liquid slurry is poured under pressure. As a result, the liquid passes through the walls of the container, and the compacted and dewatered sludge remains inside to be subsequently transferred for treatment to a specialized organization.

Meanwhile PNTZ recently launched its AQA Genesis wastewater treatment facility, designed to create a closed-loop water recycling system for the pipe rolling production process to reduce its environmental impact. The AQA Genesis facility allows staff to lower the content of suspended solids in water used by the plant's rolling shop by seven times, iron by six times and petroleum products by more than 100 times and cuts the overall discharge of the enterprise's industrial wastewater by 30%.

STZ has upgraded its bioengineered effluent polishing system, which is based on a string of biological ponds located in a specific order. Together, they ensure all water flowing through the system (about 16 thousand m^3 per day) is thoroughly cleaned. The water in the system is treated to quality standards for fisheries, which are even more stringent than requirements for drinking water.

COME ONE, COME ALL!

TMK is no stranger to industrial tourism and the experience economy: all three plants welcome visitors regularly and offer captivating programs for even the most seasoned tourist.

The company's most famous tourist attraction is the Severskaya Domna museum complex in Polevskoy, which reopened in 2022 after a massive refurbishment, adding 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. "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."

The AQA Genesis complex in Pervouralsk offers a closed-loop water recycling system

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. At its heart is the blast furnace, a masterpiece of 19th century Ural industrial architecture. Local preservationists were able to keep the furnace, only one of its kind on display in Europe, largely intact, treating visitors 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 international Night of the Museums event at Severskaya Domna and the complex has hosted over 100 thousand guests to date. Today the museum complex enjoys a perfect 5-star rating on TripAdvisor (in English).

Since 2016, the Severskaya Domna museum complex has been participating in the worldwide Night of Museums event

Meanwhile, to mark its anniversary, PNTZ completed a major revamp of its Pervouralsk-based corporate museum under the new name of the Museum and Exhibition Center of PNTZ. It plans to host up to 15 thousand visitors every year.

The museum was designed for the greater public and occupies five rooms, tracing the history and milestones of the plant as well as those of the city and the metals industry in the Urals. Blending history and modernity, it offers visitors multimedia and interactive experiences.

In 2021, SinTZ unveiled the TubeHiTech museum, which offers exhibits of tubular products from all over the world. "It took the company's employees 2.5 years to assemble the unique collection. In total, we have more than 150 exhibits on display," explained Svetlana Russkikh, Head of SinTZ's Personnel Development Department.

TubeHiTech offers insights into the evolution of pipe manufacturing through the use of full-size specimens. The exhibition presents over 150 pipe and tubular products manufactured by TMK plants, while multimedia tools introduce guests to pipe manufacturing processes and applications.

The facility also operates as a student campus of TMK2U Corporate University and hosts various workshops, round tables, youth technology, application conferences and development activities. The campus has facilities for career guidance and educational activities as well as employee training and upskilling.

No major global event or trend of the preceding 90 years (or 285 years – in the case of STZ!) has passed any of the three plants by the side. Throughout wars, reconstruction and new economic realities, STZ, SinTZ and PNTZ have all proven their ability to evolve, adapt to change and remain critical pillars for their communities. TMK is proud to be part of that history. **YT**

SAFETY FIRST!

TMK'S ANNUAL SAFETY DAY HAS CONTRIBUTED TO THE COMPANY ACHIEVING A LOST TIME INJURY FREQUENCY RATE (LTIFR) OF 0.6, WELL BELOW THE INDUSTRY AVERAGE. YOURTUBE REVEALS SOME OF THE HIGH-TECH SOLUTIONS DRIVING TMK'S BID TO ACHIEVE ZERO HARM.

Industrial processes are inherently hazardous, and when accidents or work-related illnesses occur, the consequences can be severe. Therefore, the foremost priority of any steel company must be the health and safety of its workers.

Steel production is a demanding and complex process involving high temperatures, heavy machinery, hazardous chemicals and other physical and environmental risks.

To mitigate these risks and ensure a safe and healthy workplace, strong occupational health and safety (OHS) measures are essential. These include the implementation of safety protocols, regular training on workplace hazards, routine safety inspections, and providing workers with suitable personal protective equipment (PPE).

However, despite improvements in OHS, the sector faces new challenges. Increasing automation, evolving job roles, shifting health and safety risks and insufficient corporate investment in OHS policies and resources create additional concerns. As tasks become more automated, the nature of steelworkers' jobs—and the associated risks—will change. Management and employees must collaborate to address emerging OHS challenges, such as those posed by robotic machinery.

As our understanding of workplace hazards and their impact on workers' health evolves, it is vital that OHS measures keep pace. This requires ongoing vigilance and proactive efforts from workers and employers to identify and manage new risks, including those from emerging chemicals or materials.

SAFETY DAY

That's why TMK conducts annual audits across its enterprises as part of its annual Safety Day initiative, focusing on opportunities to reduce workplace risks. This year, particular attention was given to improving occupational health practices throughout the company.

Since its launch in 2015, Safety Day has involved a range of activities aimed at fostering a safer working environment. In 2023, the event engaged 46,000 employees.

Each year, TMK's industrial sites undergo inspections led by senior management to ensure adherence to safety protocols. For the 2024 inspection cycle, the focus was on electrical safety, potential hazards from pinching between objects, electrical and gas welding operations, manual tool usage and the effectiveness of safety monitoring at both employee and management levels.

"TMK and all our enterprises are committed to achieving zero injuries. This is an attainable goal, and we are making steady progress toward it by taking all necessary measures," said Boris Pyankov, TMK's Deputy Director General – Technical Director. "Employees play a pivotal role in these efforts by ensuring occupational health rules are followed, monitoring their workplaces, and identifying key risks."

Following the inspections, the company held meetings to discuss the findings and develop preventive and corrective measures, aiming to achieve a zero-injury rate across its operations.

COMMUNICATION IS KEY

TMK has also introduced new on-the-job training facilities at its key production sites, including at the Volzhsky Pipe Plant (VTZ) and Taganrog Metallurgical Plant (TAGMET).

At VTZ, management highlighted newly commissioned high-tech Safety Rooms in three workshops. These rooms, unveiled in 2023, serve as dedicated spaces for daily briefings, lectures on OHS and operational meetings. They provide employees with access to regulatory documents and technical instructions, ensuring they are up-to-date on safety protocols. The Safety Rooms are equipped with multimedia solutions, which have been further enhanced, such as the recent integration of the Rolling Shop No. 1 room with the plant's video surveillance system. This allows visitors to observe production processes remotely, reducing their exposure to potential hazards.

The Safety Rooms were built using modular units and feature durable materials, designed in TMK's brand colors to fit seamlessly within the existing production environment.

Meanwhile, at TAGMET, a new training facility within its power shop was opened on Safety Day, dedicated to training crane operators and slingers. The space is divided into functional areas where employees can practice the safe operation of lifting devices. The facility also includes a simulator, enabling workers to test their knowledge and strengthen their understanding of OHS procedures, including emergency response protocols.

These initiatives are part of TMK's broader commitment to enhancing safety across its operations, ensuring employees receive thorough training and support in maintaining safe working conditions.

ON-THE-JOB TRAINING

Pervouralsk Pipe Plant (PNTZ), part of TMK Group, is advancing its workplace safety initiatives with a series of projects aimed at reducing injury risks and enhancing working conditions. These efforts form part of the steel giant's broader safety program, which includes cross-audits and extensive first aid training.

PNTZ has implemented cross-audits across its production facilities, initially focusing on shop floor monitoring and gradually expanding to cover all operational areas. These audits are now a standard safety procedure across TMK's global network. A dedicated team, including foremen, health and safety officers, and volunteer rescuers, participates in the audits to identify potential hazards and recommend improvements. The rescuers, part of the Volunteer Rescuer movement, are certified instructors who train colleagues in essential first aid techniques.

This initiative follows the Russian government's recent resolution mandating that all employees in industrial enterprises undergo occupational safety training and testing of safety knowledge. As a result, all TMK workers are now required to acquire first aid and emergency response skills as part of their ongoing safety education.

Beyond risk mitigation, TMK has focused on improving working conditions. At Chelyabinsk Pipe Plant (CHTPZ), the control room of Rolling Shop No. 2 underwent significant upgrades, including major repairs and the installation of a modern air conditioning system. The refurbishment, completed in spring 2023, provided operators with a safer and more comfortable work environment.

THE TECH BEHIND THE TALK

New digital tools and innovative measures aimed at improving safety standards across production facilities are playing a key role in TMK's OHS drive. Sinarsky Pipe Plant (SinTZ) and TMK-INOX are leading the charge by implementing cutting-edge OHS management systems and advanced safety technologies.

One key development is the OTPB.Online OHS management system, which TMK began rolling out several years ago. This digital tool, now widely used across the company's plants, supports walkaround inspections and allows employees to register breaches, such as unsafe acts or conditions, directly through their mobile devices. Line managers receive notifications via email or push alerts to rectify any issues, streamlining the process for quicker responses. The system, which has thousands of active users, was further expanded in 2023–2024 to cover smaller TMK companies and subsidiaries, including TMK Power Network Company and TMK TechService.

At Seversky Pipe Plant (STZ), TMK has introduced a range of high-impact initiatives designed to enhance safety and comfort for employees. Among these are vending machines that dispense personal protective equipment (PPE) directly at workstations. STZ has also introduced passive industrial exoskeletons, which protect workers' musculoskeletal systems, reduce fatigue, and improve endurance, ensuring a safer and more efficient working environment.

TMK continues to embrace advanced technologies to support workplace safety, including big data analytics through the Incident Library, and smart video cameras. The company fosters cross-plant collaboration, encouraging its sites to adopt best practices and innovative tools sourced from forums such as the Youth Technology and Application Conference. Additionally, TMK informs its workforce of potential hazards through instant leaflets and the Probezopasnost newspaper, which reviews past emergencies and their root causes.

The company's concerted efforts in safety management have led to an impressive Lost Time Injury Frequency Rate (LTIFR) of 0.6, which is below the industry average. Furthermore, in 2023, several TMK sites, including TMK-INOX and TMK Steel Technologies, achieved the milestone of operating injury-free for 12 consecutive months.

Boris Pyankov said: "Workplace safety demands systematic efforts and the attention of everyone involved, without exception. We will continue investing in preventive and corrective measures, improving workplace conditions and upgrading facilities. Most importantly, we will keep engaging our employees in identifying risks and advancing our operational safety culture." **YT**

Safety Rooms at VTZ serve as dedicated spaces for daily briefings, lectures on OHS and operational meetings

Participants of the Volunteer Rescuer movement are certified first aid instructors

BEYOND THE HORIZON

THE 20TH ANNUAL HORIZONS FORUM, HOSTED BY TMK'S CORPORATE UNIVERSITY, CONCLUDED IN SOCHI AT THE END OF SEPTEMBER, MARKING A MILESTONE IN THE COMPANY'S COMMITMENT TO INNOVATION AND PROFESSIONAL DEVELOPMENT. OVER 1,100 PARTICIPANTS FROM TMK FACTORIES AND PARTNER ENTERPRISES GATHERED TO PRESENT PROJECTS AIMED AT ENHANCING PRODUCTION PROCESSES, MANAGEMENT PRACTICES AND THE CREATION OF NEW PRODUCTS AND SERVICES. THE CUMULATIVE ECONOMIC EFFECT OF INITIATIVES LAUNCHED AT THE FORUM OVER THE PAST TWO DECADES IS ESTIMATED AT MORE THAN 80 BILLION RUBLES ($830 MILLION).

600 participants

65 enterprises

8 days

4 tracks

9 speakers

12 hours of sporting events

The TMK Leadership Workshop aims to select and nurture young leaders among frontline managers

The organizers of this year's forum, themed "Above the Horizon Line," ambitiously aimed to reach new heights and set records in all areas of its operations, with over 400 projects presented across nearly 200 events. Praised by participants as both an intellectual and athletic Olympiad, it featured high-level brainstorming, scientific debates and personal development workshops. In addition, it marked the 50th anniversary of the forum's long-time venue, Burgas health resort, as well as the anniversaries of TMK's Leadership Workshop contest and its comedic festival, KVN.

"The Horizons forum is particularly special this year, not only because it marks its 20th anniversary, but because of the significant impact it has had on the careers and development of our employees," said Elena Pozolotina, TMK's Deputy General Director for Human Resources and Director of TMK2U. "The forum is a key driver of our corporate culture, contributing to financial results, identifying talented personnel, and fostering team cohesion."

Divided into three streams, the IT track was the forum's largest

A focal point of the event was the Youth Scientific and Practical Conference

SUSTAINABLE DEVELOPMENT

A focal point of the event was the Youth Scientific and Practical Conference, where employees defended their projects in four categories: SMART Metallurgy, Business, Digital and Sustainable Development Strategy.

With 29 projects evaluated, the Sustainable Development track saw the most participation. These initiatives focused on automating HR processes, including artificial intelligence solutions, talent retention, motivation systems and service quality improvements. Arstan Zhalgaspaev, Head of Organizational Development at TMK Pipeline Solutions, emerged as the track's winner. His proposal for real-time management of production staff using interactive dashboards was lauded for its efficiency.

"It's great to win at Horizons, not only because it's an honor, but because my project will be implemented within the company. The dashboards allow for better workforce planning, reducing routine tasks for me and my colleagues," said Zhalgaspaev.

Andrey Kaplunov,
TMK Vice President:

"The Horizons forum, established 20 years ago, unites youth, science and practice. The effectiveness of the ideas generated and implemented through this significant event in the lives of TMK and its partner companies is evidenced by the economic impact of optimizing production and business processes and introducing advanced technologies. Over the years, hundreds of employees have discovered their scientific and creative potential through the forum. Research and development applicable in metallurgy and other sectors of the Russian economy are crucial for us. I am confident that many of the participants' ideas will soon be realized."

This year, Horizons introduced a new Open Innovations track. Projects included water purification technologies, the development of new large-diameter two-weld pipes, and strategies to extend maintenance intervals for reheat furnaces.

The outstandingly novel ideas presented prompted the jury to award two projects for first place. Nadezhda Tomilina, a senior engineer at TMK, was recognized for her project to reduce pipe diameter variability and improve expansion productivity. Mikhail Chubukov, Head of the Central Laboratory at Volzhsky Pipe Plant, was also honored for his work on producing copper mold tubes from in-house raw materials.

"My proposal focuses on expanding our competence in manufacturing copper mold tubes. This process will ensure raw material security for the company, allowing us to create a closed-loop production system," said Chubukov.

THINKING DIGITALLY

As one of the forum's largest, the IT track, was divided into three streams: infra++ (infrastructure), sec++ (security), and dev++ (development). Over 60 participants from TMK's and its partner companies spent six days designing strategic software, deploying infrastructure and defending it from external threats. Highlights included drills, hackathons and Pecha Kucha-style presentations.

"For the past few years, the IT track has functioned as its own forum within Horizons. Each year, TMK++ experts and TMK2U's Corporate University refine the track to focus on practical exercises where IT specialists can showcase their skills," said Dmitry Yakob, TMK's Deputy General Director for Information Technology. This year, students from the Engineering Olympiad, held as part of the Russian national "I Am a Professional" competition, participated in the IT track for the first time.

Projects across the forum's 20 tracks spanned areas such as occupational safety, production automation, machine vision, artificial

Elena Pozolotina,
TMK's Deputy General Director for Human Resources and Director of TMK2U:

"The 20th 'Horizons' forum was unprecedented in terms of participant numbers, presentations, and the richness of the business and sports program. Among the delegations are those who have participated before, yet 55% of the participants at this anniversary forum are newcomers. Like 20 years ago, talented young individuals attend the conference to engage in the growth of a major company, address current challenges, and propose ambitious projects."

Ten teams tried to win over the jury with humour. PNTZ team «Anatomy of Metal» took gold

intelligence and the development of high-tech products, aiming to improve the quality of stainless-steel pipes, optimize production costs and enhance energy efficiency. With feedback from expert juries, the presented projects will be ready to be implemented across TMK and its partner companies.

Key events were also streamed via TMK's corporate mobile app, Mobi2U, allowing hundreds of employees and mentors to support participants virtually.

CHECKMATE

This year's forum featured the 15th edition of the TMK Leadership Workshop, a competition aiming to select and nurture young leaders among frontline managers. This year's record number of participants showcased 23 employees vying for the championship title.

Judges evaluated performances based on ten management competencies, including organizational abilities, delegation skills, analytical thinking and problem-solving agility.

"The competition provides a comprehensive assessment of knowledge across vital areas such as occupational safety, quality management, environmental aspects, management systems, ethics codes, materials science and metallurgy. Understanding the company's core products is essential for all leaders, regardless of their field. Feedback from the expert jury helps participants identify strengths and areas for improvement, allowing them to continue developing their managerial skills," said Olga Rud, Director of Client Program Development at TMK2U Corporate University.

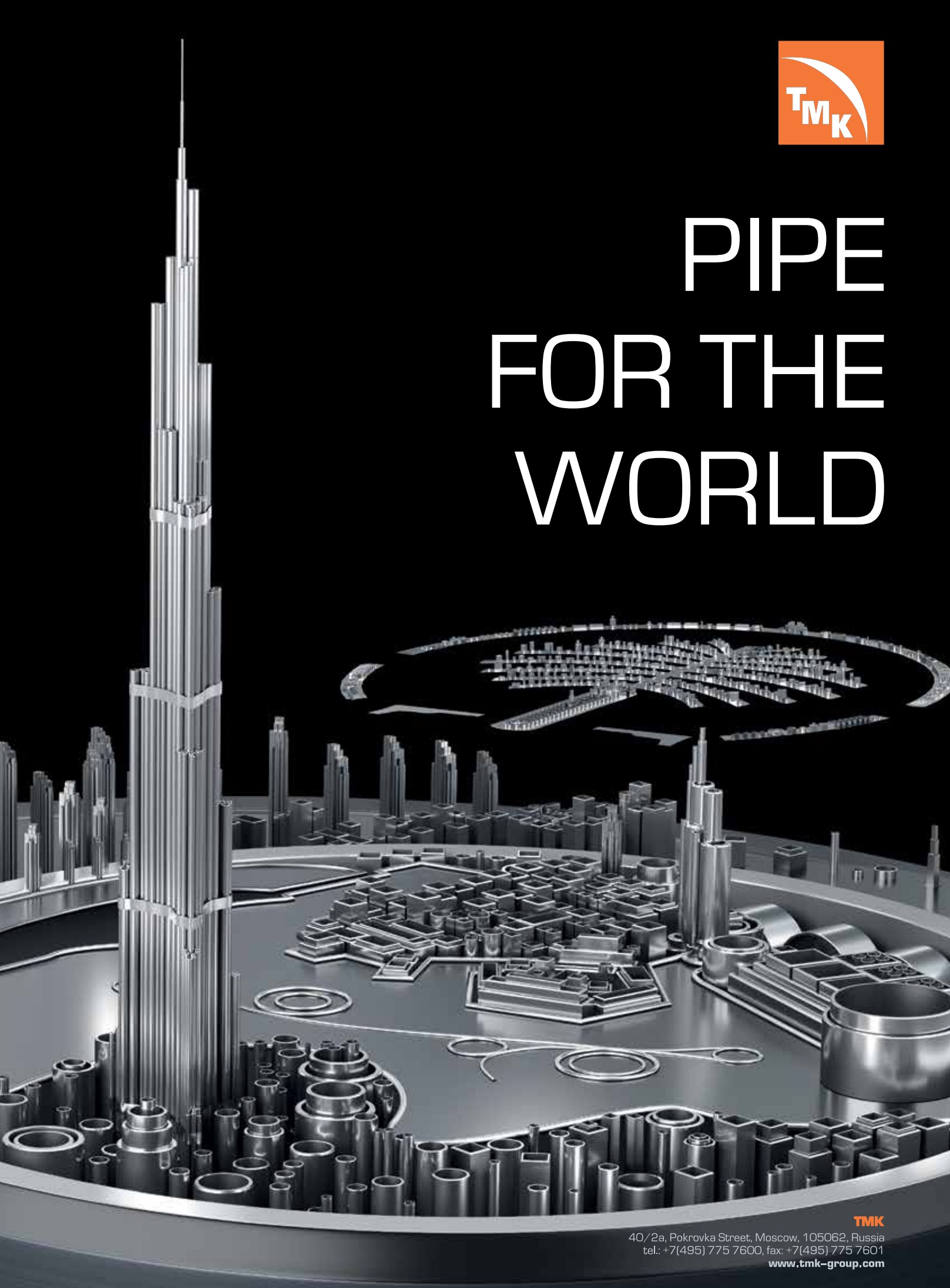
"This competition is very significant for me; it promotes personal development, allows me to showcase my abilities, compete with others, and learn new management techniques," shared silver medalist Evgeny Lebedev, an equipment repair master at the Volzhsky Pipe Plant.

The chess tournament, featuring 15 teams from TMK and partner companies, brought together masters of their craft, practicing strategies such as developing pieces, controlling the center and safeguarding the king. The opportunity to compete against a renowned chess grandmaster was one of the highlights of the tournaments. To increase the challenge, the rapid chess format adopted provided limited time to participants to ponder their next moves. The championship title went to the Pervouralsk Novotrubny Plant team.

The Volga team took 1st place in the Horizons mini-soccer tournament

GOING BEYOND THE HORIZON

Over 100 winners and laureates from the Youth Scientific and Practical Conference celebrated victory at the closing ceremony. **YT**



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