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International Association “Welding”

The Paton Welding Journal

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- «Avtomatychne Zvaryuvannya» (Automatic Welding), https://patonpublishinghouse.com/eng/journals/as;
- «Suchasna Elektrometalurhiya» (Electrometallurgy Today), https://patonpublishinghouse.com/eng/journals/sem;
- «Tekhnichna Diahnostyka ta Neruinivnyi Kontrol» (Technical Diagnostics & Nondestructive Testing), https://patonpublishinghouse.com/eng/journals/tdnk.

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**Translated Article(s) from “Tekhnichna Diahnostyka ta Neruinivnyi Kontrol” (Technical Diagnostics & Nondestructive Testing), No. 3, 2024.

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FABTECH 2024 EXHIBITION

ARC SPECIALTIES AND ASM INTERNATIONAL

At the invitation of Dan Allford, President of Arc Specialties, Houston, USA, as part of long-term co-operation with the E.O. Paton Electric Welding Institute (PWI), a business visit to the USA was held in October 2024 of Dr. Volodymyr Kachynskyi, a senior scientist at the PWI. The program of the visit included presentations of the latest results of the PWI work on scientific achievements in the development of advanced technologies of welding and related processes such as flash butt welding, electron beam welding and additive technologies, narrow gap welding, manual laser welding, explosion technologies, underwater welding and cutting, electron beam welding in space, high frequency live tissue welding, microplasma spraying, plasma-inductive process of single crystals tungsten growing, method for determination of residual stresses in welded joints, magnetically impelled arc butt welding (MIAB) also their industrial application for the purpose of economic growth. During the visit, presentations were held by Arc Specialties.

Presentation at Arc Specialties with live demo MIAB welding

Presentation of PWI developments for ASM International, Houston, USA

Arc Specialties is the leading supplier of choice for automated manufacturing systems with over 40 years of experience in 33 countries around the world: from different arc welding technologies, 3D cladding, hardfacing and plasma cutting to material handling, precision positioning equipment and assembly hard automation. And the American Society Metals (ASM International) with the support of Jean-Marc Tetevuide, business development specialist at Har-Bach Fusion Technology Company, for representatives of scientific organizations and industrial companies in the USA. ASM International is an association for attracting specialists in the field of materials science and their organizations to the resources necessary to solve scientific and technical problems in order to achieve the required results. The total number of people present was approximately 120 individuals.

AMERICAN WELDING SOCIETY

On October 14, the PWI was presented at the American Welding Society (AWS) Annual Business Meeting. During the AWS work, several meetings were held, including with the AWS President in

Meeting with the
Mr. Ernest Levert Sr.,
President of the AWS in 2003

Meeting with Ms. Nancy C. Cole,
President of the AWS in 2013

Meeting with Richard Holdren, coming AWS President in 2025, Dan Allford,
President of Arc Specialties and Dr. Volodymyr Kachynskyi, PWI

2003, Mr. Ernest Levert Sr., the AWS President in 2013, Ms. Nancy C. Cole, and the coming AWS President in 2025, Mr. Richard Holdren.

FABTECH 2024

Additionally, from October 15 to 17, the AWS development, a MIAB welding machine, was presented at the FABTECH 2024 exhibition in Orlando with a demonstration of the welding process. The PWI developed MIAB welding process was included in the 60 coolest technology demonstrations in one video presented at FABTECH, according to the renowned expert Jake Hall, The Manufacturing Millennial. FABTECH Expo is North America's largest metal forming, fabrication, welding, and finishing event.

At the 2024 FABTECH exhibition, over 1,500 companies showcased their products and services to 35,000 exhibitors across 750,000 square feet of exhibit space. Despite the inclement weather caused by Hurricane Irma that impacted Orlando, Florida the week prior, FABTECH was a resounding success. The event attracted a substantial number of exhibitors and attendees, who expressed their optimism about the future of manufacturing globally and in the United States. A notable highlight of this year's FABTECH was the demonstration of collaborative robots (cobots). While arc welding is not traditionally associated with cobot, the collaborative nature of a cobot, coupled with its ability to sense human contact and deactivate before causing harm, enhances the safety of welding operations. Repetitive, routine, and ergonomically challenging tasks can be tedious and hazardous for workers in virtually any manufacturing environment. Cobots can significantly increase productivity levels by automating virtually any manual task, including small batches or quick changeovers. Additionally, cobots can reuse programs to perform repetitive tasks. In the coming years, cobots are expected to witness increased adoption, particularly in welding and cutting applications. This trend is accompanied by a decline in the number of manufacturers, as the current market is overcrowded with new entrants, many of which may not survive beyond a few years. Another area of innovation introduced at FABTECH was 3D printing, or additive manufacturing (AM). While AM is often perceived as a novel technology, welding is one of its pioneering additive technologies. AM is rapidly transitioning from a novelty

FABTECH 2024

The MIAB welding machine was presented at the FABTECH 2024 with a demonstration of the live welding process by Dr. Volodymyr Kachynskyi

to a viable manufacturing method. Much of the work involves the use of gas metal arc welding using small wires, a process known as wire-arc additive manufacturing.

While significant research continues in developing codes and specifications for this new technology, as well as measuring material properties in printed parts, there is scope for innovation in the use of other welding processes with higher deposition rates than traditional GMAW. High-performance AM candidates include electroslag and submerged arc welding. There has been a significant emphasis on automating not only the welding processes, but also the automation of part preparation, machining, cleaning, post-weld inspection, and post-weld finishing. Future manufacturing cells will incorporate more processes in a smaller footprint. There is also a noticeable trend away from traditional capital-intensive procurement of large systems toward more accessible, low-cost models. The first model is robots as a service, where the supplier retains ownership and simply provides the equipment for a fee for a limited time. This allows manufacturers to take advantage of robotics without making significant capital investments. This also justifies the use of robots for shorter production runs.

The second model is leased robots. In this model, the manufacturer retains ownership as well as responsibility for monitoring, software updates, and maintenance. It also eliminates the risk of large capital expenditures. It is likely that both of these models will become more common in the industry. At the ARC Specialties booth, we proudly demonstrated several innovative technologies. The first was the concept of deploying traditional robots in hazardous environments, such as drilling ships in the Gulf of Mexico, to replace humans in physically demanding and dangerous tasks. By making robots mobile, numerous opportunities are opened up for working on stationary or excessively large parts that would be economically impractical to move manually. The second was a robot capable of both welding and cutting in the field on a moving magnetic base. This application utilized a collaborative robot, which improved safety and reduced the size of the robot to allow for mobility in tight spaces and single-handed operation.

Our third exhibit showcased MIAB a technology developed by the PWI. We were fortunate to have Dr. Volodymyr Kachynskyi who contributed to its development, present and demonstrate this unique technology. MIAB is relatively unknown in the United States, and visitors were amazed by its ability to weld small diameter pipes in under four seconds, which would typically take hours using traditional methods. Overall, the exhibit highlighted the rapid pace of technological advances. Computers, sensors, and robots are becoming faster, more efficient, and more accessible, allowing us to solve previously impossible problems. Automating quality control allows for greater measurement consistency and maintaining high levels of product quality. The cobot arm's repeatability of +/–0.03 mm (30 microns) is ideal for automating high-precision operations in quality control and testing. However, it is equally important to maintain a clear understanding of welding processes, parameters, and procedures to ensure success. Despite the challenges caused by the COVID-19 pandemic, trade shows remain indispensable platforms for connecting technology providers with end users. As such, we expect trade shows to continue to play a key role in the future of the industry.

Volodymyr Kachynskyi, PWI, Ukraine,
Dan Allford, President of Arc Specialties, USA

SAZ s.r.o. — RELIABLE MACHINERY FOR THE RAILWAYS

SaZ s.r.o. is a Czech mechanical Engineering Company, which since 1954 has specialized in the design, production and repair of special road and railway machinery, road-rail vehicles (double-track machines), in particular rail machines with telescopic lifting platforms, insulated platforms for working with contact wires and rail layers, machines for flash-butt welding of rails, railway track layers and other equipment designed for servicing the railway and tram tracks.

SaZ s.r.o. production range includes railway platforms and transporters, railway boogies, body superstructures, access ramps, etc.

SaZ s.r.o. main clients are large construction companies, municipal transport companies, fire and road transport services, as well as small companies, involved in maintenance and repair of railway and tram tracks.

Since 2011 **SaZ s.r.o.** has also concentrated on engineering, namely: highway construction, road construction, railway construction, real estate construction and other construction work.

Over these years **SaZ s.r.o.** Company has grown and has become one of the main suppliers not only in Czechia and Slovakia, but also in many other countries, for instance in Denmark, Italy, Hungary, Poland, Germany, France, Spain, Austria, Bulgaria, Latvia, Lithuania, India, Australia, Azerbaijan, Ukraine, Ghana, Israel, and oth.

Continuous investments into research and development allow **SaZ s.r.o.** Company proposing innovative and high-quality products, which meet the highest technical standards and clients' requirements. Our modern production facilities and a team of qualified experts ensure that each product leaving our shops is a guarantee of reliability and productivity.

SaZ s.r.o. double-track machinery performs the tasks of renovation and construction of the tracks, cleaning the railway track from sand, dirt, snow, maintenance and upgrading of power transmission lines. The Company product line also includes special double-track fire trucks

Double-track machine DUOLINER MIJ is designed primarily for conducting expert operations on bridge structures, diagnostics and detailed inspection of both road and railway bridges

Double-track machine R DUOTRAM H is designed for movement and working on the motor roads, railway and tram tracks, predominantly for maintenance of contact lines

Double-track machine IT DUOLINER is fitted with a working platform with scissors for railway maintenance, hydraulic valve and measuring pantograph

Company Certification. In addition to certificates of quality control system ISO 9001:2015, certificates of the environmental management system ISO 14001:2015 and certificate of conformity of production management EN ISO 3834-2:2005, **SaZ s.r.o.** also has other certificates that demonstrate a high standard of quality.

UKRAINIAN-CZECH COOPERATION

Seventy-year experience of **SaZ s.r.o.** successful operation has found its implementation in solving the ever-present problem — creation of efficient equipment for welding the railway rails. In 2023 **SaZ s.r.o.** Company in close cooperation with the E.O. Paton Electric Welding Institute (PWI) of the NAS of Ukraine successfully set up production of double-track

rail-welding complexes **WELDERLINER**, fitted with K922-1 mobile machines for flash-butt welding (FBW).

SaZ s.r.o., which previously did not specialize in welding equipment, mastered production of K922-1 machines for FBW in a very short time frame, ensuring an extremely high production quality.

Mobile (suspended) K922-1 machine is an original development of the PWI and it implements the innovative technology of pulsed flash-butt welding. K922-1 machines are fitted with a modern computerized system of multifactor monitoring of welding parameters, high-speed hydraulic drives, as well as a cutting device, which removes the hot flash without unclamping the welded rail section. The welded butt joint can be held during the time required for cooling of the joint to the specified temperature. K922-1 machines have been successfully used, as part of mobile rail-welding complexes, for dozens of years in many countries of the world on all the continents, both for construction and repair work on rails of any types and dimensions.

Double-track **WELDERLINER** complexes, fitted with K922-1 machines, meet all the requirements of the international safety standards for the quality of welded butt joints of rails, and the requirements on EU environmental indicators.

SaZ s.r.o. Company has successfully fulfilled the contracts for supplying several rail-welding **WELDERLINER** complexes to customers in the EU countries. **WELDERLINER** complexes have successfully passed comprehensive testing specified by the European standard EN 14587-2:2009.

For Ukraine, as a country with an extremely extensive network of railways, introduction of **WELDERLINER** complexes, fitted with modern mobile K922-1 machines, is highly relevant. **SaZ s.r.o.** Company provides maintenance of **WELDERLINER** complexes, service, training of the operators and engineering personnel. All the testing and adjustment operations in the rail-welding complexes of **SaZ s.r.o**. Company are conducted with the participation of PWI specialists.

WELDING WIRE FROM “DNIPROMETYZ TAS” YEAR-END RESULTS AND INNOVATIONS FOR THE FUTURE

The year 2024 has been a period of significant achievements for “DNIPROMETYZ TAS” in welding material production. By focusing on quality, innovation, and expanding its product range, the Company has strengthened its position in domestic and international markets. The factory’s products, including G3Si1 and G4Si1 grades, have gained customer trust in various economic sectors, from construction to mechanical engineering.

Since the launch of cutting-edge production lines for welding wire by the Swedish manufacturer Lämneå Bruk AB, the welding wire manufacturing and sales division has achieved a leading position among Ukrainian producers, even amid wartime challenges, reaching over 1,500 tons per year.

PRODUCT RANGE EXPANSION

In response to the demands of modern industries, “DNIPROMETYZ TAS” offers a wide selection of welding wire:

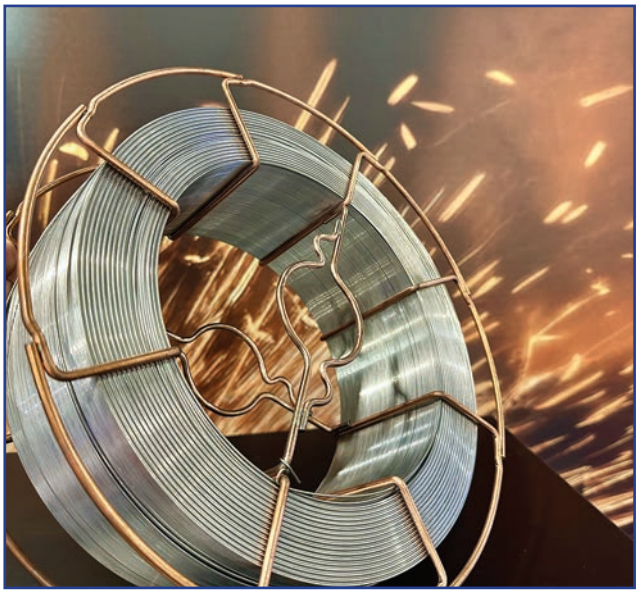
- Copper-coated wire G4Si1 and G3Si1, with diameters from 0.8 to 2.0 mm, available on spools weighing 15, 5, 2.5, and 1 kg. Precision winding ensures stable wire feeding during welding;
- Polished wire without coating, available in diameters of 0.8, 1.0, 1.2, and 1.6 mm on 15 and 18 kg spools;
- Wire for robotic systems in 250 kg drums, optimizing production processes at large enterprises.

EXPANDING INTERNATIONAL INFLUENCE

A key achievement this year was accreditation by Deutsche Bahn. As one of the largest transportation operators in Europe and globally, Deutsche Bahn plays a vital role in mobility and significantly influences the transportation sector. This accreditation confirms the factory’s products meet the highest European Union quality standards.

Additionally, the welding wire successfully passed testing at the E.O. Paton Electric Welding Institute, paving the way for applications in steel bridge construction.

The factory also actively showcased its solutions at leading international exhibitions, such as *Wire 2024* in Düsseldorf, the XXII International Industrial Forum in Kyiv, *WeldTech 2024* in Warsaw, and *InnoTrans 2024* in Berlin. These events demonstrated international interest in welding materials from Ukrainian producers, facilitating new partnerships, knowledge exchange with other manufacturers, and valuable feedback for product improvement. “DNIPROMETYZ TAS” continues to strengthen its position in foreign markets, presenting its products to clients worldwide and proudly upholding the “MADE IN UKRAINE” mark on the global stage.



EMERGING INDUSTRY TRENDS

The global welding materials market shows steady growth, driven by industrialization, urbanization, and increased automation. Welding process automation significantly boosts productivity, improves weld quality, and reduces the risk of injuries.

“DNIPROMETYZ TAS” actively invests in developing robotic solutions, offering welding wire in convenient packaging for automated production lines. In 2024, the Company also implemented new approaches to customer training and support. Its welding production technologists provide consultations, technical assistance, and support at every stage of product usage.

PROVEN QUALITY

Welding wire from “DNIPROMETYZ TAS” complies with international standards, including ISO 9001, TÜV NORD certification, and DB accreditation. These certifications guarantee excellent quality, high-strength welds, corrosion resistance, and durability. The CE marking confirms compliance with safety requirements in the European Union.

LOGISTICS AND CUSTOMER FOCUS

Efficient logistics are one of the factory’s strengths. With its fleet of vehicles, the Company ensures fast product delivery across Ukraine and abroad, reducing lead times and increasing customer satisfaction.

LOOKING TO THE FUTURE

“DNIPROMETYZ TAS” continues to invest in advanced technologies and improve its products. The Company is confident that its innovative solutions will help clients adapt to new challenges, ensuring quality and reliability in any conditions.

MARKET PROSPECTS FOR WELDING MATERIAL

The global welding materials market is experiencing consistent growth and is expected to expand significantly in the coming years. Analysts predict that by 2030, the market will grow due to its extensive use in constructing metal structures in various sectors, such as construction, bridge building, pipeline installation, and other engineering projects. The wide application of welding materials in the transportation industry, shipbuilding, and energy sectors will also drive demand.

Innovative technologies, such as laser and robotic welding, are gradually transforming the industry. Automation enhances welding quality and reduces costs. “DNIPROMETYZ TAS” actively adopts these trends, offering products that meet modern standards.

A key growth factor for the market is the demand for environmentally friendly and highly efficient welding materials. This trend creates new opportunities for Ukrainian manufacturers like “DNIPROMETYZ TAS,” focusing on sustainable technologies and compliance with international standards.