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### Address of Editorial Office:

E.O. Paton Electric Welding Institute, 11 Kazymyr Malevych Str., 03150, Kyiv, Ukraine

E-mail: [office@paton.kiev.ua](mailto:office@paton.kiev.ua); <https://paton.org.ua/en/>

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### Representative Offices of "The Paton Welding Journal":

#### BRAZIL, Arc Dynamics

Address: Nova Iguacu, Rio de Janeiro, Brazil

Daniel Adolpho, Tel.: +55 21 9 6419 5703,

E-mail: [dadolpho@arcdynamics.com.br](mailto:dadolpho@arcdynamics.com.br)

#### CHINA, China-Ukraine Institute of Welding, Guangdong Academy of Sciences

Address: Room 210, No. 363 Changxing Road, Tianhe, Guangzhou, 510650, China

Zhang Yupeng, Tel.: +86-20-61086791,

E-mail: [patonjournal@gwi.gd.cn](mailto:patonjournal@gwi.gd.cn)

#### BULGARIA, Bulgarian Welding Society

Address: Blvd. Asen Yordanov No.10, Sofia 1592, Bulgaria

Pavel Popgeorgiev, Tel.: +359 899 96 22 20,

E-mail: [office@bws-bg.org](mailto:office@bws-bg.org)

#### POLAND, PATON EUROPE Sp. z o. o.

Address: ul. Kapitałowa 4, 35-213, Rzeszów, Poland

Anton Stepakhno, Tel.: +38067 509 95 67,

E-mail: [Anton.Stepakhno@paton.ua](mailto:Anton.Stepakhno@paton.ua)

The content of the Journal includes articles received from authors from around the world in the field of welding, cutting, cladding, soldering, brazing, coating, 3D additive technologies, electrometallurgy, material science, NDT and selectively includes translations into English of articles from the following journals, published in Ukrainian:

- «Автоматичне Зварювання» (Automatic Welding), [https://patonpublishinghouse.com/eng/journals/as](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 “Avtomatychne Zvaryuvannya” (Automatic Welding), No. 6, 2025.

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\*\*\*Translated Article(s) from “Tekhnichna Diahnostyka ta Neruinivnyi Kontrol” (Technical Diagnostics & Nondestructive Testing), No. 3, 2025.



# AOTAI COBOTS: A NEW ERA OF WELDING AUTOMATION

Aotai Electric Corporation, known for its innovations in welding technology and welding equipment, has introduced its own line of collaborative robots (cobots) specially adapted for welding tasks. Unlike traditional industrial robots, AOTAI cobots Ai7 and Ai10 series (the technical parameters of which are presented in Table 1) are designed to work safely side by side with personnel without the need for massive protective barriers and comply with the ISO 10218-1 safety standard. Since safety is one of the most important characteristics of collaborative robots, they are equipped with advanced sensors such as torque sensors and collision detection systems and can immediately detect contact and limit the output force when interacting with people, preventing accidents without the need for physical protective barriers.

**Table 1.** Technical characteristics of Aotai Electric Cobots

|               | Ai10     | Ai7      |
|---------------|----------|----------|
| Weight        | 38.5 kg  | 24 kg    |
| Payload       | 10 kg    | 5 kg     |
| Repeatability | ±0.02 mm | ±0.02 mm |
| Range         | 1350 mm  | 786.5 mm |
| Reach         | 1513 mm  | 908.5 mm |
| Speed         | 1.9 m/s  | 3.0 m/s  |
| Service life  | 30000 h  | 30000 h  |

Collaborative robots (cobots) are characterized by safety, ease of use, flexibility and integration. Safety is the basis of human-robot cooperation, as joint operations must ensure the protection of the operator.

Ease of use and flexibility are key advantages that allow cobots to quickly adapt to complex, flexible production processes. Integration allows cobots to penetrate diverse markets and complement human labor in a wide range of applications.

Aotai cobots are easy to use, allowing small and medium-sized workshops to automate work without the need for a specialized robotics engineer. One of the latest developments of Aotai Electric is the Mini COBOT Welding Station (see Figure 1), which mainly consists of a cobot, a welding machine and a welding platform.



**Figure 1.** Mini COBOT Welding Station

This complex offers increased usability for welding tasks by integrating additional functions such as a flexible platform, a laser positioning system and other auxiliary equipment.

Its key features are as follows:

- Integrated arc welding software: Deep integration with the robot control system allows you to freely switch between welding modes and easily adjust welding parameters.
- User-friendly interface: The arc welding software has a clear structure and setup instructions, which simplifies the parameter configuration process for users.
- Laser sensing system: The integrated laser sensing system allows real-time position monitoring on the training pendant, which is conducive to accurate positioning.
- End tool with integrated buttons: The tool at the end of the cobot has buttons for switching operating modes, recording points and performing other functions, which ensures convenient operation.
- 4WD + encoder motor.

The system uses a fully digital motor control system with precise and stable wire feed powered by a 4WD motor + encoder motor, which provides efficient, accurate and user-friendly welding solutions.

Of particular note is the AOTAI Mini COBOT welding station (see Figure 2), which uses a magnetic base and a welding cart that integrates the welding machine and the robotic system for easy mobility and control.



**Figure 2.** AOTAI Mini Cobot Welding System

The magnetic base plate allows the robot to be securely fixed on steel structures. Equipped with a 10-meter wire feed cable, it provides convenient work in a wide working area.

Despite the fact that the main specialization of AOTAI cobots is arc welding (MIG/MAG, TIG), their versatility allows them to be used in the following areas: laser welding and cutting; grinding and polishing; palletizing and moving.

AOTAI cobots are not just a replacement for a welder, but also a powerful tool that can not only replace heavy and often repetitive work with improved quality and stability of obtaining high-quality seams, but also helps in the development, manufacture and implementation of new products, which leads to increased profitability of production.

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## SCIENTIFIC AND TECHNICAL CONFERENCE “WELDING AND RELATED TECHNOLOGIES FOR THE RECOVERY OF UKRAINE”

On February 27, 2025, E.O. Paton Electric Welding Institute (PWI), Kyiv, Ukraine hosted the scientific and technical conference “Welding and Related Technologies for the Recovery of Ukraine”. More than seventy researchers, engineers, and industrial practitioners from institutes and organizations in Kyiv, Dnipro, Lviv, Kamianske, and Poltava took part in the event. The conference was held in the format of plenary and poster presentations.

The conference was opened by the Director of the E.O. Paton Electric Welding Institute, Academician of the National Academy of Sciences of Ukraine I.V. Krivtsun. He noted that the conference was dedicated to scientific and technical challenges in the field of welding and related technologies. Without exaggeration, it can be stated that welding technologies, which have been widely used in various branches of industry for more than one hundred years, remain among the most relevant areas of development in modern industrial production. The potential for further advancement of these technologies requires continued scientific research and practical validation, which is precisely the focus of this conference.

During the conference, the following plenary reports were presented:



Address by Academician of the National Academy of Sciences of Ukraine I.V. Krivtsun



Plenary presentation by D.I. Stelmakh

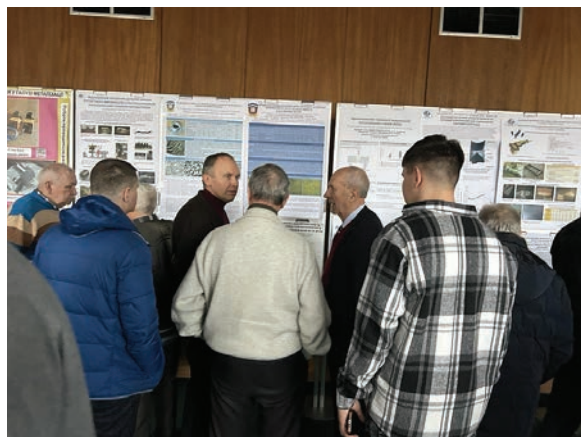
- Matviichuk V.A. “*GTE Components Made of VT6 Alloy: Additive Manufacturing and Properties*” (PWI);
- Kovalchuk D.V. “*xBeam 3D Metal Printing — New Research, Materials, and Technological Solutions*” (NVO “Chervona Hvilya”, Kyiv);
- Yarovytsyn O., Cherviakov M., Motrunych S., Volosatov I., Zviagintseva G., Pestov V., Khrushchov H., Tomko D., Junwen D. “*Materials Science Challenges of Arc Additive Manufacturing of Inconel 625 Alloy Parts*” (PWI);
- Korzhyk V.M., Illyashenko Ye.V., Chygileichyk S.L., Torba Yu.I., Chechet O.V. “*3D Printing of Heat-Resistant Alloy Products by Additive Plasma-Arc Surfacing: New*

*Technological Approaches and Equipment Development*” (PWI; JSC Zaporizhzhia Machine-Building Design Bureau “Progress”; Zaporizhzhia Polytechnic National University);

• Shapovalov Ye.V., Dolynenko V.V., Koliada V.O., Vashchenko V.M., Novodranov A.S., Vashchenko O.Yu., Mangold A.M., Klishchar F.S. “*Development and Research of a Robotic System for Implementing WAAM Additive Technology for Manufacturing Drilling Tools*” (PWI);

• Korzhyk V.M., Strohonov D.V., Tereshchenko O.S. “*Application of Arc Plasma Torches with Tubular Copper Electrodes for Producing Fine Spherical Metal Alloy Powders*” (PWI);

• Demchenko V., Nomirovskii D., Krivtsun I. “*Optimization of Current Pulse Shape Based on the Criterion of Force Action of*



During the poster presentation session



Exhibition of equipment, materials, and technologies for welding and non-destructive testing

*Modulated Current*” (PWI; Taras Shevchenko National University of Kyiv);

- Kovalenko Dmytro, Krivtsun Igor, Biber Alexander, Mokrov Oleg, Pavlov Oleksii “*Features of Increasing Penetration in High-Frequency Pulsed TIG Welding of Carbon and Stainless Steel (Experimental Studies)*” (PWI; RWTH Aachen University; ISF — Welding and Joining Institute);

- Lobanov L., Stelmakh D., Dyadin V., Savytsky V. “*Technical Diagnostics of Bridge Conditions Based on Photogrammetry Using Unmanned Aerial Vehicles*” (PWI);

- Makhnenko O.V., Milenin O.S., Velykoivanenko O.A., Rozynka G.P., Makhnenko O.O. “*Numerical Analysis of the Operational Strength of Welded Absorber Rods of the Control and Protection System of the WWER-1000 Nuclear Reactor*” (PWI);

- Pavlii O.V. “*Digital Systems for Radiographic Inspection of Welded Joints*” (LLC Scientific and Production Firm “Diagnostic Instruments”, Kyiv);

- Yudin Yu.V. “*AOTAI Collaborative Robots as a System Solution to Workforce Crises Caused by the Shortage of Qualified Workers at Industrial Enterprises*” (LLC “WTC”, Kyiv).

The conference also featured 48 poster presentations in the fields of welding, electrometallurgy, non-destructive testing, technical diagnostics, and related technologies, prepared by specialists from Ukraine and countries outside the region.

Several companies participated in an express exhibition of equipment, materials, and technologies for welding and non-destructive testing, including:

- PJSC “OKO Association”, Kyiv — a leading Ukrainian developer of ultrasonic and eddy-current flaw detectors, including those for rail and weld inspection;

- LLC “Scientific and Production Firm “Diagnostic Instruments”, Kyiv — equipment and materials for non-destructive testing, as well as NDT and flaw detection services;

- LLC “WTC”, Welding Technologies Center, Kyiv — a full range of pipeline welding equipment and AOTAI collaborative robots;

- LLC “VELTEK”, Kyiv–Dnipro — a leader in the production of flux-cored wires in Ukraine;

- LLC “NVO “Chervona Hvilya”, Kyiv — technologies for 3D printing of high-quality parts from titanium, niobium, stainless steel, copper, and other metals using xBeam 3D Metal Printing technology with welding wire;

- LLC “Promavtozvarka”, Kyiv — welding equipment and systems for electric arc metallization.

The event brought together leading Ukrainian researchers, engineers, and representatives of industry, who presented current research results and technological developments in the fields of welding and materials science. Within the framework of the conference, advances in additive manufacturing, robotic systems, high-temperature materials, non-destructive testing, and digital technologies in welding processes were showcased. Special attention was paid to the application of modern technologies for the restoration of critical infrastructure, bridges, energy systems, and industrial facilities in the post-war period. Participants emphasized the importance of integrating scientific developments into practice, expanding cooperation between the scientific community and business, and training highly qualified specialists for the implementation of large-scale reconstruction projects.

The conference became a landmark event for experience exchange and for defining strategic directions in the development of welding technologies in Ukraine. The obtained results will contribute to strengthening the technological potential of the country and to the formation of effective solutions for rapid and safe infrastructure recovery.

Considering the scale of challenges in the field of welding in the implementation of Ukraine’s reconstruction projects, the conference participants expressed their wish to hold a similar conference annually on November 27, the birthday of Academician Borys Paton.

The collection of conference abstracts is available at:  
<https://patonpublishinghouse.com/ukr/proceedings/WRT2025>

Oleksandr Zelnichenko, Iryna Romanova  
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