



## CHINA-UKRAINE E.O. PATON INSTITUTE OF WELDING

The China-Ukraine E.O. Paton Institute of Welding (CUPIW), founded in 2011, is a platform for international scientific and technical cooperation in the PRC for implementation of the achievements and experience of the E.O. Paton Electric Welding Institute, other institutes of the NAS of Ukraine and enterprises in China and Ukraine, as well as for cooperation with Chinese partners on joint developments and organization of high-tech industries in the fields of shipbuilding, marine engineering, aviation, railway transport, production and transportation of oil and gas, power engineering, energy saving. This form of cooperation has no analogues in terms of the scale of already realised projects.

Currently, the China-Ukraine E.O. Paton Institute of Welding is a legal entity, acting under the Chinese law, which is a part of the Guangdong Academy of Sciences. All international cooperation activities within the framework of the CUPIW are funded by the Chinese side. The sources of funding from the Chinese side are applied projects of the central government of the PRC, the government of Guangdong province, the city of Guangzhou or state-owned industrial corporations, as well as joint-stock and private companies in the PRC. The financial support of the projects is carried out on a competitive basis, that is, in order to receive funding in China for each project, in the competition state institutions and enterprises of the PRC, as well as leading foreign companies in the field of welding and related processes, participate.

Within the framework of CUPIW, in the fulfillment of international projects a number of institutes of the NAS of Ukraine, leading technical universities

of Ukraine, as well as large industrial enterprises and research and production innovation companies are involved. In particular, except of the E.O. Paton Electric Welding Institute of the NAS of Ukraine, the following academic institutes are involved in such cooperation: Frantsevich Institute for Problems of Materials Science, PTIMA. In the international projects within the framework of CUPIW, the following universities take the most active part: NTUU «Igor Sikorsky Kyiv Polytechnic Institute», Admiral Makarov National University of Shipbuilding. Also, for realization of production tasks, in particular for the production of critical units of high-tech equipment, CUPIW involves a number of industrial and scientific-production enterprises from different regions of Ukraine, in particular, from Kyiv, Dnipro, Kharkiv, Zhytomyr, Mykolaiv, Sumy and other cities.

Throughout the period of its activity, CUPIW in cooperation with the E.O. Paton Electric Welding Institute of the NAS of Ukraine (PWI) has realized several dozen major projects on modifying and implementation of the advanced developments of the PWI into industry. Among them the following could be mentioned:

- development of universal equipment and technology for flash butt welding of structural steels, aluminum and titanium alloys and their industrial application;
- creation of new generation of equipment for flash butt welding of pipes (114–320 mm);
- development of technology and equipment for orbital welding of power equipment pipelines over the active flux layer (A-TIG);



Signing of official documents on establishment and organisation of activity of the China-Ukraine E.O. Paton Institute of Welding (2012–2013). From left — to right: Mr. Zhu Xiaodan, governor of Guangdong province; Academician B.E. Paton, President of the National Academy of Sciences of Ukraine, honoured Chairman of the CUPIW Board; Mr. Cao Jianlin, Vice-Minister of Science and Technology of PRC, honoured Chairman of the CUPIW Board; Academician I.V.Krivtsun, Deputy Director of the PWI, Chairman of the CUPIW Board



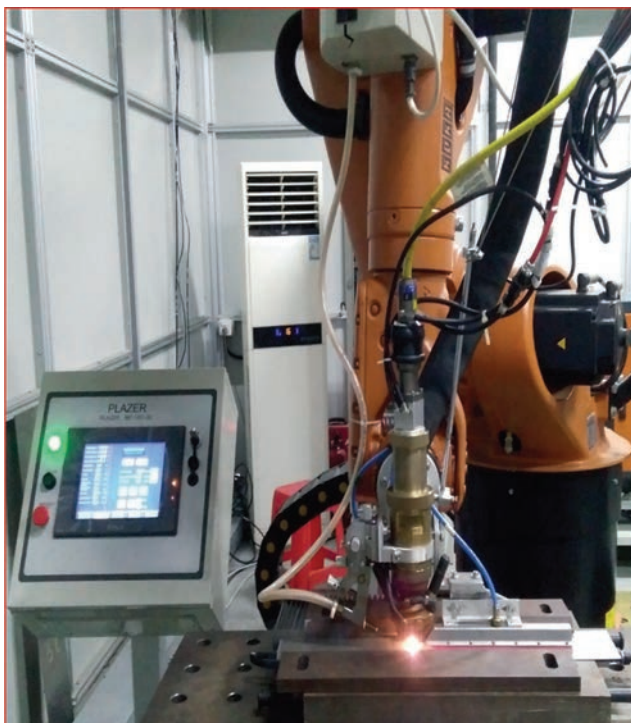
Equipment for narrow gap welding of long-length structures of titanium alloys of 20–120 mm thickness and up to 4 m length and welded product of titanium Ti4–Al–2V alloy of 120 mm thickness under the controlling magnetic field

- creation of technology and universal equipment for high-speed plasma as well as hybrid and combined (tandem) plasma-arc (Plasma-MIG) welding, its integration into a robotic complex;

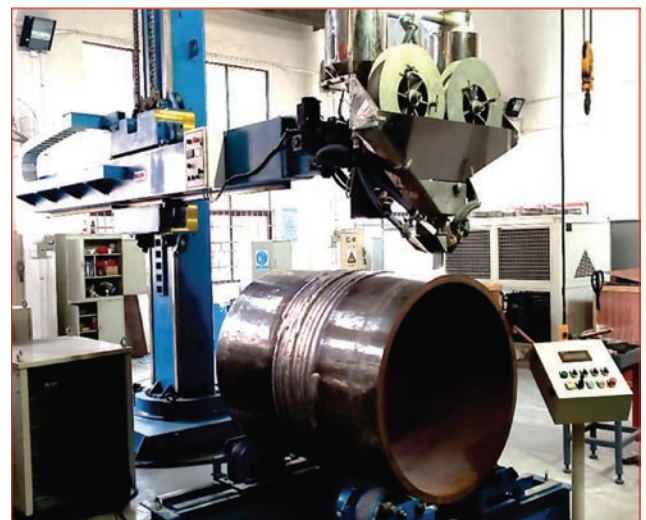
- creation of technology and new generation of equipment for microplasma and hybrid laser-microplasma pulsed current welding in different polar modes;

- creation of technology and equipment for automated arc welding of long-length structures (up to 4 m) of high-strength titanium alloys of large thickness (up to 120 mm) into a narrow gap in a controlled magnetic field;

- development of equipment and technology of electrodynamic treatment of welds of aluminum alloys for shipbuilding in order to effectively reduce and regulate welding deformations;



Robotic technological complex for high-speed hybrid laser-plasma welding



Electroslag surfacing of large-sized structures of the power equipment with the use of two strips



- development of technology and equipment for producing spherical shape powders from high-strength complexly alloyed titanium alloys using plasma processes;

- application of advanced electron beam technologies in turbine construction during producing billets of gas turbine blades by the method of hot isostatic pressing of powders (filling, degassing, compaction, sealing (welding) of containers with metal powder for further hot isostatic pressing);

- development of technology of diffusion welding of heat-resistant alloys based on Ni<sub>3</sub>Al with controlled stress-strain state;

- improvement of equipment for high-frequency welding of living tissues, its adaptation to working conditions in the Chinese medical institutions;

- development of new titanium-steel plasma welding technologies and their testing in the production of bimetallic pipes for oil and gas transportation;

- creation of specialized equipment and technology of high-performance (up to 45 kg/h) electroslag surfacing with two strips of large-sized products of power equipment;

- creation of technology and equipment for high-performance plasma cutting of metals of increased thicknesses (up to 120–150 mm) on reverse polarity, its integration with systems of numerical program control in relation to the production of large-sized structures;

- development of new generation equipment for supersonic plasma spraying of heat-resistant, thermal-barrier, wear-resistant, corrosion-resistant and special coatings.

The China-Ukraine Welding Institute has a high authority in the PRC. The Government of the PRC highly appreciates the results of CUIPW's activities and the contribution of PWI to these activities. In



Installation for electron beam welding for application in granular metallurgy

particular, Ukrainian colleagues of PWI, who participated in the implementation of joint projects, were awarded more than ten governmental awards by the PRC, including the highest awards by the central government of the PRC.



Awarding I.V. Krivtsun, Deputy Director of the PWI, 2019 (left) and V.M. Korzhyk, Chief of the PWI Department, Director of the CUIPW on the Ukrainian side (2014) the highest awards of the PRC Government — medals «For outstanding achievements in the international scientific and technical and economic cooperation»





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