In Memory of Prof. Vladimir I. Makhnenko

In January 2, 2013 Makhnenko Vladimir Ivanovich, Doctor of Technical Sciences, Professor, Academician of the NAS of Ukraine, Honored worker of science and technology of Ukraine, laureate for the State Prize of Ukraine, has gone on the 82nd year of his life.

V.I. Makhnenko was born in Cherkassy city. After graduation from the Odessa Institute of Navy Engineers (now Odessa National Navy University) in 1955 he started his industrious activity at the ship-building plant in Arkhangelsk. He worked as a serviceman and then as a senior technologist of the hull-welding workshop of the plant «Krasnaya Kuznitsa».

In 1959 he entered the post-graduate courses of the Odessa Institute of Navy Engineers and successfully defended a thesis for the Candidate's degree in 1963. In 1964 he was invited to work at the E.O. Paton Electric Institute, where directly with his participation and on the initiative of B.E. Paton the Department of mathematical methods of study of physical and chemical processes in welding and special electrometallurgy was founded and headed by him till the last days of his life. The task of the Department was the wide application of computer engineering and numerical methods, actively developing in the world, for effective processing and analysis of the results of complicated experimental studies of the phenomena, arising during the welding, and also their mathematical description with the purpose of obtaining optimal technological and design parameters.

In 1973 he defended a thesis for Doctor's degree, in 1978 he was elected as a correspondent-member and in 1990 as an academician of the AS of the UkrSSR.

The course of life of V.I. Makhnenko is closely connected with welding science. These are the years of fruitful fundamental investigations, when his inexhaustible diligence, purposefulness, sense of innovations and scientific intuition were fully revealed. V.I. Makhnenko together with his disciples founded a school on mathematic modeling of heat, diffusion, deformation, electromagnetic and other physical phenomena in welding and related technologies, which is well known both in his country and abroad.

The works of V.I. Makhnenko on prediction of the complex of physical parameters in welding of modern structural materials, which determine the quality of welded joint and operability of welded structure: sizes, shape, chemical composition and structure of penetration zone, thermal cycles, microstructure and properties of metal of heat-affected zone, kinetics of stresses, deformations and displacements in the process of welding heating, risk of cold and hot cracks formation, distribution of residual stresses and their influence on marginal state of welded units at static or variable external loads, were highly recognized in the world. Basing on these theoretic works together with different branch research institutes and industrial enterprises the optimal variants of design and technological solutions for a number of welded structures were developed.

In the recent years V.I. Makhnenko actively worked on the actual problem of evaluation of operability and life of safe operation of welded structures and constructions including objects of power engineering of Ukraine and main pipelines. The methods of evaluation of accessibility of revealed defects within the frames of ideology of «prediction and prevention» in the whole number of cases made it possible to refuse from untimely repairs of critical welded structures. In particular, he grounded the possibility of repair of main pipelines under their operating conditions. The result of fruitful developments in this direction is monograph «Life of Safe Operation of Welded Joints and Units of Modern Structures», published in 2006, and also the State Prize of Ukraine in science and technology of 2008.

Under the management of V.I. Makhnenko within many years the international conferences «Mathematical Modelling and Information Technologies in Welding and Related Processes» were

held, where specialists from different countries of the world took place.

V.I. Makhnenko is the author of more than 370 printed works, 112 of which are published in the journal «Avtomaticheskaya Svarka», 12 monographs. Many of his works were published in USA, England and Germany. Prof. Makhnenko lavishly shared his knowledge with youth and constantly paid attention to education of scientific staff. From the moment of foundation of the Chair of physical metallurgy and materials science of the Moscow Institute of Physics and Technology in 1988 Prof. Makhnenko delivered course of lectures «Strength of Welded Structures and Joints» to the students. Under his leadership 5 Doctors and 24 Candidates of Technical Sciences were prepared.

V.I. Makhnenko combined the fruitful scientific work with scientific-organizational and social activity, being the leader of section of the Scientific-Coordination Council on the problems of life and safe operation of structures, constructions and machines of the NAS of Ukraine, member of editorial board of the journal «Avtomaticheskaya Svarka».

V.I. Makhnenko was decorated with the awards of Friendship of Nations, For Merits of the III and II degrees and also medals. The international acknowledgement of merits of V.I. Makhnenko in welding science found the reflection in his election to the American Welding Society and member of International Federation of Quantity Non-Destructive Methods of Examination. In 2004 V.I. Makhnenko was decorated with the merit award «Merit worker of science and technology of Ukraine» for significant investment into development of national science and technology in the direction of creation of modern welded structures and guarantee of life of their operation.

Due to his talent, spiritual warmth and tenderness, benevolence and modesty, the scientist gained authority and respect among the welding society. Many disciples, friends and colleagues take this loss with deep sorrow, express sincere condolence to family and relatives of Vladimir I. Makhnenko everybody who was acquainted with him, loved and respected him. Bright memory shall always remain in their hearts.

E.O. Paton Electric Welding
Institute of NASU
Editorial Board
of «The Paton Welding Journal»

NEWS

Glass Backing for Weld Back Bead Formation in Manual and Mechanized Arc Welding

Glass backing is used for submerged-arc, stick-electrode and gas-shielded arc welding of root welds. Sticke-lectrode and gas-shielded welding can be performed in site in various positions.

Applications. Site welding in construction, shipbuilding, tank and bridge construction and other sectors.

Technical and economic advantages. The cost is reduced through application of glass as backing material instead of the regularly applied more expensive ceramic backing. Glass backing does not absorb moisture from the atmosphere, unlike the ceramic one, and, therefore, it has no limitations on storage conditions and does not require preliminary baking before welding. Replacement of two-sided welding by welding with application of glass backing allows improvement of welded joint quality due to prevention of burns-through and lacks-of-penetration. An improvement of labour conditions is achieved owing to elimination of welding in closed volumes under constrained conditions.

Efficiency. An improvement of welding efficiency is achieved due to elimination of the operation of gouging the root part of the first weld, which is used in welding from both sides.

Return-on-investment. Introduction of welding with application of glass backing, instead of welding from both sides with intermediate gouging of the root weld, allows saving 43.2 UAH per one running meter of weld owing to reduction of labour consumption of the operations, reduction of deposited metal volume, and shortening of construction time. Replacement of ceramic backing by glass one allows saving 42.6 UAH per one running meter of weld through lowering of backing cost.

State of development. Ukrainian specification was developed, manufacturing of commercial batches of backing is organized. Testing of welded joints made with application of glass backing was conducted. Charpy impact bending tests showed that at −20 °C testing temperature the impact energy is not less than 52 J.