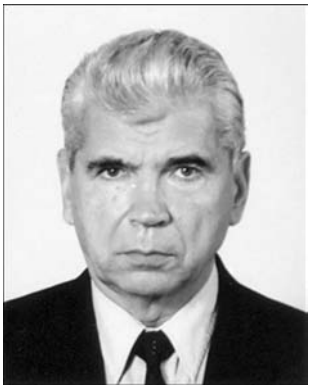
S.I. KUCHUK-YATSENKO IS 80



August 2, 2010 marked 80th birthday anniversary of Sergey I. Kuchuk-Yatsenko, First Deputy Director of the E.O. Paton Electric Welding Institute of the NAS of Ukraine, academician of the NAS of Ukraine.

After graduating from the Kiev Polytechnic Institute, S.I. Kuchuk-Yatsenko was placed on a job at the E.O. Paton Electric Welding Institute, where he has successfully worked his way from young specialist-engineer to professor, Doctor of Science in Engineering, head of one of leading departments, First Deputy Director of the Institute on research, academician of the National Academy of Sciences of Ukraine. In 1960 S.I. Kuchuk-Yatsenko defended the thesis of Candidate and in 1972 — thesis of Doctor of Science. In 1978 he was elected the Corresponding Member, and in 1987 he became the Full Member of the National Academy of Sciences of Ukraine.

Research performed by S.I. Kuchuk-Yatsenko is related to investigation of physico-metallurgical processes in solid-phase welding of different materials. In particular, he obtained new data on peculiarities of producing joints with formation of a thin layer of the melt on contacting surfaces of the parts being welded, its behaviour under the impact of electrodynamic forces and features of its interaction with the gas medium in the contact zone. It was shown for the first time that condition of the melt in the period preceding deformation of the parts being welded, has a dominating influence on formation of metal bonds between the contacting surfaces and development of chemical inhomogeneity in the contact zone. Influence of oxide structures in the melt on joint quality was studied in detail and ways of optimization of oxidation processes in the mentioned welding period were determined.

Alongside the above-mentioned investigations, S.I. Kuchuk-Yatsenko has for many years conducted purposeful study of fast processes of heating and breaking up of unit contacts at high energy concentrations. He established a number of new regularities characterizing energy indices of the process of contact melting of metals, determined the methods of automatic control of the main parameters of the process to obtain more favourable conditions of heating and deformation of parts being welded.

A practical result of the above-mentioned fundamental investigations is development by S. Kuchuk-Yatsenko of new processes of continuous, impulse and pulsed flash-butt welding patented in leading countries of the world. On their basis S. Kuchuk-Yatsenko together with a team of staff members developed technologies of welding various products, control systems and new samples of welding equipment, having no analogs in the world practice. Equipment has a high efficiency, minimum consumed power and weight, provides a stable and high quality of the joints. These advantages are the most significant in welding parts of a complex configuration with large cross-sections. Over the recent years, he has been studying resistance welding of parts from difficult-to-weld alloys, composite materials using activating coatings and special interlayers of a composite structure, including those consisting from multilayered nanostructured materials. This allowed development of new technologies of joining high-temperature materials based on nickel and titanium intermetallics, as well as tool alloys. Scientific and engineering activity of S. Kuchuk-Yatsenko is characterized by an integrated approach to solving the posed problems. Fundamental research performed by him, is accompanied by development of original technologies of welding, automatic and over the recent years, computerized control of the welding process and development of modern welding equipment.

Organization of industrial production of the developed new welding equipment and its mass introduction into industry are performed with his direct participation. Some of the most important stages of S. Kuchuk-Yatsenko's activity are described below. S. Kuchuk-Yatsenko has been working on rail welding for more than fifty years. Technologies and equipment for rail welding developed with his active involvement and guidance allowed for the first time in the world practice application of highly efficient flash-butt welding in the field, this greatly promoting transfer of the railways to continuously by welded rail tracks. With active participation of S. Kuchuk-Yatsenko batch production of such equipment was organized in the Kakhovka Plant of Electric Welding Equipment, which beginning from 1970s became world exporter of such equipment. Over the past years, more than ten generations of rail-welding machines were developed, which are used in CIS and many countries of the world. S. Kuchuk-Yatsenko actively participates

in improvement of this equipment and technology of welding, thus allowing its high competitiveness to be maintained. Over the recent years new generations of welding machines have been developed, allowing welding rails of infinite length at repair of continuously welded rail tracks with simultaneous stabilization of their stressed state. In 1966 S.I. Kuchuk-Yatsenko with a team of authors was awarded the Lenin Prize for development and introduction of a machine for butt welding of rails in repair and construction of continuously welded rail tracks. He was awarded the title of «Honorary Railway Worker of the USSR».

Developments of S.I. Kuchuk-Yatsenko and his associates have been also applied with success in mechanical engineering plants in manufacture of circular billets, shafts and blanks from dissimilar materials. Particularly effective was application of multiposition resistance welding, allowing welding large-sized parts in several locations simultaneously (engine cases, radiators of powerful transformers). Introduction of one machine in the line for production of cases of blocks of powerful diesel engines at Kolomna Diesel Locomotive Plant allowed increasing labour efficiency 70 times and making 380 welders available for other jobs. Considerable effect was also achieved as a result of multiposition welding in Zaporozhie Transformer Plant in manufacture of transformer radiators. In 1976 S.I. Kuchuk-Yatsenko as part of a team of authors was awarded the State Prize of the Ukr. SSR for development and introduction into industry of a new technology and highly-efficient assembly-welding systems for batch production of large-sized structures from modules.

For the first time in the world practice, S.I. Kuchuk-Yatsenko with a group of associates developed an original technology of flash-butt welding of items of a complex shape and large cross-section from aluminium-base high-strength alloys, providing joints of practically equivalent strength with that of the base metal. It was the basis for developing and mastering production of unique equipment which is used in manufacturing of space systems in the plants of Ukraine and RF. In 1986 S.I. Kuchuk-Yatsenko as a member of a team of authors was awarded the USSR State Prize for development of the technology and equipment for flash-butt welding of structures from high-strength aluminium alloys.

S.I. Kuchuk-Yatsenko made a considerable contribution into development of technology and equipment for flash-butt welding of various-purpose pipelines. Technologies, control systems and equipment for flash-butt welding of pipes of 60 to 1400 mm diameter were developed and its wide-scale introduction in pipeline construction in ex-USSR territory was performed with his active participation. Flash-butt welding was used to weld more than 70,000 km of various pipelines, including 4,000 km. of the most powerful pipelines in Extreme North regions. Application of flash-butt welding allowed increasing labour efficiency and ensuring pipeline reliability. This work was also awarded the Lenin Prize in 1989.

Work on development of technologies of pressure welding of position butts of various-purpose pipes is going on under his leadership and with his direct participation. Technologies and equipment for pressure welding with heating by a magnetically impelled arc of pipes of up to 300 mm diameter with 5–15 mm wall thickness were developed for the first time in the world, the equipment featuring a high efficiency at minimum energy content of the process.

S.I. Kuchuk-Yatsenko takes an active part in all the stages of the above-mentioned activities. In 1998 he received the title of «Honoured Scientist and Engineer of Ukraine», in 2000 he was awarded the Evgeny Paton Prize for scientific work «Solid-Phase Welding». S.I. Kuchuk-Yatsenko is the author of 640 scientific publications, including 9 monographs, 350 author's certificates. He was granted more than 300 Ukrainian and foreign patents, many of which were purchased by license agreements by foreign companies.

At present academician S.I. Kuchuk-Yatsenko continues actively working on urgent problems in the field of welding, development of advanced technologies of joining difficult-to-weld materials. He is head of one of the leading scientific departments of PWI. S.I. Kuchuk-Yatsenko has had fruitful co-operation for many years with Kakhovka Plant of Electric Welding Equipment — one of the leading enterprises-manufacturers of welding equipment in Ukraine. He is actively involved in organization of batch production of flash-butt welding machines for welding railway rails and pipes.

S.I. Kuchuk-Yatsenko is Deputy Director of PWI Scientific Council, Deputy Editor-in-Chief of «Avtomaticheskaya Svarka» journal, Member of Interestate Scientific Council on Welding and Allied Technologies. He prepared more than ten Candidates and Doctors of Science in Engineering. He was elected the first President of the Society of Welders of Ukraine, he is member of the Society Board, member of the Society of Welders of USA and Great Britain.

The scientists' contribution was awarded two orders of the Labour Red Banner, Order of Merit, Order of Prince Yaroslav the Wise and medals.