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CONTRIBUTION OF WELDERS INTO GREAT VICTORY

The remarkable date, the 65 years of Great Victory over fascist Germany and its satellites, is also celebrated by many-million group of welders: scientists, engineers, technicians and workers.

The stimulus for development of welding was given after the First World War having put forward a number of technical problems before welders. By the end of the 1930s welding became leading technology in the production of armaments of many countries, having almost completely replaced riveting.

During the World War II the necessity in acceleration of armament production gave a powerful impetus for widening the application and modernization of welding processes. The main emphasis was made on search of reserves, hidden capabilities of technologies. Perfidious attack of fascist Germany on the Soviet Union, loss of considerable part of the territory of Ukraine with metallurgical and machine-building plants, dismantling of plant equipment and its transportation to eastern regions dragged rates of weapon production at the end of 1941. The application of welding engineering allowed quick disassembling of equipment of evacuated plants in the very shortest terms, accelerating the assembly at the new site and starting the production. The designers, production managers understood that only simplification of manufacturing process, including also welding, will allow production of necessary amount of weapon for the front in the shortest period.

In the pre-war years the Soviet designers constructed the most advanced tanks: heavy KV-1, medium T-34, floating T-40 and SAU, based on them. Armored bodies, assemblies and structure elements were welded manually using special electrodes. To fulfill this work, thousands of high-skilled welders were required. The solution was found in application of automatic welding.

At the end of the 1930s the technology of automatic submerged arc welding of structural steels was developed under supervision of Evgeny O. Paton at the Electric Welding Institute. At the beginning of Great Patriotic War the Institute was evacuated from Kiev to Nizhny Tagil and arranged at the Ural Railway-Carriage Works where high-speed welding began to

be implemented in production of aviation bombs. Soon, the specialists and equipment of Kharkov plant No. 183 were transported there, where tank T-34 was constructed. The plants were united into one enterprise, called the Ural tank plant. E.O. Paton forwarded efforts of personnel to the development of technology of automatic submerged arc welding of special, armored steels and application of the new technology to manufacture intricate three-dimensional structures of armored bodies of tanks. It should be noted that such task was solved for the first time in the world. In the shortest terms it was succeeded to find out the causes of cracks initiation in welds. The technology of defectless welding was developed (V.I. Dyatlov, A.I. Ivanov); the nature of processes was studied and presence of arc charge under the flux layer proved experimentally (B.E. Paton, A.M. Makara); the fluxes of blast-furnace slags were developed (A.I. Korennoj); the phenomenon of self-control of arc processes with consumable electrode was revealed (V.I. Dyatlov), on the basis of which the simplified automatic welding heads with constant speed of electrode wire feed were developed (P.I. Sevbo, B.E. Paton). In 1942–1943, 20 designs of installations for welding of tank bodies and 8 designs for welding of aviation bombs and ammunition were developed and realized. One more remarkable achievement was the construction of the first assembly-welding production line, proposed by Yu.E. Maksaryev, the director of plant, and Evgeny O. Paton.

The works on application of new welding process were carried out in cooperation with the Institute, tank design bureaus and plants. A.A. Morozov, the leading designer of tank T-34, Zh.Ya. Kotin, the leading designer of heavy tanks IS and KV, participated actively in the solution of these questions. The colleagues of the Electric Welding Institute trained workers and set up the equipment at the plants of the country. Automatic welding found its large-scale application in Chelyabinsk where the S.M. Kirov Leningrad Tractor Plant (tanks KV, T-34 and SAU) was evacuated; at Gorky Automobile Plant (artillery installations, shells and other); at S. Ordzhonikidze Ural Heavy Machine-