



## ENGINEERING CENTER OF PRESSURE WELDING OF E.O. PATON ELECTRIC WELDING INSTITUTE

The Department of Butt Welding of E.O. Paton Electric Welding Institute of the NAS of Ukraine and the State Enterprise «Engineering Center of Pressure Welding NTC «E.O. Paton Electric Welding Institute of the NAS of Ukraine» for many decades have specialized in the development of technologies and equipment for flash butt welding (FBW) of rails of various grades as well as pipes of different diameters and assortments.

The State Enterprise «Engineering Center of Pressure Welding» was found in 1987 for industrial implementation and extensive mastering of the Institute developments.

**The main activity of the Center** is the production of basic models of machines, repair and modernization of the equipment for FBW of rails in the field conditions, as well as training personnel to work in the mentioned areas.

The technologies and equipment developed at the PWI and manufactured at the Engineering Center, have quickly found a widespread application on the railways of Ukraine and in the world. In the conditions of high global competition, this technology and equipment became interesting to the leading world railway companies from Austria, France, Japan, USA, China and other countries.

In the last decade, in many countries an intense reconstruction of railways and rail track is observed. In these works high-strength rails with the hardness of up to *HB* 400 are used. According to the technological conditions, it is required to obtain the strength of welded joints practically equal to base metal of the rail steel and high ductile properties. Such indices could not be obtained using traditional technologies. The PWI conducts systematic studies of weldability of new high-strength rails of different world manufacturers (Austria, China, USA, Ukraine, Japan) in order to develop welding technologies which provide the required mechanical properties. This raises the need for a significant change in the control systems of welding machines and designs of their individual units. In particular, it was found that for high-quality welding of high-strength rails it is necessary to significantly change the technology of contact heating and the design of a mechanical part of the machines, that provide an increase in the clamping forces by 1.5–2.0 times.

It is known that during the operation of a continuous welded rail, the fixed rails are subjected to stresses related to changes in temperature, i.e. under the influence of the environment. Their impact leads to defor-







Machine K900



Machine K960



Machine K1045

mation of the track, violations of the set dimensions of the track and in critical situations to accidents.

As a result of the carried out developments, in leading foreign countries a new generation of welding machines and the technology, known as «pulsating flashing», were created and patented. The first machines of a type K900 and K920 were designed at the PWI and tested on the US railways together with «Norfolk Southern Corporation» and other US customers.

Over the past five years, a new generation of machines of a type K1045 and K960 for FBW have been developed at the PWI with the tension of rails of up to 1000 m length.

For today, the Center has a successful experience in welding rail sections with the use of the developed equipment and technology for metro in the USA, China, Singapore and other countries of the world. Moreover, joining is performed directly in the tunnels.