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*Electron galley:*  
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**Address:**

E.O. Paton Electric Welding Institute,  
International Association «Welding»,  
11, Bozhenko str., 03680, Kyiv, Ukraine

Tel.: (38044) 287 67 57

Fax: (38044) 528 04 86

E-mail: journal@paton.kiev.ua

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*According to estimations of specialists, a great number of structures, constructions and machine in operation in Ukraine have exhausted their designed service life. In this connection, of special current importance are the issues related to control of operating reliability and durability of critical facilities by determining their technical state, residual life and scientifically grounded safe operation life.*

*Below we give a selection of articles based on the results of studies completed in 2007–2009 under targeted integrated program RESOURCE of the National Academy of Sciences of Ukraine by involving scientists and specialists from 26 institutions of 8 departments of the Academy.*

*Editorial Board*

## SUBSTANTIATION OF THE SYSTEM OF DEOXIDATION AND MICROALLOYING OF DEPOSITED METAL WITH ELECTRODES FOR WELDING AND REPAIR OF BRIDGE AND TRANSPORT STRUCTURES

I.K. POKHODNYA, A.E. MARCHENKO, I.R. YAVDOSHCIN, N.V. SKORINA and O.I. FOLBORT  
E.O. Paton Electric Welding Institute, NASU, Kiev, Ukraine

The paper provides substantiation of the system of deoxidation and microalloying of weld metal produced with electrodes that are designed for welding and repair of bridge and transport structures. The main characteristics of the electrodes developed by using this system are described.

**Keywords:** *arc welding, structural low-alloy steels, covered electrodes, welding and repair of structures, microalloying system*

The Second Pan-European Transport Conference held in 1994 passed the program of development of the continental transport network, according to which nine main transcontinental cargo transportation directions, called «Crete Corridors», were to be built. Four of them are to pass through the territory of Ukraine. Taking a central place in Europe in this way, i.e. having the highest transit traffic factor among the neighbouring European countries, Ukraine should become a peculiar bridge between Europe and Asia to substantially reduce traffic expenses and delivery time in the system of international goods exchange. The program was approved for building and functioning of the national network of international transport corridors in Ukraine [1].

To implement this program, it will be necessary to upgrade railways, so that they meet modern requirements for speed, length and weight of the passed-through trains, build new highways of the international level, construct many bridges, tunnels and crossroads, as well as 26 unique transport-storehouse terminals.

Transport problems have to be solved also because of the European Football Championship to be held in

Ukraine in 2012. City and belt highways are reconstructed in Kiev and other cities of Ukraine. Bridges across the Dnieper River, over- and underpasses, as well as junctions at most intensive traffic crossroads are built. This will require involvement of metalwork and transport engineering factories, as well as building and assembly organisations that intensively employ welding technologies. For factory conditions, these are mostly mechanised welding processes. However, part of the operations, which are associated, as a rule, with welding of the most critical structures and repair of defects are traditionally performed under factory conditions by using covered electrodes. In field, the major part of spatial welds, which for technical reasons cannot be made by the mechanised welding methods, are usually produced by manual covered-electrode arc welding.

Operation of bridge and transport structures, which were built earlier, is accompanied by current repairs and overhauls to maintain them in an appropriate condition. After liquidation of the united national economy system of the USSR, condition of basic assets of the key industries and inter-industry manufacturing infrastructure in Ukraine and other CIS countries is constantly deteriorating.