

EDITORIAL BOARD

Editor-in-Chief

B.E. Paton*Scientists of PWI, Kiev***S.I. Kuchuk-Yatsenko** (*vice-chief ed.*),**V.N. Lipodaev** (*vice-chief ed.*),**Yu.S. Borisov, G.M. Grigorenko,****A.T. Zelnichenko, V.V. Knysh,****I.V. Krivtsun, Yu.N. Lankin,****L.M. Lobanov, V.D. Poznyakov,****I.A. Ryabtsev, V.F. Khorunov,****K.A. Yushchenko***Scientists of Ukrainian Universities***M.N. Brykov**, ZNTSU, Zaporozhie**V.V. Dmitrik**, NTU «KhPI», Kharkov**V.V. Kvasnitsky**, NSU, Nikolaev**V.D. Kuznetsov**, NTUU «KPI», Kiev*Foreign Scientists***N.P. Alyoshin**

N.E. Bauman MSTU, Moscow, Russia

Guan Qiao

Beijing Aeronautical Institute, China

A.S. Zubchenko

DB «Gidropress», Podolsk, Russia

M. Zinigrad

College of Judea & Samaria, Ariel, Israel

V.I. Lysak

Volgograd STU, Russia

Ya. Pilarczyk

Welding Institute, Gliwice, Poland

U. Reisgen

Welding and Joining Institute, Aachen, Germany

O.I. Steklov

Welding Society, Moscow, Russia

G.A. Turichin

St. Petersburg SPU, Russia

Founders

E.O. Paton Electric Welding Institute, NASU

International Association «Welding»

Publisher

International Association «Welding»

Translators

A.A. Fomin, O.S. Kurochko, I.N. Kutianova

Editor

N.A. Dmitrieva

Electron galley

D.I. Sereda, T.Yu. Snegiryova

Address

E.O. Paton Electric Welding Institute,

International Association «Welding»

11 Kazimir Malevich Str. (former Bozhenko Str.),

03680, Kiev, Ukraine

Tel.: (38044) 200 60 16, 200 82 77

Fax: (38044) 200 82 77, 200 81 45

E-mail: journal@paton.kiev.ua

www.patonpublishinghouse.com

State Registration Certificate

KV 4790 of 09.01.2001

ISSN 0957-798X

Subscriptions

\$348, 12 issues per year,

air postage and packaging included.

Back issues available.

All rights reserved.

This publication and each of the articles contained herein are protected by copyright.

Permission to reproduce material contained in this journal must be obtained in writing from the Publisher.

CONTENTS**SCIENTIFIC AND TECHNICAL**

- Egerland S., Zimmer J., Brunmaier R., Nussbaumer R., Posch G. and Rutzinger B.* Advanced gas tungsten arc welding (surfacing) current status and application 2
- Knysh V.V., Solovej S.A., Nyrkova L.I., Shitova L.G. and Rybakov A.A.* Improvement of cyclic fatigue life of tee welded joints by high-frequency mechanical peening under the conditions of higher humidity and temperature 12
- Lebedev V.A., Lendel I.V., Yarovitsyn A.V., Los E.I. and Dragan S.V.* Peculiarities of formation of structure of welded joints in arc surfacing with pulse feed of electrode wire 18
- Lukashevich A.A.* Calculation-experimental method for determination of spectrum components of non-stationary loading of carbon steel welded joint 24

INDUSTRIAL

- Tsaryuk A.K., Skulsky V.Yu., Nimko M.A., Gubsky A.N., Vavilov A.V. and Kantor A.G.* Improvement of the technology of welding high-temperature diaphragms in steam turbine flow section 28
- Kulik V.M., Osadchuk S.A., Nyrkova L.I., Elagin V.P. and Melnichuk S.L.* Extension of service life of welded tanks of stainless steel by increasing pitting resistance 37
- Olejnik O.I., Maksimov S.Yu., Paltsevich A.P. and Goncharenko E.I.* Development of technology of mechanized arc welding in repair of pressurized main gas pipeline 42
- Vasilev Yu.S., Olejnik N.I. and Parshutina L.S.* Development of adhesion and adhesion-welding technology for repair of bearing seats for extension of service life of casing parts of power equipment 49

INFORMATION

- On the 100th anniversary of Boris I. Medovar 54

ON THE 100th ANNIVERSARY OF BORIS I. MEDOVAR



29 March 2016 marks the centenary of the birth of Ukrainian metallurgical scientist, pioneer of modern electroslag remelting, academician of the NASU Boris Izrailevich Medovar.

B.I. Medovar is one of the brightest representatives of Paton scientific school, faithful disciple and colleague of Evgeny O. Paton and Boris E. Paton. Throughout his life, except for two years on the Great Patriotic War frontlines, B. Medovar worked at the E.O. Paton Electric Welding Institute of the NASU. A man of his time, he grew and developed together with the Soviet Union, has experienced its heyday, fall and collapse, has worked in the independent Ukrainian state and obtained new scientific results, even in the last years of his life. In the Internet, encyclopedias of the Soviet era and independent Ukraine, the scientists' major achievements, awards and academic status are highlighted in details.

Here we'll try to remember a great personality and follow B. Medovar own estimates, which he has repeatedly expressed among students and colleagues, recall his life's journey and achievements, becoming a welder, metallographer and metallurgist.

B.I. Medovar started at the Electric Welding Institute as a researcher of welding processes. The war veteran-armor crewman, he was proud of the fact that forward welding and the relevant terms of the Regulations of armored troops on forming-up of machines in wedge formation and inverted wedge formation were introduced in welding technology with his filing. After the war, the scientist engaged in creation of equipment and technology of welding gas pipes of large diameter at Khartsyzsk Pipe Plant. In 1950, this work was marked by the Stalin Prize. Specialists-pipe makers are well aware that even today large-diameter pipe welding is carried out on the principles developed by B.I. Medovar in the middle of the last century.

A separate bright page of his creative life has been studies in the field of welding of austenitic steels and alloys. His monograph «Welding of heat-resistant austenitic steels and alloys» went through three editions, and according to many welders, especially those related to nuclear energy machine building, it served as a daily desktop tool. Very instructive and well-known in the circles of welders and metallurgists became a story about doctoral thesis defense by B. Medovar. In 1960, he defended the second edition of the mentioned book as his thesis. Suddenly, a wave of sharply negative reviews went in the Scientific Council, which alleged that the applicant should be deprived of the PhD degree leaving alone the doctorate... The current scientific degree seekers, usually defending the thesis without the «black» balls, it is difficult to imagine a defense when positive result decided by one vote, and nearly a third of the Council votes against. Anyway, after this defense none of welders or metallographers defended doctoral thesis in the form of a book.

Iron character of B. Medovar fully appeared at this time. Remembering that, the Academician repeatedly stressed that many colleagues helped him to survive, but above all — the support of his wife and the Director of the Institute — friend and teacher — Boris E. Paton.

And the transition from welding to metallurgy was not easy for him. For many years he continued his studies as a welder and as a metallurgist in parallel, creating a hitherto unknown metallurgical process — electroslag remelting. After all, the ability to create entirely new technology and equipment has won: step by step, the scientist has been reducing working on welding problems and increasingly focused own and his team efforts on creation and development of ESR. Today, it is hard to imagine, but the modern ESR was born in Kiev, exactly at the Electric Welding Institute. From Kiev ESR began its triumphal march around the world: in 1958, in Zaporozhie at electrometallurgical plant «Dneprospetsstal», and at Novo-Kramatorsk Machine-Building Works, the world's first ESR furnaces became operational, and in 1963, the license for using the ESR technology was sold to France. For many years, the Electric Welding Institute and Medovar's team have been leaders in this area of the world



At the Caucasian front (1942)

metallurgy. Licenses and ESR furnaces, created on the basis of their research appeared in the US, Sweden, Germany, Japan, and the Eastern European countries. According to the estimates by Boris Medovar, the peak in the ESR area for him and his team became a unique plant for 40-ton ESR slab ingots, built in Japan under the license of the PWI.

We'll notice that ESR has become the metallurgical basis for creating a powerful submarine fleet in the USSR. Nothing like this they had either in the US or in other countries. ESR found many other military applications at home and abroad, in particular, for production of tank guns. Interestingly, in 1991, an American journalist came to Kiev to photograph B.I. Medovar near T-34 tank in the yard of the first building of the Institute. This tank is a monument to the Paton Institute employees, who were creating tank production during the years of the Great Patriotic War. But the American in the short article stressed another thing — specifically that thanks to the license for the technology of ESR hollow ingots purchased in the USSR, American tanks did not concede to Russian...

As the years passed, and as this happens, keeping the leadership failed — the arms race and increasing concentration of efforts led by Academician team on solving practical problems of military-industrial complex have slowed exploration work. As a result, in new Ukraine in the beginning of a new period of life and work, the scientist and his colleagues faced the fact that competitors have advanced far ahead, especially in the creation of new slags, modeling of ESR, creation of new structures of furnaces and power supplies. However, B.I. Medovar succeeded in this difficult period to create a range of new ESR technology with direct processing of liquid metal, to develop fundamentally new equipment and implement it in the industry.

Features of character Boris Medovar developed in communication, with both familiar and unfamiliar people, with subordinates and not depending on him people. He was an enthusiastic man, sometimes not careful with words, but always trying to support people. That's why he brought dozens of candidates and doctors of technical science. His desire and willing-

ness to help people specifically highlighted in those years when Medovar — deputy of the Supreme Council of Ukraine — continuously met with voters and tried to help people in their struggle against the bureaucracy of the Soviet state.

This fact also speaks a lot — while preparing for his first speech in the United States at a symposium on ESR (1967), he spent hours rehearsing its report and with the help of a tape recorder corrected English pronunciation learned by self-teaching guide. It's interesting that he was able to read and communicate with colleagues without interpreters not only in English-speaking countries, but also in Germany and in France, read in the original foreign scientific articles. Consistent and purposeful self-training was another characteristic feature throughout the life of the scientist. Already being recognized, Medovar did not hesitate to learn from the young, has never hidden if he did not know any thing...

Students and academic colleagues have been repeatedly struck by his intuition and ability that is called «the tip of the pen» to find solutions to complex problems. For example, in the last quarter of his life, at his desk, he created low-carbon steel armor, boldly dropping almost twice the carbon content in compar-



Furnace U-436M for production of slab ingots of up to 9 t mass (company «Avesta», Sweden, 1970)



B.I. Medovar (*third from the left*) with his followers and Japanese metallurgists of «Nippon Steel» company standing on the first in the world 40-ton ESR slab ingot (Yawata, Japan, 1974)

ison with the conventional level of 0.35–0.40 %, invented a new slag for rolling mill roll cladding and decided to go for considered impossible hardening and tempering low-carbon low-alloyed steel of 09G2S type. In all these cases, the practice proved brilliantly bold foresight and technical solutions of B. Medovar.

In conclusion, we'll notice that today a number of B.I. Medovar developments and his apprentices and followers have not surpassed by anyone in the world. This, above all, is the technology of ESR hollow ingots, providing the production of cast ESR metal with physical and mechanical properties at the level of forged metal. Today, the technology of ESR slab

ingots for rolling particularly thick sheet of high-strength steels has no peers. The business of one of the founders of our magazine is alive and continues to grow worldwide.

Despite the well understood difficulties of the present time in Ukraine and the PWI, the ESR studies are successfully continued. In particular, established during the life of Boris I. Medovar ESR bypass technology has been applied in the production of bimetals and making bars of heat-resistant alloys without freckle-type segregation, and decades later his long-standing idea of ESR rail steel is making its way into industrial production.

Editorial Board