

SCIENCE BASED MATERIALS DEVELOPMENT FOR POWER ENGINEERING

Workshop, Kiev, 12 March 2015



Z-ULTRA: A EUROPEAN PROJECT

Z PHASE STRENGTHENED STEELS FOR
ULTRA-SUPERCritical POWER PLANTS





SCIENCE BASED MATERIALS DEVELOPMENT FOR POWER ENGINEERING – THE EUROPEAN Z-ULTRA PROJECT

Workshop, Kiev, 12 March 2015

The lectures are grouped around work in the European Z-Ultra project (www.z-ultra.eu). The project aims at developing new heat resistant steels which allow increasing the thermal efficiency of fossil power plants to over 50%, which is 30% higher than the standard in most existing power plants. CO₂ emissions are reduced accordingly. Lectures from the E.O. Paton Electric Welding Institute and from IPP Centre complement the presentations from Z-Ultra.

The modelling activities range from atomistic theories over thermodynamic and kinetic models for microstructural evolution to macroscopic component design based on the finite element method. Experimental methods include methods with atomic resolution (atom probe tomography and high resolution transmission electron microscopy) as well as ageing, corrosion, creep, fatigue and internal friction tests.

Z-ULTRA CONSORTIUM

The consortium combines the expertise of a steelmaker, a utility company, an engineering consultant company and eight research organizations and universities from EU and Eastern Partnership countries.



RWE Generation SE, Essen
(Germany)



Thursday, 12 March 2015

- 9:00 Welcome**
Leonid M. Lobanov, Paton Electric Welding Institute, Kyiv
- 9:15 Introduction and overview**
Hermann Riedel, Fraunhofer IWM, Freiburg, Germany
- 9:30 Z-ultra – the idea and material development**
John Hald, Technical University of Denmark, Lyngby
- 9:55 Fabrication of Z-phase steels**
Bernhard Donth, Saarschmiede, Völklingen, Germany
- 10:20 Research and development of Paton Electric Welding Institute to modern power engineering**
Leonid M. Lobanov,, Paton Electric Welding Institute, Kyiv, Ukraine
- 10:45 Coffee break**
- 11:15 Electroslag melting of dissimilar steel ingots of big diameter for turbine rotors**
Oleh Makhnenko and Aleksey Milenin, Paton Electric Welding Institute, Kyiv, Ukraine
- 11:40 Nanoscale experiments with applications to 9 to 12% Cr steels**
Masoud Rashidi, Chalmers University of Technology, Gothenburg, Sweden
- 12:05 Nanoscale modelling: Application to Z-phase steels**
Hermann Riedel, Fraunhofer IWM, Freiburg, Germany
- 12:30 Lunch break**
- 13:30 Weldability of heat-resistant stainless steels**
Konstantin A. Yushchenko, Victor S. Savchenko, Paton Electric Welding Institute, Kyiv, Ukraine
- 13:55 Thermodynamics of alloys and kinetics of micro-structure evolution: application to Z-phase steels**
Jiri Svoboda, Institute of Physical Metallurgy, Academy of Science of the Czech Republic, Brno
- 14:20 Stress state of pipes with form imperfections**
Igor V. Orynyak and Arnold Y. Krasowsky, IPP-Centre, Kyiv, Ukraine
- 14:45 Creep tests and modelling**
Bernhard Sonderegger, Graz University of Technology
- 15:10 Coffee**
- 15:40 Creep rupture and corrosion tests in flue gas atmosphere using component-like tubes**
Simon Heckmann, RWE Power AG, Germany
- 16:05 Power plant technology**
Paul Lemmens, Kreivo and EU, Belgium
- 16:30 Crack opening area and leak rate calculation for through crack in pipe**
Igor V. Orynyak and Yaroslav Dubyk, IPP-Centre, Kyiv
- 16:55 Z-Ultra demonstration parts in power plants**
Andryi Oryniak, IPP Centre, Kyiv, Ukraine
- 19:00 Dinner**

SCIENCE BASED MATERIALS DEVELOPMENT FOR POWER ENGINEERING

Workshop, Kiev, 12 March 2015

The course will take place at the E.O. Paton Electric Welding Institute in Kiev, (11, Bozhenko St., Kiev, 150, 03680 Ukraine). The participation is free of charge.

Who should attend

The workshop is designed for people from the electric power generating industry, faculty members, post-doctoral scientists and advanced students in Material Science, Mechanical Engineering, Energetics and Physics.

Contact

Dr. Hermann Riedel
Fraunhofer IWM, Woehlerstr. 11, 79108 Freiburg, Germany
hermann.riedel@iw.fraunhofer.de
+49 (0)761 5142103

Dr. Valentyn Skulskyi
E.O. Paton Electric Welding Institute
11, Bozhenko St., Kiev, 150,
03680 Ukraine
vsku@paton.kiev.ua

Dr. Oleg Makhnenko
E.O. Paton Electric Welding Institute
11, Bozhenko St., Kiev, 150,
03680 Ukraine
makhnenko@paton.kiev.ua