



AKTION ÖSTERREICH – TSCHECHISCHE REPUBLIK
Wissenschafts- und Erziehungskooperation
AKTION ČESKÁ REPUBLIKA – RAKOUSKO
spolupráce ve vědě a vzdělávání

FINAL REPORT project 92p15

Title: International lectures from the field of steel metallurgy and study of thermophysical behaviour of metal systems

Project duration: 01.01.2022-31.12.2022

Category: Pedagogy collaboration

Co-operating institutions:

CZ: VŠB- Technical University of Ostrava / Faculty of Materials Science and Technology/ Department of Metallurgy and Foundry(up to 31.3.2022), Department of Metallurgical Technology (from 1.4.2022)

Au: Montanuniversität Leoben / Department of Metallurgy/ Ferrous Metallurgy

Project coordinator in Czech Republic: Markéta Tkadlečková, prof., Ing., Ph.D., VŠB-TUO

Project coordinator in Austria: Christian Bernhard, Ao. Univ.-Prof. Dipl.-Ing. Dr.mont., MU Leoben

Realised activities

The main aim of the project was the development of bilateral cooperation in education and research in the field of steel metallurgy, namely between the Department of Metallurgy and Foundry, Faculty of Materials Science and Technology at VŠB – Technical University of Ostrava in Czech Republic and Department of Ferrous Metallurgy of Montanuniversität Leoben in Austria.

Based on the primary goal of the project, 8 lectures were realised for students of bachelor, masters and doctoral study degree programs of both institutions. Invitation on lectures and the photo documentation can be seen in **Fig. 1** and **Fig.2**. The Invitations were distributed through the website of faculties, through the Facebook of Faculty of Material Science and Technology, and directly by email to interested students.

The lectures were realized reciprocally on institutions of the project partners. The topics of the individual lectures introduced to students the possibilities of increasing the quality of continuously cast steel billets and steel ingots using the state-of-the-art methods of investigation, such as physical and numerical modelling, and the methods of thermal analysis, namely:

- **BERNHARD Christian**, Ao. Univ.-Prof. Dipl.-Ing. Dr.mont.,
Lecture theme (title): Smart quality prediction systems for continuous casting of steel
Range of Lectures: 2 hours/Summer semester 2022

- **PRESOLY Peter**, Dipl.-Ing., Dr.mont. and **BERNHARD Michael**, Dipl.-Ing., Dr.mont.
Lecture theme (title): Application of advanced thermal analysis techniques in the field of continuous casting - Experimental and computational approaches for the development of thermodynamic databases of steel
Range of Lectures: 4 hours/Summer semester 2022

- **KERN Maximilian**, Dipl.-Ing.
Lecture theme (title): Application of High-Temperature Laser Confocal Microscopy for in-situ investigation of phase transformation and grain growth in steel
Range of Lectures: 2 hour/Summer semester 2022

- **GAISER Georg**, Dipl.-Ing.
Lecture theme (title): High temperature oxidation of steel under air and H₂O steam conditions - Experimental and kinetic principles
Range of Lectures: 2 hour/Summer semester 2022

- **TKADLEČKOVÁ Markéta, WALEK Josef, CUPEK Jiří**, VŠB – TU Ostrava
Lecture theme (title): Physical and numerical modelling of steel flow in tundish
Range of Lectures: 3 hours/ Winter semester 2022

- **STROUHALOVÁ Michaela, CHUDOBOVÁ Lucie, SNIEGOŇ Michal**, VŠB - TU Ostrava
Lecture theme (title): Thermal analysis of steel and their use in metallurgical practice
Range of Lectures: 3 hours/ Winter semester 2022

- **SMETANA Bedřich, ZLÁ Simona, KAWULOKOVÁ Monika, DROZDOVÁ Ľubomíra**, VŠB - TU Ostrava
Lecture theme (title): Utilization of thermal analysis methods for inorganic materials characterization.
Range of Lectures: 3 hours/ Winter semester 2022

- **ŘEHÁČKOVÁ Lenka, ROSYPALOVÁ Silvie, NOVÁK Vlastimil**, VŠB - TU Ostrava
Lecture theme (title): Surface and rheological properties of inorganic melts
Range of Lectures: 3 hours/ Winter semester 2022

Part of the bilateral meetings included also the discussion on the theme of development of bilateral co-operation between the institutions in the form of co-administered and solved projects in the field of steel production and processing leading to the growth of the scientific research potential and capacities of both institutions of international importance. Within this, the laboratories with equipment of both departments were introduced and visited during the stay of participants of project reciprocally. Also the discussion with partners from steel industry was organized.

VŠB- Technical University of Ostrava
 Faculty of Materials Science and Technology
 Department of Metallurgical Technologies
 Department of Chemistry and Physico-Chemical processes

in cooperation with
 Montanuniversität Leoben
 Department of Metallurgy

VSB TECHNICAL UNIVERSITY OF OSTRAVA

Invitation - Invited Lectures

When: 10.th May 2022
 Where: PorB5, VŠB-TUOSTRAVA
 From: 10:00

 **BERNHARD Christian, Ao. Univ.-Prof. Dipl.-Ing. Dr.mont.**
 Head of the Workgroup "Continuous casting, Metallurgy and Materials"
 Montanuniversität Leoben, Leoben, Austria
 Lecture theme (title):
Smart quality prediction systems for continuous casting of steel

 **PRESOLY Peter, Dipl.-Ing. Dr.mont.**
BERNHARD Michael, Dipl.-Ing. Dr.mont.
 Workgroup: Continuous Casting (Metallurgy and Materials, Casting of Ferrous Steel Grades), DSC measurements and determination of phase diagrams of new alloys, Montanuniversität Leoben, Leoben, Austria
 Lecture theme (title):
Application of advanced thermal analysis techniques in the field of continuous casting - Experimental and computational approaches for the development of thermodynamic databases of steel

 **Application of advanced thermal analysis techniques in the field of continuous casting - Experimental and computational approaches for the development of thermodynamic databases of steel**

 *The lectures are realized with the support of project: AKTION Österreich - Tschechische Republik (Wissenschafts- und Erziehungskooperation) No. 92p15 international lectures from the field of steel metallurgy and study of thermophysical behaviour of metal systems.*

VŠB- Technical University of Ostrava
 Faculty of Materials Science and Technology
 Department of Metallurgical Technologies
 Department of Chemistry and Physico-Chemical processes

in cooperation with
 Montanuniversität Leoben
 Department of Metallurgy

VSB TECHNICAL UNIVERSITY OF OSTRAVA

Invitation - Invited Lectures

When: 11.th May 2022
 Where: PorB5, VŠB-TU OSTRAVA
 From: 10:00

 **KERN Maximilian, Dipl.-Ing.**
 Montanuniversität Leoben, Leoben, Austria
 Lecture theme (title):
Application of High-Temperature Laser Confocal Microscopy for in-situ investigation of phase transformation and grain growth in steel

 **GAISER Georg, Dipl.-Ing.**
 Montanuniversität Leoben, Leoben, Austria
 Lecture theme (title):
High temperature oxidation of steel under air and H2O steam conditions - Experimental and kinetic principles

 *The lectures are realized with the support of project: AKTION Österreich - Tschechische Republik (Wissenschafts- und Erziehungskooperation) No. 92p15 international lectures from the field of steel metallurgy and study of thermophysical behaviour of metal systems.*



Fig.1 Lectures at VŠB-TUO



Program
Tuesday October 11th: detail planning
Lecture1: Physical and numerical modelling of steel flow in tundish
Lunch @Mensa
Lecture2: Thermal analysis of steel and their use in metallurgical practice
Wednesday October 12th: detail planning
Lecture3: Utilization of thermal analysis methods for inorganic materials characterization
Lunch @Mensa
Lecture4: Surface and rheological properties of inorganic melts

Chair of Metallurgy
University of Leoben
Franz-Josef-Straße 15 - A-8700 Leoben, Austria



Fig.2 Lectures at Montanuniversität Leoben

Results of the Project of Co-operation



- [1] Bilateral lectures for students of both universities (including photo documentation, an overview of the use of finance - **non-public attachment** of projects).
- [2] The schema of future co-operation of universities in the field of co-administrated project of international meaning.
- [3] Final Report.

Evaluation of co-operation

The project helped to deepen the awareness of students of both universities of the specialization of both departments and to increase the bilateral co-operation of both departments of universities (especially in the field of determination of thermodynamic properties of steel with using thermal analysis and special software).

The Aktion project allowed also to establish personal relationships, deepening the experience with realization of an international project of a smaller scale with the possibility of discussion and planning of the submission of a conjoint international bilateral project of research and development of significant meaning including the involvement of the application sphere, increasing the interest in studying the technically oriented study programs, increasing the exchange of doctoral students for short-term scientific stays.

In the year of 2023, the research joint publication is planned.

In Ostrava 23 th January 2023	In Leoben 24 th January 2023
	
Signature of project coordinator in Czech Republic	Signature of project coordinator in Austria