

Microbiologically Influenced Corrosion (MIC) Industry Workshop & Training Event

Düce, Turkey, May 30 - June 2, 2023

Date: May 30 to June 2, 2023

Location: Düce University, Faculty of Engineering, Department of Mechanical Engineering, Corrosion Research Laboratory, Turkey

Introduction:

The event, titled "Insights into Microbiologically Influenced Corrosion (MIC) surveillance tools, threat assessment, and mitigation – Industry Workshop & Training," was held from May 30 to June 2, 2023. It focused on addressing the critical issue of corrosion, which poses a substantial global challenge, with an estimated annual cost of \$3 trillion USD. This report provides an overview of the event's key aspects, objectives, target audience, venue, and the organization committee responsible for its success.

Workshop Objectives:

The four-day focused workshop aimed to equip participants with a foundational understanding of MIC, enabling them to apply their knowledge in real-world settings and ensure effective mitigation. Specific learning objectives included:

- Understanding the causes of MIC and its recognition and monitoring.
- Familiarity with laboratory and field-testing techniques for MIC.
- Awareness of available mitigation strategies, including practical demonstrations.
- The ability to identify and apply appropriate strategies to mitigate MIC.

Target Audience:

The event catered to a diverse audience, including:

- Industry professionals
- Industry partners
- Postgraduate students
- Postdoctoral research fellows

The workshop provided a valuable opportunity for these individuals to specialize in facility corrosion, particularly focusing on biocorrosion, while facilitating networking with peers in the field.

Number of participants:

Learning Objectives:

Participants were expected to achieve the following learning objectives:

- Gain a fundamental understanding of corrosion, emphasizing MIC.
- Comprehend various corrosion mechanisms, with a focus on MIC.
- Apply the Multiple Lines of Evidence (MLOE) approach for diagnosing MIC.
- Implement the latest Industry Guidelines and Standards for Corrosion Management and MIC in Engineered Systems.
- Utilize Corrosion Management principles to assess, mitigate, and monitor MIC-related corrosion threats.

- Understand and apply state-of-the-art MIC diagnostic methods.
- Grasp sampling strategies and procedures for different sample types obtained in Engineered Systems.
- Become familiar with chemical, metallurgical, and microbiological test methods used in corrosion investigations and MIC laboratory experiments.
- Gain insight into corrosion and MIC mitigation methods, as well as their implementation and monitoring in various industries.

Organization Committee:

The event was organized by Prof. Dr. Husnu Gerengi, who served as the Local Course Organizer, ensuring the successful execution of the MIC Industry Workshop & Training. Course content director was: Dr Torben Lund Skovhus, VIA University College.

Trainers:

Annie Biwen An Stepec (NO, WG2)
Husnu Gerengi (TR, WG1)
Judit Knisz (HU, WG1)
Matthew Snape (CH, WG3)
Pierangela Cristiani (I, WG1)
Rick Eckert (US, WG5)
Torben Lund Skovhus (DK, Vice Chair)

Summary

The Microbiologically Influenced Corrosion (MIC) Industry Workshop & Training event held from May 30 to June 2, 2023, provided a comprehensive platform for industry professionals, students, and researchers to enhance their understanding of MIC and its mitigation strategies. It fostered collaboration, knowledge exchange, and skill development in the fight against corrosion, a pervasive global issue.

Find more here: <https://mic.duzce.edu.tr>

Corrosion Management Event with Special Focus on Microbiologically Influenced Corrosion (MIC) – Prague, Czech Republic, August 22 - 25, 2023

Date: August 22-25, 2023

Location: Prague, Czech Republic

Introduction:

The event titled "Corrosion Management for the Sustainability of Assets in Aqueous Environments - with Special Focus on Microbiologically Influenced Corrosion (MIC)" was held from August 22 to 25, 2023. The primary objective of this report is to provide an overview of this comprehensive training course, including key event details, learning objectives, and the distinguished faculty members facilitating the program.

Number of participants: 33

Target Audience:

The training course was designed to cater to a diverse audience, including:

- Graduate students
- Post-doctoral researchers
- Young researchers
- Industrial professionals
- This course aimed to offer specialized postgraduate training and foster networking opportunities among participants.

Organization Committee:

The course was coordinated by Dr. Jan Stoulil, who served as the Local Course Organizer and Dr Torben Lund Skovhus, VIA University College.

The Prague MIC Summer School featured a distinguished international faculty with expertise in corrosion management, microbiology, and failure analysis:

- Dr. Elsemiek Croese (NL): Specialist in corrosion management and microbial processes in industrial systems.
- Prof. Scott Wade (AU): Researcher in marine corrosion, biofouling, and MIC-resistant coatings, with extensive academic and industrial collaborations.
- Dr. Anette Alsted Rasmussen (DK): Expert in corrosion and surface technology with over two decades of experience in damage investigation and mitigation.
- Rick Eckert (US): Principal consultant with over 40 years of experience in internal corrosion and MIC in the oil and gas industry; author of multiple reference books on MIC failure analysis.
- Dr. Torben Lund Skovhus (DK): Vice Chair of EURO-MIC, internationally recognized for his work in MIC diagnostics and corrosion management.
- Dr. Jan Stoulil (CZ, WG1): Expert in corrosion mechanisms and electrochemical analysis.
- Dr. Judit Knisz (HU, WG1): MIC researcher and WG1 lead, specializing in MLOE-based MIC diagnostics and environmental microbiology.
- Dr. Julian Wharton (UK, WG5): Specialist in electrochemical corrosion processes and MIC-related surface interactions.

Learning Objectives:

- Throughout the course, participants were expected to achieve the following learning objectives:
- Understanding Corrosion Mechanisms: Gain comprehensive knowledge of various corrosion mechanisms, with a particular emphasis on Microbiologically Influenced Corrosion (MIC).
- Application of MLOE Approach: Learn to apply the Multiple Lines of Evidence (MLOE) approach for diagnosing MIC, a critical aspect of corrosion management.
- Industry Guidelines and Standards: Acquire the skills to apply the latest Industry Guidelines and Standards for Corrosion Management and MIC in Engineered Systems.
- Corrosion Management Principles: Understand and apply Corrosion Management principles to assess, mitigate, and monitor the corrosion threat posed by MIC.
- MIC Diagnostic Methods: Learn to understand, correctly apply, and interpret state-of-the-art MIC diagnostic methods, ensuring effective diagnosis and control.
- Sampling Procedures: Gain insight into sampling procedures for various sample types obtained in Engineered Systems, enabling accurate data collection.
- Failure Analysis Investigation: Be equipped to plan and execute a failure analysis investigation, particularly when MIC is identified as the root cause of the issue.

Conclusion:

The "Corrosion Management for the Sustainability of Assets in Aqueous Environments" event, held from August 22 to 25, 2023, offered an exceptional opportunity for participants to deepen their understanding of corrosion management, with a special emphasis on Microbiologically Influenced Corrosion (MIC). The distinguished faculty members and the comprehensive curriculum ensured that participants gained valuable insights and practical skills to address corrosion-related challenges effectively. Overall 33 participants attended the course: 20 from Czech institutions, 13 from foreign institutions (Germany, Ukraine, Belgium, Cyprus, Denmark, France, Italy, Slovakia). The ratio of participants from academia and industry was also 20 to 13. Besides 12 lectures and 1 lab practice, the participants also visited the Pump storage hydro power plant Stechovice.

For detailed information, interested individuals were encouraged to visit the event's official website.

<https://ukmki.vscht.cz/aki/mic-summer-school>

MIC Summer School – Integrating Multiple Lines of Evidence in Microbiologically Influenced Corrosion (MIC) Investigations Budapest, Hungary, August 26-30, 2024

Date: August 26-30, 2024

Location: Ludovika University of Public Service, Budapest, Hungary

Title: MIC Summer School Budapest – Integrating Multiple Lines of Evidence in Microbiologically Influenced Corrosion (MIC) Investigations

Introduction:

The Budapest MIC Summer School was organized by the Ludovika University of Public Service, with Dr. Judit Knisz (WG1 lead) serving as the local organizer. The event focused on the integration of multiple lines of evidence (MLOE) in microbiologically influenced corrosion (MIC) investigations. The course was part of the EURO-MIC COST Action CA20130 and attracted significant international attention.

Target Audience:

The summer school was designed for:

- Graduate and postgraduate students
- Early-career researchers
- Industry professionals
- Academic experts in corrosion and microbiology

Participants came from various countries, including Australia and the United States, fostering interdisciplinary and international collaboration.

Number of participants:

Learning Objectives:

- Know the basic MIC mechanisms and microorganisms involved
- Be familiar with the chemical, metallurgical and microbiological test methods used for corrosion investigation and MIC laboratory experiments
- Understand sampling strategies and procedures for various sample types obtained in Engineered Systems
- Be able to apply Corrosion Management principles to assessing, mitigating and monitoring the corrosion threat of MIC
- Be able to plan and execute a failure analysis investigation to differentiate between biotic and abiotic corrosion mechanisms as the immediate cause.
- Understand and apply the multiple line of evidence (MLOE) approach for diagnosing MIC.
- Understand, correctly apply and interpret state of the art MIC diagnostic as well as mitigation methods and know how they are implemented in different industries
- Be able to apply the latest Industry Guidelines and Standards on Corrosion Management and MIC of Engineered Systems

Faculty and Trainers:

The course was coordinated by Dr. Judit Knisz, who served as the Local Organizer and Dr Torben Lund Skovhus, VIA University College.

The course was taught by internationally recognized experts, including:

- Dr. Judit Knisz (HU) – Local Organizer, MIC researcher and WG1 lead
- Dr. Torben Lund Skovhus (DK) – Course Director, MIC expert and AMPP Fellow
- Rick Eckert (US) – MIC consultant, author, and internal corrosion specialist
- Andre Abilio (DE) – BAM researcher, MIC failure analysis specialist
- Dr. Anette Rasmussen (DK) – Corrosion and surface technology expert
- Dr. László Péter (HU) – Electrochemist and corrosion researcher
- Prof. Scott Wade (AU) – Marine corrosion and biofouling expert
- Dr. Herman de Vries (NL) – MIC diagnostics and molecular analysis specialist
- Tamás Knisz (HU): IT specialist supporting molecular data analysis and integration in MIC investigations.
- Functional Interfaces Research Group (HU) – Zsófia Keresztes, Ilona Felhősi, Gábor Mészáros, Tamás Szabó, Tamás Marek, Loránd Románszki

Conclusion:

The Budapest MIC Summer School provided a comprehensive and interdisciplinary training experience in MIC investigation and management. The integration of theoretical lectures, practical exercises, and expert-led discussions ensured that participants gained valuable skills applicable to both academic and industrial settings. The event significantly contributed to the objectives of the EURO-MIC COST Action by fostering knowledge exchange and capacity building in the field of microbiologically influenced corrosion.

EURO-MIC Industry Course – Groningen, Netherlands, June 17-20, 2025

Date: June 17–20, 2025

Location: Hanzehogeschool Groningen, Netherlands

Title: EURO-MIC Industry Course 2025 – External MIC in Industrial Systems

Introduction:

The EURO-MIC Industry Course 2025 was a four-day intensive training program focused on external microbiologically influenced corrosion (MIC) in industrial systems. Hosted by Hanze University of Applied Sciences, the course was supported by the EURO-MIC COST Action CA20130 and several industry sponsors.

Target Audience:

The course was designed for:

- Industry professionals
- Corrosion engineers
- Microbiologists
- Integrity managers
- Graduate and postgraduate students

Number of participants:

Learning Objectives:

Participants were trained in:

- MIC fundamentals and myths
- Corrosion mechanisms and management strategies
- Industry standards and diagnostic methods
- Cathodic protection and microbial interactions
- Sampling techniques and bioinformatic analysis
- Integration of microbiological data with engineering evidence

Program Structure:

The course included:

- 12 lectures covering MIC theory and practice
- Hands-on laboratory sessions (ATP, DNA isolation, qPCR, bioinformatics)
- Site visit to the GASUNIE LNG terminal
- Group discussions and integration workshops
- Final evaluation and certification

Organizers and Trainers:

The course was coordinated by Herman de Vries from MICBUSTERS and Folkert Faber Hanzehogeschool Groningen as local organizers, Dr. Judit Knisz (Ludovika University of Public Service, WG1 lead) and Dr. Torben Lund Skovhus (VIA University College, Denmark Vice Chair of EURO-MIC). The training was delivered by a multidisciplinary team of internationally recognized experts:

- Dr. Torben Lund Skovhus (DK): Specialist in corrosion management and industrial microbiology, with extensive experience in MIC diagnostics, molecular microbiological methods, and corrosion mitigation in oilfield and water systems.
- Herman de Vries (NL): Expert in surface pre-treatment and MIC diagnostics, developer of on-site qPCR-based MIC test kits, and active in industrial knowledge transfer through Corrosion Alliance.

- Dr. Stefan Jansen (NL): Environmental chemist at Deltares, focusing on in situ MIC monitoring and predictive modeling for infrastructure systems such as pipelines and offshore wind monopiles.
- Markus Buechler (CH): Corrosion protection specialist with over 30 years of experience in cathodic protection and laboratory simulation of MIC processes under AC/DC interference.
- Andre Abilio (DE): Researcher at BAM, Germany, specializing in MIC failure analysis and susceptibility modeling, with a focus on underground hydrogen storage systems.
- Dr. Anette Alsted Rasmussen (DK): CEO of Corrosion Advice ApS, expert in electrochemistry and damage mitigation in water utility systems, with over two decades of applied research experience.
- Dr. Judit Knisz (HU): Senior researcher at the Ludovika University of Public Service, Hungary, with expertise in the application of the MLOE approach in MIC diagnostics.
- Tamás Knisz (HU): IT specialist supporting molecular data analysis and integration in MIC investigations.

This diverse faculty ensured that participants received both theoretical and practical insights into MIC diagnostics, sampling, and mitigation strategies, bridging academic research and industrial application.

Conclusion:

The EURO-MIC Industry Course 2025 provided a unique opportunity for participants to deepen their understanding of MIC in industrial contexts. The combination of theoretical and practical training, along with international expertise, made the course a valuable contribution to the COST Action's objectives.