Announcement of the

EFC WP 5

Environment Sensitive Fracture

Keywords: Stress Corrosion Cracking (SCC), Hydrogen Embrittlement (HE), Corrosion Fatigue (CF), Environmentally Assisted Cracking (EAC), Liquid metal embrittlement (LME), Pit-to-crack transition, Failure mechanism, Crack growth, Fractography.

The key objective of this year's EFC **WP5 session on Environment Sensitive Fracture** is to bring together talks about environmental fractures, cracks and failure modes. The forum will provide a joint platform for the corrosion, metallurgy and fracture mechanics community, to discuss our current understanding, address recent advances, and introduce novel techniques and approaches to prevent environmentally assisted cracking. This also includes all aspects addressing the effect of material- and microstructure condition, stress/strain, and exposure parameters on environment-related fracture and failure modes.

In the framework of developing a global net zero carbon economy, WP5 also continues to unravel the mechanisms behind hydrogen embrittlement, stress corrosion cracking, corrosion fatigue, and liquid metal embrittlement. The proposed session therefore includes a broad range of fracture-based topics, covering the initiation and nucleation of cracks, from pit-to-crack transition to short crack growth behaviour, associated crack propagation mechanisms and failure modes, to in-situ and post-mortem fractographic studies. Theoretical approaches and practical solutions that have been successfully applied to reduce the likelihood of environment sensitive fracture, or the introduction of fracture related life-extension models and associated mitigation strategies, are also welcome.

The fracture of materials via the interaction with hydrogen is this year included in our WP5 session, addressing, for example, the effect of hydrogen on tensile, fracture and fatigue properties of structural materials. Other physico-chemical and mechanical approaches to address the occurrence of environment sensitive fracture will also be discussed, with the overarching goal to provide a vibrant platform for the exchange of knowledge, ideas, and hypotheses for academics, engineers and industry experts.

The session will include advances in the following key areas:

- Transition from localised corrosion to crack initiation, and crack nucleation sites,
- Corrosion-crack mechanisms, with short-to-long crack growth behaviour,
- Hydrogen embrittlement, hydrogen-induced failure and hydrogen-based fracture,
- Stress corrosion cracking, environmentally assisted failure modes,
- Liquid metal embrittlement and molten salt-based stress corrosion cracking,
- Corrosion fatigue and the effect of environment on crack growth,
- Characterisation and detection techniques of cracks, and crack growth analysis tools,
- Modelling of all environment-sensitive fracture mechanisms; prevention and mitigation strategies,
- Industry needs for further understanding and development of more crack resistant materials.

Please submit your abstract before January 31, 2024 via the EuroCorr Website.

WP5 - Chair: Professor Christine Blanc (University of Toulouse, France)
WP5 - Vice Chair: Professor Dirk Engelberg (University of Manchester, UK)

Expected duration: 1 - 2 days
Expected audience: 60-100 attendees