**The 15th International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering (QR2MSE2025) & International Conference on Materials and Reliability (ICMR2025)**

**July 23-26, 2025, Hohhot, Neimenggu, China**

**Special Session on:**

**Reliability Assessment and Design of Complex Equipment**

As modern manufacturing upgrades towards high-end and autonomous development, high-end equipment is characterized by increasingly complex structures and more extreme service conditions. Simultaneously, it faces unprecedented demands for stringent safety standards and energy efficiency/environmental protection metrics. These combined factors have significantly increased the risk of system failure, making reliability a core bottleneck currently constraining the R&D and industrial application of high-end equipment. Facing these challenges, reliability assessment and design for complex equipment has evolved significantly in both importance and purpose. It has transitioned from being primarily focused on basic "availability assurance" to becoming a crucial factor that determines the performance and competitiveness of high-end equipment systems.

The achievement of high reliability in equipment is fundamentally constrained by multiple sources of uncertainty. These uncertainties are pervasive across multiple stages, including material property variations, stochastic changes in load and environmental conditions, and manufacturing/assembly deviations. More critically, the coupling effects of these multi-source uncertainties often result in unpredictable, significant fluctuations in structural or product performance, and even functional failures. Precisely quantifying, deeply analyzing, and efficiently optimizing designs against these complex uncertainties represent crucial pathways towards ensuring stable product performance and reliable service life. This imperative is not only key to tackling practical engineering challenges but also represents a major research direction and academic frontier in the field of mechanical design.​

This session aims to focus discussions on reliability analysis and design for complex equipment. By facilitating the exchange of the latest research findings and practical engineering applications, we seek to create an open platform for in-depth exchanges and collaborative opportunities among researchers and practitioners

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