ICAM26

International Conference on Advanced Manufacturing

Research to Application through Standardization

ORLANDO, FL
SEPTEMBER 28 - OCTOBER 2, 2026

Industrial Sector: Energy, Maritime, Oil and Gas

Additive manufacturing (AM) technology has gained considerable attention in the Energy, Maritime, and Oil & Gas (EMOG) industries transitioning beyond prototyping into production for specific applications and requirements. In comparison to the aerospace, automotive, and medical industries, the adoption of AM in the EMOG industries appears to have been relatively slow and extremely challenging. However, these sectors are aggressively exploring the potential of using AM to improve supply chain lead-time, performance, and operational efficiency. These industries face some unique sector specific challenges that other; more AM matured industries like aerospace and medical do not encounter. Standard development bodies (e.g., API 20S, DNV ST-B203, ASME PTB-13) have already established frameworks around AM part adoption in EMOG. However, qualification and certification of components in extreme environments are still to be defined and or otherwise in early stages and needs to be established at an industrial scale. Many stakeholders in EMOG industries have already demonstrated the capabilities in focused areas and components of AM to produce high-performance components, which has triggered increased interest in qualifying components with higher criticality requirements.

Topics of interest include but are not limited to:

- **Operational Requirements:** Focus on specific operational requirements with an emphasis on environmental and long-term in-service behavior prediction or accelerated functional testing (e.g., testing in H2S- containing environments such as stress corrosion cracking, cyclic oxidation testing, static and dynamic testing etc.)
- **Design for AM:** Including digital twin, process modelling and simulation (e.g., generative design, topology optimization) and multi-scale modeling for AM in the EMOG industries
- **Materials Development:** Qualification of materials for in-service behavior prediction or accelerated functional testing (e.g., high strain rate deformation, life prediction)
- **Process Optimization:** Development of the next generation AM materials for novel applications in the EMOG industries, such as Hydrogen tanks and extreme high temperature irradiation environments and creep / stress rupture applications.
- **Qualification & Certification:** Rapid qualification and certification for regulatory compliance, approaches to reduce qualification and certification time, opportunities and challenges to AM adoption in these industries, while still maintaining IP rights and warranty issues
- **Real time Process Monitoring:** Robust and reliable In-situ monitoring techniques to lower the frequency, costs and lead-time in performing non-destructive examinations and inspections of AM components.
- **Scalability:** Scalability of large components manufactured using additive manufacturing technologies such as Wire-Arc Additive Manufacturing (WAAM), Laser Directed Energy Deposition (Laser-DED), and hybrid additive processes, to name a few but not limited. with a focus on use-case demonstrations that highlight successes, failures, and lessons learned across qualification, testing, inspection, and post-processing approaches and their associated challenges.
- **Data Analysis:** Comprehensive data analysis for Technical Data Packages (TDP) including modelling, simulation, and AI integration within AM
- **Post-processing:** Identifying AM components, including adopting new techniques, addressing challenges, improvement opportunities, automated workflows, and inventory digitization and management
- **Workforce training and development:** rapidly enable adoption of AM in EMOG (e.g., operators and Engineers)

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