



EDUCATION

- Texas A&M University
 - Bachelor of Science, Mechanical Engineering, 2002
 - Master of Science, Mechanical Engineering, 2003
 - Doctor of Philosophy, Mechanical Engineering, 2008

PRACTICE AREAS

- Fitness for Service
- Pressure Vessel Design
- Finite Element Analysis
- Design
- Fatigue and Fracture Assessment
- Peer Review

REGISTRATIONS

- Professional Engineer in CO, KS, NM, OK, TX, UT, and WY

PROFESSIONAL AFFILIATIONS

- American Society of Mechanical Engineers (ASME)
- Society of Women Engineers

CONTACT

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EXPERIENCE

Melanie Sarzynski joined WJE in 2018 with a diverse background in solid mechanics analysis including evaluation of various failure modes to support design and fitness for service (FFS) assessments. Dr. Sarzynski specializes in advanced finite element analysis (FEA), fatigue evaluation, and fracture mechanics assessment of pressurized and non-pressurized equipment. She is highly proficient in the application of industry codes and standards such as the ASME Boiler and Pressure Vessel codes, API recommended practices and standards, and additional guidance in DNV and ISO specifications.

Prior to joining WJE, Dr. Sarzynski spent ten years at Stress Engineering Services, leading a wide variety of engineering design and development projects in both upstream and downstream oil and gas segments. She has authored numerous papers, presentations, and comprehensive training materials on a variety of assessment and analysis topics.

REPRESENTATIVE PROJECTS

Fitness for Service

- Evaluation of metal loss, distortion, cracklike flaws, creep, and other in-service degradation using API 579-1/ASME FFS-1*
- Extension of FFS assessment techniques to nonpressurized equipment*

Pressure Vessel Design

- Design and analysis of pressure vessels according to ASME Boiler and Pressure Vessel Code Section VIII with special emphasis in high pressure design using Division 2 and 3*
- Preparation of certified User Design Specifications (UDS) and certified Manufacturer Design Reports (MDR) for code-stamped vessels*

Finite Element Analysis

- Static, dynamic, coupled thermo-mechanical, steady-state and transient heat transfer with geometric and material nonlinearities*
- Development of material models to capture constitutive response based on experimental data*

Design

- Design verification of standard and non-standard API equipment to evaluate strength capacity, fatigue performance, and sealing characteristics to ensure compliance with applicable specifications*
- Design and analysis of high-pressure high-temperature (HPHT) oil field equipment and implementation of the related guidance in API 17TR8*
- Arctic engineering experience with constitutive ice response modeling, global and local ice loading on structures, and related industry codes, including API RP 2N and ISO 19906*

Fatigue and Fracture Assessment

- S-N fatigue life using elastic and elastic-plastic approaches*
- Fracture mechanics (both elastic and elastic-plastic) to determine critical flaw sizes and crack propagation under cyclic loading*
- Leak-before-break calculations and failure assessment diagram (FAD) evaluations for new and in-service equipment*
- Engineering critical assessment (ECA) to develop flaw acceptance criteria and guide nondestructive examination (NDE)*
- Analysis to evaluate the performance of crack arrestors for a running ductile fracture on a CO₂ pipeline, including a material-based failure criterion and depressurization of the pipeline behind the crack tip*

Peer Review

- Independent third party (I3P) review for verification of HPHT equipment*
- Participation in root cause failure analysis and extreme event investigations*
- Independent review of pressurized equipment design*

**Indicates with previous firm*