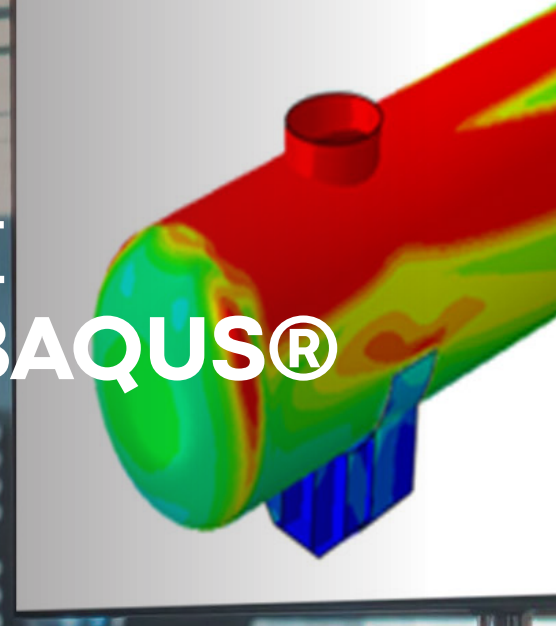


FITNESS-FOR-SERVICE ASSESSMENT WITH ABAQUS®



Apply API-579 Fitness-For-Service methodologies using Abaqus to evaluate the structural integrity of refinery and chemical plant components and drive Run as-is, Repair, Rerate or Replace decisions on components.

OVERVIEW

Mechanical failure of pressurized equipment due to metal loss (corrosion/erosion), hydrogen induced cracking, crack-like flaws and other damage mechanisms often lead to unexpected plant shutdowns or even catastrophic failure. Such events can result in huge material loss, environmental damage and casualties.

Fitness-For-Service assessment with Abaqus helps reduce downtime, unexpected shutdowns and the likelihood of failure through realistic simulations of pressurized equipment.

WHAT IS FITNESS-FOR-SERVICE

According to API 579/ASME FFS-1 Fitness-For-Service (FFS) assessments are quantitative engineering evaluations that are performed to demonstrate the structural integrity of an in-service component that may contain a flaw or damage, or that may be operating under a specific condition which may cause failure [1]. Based on assessment results, decisions have to be made on which plan to implement: Run as-is, Repair, Rerate or Replace. Finite element analysis (FEA) using Abaqus is a powerful tool for FFS assessment and often utilized for predicting fatigue, fracture, or the detailed stress fields needed to determine the reliability and durability of flawed components. Examples of such components include: pressure vessels, piping systems, and storage tanks. FEA simulations embed detailed inspection and component information with accurate material property models to determine if flawed equipment can continue to operate safely.

THE BENEFITS OF USING ABAQUS FOR FITNESS-FOR-SERVICE

Evaluate present integrity of industrial components: an introductory Abaqus training course enables users to routinely conduct level 3 Fitness-For-Service assessments. These level 3 Abaqus FEA simulations provide more precise and detailed assessments than level 1 and 2 empirical models provide, helping reduce downtime while assuring safe operation of damaged or flawed equipment.

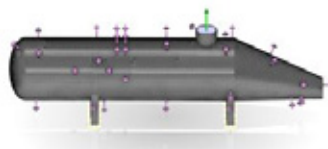
DAMAGE MECHANISMS ASSESSED USING ABAQUS:

- Brittle Fracture
- General Metal Loss
- Local Metal Loss
- Pitting Corrosion
- Blisters and HIC/SOHIC Damage
- Weld Misalignment and Shell Distortions
- Crack-Like Flaws
- High Temperature Operation and Creep
- Fire Damage
- Dent, Gouge, and Dent Gouge Combinations
- Laminations
- Fatigue

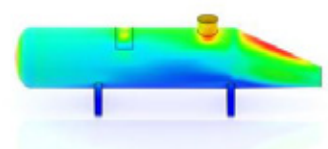
FITNESS-FOR-SERVICE ANALYSIS OF PRESSURIZED VESSELS WITH ABAQUS



Equipment Inspection [2]



FEA simulation



FFS Assessment

[1] API 579-1/ASME FFS-1 Fitness-for-service, 2016, Part 1.

[2] Ultrasonic testing to pipe welds, Funtay / Dreamstime.com