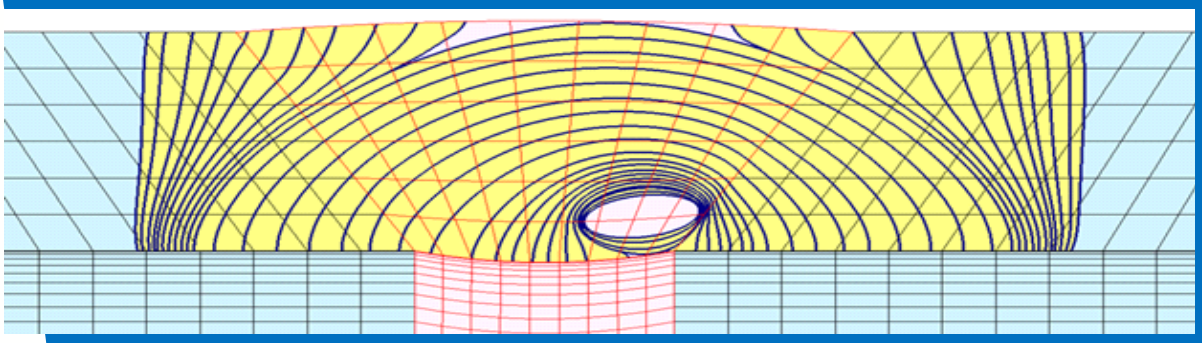
CATALOG ISSUE

10

Advanced Fracture Mechanics



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Cutting-Edge Science into the Practice of Fracture Analysis

Fracture comprises a significant portion of unforeseen failure in the industrial world around us, and the art of controlling the fracture is being continuously advanced by developing the capability of designer-driven optimization and case-specific understanding of behaviour over the course of service.

The use of computational models is well established in many areas of engineering; and using the state of the art algorithm and platform for failure modeling enables our engineers applying their creativity, expertise and skill to be optimal, more productive, and innovative when dealing with design for failure. The failure in weld is among few fields where design, control, and optimization remain generally traditional and not yet well advanced. Generally, a large variety of fracture resistance materials and structures are designed to tolerate failure such as fatigue, creep, rupture and so on. Yet, failure has been observed to occur in our structures after a relatively low in-service life and frequently reported in weld for a large portion of occurrences. The reason is because we are taking the weld for granted in all discipline of engineering. The bottleneck that is complex engineering in nature because the weld region is complex physics and therefore not many experts would take the challenge of engineering a perfect weld.

Our team delivers a cutting-edge solution to your fracture analysis including case-specific algorithms that predict evolution of damage in weld in particular in the interface of weld and base metal i.e. fusion line. We offer a full spectrum of skills, capability, and experience in precisely computing fracture evolution using coupled damage algorithms on a case-by-case basis in order to make structural integrity decisions.

Our previous projects and experience:

- All-purpose Fitness for Service (FFS) assessment under API 579 and BS 7910 Level I, II, III, and full 3D structural damage assessment on service life.
- Predicting 3D evolution of crack front and damage accumulation in a mixed loading of fatigue.
- Critical assessment and determining the time to crack ignition, crack short and long growth, multiple crack coalescence, leak-before-break and ultimate failure.
- Elevated temperature assessment and creep life prediction including computed 3D map of welding residual stress, PWHT, stress relaxation, coarse and fine grain HAZ, and welding flaw effect.
- Integrating experimentation to the computational recipe for realistic prediction, build up special sample for extracting Compact Tension (CT) specimens and conducting fracture crack growth testing at custom-made loading, temperature and exposed environment.

We are also the sole Canadian representative of Zencrack software (http://www.zentech.co.uk), the state-of-the-art software tool for 3D fracture mechanics simulation including non-planar crack growth prediction for fatigue and time-dependent load conditions. Our work with R&D team of Zencrack in UK led to developing an exclusive capability of growth prediction on metallurgical notch effect in material such as in weld fusion line.

Our team of computational engineers are not only using general modeling software but experts in time-effective programing and scripting subroutines for custom-made numerical recipes in Abaqus platform. We are directly working SIMULIA South for developing Abaqus Welding Interface (AWI). We use the computer and math algorithms to solve physics-based equations to make predictions and simulate scenarios for a variety of industries.

We always deliver a practical solution to your fracture problem