



Fracture & Crack Growth Case Study

Integrity Assessment of a JO BELL Switch

The Challenge

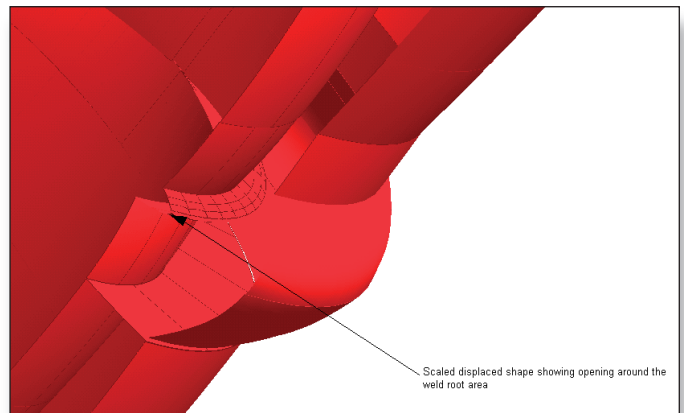
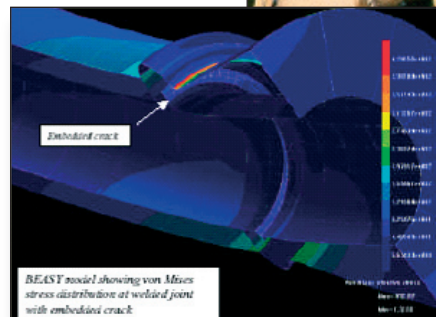
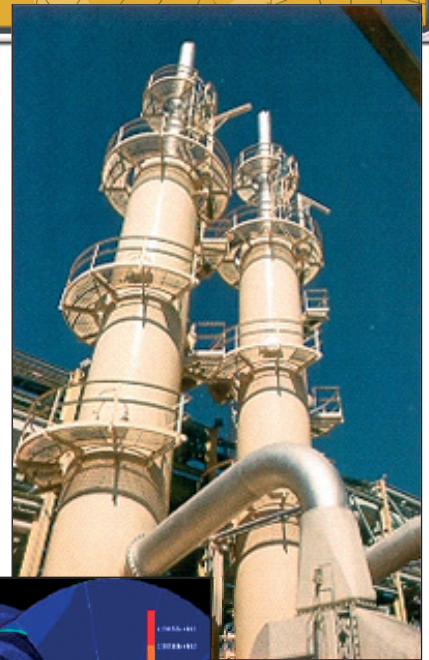
During inspection of Offshore Oil & Gas equipment it was identified that the welding had not been performed correctly and that there was incomplete root penetration. The choice of the operator was to either shut down the operation and replace the valves or to remain in operation until a convenient time for replacement could be identified. The challenge was to determine if the incomplete welds could be safely operated until they are replaced.

The Solution

BEASY was used in conjunction with the existing Engineering Critical Assessment (ECA) procedures to predict the limiting fatigue life of welded joints on the level switches piping associated with various process pressure vessels. Non-destructive testing (NDT) methods were used to determine the general location and extent of crack like defects caused by incomplete welds at pipe weld connections. Radiographs produced during the NDT program provided details such as material property zones, joint misalignments, and the location and geometry of multiple cracks both on the surface and embedded in the weld material. BEASY was used to model the exact geometry of the welds and simulate fatigue crack growth under cyclic loading for a critically located weld crack.

The Value

The results of the assessment enabled the offshore facility to remain in operation as it was demonstrated that the welds had sufficient life.



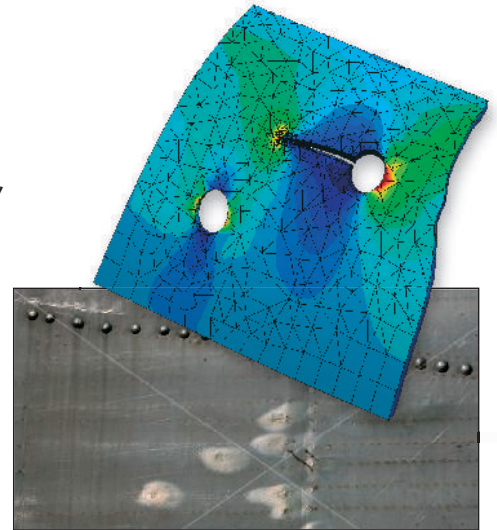
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Crack Growth and Defect Assessment Engineering Services

BEASY is an internationally recognized leader in engineering computation and simulation for structural integrity, damage tolerance, mechanical analysis, and corrosion control. BEASY provides Engineering Services in the area of engineering analysis and design for a variety of clients including small manufacturers, major industrial corporations, and defence related government agencies.

We have a long track record of helping clients improve quality and reliability through the application of computer-based analysis technology. Innovative solutions are applied by a staff of highly qualified engineers to a diverse range of problems.



The need to Analyse Structural Damage

Material properties of structural components often degrade over time as a result of cyclic loading, fluctuations in temperature, or corrosive environments. This degradation of material integrity may manifest itself as discrete flaws in the structure or through localized loss in the section thickness of a critical support member. Once structural damage has been discovered it is important to be able to accurately evaluate its impact on the continued safe performance of the structural components. Because structural damage is often related to fatigue, which can result in the initiation and growth of cracks, it is critical for engineers to evaluate the impact of fatigue loading on structural performance.

Providing Fracture Simulation Technology to Engineers Worldwide

BEASY's Engineering Services Group offer specialized analysis in the areas of FRACTURE MECHANICS and FATIGUE CRACK GROWTH.

Available services range from performing simple stress intensity factor calculations to comprehensive three-dimensional crack growth studies. Our engineers have extensive expertise in applying the state-of-the-art BEASY Fracture and Fatigue Crack Growth computer code to solve complex fracture mechanics problems.



BEASY engineers can quantify the fracture mechanics behavior for the real part without any simplifying assumptions. There are no restrictions on component geometry, loading, or crack shape. We can help determine Critical Crack Sizes so that you can improve the timing and quality of your inspection and maintenance programs. Using BEASY's novel crack growth technology our staff can define the most likely crack growth path and help your NDT technicians search for flaws in structural components. We can also estimate remaining service life for components with existing flaws.

BEASY provides the conceptual analytical modelling capabilities to help manufacturers achieve the stringent performance requirements needed to remain competitive. By linking with the BEASY Team you can focus your manpower on core technologies but at the same time improve the strength of your company by temporarily adding the unique strengths in structural integrity analysis that we offer. We can help you reduce and control your operating expenses and meet budget and schedule deadlines during peaks in workload by providing specialty services on a temporary basis.



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