

FEACrack™

Solutions

- Windows®-based finite element analysis software package generates 3D crack meshes.
- Our fracture mechanics experts, who themselves are end-users, developed FEACrack™ for practical application.
- Intuitive, easy-to-use interface guides you step- by-step through the process of entering the model data, running the analysis, and processing the results.

Features

- Create Abaqus™, ANSYS™ and Warp3D™ input files
- Import and post process results from Abaqus, ANSYS and Warp3D with the following options:
 - J-integral and stress intensity K plots
 - Extracted J and K values along with J path dependence index
 - K from displacement when using standard mesh
 - Displacement scaling
 - Output views in terms of Von-Mises stress, forces and displacement
 - Custom stress plots
- Perform detailed fatigue analysis with the following features:
 - Variable loading
 - Multiple fatigue growth equations
 - Growth parameters:
 - Initial size, final size
 - Number of cycles, number of steps
 - Curve fitting and smoothing of K results
 - Stress interpolation for each analysis step
- Choose from an extensive library of elastic material properties and constitutive plasticity models
- Utilize the drop-down menu with custom boundary conditions
- Analyze the crack mesh as a submodel
- Run and control the analysis through the internal file controller

FEACrack™ gives you the ability to model 3D cracks in anything from solid rocket motors to fusion reactors in a matter of minutes.

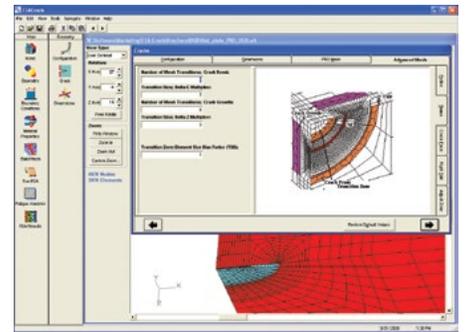
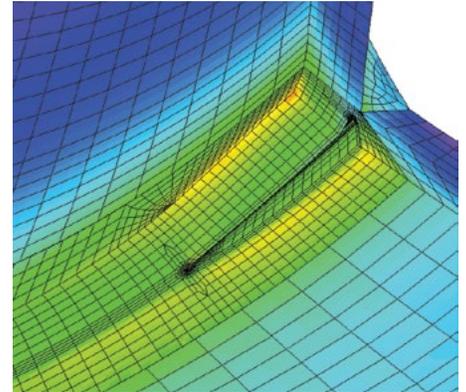


Figure 1. PRO mesh allows for unlimited levels of crack mesh refinement. It is also used for cell-type meshes to analyze crack growth.

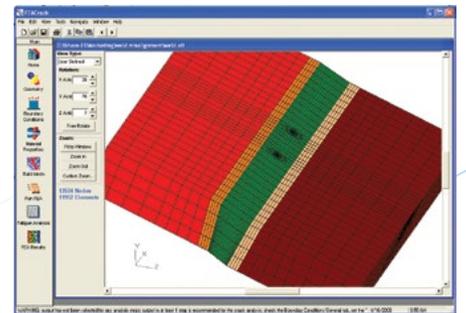


Figure 2. Model cracks in welds with multiple material properties, heat affected zones (HAZ) and weld misalignments.

Featured Users

FEACrack is applied in a variety of research and commercial settings which include:

- NASA Marshall Spaceflight Center
- Shell Global Solutions International B.V.
- Chevron Energy Technology Company
- Mitsubishi Chemical Corporation
- Los Alamos National Laboratory
- ATK Launch Systems Group
- ITER Organization

Testimonials

“FEACrack allows the analyst to create 3-dimensional crack meshes with ease.”

– Pedro Vargas, PH.D., Chevron

“The application of FEACrack in the design process of the next generation of NASA space launchers is allowing us to perform 3-dimensional fracture analysis in a more efficient way. With its user-friendly interface, FEACrack provides the best solution for both the expert and the first-time user to create complex meshes in a short time period.”

– Joel Quincieu, NASA Solid Rocket Booster Analyst, ATK Launch Systems Group

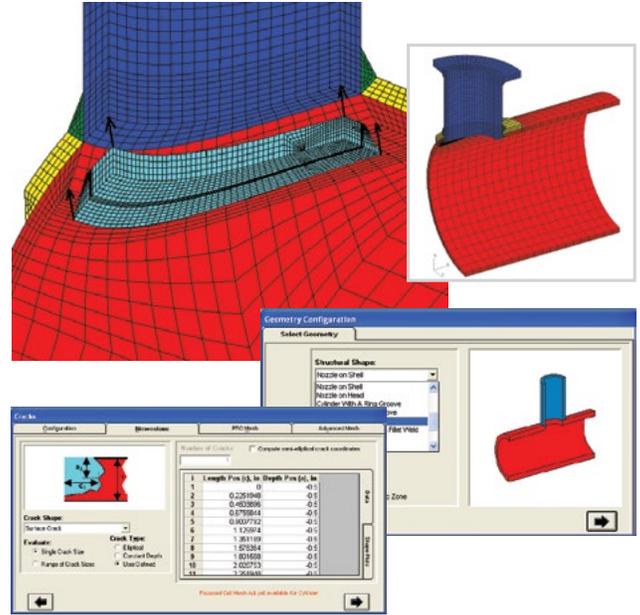


Figure 3. Choose from an extensive library of structural geometries and crack shapes. Advanced crack analysis allows the user to place a local 3D mesh anywhere in a global model.

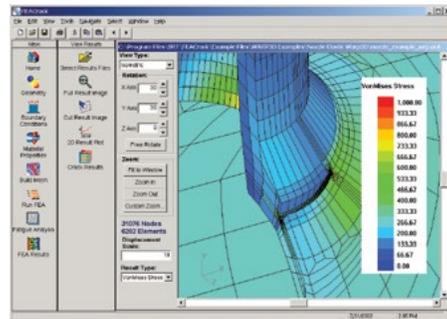


Figure 4. Post process results directly within FEACrack.

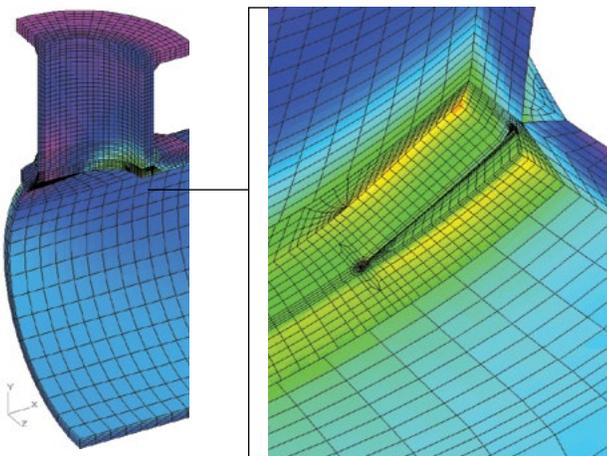


Figure 6. Left, Pressure vessel with a surface crack located at the internal weld of a nozzle. Right, Magnified view of nozzle's internal weld with surface crack.

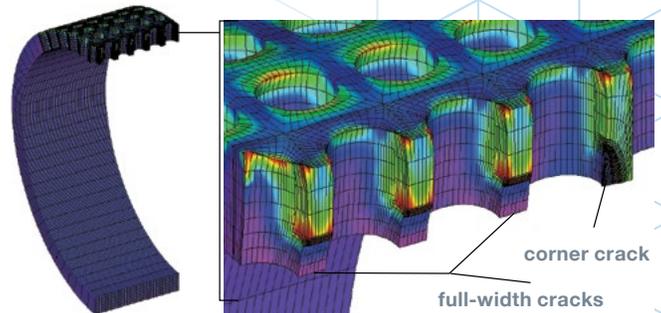


Figure 5. Left, Cracked ligaments along generating bank tube holes in an electric power steam drum. Right, Magnified view of cracked ligaments.