



Know the details of your asset

Structural Analysis Skills

A Finite Element Method (FEM) provides a numerical solution for a complex problem, which allows for some level of error. Usually, it's used when math equations are too complex to solve.

A simple way to understand FEM is to look at it as separating a large problem into a series of smaller ones ("finite elements"). This makes the overall problem easier to investigate. Our engineers use FEM when they need to develop an adoptable design that's practical but not necessarily perfect for a particular application or to investigate the current and future impact of observed anomalies within an object.

The mathematical equations behind FEM are applied to create a simulation, or what's known as a finite element analysis (FEA). This simulation is used to provide a structural analysis

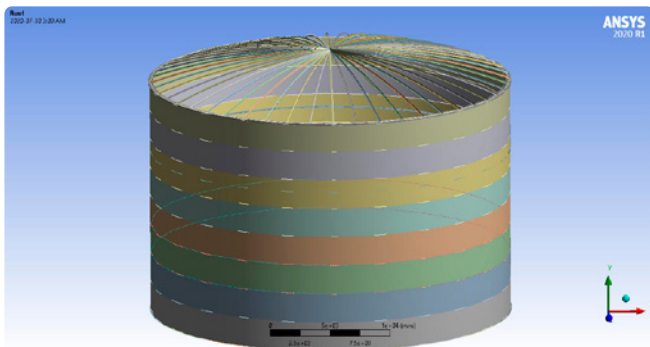
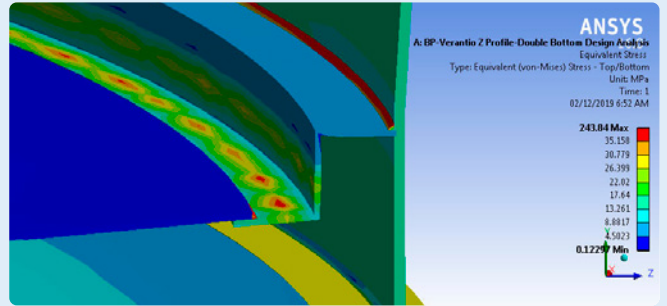
of how a particular product or design would react under stress in the real world as caused by the different load cases. The simulation breaks down the entire model into smaller elements within a mesh, which our engineers use to test how the different elements of a design interact and perform under simulated load conditions.

Together, FEA and the underlying math of FEM are used to predict the structural behavior and integrity of the object under consideration.



We provide support in the following areas:

- Structural Analysis
- Kinematic Analysis and Synthesis of Mechanisms
- Computational Fluid Dynamics
- Heat Transfer

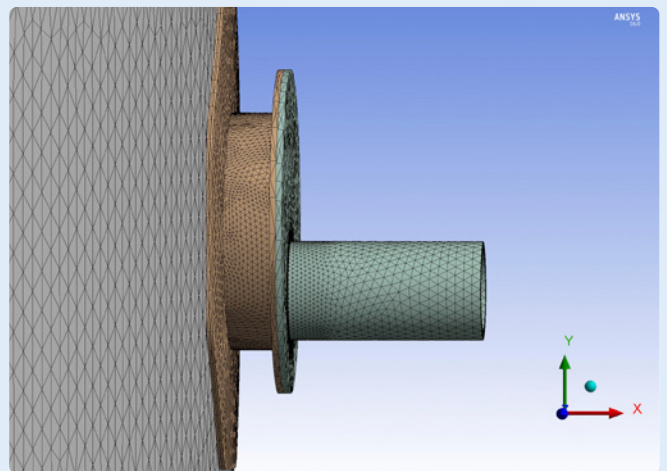


We perform the following types of analysis according to the criteria defined by our customers:

- Linear Static Analysis
- Nonlinear Static Analysis
- Implicit/Explicit Nonlinear Analysis
- Buckling Analyses (FEA, Hand Calculations: Local/Post Buckling)
- Fatigue Analysis
- FE Modeling (2D & 3D)
- Automated FE Analysis via Macros
- Advanced Hand Calculations with Combined Macro/Excel Applications

We have extensive experience in the Fitness-for-service assessment as per API579 and BS7910 of the following damage mechanism:

- Brittle fracture
- General Metal Loss
- Local Metal Loss
- Pitting Corrosion
- HIC, SOHIC and Hydrogen Blister Damage
- Weld Misalignment and Shell Distortions
- Crack-Like Flaws
- High temperature Creep Damage and Remaining Life
- Fire Damage
- Dents, Gouges and Dent-Gouge Combinations
- Storage tanks Hydrotest exemption
- Storage tanks shell and edge settlement evaluation
- Out-of-roundness analysis
- Laminations
- Weld Misalignment and Shell Distortions
- Evaluation of cycling loads equipment for fatigue damage
- Analysis and measurement of Residual (locked-in) stresses
- Strains in a structural material or component



Benefits of FEM and FEA

FEM and FEA allow for enhanced accuracy of structural analysis because they give insight into how the various elements of an object behave under certain circumstances (read acting loads), more specifically its design, and are interacting in the smallest detail. And because FEM and FEA allow engineers to create virtual simulations, they reduce the need for physical prototypes, testing or repair which saves time and reduces costs.