

EXTREME LOADS AND STRUCTURAL RISK

FINITE ELEMENT ANALYSIS FACTSHEET



What is Finite Element Analysis?

Finite Element Analysis (FEA) is a numerical method generally used:

- To support the design, substantiation, or investigation of various structures, including buildings, plant and equipment
- To understand the physical behavior of a complex object and produce an optimal design
- To predict the performance and behavior of the design; to calculate the safety margin; and to identify the weakness of the design accurately

FEA can be applied to a range of problems:

- Structural Assessment (stress, strain, deformation)
- Dynamic Behaviour Response (seismic, blast, shock, impact loading)
 - Linear and Non-linear Behaviours (geometric, material and interfaces)
 - Hydrodynamic
- Specialist Analyses
 - Thermal Analysis
 - Fatigue Analysis
 - Fracture Mechanics
 - Wear Analysis
 - Electromagnetic

Our Capabilities

With 40+ years' experience, ABS Group have studied the behavior of structures, equipment and personnel to dynamic loading events and nonlinear response modeling.

Our evaluations involve both FEA simulation and physical testing of nonlinear structural systems under dynamic loading conditions.

The benefits of FEA include:

- Cost-effective Simulation
- Engineering Justification and Validation
- Removal of Detailed Physical Testing or Prototypes
- Behaviour Understanding of Complex Behaviors
- Informed Decisions in Responses to the Output

ABS Group has expertise in but is not limited to the following FE software:

Advanced FE Packages

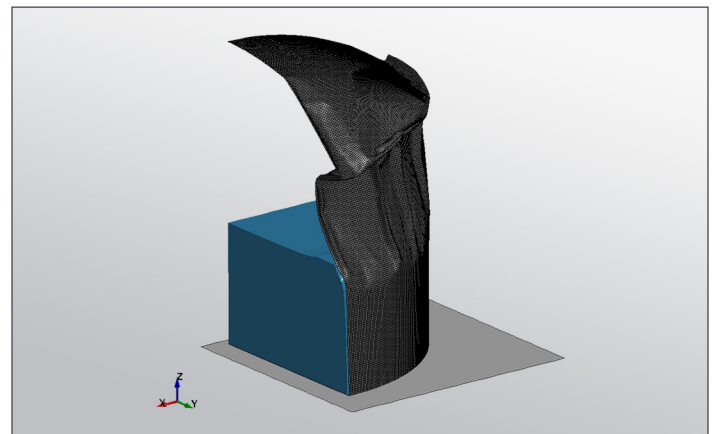
ABAQUS, ANSYS, LS-DYNA

Civil/Structural Analysis

STAAD, SAP 2000

Specialist Examples

CrackWise, Autopipe



Our Experience

Power (Nuclear and Renewable Energies)

- Detailed structural analysis of several structures, subjected to various loadings, such as flooding, wind and seismic loadings.
- Detailed crack and fracture analysis of wind turbine blades, along with assessment and review of typical foundations.
- Plant and equipment analysis e.g. piping, pressure vessels and cubicles.
- Design and testing of containers for the storage and transport of hazardous materials.

Oil and Gas

- Detailed analysis of building and components subjected to blast loads (initial design phase and retrospective design).
- Incident investigation support for several sites, including looking at the probable causes to explosions.

Manufacturing

- Justification of several floor and wall mounted cubicles, the proposed anchorage and their contents.
- Detailed design support and suggested design improvements for overhead crane.
- Fatigue analysis and assessment of hoppers in the pharmaceutical industry, providing an effective solution to repeated cyclic loadings and a typical design life.
- Wear Analysis of heavy rollers.

Defense (Government and Civilian)

- Design of explosive containment chambers (i.e. blast chambers) at a number of sites.
- Analysis and assessment of sensitive buildings and items of plant within facilities.
- Informed and aided a number of clients in producing safe working environments for both their employees and the wider community.
- Optimization of the design of blast doors from concept to manufacture and installation.

