

## Case Studies: Fluid-Loaded Structural Analysis

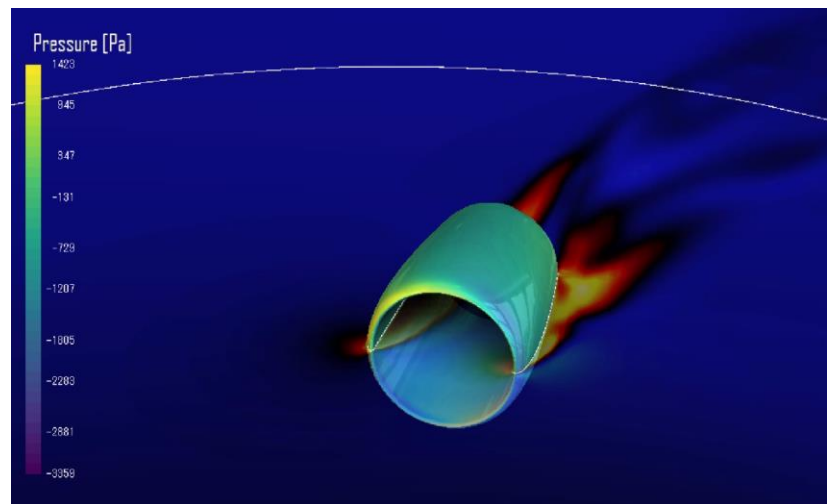
A look into combined computational fluid dynamics (CFD) & finite element (FE) stress analysis for structures under complex fluid loading conditions such as wind & wave loads.



### Transient Fluid Analysis

Frewer uses CFD analysis to model structures subject to varying loads based on changeable environmental conditions, such as gusting wind or wave slapping. By modelling the geometry of the exposed components and simulating the harsh boundary conditions which call for this advanced analysis, we can assess items like structural integrity, survivability and fatigue life from cycling loads.

For structures that are moving relative to these environmental loads, we utilise moving meshes and transient RANS modelling methods to illustrate how loading profiles can change with respect to time. These can then be used to structurally assess the assembly across the dynamic load case.



### Efficient Stress Analysis

Our engineers take the load profiles generated by CFD analysis and map the surface pressures or loads onto FEA models. We then iterate through the profile of cases, taking time stepped data and generating batch files which automatically run the full loading cycle in a time and cost-efficient manner. From this detailed analysis we can then generate accurate assessments of the stresses and deflections to guide design improvements or verify part integrity.

Structural  
Analysis

frewer  
Engineering

Math  
Modelling

Fluid/Thermo  
Dynamics