

STRUCTURAL AND THERMAL



Engineers designing and testing mechanical components and devices can leverage powerful features in SimScale[®] to solve realistic structural mechanics problems dealing with **static**, **dynamic**, and **thermal loading conditions**.



Run multiple design iterations in parallel harnessing the practically unlimited HPC power of the cloud.



ACCURATE

Advanced solvers account for thermal and structural behavior and deliver accurate assessment of deformation, stresses, and other design critical output quantities.



ROBUST

Mesh interfaces are both conformal between all parts and robust enough to apply to many types of CAD models the first time around.



ACCESSIBLE

Cloud-native deployment makes high-fidelity engineering simulation truly accessible from anywhere you have access to a browser and at any scale.

DATASHEET | STRUCTURAL AND THERMAL

SIMSCALE STRUCTURAL AND THERMAL | CAPABILITIES

STRUCTURAL & THERMAL ANALYSIS

Static

- Solid
- Steady Loads
- Linear
- Non-Linear
- Snap-fit
- Automatic Contact

Dynamic

- Solid
- Linear
- Non-Linear
- Drop-Test

Thermomechanical

- Solid
- Thermal Stress
- Thermal Expansion

Frequency (Modal) Analysis

- Solid
- Frequencies
- Eigenfrequencies

Harmonic

- Solid
- Periodic/Cyclic/Sinusoidal Loads
- Forced Vibration
- Shaker Table Test

CONNECTIVITY (API Integrations)

- Rhinoceros[®]
- Grasshopper[®]
- Autodesk[®] Revit[®]

The SimScale API enables easy integration with your preferred CAD, simulation pre- and post-processing, and workflow tools, such as Esteco's modeFrontier[®] and VOLTA[®] enabling sophisticated parametric optimization loops.









- Nonlinear Contact
- Friction
- Large Strains
- Elasto-plasticity
- Hyperelasticity
- Bolt preload
- Shock
- Material Damping
- Bolt preload
- Interference-fit
- Thermal Shock
- Bolt preload
- Eigenmodes
- Prestress for rotating parts
- Bolt preload
- Frequency Response
- Damping
- Bolt preload

SIMSCALE STRUCTURAL AND THERMAL | FEATURES

PRE-PROCESSING

CAD Compatibility

- 3D Systems® STL
- Autodesk[®] Inventor[®]
- Autodesk Revit
- Dassault Systèmes[®] ACIS[®]
- Dassault Systèmes CATIA™
- Dassault Systèmes SolidWorks[®]
- IGES

CAD associative simulation supported via named selections.

CAD Plugins

- SimScale Connector App for Onshape®
- SimScale Plugin for Solidworks
- SimScale Integration for Autodesk[®] Fusion 360[™]

CAD Mode

A dedicated environment to interact with your CAD model, delete, extrude, or scale CAD parts, and perform CAD-related operations directly within the platform. Operations being added continuously.

- Edit
- Close sheet
- Boolean
- Transform
- Simplify

Meshing Tools

Automatic global meshing algorithm using first and second order tetrahedrals defined, allowing for manual refinement.

Materials Library

Default materials include many common solids (metals, plastics). Custom materials and custom libraries can be defined.

Boundary Conditions

SimScale offers many boundary condition types for different types of applications.

Structural:

- Bolt preload
- Base excitation
- Elastic support
- Fixed Support
- Fixed value
- Point mass
- Remote Displacement
- Rotating motion

Thermal:

- Fixed temperature value
- Convective heat flux

- Symmetry plane
- Centrifugal force
- Force
- Nodal load
- Pressure
- Remote Force
- Surface Load
- Volume Load
- Surface heat flux
- Volume heat flux



- PTC[®] Creo[®]
- Rhinoceros[®]
 - Siemens[®] NX[™]
 - Siemens Parasolid[®]
- Siemens Solid Edge[®]
- STEP

- Fix Interferences
- Tools Gaps
- Tools Interferences
- Export

DATASHEET | STRUCTURAL AND THERMAL

SIMULATION

Processor/Cloud

Run as many simulations in parallel as desired, while continuing to work. That's the power of the cloud.

Collaboration

Share projects with other users, within or outside an organization, and also with the SimScale support team.

Solver Numerics

All numerical settings are made available for users to have full control over the simulation. These settings can be found for Code_Aster[®].

POST-PROCESSING

Visualization

SimScale's integrated post-processor offers 3D visualization of the result fields.

- Statistics and Inspect Point
- Visualization and Selection Modes
- Cutting Plane
- Iso Surface and Iso Volume
- Animation
- Field Calculator (Beta)
- Custom Camera Position

Data/results can also be exported in open formats such as *.CSV for further post-processing in third-party tools.







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