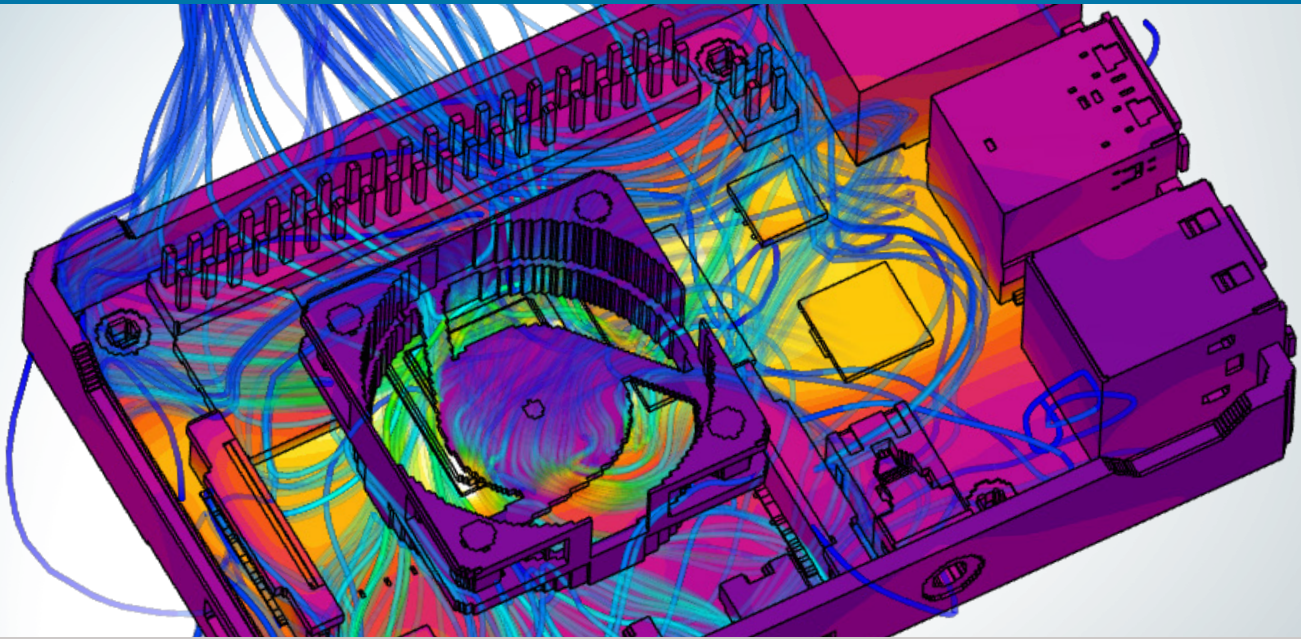


ELECTRONICS SIMULATION



SimScale® provides **electronics industry designers** and **engineers** with easy access to **powerful flow, thermal, and structural** cloud-native simulation. From individual components to complex electronics assemblies, from transformers to EV/HEV battery modules and electric drivetrain components, SimScale® is the perfect tool to understand and optimize durability, efficiency, structural integrity, and thermal performance of electronics, enabling rapid optimization and development of products with minimal investment.



FAST

Electronics design is driven by short design cycles. Cloud-native solvers, providing access to a huge number of CPU's and/or GPU cores to reduce job turnaround times. Plus the ability to run as many jobs as needed in parallel.



ACCURATE

Engineers can harness advanced solvers that account for coupled physics conjugate heat transfer and thermal stress analyses deliver accurate results across a variety of problem domains and scales.



ROBUST

Allows for simulation directly after CAD geometry import. Even complex CAD assemblies can be easily handled via the robust IBM cartesian mesh solving, avoiding the need for tedious CAD clean-up and geometry simplification.



ACCESSIBLE

Cloud-native deployment with an intuitive interface, in platform live help, and collaboration tools built in makes high-fidelity engineering simulation truly accessible from anywhere you have access to a browser and at any scale.

SimScale makes high-fidelity engineering simulation technically and economically accessible. **At any scale. In the cloud.**

SIMSCALE ELECTRONICS SIMULATION | CAPABILITIES

COMPUTATIONAL FLUID DYNAMICS (CFD)

Immersed Boundary Method (IBM)

- Fluid flow (gas or liquid)
- Incompressible – Mach<0.3(100m/s)
- Compressible – Mach>0.3(100m/s)
- Large scale transient
- Fan curves
- Momentum sources

Incompressible

- Fluid flow (gas or liquid)
- Mach<0.3(100m/s)
- Negligible density variation
- Multiple frames of reference
- Porous media (Filter media)
- Momentum sources
- Non-newtonian fluid modeling

Conjugate Heat Transfer

- Fluids & solids
- Temperature Distribution
- Heat Flux
- Multiple reference frames
- Porous media (Filter media)
- Power & Momentum sources

STRUCTURAL AND THERMAL ANALYSIS

Static

- Steady Loads
- Linear & non-Linear
- Snap-fit
- Automatic & non-linear contact
- Friction
- Large Strains
- Elasto-plasticity & hyperelasticity
- Bolt preload

Dynamic

- Linear & Non Linear
- Drop-Test & shock
- Material Damping
- Bolt preload

Thermomechanical

- Thermal Stress & Expansion
- Thermal shock
- Thermomechanical Fatigue
- Interference-fit

Frequency Analysis

- Frequencies
- Eigenfrequencies & eigenmodes

Harmonic

- Periodic/Cyclic/Sinusoidal Loads
- Forced Vibration
- Shaker Table Test
- Frequency Response
- Damping

CONNECTIVITY (API Integrations)

The SimScale public 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.

SIMSCALE ELECTRONICS SIMULATION | FEATURES

PRE-PROCESSING

CAD Compatible

- 3D Systems® STL
- Autodesk® Inventor®
- Autodesk® Revit®
- Dassault Systèmes® ACIS®
- Dassault Systèmes® CATIA™
- Dassault Systèmes® SolidWorks®
- IGES
- PTC® Creo®
- Rhinoceros®
- Siemens® NX™
- Siemens® Parasolid®
- Siemens® Solid Edge®
- STEP

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.

- Create – Flow Volume-Internal
- Create – Flow Volume-External
- Close sheet
- Boolean
- Transform
- Simplify
- Fix Interferences
- Tools – Gaps
- Tools – Interferences
- Export

Meshing Tools

Current meshing strategies available on the platform are:

- Standard
- Hex-dominant
- Hex-dominant parametric
- Meshing for subsonic analysis type
- IBM Cartesian based mesh

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

Materials Library

Default materials include both solids and fluids according to the analysis type selected, orthotropic materials, or define your own custom materials.

Advanced concepts

- Power sources
- Thermal resistance networks
- Fan momentum sources
- Contact & thin layer resistances

Boundary Conditions

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

Fluid:

- Velocity inlet and Velocity outlet
- Pressure inlet and Pressure outlet
- Natural convection inlet-outlet
- Wall
- Fan Boundary Condition
- Periodic
- Symmetry
- Wedge
- Custom
- Empty 2D

Structural:

- Bolt preload
- Base excitation
- Elastic support
- Fixed Support
- Fixed value
- Point mass
- Remote Displacement
- Rotating motion
- Symmetry plane
- Centrifugal force
- Force
- Nodal load
- Pressure
- Remote Force
- Surface Load
- Volume Load

Thermal:

- Fixed value temperature
- Convective heat flux
- Surface heat flux
- Volume heat flux

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 Fluid Dynamics (OpenFOAM®) and Solid Mechanics (Code_Aster®) analysis types.

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
- Particle Trace
- Animation
- Field Calculator (Beta)
- Custom Camera Position
- Result / design comparison

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

