SOLIDWORKS® FLOW SIMULATION KEY CAPABILITIES

CAPABILITIES	DESCRIPTION
SOLIDWORKS FLOW SIMULATION	
Streamlined CFD User Experience Set up, run, and analyze simulations right inside your familiar SOLIDWORKS design workflow.	
Fast learning and easy access to support	Learn faster with intuitive menus, contextual commands, built-in tutorials, and searchable help.
Help documentation	Find answers faster with contextual, searchable help built into your workflow.
Local and worldwide support services	Get fast support wherever you work, backed by our worldwide network.
Built-In Analysis Wizard and guided setup	Set up simulations faster and more reliably with step-by-step guidance from the Analysis Wizard.
Knowledge Base	Solve issues faster with quick access to trusted examples, troubleshooting guidance, and best practices.
Concurrent engineering	Work in parallel with your team to collaborate more effectively and speed up product development.
Full associativity with 3D design changes	Keep your analysis aligned automatically as your 3D design changes.
Support for SOLIDWORKS configuration	Analyze multiple design variants efficiently using your existing SOLIDWORKS configurations.
Multiparameter optimization	Find your best-performing design faster by automatically exploring multiple parameters.
Enhanced Flow Conditions Simulate the full range of fluid behavior, from basic airflow to complex multiphase, thermal, and high-speed conditions, so you can validate real-world performance with confidence.	
2D flow	Simplify flow analysis in two dimensions to reduce model complexity and speed up setup and results.
3D flow	Analyze complex airflow, pressure, velocity, and thermal behavior in three dimensions, inside or around your product.
Symmetry	Reduce model size and computation time with symmetry conditions, without sacrificing CFD accuracy.
Sector periodicity	Model only a repeated sector of rotational or periodic geometry to cut computation time while preserving accurate CFD behavior.
Internal fluid flows	Evaluate pressure, velocity, and thermal performance inside enclosed systems like pipes, ducts, valves, and cooling channels.
External fluid flows	Analyze aerodynamics, drag, pressure distribution, and thermal behavior in flow around your product.
Steady-State fluid flows	Evaluate stable pressure, velocity, temperature, and flow behavior in flows that remain constant over time.

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Time-Dependent fluid flows	Capture transient changes in velocity, pressure, temperature, and flow patterns over time.
Liquids	Analyze velocity, pressure, temperature, and flow behavior in internal or external liquid flows.
Gases	Analyze airflow, pressure, velocity, temperature, and compressibility effects in gas flows.
Non-Newtonian liquids	Analyze complex fluids like polymers, gels, and pastes, where viscosity changes with shear rate.
Combustibles mixtures	Analyze the behavior, temperature distribution, and flow performance of combustible mixtures.
Mixed flows	Analyze interactions, flow behavior, pressure, and thermal effects across multiple fluids in the same simulation.
Separated flows (as fluid subdomains)	Analyze distinct flow regions, interactions, pressure, velocity, and thermal behavior within the same CFD model.
Compressible gas and incompressible fluid flows	Analyze pressure, velocity, density, and thermal behavior across both compressible gas and incompressible liquid flows.
Subsonic, transonic, and supersonic gas flows	Analyze velocity, pressure, shock waves, and compressibility effects across subsonic, transonic, and supersonic gas flows.
Flows of compressible liquids	Analyze pressure, density changes, velocity distribution, and flow behavior in compressible liquids under high-pressure conditions.
Real gases	Analyze compressibility, density changes, pressure, temperature, and flow performance under realistic operating conditions.
Cavitation in incompressible water flows	Analyze vapor formation, pressure drops, flow instability, and potential damage risk from cavitation in incompressible water flows.
Laminar-only flow	Analyze smooth, orderly fluid motion; pressure losses; velocity distribution; and heat transfer behavior in laminar flow.
Porous media	Analyze pressure drop, resistance, velocity distribution, and heat transfer in flow through porous materials.
Multispecies fluids and multicomponent solids	Analyze material interactions, composition effects, heat transfer, and flow behavior across multispecies fluids and multicomponent solids.
Fluid flows in models with rotating surfaces or parts	Analyze velocity, pressure, forces, torque, and thermal behavior in flows around rotating parts.
Heat conduction in fluid, solid, and porous media	Analyze conjugate heat transfer and contact resistance across fluids, solids, and porous media.
Heat conduction in solids only	Focus your thermal analysis on solids alone by freezing fluid motion.
Gravitational effects	Analyze buoyancy, natural convection, pressure variation, and flow behavior influenced by gravity.
Radiation heat transfer between solids	Analyze temperature distribution and thermal performance from radiation heat transfer between solids.
Various types of thermal conductivity in solid medium	Analyze heat transfer, temperature distribution, and material performance across different thermal conductivity behaviors in solids.
Equilibrium volume condensation of water from steam and its influence on fluid flow and heat transfer	Analyze how water condensation from steam affects fluid flow, heat transfer, temperature, and pressure.
Relative humidity in gases and mixtures of gases	Analyze how moisture affects flow behavior, condensation, and heat transfer in gases and gas mixtures.
Two-phase (fluid + particles) flows	Analyze particle transport, distribution, separation, and their impact on flow behavior in two-phase flows.
Periodic boundary conditions	Model repeating flow regions to reduce simulation size while preserving accurate flow and thermal behavior.
Automatic and manual global mesh settings	Balance accuracy, computation time, and model complexity with automatic or manual global mesh controls.
Local mesh refining cells	Improve accuracy in critical regions by refining mesh cells locally, without slowing down your overall computation.
Engineering DB	Streamline simulation setup and ensure consistency with a centralized database for materials, fluids, components, and project data.

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SOLIDWORKS FLOW SIMULATION	
Noise prediction (steady state and transient)	Assess acoustic performance by predicting steady-state and transient flow-induced noise.
Free surface	Analyze fluid interface behavior, sloshing, filling, draining, and liquid movement under gravity.
HVAC MODULE (requires a SOLIDWORKS Flow Simulation license)	
Tracer study	Analyze flow paths, mixing behavior, residence time, and contaminant dispersion with tracer transport studies.
Radiation absorption in semitransparent solids and the radiation spectrum	Analyze temperature distribution and thermal performance from radiation heat transfer between opaque and semitransparent solids.
Comfort parameters	Assess occupant comfort in indoor environments by evaluating temperature, airflow, humidity, and thermal conditions.
ELECTRONICS COOLING MODULE (requires a SOLIDWORKS Flow Simulation license)	
Thermal joints	Analyze heat transfer, contact resistance, temperature distribution, and thermal performance across interfaces.
Two-resistor components	Simplify thermal analysis of electronic components while accurately predicting junction, case, and overall temperature behavior.
Printed circuit boards	Analyze electronic cooling, temperature distribution, heat dissipation, and thermal reliability in printed circuit boards.
Thermoelectric coolers	Analyze active cooling performance, heat transfer, temperature control, and electronic thermal management in thermoelectric coolers.
Joule heating due to direct electric current in electrically conducting solids	Analyze heat generation, temperature rise, and thermal performance from Joule heating in conductive solids.
Heat sources due to Peltier effect	Analyze thermoelectric cooling, heating behavior, and temperature distribution from Peltier effect heat sources.
Heat pipes	Analyze passive heat transfer, temperature control, cooling efficiency, and thermal performance in heat pipes.

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Europe/Middle East/Africa
Dassault Systèmes
10, rue Marcel Dassault
CS 40501
78946 Vélizy-Villacoublay Cedex
France

Asia-Pacific
Dassault Systèmes
17F, Foxconn Building,
No. 1366, Lujiazui Ring Road
Pilot Free Trade Zone, Shanghai 200120
China

Americas
Dassault Systèmes
175 Wyman Street
Waltham, Massachusetts
02451-1223
USA

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