

Simcenter STAR-CCM+ design exploration

Enhancing product performance by exploring the design space early in the process

Benefits

- Improve product performance by exploring the design space early in the process
- Evaluate real-world behavior of complex systems using multiple what-if scenarios in a cost-effective manner
- Use simulation to drive innovation and gain market share with better designs
- Increase product knowledge to enhance confidence in design decisions
- Improve product reliability to reduce risk and cost
- Align resources with the value of simulation for a higher ROI

Summary

Simulation is a critical tool in troubleshooting and preventing in-field failures, validating product performance and predicting how designs perform in real-world conditions. To keep a competitive edge in today's fast-paced market, companies must use simulation to drive innovation. Design space exploration takes engineering analysis to the next level by driving design decisions based on appropriate engineering and performance objectives. Although companies agree they need to rethink their simulation practices to stay in the race, some challenges and roadblocks remain, such as:

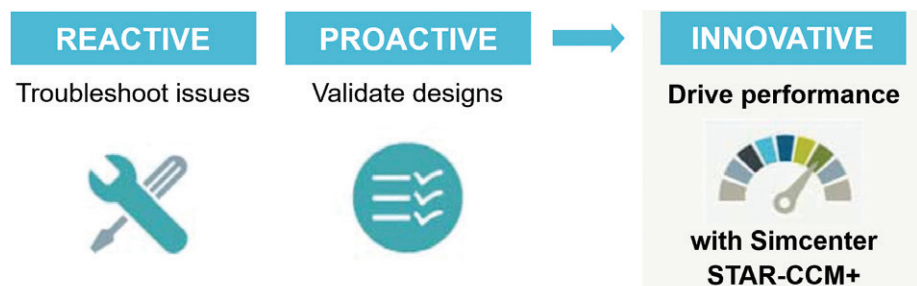
- Driving parametric modifications of computer-aided design (CAD) models

- Robustly automating the CAD-to-results process
- Efficiently and effortlessly searching the design space
- Managing and extracting insights from large data sets

Simcenter STAR-CCM+ offers the solution

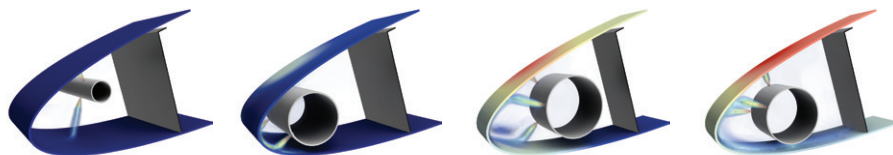
Using Simcenter™ STAR-CCM+™ software allows you to unlock the power of simulation and drive innovation. Instead of using simulation to evaluate the performance of one design, you can define the desired performance objectives and let our embedded search technology identify better-performing designs. With its integrated CAD-to-exploration approach, Simcenter STAR-CCM+ removes all existing bottlenecks and allows you to:

- Explore early and often using an **integrated automated process**
- Leverage your resources with **efficient resource management**
- Affordably deploy design exploration with **flexible license schemes**



Redefining simulation strategy for innovation.

Simcenter STAR-CCM+ design exploration



Improving the heat transfer performance of an aircraft ice protection system (courtesy: Honda Aircraft).

- Discover better designs faster with our **intelligent search** method
- Find novel and nonintuitive designs with the robust **integrated adjoint** solver
- Easily gain insight into product behavior with **effective visualization**

Integrated automated process

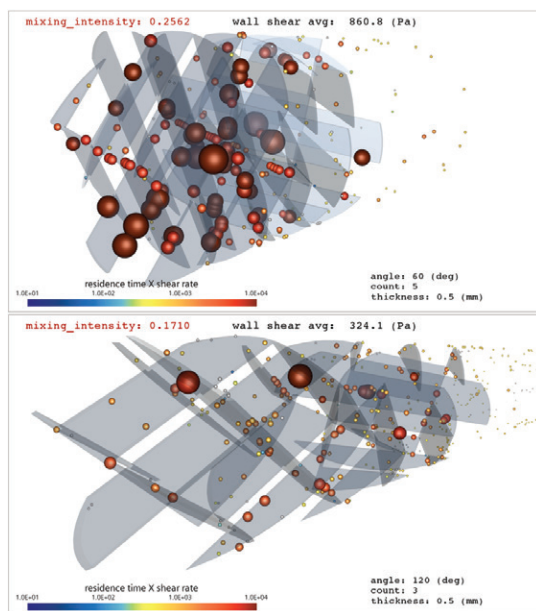
Seamlessly deploy design space exploration in a single user environment:

- Effortlessly re-execute model updates with a robust, automated workflow
- Create or modify parametric CAD models using the built-in 3D CAD modeler
- Easily define and control design and operating condition parameters
- Explore designs using native CAD tools using CAD Clients
- Evaluate your CAD model upfront with the CAD robustness study
- Automatically run defined what-if scenarios with manual and parameter sweep studies
- Seamlessly extend to optimize with the Simcenter STAR-CCM+ Intelligent Design Exploration add-on license
- Save time and increase accuracy by optimizing your methodologies' simulation parameters
- Perform nonparametric optimization using the adjoint solver

Efficient resource management

Easily leverage available computing resources to increase simulation throughput:

- Integrate easily with existing hardware and software environment with multiple submission modes
- Meet your priorities with upfront pre-allocation of hardware and license resource
- Seamlessly submit, monitor and control studies on Linux clusters with job manager
- Automatically orchestrate different simulation operations across resources and operating systems

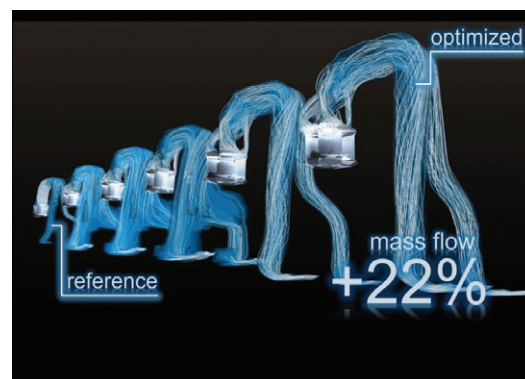


Comparison of static mixer designs showing areas where material will be exposed to higher shear for longer periods of time. A total of 192 designs were explored.

Flexible license schemes

Affordably deploy design space exploration:

- Simcenter STAR-CCM+ Power Session: unlimited number of cores per session at a fixed price
- Simcenter STAR-CCM+ Power on Demand: pay-as-you-go on an unlimited number of cores
- Simcenter STAR-CCM+ Power Tokens: adaptable use of licenses based on number of simultaneous design runs and cores needed per study



HP Multi Jet Fusion 5200 3D printer ventilation system optimization, delivering 22 percent improved efficiency (courtesy: HP).

Intelligent search

Discover better designs with our embedded HEEDS™ software intelligent search:

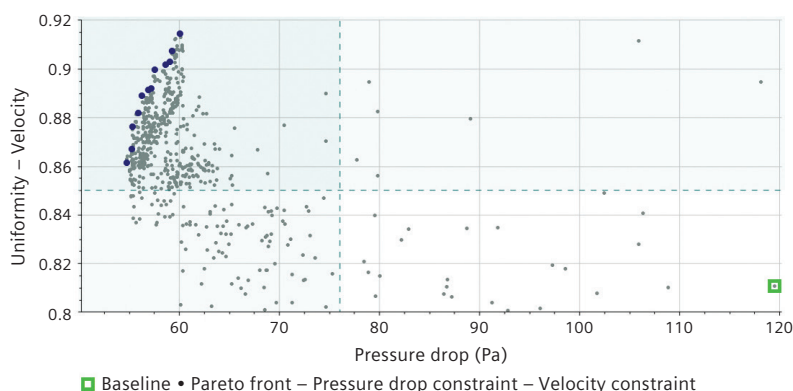
- Requires only variables, objectives, constraints and time budget as inputs
- Leverages multiple global and local search strategies
- Adapts the search as it learns more about the design space
- Finds better design alternatives in the allotted time
- Cost-effective on complex models, no matter the number of parameters and constraints
- Allows collaborative optimization to benefit from user knowledge

Effective visualization

Gain insight into product behavior to drive design decisions:

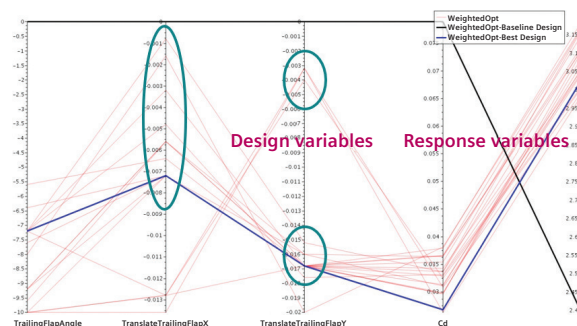
- Compare multiple variants or studies simultaneously to identify families of top-performing designs
- Highlight design dependencies and common trends using parallel plots
- Understand tradeoffs across designs for multi-objective optimization with Pareto plots
- Monitor your study convergence with live postprocessing updates
- Facilitate design comparison with interactive linked snapshots
- Quickly navigate large data sets with interactive and synchronized design table, snapshots and plots

Pareto plot: uniformity versus pressure drop



Understand tradeoffs across designs with Pareto plots.

Parallel coordinates



Identify common trends with parallel plots.

Siemens Digital Industries Software
[siemens.com/software](https://www.siemens.com/software)

Americas +1 314 264 8499
 Europe +44 (0) 1276 413200
 Asia-Pacific +852 2230 3333