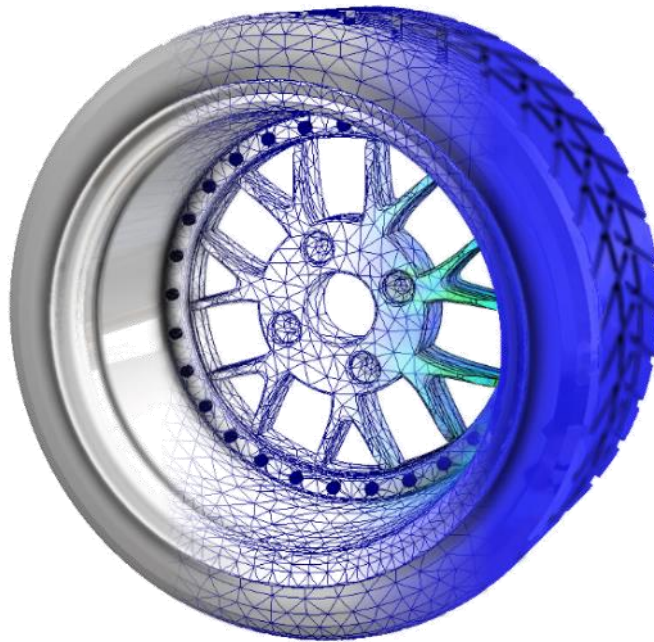


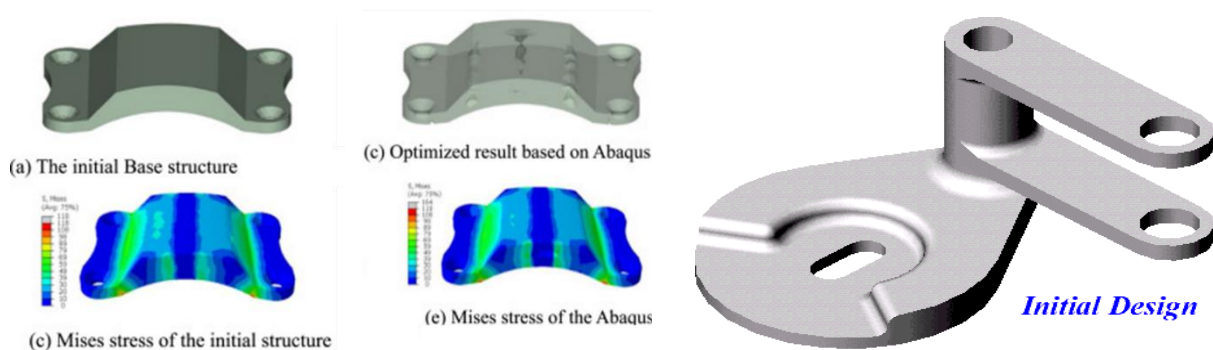
BEACON Newsletter - November 2024

Simulation-Driven Design with 3DEXPERIENCE Works

Simulation is a powerful tool to analyze and validate the real-world performance of a design. However, many are finding that simulation can do even more. An increasing number of product development teams are embracing simulation driven design, where design engineers use simulation early and often in developing a model.



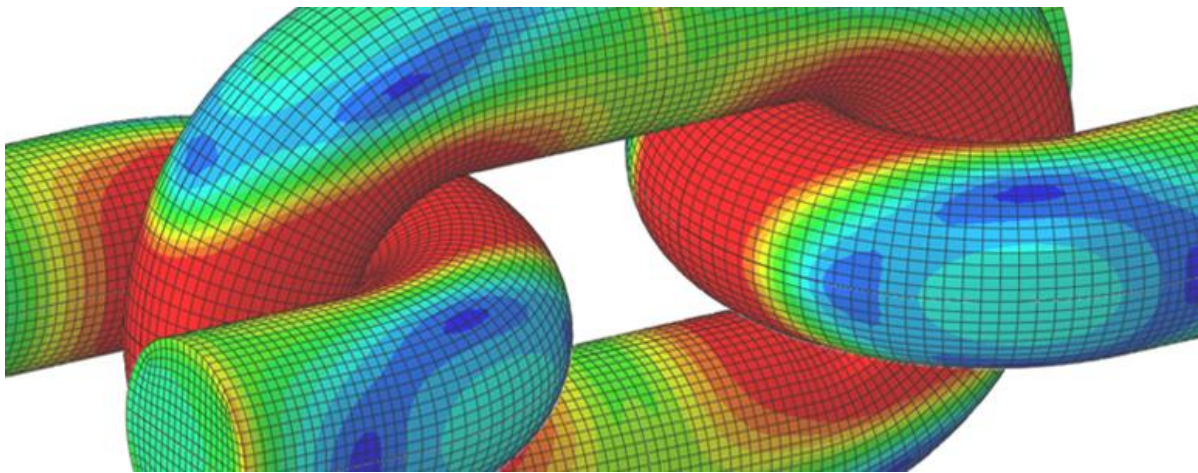
Upfront simulation has many potential benefits. Simulation can serve as a rudder that keeps designs on track, answering questions such as, Is this rib too thin? Should this heat sink be larger? How can I make this part lighter? Ultimately, the ability to answer such questions as early as possible enables teams to spend less time and money on physical prototyping, reduce product time-to-market and deliver better products to their customers.



Throughout this document, we'll see how simulation is being democratized for SOLIDWORKS users via the 3DEXPERIENCE WORKS cloud platform.

3DEXPERIENCE WORKS

Since 2013, Dassault Systèmes has presented its vision of product development in the cloud with the 3DEXPERIENCE platform. The platform was designed to serve as a central hub of engineering software and product lifecycle management tools, with an underlying data structure allowing communication and collaboration across all apps. In 2019, to help SOLIDWORKS users realize the benefits of its cloud approach, Dassault unveiled 3DEXPERIENCE WORKS, a suite of cloud-based applications that directly compliment the desktop-based SOLIDWORKS. 3DEXPERIENCE WORKS incorporates a wide range of capabilities, from mechanical design to manufacturing, electrical design to governance, industrial design to marketing—and, naturally, simulation.



The simulation tools available in 3DEXPERIENCE WORKS encompass a wide range of analysis types, as with SOLIDWORKS Simulation. However, 3DEXPERIENCE WORKS surpasses SOLIDWORKS Simulation in non-linear analysis, contact analysis, meshing options and high-performance computing (HPC). This is because the simulation applications on 3DEXPERIENCE WORKS are built on the Abaqus FEA solver, which originated to tackle non-linear analysis and has been in consistent development since the late 1970s. It's the same solver used in Dassault's SIMULIA simulation package, and it brings the same power into the 3DEXPERIENCE WORKS.

SIMULATION WITH 3DEXPERIENCE WORKS

The 3DEXPERIENCE WORKS portfolio includes simulation tools for basic to advanced structural analysis, computational fluid dynamics, plastic injection molding and Electromagnetic Simulation. Studies can be run on local hardware or in the cloud using credits that depend on the size and type of study. Simulating on the cloud gives users access to as many cores as necessary to solve a problem, resulting in faster solutions and eliminating the need for expensive local hardware.

Like SOLIDWORKS Simulation, the simulation tools available on 3DEXPERIENCE WORKS connect directly to SOLIDWORKS models and can be accessed from a link embedded in the CAD interface. Thanks to this connector, updates to the SOLIDWORKS model are automatically reflected in 3DEXPERIENCE WORKS. This eliminates the tedious need to re-import models or re-setup studies.

Let's understand in detail Simulation tool present in 3DEXPERIENCE Platform.

Structural Simulation

Structural Simulation solutions available to SOLIDWORKS users provide a comprehensive set of structural analysis capabilities to guide design decisions and improve product performance and quality.

- CAD-embedded structural analysis solutions using Finite Element Analysis (FEA) to predict real-life performance.
- Easy to use, comprehensive capabilities solve everything from a simple linear analysis of single components to complete simulations of full assemblies with contact and non-linearities.
- Cloud-enabled solutions deliver access to powerful, proven, and scalable Abaqus technology from SIMULIA.
- Understand product performance early in the design process to innovate more and avoid rework.

| Structural Designer (SRD) | | | | Structural Engineer (SLL) | | | | Structural Performance Engineer (SFO) Durability Performance Engineer (FGP)* | | | | Structural Mechanics Engineer (SSU) Durability and Mechanics Engineer (FGM)* | | | |
|---------------------------|--|-------------------|-------------------|---------------------------|---------------------|---------------------|-----------------------|---|----------------------|--|--|---|--|--|--|
| Linear Static | Frequency | Harmonic Response | Modal Dynamic | Nonlinear Static | Thermal-Structural | NL Dynamic Implicit | NL Dynamic Explicit | Quasi-Static Explicit | Complex Frequency | | | | | | |
| Thermal | Buckling | Advanced Meshing | Advanced Elements | Material Failure | Advanced Connectors | Advanced Contact | Random Vibration | Geometry Preparation | Material Calibration | | | | | | |
| Cloud Computing | Assistant | Multi-Step | | General Contact | Advanced Materials | *Fatigue | Restart | Sub-Modelling | | | | | | | |
| | <input checked="" type="checkbox"/> Setup <input type="checkbox"/> Materials <input type="checkbox"/> Connections <input type="checkbox"/> Restraints | | | | | | Restart Analysis Case | Submodel Analysis Case | | | | | | | |

Computational Fluid Dynamics

Perform fluid flow and heat transfer simulation to improve quality and avoid manufacturing issues.

- Explore fluid flow and thermal performance of products to accelerate product innovation.
- A wide range of capabilities provides tools to easily predict steady-state and long transient flow and thermal behaviour of products.
- Fully integrated multidisciplinary environment to quickly and easily conduct CFD analyses.
- Collaborate with project stakeholders around fluid flow simulation results for informed decisions.

| Fluid Dynamics Engineer (FMK) | | | | | |
|---|------------------------------------|-----------------------------|--------------------------------|---------------------------------|--|
| Internal & External | Laminar & Turbulent | Heat Transfer | Rotating Components | Joule Heating | Assistant <input checked="" type="checkbox"/> Model <input checked="" type="checkbox"/> Physics <input checked="" type="checkbox"/> Initial Conditions <input checked="" type="checkbox"/> Boundaries (3) |
| Compressible | Non-Newtonian | Results Exchange | Free Surface | Comfort Parameters | Particle Modeling |
| Steady state & Transient | Robust Meshing | Cloud Computing | Turbulence Models | Geometry Preparation | |

Electromagnetics Simulation

Easily analyze and optimize electromagnetic components and systems design and placement for maximum performance and reliability. Study the impact of both low and high frequency electromagnetic waves on product and system behaviours.

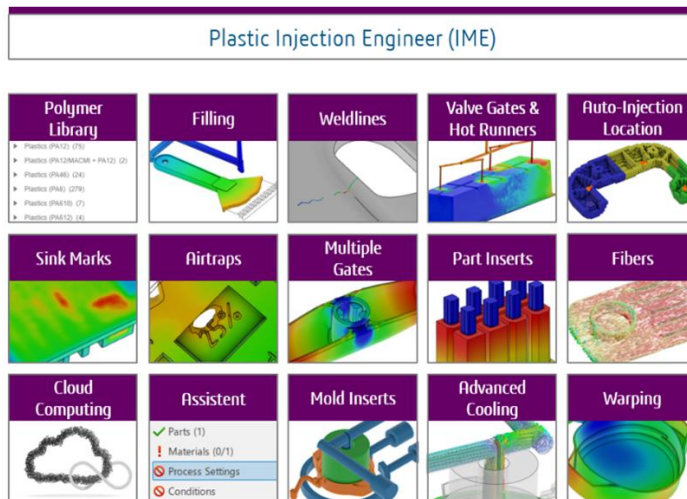
- Perform electromagnetics analysis, including optimization of antennas and microwave components (e.g., filters, connectors, etc.) as well as electro-mechanical devices (e.g., motors and generators) to reduce time-to-market.
- Minimize the electromagnetic compatibility (EMC) risks and the exposure of the human body to electromagnetic fields to ensure the device passes the required legal certification tests.
- Provide the most powerful methods such as the unique finite integration technique (FIT), the classical finite element method (FEM) and the transmission line matrix method (TLM), even for hybrid simulations.
- Deliver unprecedented simulation reliability through cross-verification to avoid device malfunctions, warranty claims, and recalls.

| Electromagnetics Engineer (EMC) | | | | | | | | | |
|---------------------------------|--|---------------------------------|-------------------------------------|--|---------------------------------------|-------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|
| Static & Low Frequency | | Microwaves & RF / Optical | | EDA / Electronics | | EMC / EMI | | Particle Dynamics | |
| EM Devices | High Voltages / Heavy Current | Antennas | Circuit & Components | Signal Integrity Analysis | Power Integrity Analysis | Radiated Emission | Conducted Emission | Accelerator Components | Vacuum Electronic Device |
| Magnetic Design | Sensors | Radar Cross Section | Biomedical Exposure, SBR | SI-PI Co-Simulation | Broadband Model Extraction | Conducted Susceptibility | Radiated Susceptibility | Space Applications | Beam Optics |
| EMC / Shielding | Power Electronics | Optical Applications | Periodic Structures | Narrowband Model Extraction | Design Rule Check (DRC) | Components | PCB Rule Check | | |

Plastics Injection Molding Simulation

Predict and avoid manufacturing defects in plastic part and injection molding designs, eliminating costly rework, improving part quality, and decreasing time to market.

- Virtually assess the manufacturability and quality of injection molded part designs and tooling
- Leverage easy-to-use simulation to reduce development time and costs.
- Evaluate effectiveness of mold cooling system designs for the right technical insights at the right time.
- Maintain associativity with SOLIDWORKS CAD data and workflows.

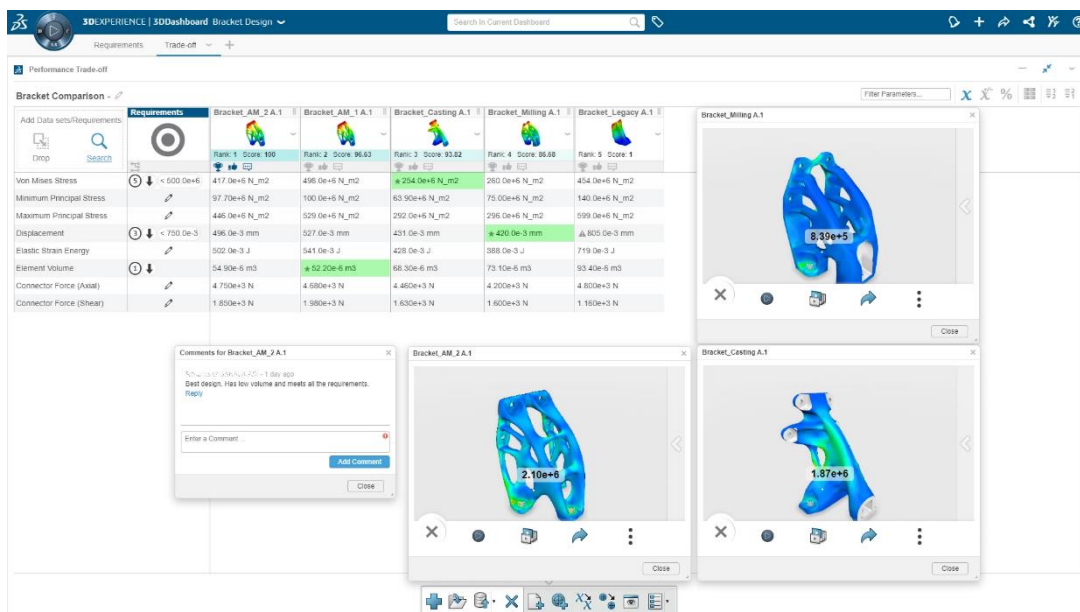


Simulation Collaborator

Facilitate collaborative decision making across the organization through the 3DDashboard to review, compare, and perform trade-offs between design alternatives.

The Simulation Collaborator role allows you to:

- Accelerate selection of the best designs by comparing performance metrics across alternatives and ranking designs based on requirements, using multi-criteria decision-making methods.
- Perform trade-offs between competing objectives and constraints.
- Review, share and collaborate on geometry and simulation results, from anywhere, through a lightweight, browser-based widget.
- Build your own simulation dashboard, with widgets to view all your recent simulation content, for interactive review.

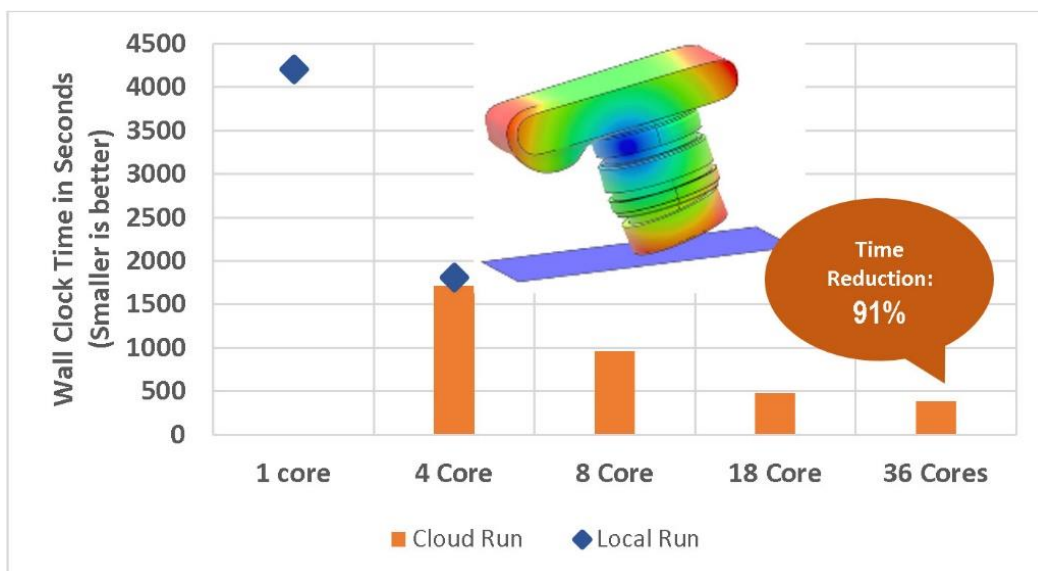


WHY SIMULATE ON THE CLOUD?

There are two big reasons to push simulation to the cloud: time and money.

Simulation is often a lengthy process, with processors crunching away for hours at a time to converge on a result. And though the cloud can't speed up time, it can lend more resources to a computation. There's a dramatic difference between running a simulation on four cores on a local machine and sixty-four cores in the cloud.

Not only can the cloud offer faster results, but it can also serve them up on a pay-per-use basis rather than a large upfront investment in local hardware. CAD workstations are already known for their beastly specs (and prices), but even the highest-end workstation can't compete with the virtually unlimited resources of the cloud.



Time v/s number of core: - Drop test of Camera Body

CONCLUSION

There are many ways for SOLIDWORKS users to take advantage of simulation-driven design, whether those users are design engineers or expert analysts. 3DEXPERIENCE WORKS provides a full set of analysis types and a close connection with SOLIDWORKS models. Built on the Abaqus solver, the simulation tools in 3DEXPERIENCE WORKS provide the power and depth needed for even the toughest non-linear problems.

With its cloud-based architecture, 3DEXPERIENCE WORKS offers several unique advantages over other simulation solutions. For one, it offers the computational resources of the cloud for simulations that require high performance computing. For another, it offers all the benefits of SaaS applications: flexibility, low upfront cost, and easier collaboration, to name a few.

Opening the door to multi-scale and multi-physics capabilities, 3DEXPERIENCE® Works Simulation provides SOLIDWORKS® users with powerful, integrated, cloud-enabled analysis tools from SIMULIA. How will advanced simulation improve your product development process? Here is what you can expect from 3DEXPERIENCE Works Simulation:

- **Powerful Analysis Capabilities:** Multi-scale and multi-physics capabilities enable you to solve everything, from simple, single events to large, multi-event problems, with confidence.
- **Flexible and Scalable:** Skip the expensive hardware! Cloud-enabled simulation gives you access to high-performance computing resources when you need them—while enabling you to maintain data consistency, streamline processes, avoid errors, and save time searching on version control.
- **Accuracy You Can Trust:** Cutting-edge and industry-proven technology from SIMULIA, including Abaqus for structures, fe-safe for durability, and CST for electromagnetics, solves even the most complex analyses with speed and accuracy you can trust.
- **Real-Time Collaboration:** Combine powerful, accurate results with a collaborative feedback environment and your team will be set up to make intelligent decisions faster.
- **SOLIDWORKS Integration:** Associativity to SOLIDWORKS means no export/import rework—streamlining the use of SOLIDWORKS data with included data management solutions.

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