



A POWERFUL CONNECTION: MODELING + SIMULATION (MODSIM)

Speed development while increasing quality,
enhancing efficiency, and reducing costs.

EXECUTIVE SUMMARY

MODSIM solutions from Dassault Systèmes break down collaboration and technology barriers among teams using 3D CAD and simulation. Because everyone works from the same cloud-enabled environment, CAD designers are empowered to use simulation earlier in the product development process to optimize their designs while identifying and resolving issues as they arise. Everyone works in the same real-time environment, easily accessing only up-to-date model files.

Multidisciplinary tools enable you to run simulations across various physics while keeping everything tied to the original CAD data. The cloud-based MODSIM environment maintains a single source of truth. That means you're always working with the right data and the latest design, and you have easy access to past simulation results including key performance indicators.

Implementing MODSIM drastically improves communication among the entire team, especially coworkers from different departments or geographic locations. By integrating modeling and simulation into a unified workflow, everyone works from the same real-time data, which translates to reduced errors and seamless collaboration. As the product development team collaborates as a cohesive unit on the cloud, design intent, performance insights, and design modifications are always in sync across the team.



CONCEPTUAL DESIGN

Choices made during the concept phase massively impact every subsequent step. If a critical design element is locked in too early, it may later prove problematic. The solution can involve costly, time-consuming rework. Creating a manufacturable design is essential, and with so many factors to balance and no physical prototypes to test, how can product development teams make the best decisions?

Modular Parametric Design

One quick way to develop a design concept is through the assembly of modular building blocks. Parametric modeling makes it easy to adjust these modules as needed to ensure they fit the application's requirements. With integrated simulation tools, design variations can be tested and optimized automatically, which helps teams quickly refine their concepts without starting over from scratch.

Collaborative Design

Product development is rarely a solo effort. One change can have ripple effects across an entire organization. MODSIM enables real-time collaboration by keeping everyone connected via a cloud-based platform, while all changes to the data are stored in one centralized location. All updates are automatically propagated across the entire team, reducing communication headaches.

Multiphysics Analysis

Every design involves trade-offs. Strengthening a structure, for example, might impact airflow and cooling efficiency. Understanding these interdependencies requires a multiphysics approach: integrated simulation tools that simultaneously consider multiple physical forces. This gives project managers all the data they need to formulate the accurate insights required to make strategic, data-driven product development decisions.





INTEGRATION MATTERS

There is no shortage of modeling and simulation applications designed for product developers. But a true MODSIM approach doesn't just line up tools side by side, it seamlessly integrates tools on a shared platform. This enables product development teams to effortlessly exchange data and collaborate across diverse geographic locations while working with their preferred software.

Computing Power On-Demand

High-performance computing (HPC) is a game-changer for simulation, drastically shortening design cycles, however, maintaining dedicated HPC hardware in-house is an expensive and often inefficient investment. A cloud-based MODSIM platform taps into HPC resources as needed to deliver the speed required for analysis while keeping infrastructure costs under control.

Eliminating Guesswork

When designers and simulation engineers collaborate from the very start by using fully integrated modeling and simulation, the entire

design and validation process becomes data-driven and more efficient. This approach doesn't just optimize a product; it eliminates guesswork and provides a clear picture of how the final product will perform. With simulation woven into the product development process, design teams can explore more alternatives and even ensure, right from the start, that manufacturing constraints will be met at the front end.

Ensuring Traceability for Compliance

Regulatory agencies are increasingly accepting simulation data in place of physical testing, which can significantly expedite the certification process. However, regulatory agencies require that every aspect of a simulation be fully traceable back to the original design. A unified MODSIM platform preserves the digital thread, which includes all the relevant data that defines a product throughout its lifecycle, from the initial design and development to manufacturing, maintenance, service, and retirement. This ensures that auditors can validate compliance directly from the digital model, streamlining certification while maintaining real-world reliability.

UNIFYING PEOPLE AND TOOLS

Product development teams are often spread across different departments, locations, and even continents. Keeping everyone on the same page can be a challenge, and miscommunication can lead to costly mistakes. By providing a unified, data-driven platform where every team member works with the same up-to-date information, MODSIM ensures seamless collaboration.

Removing Silos

No matter if team members are located in different buildings or across the globe, MODSIM keeps everyone connected with a shared platform. All stakeholders access status updates on a common dashboard. Everyone has instant access to the same project data, just as if they were working side by side in the same office, thereby eliminating communication barriers while streamlining development.

Secure Collaboration

Protecting intellectual property is critical, especially when working with external partners. MODSIM ensures data security through controlled access, allowing each team member to view and edit only the information relevant to their role. Built-in model encryption further safeguards sensitive data, ensuring confidentiality even when sharing simulation results with remote colleagues, and with customers and suppliers.

Empowering Every Team Member

Great ideas or key insights that help solve difficult problems can come from anyone, not just the CAD and simulation engineers on a team. MODSIM democratizes innovation by giving every team member the tools to participate in all design reviews. With intuitive project templates and wizard-guided workflows, even stakeholders who are not engineers can contribute valuable perspectives that may drive innovations.



FINDING THE RIGHT BALANCE

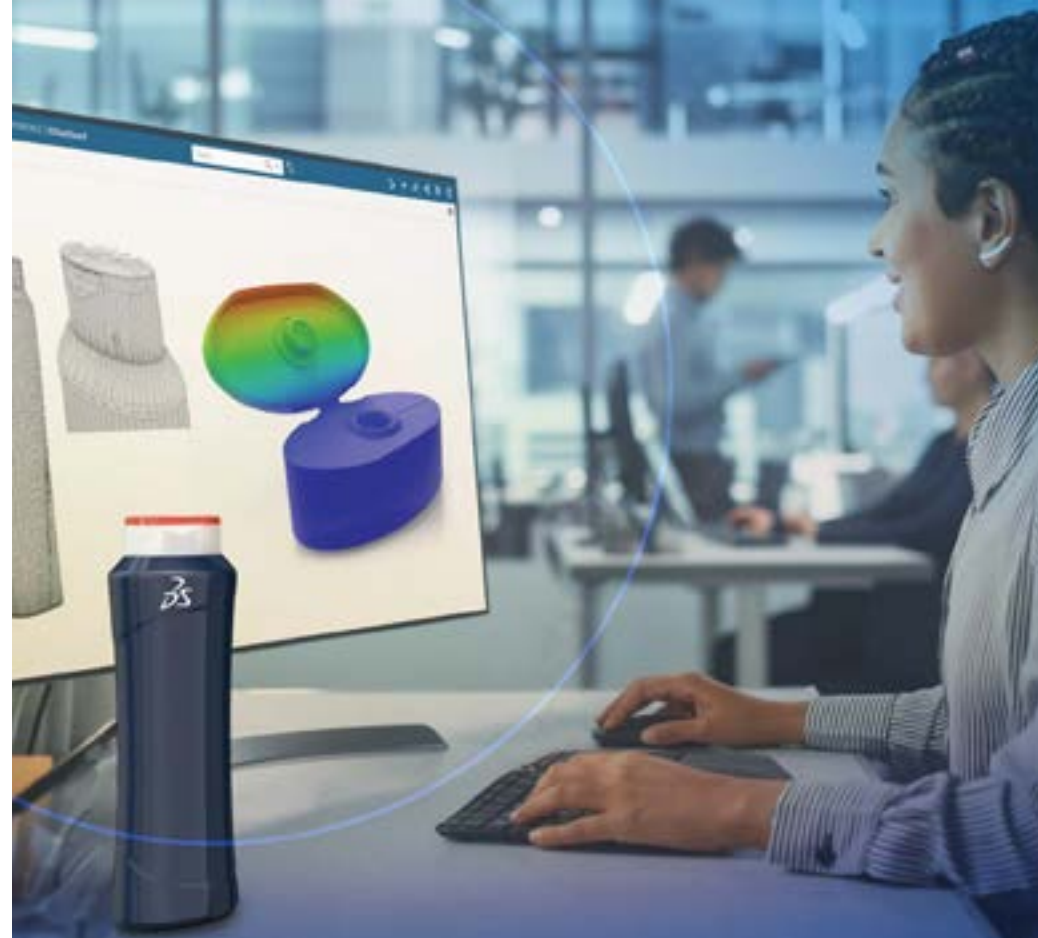
Design always involves trade-offs, such as balancing strength versus weight, durability versus cost, and aesthetics versus manufacturability. To make smart decisions, product development teams need access to the right data, including model files, simulation results, and real-world measurements—all in a format that's easy to interpret. But data alone isn't enough. True optimization requires collaboration across teams working on different aspects of a project. The MODSIM platform brings everyone together to make data-driven trade-offs while preserving the design and adhering to project requirements.

Process Automation for Better Decisions

Pulling meaningful insights from simulation results often requires additional post-processing and calculations. Instead of a slow and monotonous manual process, automation converts raw simulation data into the correct format and exports it as needed. Engineers get KPIs they need without worrying about tedious calculations, enabling them to collaborate on making the best design trade-offs for the product and the company.

Streamlining Standard Engineering Tests with Templates

Many design decisions are tied to industry regulations and performance standards. For example, a car must pass crash tests, and an electronic device must meet interference requirements. Engineering templates with automated test setups make these compliance-driven simulations easy. The simulation environment is automatically configured with the correct settings from the start, which saves time and reduces the learning curve for running accurate simulations.



Optimizing Complex Trade-Offs

Some design trade-offs involve multiple competing variables, making manual adjustments impractical. Design of Experiments (DOE), a methodology for general problem-solving, automates the process by efficiently investigating a multi-dimensional design space. Instead of tweaking parameters one by one, DOE runs systematic tests across all key variables, which helps teams find the best balance faster and more efficiently.

With the MODSIM platform, engineers can manage complexity, streamline decisions, and optimize designs without unnecessary trial and error. MODSIM helps find the best possible trade-offs based on all of the product development data, thereby eliminating guesswork.



CATCHING ISSUES EARLY

In most product design workflows, simulation analysis happens late in the process, typically when testing begins on physical prototypes. At that stage, changes are costly and often require significant rework, putting the entire project timeline at risk. Simulation analysis integrated into early development as part of a MODSIM workflow can catch and correct issues before they snowball into major problems. Rather than waiting until the final stages, it's more efficient to schedule simulation and validation as early as possible in the design timeline.

Early Feedback for Smarter Decisions

Integrating simulation directly into modeling allows for real-time analysis at any stage of development. Instead of making design decisions and hoping for the best, engineers can immediately see the impact of their choices, even at the concept phase of design. This eliminates the uncertainty and potential setbacks of a wait-and-see approach.

High-Fidelity Simulation with a Virtual Twin

With a platform-based MODSIM approach, simulations rely on the

same CAD data that designers are working with, essentially a virtual twin of a product. Changes in CAD design instantly update simulation models, providing real-time accuracy. This ensures that every relevant design aspect is accounted for, which delivers accurate, high-fidelity results that reflect real-world performance. Engineers can also run what-if scenarios to predict wear, failure risks, and performance over time. This type of virtual twin in a MODSIM environment enables faster innovation, better accuracy, and more informed decision-making throughout the product lifecycle.

Late-Stage Failures and Costly Redesigns

By the time a full-scale physical prototype is built, significant investments have already been made in materials, engineering hours, and testing. Discovering a critical issue at this stage—such as failing to meet regulatory requirements—can lead to costly delays and budget overruns. Incorporating validation and testing earlier in the development cycle enables teams to detect and address issues proactively, minimizing downstream risks and ensuring projects remain on schedule, within budget, and aligned with quality standards.



CASE STUDY #1 – RANGEAERO SLASHES DEVELOPMENT TIME

RangeAero designs unmanned, autonomous freight helicopters for commercial and military transport. Their coaxial rotor-driven aircraft offer logistical advantages such as reduced infrastructure reliance, lower operating costs, and a smaller carbon footprint. However, rotorcraft design presents complex challenges, including structural integrity, aerodynamics, and vibration control.

To enhance their design process, RangeAero transitioned from Siemens Simcenter® tools to the **3DEXPERIENCE** Simulation portfolio, which provided advanced nonlinear simulation capabilities via its Abaqus solution, which is essential for rotorcraft development.

“Using **3DEXPERIENCE** Simulation has enabled our company to simulate complex mechanical behavior, including nonlinear material behavior, geometric nonlinearities, and contact mechanics,” notes CEO Arpit Sharma. The seamless integration of **3DEXPERIENCE** Simulation with SOLIDWORKS CAD software also streamlined workflows, reducing analysis time and effort.

Sharma continues, “**3DEXPERIENCE** Simulation enables the automation of many of the tedious and time-consuming tasks

involved in setting up and running simulations, such as meshing, boundary conditions, and post-processing.” This has freed up time to focus on other aspects of the design process, such as optimization and validation.

RangeAero has substantially reduced the number of design and prototyping iterations, shortening design cycles by 30 percent, decreasing prototyping costs by 40 percent, and slashing development costs overall by 30 percent, while bringing products to market five months sooner. “Dassault Systèmes solutions help us avoid costly delays and rework while optimizing designs to reduce material usage,” Sharma explains. The software supports comprehensive simulations, including nonlinear structural analysis, rotor dynamics, and landing gear impact testing.

With competition in unmanned aircraft intensifying, speed to market is critical. “The **3DEXPERIENCE** Simulation tools help us overcome engineering challenges faster,” Sharma concludes. By leveraging advanced simulation tools, RangeAero enhances efficiency, reduces costs, and strengthens its position in the evolving autonomous aviation industry.



CASE STUDY #2 – CALOI DRAMATICALLY REDUCES PRODUCT DEVELOPMENT COSTS

In 2023 CALOI, a leading South American bicycle manufacturer, sought a simulation solution to maintain its commitment to excellence and its leadership position by reducing lengthy and costly prototyping cycles to shorten design and manufacturing operations, thereby accelerating time to market.

CALOI sought a simulation solution to replace its long reliance on physical prototyping alone. “In the past, we spent a lot of time and money on physical tests that were carried out by a specialized company in Portugal as well as in our internal laboratories,” CALOI Product Engineer Leandro Timóteo da Silva explains. Upon learning that **3DEXPERIENCE** Simulation was fully compatible with their favorite 3D CAD software, SOLIDWORKS, the decision to purchase it was a no-brainer.

Since implementing **3DEXPERIENCE** Simulation, CALOI has drastically cut its development cycles for new bike frames and shortened time to market by 25 percent. The company has turbo-charged development with the MODSIM approach, which unifies modeling and simulation into a seamless process. “We

reduced our design cycles from two months to two weeks, which frees up our team to design more in the same amount of time, enabling us to optimize our workforce,” notes Timóteo da Silva. “By adopting the **3DEXPERIENCE** solutions, we have reduced the cost and time of our prototyping process by at least 50 percent.”

The development team has not stopped conducting physical tests but now performs them only as a final validation—a huge change for a company that, in the past, conducted 100% of its tests physically. “Because we’ve completely integrated the design with simulation, we’ve realized a 50-percent reduction in design errors, resulting in cutting scrap and rework costs in half,” Timóteo da Silva enthuses.

The cloud-based **3DEXPERIENCE** platform also enables CALOI to avoid costly hardware investments and other IT infrastructure costs because simulation studies are run in the cloud using high-performance computing, which frees up local resources. By leveraging SOLIDWORKS with advanced simulation tools on the cloud, CALOI has significantly reduced development costs, accelerated time to market, and enhanced design accuracy.



CASE STUDY #3 – INOVONICS STREAMLINES DESIGN AND IMPROVES COLLABORATION

Wireless technology is an essential part of daily life, yet its reliability depends on precise engineering and careful design. Inovonics, a leader in wireless solutions, is committed to ensuring that its products “just work,” a philosophy that drives every stage of development.

Placing antennas in real-world environments presents significant challenges. Interference resulting from the positioning and material properties of physical objects—as well as human presence or movement—can significantly degrade antenna signal performance. “Nothing in our world can communicate without antennas,” explains Inovonics Staff Hardware Design & Regulatory Engineer Mark Zakhem. Ensuring optimal antenna placement requires careful consideration of positioning, height, and regulatory compliance factors.

“If your antenna is placed in an environment where it could be interrupted, different materials and surroundings will impact performance,” Zakhem notes. To address these complexities, Inovonics meticulously designs products that maintain reliability across various conditions.

To enhance their design process, Inovonics leveraged a powerful

electromagnetic simulation tool from Dassault Systèmes. The company was already using SOLIDWORKS for precise 3D modeling, and the **3DEXPERIENCE** Simulation’s portfolio of solutions provided an additional advantage by enabling digital testing of electromagnetic components.

“Simulation allows us to model different environments and anticipate design challenges before reaching the lab,” says Zakhem. “This reduces revision times, and in many cases, our first proof-of-concept antenna works exactly as designed.” By integrating simulation tools, Inovonics has significantly minimized physical prototyping, accelerated development cycles, and improved product efficiency.

Beyond simulation, Inovonics benefits from the seamless collaboration enabled by the **3DEXPERIENCE** platform. The cloud-based system allows engineers to access, share, and run simulations from any device, streamlining workflows and enhancing teamwork. “I can pull up my designs on a tablet, run a quick simulation on my phone, and collaborate with colleagues effortlessly,” Zakhem adds. “It helps me work faster and deliver better results.” Through the combination of SOLIDWORKS and **3DEXPERIENCE** Simulation solutions, Inovonics continues to innovate, ensuring its wireless solutions perform reliably in any environment.

CONCLUSION

Product development involves countless challenges, from balancing trade-offs between performance and cost to ensuring designs meet real-world requirements. Dassault Systèmes' MODSIM platform changes the game by integrating modeling and simulation into a single, cloud-based environment, allowing engineers and designers, along with all key stakeholders, to work together seamlessly.

By embedding simulation early in the design process, MODSIM enables teams to identify and correct mistakes before they become costly, reducing reliance on late-stage physical prototypes. A virtual twin approach ensures real-time synchronization between CAD and simulation data, while high-performance computing provides the power needed for fast and accurate simulation results.

Beyond improving efficiency, MODSIM streamlines compliance and democratizes innovation by giving every team member, from designers to decision-makers, the tools to collaborate effectively. With process automation, engineering templates, and DOE-driven optimization, teams can explore more design alternatives and make data-driven trade-offs without frustration and sometimes extremely costly trial-and-error scenarios.

The result is faster development cycles, reduced costs, and higher-quality products. By moving simulation studies earlier in the product development timeline, MODSIM helps companies innovate with confidence, eliminate design surprises, and bring higher quality products to market faster.



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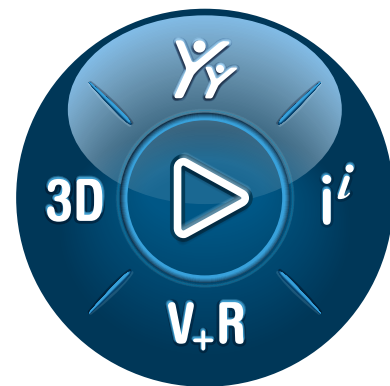
<https://www.solidworks.com/lp/cloud-enabled-simulation>



Dassault Systèmes is a catalyst for human progress. Since 1981, the company has pioneered virtual worlds to improve real life for consumers, patients and citizens.

With Dassault Systèmes' **3DEXPERIENCE** platform, 370 000 customers of all sizes, in all industries, can collaborate, imagine and create sustainable innovations that drive meaningful impact.

For more information, visit: www.3ds.com



3DEXPERIENCE®

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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