



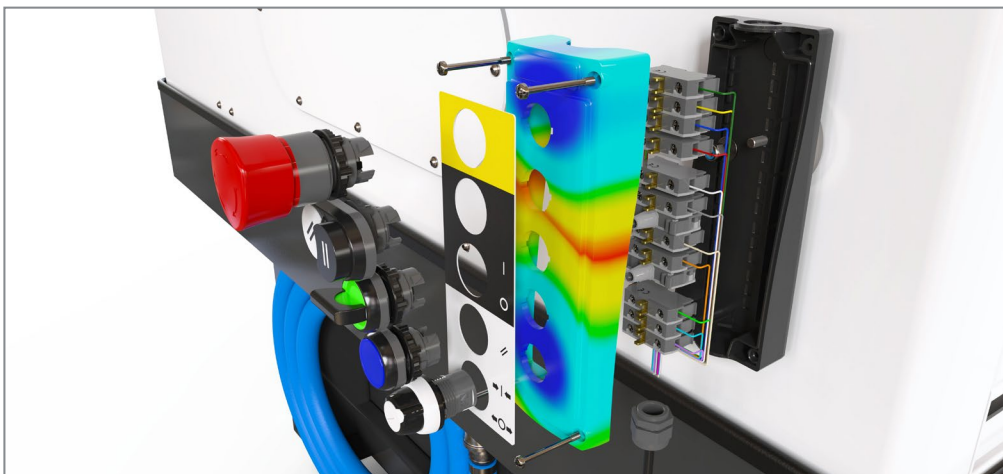
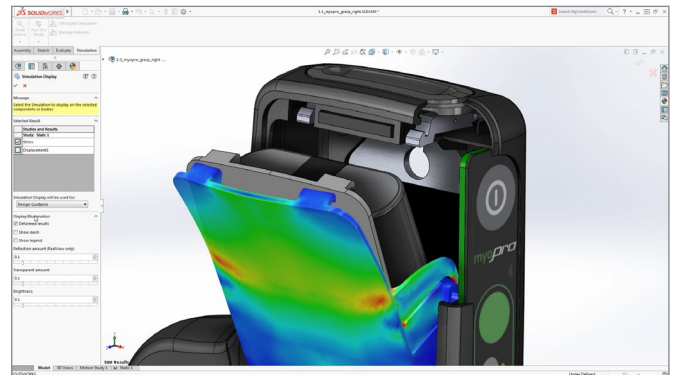
FEA MISCONCEPTIONS PROVE COSTLY TO MANUFACTURERS

EASIER-TO-USE, CAD-INTEGRATED SIMULATION TOOLS SAVE TIME AND MONEY

Some product development and manufacturing organizations view finite element analysis (FEA) technology as an afterthought and consider using FEA software only after product failures. Many designers and engineers have the misperception that FEA packages and simulation tools in general are too difficult to use, requiring a Ph.D.-level education, taking up too much time, and adding little benefit except for finding out why something broke after the fact. Similarly, some business, engineering, and product development managers have the opinion that FEA and simulation solutions are not absolutely necessary for a best-in-class product development process. They believe that FEA is more of a luxury than a mandatory, valuable pillar of product development.

These views are extremely short sighted and misconceived in today's increasingly smart, automated, and agile product development and manufacturing environment. Today's simulation tools enable designers and engineers to do a better job—and grow professionally—and allow manufacturing organizations to achieve the innovation, agility, productivity, flexibility, and increased profit margins that fuel and sustain business growth. As product development and manufacturing organizations become more integrated and automated, FEA and simulation tools are becoming an increasingly critical, must-have technology for companies that seek to introduce innovative, high-quality, issue-free products faster and at lower cost than the competition. Just consider the outcomes generally associated with not deploying simulation tools in an increasingly agile, flexible, and competitive marketplace: wasting time and incurring the costs of physical prototyping cycles, coming to market late and losing ground to competitors, experiencing poor product performance and field failures, or suffering high rates of product returns and warranty claims.

Not only have FEA and simulation tools become increasingly necessary for helping manufacturers attain their product development objectives, they have also become much easier to use. They will undoubtedly help designers and engineers do a better job developing products by providing greater insight into design behavior and product performance. In designing a product, designers frequently need to make decisions and judgments without having answers to fundamental design questions, such as how much material do I need to use on this part to make sure it won't break, crack, or deflect; how many bolts do I need to join two parts together; or how long will this part last before it fails due to fatigue? Without answers to basic questions like these, designers will either utilize a trial-and-error approach, requiring numerous rounds of physical prototyping that increase costs and waste time, or overdesign a product or component to make sure that it won't fail, increasing material usage and costs unnecessarily.



TODAY'S FEA IS NOTHING LIKE EARLY FEA

The reason why many designers and engineers view FEA packages and simulation software as too difficult and specialized to use is that they base their perception on impressions formed by the complexity, tedium, and unintuitiveness of early FEA systems. Today's simulation solutions are dramatically easier to use, with many automation tools that streamline and facilitate the FEA workflow and leverage the inherent intelligence in a 3D CAD model. For example, SOLIDWORKS® Simulation software was designed for use by design engineers who are not full-time simulation users. Also, it is fully embedded inside the SOLIDWORKS 3D CAD design system.

Because SOLIDWORKS Simulation operates inside the SOLIDWORKS CAD system, simulations are performed on high-fidelity CAD data with no data corruption or dirty geometry, and no need for file imports or conversions or a third-party translator. This saves designers and engineers a lot of time, because they can use CAD capabilities to drive simulations, such as using design configurations and material properties to run a bunch of simulations, while continuing to work on the design within the CAD system.



In addition to enabling designers to validate and iterate on design concepts in software—instead of through time-consuming, costly, trial-and-error physical prototyping—CAD-integrated SOLIDWORKS Simulation software helps designers innovate and optimize designs by supporting more complete design exploration. Topology optimization, for example, provides a designer with organic, futuristic-looking shapes based on the specific design space and load case for a part. This tool lets designers begin with a lighter-weight, better-performing shape for refinement than they could have come up with on their own. With simulation as part of their design toolbox, designers will also be able to explore ideas, paths, and boundaries that they may never have thought of before, resulting in increased innovation, more design options, and better decision-making. Engineers can even use CAD-integrated simulation to optimize manufacturing processes and explore the viability of new production methods, such as additive manufacturing.

When more simulation power is needed, engineers and analysts can turn to SIMULIA® software, a cloud-based solution that runs on the Dassault Systèmes **3DEXPERIENCE®** platform. SIMULIA

is a well-established FEA brand known for the simulation of advanced mechanics. Now, SOLIDWORKS users can access this world-class technology and the power of solving in the cloud. So, with the SIMULIA solution, engineers and analysts can decide to run simulations on their local desktop or in the cloud, providing a level of flexibility that can help enhance problem setup and results accuracy. Instead of tying up computing resources on their desktop solving simulations, or investing in bigger, more expensive computing hardware, engineers and analysts can spend more time on the desktop setting up simulation problems and less time waiting for simulations to solve.

TIME AND COST SAVINGS WITHOUT SACRIFICING QUALITY

Another long-held design and engineering misconception is that you can have cost and time savings or product quality, but you can't have both. By using automated, CAD-integrated SOLIDWORKS Simulation and cloud-based SIMULIA software, manufacturing organizations can achieve the time and cost savings that boost profit margins without sacrificing quality. In fact, use of these tools will lead to quality improvements and increased innovation.

"As we design products, we need to be able to run a range of simulation studies—from complicated contact finite element analysis to design optimization, sensitivity, motion analysis, and fatigue studies," says Dr. Steve Jia, chief engineer in the Computer-Aided Engineering (CAE) Technologies and Materials Engineering group at global transmission system leader Litens Automotive. "We needed an FEA solution that can not only handle all of these types of analyses, but also produce accurate results right away. That solution is SOLIDWORKS Simulation Premium.

"Time is the critical factor, and with the fast solver in SOLIDWORKS Simulation Premium software, we can solve a full assembly contact analysis in a couple of hours. Who else can do that? When you consider the time and prototyping costs that virtual product development using CAE helps us save, it amounts to millions of dollars each year ... We've realized outstanding ROI [return on investment] with SOLIDWORKS Simulation Premium and rely on the software for our daily work."

InFocus Energy Services, an innovative developer of down-hole products for the oil and gas industry, is leveraging cloud-based SIMULIA software to develop higher-quality, more-innovative products, such as the company's RE|FLEX Premium HP/HT Drilling Motor. The motor's bearing section is a proprietary design that was developed to convert extreme loading parameters, including torque of over 30,000 foot-pounds, into efficient drilling action. The company's initial concept design

of the drive system, which utilized traditional ball bearings, resulted in failure during testing when the load crushed the bearings and the faces that load the bearings. SIMULIA predicted the failure—with accurate correlation to actual test results—and helped the company develop a better, more innovative design.

“With SIMULIA, we were able to evaluate a range of geometric and material options, a process that helped us quickly optimize the tapered, barrel-shaped design of the bearings, and also decide the best high-strength steel for the design,” recalls Mechanical Engineer/Simulation Specialist Peter Kjellbotn. “Because we analyzed our options in software, we didn’t need to physically test all of the possibilities and ran just a few verification tests on the design validated in SIMULIA, which confirmed that our simulation results were accurate. This allowed us to optimize critical internal components for cyclic fatigue-loading [bending stress], a common cause of twist-offs down hole, and confirm a higher torque rating and increased durability for our product.”

As these customer examples demonstrate, integrated FEA and simulation tools are evolving to make them easier to use. They add value during initial design and throughout the complete product development and manufacturing process, providing cost, time, and quality benefits. Companies are discovering that the CAD-integrated SOLIDWORKS Simulation and cloud-based SIMULIA solutions enable them to gain greater insight into their designs and make greater contributions to product innovation, productivity gains, reduced costs, and quality improvements, all of which manufacturers need to succeed.



Using SIMULIA SSE analysis software on the bearing section of the company’s RE|FLEX Premium HP/HT Drilling Motor, InFocus Energy Services was able to evaluate a range of geometric and material options, resulting in the tapered, barrel-shaped design of their high-strength steel bearings, while saving tens of thousands of dollars in testing costs and months of time and extra labor.

TO FIND OUT WHAT’S NEW IN SOLIDWORKS PRODUCT DEVELOPMENT AND LEARN MORE ABOUT HOW INTEGRATED SOLIDWORKS SOLUTIONS CAN HELP YOUR COMPANY TAKE ADVANTAGE OF THE OPPORTUNITIES PRESENTED BY INTEGRATED SIMULATION TOOLS, [CLICK HERE](#) OR CALL 1 800 693 9000 OR +1 781 810 5011.

Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the 3DEXPERIENCE® Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes’ collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 250,000 customers of all sizes in all industries in more than 140 countries. For more information, visit www.3ds.com.



3DEXPERIENCE®