DASSAULT SYSTEMES

3DEXPERIENCE

SOLIDWORKS SIMULATION

*SIMULATE VIRTUALLY WITH COMPREHENSIVE TESTING TOOLS
TO MAKE YOUR PRODUCTS BETTER*

SOLIDWORKS SIMULATION SOLUTIONS

SOLIDWORKS® Simulation solutions enable every product engineer to evaluate performance concurrently with design to help answer the fundamental question, "Do I have the best design?" Specifically engineered for power and ease of use, SOLIDWORKS Simulation will quickly become a standard, integrated part of the design process.

From the start, you can simulate real-world environments and actual product conditions to optimize performance while you design. You'll be able to boost product innovation with meaningful technical insights about product behavior and quality, as well as reduce the number of prototypes, development cycles, and testing costs.

SOLIDWORKS Simulation solutions let you

- Simulate virtually a large variety of physical environments in an intuitive and powerful interface
- Perform a wide range of structural simulations such as linear and nonlinear static, vibration, fatigue, thermal, optimization, and nonlinear dynamics simulations
- Conduct rigid-body time-based and event-based simulations
- Compare the performance of products made with different materials
- Enhance designs for products impacted by liquids or gases with fluid flow and heat transfer simulation (CFD analysis)
- Identify and avoid manufacturing defects during the earliest stages of plastics part and injection mold design
- Conduct environmental impact simulation on your products

Here are examples of what SOLIDWORKS Simulation can do, told through SOLIDWORKS customers.

IDEX Health® & Science
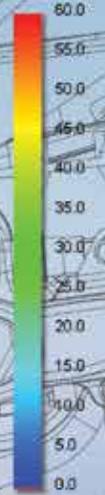
Teknion Corporation

POLYRACK Tech-Group

HIOKI E.E. Corporation

SE Corp.

von Mises (N/mm^2 (MPa))

60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0

SIMULATE REAL-WORLD CONDITIONS RIGHT ON YOUR SCREEN

SOLIDWORKS Simulation enables product engineers to recreate virtually the conditions a product may face during its lifecycle and helps identify ways to make it stronger. You can accurately predict how components will interact, how repeating loads will impact performance with fatigue, and how a design will hold up in a drop test. Used as a standard part of your design process, these tools can help you create products faster and more cost-efficiently.

SOLIDWORKS SIMULATION
ENABLE PRODUCT ENGINEERS TO RUN COMPREHENSIVE ANALYSIS

IDEX® Health & Science manufactures precision microfluidics system components—including valves, pumps, manifolds, fittings, injectors, and tubing systems—that support sophisticated laboratory instruments, such as liquid chromatographs, mass spectrometers, and DNA analysis systems. To achieve microfluidics breakthroughs to succeed in the highly competitive laboratory market, the company's engineers needed integrated design and simulation tools.

"IDEX standardized on SOLIDWORKS because it's not only easy to use, but provides powerful structural and fluid flow simulation tools," Mechanical Design Engineer Kevin Longley explains. "This allows us to innovate more precise designs while simultaneously streamlining our development processes."

As design complexity grew, so did the engineers' use of SOLIDWORKS Simulation and SOLIDWORKS Flow Simulation. The instruments need to push incredibly small volumes—as little as 0.1 microliters—at extremely high pressure to increase throughput and make it more economical for instrument manufacturers to purchase equipment. "Our valves experience forces that want to pull them apart, so we need to conduct finite element analysis (FEA) on every single link in the project," concludes Longley.

Results:

- Reduced design cycles
- Mimimized of prototyping requirements
- Reduced tooling leadtimes
- Improved fluidics pressure capability

"With SOLIDWORKS Simulation as part of the design process, we've been able to minimize the prototyping loops that were required in the past."

Kevin Longley
Mechanical Design Engineer
IDEX Health & Science

SOLIDWORKS FLOW SIMULATION
REDUCE THE NUMBER OF PROTOTYPES

POLYRACK Tech-Group is a leading provider of integrated packaging solutions for the electronics industry, offering a range of products and services, including enclosures, subracks, microcomputer packaging systems (MPS), industrial PC applications, and backplanes. POLYRACK added fluid flow analysis capabilities to meet customer demand for flow simulation consulting, save time, and reduce prototyping costs.

Head of Development Bernd Knab recalls, "When a customer requested that we conduct flow simulations of our packaging designs, we realized these capabilities would become an increasingly important part of our operations. The ability to visualize the behavior within a laid-out construct would enable us to save time, reduce costs, and improve performance."

Using SOLIDWORKS Flow Simulation, POLYRACK can determine the best placement and number of fans within the racked systems. It enables them to simulate heat transfer phenomena and understand how even small changes to packaging designs impact cooling system performance.

"With SOLIDWORKS Flow Simulation, we were able to develop a solution that would disperse the flow and provide homogeneous airflow throughout the system," said Knab. "We were quite excited by this achievement because we may not have tried it without SOLIDWORKS Flow Simulation."

Results:

- Reduced development time from three months to two weeks
- Cut two prototyping cycles
- Generated new flow simulation consulting business
- Innovated new approaches to electronics cooling system design

"In addition to optimizing the cooling system, SOLIDWORKS Flow Simulation helps us cut an average of two prototypes from each project."

Bernd Knab
Head of Development
POLYRACK Tech-Group

SPEND LESS TIME PROTOTYPING AND MORE TIME INNOVATING

Being able to test your models virtually at the early design stages in the development process can lead to more impressive and successful final products. Because SOLIDWORKS Simulation and SOLIDWORKS Flow Simulation give you the freedom to be more innovative and verify your design, you won't have to waste time or money building prototypes that may not work. That means you can test more ideas and accelerate your time-to-market—differentiating both your product and your company in the process.
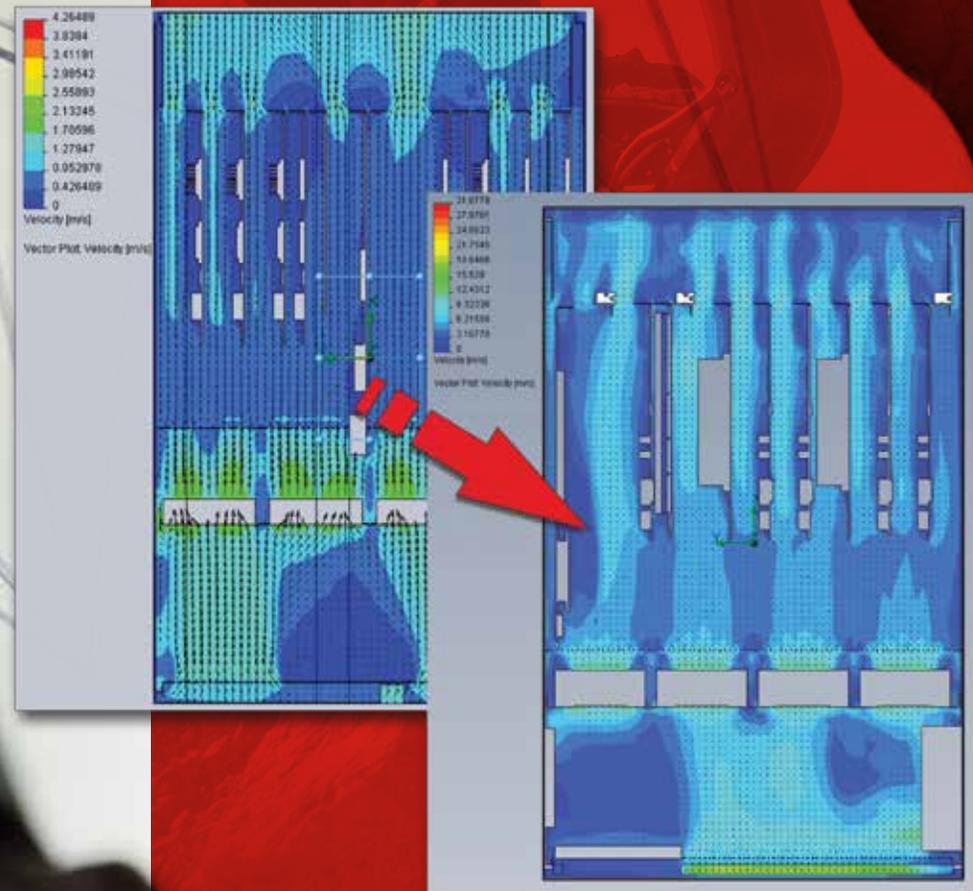
ENHANCE DESIGNS FOR FLOWS OF LIQUIDS OR GASES

SOLIDWORKS Flow Simulation lets you quickly determine how a design will react to fluid flow and simulate how liquid, gas, heat, and steam will move through pipes and nozzles. For engines and motors, the software reveals how fluids will react internally and externally. Based on these tests—along with pressure and thermal simulations—you'll be able to enhance your designs with a concurrent CFD approach.
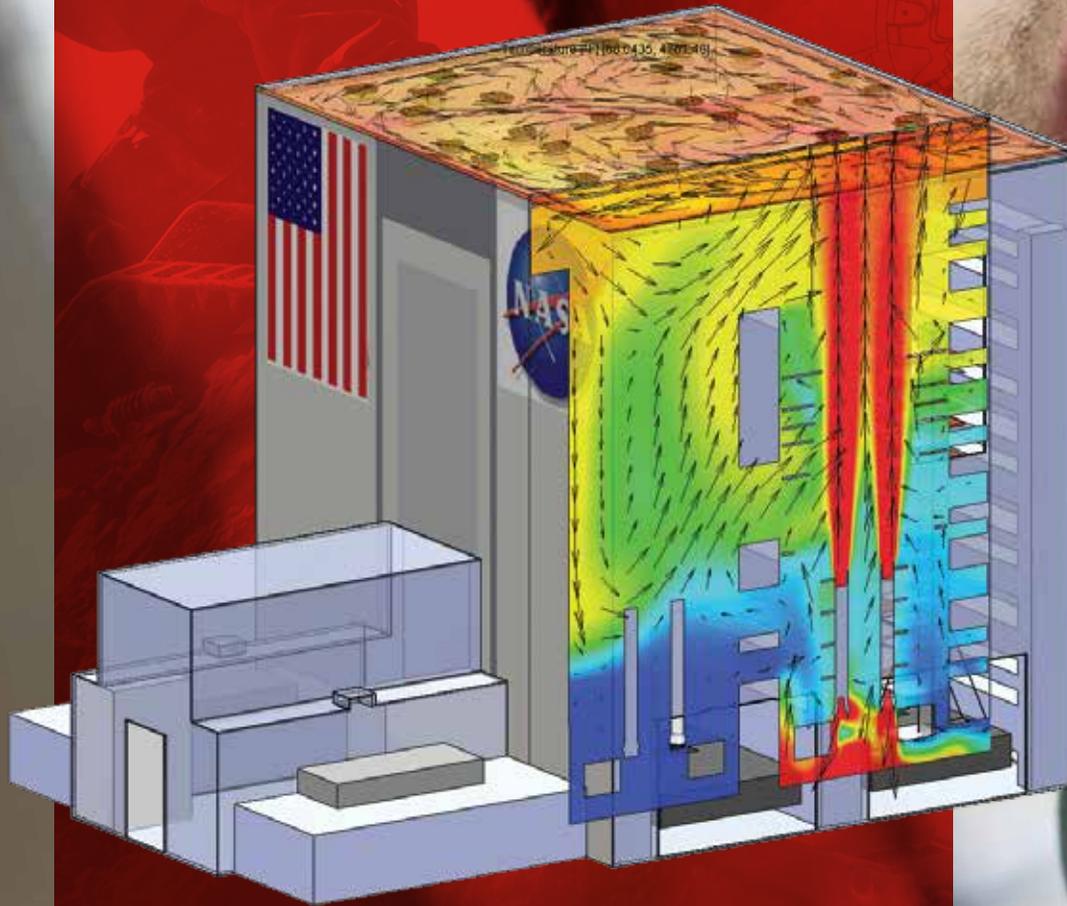
SOLIDWORKS FLOW SIMULATION
PREDICT PRECISE BEHAVIOR FOR LIQUID OR GAS FLOW

SE Corp. specializes in providing high-end analysis consulting for prestigious clients that demand robust, cost-effective engineering tools. One project for SAIC involved analysis of the Vehicle Assembly Building (VAB) at NASA's Kennedy Space Center to evaluate facility safety and emergency escape procedures in the event of a rocket fuel ignition accident, and to determine if the VAB would remain viable for future projects.

Founder Sean Stapf chose SOLIDWORKS Simulation because of its CAD integration, extensive set of capabilities, and fast solvers. "SOLIDWORKS Simulation Premium and SOLIDWORKS Flow Simulation software provided the structural, thermal, and computational fluid dynamics (CFD) analysis tools I needed to help predict where and when these exhaust gases would become lethal," said Stapf.

Using SOLIDWORKS Flow Simulation, Stapf was able to quantify the time and severity of structural and personnel exposures to exhaust temperature, velocity, pressure, and concentration of high-temperature exhaust gases from the ignition and subsequent explosion. Stapf notes, "Although the model and mesh were large—roughly 200,000 elements—I was able to accelerate solution time."

Results:

- Completed NASA VAB CFD simulation in just 24 hours
- Shortened solution time with smart elements
- Produced results that helped NASA improve safety planning
- Won NASA's Space Flight Awareness Team Award

"With SOLIDWORKS Flow Simulation, I was able to produce grid-independent solutions and report multiple flow gradients with high fidelity and detail in a single day."

Sean Stapf
Founder
SE Corp.

SOLIDWORKS SUSTAINABILITY
PERFORM REAL-TIME ENVIRONMENTAL ASSESSMENT AS PART OF THE DESIGN PROCESS

Teknion Corporation is a leading international designer and manufacturer of office systems and related furniture products. Over the past decade, sustainability has become an integral part of Teknion's operations. Teknion added SOLIDWORKS Sustainability software to give its designers access to environmental impact information, which they can use to guide design decisions. Teknion designers can estimate the carbon burden, energy consumption, air emissions, and liquid discharges associated with a specific design, and then use this information to consider which design alternatives are more environmentally sustainable.

"Sustainable design is not always about selecting the 'greenest' option, but rather using environmental assessment information to make choices and evaluate trade-offs," Product Engineering Manager Claudio Perfetti says. "It's about comparing the use of stained wood versus laminated surfaces; evaluating the impacts of particle board, steel, or aluminum; or understanding the effects of varying footprints for different products."

With SOLIDWORKS Sustainability, Teknion can provide apples-to-apples comparisons regarding material choices, so customers can consider environmental impacts when selecting materials for furniture components. The ability to provide these insights up front as part of the sales process helps give Teknion a competitive advantage.

Results:

- Quadrupled the number of product lines
- Reduced development time by 50 percent
- Cut prototyping requirements in half
- Supported sales, collaboration, and sustainable design initiatives

"Just as 3D enhances design visualization, SOLIDWORKS Sustainability provides greater insights into a design."

Claudio Perfetti
Product Engineering Manager
Teknion Corporation

EVALUATE ENVIRONMENTAL IMPACTS OF PRODUCT DESIGNS

SOLIDWORKS Sustainability can help you quickly evaluate environmental impacts of product designs, reduce material and energy usage, and incorporate sustainable design practices to save time and money. You can gain an important strategic advantage over competitors by quickly capturing and acting on environmental impacts. Flexible analysis inputs, such as recycled content level and end-of-life scenarios, enable more detailed assessments.
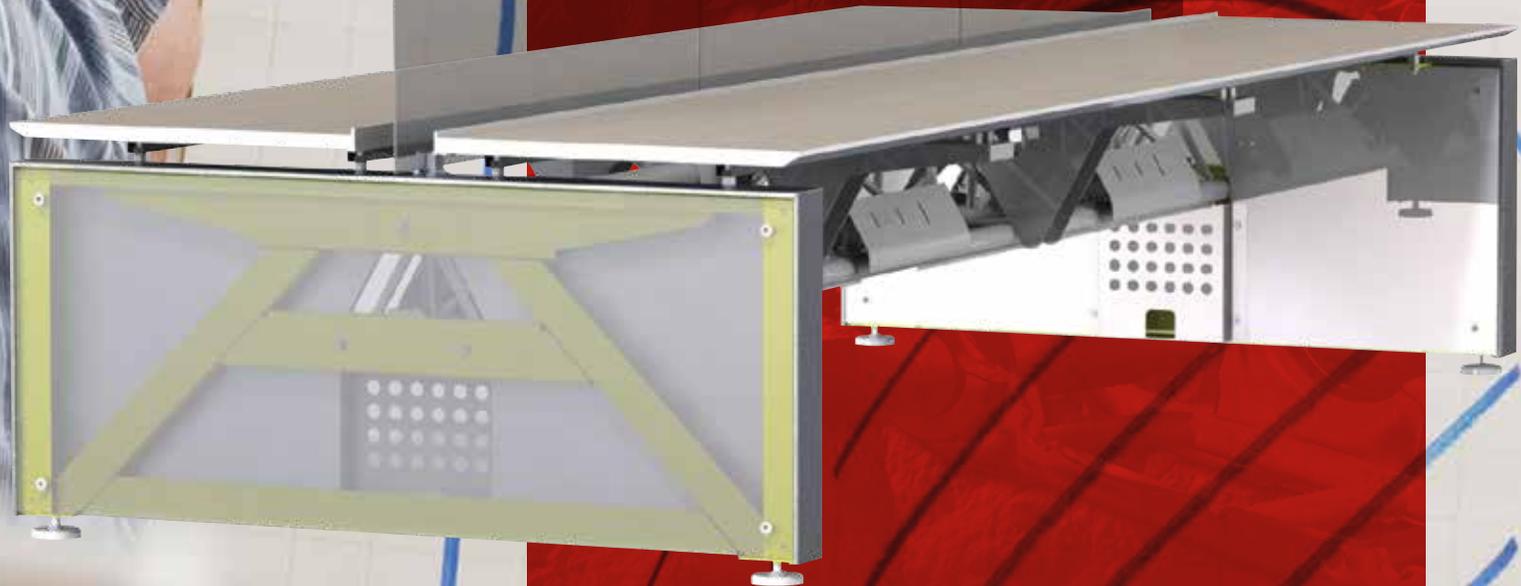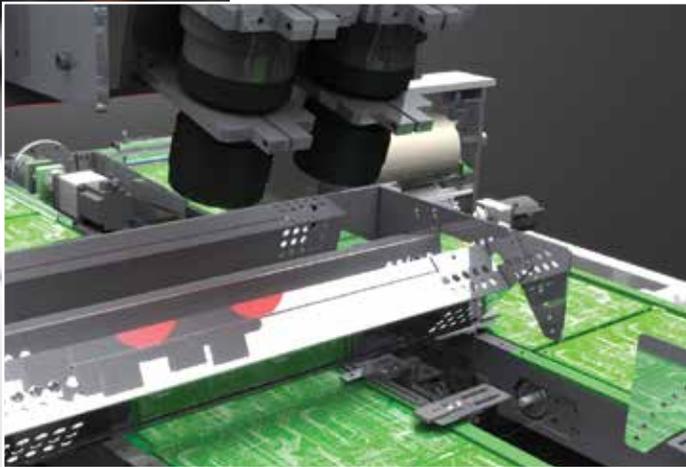
IMPROVE QUALITY, ELIMINATE COSTLY MOLD REWORK, AND ACCELERATE TIME-TO-MARKET

SOLIDWORKS Plastics brings easy-to-use injection molding simulation directly to the designers of plastic parts and injection molds. It simulates how melted plastic flows during the injection molding process to predict manufacturing-related defects on parts and molds. You can quickly evaluate manufacturability while you design, to eliminate costly mold rework, improve part quality, and accelerate time-to-market.
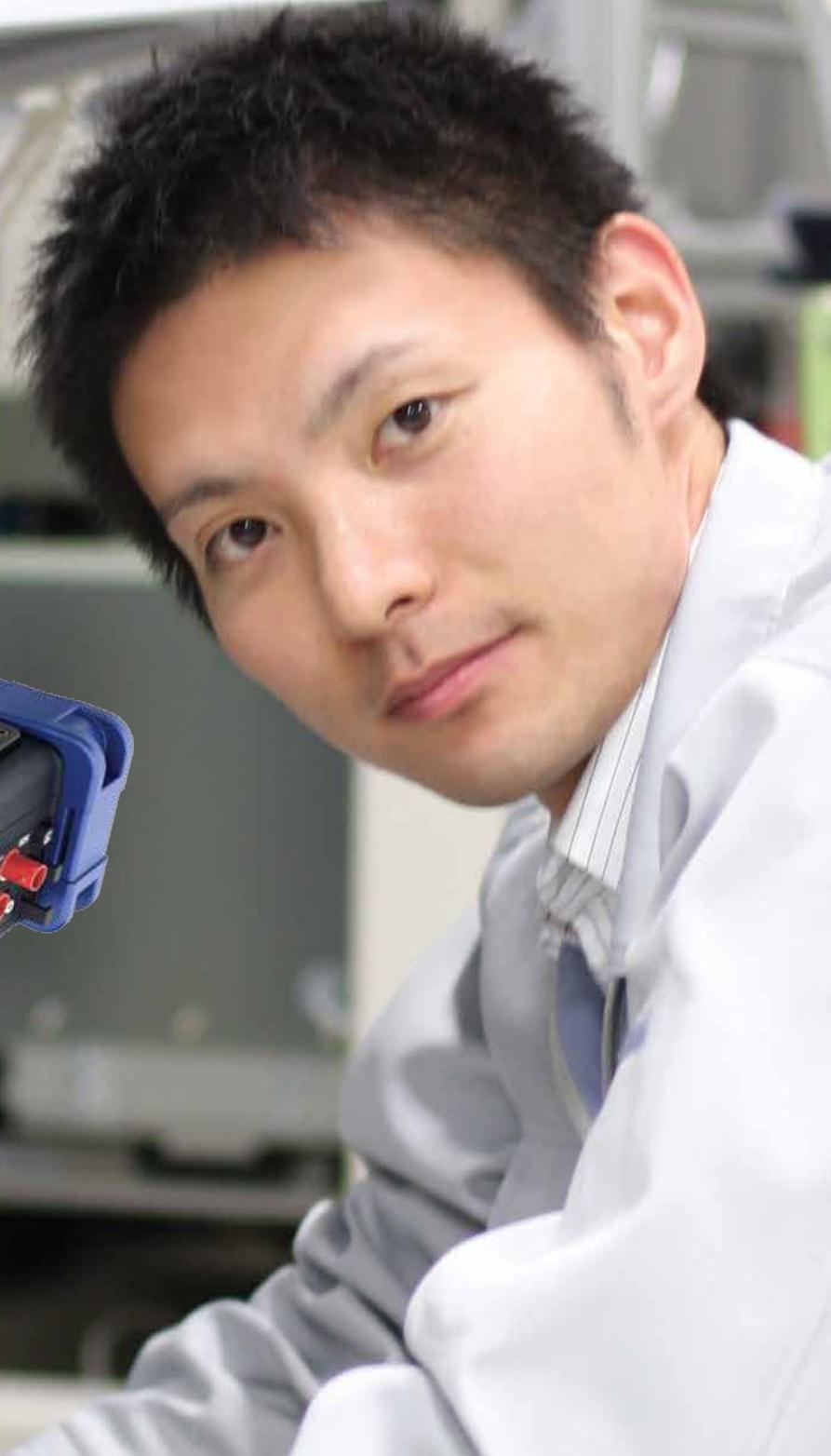
SOLIDWORKS PLASTICS
IDENTIFY AND AVOID MANUFACTURING DEFECTS DURING EARLY STAGES OF DESIGN

For over 75 years, HIOKI E.E. Corporation has been a leader in the electrical measurement industry, manufacturing a range of automatic test equipment, memory recorders, electrical measurement instruments, and field measurement devices. To support its QCDS (Quality, Cost, Delivery, and Service) improvement initiative, HIOKI replaced its 2D design tools with 3D technology.

"Our vision of providing every designer and engineer with access to 3D CAD rested on the belief that it would help them more accurately and effectively communicate design intent, and ultimately improve design quality, reduce lead-times, and more quickly deliver excellent products to our customers," Hiroshi Mizuide, manager of development assistance in HIOKI's Engineering Department stresses. "SOLIDWORKS has enabled us to achieve these goals."

While some of HIOKI's development cost reductions relate to time savings, a large portion involves the 30 percent fewer prototyping cycles that the manufacturer has achieved using SOLIDWORKS solutions. Mizuide says that by using design analysis in SOLIDWORKS Simulation and plastic injection simulation in SOLIDWORKS Plastics, HIOKI designers and engineers can validate design performance, resulting in more streamlined interaction with mold manufacturers and requiring fewer prototypes.

Mizuide points out, "SOLIDWORKS Plastics software enables our designers to simulate how a mold will fill with resin, which has improved communication with our mold manufacturers. There are fewer questions raised and fewer errors to correct."

Results:

- Shortened design cycles by 30 percent
- Accelerated time-to-market by 30 percent
- Cut development costs by 30 percent
- Reduced prototyping cycles by 30 percent

"SOLIDWORKS Plastics software enables our designers to simulate how a mold will fill with resin. There are fewer questions raised and fewer errors to correct."

Hiroshi Mizuide
Manager of Development Assistance
HIOKI E.E. Corporation

SIMULATION PRODUCT FEATURES

SIMULATION PRODUCT FEATURES	SOLIDWORKS SIMULATION	SOLIDWORKS FLOW SIMULATION	SOLIDWORKS PLASTICS	SOLIDWORKS SUSTAINABILITY
Concurrent Engineering	▶	▶	▶	▶
Optimize Design	▶	▶	▶	▶
Test Assembly with Linear Static Analysis	▶			
Simulate Mechanism with Time Based and Event based Motion approach	▶			
Simulate Natural Frequencies	▶			
Simulate heating or cooling	▶	▶		
Simulate Drop Test	▶			
Simulate Fatigue	▶			
Predict Buckling or Collapse	▶			
Simulate Plastic and Rubber Components	▶			
Simulate Composites	▶			
Simulate Forced Vibrations	▶			
Simulate Nonlinear Dynamics	▶			
Simulate External and Internal Fluid Flows		▶		
Simulate Laminar, turbulent, and transitional flows		▶		
Simulate Time dependent (transient) flow		▶		
Simulate Subsonic, transonic, and supersonic regimes		▶		
Simulate Multi-species flows		▶		
Simulate Non-Newtonian liquids Flows		▶		
Simulate Conjugate heat transfer (conduction, convection, radiation)		▶		
Simulate Heat transfer in solids		▶		
Simulate Fluid flows with liquid droplets or solid particles		▶		
Predict Joule heating		▶		
Calculate Comfort parameters		▶		
Analyse Filling (1st stage injection)			▶	
Analyse Packing (2nd stage injection)			▶	
Analyse Mold Cooling			▶	
Analyse Part Warpage			▶	
Analyse Gate Location Automatically			▶	
Predict Sink Mark, Weld Line & Air Trap			▶	
Simulate Product Environmental Impact with Key Indicators (carbon footprint, total energy consumption, air impacts, water impacts)				▶
Access to Sustainable Design Guidance tools (such as Compare Raw Material Financial Impact)				▶
Customize Process Inputs (Manufacturing, Transportation, Recycled Content, End-of-Life)				▶

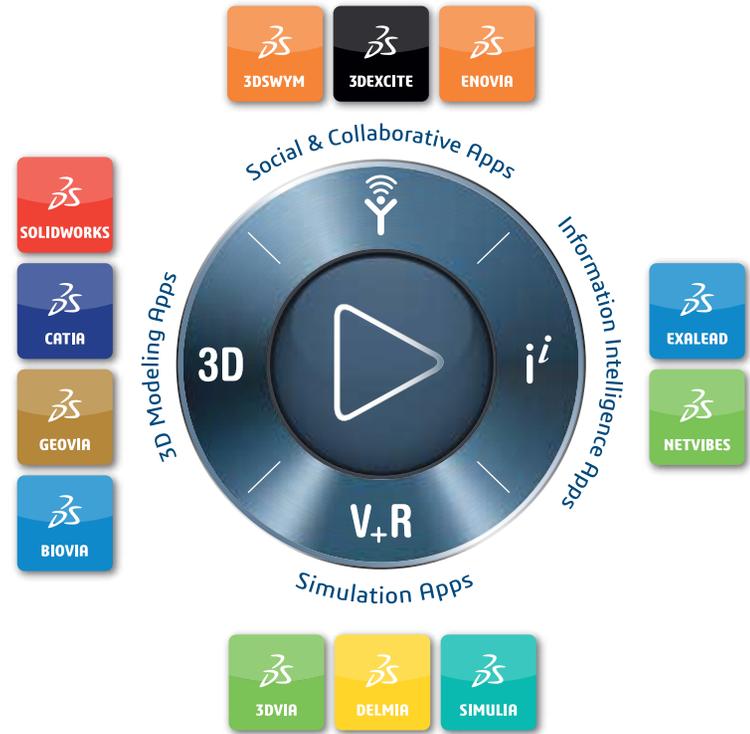**For more details about SOLIDWORKS, visit www.solidworks.com/simulation.**

SEE WHAT SOLIDWORKS SIMULATION CAN DO FOR YOUR BUSINESS

You've seen the impressive results that the SOLIDWORKS Simulation suite creates for companies. Now learn how this intuitive software portfolio can help you make improvements while you design, cut down on prototypes, and eliminate rework and delays. Talk to your local SOLIDWORKS Value-Added Reseller or visit www.solidworks.com/simulation to learn more about all the features of SOLIDWORKS Simulation.
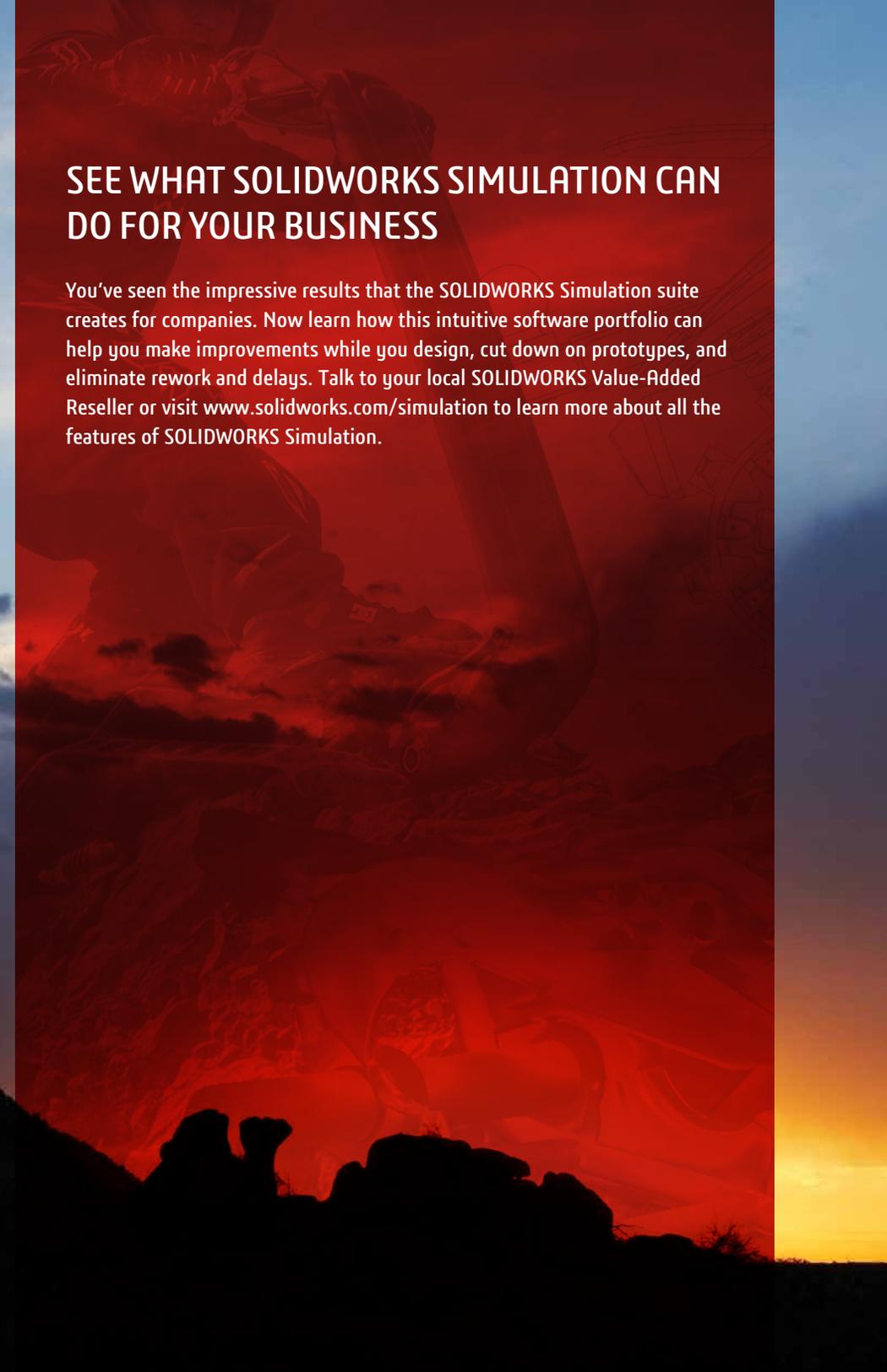
Our 3DEXPERIENCE platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3D**EXPERIENCE® 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 190,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.

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