

RESEMIN

IMPROVING MINING EQUIPMENT PERFORMANCE AND LONGEVITY WITH 3DEXPERIENCE WORKS DURABILITY PERFORMANCE ENGINEER

Case Study



Resemin added the Durability Performance Engineer role from the SIMULIA brand within the **3DEXPERIENCE** Works portfolio to conduct nonlinear vibration and fatigue simulations to extend machine life and improve product performance.

Challenge:

Improve equipment performance and increase innovation while accelerating development cycles to meet market demand for faster delivery times.

Solution:

Add the Durability Performance Engineer role from the SIMULIA brand of simulation solutions within the **3DEXPERIENCE** Works portfolio to its existing SOLIDWORKS installation—comprising SOLIDWORKS Premium design, SOLIDWORKS Simulation Premium analysis, SOLIDWORKS PDM Professional product data management, SOLIDWORKS Composer technical communications, SOLIDWORKS Inspection quality assurance, SOLIDWORKS Electrical Schematics design, SOLIDWORKS Electrical 3D design, SOLIDWORKS Visualize rendering, and DraftSight 2D design software solutions—as well as **3DEXPERIENCE** Works collaboration, communication, and data management solutions that include Collaborative Designer for SOLIDWORKS, Collaborative Industry Innovator, and Collaborative Business Innovator, to leverage the cloud-based **3DEXPERIENCE** platform.

Results:

- Reduced time to market by additional 10 percent
- Shortened nonlinear analysis solution time by three hours by running simulations in cloud
- Doubled product development throughput and expanded product line
- Extended durability of equipment

Resemin is the third-largest global manufacturer of underground mining drilling and related equipment, and the undisputed world leader in the niche narrow seam mining market. The company's drilling equipment provides a better, more cost-effective alternative to using traditional drilling rigs for mining and tunneling applications. Headquartered in Lima, Peru, Resemin manufactures some of the leading mining equipment brands in the world, such as its RAPTOR and MUKI long-hole, and BOLTER 99 rock-drilling machine rigs.

Founded in 1989, Resemin has been able to sustain its growth through its business strategy, sense of technological innovation, and highly skilled workforce. The company has grown into an international leader by focusing on quality, safety, and reliability, and strict adherence to international



"With the capability that we've gained with Durability Performance Engineer, we are both improving the performance of our existing designs as well as increasing innovation in the design of new products. Working with Dassault Systèmes solutions, we've expanded our product line and doubled throughput from 60 to 115 machines each year."

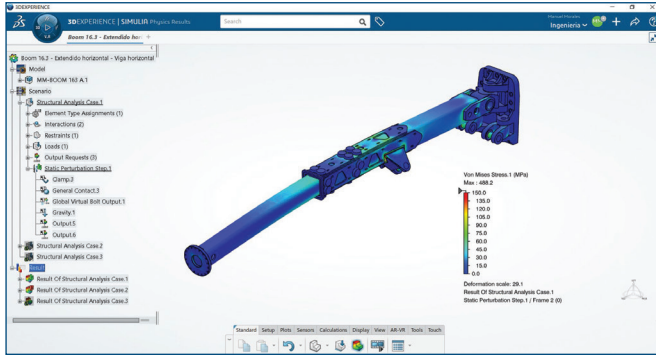
— Fernando Díaz, Engineering Manager

standards under its ISO 9001:2000 certification. Because Resemin products must operate safely and reliably within extreme underground mining environments, the company is committed to leveraging advanced design, engineering, and analysis technologies to ensure quality and dependability.

The company's commitment to technology was the reason Resemin moved from AutoCAD® 2D tools to SOLIDWORKS® 3D design software in 2008, and acquired SOLIDWORKS Simulation Premium analysis software in 2011. The benefits of those solutions prompted the company to acquire a range of additional SOLIDWORKS solutions in 2015, including SOLIDWORKS PDM Professional product data management, SOLIDWORKS Composer™ technical communications, SOLIDWORKS Inspection quality assurance, SOLIDWORKS Electrical Schematics design, SOLIDWORKS Electrical 3D design, SOLIDWORKS Visualize rendering, and DraftSight® 2D design software solutions.

The transition to SOLIDWORKS enabled Resemin to cut its machine delivery times in half, increase throughput from two to 45 machines annually, shorten analysis run times from two days to two hours, and reduce prototyping by 70 percent, according to Engineering Manager Fernando Díaz. "The productivity gains with SOLIDWORKS prompted us to evaluate the new **3DEXPERIENCE**® Works solutions from Dassault Systèmes when we encountered a need to run nonlinear vibration and fatigue analyses to extend the durability of our equipment and develop more innovative products," Díaz explains.

In investigating the best solution for nonlinear vibration and fatigue analyses—simulations that provide insights into ways to extend equipment life and durability—Resemin benchmarked Ansys® Simulation Premium software against the Durability Performance Engineer role from the SIMULIA® brand within the **3DEXPERIENCE** Works portfolio. The innovation portfolio leverages the cloud-based **3DEXPERIENCE** platform to give customers access to the power of industry-leading tools



Resemin selected the Durability Performance Engineer role from the SIMULIA brand within the **3DEXPERIENCE** Works portfolio after a benchmark showed that it was the fastest and most cost-effective solution for conducting nonlinear vibration and fatigue simulations.

for design, simulation, manufacturing, and marketing from Dassault Systèmes.

The results of that benchmark on the same nonlinear vibration and fatigue simulation showed that Durability Performance Engineer and Ansys provided accurate results, but the Durability Performance Engineer solution was easier to set up and use, and the simulation took three fewer hours to solve—eight hours for Ansys and five hours for Durability Performance Engineer. The results of this benchmark, and the solution's compatibility

with SOLIDWORKS, prompted Resemin to acquire a three-year subscription for Durability Performance Engineer in 2021, as well as **3DEXPERIENCE** Works collaboration, communication, and data management solutions—including Collaborative Designer for SOLIDWORKS, Collaborative Industry Innovator, and Collaborative Business Innovator.

SAVING TIME CONDUCTING COMPLEX SIMULATIONS IN THE CLOUD

According to Designer Manuel Morales, who heads up Resemin's simulation operation, the issue that the company was looking to solve when the benchmark was conducted involved vibration of 48 Hz (vibrations per second) in a driller arm that not only created fatigue that shortened the life of the part, but also caused some shaking in the operator's platform. "When we ran this problem in Ansys, we first had to export a neutral file format like IGES or STEP, set up the simulation case, pay for a sufficient number of HPC cores for solving, and run the simulation, which took eight hours," Morales recalls.

"When we ran the simulation in Durability Performance Engineer, there was no file export or computing cost because it ran in the cloud," Morales continues. "We set up the simulation, and it ran in five hours in Durability Performance Engineer. The solution was faster and more cost-effective, and when we made a change and reran the simulation in Durability Performance Engineer, it only took an hour to solve."



IMPROVING PRODUCT PERFORMANCE, INCREASING INNOVATION

With the benchmark information, Resemin increased the mass of the part and changed the material, which dampened the vibration, improved the stability of the operator's platform, and improved the durability of the product. "Because of the more simplified process and speed associated with using Durability Performance Engineer, we've been able to shorten time to market by an additional 10 percent," Díaz notes.

"With the capability that we've gained with Durability Performance Engineer, we are both improving the performance of our existing designs as well as increasing innovation in the design of new products," Díaz adds. "Working with Dassault Systèmes solutions, we've expanded our product line and doubled throughput from 60 to 115 machines each year."

SYNCHRONIZED MODELING AND SIMULATION PROCESS

The use of Durability Performance Engineer simulation tools in conjunction with SOLIDWORKS design and modeling software not only provided insights into improving the driller arm in this one benchmark example, but also supports Resemin's overarching product and business objectives that are particular to its underground heavy equipment mining market. "Top manufacturers in our market spend 1.5 to 2 percent of revenue—close to \$2 billion—on product failures and warranty claims," Díaz stresses.

"In addition to the loss of revenue, such claims typically result in a loss of customer trust and market share, both of which we need to avoid," Díaz says. "The combination of SOLIDWORKS for design and Durability Performance Engineer for running simulations in the cloud gives us a seamless solution for a synchronized design modeling and simulation process, which is critically important for improving product reliability, durability, and performance."

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