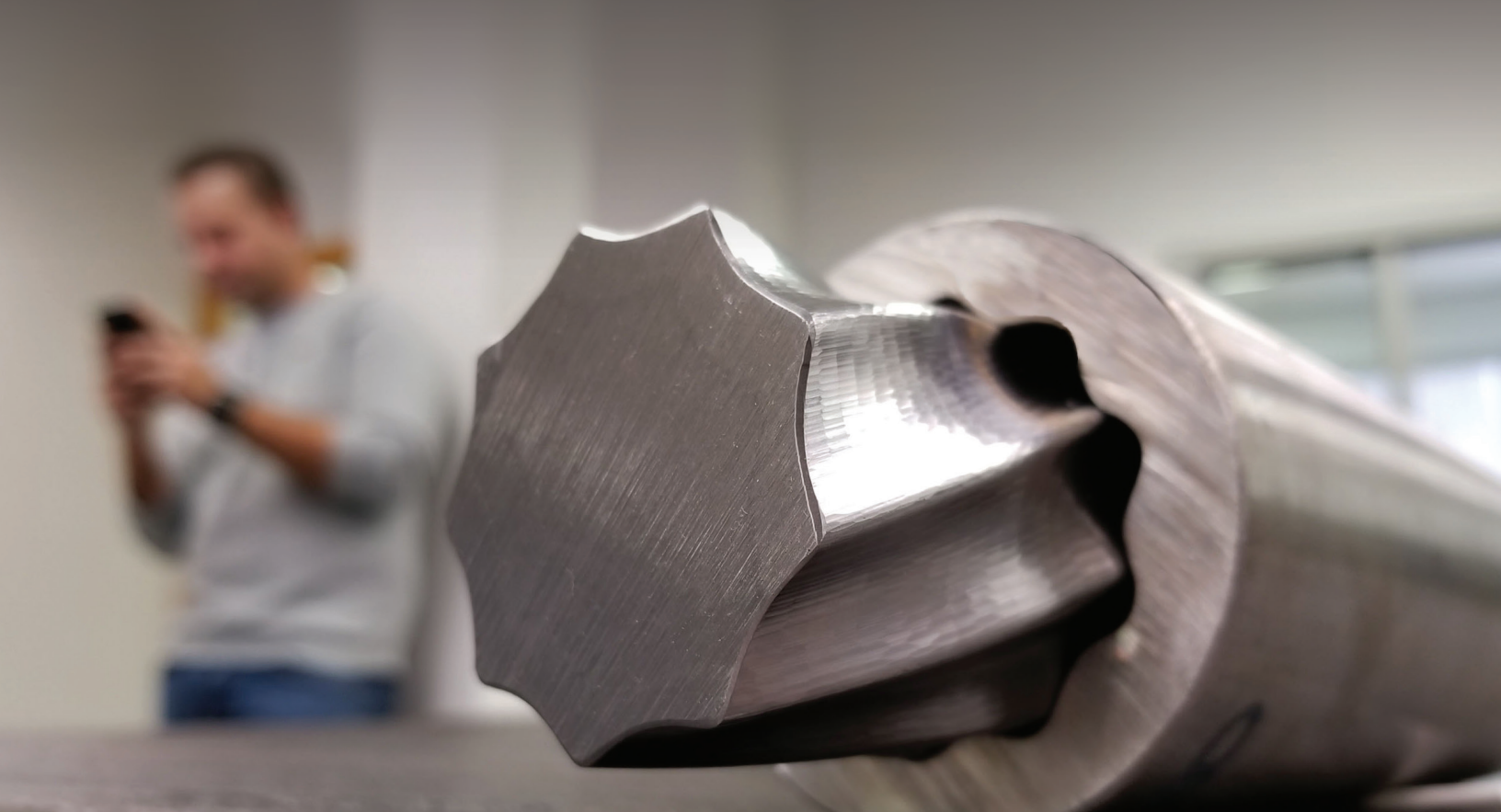




DEVELOPING DOWNHOLE OIL AND GAS DRILLING PRODUCTS FASTER WITH SIMULIA STRUCTURAL SIMULATION ENGINEER



By adding SIMULIA SSE analysis software to its SOLIDWORKS product development implementation, InFocus Energy Services has acquired the simulation power and efficiency that it needs to consistently develop innovative, effective downhole products for the oil and gas industry more quickly and affordably.



Challenge:

Leverage high-end, nonlinear structural simulation technology to reduce reliance on costly, time-consuming physical testing and develop innovative downhole drilling products more quickly and cost-effectively.

Solution:

Add SIMULIA Structural Simulation Engineer to its SOLIDWORKS implementation to conduct nonlinear structural and complex contact analyses in the cloud to advance and accelerate new product development.

Results:

- Saved tens of thousands of dollars in testing costs
- Cut months of time and extra labor from development process
- Realized close correlation between simulation and testing results
- Freed up computing resources for other functions
- Saved money spent on unnecessary mold iterations

InFocus Energy Services, Inc. is an innovative Canadian company specializing in the development of solution-driven downhole products for the oil and gas industry. Committed to the development of high-performance, innovative drilling and well-completion products, InFocus is primarily an R&D-based company that licenses its technology and products to strategic partners.

Staying on the cutting edge of the oil and gas industry requires robust design and engineering tools, which is why the company utilizes the integrated SOLIDWORKS® 3D product development suite. According to Founder/Director Allan Pearson, InFocus has utilized SOLIDWORKS tools from the start because the integrated solutions provide the power, agility, and flexibility that the company needs to consistently develop innovative products. "SOLIDWORKS is the core of our engineering group," Pearson notes. "It's the basis for everything we do: modeling, simulation, flow analysis, renderings. We rarely have to rely on other products."

With its concentration on developing oil and gas products that are currently not available anywhere else, InFocus regularly pushes SOLIDWORKS tools, including simulation solutions, to the limit and remains on the lookout for emerging solutions. "We've used SOLIDWORKS Simulation Premium software for certain types of analysis, but our work increasingly involves not only geometric and material nonlinearities but also complex contact problems," explains Mechanical Engineer/Simulation Specialist Peter Kjellbotn.

"We needed more simulation power, as well as a solution that worked smoothly with SOLIDWORKS," Kjellbotn continues. "When we heard that SOLIDWORKS was launching a new

3DEXPERIENCE® simulation solution that incorporated the SIMULIA® Abaqus solver, we signed up for the Lighthouse Program so we could start using the new SIMULIA Structural Simulation Engineer immediately. As soon as we got our hands on it, we started testing it and benchmarking it against known test results."

SIMULATING TRICKY, COMPLEX CONTACT ACCURATELY

InFocus first utilized SIMULIA Structural Simulation Engineer on the bearing section of 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 Structural Simulation Engineer predicted the failure—with accurate correlation to actual test results—and helped the company develop a better, more innovative design.

"With Structural Simulation Engineer, 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," Kjellbotn recalls. "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 Structural Simulation Engineer, 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 downhole, and confirm a higher torque rating and increased durability for our product."

DEVELOPING UNIQUE, INNOVATIVE PRODUCTS QUICKLY AND AFFORDABLY

The experience using SIMULIA Structural Simulation Engineer software to develop the bearing section of the RE|FLEX Premium Drilling Motor is representative of the fast, focused development process that InFocus needs to introduce industry innovations in a timely, consistent fashion. "We can develop more products quicker and at lower cost by using Structural Simulation Engineer," Kjellbotn stresses.



"With [SIMULIA] Structural Simulation Engineer, we are only limited by our imagination."

— Peter Kjellbotn, Mechanical Engineer/Simulation Specialist

"For example, on the bearing section of the RE|FLEX Motor, if we had had to physically test all of our design options instead of evaluating them in Structural Simulation Engineer, it would have taken a lot more time and money," Kjellbotn says. "To do all of those tests on a high-strength drive shaft—at a cost of thousands of dollars per test—would have blown both the schedule and budget. We saved tens of thousands of dollars, months of time, and extra labor costs by using Structural Simulation Engineer. It helped us condense a process that would usually take months into just a few weeks."

GREATER AGILITY AND FLEXIBILITY FUEL GROWTH

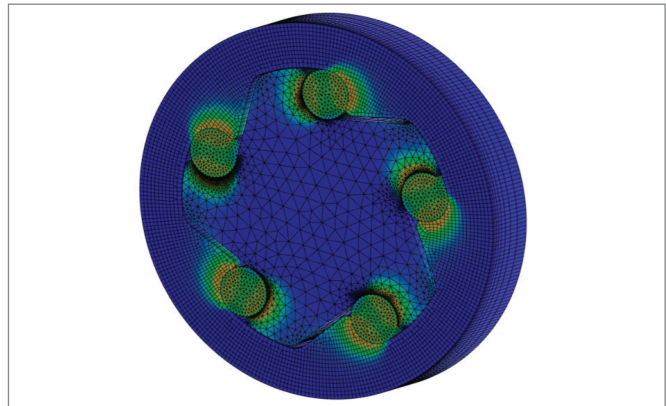
The implementation of SIMULIA Structural Simulation Engineer provides InFocus with the increased agility and flexibility that it needs to continue to innovate and grow. "Getting the products out and into the market faster is everything to us," Pearson says. "Structural Simulation Engineer fits into our goal to go from concept to completion in a week. Our business needs change quickly, so having an agile system that gets results that we can trust quickly is extremely important for our continued growth."

"Because Structural Simulation Engineer is on the **3DEXPERIENCE** platform in the cloud and is fully compatible with our SOLIDWORKS modeling data, it provides additional advantages," Kjellbotn adds. "It's hardware-independent, freeing up our workstations for other things, and utilizes SOLIDWORKS data, saving time and money because we don't have to go through time-consuming import/export protocols. The solution also automatically stores data in the cloud and supports collaboration. With Structural Simulation Engineer, we are only limited by our imagination."

Focus on InFocus Energy Services, Inc.
VAR: Javelin Technologies, Inc.,
Oakville, Ontario, Canada

Headquarters: 9759 51st Ave. NW
Edmonton, AB T6E 4W8
Canada
Phone: +1 780 851 2026

For more information
www.infocusenergy.com



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.

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