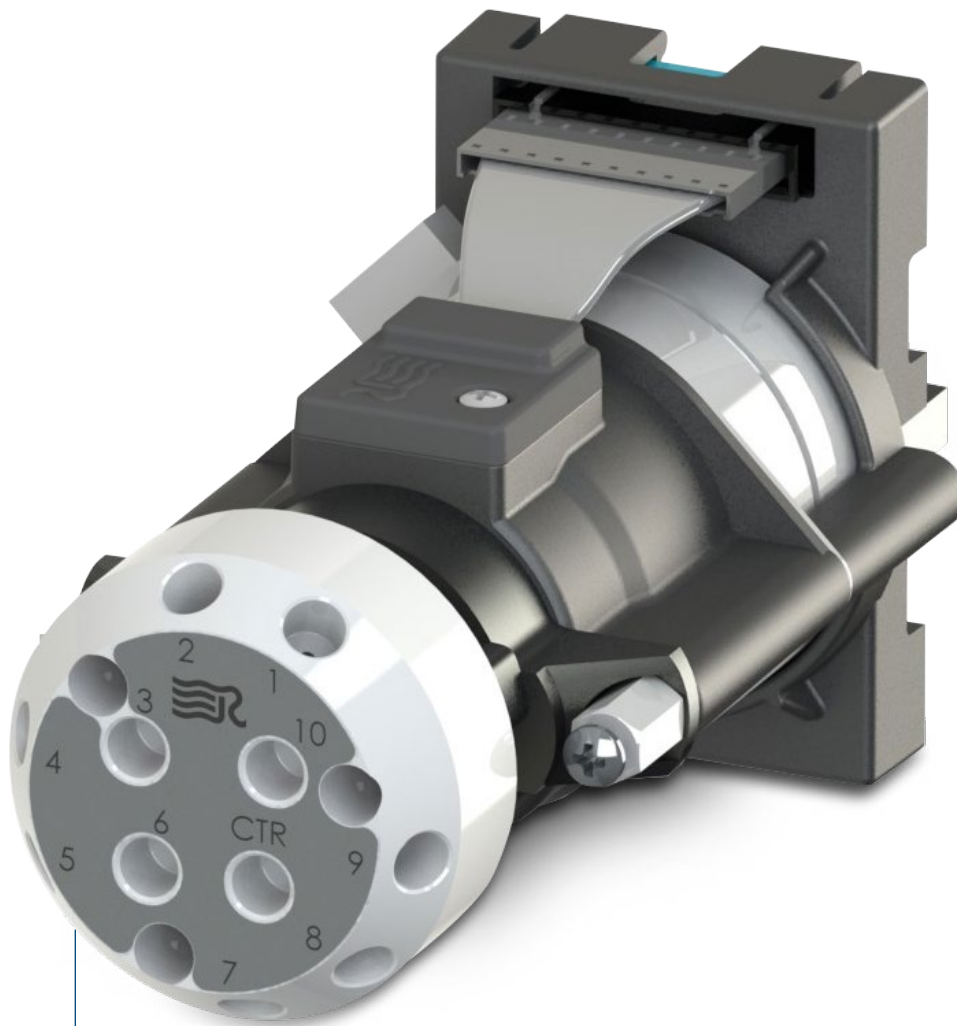


IDEX HEALTH & SCIENCE LLC

STREAMLINING PRECISION MICROFLUIDICS SYSTEM DESIGN
WITH SOLIDWORKS SOLUTIONS



IDEX Health & Science leverages SOLIDWORKS design, simulation, and product data management solutions to streamline and advance development of its microfluidics systems and products.

Challenge:

- Develop innovative microfluidics systems—at the microscopic level—more accurately and efficiently.

Solution:

- Implement SOLIDWORKS Professional design and SOLIDWORKS Premium design and analysis software, the SOLIDWORKS Simulation Premium and SOLIDWORKS Flow Simulation analysis applications, and the SOLIDWORKS Enterprise PDM product data management system.

Results:

- Reduced design cycles by 50 percent
- Eliminated 90 percent of prototyping requirements
- Cut six to eight weeks of tooling
- Increased fluidics pressure from 500 to 30,000 psi

Laboratory sample processing challenges drive innovation at IDEX® Health & Science. A division of IDEX Corp., IDEX Health & Science manufactures the 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.

Maximizing throughput is critically important in the highly competitive laboratory market, according to Mechanical Design Engineer Kevin Longley. “The more throughput that laboratories can get, the more money they make,” Longley explains. “They get more throughput by using higher pressure to push more samples through the column. The first high-pressure liquid chromatography valves were rated at about 500 psi. The Rheodyne® valves that we develop at IDEX today handle 30,000 psi of pressure. So, we’re pushing incredibly small volumes—in some cases as little as 0.1 microliters—at extremely high pressure to increase throughput and make it more economical for labs to purchase equipment.”

To achieve microfluidics breakthroughs, the company’s engineers needed access to integrated design and simulation tools. IDEX decided to migrate from Pro/ENGINEER® software to integrated SOLIDWORKS® solutions in 2001. “IDEX standardized on SOLIDWORKS because it’s easy to use and facilitates training, yet provides powerful structural and fluid-flow simulation tools,” Longley explains. “With SOLIDWORKS, I don’t even notice the software. It doesn’t slow me down or force me to jump through hoops. It’s really just an extension of the work I do.”

IDEX acquired 120 licenses of SOLIDWORKS Professional design and SOLIDWORKS Premium design and analysis software, the SOLIDWORKS Simulation Premium and SOLIDWORKS Flow Simulation analysis applications, and the SOLIDWORKS

Enterprise PDM product data management system. “Because SOLIDWORKS solutions are so intuitive, we can focus on our designs and not on the tools. This allows us to innovate more precise designs while simultaneously streamlining our development processes,” Longley says.

SIMULATING WHAT’S GOING TO HAPPEN

As the complexity of IDEX designs has grown, so has its reliance on SOLIDWORKS Simulation and SOLIDWORKS Flow Simulation tools. “Much of what we do would be near-impossible to do by hand,” Longley stresses. “The tubing we use is 1/32nd of an inch in diameter, but the inner diameters are 0.004 inches. With such small passages and such high pressure driving such small fluid volumes through the system, simulation is a must. We conduct flow simulations on products that involve mixing and structural finite element analysis (FEA) on just about everything else.

“Our valves experience forces that want to pull them apart, so we need to conduct FEAs on every single link in the project,” he continues. “We use analysis to ensure that the design will hold up prior to prototyping. That’s done on every valve that we make. Using SOLIDWORKS Simulation as part of our design process cuts 90 percent of the prototyping loops that were required in the past.”

SAVING TIME AND MANAGING DATA

Using SOLIDWORKS solutions, IDEX has shortened its design cycle by 50 percent while increasing innovation. In addition to saving time using SOLIDWORKS simulation tools, IDEX realizes time savings from SOLIDWORKS design configuration capabilities.

“Configurations help because our product is 99 percent components,” Longley points out. “The liquid end of our valves is a stator. While the stator body remains the same, it could have many port configurations. Some have two ports; others have up to 25 ports, and the angles of the holes vary widely. With configurations, we can efficiently model all of the potential configurations from our initial design, which saves a lot of time.”

The company has implemented the SOLIDWORKS Enterprise PDM system to improve management of product design data.

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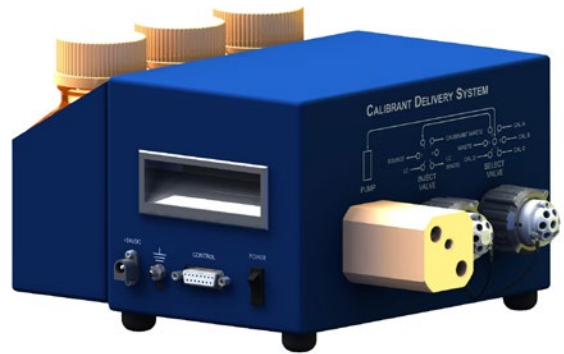
— Kevin Longley, Mechanical Design Engineer

"We anticipate saving more time once we fully implement SOLIDWORKS Enterprise PDM," Longley adds. "With the PDM system, all of the design data is right there at your fingertips. You just log into the vault, grab your model, and you're off and running."

ROUTING PRECISION TUBING

SOLIDWORKS has also reduced manufacturing time and costs. With SOLIDWORKS Routing, Longley outputs a bend file that captures the XYZ coordinates on the bend radii for fabricating extremely small stainless steel tubing. This capability enables IDEX to leverage automated tube-bending technology instead of using manual jigs and fixtures.

"The manual approach would have taken months," Longley notes. "Those jigs alone take six to eight weeks to produce. Using SOLIDWORKS Routing, I got the tubes back in about a week. This is just one example of how using SOLIDWORKS helps us meet our deadlines."



With SOLIDWORKS Simulation and SOLIDWORKS Flow Simulation analysis capabilities, IDEX Health & Science can increase design complexity and innovation.

Focus on IDEX Health & Science LLC
VAR: GoEngineer, Sacramento, CA, USA

Headquarters
600 Park Court
Rohnert Park, CA 94928 USA
Phone: +1 707 588 2000

For more information
www.idex-hs.com

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