DASSAULT SYSTEMES

SOLIDWORKS

PENN-TROY MANUFACTURING, INC.

MODERNIZING COMPLEX VALVE DEVELOPMENT WITH SOLIDWORKS SOLUTIONS

Penn-Troy Manufacturing leveraged SOLIDWORKS design, simulation, CFD analysis, PDM, and technical communication solutions to shorten design cycles, improve quality, reduce prototypes, and expand its line of specialized water and explosion relief valves.

PENN-TROY MANUFACTURING INC.
MANUFACTURING TRUST.

Challenge:
Accelerate development of water valves and explosion relief valves to expand the company's product line and take advantage of market growth opportunities.

Solution:
Implement SOLIDWORKS Premium design, SOLIDWORKS Simulation Professional analysis (FEA), SOLIDWORKS Flow Simulation computational fluid dynamics (CFD) analysis, SOLIDWORKS Enterprise PDM product data management, and SOLIDWORKS Composer technical communication software.

Benefits:
- Reduced design cycles by 50 percent
- Saved $40,000 to $50,000 on prototypes
- Cut valve weight by 10 percent
- Improved product quality

Penn-Troy Manufacturing, Inc. is a leading manufacturer of specialty valves for use in water treatment systems, wastewater treatment plants, and marine diesel engines. The company's Troy Valve Division produces standard and custom valves for the water and wastewater industries. Its Bicera Valve Division supplies crankcase explosion relief valves, which prevent engine room explosions and fires related to crankcase ignitions.

The Bicera valve is named for the British Internal Combustion Engine Research Association (BICERA), which determined that a crankcase ignition of oil mist caused an engine room explosion that killed 28 men in 1947. Penn-Troy has manufactured the Bicera explosion relief valve since 1959. The valve operates by relieving internal pressures once they reach a certain threshold and quenches any fire with an internal oil-wetted flame trap.

Until 2010, the company used 2D engineering drawings to manufacture its products. However, greater competition and management's desire to increase research and development, expand the company's product line, and grow market share, prompted Penn-Troy to evaluate 3D solutions, according to Lead Mechanical Engineer Mike Kafka. "Management wanted to ramp up new product development, so we needed to acquire 3D design, simulation, and communication tools to achieve efficiency and productivity gains to support that effort," Kafka recalls.

Although he had used Pro/ENGINEER® software in college, Kafka recommended that the company invest in SOLIDWORKS® solutions after seeing a presentation by reseller Prism Engineering. Penn-Troy chose SOLIDWORKS because it's easy to use and provides a full range of integrated design and engineering solutions. The company has implemented SOLIDWORKS Premium design, SOLIDWORKS Simulation Professional analysis, SOLIDWORKS Flow Simulation computational fluid dynamics (CFD) analysis, SOLIDWORKS Enterprise PDM product data management, and SOLIDWORKS Composer™ technical communication software solutions.

"The intuitiveness of SOLIDWORKS stood out from the packages that we evaluated," Kafka recounts. "The software works like you think it should, and I haven't found anything that I haven't been able to do with SOLIDWORKS."

TURNING MARKET ON ITS HEAD

After implementing SOLIDWORKS solutions, Penn-Troy undertook the challenge of expanding its product line, particularly at its Bicera Valve Division. The company sought to shake up the market by offering more advanced door designs. Its Bicera valves would be integrated directly into customers' crankcase inspection door designs as they had always been, but now faster and more accurately by working with the customer's existing 3D CAD data and validating new valve designs using SOLIDWORKS simulation tools. To offer this value-added service, Penn-Troy needed to be able to work with a variety of 2D and 3D CAD formats, a process at which SOLIDWORKS excels.

"The ability to integrate our valves into customer door designs and then validate the performance of both the valve and the door using SOLIDWORKS Simulation gives us a competitive advantage," Kafka stresses. "SOLIDWORKS tools are helping us support this new approach and revamp every aspect of the Bicera valve design."

"SOLIDWORKS Simulation tools save us thousands of dollars. I ran fluid flow simulations on six different configurations to determine the valve design that performed best for venting exhaust gases with an even flow distribution. SOLIDWORKS Simulation is also enabling us to quickly develop new sizes of our Troy Valve line without a lot of prototyping because we can calculate the stresses and loads associated with different levels of torque and flow pressure."

— Mike Kafka, Lead Mechanical Engineer

SIMULATING EXPLOSIVE FORCES

Penn-Troy used SOLIDWORKS Simulation Professional and SOLIDWORKS Flow Simulation software to simulate a range of explosive forces for the redesign of the Bicera valve. The company can simulate the structural and vibration effects of a crankcase explosion, such as identifying where the bolts will give out, locating where the resonance medium will be, and identifying where to add material or ribs.

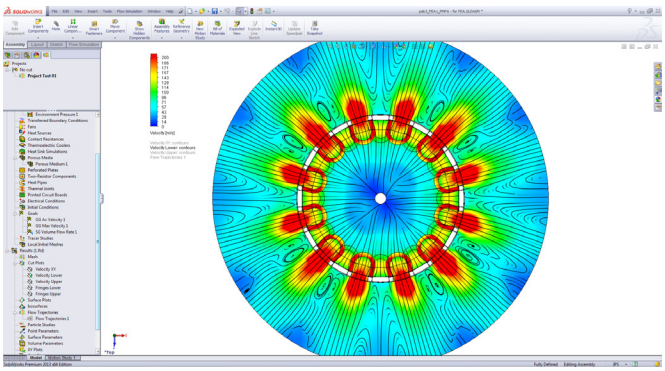
Using SOLIDWORKS Flow Simulation software, Penn-Troy can simulate the response of the porous sintered metal used in the valve to a crankcase explosion. By running simulations, the company has reduced prototyping, saving between $40,000 and $50,000; cut valve weight by 10 percent, realizing material savings; and increased valve strength, all while producing a more robust design in half the time.

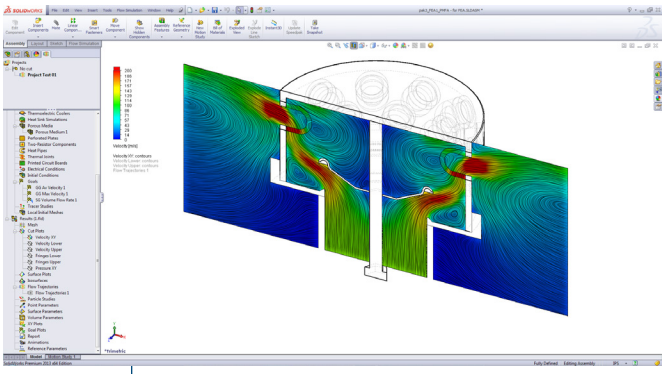
"SOLIDWORKS Simulation tools save us thousands of dollars," Kafka notes. "I ran fluid flow simulations on six different configurations to determine the valve design that performed best for venting exhaust gases with an even flow distribution. SOLIDWORKS Simulation is also enabling us to quickly develop new sizes of our Troy Valve line without a lot of prototyping because we can calculate the stresses and loads associated with different levels of torque and flow pressure."

LEVERAGING CAD DATA SAVES TIME AND MONEY

In addition to leveraging 3D CAD data to run design simulations, Penn-Troy is using SOLIDWORKS Composer technical communication software to revamp its website and product catalog. "The great thing about SOLIDWORKS is that there's so much downstream potential for saving time and money," Kafka says.

"With SOLIDWORKS, we can realistically handle more capacity, customers, and throughput without adding manpower," Kafka adds. "There's no way I could do my job without it."





Using SOLIDWORKS Simulation Professional and SOLIDWORKS Flow Simulation software, Penn-Troy Manufacturing simulated the structural, vibration, and explosive gas effects of a crankcase explosion to improve the performance of its Bicera relief valves, cutting weight and improving performance while simultaneously reducing prototyping costs.

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