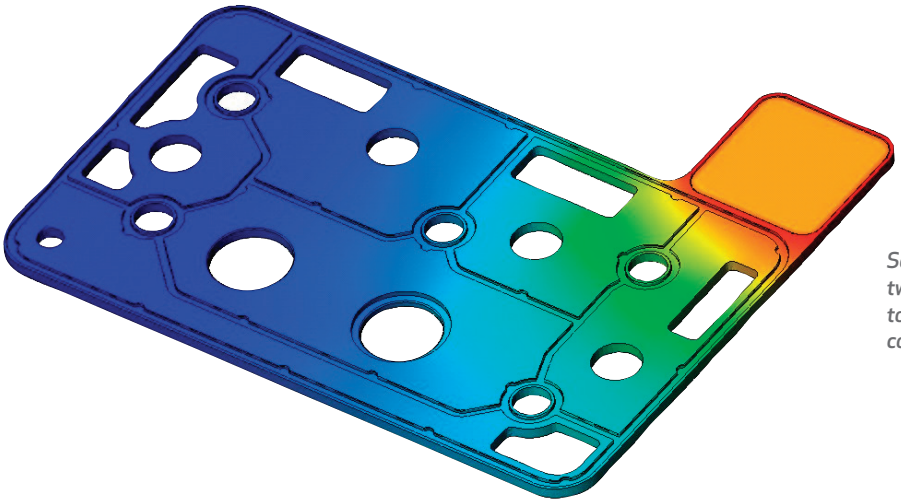
DRÄGER MEDICAL

SolidWorks Simulation cuts design time for critical care equipment in half



SolidWorks Simulation performed in two days a calculation that previously took an outsource lab three months to complete and cost $26,000.

Dräger is the world leader in anaesthesia and critical care equipment. In the design and manufacture of products as vital as these, design engineers face a constant challenge to ensure that their products meet thermal, strength, and fluid specifications. This is particularly important at Dräger, where mistakes in these areas can have a negative effect on safety and patient care. The process of trial and error using physical prototypes to test new product designs is effective but expensive and time-consuming. With the goal to reduce product development time by fifty percent, Dräger Medical uses SolidWorks® Simulation and SolidWorks Flow Simulation to analyse its designs and reduce the number of physical prototypes that need to be made.

Breathing easy

"The decision to adopt SolidWorks Simulation was an easy one once we discovered the enormous time and cost savings that could be made," according to Development Engineer Karsten Hoffman. The turning point came with the design of a new ventilation system for an anaesthesia device supplying unconscious patients with oxygen and anaesthetic. The system absorbs exhaled carbon dioxide into ventilation lime and recirculates the gas, enriched with oxygen, back to the patient.

For reasons of cost and quality, it was decided that the ventilation system should no longer be manufactured from aluminum, but from plastic. However with the new plastic material and the toggle-type fastener which pressed the cover against the seal, there was a possibility that the cover would bend more than in the aluminum design, breaking the seal.

Hoffman employed an outside company to run FEM (Finite Element Method) calculations on this problem and the results showed that there was indeed a need to modify the design. The calculation work, including redesigning, lasted three months over several iterative processes and cost $26,000. For the next project, Hoffmann and his team made the same calculation using SolidWorks Simulation. This time, the results were achieved in two afternoons.

Results:

- Reduced design cycle by 50 percent
- Slashed analysis time from three months to two days
- Reduced total number of prototypes from eight to two
- Identified design flaw early in the design process, saving thousands of dollars

SOLIDWORKS

Hot issue

The ability of SolidWorks Simulation to analyze temperature meant it was the ideal tool to help solve another problem with the new design. The patient's humid exhaled breath can condense on the walls of the ventilation system, so that the doctor is no longer able to see the valves—and can even restrict the function of the device. To prevent this condensation, the Dräger designers need to provide heating to the ventilation system. The previous aluminum version had a heat contact plate attached from outside, but in the new device this was not achieving the desired temperature of 40 degrees at the other end of the valve plate.

New testing is fast and accurate

SolidWorks Simulation cut testing time for Dräger's new and redesigned products by an average of 50 percent. Before SolidWorks software, the typical design process included eight physical prototypes and outsourcing dozens of finite element analysis (FEA) calculations to verify design parameters. Now Dräger averages two prototypes per project. Although time was Dräger's main concern, SolidWorks Simulation also cut testing costs. The SolidWorks software products virtually paid for themselves in their first major test, the redesign of an anesthetic unit. Early in the design process, SolidWorks Flow Simulation identified a flaw that engineers would not otherwise have discovered until expensive physical prototyping, saving $1,600 on each prototype.

One-stop shop

The unpredictable behaviour of fluids can surprise even the most experienced design engineers, so the ability to simulate this side of the design process is vital to Dräger. "We were once trying to analyze the effects of changing the position of the gas flow into the ventilation systems. It is very important to get this right as it is all about making sure the patient is getting enough gas. When we ran an analysis on the flow of gas on our new design, I would have bet my mortgage that the pressure fall of only 0.2 mbar for 60 litres calculated by SolidWorks Flow Simulation could not be correct, based as it was on a conical resistor. I had been expecting 2 mbar, but when we built a prototype, it was clear that the software was correct," according to Hoffman.

Single-window integration between SolidWorks 3D CAD software, SolidWorks Simulation, and SolidWorks Flow Simulation allows design engineers to quickly run calculations on unconventional ideas, too. In addition, the integrated approach avoids interoperability problems as no translation is needed. And finally, separate specialist systems such as the conventional CFD (Computational Fluid Dynamics) systems would take more time to operate and get used to.

The use of SolidWorks Simulation and SolidWorks Flow Simulation may well help Hoffman and his team to meet the new product development goals; they will doubtless also save the company a considerable amount of money. More important perhaps is the vital contribution made by these systems to the quality and ultimate safety of Dräger Medical's equipment.

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Development Engineer

Dräger Medical used SolidWorks Simulation in the redesign of this anesthetic unit.

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Dräger Medical AG & Co. KGaA
Corporate Marketing & Communications
Moislinger Allee 53 - 55
23542 Lübeck, Germany
www.draeger.com

Dassault Systèmes
SolidWorks Corp.
300 Baker Avenue
Concord, MA 01742 USA
Phone: 1 800 693 9000
Outside the US: +1 978 371 5011
Email: info@solidworks.com
www.solidworks.com

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