CAMELBAK PRODUCTS, LLC
REVOLUTIONIZING HYDRATION PRODUCT DEVELOPMENT WITH SOLIDWORKS SOLUTIONS

CamelBak leveraged SOLIDWORKS design and simulation solutions to expand its product line into the the bottled, filtration, and military hydration markets, and is implementing the SOLIDWORKS PDM system to maintain and extend its position as the leading hydration brand.

CAMELBAK®

Challenge:
Expand hydration products from initial backpack line into markets for bottled, filtered, and military hydration, while simultaneously increasing innovation, boosting durability, and streamlining development processes.

Solution:
Implement SOLIDWORKS Premium design, SOLIDWORKS Simulation Professional analysis, and SOLIDWORKS PDM Professional product data management software solutions.

Benefits:
- Grew offering to include bottled, filtered, and military hydration products
- Innovated first BPA-free plastic water bottle
- Supported lifetime "GOT YOUR BAK" product guarantee
- Created prototypes 10 to 20 times faster

Ever since founder Michael Eidson filled an IV bag with water, stuck it in a tube sock, and strapped it on his back to compete in the Hotter'n Hell Hundred bike race in Texas in 1988, CamelBak Products, LLC has innovated unique ways to stay hydrated. Today, CamelBak is the leading hydration brand, expanding its initial offering of reservoir backpacks with product lines for the bottled, filtration, and military markets. The company's Hard Goods Group, which focuses on the development of reusable bottles and containers for water and beverages, has made displacing plastic disposable water bottles its ongoing mission.

Before CamelBak introduced bottles in 2006, the company didn't use 3D design tools because it could efficiently generate patterns for its backpacks using pen and paper. However, developing new products and innovative features demanded the greater design power of 3D, according to Principal Engineer Jeff Davies. "Expanding product lines required 3D design tools, including organic surfacing, rapid prototyping, and FEA [finite element analysis] simulation capabilities," Davies explains.

"We found the design power that we needed to maintain our leadership position in the SOLIDWORKS® development environment," Davies adds. "The software is easy to use and provides the integrated solutions we need to continue to innovate and succeed."

CamelBak implemented SOLIDWORKS Premium design and SOLIDWORKS Simulation Professional analysis software to support its product expansion, and recently added SOLIDWORKS PDM Professional product data management software to more efficiently handle the increasing volume of design, engineering, and manufacturing data associated with its products.

"With SOLIDWORKS, we can roll out product innovations in a timely manner," Davies says. "We introduced the first BPA-free bottle [BPA is bisphenol A, a harmful industrial chemical] in 2011 and secured a patent for the unique trigger mechanism of our Forge® insulated travel mug. SOLIDWORKS helps us to consistently achieve our product development, testing, innovation, ergonomics, and durability goals."

SURFACING AND, MOTION STUDIES SPARK DEVELOPMENT

CamelBak leveraged SOLIDWORKS surfacing and motion analysis tools during the development of its KickBak™ bottle, which features an innovative snap-back cap. Design Engineer Kelsey Hammond conducted motion studies on the living hinges that allow the cap to open and close—then ran multiple days of machine testing to ensure the cap would last for thousands of cycles. SOLIDWORKS surfacing tools helped her make the cap more ergonomic and aesthetically pleasing.

"We are committed to offering a durable product that you can take out in the field and drop numerous times—or bang around your car—and it will still function properly," Hammond stresses. "But we also want our products to look cool. SOLIDWORKS is extremely crucial for helping us uphold our standards.

"For example, on the KickBak cap, I used SOLIDWORKS advanced surfacing techniques to place an undercut where one side of the cap snaps into the other side and to smooth the area where users drink," Hammond continues. "Then, I added fillets to clean it up, improving performance and aesthetics. If I didn't have SOLIDWORKS, I couldn't do my job."

> "SOLIDWORKS saves us time and money because we can iterate quickly on a design, helping us to shorten time-to-market, meet firm deadlines, and ensure product durability and performance."
>
> — Jeff Davies, Principal Engineer

ENSURING PRODUCT DURABILITY AND PERFORMANCE

Because CamelBak offers a lifetime "GOT YOUR BAK" guarantee on all products, the company strives to design products to last a lifetime. That doesn't mean CamelBak skimps on innovation. In addition to conducting extensive testing of its design concepts, CamelBak relies on SOLIDWORKS Simulation Professional FEA capabilities to push the envelope of what's possible, such as the patented auto-seal trigger on the Forge insulated travel mug.

"The Forge travel mug presented an interesting design challenge because we were introducing an industry innovation while attempting to shorten time-to-market," Davies notes. "With SOLIDWORKS Simulation Professional, I was able to quickly study stress concentrations and deflection of the leaf-spring which operates the trigger mechanism. This enabled me to whittle 30 different designs to three or four for prototyping, and then reduce the number of prototyping cycles required to identify the optimal design. SOLIDWORKS saves us time and money because we can iterate quickly on a design, helping us to shorten time-to-market, meet firm deadlines, and ensure product durability and performance."

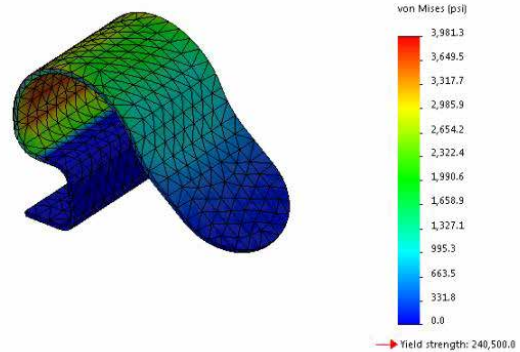## FASTER PROTOYPING SHORTENS DEVELOPMENT

The SOLIDWORKS design environment also lets CamelBak shorten its prototyping process through the rapid creation of fixtures, molds, and testing platforms. Design Engineer Aaron McCready used SOLIDWORKS to make a 3D-printed mold, with which he made a prototype of CamelBak's one-piece, self-sealing, silicone bite valve.

"The more testing we can do with real people to obtain feedback from actual users, the better," McCready says. "We use SOLIDWORKS to create usable prototypes as much as possible because the speed with which we complete prototyping has become extremely critical. SOLIDWORKS is a huge timesaver—at least 10 to 20 times faster—for creating prototypes. For the bite valve, I had actual silicone parts for testing in two days with the 3D-printed mold as opposed to the two months it likely would have taken to create these parts elsewhere."

von Mises (psi)

3,981.3	
3,649.5	
3,317.7	
2,985.9	
2,654.2	
2,322.4	
1,990.6	
1,658.9	
1,327.1	
995.3	
663.5	
331.8	
0.0	

Yield strength: 240,500.0

Using SOLIDWORKS Simulation Professional software, CamelBak quickly optimized the leaf-spring design for the auto-seal trigger mechanism on the Forge insulated travel mug, improving performance, reducing prototypes, and securing a patent for this product innovation.

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