DASSAULT SYSTEMES

SOLIDWORKS

STRONG ARM TECHNOLOGIES, INC.

DEVELOPING AN ERGOSKELETON TO MINIMIZE LIFTING INJURIES WITH SOLIDWORKS SOLUTIONS

Strong Arm Technologies relied on SOLIDWORKS design, analysis, and injection-molding simulation solutions to develop the Strong Arm Ergoskeleton, which uses a cabling system to lessen the impact of lifting loads, correcting posture and reducing fatigue.

STRONGARM TECHNOLOGIES

Challenge:
Develop an ergoskeleton that changes the dynamics of lifting by reducing the load carried by the hands, thereby minimizing lifting injuries.

Solution:
Implement SOLIDWORKS design, SOLIDWORKS Simulation analysis, and SOLIDWORKS Plastics Professional software solutions.

Benefits:
- Won MassChallenge Accelerator $100,000 Diamond Prize
- Accelerated product design iterations
- Enhanced manufacturability of design
- Improved design performance

Sean Petterson and Justin Hillery grew up with fathers whose bodies endured enormous physical strain at their blue-collar jobs, resulting in negative physical consequences from their work in the latter part of their lives. As students at the Rochester Institute of Technology, the pair became motivated by their fathers' experiences to collaborate on Petterson's idea for designing an ergoskeleton that makes lifting easier, with the goal of minimizing lifting injuries and improving the lives of everyday workers.

Their passion and dedication led to the founding of Strong Arm Technologies, Inc., and the development of the Strong Arm Ergoskeleton. Many occupations require lifting, including material handlers, dockworkers, baggage handlers, and warehouse workers, and studies show that $50 billion is spent annually compensating injuries to workers who lift incorrectly. The Strong Arm Ergoskeleton uses a cabling system to lessen the impact of lifting loads, correcting posture and reducing fatigue in the process.

The need to help workers lift more safely and with less effort has attracted so much attention that Strong Arm Technologies won the MassChallenge 2012 Accelerator $100,000 Diamond Prize. Refining the idea for the Strong Arm Ergoskeleton into a successful commercial product, however, involves a range of technical challenges. Overcoming these challenges required access to the latest product design, analysis, and design for manufacturability tools.

Strong Arm Technologies chose SOLIDWORKS® solutions to optimize the product's performance, implementing SOLIDWORKS design, SOLIDWORKS Simulation analysis, and SOLIDWORKS Plastics Professional injection-molding simulation software. The company chose SOLIDWORKS software because it's easy to use and offers the suite of integrated design and analysis tools that Strong Arm Technologies needs to refine and introduce its product.

"SOLIDWORKS software has enabled us to communicate effectively, whether with manufacturers, suppliers, or industrial design partners," Petterson says. "Having full-time access to SOLIDWORKS has allowed us to secure three patents, get the product ready for launch, and continue development of a pipeline of additional products."

ACCELERATING PRODUCT DEVELOPMENT

Using SOLIDWORKS solutions, Strong Arm Technologies has efficiently completed 22 iterations of the ergoskeleton. The V22™ has evolved to become a self-powered exoskeleton. The technology bolsters a worker's musculoskeletal system to make lifting more natural, safe, and powerful. The product is the first precision lifting ergoskeleton in the world. It establishes an entirely new category of safety equipment that enhances human performance.

"Our product demands precision," Petterson stresses. "With SOLIDWORKS, we were able to use rapid prototyping to build parts on a 3D printer to accelerate the prototyping iterations necessary to ensure fit and function for people of all shapes and sizes. This required examination of many combinations of materials and parts, and SOLIDWORKS made the process faster and easier.

"It's really beneficial to cost-effectively prototype parts to see how they look and function instead of producing injection-molded parts," Petterson adds. "In the end, SOLIDWORKS will have saved us a significant amount of money on development."

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— Sean Petterson, CEO

LIGHTER, STRONGER, MORE EFFECTIVE PRODUCT

Strong Arm Technologies has combined physical prototyping with SOLIDWORKS Simulation studies to make the product lighter, stronger, and more effective. "We used SOLIDWORKS Simulation to evaluate our static loading and to understand the bearing stresses on the product's many plastic parts," says Engineer Jordan Darling. "Combined with actual prototype studies, simulation has helped us optimize load distribution so that loads only hit specific, strategic areas of the torso.

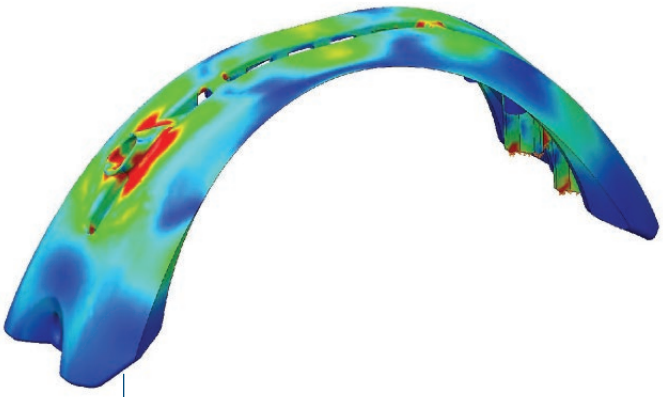
"This approach has enabled us to make the parts as light and streamlined as possible, yet still strong enough to function effectively," Darling notes.

OPTIMIZING DESIGN FOR MANUFACTURABILITY

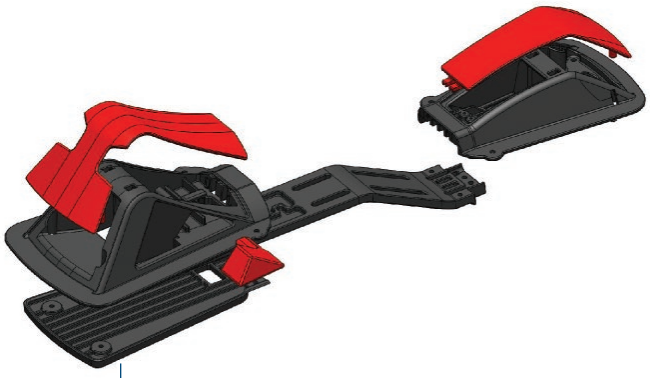
In addition to refining the product design in terms of performance, Strong Arm Technologies used SOLIDWORKS DFMXpress design for manufacturability and SOLIDWORKS Plastics Professional injection-molding analysis tools to further optimize the product for manufacturability.

"After optimizing the product's functionality, we need to do additional work to improve manufacturability and assembly," says Vice President of Engineering Michael Kim. "We need to ensure that we can cost-effectively produce and assemble the product's many parts without impacting performance. SOLIDWORKS analysis, design for manufacturability, and injection-molding tools let us affordably produce a high-performing product that will last.

"For example, SOLIDWORKS Plastics allows us to run our parts through a virtual injection-molding process, so we can spot potential draft angle or filling issues before investing in tooling," Kim continues. "With SOLIDWORKS design for manufacturability solutions, we will save time and money working with our manufacturing partners by streamlining the entire process."



Using SOLIDWORKS Simulation tools, Strong Arm Technologies conducted design performance studies that allowed the company to optimize load distribution, resulting in a lighter, stronger, and more effective product.



With SOLIDWORKS design for manufacturability solutions, Strong Arm Technologies was able to improve the manufacturability of parts for its ergoskeleton.

Focus on Strong Arm Technologies, Inc.
VAR: CADimensions, Inc., Rochester, NY, USA

Headquarters: 125 Tech Park Drive
Rochester, NY 14623
USA
Phone: +1 631 903 4965

For more information
www.strongarmtech.com

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Corporate Headquarters
Dassault Systèmes
10, rue Marcel Dassault
CS 40501
78946 Vélizy-Villacoublay Cedex
France

Americas
Dassault Systèmes SolidWorks Corporation
175 Wyman Street
Waltham, MA 02451 USA
Phone: 1 800 693 9000
Outside the US: +1 781 810 5011
Email: generalinfo@solidworks.com

Asia-Pacific
Dassault Systèmes K.K.
ThinkPark Tower
2-1-1 Osaki, Shinagawa-ku,
Tokyo 141-6020
Japan