SOLIDWORKS

eos Positively ingenious.

EOS ENERGY ENTERPRISES, INC.
EXPANDING LARGE BATTERY STORAGE PRODUCT LINE AND CAPACITY WITH SOLIDWORKS SOLUTIONS

Case Study

EOS relies on integrated SOLIDWORKS design, simulation, flow simulation, and product data management solutions to shorten design cycles for its next-generation battery storage systems, improve product performance, increase manufacturing throughput, and support and sustain rapid growth.

DASSAULT SYSTEMES

Challenge:

Develop a zinc-based battery technology for large, industrial-size electricity storage applications and expand its product line to increase storage capacity.

Solution:

Add SOLIDWORKS Simulation Premium for nonlinear static, nonlinear dynamic, and linear dynamic analysis; SOLIDWORKS Flow Simulation for CFD (computational fluid dynamics) analysis; and SOLIDWORKS PDM [Professional product data management] solutions to its existing SOLIDWORKS implementation.

Results:

- Cut multiyear development process to 12 months
- Optimized cooling system with simulation
- Obtained UL certification
- Set goal to increase manufacturing capacity by 50 percent

Eos Energy Enterprises, Inc. (NASDAQ: EosE) is accelerating the shift to clean energy with positively ingenious solutions that transform how the world stores power. The company's breakthrough Zynth™ aqueous zinc battery was designed to overcome the limitations of conventional lithium-ion technology. Safe, scalable, efficient, sustainable, and manufactured in the U.S., the Zynth battery represents the core of innovative Eos systems that today provide utility, industrial, and commercial customers with a proven, reliable energy storage alternative.

Founded in 2008 and headquartered in Edison, N.J, Eos Energy Enterprises manufactures its products at the old Westinghouse Electric factory in Pittsburgh, PA. Its energy storage technology was nearly a decade in the making, and the company introduced its first battery product in 2016. The Eos system uses proven chemistry with accessible non-precious-earth components in a durable design that's been tested in real-world deployments, delivering results in even the most extreme temperatures and conditions. Safe, long-lasting, and 100 percent recyclable, Eos storage systems feature 3 to twelve hours of discharge capability, immediate response time, modular construction, and the ability to be scaled and configured to reduce cost and maximize profitability in utility, commercial, industrial, and military market segments.

While the company completed R&D and launched its first product in 2016 using SOLIDWORKS® CAD design software, the firm's recent acquisition by and merger with B. Riley Principal Merger Corp., a special purpose acquisition company, and initial public offering of stock in November 2020, compelled the company to accelerate product development as a catalyst for growth. According to Senior Mechanical Engineer David Dubois, Eos product developers were challenged to both accelerate product development and improve product performance, which means they would need to shorten the company's multiyear product development cycle dramatically.

"We were challenged to move the product forward and speed up development, which required straightening out all of the drawings and files, redesigning the container that holds the 144 batteries that store power, and acquiring additional simulation and product data management [PDM] capabilities to support greater product development throughput," Dubois explains. "We added SOLIDWORKS Simulation Premium for nonlinear static, nonlinear dynamic, and linear dynamic analysis; SOLIDWORKS Flow Simulation for CFD [computational fluid dynamics] analysis; and are currently in the process of implementing the SOLIDWORKS PDM [Professional product data management] system, to provide us with integrated solutions to help us achieve our ambitious goals."

> "Accelerating product development to support growth is all about bringing in the right tools and people to use them. …
>
> We've improved the product, improved our processes, and improved our documentation using SOLIDWORKS solutions. If this market turns out to be as big as we think it will be, our business is primed for explosive growth."
>
> — David Dubois, Senior Mechanical Engineer

ACCELERATING BATTERY DEVELOPMENT

Since adding SOLIDWORKS Simulation solutions and beginning the SOLIDWORKS PDM implementation, Eos has cut its development cycle from years to months; increased product development throughput; improved the design and performance of its Gen 2.3 battery, with 60 percent higher output; and advanced development of its Gen 3 battery, which will increase container storage capacity by approximately 25 percent. "We've been able to really streamline development by using SOLIDWORKS in the right way, such as knowing when to use configurations and when not to use configurations, as well as leveraging mirroring, virtual patterns, sketch patterns, and linear patterns to save time," Dubois points out.

"We aim to get even faster product development throughput through the implementation of PDM and doing all of our production in Pittsburgh," Dubois adds. "We need to keep product development and manufacturing under better control to continue advancing our company and the technology. Early generations of our battery were contract-manufactured in New Jersey and China. With faster product development and preparations for building an automated factory, we are well on our way to achieving our goals."

OPTIMIZING COOLING SYSTEM WITH SIMULATION

In addition to utilizing SOLIDWORKS tools to accelerate development and increase capacity, Eos leveraged SOLIDWORKS Simulation Premium and SOLIDWORKS Flow Simulation to optimize the container and racks that hold the batteries inside the redesigned container, as well as to improve the efficiency of the storage system's cooling system, which cools the 144 batteries weighing 6,000 pounds inside the storage container. "We used SOLIDWORKS Flow Simulation to conduct thermal/flow studies to define the thermal dynamics of the incoming air and outgoing exhaust," Dubois recalls.

"The cooling system pushes a column of air from the bottom row to the top row and turns the air over several times each minute," Dubois explains. "Running a flow simulation revealed that the airflow was bypassing some of the batteries, so we made design changes to optimize airflow and were able to improve our thermal gradient by 2/3, which was a substantial improvement in performance."

MANAGING GROWTH IN PRODUCT DEVELOPMENT AND MANUFACTURING

With development of the Eos Gen 3 battery rapidly progressing and factory expansion plans to increase manufacturing capacity to 800 MWh, Eos is moving ahead with its SOLIDWORKS PDM implementation, utilizing three servers for its vault to serve product development, the factory, and field implementation personnel. "Accelerating product development to support growth is all about bringing in the right tools and people to use them," Dubois stresses.

"With SOLIDWORKS PDM, we're using CADlink to connect product design and engineering data with our Oracle NetSuite enterprise resource planning [ERP] system to realize additional productivity gains. This will help us obtain quality certifications, like the safety certification that we just got from UL. Our next step will be to bring in SOLIDWORKS Electrical products, beginning with SOLIDWORKS Electrical Schematic Professional, so that we can generate electrical BOMs [bills of materials] and acquire long-lead items more quickly, and avoid production delays. We've improved the product, improved our processes, and improved our documentation using SOLIDWORKS solutions. If this market turns out to be as big as we think it will be, our business is primed for explosive growth."

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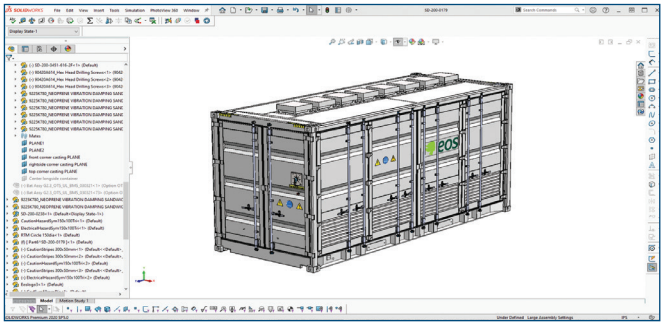

Having realized extensive benefits from using SOLIDWORKS solutions to achieve its product development goals, Eos is planning on adding SOLIDWORKS Electrical solutions following implementation of SOLIDWORKS PDM to realize additional productivity gains.

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