AM BATTERIES

INNOVATING DRY-ELECTRODE MANUFACTURING FOR EV AND OTHER BATTERIES WITH **3D**EXPERIENCE SOLIDWORKS AND EXPANDED PORTFOLIO SOLUTIONS

Case Study

Using **3D**EXPERIENCE SOLIDWORKS and expanded portfolio solutions, AM Batteries is innovating a dry coating method for making Li-ion battery electrodes that is safer, less costly, and less environmentally harmful than the dry coating solvent-based slurry-coating methods that are currently used to make Li-ion battery electrodes, including those that are used on EVs.

Challenge:

Accelerate development, commercialization, and manufacturing of a new dry-electrode manufacturing technology for lithium-ion EV batteries that is safer, less costly, and less environmentally harmful.

Solution:

Replace Autodesk Inventor tools with **3D**EXPERIENCE SOLIDWORKS design and the expanded porfolio of data management, collaboration, communication, and manufacturing solutions.

Results:

- Automated ECR and ECO processes, reducing engineering response time by 50 percent
- Streamlined drawing review process for new electrode manufacturing equipment
- Enabled rapid sharing and iteration of designs, improving engineering collaboration
- Allowed for easy mass distribution of updates to templates and notes, saving time creating parts and drawings

Recognized in *TIME* magazine's list of the Best Inventions of 2024, AM Batteries is the leader in dry battery-electrode (DBE) manufacturing technology for lithium-ion (Li-ion) batteries for electric vehicles, large-scale grid energy storage solutions, and consumer electronics. The technology — known as the Powder to Electrode™ dry coating method — is safer, less costly, and less environmentally harmful than the traditional solvent-based slurry-coating methods that are currently used to make EV battery electrodes. Once commercialized, this innovative technology will greatly contribute to advancing sustainable, high-performance battery manufacturing and cultivate a robust ecosystem around its dry coating technology. This commitment extends to transforming the manufacturing processes and enhancing the performance of Li-ion batteries to make them more affordable for consumers by replacing more costly electrode production.

"Before we moved to data management on the 3DEXPERIENCE platform in the cloud, it was difficult to know the state of a product or what additional metadata might be associated with a part. ... The really great thing about 3DEXPERIENCE SOLIDWORKS [and the Expanded Portfolio of solutions] is that it's not just a CAD tool but also a PDM [product data management] tool."

– Joel Hauerwas
Mechanical Engineer II and CAD Administrator

The AM Batteries process sprays dry active material directly onto current collectors to form a battery electrode. This eliminates the need for toxic solvents and energy-intensive dryers that are currently used to evaporate the solvents from the finished electrodes. As a turnkey equipment supplier, AM Batteries enables battery manufacturers to produce batteries that are both cleaner and cheaper while eliminating toxic solvents. Because AM Batteries technology eliminates solvent recovery and electrode drying, it can reduce the factory footprint of a battery plant by five times and cut energy costs by 75 percent. When considering just electrode manufacturing, the savings can reach 75 percent. Additionally, it reduces capital expenditures by up to 40 percent and operating expenses by more than 50 percent.

Founded in 2020 and based in Billerica, Massachusetts, AM Batteries utilized Autodesk® Inventor® design tools until 2024, when the company's need for automation — during both development and manufacturing — prompted the equipment supplier to evaluate better solutions to support commercialization, according to Joel Hauerwas, mechanical engineer II and CAD administrator. "The company had reached a stage at which we needed to improve our data management, development, and release processes to take advantage of more automation," Hauerwas recalls.

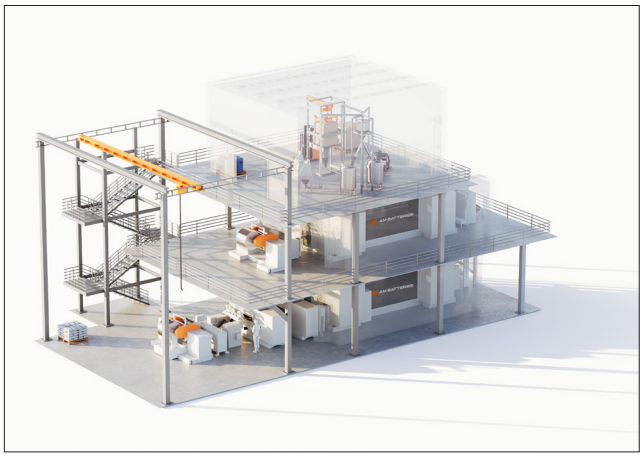
"Product design data was being managed in the Inventor vault, which offered little to no automation," Hauerwas continues. "Revision tracking was difficult, and the drawings and product release processes were messy. In advance of commercialization of our technology, we needed to improve data management and automate our release processes to support manufacturing."

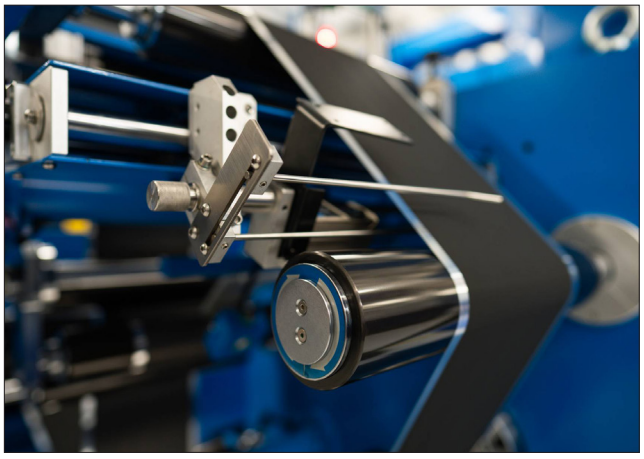
In 2024, AM Batteries management decided to replace its Inventor tools and vault with **3D**EXPERIENCE® SOLIDWORKS® design and the Expanded Portfolio of data management, collaboration, communication, and manufacturing solutions. The company chose SOLIDWORKS solutions to improve scalability, data management, product release cycles, part numbering management, and data searching capabilities and especially valued the fact that the solutions are all cloud-based, operating on the **3D**EXPERIENCE platform. AM Batteries worked with SOLIDWORKS reseller GoEngineer to transfer the 15 GB of product design data in its Inventor vault to the cloud-based platform using third-party Elysium® software.

MOVING DATA MANAGEMENT TO THE CLOUD

By using **3D**EXPERIENCE SOLIDWORKS and the Expanded Portfolio of solutions to move data management to the cloud on the **3D**EXPERIENCE platform, AM Batteries has resolved many of the impediments to automating its processes. "Before we moved to data management on the **3D**EXPERIENCE platform in the cloud, it was difficult to know the state of a product or what additional metadata might be associated with a part," Hauerwas points out.

"There are also processes that we need to automate — such as engineering change order (ECO), design release, and drawings release processes — that were difficult to set up with Inventor," Hauerwas adds. "The really great thing about **3D**EXPERIENCE SOLIDWORKS [and the Expanded Portfolio of solutions] is that it's not just a CAD tool but also a PDM [product data management] tool."





With cloud-enabled data management on the **3D**EXPERIENCE platform, AM Batteries has been able to standardize the design processes and templates used to develop its innovative Powder to Electrode dry coating technology, accelerating commercialization in the process.

STANDARDIZING PROCESSES AND TEMPLATES

In addition to improving data management scalability in the cloud, the move to **3D**EXPERIENCE SOLIDWORKS and the Expanded Portfolio of solutions has enabled AM Batteries to standardize its part, drawing, and assembly templates, as well as the development and release processes that they support. "Prior to moving to **3D**EXPERIENCE SOLIDWORKS [and the Expanded Portfolio of solutions], everyone pretty much did their own thing in terms of the templates that they used," Hauerwas notes.

"Now, templates are automated and standardized, so everyone's using the same shared templates that are linked to the **3D**EXPERIENCE platform," Hauerwas says. "Just this step has had the effect of improving our revision control, data search, and ECO processing capabilities, as well as managing other types of data, such as safety and operating manuals."

ACCELERATING COMMERCIALIZATION

Using **3D**EXPERIENCE SOLIDWORKS and the Expanded Portfolio of solutions in the cloud has supported AM Batteries' acceleration toward commercialization. "On the development side, colleagues now have a much cleaner understanding of what our release processes look like, and product developers are able to move things along much more quickly," Hauerwas stresses.

"On the manufacturing side, we've acquired tools like Manufacturing Definition Creator and Shop Floor Programmer that will help us ramp up for production once development is complete," Hauerwas says.

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VAR: GoEngineer, Lowell, MA, USA

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