

Nuvera Fuel Cells, Inc.

ENERGIZING FUEL CELL AND HYDROGEN GENERATION DEVELOPMENT WITH SOLIDWORKS



With SolidWorks, Nuvera Fuel Cells is developing cutting-edge hydrogen generators, such as the PowerTap™ Hydrogen Generator shown here.

CHALLENGE:

Develop cutting-edge fuel cell and hydrogen generation systems for commercial applications quickly and affordably.

SOLUTION:

Implement SolidWorks 3D design and simulation solutions for product development.

RESULTS:

- Shortened design cycles by 25 percent
- Cut development costs by 33 percent
- Reduced costs related to scrap and rework by 20 percent
- Grabbed significant share of forklift truck fuel cell market

Hydrogen is the most abundant element in the universe, and Nuvera Fuel Cells, Inc., is working to make it the clean, safe, and efficient energy source of tomorrow. As a global leader in the development of fuel cell systems and processors, the company is on the forefront of research and development – with active commercial applications – toward tapping the incredible potential of hydrogen power.

Although automotive and transportation applications remain the ultimate goal for fuel cells, Nuvera's pioneering work in the deployment of fuel cell and hydrogen generation systems for industrial vehicles and equipment is laying the groundwork for clean, efficient hydrogen-powered cars. To accelerate the development of systems that power and fuel forklift trucks at warehouses and distribution centers, Nuvera needed to utilize the most productive 3D design and simulation tools available, according to Anthony Macaluso, manager of Product Design.

"Nuvera is on the cutting edge of a new industry. We must bring products to market and grab market share while R&D continues, because that market presence will give us a tremendous advantage in the long run," Macaluso stresses. "To support our ambitious product development effort, we need a platform that helps us to design, validate, and manufacture innovative products quickly and cost-effectively."

The company chose the SolidWorks® 3D design system, acquiring 15 licenses of SolidWorks Professional, two seats of SolidWorks Premium, and a copy of SolidWorks Flow Simulation software. Nuvera chose SolidWorks because it is easy to use and reasonably priced, and provides the range of integrated design and simulation capabilities that the company needs to successfully develop its products.

"From large assembly, mold, and sheet-metal design to vibration, stress, and fluid flow simulation, SolidWorks gives us the tools we need to make hydrogen fuel cells an attractive, economically viable source of energy," Macaluso says. "Many of our people already knew how to use SolidWorks when they came on board. With its unique combination of ease-of-use and power, SolidWorks has proven to be the most productive platform for our operations."

“With SolidWorks, we are saving time and controlling costs at practically every step of the development process, from component design to system assembly.”

Anthony Macaluso
Manager of Product Design



Using SolidWorks Simulation, Nuvera Fuel Cells can simulate the physics during the water-gas conversion process and optimize performance of both fuel cell and hydrogen generation systems.

Compressing design cycles, cutting costs

Since implementing SolidWorks software, Nuvera Fuel Cells not only has released its PowerEdge™ hybrid fuel cell system – which replaces standard lead acid batteries in forklift trucks – and its PowerTap™ Hydrogen Generator – which generates hydrogen on-site using water and natural gas – but also has saved time and money in the process. Macaluso says that Nuvera has shortened its design cycles by 25 percent, cut development costs by 33 percent, and reduced expenses related to scrap and rework by 20 percent.

“With SolidWorks, we are saving time and controlling costs at practically every step of the development process, from component design to system assembly,” notes Macaluso. “At this point, we cannot imagine doing the type of design and engineering work we do without SolidWorks.”

Producing design innovations via simulation

One of the SolidWorks applications that Nuvera has heavily relied on to fast-track its fuel cell and hydrogen generation systems is SolidWorks Simulation, which the company’s design engineers use to simulate and optimize system performance. In addition to stress and vibration analysis, designers conduct preliminary flow analyses of water and gas flows using SolidWorks Flow Simulation.

“The water-gas conversion process represents the crux of our technology,” Macaluso explains. “Making that conversion as efficient as possible – whether it is within the fuel cell stack or our hydrogen generator – is our primary challenge. With SolidWorks Simulation software, our designers are able to simulate the physics at work during component and system design, which results in product innovations that are more fully developed when final validation occurs.”

Working better with partners and customers

Standardizing on SolidWorks has also enhanced Nuvera Fuel Cells’ ability to collaborate, interact, and communicate with vendors, partners, and customers. Because many of the company’s vendors use SolidWorks, engineers can use native SolidWorks files to work more efficiently and cost-effectively. “We outsource some of our manufacturing, and most of the machine shops and fabricators use SolidWorks, which cuts down on our costs and lead times.

“When we are working with a customer or the integrator that fabricates our large assemblies and do not want to send the entire model, we use eDrawings® files,” Macaluso points out. “We also use PhotoWorks™ software to create photorealistic renderings that we can show to a customer or use as a sales tool with prospective customers.”



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