

# ARCIMOTO

INNOVATING A NEW ELECTRIC, FUN UTILITY VEHICLE (FUV)  
CATEGORY WITH SOLIDWORKS SOLUTIONS



Arcimoto relied on SOLIDWORKS mechanical design, electrical design, simulation, and product data management (PDM) solutions to innovate its electric three-wheeled FUV, the first electric fun utility vehicle.

### Challenge:

Streamline the development and production of electric-powered vehicles that break new ground in terms of efficiency, drivability, and performance.

### Solution:

Implement SOLIDWORKS Professional mechanical design, SOLIDWORKS Premium mechanical design and analysis, SOLIDWORKS Electrical Schematics Professional electrical design, SOLIDWORKS Electrical 3D electrical design, and SOLIDWORKS PDM Standard product data management software solutions.

### Results:

- Brought first fun utility vehicle (FUV) to market
- Cut vehicle weight by nearly 40 percent
- Innovated multibody sheet metal vehicle chassis
- Improved manufacturability of vehicle chassis and components

Founded in 2007 to catalyze a shift to a more sustainable transportation system, Arcimoto, Inc. (NASDAQ: FUV), has devised new technologies and patterns of mobility that together raise the bar for environmental efficiency, footprint size, and price affordability in electric vehicle design. The word means “future I drive,” and the company has broken new ground in the transportation industry by establishing the fun utility vehicle (FUV) category for electric vehicles, following the introduction of Arcimoto’s first electric three-wheeled FUV, which is currently available for preorder with a target purchase price of \$11,900.

Over the past decade, Arcimoto has focused R&D efforts at its Eugene, Ore., headquarters and manufacturing facility on creating the most affordable and performance-packed electric vehicle suitable for the daily driver. “Early concept development was done by hand in a low-tech shop, and with limited design software. However, it was soon evident that a competitive, mass producible product would require the use of advanced engineering tools for design and analysis,” says Mechanical Engineer/PDM Administrator Diana Standish.

“The company operated without an official CAD system until 2011,” Standish explains. “While that effort certainly advanced the early-generation concepts, it was difficult and time-consuming to work that way, especially as the design team grew. We needed a CAD system to support visualization and simulation in lieu of heavy prototyping, and to help us streamline the development process ahead of manufacturing our first products.”



“With SOLIDWORKS, we can create and combine sheet metal parts of different thicknesses and control each bend radius from the central part. This eliminates the need to deal with a messy assembly, in which a face change would blow up 200 mates. SOLIDWORKS allows us to have multiple sheet metal parts combined in a single part, which is making design changes faster and easier, as well as improving manufacturability.”

— Diana Standish,  
Mechanical Engineer/PDM Administrator

Although Arcimoto initially tried to design products using the Rhino® surfacing package, the company soon realized that it needed a 3D solid modeling system with integrated mechanical design, electrical design, and engineering solutions. “Arcimoto chose the SOLIDWORKS® design platform because it’s easy to use, includes robust sheet metal and weldment design capabilities, and provides access to a complete set of integrated solutions, such as analysis, product data management [PDM], and electrical design tools,” Standish says.

Following the SOLIDWORKS Professional implementation, Autodesk offered Arcimoto its Inventor® 3D design and Vault® PDM systems free of charge for a limited period of time. “After trying Autodesk tools for a few months, our engineers were virtually unanimous in wanting to remain with SOLIDWORKS because of the progress we made using SOLIDWORKS,” Standish recalls. “We have since added SOLIDWORKS Premium design and analysis software, as well as SOLIDWORKS Electrical Schematics Professional electrical design, SOLIDWORKS Electrical 3D electrical design, and SOLIDWORKS PDM Standard product data management software. More than 98 percent of our first product was designed with SOLIDWORKS.”



## MULTI-BODY SHEET-METAL TOOLS SAVE TIME, IMPROVE PERFORMANCE

Using SOLIDWORKS, Arcimoto has not only streamlined its development processes but has also improved the manufacturability of components. For example, the need to minimize weight while maximizing strength and stiffness led the company to use multi-body sheet-metal parts and weldments to create the chassis for its FUV vehicle.

“SOLIDWORKS sheet metal and weldment design tools let us utilize multibody sheet metal parts to create the vehicle chassis,” Standish notes. “With SOLIDWORKS, we can create and combine sheet metal parts of different thicknesses and control each bend radius from the central part. This eliminates the need to deal with a messy assembly, in which a face change would blow up 200 mates. SOLIDWORKS allows us to have multiple sheet metal parts combined in a single part, which is making design changes faster and easier, as well as improving manufacturability.”

## SHEDDING WEIGHT, REDUCING PROTOTYPING

Arcimoto’s decision to redesign its vehicle chassis using multibody sheet-metal parts, and its designers’ use of SOLIDWORKS sheet metal modeling capabilities to thoroughly redesign the chassis, allowed the company to reduce the weight of its design by roughly 40 percent compared to early generations of the design.

“Reducing weight is an overarching objective, and SOLIDWORKS tools have helped us reduce the weight of earlier vehicle generations from 1,800 pounds to 1,100 pounds,” Standish says.

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### For more information

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With the addition of SOLIDWORKS Premium software, Arcimoto is hoping to leverage simulation tools during design to minimize prototyping cycles for future models while simultaneously improving performance.

## POWER OF INTEGRATED TOOLS, INCLUDING PDM

The key to streamlining development at Arcimoto has involved the integration of mechanical design, electrical design, engineering, and PDM solutions. “When facing brutal deadlines—when everyone is busy and pushing forward—having integrated tools is vital, especially with PDM,” Standish stresses. “One of the reasons that we stayed with SOLIDWORKS was the efficiency and reliability of SOLIDWORKS PDM to capture all of the changes that we make as we resolve issues and refine the design.

“We added SOLIDWORKS Electrical 3D so that we can incorporate wiring harnesses into our designs,” Standish continues. “In short, we’d rather pay for the SOLIDWORKS suite because it is fully compatible with all of the solutions working together, and doesn’t erect roadblocks that have to be overcome, which has become increasingly important as we ramp up for mass production.”



Arcimoto leveraged SOLIDWORKS Premium sheet metal design tools to create a multibody sheet metal chassis for its FUV, helping the vehicle manufacturer achieve its ambitious strength, stiffness, and weight-reduction goals.

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