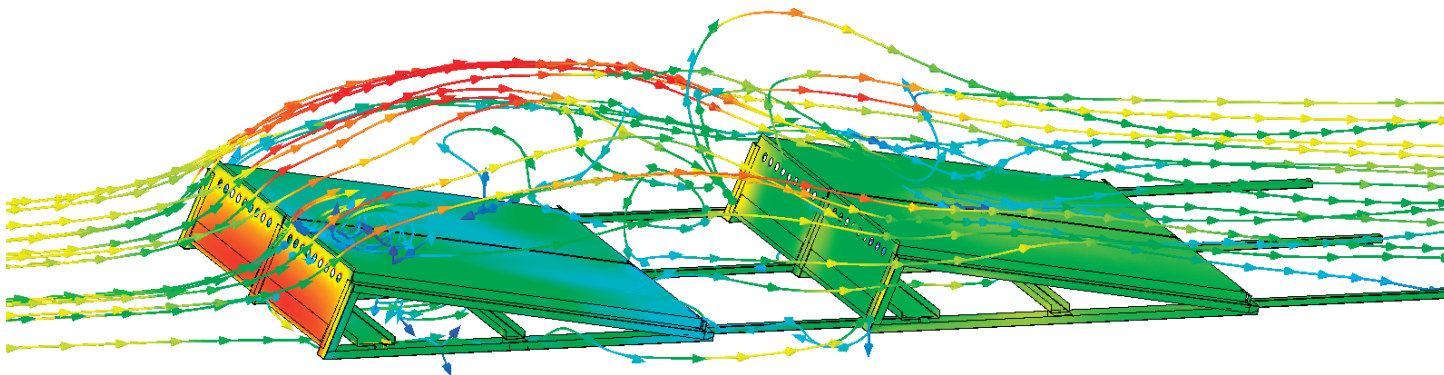# SUNEDISON LLC

Generating clean, low-cost solar power worldwide with SolidWorks

Using SolidWorks solutions, SunEdison created a mount design that dramatically reduced the cost to install solar panels, making this clean, efficient power source available to greater numbers of retail customers.

Transforming the Sun's rays into clean, renewable electricity certainly makes sense, especially if solar power is cheaper than conventional power. For many businesses, the impact of energy costs on the bottom line is the most important factor in determining whether to replace traditional, fossil fuel-based energy with electricity produced from the Sun.

By making solar power less costly, SunEdison LLC is delivering this important renewable resource to commercial and governmental customers. An MEMC company, SunEdison provides power to retail stores, such as Kohl's and Staples; governmental institutions; utilities; and real estate investment trusts via solar panels mounted on roofs or the ground.

The company installs rooftop solar systems and then sells the electricity generated to the host customer at a fraction of the cost of conventionally produced power. According to Senior Product Design Manager Eric Wallgren, a key element in making this model successful is lowering the cost of solar power through the development of more innovative and effective ways to mount rooftop panels.

"Using the photovoltaic panel-racking systems that were commercially available back in 2007, we were looking at mounting-structure costs in excess of 50 cents per watt," Wallgren explains. "We needed to cut those costs substantially and believed we could drive down our costs by developing our own rack-mounting system."

The first step was selecting the right development package. SunEdison chose SolidWorks® Premium design and analysis and SolidWorks Flow Simulation computational fluid dynamics (CFD) analysis software because they are easy to use, support an iterative approach, provide eDrawings® design communications capabilities, and include integrated structural and fluid dynamics analysis software. The company also values the software's sheet-metal design capabilities.

Challenge:

Lower solar power mounting-structure costs through the development of a more cost-efficient solar panel rack-mounting system for retail store applications.

Solution:

Implement SolidWorks Premium 3D design and analysis and SolidWorks Flow Simulation software to create, prototype, and build a more innovative and effective solar power rack-mount design.

Results:

- Cut solar panel mounting-structure costs by 80 percent
- Realized 75 percent reduction in development cycle
- Decreased wind tunnel expenses
- Improved design communications

_DS_ SOLIDWORKS

"Having done a good bit of multidisciplinary product design in the past, I knew that SolidWorks was the best package for the job," Wallgren recalls. "We need to do mechanical design, work with sheet metal, and manage wind and structural loads. We thought SolidWorks was particularly well suited for our requirements."

The Eureka moment

After installing SolidWorks, Wallgren and his design team faced the challenge of building a better racking system. The team was exploring different materials—hoping to cut costs by using something other than aluminum extrusions—when Wallgren noticed that the building contractors who were expanding the company's offices were using structural steel studs.

"I picked up a scrap of the steel wall framing stud that the contractor was using, and a light bulb went on in my head. So I made a rough prototype," Wallgren recounts. "I immediately began working in SolidWorks to learn how we could leverage the inherent strength of the material to build a less expensive yet more effective mounting system out of roll-formed stock steel."

Once the design was ready to be prototyped, research led to the use of Galvalume coated steel. "Galvalume is used to make standing steel roofs that last 40 years or more. The material is available in light gauge and fabricated into U channels," Wallgren adds.

Cheaper, cleaner energy

Using SolidWorks software to iterate and validate the new Delta Rack solar panel rack-mounting concept, SunEdison not only created a better, more efficient way to mount solar panels on building roofs, but also dramatically drove down its mounting-structure costs—from 50 cents to 10 cents per watt.

"An 80 percent, bottom-line cost reduction is significant," Wallgren stresses. "The beauty of using SolidWorks to develop the Delta Rack is that we were able to achieve this kind of a breakthrough while reducing our development cycle by at least 75 percent. With SolidWorks, it's fast and easy to extrapolate flat patterns from modeled sheetmetal parts. We can flatten a part and fold it up, then make a change and go back and forth until we get it right. That was an enormous benefit in enabling us to produce this design so quickly."

Simulation saves time and money

In addition to using SolidWorks modeling tools to develop the Delta Rack, SunEdison utilized structural analysis tools in the SolidWorks Premium package and SolidWorks Flow Simulation CFD software to simulate and validate system performance.

"SolidWorks makes it easy to extract volume and density of materials data so that we understand the center of gravity, effort, and mass for a part," Wallgren notes. "That information is really helpful, but the ability to simulate the effect of structural and wind loads is even more powerful because it shortens the time that we need to spend testing in a wind tunnel, which is very expensive."

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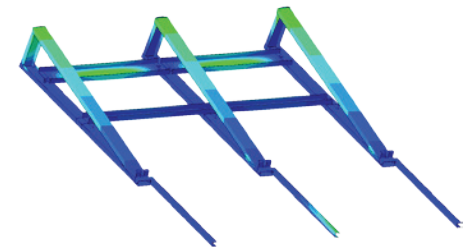
With SolidWorks simulation tools, SunEdison studied the effects of structural and wind loads, validating system performance quickly and cost-effectively.