

ADES

Solar energy pioneer glides into wind power with SolidWorks software



Using SolidWorks software, ADES brought its innovative pendular wind turbine to market in half the time of previous projects.

Just as the angle and intensity of the sun's rays change throughout the day, wind direction and speed can vary greatly. Most wind turbines are stationary and constructed to face in the direction of the prevailing winds. However, the ability to adjust the perspective of turbine blades to catch the wind and compensate for sudden changes in wind speed is an innovation that can extend the lifespan and boost the efficiency of wind-based generating systems.

As a pioneer in solar power, ADES (Aplicaciones De Energías Sustitutivas) set out to apply the same concept that has made its industry-leading solar-tracking systems so successful to the wind power market. Like a flower chasing the sun, the company's solar panels include autonomous tracking systems that slowly move the panel so that it remains directly aligned with the sun's rays throughout the day. ADES engineers believed that they could apply the same approach to wind turbines not only to improve the quality of power output, but also to make them last longer.

The company had used AutoCAD® and Solid Edge® design tools until 2007, when management decided to reassess ADES' design solution in anticipation of an expanded product offering, according to Fabian Riveros, technical office director. "Our entry into the wind turbine market compelled us to look at upgrading our development environment to improve our efficiency," Riveros recalls. "We needed a single platform within which we could do all of our design work, including simulation. That way, we could quickly bring breakthrough products in wind turbine design to market."

After evaluating all of the leading 3D design packages, ADES chose SolidWorks® Premium, SolidWorks Simulation Premium, and SolidWorks Flow Simulation software because the integrated solution satisfied all of the company's design requirements and provided structural and CFD (computational flow dynamics) analysis tools at an affordable price.

Challenge:

Extend the company's expertise in the development of innovative solar-tracking products into the wind power market.

Solution:

Utilize integrated SolidWorks design and simulation solutions to reduce design cycles, minimize waste, and accelerate time-to-market.

Results:

- Cut design cycle by 25 percent
- Shortened time-to-market by 50 percent
- Reduced scrap/rework costs by 33 percent
- Created a revolutionary wind turbine design

"We particularly value the SolidWorks Simulation capabilities because we can easily analyze our designs without changing formats or modifying drawings, as we did in the past," Riveros notes. "The integration between applications provides the speed and versatility we need to create innovative products, while achieving our productivity goals."

A revolutionary wind turbine design

After initially learning to use SolidWorks to design a solar tracker, ADES engineers utilized the software to create the company's revolutionary pendular wind turbine. With conventional wind turbine designs, the lack of evenness in intensity and direction, as well as the continuity in wind, can damage both turbines and the electric system to which they are connected.

The unique ADES pendular wind turbine employs a downwind construction shape that automatically orients itself toward the wind by means of three passive mechanical systems: a swiveling single-blade rotor, a pendulum power train, and a self-steering nacelle. The design compensates, accumulates, and reinstates wind speed variations, preventing them from affecting the evenness of generator rotation and subsequently diminishing structural overload and power peaks caused by wind gusts. With lower stress loads, the turbine tower has a longer lifespan and requires fewer materials in its construction, thereby lowering the cost.

"The project took just six months with a team of six people," Riveros stresses. "Simulation was the key to helping us create this product so quickly and shorten our design cycle by 25 percent."

Versatility shortens time-to-market

In September 2009, ADES debuted its 100 kW and 250 kW turbines at the Wind Power Expo Fair in Saragossa, Spain, with 1000 kW and 1600 kW turbine models to follow. Riveros asserts that the versatility of SolidWorks software enabled the company to shorten by 50 percent the time it took to bring this revolutionary product to market.

"Because of the benefits SolidWorks provides in terms of design speed, we are more competitive," Riveros points out. "It allows us to come up with fast solutions and provides realistic views and animations of our design projects."

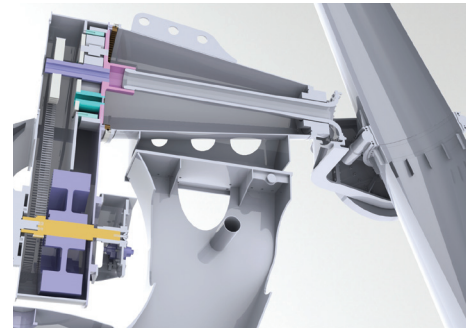
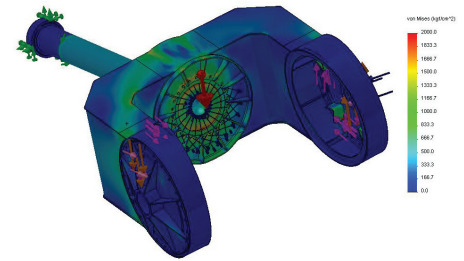
Fewer errors minimize waste

In addition to helping ADES bring innovative products to market more quickly, SolidWorks has allowed the company's designers to curb scrap/rework costs by at least a third. Since implementing SolidWorks solutions, ADES has minimized waste and unnecessary costs by substantially reducing the number of design errors.

"With robust tools such as interference detection and sheet-metal design, we simply have fewer surprises," Riveros explains. "We can also communicate more effectively with customers and suppliers using eDrawings® files, which help to eliminate potential errors or misunderstandings."

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Fabian Riveros
Technical Office Director



With SolidWorks Simulation software, ADES accurately predicted that its pendular wind turbine design would lower stress loads, extending a turbine tower's lifespan and lowering construction costs.



ADES
C/ La Sabina Nº13
50171 Poligono Malpica-Alfinden
(ZARAGOZA) SPAIN
Phone: +34 976 57 11 93
www.ades.tv
VAR: Konotec, Barcelona,
SPAIN



Dassault Systèmes
SolidWorks Corp.
300 Baker Avenue
Concord, MA 01742 USA
Phone: 1 800 693 9000
Outside the US: +1 978 371 5011
Email: info@solidworks.com
www.solidworks.com

