



CASE STUDY /

Designing the World's First Structural Composite Solar Module Mounting System Requires Complete Simulation of Failure Mechanisms and Load Capabilities — Tessolar Inc.

“At Tessolar, we design and build molded structural mounting systems for solar arrays that are subject to variable loads from wind or snow. By leveraging Ansys’ finite element analysis capabilities, we are able to rapidly and accurately assess design options, allowing us to more cost effectively iterate and improve design in a timely manner.”

Yang Jin

Lead Design Analyst / Tessolar Inc.

Solar is one of the most rapidly growing sectors within the renewable energy industry. Cost pressures from competitive energy sources have led to major advances in solar panel efficiency and price declines in solar modules over the past decade. As a result, solar hardware innovation, including hardware and soft costs reduction (e.g., labor, supply chain and other overhead expenditures), has become more important in controlling total system cost.

/ Technology Used

- Ansys Mechanical
- Ansys Workbench
- Ansys HPC
- Ansys Discovery Live
- Ansys Cloud (evaluating)

/ Business Challenges

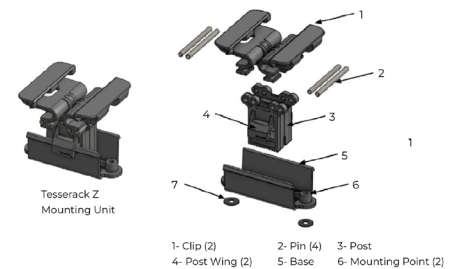
- Improve solar mounting systems by reducing parts, lowering overall costs and simplifying installation while maintaining structural integrity.
- Understand failure mechanisms and load bearing capabilities of part design under various wind and snow loading conditions.
- Understand interaction between solar array rows under wind loads.
- Simulate potential changes in materials properties due to UV exposure, temperature and moisture across 25-year lifespan.

/ Engineering Solution

- Preliminary designs were evaluated based on FEA simulation assumptions of material properties, boundary conditions and applied forces.
- An initial design was chosen for rapid prototyping, then subjected to simulated and full system test loading conditions.
- Part behaviors and test-to-failure conditions were observed and simulation assumptions were reevaluated to improve predictive value.
- Iterative prototypes are then produced until design load requirements are met.

/ Benefits

- Ansys simulations have reduced the cycle time between iterative designs and, more significantly, reduced the number of design and test cycles to arrive at a part that meets application requirements.
- Simulation has improved the starting point for alternative and second-generation designs.
- Engineers have gained a better understanding of failure modes and can now predict design options most likely to improve product performance.



Components and assembly unit of Tesseract™ Z.



Indian commercial rooftop solar project installation using Tesseract™ Z. This picture shows that mounting hardware is installed in place for this solar panel row.



Indian commercial rooftop solar project installation using Tesseract™ Z. This picture shows the final look of solar panels and mounting hardware installed on the roof.

/ Company Description

Tessolar Inc. is a rapidly growing product design and manufacturing company focused on reducing the cost of photovoltaic energy systems through innovative hardware design. The company has developed a suite of solar module mounting hardware that is significantly simpler than conventional mounting hardware. Tesserack™ polymer composite mounting hardware enables much faster installations, leading to significant reductions in overall system cost.

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