Case Study : Solar Systems Pty Ltd

Using LEAP for a Total Computer Aided Engineering Solution

Solar Systems Pty Ltd design and supply large-scale solar concentrators units for electricity generation throughout areas where grid distributed power is impractical or uneconomical. Their 20 kW Mark II system focuses solar radiation from the 12m diameter reflector onto the solar cell receiver where it is then converted to electricity.

The reflector dish is itself made up of over 100 individual mirrors. For their next generation concentrator, Solar Systems wanted to increase the size of these mirrors in order to increase the energy output of the system. The trade-off was that an increased mirror size meant extra weight and more importantly, increased wind loads. Using hand-calculations and truss analysis programs was promising to be a tedious and conservative method of achieving this design change.

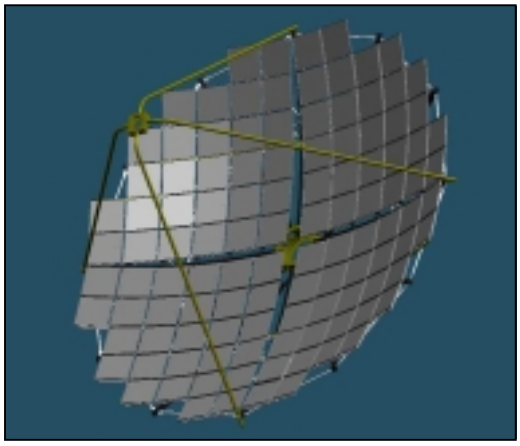
Updated approach to design

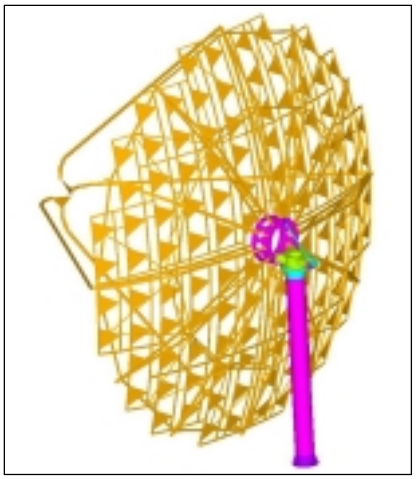
Changes to the mirror size would result in increased loads on the mirror support structure, drive system and mast structure. Solar Systems were looking for a method of efficiently and accurately assessing the impact of their design change - and changes further down the road.

They wanted more than a confirmation of the structural integrity of the unit. They saw Finite Element Analysis and 3D solid modeling as having longer term benefits for their operation. As a result of this, they were looking for not only FEA consulting but software, suitable hardware, technical support, training and solid modeling assistance.

LEAP provides a Total Solution

Solar Systems engaged LEAP Australia to help them achieve these goals for the concentrator design. LEAP were able to offer analysis assistance from the provision of ANSYS and Design Space software and training through to expert consulting. Solar took advantage of the same depth of service when it came to switching from 2D to 3D CAD - installing seats of Solid Edge, getting training and support and using LEAP to provide full manufacturing standard drawings for the mirror system. In a little under 4 months, LEAP assisted Solar in switching to 3D modeling, analysing an entire concentrator and providing manufacturing standard drawings for the whole assembly.





Leading Software and Hardware

Before commencing work, Solar Systems needed to put the tools in place. Starting effectively from scratch in terms of FEA and solid modeling, they needed the right software, hardware and training support. Any two without the other one would be useless. LEAP provided Solar Systems with:

- Design Space - a powerful "first check" FEA package that is highly associative with 3D CAD and enables designers to analyse the performance of models early in the design process.
- ANSYS/Mechanical - an extensive all-purpose FEA package for detailed structural, modal and contact analysis and more.
- Solid Edge - a high-performance mid-range 3D CAD modeler for mechanical assembly design and drafting.

Introductory Training and Technical Support

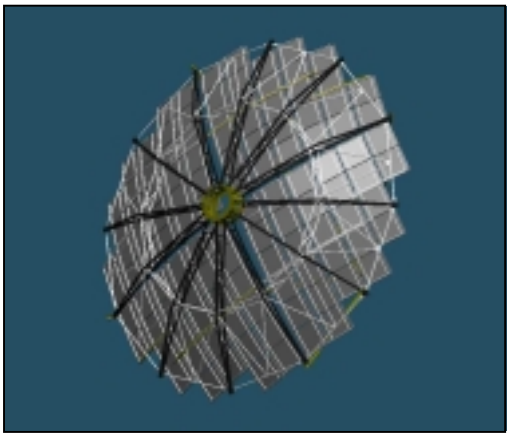
LEAP trained Solar Systems engineers and designers to the level of working unassisted with completely new packages very soon after installation. On-going Technical Support was also provided (and is offered to all software purchases through LEAP).

Analysis, Modeling and Advice

What Solar Systems was attempting to do would have been a challenge for an experienced FEA department. Work proceeded in a number of stages. Initial benchmarking of FEA results with existing Solar data required a complete "first-pass" drive system assembly analysis. Solid Edge was used to create, orientate and import solid-models directly into Design Space.

Solar Systems was then free to optimise components of the drive leaving LEAP to analyse the full system for all critical wind, self-weight and frequency load cases. Models included mirrors, mirror trusses, support structures, the drive system and the mast. The various stages of the modeling incorporated shell, beam and solid elements, contact surfaces, load extraction and superposition and sub-modeling of critical areas such as welded truss joints. Different model orientations were also handled by direct associativity between the CAD and FEA packages.

Once thorough analysis had given the green light to the new design, LEAP used Solid Edge to create a full model of the mirror assembly - down to the last nut and bolt. This was used to create manufacturing drawings and was passed on to Solar for their own further use.



LEAP helped Solar Systems achieve their design goal by providing a Total Computer Aided Engineering Solution. Not just limited to provision of software or consulting, LEAP has enabled Solar Systems to use CAE for themselves in the future.