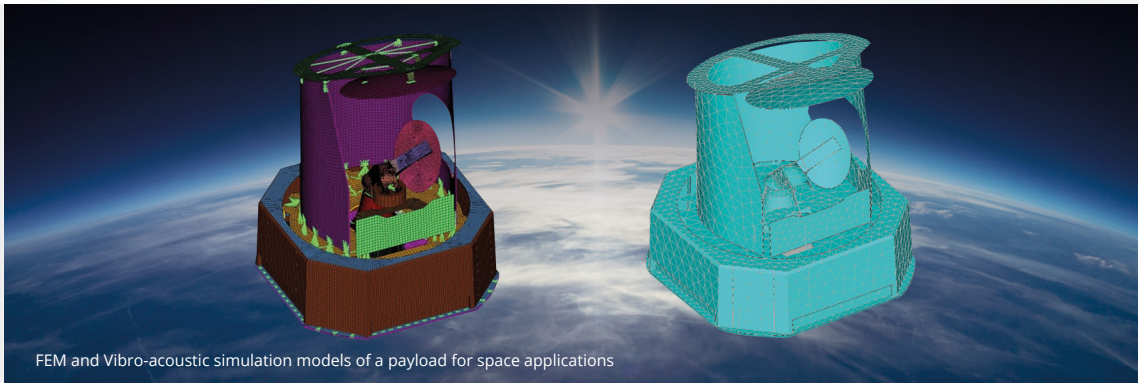
Space Structures Grows Their Business and Customer Satisfaction with Help from ESI VA One



FEM and Vibro-acoustic simulation models of a payload for space applications

Challenge

Accurate models are required to ensure the integrity of vital launch equipment subject to the high-intensity acoustic field experienced during the launch process. Modeling launch acoustic conditions using traditional calculation methods relies on assumptions that can lead to an inaccurate result, conservative assumptions, and neglect of frequency dependency of the responses. Space Structures realized they needed a more advanced simulation methodology when designing structures for vibro-acoustic loading (e.g.) for the development of a multi-functional panel for large satellites under ESA contract.

Benefits

Using ESI VA One, Space Structures was able to create predictive vibro-acoustic models, which made it possible to quickly and accurately simulate interlayer carbon fiber composite stresses. ESI's exceptional technical service and the comprehensive capabilities of VA One enabled Space Structures to perform necessary calculations and analyses to support and optimize their designs. As a result, Space Structures received a high return on investment and increased customer satisfaction.

Story

The aerospace industry has been striving to find a tool that can accurately predict acoustic and vibration responses under rocket launch conditions, which create an intense diffuse acoustic field during the early launch phase. This can compromise the integrity of both the spacecraft and protective fairing, along with sensitive ground-based equipment.

> *"ESI VA One is an outstanding software product. However, the real success is provided in the proactive, flexible, timely and high-quality support of the ESI team from our first contact with the sales team to our contact with technical support".*
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> **Florian Ruess**
> Managing Director
> Space Structures GmbH

Based in Germany, Space Structures GmbH is an independent engineering firm that specializes in space applications, the development of metal and composite structures, and structural mechanics. One of their core competences is the development of carbon-fiber composite structures, including primary structures for large spacecraft. With years of experience under their belt, Space Structures is familiar with the challenges of designing the right equipment for the launch environment.

The aerospace industry previously relied on trial-and-error testing as well as test results from legacy designs, which provided little opportunity for design optimization. The realization of the need for advanced simulation came during the development of a multi-functional panel for large satellites. Space Structures' project incorporated a new, cutting-edge technology that reduced uncertainties and risks. Overall, the uncertainty was related to the inability to verify the appropriate strength of the structure for the acoustic pressure during the design phase. They had already been using ESI VA One, ESI's vibro-acoustics simulation software, and extended their simulation capabilities to include the prediction of structural stress/ strength responses during acoustic noise excitation.

Space Structures was the first ESI customer to successfully perform a BEM model with more than 250,000 nodes, which was a landmark achievement unthinkable in the industry just 10 short years ago. In addition, Space Structures was able to predict interlayer stresses of carbon fiber composites, which was being used to meet design targets by reinforcing sandwich composite parts subject to high acoustic loading. They even expanded their business thanks to the simulation tool and now have a customer service department that conducts analytical verification and design optimization of spacecraft structures, including vibro-acoustic simulation.

With the assistance of ESI's technical service, Space Structures learned to benefit from the full functionality of VA One. The company realized a high return on investment and saw rising levels of customer satisfaction. In the future, Space Structures intends to continue their use of VA One to better design structures for all acoustic noise environments.

for more information
www.spacestructures.de