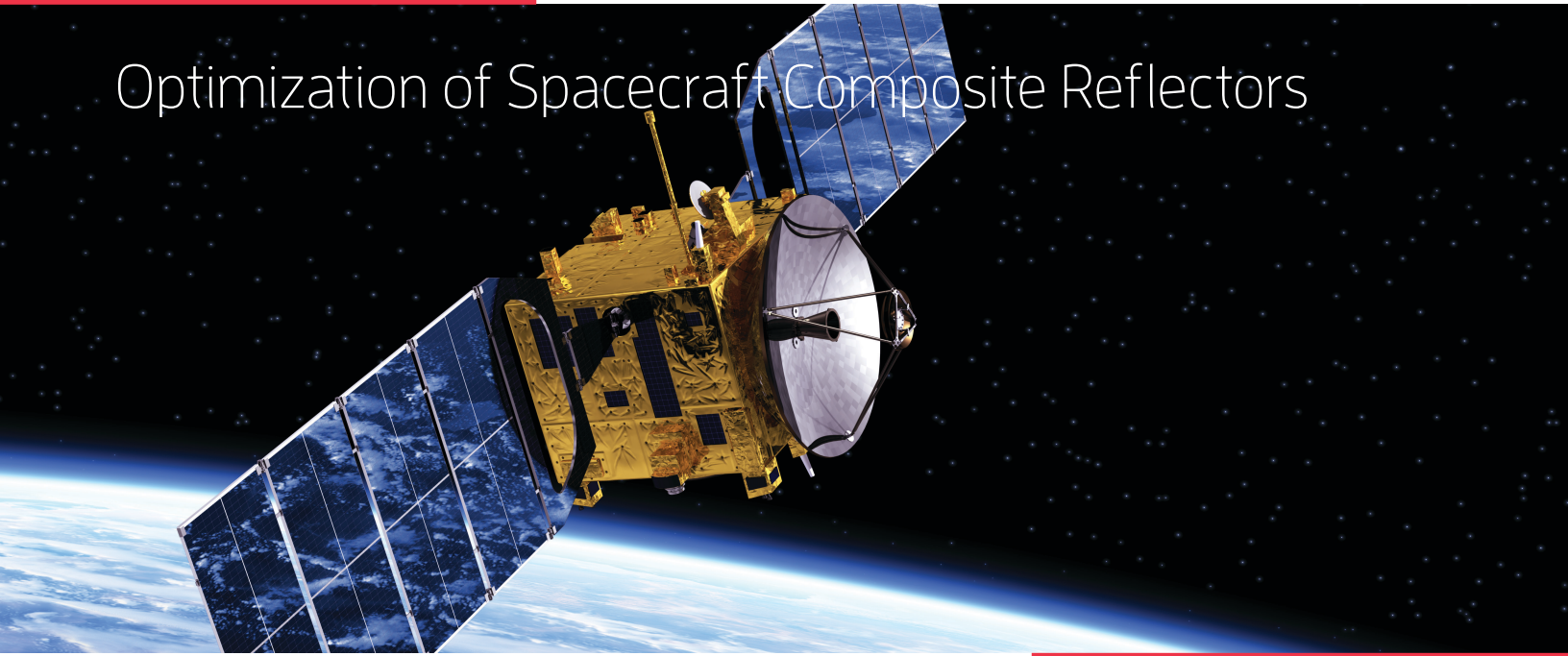


Optimization of Spacecraft Composite Reflectors



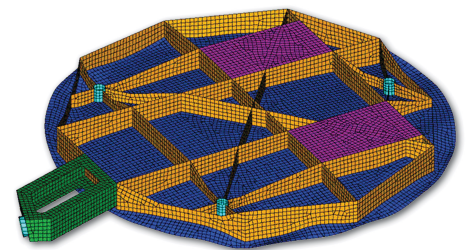
Case Study

OVERVIEW

Orbital ATK (formerly Composite Optics, Inc.) is a provider of advanced composite products for the space and aerospace markets. One of Orbital ATK's core businesses is large, shaped reflector assemblies for the telecommunications industry. Typically, Orbital ATK is responsible for their design, analysis, and fabrication. The shaped reflectors are geometrically complex, high-accuracy surfaces. The composite materials used for the assembly offer light weight, high stiffness, and tailorable coefficient of thermal expansion (CTE) characteristics. Since 2000, ATA has augmented Orbital ATK's internal staff by providing analysis support on a wide variety of composite reflector programs.

TASKS PERFORMED & KEY OUTCOMES

- Developed coarse finite element models (FEMs) of design concepts and performed feasibility studies to assess their performance early in the program.
- Constructed detailed reflector FEMs as the design evolved and performed static, dynamic, thermal distortion, and acoustic analyses per the design specification.
- Assessed overall structural stresses, detailed stresses at fittings, edge bond loads, lap bond interfaces, and bolted joints.
- Developed custom software code to automate repetitive tasks and increase efficiency.
- Iteratively performed analyses, calculated margins of safety, and made design recommendations to achieve positive margins.
- Reduced reflector weight by optimizing rib configurations and fitting designs.



Example finite element model of composite reflector structure