

CUSTOMER:
Alliant Techsystems, Inc. (ATK)

INDUSTRY:
Aerospace

PROJECT NAME:
Modeling and Analysis of
Composite Radar Structure

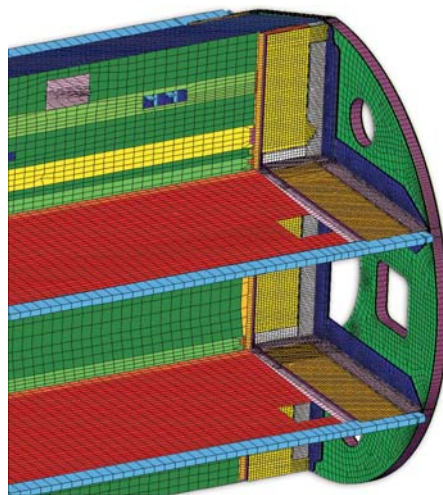
CUSTOMER LOCATION:
Magna, Utah

OVERVIEW

Alliant Techsystems, Inc. (ATK) was under contract to develop a prototype lightweight aircraft radar structure, manufactured entirely from advanced composite materials. ATA Engineering, Inc. (ATA) provided key analysis support for a fast-approaching Critical Design Review (CDR) by performing a variety of advanced structural analyses required to validate the design. Presentation materials and a final detailed stress report were provided to ATK to support the CDR. After CDR, a highly detailed solid element model of a very complex region of the structure was created to provide greater insight into the load distribution in the area and verify the design at that location.

ATA SUPPORT INCLUDED:

- ▷ Calculated modes of vibration for a detailed model of the radar structure combined with Nastran DMIG of customer supplied components.
- ▷ Calculated ply-by-ply stresses and line loads for static, thermal, random vibration and transient load cases.
- ▷ Performed a design study to determine optimum cover design and fastener locations for radar structure.
- ▷ Developed scripts to recover very large amounts of data in a format that could be used by ATK in stress calculations.
- ▷ Developed a MATLAB program to calculate random response quantities, such as ply-by-ply stresses, that are not available directly from MSC.Nastran.
- ▷ Created highly detailed solid element model of a complex region of the structure (~2 million DOF) to gain further insight into loads and stresses for critical dynamic load cases.
- ▷ Supported ATK at CDR and provided documentation of all stresses in detailed final report.



▲ Finite element analysis mesh optimized for efficiency and accuracy

▼ Detailed solid mesh at end bulkheads offered insight into load distribution (end caps removed for clarity)

