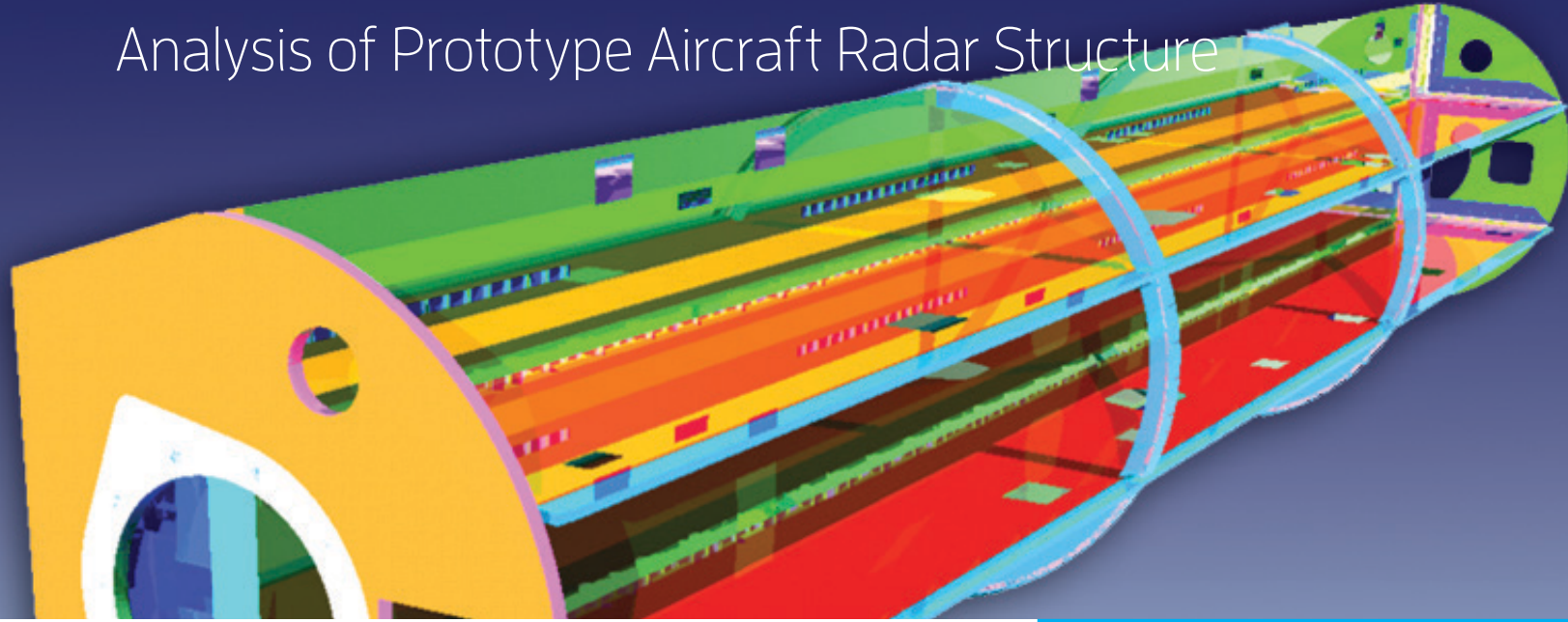


Analysis of Prototype Aircraft Radar Structure



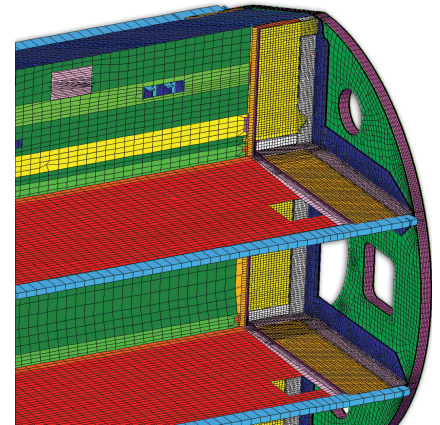
Case Study

OVERVIEW

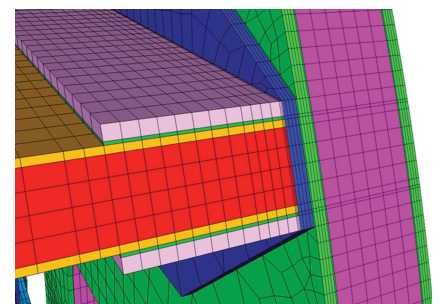
Orbital ATK (formerly ATK) was under contract to develop a prototype lightweight aircraft radar structure, manufactured entirely from advanced composite materials. ATA Engineering, Inc., (ATA) provided key analysis support for a fast-approaching critical design review (CDR) by performing a variety of advanced structural analyses required to validate the design. Presentation materials and a final detailed stress report were provided to support the CDR. A highly detailed solid element model of a 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.

TASKS PERFORMED & KEY OUTCOMES

- 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.
- Determined optimum cover design and fastener locations for radar structure.
- 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 (millions of degrees of freedom) 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 bulkheads used to understand complex loads