

Concept Evaluation and Refinement Support



Image Credit: NASA | Public Domain

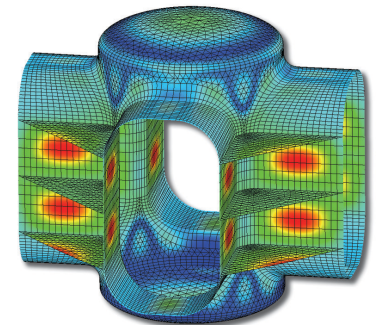
Case Study

OVERVIEW

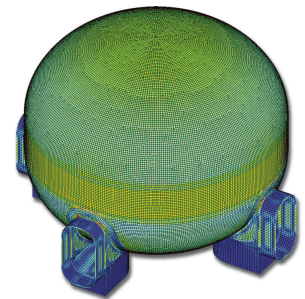
OATK (formerly Orbital Sciences Corporation) was awarded a series of contracts by NASA to define an architecture to support NASA's Space Exploration Vision. ATA worked closely with OATK's Concept Evaluation and Refinement (CE&R) design team to help develop conceptual designs for lunar exploration infrastructure. ATA's efforts involved developing conceptual designs, performing trade studies, and carrying out structural analyses—static, dynamic, structural optimization, and thermal—to define initial sizing and generate mass estimates for elements of OATK's system.

TASKS PERFORMED & KEY OUTCOMES

- Heavy Lift Launch Vehicle: Internal loads evaluation and tank structural sizing.
- Human Lunar Lander: High-level layout and packaging, structural analyses and material and design trade studies
- Crew Exploration Vehicle: Structural analysis of launch abort system and optimization of crew module.
- Space Exploration Module: Internal loads analysis, tank structural sizing, and design and sizing of tank supports and thrust structure.
- Cargo Lunar Lander: High-level layout and packaging, structural analyses to define initial sizing for primary structure of lander base.
- Airlock: Conceptual design, structural analysis to determine initial sizing and mass.
- Habitat: Trade studies of various habitat shapes to determine optimal design for given constraints, structural optimization to determine initial sizing.
- Crawler Crane: Initial sizing of crane structure to move large payloads from the lunar lander.



Habitat Airlock Stress Analysis



Lunar Habitat Structural Design Optimization

© ATA Engineering, Inc. 2020