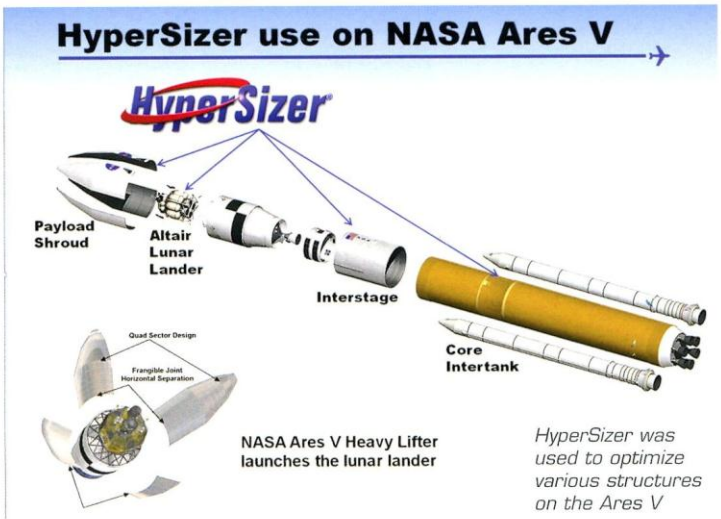
HyperSizer from Collier Research Takes Weight and Uncertainty out of Space Launch Vehicles from Design to Certification

Watch pre-release demos of latest version of NASA-licensed optimization software at Spacecraft Technology Expo Booth # 5024

Collier Research president Craig Collier demonstrates HyperSizer software to NASA's Lori Garver

When NASA deputy administrator Lori Garver visited Langley Research Center in Hampton, Va., earlier this year she got a close look at the Orion Multi-Purpose Crew Vehicle, which remains one of the space agency's top priorities in its 2012 budget. Garver got an even closer look at how HyperSizer software helped optimize the Orion structure during the early stages of its development, when Collier Research president Craig Collier gave her an onscreen demonstration of the tool's start-to-finish capabilities in space launch vehicle design.

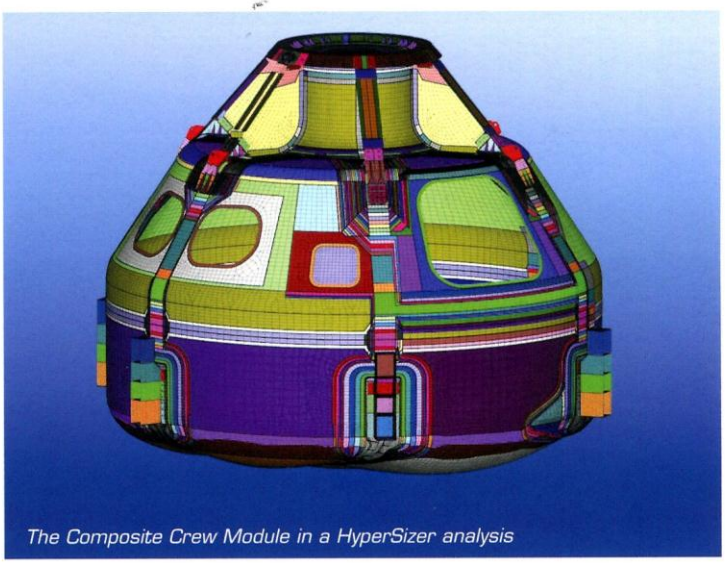
As the first NASA software to be licensed and commercialized some 17 years ago, Collier's HyperSizer has been used on the National Aerospace Plane, the Composite Crew Module (CCM), and the Ares V Heavy Lifter, and continues to be employed on various Agency projects at centers around the US, including the LADEE spacecraft due to be launched in 2013.



HyperSizer was used to optimize various structures on the Ares V

Other HyperSizer users include Tier 1 aerospace industry firms such as Boeing, Lockheed Martin, Gulfstream, and Bombardier. This structural-sizing and design-optimization tool works in a feedback loop with finite element analysis (FEA) to automatically search for solutions that minimize weight, reach performance and certification goals, and maximize manufacturability – in almost any metal or composite material.

Although the current Orion vehicle is a largely metallic structure, the Composite Crew Module (CCM) project – for which HyperSizer guided design and manufacturing decisions throughout the three-year product development process – has also proved out the particular value of composites in space. Successful load and pressure tests of the CCM established HyperSizer's ability to accurately predict the behavior of large composite structures with exacting design and manufacturing requirements.



The Composite Crew Module in a HyperSizer analysis

Lightweighting space vehicles brings obvious benefits in terms of reduced fuel use and greater payload capability. But more subtle advantages can result from design optimization with HyperSizer such as product simplification, lower material costs, and faster manufacturing turnaround. Reduced budgets in NASA and commercial spacecraft development programs make these issues even more critical now.

The latest, pre-release version of HyperSizer software is being demonstrated at Booth #5024 during Spacecraft Technology Expo, May 8-10, 2012. For additional information: **www.hypersizer.com**