



CUSTOMER:  
**NASA Johnson Space Center**

INDUSTRY:  
**Aerospace**

PROJECT NAME:  
**Design and Analysis of the TransHab Window Frame**

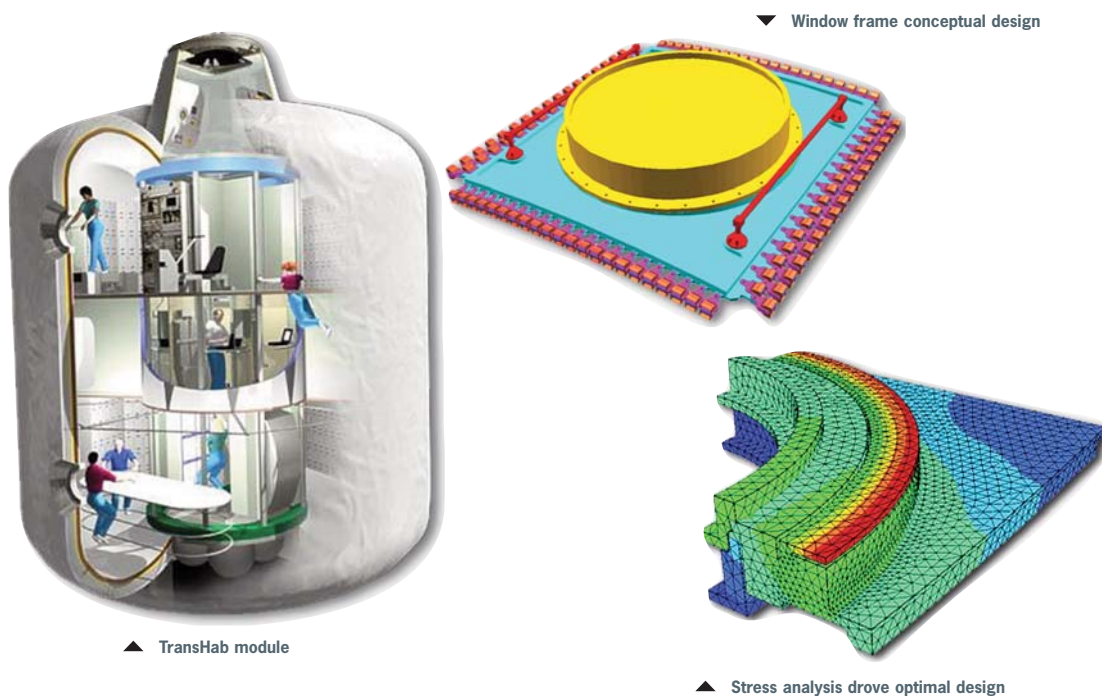
CUSTOMER LOCATION:  
**Houston, Texas**

## OVERVIEW

Johnson Space Center (JSC) developed the TransHab, an inflatable habitation module as a potential crew quarters for the International Space Station (ISS). The general structural configuration consists of a central structural core combined with a multilayer inflatable shell. Two identical windows were designed into the TransHab inflatable shell. These are located in the 25 ft diameter cylindrical section of the shell. Each window assembly consists of the current baseline ISS window, the window frame, the bladder interface, and the connection to the TransHab restraint layer. ATA Engineering, Inc. (ATA) was responsible for the design of the window frame structure.

## ATA SUPPORT INCLUDED:

- ▷ Developed a preliminary design of the window frame.
- ▷ Developed finite element models including the window frame, clevis and clevis lugs.
- ▷ Optimized the design of the window frame for required load cases including thermal, pressure and EVA loads.
- ▷ Completed 10 design iterations in 15 man-weeks.
- ▷ Reduced design weight from initial weight of 250 lbs to final weight of 87 lbs through the optimization process.
- ▷ Generated detailed design drawings.
- ▷ Generated CNC tool paths and produced scale model of window frame.



▲ TransHab module

▼ Window frame conceptual design

▲ Stress analysis drove optimal design

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