Overview of the 2nd Gen 3.7m HIAD Static Load Test

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Why Static Load Testing?
- Demonstrate Structure Maintains Acceptable Shape Under Load
- Demonstrate Structure Robustness to Max Loading Conditions
- Experiment with Different Layouts and Inflation Conditions to Determine the Acceptable Lowest Mass Inflation State
- Inexpensive Compared to Alternative Structural Tests

Static Load Test Setup
- Vacuum Fixture (Tub)
- Hydraulic Ram & Cross Member
- Slip Sheet & Vacuum bag
- 50,000lb Loadcell & Manometer
- Industrial Vacuum

Inflation Pressure Comparison
- 12 PSI: Uniform Deflection Under 10,000lb Load
- 10 PSI: Aeroshell Begins Asymmetric Deflection

Example Test Results
- Chevron Termination
  - Centerbody Chevron Termination: Slight Deflection Reduction, Pairing Loop Load Reduction
- Tri-Torus vs. Baseline Configuration
  - With Tri-Torus: Less Deflection by ~2in
  - Baseline (No Tri-Torus): Less Shoulder Stiffness

Conclusions and Future Work
- Aeroshell Performs Well at 10,000lbs of Load with 12 PSI Inflation
- Alternate Chevron Termination Reduces Load In Inflatable Structure
- System Variability Can Induce Early Asymmetric Deflection
- Tri-Torus Increases Rigidity of Structure, but Increases Volume & Mass
- Develop and Test 15m Class 2nd Gen HIAD Aeroshell
- Perform Pack and Deploy Testing on 2nd Gen Aeroshell
- Conduct Greater Zylon Environmental Testing to Fully Characterize Current System and Document Limitations