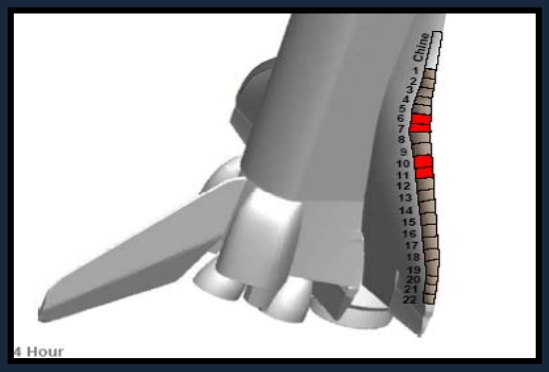
Exploration

MISSE

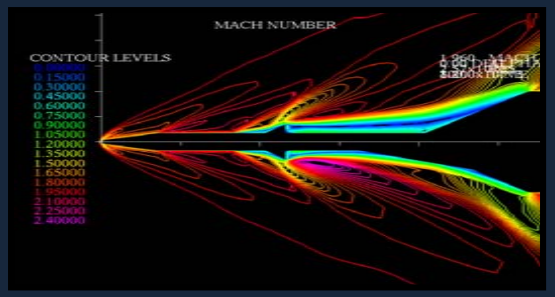
Wing Leading Edge Impact Detection



Mission Management Support

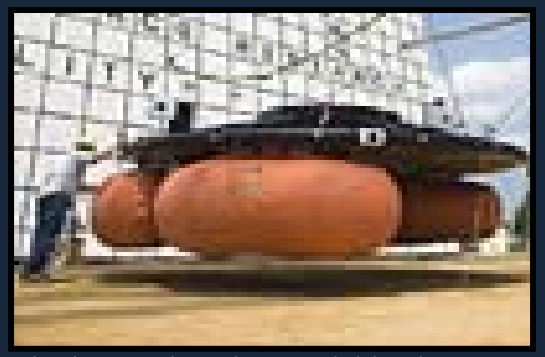
Flight Test Articles

Ares I Aero Characterization



Launch Abort System

Landing Systems

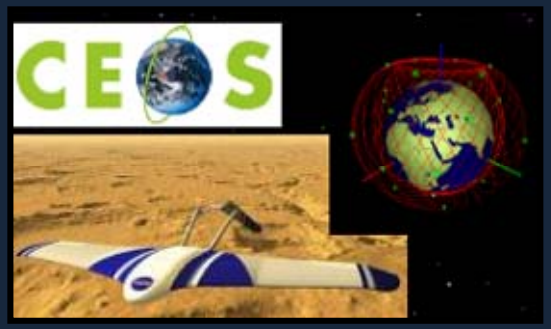


Lunar & Mars Architectures

Habitat Structures & Materials

Science

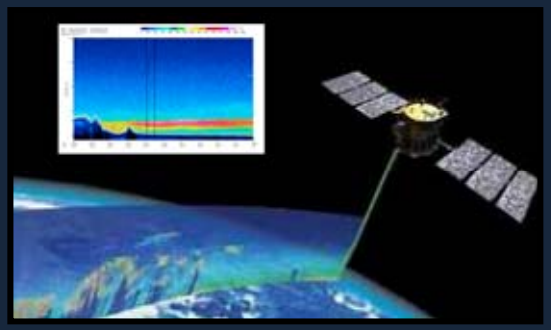
Mission Concepts



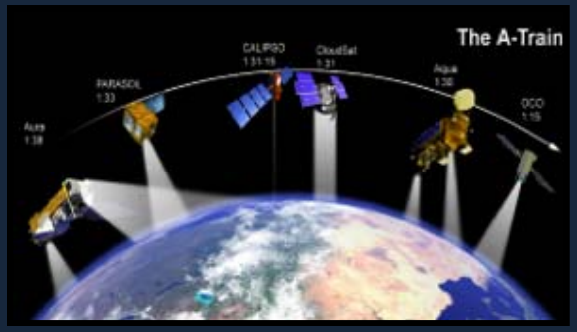
Advanced Instruments

Space-based Missions

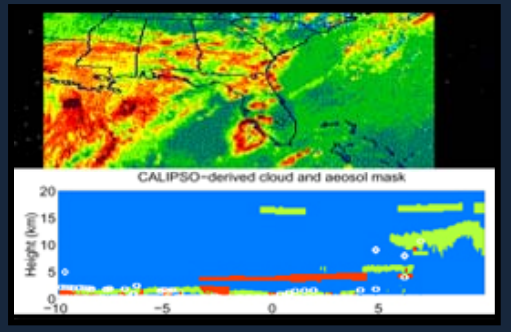
CALIPSO



A-Train

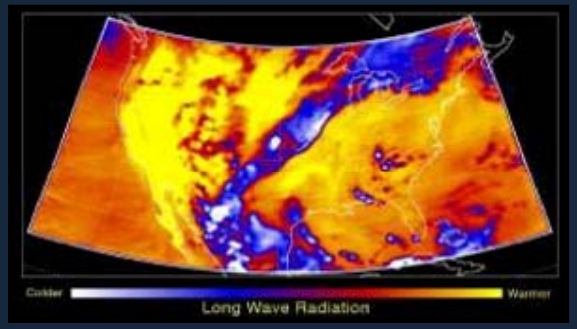


Algorithm Development

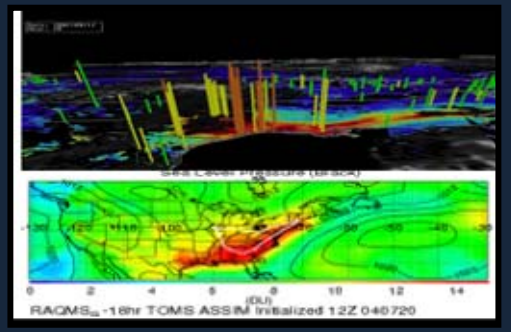


Field Missions

CERES - Radiation



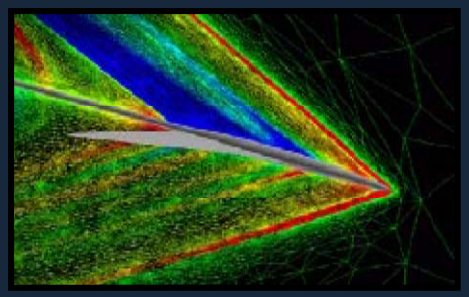
Applications - Air Quality



Aeronautics

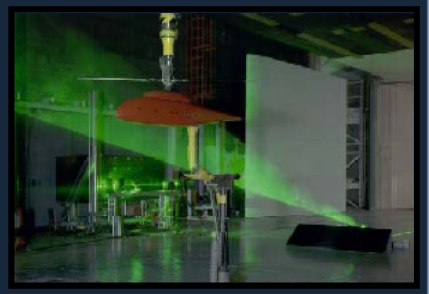
Hypersonics

Supersonics



Fixed-Wing

Rotary-Wing



Integrated Vehicle Health Management

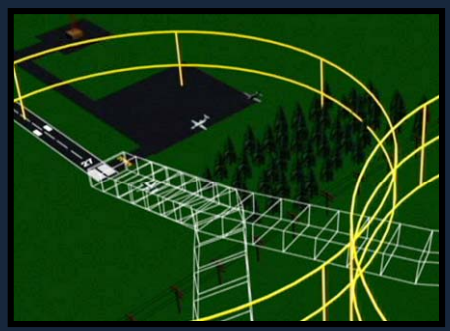
Integrated Intelligent Flight Deck

Aircraft Aging and Durability

Integrated Resilient Aircraft Control

Airportal

Airspace



Test Facilities

NASA and Jamestown
The Road to Discovery

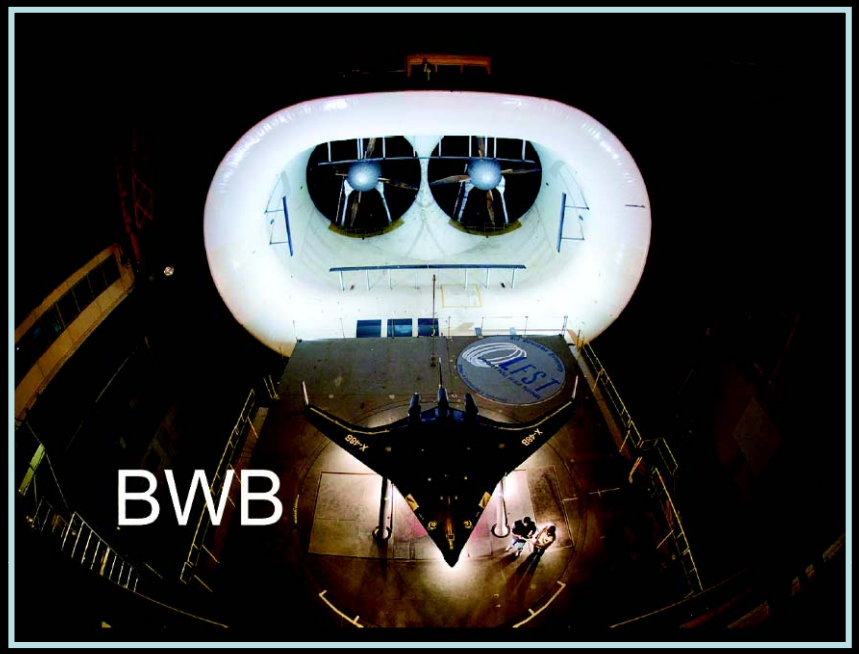
051507

1

Orion Landing System Tests at the Gantry

NASA Langley

IPCC Report Authors Share in
Nobel Peace Prize



The 2007 Robert J. Collier Trophy

Hy-BoLT/SOAREX/ALV-X1

Speedo

A Problem…

A World Record Solution

Polyimide Foam Insulation

NASA 2007 Commercial Invention of the Year



LN2 Plant Construction



VASTS

Virginia Aerospace Science and Technology Scholars

On-line Discussions

Lessons


Mentoring

On-Site Activities

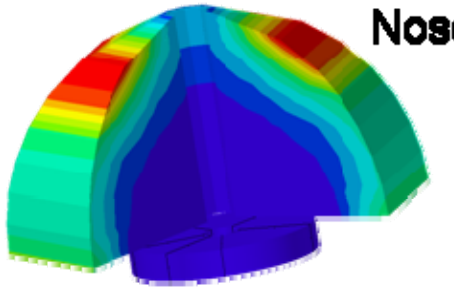
Science Elective Credit

Projects

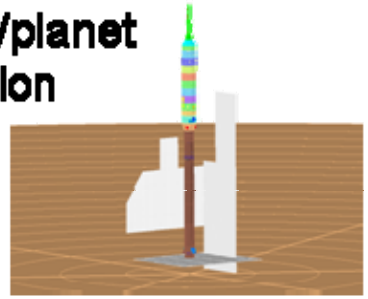
Ares I-X Thermal

Ruth Amundsen 2008

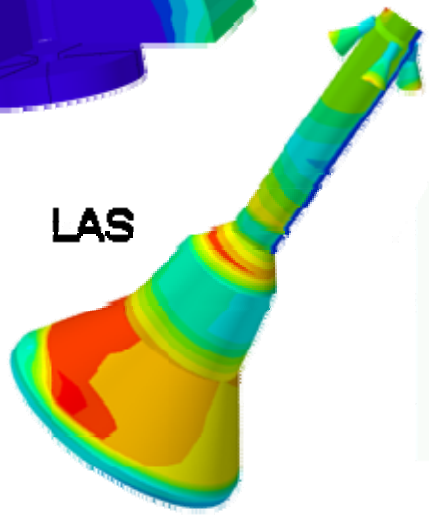
Nose



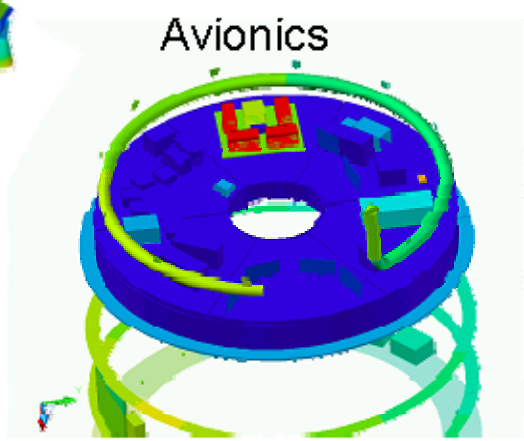
Vehicle/planet interaction



LAS

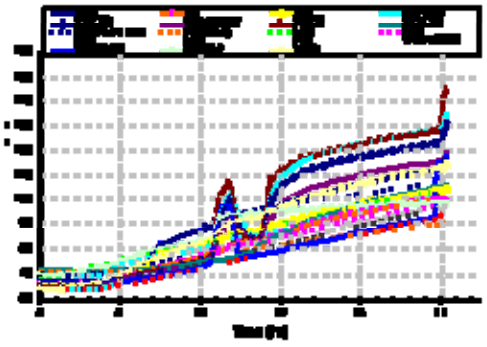


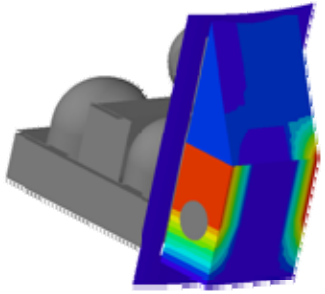
Avionics



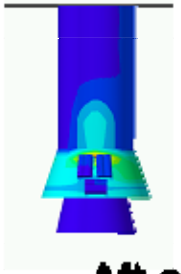
RoCS plume on USS

Example transients





RoCS plume

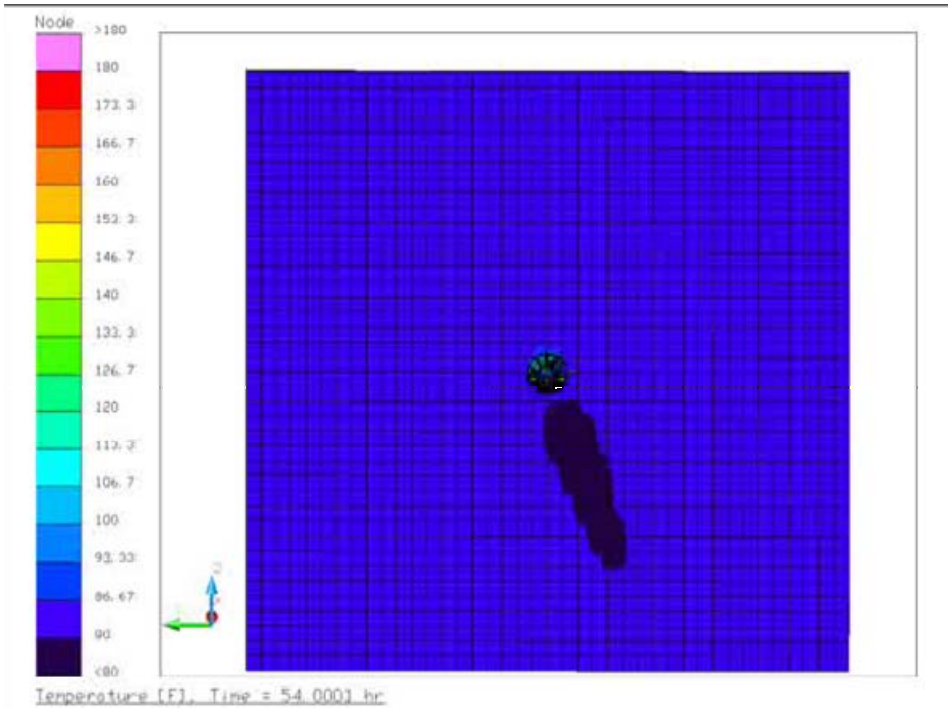


Aft skirt

Ares I-X launch:
April 15, 2009

Orion Flight Test

Joe Gasbarre, Joe Del Corso 2008

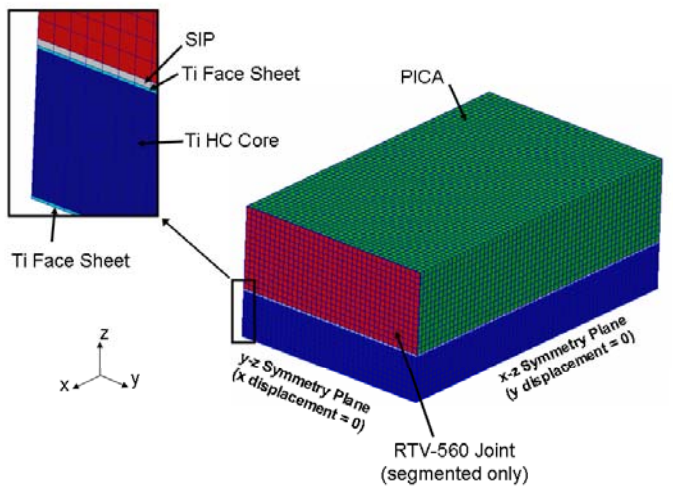


Video of PA-1 Test Article showing diurnal shadow contours (6 AM – 7 PM LST)

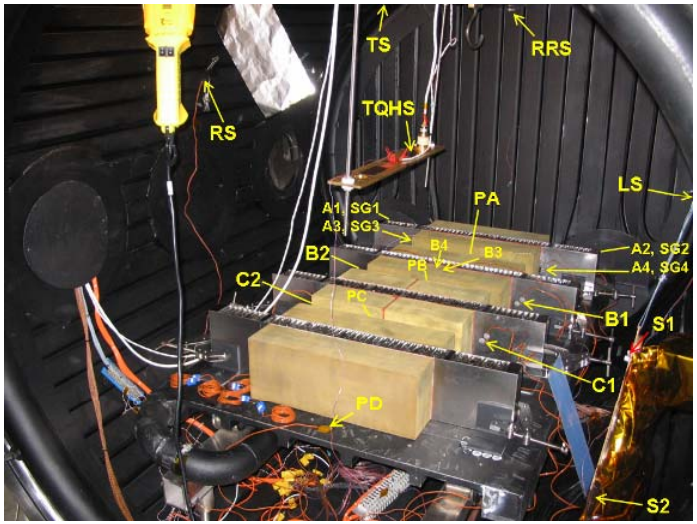
- **LaRC has thermal lead for Orion flight tests (PA-1/2, AA-1/2/3)**
- **Tests to be done at White Sands Missile Range (WSMR), NM**
- **PA-1 test schedule for Spring 2009**
- **AA-1 test scheduled for Spring 2010**

PICA Thermal Testing

Salvatore Scola 2008



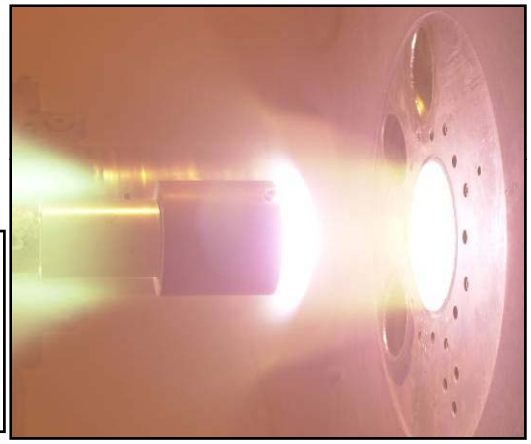
PICA Vacuum Cycling Test

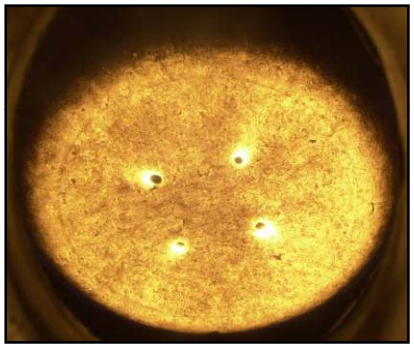


MEDLI Pressure Port Arc Jet Test

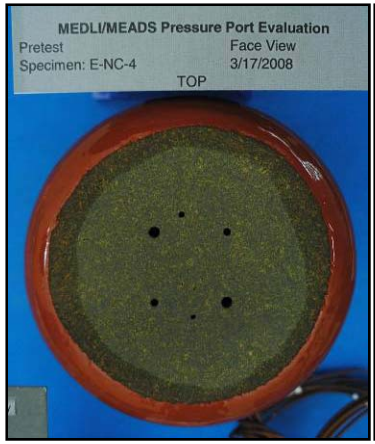
Walt Bruce, Kaitlin Liles 2008

PICA Models Fabricated at Langley
- Quantity = 44
- Four active pressure measurements
- Eight temperature measurements





Tested at Boeing LCAT Facility (St. Louis)
- March 8 – 21, 2008
- Tested 34 models in 13 runs
- Test conditions match predicted flight conditions

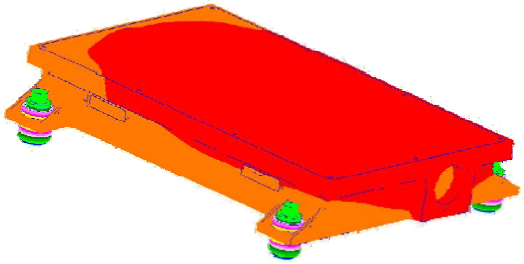


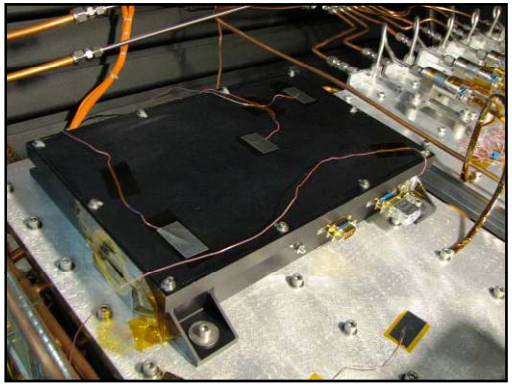
Results
- Pressure port shape change (enlargement) greater than anticipated
- Cause identified as material oxidation phenomena
- Use of smaller port diameter being considered to stay under a maximum hole growth diameter - Science team evaluating potential impact if any
- Hole oxidation barriers (material liners) investigated during test with success

MEDLI Thermal Vacuum Testing

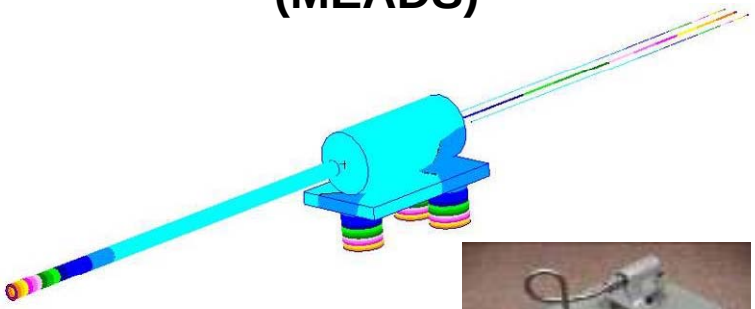
Kaitlin Liles, Walt Bruce 2008

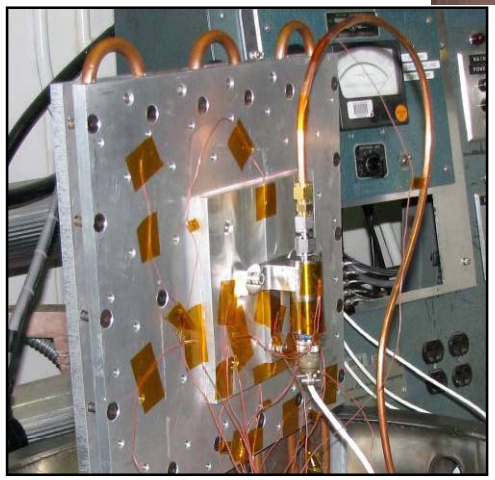
Sensor Support Electronics (SSE)





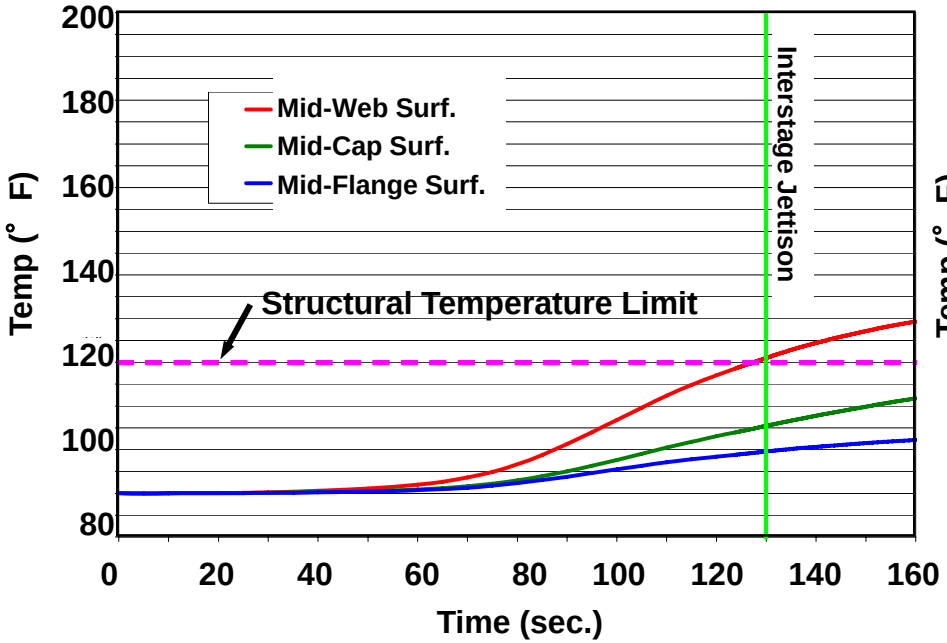
Mars Entry Atmospheric Data System (MEADS)



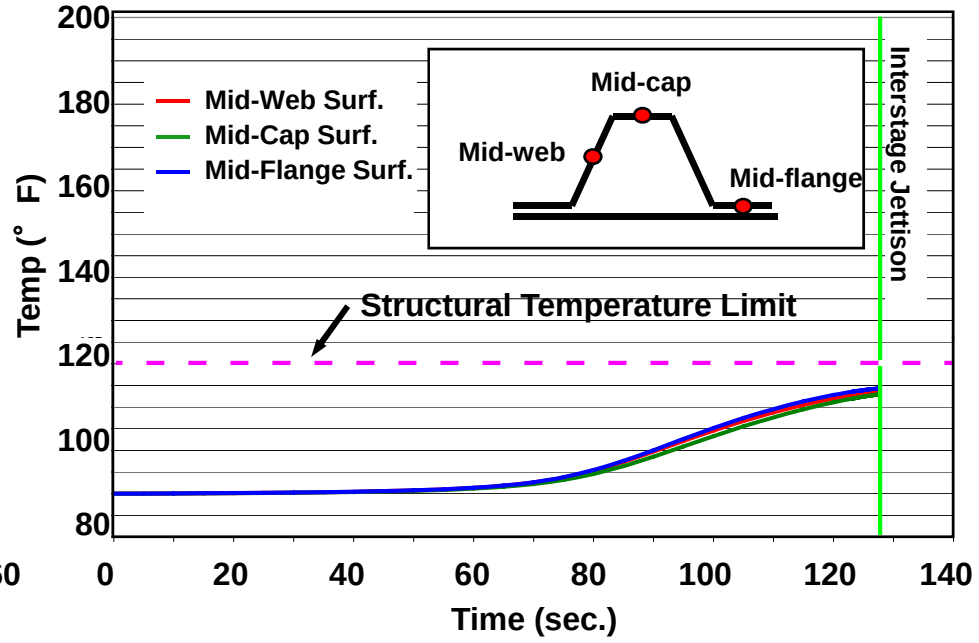


Interstage Thermal Protection System Sizing

Joe Gasbarre 2007



0.75 in TPS

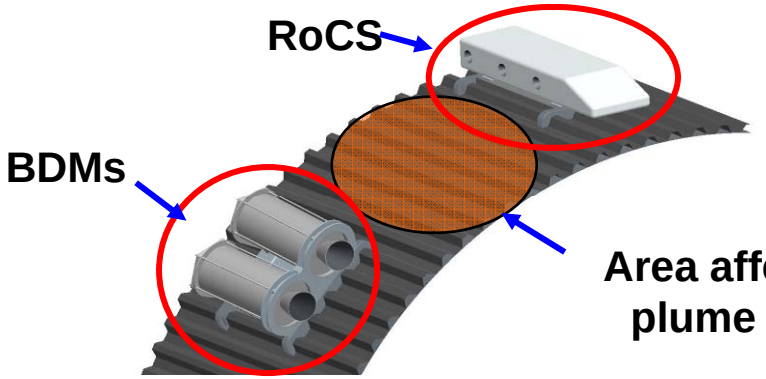


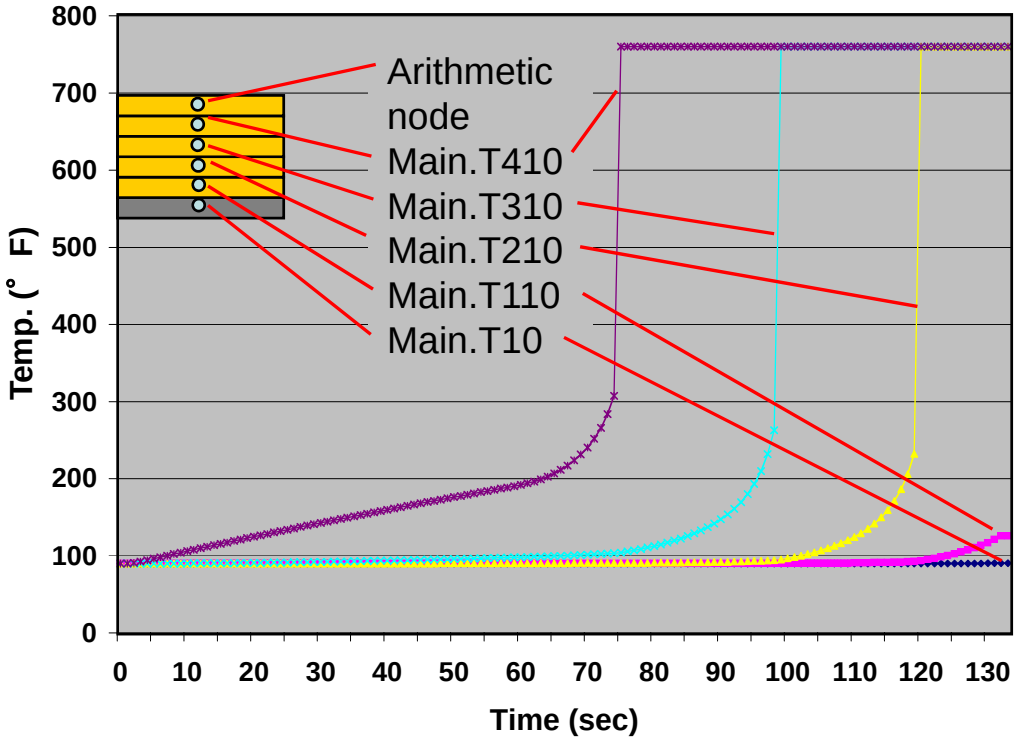
Foam-filled Hat-Stiffeners - 0.25 in TPS

- **A thickness of 0.75 in of TPS is required for the DAC-2 thermal loads with a heating amplification factor 1.17 for stringers in the flow**
- **Increasing the thickness of the stringer web decreased TPS thickness**
- **Rohacell filled hat-sections adds approximately a total of 50 lbm**

Interstage RoCS Plume Shielding Sizing Results

Mark Thornblom 2007

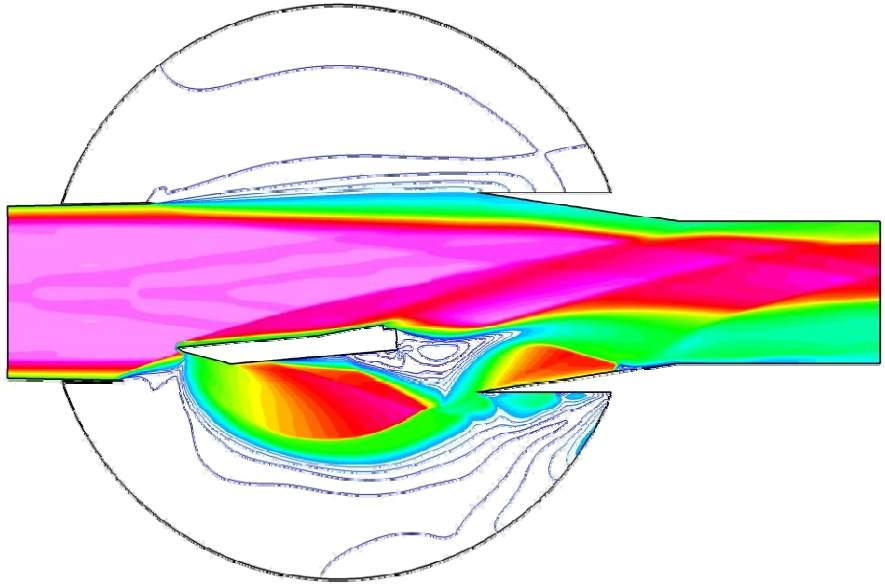


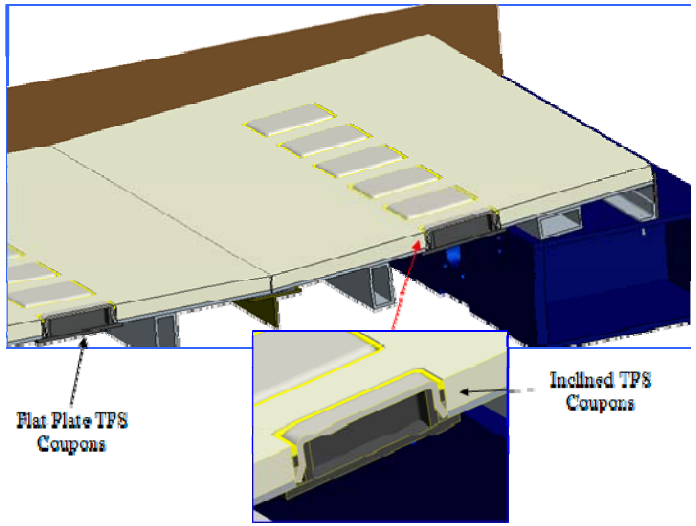


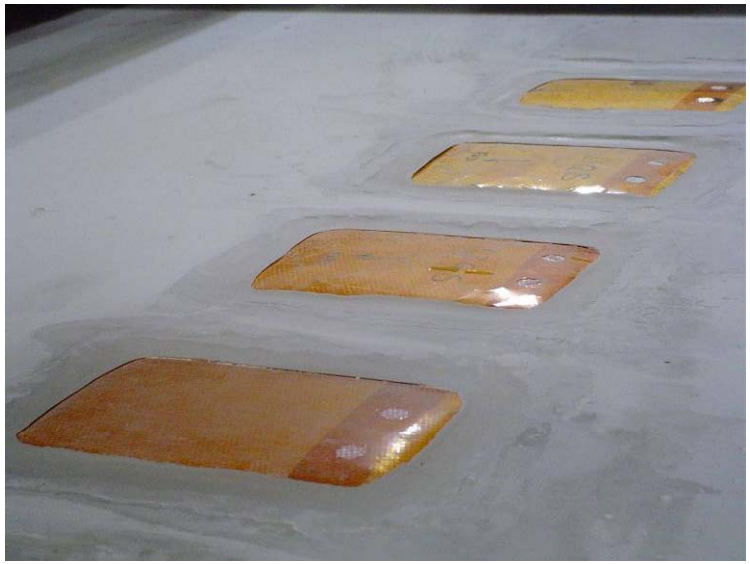
- **Initial RoCS plume shielding analysis was performed**
- **Near 'worst-case' heating requires 1.0 in of P-50 cork to protect substrate from excessive heating**
- **Low conductivity materials are desired to prevent excessive temperature (<120° F) at the substrate**

Program to Advance Inflatable-Decelerators for Atmospheric Entry (PAIDAE)

Joe Del Corso, Walt Bruce, Kaitlin Liles 2008



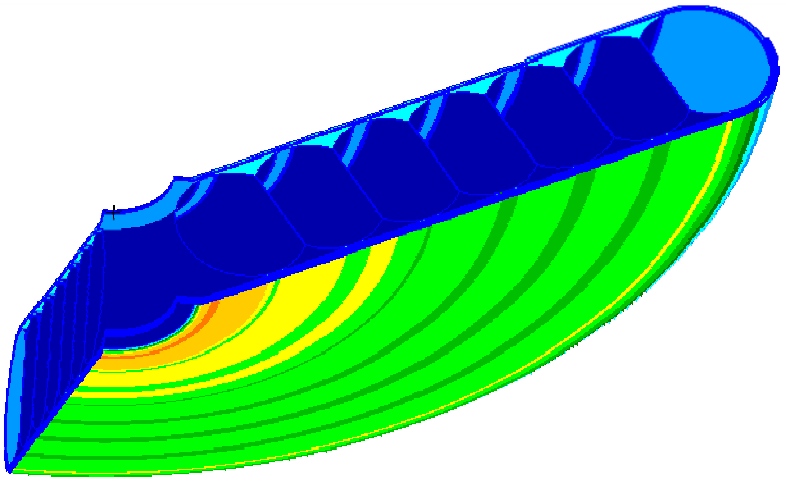


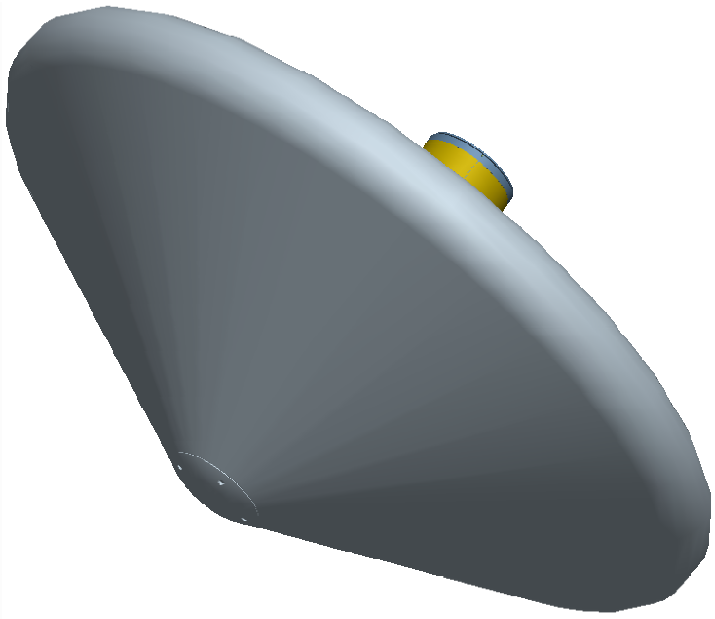


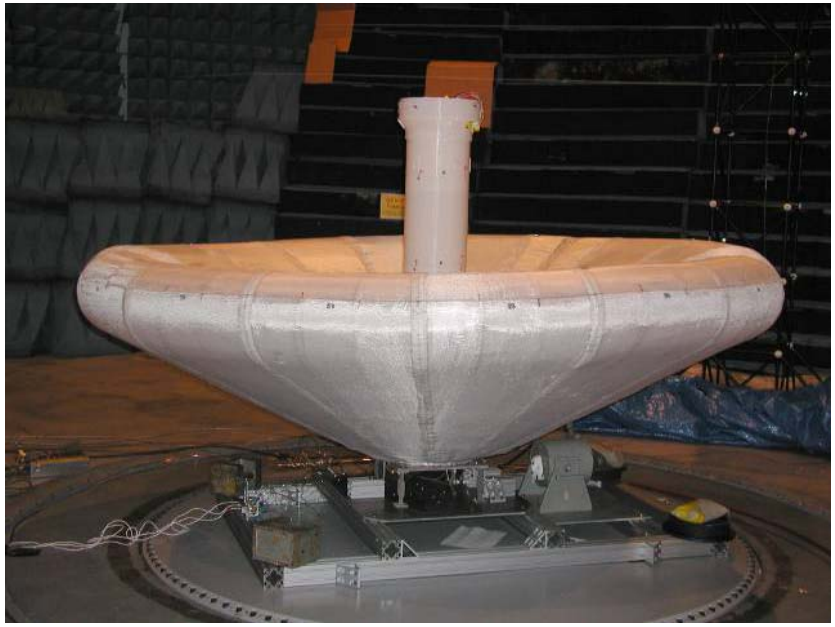
Inflatable Reentry Vehicle Experiment (IRVE I & II)

Walt Bruce, Joe Del Corso 2008

- Flight test demonstration of inflatable ballute concept
- Designed, analyzed, integrated, and tested by NASA Langley
- Aeroshell fabricated by ILC Dover
- Centerbody fabricated by NASA Langley



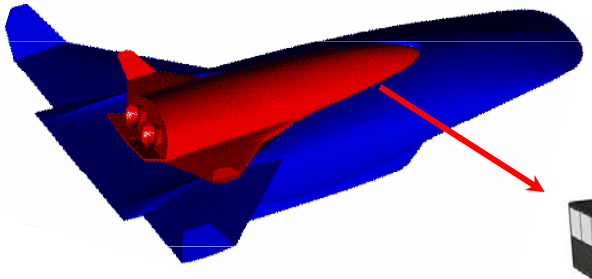


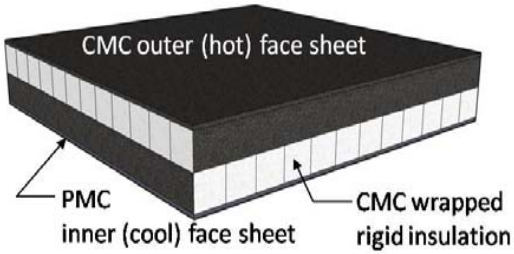


RTD/Structures Mechanics Concepts Branch
Thermal Analysis & Test Highlights

Hypersonics Project, Fundamental Aeronautics Program
POC: Dr. Kim Bey

TPS Application: **Highly Reliable Reusable Launch Systems (HRRLS)**



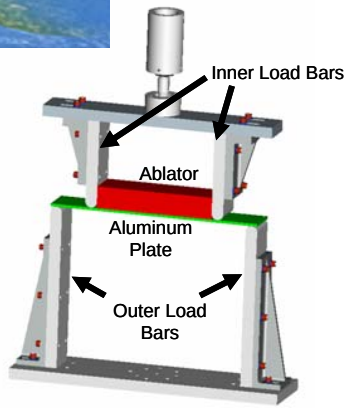


Structurally Integrated TPS Concepts

CEV TPS ADP Thermal Structures Testing
POC: Dr. Max Blosser

Thermal Environmental Chamber
– Elevated/Cryogenic

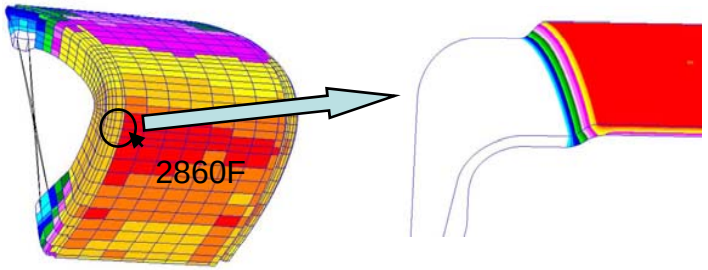
Flexure
- 4pt bend



Entry Thermal Gradients on Shuttle Wing Leading Edge RCC Panel
POC: Dr. Sandra Walker

Boeing Global Shell Model

LaRC Joggle Region Local 3D Model



Root Cause Investigation - SiC Coating Liberation in Joggle