3rd Space Exploration Conference

Denver, Colorado • February 26-28, 2008



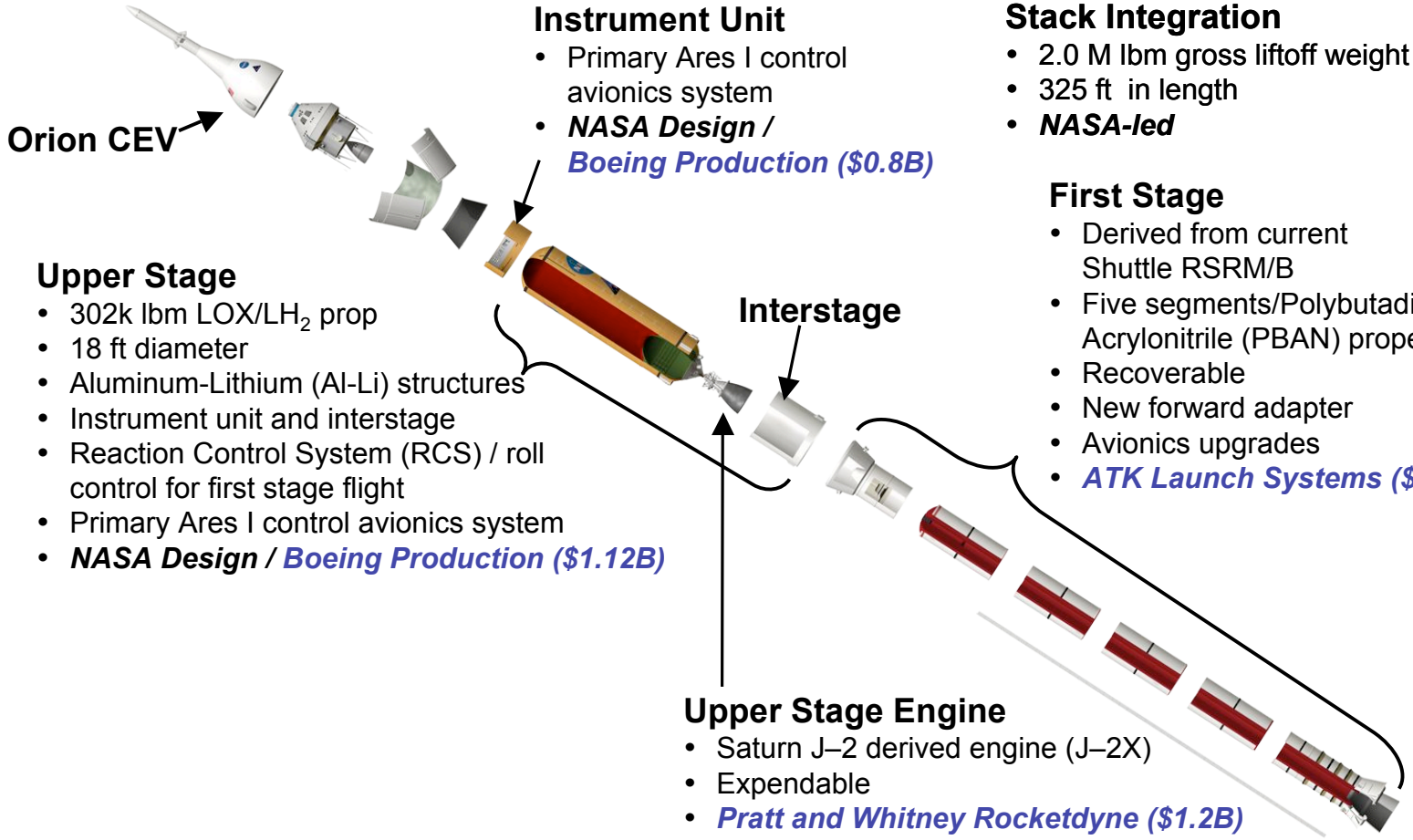
Ares Launch Status Update

Steve Cook

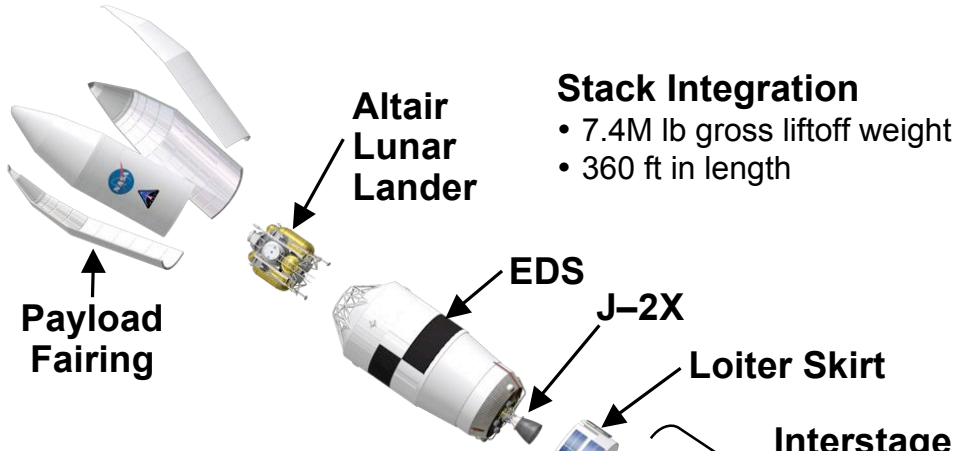
Manager, Ares Projects Office

February, 2008

Ares I Elements



Ares V Elements



Stack Integration
- 7.4M lb gross liftoff weight
- 360 ft in length

First Stage
- Two recoverable 5-segment PBAN-fueled boosters (derived from current Ares I first stage)

Earth Departure Stage (EDS)
- One Saturn-derived J–2X LOX/LH_2 engine (expendable)
- 33-ft diameter stage
- Aluminum-Lithium (Al-Li) tanks
- Composite structures
- Instrument unit and interstage
- Primary Ares V avionics system

Core Stage
- Five Delta IV-derived RS–68 LOX/LH_2 engines (expendable)
- 33-ft diameter stage

Vehicle 51.0.39

Some Ares I "Myths" Debunked

- **The Ares I is underpowered to lift the Orion CEV**
  - Today, Ares I has ~ 4,400lbm of total performance margin above the requirement for a driving lunar mission
  - Constellation maintains an additional 3,000 lbm of margin over Orion's maximum mass requirement (which also contains margin)
  - That's 15% of margin coming into PDR. That's in addition to mass growth allowances on all systems

- **The Ares I will violently shake apart during 1st stage flight**
  - Solid-based stages exhibit a phenomenon called thrust oscillation - on Ares I, particularly in the last ~20 sec of 1st stage flight
  - The Ares I is a relatively "quiet" motor (~0.5% variation in pressure) and analysis is ongoing to characterize this environment and effect on the launch stack
  - Recent results suggest this is well within our design capabilities to mitigate, if necessary

- **The Ares I is too long and thin and will not be controllable**
  - NASA has spent significant effort analyzing and testing in wind tunnels the flight dynamics of Ares I.
  - The vehicle has control margin above the requirements using the heritage TVC and while long/thin, is well within the experience base of previous launch vehicles

- **Ares I is behind schedule**
  - The Ares team has met all of its key milestones over the last 2.5 years (including 4 major acquisitions) and is on track to meet its PDR milestone in August, 2008

Ares Nationwide Team

ATK Launch Systems

Ames

Marshall

Glenn

Langley

Pratt & Whitney Rocketdyne

Johnson

Kennedy

Boeing

Michoud Assembly Facility

Stennis

First Stage Accomplishments

Nozzle Process Simulation Article
Promontory, UT

Installation of New SRM Insulation
Promontory, UT

Main Parachute Fabrication/Columbia, MS
Main Parachute Test/Yuma, AZ

Solid Rocket Motor Testing
Promontory, UT

Upper Stage Accomplishments

Friction Stir Weld Process Development System
MSFC, AL

Liquid Hydrogen Tank Dome Gore
Los Angeles, CA

Bench-Level S-IVB Testing
MSFC, AL

New Vertical Weld Tool
Elkhart, IN

Upper Stage Engine Accomplishments

E-3 Subscale Diffuse Testing
SSC, MS

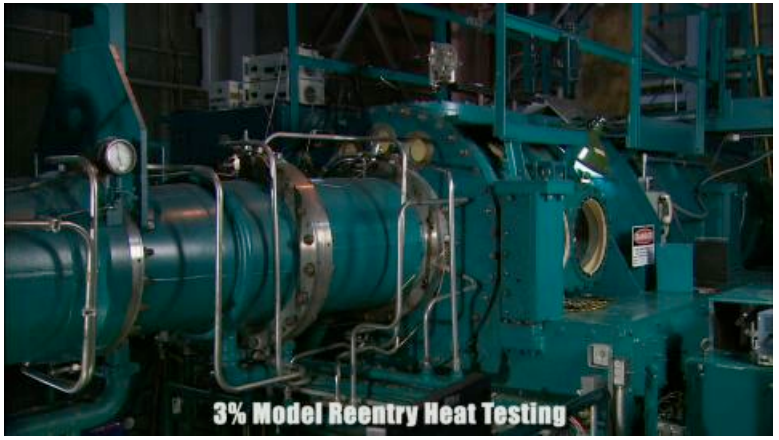
Test Stand A-3 Foundation
SSC, MS

J-2X Powerpack 1A Testing
Stennis Space Center (SSC), MS

J-2X Materials Testing
MSFC, AL

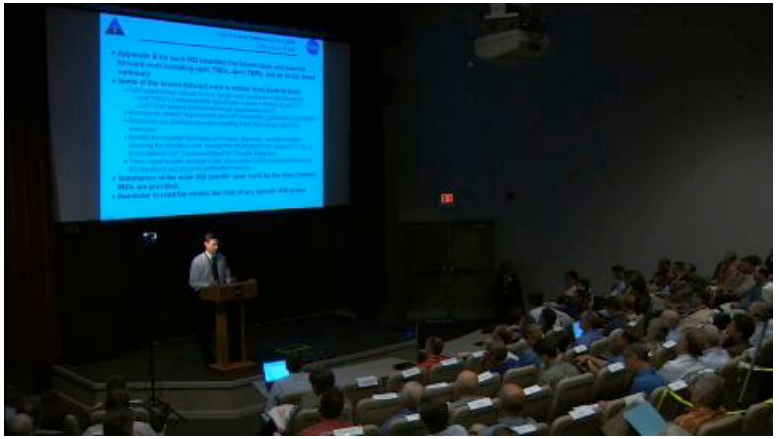
Vehicle Integration Accomplishments

Wind Tunnel Testing
Boeing, LaRC, Ames Research Center (ARC), CA



3% First Stage Reentry Testing
Arnold Air Force Base, TN

Ares I-X Rigid Buffet Model
Langley Research Center (LaRC), VA



Ares I System Definition Review
Huntsville, AL

Summary

- **The Ares family will provide the U.S. with unprecedented exploration capabilities.**
  - Can inject ~40% more mass to the moon than Apollo/Saturn
- **The Ares team has made significant progress since inception in October, 2005.**
  - Full team is onboard
  - Have met all major milestones to-date and working to PDR in late Summer
  - The Ares I–X test flight is on schedule for April 2009
- **We are making extensive use of lessons learned to minimize cost, technical, and schedule risks.**
- **The NASA-led / Contractor partnership is very effective in developing the Ares I.**