Ares I First Stage Progress

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August 5, 2009
Building on the legacy of the Space Shuttle and other NASA space exploration initiatives, the propulsion for the Ares I First Stage will be a Shuttle derived reusable solid rocket motor.

Significant progress has been made to date by the Ares First Stage Team.

This brief status provides an update on the design and development of the Ares First Stage propulsion system.
**Ares I Elements**

**Stack Integration**
- 927.1 mT (2,044.0K lbm) gross liftoff mass
- 99.1 m (325.0 ft) in length
- NASA-led

**First Stage**
- Derived from current Shuttle RSRM/B
- Five segments/Polybutadiene Acrylonitrile (PBAN) propellant
- Recoverable
- New forward adapter
- Avionics upgrades

**Upper Stage**
- 137.1 mT (302.2K lbm) LOX/LH$_2$ prop
- 5.5-m (18-ft) diameter
- Aluminum-Lithium (Al-Li) structures
- Instrument unit and interstage
- Reaction Control System (RCS) / roll control for first stage flight
- Primary Ares I control avionics system

**Upper Stage Engine**
- Saturn J–2 derived engine (J–2X)
- Expendable

**Instrument Unit**
- Primary Ares I control avionics system
- NASA Design

**Encapsulated Service Module (ESM) Panels**

**Orion CEV**

**Interstage**

**NASA Design Encapsulated Service Module (ESM) Panels**
Ares I First Stage Overview

- **Legacy motor casings, aft skirt**
- **New forward structures**
  - Forward Skirt
  - Forward Skirt Extension
  - Aeroshell
  - Frustum
- **Metal and composite materials**
- **Shuttle-derived five-segment solid rocket motor**
  - Increased performance
  - Extensibility to Ares V

- **Redesigned Deceleration System**
  - Pilot, Drogue and Main Parachutes
  - Larger higher performance parachutes
  - Lighter weight, higher strength materials

- **Avionics**
  - Redesign obsolete heritage TVC and recovery avionics
Ares First Stage Upgrades

Modifications to the motor were made to:

- Improve performance (thrust)
- Improve reliability
- Eliminate hazardous materials
- Replace obsolete materials

- Increased number of fins from 11 to 12 in fwd segment
- Burn rate lowered to meet Ares I requirements
- Wider throat and nozzle extension for increased mass flow
- Insulation and liner formulations modified to eliminate Chrysotile fibers
  Lay-up optimized to provide additional thermal protection
- Added Segment
- Propellant chamfers on aft and center segments
- Modified height and thickness to prevent bore choking
New 150-ft-Diameter Parachutes
November 15, 2007

Frustum Separation Test
May 7, 2009

Systems Integration and Verification Lab (SIVL)
13 July 2009

Main parachute cluster
(Largest parachutes ever flight tested)
May 20, 2009

Completed assembly of DM-1
On the Test Stand for Aug 2009 Static Firing Test

Ares I-X Vehicle Stacking Nearing Completion at KSC
May 20, 2009

Ares I 1st Stage PDR Complete
5 June 2008

Main parachute cluster
(Largest parachutes ever flight tested)
May 20, 2009

Orion I Flight Test
Sept 2014

Ares I-Y Flight Test
March 2014

Ares I 1st Stage Significant Accomplishments

FSE Separation Test
Jan 29, 2009

Ares I 1st Stage Project making Significant Progress to First Human Flight
Forward Skirt Extension Separation Test
Ares Demonstration
Motor Test #1

Next Ares I First Stage Major Test
August 25, 2009
Conclusion

- Ares First Stage design is progressing per plan and schedule
- Ares I-X hardware is fabricated and being stacked.
- Recovery system testing is well underway.
- Separation testing has begun.