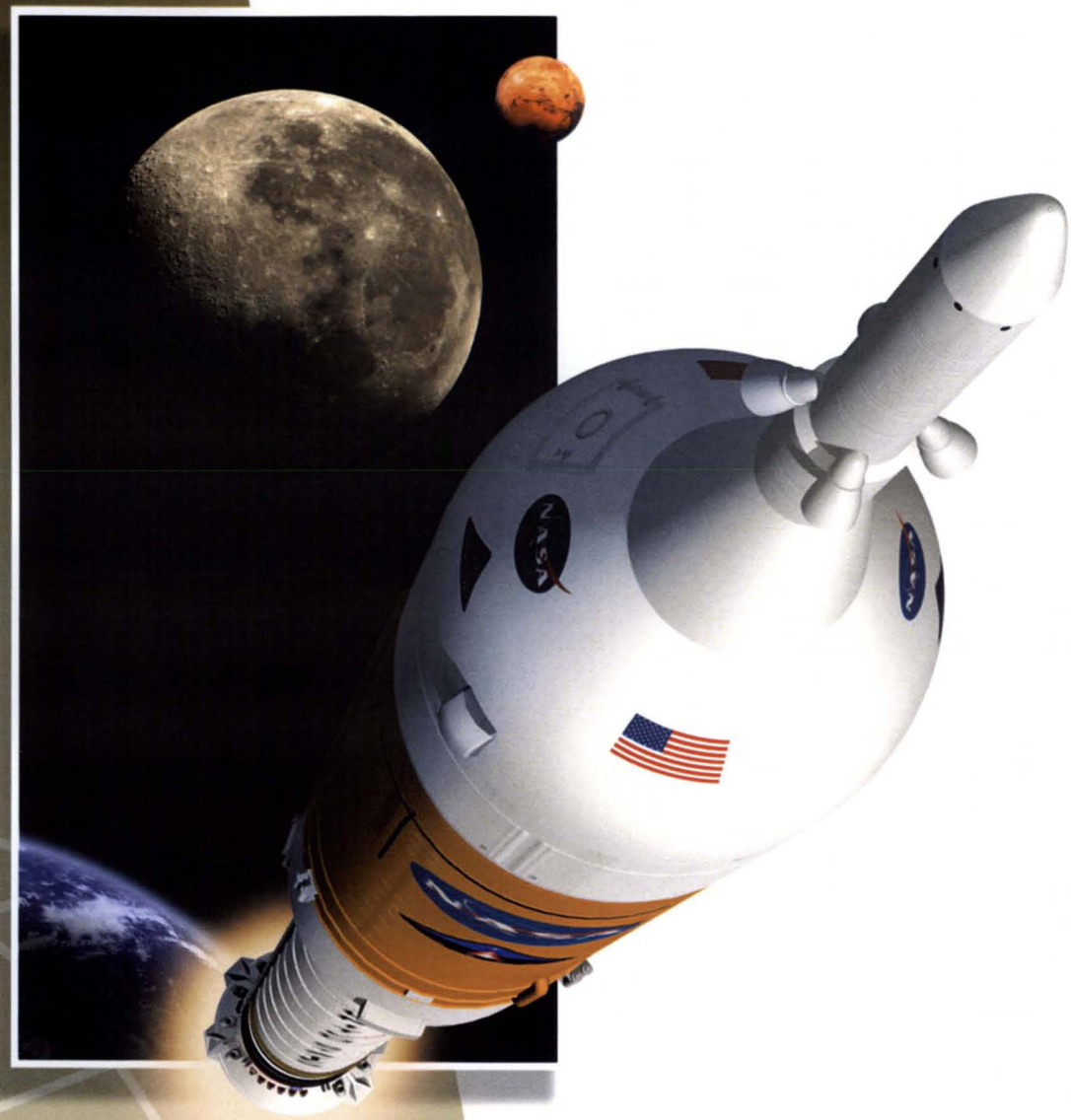
MSFC - 146 - PRESENTATION

National Aeronautics and Space Administration



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Ares Project Overview – Quality in Design

Chris Cianciola

Kenneth Crane

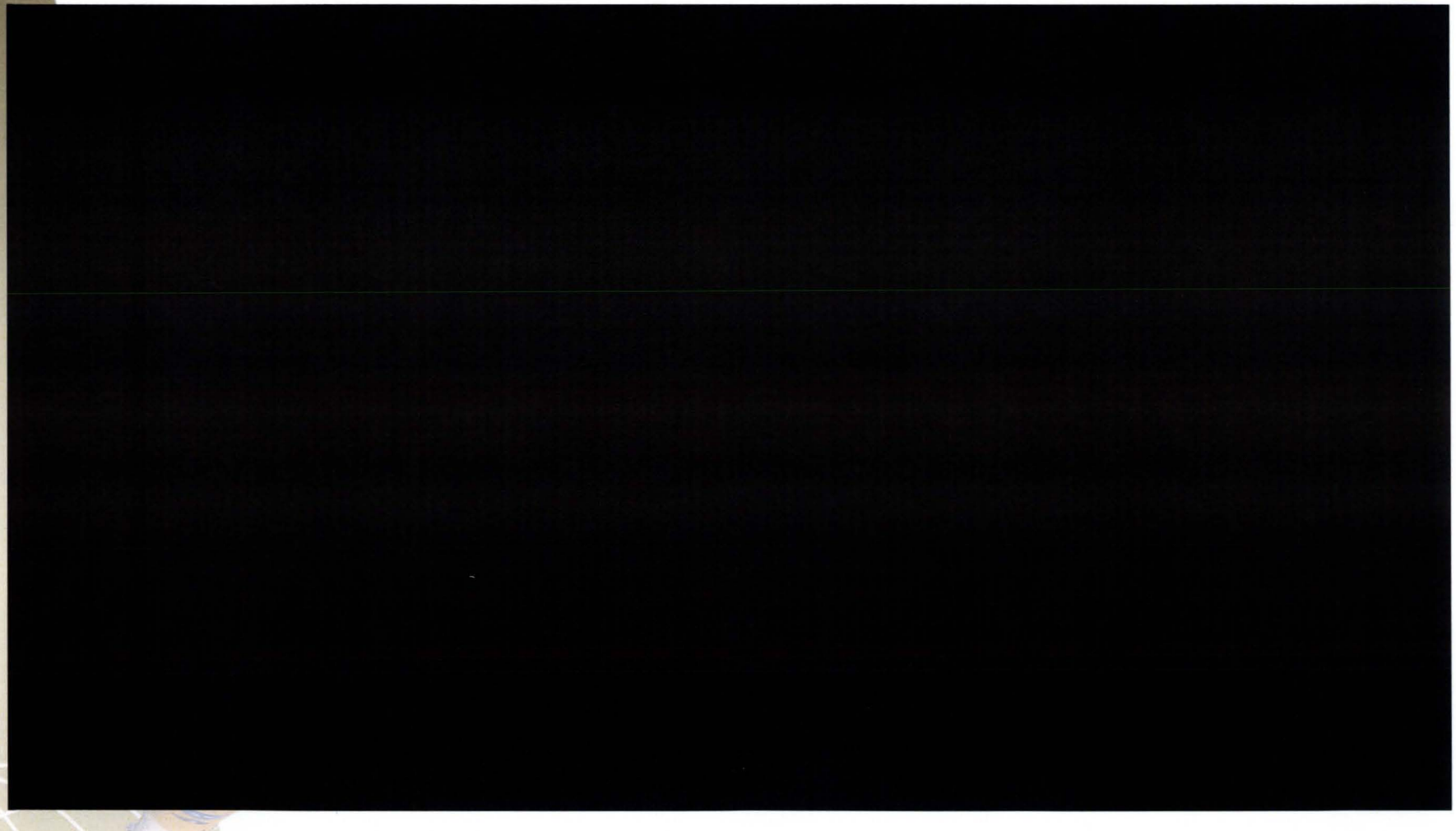
Agenda

- Project Overview
- Testing Strategy
- Project Status
- Quality in Ares Design

Ares Project Introduction

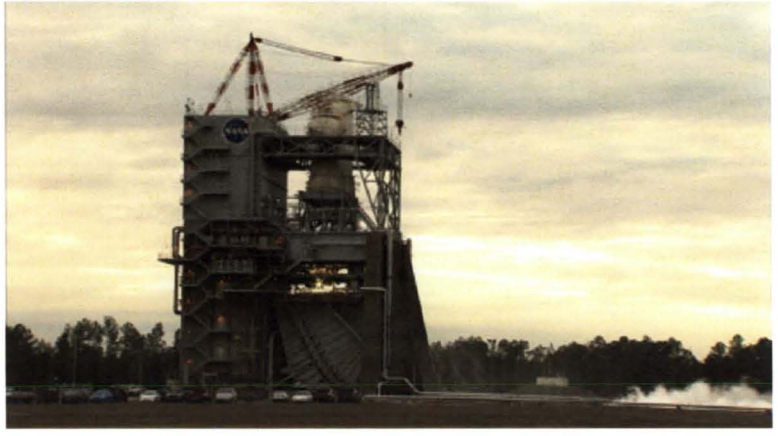
- **The next chapter in human space exploration—Moon, Mars and beyond**
- **Building on experience from 50 years of Saturn and Shuttle ops**
- **Exploration Systems Architecture Study (ESAS) established requirements**
- **U.S. Space Exploration Strategy**
  - Complete the International Space Station
  - Retire the Shuttle
  - Develop and fly the Crew Exploration Vehicle (Orion)
  - Explore and establish an outpost on the Moon
  - Send humans to Mars
- **Separate crew and cargo launch vehicles**

Video: Moon and Beyond



Ares Project Status

First Stage Nozzle
Process Simulation Article



J-2X Powerpack Testing

Fabricating Gore
Dome Panels for Upper Stage

Over 4,000 Hours of
Wind Tunnel Testing

Testing Strategy

- **"Test as you fly" strategy**
- **Ground, flight, and orbital tests**
- **Ares I-X**
  - April 2009
  - Suborbital flight test
  - Combination of operational and mockup hardware
  - Demonstrate ability to control Ares I vehicle
- **Additional Ares tests**
  - Ares I-Y: First flight of five-segment RSRB
  - Orion 1: First flight of J-2X and Orion
  - 2015: First crewed flight to International Space Station
  - 2018: First flight of Ares V

Lean, Kaizen, Six Sigma, and Other Best Practices in Ares Design

- **Applied Lean practices to Ares I-X flight test organization and schedule margins**
- **Instituting Lean and Kaizen practices throughout the Ares Project**
  - Creating Lean success stories
  - Using Kaizen to improve operational and business practices
  - Using Kaizen to develop new operational and business processes
- **Using Six Sigma experiment design to develop and improve Ares upper stage production practices**
- **Establishing team norms to model appropriate behavior within Ares and S&MA**

S&MA in Ares Design – Summary

- Providing more resources to support Ares design work
- Making S&MA more independent for objective assessments
- Improving discipline expertise as well as training and mentoring opportunities for new employees
- Adding value through Failure Mode Effect Analyses (FMEAs)
- Improving system safety
- Getting involved in quality up front using Lean, Six Sigma, and Kaizen practices
- Receiving respect for technical expertise
- Becoming an organization where NASA's best and brightest want to work
- Bringing unique engineering expertise to the table in support of programs and projects

Questions?

Chris Cianciola

www.nasa.gov/ares