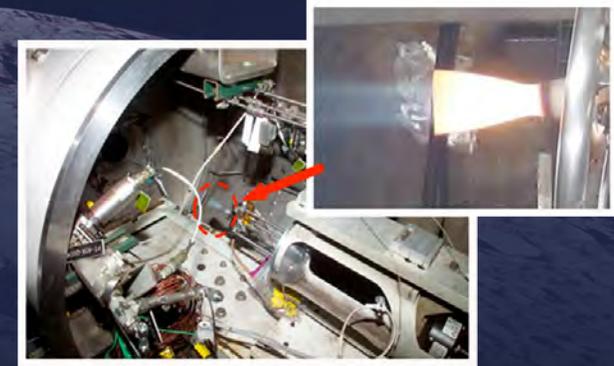
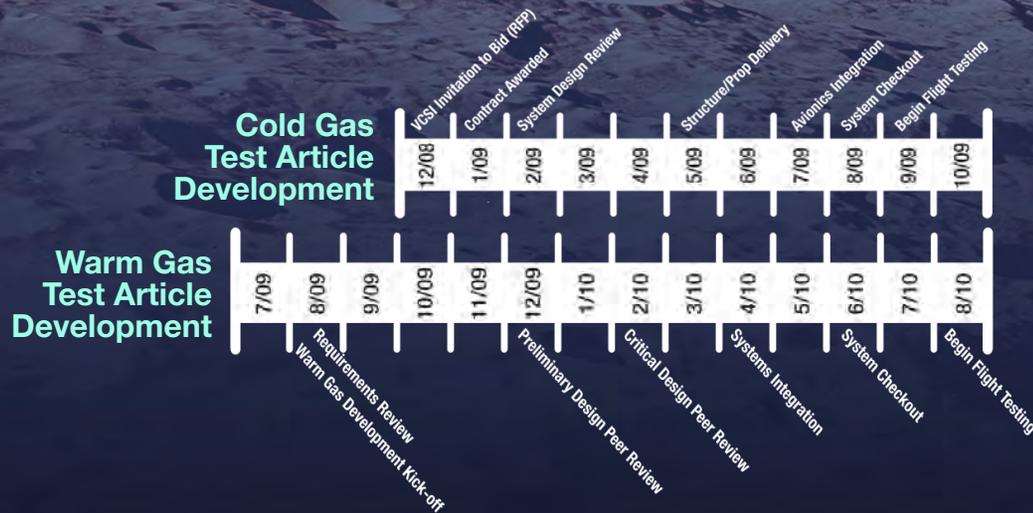




DACS Thruster Testing



Test Setup in Vacuum Chamber at WSTF

## Robotic Lander Test Activities

# NASA's Robotic Lunar Lander Development Project — Robotic Lander Test Activities

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The Robotic Lunar Lander Development Project is conducting test and risk reduction activities through unique collaborations and by leveraging existing government and industry resources. The Lunar Lander Exploration Test Bed is a joint effort that includes NASA's Marshall Space Flight Center, Johns Hopkins Applied Physics Laboratory, and the Von Braun Center for Science and Innovation, which is comprised of academic and private industry partners. The project's propulsion risk reduction activities are leveraging heritage hardware through new applications of Missile Defense Agency and Department of Defense technology.

## Cold Gas Test Article Characteristics

- Completed in 9 months
- Emulates Robotic Lunar Lander thruster configuration
- Demonstrates autonomous controlled descent and attitude control
- Utilizes compressed air for safety, operational simplicity, and frequent testing
- Flight time of 10 seconds at 3,000 psi

## Warm Gas Test Article Characteristics

- Provides longer flight duration (~1 min) and greater altitude for more complex testing
- Emulates Robotic Lunar Lander thruster configuration
- Demonstrates autonomous controlled descent and attitude control
- Utilizes flightlike sensor suite

- Structure developed using flightlike processes and materials
- Provides flightlike software environment
- Utilizes flightlike avionics components (processors)

## Test Bed Capabilities

- Flexibility to accommodate various sensors, avionics, and software/ algorithms for test
- Open to academia and private industry testing

## Propulsion Testing

- Conducted successful hot-fire test series with DACS thruster across a wide range of pulsing, power-level, and operating conditions
- Simulated mission profile from launch to lunar landing
- Demonstrated use of modified propellant to reduce heater power
- Met 100% of the hot-fire test objectives
- Benefits include lower cost, smaller system volume (improved packaging), lower system mass, lower minimum operating temperature (with modified propellant)
- Plan Attitude Control Thruster testing at White Sands Test Facility in April 2010

For more information on the Robotic Lunar Lander Development Project, please visit <[www.nasa.gov/roboticlander](http://www.nasa.gov/roboticlander)>.