Lockheed Martin Completes Mars Science Laboratory Heatshield For NASA's Jet Propulsion Laboratory

PARIS AIR SHOW -- Lockheed Martin has completed production and testing of the heatshield for NASA's Mars Science Laboratory (MSL). The heatshield is half of the large and sophisticated two-part aeroshell that will encapsulate and protect the Curiosity rover during its deep space cruise to Mars, and from the intense heat and friction that will be generated as the system descends through the Martian atmosphere.

In October 2008, Lockheed Martin delivered the other half of the aeroshell, the backshell, to NASA's Jet Propulsion Laboratory in Pasadena, Calif. where it is being integrated with other flight systems. The heatshield will be stored at Lockheed Martin facilities near Denver, Colo. until early 2011 when it will be shipped to Kennedy Space Center.

The aeroshell/heatshield is the largest ever built to be flown at 4.5 meters (nearly 15 feet) in diameter. In contrast, the aeroshells/heatshields of the Spirit and Opportunity Mars Exploration Rovers measured 8.5 feet and Apollo capsule heatshields measured just less than 13 feet.

Because of the unique entry trajectory profile that could create external temperatures up to 3,800 degrees Fahrenheit, the heatshield uses a tiled Phenolic Impregnated Carbon Ablator (PICA) thermal protection system instead of the Mars heritage Super Lightweight Ablator (SLA) 561V. This will be the first time PICA has flown on a Mars mission. Invented by NASA Ames Research Center, PICA was first flown as the thermal protection system on the heatshield of the Stardust Sample Return Capsule that is now in the Smithsonian Air and Space Museum.

"The Mars Science Laboratory aeroshell is the most complex capsule to fly to Mars," said Rich Hund, MSL program manager at Lockheed Martin Space Systems Company. "The design had to address the large size and weight of the rover, the largest ever sent to Mars, and the requirement for landing at a more-precise point on Mars."

The aeroshell has a steering capability that is produced by ejecting ballast that off-sets the center-of-mass prior to entry into the atmosphere. This off-set creates lift as it interacts with the thin Martian atmosphere and allows roll control and autonomous steering through the use of thrusters.

Prior to shipping to Kennedy Space Center, engineers will install the MSL Entry Descent and Landing Instrumentation (MEDLI) suite on the heatshield. Developed by NASA Langley Research Center, the MEDLI instrumentation will measure heatshield temperatures and atmospheric pressures as the aeroshell descends through the Martian atmosphere.

Scheduled for launch in the fall of 2011, the Curiosity rover - built by the Jet Propulsion Laboratory - will support the Mars Exploration Program's strategy of "follow the water" and will have the science goals of determining whether the planet was ever habitable, characterizing the climate and geology of Mars, and preparing for human exploration.

Headquartered in Bethesda, Md., Lockheed Martin is a global security company that employs about 146,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services. The corporation reported 2008 sales of $42.7 billion.

NOTE: Photographs of the MSL heatshield being built at Lockheed Martin are available at:

http://www.lockheedmartin.com/news/press_releases/2009/0616ssMSLHeatShield .html

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