October sky

PHOTO: NASA's 327-foot-(100-meter-) tall Ares I-X test rocket lifts off from Launch Complex 39B at Kennedy Space Center on Oct. 28. The rocket produced 2.96 million pounds (13,167 kilonewtons) of thrust at liftoff. This was the first launch from Kennedy's pads of a vehicle other than the space shuttle since the Apollo Program's Saturn rockets were retired. NASA

The **Ares I** rocket could send the next generation of U.S. astronauts into space.

BY AMY L. REAGAN

A fiery streak lit up the midday sky over NASA's Kennedy Space Center in late October, the first time in more than a generation that NASA had tested a new rocket. The Ares I-X flight test was a key milestone for NASA's Constellation Program and for the Ares I rocket, which is being developed to launch the next generation of astronauts into space once the space shuttles are retired.

As it has been since the dawn of the Space Age, Boeing is at the fore of developing this important capability.

Boeing is the design and production partner for the Ares I upper stage and instrument unit avionics. The upper stage is the second stage of the rocket; the avionics, or "brains," of Ares I will provide guidance, navigation and control for the rocket until it reaches orbit.

Since winning the contracts two years ago, the Boeing Space Exploration team in Huntsville, Ala., has worked closely with NASA to validate the upper stage and avionics designs. Boeing employees have supported and conducted trade studies to determine the best materials and designs for the rocket, and worked to develop processes and procedures that will be used to manufacture the upper stage and avionics units.

The team has made great strides, according to Jim Chilton, Boeing's vice president of Exploration Launch Systems. "By working closely with the customer and having an intimate understanding of their requirements and needs, we've been able to develop a safe and reliable vehicle that can return humans to the moon."

Even as the Ares I program moves forward after the successful first flight of the Ares I-X, there are questions about the direction of America's human spaceflight program, as well as the future of the Ares program. In October, a presidential commissioned blue-ribbon panel reviewing U.S. human spaceflight plans submitted a list of options to President Obama. The administration could announce its decision on the nation's future space policy before the end of the 2009 (see box below).

In the meantime, Boeing's Ares team is determined to fulfill its mission.

"The most important thing for our employees to focus on right now is performing on the contracts we have in hand," Chilton said. "We're in a very dynamic time, but focusing on performance and productivity will ensure we continue to have a role in America's human spaceflight plans."

The NASA-Boeing team is co-located at Marshall Space Flight Center in Huntsville, Ala. "Being close to the customer and being able to run into them in the hallway allows us to work through any problems quickly and efficiently," Chilton said.

This close customer interaction will continue when Boeing begins production of the upper stage and avionics units at NASA's Michoud Assembly Facility, outside New Orleans, in late 2010. NASA and its contractors are already preparing Michoud for the Ares upper stage and avionics work.

Because the tooling required to produce the upper stage is about the height of a 2.5-story building, the first step in the facilities work is to reinforce the floors in the Boeing Ares areas. Once the floor is reinforced, a robotic weld tool and a machining center will be installed. Also, construction has begun on a Vertical Assembly Building where the upper stages will be assembled.

About 15 Boeing employees work at Michoud. That number is expected to grow to about 120 by the end of next year. Steve Larson, Boeing facilities manager and the first employee hired at Michoud to support the Ares program, said of the progress being made at the facility in preparation for production, "It's exciting to see the construction work and the facility really starting to become the location for

WHITE HOUSE TO DECIDE COURSE FOR NASA HUMAN SPACEFLIGHT

In October, a 10-member independent committee appointed by U.S. President Obama to review the country's human spaceflight plans concluded that NASA needs increased funding of $3 billion a year to continue efforts to return to the moon using the current Constellation architecture that includes Ares I. The Review of U.S. Human Space Flight Plans committee, led by retired aerospace executive Norman Augustine, provided the administration several other options, including extending operations of the International Space Station to 2020 and replacing Ares I with commercial launch vehicles for low Earth orbit missions.

The committee's report followed months of public meetings, tours of NASA centers, and meetings with industry representatives and other experts. In June, Boeing Space Exploration leaders met in Huntsville, Ala., with members of the committee to share information about Boeing's role in space exploration and the capabilities Boeing offers for human spaceflight. Pat Schondel, Boeing vice president for Integrated Defense Systems Government Relations, said the report represents a wake-up call for the human spaceflight program by focusing attention on the critical funding challenges faced by NASA.

"We look forward to the president and his administration reviewing the findings of the committee and hope the severity of NASA's underfunding in exploration resonates with the president," Schondel said.

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– Jim Chilton, Boeing's vice president of Exploration Launch Systems

Ares and Constellation work."

This isn't the first time Boeing has been at Michoud. In the 1960s, Boeing was the prime contractor of the first stage of the Saturn V, which propelled the massive moon rocket on the first leg of its journey into space. Boeing manufactured the first stage at Michoud.

"Boeing and the Michoud Assembly Facility have an impressive legacy of supporting human spaceflight. We're excited that we can once again team with NASA and the local community to continue that legacy," said Rick Navarro, Boeing director of stage operations for the Ares I and Boeing site leader at Michoud.

Before production begins, however, Boeing and NASA employees at Marshall Space Flight Center are developing the manufacturing and welding processes for the upper stage and avionics units.

"By doing this work at Marshall before production begins at Michoud, we can identify areas that need improvement, reduce costs and work through any issues prior to the start of actual production," Navarro said. "We also are ensuring Lean+ principles are instilled in the design and processes from the earliest stages of the program."

As the program has matured, the Ares team has reached out to experts across Boeing to utilize their experience and capabilities.

A team in Seattle is manufacturing an Ares I interstage test article (the interstage is the interface between the Orion, the Apollo-like crew capsule that will launch on the new rocket, and the Ares I upper stage). And employees from the Space Shuttle program in Houston have been sharing their vehicle and integration experience with their Ares counterparts, some spending significant time in Huntsville supporting the Ares team.

Sharing experience is vital to performing on existing contracts and winning new ones, Chilton said. "One of our strengths at Boeing is we can look across the company for knowledge and solutions to emerging challenges. Many, many people across Boeing own the success of the Ares team." ■

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UPPER STAGE

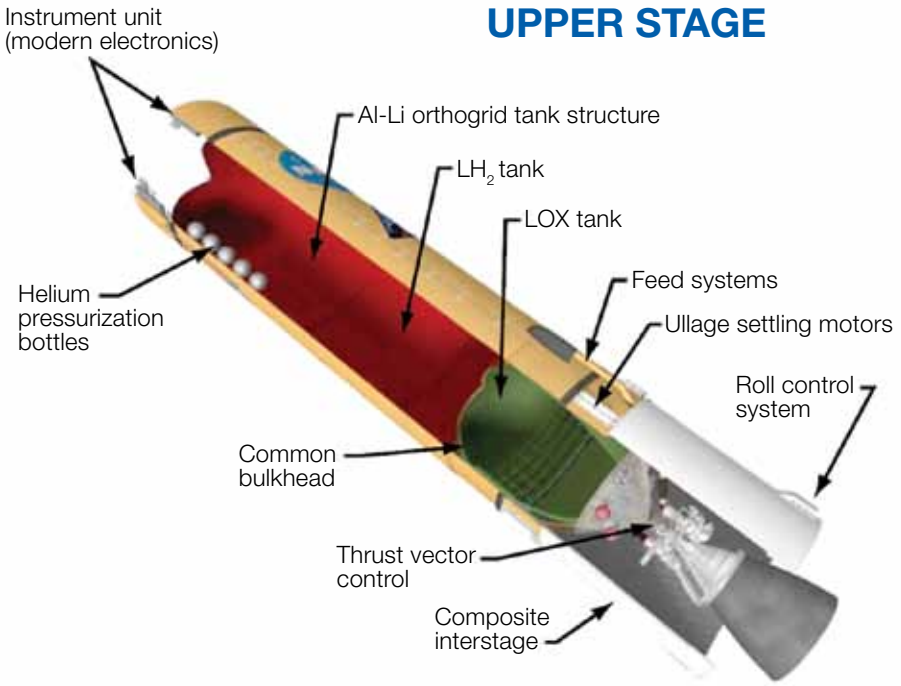

PHOTO: Boeing's Rebecca Ahern, Scott Scarberry and Bill McGee discuss the requirements for welding an Ares liquid hydrogen tank dome. In the background is a full-size dome test article on the robotic weld tool, one of the largest tools of its kind in the world, located at Marshall Space Flight Center in Huntsville, Ala. MIKE MCCORMICK/BOEING

GRAPHIC: Boeing is NASA's design and production partner for the Ares I second, or upper stage, and instrument unit avionics. NASA