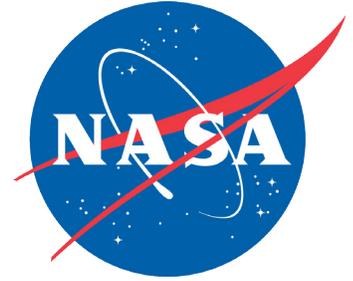


# Spaceport News

John F. Kennedy Space Center - America's gateway to the universe



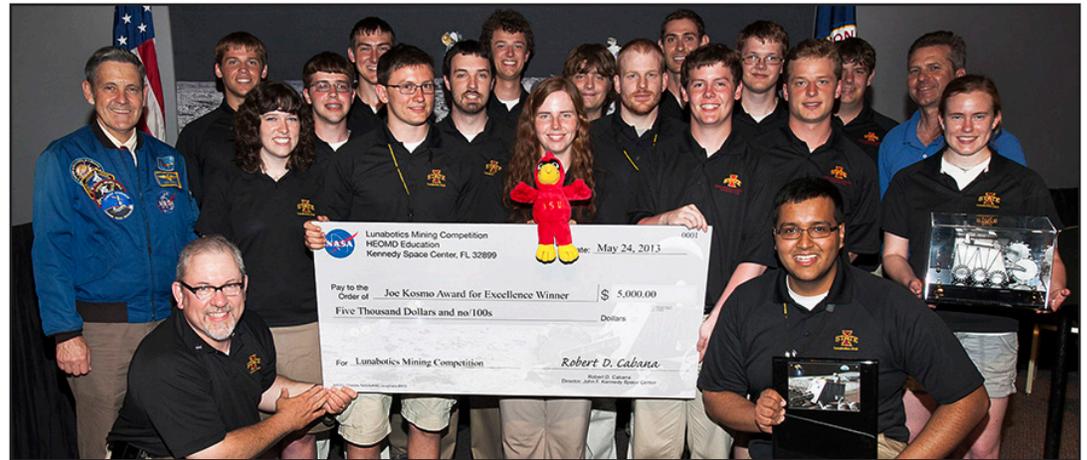
## Students 'dig deep' in mining competition

By Linda Herridge  
Spaceport News

Overcoming challenges, displaying teamwork and sharing team spirit were all part of NASA's Fourth Annual Robotic Mining Competition, coordinated by Kennedy Space Center's Education Office and held May 20-24 at the Kennedy Space Center Visitor Complex.

Fifty college and university teams from the U.S., Australia, Bangladesh, Canada, Colombia, India, Mexico and Poland brought their unique robotic miners to the visitor complex. During four days of intense competition, the teams placed their robots in the mining arena to dig in the rocky terrain of simulated extraterrestrial regolith and deposit at least the minimum amount of 10 kilograms in the hopper.

Teams also prepared and presented a systems engineering paper and slide presentation, demonstrated their robotic miners to a panel of judges, displayed team spirit, performed outreach education projects and worked to display



NASA/ Tom Farrar

Team LunaCY from Iowa State University won the grand prize, the Joe Kosmo Award for Excellence, at NASA's Fourth Annual Robotic Mining Competition held May 20-24 at the Kennedy Space Center Visitor Complex. The award is given to the team that scores the most points during the competition and includes a trophy, \$5,000 team scholarship, Kennedy launch invitations, and an opportunity to attend one of NASA's remote research and technology tests. At far left is Kennedy Director Bob Cabana.

efficient use of communications power during robotic operations.

When the "dust" settled May 24, several teams were recognized at the awards ceremony held in one of the visitor complex's IMAX theaters.

The grand prize, the Joe Kosmo Award for Excellence, was awarded to Iowa State University Team LunaCY for accumulating the most points during the competition. The team also received the First

Place On-Site Mining Award for collecting the most regolith.

"We weren't sure how it was going to work out," said Katie Goebel, the project director. "It was amazing and very nice that our hard work as a team paid off like we wanted it to."

"It was a labor of love, and even with the challenges, we were able to have an exciting and inspiring competition," said Gloria Murphy, mining competition project manager.

"Reading about the teams and their dedication to this competition energized me and all of the event coordinators and volunteers."

During the awards ceremony, Kennedy Center Director Bob Cabana said, "I hope you learned what inspires you and what challenges you. It's our destiny to go beyond Earth. We are explorers."

For the complete story, go to <http://www.nasa.gov/kennedy>

Inside this issue...

Rocket University



Page 2

Boeing milestones



Page 3

Orion update



Page 7

Hurricane season



Page 8

# 'Rocket U' enhances flight engineering skills

By Bob Granath  
Spaceport News

As NASA plans for future spaceflight programs to low-Earth orbit and beyond, teams of engineers at the Kennedy Space Center are gaining flight systems experience in designing and launching vehicle systems on a small scale. As part of Rocket University, the engineers are given an opportunity to work a fast-track project to develop skills in flight systems through the life cycle of a program.

Four teams of five to eight members from Kennedy are designing rockets complete with avionics, separation and



NASA/Jim Grossmann

A Rocket University team of engineers displays a small rocket following its launch May 24. From the left are Myphi Tran of Flight Instrumentation, Susan Danley of Flight Structures, Morgan Simpson of Flight Hardware Processing, Kim Simpson of Fluids, Mechanical and Structural Systems, Leandro James of Systems Hardware Engineering and Julio Najarro of Mechanical Assembly, Lifting and Handling.

recovery systems.

Launch operations require coordination with federal agencies, just as they would with rockets launched in support of a NASA mission.

"Rocket University began in the summer of 2010," said Kevin Vega, assistant chief engineer

for NASA's Commercial Crew Program (CCP). "As the Space Shuttle Program was coming to an end, we realized many of our engineers were working systems designed long ago. 'Rocket U' was developed to help civil service and some contractor engineers

expand their skill set, flight systems engineering experience and learn to manage design programs."

Rocket University is designed to develop, refine and maintain flight engineering skills. The training program's goals include developing and

testing new technologies and potential ground-breaking systems through projects involving small scale vehicles.

NASA is currently working in partnership with the nation's aerospace industry in the Commercial Crew Program to develop space transportation systems to launch astronauts safely to the International Space Station. Also in the design stages are the Orion multi-purpose crew vehicle and the Space Launch System advanced, heavy-lift rocket to provide the capability for human exploration beyond low-Earth orbit.

For the complete story, go to <http://www.nasa.gov/kennedy>

## NASA, United Paradyne sign agreement

Spaceport News Report

Kennedy Space Center signed a new partnership agreement May 20 with United Paradyne Corp. of Santa Maria, Calif., for use of the Hypergolic Maintenance Facility (HMF).

The HMF previously was used during NASA's Apollo and Space Shuttle Programs. Because of NASA's transition from the shuttle to future commercial and government mission activities, this agreement allows NASA to preserve the unique facility capabilities for future spaceflight projects.

United Paradyne will utilize the HMF to provide offline processing support services in the storage, delivery, handling and maintenance of hypergolic and green propellant commodities and satellite fueling operations.

The company also will provide services to refurbish, manufacture and assemble test ground support equipment.

"Kennedy continues to work with the commercial community to find innovative ways to use and preserve our unique capabilities," Kennedy Director Bob Cabana said. "With the support of organizations such as the Economic Development Commission of Florida's Space Coast, Kennedy Space Center is well on its way to becoming a world-class multiuser launch complex. We look forward to our partnership with United Paradyne and its contributions to America's space program."

### More online

For more information about United Paradyne Corp., visit: <http://www.unitedparadyne.com>.



NASA file/2009

United Paradyne soon will utilize Kennedy Space Center's Hypergolic Maintenance Facility, as shown in this 2009 photo.

Under a 15-year lease agreement, United Paradyne will operate and maintain the facility at its own expense. The company, which will access the facility in June, will employ about

12 aerospace workers within the first year and has a goal of achieving 50 new jobs over the next four years.

Kennedy's center planning and development team and the Economic Development Commission of Florida's Space Coast worked with the company to establish the agreement.

United Paradyne is a privately held business specializing in hypergolic storage facility operations and satellite fueling services.

Kennedy is positioning itself for the next era of space exploration, transitioning to a 21st-century launch facility with multiple users, both private and government. A dynamic infrastructure is taking shape, designed to host many kinds of spacecraft and rockets sending people on America's next adventures in space.

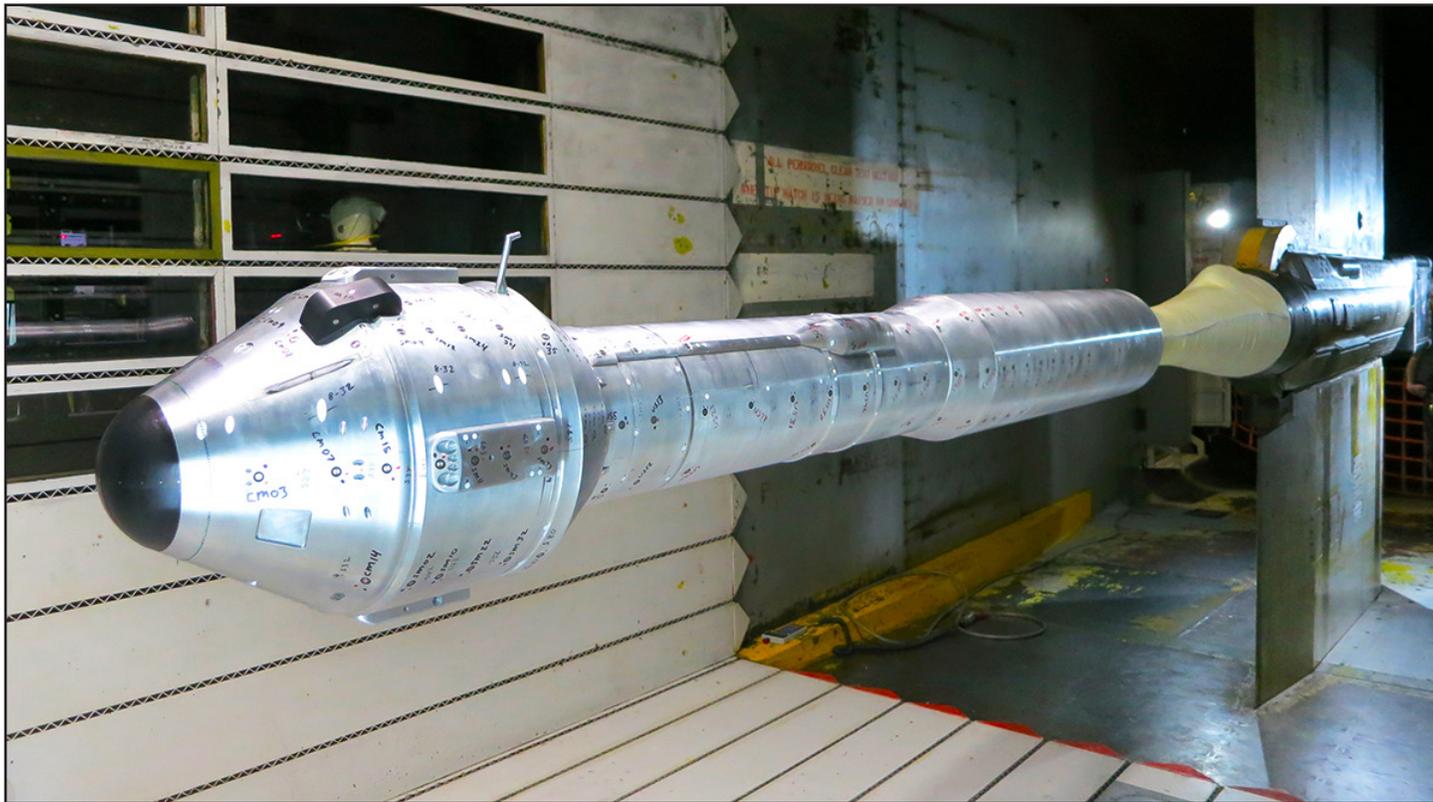


Photo courtesy of the Boeing Company

Shown is the integrated model at NASA's Ames Research Center in Moffett Field, Calif. The model is a seven percent model of the Boeing CST-100 vehicle, launch vehicle adaptor (LVA) and launch vehicle (LV).

## Boeing completes pair of new milestones

By **Rebecca Regan**  
Spaceport News

The Boeing Company of Houston, a NASA Commercial Crew Program (CCP) partner, recently performed wind tunnel testing of its CST-100 spacecraft and integrated launch vehicle, the United Launch Alliance (ULA) Atlas V rocket. The testing is part of NASA's Commercial Crew Integrated Capability (CCiCap) initiative, intended to make commercial human spaceflight services available for government and commercial customers.

Boeing and ULA also worked together to test a newly devel-

oped component of the Atlas V's Centaur upper stage. Boeing now has completed two of eight performance milestones under CCiCap and is on track to complete all 19 of its milestones around mid-2014.

"The Centaur has a long and storied past of launching the agency's most successful spacecraft to other worlds," said Ed Mango, NASA's CCP manager at the agency's Kennedy Space Center in Florida. "Because it has never been used for human spaceflight before, these tests are critical to ensuring a smooth and safe performance for the crew members who will be riding atop the human-rated Atlas V."

The wind tunnel tests, which began in March and wrapped up in May at NASA's Ames Research Center in Moffett Field, Calif., were the first interface tests of Boeing's spacecraft, launch vehicle adaptor and launch vehicle. A scale model of the integrated spacecraft and rocket was placed in Ames' 11-foot diameter transonic wind tunnel. The data gathered provides Boeing with critical information it needs to ensure its system is safe for launching crews to low-Earth orbit.

The Centaur liquid oxygen-feed duct line was tested in March in Murrieta, Calif., to characterize how liquid oxygen moves from the

stage's oxygen tank to its two engines where the propellant will be mixed with liquid hydrogen to create thrust. The Centaur, which takes over after the Atlas V first stage runs low on propellants, will push the spacecraft to its intended orbit. The Centaur has an extensive and successful history of delivering spacecraft to their destinations, including carrying NASA's Curiosity science rover to Mars.

"The CST-100 and Atlas V, connected with the launch vehicle adaptor, performed exactly as expected and confirmed our expectations of how they will perform together in flight," said John Mulholland, Boeing vice

president and program manager for Commercial Programs.

Boeing is one of three U.S. companies NASA is working with during CCiCap to set the stage for a crewed orbital demonstration mission around the middle of the decade. Future development and certification initiatives eventually will lead to the availability of human spaceflight services for NASA to send astronauts to the International Space Station from the United States.

### More online

For more information about NASA's Commercial Crew Program, visit:  
<http://www.nasa.gov/commercialcrew>.

# Scenes Around Kennedy Space Center



CLICK ON PHOTO NASA/Tom Tschida  
Plastic wrapping that protected Sierra Nevada Corporation's Dream Chaser flight test vehicle during its transport from Colorado is carefully removed by Dream Chaser Crew Chief Christian White following the craft's arrival at NASA's Dryden Flight Research Center in Southern California on May 15. The test vehicle will undergo ground and approach-and-landing flight tests in coming months at NASA Dryden. For more information on NASA's Commercial Crew Program, click on the photo.



CLICK ON PHOTO NASA/Dimitri Gerondidakis  
An aerial view captures construction workers removing crawler track panels from the surface of Launch Pad 39B at Kennedy Space Center. Launch Pad 39B is being refurbished to support NASA's Space Launch System and other launch vehicles. The Ground Systems Development and Operations Program (GSDO) at Kennedy is leading the center's transformation to safely handle a variety of rockets and spacecraft. For more information about GSDO, click on the photo.



CLICK ON PHOTO NASA/Randy Beaudoin, VAFB  
Engineers and members of the IRIS-Pegasus launch team re-verify the spacecraft May 24 at Vandenberg Air Force Base in California, ahead of the next flight simulation for the mission. NASA's IRIS spacecraft, short for Interface Region Imaging Spectrograph, is being prepared for launch no earlier than June 26 on a Pegasus XL rocket from Vandenberg. For more about the IRIS mission, click on the photo.



CLICK ON PHOTO NASA/Kim Shifflett  
The KSC Veterans Group hosted its first annual cookout May 29 at KARS Park II. Those in attendance included Kennedy Center Director Bob Cabana and Associate Director Kelvin Manning, who can be seen on the right side of the photo.



CLICK ON PHOTO NASA/Jim Grossmann  
A group of nine Florida Institute of Technology aspiring journalists observe the interior of the mobile launcher inside the Vehicle Assembly Building at NASA's Kennedy Space Center on May 22. The group of students, in collaboration with Florida Today, is working on a multimedia project that examines health in zero gravity and how life in space can help people live better on Earth. These multimedia stories will be published for the print and online versions of Florida Today. To learn more about their findings, click on the photo.



CLICK ON PHOTO NASA/Kim Shifflett  
Students of the Asian-Pacific American Coalition (APAC) of the University of Central Florida (UCF) perform a lion dance during the Asian-Pacific American Heritage Month celebration May 23 in the KSC Training Auditorium. The theme of the event, hosted by Kennedy's Asian-Pacific American Connection (APAC) was "Building Leadership: Embracing Cultural Values and Inclusion." APAC is an employee resource group at KSC.



CLICK ON PHOTO

NASA/Jim Grossmann

During the second in a series of "Masters with Masters" interviews May 29, Ed Hoffman, left, NASA's chief knowledge officer, moderates questions from the audience at Kennedy Space Center for Bob Sieck, former space shuttle launch director, and Kennedy Director Bob Cabana. The series is presented by the Academy of Program/Project and Engineering Leadership.

## Masters session details transition, era

By Steven Siceloff  
Spaceport News

Kennedy Space Center saw a dramatic restructuring in the late 1970s, but the transition now under way is in some ways more substantial given that the entire civilian spaceflight architecture is changing, said two of the main figures behind both evolutions.

"We don't want to lose the lessons we learned, but we also need to see how to operate more efficiently," said Bob Cabana, Kennedy's center director and a former space shuttle commander. "We know where we want to be and we have to go make that happen."

Working to the center's advantage is a newly detailed mission to capture an asteroid using an uncrewed spacecraft and move it to an area near the moon where astronauts can travel to it and take samples for detailed analysis.

"I can't say enough good things about our future," Cabana said. "Let's go off and do something really hard and challenging."

Although that one mission will entail tremendous work and research into the construction of a new, massive rocket, the Space Launch System; a new spacecraft called Orion; and a solar-electric spacecraft strong enough to maneuver an asteroid, Cabana said Kennedy's transition will not stop there.

It also will include numerous launch companies, some partnering closely with NASA's Commercial Crew Program to carry astronauts to the International Space Station and others using the center's vast and unique facilities to

launch business models of their own.

"We have an opportunity to define what we want our future to be, we are diversifying," Cabana said. "I think that's hugely exciting."

Cabana was joined by Bob Sieck, the iconic former shuttle launch director, for the second in the "Masters with Masters" series of interviews with NASA's Chief Knowledge Officer Ed Hoffman on May 29. The session was recorded and will go into the agency's knowledge base website.

Both discussed in detail how the approach to spaceflight changed during their careers and what that suggests for the future.

Sieck, who came to Kennedy in 1964 to

work in the Gemini program, said the agency's noted workforce adapted repeatedly to changing spacecraft, new rockets and different missions, although it was always resisted by everyone's urge to keep doing things as they had done before.

"You had to understand it's a different mission and you had to do things differently," Sieck said.

The change was most dramatic starting in 1976 as the agency moved from landing astronauts on the moon with Apollo to making spaceflight more routine with the space shuttle. The first shuttle mission launched in 1981, but it would be several more years before the processing and launch teams hit their stride, Sieck said, fueled

in part by new workers.

"It wasn't until we got the next generation involved that we really started ticking," Sieck said. "Apollo was a great adventure, but from a performance standpoint, I'd rate shuttle higher."

Both offered several keys to making a successful transition, including not trying to cut corners.

"Transitions are disruptive," Sieck said. "But don't tell us here's why we can't, tell us here's how we can and we'll go get the resources."

Cabana told the audience to embrace assignments, especially ones that are outside their comfort zones. Working with that thought in mind, the agency and its premier launch center will come through this transition strong, he said.

"A lot has to happen between now and then to make this happen," Cabana said. "I think it's a clear definition of where we need to go and we're on board."

***"Transitions are disruptive, But don't tell us here's why we can't, tell us here's how we can and we'll go get the resources."***

*Bob Sieck, Space Shuttle Launch Director, 1984-1994*

# Orion test vehicle undergoes pyro bolt test

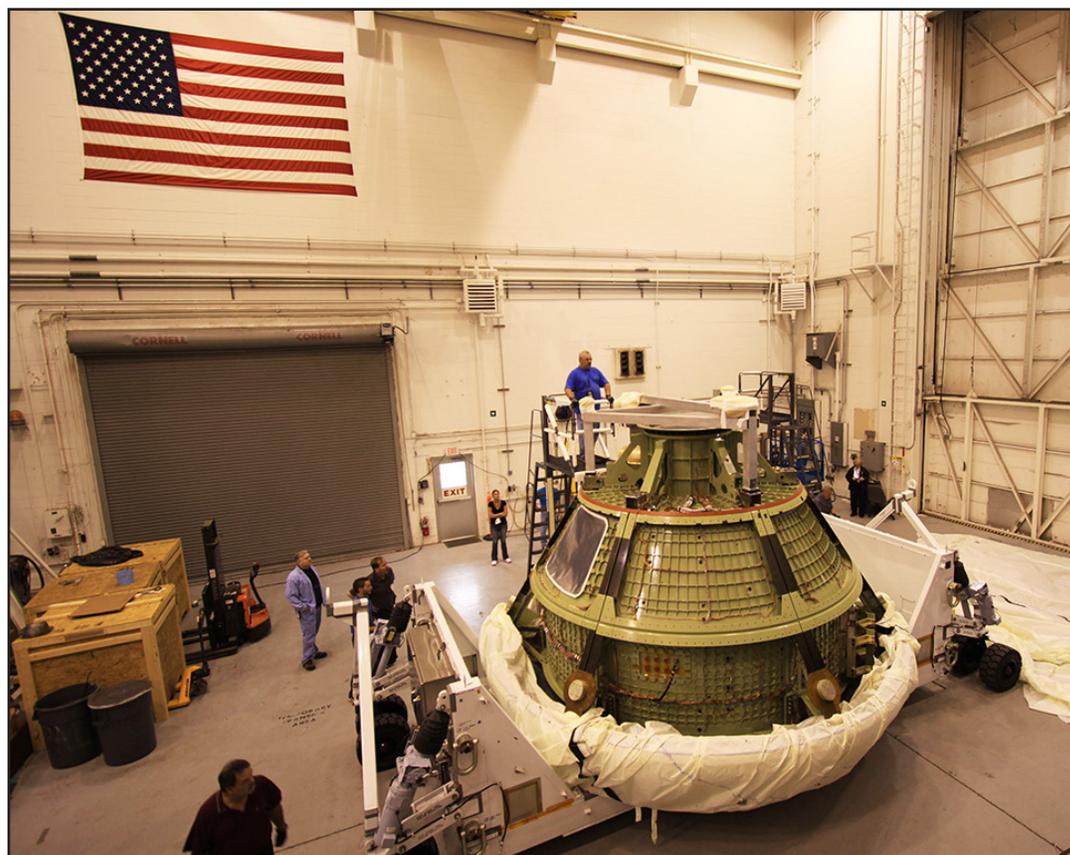
By Linda Herridge  
Spaceport News

Lockheed Martin engineers and technicians completed a series of pyrotechnic bolt tests on the Orion ground test vehicle (GTA) in the Launch Equipment Test Facility (LETF) at Kennedy Space Center May 13-17.

Earlier in the month, the GTA was transported from the Operations and Checkout Building to the LETF. During the week, technicians individually tested five frangible, or breakable, nut detonations between the GTA and a launch abort system (LAS) retention and release mechanism. Each test took about four hours to set up and about 30 minutes to test.

The purpose of the LAS is to ignite its solid-fueled engines and lift Orion and its crew away from disaster in the unlikely event that the booster fails during the first part of launch.

"The purpose of the test was to reduce the shock levels on Orion when the launch abort system is jettisoned," said John Blair, the Lockheed Martin Orion Manufacturing Engineering



NASA/Jim Grossmann

Workers moved the Orion ground test vehicle (GTA) from the Operations and Checkout Building to the Launch Equipment Test Facility on May 13. Lockheed Martin workers uncovered the GTA to prepare it for the second series of pyrotechnic bolt tests.

manager. "Several different materials and detonation device designs were tested on the GTA, providing data that will be evaluated to choose the best design for Exploration Flight Test-1."

Orion is the exploration spacecraft designed to carry crews to space beyond low-Earth orbit. It will provide emergency abort capability, sustain the crew during space travel and provide safe re-entry from deep space return velocities. Orion's first uncrewed test flight, EFT-1, is scheduled to launch in 2014 atop a Delta IV rocket.

The tests involved a LAS and measured how the explosive separation mechanism affected the GTA and its tiles as it separated the spacecraft from the LAS. The data collected from the tests will be used to assess how the shock levels, generated by the separation, affect the capsule's tiles and surrounding components.

"Shock discovery tests like this one anchor the analytical

models and record the shock levels the spacecraft will experience during separation events," said Ryne Waggoner, the Lockheed Martin Orion Mechanisms test engineer. "Correctly predicting the EFT-1 shock environment is critical to protecting sensitive electronic components."

The first series of pyrotechnic tests was performed in the LETF in October 2012. Waggoner said the tests were successful, and the thermal protection system tiles showed no damage due to the shock, and all of the accelerometers collected consistent, accurate data.

The GTA is being used for pathfinding operations, including simulated manufacturing and assembly procedures in the O&C.



NASA/Kim Shifflett

In October 2012, Lockheed Martin workers prepared the Orion ground test vehicle for the first series of pyrotechnic bolt tests inside the Launch Equipment Test Facility.

## Expect active 2013 hurricane season

The 2013 hurricane season is expected to be very active -- 163 percent of average. On May 23, the National Oceanic and Atmospheric Administration (NOAA) predicted the Atlantic hurricane season will have 13 to 20 named tropical storms, seven to 11 hurricanes, and three to six major hurricanes of Category-3 strength or higher (111 mph or higher). An average season has 12 tropical storms, six hurricanes, and three major hurricanes.

The official hurricane season is June 1 to Nov. 30, with a peak from mid-August to late October.

There are two primary reasons for this year's well above normal hurricane season forecast. First, water temperatures across most of the tropical Atlantic Ocean are well above average. Warmer water increases the formation and intensification of tropical cyclones. Second, El Nino is unlikely to form this summer or fall. An El Nino is a warmer than average water temperature in the equatorial Pacific Ocean. The lack of El Nino means the subtropical jet stream over the tropical Atlantic Ocean will be weaker, decreasing wind shear and allowing more tropical cyclone activity.

The NOAA forecast is consistent with the forecast from Colorado State University issued April 10. NOAA will update its forecast in early August, before hurricane activity usually increases significantly.

Remember, it takes only one land-falling hurricane to cause a disaster. BE PREPARED! Weather safety training, including hurricane preparedness, is available from the 45th Weather Squadron (william.roeder@us.af.mil, 853-8410), or the KSC Emergency Management Office, (wayne.m.kee@nasa.gov, 867-8723).

## Looking up and ahead . . .

*\* All times are Eastern*

### June 5

**Mission:** ISS Automated Transfer Vehicle 4

**Launch Vehicle:** Ariane 5

**Launch Site:** Guiana Space Centre, French Guiana

**Launch Pad:** ELA-3

**Description:** The European Space Agency's ATV-4, also known as the "Albert Einstein," will deliver several tons of supplies to the ISS, docking with the Zvezda Service Module on the Russian segment of the station June 15.

### June 26

**Mission:** Interface Region Imaging Spectrograph (IRIS)

**Launch Vehicle:** Pegasus XL

**Launch Site:** Vandenberg Air Force Base, Calif.

**Launch Window:** 10:25:04 to 10:30:04 p.m.

**Launch Time:** 10:27:34 p.m.

**Description:** IRIS is designed to provide significant new information to increase our understanding of energy transport into the sun's corona and solar wind and provide an archetype for all stellar atmospheres.

### July 24

**Mission:** ISS Resupply

**Launch Vehicle:** ISS Progress 52

**Launch Site:** Baikonur Cosmodrome, Kazakhstan

**Description:** Progress 52 will carry supplies, hardware, fuel and water to the ISS.

### Sept. 5

**Mission:** Lunar Atmosphere and Dust Environment Explorer (LADEE)

**Launch Vehicle:** Minotaur V

**Launch Site:** Wallops Flight Facility, Va.

**Launch Time:** 10:37 p.m.

**Launch Pad:** Mid-Atlantic Regional Spaceport Pad 0B

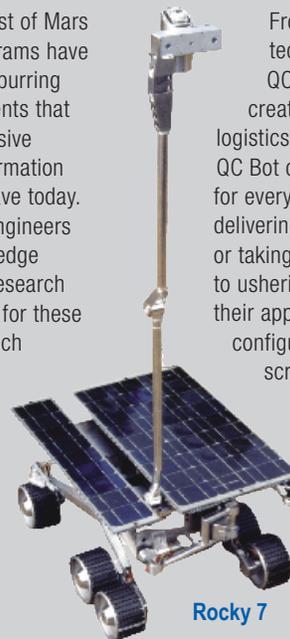
**Description:** LADEE will gather detailed information about conditions near the surface and environmental influences on lunar dust. A thorough understanding of these influences will help researchers understand how future exploration may shape the lunar environment and how the environment may affect future explorers.

To watch a NASA launch online, go to <http://www.nasa.gov/ntv>.

## NASA Spinoffs: Did You Know?

### Mars rovers paved the way for hospital robots

Over the years, a host of Mars missions and programs have built on one another, spurring technology advancements that have led to the impressive collection of Mars information and images that we have today. NASA scientists and engineers gained valuable knowledge and experience from research models, or prototypes, for these Mars missions. One such prototype -- Rocky 7 -- was built at the Jet Propulsion Laboratory (JPL) in the mid-1990s as a research test rover for navigation and sampling technology on Mars.



Rocky 7

From this technology, the QC Bot was created. To ease logistics in hospitals, QC Bot can be used for everything from delivering medications or taking out the trash, to ushering patients to their appointments. A configurable touch screen allows hospital staff and patients to interact with the robot through intuitive menus.



QC Bot

The touch screen can be used for completing bedside registration, as well as capturing vital signs. To achieve each of these tasks, the robot can autonomously call elevators and find its way through corridors. And with NASA's fourth annual mining competition recently held at the Kennedy Space Center Visitor Complex that featured unique robotic miners created by college students, we can only wonder what the next generation of technology will inspire.

For more about NASA Spinoffs, go to <http://www.nasa.gov/spinoffs>.



John F. Kennedy Space Center

## Spaceport News

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