Sept. 20, 2013 Vol. 53, No. 19

Spaceport News

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

UAV contest challenges engineers

By Steven Siceloff
Spaceport News

Competition was in high gear at Kennedy Space Center recently as three teams piloted unique remote-controlled and autonomous aircraft through a demanding series of search-and-rescue tasks, capping off months of work that pushed NASA engineers outside their usual specialties.

Using helicopters, rotorcraft and a built-from-scratch, radio-controlled airplane, the teams scanned a mock airplane crash site with sensors and software they developed and installed in the aircraft. The flights took place at the north end of the Shuttle Landing Facility at a time when the airspace around it was closed so the craft wouldn't interfere with runway operations.

Although human operators were at the flight controls of the aircraft, the sensors had to identify the aircraft, a replica "black box" and several crash dummies. Later, the aircraft were sent on endurance runs.

NASA field centers Kennedy, Johnson Space Center and Marshall Space Flight Center took part in the competition while engineers from Ames Research Center, Dryden Flight Research Center and Langley Research Center judged the results.

"There was a plaque, but other than bragging rights, that was about it," said Mark Ross, a NASA test director who coordinated the competition.

The technology could be implemented in a number of different ways, including locating a crew returning from space or rescuing stranded hikers, pilots or boaters. The real point of the competition, though, was to add new skills to established engineers' portfolios and to give young engineers a taste of the process that goes into developing a full project.

"There was a lot of realization that this was a rare opportunity to see things from cradle to grave, to see something from idea to actually flying," Ross said. "They also learned a good bit about the systems engineering process, which was the whole intent behind this and how to apply it in a practical way."

Kennedy's Rocket University developed the fixed-wing, remote-control aircraft used in the competition. The group built the airframe from scratch, along with designing the software to operate it.

"The whole purpose is to use low-cost, high-capability equipment to get hands-on experience," said Steve Sullivan, chief engineer for the Kennedy team. "If you go to class, build something and fly it, that stays with you. I think it keeps your brain sharp."

The principle of diversifying engineers' skills also is in keeping with Kennedy's push to operate as a multi-user spaceport with expertise in many different areas, Sullivan said.

Working outside their areas of expertise excited the engineers from all the centers and made them work together intently, said Jan Lomness, project manager for the Kennedy aircraft.

"I think the team camaraderie and exchange of information was really important," Lomness said.

Peter Ma, an engineer with the Marshall team, said the hardest part about the software design was getting the machine to recognize people. The Marshall group went on to win the competition.

"People can be in a lot of different positions, make a lot of shapes," he said.

The aircraft went through a full safety and air worthiness review before being allowed to fly at Kennedy, despite being very small and not carrying a crew, said Tom Friers, the chief of Flight Operations.

A remote-controlled helicopter with a unique set of sensors and software flies during a competition Sept. 11 at Kennedy Space Center.

NASA/Dimitri Gerondidakis

Innovation Expo unites spaceport's efforts

By Bob Granath
Spaceport News

Kennedy Space Center's annual Innovation Expo is designed to spark creativity and new ideas to aid in transitioning the spaceport from a historically government-only launch facility to a multi-user spaceport. On Sept. 10, as part of the four-day event, Kennedy's Center Planning and Development Directorate (CPD) hosted displays by partners, bringing together center employees with many of the organizations that are helping build the center's future.

Innovation is defined as the introduction of something new or a fresh idea, method or device. Kennedy's Innovation Expo highlights just that -- groundbreaking efforts facilitated by both civil service and contractor employees, as well as partner organizations. The exhibits and presentations allow those who are developing new approaches to share how they plan to implement their ideas.

"We hope this will lead to some 'out-of-the-box' thinking about Kennedy becoming a multi-user spaceport," said Scott Colloredo, director of CPD. "We also hope this will be a forum to encourage interaction between partners, resulting in developing relationships that will lead to collaborative efforts."

Center Planning and Development is the "front door" for partnerships with Kennedy. With a partnership, the agency can allow industry to operate a facility or provide services NASA wants to maintain.

"Through partnerships with industry and academia, KSC is truly becoming a multi-user spaceport," Colloredo said. "This is the first time we've had partner displays at Kennedy's Innovation Expo."

Kennedy employees had an opportunity to meet many of NASA's partners. Additionally, representatives from partner organizations had an opportunity to interact with each other and learn how each adds value to developing the Kennedy Space Center of the future.

"The invitation to Kennedy's Innovation Expo provided us an opportunity to meet and collaborate with other companies and space center employees, which was very positive for our company." said Martin Belson, president and chief executive officer of Diversified Industries C&IS Inc.

Booths representing CPD focused on Spaceport Planning, Partnership Development, Research and Technology, Technology Evaluation for Environmental Risk Mitigation and Flight Opportunities Programs.

According to Robert Ashley, Kennedy's manager of the Flight Opportunities Program in NASA's Research and Technology Management Office, the program gives engineers and principal investigators multiple innovative ways to flight test their new space technologies.

"One of the agency's biggest challenges is space testing and space qualification of promising new technologies that are needed to extend our presence farther out into the solar system and beyond," he said.

During the Innovation Expo, Howard Biegler, Human Launch Services lead for United Launch Alliance, showed off a Dual Satellite System-5 model that provides the Atlas V and Delta IV rockets with the capability of launching two payloads to different orbits on a single launch vehicle.

"By utilizing dual-launch technology, ULA provides efficient use of excess performance margins on launches, which in turn provides lower mission cost and operational flexibility to our customers," Biegler said.

Other organizations represented in the partner exhibits were: The Boeing Company, Craig Technologies, Juntura, Micro Aerospace Solutions, PaR Systems Inc., Quantum Innovative Technologies, Space Coast Energy Consortium, United Paradyne Corp. and the University of Central Florida.

NASA/Charisse Nahser

At the 2013 Innovative Expo Sept. 11, Howard Biegler, right, Human Launch Services lead for United Launch Alliance, describes a model of his company's payload fairing, which could deploy multiple satellites on a single launch vehicle.

Nearly 1,000 attend event

The 2013 Kennedy Space Center Innovation Expo came to a close Sept. 13. Nearly 1,000 Kennedy employees attended the four-day event, which included a showcase, kick-start, guest speaker engagement, tours of the center and a finale.

"The Innovation Expo was created to kindle a creative and collaborative culture within the Kennedy workforce," said Derrick Bailey, expo chair and NASA mission safety engineer. "The Innovation Expo Team wants the Kennedy workforce to know opportunities exist for them to reach outside their day-to-day routine and make substantial improvements to how we operate and to the products we create."

The expo was designed to provide a forum for individuals to learn about ongoing activities at Kennedy, to break down organizational silos that hinder collaboration and to establish relationships where expertise can be shared cross-organizationally.

Center Director Bob Cabana believes innovation is the key to success for future missions, endeavors and business at Kennedy.

"I've received a lot of positive feedback about the 2013 Innovation Expo and I couldn't agree more," said Cabana. "Not only did the expo highlight new technologies, showcase technology initiatives being worked across the center through the different lectures and tours, and provide the opportunity for innovators to kick off projects through our KSC KickStart program, but it also brought together 17 of our center partners for an unprecedented display of the different collaborations being worked centerwide. I am proud of what we accomplished this year."

Boeing completes MCC interface test

By Rebecca Regan
Spaceport News

For the first time, the Mission Control Center (MCC) at NASA's Johnson Space Center in Houston has tested communications with a commercial made, crew-capable spacecraft, as The Boeing Company conducted an interface test between the MCC and software planned for the company's CST-100 spacecraft.

Boeing has partnered with NASA to develop a fully integrated crew transportation system, with its CST-100 spacecraft and United Launch Alliance Atlas V rocket, in partnership with NASA's Commercial Crew Program (CCP). New commercial spaceflight capabilities being developed by NASA partners through commercial crew initiatives could eventually provide services to transport astronauts to and from the International Space Station, launching from U.S. soil.

The August test verified that Boeing could send and receive data from its Avionics Software Integration Facility to the MCC. The company's software facility and CST-100 spacecraft simulator are serving as precursors to integrated flight operations training.

"Every day, our connection to the humans living and working in space comes through the historic and hallowed MCC in Houston," said Ed Mango, NASA's CCP manager.

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

"As low-Earth orbit opens to a growing commercial space industry, the ability of new spacecraft to communicate with existing space infrastructure is critical."

Through a reimbursable Space Act Agreement with NASA's Mission Operations Directorate, which began during CCP's second phase of development, Boeing is collaborating with the agency on mission planning, training and flight operations for its CST-100.

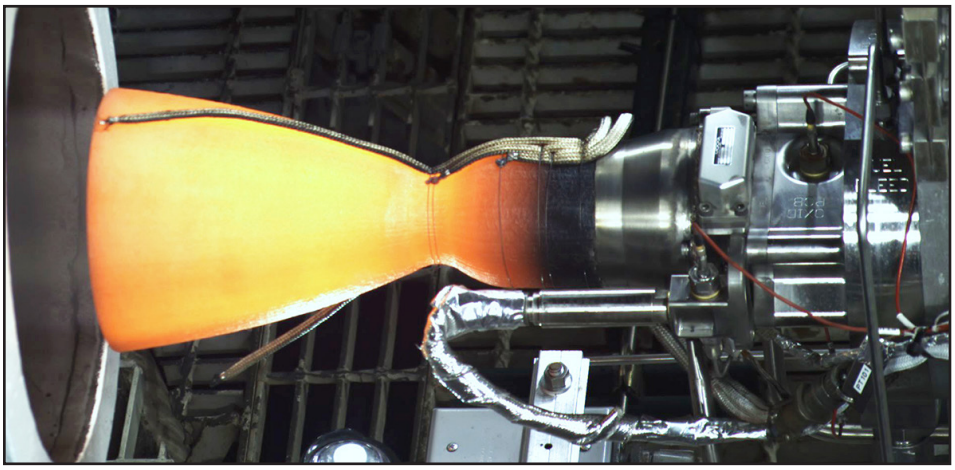
"Our continued partnership with the NASA Mission Operations Directorate brings valued experience to our Commercial Crew Program," said John Mulholland, vice president of Boeing Commercial Crew Programs. "This fully integrated team will ensure that we can safely and affordably conduct missions."

Additional interconnectivity assessments conducted by Boeing will include software avionics testing for the ascent phase of flight and demonstrations that will put a human at the controls of the spacecraft simulator. A pilot will run through the critical phases of flight, including rendezvous and docking by firing thrusters, navigating state changes and adjusting the spacecraft attitude.

Courtesy of United Launch Alliance

This is an artist concept of The Boeing Company's CST-100 spacecraft atop a United Launch Alliance (ULA) Atlas V rocket.

Hot-fire thruster test milestone completed



Courtesy of Boeing

A thruster glows red during a hot-fire test of Boeing's CST-100 spacecraft orbital maneuvering and attitude control (OMAC) system. During the tests at NASA's White Sands Test Facility in Las Cruces, N.M., Boeing and partner Aerojet Rocketdyne tested two thrusters to demonstrate stable combustion and performance in a vacuum, simulating a space environment. Two additional thrusters were tested in a vacuum to demonstrate long-duration mission survivability. The 24 thrusters that compose the CST-100's OMAC system will be jettisoned with the service module after deorbit burn, prior to re-entry.

CCP rocking steady

NASA's Commercial Crew Program (CCP) is four years old and continues to build momentum toward space. After beginning with artist concepts and designs, spacecraft developers now are testing full-size models and taking steps to qualify subsystems.

The agency's astronauts are practicing launches and landings in simulators to iron out the details in critical software. CCP's progress so far is the result of diligent and relentless efforts to reshape America's human spaceflight program.

Spacecraft developed by CCP partners will be the safest, most reliable and cost-effective transportation systems to and from low-Earth orbit and the International Space Station.

NASA and CCP stand on a path leading to launch from American soil in 2017. To see the progress to date, watch this video: **http://go.nasa.gov/150ryFH**.

Self-healing metal SMASHes fatigue

By Bob Granath
Spaceport News

A future spacecraft landing on a distant planet may have an improved margin of safety due to innovative metal alloys being developed at Kennedy Space Center. Called "SMASH," Shape Memory Alloy Self-Healing is a technology that creates metals that, when damaged, can repair themselves.

Aircraft and spacecraft can be subject to material fatigue, the progressive and localized structural damage that occurs when a material is subjected to repetitive stress.

"This technology could be used on deep-space missions to destinations such as Mars or for high-performance aircraft," said Clara Wright, a materials engineer in NASA's Engineering and Technology Directorate and the principal investigator for the project.

NARI is part of the agency's Aeronautics Research Mission Directorate (ARMD) and was established to invest in innovative, early-stage and potentially revolutionary aviation concepts and technologies.

This is the first time that a Kennedy-led team has been selected for both the Phase I and Phase II seedling award in this type of project. The NARI Seedling Fund provides NASA civil servants the opportunity to perform research, analysis and proof-of-concept development of ideas that have the potential to meet national aeronautics needs.

Wright works in Kennedy's Materials and Process Engineering Branch and within the Failure Analysis Laboratory where experts determine why structures break down and how to avoid future malfunctions.

During Phase I, and leveraging a NASA Early Career Faculty Award, the SMASH team developed structural alloys that could self-repair fatigue cracks.

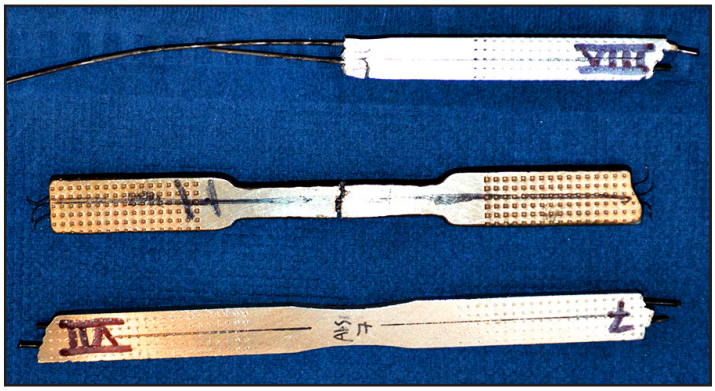
NASA/Bob Granath

Clara Wright, a materials engineer in NASA's Engineering and Technology Directorate, displays one of the Shape Memory Alloy Self-Healing, or SMASH, samples during Kennedy's 2013 Innovation Expo Sept. 10. The principal investigator for the SMASH project, Wright explained the effort to guests at an exhibit in the lobby of the Operations and Checkout Building.

The Phase II SMASH team researchers include Catherine Brinson, Ph. D., professor and chair of Mechanical Engineering at Northwestern University in Illinois, and Terryl Wallace, Ph. D., of Structural Materials Engineering at NASA's Langley Research Center in Virginia.

For Phase II, Northwestern will be using finite element modeling to determine the best alloy reinforcement, while Langley will be supporting fabrication and potential applications for both aeronautical vehicles and spacecraft.

"The alloys being developed are to be used in critical locations where fatigue crack propagation fractures would likely occur," Wright said. "We'd use them in areas where we can predict stress localization that might cause fatigue on aircraft structural parts, such as where the wings attach to the fuselage or areas that involve repetitive motion such as the landing gear."



NASA/Bob Granath

A display at the Innovation Expo Sept. 10 illustrates how SMASH technology begins by reinforcing metal alloys with "shape-memory wire," similar to that used in dental braces, but with much higher performance (top). Under repeated loading, metal can break over time (middle). Before full failure, heating can force the shape-memory wire to return the sample to its original form (bottom), and continued heating causes a low melting phase in the metal alloy matrix to fill in the gap where the crack occurred.

Wright points out that for spacecraft traveling far from Earth, a repair shop would not be an option.

"This is all about finding ways to mitigate potential damage from stress and coming up with a good answer to that problem," she said. "Once a spacecraft is well beyond Earth, anything we can do to stop crack propagation and prevent a failure will improve our safety margins."

The SMASH technology begins by adding to metal alloys "shape-memory wire," similar to that used in dental braces.

"Once shaped, memory wire will want to return to its original form," said Wright, "so if stress bends a metal component out of its designed shape, it will want to return to its proper form."

The key to shape-memory wire returning to its designed shape is heat.

"In the case of dental braces, the heat in the person's mouth keeps the braces in the correct shape, pulling the teeth in the desired position," she said. "For the SMASH aerospace alloys, if a fatigue crack begins, the shape-memory alloys' reinforcements will stretch across the crack."

Wright explains that putting the technology to work in actual aircraft or spacecraft is still about eight to 10 years away.

"In the Failure Analysis Lab, we are usually trying to figure out why something failed," she said. "The SMASH Project is giving us an opportunity to determine how to prevent failures in the first place."

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

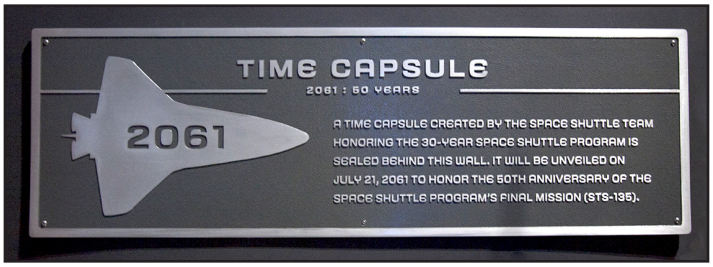
Scenes Around Kennedy Space Center

NASA

Retired Astronaut Winston Scott, left, Tom Joyner, and Hortense Burt, Teacher and Student Programs lead of Kennedy Space Center's Education Programs and University Research Division, take part in the Tom Joyner Family Reunion Aug. 29 to Sept. 1 at the Gaylord Palms Resort and Convention Center in Orlando. Families from all over the country joined Joyner and his celebrity friends for a weekend filled with stellar concerts; visits to Universal Studios, Sea World and Islands of Adventure; interaction with celebrities and leaders; and enlightening seminars.

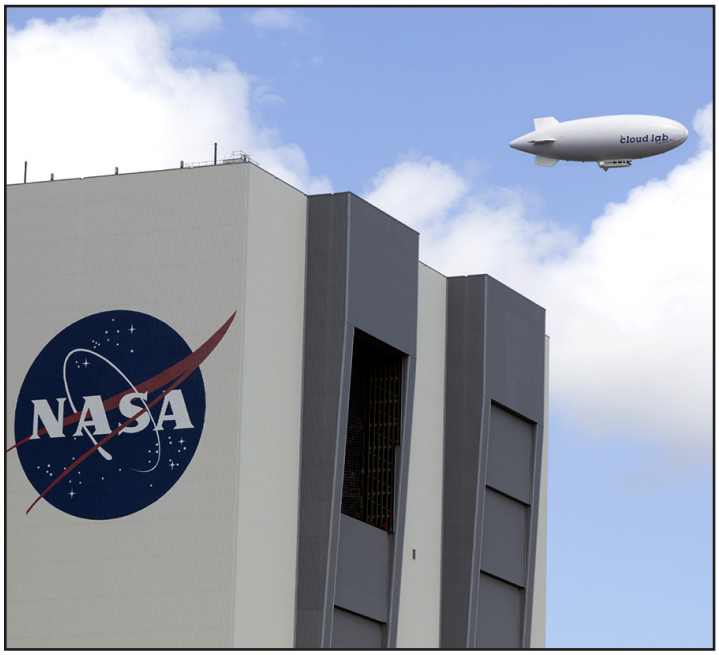
NASA/Jim Grossmann

Brevard County Sheriff Wayne Ivey, a nationally acknowledged expert on the subject of identity theft prevention, gave a one-hour presentation in the KSC Training Auditorium on how to avoid being the victim of identity theft to Kennedy workers Sept. 10. Sheriff Ivey said more than 10 million people are victimized and Florida has the highest rate of occurrence in the nation.



NASA/Jim Grossmann

A Space Shuttle Program time capsule was enshrined Sept. 9 in a secured vault within the walls of the 90,000-square-foot Space Shuttle Atlantis home inside the Kennedy Space Center Visitor Complex. The time capsule, containing artifacts and other memorabilia associated with the history of the program is designated to be opened on the 50th anniversary of the shuttle's final landing following STS-135.



NASA/Dimitri Gerondidakis

An airship from the British Broadcasting Corp., or BBC, flies over Launch Complex 39 past the Vehicle Assembly Building at Kennedy Sept. 18. A team of scientists from the BBC's television project "Cloud Lab" is conducting a number of experiments aboard the airship as it flies across the U.S., exploring all aspects of the Earth's atmosphere. One of the experiments is NASA's Microorganisms in the Stratosphere, or MIST, which is designed to measure the microbial survival and cellular responses to exposure in the upper atmosphere.

NASA/Glenn Benson

Carol Craig, founder and CEO of Craig Technologies, discusses technology transfer Sept. 12 with attendees at the Technology Transfer Forum of the Economic Development Commission of Florida's Space Coast. A goal of the session was to showcase ways commercial businesses can work with NASA to develop new, and apply existing, technology to commercial uses.

Engineers test MAVEN communications

By Steven Siceloff
Spaceport News

NASA/Kim Shiflett

Engineers and technicians deploy the Solar Wind Electron Analyzer boom on the Mars Atmosphere and Volatile EvolutioN (MAVEN) spacecraft Sept. 16 inside the Payload Hazardous Servicing Facility at Kennedy. The analyzer will measure the solar wind and electrons in the ionosphere of the Red Planet. MAVEN is being prepared for its scheduled launch in November from Cape Canaveral Air Force Station atop a United Launch Alliance Atlas V rocket. Positioned in an orbit above the Red Planet, MAVEN will study the upper atmosphere of Mars in unprecedented detail. For more information, click on the photo.

It's not easy to simulate millions of miles electronically, but that's what engineers did recently as they tested the all-important communications system the MAVEN spacecraft will use to relay its study results from Mars orbit to Earth-bound researchers.

Working from their consoles at Kennedy, a team of test engineers from the Jet Propulsion Laboratory in California, better known as JPL, conducted more than a week of evaluations on the antennas and circuitry aboard the spacecraft.

They beamed signals to the low-gain and high-gain antennas on MAVEN and basically treated the machine as though it really were flying on a 10-month journey from Earth to Mars and then studying the upper atmosphere of the Red Planet.

Such work is critical, mission managers said, because there is no way to fix a spacecraft's communications system once it leaves Earth.

"It doesn't matter what we do out there if we can't get the data back to Earth," said Jeff Coyne, Lockheed Martin's Assembly Test and Launch Operations manager for the project.

MAVEN is short for Mars Atmosphere and Volatile EvolutioN. It is scheduled to launch in November aboard a United Launch Alliance Atlas V.

"I say this is one of the most important things, because if we can't talk to it . . . ," said Sheryl Bergstrom, manager of JPL's Cape Operations Office at Kennedy.

The testing was standard stuff for the engineers, but nonetheless mind-bending considering that the spacecraft will operate millions of miles from Earth and rely on commands from operators at Goddard Space Flight Center in Maryland.

To mimic the distances between the spacecraft and Earth, the electronic signals sent between the two during testing are run through a cabling system that quickly ramps down the power by going through various wiring networks.

"We'll try to squeeze the signal down to its lowest possible point," said Chris Green, an engineer with Exelis who supervised the testing. "It's a machine and we test its actual flight performance -- every scenario of flight configuration it would be in is what we go through in testing."

NASA has an intricate system of antennas in California, Spain and Australia to pick up and transmit signals to its fleet of spacecraft that now reaches out beyond the solar system in the form of Voyager 1.

Called the Deep Space Network and referred to by its acronym, DSN, the system uses antennas almost as big as a football field to communicate with the spacecraft that are using their own much smaller antennas and more limited power sources.

It's the system NASA uses to communicate with all of its interplanetary probes and some of the spacecraft studying Earth, as well. In addition to Voyager 1, whose signal is incredibly weak because of the vast distance it is from Earth, the network is picking up signals from newer spacecraft such as New Horizons, which is speeding toward Pluto. Cassini in orbit around Saturn, Juno on its way to Jupiter and the Curiosity rover operating on Mars all relay their data to Earth on the DSN and get their commands from ground operators through the same network.

Kennedy's portion of the DSN structure is a testing facility called MIL-71, a reference to the time when the space center was known as the Merritt Island Launch Annex. Every time a spacecraft comes to Kennedy for launch preparations, a team of engineers sets up racks of equipment and computer servers before beginning several days of 12-hour shifts to make sure the mission's communications system and interface with the Deep Space Network will work.

With the spacecraft checked out, the team takes its gear back to California and gets ready for launch day, knowing that it won't hear anything from the spacecraft until well after liftoff. In the case of MAVEN, the engineers and scientists won't find out if the testing really was successful until 54 minutes after launch from Cape Canaveral when MAVEN makes its initial contact with the DSN.

"When the signal is acquired," said Bergstrom, a veteran of long wait-times for good missions and bad, "that's when we get to breathe."

At 36, Voyager 1 enters interstellar space

NASA News Report

NASA's Voyager 1 spacecraft officially is the first human-made object to venture into interstellar space. The 36-year-old probe is about 12 billion miles from our sun.

New and unexpected data indicate Voyager 1 has been traveling for about one year through plasma, or ionized gas, present in the space between stars. Voyager is in a transitional region immediately outside the solar bubble, where some effects from our sun are still evident. A report on the analysis of this new data, an effort led by Don Gurnett and the plasma wave science team at the University of Iowa, Iowa City, was published in a recent edition of the journal Science.

"Now that we have new, key data, we believe this is mankind's historic leap into interstellar space," said Ed Stone, Voyager project scientist based at the California Institute of Technology, Pasadena. "The Voyager team needed time to analyze those observations and make sense of them. But we can now answer the question we've all been asking -- 'Are we there yet?' Yes, we are."

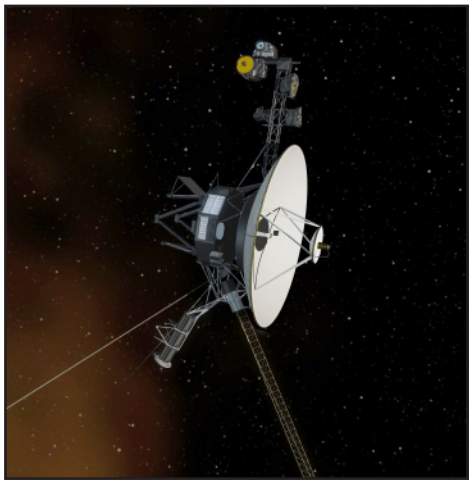
Kennedy Space Center had the privilege of launching the now-historic vehicle into space back in 1977. Jim Womack, former propulsion mechanical branch chief, recalls the excitement from launch.

"We were all smiles – we all knew the [Voyager] missions would be around for a long time," he said. "Though I expected a very successful mission, I'm shocked and proud to know how far it's actually gone."

Voyager 1 and its twin, Voyager 2, were launched 16 days apart in 1977. Both spacecraft flew by Jupiter and Saturn. Voyager 2 also flew by Uranus and Neptune. Voyager 2, launched before Voyager 1, is the longest continuously operated spacecraft. It is about 9.5 billion miles away from our sun.

NASA file/1977

A Titan/Centaur rocket carrying Voyager 1 lifted off from Launch Complex 41 at 8:56 a.m. Sept. 5, 1977. It joined sister spacecraft, Voyager 2, on a mission to the outer planets.



NASA artist conception

This artist's concept shows the Voyager 1 spacecraft entering the space between stars.

Steve Francois, former Launch Services Program manager, worked alongside Womack in the late 1970s.

"I've been following the Voyager missions for 36 years and was thrilled to hear this latest news," said Francois. "Though it didn't have the prestige of a manned launch, we knew Voyager 1 and 2 would do great things."

Voyager mission controllers still talk to or receive data from both Voyagers every day, though the emitted signals are currently very dim, at about 23 watts -- the power of a refrigerator light bulb. By the time the signals get to Earth, they are a fraction of a billion-billionth of a watt. Data from Voyager 1's instruments are transmitted to Earth typically at 160 bits per second, and captured by 34- and 70-meter NASA Deep Space Network stations. Traveling at the speed of light, a signal from Voyager 1 takes about 17 hours to travel to Earth. After the data are transmitted to JPL and processed by the science teams, Voyager data are made publicly available.

"Voyager has boldly gone where no probe has gone before, marking one of the most significant technological achievements in the annals of the history of science, and adding a new chapter in human scientific dreams and endeavors," said John Grunsfeld, NASA's associate administrator for science in Washington. "Perhaps some future deep space explorers will catch up with Voyager, our first interstellar envoy, and reflect on how this intrepid spacecraft helped enable their journey."

Looking up and ahead . . .

***All times are Eastern**

2013

Sept. 25
Mission: Expedition 37/38
Launch Vehicle: Soyuz 36 (TMA-10M)
Launch Site: Baikonur Cosmodrome, Kazakhstan
Launch Time: TBD
Description: Soyuz TMA-10M will carry three Expedition 37/38 crew members to the International Space Station. They are NASA Flight Engineer Michael Hopkins, Soyuz Commander Oleg Kotov and Russian Flight Engineer Sergey Ryzansky.

Nov. 6
Mission: Expedition 38/39
Launch Vehicle: Soyuz 37 (TMA-11M)
Launch Site: Baikonur Cosmodrome, Kazakhstan
Launch Time: TBD
Description: Soyuz TMA-11M will carry three Expedition 38/39 crew members to the International Space Station. They are NASA astronaut Rick Mastracchio, Japan Aerospace Exploration Agency astronaut Koichi Wakata and Russian cosmonaut Mikhail Tyurin.

Nov. 18
Mission: Mars Atmosphere and Volatile EvolutioN (MAVEN)
Launch Vehicle: Atlas V
Launch Site: Cape Canaveral Air Force Station
Launch Pad: Space Launch Complex 41
Launch Time: TBD
Description: MAVEN is the first mission devoted to understanding Mars' upper atmosphere. The mission's goal is to determine the role that loss of atmospheric gas to space played in changing the Martian climate through time.

Nov. 20
Mission: ISS Resupply
Launch Vehicle: ISS Progress 53
Launch Site: Baikonur Cosmodrome, Kazakhstan
Launch Time: TBD
Description: Progress 53 will carry supplies, hardware, fuel and water to the International Space Station.

Dec. 9
Mission: SpaceX-3 Commercial Resupply Services flight
Launch Vehicle: Falcon 9
Launch Site: Cape Canaveral Air Force Station
Launch Pad: Space Launch Complex 40
Launch Time: TBD
Description: SpaceX-3 will be the third commercial resupply mission to the ISS by Space Exploration Technologies (SpaceX).

2014

Date: January
Mission: Tracking and Data Relay Satellite-L (TDRS-L)
Launch Vehicle: Atlas V
Launch Site: Cape Canaveral Air Force Station, Fla.
Launch Time: TBD
Launch Pad: Space Launch Complex 41
Description: TDRS-L is the second of three next-generation satellites designed to ensure vital operational continuity for the NASA Space Network.

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

Cygnus en route for rendezvous with ISS

NASA News Report

While the newest commercial cargo vehicle to join the International Space Station's resupply fleet launched Sept. 18 on its demonstration flight, the Expedition 37 crew aboard the orbiting complex was hard at work with medical research, emergency simulation training and preparations for arrival Sept. 22 of the new space freighter.

NASA commercial space partner Orbital Sciences Corp. of Dulles, Va., launched its Cygnus cargo spacecraft aboard its Antares rocket at 10:58 a.m. EDT from the Mid-Atlantic Regional Spaceport Pad-0A at NASA's Wallops Flight Facility in Virginia. At the time of launch, the space station was flying about 261 miles above the southern Indian Ocean. Cygnus will deliver 1,300 pounds of cargo, including food and clothing, to the space station's Expedition 37 crew.

All three Expedition 37 crew members -- Commander Fyodor Yurchikhin and Flight Engineers Karen Nyberg and Luca Parmitano -- gathered around a laptop computer screen in the station's Destiny laboratory to watch a live video stream of the launch of Cygnus. Nyberg then sent her congratulations to Orbital Sciences via her Twitter account.

NASA

NASA commercial space partner Orbital Sciences Corp. of Dulles, Va., launches its Cygnus cargo spacecraft aboard its Antares rocket at 10:58 a.m. EDT Sept. 18.

Nyberg and Parmitano began their workday aboard the space station reviewing Cygnus' cargo manifest and discussing with ground teams the plan to unload the cargo. During the month that Cygnus is berthed to the station, the crew will unload its 1,300 pounds of cargo and reload it with trash for disposal when Cygnus departs for a destructive re-entry in the Earth's atmosphere.

John F. Kennedy Space Center
Spaceport News

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