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Spaceport News

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

Inside . . .

NASA/Jim Grossmann

Employees at Kennedy Space Center admire space shuttle Atlantis as it moves from Orbiter Processing Facility-2 to the Vehicle Assembly Building on Oct. 17. Atlantis will be moved to the Kennedy Space Center Visitor Complex in November where it will be placed on public display.

Workers celebrate milestone move

By Linda Herridge
Spaceport News

The Oct. 17 move of space shuttle Atlantis from Orbiter Processing Facility-2to the Vehicle Assembly Building gave employees at Kennedy Space Center an opportunity to celebrate. The milestone completed preparations for display at Kennedy's visitor complex. Atlantis will remain in the VAB on display until it is transported to its final home at Kennedy's visitor complex next month.

During the move, Atlantis stopped on the towway for a photo opportunity. For several hours there was a constant crowd of Kennedy employees who brought cameras to take pictures with the shuttle prior to its move to the visitor complex, slated for early November. Adding to the event's festive nature, representatives from the NASA Exchange were on hand with ice cream and other refreshments.

Buddy McKenzie, the United Space Alliance (USA) manager for Atlantis' forward and midbody looks forward to seeing the shuttle on display in the new museum.

"If seeing Atlantis on display inspires even one young child, then it's all worth it," McKenzie said. "It's not the end -- I think of it as a beginning."

Preparations for the move to Atlantis' new home included closing of the shuttle's crew hatch on Oct. 11.

As he did with the final hatch closure on Endeavour, Bob Cabana, director of Kennedy and a former space shuttle commander, lent a hand in bay 2 of the Orbiter Processing Facility as USA technicians Danny Brown and Dave Chodkowski performed the task. Cabana turned the special T-shaped tool, which is much like a key, to lock the hatch in place.

Through this crew hatch, 207 astronauts passed to enter Atlantis and take their seats for launch on 33 space shuttle missions.

"This is the end of an era," Cabana said. "Atlantis is going to have a really nice home at the visitor complex."

"The team preparing Atlantis for display has used the same pride and integrity they had as Atlantis was readied for each flight," said Bart Pannullo, NASA's Transition and Retirement vehicle manager.

"Atlantis is the last space shuttle at Kennedy, the last vehicle to fly," said McKenzie who helped direct the hatch closing. "It's fitting that as the caretakers, we deliver it to the Kennedy Space Center Visitor Complex."

The move to the museum being built especially for the historic spacecraft is scheduled for Nov. 2.

Cabana is looking even further ahead.

"The good side of this is that Atlantis, Discovery and Endeavour will be able to tell the space shuttle story to millions for years to come."

Space Launch System umbilical arm ready for testing

By Bob Granath
Spaceport News

System installation and integration of a test umbilical arm recently was completed at Kennedy Space Center. Components of this arm eventually will be mounted on the new mobile launcher tower to support vital functions on NASA's Space Launch System, or SLS, an advanced heavy-lift rocket that will provide the capability for human exploration beyond low-Earth orbit.

A key element of NASA's plan for future exploration, SLS will boost the Orion spacecraft designed for crews of up to four astronauts traveling on deep-space missions to asteroids and eventually Mars.

The test umbilical arm will support cryogenic, or super-cold, propellant loading for the new rocket's propulsion systems. It recently was mounted to the mobile launcher tower simulator at Kennedy's Launch Equipment Test Facility, or LETF, for further checkouts and simulations.

The results and lessons learned from the testing will be used to develop the next round of umbilical hardware. When testing is complete, some of the hardware will be reused as part of the Orion service module umbilical on the mobile launcher.

The Orion spacecraft consists of two main parts: a conical crew module and a cylindrical service module holding the spacecraft's propulsion system and expendable supplies. The service module umbilical arm supports the primary power and environmental control systems of the spacecraft.

"Design work on the umbilical arm began in 2008," said Steve Larsen, lead design engineer for liquid oxygen systems in NASA's Engineering and Technology Directorate. "The umbilical was originally developed as part of the Constellation program to provide propellant, pneumatic services, power and data connections to the Ares I launch vehicle. After this test, we are planning to reconfigure the arm to provide the same for SLS."

After the cancelation of the Constellation Program, Kennedy's Ground Systems Development and Operations Program office funded fabrication of one umbilical system for testing in the LETF and potential use supporting future NASA launch vehicles.

NASA

The umbilical arm is shown mounted on a simulated portion of the launch umbilical tower recently at Kennedy Space Center's Launch Equipment Test Facility.

In the summer of 2011, EMF Corp. of Merritt Island, Fla., received a contract to fabricate the umbilical arm. The company specializes in manufacturing and designing custom parts and assemblies for a variety of uses.

"After EMF delivered the arm to Kennedy, LETF technicians assembled the arm to its flight-like configuration and installed it for test activities," said Jeff Crisafulli, manager of the LETF.

An umbilical arm is attached to a simulated portion of the launch umbilical tower at the LETF, and a complex series of simulations will follow.

"The primary objective of the tests will be to validate engineering analysis models involving the dynamics of the umbilical arm's retraction, stress and thermal conditions at the ground-to-flight interface," Larsen said. "We'll use the vehicle motion simulator in the LETF to simulate on-pad vehicle sway and liftoff."

Some secondary objectives include evaluating a new fault-tolerant quick disconnect, measuring the performance of a new type of insulation for environmental control system pipes, and assessing the viability of the technology for use on the SLS.

"Since one of the major roles of the umbilical is to load cryogenic propellants for the launch vehicle's propulsion system, we'll perform tests at both ambient and cryogenic temperatures," Crisafulli said. "For this testing we plan to use liquid nitrogen which costs less, is readily available and far less hazardous than liquid hydrogen."

Liquid nitrogen is 321 degrees below zero Fahrenheit, compared to liquid oxygen at 368 degrees below zero and liquid hydrogen at 423 degrees below zero. These commodities bring challenges to hardware due to the extreme cold temperatures involved.

Crisafulli noted that an important focus is on the mechanical and electrical disconnects.

"With safety and reliability among our primary concerns, we want to be sure the system is 'fault tolerant,'" he said. "Altogether we plan to run more than 800 different tests with the vehicle motion simulator."

By engineering and designing the hardware to be "fault tolerant," it ensures the system will still work if one component fails.

"The way the umbilical arm is designed, it retracts away from the SLS rocket by tilting up rather than moving to the side or dropping down," Larsen said. "This allows the umbilical arm to track the vehicle as it is moving up if the primary release mechanism fails. The secondary release mechanism is passively engaged when the vehicle reaches a predetermined height."

While there is still much to do, Crisafulli believes their systems will be ready to support NASA's future deep-space missions.

"LETF testing is on the critical path for mobile launcher operational readiness," he said. "There are currently nine different umbilicals scheduled for qualification testing at the LETF. Once we complete all the needed simulations, we'll be ready to have the hardware installed on the mobile launcher tower. We'll be ready when Orion and SLS are ready to go."

Blue Origin tests rocket engine thrust chamber

By Rebecca Regan
Spaceport News

NASA's Commercial Crew Program (CCP) partner Blue Origin has successfully fired the thrust chamber assembly for its new 100,000 pound thrust BE-3 liquid oxygen, liquid hydrogen rocket engine. As part of Blue's Reusable Booster System (RBS), the engines are designed eventually to launch the biconic-shaped Space Vehicle the company is developing.

The test was part of Blue Origin's work supporting its funded Space Act Agreement with NASA during Commercial Crew Development Round 2 (CCDev2). CCDev2 continues to bring spacecraft and launch vehicle designs forward to develop a U.S. commercial crew space transportation capability that ultimately could become available for the government and other customers.

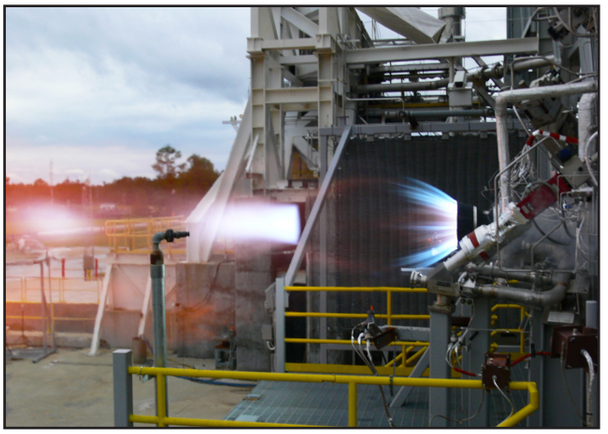


Photo courtesy of Blue Origin

Blue Origin successfully test fires its BE-3 high-performance liquid oxygen, liquid hydrogen engine thrust chamber at NASA's Stennis Space Center in early October.

"Blue Origin continues to be extremely innovative as it develops a crew-capable vehicle for suborbital and orbital flights," said Ed Mango, CCP manager. "We're thrilled the company's engine test fire was met with success."

The test took place early this month on the E-1 test stand at NASA's Stennis Space Center near Bay St. Louis, Miss. Blue Origin engineers successfully completed the test by powering the thrust chamber to its full power level.

"We are very excited to have demonstrated a new class of high-performance hydrogen engines," said Rob Meyerson, president and program manager of Blue Origin. "Access to the Stennis test facility and its talented operations team was instrumental in conducting full-power testing of this new thrust chamber."

As part of CCDev2, Blue Origin also completed a system requirements review of its spacecraft. During the review, engineers and technical experts representing NASA, the Federal Aviation Administration and the company assessed the spacecraft's ability to meet safety and mission requirements to low-Earth orbit. That review also included results from more than 100 wind tunnel tests of the vehicle's aerodynamic design, stability during flight and cross-range maneuverability.

More info online

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

Bike tour breaks records

By Bob Granath
Spaceport News

A total of 559 bicyclists were given a special opportunity to explore NASA's Kennedy Space Center on the morning of Oct. 6 during the annual Tour de KSC. The tour enabled employees and their guests to see historic Kennedy facilities, while raising money for local and international charities.

The ride encourages exercise, good health and serves as the kickoff for the annual Combined Federal Campaign, or CFC. The mission of CFC is to support those in need through a program that is employee focused, cost efficient and effective in providing all civil service employees the opportunity to improve the quality of life.

In brief ceremonies prior to the start of the bicycle ride, center director Bob Cabana said this year's event well exceeded the goal of raising $10,000 and the number of participants was up from 500 a year ago.

"We're kicking off the Combined Federal Campaign here at the Kennedy Space Center in style," he said. "We've set a record today for the amount of money raised by our Tour de KSC CFC kickoff event."

Cabana then presented a check for $11,180 to Susan McGrath, vice president of resource development for United Way of Brevard County.

Tour de KSC co-chairman Bob Willcox, of the Kennedy Information Technology and Communications Services, was pleased with the turnout.

"I am personally proud of the Tour de KSC," Willcox said. "We raised $11,180 for such a great cause, the Combined Federal Campaign. We offer a unique opportunity for our employees to bring family and friends to get a special look at our wonderful facility in a healthful activity."

NASA/Dimitri Gerondidakis

A long line of bicyclists head north on Kennedy Parkway toward the Vehicle Assembly Building on the first leg of the Tour de KSC on Oct. 6.

"The smiles on people's faces before, during, and after speak volumes and make all the hard work worthwhile," Wilcox said.

The reaction of Phil Metzger, a research physicist in Kennedy's Granular Mechanics and Regolith Operations Laboratory, reflected the feelings of many participants.

"My wife and I had so much fun we're wondering why we never did this before," Metzger said. "Helping people through the Combined Federal Campaign, enjoying a beautiful day cycling and seeing the sites at KSC -- what could be better than that?"

More than 25 volunteers helped make the third Tour de KSC possible, assisting along the way.

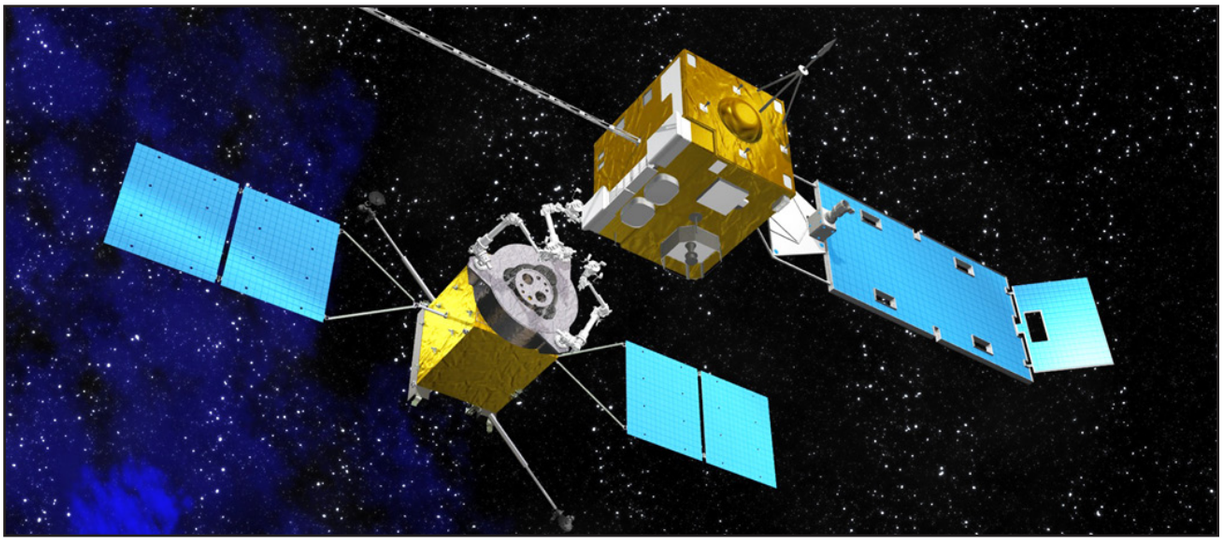
All riders started at the Kennedy Space Center Visitor Complex and had the opportunity to choose from up to four tour routes that took cyclists past the Orbiter Processing Facility Bay 2 giving bikers an opportunity to see the space shuttle Atlantis up close, Launch Pad 39B, the Shuttle Landing Facility, and through Kennedy's Industrial Area, passing buildings such as the Space Station Processing Facility, the Operations and Checkout Building and the Kennedy Headquarters Building.

"Stop-and-go" stations strategically located along the routes gave riders a chance to pause for a snack, water break and photo opportunities.

Charities chosen for the CFC support a variety of needs across the world, including early education, child protection, animal shelters, health and medical research, environmental cleanup, feeding the hungry, housing the homeless, aiding the disabled and more.

Kennedy supports effort to develop satellite servicing capabilities

By Bob Granath
Spaceport News



NASA/Goddard Space Flight Center

This artist's concept shows a servicing spacecraft, left, approaching a satellite needing assistance. NASA is developing the tools needed to bring a high-technology gas pump, robotic mechanic and tow truck to satellites in orbit.

With satellites playing increasingly important roles in everyday life, NASA is developing the technology to build Earth-orbiting, roving "service stations" capable of extending the life of these spacecraft. Engineers at Kennedy Space Center are assisting the space agency's Goddard Space Flight Center in Greenbelt, Md., in developing the concept for bringing a high-technology gas pump, robotic mechanic and tow truck to satellites in space.

There are 149 government-owned spacecraft and 275 commercial satellites currently in geosynchronous Earth orbit, or GEO. Placed 22,300 miles above the Earth, these satellites play key roles in communications, science, defense and weather monitoring. GEO permits these spacecraft essentially to stay over the same point, allowing for constant coverage of a designated position. This is crucial for satellites relaying meteorology and television signals covering specific portions of the globe.

According to Tom Aranyos, technical integration manager in NASA's Fluids and Propulsion Division at Kennedy, engineers at the Florida spaceport are supporting the hypergolic propellant refueling portion of the Goddard-led study by examining how free-flying servicing spacecraft could expand options in orbit for government and commercial satellite owners.

"Kennedy, as part of the Goddard team, is studying and performing preliminary tests for the design, development and qualification testing of the critical subsystem for an in-orbit hypergolic propellant transfer system," Aranyos said.

According to Aranyos, America depends on satellites in geosynchronous orbit. These expensive spacecraft eventually develop systems failures or run out of propellant.

"Servicing and refueling these satellites can keep them operating longer and in the correct orbit, giving the nation and their owners more value for their investment," he said.

Preliminary work with a technology demonstrator is under way on the International Space Station. The crew of space shuttle Atlantis' STS-135 flight delivered the Robotic Refueling Mission, or RRM, hardware to the station in July 2011.

During a spacewalk, astronauts Mike Fossum and Ron Garan transferred the RRM onto a temporary platform on the Special Purpose Dexterous Manipulator, also known as Dextre, a two-armed robot developed by the Canadian Space Agency that serves as part of the station's Mobile Servicing System. RRM now resides on the Express Logistics Carrier 4 platform outside the station.

Designed by the same team that developed the instruments and astronaut tools for the Hubble Space Telescope servicing missions, the four RRM tools cut and manipulate wires, unscrew caps, open and close valves and transfer fluid, demonstrating that a remote-controlled robot can service and refuel a satellite in orbit.

In March 2012, the 12-foot Dextre performed the most intricate operation ever attempted by a space robot: cutting two twisted "lock wires," each 20 thousandths of an inch (0.5 millimeters) in diameter using the RRM wire-cutter tool.

The RRM refueling demonstration is scheduled to take place on the space station in the fall of 2012. Meanwhile, back on the ground, preparations are ramping up for a second set of activities and task boards to continue RRM operations through 2014.

Goddard's study and associated development campaign to advance technology readiness levels, or TRLs, of satellite-servicing technologies are the next steps in building capabilities for a fully robotic maintenance vehicle that could service satellites, including those that were not originally intended to be serviced.

Goddard envisions a future in which servicer spacecraft equipped with a state-of-the-art navigation system, enhanced robotic arms and tools, and a supply of propellant would be able to autonomously rendezvous and dock with a satellite needing aid. Depending on the type of assistance needed, the servicing spacecraft could perform one of five "R" capabilities: refueling, repositioning, remote survey, replacing of components or repairing an ailing satellite.

The Goddard development campaign is designed to ensure that the capabilities and technologies are matured, vetted and ready for potential future servicing missions.

"That will include a pumping system with high-accuracy metering and hose management system to transfer propellant to multiple client locations on existing orbiting satellites, " Aranyos said.

Since May 2011, Aranyos' technical team has been developing a highly reliable, leak-free hypergolic propellant transfer module capable of high-accuracy metering at high-pressure, low-flow rates. Hypergolic propellants, such as nitrogen tetroxide, hydrazine and monomethyl hydrazine are the propellants most frequently used in satellites.

A key milestone in the Kennedy effort was completed in August with testing of the low-TRL prototype pump, led by Brian Nufer who heads up the propulsion subsystem team. NASA engineers worked with technicians from Sierra Lobo of Fremont, Ohio, under an institutional support contract to conduct the first simulation of proof-of-concept hardware to see how to pump highly corrosive, toxic, low viscosity and high-density nitrogen tetroxide propellant at required transfer pressures.

Aranyos is pleased with the progress so far.

"This is a great partnership with Goddard," he said. "Through most of Kennedy's history, we have received, processed and launched vehicles developed at other centers. Over our 50-year history, we've developed an extensive knowledge base and diverse capabilities. Projects such as this give us an opportunity to put that expertise to work."

Scenes Around Kennedy Space Center

CLICK ON PHOTO NASA/Tim Jacobs

Turner Classic Movies, or TCM, brought their Classic Film Festival to Kennedy Space Center on Oct. 13 with a free screening of "Forbidden Planet," presented in the Rocket Garden at the Kennedy Space Center Visitor Complex. Kennedy Director Robert Cabana, left, NASA astronaut Mike Massimino and TCM host Ben Mankiewicz participated in a panel discussion before the movie started.

CLICK ON PHOTO NASA/Rick Wetherington and Tim Powers

Merlin engines ignite under the Falcon 9 rocket at Space Launch Complex 40 on Cape Canaveral Air Force Station, Fla., on Oct. 7. The rocket carried a Dragon capsule to orbit. Space Exploration Technologies Corp., or SpaceX, built the rocket and capsule for NASA's first Commercial Resupply Services, or CRS-1, mission to the International Space Station. The spacecraft joined the station three days later. Dragon is scheduled to return to Earth on Oct. 28 for a parachute-assisted splashdown off the coast of southern California.

NASA/Kim Shiflett

Local business representatives attended NASA's Historically Underutilized Business Zone, or HUBZone, Industry Day and Expo 2012 in Port Canaveral, Fla., on Oct. 16. Exhibitors included vendors from product and service areas, such as engineering services, computer technology, communication equipment and services, and construction and safety products. The event was hosted for business leaders who are interested in learning about government contracting opportunities and what local and national vendors have to offer.

CLICK ON PHOTO NASA/Chris Chamberland

Dr. J.R. Harding spoke to Kennedy Space Center workers on Oct. 17 about his unique first-hand experiences in overcoming the challenges that life with a disability can create. Harding said has learned from his experiences and is now leading by example because everyone has the right to achieve gainful employment, live independently and have fun. The event was sponsored by the Disability Awareness and Action Working Group, or DAAWG.

New food service caters to workers' fresh ideas

By Frank Ochoa-Gonzales
Spaceport News

Photos by NASA/Jim Grossmann

Fresh Ideas Southeast LLC, of Columbia, Mo., was awarded concession agreements for the traditional cafeteria at Headquarters (M6-399) at Kennedy Space Center. Fresh Ideas is in discussions with other vendors to bring their menus to Kennedy.

Last year, more than 1,600 Kennedy Space Center workers responded to a food service survey to determine the best steps the Food Service Program could take.

Results showed a majority of workers wanted three components:

• a traditional cafeteria providing breakfast and lunch;

• a food court with branded concepts offering breakfast and lunch;

• an independent branded fast food/casual dining restaurant providing breakfast and lunch.

Employees received what they wanted. And they seem happy about it.

"It's good that we have the number of options we have now," said Seth Schisler, an engineer with Nelson Engineering. "I enjoy that I can go to Starbucks or Subway here on center."

Fresh Ideas Southeast LLC, of Columbia, Mo., was awarded concession agreements for the traditional cafeteria in Headquarters (M6-399) and a food court featuring four branded concepts in the Multi-Functional Facility, MFF (K6-1145).

The top vote getter in the employee survey was a food court and the top choice of eatery to be in that food court was Subway.

"We wanted to provide complimentary services that provided a variety of options for the workforce," said Xaivian Raymond, NASA Exchange Operations program manager for food services. "Our primary goal was to get what the employees wanted.

"Our new food services agreements represent a new way of doing business here at KSC, the new vendors are no longer subsidized, and they must find ways to make a profit and meet customer needs. This means what the customer wants is more important than ever to these vendors."

In addition, Fresh Ideas' concession agreements include catering capabilities. The Space Station Processing Facility, or SSPF (M7-360) cafeteria will be modified into a training and meeting venue and will offer catering at this and other locations across the center.

Space Coast Bar-B-Q, operating as Sonny's Real Pit Bar-B-Q, was awarded a concession agreement for the independent branded fast food/casual dining restaurant in the Operations and Checkout (O&C) building (M7-355). Sonny's concession agreement also includes catering capabilities. Sonny's Real Pit Bar-B-Q is scheduled to open in late January or early February; however, they are available for on-site catering now.

According to Raymond, Fresh Ideas continues to take workers' suggestions to improve the food services.

In fact, workers originally expressed concerns about prices during the first week of the new food services operations and requested some other menu options at the food court venues. Since then Fresh Ideas changed some prices and added combos to bring down costs, and they expanded their menu options at the MFF, Raymond said.

"Fresh Ideas is eager to change and meet the needs of the customer," Raymond said. "They'll do whatever it takes to make us, the workforce, happy. It is a pleasure working with this concessionaire."

According to Raymond, Fresh Ideas is in discussions with other vendors to bring their menus to Kennedy.

"Fresh Ideas has the ability to change out menus and concepts at the food court and will do so as necessary to meet the customers' needs," Raymond said.

Fresh Ideas Southeast

Hours of operations are:

Headquarters (M6-0399)
Breakfast: 6:30 to 9:30 a.m.
Grill items, salad, soup: 10 a.m. to 1:30 p.m.
Full lunch menu: 11 a.m. to 1:30 p.m.
Deli/dessert only: 1:30 to 3 p.m.

MFF (K6-1145)
Subway: 6 a.m. to 4 p.m.
Starbucks: 6 a.m. to 4 p.m.
Southern Beats: 6 a.m. to 2 p.m.
Rooster Bay Chicken: 10 a.m. to 4 p.m.
Yo2Go - Frozen Yogurt: 11 a.m. to 4 p.m.

http://www.freshideasllc.com/online/kscdining/online-menu.cfm

Heart Healthy Program

Fresh Ideas offers a registered dietitian to work with the dining staff and provide wellness programming, including Wellness Day events and healthy eating tips. Our Heart Healthy Program notes with individualized signage those items whose calories from fat are less than 30 percent. In addition to large salad and deli arrays, display cooking stations are areas where selections can meet individualized needs. Also, all menus have been reviewed and critiqued by the registered dietitian and their corporate chef. Help is always an email away with the Ask The Dietitian program. For more information, email **pholmes@freshideasfood.com**

Yo2Go - Frozen Yogurt offers an amazing selection of frozen yogurt flavors, toppings and combinations to make your visit an adventure for your sweet cravings

Photos by NASA/Jim Grossmann

Rooster Bay offers a variety of fresh fried and grilled chicken sandwiches and wraps, tenders and salads. Southern Beats offers "Southern comfort" hearty meals for individuals craving a taste of home.

The Barista offers hot and cold coffee, espressos and other beverages from one of the world's most notable brands -- Starbucks. In addition, the Barista offers fresh baked pastries all day.

Station experiment to test fresh food experience

By Rebecca Regan
Spaceport News

CLICK ON PHOTO NASA

Crops tested in VEGGIE plant pillows May 9, 2011, include lettuce, Swiss chard, radishes, Chinese cabbage and peas.

With all the pre-packaged gardening kits on the market, an exceptionally green thumb isn't necessary to grow your own tasty fresh vegetables here on Earth. The same may hold true for U.S. astronauts living and working aboard the International Space Station when they receive a newly developed Vegetable Production System, called VEGGIE for short, set to launch aboard SpaceX's Dragon capsule on NASA's third Commercial Resupply Services mission.

"Our hope is that even though VEGGIE is not a highly complex plant growth apparatus, it will allow the crew to rapidly grow vegetables using a fairly simple nutrient and water delivery approach," said Howard Levine, Ph.D. and chief scientist, Kennedy Space Center International Space Station Research Office.

Gioia Massa, a postdoctoral fellow in the Surface Systems Group of Kennedy's Engineering Directorate, has been working with the International Space Station research office to validate the VEGGIE hardware here on Earth before it takes flight next year.

"VEGGIE could be used to produce faster-growing species of plants, such as lettuce or radishes, bok choy or Chinese cabbage, or even bitter leafy greens" Massa said. "Crops like tomatoes, peas or beans in which you'd have to have a flower and set fruit would take a little longer than a 28-day cycle."

NASA

An earlier version of NASA's VEGGIE experiment hardware is tested June 29, 2011, at Kennedy Space Center.

It may not sound like a big deal to us Earthlings who can just run out to our local produce stand or supermarket when we have a hankering for a salad, but when you're living 200 miles above the surface of the planet, truly fresh food only comes a few times a year.

"When the resupply ships get up there, the fresh produce gets eaten almost immediately," Massa said.

Weighing in at about 15 pounds and taking up the space of a stove-top microwave oven, the stowable and deployable VEGGIE system was built by Orbital Technologies Corporation, or ORBITEC, in Madison, Wis. The company designed the system to enable low-maintenance experiments, giving astronauts the opportunity to garden recreationally.

"Based upon anecdotal evidence, crews report that having plants around was very comforting and helped them feel less out of touch with Earth," Massa said. "You could also think of plants as pets. The crew just likes to nurture them."

In simple terms, the VEGGIE system works like this: Clear Teflon bellows that can be adjusted for plants as they grow are attached to a metal frame housing the system's power and light switches. A rooting pillow made of Teflon-coated Kevlar and Nomex will contain the planting media, such as soil or claylike particles, along with fertilizer pellets. Seeds either will be preloaded in the pillows on Earth or inserted by astronauts in space. To water the plants, crew members will use a reservoir located beneath the pillows and a root mat to effectively add moisture through an automatic wicking process.

VEGGIE is set to join a suite of other Kennedy-managed plant growth facilities that vary in size and complexity, such as the Lada greenhouse unit and the ABRS, short for Advanced Biological Research System. VEGGIE is the simplest of the three designs, but has the largest surface area for planting and is expected to produce data on a more regular basis. "What's interesting is that plants breathe, just like humans," Levine said. "Initially, biologists tried to grow plants in sealed compartments but that didn't work because without continuous airflow bringing carbon dioxide and oxygen to plants for respiration, they won't thrive."

An added benefit of the VEGGIE system is that it requires only about 115 watts to operate, less than half the energy it takes to power a desktop computer and monitor. The blue, red and green light-emitting diodes, or LEDs, are bright enough for crops to grow, but energy efficient enough for a place where power is at a premium.

"We really only need the red and the blue LEDs for good photosynthesis, but we have the option of turning the green LEDs on, which will make the overall light look white, making the plants look green rather than purple," Massa said.

Once the facility reaches the station, astronauts will unpack it and install it into one of the station's EXPRESS racks. Then, they'll report back to Kennedy's International Space Station research office about the setup and work that goes into planting, maintaining and harvesting the crops, as well as the effort that goes into pillow disposal and sanitation.

Mary Hummerick, a microbiologist at Kennedy, will be awaiting swab samples and frozen plant tissues to return from space so she can analyze them for bacteria and microorganisms that could adversely affect the crew. If those numbers are acceptable, NASA could give the go-ahead for crews to start eating what they grow.

NASA is looking into other ways to use the VEGGIE facility once its operation is validated on the first flight to the station.

"You could have bio-behavioral studies on the effect of growing edible plants compared to ornamental plants with flowers, nutritional studies, psychological studies, or you could grow herbs like mint and basil," Massa said.

While a successful run of VEGGIE would open innumerable possibilities for future experiments, the near-term goal will be seeing whether the hardware performs as expected on the station come next year.

Kennedy offers many ways to stay in shape

Have a drink of water

New research from the Institute of Medicine recommends that women should attempt to drink eight glasses a day, while men should drink up to 12 glasses a day of any drink, excluding caffeinated drinks and alcohol.

Join a league

KARS Park has several leagues throughout the year:

KARS Softball League
John Robb -- 867-7730

KARS Flag Football League
Scott Colloredo -- 867-2640

KARS Tennis League
Teresa Bollig -- 264-8575

KARS Flyers
Mae McCreary -- 452-3151

Have fun, go on a run

Did you know that Kennedy has had a running club since July? Membership is free to employees. The running groups are as follows:

No Runner Left Behind
Mondays, 4:30 p.m.
Meet and Run O&C Track

On the Clock Runners
Tuesdays and Thursdays, 4:30 p.m. Meet: O&C Gym Group Fitness Room - 30-minute timed runs (around Industrial Area)

Sunrise Runners
Wednesdays, 6 a.m.
Meet: O&C East Parking Lot - Run Industrial Area

5K+ Runners
Mondays, 4:30 p.m.
Meet: O&C Track

Friday Fun Run
Every other Friday, 4:30 p.m.
Meet and run different routes

By Brittney Longley
Spaceport News

As the old saying goes, "An apple a day keeps the doctor away." Kennedy Space Center is creating a new motto, "30 minutes of exercise a day keeps the health issues away."

The KSC fitness center has created several new fitness classes and programs to encourage the workforce to live a more healthy and active lifestyle.

Ryan Grist, an intern with the KSC fitness center, has come up with several health and wellness initiatives to help workers get up and out of their seats. On Oct. 1, a six-week program started, the "KSC T.E.A.M. (Together Everything and Anything Matters) Wellness Challenge." Eight teams compete against each other by gaining points for participating in daily activities, such as donating blood, keeping a daily food log, and more. At the end of the six weeks, the team with the most points will win a prize donated by the NASA Exchange.

"We are looking to encourage people to maintain and motivate them to add new aspects to their daily lives." Grist said.

The fitness center also has included several new classes, such as a boot camp class on Tuesdays from 4:30 to 5:15 p.m.; core classes on Wednesdays from 4:30 to 4:45 p.m. and Thursdays from 11:30 to 11:45 a.m.; and beginning yoga classes on Wednesdays from 11:30 a.m. to 12:15 p.m.

As these new health and wellness programs and competitions are forming, the fitness center will continue with its other annual events.

The fitness center will oversee the 11th Annual Indoor Triathlon from Monday, Oct. 15 to Thursday, Nov. 15. Participants may choose between two series, the masters or novice; two different length events, the sprint or distance; and may participate as an individual or with a team.

In order to participate in any of the activities you must be a member of the fitness center, which is at no cost to employees.

Looking up and ahead . . .

*** All times are Eastern**

Oct. 23	NASA Launch/Baikonur Cosmodrome, Kazakhstan: Expedition 33/34, Soyuz TMA-06M Launch window: Under review
Oct. 25	USAF Launch/Cape Canaveral Air Force Station (SLC-41): Atlas V, Orbital Test Vehicle (OTV) Launch window: Under review
Oct. 31	NASA Launch/Baikonur Cosmodrome, Kazakhstan: ISS Progress 49 Launch window: Under review

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

In celebration of Kennedy Space Center's 50th anniversary, enjoy this vintage photo . . .

FROM THE VAULT

NASA file/1969

A view of Firing Room No. 2 on Oct. 29, 1969, during the Countdown Demonstration Test for the Apollo 12 mission.

John F. Kennedy Space Center

Spaceport News

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Managing editor . . . . . Candrea Thomas
Assistant managing editor . . . . . Stephanie Covey
Editor . . . . . Frank Ochoa-Gonzales
Copy editor . . . . . Kay Grinter

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