



# Spaceport News

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John F. Kennedy Space Center

## Space symposium takes look ahead

Kennedy Space Center Director Roy Bridges, speaking at the 6<sup>th</sup> Annual Cape Canaveral Spaceport Symposium, challenged managers and workers to prepare for the day when the spaceport will be called upon to meet challenges such as processing and launching new generation vehicles or going to the moon and Mars.

He encouraged the team not to get discouraged that development in those areas seems to be going slowly because they have not been made priorities in the federal budget.

"We don't know when we will be called upon, but we've got to be ready to move out when we get our marching orders. Maybe we can even become a catalyst for bringing on the call," Bridges said. "I'm more optimistic than some people about when we're going to get to do these things."

The symposium, held Nov. 14 and 15 at the Radisson at the Port in Port Canaveral, centered on "Planning Together for the Future."

Hosted by NASA-KSC, the Air Force's 45<sup>th</sup> Space Wing and Spaceport Florida Authority (SFA), the symposium offered about 375 space program and industry leaders the opportunity to share information on improvements being made and planned for the spaceport.

Spaceport enhancements already being made through successful partnering efforts among government, industry and academia were



The theme of the 6th Annual Spaceport Symposium was "Planning Together for the Future."

emphasized. Discussions covered customer service, range modernization, the national space policy and management of the spaceport.

"The spirit of partnership we're now experiencing is thrilling," Bridges said. "Our success depends on the strength of our partnerships, more than resources, laws or policies."

Gen. Don Pettit, commander of the 45<sup>th</sup> Space

Wing, and Ed O'Connor, executive director of the SFA, further commented on how far the spaceport has come in recent years as partnerships have strengthened.

"This year's symposium is a contrast in that for the first time we're talking about what we're doing instead of just about what we should be

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## ELV Program supports Mars plans

By means of orbiters, landers, rovers and sample-return missions, NASA's recently revamped campaign to explore Mars is poised to unravel the secrets of the Red Planet.

As NASA's lead center for Expendable Launch Vehicle Services, Kennedy Space Center (KSC) has a significant role to play in six major Mars missions planned for this decade. The KSC ELV program office provides launch vehicle project management for the Mars Program.

The KSC ELV program mission integration team is currently working with the 2001 Mars Odyssey team and the Mars projects getting geared up for launches in 2003 and 2005.

The ELV team works with the individual Mars projects to identify the launch vehicles and services needed for the upcoming missions, assists in



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An artist's conception of the 2001 Mars Odyssey.

# VPP to improve safety and health

VPP is becoming an ever more common acronym at Kennedy Space Center.

That's because KSC is seeking a Voluntary Protection Program (VPP) designation from the Occupational Safety and Health Administration (OSHA). NASA and several of its contractors have agreed to participate in pursuing the designation and are in the process of creating their own VPP programs.

VPP is a cooperative effort between OSHA, employers, employees and unions that recognizes exemplary safety programs, those which go beyond federal law.

"Achieving VPP status is like many things in life. The real benefit stems from the effort we make in improving the safety and health of our employees, our number one asset," said KSC Director Roy Bridges. "Even though our safety and health records are well above the industry standard, we should all do the work required for real lasting benefits that will be gained by achieving VPP designation."

The program began in 1982 in the private sector and was opened to federal work sites in 1997. More than 600 private and four federal worksites have been accepted into the VPP program.

At VPP sites, employers and employees work together and in partnership with OSHA to provide a level of safety and health protection that exceeds minimum

*VPP is a cooperative effort between the OSHA, employers, employees and unions that recognizes exemplary safety programs, those which go beyond federal law.*

OSHA standards. These sites enable participants to "self-certify" their safety programs and practices.

In exchange for over-compliance by employers, OSHA agrees to exempt a facility from its routine annual inspection because OSHA's VPP onsite reviews ensure that their safety and health programs provide superior protection. VPP Star-certified sites are evaluated on site every three years.

There are three main parts to achieving VPP status for KSC.

- To begin, there is an initial visit by OSHA to verify that KSC has a superior safety and health program.
- KSC will then submit a comprehensive application, which describes how KSC complies with the 19 safety program elements required by OSHA. The process required to complete the application will take 12 to 18 months.
- OSHA will then perform a rigorous on-site, in-depth inspection to assess that KSC has a superior safety and health program.

KSC's VPP participation will not



KSC team members take safety precautions while using a ladder.

affect the rights of employees or union to OSHA protection, as OSHA will still respond to employee complaints and major mishaps. OSHA requires the local union to declare their written approval of a site's participation in the VPP or the site may not participate.

"The American Federation of Government Employee Union (AGFE), local 513, fully supports the VPP program to increase safety awareness at KSC," said Tim Williamson, president of the AFGE. "We welcome the opportunity to join Kennedy Space Center in the acceptance and adherence of the VPP 19 elements that will provide guidance to achieve a safer and healthier work place."

More than 150 KSC employees attended this year's Safety and Health Professional Development seminar Oct. 19 at the Debus

Center. VPP was a focus area.

Charlie Anderson, OSHA's Assistant Regional Administrator, described how the VPP program has helped improve the health and safety of workers in organizations that have adopted it.

VPP sites usually experience reduced significant reduction in work-related injuries and illnesses, he said. Other benefits include increased productivity and improved employee morale.

In the coming months, employees will be hearing more about VPP, how they can participate and volunteer for teams, which will be vital to reach this goal.

For more information about the VPP program, visit the OSHA VPP homepage at <http://www.osha.gov/oshprogs/vpp/> or contact Dave Facemire or Dave Barker, NASA Industrial and Safety Branch, at 867-7554 or 867-6351.

## SPACE ...

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doing," O'Connor said. "We're moving forward with solutions. It's a real confidence builder."

Bridges and the others pointed to a number of recent successful spaceport partnering efforts:

- The Joint Planning and Customer Service Office, a one-stop shop for new spaceport customers, was formed by an agreement signed by KSC and the 45<sup>th</sup> Space Wing.
- State funding for the Space Experiment Research and Processing Laboratory (SERPL) was approved through the efforts of the SFA, KSC and other champions.

SERPL is expected to benefit from partnerships with industry and academia as well and serve as a magnet facility for a planned Space Station Commerce Park.

- KSC, Space Gateway Support (SGS) and The Boeing Co. cooperated in the construction of a helium pipeline, which was recently commissioned. The pipeline will save NASA and others money through sharing use and costs of the KSC Helium Facility.
- The Mobile Command Center, an emergency response vehicle equipped for large-scale emergency situations, was purchased through savings of the Joint Base Operations Support Contract.

Bridges said such successes are just the beginning for taking the spaceport to a new level of readiness and productivity. Much remains to be done, however, and that will depend on the full participation and enthusiasm of individual workers.

"We need to expand our thinking. Too often we think too small," Bridges said. "Who in 1903 at Kitty Hawk with that first flight would have thought we'd have come this far? So many of advances since then have been spurred by far-ranging visions."

Future spaceport improvements discussed at the symposium:

- creation of a space-based range

where telemetry, communication and other necessary support is provided through satellite vs. ground-based infrastructure;

- provision of significant range flexibility and capacity improvements as well as modernization of critical systems to improve reliability through the Range Standardization and Automation (RSA) program;

- greater involvement in the direction of the spaceport; and

- creation of a Cape Canaveral Spaceport Master Plan, a 50-year plan to help guide the growth of the nation's premier spaceport being developed through efforts of KSC, the 45<sup>th</sup> Space Wing and SFA.





# Inside



Above, technician Rusty Allen sets up equipment to weld a replacement check valve in Atlantis' right hand OMS pod. At left, United Space Alliance technician Walter Harris rebuilds a hypergolic ground half coupling in the quick disconnect lab. Below, one of Columbia's OMS pods waits in storage while Atlantis' OMS pod is repaired in the HMF's east test cell.



## Hypergolic Maintenance Facility team

While most of Columbia is being refurbished in Palmdale, Calif., two important elements of the orbiter are being upgraded at Kennedy Space Center's Hypergolic Maintenance Facility (HMF).

Columbia's Orbital Maneuvering System (OMS), consisting of two OMS pods and a forward module, are being refurbished in test cells at the HMF and will be reunited with

Columbia when the orbiter returns to KSC in the coming year.

The test cells are included in the complex of four main buildings in the Hypergolic Maintenance and Checkout Area.

The area is remotely located southeast of the Operations and Checkout Building.

Because of the facility's location, the work being done there,

primarily by United Space Alliance workers, rarely gains the notice of the average KSC team member.

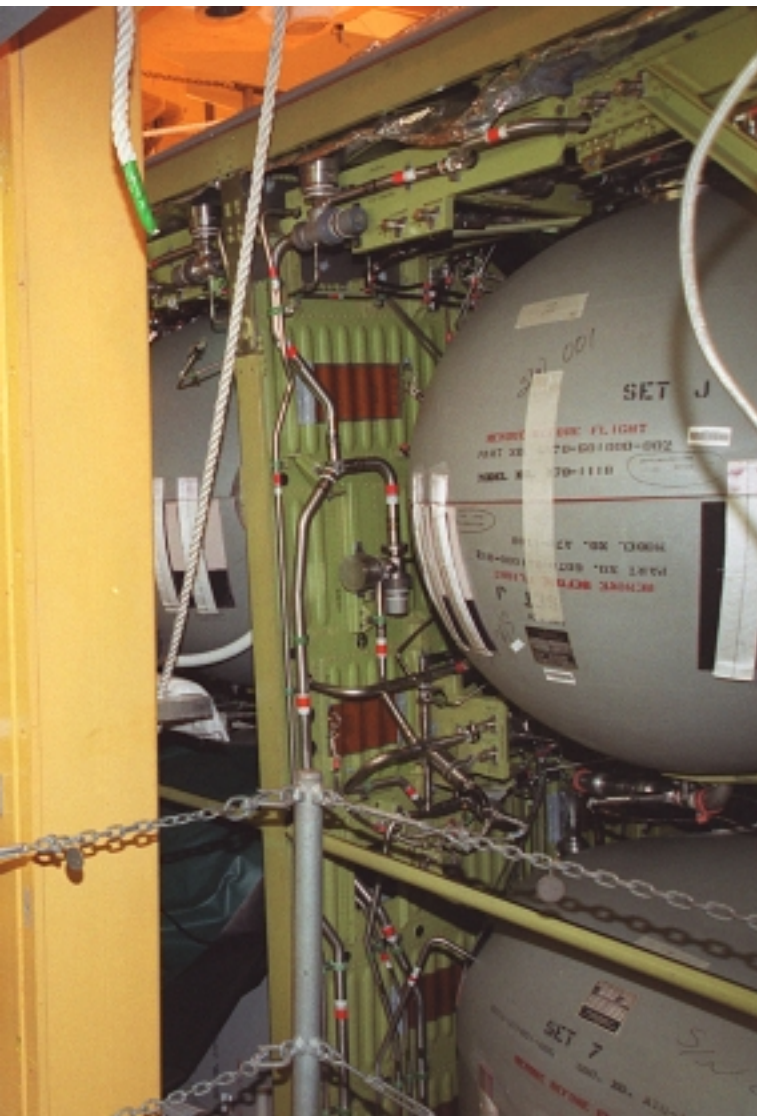
A number of safety precautions are taken by the approximately 83 workers in the area because of the hazardous nature of hypergolic fuels. Technicians wear full body SCAPE suits for any operation where liquid or large amounts of propellant vapors are expected.

Vapor concentrations are monitored during hazardous operations by hand-held monitors. A project is under way that will monitor for propellant vapors continuously.

Much of the work completed at the facility consists of checkout, refurbishment and revalidation of the hypergolic-fueled modules of the orbiter's OMS and Reaction



# e the HMF



United Space Alliance technician Elliott Clement, above, performs ground half coupling leak checks at the Hypergolic Maintenance Facility. At left, Ralph Gentner and Rusty Allen, right, prepare to weld a replacement check valve in Atlantis' OMS pod. Below, Walter Schmitz, HMF engineering lead, inspects a forward module.



# refurbs OMS, RCS, quick disconnects

Control System (RCS).

"The bulk of the work done here is on the hypergolic system but electrical, tile and TPS (Thermal Protection System) repairs on the pods and modules are also performed at the HMF," explained Andy Kelly of NASA OMS/RCS.

Repairs on Atlantis' right-hand OMS pod were recently made in the east test cell of the facility, for

example.

A helium isolation valve, pressure regulator, and check valve were replaced and retested.

While the OMS pod was being worked on at the HMF, a section of its flexible insulation blanket was also replaced.

The quick disconnect lab at the HMF is responsible for the refurbishment and testing of approxi-

mately 750 quick disconnect mechanisms used at the pads, the Orbiter Processing Facility and the HMF. In addition, the lab maintains roughly 100 air half coupling caps for each orbiter.

These quick disconnects are used to connect ground checkout equipment to the hypergolic fluid systems of the orbiter.

Because materials passing

through pipelines associated with those disconnects may be hazardous, the disconnects must be leak free.

A new Checkout and Launch Control System (CLCS) control room has been built at the HMF that will be used to test the pods in the near future. The CLCS control room is already used for testing of the forward module.



# Submersible robot takes on challenges

A pint-size submersible robot named Video Ray Pro has joined the team of hazardous duty robots at the Development Integration Laboratory, also known as the Prototype Shop.

Although the new remotely operated vehicle (ROV) looks like a toy – the sturdy, sophisticated instrument has already contributed to two very different projects at Kennedy Space Center (KSC). It has conducted internal inspections of fuel storage tanks and helped set up sound sensors for an environmental study. It has also survived an alligator attack.

Now Video Ray Pro's master, Steve Van Meter, NASA hazardous duty robotics specialist, is looking for new challenges for the ROV to meet.

"This is a wonderful asset for our Spaceport Technology Center and we want to put it to work," Van Meter said. "This is the type of technology we will see a great deal more of in a few years. We are on the leading edge."

The ROV, which is a tidy 10 inches by 8.75 inches, can be used to visually explore liquid environments. The only requirements, beyond a liquid-filled space large enough for the vehicle to freely travel in, are that the liquid must not be highly corrosive and must provide for visibility.

Video Ray Pro uses three motorized propeller thrusters for going forward, backward, up and down. It's equipped with two 20-watt lights and a color video camera. A second fixed-focus black and white camera is located in the rear of the ROV. A grabbing mechanism can be installed for picking up small items.

Power for the robot is sent from the control console via a 250-foot tether, which also transmits commands and returns the video images to the control console. The operator controls or "flies" the swimming robot. The control console includes a color monitor for the operator to view the video images from the ROV. In addition, a separate monitor/VCR can be attached to record the ROV's journey.

The off-the-shelf submersible was purchased last summer for \$16,000. It was originally acquired to be used to inspect two 22,000-gallon fuel storage tanks at Space Gateway Support's Fuel Storage Area 1. If not for the ROV, which only recently went on the market, the 47-foot-long tanks would have had to be drained before being inspected. Even drained, the tanks could pose a risk to humans because of the low overhead and toxic vapors.

"Robots are an invaluable tool for tasks that people cannot do or that are dangerous for a human to do," Van Meter said. Other robots on his team have in the past been used for bomb disposal and in areas with hazardous materials.

SGS Engineer Dan Tierney, who worked with Van Meter's group to obtain the robot, was pleased with how the ROV was used to handle the leak check.



Mike Lane, an electrical engineering technician, lowers Video Ray Pro into a fuel storage tank as Steve Van Meter, a hazardous duty robotics specialist, prepares to operate the robot.



Steve Van Meter demonstrates the Video Ray Pro robot at KSC's Prototype Shop.

"The video tape of the internal tank inspection was very clear and provided a good record of the tank condition," Tierney said. "The use of this inspection technology presents both convenience and cost savings to customers."

Video Ray Pro is also being used as a scout to find locations for setting up sound sensors to be used in an aquatic research program headed by Grant Gilmore, a senior aquatics scientist with Dynamac Corp. at KSC. Gilmore's group is trying to isolate and study spawning populations of spotted sea trout and red fish, two valuable sport fish. Such research could eventually lead to better management of those fish populations, Gilmore said.

Both species make characteristic sounds while spawning at night. The sound will be detected by strategically placed sensors in KSC area waterways. The study will eventually be expanded to track spawning populations in the Atlantic Ocean off Cape Canaveral.

"When it comes to setting up strategies for harvesting fish for food, we're now relying on voodoo science. It's all guesswork because we don't have the hard data," Gilmore said. "We're still catching these fish the way we have for hundreds of years, with a hook and line."

"Through research we're hoping to find better ways of using these fish for food without depleting their population."

Gilmore said that the ROV has been a handy resource in the project. After it was attacked by an alligator in a culvert near Launch Pad A, Gilmore, Van Meter and other KSC team members gained an even greater appreciation for its use in scouting sensor locations.

"The gator grabbed its tether cable, swam 50 feet and submerged. After it realized the ROV wasn't edible, it let it go," Van Meter said. "Luckily we were easily able to repair the cable and a bulb in the ROV that was broken during its adventure."

When the ROV isn't busy helping out at KSC, it is available for use by other government agencies, Van Meter said. For example, divers with the Brevard County Sheriffs Dept. are training with the ROV for future use in looking for submerged evidence and missing persons.

"It's an incredible tool and we're fortunate to have it on Center," Van Meter said.



# MARS ...

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developing the appropriate launch strategies, and leads the overall launch vehicle to spacecraft integration.

“This is an ongoing effort, by many talented team members, that precedes the launch by many years,” said Darin Skelly, ELV mission integration manager. “We look at all aspects of several launch vehicles prior to making a recommendation.”

“This includes associated costs, current contract options, and the technical capabilities available to meet the specific spacecraft mission parameters.”

The first mission, the 2001 Mars Odyssey, is scheduled to be launched aboard a Delta II rocket on April 7 from Pad 17-A at the Cape Canaveral Air Force Station.

Delivery of the spacecraft from the Jet Propulsion Laboratory to KSC is planned for Jan. 5.

The Mars Odyssey and the other missions are part of a new long-term Mars exploration program.

The new program incorporates the lessons learned from previous missions and builds on those missions’ scientific discoveries.

“All of us in the program are excited about the opportunity to play a role in the exploration of Mars,” Skelly said. “We hope that the orbiters, landers and other missions are the scouts for the eventual human exploration of Mars.”

The agency effort to define the program well into the next decade is focused on the science goals, management strategies, technology development and resource availability in an effort to design and implement missions that would be successful and provide a balanced program of discoveries.

In addition to the Mars Odyssey mission and the twin Mars Exploration Rovers in 2003, NASA plans to launch a powerful scientific orbiter in 2005.

This mission, the Mars Reconnaissance Orbiter, will focus on analyzing the surface at new scales in an effort to follow the tantalizing hints of water from the Mars Global Surveyor images and to bridge the gap between surface observations and measurements from orbit.

For example, the Reconnaissance Orbiter will measure thousands of Martian landscapes at 8-inch-to-12-inch (20-cm-to-30-cm) resolution, good enough to observe rocks the size of beach balls.

NASA proposes to develop and launch a long-range, long-duration mobile science laboratory that will be a major leap in surface measurements and pave the way for a future sample return mission.

NASA is studying options to launch this mobile science laboratory mission as early as 2007.

This capability will also demonstrate the technology for accurate landing and hazard avoidance in order to reach what may be promising but difficult-to-reach scientific sites.

NASA also proposes to create a new line of small “Scout” missions that would be selected from proposals from the science community, and might involve airborne vehicles or small landers as an investigation platform.

Exciting new vistas could be opened up by this approach either through the scale of observation or by increasing the number of sites visited. The first Scout mission launch is planned for 2007.

In the second decade, NASA plans additional science orbiters, rovers and landers, and the first mission to return the most promising Martian samples to Earth. Current plans call for the first sample return mission to be launched in 2014 and a second in 2016.

Options that would significantly increase the rate of mission launch and/or accelerate the schedule of exploration are under study, including launching the first sample return mission as early as 2011.

Technology development for advanced capabilities such as miniaturized surface science instruments and deep drilling to several hundred feet will also be carried out in this period.

Mars missions can be launched every 26 months during advantageous alignments – called launch opportunities – of the Earth and Mars, which facilitate the minimum amount of fuel needed to make the long trip.

The agency’s Mars Exploration Program envisions significant international participation, particularly by France and Italy.

## Safety stripes



Aircraft Operations, based at Patrick Air Force Base, recently had the tops of the main rotor blades of four NASA UH-1H helicopters painted in a pattern of white and yellow stripes. One of the painted helicopters is pictured at the top. The pattern was painted by Creative Management Technology workers, above, on the tops of the black blades to provide for better visibility in smoke and fire conditions. When the rotors are turning, the stripes create a yellow and white circle that may be seen from above by a second helicopter, thus improving safety. The change was made to comply with U.S. Fish and Wildlife and Department of Forestry regulations for helicopter-assisted fire control. The helicopters, primarily used for security and medical evacuation for NASA, will be used to deliver water via buckets during brush fires.



John F. Kennedy Space Center

## Spaceport News

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