Space Systems Company – Michoud Operations

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Mission Success Bulletin

July 26, 2007

on-line

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NASA *Orion* gets "Opening Night" star treatment

NASA's* Orion *CEV Project Manager Skip Hatfield addresses the crowd at the* Orion *event with the model to his left.

"On this day thirty-eight years ago, we were on the eve of the first humans to walk on the moon with *Apollo 11*; today, we're going back to the moon – and, both journeys began in New Orleans," said **Jim Bray**, Michoud Operations *Orion* program manager to an enthusiastic crowd at the NASA *Orion* program kick-off event on July 19.

Sheila Cloud, director, Michoud Transition from Marshall Space Flight Center, led the event, which included community leaders and a distinguished panel of speakers: **Skip Hatfield**, project manager, *Orion* Crew Exploration Vehicle from Johnson Space Center; **Cleon Lacefield**, Lockheed Martin vice president and *Orion* program manager; Bray; **Jim Landry**, director, Advanced Materials for the Louisiana Department of Economic Development; and **Dr. Tim Ryan**, chancellor, University of New Orleans.

Hatfield congratulated employees for their hard work and dedication on the ET Project and said he looked forward to working with Michoud's *Orion* engineering team.

Landry discussed the $20 million in state funding for state-of-the-art Friction Stir Welding tooling, "...the largest of its kind and one of the most sophisticated tools in the world."

Dr. Ryan referred to *Orion* "as another opportunity to create the new economy for New Orleans while positioning Michoud for future space programs and development."

Michoud work on the *Orion* program will begin mid-2008. ■

Space Shuttle* Endeavour *and ET-117 await their mission to the International Space Station on the launch pad next to the Atlantic Ocean. Note the 80-foot-tall lightning mast atop the fixed service structure. At right is the 290-foot-tall water tank, which provides the deluge over the mobile launcher platform for sound suppression during liftoff.* Endeavour *is scheduled to launch at 6:02 p.m. CDT August 7 and carry the S5 truss to station. STS-118 will be the first flight since 2002 for* Endeavour, *which has undergone extensive modifications and safety upgrades. The mission will mark the first flight of Mission Specialist* Barbara Morgan, *the teacher-turned-astronaut whose association with NASA began more than 20 years ago.

Ice Frost Ramp redesign to soon begin on ET-128

Initial implementation begins on well-traveled ET-120

The Ice Frost Ramp redesign is pictured above on ET-120's Liquid Hydrogen Tank.

After studying an Ice Frost Ramp redesign for 18 months, the Michoud Operations team will soon begin to implement the new design as part of the continuous improvement effort – emanating from the Columbia Accident Investigation Board mandate to continue to minimize debris risk on the External Tank.

The tank chosen for the redesign is STS-128 – the first in-line tank since Return to Flight (RTF) – thus returning Michoud to a normal production flow. Currently located in Cell A, ET-128 will have Ice Frost Ramps applied at its next stop in Final Assembly.

To get a jump on the Ice Frost Ramp redesign effort, Michoud implemented several of the changes on ET-120, currently scheduled to fly aboard STS-120 in October.

ET-120 charts an interesting history. Originally the first RTF tank, ET-120 underwent a tanking test and a launch attempt at KSC in April 2005 before NASA decided to postpone the launch and switch tanks due to issues relating to debris, ET diffuser, and Engine Cut-Off sensor anomalies.

A few months later, the RTF mission (STS-114) launched with ET-121 and incurred foam loss on one of the Protuberance Airloads (PAL) Ramps. That brought ET-120 and the other KSC tanks back to Michoud for more testing and retrofitting.

Michoud technicians found cracks in ET-120's Liquid Hydrogen (LH2) Tank PAL ramp during the post-STS-114 investigation effort. The cracks led investigators to adjacent Ice Frost Ramps. Cracks were also found beneath the LH2 ramps in the automated spray and poured foam areas near the substrate. To better characterize the effects of cryogenic loading on the tank, technicians dissected a substantial amount of foam.

ET Program Manager **Wanda Sigur** calls ET-120 "a fundamental redesign". Sigur and ET-120 Restoration Lead **Jim Doll** acknowledge that implementing the new Ice Frost Ramp redesign on some of ET-120's ramps contributed to the delays in production.

"In dissecting the foam to remove cracks beneath the Ice Frost Ramp, we found that manually spraying BX-265 foam as a repair at the substrate turned out to be an ideal fix for the conditions that caused cracking and contributed to foam loss events adjacent to the Ice Frost Ramps," Doll said. "We will carry this over to ET-128 and make it part of the permanent redesign."

On ET-120, the team replaced 14 of the 16 Ice Frost Ramps on the Liquid Hydrogen Tank. In another change, the team pre-filled pockets in the brackets with sprayed foam in the backshop. That reduced voids and made the subsequent pour less complex when covering the bracket because the difficult geometry had already been filled in, Doll explained.

So now the team cuts out an area of acreage foam on the tank, sprays the substrate areas with BX-265, installs the bracket there with pre-filled foam, pours the lower ramp, installs the press lines and cable trays that lay in the bracket, and then completes the upper pour to closeout the ramp.

Months ago, most thought the Ice Frost Ramp would have to be reshaped to reduce foam loss. But analysis and testing did not prove out that theory. Today, the new Ice Frost Ramps look the same with no hardware changes and only a negligible weight difference, Doll says.

"What's 'under the hood' will be much different and much better though," he states. "We've shown through analysis and testing that the BX-265 material substitution at substrate will reduce the potential for cracking and delamination of foam that was seen during the STS-114 investigation."

"Some of the Ice Frost Ramp work was especially hard, such as the unique ramp at Station 1593," commented Sigur. "As the process would have it, we had to spend many weeks developing a process that unfortunately retained a suspect area of performance. To assure that our risks were minimized, the foam was removed from that area, which later proved to be perfectly good. But we did the right thing to fly safely. The whole activity was a phenomenal effort, a bang-up job, and my congratulations all the way round."

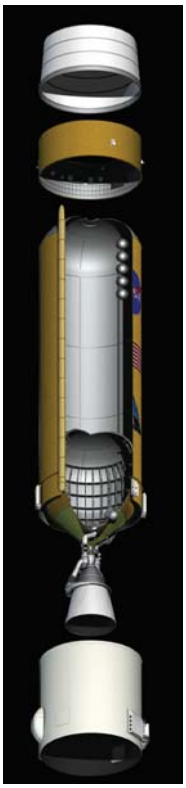
So now the team awaits ET-128, an in-line tank with the advantage of having no previously-applied PAL ramps. Ice Frost Ramps on the Liquid Oxygen Tank have always performed well so there will be little work there and none on the Intertank ramps. The work will focus again on the LH2 tank ramps.

Doll realizes too that ET-128 will have additional work scope, but is satisfied that some of that was leveraged on ET-120. Changes planned for ET-128 include a smaller foam cutout underneath the ramp to install the bracket, rounding some of the sharp corners to relieve stress on the bracket and composite thermal isolator that sits between the bracket and the tank surface, and sealing the shear pinhole to block air that could influence foam loss in the closeout.

ET-128 is scheduled to fly with STS-124 in April 2008. ■

Ares I team makes final push to win Upper Stage work

NASA to announce competition winner in late August or September



The *Ares I* Upper Stage competition is in its final two months before NASA announces the winner, and the pace of Team *Ares* work hasn't slowed a bit.

The ATK-led team, along with Lockheed Martin and Pratt & Whitney Rocketdyne, recently submitted written responses to a number of questions NASA had about the proposal to build the Upper Stage that was originally delivered in April. Now the team is busy making a series of oral presentations to NASA that could extend into August.

"It's always a busy time trying to make sure the customer has all the information it needs in terms of your proposal relating to cost, labor, and technical content," says **Ron Wetmore**, vice president, Shuttle Derived Launch Vehicles. "Now that we're in the final stages of this competition, we want to make sure we haven't overlooked anything that might give NASA a clearer picture of our proposal."

NASA has indicated it will announce the winner of the competition in late August or September. Regardless of who wins the competition, the Upper Stage will be built at Michoud.

Glynn Adams, manager, Business Development, thinks team members have a sound proposal and have supported it with strong responses to NASA.

"A win will strengthen our position at Michoud and help us transition from building the External Tank to providing NASA's Constellation Program launch vehicles," Adams states.

Upper Stage work at Michoud will consist of structural assembly of cryogenic tanks, final assembly, integration, and check-out. The work would probably mean over 200 positions at Michoud.

"This is the first step in NASA's plan to make Michoud its location for integrating complete launch systems, including engines, instrumentation, and avionics," Adams asserts. "When the *Ares I* Upper Stage leaves Michoud, it'll be ready to launch." ■

Michoud builds common bulkhead demonstration articles for Constellation launch vehicles

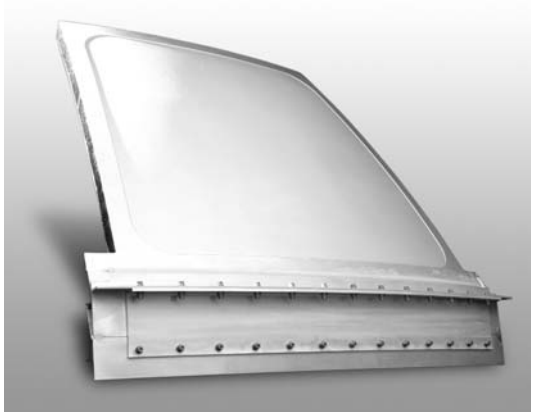
As part of Team *Ares* and its risk reduction efforts focused on the *Ares I* Upper Stage production proposal, Lockheed Martin has completed fabrication of two common bulkhead demonstration articles.

Each Team *Ares* company – ATK, Lockheed Martin and Pratt & Whitney Rocketdyne – has initiated specific activities for early research and development, which promise to reduce the technical risk for *Ares I*.

Lockheed Martin has invested in a demonstration of the manufacturing techniques required to fabricate a common bulkhead that separates the fuel and oxidizer compartments of a propellant tank. Lockheed Martin leveraged its experience in designing and manufacturing high-performance lightweight space structures to build the demonstration articles at Michoud.

The articles represent a portion of a full spherical dome assembly. Two test articles measuring 4 feet by 4 feet with a 9-foot radius of curvature and using phenolic resin honeycomb sandwiched between thin gage aluminum face sheets were fabricated. The first is representative of NASA's Upper Stage design, and the other incorporated an alternate Lockheed Martin design more focused on producibility.

In building the demonstration articles, Lockheed Martin utilized manufacturing processes that it has validated in recent years. Conventional Friction Stir Welding of thin gage alloys joined the face sheets to y-chord sections, and engineers **Randy Brown, Jennifer Takeshita**, and **Duy Pham** demonstrated Self-Reacting Friction Stir Welding as a method for providing the structural joint between the forward and aft y-chord sections.



Common bulkhead demonstration article

Phased Array Ultrasonic inspection was used to evaluate weld quality. Shearography was demonstrated as an applicable inspection technique for ensuring the quality of the honeycomb to the face sheets bonds. Tomo-lithographic molding processes were demonstrated as an alternative method for fabricating honeycomb. Each of the critical processes was demonstrated in an environment that focused on meeting stringent human-rated requirements in a cost effective and reliable manner.

"Our goal is to leverage Lockheed Martin's core competencies in mitigating development risk for future launch vehicles in NASA's Constellation Program," said **Ron Wetmore**, vice president, Shuttle Derived Launch Vehicles. "One obvious way to accomplish this objective is to develop and implement technologies that reduce manufacturing risks associated with hardware such as the common bulkhead." ■

Environment improves in Final Assembly area

If you've wondered about the work taking place in front of the Final Assembly area, chalk it up to another advance for ET production. New Thermal Protection Systems spray requirements have driven a tighter environmental control – temperature and relative humidity – which was not achievable with the old HVAC (Heating, Venting, Air Conditioning) systems supporting Final Assembly, Positions 1, 2 & 3.

Mike Morgan (left) and Bernie Zagorski scan the new ductwork and piping in Final Assembly that improves the environment there.

Over the past few years, Production Operations has had difficulty in maintaining and controlling the proper environment in Final Assembly to support foam spray operations or other sensitive work in the giant cells. At times, work stopped or was delayed, especially in the summer.

It was indeed a challenge to maintain the environment or "stay in the box" as spray technicians referred to it.

Now, that problem may be evaporating quickly. Facility Operations & Services approved a $12 million contract to install new HVAC systems on the roof of Building 103, above the Final Assembly positions. The project also includes new lighting, new air ducts, new breathing air piping and compressors, and 6,000 feet of new piping to the units.

"We installed new 8-inch chilled water supply and return piping throughout the factory along with steam supply, condensate, and instrument air to operate the units," describes **William Bouchereau**, the project manager.

Work began in February and finished in June on Positions 1 & 2. Improvements in Position 3 started this month and will finish in October. The general contractor is PALA Interstate. Bouchereau says the work runs seven days a week, two to three shifts a day.

"It's been a real team effort with Production, Transportation, Quality Control, and DCMA for all to help us be successful in making that June 16th commitment date when we turned the positions back over to Production," Bouchereau says.

Pat Whipps, NASA ET resident manager, has also taken notice. "First, there's nothing but kudos to all the folks on this project who did this without any work interruption and kept it within cost and time schedule. The process control is much needed and much appreciated, considering our tight schedule in flying out the shuttle program."

Bernie Zagorski, the Facilities construction engineer overseeing day-to-day implementation activities that also included numerous weekend and off-shift coordination, observes that lighting in the joint cell is much brighter now, going from high pressure sodium to metal halide lighting.

Mike Morgan, who works in Final Assembly, thinks the improvements will provide better control and offer more opportunities to spray foam on tanks. "Before, when we opened the hangar door, sometimes we could never get the environment back. Recently, we opened and closed the door and got the environment back in 24 minutes." ■

A joint cell in Final Assembly, Positions 1 & 2's luminance is greatly improved with replacement lighting.

Coast Guard/NASA Exchange opens

With a variety of products on the shelves, the Coast Guard/NASA PX had scheduled its grand opening at press time for July 24. A sampling of products at the PX includes household goods, small appliances, purses, fine jewelry, sunglasses, NASA and Coast Guard souvenirs, snacks, and alcohol.

The store is open from 5:30 a.m. to 5 p.m. Monday through Friday and closed on Saturday and Sunday. It is located in the former child care facility – Building 358.

"This partnership is unique and for the benefit of all permanently-badged Michoud employees and will go a long way in helping our employees recover from the storm," explained **Patrick Scheuermann**, NASA Michoud chief operating officer.

The store is tax-free and sells merchandise at discounted prices. Credit cards and checks are accepted. ■

The PX offers a variety of goods at discounted prices.

Records Retention: Filled to the brim

It is an area seldom seen – the Materiel Sourcing Records Retention area on the south mezzanine of Building 103 where nearly 30,000 cartons of accumulated records line the shelves.

Each of the carefully-documented cartons may hold historical data, which could prove vital some day. Indeed, **Warren Wilson**, Records Retention operator, has assisted numerous investigative teams.

Wilson continues to provide timely support to departments throughout the facility. Striving to meet each department's long-term record storage and retrieval requirements, Wilson refers to the controlled-access area as a "bank" where each deposit and withdrawal event are carefully documented and recorded.

Currently, though, there are no remaining storage spaces available in Records Retention. The area is filled to capacity.

"Contracts is currently in the process of obtaining destruction approval from NASA," reports **Amber Ellinwood**, Contracts, who has been closely monitoring the situation. "This approval will enable us to destroy those documents, which have satisfied all contractual requirements. As a result, much-needed additional space will be available for back-logged cartons."

Each department will soon be asked to review their records with an eye for possible future destruction. ■

Warren Wilson oversees the Records Retention area, which is filled to capacity with document cartons.

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Space Systems Company

2007 Awards Night

Space Systems recognized outstanding employees at Awards Night on May 19 in Denver. Seven Michoud employees captured individual awards. Two Michoud teams were recognized for their performance, and several other individuals were honored for their contributions to Space Systems teams.

Exceptional Service

Paul Cooper
For developing and successfully implementing integrated planning activities on the External Tank Return to Flight programs. His leadership resulted in a more proactive approach to delivering the first redesigned tanks.

Bob Goodwin
For superior coordination of all facets of production and Return to Flight in the Large Structures Thermal Protection Systems department. With keen foresight he secured equipment well in advance of need, ensuring that aggressive schedules were met.

Beverly Vaultz
For business systems integration improvements that allowed more visibility to detail. Her improvements reduced turnaround time and increased customer satisfaction on major funding exercises and action items.

Technical Excellence

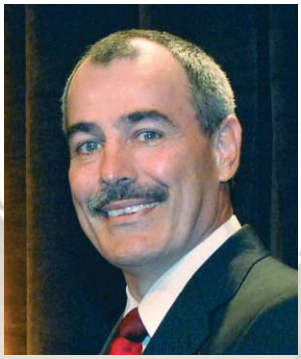
Celia Blum
For execution of *Orion* Phase 1 primary structures design and analysis tasks, leading to a Phase 2 *Orion* win

Angelo Greconia
For demonstrated expertise during the anomaly investigation of the External Tank engine cut-off sensor system, enabling a successful Space Shuttle launch

Kevin Montelepre
For outstanding technical achievement in support of an In-Flight Anomaly investigation of the Space Shuttle Protuberance Airloads (PAL) ramp and the subsequent elimination effort

Leadership

Mike McGehee
For leadership in the successful delivery of four Return to Flight External Tanks and for his role in developing a comprehensive strategy to restart the production work centers following Hurricane Katrina



Team Excellence

Eugene Sweet
accepted award on behalf of
Kennedy Space Center Modifications Team
For exemplary performance in completing, on schedule, critical External Tank (ET-118) modifications in support of a successful Space Shuttle launch

Educational Excellence

For engaging educators in motivating students to pursue careers in science and technology, providing a valuable pipeline of employees to meet the nation's toughest challenges

Marion LaNasa and Jenny Smith represented Michoud on this 17-person team.

Full Spectrum Leadership

For implementing Space Systems' Full Spectrum Leadership Forums, which have impacted the company's culture and its ability to shape future business success

Jerry Fabre represented Michoud on this 16-person team.

Team members include: John Alexander, Mike Berger, E.J. Bice, Marissa Billings, Rodney Broussard, Dave Buras, Charles Campbell, Jorge Chacon, Tom Davis, John Desforges, James Dillon, Paul Dillon, Jim Doll, Aida Elsayed, Ben Ferrell, Verna Freeman, Bill Gilbert, Francisco Gutierrez, Ed Harrington, Jason Holbrook, Mike Holcomb, Joe Johnson, Rob Johnson, Tommy Kerr, Jesse Lamonte, Kermit Lawrence, Terry Lee, Debbie Liebel, Bert Maatta, Mike McBain, Rodney McQueen, Tim Momenee, Vince Morales, Mike Morgan, Dave Newman, Terry Oldfather, Scott Otto, Pete Perbes, Donald Pittman, Doug Powell, Teresa Rivera, Benny Robinson, Dave Rodrigue, Troy Smith, Eugene Sweet, Vivian Tolliver, Ralph Tortorich, Jennifer Travino, Quoc Vo, Kathy Wakefield

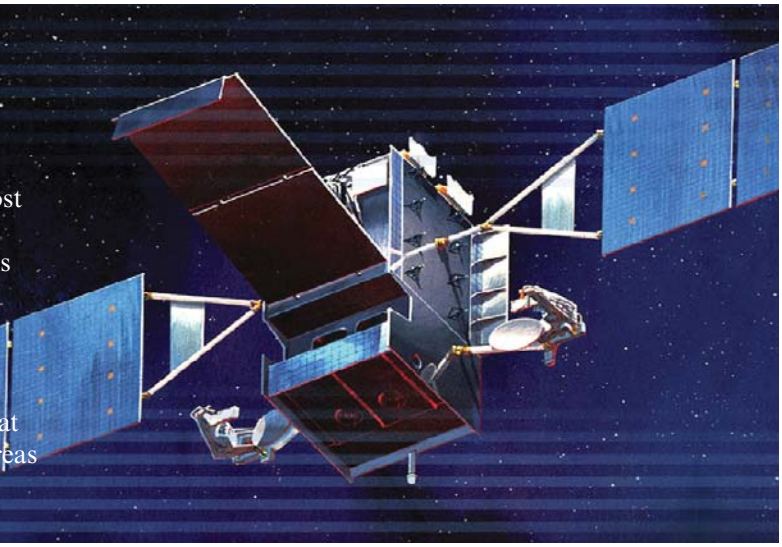
Team Excellence

Building 420 Test & Checkout for External Tank Delivery Team
For outstanding performance in delivering Space Shuttle External Tanks-118, -119, -123, and -124 to Kennedy Space Center, enabling the manifest to be met

The Building 420 Test & Checkout for ET Delivery Team includes front row from left: Suzette Cousin, Tom Melchionne, Dan Willis, Ronnie Grice, Carl Jasper, and Lisa Haley. Second row: Jorge Chacon', Al Ferrier, Sofia Adams, Ron Howard, Dawn Karchner, and Nick Waterwall. Back row: George Bruder, Ed Penick, Ken Auter, Miles Herleikson, Rusty Carpenter, and Don Brewster. Not pictured are E.J. Bice, Kirk Drumm, John Dunlop, Tim Gerstner, Chris Isaac, and John Rigney.

(For a complete listing of awards, see the on-line version of the 2007 Awards Night on EVPN. Click on the MAF EVPN portal, click on Space Systems, scroll down to 2007 Awards Night.)

One year of safe work



Michoud Operations employees at the Mississippi Space & Technology Center at Stennis have reached a milestone in completing one year of work without any lost time or recordable safety accidents or incidents.

Approximately 100 employees, whose main mission is building satellite propulsion cores and thermal blankets, work at the center. The one-year mark encompasses all areas of the center including clean room production activities.

"Stennis' Target Zero Program is a perpetual goal that is fed by the team's commitment to making their work areas safe," stated Site Director **Laryssa Densmore**.

Milestones

Employees celebrating anniversaries with Lockheed Martin in August 2007

30 Years
Lloyd Brinker
Ronnie Coleman
Charles Garner
Edward Harrington
Mike Holcomb
Will Jones
Mark Lockwood
Michael Murphy
Patrick O'Rourke
Ronald Troxclair

25 Years
Robert Conzonire
Paul Cooper
Dominick DiGange
Harshel Gildhouse
Herman Gleason
Clarence Hindman
Lowell Howard
Dawn Karchner
Robert Landry
Wendy Martin
Sam Moley
David O'Neal
Larry Pichon
Theodore Pilet
Keith Province
Ronald Schouest
Jerry Swearns

20 Years
James Angel
Jeffery Best
Medardo Jimenez
Keith Joiner
Jorge Ledo
Fulvio Manto
Toni McCormick
Alfred Stephens

10 Years
Charles Cottier
Travis Cuevas
Kevin Davis
Jim Doll
Sandra Hammonds
Larry Hoyt
Murali Kris
Ashok Limaye
Robert Mitchell
Kathryn Stephens
Edwin Ware

Emergency Information

To find out work status during hurricane season at Michoud, go to www.mafstatus.com or call 257-1MAF or 1-800-611-3116, check ETV or www.maffamily.com, listen to WWL-870 radio or WWL-TV, Channel 4 or www.wwltv.com

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