Space Systems Company–Michoud Operations

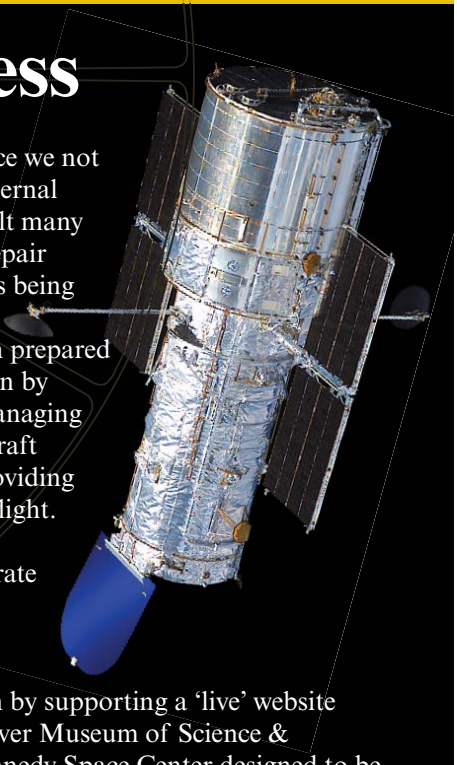
LOCKHEED MARTIN
We never forget who we're working for®

Mission Success Bulletin

April 27, 2009

on-line
http://www.lockheedmartin.com/michoud/

Final Hubble mission a success



After years of planning and rehearsing, *Atlantis* and the STS-125 crew lifted off successfully on May 11 to begin the final servicing mission to the Hubble Space Telescope. Helping launch *Atlantis* was ET-130, whose performance on launch day was hailed by NASA Associate Administrator for Space Operations **Bill Gerstenmaier** as "very good."

Indeed, the ET's umbilical camera showed only scant foam debris, most of which appeared beyond the critical time zone of 135 seconds into flight. A debris impact did cause limited damage to some orbital tiles on the starboard chine area. At press time, there is conjecture that the debris in question might have originated from a Liquid Oxygen Tank Ice Frost Ramp (based on limited imagery from astronaut hand-held photography).

Final imagery assessments will occur post-landing when umbilical well camera imagery becomes available. In the meantime NASA has already declared that a focused inspection of Orbiter tiles and wing leading edge is unnecessary, and has cleared the Orbiter Thermal Protection System for re-entry.

Preliminary results also show that ET-130 performed well in terms of structural, electrical and propulsion indicators. "I can't be more pleased with the tank's performance," said ET Program Manager **Mark Bryant**. "This is an extremely important mission for Lockheed Martin since we not only provided the External Tank, but we also built many of the upgrade and repair hardware components being installed on Hubble."

Lockheed Martin prepared for the Hubble mission by assisting NASA in managing the telescope's spacecraft operations and by providing training for the final flight. The corporation also helped develop, integrate and test replacement hardware.

Space Systems participated at launch by supporting a 'live' website broadcast by the Denver Museum of Science & Technology from Kennedy Space Center designed to be interactive with students and museum-goers in Montana, Illinois and Colorado. The company also sponsored spaceflightnow.com's 'live' webcast and arranged an interview with Jim Crocker, vice president, Sensing & Exploration Systems. The website tallied 440,000 hits prior to and during Crocker's interview.

Continued on Page 2

Hubble mission

Continued from Page 1

With five back-to-back spacewalks to repair and upgrade Hubble now completed, the telescope's viewing power could be increased by as much as 70 times and its lifetime enhanced another five, six, even eight years. NASA managers are calling the repairs 110 percent successful.

Astronomers hope that the **James Webb** Space Telescope scheduled to launch in 2014 will build on what Hubble has accomplished – such feats as determining the age of the universe and finding that virtually all major galaxies have black holes at their center.

Hubble flies 350 miles above the Earth; the International Space Station in comparison is 215 miles high. At the higher altitude Hubble and *Atlantis* are more susceptible to orbital debris (a 1 in 229 chance of impact) so the crew, after ungrappling from the observatory, conducted a final inspection of *Atlantis*. Then the shuttle dropped down to spend its last two days on orbit at a lower altitude.

Meanwhile, *Endeavour* and ET-131, on standby as the rescue vehicle for *Atlantis*, are preparing to roll around from Launch Pad 39B to Pad 39A on May 30 for their June 13th launch. With two launches already under its belt this year, NASA's manifest calls for three more missions in 2009.

"We'll be operating within tight schedules from now until the program ends," said Bryant. "It'll be a challenge, but I know our employees are up for it." ■

Second time's the charm to see a launch

At 2:01 p.m. on May 11 in the glaring sun of Florida's Space Coast, *Atlantis* and her historic mission to the Hubble Space Telescope were seconds from launch. The 95-degree heat tried its best to divert attention from liftoff, but this wasn't going to happen for a special 46-person group from Michoud Assembly Facility. For the great majority, this would be their first time to see a shuttle launch.

"It was a beautiful clear day," says **Betty Marcus**, a Thermal Protection Systems mechanic and 28-year employee. "It was hot, but nobody cared when trying to see the launch." Many of the group had already traveled to Florida to see a launch, but STS-119 scrubbed in March. Dubbed the "Airport Group," the employees made it only as far as the Orlando airport before hearing of the March 11th scrub. They returned home the next day.

However, that setback only heightened anticipation for the real thing this time. Finally, engines began to rumble, and *Atlantis* lifted beautifully into the warm afternoon sky.

Marcus had felt a little anxious prior to launch after hearing that inspectors noticed some ice on the vehicle. However, NASA cleared the issue soon enough. "I take this personally," she explained. "When it took off, I just felt like 'YES!'."

"It was like standing in front of a speaker at a rock concert with all the bass turned up," describes **Virgil Philips**, an electromechanical technician with 29 years to his credit. "I was more than proud because I knew I had something to do with that; proud to be part of the whole program."

Jim Lasecki, a senior logistics analyst also with 29 years at Michoud, said what amazed him was the time – it seemed like a minute – before the shock waves reached the group six miles away on the KSC Causeway. "The shock waves came through the water too, and porpoises were jumping out of the water."

"For those of us who have worked on ET for years, it was emotional and kind of bittersweet – people were wiping their eyes," continued Lasecki. "We felt a lot of pride because we've been involved and have played a part in this program."

Returning to New Orleans, the group received a congratulatory nod from the pilot. Then a flight attendant voiced a 10-second countdown timed perfectly with the plane's takeoff.

Russell Arthur who organizes the special trips paid for by Award Fee funds has several more lined up this year. "The company pays all the expenses, but employees do have to take vacation time if it's during the week," Arthur said. "This allows us to take more people who have not seen a company-sponsored launch before." Already, 54 are scheduled to go to the June 13th launch. ■

Some of the employees who flew down to see their first launch sponsored by the company included first row from left: Doug Vitrano, Larry Jackson, Becky Jordan and Steve Gaiennie. Second row: Sandra Hindman, Cliff Mitchell, Rodney Lemoine, Marie Barré and Dave Turnage. Back row: Jim Quirin and Donnie Bollich.

Launch Attendees

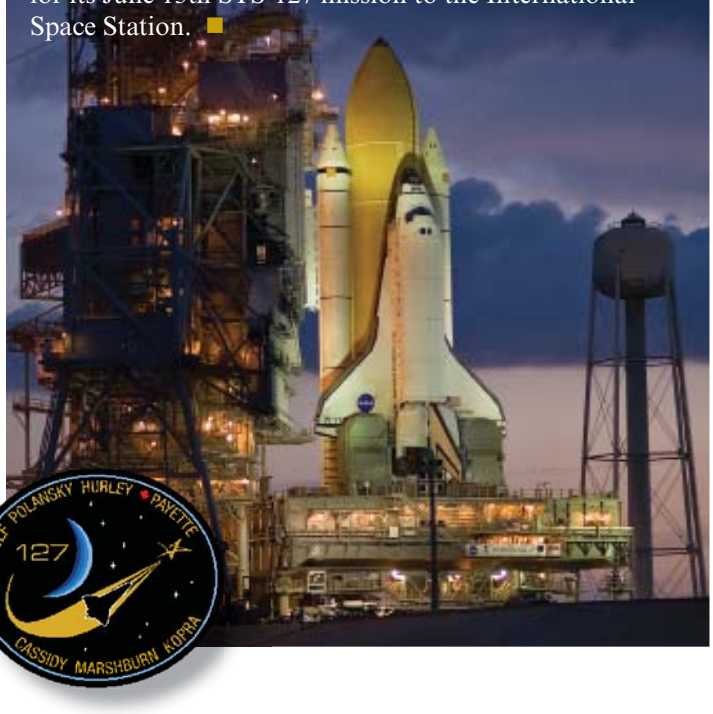
Mario Arthur
Roseann Augustine-Gray
Marie Barré
Don Bollich
Sue Bullington
Herbert Claybrook
John DesForges
Robert Dossett
Melissa Earhart
Kenneth Eddlestone
David Farin
Bruce Forest
Steve Gaiennie
Raymond Guidry
Norman Harris
Sandra Hindman
Larry Jackson
Dianne Javery-Knox
Becky Jordan
Danny Jurado
Phil Knight
Rose LaLanne
Jim Lasecki
Rodney Lemoine
Tim Livengood
Stanley Major
Betty Marcus
Terry Marsh
John McDonald
Cliff Mitchell
David O'Neal
Paul Pareti
Virgil Phillips
Debbie Chavez-Pittman
Jim Quirin
Michael Raybon
Webb Simmons
Rodney Spence
Allen Surla
Cleveland Thomas
Vivian Tolliver
Dave Turnage
Dianne Turner
Antoinette Verrett
Doug Vitrano
David Welsh

First "sixsome" to live aboard space station

Since astronauts and cosmonauts started living and working on the International Space Station in 2000, long-duration crews have never exceeded three persons. But on May 27, a Soyuz *spacecraft will launch from Kazakhstan with a crew of three (Frank De Winne, Roman Romanenko and Bob Thirsk) to join the three (Gennady Padalka, Mike Barratt and Koichi Wakata) already on station – in effect, forming the Expedition 20 crew and doubling its size to six. In the photo, the commander will be Padalka (Russia), 1st row right. Joining him will be De Winne (Belgium-ESA), 1st row left. Back row from left are Barratt (USA), Thirsk (Canada), Wakata (Japan) and Romanenko (Russia).*

Endeavour/ET-131 next to launch June 13

Space Shuttle *Endeavour* and ET-131 stand ready to fulfill their role as an "as-needed rescue vehicle" for the Hubble mission. Subsequently, *Endeavour* will roll from Launch Pad 39B to Pad 39A on May 30 to prepare for its June 13th STS-127 mission to the International Space Station. ■



MSFOC transition under way at Michoud

On May 1, 2009, NASA awarded a new Michoud Assembly Facility Manufacturing Support & Facility Operations Contract (MSFOC) to Jacobs Technology, Inc. Following a two-month transition period, Jacobs will assume full maintenance and operations responsibility at MAF, effectively ending Lockheed Martin's 26-year role as the Facility Operating Contractor.

During that time, Lockheed Martin exceeded expectations in managing and operating every aspect of the facility from assuring production readiness for the build of over 110 External Tanks to cutting endless acres of grass.

Along with the routine came human, natural and environmental threats to the facility. From the expansion of site infrastructure and systems, to the 1988 breathtaking dead-stick landing of a TACA airliner during a hailstorm, to the relentless pounding from Hurricane Katrina in 2005, our employees guided the facility through historic events, which literally made possible the continuation of human space flight.

Transferring decades of heritage technical facilities knowledge and thousands of records to a new contractor is a Herculean task. To ensure a smooth, uninterrupted transition, Lockheed Martin created Turnover Plans at NASA's request. Each of these 35 plans document processes, inventories and schedules designed to capture the whole day-to-day operations. "Turnover Plans are the key to a successful transition," explained **Elliot Perret**, Lockheed Martin Transition lead.

Lockheed and Jacobs met to finalize the terms of each plan within days following the award. "All 35 plans are currently in work as Jacobs' Points of Contact (POC) and Lockheed Martin POCs work together throughout the day," Perret said. "Implementation of activities is tracked by the two companies on a daily basis. Schedules are reviewed and incorporated into one integrated schedule, and that is when the rubber meets the road on the transition process."

Jacobs has committed to hiring most of the affected incumbent employees to minimize disruption to MAF and ET operations, and enable employees an opportunity to continue to perform their critical roles. Interested employees have submitted applications and interviews are under way. Job offers are expected to be extended in the near future.

"I am proud of what Lockheed Martin has accomplished over the years as the Facility Operating Contractor," recounted Perret. "We are committed to working with Jacobs to assure a smooth transition as we remain focused and demonstrate the dedication that has distinguished Lockheed Martin for all of these years." ■

Employees who desire to stay with Lockheed Martin, explore a new career or seek skills training are encouraged to meet with their Human Resource Business Partners for individual guidance.

Winding down ET's long history – final major weld

The 2nd shift Major Weld team completed the last circumferential weld, joining the Dome assembly to the Barrel sections of ET-138's Liquid Hydrogen Tank on April 26.

ET-138 is scheduled to be the final tank to be manufactured in Major Weld for the Space Shuttle Program at Michoud. Standing in front of the 5068 tool are John Olavesen (from left), Derrick Juneau, Richard Michel, Tim Livengood and James Miller. ■

National Safety Council recognizes Lockheed Martin

Representing Lockheed Martin at the awards banquet were James Moffett (from left), Jeff Beal, Andrew Thompson, Chris Koch, Jill Charrier, Robert Pedeaux, Steve Francis, Hank Knighton, Craig Palmisano and Greg Lain.

Last month, the South Louisiana Chapter of the National Safety Council presented Lockheed Martin with three awards for Michoud's 2008 safety performance:

- Fleet Award for Trucks division, 50,000 – 100,000 miles driven with no recordable cases
- Fleet Award for Passenger vehicles division, 50,000 – 100,000 miles driven with no recordable cases
- Occupational Safety Award for no lost workday cases in 4 million hours worked ■

Kaizen events improve critical path on ET production

Since Return to Flight, Michoud Operations has focused on building one tank at a time in Final Assembly. Today to meet the Space Shuttle launch manifest, Michoud is streamlining the production process and working on multiple tanks in Final and in Building 420.

The Final Assembly Collaborative Work Cell (CWC) led by **Tom Kilroy**, reviewed several production processes and decided on a series of Kaizen events to improve Michoud's build processes. Kaizen, a philosophy that focuses on making little changes on a regular basis, improves productivity while reducing waste.

The CWC included employees from support and build departments who are tasked full time to focus their efforts on critical path items in their particular area.

Final Assembly Manager **Mike Morgan** said the first Kaizen turned out to be the biggest effort. "It encompassed everything from the time one reports into work to the time one begins doing value-added work."

The remaining Kaizens worked Ice Frost Ramp installation and an aft end Six Sigma initiative.

In March, managers, supervisors and technicians met to begin the first of two Kaizen events to improve the production flow of pouring Ice Frost Ramps and installing brackets and press lines. The team flowed out the current state of production, came up with a plan to streamline the processes, and designed a Visual Management Board (VMB).

Tracking day-to-day progress of work, the board became the core product of the three Kaizen events and focused management and the workforce on areas that needed extra effort. At any time, one could check the board to see what was happening.

"We got our VMB together and tried our improved process on the next tank, which was ET-133," said Morgan. "The original flow showed 26 days to pour the lower Ice Frost Ramps and install brackets; we did it in 10 days." The Final Assembly crew went on to install the press lines and pour the upper Ice Frost Ramps in 10 days as well, a 9-day reduction in existing schedule.

"It's the most impressive thing I've seen since coming to Michoud," said **Alan Adams**, NASA manufacturing lead.

Because Ice Frost Ramp and press line installations were so far ahead of schedule, supervisors decided not to install the last two press lines in order to give crews working on the aft end of the tank unfettered access.

The 6S event on the aft end of the tank helped to reduce clutter, organize tool and work instruction locations, and ease access to consumable items with the use of point of view racks located on the stand. These improvements reduced the amount of time technicians spent retrieving items from the crib and locating tools, paperwork and drawings necessary for their jobs.

"This exercise also branched out across all of our Kaizens," 6S lead **Kevin Gauley** said. "We dedicated one employee to kitting jobs with the necessary hardware, paper work and drawings. For example, a technician working the flange 'D' press line can go to the kitting area and find the kit labeled flange 'D' with everything needed for the job. He or she takes it, and goes to perform the job. It's just that easy."

The team has noted that the effectiveness and success of the Ice Frost Ramp Kaizens has spilled over to other areas of Final Assembly.

"I've seen a higher energy in the workforce working ET-133, and how the tank is being processed," emphasized Morgan.

"The crew installing feedlines has been hitting that schedule out of the park every day," said an excited **Mike McGehee**, senior manager, Final Assembly & Test. "In three days the entire feedline will be installed, torqued and leak checked."

To continue the success and buy-in from the workforce, several hourly employees have recently participated in Greenbelt training and will be certified. The plan is to grow a critical mass that has the culture of process improvement.

"All of these efforts are based for us to successfully fly out in these tight schedules and meet our deliveries," concluded McGehee. "So from tie-ins to job assignments, the VMBs are the road map to meet our commitments." ■

Technicians Kiana McCants and Tom Maroney and supervisor Debbie Liebel look on as manager Mike Morgan points to the progress of Ice Frost Ramp installation on the Visual Management Board.

Three receive Snoopy awards

The STS-119 astronauts presented Silver Snoopy awards on May 5 to Mark Pokrywka (from left), Fred Ubas and Joe Johnson:

- Pokrywka, a structural engineer for 23 years, for helping resolve technical issues associated with the ET Main Propulsion System
- Ubas, a Thermal Protection Systems (TPS) mechanic, for leveraging 28 years of experience to provide professional insight into Bipod and Ice Frost Ramp redesigns
- Johnson, a TPS mechanic with 30 years of experience, for participating on the "Dream Team," whose members voluntarily move to 3rd shift to maximize ET production and not impact 1st and 2nd shift processing due to spray foam application ■

ET Completion Plan Update

Milestone	Event Date	Description
1	4/25/08	Base Incentive
2	5/31/08	STS-124 launch/ land 6/14/08
3	7/10/08	ET-127 delivery
4	8/6/08	ET-129 delivery
5	11/14/08	STS-126 launch/ land 11/30/08
6	11/19/08	ET-130 delivery
7	2/14/09	ET-131 delivery
8	3/15/09	STS-119 launch/ land 3/28/09
9	4/28/09	ET-132 delivery

Young Minds learn about Michoud

This year 135 inquiring minds raised their hands on April 23 while **Orion's** *Wes Geiman fired questions at them about the future spacecraft during the annual Young Minds at Work activity. Usually, Michoud has about 200 Young Minds shadowing their parents for the day but this year standardized school testing reduced the number of students who could attend.*

Kids love Space Day

Lockheed Martin sponsored National Space Day on May 7. Here in the New Orleans area, Michoud Operations expanded Space Day to week-long activities at partner school Jefferson Elementary that included guest speakers talking about space careers, the huge mural Space Systems employees painted in December at the school and FIRST Robotics. During his presentation on space exploration, Communications Director Marion LaNasa calls upon an enthusiastic student.

Astronauts thank employees for their ride uphill

Four members of the STS-119/ ET-127 crew – Commander **Lee Archambault,** pilot **Tony Antonelli,** and mission specialists **Steve Swanson** and **Ricky Arnold** – shared their mission experiences with employees at a General Assembly on May 5.

Archambault led with a brief overview of the March 15-28th mission. Then Swanson walked into the audience and took questions ranging from dealing with space debris, to losing body mass, to detailing the re-entry process, and so on. Fortunately, no one asked how an astronaut goes to the bathroom in space.

Using their sense of humor, the astronauts interacted well with employees, demonstrating how 'down to Earth' they really can be. During the mission highlight video, crew members offered their own commentary – some of it quite tongue-in-cheek.

For instance, when discussing the shuttle's cuisine, Antonelli deadpanned, "The best thing on the shuttle menu is the crawfish etouffee."

Later in a more serious moment, the pilot commended Lockheed Martin employees and recognized the family sacrifice inherent in space work. "Thanks to all of you for building the External Tanks. Every one of you has a part in it. Thanks to your families for letting you do it. All your hard work is definitely paying off."

Archambault added that "the tank performed wonderfully" during launch and ascent.

The crew also presented to ET Program Manager **Mark Bryant** and the facility a collage signed by all seven members with photos of the expanded space station, the crew, *Discovery* and ET-127 on the pad, a small flag and a crew patch flown in space.

"We are really excited to share these moments with the American public, but in particular we like to share these moments with the rest of the team," said Archambault. "And you guys are obviously a very, very, very strong part of that team.

"So thanks for making good tanks, particularly the one that went up on the mission with us. Coming here is our opportunity to thank you guys for doing what you do for our country's space program." ■

STS-119 Commander Lee Archambault addresses employees at the May 5th General Assembly. Below, NASA ET Manager John Chapman talks with employees while ET Program Manager Mark Bryant, mission specialists Ricky Arnold and Steve Swanson, pilot Tony Antonelli, and Archambault listen.

Launch Awardees watch *Atlantis* and ET-130 fly

Chosen for their outstanding performance, these 14 Launch Awardees posed at the KSC Banana Creek viewing area two hours before STS-125 launched on its Hubble mission May 11.

1st Row from left: David Wiggins, Mike Campbell, Alex Karas with dad John Karas, head of Space Systems' Human Space Flight.

2nd Row: Twyla Torregano, Kellie Alleman, Connie Britt, Mark Rohlinger, Jeff Pfrimmer, Twanda Vaughn and Teresa Dillon.

3rd Row: Danny St. Romain, Jerry Majors, Sam Ducksworth, John Rhodes and Isolde Dagg.

Milestones

Employees celebrating anniversaries with Lockheed Martin in June 2009

35 Years
Wayne Wright

30 Years
Faye Baillif
Thomas Dirksen
Joseph Miller
Chi Chi Williams

25 Years
William Bouchereau
Maria Bzik
Kenneth Eddlestone
Angelo Greconia
Larry Groves
William Hall
Gary Harris
Patti Jones
Jon Sharpe

20 Years
Terri Murphy
Terry Sheeley

15 Years
Ronald Bozant
Randy Brown
Larry Dickson
Todd Duhon
Jesse Hawkins
Guillermo Ladut
Richard Michel
Clayton Newbill
Aaron Pearson
Rosemarie Sanders
David Saunders

10 Years
Raymond Cuccio
Wesley Martin
Timothy Momenee
Nancy Turnage

5 Years
Desiree Bennett
Marissa Billings
Tamatha Hinson
Moly Ittia
Artiom Ivakin
Joseph Noble
Rebecca Pham
Lisa Stewart

Mission Success Bulletin on-line

LOCKHEED MARTIN

Lockheed Martin Space Systems Company – Michoud Operations

Volume 28, Number 4 • May 27, 2009

Director of Communications: Marion LaNasa

Editor: Harry Wadsworth

Graphics, Photography: Eric Bordelon, André Bourdier, Chip Howat, Jon Irving, Jim Lasecki, NASA, Brian Peterson, Richard Schneider, Steve Seipel

Contributors: Kevin Barré, Eric Bordelon, André Bourdier, Brian Peterson

Mission Success Bulletin is published by the Communications Department.