Space Systems Company – Michoud Operations

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Bulletin

May 29, 2007
on-line
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NASA praises ET-124 repairs

Hail-damaged tank back on pad

Atlantis with ET-124 beneath its belly is poised to fly within the next few weeks to resume construction of the International Space Station. Most space odysseys begin at launch, but not this one.

Atlantis and ET-124's tale began on February 26 at Launch Pad 39A when a sudden, violent storm pummeled the tank with golf ball-sized hail, damaging the protective foam in 4,200 places. Just 2½ weeks from its scheduled launch, some skeptics questioned if ET-124 could be repaired.

"First time I saw the tank, I was really wondering if we could fly this tank," remembers **Mike Leinbach**, KSC launch director. The first step would be a complete inspection and assessment, and on March 4 the shuttle stack returned to the Vehicle Assembly Building.

For ten weeks NASA, Lockheed Martin, and USA crews assessed and fixed foam. USA technicians repaired divots on the tank by using sand and blend techniques and foam pours while Lockheed Martin's KSC Operations and a small engineering team from Michoud facilitated the activities. Finally, with those repairs completed, a team from New Orleans arrived to prep, spray, and trim two concentrated areas of damage on the forward and aft ogives.

While developing the unique spray application was challenging enough, trimming the foam would be another matter.

The forward ogive spray required a tool specially designed by engineer **Glenn Lapeyronnie** that fit over the nose cone spike and trimmed the foam in the area known as the pencil sharpener. Built by Lockheed Martin workers at Michoud, the portable tool was flown to Kennedy Space Center to complete its one-time requirement.

Air driven with sandpaper covering rollers, the tool made seven passes to machine the foam insulation on the first day and followed up with two more the next.

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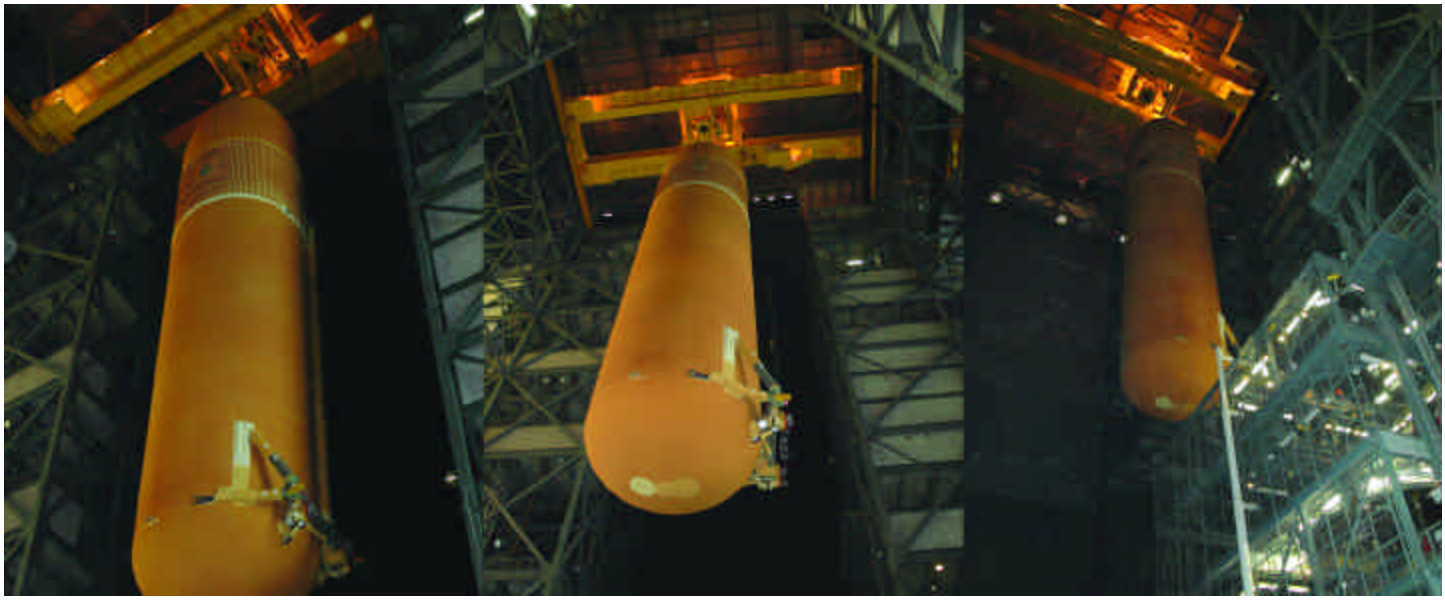
Some of the white hail storm repairs near the top of ET-124 are visible after Space Shuttle* Atlantis *and the tank returned to the pad May 15.

ET-117 lifted into cell at Vehicle Assembly Building



At Kennedy Space Center, ET-117 undergoes processing earlier this month in preparation for its August 9th launch with **Endeavour** *to the International Space Station. The tank is scheduled for a June 12th Solid Rocket Booster mating and a June 30th Orbiter mating as part of mission STS-118.*

NASA praise

Continued from Page 1

John Chapman, NASA ET program manager, called the tool "a real work of art. It worked flawlessly." Chapman says the tool was "almost bordering on an *Apollo 13* story," referring to the carbon dioxide filter that engineers hastily devised on the ground to help the *Apollo* astronauts return safely to Earth.

Referring to the ET repair team working across the country, **Wayne Hale**, Space Shuttle program manager said "we're really proud of what they have done because in a really unexpected circumstance and in the midst of all the other work they have to do, they turned to a 3-shift-a-day, 7-day-a-week activity to not only develop the engineering requirements and analysis, but also do the physical touch labor to fix the tank, and it's just an outstanding effort by hundreds and hundreds of people.

"Certainly the people who came from Michoud – to do the final large area spray and develop the techniques to trim that – have done an outstanding amount of work."

Lockheed Martin's Ken Phillips (left) and Toan Nguyen use the new portable "pencil sharpener" tool to trim and machine the foam spray repair on ET-124's forward ogive. The tool, designed and built in 10 days specifically for the repair at Kennedy Space Center, performed flawlessly.

Leinbach agreed. "A phenomenal job. One of the finest if not the finest recovery program I've seen."

Chapman says the tank has taken on a speckled look from a variety of foam colors, but notes the tank "meets surface smoothness and roughness requirements and is absolutely ready to go."

Hale says the tank passed an extensive set of tests and analysis, so the team is confident that the repairs are not a debris threat. "The key is how you buck up in the face of adversity. This team showed real American grit."

Wanda Sigur, ET program manager, deems the repairs, "a super achievement in addressing a series of complex issues. A lot of people worked very hard on this project - our engineers, technicians, and support people at Michoud, Marshall, and KSC – and I want to thank them all including our NASA and USA teammates."

Atlantis rolled back out to the pad May 15 with several contingency days available before the launch window opens June 8. "Barring a technical issue, we have a good shot at June 8," Leinbach asserted.

The first milestone this week is the delta Flight Readiness Review on Wednesday and Thursday. ■

ET-124 hail damage hits

1,400 to 1,500	–	strikes to large area on pencil sharpener
449	–	hits to lower ogive area
1,038	–	pour foam repairs
889	–	sand and blend repairs
402	–	minor impacts, no repairs needed

Approx. 4,200 – total hits

NASA, Lockheed Martin continue fortifying site for storms

The rumblings of another 6-month hurricane season begin this week. Last year generally proved quiet for the Gulf Coast and Florida. Will we be as fortunate this season? Is Michoud ready for a storm?

Malcolm Wood, director, Facility Operations & Services, ticks off improvements made to prepare for the next storm season:

- Incident Command Center modernized with state-of-the-art camera system in Bldg 320
- Remote control of water pumps at pump house
- Pump house hardened and pumps inside now have protective coverings
- Building roofs fortified to withstand 130 mph winds
- Project to put power lines underground has started
- Water well provides independence from city if need be
- Satellite telephones added
- Business Continuity Plan established with off-site locations

Regarding off-site work locations, Wood says that when a storm has passed and his Facility Operations & Services employees have had a reasonable amount of time to secure their families out of town, they will then report to Hammond or to Stennis if Michoud is closed.

"If the storm goes east of New Orleans, Facility Operations & Services employees will go to Hammond. If the storm goes west of New Orleans, our folks will go to Stennis. And they may not know until the last minute. People will have to call in and find out where we're mobilizing. If need be, from there we'll take a helicopter to Michoud." Wood says no longer will the Ride-Out Crew stay on site for several weeks at a time. "We want to start getting fresh people in."

And more improvements will be made in the future. "NASA still wants to build an alternate pumping station and make Building 320 totally self-sufficient," Wood adds.

Steve Turner, Safety manager, is the lead for emergency operations preparation and conduct. His group has identified a number of locations that will be ready for employees to show up and work – some are near Michoud; some are farther away.

"They're either existing NASA properties, existing Lockheed Martin properties or hotel chains where we have an agreement," Turner says. "Basically, it depends on the emergency. If a fire shuts down Michoud, we might send people downtown. If it's a pandemic, we would send people farther away.

"We've carefully worked the contingencies for alternate work site requirements, which include our ability to quickly re-stock Michoud with critical supplies. That will be key to our success, to quickly reopen after an emergency."

Each department should review its own off-site work plan.

Cheryl Alexander, director, Human Resources, reminds employees that in the event of any emergency such as a hurricane or a pandemic, they can go into LMPeople and update their status depending upon where they evacuate to – whether it's a hotel in Arkansas or a relative's home in Birmingham.

"That's real time in an emergency, and LMPeople will reflect that. Right now, we encourage employees to again look at the emergency contact information they have listed on LMPeople. In addition, we prefer that you include at least one telephone number of a relative or friend outside Louisiana who would know how to reach you."

Alexander cautions against using telephone numbers with area codes 504 or 985, which may be worthless in the event of a major storm – just as in Katrina. ■

Huntsville Snoopy Award winners

Astronaut Terry Virts poses with Bob Stowell and David Myers (right) whom NASA recognized on May 9 for their Non-Destructive Evaluation efforts supporting STS-114, STS-121, STS-115, and STS-116 post-flight studies. During the* Columbia *investigation, Myers was instrumental in the operation of the Computed Tomography (CT) x-ray system to characterize different repair methods in damaged Reinforced Carbon-Carbon panels of the Orbiter. NASA also noted his contributions in the setup of radiography equipment and data acquisition as the Reusable Solid Rocket Motor program utilized real-time radiography for imaging the formation of hidden ply lift in the nozzle insulation during sub-scale hot fire testing. Stowell was honored for his support of the Solid Rocket Booster micro-focus CT to help characterize the failure mechanism of carbon bearings when infiltrated by toxic hydrazine in the Auxiliary Power Unit and for his setup of scans and data provision.

Michoud Operations stands down for Safety

With a recent injury to an employee's finger, and accident and incident rates on the rise, Safety & Product Assurance called a one-hour Stand Down on May 4 to allow employees to focus their attention on safety.

Since July 2006, the accident rate at Michoud has risen 33 percent, and the incident rate has climbed 45 percent. During the Stand Down, managers asked employees how to improve safety at Michoud. In all, 395 responses came back.

Suggestions on how to avoid Slips, Trips, and Falls led the list with 23 percent; Pedestrians & Traffic issues accounted for 11 percent; and Tools/ Equipment received 8 percent of the comments.

"Now that we have the feedback, we'll evaluate the responses to determine the potential frequency of occurrence, the severity, and what needs to be done – then set about resolving issues, and communicate back to employees," said **Paula Hartley**, director, Safety & Product Assurance.

Safety will assign a risk assessment code to prioritized items and track them. Some employees may even take part in Kaizen events to discuss safety issues, and management will walk the facility more and meet more frequently to raise the safety awareness level. ■

Norway launches Hybrid Sounding Rocket

With Lockheed Martin's assistance, Nammo Raufoss, a leading manufacturer of missile and space propulsion products, launched a Hybrid Sounding Rocket on May 3 in Norway.

The 7,000-lb.-thrust rocket measured 35 feet in length, 10 inches in diameter, and weighed 1,035 pounds. Burn time was 20 seconds. Nammo Raufoss fabricated the rocket motor, tank/valve system and mobile group support equipment with Lockheed Martin's design assistance and was also responsible for ground testing and launch demonstration activities.

Technicians finalize the assembly of the pencil-like Hybrid Sounding Rocket.

"Nammo made history by being the first in Norway to launch a Liquid Oxygen Hybrid launch vehicle into suborbital space from the Andoya Rocket Range, a fantastic accomplishment," says **Mike Gnau**, acting director, Program Management & Advanced Programs, who prior to the launch traveled to the rocket range with Lockheed Martin Hybrid rocket expert **Joe Arves**.

"Lockheed Martin is happy to have been part of this technology program with Nammo Raufoss, and I hope that we can continue building our business relationship," Gnau says.

The launch came about as a result of an offset where Lockheed Martin transferred Hybrid rocket technology under a U.S. government-approved ITAR (International Traffic in Arms Regulations) manufacturing license to Nammo after the Norwegian Ministry of Defense purchased Pantera targeting pods from the corporation.

A Hybrid Sounding Rocket has several advantages over a solid-fueled motor in that it's more reliable, safer to handle, throttleable, and less expensive. ■

Above the Arctic Circle, the Andoya Rocket Range is the world's northernmost, permanent launch facility for sounding rockets and scientific balloons.

Board of Directors tours Michoud

Prior to Lockheed Martin Corporation's Annual Shareholders Meeting in New Orleans on April 26, the board of directors toured the Michoud facility and the ET production line. The board also heard presentations about the new space exploration programs – *Orion*, Rocketplane Kistler, and *Ares I* Upper Stage – that will be built at Michoud.

On the way out to Michoud, board members toured some of the city's neighborhoods that flooded during Hurricane Katrina and received an update on community recovery efforts.

With a model of* Orion *behind him, Michoud* Orion *Project Manager Jim Bray briefs the board about plans for the Space Shuttle's successor.

Chairman, President & CEO Bob Stevens (foreground right) listens as the board tours the Vertical Assembly Building with two Liquid Oxygen/Intertanks in the background.

Posing above with a Liquid Hydrogen Tank are front row from left: Jim Ukropina, Nolan Archibald, Doug McCorkindale, Bob Stevens, Gwen King, Gene Murphy, and Marc Bennett. Back row: Joe Ralston, Jim Loy, Jim Ellis, Pete Aldridge, Jim Schneider, Anne Stevens, and Frank Savage.

Production Operations Director Hal Simoneaux (right) explains the Model Room.

Students have a blast at Space Day activities

"This is Mission Control – 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, Blast Off!" – cried a chorus of screaming elementary and middle school students to kick off Space Day 2007.

An Einstein Elementary student experiences his first mini-jet ride in the Microjet as part of Lockheed Martin Space Day.

Across the nation, students in nearly every state participated in the annual Lockheed Martin-sponsored event to share the excitement and wonder of space exploration.

Nathan Loper, Communications, gives an Einstein third grader his first real Mission Control experience in the Space Lab console.

In the New Orleans area, nearly 1,000 students, teachers and Lockheed Martin volunteers participated in events on Space Day May 8 and May 10 at Jefferson Elementary and Einstein Charter School.

Children enjoyed the *Odyssey III* Space Lab Module – a 12 foot-long replica of a laboratory module on the International Space Station. Students climbed aboard as volunteers **Curtis Craig** and **Gilbert Bennett** showed them how to explore the ten workstations. Students also learned to operate remote control headsets and video displays on a Mission Control Console manned by **Nathan Loper**.

A budding third-grade rocket scientist fires off his first water bottle rocket, thus learning the principles of aerodynamics at Einstein Charter's Space Day.

Paul Macaluso shared information on aerodynamics and helped children fly the flight simulator that gives students the sensation of piloting a spacecraft. **Raynard Bender** led the rocket demonstration, and **Carolyn Baringer** took kids through the "Astro Jeopardy" game.

Affectionately dubbed "Rocket Man" by students, **Hale Davidson** fired the Hybrid Rocket Motor. **Albert Porre** and **Johnny Seither** helped kids climb inside the world's smallest jet – 13 feet – that was featured in a James Bond movie. "When you saw that 'aha' look in children's eyes, telling you that they got it and actually learned something new, that was priceless," commented Davidson.

Said one Jefferson Elementary 8-year-old, "Before Space Day, I wanted to be a doctor; now I really want to become an aerospace engineer!" ■

Mike Sandras, head of the Pontchartrain Astronomy Society, coaches a Jefferson Elementary student in exploring space.

Three Einstein students model their new lightweight paper spacesuits.

As part of their "Fifty Years and Still Having a Blast" skit, Jefferson Elementary students performed an original song and dance routine about all the accomplishments our nation has made in space flight.

Astronaut addresses Michoud *Orion* team

***Orion** crew astronaut Lee Morin and Michoud Program Manager Jim Bray presented a program overview at an **Orion** All Hands meeting May 17. Morin discussed state-of-the-art avionics and presented a detailed scope of his current assignment – working on **Orion**'s cockpit. Morin flew in space on the STS-110 mission in 2002 and completed several spacewalks.*

EVO turns up the heat

The Lockheed Martin Employee Volunteer Organization is providing exciting volunteer opportunities as we begin the summer months:

Children's Miracle Network Telethon
WDSU-TV Studio
Sunday, June 3, 11:45 a.m. to 3 p.m.
Contact: **Carolyn Baringer**, 7-0847

The Children's Miracle Network (CMN), a non-profit organization, is dedicated to saving and improving the lives of children by raising funds for childrens' hospitals across North America.

Each year, the 170 CMN hospitals provide the finest medical care, lifesaving research and education to help millions of kids overcome diseases and injuries.

The telethon will benefit Children's Hospital in New Orleans in its continued efforts to recover from Hurricane Katrina. Proceeds from the telethon will fund mobile immunizations, recover lost records, and assist in hiring staff displaced due to the hurricane. Volunteers will:

- take pledges for donations over the telephone
- help play with former Children's Hospital patients who will be on the air with their amazing stories
- serve as runners and assist news-casters and other volunteers

WYES Art Auction
WYES-TV Studio
Sunday, June 24th, 4 p.m. to midnight
Contact: **Harry "Hank" Knighton**, 7-0404

WYES-TV is the Public Broadcasting station in New Orleans. One of its annual fundraising initiatives is the annual Art Auction. Local and regional artists donate paintings, drawings, and sculptures that are auctioned off through bidding. Volunteers will assist in arranging the artwork in the studio and by taking telephone bids.

The television station recently returned to its Navarre Avenue studio, which suffered catastrophic damage in Hurricane Katrina.

Habitat for Humanity
The EVO is also planning a Habitat for Humanity event in June.

For more information on how you can become instrumental in your community's recovery this summer, check the EVO website: http://maflm509.maf.nasa.gov/303x/evo/index.htm ■

Young Minds light up the factory

Approximately 250 students participated in Michoud's third Young Minds at Work on April 26. The event included tours, presentations, and a full day with Mom or Dad. Here, Frank Duncan shows kids how materials change when exposed to liquid nitrogen's extreme cold – flowers become brittle as glass, balloons collapse, a banana so hard you can almost drive a nail with one.

Milestones

Employees celebrating anniversaries with Lockheed Martin in June 2007

30 Years
Curtis Craig
Mike Javery
Mike Newbold

25 Years
John Dobson
John Ezell
John Fisher
Edward Goelz
Bruce Hollingworth
Kenneth Nicosia
Lloyd Norton
William Pollard
Willie Smith
Dave Turnage
Malcolm Wood

20 Years
Roger Myers

15 Years
Charles Gartman
Alvin Kurtz

10 Years
Sandra Campbell
Mark Cantrell
Sheri Delaup
Gregory Farve
Mark Javery
Darren Kearney
William Koster
Chad Purser
Gregory Sass
Edgart Velarde

5 Years
Bahiy Watson

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**

Mission Success Bulletin on-line

LOCKHEED MARTIN

Lockheed Martin Space Systems Company – Michoud Operations

Volume 26, No. 5 • May 29, 2007

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Mission Success Bulletin is published by the Communications Department.