Space Systems Company – Michoud Operations

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Mission Success
Bulletin

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Repairs to ET-124 begin after hail storm

ET-124 got a good dose of just how volatile Florida weather can be.

After rolling to the launch pad at Kennedy Space Center in preparation for the STS-117 launch, the tank got clobbered by a passing thunderstorm that pelted the pad with golf ball-sized hail on February 26.

Following the storm, a team of engineers and technicians inspected the condition of the vehicle and identified numerous impacts to the Thermal Protection System (TPS) on Liquid Oxygen Tank acreage near the nosecone.

Based on the results of the initial inspection, NASA managers decided to return the shuttle stack to the Vehicle Assembly Building for further inspections and repair activity.

Subsequent inspections over the past several weeks revealed that ET-124 had more than 2,000 impacts from the hail storm. The area around the nosecone, commonly referred to as the 'pencil sharpener' region, suffered the most severe damage.

A repair process for the area is in-work that will require removal of the damaged acreage foam and replacement with new foam to be hand sprayed by Michoud technicians in April. The TPS will then be hand-sanded to the final thickness and outer mold line requirements.

Prior to the spray, engineers and technicians will design and build a mock-up of the current ET configuration at KSC so that proficiency sprays can be done at Michoud just as they will take place in Florida.

Jim Feeley, senior manager, ET Launch Integration, and **Eugene Sweet**, senior manager, ET Technical Support, are leading a team of Lockheed Martin engineers and KSC technicians to perform the repairs necessary to bring ET-124 back to a flight-ready condition.

Sweet, an experienced engineer who has been involved in many unusual TPS repairs, noted that this is one of the most unique.

"We definitely have our work cut out for us, but we have a great team in place, and I'm confident we can get ET-124 ready to fly safely on STS-117."

Additional TPS repairs will be required, but the majority of the work is expected to be within the normal limits of repairs that are typically performed while processing each External Tank. Sand and blend repairs started several weeks ago to heal minor hail dings. Technicians will also perform foam pour repairs on other parts of the tank.

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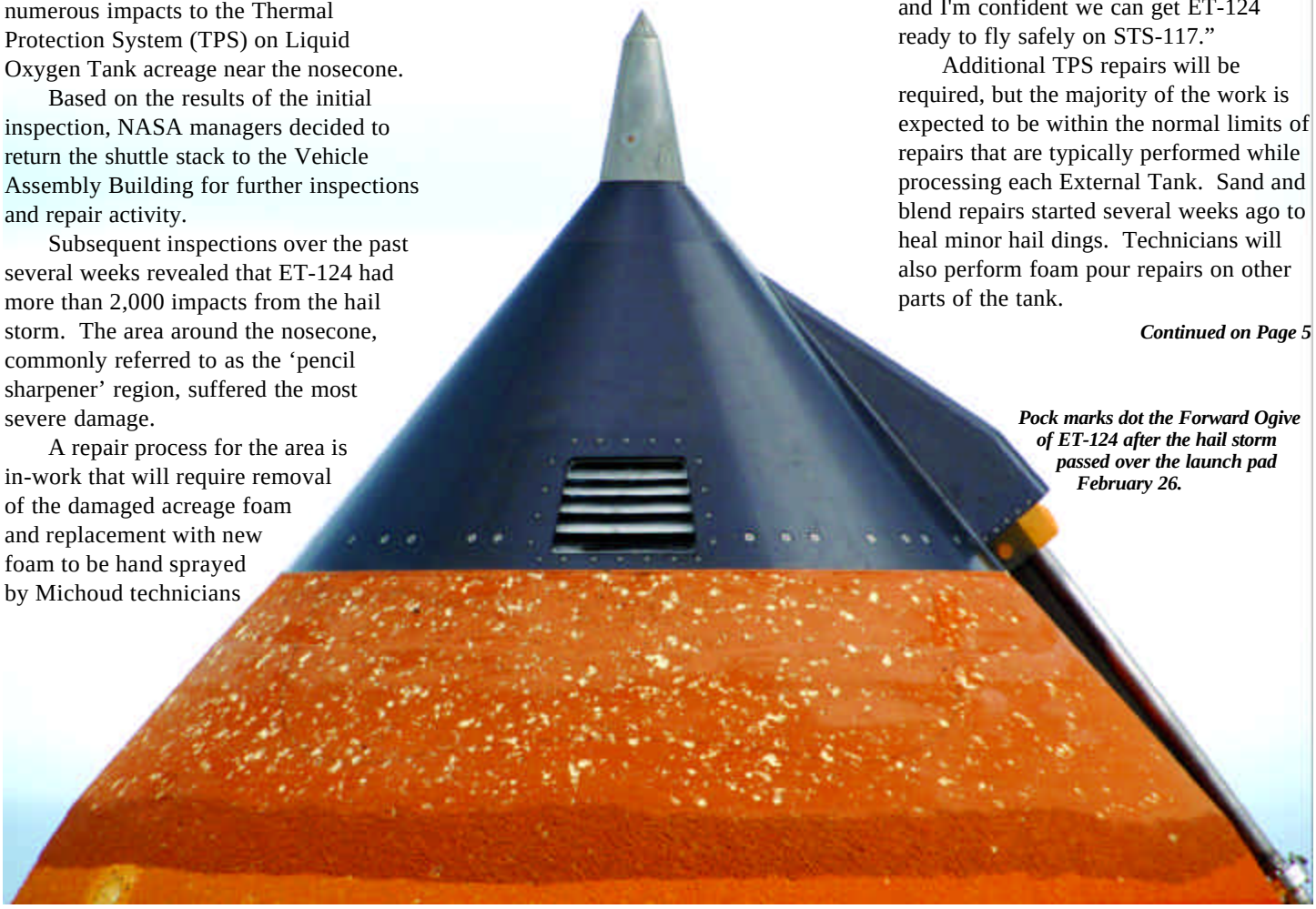

Pock marks dot the Forward Ogive of ET-124 after the hail storm passed over the launch pad February 26.

Process improvements pay dividends across Michoud

With the continuing need to meet a demanding flight manifest, External Tank process improvements remain a priority.

To improve ET critical path processing, Michoud implemented this past summer the LM21 Critical Path Hardware Transformation Process Review. The review produced a number of actions resulting in an implementation strategy called Get to Excellence.

The strategy is already paying off, as Cell A processing has shown dramatic improvements. ET-124 spent 63 work days in Cell A, followed by ET-117 with 40 days and most recently ET-125 logging 44 days.

Another promising activity is improvements to the standardized process to refurbish test panels in the high fidelity mock-up area.

Now, in order to help ensure on-time delivery of ET hardware, a Critical Path/No Fail process improvement initiative is in the initial "development and deployment stage."

"Our local NASA customer proposed the idea/concept and encouraged us to put a process in place," explained **Brian Magendie**, manager, Industrial Engineering.

"We made contacts and obtained help from Master Blackbelt resources in Denver. Next, we solicited input from **Patrick Whipps**, our resident NASA ET manager, and formulated a training plan."

Several departments then provided team members who completed the additional training. The teams consist of seasoned Greenbelts and Blackbelts, experienced in using LM21 tools. **Mike McGehee**, senior manager, ET Recurring Build, and **Augie Panks**, senior manager, Final Assembly & Test, also provided direction and backing to initiate the process on ET-120.

For now, two four-person teams are in the initial deployment phase to work "hot spots" on ET-120.

"We've assembled a diverse team of individuals who've been involved in other process improvement initiatives," affirms **Tim Livingston**, Production Operations Lean/Six Sigma lead. "They know what will work and what won't work."

The teams will examine critical path tasks and react to issues delaying a process, or be proactive and look downstream at a process that has yet to happen. Team members will work on the best possible outcome that is both successful and timely.

Technicians Brandon Abbott (left) and Freddie Ubas check the bipod fitting area on ET-117 in Building 420. Process changes have vastly improved the bipod installation over the past several years.

New Business improvements

The ET is not the only area where process improvement is under way. "We're supporting the strategy of the enterprise for improvement in New Business areas," reports **Bob Bruce**, leader of the Enterprise Improvement Team.

"For *Orion* and Team *Ares*, we've facilitated 13 Pre-Development Kaizens (PDKs), which helped each of the programs form manufacturing flows, engineering flows, and even transactional to transitional flows – giving them the capability to not only have a documented process flow, but also an enabler plan to assure they can implement the process to save time, money, and leverage company assets."

Richard Harris, CEV deputy program manager for production, called the PDK streamlining plan section of the CEV proposal a major contributor to Lockheed Martin's win as identified by the customer.

"PDK streamlining provided savings by combining test objectives to eliminate two development flights and by reducing build stations, flight software, and flight weight," Harris said. "In selecting Lockheed Martin to build CEV, NASA noted that a significant contributor was that we had more innovation in our proposal, which can be attributed to using the LM21 process during the proposal phase."

Bruce and three other Blackbelts on his staff have conducted Kaizens at Kennedy Space Center, Huntsville, and Michoud. His team also facilitated a Kaizen to identity process, design, and machine improvements for the Goodrich nacelle fiber placement.

"We're the subject matter experts in the LM21 tools," Bruce said. "We mentor Greenbelts to certification and provide training class expertise."

A total of 73 Greenbelts completed training in September and December of this past year. Now Michoud has its own certified trainers.

"We also develop LM21 tools here and then deploy them through the enterprise to be used by subject matter experts in engineering, manufacturing, materiel or other support organizations."

The Enterprise Improvement Team has led Kaizens to help Facility Operations & Services transition its environmental inventory to an ITS operating system, and also to give Program Management & Technical Operations a way to track engineering designs.

Whatever the program or activity, process improvement steps are vital to current and future success. ■

Build on final tank, ET-138, begins at Michoud

Chris Clutter lowers an aft gore panel as Danny Guarino guides it into place onto the 5001 weld tool. The panel is the first of 12 that will eventually construct the Liquid Hydrogen Tank aft dome for the final tank, ET-138. The tank will be "partially-built," providing NASA with an important resource should it be needed to support a future, unplanned shuttle mission. Lockheed Martin is scheduled to deliver ET-138 in 2010.

Air and Space Museum honors Hale, STS-121 team

Members of the STS-121 team, front row from left: Wanda Sigur, Lockheed Martin; Ed Mango, Johnson Space Center (JSC); STS-121 Commander Steve Lindsey; and Anthony Cecacci, JSC. Top row: Gen. Jack Dailey, museum director; Mark Nappi, United Space Alliance; Mike Leinbach, Kennedy Space Center (KSC); John Chapman, NASA ET Manager; Wayne Hale, shuttle program manager; John Shannon, JSC; Kimberly Doering, JSC; Mike Wetmore, NASA KSC; and David Hartman, emcee.

The National Air and Space Museum has recognized NASA Space Shuttle Program Manager **Wayne Hale** and the STS-121 team with the Trophy award – the museum's highest honor – for executing a crucial mission that restored confidence in the country's human space flight program.

External Tank Program Manager **Wanda Sigur** represented Michoud Operations employees at the awards ceremony on March 7 in Washington D.C.

The award recognizes outstanding achievement in scientific or technological endeavors relating to air and space technology and exploration.

NASA appointed Hale shuttle manager in 2005, with his first priority to ensure a successful STS-121 mission to put the shuttle back on track for completing assembly of the International Space Station.

Hale succeeded in leading the 16,000 shuttle employees through the technical challenges prior to the flight of STS-121. The team made changes in design, processing, and systems – and reduced foam debris to a negligible state.

Launched on July 4, 2006, STS-121 achieved an overwhelming success and created momentum for two other successful launches in 2006.

In his acceptance remarks, Hale recognized the contributions that the Michoud Operations team made following Hurricane Katrina in delivering flight hardware to support STS-121. ■

ET-117 gets closer to delivery

Lockheed Martin's Bryan Tircuit puts the finishing touches on the ball joint near the +Y (right) aft end of ET-117. The tank is scheduled to fly later this year on the STS-118 mission to the International Space Station. The flight crew includes the first ever astronaut educator Barbara Morgan. The tank is on track to be delivered to NASA April 4.

Hail damage

Continued from Page 1

A similar hail storm occurred in 1999 during the processing of STS-96 / ET-100 out on the pad that also resulted in numerous repairs to the TPS. Several weeks later, ET-100 flew successfully with no anomalies attributed to repairs performed on the TPS.

This STS-117 hail storm struck 17 days before Atlantis' planned launch on March 15. ■

Lockheed Martin's Eugene Sweet (top) and NASA's Jim Bolton inspect ET-124 after technicians applied red dye to the foam to expose cracks or dents.

Build Process Team of Year named

Earlier this month, Production Operations once again honored the four Build Process Teams of the Quarter for 2006 in preparation for naming the BPT of the Year.

The four teams included:

- Large Structures A, B, C & D
- Detail Fabrication Commodity Shop, Machine Shop
- Tool Fabrication Major Weld
- Detail Fabrication – Harness Fab & Support Shops

"We're here to celebrate the accomplishments of all four Teams of the Quarter," said **Michael McGehee**, senior manager, Recurring Build, who emceed the awards luncheon.

McGehee quoted former UCLA basketball coach **John Wooden** who stressed success rather than winning and losing.

" 'Success is not determined by the scoreboard; not even by wins or losses or your record. Instead, success is an internal feeling resulting from the self satisfaction of knowing that you've given your best to become the best that you're capable of. With this belief, it enables every member of the team to know that he or she is an important part of the team and a genuine contributor.' "

Astronaut **Barry "Butch" Wilmore** echoed McGehee's remarks. "We all appreciate the job you do on the ET. You've been doing things right the entire year – all four of the teams."

Then Wilmore announced the winning team – Detail Fab Commodity Shop, Machine Shop.

Significant team accomplishments included members writing computer programs to build hardware for tank, tooling and test panels. Results of their efforts included reducing both cycle time and the cost of test panels. ■

The Detail Fabrication Commodity Shop, Machine Shop is the Build Process Team of the Year. Bottom row from left: Team Lead Leon Richard, Trudy Wigginton, Alan Snyder, André Bourdier, and BPT Administrator Cheryl Iwanczyk. Center row: Mike McGehee, Ken Vallie, Barry Pearson, astronaut Barry "Butch" Wilmore, Don Ricouard, and Charles Arthur. Top row: Chip Howat, Aaron Pearson, Kevin Gauley, Dennis Necaise, Robert Taylor, and John Chatelain. Not pictured: Morgan Ballard, Hannah Ladner, Stephen Mayfield, Timothy Smith, Randy Strahan, and David White.

Lockheed Martin-sponsored team wins FIRST Robotics

After six weeks of long hours building a robot, the Nuts & Volts team at Northshore High School in Slidell captured first place at the regional FIRST (For Inspiration and Recognition of Science and Technology) Robotics competition and now advances to the National Championship in Atlanta on April 12-14.

As lead Lockheed Martin mentor for the team, **Riki Takeshita –** who was assisted by **Harold Barrios** and **David Quigley –** said success came from the team's willingness to accept any task presented to them.

An exuberant Northshore High School student team takes first place in the FIRST Robotics competition.

"This team did more than just build a robot. They learned management practices, finance, public relations, computer programming, and so much more. It was rewarding to see the robot keep winning the competition. Students are already helping to plan the next trip, the next round of improvements, and more fundraising."

Northshore also received the Rockwell Automation Innovation in Control award.

Congratulations are also in order for the Slidell High team who won the Highest Seeded Rookie award and the Rookie All Star award under the tutelage of **Darren Kearney** and **Keith Joiner,** and who now advance to the National Championship. Another mentor characterized the pair. "They did a remarkable job. It's hard to believe they're a rookie team."

Joiner related their experiences, "The build season is six weeks long and takes a chunk out of your life, but the regionals make it all worthwhile.

Kearney added, "The day before the competition we had a significant amount of work on the robot to finish, which meant no practice matches. The first day started out great winning the first match. We had some trouble in our third match when our arm got ripped off, but we used the lost weight from the missing arm to improve our ramp mechanism. In the semi-finals Saturday we carried a best two out of three match to four games before finally losing. Even then it was a questionable call from the refs but this is what FIRST is all about – gracious professionalism under circumstances that might be out of your control, a lesson for the kids as well."

Lockheed Martin mentors

Covington High – **Scot Marshall**

Fontainebleau High – **Curtis Craig, Nathan Loper, Scot Marshall**

McMain High – **Raynard Bender, Gilbert Bennett, Thioreau Hawkins**

Northshore High – **Riki Takeshita, Harold Barrios, David Quigley**

O. Perry Walker High – **Gilbert Bennett, Curtis Craig, Scot Marshall**

Salmen High – **Glen Gilmore**

Sarah T. Reed High – **Travis Smith**

Slidell High – **Keith Joiner, Darren Kearney**

St. Paul's High – **Scot Marshall**

Engineer Keith Joiner (left) and student Ben Franco accept their awards as part of Slidell High's surprising team, which finished third.

Lockheed Martin sponsored ten high school teams, and five of them made the finals – Northshore (1st place), Slidell (3rd), McMain (8th), Covington (11th), and Salmen (21st). The remaining sponsored teams included Fontainebleau, New Orleans Science & Mathematics, O. Perry Walker, Sarah T. Reed, and St. Paul's. Altogether, 37 teams competed in the regional.

Sarah T. Reed's team received the Rookie Inspiration award, and McMain won the Daimler Chrysler Team Spirit award.

This year Lockheed Martin had 16 mentors on school teams. **Curtis Craig** has led the mentoring effort for several years and said, "The skills that we teach the students are our way of preparing them for the future."

Lockheed Martin also provided additional volunteers to support the regional competition.

NASA is a dedicated supporter of FIRST Robotics, this year sponsoring the Bayou Regional at the Morial Convention Center and providing an additional $284,000 grant to assist high school teams in the New Orleans area and along the Gulf Coast. For more information, see these websites:

www.usfirst.org

www.LaFRC.org

http://www.usfirst.org/community/frc/regionalevents.aspx?id=430

http://www.bayouregional.org/Team.html

Employees take advantage of Health & Wellness programs

Blaring out of the speakers in Building 351 Cafeteria comes the refrain of a popular country music song – "Ya' know I feel just like a kid again..." After that come favorites from R&B, Rock, and Pop music.

Obviously, "Jazzercise" has little to do with Jazz. Led by an instructor, the class starts slowly with stretching and gradually builds momentum with arms and legs providing visual rhythm to the music.

Sandra Blanchard (foreground) and Lisa Blaum take advantage of Yoga classes with instructor Aimee Buckel (background).

Most exercisers agree – Jazzercise is a way to shake off the stress that life throws at them and after exercising a month, they've noticed an energy boost.

"Typical of most joggers and cyclists, I tend to work the legs hard but neglect my upper body," explains **Cathy Voelkel**. "Jazzercise has been a tremendous resource for toning core muscles, which provides greater flexibility and upper body strength, and it's fun!"

Participants move at their own pace at the Monday and Wednesday classes from 4 to 5 p.m.

"If you feel better, you're going to do a better job, and that brings about Mission Success," smiles **Cathy Brawley**.

Another popular class is Yoga. Every Tuesday at 4 p.m. and Thursday at 4:30 p.m., participants gather to take a deep breath and exhale away their stress.

"I went to my first class not knowing what to expect and that evening felt a sense of restfulness and peace," **Sandra Blanchard** offered. "I slept very well. You let go of your problems and negative thoughts."

The word Yoga means union, and in practice, Yoga helps create a union of mind, body, and spirit. This class is easy on beginners.

"I always had tight flexibility and found that Yoga improves my flexibility," observes **Tim Flannery**.

The class performs a series of poses that stretch out the body. By holding the pose, one develops stamina.

Yoga offers employees like Antonio Johnson the chance to stretch at their own pace and increase flexibility.

"When I evacuated to Texas after Katrina, my girlfriend and I started Yoga to help with stress, but I also found that the increase in flexibility and core body strength improved my athleticism," says **Elliot Brett**. "I'm also better able to cope with renovating my house."

Dr. Troy Hutchinson

Both classes are Lockheed Martin Healthworks initiatives. Other programs that help employees stay in shape include on-site leagues for basketball, flag football, and ultimate frisbee. Softball and volleyball are also planned as is a $250 fitness club reimbursement.

The Weight Watchers at Work support group is another choice. "It allows you to share the pain of losing weight with folks who have the same goals as you – eat healthier and lose weight," says **Debbi Dauth**.

Weight Watchers has an excellent support group, according to **Dr. Troy Hutchinson**, medical director. "It is the only weight-loss program that encourages lifestyle changes beyond eating habits."

"This is my first time doing Weight Watchers, and things are going great," exclaimed **Christina Bain**. "I've lost 15 pounds in eight weeks and feel better already. Having this program at work is convenient and leaves me no excuses."

Dr. Hutchinson points to another program – Smoking Cessation. "The company has provided both medicine and support for employees who wish to make the change."

Lockheed Martin recognizes the benefits of a healthy workforce and each of these programs and activities is a step toward fitness and good health. "We help employees stay healthy and on top of their game," concludes Dr. Hutchinson. "This way people are more focused, and it's a win-win for the company." ■

Protective Services reinforce traffic/parking rules

If you've been stopped for a car search recently while leaving work, you know that Protective Services is very serious about safety and security on the Michoud campus.

The department is committed to providing a safe work environment and protection of people and property through the enforcement of Michoud directives.

Protective Services has increased its activities in the areas of traffic control, vehicle and parcel searches, parking enforcement, theft investigations, and access control. Department officers ask that all Michoud employees and visitors abide by these directives, and assist in the enforcement process.

You can help in these matters by:

- Obeying posted traffic signs. The maximum speed on the facility is 30 mph unless otherwise posted. When an individual is cited for exceeding the speed limit by 20 mph or more, that driver will also be cited for reckless driving.
- Driving safely – buckle up; avoid the use of cell phones; give right-of-way to pedestrians in the cross-walk; and maintain current insurance, registration, and brake tags.
- Respecting reserved parking and visitor parking. Review the requirements for Special Permit Parking and handicapped parking.
- Reporting any observed infractions of access violations, suspected theft or contraband possession, or other violations of Michoud directives that Protective Services enforces. ■

Milestones

Employees celebrating anniversaries with Lockheed Martin in April 2007

30 Years
Dani Davis
William Fallon
Joseph Giordano
Sidney Merkouris
Felix Pourciau
Don Ricouard
Richard Whittington

25 Years
Marie Alongi
Teresa Brenning
Jerome Douglas
Brian Glowacki
Bob Goodwin
Lonnie Harness
Jean Hendrix
Cedric Larche
David Matherne
George Ragas
Dudley Royal

20 Years
Kevin Barré
Jacob Francis III
Melinda Johnson
Mark Smith

15 Years
Errol Roy

10 Years
Denise Maynard
Bobbie Tucker

5 Years
Melissa McCaughey
Stephen Wright

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