Space Systems Company–Michoud Operations

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ET-122 restoration fully authorized

Hundreds to receive new dates

NASA recently completed contract actions on August 24 to fully authorize the restoration of ET-122 to flight-certified configuration, thereby continuing Return to Flight modification work and Hurricane Katrina damage repair to the tank.

Construction work on ET-122 came to a halt following Katrina in 2005, and the tank remained mostly untouched until NASA signed the Undefinitized Contract Action (UCA) on November 21, 2008.

"At that time, NASA also provided its Request for Proposal associated with the restoration of ET-122 to be completed by September 30, 2010," said Contracts Administration Senior Manager **Glenn Schmitt**. "In response, the proposal development was a significant effort by many people, culminating with the recent contract modification to fully authorize the performance of repairs resulting from Hurricane Katrina damage and the implementation of Return to Flight modifications."

ET-122 Project Manager and Missile Mother John DesForges (right) and Deputy Missile Mother Jamie McKeough examine ET-122's Intertank skin repair work that's under way in Building 420. Hurricane Katrina caused the damage four years ago.

"Getting this modification on contract is a real vote of confidence by our customer in our ability to perform," said **Mark Bryant**, ET program manager. "And it will also extend employment dates for hundreds of workers on the ET team. That's extremely good news against a challenging and difficult backdrop."

"It wasn't that long ago when timely deliveries were the exception," Bryant went on. "Now it's the rule due to our employees' hard work. What also helped secure this work was the way we surmounted other challenges such as the hail-damaged tank, which is directly applicable to ET-122 repairs."

The UCA authorized a team from Marshall Space Flight Center to use shearography, a non-destructive testing method, to map the surface of the tank looking for damaged areas in the foam, specifically those not visually seen by the naked eye. The UCA also provided NASA an analysis of what it would cost to repair the tank and return it to flight status.

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Discovery's ET-132 performs to max

Discovery and ET-132 launched beautifully into the Florida sky at one minute before midnight on August 28. Equally impressive was ET-132's solid performance in terms of minimal foam loss.

Overall, the ET appeared clean and near-pristine on its Liquid Oxygen (LO2) Tank, Intertank and Liquid Hydrogen (LH2) Tank. NASA and Lockheed Martin engineers did note some debris loss adjacent to the +Y bipod closeout of the ET. However, Ice Frost Ramps on the LO2 tank performed very well and showed only expected erosion. Also, on-orbit inspection of *Discovery* revealed minimal damage to the Thermal Protection System, and the vehicle did not require a focused inspection while in space.

"ET-132's performance is a real testament to our employees who have worked hard, always striving to improve the quality and safety of the tank," said **Mark Bryant**, Lockheed Martin's ET program manager.

Indeed, many employees put in a tremendous effort since the July 15th flight of the previous mission (STS-127) incurred unexpected foam loss from the ET-131 Intertank and some small losses from an LO2 Ice Frost Ramp and one of the bipod closeouts.

To assure the success of STS-128, engineers and technicians performed 188 bond adhesion tests on ET-132's Intertank, performed a comprehensive fishbone root-cause assessment of the Intertank, and scanned additional Ice Frost Ramps on ET-132 and ET-133. When the tests showed proper adhesion and the imaging scans revealed no significant voids, Lockheed Martin and NASA felt confident to fly.

Discovery and ET-132 launched successfully on the third attempt. Unstable weather and an Orbiter LH2 fill/drain valve that failed to indicate 'closed' at the end of fast fill scrubbed the first two tries. All ET systems performed nominally during the three loadings with no leaks at the Ground Umbilical Carrier Plate. Also during ascent, all structural, electrical and propulsion systems performed nominally on ET-132.

Furthermore, ET-132 was the first tank to fly with two of four LH2 barrels having been joined longitudinally using Friction Stir Welding (FSW). ET-134, scheduled for a February launch, will be the first tank to fly where longitudinal FSW joined the panels on all four LH2 barrels.

Discovery's STS-128 mission to the International Space Station delivered scientific equipment and enough food and supplies to last astronauts through January, completed three spacewalks, positioned the station for future flights, and returned home with a significant amount of scientific research. The fourth flight of the year culminated in a safe landing September 11 at Edwards Air Force Base. Six shuttle launches remain until the program flies out late next year or in early 2011.

"A strong flight like ET-132's with all systems performing well is a great acknowledgement to the work ethic of our employees and really gives everybody that momentum boost to finish out the year on an up note," Bryant said. "I'm glad we did all the confirmation work on ET-132 because this will pay dividends on ET-133 when it launches in November." ■

NASA Administrator Bolden visits Michoud

ET Deputy Program Manager Mike McBain explains the Liquid Oxygen Tank Ice Frost Ramp foam application/build process to NASA Administrator Charles Bolden and Deputy Administrator Lori Garver on August 20. Looking on are ET Chief Engineer Jeff Pilet and ET Program Manager Mark Bryant.

ET-122 restoration

Continued from pg. 1

ET-122 was well into its Return to Flight modification work in Cell A when Hurricane Katrina blew concrete panels loose from the roof of the Vertical Assembly Building that fell on and around the tank, damaging it.

Within a few weeks of the hurricane, NASA funded a damage assessment and ET-122 Project Manager **John DesForges** subsequently provided a stem-to-stern evaluation of Katrina's damage to the tank.

"The tank was salvageable, and the majority of the damage was to foam insulation that numbered in the hundreds of impacts," said DesForges. "The primary damage was to the Intertank between the access door and –Z, which fortunately is on the blind side of the tank away from the Orbiter."

Work on ET-122 has begun in Building 420 with repairs to the foam damage on the LO2 tank. Repairs to Intertank damage are under way, and Engineering is identifying and writing the paperwork to complete RTF modifications. For some of the completed mods, DesForges said their configurations have been revised over the past several years, and they will need to be removed and reworked.

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*–**Mark Bryant**, ET Program Manager*

Some of the tank's major instrumentation also will be replaced including pressure transducers, temperature sensors and the Engine Cut-Off (ECO) sensors inside the LH2 aft dome.

Another major hurdle for ET-122 is extending the useful shelf life of the Thermal Protection System (TPS). Michoud first delivered ET-122 in November 2002, and the TPS expired last November. "Material Sciences is performing tests to extend the TPS life for the tank, and all is proving well," said DesForges.

ET-122 will become a fully-configured flight tank residing on NASA's Flight Assignment Working Group manifest as the launch-on-need tank for ET-138, the final tank to fly.

For the Michoud team, ET-122 means more than the extension of jobs beyond the completion of ET-138 in June 2010, Des Forges explained. "ET-122 is the last big visible evidence of Hurricane Katrina at Michoud, and there are a lot of folks who want to work on it and do their share to get Katrina behind us." ■

STS-128/ET-132 Awardees recognized

These Awardees hoped to watch Discovery *launch on August 24 & 25, but unfortunately those two attempts turned into scrubs, and the Awardees returned to Michoud.* Discovery *launched successfully August 28. Honored for outstanding performance are from left Mary Officer, Nelda Bellinger, Mike Pohlman, Keith Marx, Joe Garcia, Dave Windham and Mike Bankester. Awardees not pictured include Richard Augustin, Hassan Boroujerdi, Gunther Gillat, Judy Green, Gordon Meadors, Tim Momenee, Ralph Tortorich and Randy Wiggins.*

Maguire receives *Orion* manufacturing update

After speaking to a General Assembly and answering employee questions on August 27, Space Systems Executive Vice President Joanne Maguire toured the Orion *manufacturing weld area to receive a status on the Crew Module Ground Test Article. With her are Vice President Manny Zulueta,* Orion *Production Engineering Manager Mark McCloskey (partially obscured) and* Orion *Manufacturing Senior Manager Bob Campbell.*

Houchin named Diversity Champion

Debra Houchin, a Materiel Sourcing senior manager, becomes Michoud's latest Diversity Champion. Houchin has been active for many years in fostering an inclusive environment for all employees. She encourages employees to get involved with departmental activities and promotes "bottom-up" communications to complement the traditional "top-down" approach.

Houchin is an officer in the Women's Intrinsic Network affinity group and Lockheed Martin's National Management Association. She also previously served on Michoud's Diversity Council. ■

Michoud team hosts *Orion* leaders; Program receives thumbs up at PDR

The Michoud Operations *Orion* team hosted some special visitors September 3. **Mark Geyer**, NASA *Orion* program manager, selected Michoud as the site to conduct his *Orion* Program Schedule Review. Geyer brought his leadership team along to meet the Michoud team and view the progress on the Ground Test Article (GTA) manufacture.

Following a comprehensive chart review of GTA activities, **Bob Campbell**, *Orion* Manufacturing senior manager, led Geyer and his team on a facility tour. Campbell showed the group a Friction Stir Weld demonstration at the Universal Weld System 1 and a composite aviation ring panel for the *Orion* Service Module in development on Fiber Placement Machine 2.

Composite capabilities and capacity at Michoud are important to the success of the *Orion* program. Michoud is scheduled to build numerous composite parts for the GTA and flight articles. The expectation of a larger autoclave (25 feet in diameter) will increase the capacity at Michoud to fabricate all of the composite structures in the future.

Central to the tour was the *Orion* main assembly and weld area. Here, the team had an opportunity to view progress in the new manufacturing area, examine numerous flight hardware components, see the Universal Weld System II, and inspect Friction Stir Welded GTA hardware.

Mark McCloskey, *Orion* Production Engineering manager, explained to visitors the importance of this manufacturing pathfinder. "By establishing our strong Production Readiness Team, we have identified and eliminated problems while refining our processes and tools to the point that subsequent vehicles will flow through with minimal impacts."

The Michoud team recently completed its longest weld to date on the GTA by joining the aft ring to the aft bulkhead. Engineers and technicians used Self-Reacting Friction Stir Welding on the 427-inch-long circular weld, which took 50 minutes. The team indicated that the weld went so smoothly that things got a little monotonous. The Friction Stir Plug welds were also completed with no impacts.

Lockheed Martin and NASA also recently conducted the *Orion* Preliminary Design Review (PDR) in Houston. The PDR process consisted of several weeks of Subsystem Design Reviews, System and Module Review, and disposition of over 4,000 review items. Photographs of GTA progress were a focal point of the review as participants were able to see the designs evolve into actual hardware.

NASA's Geyer summed up the review, "The board, consisting of Constellation and *Orion* leaders from across the agency, determined unanimously that the *Orion* Project has demonstrated PDR maturity, and that our strategy and plans for Phase C will achieve agency commitments with acceptable risk."

Jim Bray, Crew Exploration Vehicle director and program manager, said he was thrilled with the outcome of both events. "Our NASA customer and our leadership team recognize the personal sacrifices and long hours that you our employees have endured to reach this successful PDR. From the beginning of our efforts, you have demonstrated extraordinary commitment to ensure success. We should all be proud of these accomplishments." ■

Michoud* Orion *Crew Module Manufacturing Lead Carlos Ramirez (right) briefs NASA* Orion *Program Manager Mark Geyer (second from left with tie), and a host of other NASA and Lockheed Martin managers on the Ground Test Article weld processes on the Universal Weld System II.

Affinity group teams up with St. Bernard Project

To commemorate the fourth anniversary of Hurricane Katrina, the Asian American & Pacific Islander American affinity group joined with the St. Bernard Project to renovate a home in Arabi in St. Bernard Parish on Saturday, August 29. Taking part were from left Chu Hui Pak, Sudhir Gopinath, Trieu Trinh, Greg Huston, John Fisher, Quyen Nguyen and Carlos Yingst.

ET Incentive Plan milestones

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
10.	5/11/09	STS-125 launch/ land 5/24/09
11.	7/15/09	STS-127 launch/ land 7/31/09
12.	7/29/09	ET-133 delivery
13.	**8/28/09**	**STS-128 launch/ land 9/11/09**

Employees support United Way and Blood Drive

Michoud employees have come through again to help those in need in our communities.

First, the United Way campaign ran from September 1-17. Lockheed Martin has had a long and storied history of successful United Way drives, and this one was no different.

This year, 56 percent of our employees participated by going on-line and pledging their support. And ITS employees again banded together to organize a silent auction, this year raising $1,140. The total amount of employee contributions amounted to $287,000.

At the same time, Lockheed Martin sponsored its third and final Blood Drive of the year September 14-17. Going into the last day of the drive, things looked a little bleak. We needed 71 units of blood to make our goal of 200 units. The highest amount collected on a single day so far during the drive had been 53 units.

But coordinators and executive secretary **Michelle Morlier** said 'never fear' and continued publicizing the drive and encouraging employees to donate through face-to-face conversations and e-mails. And it worked. Exactly 110 employees showed up to donate. Although 21 had to be deferred, 89 were able to give the gift of life, and that pushed Michoud's total to 218 units, far surpassing the goal.

Pat Powell, executive sponsor for the United Way campaign, was impressed with both endeavors.

"I have a lot of respect for our employees and their continued commitment to Operational Excellence at work and in the community. It is said that adversity reveals character, and we have had our share of adversity! Yet the character I see in our workforce is that of *achieving* amazing results in delivering quality products to our customers, *generosity* in supporting our community through the United Way, and *caring* for the infirmed by donating blood. My heartfelt thanks to all our employees." ■

Donor Michelle Guillot helps Lockheed Martin make its goal on the final day of the blood drive.

Missile Mothers watch over their tanks

Commitment, duty, empowerment – these are traits associated with a special assignment like the External Tank Missile Mother program where one employee shepherds a tank through the build process to ensure the vehicle is the best it can be.

Former ET Program Manager **Wanda Sigur** started the program, now carried on by ET Program Manager **Mark Bryant**.

"The role of the Missile Mother is to take ownership of the timely delivery of a quality tank on an individual tank basis throughout all the production stations," Bryant explained.

Missile Moms are the one constant in the build process. They ensure their tank is on schedule by facilitating resources to support production when issues arise.

The selection process for Missile Mother assignments begins with a call-out for volunteers. "The volunteer process is a big part of the selection criteria," Bryant explains. "It means a lot when someone has thought about taking on the challenge and steps up."

Volunteers for the current Missile Mothers had all been interested in expanding their leadership and project management skills. Missile Mothers, like **Christina Bain** (ET-137), had also shown great problem-solving skills prior to volunteering.

"There was no prerequisite for Missile Mothers to be managers or have senior positions," according to Bryant. "But we were looking for motivated self-starters who acted like leaders, wanted the opportunity to contribute and showed potential."

Lance Spiers (ET-135), along with other Missile Mothers, volunteered because he wanted to participate in ET production from a more hands-on approach than his experience in the labs allowed.

Missile Mothers Christina Bain (from left), ET-137; Lance Spiers, ET-135; Karen Poy, ET-136; and Lisa Brown, ET-134 are guiding the next four tanks through production.

Lisa Brown's (ET-134) goal was similar. "I wanted to have a direct impact on the ET program and gain first-hand experience with the build process and production personnel."

The Missile Mother role is demanding and requires the near full-time attention of an individual. "Personally one of the biggest challenges is balancing being on the floor when there is an issue, and your home life," explained Brown. To help accomplish this, a Missile Mother puts together a group of individuals who supply support throughout the build process.

Since the job of Missile Mother can be a three-shift operation, Missile Teams help by scheduling and providing support around the clock to ensure a quality tank that is on time. "The biggest help from team members is when they are enthusiastic and can get things done on their own," Bain said. "The technical knowledge can be learned; it's the people skills that will make the difference."

Karen Poy (ET-136) also says that communications between Missile Mothers and other teams are helpful. "There's a synergy between the Missile Moms, which promote the success of every tank," she explains. "Each time something happens that affects a move, tank defect, processing issue – or even better, an improvement – the Missile Moms are sure to pass the word."

Mark Bryant believes synergy to be one of the greatest benefits of the program. "Before the Missile Mother program, many of the dates for ET deliveries were not going to meet our customer's needs. Along with Build Process Teams, the Collaborative Work Cells, and Kaizen events, the Missile Mother program is one of the main reasons we'll be shipping tanks on schedule or prior to their delivery dates." ■

Space Shuttle Schedule

Mission	Launch Date	Tank	Tank Delivery Date
STS-129	November 12	ET-133	July 29
STS-130	February 4, 2010	ET-134	October 27
STS-131	March 18, 2010	ET-135	December 18
STS-132	May 14, 2010	ET-136	February 24, 2010
STS-133	July 29, 2010	ET-137	May 5, 2010
STS-134	September 16, 2010	ET-138	June 29, 2010
		ET-122*	September 30, 2010

** ET-122 is the launch-on-need tank for STS-134/ET-138*

Fall Fest may be ghoulish

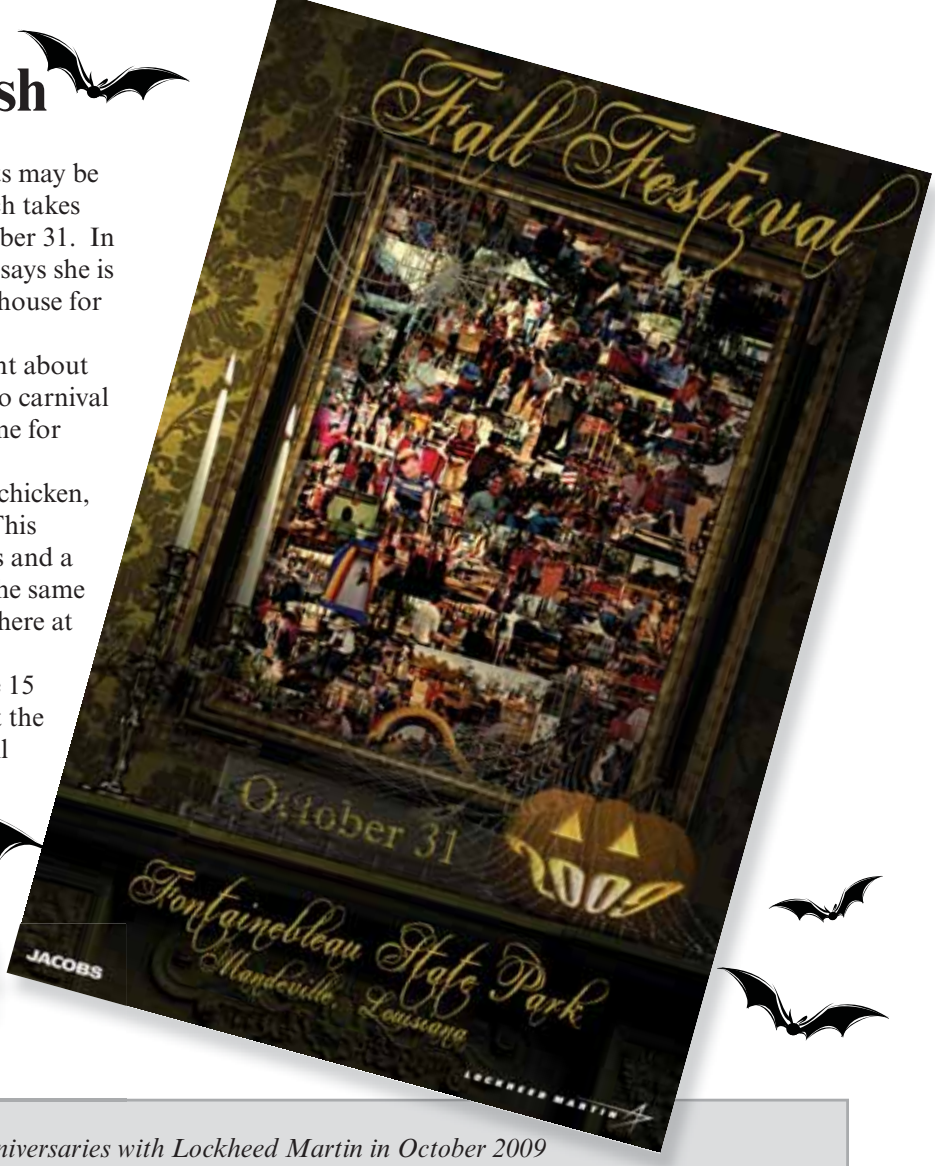
Yes, that's right – this year the goblins and ghosts may be out for Lockheed Martin and Jacobs' Fall Fest, which takes place at Fontainebleau State Park on Saturday, October 31. In fact, **Debbie Berkman** in Performance Enhancement says she is looking for a volunteer to possibly set up a haunted house for the little kids. Call her at 7-1056.

Fall Fest begins at 9 a.m. and goes to dusk – right about "trick or treat" time. Again, this year there will be no carnival rides, but lots of inflatables for the kids and even some for adults.

Cashio's Catering will cook the food, preparing chicken, sausage and pork jambalaya; hot dogs and drinks. This year, each employee will receive four free food tickets and a parking pass the week before Fall Fest. Cashio's is the same vendor who has prepared crawfish and shrimp boils here at Michoud.

Debbie also is looking for volunteers to staff the 15 game booths – just two hours for each volunteer, not the entire day. The money raised in the game booths will again go to Children's Hospital.

The Nobles Band is scheduled to play in the afternoon. ■



be there or beware

Milestones

Employees celebrating anniversaries with Lockheed Martin in October 2009

35 Years	25 Years	20 Years	15 Years	5 Years
Frederick Williams	Pamela Hogan	Denise Clayton	Christopher Lacoste	Bernard Zagorski
	Thu-Phong Nguyen	Kirk Hill	Chau Luong	
	Michael Raybon	Randall Seale	John White	

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Director of Communications: Marion LaNasa

Editor: Harry Wadsworth

Graphics, Photography: Eric Bordelon, André Bourdier, Chip Howat (Jacobs), Jon Irving, Ryan Martin (Johnson Service Group), Brian Peterson, Steve Seipel (Jacobs)

Contributors: Kevin Barré, Eric Bordelon, Brian Peterson

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