Space Systems Company – Michoud Operations

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Mission Success Bulletin

April 27, 2009

on-line

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Complex Hubble mission to launch May 12

The challenging mission to repair and upgrade the Hubble Space Telescope will begin on May 12 at 12:31 p.m. CDT with lift off for an 11-day Space Shuttle flight. STS-125 will be the final shuttle mission to a destination other than the International Space Station.

The mission goal for spacewalking astronauts – install new instruments and thermal blankets, repair two existing instruments, and replace gyroscopes and batteries. The primary objective is to replace the Science Instrument Command & Data Handling computer that stopped working last fall, thus delaying the mission originally scheduled for October 2008.

If everything works as planned, the improvements will increase Hubble's viewing power by 10 to 70 times – amazing, considering that the observatory has already seen galaxies 11 billion light years away – and extend Hubble's life into 2014.

Lockheed Martin has played a significant role in preparing for *Atlantis*' mission to the observatory. The company has assisted NASA in managing day-to-day spacecraft operations of the telescope and provided extensive preparation and training for this final servicing mission. Lockheed Martin also helped in developing, integrating and testing replacement hardware and mission support equipment.

The company assisted crew training in the neutral buoyancy tank at Johnson Space Center where astronauts practice spacewalks on a submerged replica of the Hubble telescope, to mimic as closely as possible the conditions they will see in orbit.

Scott Altman leads the seven-member astronaut crew. This will be his fourth flight, including the last Hubble servicing mission in 2002 that he also commanded. **Greg C. Johnson** will pilot the mission on his rookie flight.

Astronomer and mission specialist **John Grunsfeld** makes his fifth trip into space, having participated in Hubble's past two servicing missions. **Mike Massimino** is another key mission specialist having traveled to Hubble on the 2002 flight. He is twittering about the mission at http://twitter.com/Astro_Mike

Making their first flight, **Megan McArthur**, **Andrew Feustel** and **Michael Good** round out the crew. Grunsfeld, Massimino, Feustel and Good will perform the five critical spacewalks.

Lockheed Martin designed and built the Hubble Space Telescope in Sunnyvale. Launched in 1990 by shuttle *Discovery*, the telescope has revolutionized astronomy with its discoveries and provided nearly 900,000 pictures of galaxies, dying stars, and giant gas clouds that give birth to stars. This will be the fifth servicing mission, following ones in 1993, 1997, 1999 and 2002.

During the final countdown, Space Systems will support a 'live' website broadcast by the Denver Museum of Science & Technology from the Kennedy Space Center. The website will be interactive with students in both Louisiana and Colorado. Podcasts, quick time movies and twittering are also planned. ■

This may be the final time that two shuttle stacks adorn Launch Pads 39A & 39B simultaneously. The Hubble mission with* Atlantis *& ET-130 on pad 39A (left) requires a rescue vehicle since there is no safe haven at the Hubble telescope. So* Endeavour *& ET-131 (right) will fulfill that back-up role from pad 39B.

Additional Hubble information on Page 3

Tank performance superb in previous two launches

Michoud probes GH2 leak that delayed March launch; ET-132 to deliver early

Despite a leaking gaseous hydrogen (GH2) vent line that caused STS-119 to scrub March 11, and troublesome Orbiter Flow Control Valves that earlier pushed the mission from February into March, *Discovery* – when it finally did launch March 15 – was picture-perfect. ET-127 performed spectacularly in terms of foam debris and also in its other critical systems – propulsion, structural and mechanical.

"We've had excellent tank performance of late, not only with ET-127 and *Discovery* in March but also with ET-129 and *Endeavour*'s launch back in November," says **Mike McBain**, ET deputy program manager. "It's a testament to our employees who carefully, safely and expertly build these quality tanks. These are some of the best tanks we've ever flown."

To ensure the next shuttle flight – the STS-125 Hubble servicing mission – is ready and safe on May 12, a team comprised of Lockheed Martin, NASA and United Space Alliance personnel has been working both the GH2 leak and Flow Control Valve issues.

"On the GH2 leak, we set up a fault tree and have been working through the different scenarios – 71 events in all," reports **Jeff Pilet**, chief engineer. "Engineers and technicians are performing a cryo-test of the hardware that was removed from ET-127 after the scrub. The test will incrementally test elements of the quick disconnect (umbilical) and the flight-side seal in order to isolate the cause of the leak."

At press time, the first test will include the quick disconnect with a new seal. If no leakage occurs, that will effectively clear the quick disconnect, Pilet says. Next, the need for testing the flight-side seal will be assessed.

"All the observations that were noted during the dis-assembly process after the scrub indicate that there was some misalignment in the entire assembly," Pilet adds. He points out there was an asymmetrical compression in the flight-side seal, probably the result of some motion in the system.

Pilet thinks the seal may have been compressed on one side because of the weight of the heavy umbilical line. "The load applied by the vent line is significant and most likely caused the motion."

In preparation for the STS-125 mission, technicians have disassembled the entire quick disconnect and Ground Umbilical Carrier Plate (GUCP) from ET-130 and replaced the flight-side seal with a seal that has been fully inspected. The quick disconnect also has been rebuilt and retested.

"Now we have the best possible hardware on ET-130, so we don't expect to see a leak or an unacceptable leak for sure," Pilet notes. And the same is true for ET-131, the launch-on-need tank for the Hubble mission. A new seal replaced the ET-131 flight-side seal that showed a small indentation. Pending other findings from the fault tree and test results, Pilet is confident of the action taken so far.

Most of Lockheed Martin's work on the Orbiter Flow Control Valve issue also is completed. The valves regulate the flow of GH2 from the Orbiter back to the Liquid Hydrogen Tank so the tank is properly pressurized during ascent.

After *Discovery* landed at KSC on March 28, the valves and poppets were removed from the Orbiter, inspected and found to be crack-free. Pilet says the shuttle program uses an eddy current inspection, a technique typically used to inspect highly-loaded bolts. Using a special probe, the inspection looks for cracks in the poppets, which have geometry similar to a bolt. The current plan is to install the valves from *Discovery* into *Atlantis* for the STS-125 mission.

Meanwhile, before the Hubble mission launches, Lockheed Martin plans to deliver ET-132 to NASA on or about April 29, ten days ahead of the previous May 8th commitment date.

"We're supporting a NASA request to get the tank out of here by May 1 so the Solid Rocket Booster retrieval ship can tow ET-132 to KSC in time to provide support to the Hubble launch on May 12," McBain explains. "Again, these kinds of accomplishments can only take place with the employee commitment we have at Michoud." ■

This photo shows the umbilical or quick disconnect ground equipment that hooks into the side of the Intertank where the gaseous hydrogen leak was spotted prior to the STS-119 scrub March 11.

First friction stir weld completed on *Orion* crew module

Lockheed Martin completed the first friction stir weld on an *Orion* crew module Ground Test Article on April 16 with flawless results.

The Ground Test Article will serve as a production pathfinder to validate the flight vehicle production processes and tools. When completed, this first full-sized, flight-like crew module will be tested on the ground in equivalent flight-like environments, including static vibration, acoustics and water landing loads. Results will be used to correlate sizing models for all subsystems on the vehicle.

The initial weld joined an Aluminum-Lithium (AL) 2195 cone panel and an AL 2219 longeron using an innovative Friction Stir Welding process. This high-strength, high-quality welding process will be used for all welds on the crew module. Weld operations on the test article will continue for approximately three months. The structure will then undergo mechanical assembly, integration and testing in New Orleans and Denver.

Derek Townsend, *Orion* Crew Module senior manager, noted that "the *Orion* team is excited to build NASA's next generation spacecraft. This is the beginning of a new era in human space flight and America's space program."

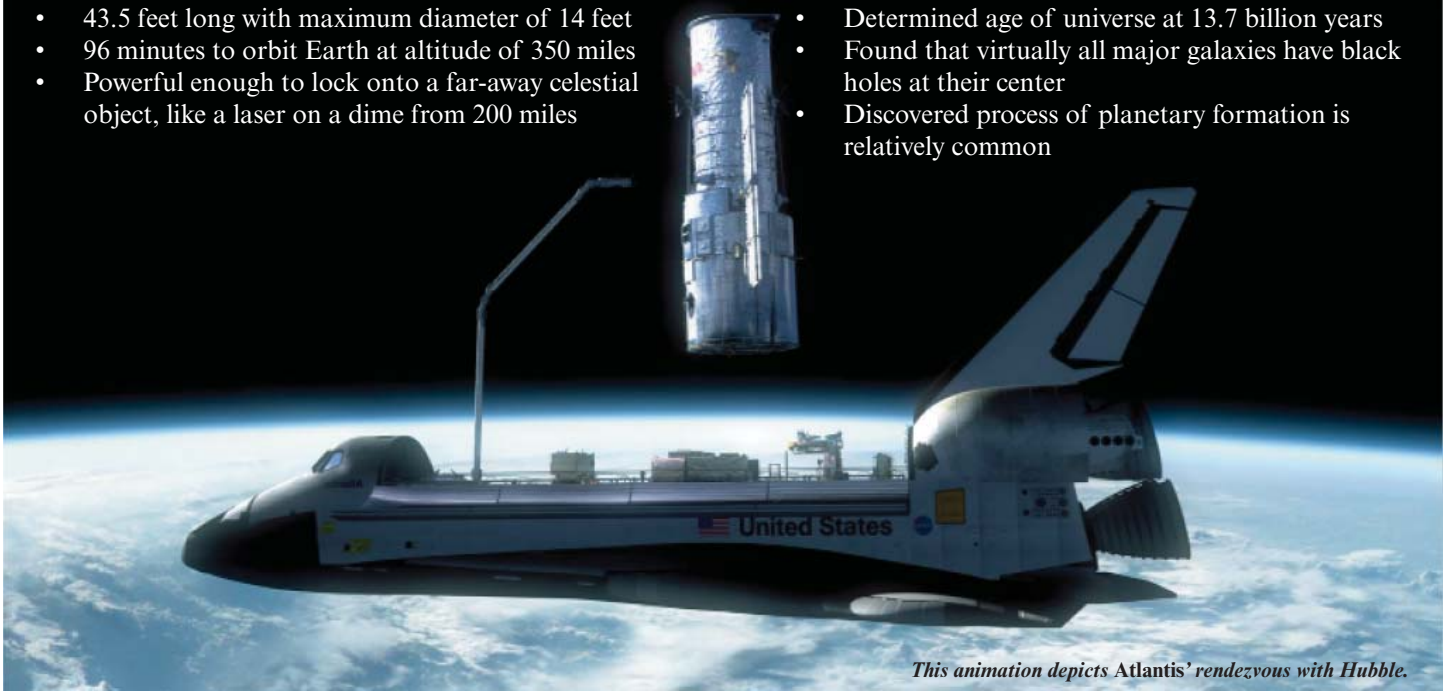
Lockheed Martin weld engineers watch closely as the friction stir weld pin joins the first crew module Ground Test Article components. In less than six minutes, the weld was complete as onlookers witnessed the beginning of a new era in human space flight.

Lockheed Martin is the prime contractor to NASA for the *Orion* crew exploration vehicle, which is scheduled to make its first crewed flight in 2015.

Orion will be a complex, state-of-the-art spacecraft with more capability, flexibility and adaptability than any previous human space flight vehicle. ■

Hubble Notes & Discoveries

- 43.5 feet long with maximum diameter of 14 feet
- 96 minutes to orbit Earth at altitude of 350 miles
- Powerful enough to lock onto a far-away celestial object, like a laser on a dime from 200 miles
- Determined age of universe at 13.7 billion years
- Found that virtually all major galaxies have black holes at their center
- Discovered process of planetary formation is relatively common



This animation depicts* Atlantis' *rendezvous with Hubble.

Space Shuttle's Target Launch Dates

May 12, 2009	STS-125	ET-130
June 13, 2009	STS-127	ET-131
Aug 6, 2009	STS-128	ET-132
Nov 12, 2009	STS-129	ET-133
Dec 10, 2009	STS-130	ET-134
Feb 11, 2010	STS-131	ET-135
April 8, 2010	STS-132	ET-136
May 31, 2010	STS-133	ET-137

To "Affinity" Groups and Beyond!

The business environment can often be difficult and unforgiving to individuals seeking to climb the corporate ladder. Assistance from a familiar face or different perspective when one is seeking knowledge can be a career turning point.

Three new Affinity Groups at Michoud are getting started with plans to give employees assistance with their professional goals, provide cultural knowledge, help the community, and have a little fun all at the same time.

On March 25, the Diversity Council invited the three groups to introduce themselves to Michoud employees. The Women's Intrinsic Network (WIN), the African American Affinity Group Professional Fitness Initiative (PFI), and the Asian Pacific Islander American Leadership & Mentoring Association (ALMA) outlined their goals, objectives, and upcoming events to the council.

Chu Hui Pak (from left) represents the Asian American Affinity Group; D'Andrea Brown, the Women's Intrinsic Network Affinity Group; and Brian DeJan, the African American Affinity Group.

Affinity Groups form a collection of persons with similar interests or culture in order to better contribute to Lockheed Martin success. Their goals also include enhancing personal professional knowledge and resource sharing.

Lockheed Martin sees Affinity Groups as a benefit to the company because they offer an opportunity to improve inclusivity and promote corporate ethics goals.

"These groups create the opportunity for new leadership to emerge, and as the face of Lockheed Martin's workforce changes, they also help to attract and retain talented individuals," Vice President **Manny Zulueta** explained. "The spirit of fellowship that these groups offer is also a benefit to the company and to the individuals."

Dave Boyarski of Lockheed Martin Information Systems & Global Services (IS&GS) said Affinity Groups can be more effective when they partner together on projects. Boyarski who grew up in the Philippines spoke at the kickoff luncheon of the Asian American Affinity Group.

Affinity Groups are recruiting new members and invite every employee to take part. ALMA recently sponsored a luncheon featuring guest speaker **Dave Boyarski**, deputy for Performance Excellence, IS&GS-Civil, who stated that one of Lockheed Martin's goals is to be "the employer of choice," and Affinity Groups help accomplish that. Boyarski related the history of Asian American groups, citing that Lockheed Martin's organization in Dallas is five years old.

PFI already has offered a résumé writing workshop that attracted 30 employees. In addition, the affinity group has partnered with the Asian American organization to sponsor another seminar on interviewing.

Each group plans monthly meetings with networking and professional events year-round. Keep in mind that all time spent participating in Affinity Groups must be on an employee's own time.

Michoud's Affinity Groups welcome those interested in joining a group of their peers or in discovering something new from another culture. Contact **Chu Hui Pak** at 7-0568, **D'Andrea Brown** at 7-2150 or **Brian DeJan** at 7-0742. ■

LM volunteer groups combine forces to paint mural

With paint brushes in hand, 30 LMents, Employee Volunteer Organization and Lockheed Martin Leadership Association employees gathered at Sarah T. Reed High on March 28 not to swab hallways and doors, but to brighten the school's cafeteria with a huge space-related mural, measuring 21 X 8½ feet. Hoping to spark an interest among students in space exploration, volunteers spent six fun hours painting the mural that features Lockheed Martin-involved space projects and vehicles such as the Hubble Space Telescope, Mars Rovers, *Orion*, External Tank, the International Space Station and various satellites. Ten students and teachers also pitched in. Graphic artist **Shannon Jurado** designed the mural and served as the technical lead for the event. ■

Job Fair offers employees future opportunities in state

Approximately 200 Lockheed Martin employees showed up with resumes in hand for the April 14th Job Fair at the Career Transition Center across Old Gentilly Road from the Michoud Assembly Facility.

The Louisiana Workforce Commission hosted the fair, inviting 11 Louisiana employers to participate – companies such as Bollinger, Laitram, Northrop Grumman, Textron, and Trinity Marine. Job opportunities were mainly technical in nature as employers looked for experienced applicants in engineering, IT, marine, and manufacturing areas.

By sponsoring the Job Fair, the State of Louisiana is taking an active role to keep people employed locally. "Louisiana is investing in the quality of the workforce, and Lockheed Martin has a highly educated and skilled workforce," stated **Matt Mayer**, rapid response coordinator for the Louisiana Workforce Commission.

"I came here to gain some insight into the job market, and see what opportunities are out there," employee **Vaughn Bolden** said in explaining why he attended.

Another in attendance, **Ralph LeBoeuf**, said, "My goal is to stay with Lockheed Martin, but it might not be in the cards. I have to have a Plan B. Lockheed Martin is doing the right thing by offering this Job Fair."

Several hundred Lockheed Martin employees attended the April 14th Job Fair and exchanged resumes with prospective employers.

Michael Davis, Jefferson Parish field service rep for Louisiana Workforce Commission, summed up, "Through skills evaluation and training, our goal is to help the applicant become worthy of the job – to match business needs with applicant needs."

Michoud Operations is committed to helping employees secure their future as the External Tank build comes to an end. The company and the State will host future Job Fairs through the end of the ET Program to help employees connect with near-term opportunities.

"I went to the first Job Fair that concentrated on Lockheed Martin job openings, but I'm more interested in local jobs," employee **John Anderson** said. "It's going to be a new beginning for all of us." ■

Michoud employees lose the weight and get fit

In the NBC-TV reality show, "The Biggest Loser," contestants lose weight through diet and exercise. Hmmm. Sounds like a novel idea.

Cut to Michoud's **Kathy Wakefield** who was determined to lose weight earlier this year. Wakefield and **Judy Atilano** agreed to diet together and told several colleagues in Final Assembly & Test and the Build Process departments.

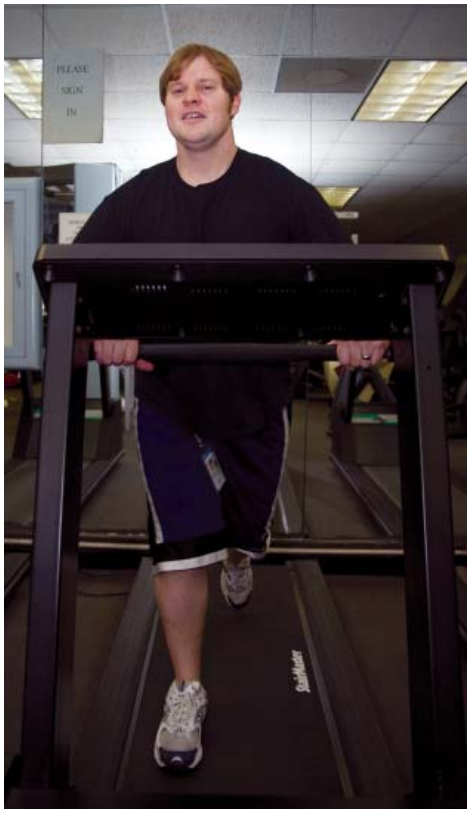
Soon, word spread that they were starting a Biggest Loser challenge and eventually 36 participants joined the program. In order to even the playing field for those losing weight, **Adam Gates** used a program to calculate the percentage of body fat from their first weigh-in. Everybody stepped out of their comfort zones and presented their weight at the end of each week on calibrated scales in Building 420 and Final Assembly.

"There's a big push about people taking charge of their careers," said **Mike McGehee**, senior manager, Final Assembly & Test. "I'd like this to be the human interest story for people taking charge of their health. We should all be motivated to excel professionally and personally."

McGehee was happy to see the department working together for better health. All who participated gathered at the end of each week and compared their statistics for three months. They realized the benefits of an active workforce outweigh the risks of an unhealthy, sedentary crew, and that they're more focused and alert when healthy.

As people get older, they tend to gain weight.

"On a recent study done at Stennis,



Adam Gates lost 45 pounds and wants to lose more.

results showed that a male 40-50 years of age gains an average of five pounds a year," reported **Dr. Juan Blanch, Jr.**, Michoud's physician. "Only those individuals who aggressively worked on increasing activity and changing their diet maintained their weight. As for why this happens, we look back at our great-grandparents growing up in the depression; they knew what it was like to go hungry. They never wanted their children to go hungry so this is where we developed the eating habits and food choices that impact us now."

So what does it take to be the Biggest Loser? By dieting and exercising, Adam Gates lost 45 pounds and was declared the Biggest Loser. "I ate when I was hungry, but didn't keep eating until I was full. I walked around the facility when I could. Most of the work-out was cardio exercise on a treadmill at home."

How much did the 36-member group lose? A total of 335 pounds. Wakefield, who started it all, placed fifth.

Lockheed Martin offers these resources to help employees get into better shape:

- Fitness center in Building 320
- On-site Weight Watchers at Work program convenient for employees at lunch time
- Health club memberships where employees can be reimbursed up to $250
- Jazzercise cardiovascular aerobic exercise at 4 p.m. Mondays and Wednesdays in Bldg 351
- Yoga classes at 4 p.m. Tuesdays and 4:30 p.m. Thursdays in Bldg 351 ■

Hundreds bask in the sun at CCC tent after 10-K race

Each year the Crescent City Classic 10-K road race brings thousands of visitors to New Orleans. For over 20 years, Lockheed Martin has sponsored a tent for employees to relax after running or *watching* the race.

This year, a total of 334 employees and guests signed up for the tent, and 122 employees participated in the April 11th race. The multitude dined on hamburgers, chicken breast on a bun, fresh fruit, pasta salad, sodas, Gatorade, water and beer.

Schween Chiropractic also provided chair massages for the weary. East St. Tammany Habitat for Humanity representatives volunteered at the tent and passed out information about their program to build affordable housing for area residents. ■

Esposito wins Engineering award

Space Systems Company named several engineers in the first quarter for the Extraordinary Engineering Award. Among those is Michoud's **Eric Esposito** (right), a mechanical engineer in Thermal Analysis, who accepts his award from **Fulvio Manto**, director, Engineering & Technical Labs. Space Systems cited Esposito for his significant contributions in helping meet the ET manifest. He received his award during Engineering Vice President Wanda Sigur's staff meeting.

Safety winner for April

Derrick Juneau

Derrick Juneau of Production is the April "Doing it Safely" honoree. Using the AESOP (Assignment, Equipment, Situation, Obstacles & Personnel) tool, he determined that a broken electrical conduit on a tooling fixture presented an electrical shock hazard. Juneau tagged out the tool; reported it to his supervisor and Facilities for repair. Because he used the error prevention method, he may have prevented electrical shock to a fellow employee or equipment damage. ■

Mark it on your calendar

to give the Gift of Life at Michoud's second Blood Drive of the year.

May 18-22

FIRST Robotics team advances to National competition

Pictured with the robot they constructed is Mandeville High's FIRST Robotics team, sponsored by Lockheed Martin and mentored this build season by engineers **Keith Joiner** (back row, 2nd from left) and **Darren Kearney** (far right). At the Bayou Regional competition in March, the team was seeded third after qualifying matches, before losing in the first quarterfinal round.

Louisiana First Lady **Supriya Jindal** stopped by and honored the team by taking the robot out for a test-drive. Mandeville received the Rookie All-Star award, allowing the team to advance to the National Championship in Atlanta April 17-18. The school is the only Louisiana team going to the National's this year. Check the team's website with over 500 photos at http://team2992.com ■

External Tank Completion Plan

Besides the Base Incentive, the ET Completion Plan has now reached seven milestones with the addition of ET-131 delivery on February 14 and the STS-119 safe launch on March 15 and safe landing on March 28.

Several other milestones are on the near horizon – ET-132's delivery, which is scheduled for the last week in April, and the STS-125 launch to the Hubble Space Telescope on May 12.

Also, STS-127, a mission to the International Space Station, is scheduled to launch June 13.

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

Milestones

Employees celebrating anniversaries with Lockheed Martin in May 2009

35 Years
Suzette Archie

30 Years
David Farin
Thomas Fitts
Gunther Gillat
Gregory Hanrahan
Bruce Maquar
Lloyd Meekins
Debbie Pastoret
Robert Taylor
Reginald Walker
David White

25 Years
Robert Champagne
Walter Forest
Michael Harris
Larry Lovett
John Rosche

20 Years
Carlos Yingst

15 Years
Floyd Daniels
Robert Mason

10 Years
Ron Ellzey
Carl Ray

5 Years
Joseph Griffin
Jason Jaunet
Patrice Love
Lemual Pepper
Long Trinh

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