Space Systems Company–Michoud Operations

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

Mission Success
Bulletin

March 23, 2009
on-line
http://www.lockheedmartin.com/michoud/

Discovery's launch first of busy year

Finally, it happened. STS-119, the mission that had been assigned seven different launch dates, blasted off the launch pad March 15 at Kennedy Space Center on a stunning, cloud-free evening.

KSC Launch Director **Mike Leinbach** called it "the most visually beautiful launch" that he had seen. "You could see SRB (Solid Rocket Booster) sep. We could see the Orbiter seven minutes into flight when it would have been off the New Jersey, New York coast."

Bill Gerstenmaier, the NASA associate administrator for Space Operations, called it a tremendous team effort. "A lot of critical work had to be done and they did it. And I just want to thank them."

Gerstenmaier was referring to the engineers and technicians who had worked feverishly rebuilding and replacing seals and components of the gaseous hydrogen (GH2) vent system near the Ground Umbilical Carrier Plate at the Intertank after a GH2 leak caused *Discovery* to scrub four days earlier. The leak came from a 7-inch GH2 vent line during Liquid Hydrogen (LH2) Tank propellant top-off.

No leaks were detected during fueling on launch day.

And as far as tank debris, Gerstenmaier said, "We didn't see anything in the video. We'll continue to pore over data, but it looked clean."

Michoud's preliminary imagery review also noted no major observations. Some routine foam popcorning was seen, but well after the critical period where debris is of greatest concern.

But this most reluctant launch saw a first as well. A bat inexplicably perched on the back of the ET for hours prior to launch. Michoud personnel evaluated the bat risk for potential foam damage, but decided any impact would be superficial and acceptable for flight.

Prior to the March launch attempts, NASA and Michoud engineers and technicians spent weeks studying a troublesome Orbiter Flow Control Valve issue. The three valves regulate the GH2 that flows back to pressurize the LH2 tank during launch and ascent.

Continued on Page 4

Missile Mothers sustain External Tank construction

Building the External Tank is a complicated process filled with mountains of paperwork, gigabytes of data and hundreds of hours of meticulous procedure.

And if that's not enough, supervisors and technicians also deal with issues associated with multiple tanks. It's not uncommon for someone to work on a particular tank one day and a different tank the next.

Technicians move from tank to tank as their skills are needed. Supervisors are also in charge of various processes on different tanks.

It soon became apparent that one person should oversee all activity on an individual tank – to help Production efficiently construct the ET and meet the required delivery date. For that reason the position of Tank Specific Project Manager came into being or what is affectionately known as "Missile Mother."

"I see my job primarily as making sure that I move the roadblocks out of the way of the production folks so that they can do their job," says **Mike Simpson**, senior manager, Systems Engineering & Integration, and currently ET-132 Missile Mother.

Lockheed Martin created the position because of issues with ET-125, a tank far behind schedule for many factors: redesign after the *Columbia* accident, new hires unfamiliar with manufacturing procedures, an aggressive flight schedule, and to a lesser extent from Hurricane Katrina. The Missile Mother would lead a 'tank-centric' team that provided a laser-like focus on tank needs.

Kevin Aldrich, assigned to ET-125, and Simpson, ET-126, became the first Missile Mothers. How did Production greet them?

"When the Missile Mother teams were first implemented, I was extremely excited because it takes a whole lot of support to stand up Production," explained **Mike McGehee**, senior manager, Final Assembly. "And I'm always looking for people who can come help us."

From its initiation, the program has been a success, "I think it was readily apparent up front that the Missile Mothers were making a difference," said **Mark Bryant**, External Tank project manager.

Currently, six Missile Mothers are assigned: Simpson on ET-132, his second tank, in Final Assembly; and **Melanie Jennings** on ET-133, her second, in Cell A. **Lisa Brown** has been assigned to ET-134, **Lance Spiers** to ET-135, **Karen Poy** to ET-136, and **Christina Bain** to ET-137. **Ralph LeBoeuf** recently completed the assignment on his first tank, ET-131, delivered ahead of schedule February 14.

The Missile Mothers are not always chosen for their extensive production experience. LeBoeuf normally handles Work Share, and Jennings comes from Facilities. Yet their limited hands-on production experience has not been an issue because of the way their duties are structured to support Production needs.

"We have the philosophy that supervisors and workers know what needs to be done and know how to do it, and we aren't going to get in their way; we aren't going to tell them how to schedule or how to do their work," says LeBoeuf. "We're there in a support role. Now, if they have a problem and say, 'Look, I don't understand something.' Certainly we'll be the first ones there to try and help."

As Jennings puts it, "What the Missile Moms do is make sure that all the paper is together and handle all the nitpicking details."

Missile Mother team members come from various departments in order to facilitate efficient problem solving. Designers help interpret a drawing for example, or engineers assist with needed lab work.

Recently during ET-131 assembly, the Missile Mother team showed its true value. Well on its way to an early delivery, the tank sustained a major part failure in testing. The team focused on correcting the problem without pulling technicians off the tank, which would have slowed production.

As a result, Michoud delivered ET-131 eight days ahead of schedule. "When items come up, they scare you but everybody pulls together and works through it," says LeBoeuf. "It's a team effort and amazing to see what we can do."

Just as important, the successful Missile Mother program passes lessons learned on from one tank to the next. ■

Missile Mothers Melanie Jennings, Ralph LeBoeuf and Mike Simpson stand next to ET-132.

Orion's first weld at Michoud planned for April

Concealed behind towering walls of white plastic sheeting in Building 103 is a bustle of activity where participants are preparing for a major event on April 15. Apart from federal obligations that day, the real cause for celebration is the first weld of *Orion* hardware, which will be anything but taxing for the Michoud team.

The first weld on the Ground Test Article Lite (GTA Lite) of the *Orion* Crew Module marks the first production milestone in the program since its award in 2006. Securely fastened to the 5513 tool, an aluminum cone panel and longeron will be joined by a self-reacting friction stir weld. The process, to last less than an hour, initiates a series of weld operations that will continue for approximately three months resulting in the Crew Module structure.

The GTA Lite serves as a manufacturing pathfinder and as a test article for static vibration and acoustical testing, providing results used to correlate stress models for all subsystems on the vehicle. Lessons learned from the Apollo program show that this data will retire risk and mitigate potential serious program delays late in the production schedule.

Once welded, the vehicle will undergo assembly, integration and testing on-site. These activities include installation of simulators, instrumentation, back shell panels, heat shield and static tests. Influence Coefficient Tests will be conducted to verify that the stress models match the actual hardware performance.

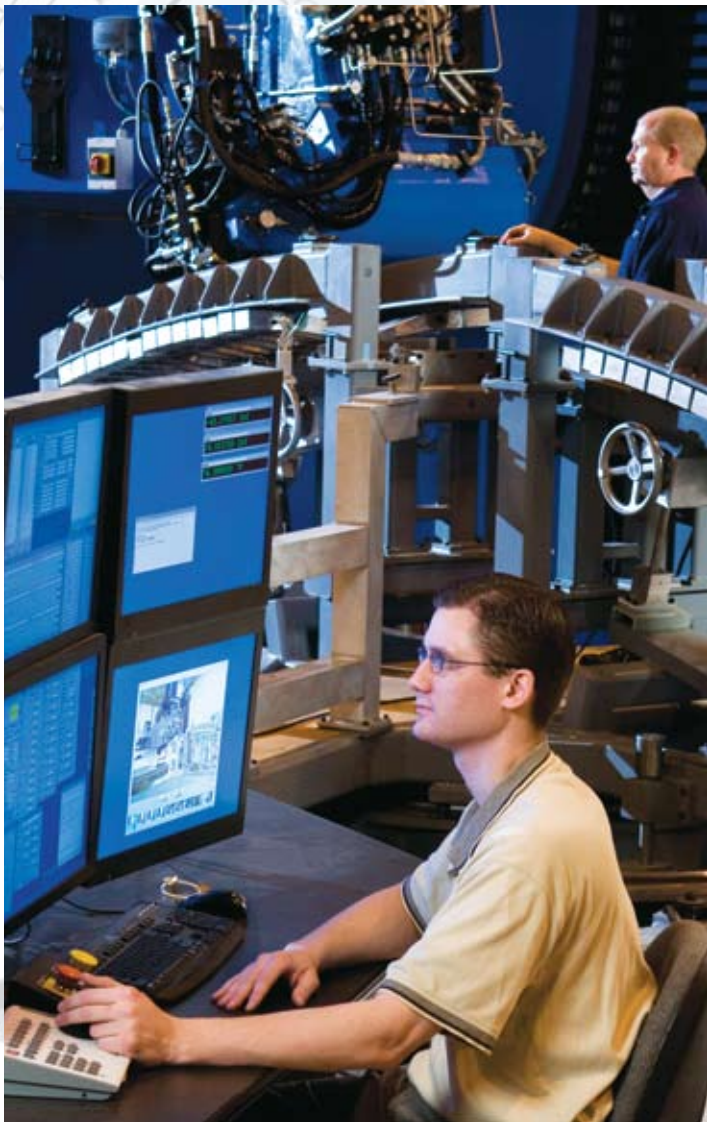
"The road to the first weld continues to be quite challenging," explains **Mark McCloskey**, manager, *Orion* Production Engineering. GTA had to be rescaled from its original design due to evolving requirements, configuration and budget challenges. "Our Production team is tough, and we have learned to take on these challenges and changing requirements on other programs like ET, X-33 and Kistler. We are going to make this happen because it is what we do."

The manufacturing profile for the *Orion* vehicle is quite different from the External Tank. Rather than utilizing a sprawling line of assembly tools, *Orion* uses a "just-in-time" methodology, which centers production on a Universal Weld System II (UWS II). Accompanied by a 22-foot diameter turntable and a modular t-grid floor, the system affords virtually unlimited five-axis welding possibilities on any fixture-mounted hardware.

The Michoud *Orion* Materials and Processes (M&P) group, with the assistance of Weld Engineering, have spear-headed the development of multiple self-reacting Friction Stir Weld schedules. Technicians welded on a development tool to closely simulate the heat sink and clamping to be seen in the production hardware fixtures. In addition, a friction push plug welding technique has been developed to closeout the circular and circumferential welds.

Dr. Mark Cantrell, *Orion* M&P manager, is proud of the group's work. "The M&P weld group has shown both innovation and tenacity as employees meet the challenges of a rapid production schedule."

Continued on Page 4



Weld engineer Wes Martin (at console) runs the newly installed Universal Weld System II through test maneuvers as project engineer Kevin Schuengel (background) validates the commands. Martin, involved in developing Friction Stir Welding technology at Michoud since its inception, anxiously awaits* Orion's *premier weld. "It will be awesome; it has been challenging and exciting, and this is the big payoff."

First weld

Continued from Page 3

The UWS II, specified by Lockheed Martin Michoud and NASA MSFC engineers, is in the final stages of acceptance testing. The UWS is part of the National Center for Advanced Manufacturing, managed by the University of New Orleans Foundation and supported by NASA and the State of Louisiana.

In coming weeks, technicians will perfect tool alignments as engineers weld confidence test panels. Identical in size and shape to the actual hardware, these panels will validate weld schedules and confirm the integrity of the weld process as they undergo rigorous testing in the M&P labs.

Mechanical assembly activities on the GTA will take place in the NCAM / New Technologies area until the entire *Orion* Main Assembly Area is complete. Concurrent with that work will be the fabrication of composite parts to be integrated into various sections of the vehicle.

Additional mechanical assembly tools required later in the GTA production schedule are on order with firm promise dates. **Bob Campbell**, senior manager, *Orion* Production confirms, "GTA hardware is also ordered with similar delivery obligations. If all commitments are met, everything is a go."

LM21 Best Practices Structured Improvement Activities have been utililized to help ensure the success of the *Orion* Program. Most notably, "Path to First Weld" and "Path to First Composite Parts" provided weekly team meetings designed to eliminate waste and redundancy, and optimize processes and flow.

"This journey has been a tremendous experience," says Campbell. "It brings together seasoned professionals who have brought programs on-line and young energetic engineers – and the dynamics are impressive. This weld will be a big boost for the entire *Orion* Program." ■

Beautiful launch

Continued from Page 1

A poppet broke off a Flow Control Valve in November during the STS-126 launch and ascent, but did not cause any damage. During the investigation, teams found several hairline cracks in other Flow Control Valves in inventory and on flight hardware. NASA outfitted *Discovery* with three valves that had flown successfully on previous missions but showed no cracks.

Mission Management Team Chairman **Mike Moses** said the Flow Control Valves performed "spot on" during the launch.

By launching March 15, NASA loses only one day and one spacewalk from the 14-day mission. *Discovery* is carrying the final set of solar arrays and a spare urine processor for the water recycling system. These two payload items will enable the International Space Station to increase its crew from three to six astronauts later this year.

When asked in the post-launch news conference about the shuttle's future, Gerstenmaier replied, "We need to stay hungry and continue to look and ask questions. We can still continue to learn about this vehicle, as many years as we've flown it. We have to fly, and have to fly safe."

Discovery must undock before a March 26th Soyuz rocket launch brings another rotating crew to the station. NASA had to launch *Discovery* by March 17 or stand down until April 7 for the Soyuz mission.

With *Discovery* launched, the Hubble servicing mission is next in line and on pace for its May 12th liftoff. ET-130 mated with its Solid Rocket Boosters back in January. And on March 23, *Atlantis* will roll over to the Vehicle Assembly Building to mate with ET-130, and then roll to the pad on March 30. ■

ASAP tours Michoud facility

The Aerospace Safety Advisory Panel visited Michoud on March 6 and toured the factory. The group met at Michoud to discuss plans for Constellation programs such as* Orion, Ares I *and* Ares V *as well as activities on the External Tank project.

Senior leadership answers employee questions

Two-Way Communications remains vitally important during the planned Space Shuttle fly-out. NASA ET Resident Manager Pat Whipps (below) and ET Program Manager Mark Bryant met with 500 employees during a recent series of meetings – many of which took place on the factory floor.

Whipps complimented employees on the quality of their work, while Bryant stressed the critical nature of meeting External Tank delivery dates. Employees raised questions about the projected flight rate, ET-122 status and when the **Orion** *program would begin production activities.*

Vice President Manny Zulueta tells employees during the latest in a series of employee Town Hall meetings that "the best way for us to assert our performance" is to deliver quality, safe tanks on time. Among other topics, employees asked questions ranging from **Orion** *to* **Ares I** *Upper Stage status, to information on a new MSFOC (Manufacturing Support & Flight Operations Contract) contractor.*

Clampitt Safety award winner

Wesley Clampitt, an electrician in Facility Operations & Services, wins the "Doing it Safely" award for January and February. While working near the sewer lift station in the factory, Clampitt noticed the manhole cover was missing. He took charge of his 25-foot safety zone and secured the area with barricades. He also notified fellow employees and had the cover replaced.

Blood donations can be a key to life

Demonstrating their commitment to fellow employees and the community, 279 Michoud Operations employees volunteered to roll up their sleeves and give the "Gift of Life" January 26-30.

The first Lockheed Martin blood drive of the year yielded 248 units of blood, five more than the 2008 January drive. Unfortunately, the Blood Center deferred 31 employees from giving due to mild colds, low iron counts and other minor medical conditions. If 25 percent of Lockheed Martin employees donate blood during 2009, $2,000 worth of replacement blood coverage is provided to all employees for one year.

The need for blood is never ending. Donations from the January drive could potentially fulfill the total units of blood required in the greater New Orleans community on a single day. ■

Senior engineer Mark Pokrywka's passion for donating blood stems from knowing that someone, possibly a family member, might need his blood some day. He emphasizes that giving blood is the "right thing to do!"

Ares V model on display

In celebration of the 40th anniversary of the first manned mission to the moon, Lockheed Martin recently donated a 1/10th scale, 30-foot tall* Ares V *model to Huntsville's Davidson Center for Space Exploration. The* Ares V *will be one of the family of launch vehicles that will return humans to the moon by 2020. Earlier this year, Lockheed Martin submitted an* Ares V *Phase 1 study proposal. NASA has designated Michoud as a site for* Ares V *production and assembly, and is scheduled to announce its Phase I selections within the next several weeks.

Two receive Snoopy awards

Astronauts Mike Foreman (above left) who performed three spacewalks last year during the STS-123 mission and Barry "Butch" Wilmore who will pilot STS-129 later this year present a Silver Snoopy to W.B. "Scooter" Clifton of Huntsville Technical Operations on February 12. For over 30 years, Clifton has worked as a test engineer supporting Marshall Space Flight Center by performing invaluable management expertise during Space Shuttle hardware testing.

Congratulations to Dawn Diecidue-Conners who received a Snoopy award from Mission Specialist Mike Good (left) who is in training as a spacewalker for the final Hubble Space Telescope mission in May, and from Wilmore. As Systems Engineering manager, Diecidue-Conners provides input and support to a number of challenging activities in preparing the ET for flight.

2009 Space Shuttle launch schedule

May 12
STS-125/ET-130 to Hubble

June 13
STS-127/ET-131 to ISS

August 6
STS-128/ET-132 to ISS

November 12
STS-129/ET-133 to ISS

December 10
STS-130/ET-134 to ISS

Wheeler named Diversity Champion

Space Systems has named Netsy Wheeler of Business Operations as the Diversity Champion of the month for February. A former two-term president of the Employee Volunteer Organization, Wheeler also donates time to United Way, Second Harvester Food Banks, UNITY Homeless Drives and Children's Hospital. Whether it's a meeting or organizational function, Wheeler greets everyone – fellow employees and visitors alike – with a friendly smile while engaging them in conversation.

STS-119 Launch Honorees tour Kennedy Space Center

Selected for their outstanding performance, STS-119 Launch Honorees pose before* Discovery's *stack at KSC, but unfortunately did not get to see a launch because of the March 11th scrub. From left are Phil Knight, Joe McDonald, Rose LaLanne, Cliff Mitchell, Pat Martin, Lon Chaney (supplier honoree), Jim Quirin, Sandra Hindman, Tom Barrett, Pam Rouleau, Vivian Tolliver, David Turnage, Steve Franklin, John Desforges and Manny Zulueta.

External Tank Completion Plan Update

Milestone	Event Date	Description
1	April 25, 2008	Basic Incentive
2	May 31, 2008	STS-124 launch/ landing
3	July 10, 2008	ET-127 delivery
4	August 6, 2008	ET-129 delivery
5	November 14, 2008	STS-126 launch/landing
6	November 18, 2008	ET-130 delivery
7	February 14, 2009	ET-131 delivery

Watch that speed!

As the license plate reads, careful that you don't get "busted" driving about the facility. Several speed limits around Michoud have dropped from 30 to 20 mph due to construction and other safety measures.

Milestones

Employees celebrating anniversaries with Lockheed Martin in March and April 2009

35 Years
Viola Balancier
David Buras
Denese Lloyd
Wilda Miller
Tom Price
Karen Sanchez-Barbudo

30 Years
Andrew Buell
Charles Campbell
Nicholas Dolese
Lavenia Emerson
Jack Garrard
Herbert Guynes
William Hanrahan
Judy Hill
Alan Jackson
Dianne Javery-Knox
Robin Legaux
Robert Lyons
Ernesto Maldonado
Calvin Martin
Agnes Motton
Mark Myers
Richard Nix
Michael Noone
Leonard Paige
Juan Ramirez
Rory Reese
Webb Simmons
Kenis Tobias
Vivian Tolliver

25 Years
John Barnett
Joseph Barrett
John Blair
Carl Bouvier
Kenneth Braxton
Mark Cleveland
Vincent Fazzio
Mario Hall
Mark Hargrave
Terry Herrin
Keith Hyde
Larry Jackson
Dave Kinchen
Steve Oxner
Jeffrey Pfrimmer
Netsy Wheeler
Jacquelyn White
Jeanetta Wilson

20 Years
Connie Britt
Eugene Hartley
Janet Jones
Michael LeBlanc
Glenn Schmitt
Donald Spiers

15 Years
Jim Dutton
David Legnon
Darrell Lincoln

10 Years
John Atchley
David Carver
Glenn Estapa
Wendy McQueen
Jody Stock
Gary Verzwyvelt

5 Years
Ernesto Avila
Charles Billiot
Donald Bollich
Earl Bonin
Erin Bowman
Julie Buell
Ryan Dardar
William Hebert
Jason Hopkins
Stephen LaFontaine
Eloy Martinez
Phat Nguyen
Timothy Nguyen
Michael Penton
Sharon Prisco
Kevin Thomas
Joseph Todd

Mission Success Bulletin on-line

LOCKHEED MARTIN

Lockheed Martin Space Systems Company – Michoud Operations Volume 28, Number 2 • March 23, 2009

Director of Communications: Marion LaNasa

Editor: Harry Wadsworth

Graphics, Photography: Russell Arthur, Eric Bordelon, Andre' Bourdier, Chip Howat, Jon Irving, Shannon Jurado, NASA, Brian Peterson, Steve Seipe

Contributors: Kevin Barré, Andre' Bourdier, Lorri Manning

Mission Success Bulletin is published by the Communications Department.