Space Systems Company – Michoud Operations

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Mission Success
Bulletin

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on-line

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Heavy work load predicted for Michoud

First six months of 2007 expected to be busy

If employees thought that 2006 was hectic with four External Tank deliveries and three Space Shuttle flights, just wait until this year.

To keep pace with the shuttle manifest, **Brian Magendie**, Industrial Engineering manager, reports that five External Tanks are planned for delivery in 2007, with four scheduled before the end of September. Along with those deliveries may come five shuttle launches, although the fifth launch now scheduled for December may slip into January 2008.

"The first six to seven months are going to be incredibly busy," understates Magendie. "Hopefully, it should get a little easier after that."

Michoud has 16 tanks yet to deliver to successfully fly-out the shuttle program in 2010 (see Page 1 & Page 2 charts). "All 16 will be in play (in work) this year," Magendie reports.

That's 14 trips to the International Space Station to finish its build, one servicing mission to the Hubble Space Telescope, and one partially-built tank just in case it is needed.

2007 Space Shuttle Flight Schedule

Mission	Tank	Delivery Date	Projected Launch
STS-117	ET-124	12/19/06	3/15/07
STS-118	ET-117	4/4/07	6/28/07
STS-120	ET-120	6/4/07	9/7/07
STS-122	ET-125	7/21/07	Oct. 2007
STS-123	ET-126	9/19/07	Dec.2007/Jan. 2008

Much of the work will take place in Building 420. ET-117 rolled into Cell 2 there earlier this month, and ET-120 should be arriving in Cell 1 near the end of January.

The ET-117 work scope includes longeron closeout, bipod harness and fitting with heater and temperature sensor wiring along with Thermal Protection Systems (TPS) closeouts, camera and fairing installation, bellows drip lip and heater installation, and Liquid Oxygen Tank and Liquid Hydrogen Tank PAL Ramp footprint repairs and extensions.

Many of the larger jobs reside with ET-120. Verification and Validation requirements must take place before TPS base repairs can be made to Ice Frost Ramp footprint acreage as well as lower and upper TPS closeouts. Disassembly work is under way now – removing hardware like cable trays, pressurization lines, harnesses, and brackets. Bipod modifications must be installed. The camera antenna and camera box must be

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You're invited to a General Assembly

The crew of *Discovery*, STS-116
10:15 a.m. Wednesday, January 31
Next to Final Assembly

Commander Mark Polansky
Pilot Bill Oefelein
Mission Specialists: Bob Curbeam,
Christer Fuglesang, Joan Higginbotham, Nicholas Patrick,
Suni Williams (remained on station)

Michoud *Orion* team developing plans, moving ahead

Since the initial contract award from NASA last August 31 to develop and build the *Orion* crew exploration vehicle, the Lockheed Martin *Orion* team has been addressing System Requirements Review (SRR) concept design maturity, preparing for the System Design Review (SDR) in August, and aligning with the Constellation program plan for the first crewed flight in 2013.

According to **Jim Bray**, Michoud *Orion* program manager, the Michoud project team has developed the facility usage plans and alternatives, secured AL-2195 long-lead materials, conducted a Service Module configuration trade study, and reviewed requirements to support the February *Orion* and Constellation Systems Requirements Reviews.

The Systems Engineering organization led by **Rick Spring** is implementing disciplined processes such as risk management, and developing early program deliverables on schedule. **Jules Schneider**, Michoud *Orion* deputy program manager, is leading the activities to establish final assembly operations at KSC. Early efforts enabled Schneider to secure facility agreements and identify initial construction and modification requirements for operations in the O&C Building. According to Schneider, the near-term challenges include providing more definitive facility requirements and securing general contractor services to meet a construction deadline for early 2009.

With a System Design Review in August, the team focus is shifting from requirements development to configuration definition. **Derek Townsend**, Structures Design manager, is building a team to design and analyze the Structures Development Unit prior to design release for all parts of the test unit.

After concluding the second *Orion* Program Management Review with NASA in Houston recently, Bray advised, "The joint NASA/Lockheed Martin team has developed an excellent working relationship – one that is focused on delivering *Orion* to achieve Mission Success for the next generation." ■

Conceptual image of* Orion *preparing to dock with Moon station

Michoud in 2007

Continued from Page 1

changed out and Engine Cut-Off (ECO) sensors replaced.

ET-125, currently in Cell A, has LH2/Intertank flange work under way, and still needs all of the same work listed under ET-117 as well.

"Tank deliveries are critical to support the Space Shuttle Program flight manifest," Magendie states. "Our success on ET hopefully will enhance our ability to attract new business. This will show that we're capable of delivering in this type of situation, which has got to add credibility to our proposals on future programs."

To accommodate this amount of work, Production Operations started "up-shifting" in critical path areas, with Cell A adding a third shift on January 8. Building 420 and Final Assembly are also scheduled to soon add a third shift for around-the-clock operations. These moves directly affect near-term tank work in 2007, according to **Hal Simoneaux**, director, Production Operations.

Other up-shifting will take place in Welding and Vertical Assembly Building work centers. Much of this work will support tank deliveries in the years past 2007.

To support the work, Production Operations increased its workforce by 283 employees to 837 by the end of 2006; another 70 will be added in the near future.

Pondering what lies ahead this year, Simoneaux remains optimistic.

"I think we have a good plan. We just have to execute it. It's definitely challenging, but we've been up for challenges before. I don't think anyone thought we could ever deliver four tanks in 2006, but we did it. A lot of people showed a tremendous amount of dedication to get that done, and that's the kind of spirit we have out here." ■

Cell A – Making Progress

Tank	Calendar Days	Work Days
ET-124	89	63
ET-117	56	40
ET-125		Goal of 37

ET Delivery Schedule

ET-117 – 2007
ET-120 – 2007
ET-125 – 2007
ET-126 – 2007 *(final retrofitted tank)*
ET-128 – 2007
ET-129 – 2008
ET-127 – 2008
ET-130 – 2008
ET-131 – 2008
ET-132 – 2008
ET-133 – 2009
ET-134 – 2009
ET-135 – 2009
ET-136 – 2009
ET-137 – 2010
ET-138 – 2010 *(partial build)*

**** ET-122 damaged in Cell A during Hurricane Katrina is not in the baseline delivery plan.***

Team *Ares* office gears up for NASA proposal

Earlier this month, Michoud Operations opened its local *Ares I* Upper Stage office at the end of Poche Court, near the facility. Michoud along with Lockheed Martin – Denver, as part of the Human Space Flight Line of Business, is a member of Team *Ares* that is competing to build NASA's Crew Launch Vehicle (*Ares I*) upper stage.

Alliant Techsystems (ATK) leads the team with Lockheed Martin and Pratt & Whitney Rocketdyne (PWR) serving as pivotal members.

The three can leverage their experience in NASA's Human Space Flight programs to provide the *Ares I* project a springboard to minimize program costs, maintain aggressive development and test schedules, and reduce the technical risk going forward.

Lockheed Martin – Denver has already competed and won the avionics contract for the early *Ares I* -1 test flight scheduled for April 2009.

Michoud Operations is a recognized industry expert on large cryogenic tanks that are essential to the *Ares I* project's success.

Michoud's proposal support effort will take place at the Poche Court office. Since NASA has announced that the *Ares I* Upper Stage will be built at the Michoud Assembly Facility, Lockheed Martin cannot perform *Ares* proposal work on-site because that could be seen as unfair to competing teams.

Actual proposal writing is taking place at the Team *Ares* joint program office, which opened December 12 in Huntsville. Approximately 80 ATK, Lockheed Martin, and PWR employees staff the office there. About 30 Michoud employees periodically will work at the Poche Court office to support the proposal effort.

Ares I ***conceptual image***

Meanwhile, the *Ares I* proposal is becoming more defined as NASA's Design Team continues its design and specification efforts. NASA released the Design Analysis Cycle Document 1C for *Ares I* Upper Stage in late December and the Draft Request For Proposal (DRFP) came out January 4.

Also, a NASA Pre-Solicitation Conference took place January 17, and NASA and industry one-on-one discussions followed the next day.

February 23 is the date the RFP will be released. Team *Ares* will then submit a phased proposal in March and April. Past Performance Volume is due 30 days post RFP, Mission Suitability due 45 days after RFP, and the Cost Volume proposal is due 60 days post RFP.

NASA will announce the winning team August 31 this year with Contract Authority to Proceed scheduled to begin a day later on September 1.

This past August, Lockheed Martin won the competition to build the Crew Exploration Vehicle or *Orion*, which will sit atop *Ares I* as the rocket boosts *Orion* to the International Space Station or to Low Earth Orbit. ■

Sunnyvale makes third trip to gut homes over holidays

Lockheed Martin – Sunnyvale employees, family members and friends show their love and spirit outside the Broadmoor Community Center where they worked over Christmas break. A total of 31 volunteers traveled to New Orleans where they gutted the upper and lower floors of the center, gutted several homes and installed drywall in another. The group plans a fourth visit this spring to team with Odyssey House and work in Musicians' Village, Lakeview and Broadmoor.

Top: Silia Andresen (from left) and her 17-yr-old daughter, Jaci, help Lockheed Martin's Bonnie Leys work on a glass block wall in the community center. Left: Air Force Academy Cadet John Andresen removes a load of trash from the center.

Technicians use new tool to improve bipod fitting

The bipod closeout design first used on STS-114 in 2005 eliminates the bipod ramp on the ET. While the redesign significantly reduces the amount of manually applied foam, it left the bipod fitting exposed to the elements.

To prevent ice formation and provide temperature monitoring prior to launch, the fitting rests on a copper plate containing heaters and temperature sensors sandwiched between the fitting and the tank.

Power to the heaters and instrumentation is provided by wiring that is fed from inside the Intertank out through a stringer and around to the bipod. Technicians apply an adhesive to bond the wires down to the bipod fitting area, but the adhesive is slippery and the wire has a tendency to pull away from the adhesive unless pressure is maintained during the cure cycle.

Electrical/mechanical technicians **Dennis Silbernagel** and **Kenis Tobias**, who act as a team and have worked on the bonding process from the beginning, previously used tape and weights on top of Teflon spacers to maintain wire contact to the substrate while the adhesive cured.

"But this was not always successful because the slope of the bipod and the radius of the tank would cause the weights to slip," says Silbernagel. "There had to be a better way."

Silbernagel, who has made countless shop aids to assist in his work on the ET, took scrap aluminum and other materials to develop a bipod wire bonding tool that could hold the wires in place during the cure cycle.

The new tool looks like a picture frame with adjustable cantilever arms around it with each holding a plastic-threaded rod. **Faye Baillif**, the certified principal engineer for manual spray foam, examined Silbernagel's prototype and quickly embraced it.

Technicians Dennis Silbernagel (left) and Kenis Tobias make final adjustments to the fingers on the wire bonding tool they helped design and develop that aids in holding the Kapton wires down around the bipod during the bonding process on ET-124. The wires provide power and instrumentation to the bipod and sensors prior to launch.

"For Dennis to take the initiative to develop a tool that uses the bipod as a hard point without harming it, thus giving technicians more flexibility, saving time, adding confidence to the process, and producing a consistent product – all that is impressive," says Baillif.

She then engaged Tooling and Manufacturing Engineering to begin the process of improving upon the prototype and securing NASA's approval for its use. Finally after months of work, technicians successfully used the wire bonding tool for the first time on ET-124, which shipped to Kennedy Space Center last month and is scheduled to fly on STS-117 in March.

"This is the whole purpose of working as teams," says Baillif. "We involve hands-on technicians and get their ideas to improve the process. In the end, they'll be the ones using the tools and processes." ■

FIRST Robotics competition piques student interest

Lockheed Martin's Linda Leavitt-Bell (center right) presents a $1,000 grant to McMain High science teacher Trudy Ferrand and the McMain student team at the FIRST Robotics kick-off at Stennis Space Center on January 6.

Lockheed Martin is supporting the For Inspiration and Recognition of Science and Technology (FIRST) Robotics competition, a national contest immersing high school students in the world of engineering.

This year, 17 New Orleans-area school teams will compete in the Bayou Regional tournament at the Morial Convention Center March 8-10.

Lockheed Martin engineer Curtis Craig (left) goes over possible design ideas with Covington High Industrial Arts teacher John Thomas for the robot.

Lockheed Martin engineer **Curtis Craig** serves as lead mentor coordinator for FIRST Robotics in Louisiana and Mississippi and reports the number of participating schools has doubled, aided by a $284,000 NASA grant.

"We held a kick-off event with teams and their teachers at Stennis Space Center earlier this month," explains Craig. "They saw the game field for the first time and received a kit of robotics parts to get started."

Lockheed Martin awarded ten schools $1,000 grants each to defray some of the costs of competing. The schools include Fontainebleau, Northshore, Slidell, Salmen, St. Paul's, Covington, O. Perry Walker, Sarah T. Reed, New Orleans Charter Science & Math and McMain. Sixteen Michoud engineers are mentors at the schools and brainstorming design and construction ideas with students to build their robots by the February 21st deadline.

Engineer **Scot Marshall** says students are determined and display real teamwork. "The result is a fun and stimulating environment where they discover the important connection between classroom lessons and real-world applications. Our engineers have been spending nearly three days a week after school and after hours to help them construct the robots."

After construction, the teams will compete in a spirited, nail-biting tournament complete with referees and time clocks. The robots must hang inflated colored tubes on pegs in rows and columns on a 10-foot high center rack structure. Robots can score extra points by lifting another robot more than four inches off the floor before time expires.

Covington High's Anthony Marcheselli (left) and Richard Otis assemble the vision system for the robot.

"There's nothing like it in the world when you get on the playing field with those kids in the regional competition," laughs Craig. "It's exhilarating! It revives your competitive spirit and the belief that with young imaginations and know-how, anything can be done."

If you would like to volunteer as a mentor, call Craig at 7-1038. See FIRST Robotics at http://www.usfirst.org or go to http://www.bayouregional.org to track Lockheed Martin teams. ■

Zulueta scheduling more time with employees

As a proponent of two-way communications, Vice President & Site Executive Manny Zulueta is making a point to talk with as many employees as he can at Town Hall meetings and employee breakfasts. After an employee breakfast earlier this month, Zulueta meets Wayne Hall of ITS. ■

Milestones

Employees celebrating anniversaries with Lockheed Martin in February 2007

30 Years
Horace Brookter
Larry Cox
William McGee
Terry McKeough
Jay Schmitt
John Trowbridge

25 Years
Clyde Furst
Charles Gudaitis
Paul Houidobre
Rich Jeppesen
Eugene Parrish
John Pucheu

20 Years
Dwayne Alfred
Camille McConnell

10 Years
Gary Jackson
Walter Lymuel
Ovidio Menendez
John Olavesen
Edward Rocha
Frederick Walker

5 Years
Eric Kieper

Manto named director

Fulvio Manto

Fulvio Manto has been promoted to the position of Director of Engineering & Science.

In his new role Manto oversees Engineering and the Technical Labs to ensure that projects complete all design, analysis, testing and manufacturing support efforts in a timely fashion. He also is responsible for providing streamlined and cost-effective engineering tools and processes to current and future programs.

Manto began his Lockheed Martin in 1975 as an associate engineer on the External Tank Project. After five years he moved to AVCO-Textron where he worked on such projects as the Boeing 757 and the Gulfstream G-IV.

He returned to Lockheed Martin in 1987 in a TDY assignment as Stress Analysis team lead at Marshall Space Flight Center to support post-*Challenger* Return to Flight efforts. In 1996, he began supervising all stress-related activities for X-33 metal liquid oxygen and liquid hydrogen tankage.

Subsequently, Manto became manager of Stress Analysis in 1998, senior manager of Design & Analysis in 2000, and acting director of Engineering in 2005.

A native of Italy, he holds a bachelor's degree in Aeronautics and Astronautics from New York University and has received numerous honors and awards during his Lockheed Martin career. ■

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