

MISSION SUCCESS[®]

BULLETIN

MICHLOUD OPERATIONS

February 28, 2000

Build Process Teams gear up

Michoud Operations is moving to an improved way of producing External Tanks. The company is implementing production-oriented *Build Process Teams* (BPT) to expedite production.

"We are implementing Build Process Teams because we recognize the need to improve our cost and schedule performance and improve our processes on the ET Project," said Michael Javery, director of Manufacturing & Test. "All seven manufacturing test areas will become BPTs."

BPTs utilize a team-based management approach to improve quality, safety, cost and schedule performance, by aggressively performing the necessary actions to continuously improve production. The intent is to have support activities originated, processed and completed within the BPT to the greatest practical extent.

The primary focus of BPT strategy is to make ET production the first priority by co-locating key functional support personnel in the shop area to perform critical activities required to expedite production.

The teams bring together shop personnel (manufacturing personnel and quality inspectors), and key functional support (technical and operational) personnel from Technical Operations, Product Assurance, Materiel Sourcing, Facilities and Production Operations. Bringing all the right resources together to keep

Continued on Page 2



Technician examines a composite tool for making X-34 composite domes.

Michoud building composite LO2 tanks

Michoud Operations is proceeding with fabricating composite liquid oxygen (LO2) tanks for NASA's X-34 technology demonstrator vehicle. Currently, Michoud Operations personnel are fabricating internal domes for the tanks at Marshall Space Flight Center.

The program authorizes Michoud Operations to build two tanks: a "pathfinder" tank that will be used for ground testing, and a flight tank.

"The flight tank will be used in one of two flight X-34 vehicles being built by Orbital Sciences Corporation for NASA's X-34 program," said David Achary, Michoud Operations' X-34 program technical lead.

The composite LO2 tank will be paired in the vehicle with a second LO2 tank made of aluminum. The composite tank will weigh 15-20 percent less than the metal tank. Michoud Operations developed a proprietary LO2-compatible composite material that is the key to

achieving this lower weight.

"Use of unlined composites for the tank instead of metal provides a significant weight savings for the vehicle," said Achary.

The flight tank will have two four and a half-foot diameter internal domes to control liquid sloshing, while the test tank will require only one.

In early February Michoud Operations received the tool for making internal domes from the tool supplier. The tool itself is fabricated of composite materials capable of withstanding the high temperatures required to cure the tank domes.

Production of the two flight tank internal domes started in mid-February and is scheduled for completion in March. Michoud Operations composite technicians stationed at Marshall Space Flight Center (MSFC) are engaged in the composite tank fabrication work.

"Making these composite domes is

Continued on Page 2



Director of Manufacturing & Test Michael Javery describes the reasons for initiating build process teams at a meeting with Production Operations employees.

Teams

Continued from Page 1

production on track is the essence of the Build Process Team strategy.

“Day-to-day direction for the teams will come from the team leads, who will set production priorities and schedules,” said Javery. “We will retain our current checks and balances to ensure that nothing that is technically incorrect is allowed to go forward.”

“We have already experienced first-hand the benefits of the BPT approach,” said Javery. “The Dome Weld Subassembly Area was organized in 1999 as a Build Process Team to try to solve problems we were having with welding domes. As a result, production rates and quality in that area improved dramatically.”

Other types of teaming strategies to improve production have been used at Michoud over the years. Satellite Control Centers, started in 1984, experimented with co-locating support resources in shop areas. Performance Refinement Teams (PRTs), based on Lockheed Martin Electronics & Missiles’ (Orlando, FL) Performance Measurement Teams, focused on process improvement and customer and supplier relations.

“Orlando was recently identified as the Corporation’s LM21

initiative’s Best in Class for continuous improvement ownership using a team-based management approach,” Javery said. “We derived a lot of our approach from them. We also looked carefully at other team-based approaches as well as our previous continuous improvement team strategies. After reviewing all these approaches carefully, we developed our Build Process Team concept. We’re taking the best of the best and tailoring it for Michoud Operations.”

Implementation of the teams is well under way, according to Javery. “Co-location of full time members is complete,” he said. “We have presented the BPT Overview to team members, and the weekly team meetings are set to start in March.”

“The issue we are working through right now,” said Javery, “is what specialized processes and resources are needed to allow the teams to be the most successful. It’s an evolutionary process. The benefits from teamwork can be great. Working together we will maximize the potential from BPTs.”

For more information about BPTs visit Production Operations’ home page (<http://gumbo.maf.nasa.gov/36xx/home/index.htm>) or call BPT Administrator, Cheryl Iwanczyk, 257-3688.

X-34 tanks

Continued from Page 1

a process of laying up composite material in the tool by hand,” said Achary. “This material is carbon fiber cloth that has been pre-impregnated with a proprietary resin matrix by a supplier. Composite specialists will build up the dome in the tool using seven layers of the cloth.”

Technicians then cure the dome by placing it in an autoclave, or curing oven. High pressure within the autoclave, supplemented by pressure applied by a vacuum bag placed directly on the laid-up plies, forces the material together so it hardens with no gaps or holes. The oven will attain a temperature of 350°F for two to four hours. Including the warming up and cooling down periods, the dome will cure in the autoclave for a total of 12 hours.

“After curing, Michoud Operations technicians will remove the dome from the tool and inspect it ultrasonically for defects, then trim it to its final dimensions,” said Achary. “Following trimming, the dome will be checked again using NDE techniques such as thermography.”

Michoud Operations has also manufactured lightweight composite lines for the two tanks.

The internal domes for the flight article are scheduled for completion in March, and the flight tank is currently scheduled for delivery to NASA MSFC at the end of October.

Additional scope of work for the pathfinder tank activity will be added to the contract in the near future. When this occurs, the delivery of the flight tank will move to January 2001.

Questions on ethics?

To obtain clarification on ethical matters or to report possible wrongdoing, contact the Michoud Operations ethics officer, **Stuart Stine**, at 7-3842, or call the Corporate Office of Ethics and Business Conduct, 1-800-563-8442.

Facilities Safety Monitors - extra eyes on safety



For Randy Watts, safety isn't just something to think about at work — it's an attitude to have at all times and in all places.

Randy Watts

“Safety should be an integral part of life,” he counsels.

Watts, Facilities and Environmental Operations, is a Facilities Safety Monitor. For his dedication to this program, he was chosen in 1999 to receive the award for outstanding Safety and Health performance at Michoud Operations' Awards Night.

The Dream Team

A 12-year employee at Michoud Operations, Watts is on the “Facilities Dream Team,” the Construction of Facilities group from Department 3100. He has participated in many construction and renovation projects, including construction of the Advanced Manufacturing Technology Spray Booth; a number of fan house, cooling tower and oxidizer renovations; and upgrades to the Industrial Waste Water Treatment Facility.

The safety monitor's role

“The safety monitor's job is basically to go to an area where a job is going to be performed, and scope it out prior to the actual work,” said Watts. “The monitor will look for any discrepancies or any problems with obstacles or objects that could be in the way of the work or present a safety hazard to the employees.”

Each department within Facilities and Environmental Operations has at least one safety monitor. Coast Janitorial Services, a subcontractor at Michoud Assembly Facility, is included in the program with its own safety monitor.

The monitors meet weekly with the departments they represent, and pass along safety information

and listen to issues that employees raise. Once a month all the monitors meet with their supervisors, foremen and management. At these meetings the monitors report their department's safety performance for the past month.

Coordinated efforts

“We also do a lot of work with the Production Safety Coordinators,” said Watts. “We have merged our forces, so to speak. If they have any discrepancies that they're not able to control, they come to us. And the same with us — if we have things we can't handle, we bring them to the Production Safety Coordinators.”

An ounce of prevention

The Facilities Safety Monitors have been active in correcting situations that could lead to accidents or incidents. The monitors' recent improvements include placing traffic cones and painting pavement yellow at the corner of the 301 Building (the carpentry shop) to prevent people from having wrecks and endangering personnel by cutting the corner. “The cones can be removed for tank passage,” said Watts.

The monitors have also been active in replacing missing mirrors used to turn corners, in crosswalk renovations, in road resurfacing and in the repair of sidewalks. The latter is important “to avoid slips, trips and falls,” said Watts.

MOP missions

Another way the monitors contribute to the safety of the facility is to carry out “monitor on patrol” or MOP missions, according to Watts. On these occasions a monitor will be assigned to go into a different area and look around for possible problems. “The monitor is providing an extra set of eyes for the area,” Watts said.

Providing information

“A major injury out here is with lower backs,” said Watts. “People

strain to pick up and move stuff in the wrong way. So the monitors put a lot of emphasis on providing information to our peers on the proper technique for lifting and handling material.”

What are the prospects for improving safety performance at Michoud?

“We have a good record,” said Watts. “We're not at zero yet, but we strive for that number in our statistics. There is always room for improvement. If everyone would get into the state of mind that they are going to leave from here with all the fingers and toes they arrived with, it would definitely be a highlight in everyone's life!”

COMPANY NEWS

HISPASAT's first launch on Atlas is complete success

An Atlas rocket soared eastward above the Atlantic Ocean on February 3 carrying a Spanish commercial communications satellite to orbit for Madrid-based HISPASAT, a satellite communication systems provider for Europe and the Americas.

The Atlas IIAS lifted off and completed its mission just under a half hour later with the successful separation of the three-ton satellite from the Centaur upper stage. A team consisting of International Launch Services, Lockheed Martin, HISPASAT and satellite builder Alcatel Space conducted the launch.

The successful launch deployed the third satellite for HISPASAT.

Lockheed Martin builds the Atlas and the Centaur upper stages at facilities in Denver, CO; San Diego, CA; and Harlingen, TX.



Morning Program

Michoud Operations President and General Manager Dennis Deel shared his views on the unit's current direction with a group of employees at a recent informal breakfast meeting. Deel fielded employee questions about the recent company restructuring and prospects for new business.

ISO team gears up for first Continuing Assessment

Two auditors will visit Michoud Operations on March 20-22 to determine if the organization is still ISO 9001 compliant. Michoud received its ISO certification last fall after undergoing a rigorous 5-day assessment of its quality management system (Product Delivery System).

"Simply put, being ISO 9001 registered means Michoud manages its business processes so that employees can consistently produce quality products that meet or exceed customers' expectations in terms of quality and performance," said Feltus Kennedy, senior ISO management representative.

"Being certified now gives our customers added assurances about our products," he said. "Plus, it puts us in a more competitive position for new business because our registration is recognized internationally."

Michoud will now undergo periodic Continuing Assessment audits by British Standards Institution every six months for two years.

After that, the audits become less frequent.

The March audit will focus only on Michoud and Marshall Space Flight Center.

"We're confident," Kennedy said. "Our processes and systems are in place and our people are trained



and dedicated. Now we're beginning to pick up the ISO 9001 awareness activities to remind ourselves of what it takes to be successful in the Continuing Assessment program."

X-33 engine tests push the envelope

A NASA/Boeing Rocketdyne team tested the Linear Aerospike Engine for 175 seconds at Stennis Space Center on February 16. The test met all objectives. The test program for the Single Linear Aerospike Engine is now 64 percent complete.

An earlier firing on February 3 was the first demonstration of the engine's full thrust vector control. Run at 100 percent power, the successful test marked the first demonstration of plus or minus 15 percent thrust vector control.

Lockheed Martin's X-33 vehicle will use thrust vector control to steer itself in flight. This capability avoids the weight and complexity of engine gimbaling mechanisms, supporting the push for aircraft-like operations.

The ISO team has scheduled a refresher training course for departments the auditors will most likely visit. The refresher course will be on video tape and distributed at crew and staff meetings beginning Monday, March 6. The video training is designed to hone employee skills and prepare workers for a possible interview with an auditor assigned to their work area.

The team has placed banners around the facility reminding employees of the upcoming ISO audit.

Kennedy said it's important to start checking the Product Delivery System Policy and those ISO Key Elements again: "Document What We Do" by having written work procedures, "Do What We Say" by following those work instructions and "Prove That We Do It" by keeping good records.

"Maintaining the ISO 9001 Registration is important to our customers and to our company," said Dennis Deel, president and general manager, Michoud Operations. "Being registered shows that we are committed to a higher standard of quality in everything we provide to the customer."

Lockheed Martin honored for hosting Explorers

The Southeast Louisiana Council of the Boy Scouts of America presented Exploring's 1999 William P. Spurgeon Award to Michoud Operations, Lockheed Martin Space Systems Company in recognition of its sponsorship of Explorer Engineering Post 314.

The Spurgeon Award is presented to "outstanding partners of Exploring and the Boy Scouts of America each year for their support of our teenage division in the area of career development. Their outstanding long term support of the program has helped to promote the school-to-work concept in a real way with hands-on experiences," according to presenter Dr. Gregory O'Brien, Chancellor of the University of New Orleans.

Director of Communications Marion LaNasa accepted the award on behalf of the company at the Council's 78th annual award banquet held February 7 at the Pontchartrain Center in Kenner.

NASA budget increase proposed

The Clinton administration's recently-proposed budget for fiscal year 2001 includes the first request for increased funding for NASA in seven years. The requested sum of \$14.3 billion is an increase of \$435 million over last year's figure.

The proposed amount, if approved by Congress, will fund the hiring of around 1,850 new employees at NASA centers around the country (full, part-time and term), new Space Shuttle safety upgrades, a new solar science program and the continued development of advanced space launch technologies.

NASA anticipates that funding levels will continue to increase over the next few years, allowing it to stay at the cutting edge of space science and launch technology development.



Michoud volunteer Hale Davidson describes fabrication techniques to Explorers at a University of New Orleans laboratory.

Michoud Explorer Post enters NASA National Moon Buggy competition

Each week two determined groups of students – one made up of high school students and one with college-age engineering students – meet after classes to saw, weld and drill. The goal of each team? To create the winning entry in Marshall Space Flight Center's yearly Moon Buggy Competition to be held in Huntsville, Alabama.

The students are members of Explorer Engineering Post 314. Michoud Operations is the sponsor of the post, which is within the career-oriented arm of the American scouting movement.

Michoud Operations engineers volunteer their time and expertise to guide the teams. "The contest is an example of applied science," said Hale Davidson, materials test engineer, Program Management and Technical Operations. "The students are bored silly with dry lectures ... they like fire, destruction!"

The exercise exposes students to problem-solving that is an integral part of manufacturing and industrial processes, according to Davidson.

Other volunteers helping the Explorers are Harry Nelson and Duane Jardine, Program Management and Technical Operations; Bruce Forrest, Production Operations; Deborah Brown, MIS; and Post administrator Wayne Gobert,

Product Assurance.

At the start of the contest the guides inform the teams of NASA's design requirements for the vehicle. The basic idea is that the vehicles have to fold up to fit within a small volume, just as the original moon buggies had to be carried to the moon aboard cramped space ships.

First the judges will determine if this criterion is satisfied, then each team of two riders must race their buggy over a half mile-long obstacle course simulating a moonscape. All buggies must conform to the same basic requirements, but each team still has a lot of freedom in how to attack the design problem.

"Our teams are about 50 percent complete," estimated Gordon Dyer, Michoud Operations volunteer activity coordinator. Generous merchants, including bicycle suppliers (Gulf Cycles and Worksman Cycles) and a tool supply company (Beerman Precision), donated material for the buggies. Avis Vans will donate use of vehicles to transport the buggies and contestants to Huntsville. La Quinta Inn will provide lodging for the contestants while they are in Huntsville for the race.

The completion date for the buggies is early spring, and the race will follow on April 7 and 8.

MILESTONES

Employees celebrating milestone anniversaries with Lockheed Martin in February include:

25 years

Evelyn Banks
Noel Debose
Erick Green

20 years

Michael Campbell
Glinda Caston
Stephen Early
Gilbert Etienne
Lori Hansen
Billie Hill
Daniel Holcomb
Harvey Jackson
Robert Larche
Charmaine Lemaire

Shawn Maheia
Keith McClaine
Carl Pentney
Russell Picone
Gary Priest
Harold Sears
Jerry Sims
Troy Smith

15 years

Glenwood Dobbins
Lynne LeBouef
Anthony Pagano
Dennis Puissegur
Leroy Ricard

10 years

Perry Degelos
Michael Dudley
Ngoc Nguyen

5 years

Jennifer
Takeshita
Michelle
Worden

Employees with five year anniversaries in January 2000 include:

Christopher
Bourgeois
Carolyn Brookter
Sherry Castanedo
Gerald Fabre
Roland Galatas
Steven Garner
Jerry Greenwood
Joseph Hillmer



Lift Every Voice

The Lockheed Martin Choir warms up for Michoud Operations' second annual salute to Black History Month. Michoud employees gathered on February 11 in the NASA Auditorium for a program of music, dance and oratory celebrating the theme: Making a Difference in 2000.

United Way Day of Caring

Employee volunteers are needed to work at Safe Harbor's facility in Slidell on Saturday, March 18, starting at 9 a.m. For information, call John Beicher, 7-0907.

Emergency Information

To find out the status of work at MAF, call 257-1MAF or 1-800-611-3116; check the EWS; listen to WWL-870 radio or WWL-TV; or access the MAF Site Status web site at <www.mafstatus.com>

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