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Space Systems Company – Michoud Operations

Mission Success Bulletin

May 28, 2010

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STS-132 – clean countdown & ascent for *Atlantis* and ET-136

Another extraordinary performance from ET family

When Space Shuttle *Atlantis* and ET-136 thundered off the launch pad May 14 enroute to the International Space Station, the ET camera spotted only a handful of foam debris events. And none of those were outside Lockheed Martin's base of experience, noted **Mark Bryant**, ET program manager.

The electrical, propulsion and structural systems all performed nominally while the final Thermal Protection Systems (TPS) assessment continues. Final imagery will be processed and included in a Launch + 30-day review, but the assessments to date indicate all observations are consistent with flight performance expectations.

Prior to liftoff, a small crack was found in a diagonal strut base, but TPS closeout was deemed acceptable for flight. During ascent, small foam losses were seen on the Intertank acreage, on the Liquid Oxygen feedline base closeout, and on a Liquid Hydrogen Ice Frost Ramp. Because of ET-136's performance, no additional Intertank bond adhesion tests are planned for ET-137.

Calling STS-132 "a great launch," Bryant said he had anticipated a solid tank performance. "Again, our employees have built a high-performing, safe tank. They just keep on doing it."

Atlantis ***and ET-136 clear the tower May 14.***

During the mission, the six astronauts delivered the Russian Mini Research Module-1 to provide additional storage space and a new docking port for both the *Soyuz* and *Progress* spacecraft. Other payload included a radiator, airlock, a European robotic arm and extra hardware.

Because the space station's construction is almost finished, spacewalks now concentrate on get-ahead tasks – mounting spare components outside such as six batteries, a Ku-band antenna and parts for the Canadian *Dextre* robotic arm. Better to do this now for the larger components since the shuttle only has two more trips to the station before the program ends later this year. *Atlantis* landed safely after 12 days at 7:48 a.m. May 26.

Next to fly is ET-137, already residing at KSC and scheduled to launch on STS-133, the next-to-last shuttle mission, on September 16. Solid Rocket Booster mate is set for June 15, Orbiter mate on August 9, with roll out to the pad on August 16.

Lockheed Martin has two remaining tanks to deliver to NASA: ET-138, the final flight tank, to be completed on June 29 and shipped to KSC for its late-November STS-134 mission; and ET-122, a spare to be delivered in September that will serve as a launch-on-need tank for the final flight.

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Award Fee rated as 'Excellent'

Highlighted by two "highly successful" shuttle flights in November and February, NASA has rated Lockheed Martin in the top category for the Award Fee period from October 1, 2009 through March 31, 2010.

"Due to LM meeting or exceeding all critical performance objectives of this contract, your overall rating is excellent with a numeric rating of 96%," wrote **Bill Gerstenmaier**, NASA associate administrator for Space Operations, in a letter to Lockheed Martin.

Gerstenmaier also noted "the downward trend in nonconformances, the numerous continuous improvement activities, support to the flight imagery teams, budget projection accuracy and successful efforts in transition and retirement."

STS-129/ET-133

STS-130/ET-134

Mark Bryant, ET program manager, said the Award Fee score is a "direct reflection of employees focusing on their work and performing at a high level across all of ET. I'm very pleased, and glad that our customer is too."

The evaluation begins by listing critical skills retention and employee morale as Significant Strengths. The report notes that LM assisted in enrolling 135 employees in state-funded training and education courses; organized two job fairs; and held numerous employee breakfasts, town halls, and work area briefings.

Completing ET-134 and ET-135 three days early and ET-136 on time also ranked as Significant Strengths. So did the 26 Kaizen/Structured Improvement Activities involving 145 employees that reduced cycle times in bellows heater installation, longeron TPS closeout, TPS feedline closeout, and ogive cover plate. Also noted were two blackbelt and 22 greenbelt certifications that were earned.

Among other Significant Strengths noted in the evaluation:

- Provided outstanding leadership, management, and engineering support in continuing efforts to return ET-122 to flight status
- Continued to support changing and emerging program requirements as exemplified by the response to increased Ground Umbilical Carrier Plate (GUCP) pyro bolts loads
- Completed verification and validation efforts on a LOX Ice Frost Ramp repair option in response to debris losses there
- Provided Non Destructive Evaluation data from the LOX Ice Frost Ramps to the shuttle program debris community over the past several flights
- Provided outstanding support not only to ET, but to other elements of shuttle program from Huntsville Technical Operations
- Performed excellent job mid-way through fiscal year managing within 1% of the FY 2010 budget and LM Operating Plan
- Demonstrated adherence to procedure by reducing DCMA shakedown discrepancies
- Employed Golden Egg program to emphasize criticality of maintaining inventory in condition it was received until final use
- Made significant progress in reducing number of open CAPS documents

NASA did not list any Significant Weaknesses, but did identify several Weaknesses such as Cell D, the handling incident that occurred during the lifting of the ET-138 LH2 tank, and that could have resulted in significant damage to the tank.

Another Weakness pointed to Intertank foam as a debris source. NASA noted, however, that LM's response has been thorough, rapid and innovative.

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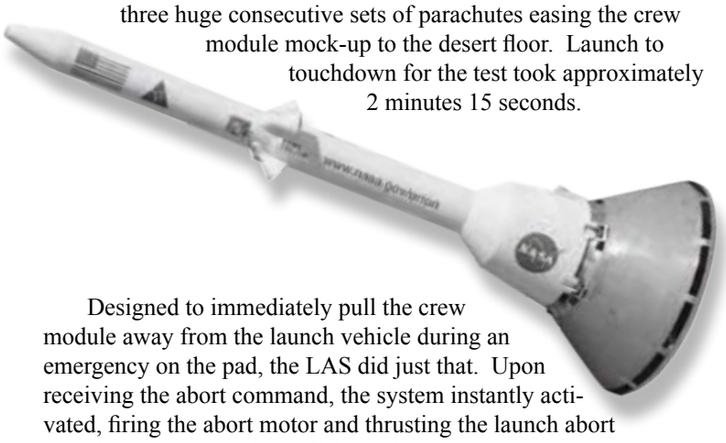
Orion's Pad Abort-1 test flight successful at White Sands

Launch Abort System tests limits of new technologies

After three and one-half years in the making, NASA and the *Orion* program carried out the first flight test of the launch abort system (LAS) with resounding success at the White Sands Missile Range in New Mexico on May 6.

About 1,100 invitees and industry team employees gathered in the windy darkness awaiting sunrise as the countdown wound to zero at 7 a.m. Fortunately, winds subsided and onlookers standing four miles away could easily see the launch, short flight and finally three huge consecutive sets of parachutes easing the crew module mock-up to the desert floor. Launch to touchdown for the test took approximately 2 minutes 15 seconds.



Designed to immediately pull the crew module away from the launch vehicle during an emergency on the pad, the LAS did just that. Upon receiving the abort command, the system instantly activated, firing the abort motor and thrusting the launch abort vehicle and crew module off the pad.

With the abort motor's 500,000 pounds of thrust, spectators watched as the 55½-ft-tall vehicle reached a speed of 445 mph in three seconds, zooming more than one mile high and a mile downrange. Nearly 700 measurements were taken real-time during the test, providing data that can only be gained through early test flights.

"It was an impressive launch," said **Cleon Lacefield**, Lockheed Martin vice president and *Orion* program manager. "This test validated the amazing performance capability of *Orion's* launch abort system. The entire industry team did an excellent job designing, building and integrating this extremely complex system."

Mark Geyer, NASA's manager of the *Orion* Project Office at JSC, said he wanted "to call out Cleon for leading this great industry team and partners. The team did such a flawless job. The system worked great."

Lockheed Martin led the team's development effort on the launch abort system, along with Aerojet, Alliant Techsystems (ATK), Honeywell and Orbital Sciences acting as key subcontractors. The team integrated technical expertise in solid rocket motors, separation mechanisms, avionics, spacecraft adapter structures, ordnance systems, electrical systems, harnesses and design integration to ensure the LAS provided escape capability for a crew.

"This new system offers the highest thrust and acceleration escape system ever tested, and is the only system of its kind in the world," said **Roger McNamara**, LM director, Launch Abort System. "Technology 'firsts' we incorporated into the LAS design included a reverse-flow, high-thrust human-rated rocket motor and the world's largest and only human-rated controllable solid rocket motor."

Previously, an abort motor system has been used twice by Russia, once during a rocket failure on the pad and the other during launch. Both times the cosmonauts walked away, showing how critical these systems can be for safe human space flight.

"Although this system is designed for crew safety, we hope it is only used during flight tests like these," Lacefield commented. "The data we collect from this launch will be vital as we continue to meet milestones and work toward completing *Orion's* Critical Design Review next year."

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Champagne is "Doing It Safely" winner

Randy Champagne of Tool Fabrication & Maintenance is the "Doing It Safely" winner for April. While walking through Building 103 near Column B7, he noticed what appeared to be the smell of something burning. Without giving it a second thought, Champagne notified an area supervisor who in turn contacted the Help Desk.

After a quick search, investigators found a belt burning in one of the Building 103 fan houses. Because of his initiative in taking action, an indication of his commitment to safety, Champagne helped prevent potentially worse damage from occurring.

Honorees see third launch of year

Standing before* Atlantis *and ET-136 are the STS-132 Launch Honorees, chosen for their outstanding performance. From left are: Jimmy Langevin, Floyd Daniels, Jim Angel, Peter Allen, Pam Anderson-Behrens, John Varriello, Leslie Jennings, Tom Melchionne, Rich Jeppesen, Charlie Arrington and Randy Seale.

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Employees see their first launch

Jed Aucoin
Mike Bankester
Betty Bennett
Cathy Brawley
Gary Burnett
Jorge Chacon
Diane Davey
Brian DeJan
Tom Dirksen
Fred Eastman
Richard Fagot
Steve Garner
Dee Geraci
William Hanrahan
Troy Harrison
Michael Hayes
Tyra Hebert
George Huber
Sybil Jolly
Dawn Karchner
Mark Knoblach
William Landwehr
Danielle Larson
Karen Laurant
Calvin Madison
Roger May
Alexander McKenzie
Zachery Melton
Sidney Merkouris
David Miles
Tony Minnick
Jimmy Monroe
Ke Nguyen
Jason Nieman
Lemual Pepper
Kim Price
Katryna Ramirez
Barry Readeau
John Smith
Lynette St. Ann
Angela Stull
Thuy Tran
Sheila Walker
Brenda Williams

As the countdown clock ticks toward Atlantis' ***liftoff, Lynette St. Ann, Calvin Madison and Jimmy Monroe prepare to watch their first shuttle launch – STS-132 – with hundreds of others on May 14 from Kennedy Space Center's Causeway viewing site.***

Lockheed Martin's Sybil Jolly, Karen Laurant, Jorge Chacon, Brian DeJan and Tony Minnick relax at Kennedy Space Center prior to the STS-132 launch. Most of the 44 employees traveling to KSC had never seen a launch. Award Fee funds have made it possible for 250 employees to see their first launch over the past year or two.

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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
14	10/14/09	ET-134 delivery
15	11/16/09	STS-129 launch/land 11/27/09
16	12/20/09	ET-135 delivery
17	2/8/10	STS-130 launch/land 2/21/10
18	2/24/10	ET-136 delivery
19	4/5/10	STS-131 launch/land 4/20/10
20	**4/30/10**	**ET-137 delivery**
21	**5/14/10**	**STS-132 launch/land 5/26/10**

Space Shuttle schedule

Mission	Launch Date	Tank	Tank Delivery Date
STS-133	September 16, 2010	ET-137	April 30, 2010
STS-134	Mid-November 2010	ET-138	June 29, 2010
		ET-122*	September 30, 2010

** Launch-on-need tank for STS-134/ET-138*

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Milestones

Employees celebrating anniversaries with Lockheed Martin in June 2010

30 Years
Mike Berger
Kenneth Hilton
Emory Hodges
James Kerr
Tim McCaffery
Cornel Peters
Cort Phillips
Pat Powell
Ken Waller

25 Years
Dave Achary
Wilbur Dudley
Bill Gilbert
Leslie Jennings
Philip Kopfinger

20 Years
Mike Campbell
Thanh Tran

10 Years
William Dickson

5 Years
Aida Elsayed
Everall Jackson
Duy Pham

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