Space Systems Company – Michoud Operations

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Mission Success

Bulletin

March 27, 2008

on-line

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Endeavour rides into night sky

STS-123 launched March 11, just 33 days after STS-122 on February 7, giving the Space Shuttle a strong one-two start in 2008. *Endeavour* lit up the early-morning sky at 2:28 a.m. EDT before disappearing into the clouds above Kennedy Space Center.

KSC Launch Director **Mike Leinbach** called it "the smoothest countdown that we've had since Return to Flight. The SRBs (Solid Rocket Boosters), the ET – they provided systems tonight that were very, very clean."

Endeavour's mission continued the build of the International Space Station by bringing two important additions: the first of a three-part Japanese human space facility called *Kibo* to expand research; and Canada's *Dextre*, a 12-foot tall robot, that when attached to the station's robotic arm can perform small jobs that would have previously required an astronaut on a spacewalk.

To help with debris analysis during the night ascent, NASA mounted a camera and flash in *Endeavour's* umbilical well that took photos as ET-126 separated from the Orbiter. ET-126 performed so well, however, that there wasn't much to see.

All systems – electrical, propulsion, structural, and Thermal Protection – performed nominally at launch and on ascent. The Post-Flight Performance Assessment identified five ET foam events around the Liquid Hydrogen Tank Ice Frost Ramps and adjacent acreage. The foam losses remained within NASA requirements and were consistent with previous flight performance. No new failure modes were reported.

The Engine Cut-Off (ECO) system also performed without a hiccup for the second straight launch.

Several days after launch, NASA concluded its post-launch assessment of *Endeavour's* Thermal Protection System or heat shield and cleared the ship for de-orbit and re-entry, scheduled at press time for the evening of Wednesday, March 26.

"It's gratifying to see our tanks perform the way they do," said ET Program Manager **Wanda Sigur**. "Our employees continue to build safe tanks that help astronauts accomplish their mission."

Next to fly is ET-128, which just arrived at Kennedy Space Center last week. Now the road gets tighter. "We must concentrate our energies on two more in-line tanks – ET-127 and ET-129 – to get them ready for the Hubble Space Telescope servicing mission now scheduled for late summer," Sigur explained. "This will be a substantial challenge to get these tanks out the door on time – much like the hurdles we faced with Return to Flight and post-Katrina. But our employees have done it before, and I know we can do it again." ■

ET-128 heads out to barge

In the early morning dawn of March 18, ET-128 rolls toward barge Pegasus ***for a ride to Kennedy Space Center where it will propel the next shuttle mission, STS-124, to orbit. The tank is unique in that it's the first in-line tank completed since Return to Flight. ET-128 also features significant safety improvements: new Liquid Oxygen Feedline titanium brackets with Thermal Protection Systems redesign, and a new design for the Liquid Hydrogen Tank Ice Frost Ramps and accompanying TPS configuration.***

Johnson melds technology, strategy and business

Dr. Ray Johnson, senior vice president and chief technology officer for Lockheed Martin Corporation, visited New Orleans in late February to brief employees on new technology trends and discover more about Michoud Operations' areas of expertise.

In a brown bag luncheon with some 70 employees, Johnson identified some questions that echo across the corporation. What are the major global security challenges facing the nation? What technologies should we develop? How can we efficiently transition technologies to products and services? How can we execute flawlessly?

Global technology trends range from omnipresent networks to a superabundance of data; ubiquitous sensing and communications to unmanned everything; microsatellite proliferation to directed energy as a reality.

Each question and each trend lend their weight to the development of Lockheed Martin's 14 Strategic Technology Threads: threads such as advanced active and passive sensing; advanced software; nanotechnology; and decision support systems, among others. The technology threads support a variety of missions that are at the very core of Lockheed Martin business.

Johnson's Corporate Engineering & Technology organization serves as both strategist and partner to identify promising technologies and helps introduce them to the Business Areas for the benefit of programs and customers. The goal is to deliver superior business outcomes through the convergence of technology, strategy, and business.

Dr. Ray Johnson

Following his presentation, Johnson toured the facility and became more familiar with the technologies and processes that separate Michoud Operations from its competitors. "It was clear that Michoud and its dedicated workforce possess some remarkable talents and capabilities in the area of large, advanced, lightweight structures. Based on these strengths and efforts to expand into adjacent markets, the business should be in a good position and ready for new challenges following the end of the External Tank Program," Johnson said.

As part of his visit, Johnson pledged to make the assets of his organization available to assist Michoud Operations' transition from the ET project, through technology interchanges that will expose other Lockheed Martin companies to the unique expertise that resides in New Orleans. It is one additional way that the thread of Michoud's manufacturing capabilities can become part of the fabric of Lockheed Martin's future success. ■

New gun room to increase capabilities

Construction nears completion on the next advance for ET production, the new Thermal Protection Systems Gun and Proportioner Facility in Building 103.

The facility features separate areas for spray gun disassembly, gun cleaning, inspection, rebuilding, calibration, and testing – all situated around a centralized parts crib. Rooms will be environmentally independent from the factory with their own climate control, hazardous waste drop-offs, and ventilation system. Isolation from Bldg 103 will minimize outside contamination and shield sensitive calibration equipment from changes in outside airflow.

Work on the $2.9 million facility began in January 2007. "The new area more than doubles the space currently available, expanding from 2,400 square feet to over 5,400 square feet – with an additional 1,085 square feet on the second floor," according to **Keith Campo**, project manager.

"We'll have our own space and workbench," says **Gary Ford**, TPS equipment repairman. "Right now, everyone's sharing space, working on tool chests or any available area."

A second-floor conference room will be used to train new employees and schedule area meetings. Adjacent to the conference area is an employee locker room and break area.

"The new area more than doubles the space currently available..."

Keith Campo, project manager

The new spray gun room layout satisfies space requirements for Portable New Delivery System (PNDS) machines. Storage bays will allow the machines to be efficiently located, and a separate area triples the current capability for PNDS maintenance and inspection.

"At times, we had to run an extension cord into the shop and work on machines outside the area because there wasn't enough room," says **Jeff Beale**, TPS equipment repairman. "That won't happen with the new space. We'll have our own area to build hoses."

Until now, building a PNDS hose involved snaking all 160 feet of material in an area with frequent foot traffic. The facility has an area running the building's length and away from walkways. Hoses will be built on racks at waist level instead of on the floor, reducing physical strain and the introduction of contamination.

Keeping things clean is one reason for the new facility and **Keith Philip**, a TPS equipment repairman, welcomes the change. "Right now, clean gun assembly and dirty gun disassembly are being done in the same area because there isn't enough room. More room allows us to keep it all separate and doubles our testing capabilities." ■

Spray center benefits ET production and future programs

This month the Thermal Protection System Mock-up Refurbishment & Spray Center will open its doors in the southwest corner of Building 103, providing a new space for BX spray proficiencies and dissection operations.

Planning for the new area began in the summer of 2005.

"We originally envisioned these booths to be a proficiency center for individuals to develop and demonstrate their skills using full-scale mock-ups that were fabricated during Return to Flight (RTF)," said **Tom Conrad**, task lead. The new design had to satisfy TPS certification and proficiency requirements generated from RTF initiatives, as well as incorporate improvements in lighting, breathing air and environmental control. A group of supervisors, support personnel, NASA engineers and consultants reviewed and approved the initial area design.

Under Project Engineer **Keith Campo** and Construction Engineer **Jeremy Luke**, general contractor Lou-Con, Inc. began the first of the three construction phases in October 2006. First, tooling personnel had to be relocated, followed by a modification of the weld lab material storage area that occupied the site prior to construction. Next, site preparation began, including the installation of a new substation, stand-alone air-cooled chillers, and a dedicated breathing air skid system. Finally, in June 2007 construction of the center began, which included three additional areas for proportioners, dissection and process evaluations.

George Johnson puts the finishing touches on an area above the proportioner room in the TPS Refurbishment and Spray Center.

By moving spray proficiencies and development out of critical production areas, personnel can continue to focus on meeting delivery deadlines with less interruption. Both spray booths provide adequate space to house full-scale mock-ups and environmental controls to maintain temperature and humidity conditions required for manual spray operations. The dissection booth features a filtration system that minimizes air particulates during dissection and mock-up refurbishments.

"Since these spray booths were designed to a higher classification standard, these booths will allow Michoud to be positioned for whatever future programs might arise once the shuttle program has run its course," said Luke. "I want to thank everyone involved in the planning, design, project management and construction of this large, complex and demanding project. We achieved what we set out to accomplish." ■

Sattler outlines plans for more agile SSC Engineering organization

On a road trip to Space Systems sites, **Julie Sattler**, Engineering vice president for Space Systems, recently visited Michoud to describe how engineers will be assigned to discipline-based Engineering teams and deployed to programs.

In the past, she says Space Systems had a stable business base with Titan, Atlas, External Tank, special programs, and military programs anchored with a backlog.

"But now as programs mature and new acquisitions occur, we need to be able to move our talent around to meet operational needs," she explains. "We need to be a lot more agile, and that was hard with all our resources stovepiped."

Design errors have been a nagging issue with programs and customers, and Space Systems needs to focus on execution, ensuring complete and robust engineering up front. The new organization construct is structured, staffed and focused on validating our engineering, flowing best practices, and assisting program execution.

Julie Sattler

To increase Operational Excellence, Sattler firmly believes that Space Systems must eliminate the stovepipes and encourage horizontal integration across product lines, programs and sites. She wants to integrate people, processes, training, tools and technical validation, and says the new functional Engineering organization will align 8,500 engineers to support missiles, satellites, instruments and customer activities.

Employees might wonder who will be responsible for performance appraisals, merit increases and the like. The answer is the management that employees are most familiar with and assigned to in the lines of business/programs.

Program Management & Technical Operations Vice President **Randy Tassin** is a believer in the new concept of operations. "We've looked at it. We're totally on board. We think the impact on people here will be measured, but where we can horizontally help another Space Systems team on a project, we certainly want to share our expertise and also be open to incoming knowledge."

"...once we harness all our resources, we are going to be a lot more efficient."

Julie Sattler
SSC Engineering VP

The new organization will make others take notice. "Our competitors still trying to assimilate into one company are a little concerned about our efforts," she explains. "They realize that once we harness all our resources, we are going to be a lot more efficient."

Sattler says customers come to Lockheed Martin "because we solve their most challenging needs. We take very complex systems and integrate them." She admits though the journey of late for some customers has not been as planned – if Lockheed Martin slips a schedule, it can mean financial ramifications for the customer.

Operational Excellence, she believes, means delivering to customers every step of the way and being as attentive to their satisfaction as to mission objectives. "We can't afford to let them down."

She plans to have a new organizational structure firmly in place by the end of March. "I am looking to get out of restructuring and into execution." ■

McMain High students John Mitchell (left) and Gerrell West discuss electronic circuitry in their robot with Lockheed Martin's Linda Leavitt-Bell.

Engineers head to the classroom

"We must inspire today's young people to believe that if they become our future engineers, they can engineer our future," says Lockheed Martin Chairman, President & CEO **Bob Stevens.**

As part of Lockheed Martin's "Engineers in the Classroom" educational initiative, Michoud engineers gave presentations to 250 students at five New Orleans-area schools during National Engineer's Week in February. The program includes multi-disciplinary engineering information and lesson plans to encourage students to pursue engineering careers.

Gilbert Bennett, **Victor Brown**, **Anthony Scieneaux**, **Sheila Walker**, **Graf Weller** and **Leonard Wiggins** spoke at McMain High, McDonogh 35 High, O. Perry Walker High, Salmen High, and Lusher Middle School.

Marion LaNasa presented an overview of Lockheed Martin's role in space exploration to 60 students from McMain and Holy Cross high schools at UNO's Engineering Olympics. McMain recently instituted an engineering-based class for exceptional students.

"Engineers in the Classroom" gets engineers out of the office and into the classroom to serve as role models for students. To make a difference in a student's life, call **Linda Leavitt-Bell** at 7-0592 or Gilbert Bennett at 7-1921. ■

New TPP application facility open in Huntsville

Products help save lives in Iraq

Lockheed Martin recently began applying thermal protection coatings at the Simulation, Training, and Support facility in Huntsville, Ala. to service the needs of Michoud customers.

Thermal Protection Products (TPP), developed at Michoud, are highly-filled elastomeric-based coatings designed to withstand extreme heat for extended periods of time.

Lockheed Martin technicians blend and package the TPP at Michoud and then ship them to commercial and military customers worldwide. Customers use the products mainly as a fire barrier in aircraft engine nacelles/thrust reversers as well as for aero-thermal insulation on various launch vehicles.

The U.S. Army approved the products for use on modifications to the AH64 Apache helicopter engine cowlings. "The Army was pursuing modifications to the Apache to improve its lethality and survivability," reports **Keith Baty**, TPP program manager.

"This engine cowling modification redirects the hot exhaust plume up into the rotor wash to disperse heat. The cowlings are manufactured of a composite material and require TPS to protect them from thermal degradation."

Baty says during initial prototype validation and testing, it was determined that the TPS thermal blankets used in the original design were unacceptable due to extensive damage from sand and water debris during flight under adverse conditions.

"So Lockheed Martin stepped in and provided a solution by using our MI-15 ablators and topcoat to insulate the cowlings, which have performed flawlessly."

The corporation has received positive feedback from the Army, according to Baty. "Being an integral part of the AH64 Apache mod kit, our products play a role in saving lives. We hear stories of pilots being shot at and surviving because of our product quality. It really gives you a sense of pride and accomplishment."

Above: Lockheed Martin technician James Chandler applies Michoud-developed Thermal Protection Products to an engine cowling in Huntsville. Left: Packaged TPP ready for shipment to customers worldwide

The Huntsville TPP application facility opened in September 2007 and contains three climate-controlled booths where products are applied.

"In the first spray booth, a set of cowlings is masked and primed in preparation for the spray-on Thermal Protection Product," explains **Brian Braswell**, process engineer, in outlining the production workflow. "The cowlings are then moved into the cure booth. Once dry, the surface is trimmed and prepped for the topcoat, which is applied in the third booth. After thorough inspection, the cowlings are shipped back to the Army for installation on helicopters."

Baty believes customer service, technical support and quality products delivered to customer requirements are what builds customer satisfaction and drives program success. At Michoud, the TPP Program utilizes all functional resources during daily operations to formulate, package and ship products, all on a non-interference basis with ET. ■

Lockheed Martin – 35th Anniversary in New Orleans
Saturday, June 21, 2008

Engineers guide student teams in building robots

More than 300 students, coaches, and mentors from Louisiana, Mississippi and Florida will participate in this year's FIRST (For Inspiration and Recognition of Science and Technology) Robotics Bayou Regional Competition on March 29 at the Morial Convention Center.

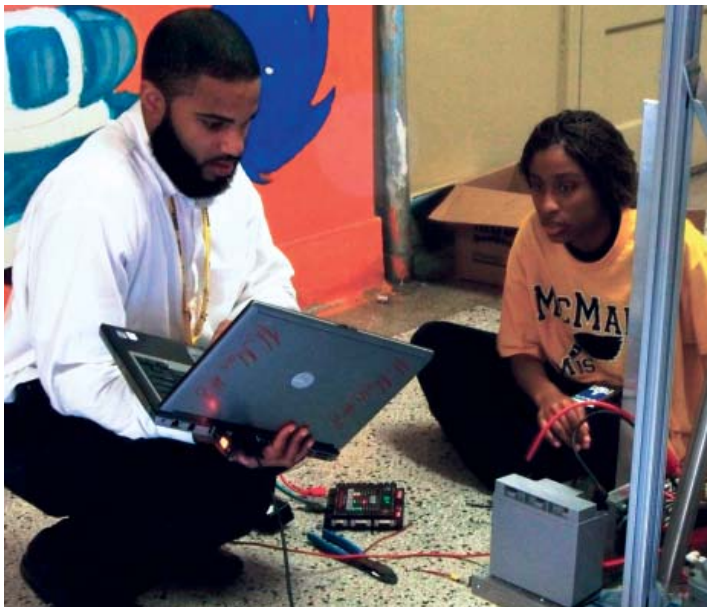
Aided by 20 Lockheed Martin employee-mentors, students from New Orleans area schools will compete against regional teams to determine who can build the best robot. In the competition, student-built robots will knock down 40-inch inflated balls, move the balls around a track and pass them over or under a 6½-foot overpass.

In mid-February, teams shipped their completed robots after spending six weeks constructing them after hours and on weekends with mentors. Lockheed Martin engineer Curtis Craig serves as lead mentor coordinator for FIRST Robotics.

The McMain High Hurricanes have affectionately dubbed their robot, "Pink Panther." While the robot doesn't resemble the pink sleuth, students believe their "bot" is cool. "We built ours for speed, much like a NASCAR vehicle," explains senior **Gerell West**. Working under the guidance of Lockheed Martin mentors **Gilbert Bennett** and **Raynard Bender**, Gerell and his classmates assembled and shipped their robot in record time.

"The kids are amazing; they've learned so much," says **Keith Joiner**, mentor to Slidell High's "Tyborgs" team. Joiner spent weeks with a Robotics team off-site in his garage giving kids the hands-on experience with shop tools and welding to assemble their robots and obtain a real-world assembly experience in the process.

"I actually learned how electricity works," smiles senior **Rebekah Locke**. "We did some calculus to figure out how to put components together. I welded parts, and it's been a pretty hectic time since we worked round-the-clock over Mardi Gras holidays to put our robot together to meet our shipping date."



Lockheed Martin engineer Gilbert Bennett works with Janay Barconey of McMain's FIRST Robotics team in assembling the main structure of the team's "Pink Panther" robot during the six-week build period.

Lockheed Martin also contributed grants to a number of schools to help defray robotic kit costs.

FIRST Robotics is looking for volunteers to participate in the March 29th Bayou Regional. For more information contact **Rogers Whitlock** at 7-0965 or visit http://www.bayouregional.org to track Lockheed Martin teams. ■

FIRST®

Lockheed Martin FIRST Robotics mentors:

Edna Karr High – Curtis Craig
Fontainebleau High – Scot Marshall and Nathan Loper
McMain High – Gilbert Bennett and Raynard Bender
New Orleans Math & Science High – Victor Brown
Northshore High – Glynn Adams, Riki Takeshita and Harold Barrios
Salmen High – Glen Gilmore
Sarah T. Reed High – Travis Smith and Paul Irland
Slidell High – Darren Kearney and Keith Joiner
St. Augustine High – James Batiste, Estelle Oertling and Jeremiah Oertling
Regional Competition – Dan Galasso, Babette Staunten and Norm Elfer

Relay for Life participants wanted

RELAY FOR LIFE
American Cancer Society

Employees are invited to a Relay for Life team planning meeting at 11 a.m. Thursday, April 3 in the Building 350-2 MIC Room, Column P-6.

Each year, this American Cancer Society event honors cancer survivors, pays tribute to the lives lost to the disease, and raises money to help fight it – all right here in your community. This year's Relay for Life is scheduled for May 31 in New Orleans. For more information, please contact **Marion LaNasa** at 7-1307.

Employee uses Heimlich maneuver to save co-worker

Harry Nelson was eating lunch and talking with co-workers in Building 102 Cafeteria on February 29 when a piece of shrimp lodged in his windpipe. At first, he tried to cough it out, but with no air in his lungs he couldn't expel the food.

Sitting across from him, **Rebecca Gibson** noticed something was wrong. "I asked Harry, 'Are you choking?'" He nodded. "Really?" she asked as Nelson's face changed color.

Co-worker **Jason Erickson** began slapping Nelson on his back but nothing happened. Gibson could hear Nelson trying to breathe.

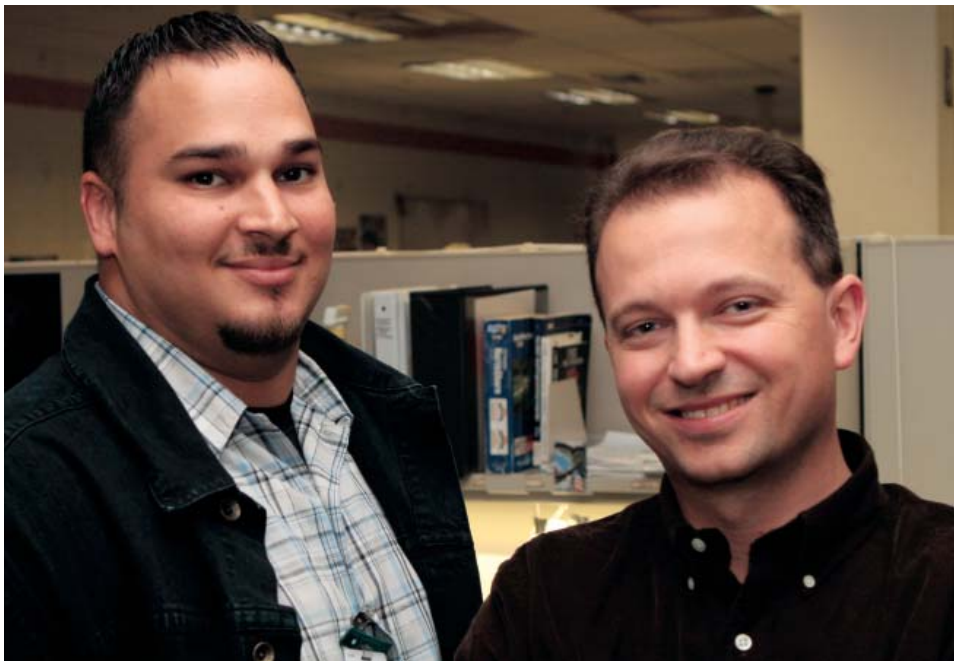
Nelson pushed his chair back and stood up. Erickson clasped his arms around him to try the Heimlich maneuver. Three thrusts. Nothing.

Gibson felt helpless, "I didn't know how to do it. Harry's eyes were trying to tell me something. Do I call 9-1-1?"

At that point, **Jose Bueiz** who was sitting with the group jumped up and grabbed Nelson around the stomach with his arms, making a fist with one hand. A burly design engineer, Bueiz lifted Nelson like a matchstick off the floor, giving him a quick upward thrust.

"At first I thought he was joking," Bueiz said. "But when he stood up, I realized he was serious."

Bueiz's first attempt didn't work. Again, he thrust upward imitating the Heimlich maneuver. This time the food dislodged only to have Nelson suck it right back down when he gasped for air. Nelson signaled Bueiz with his index finger -- one more time. This time the piece of shrimp popped out.



Harry Nelson, right, poses with his buddy for life, Jose Bueiz.

Bueiz said he had seen the Heimlich maneuver performed once in a class. To Nelson's credit, he never panicked.

"I can hold my breath a long time; I played the trumpet for 18 years. Because I'm an engineer, I had a plan. If nothing worked, I was going to throw myself on a chair."

Gibson said the event must have lasted longer than a minute and expressed her disappointment that no one from any other table offered to help during the emergency.

Afterward, Nelson felt like he had been punched in the stomach, his face sore from straining facial muscles and capillaries.

"The moral of the story is to eat with a big guy," he laughed. Then more seriously, "People don't realize how much effort it takes to administer the Heimlich. It's not just a little squeeze."

For more information on the Heimlich maneuver, see the safety posters around the facility or go on-line. ■

When someone is choking,
- Stand behind person & wrap hands around waist
- Place one fist just above person's navel with your thumb against abdomen
- Cover fist with other hand and thrust up hard
- Repeat until object is forced out of person's throat

Performing Heimlich on yourself
- Place a fist above your navel
- Grab fist with other hand and bend over a hard surface
- Shove your fist inward and upward

Performing Heimlich on someone unconscious
- Lay person on back
- Kneel & apply pressure to abdomen
- With each thrust, attempt to clear airway of object by forcing air out of windpipe

Honorees tour KSC before seeing beautiful night launch

When* Endeavour *lifted off at 2:28 a.m. March 11, Michoud's STS-123 Launch Honorees watched the gleaming spectacle from a VIP viewing area only three miles away. Honorees front row from left: Jim Louis, Arthur Boudreaux, Deadra Rayford, Pam Gremillion, Marty Hrovat, Tom Kilroy, Joe Major and J.D. Riley. Back row: John Ellis, Steve LaBrecque (Ecliptic Enterprises), Charles Holding, Tom Price, Bill Olson and Ken Ezell (Huntsville Technical Operations).

***Attention Retirees**

If you wish to still continue receiving the *Mission Success Bulletin*, please contact Lorri Manning at 504-257-1134 to confirm your address.

Milestones

Employees celebrating anniversaries with Lockheed Martin in April 2008

40 Years
Karen Weldon

30 Years
Twyla Torregano

25 Years
Randy Pretlove
Ronnie Rome
Stuart Stine
Doug Vitrano
Glen Wheeler

20 Years
Corey Arndt
Case Biezenbos
Monique Dupaquier
Don Romero
Warren Wilson

10 Years
Robert Benson
Roger Brown
Corey Dillard
Kevin Kolb
Mark Peno
Irvin Stein
Benjamin Talton
Harry Wadsworth

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