

# AEROSPACE NOW

Vol. 3, No. 6

June 2011

*Aerospace Engineering Reinvented*

Best of Both Worlds **10**

Aerospace Legend on the Move **8**

Critical Component for NATO **7**

**NORTHROP GRUMMAN**

# AEROSPACE NOW

June 2011

## Northrop Grumman Aerospace Systems

Vol. 3, No. 6

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HONORING THE PAST CELEBRATING THE PRESENT ADVANCING THE FUTURE

# 100 YEARS OF NAVAL AVIATION

**NORTHROP GRUMMAN**

# Gary's SPACE



Gary Ervin, Corporate Vice President and President, Northrop Grumman Aerospace Systems

## Built to Last

Look up the word "engineering" in the Merriam-Webster dictionary, and the definition seems straightforward: *the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people.* But the devil is, as they say, in the details.

With significant budgets and time, engineers are capable of designing and building any number of powerful, and in some cases, exquisite solutions. But not having cost or schedule constraints can also be an impediment to progress by not creating a sense of urgency. During the past decade following the attacks of 9/11, there were significant federal dollars available to address the challenges that faced our nation but today our nation faces another challenge.

Projected large government deficits for the coming decade dictate much stricter adherence to budget and schedule discipline. *Useful* is not just about providing a capability that meets customers' technical requirements. It also means delivering *affordable* solutions. And these solutions still must be physics-based, technically proficient and absolutely dependable. There's the challenge. In the words of Dr. Ashton Carter, undersecretary of Defense for Acquisition, Technology and Logistics, it means "doing more without more."

Engineers are on the front lines of this change. Programs that do not meet cost and schedule requirements may face increased public criticism, reduced procurement orders and possibly outright cancellation. Such uncertainty impacts national security and the business bottom line. Aerospace Systems is currently in the process of transforming our engineering organization to reflect this reality. The endeavor will have major implications for our people and programs. And while change can be difficult, we are committed to preserving the outstanding expertise of our engineers while incorporating improvements that will set us up for future success.

In this issue we survey how engineering touches upon people and programs. We feature a question-and-answer with Gene Fraser, sector vice president, Aerospace Engineering, who outlines the processes and priorities driving this change. We examine the Modular Space Vehicle Bus, a multi-mission spacecraft with an open systems architecture that will allow for faster, more affordable solutions suited to a range of customers. It's a reminder that innovation doesn't have to mean expensive.

And we celebrate 50 years of service by the T-38 Talon trainer aircraft. The T-38 has stood the test of time with approximately half the aircraft still in service thanks to upgrades. That venerable aircraft may be a good model for our engineering organization: built to last and made more capable through modernization.

# news briefs

## **X-47B UCAS-D Flight Test Team Honored by U.S. Air Force**

The U.S. Navy/Northrop Grumman/Air Force flight test team that successfully completed first flight of the Navy's X-47B Unmanned Combat Air System Demonstration (UCAS-D) aircraft earlier this year has been recognized for operational excellence at two levels by the Air Force Flight Test Center, Edwards Air Force Base, Calif. On April 18, the team was recognized by the 412<sup>th</sup> Operations Group as the Flight Test Team of the Quarter for its many notable achievements leading up to and including the X-47B UCAS first flight on Feb. 4 and two additional test flights in early March. On April 21, the 412<sup>th</sup> Test Wing also selected the UCAS-D flight test team as the Team of the Quarter. "This high-performing team works every day among the best flight testers in the world, so it's an honor to have our performance and professionalism recognized in this community," said Tom Soard, Northrop Grumman's X-47B Flight Test Integrated Product Team lead.

## **B-2 Spirit Bomber Division Receives 2010 Dr. James G. Roche Award**

The B-2 Spirit Bomber Division was awarded the 2010 Dr. James G. Roche Sustainment Excellence Award at a ceremony held at the Pentagon on April 11. Col. Mark Williams, chief of the B-2 Division at Wright-Patterson Air Force Base in Ohio, accepted the award on behalf of the team. The award demonstrates the most improved performance in aircraft maintenance and logistics readiness. Other notable attendees present included former Secretary of the Air Force Dr. James G. Roche; current Secretary of the Air Force Michael B. Donley; and Air Force Chief of Staff Gen. Norton Schwartz. In 2004, the Air Force chief of staff approved the award to promote maintenance excellence. This is the third time the B-2 Spirit team has been recognized with this honor.

## **Foundation's Earthwatch Educator Program Announces 2011 Scholarship Recipients**

The Northrop Grumman Foundation has announced the scholarship recipients of its Earthwatch Educator Program, an innovative environmental education program for teachers across the country. Eighteen educators from 10 states have been selected to participate in an Earthwatch expedition focused on climate

change or oceans preservation. The teachers will transfer their experiences to their classrooms and share them with students, year after year. "Helping to provide teachers real-world experience is one of the ways that we can spark student interest in science, technology, engineering and mathematics careers," said Sandra Evers-Manly, president of the Northrop Grumman Foundation. The Northrop Grumman Foundation partnered with Earthwatch Institute to develop two expeditions that will provide educators with a hands-on, immersive professional development opportunity. The teachers then share their experience with their students, yielding a positive impact on the students' understanding of math and science, and helping to inspire the next generation of environmental ambassadors.

## **Astro Aerospace Delivers Deployable Reflector to Astrium for Alphasat I-XL Spacecraft**



Astro Aerospace, a Northrop Grumman strategic business unit, has delivered its fourth deployable AstroMesh reflector to Astrium in Toulouse, France, this one for the Alphasat I-XL spacecraft that will provide commercial, broadband telecommunications services to Europe, the Middle East, Africa and parts of Asia. The 11-meter reflector is the latest in a line of successful AstroMesh deployable, large-aperture reflectors developed and built by Astro Aerospace. The company has supplied three 9-meter deployable reflectors to Astrium for the Inmarsat-4 satellites since 2004. "We are proud to once again participate as a key member of an Inmarsat/Astrium industry team," said Chris Yamada, general manager of strategic business units at Aerospace Systems. "Our AstroMesh reflector systems are employed by premium telecommunication service providers and satellite prime contractors who value mission performance and reliability." Built by Astrium as prime contractor and scheduled for delivery in 2012, Alphasat I-XL will carry both a commercial payload for Inmarsat and technology demonstration payloads for the European Space Agency.



## **Employee Survey Continues through June 15**

*Have You Completed Your Survey?*

### **SUSAN WETZEL**

Aerospace Systems employees are currently participating in the Gallup Q12 survey through June 15. This initiative is part of the ongoing efforts throughout Northrop Grumman to continue our drive for top performance.

Research indicates that employee engagement is a factor that not only improves performance but also is a strategic foundation for the way great companies do business. To measure and improve the level of engagement within Aerospace Systems, we have partnered with Gallup, a global leader in research-based consulting, to offer the Q12 to all active, part-time and full-time employees who have been employed since April of this year.

All eligible employees have been provided an invitation to complete the confidential survey from Gallup. Once the surveys are complete, managers will meet with their teams to review the feedback and create action plans with specific steps to increase engagement.

*Don't forget to take your survey today!*

# MSV

## Moving Forward



### LARRY WHITLEY

Under the Advanced Programs and Technology (AP&T) division, its Advanced Concepts - Space and Directed Energy Systems group is moving forward in support of the Modular Space Vehicles (MSV) program, having recently completed the engineering systems requirements review (SRR). The SRR event signifies that program maturity is on track to proceed with the vehicle's preliminary design.

In 2010, Aerospace Systems was selected by NASA as one of five contractors for the program. NASA's Ames Research Center, the contracting agent for the Department of Defense's Operationally Responsive Space

(ORS) program, announced the award of the indefinite delivery, indefinite quantity, cost-plus fixed-fee multi-award contract, with a five-year period of performance.

Per the contract, work will be performed under initial task orders valued at \$46 million in support of the ORS office located at Kirtland Air Force Base in New Mexico.

"As part of that contract, we have a task order to build a multi-mission spacecraft bus for which we will employ a modular open system approach using network architecture — also known as plug-and-play technology — that enables rapid integration and test," said Phil Katz, MSV Electrical Engineering

lead. "This approach and technology provides innovative, affordable and expedient solutions to the U.S. combatant commanders and opens new markets to additional customers."

Some of the lessons and applications learned from the successful Lunar CRater Observation and Sensing Satellite program are part of how MSV is being managed, according to Rick Hayner, MSV program manager, who notes that "the next critical milestone for the program is the preliminary design review confirming that the design approach satisfies the functional baseline."

## Technology Development Leads the Way in Fostering Collaboration, Sharing Ideas



Photo by Tracy Breshers

eight spacecraft subsystems, demonstrated deployables from Astro Aerospace — an Aerospace Systems strategic business unit — and showcased a unique Aerospace Research Lab anti-contamination project.

"The turnout exceeded our expectations since we didn't broadly advertise the event, and, quite frankly, we thought that the technologies we were showcasing were not necessarily of interest to a wide range of employees," said Ted Nye, director of Spacecraft Technology at Aerospace Systems. "We were surprised by the interest and enthusiasm. The event, low budget as it was, indicates that there are potential opportunities to further technology development and collaboration within the company. This event allowed many key satellite engineers to actively engage with some of TD's technology leads and vice versa."

The attendees displayed interest in TD's initiatives and posed many questions to principal investigators, who left the forum with follow-up actions and requests.

Based on the success of this forum, Nye hopes there are future opportunities to host and attend more internal technology awareness events so employees can educate one another on advanced technologies, foster collaboration and share ideas.

With just hardware and posters, the Advanced Programs and Technology division Technology Development (TD) group hosted a mini-forum for employees on spacecraft independent research and development and contract research and development advanced technology at the Aerospace Presentation Center in Redondo Beach, Calif., earlier this year. Despite the event's small budget and short planning period, the forum attracted 300 Aerospace Systems engineers.

TD displayed technologies that reduce weight and realize cost savings on

# NATO AGS Program

## Inches Closer to Contract Award

### GEMMA LOOCHKARTT

After several years of setbacks and triumphs, Northrop Grumman submitted its proposal update in March for the NATO Alliance Ground Surveillance (AGS) core capability.

"NATO AGS is a trans-Atlantic cooperation that will not only meet the security challenges of the 21<sup>st</sup> century but also will provide NATO with a transformational capability," said Bob Zeiser, NATO AGS Business Development director for Aerospace Systems. "Recent world events highlight the fact that NATO needs this capability now more than ever, and we're working very closely with NATO and the participating nations to reach contract award later this year."

Based on the Block 40 Global Hawk unmanned aircraft, the NATO AGS system will provide persistent intelligence, surveillance and reconnaissance to ground, maritime and air commanders, anytime and anywhere in the world.

According to Zeiser, NATO AGS represents the first international sale of the Block 40 Global Hawk. "It is NATO's highest acquisition priority and Europe's highest visibility program," he added.

The NATO AGS includes an air segment consisting of six Block 40 Global Hawks that will be missionized to meet NATO requirements. They will be equipped with Northrop Grumman's Multi-Platform Radar Technology Insertion Program ground surveillance radar sensor, which will be capable of detecting and tracking moving objects throughout the observed areas, as well as providing radar imagery of target locations and stationary objects.

The ground element, which provides real-time data, intelligence and target identification to commanders within and beyond line of sight, will be wholly produced by European industry partners. This will offer the potential for national reuse in other programs and direct work in the program

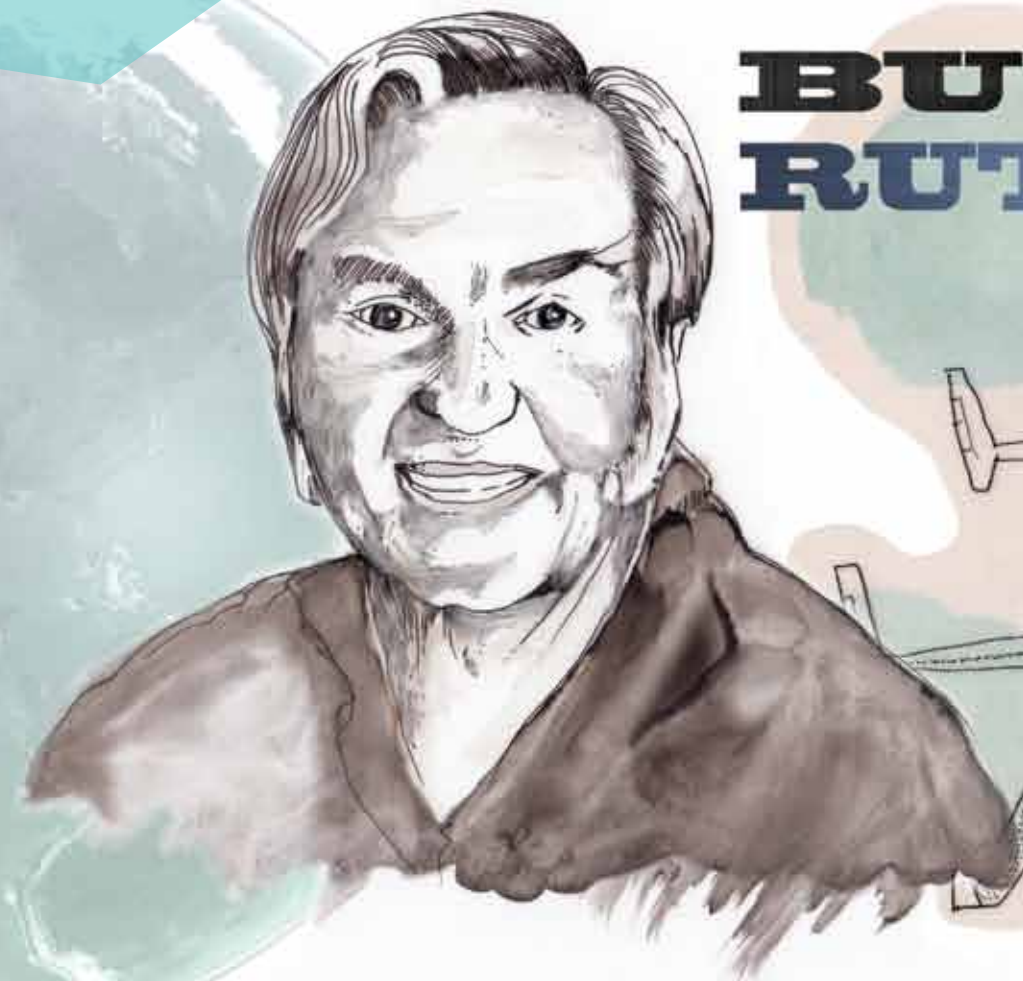
for the participating nations. It also includes mobile and transportable ground stations and a world-class mission operation support center at its main operating base in Sigonella, Italy.

"This proposal update offers an affordable, executable program that will provide an operationally relevant system to the alliance," said Pat McMahon, sector vice president of Battle Management and Engagement Systems. "NATO AGS will be a critical component of the alliance's response to threats to peace now and in the future."

Flying up to 60,000 feet for more than 32 hours, the combat-proven Global Hawk has flown nearly 55,000 hours to date. In addition to supporting operations in Iraq and Afghanistan, U.S. Air Force Global Hawks also are supporting the NATO-led coalition effort over Libya and have flown relief support missions over Japan in response to the tragic 9.0-magnitude earthquake and resulting tsunami.

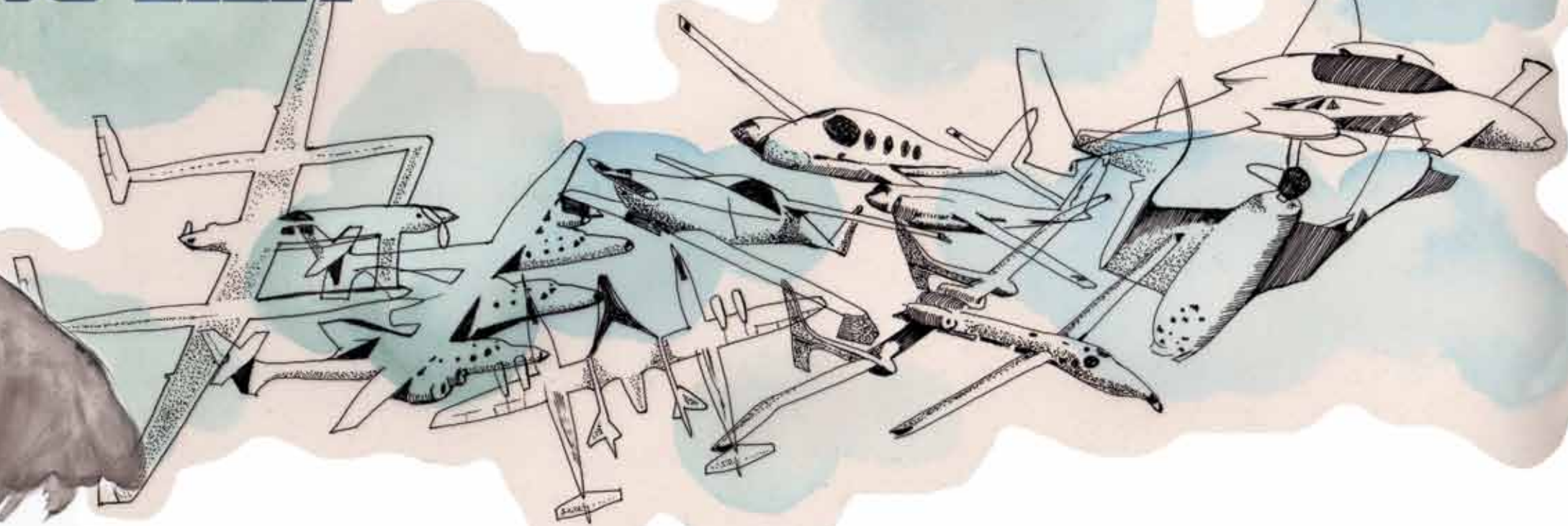
Approved by heads of state and government as a priority capability initiative at the 2010 Lisbon Summit in support of NATO's New Strategic Concept, the NATO Alliance Ground Surveillance system will empower a network-enabled approach to support interoperability with national systems and to perform the entire range of NATO missions, including force protection, border and maritime security, counter-terrorism, crisis management, peacekeeping and enforcement, and natural disaster relief.





# BURT RUTAN

## VISIONARY aircraft designer retires



### WARREN COMER

Under normal circumstances, aviation design engineers would be pleased to see just one of their creations built and flown in a lifetime — but there's nothing normal about Burt Rutan, because he's done it every year for the past 45 years.

The iconic aircraft designer is best known for building Voyager (piloted by Burt's brother Dick Rutan and Jeana Yeager) and GlobalFlyer (piloted by Steve Fossett), the first planes to fly around the world on a single tank of gas without landing, and SpaceShipOne, the first privately funded human spaceship.

But now Rutan has taken another leap into unknown territory that's completely different from a demanding job with long hours: retirement.

"I came up with a theory that leading up to retirement, people think they have 40 hours a week available to fill up with new stuff. They then find themselves doing a bunch of stuff they wouldn't do while they were working," Rutan said. "My solution to this universal

dilemma is not to make any arrangements."

Coming from a man who has achieved so much in his lifetime, most would agree that Rutan has earned the right to enjoy himself. His company — Scaled Composites — was founded in 1982 and acquired by Northrop Grumman in 2007. As a stand-alone company reporting into Advanced Programs and Technology (AP&T) division for Aerospace Systems, Scaled Composites will remain his living legacy, turning out some of the best aircraft designs the world has ever seen.

Beginning his career in 1965 as a flight test engineer at Edwards Air Force Base, Calif., Rutan worked on various aircraft including the C-130 Hercules and F-4 Phantom. "I had the best job in the world, even though it didn't pay much!" Rutan said.

After a short stint as the flight test director for Bede Aircraft in Kansas, Rutan in 1975 founded the precursor to Scaled Composites, called the Rutan Aircraft Factory. His father provided start-up funding in the form of a

\$15,000 loan, which was enough money to have a facility at the small airfield in Mojave, Calif. While there, Rutan pursued his passion in aircraft design and created the popular VariEze, a homebuilt aircraft that was stall-resistant.

"I needed to make a change in 1975 because the action was still good with airplanes," Rutan said. "I liked what I was doing as a hobby in my garage and became enthralled in entrepreneurial things."

Five aircraft that Rutan designed are on display at the Smithsonian National Air and Space Museum in Washington, D.C. Scaled Composites is also developing SpaceShipTwo, a prototype for Sir Richard Branson's company, Virgin Galactic, paving the way as the world's first commercial space transportation system.

"The most significant thing we'll have accomplished will have little to do with technical accomplishments," Rutan said. "Within 12 years after we start commercial

ops, I expect we'll have flown 100,000 people to space. That compared to everything we've done in the past — manned or unmanned — is huge for space because none of it has high volume."

Rutan explained that gaining efficiencies like those available in everyday mass transportation will make it affordable enough to go to space, thus creating a viable commercial space industry.


"Burt Rutan has inspired the world's aircraft designers and engineers to move beyond conventional thinking by embracing some risk in order to push the limits of new designs," said Paul Meyer, sector vice president and general manager for AP&T. "We've learned a great deal from him and look forward to seeing new and impressive aircraft turned out by Scaled [Composites] in the years to come. We wish him and his wife well." 



Photo by Northrop Grumman Corp.



Drive: The Surprising Truth about  
What Motivates Us

## Aerospace Engineering PREPARING TO STAND TALL

# Q&A

with Gene Fraser

### CHRIS BOYD

**T**ransforming and standing up an organization of more than 12,000 employees is a challenge that would tax even the most experienced and capable of managers. But that is exactly what Gene Fraser, sector vice president of Aerospace Engineering (AE), is focused on accomplishing this year as he and a team of colleagues begin the standup of AE. *Aerospace Now* sat down with Fraser to discuss how this change will be achieved and what it means to the sector's ultimate goal of bottom-line performance with top-line growth.

**AN: How did you and the team begin the task of reorganizing AE, and what are some of the challenges you overcame during the process?**

**GF:** We brought together employees with both space and aircraft expertise to enhance our business opportunities and improve in three key areas: 1) technical quality of our products, 2) cost competitiveness in today's market and 3) cross-domain expertise, or technology breadth derived from success in air and space. It means better aggregating the resources we have so that they are working together. John Daegele (former Engineering vice president for Space Systems division) and Frank Flores (Engineering vice president for Strike and Surveillance Systems division) laid the groundwork, and I began building on all the work they had done. AE is focused on technical quality: Get the job done right the first pass with the proper amount — not the minimum amount — of resources.

**AN: What work experiences did you draw upon to stand up AE?**

**GF:** As chief engineer for the B-2 and F-35 Joint Strike Fighter programs, I understand what AE needs to do to help our programs. From a management perspective, I understand how to be lean and mean. The question is, How do you get lean without sacrificing quality? There are ways to mitigate risk on the air side that are not acceptable on the space side and vice versa. There is no simple solution. LCROSS (Lunar CRater Observation and Sensing Satellite) is a good example of a successful high-risk program that we did relatively inexpensively. We learned a lot on LCROSS that we're already applying in other areas.


**AN: What efficiencies did you help to achieve as part of the reorganization?**

**GF:** Our customers, even more so than in the past, are sensitive to expenses; they want similar capability for less cost. We need to get things done more cost-competitively and in a more timely fashion. We're on a successful path, and there are a couple of areas where we've more than cut our costs in half. AE is essentially completing the job of getting to single, common processes. Our competitors also are pursuing this path of minimizing infrastructure and harmonizing processes. This isn't a short-term deal, either. If done right, we have tremendous leverage in the marketplace.

**AN: How did you unite two areas of expertise (air and space) under a set of common processes?**

**GF:** I am empowering the leaders who report to me, and part of that empowering involved mentoring. I assigned them four books to read in a couple of weeks, because a good leader is an educated one. They read "Drive: The Surprising Truth about What Motivates Us," "Outliers: The Story of Success," "The Contrarian's Guide to Leadership" and "The First 90 Days: Critical Success Strategies for New Leaders at All Levels." It was quite a crash course. They learned what exactly motivates people, how to motivate people and how to join a new organization and make things happen. I continue to host Town Halls and talk with engineers personally, and I've challenged them to understand how every customer dollar that comes into AE flows through the company.

**AN: What does the future hold for AE?**

**GF:** We'll have our processes better streamlined, particularly with a team of dedicated and talented employees who are well equipped to meet the challenges heading our way. Change never stops, so we'll continue to tweak the organization based on the business environment. It's up to all the employees in the organization to manage that change to make sure we're competitive now and in the future. 

# New Measures Gain Traction in Quest for Affordability

## DIANE HENSLEY

The Department of Defense (DoD) has embarked on a series of top-priority initiatives mandating better value for taxpayers and improving the way the DoD does business.

A June 28, 2010, federal mandate issued by Undersecretary of Defense, Acquisition, Technology and Logistics Ashton Carter sought a process to achieve 2 to 3 percent net annual growth in warfighting capabilities without additional budget; in effect, "doing more without more."

"The five guidelines issued by Mr. Carter reflect the increasing pressure all government agencies and their partners in industry will feel to increase productivity and operate more efficiently over the coming years," said Sid Ashworth, corporate vice president for Government Relations. "The keys to program success from the perspective of Department of Defense and congressional leaders will be delivering quality products on time and on budget."

### Aerospace Systems is addressing Carter's overarching goals:

- Target affordability and control cost growth
- Incentivize productivity and innovation in industry
- Promote real competition
- Improve tradecraft in services acquisition
- Reduce nonproductive processes and bureaucracy

Tim Leach, director of Aerospace Systems' Affordability homeroom, formed an Affordability Council to address the sector's affordability goals and to foster best practices through organizational transparency, communication, training and the expansion of an affordability community. May was declared Affordability Awareness Month, and an Aerospace Systems Affordability and Efficiency website is in work, he said.

Aerospace Engineering is actively addressing the initiatives and sharing its progress in terms of goals and metrics, tools and processes, and cost-estimating methods to support the sector's affordability initiatives.


"Our goals for 2011 are to clarify the definition of engineering affordability,

identify best practices from across the sector and corporation to implement Design to Cost and Cost as an Independent Variable (CAIV) design methodologies and implement post-design engineering efficiencies. As we work through these key initiatives, I am confident we will see improvement in both bottom-line performance and top-line growth," said Frank Flores, Aerospace Engineering Strike and Surveillance Systems division's vice president.

In February, the Battle Management and Engagement Systems (BMES) division stood up an Affordability team represented by members from across the division's programs, functions and shared services. "The team's goal is to look across our entire work environment, at our programs and processes, to understand our current baseline costs, set new affordability targets and execute those targets across the division," said Deb Andree, BMES director of Quality, Safety and Mission Assurance. Scott Hoffmann and Liliana Jutting are representing Engineering on this team.

Sector Vice President Gene Fraser established the Engineering Cost Competitiveness and Affordability Center of Excellence (CoE) as part of the Specialty Engineering and Program Integration directorate. Frank Carus will lead the directorate. Randy Schaffer will lead the CoE, which will maintain close relations with academia, industry and the government to keep affordability efforts on target.

"The CoE will work with the sector Affordability homeroom to build a unified, robust capability in cost competitiveness and Affordability that will consistently provide Aerospace Systems programs with design-to-cost, affordability and price-to-win technical tools, strategies and tactics," Carus said.

The homeroom also will provide integrated capabilities to meet the DoD's mandates and directives. Among its key strategies will be affordability as key performance parameter, affordability-based decision-making, design-to-cost process and tools, systems engineering tradeoff analysis, support of "should cost versus will cost" analysis and others, Carus said. 

## Getting to Know: DALE BURTON

Intelligence, Surveillance and Reconnaissance  
Battle Management Command and Control  
Vice President and Melbourne Site Manager



Photo by Stephen Porter

### GREGORY B. HARLAND

*Aerospace Now* sat down with Dale Burton, vice president of Intelligence, Surveillance and Reconnaissance Battle Management Command and Control, and Melbourne site manager, to discuss his background in mathematics and engineering, as well as his career experiences at Northrop Grumman.

#### AN: Tell me about your background?

**DB:** As the son of a retired Air Force enlisted man, I grew up around many different Air Force bases. I graduated from high school in Arkansas and attended the University of Arkansas at Monticello (made famous by the KGB Search Engine Boll Weevil mascot commercial). At UAM, I started out as a pre-law student, then got interested in math and physics and pursued a degree in both. I continued my education at Florida State University in applied mathematics under Dr. C.K.W. Tam in the area of fluid mechanics.

#### AN: What attracted you to study engineering?

**DB:** When I attended Florida State, they did not have an engineering program, so I'm not an engineer by degree; however, I have been referred to as a mathematician in engineer's clothing.

#### AN: Since you're a mathematician, how did you become proficient in engineering?

**DB:** "Master the fundamentals," coined from a commercial I once heard, really resonates with me and is a key component that gives me the tools to work well with engineers.

Dr. Tam kept me broad in my studies and believed mathematics was the tool of physics and engineering. I would've found it very beneficial to be able to take a variety of engineering classes while at FSU and learn the language of engineering and the different vernacular between engineers and mathematicians. Since that wasn't an option, I spent a lot of personal time learning how engineers communicate and think.

#### AN: Who gave you the best career advice?

**DB:** When I worked for Hughes Aircraft, I was mentored by a man named Alex Gregorian. He told me, "When someone asks you your technical opinion, give it to them. Don't just tell them what the boss wants to hear."

#### AN: Who within Northrop Grumman was your role model and influenced you the most?


**DB:** I've had different ones based on my role within the company.

From a technical perspective, Gerry (Gerald) McNiff (father and main architect of Joint

Surveillance Target Attack Radar System, or Joint STARS) was mathematically one of the top two intellects in physics that I have ever known. His mind was always working at the physics level and had a vision for Joint STARS.

Marty Dandridge and Scott Seymour had the greatest influence on my management style. Marty brought me to [legacy] Grumman and was a "strength of conviction" manager, and he would always listen if you took him a problem and a potential solution. Scott had a "depth of knowledge" in the technical area that was rivaled by no other. Both were great leaders, great managers and shared a deep technical knowledge of the program I was associated with.

#### AN: Earlier this year, you celebrated the 20th anniversary of the first Joint STARS deployment in support of Operation Desert Storm, which you were a part of — what is your most vivid memory of that deployment?

**DB:** One evening, not too long after the start of the war, I was sitting in the flight deck of our aircraft watching what appeared to be flares going off in the distance. Turns out, they were Scud missiles fired from Iraqi army positions throughout the region. What was most amazing was watching American Patriot missiles knock the Scuds out of the sky at eye level. I will never forget that deployment and the role Joint STARS played. 

# DISCOVERING

Humanity's  
Story



## Nobel Laureate John Mather Explains Trailblazing Science behind JWST

### MARY BLAKE

He's spoken to dozens of groups on the same topic, but his unflagging enthusiasm and energy kept a capacity crowd of Space Park site (Redondo Beach, Calif.) employees enthralled for more than an hour.

John Mather, senior project scientist for the James Webb Space Telescope at NASA's Goddard Space Flight Center, told us there is a lot to be learned with a huge infrared telescope. "We can do something truly amazing and wonderful with Webb," he said. "We can see inside the Eagle nebula's dust clouds and lift the curtain on star and planetary system formation. We have a supercomputer simulation, but we would like to know if this is our story."

The Webb telescope will look at first light and reionization after the Big Bang, the assembly of galaxies, birth of stars and planetary systems and the origins of life. A priority in the National Academy of Sciences Astrophysics Decadal Surveys in 2000 and 2010, Webb is perfect for the next steps in exoplanet science, even though it was not specifically designed for it, Mather said.


Webb has a five-year mission with enough propellant to last 10 years. It is much bigger than the Hubble Space Telescope, and Webb's

sensors will be much colder, enabling them to detect very faint objects in deep space. "The photons we look for come in sparsely — we'll see things we've never been able to see before," Mather said.

Scientists learned from working with Hubble and other satellites that the universe is about 13.7 billion years old, plus or minus 1 percent. "Webb looks further back in time, in wavelengths too long for Hubble to detect and reveals structures Hubble can't see," Mather explained. "We'll be able to see how young galaxies combine and collide early in the history of the universe. Billions of years from now, when the Andromeda galaxy collides with our galaxy, the Milky Way, we think a lot of debris will fly off through space — but is this true? Webb allows us to do cosmic archeology and see what comes out of collisions."

The properties of planets that orbit other stars are another area of study Webb will illuminate. "The Kepler mission identified 1,235 candidates so far, telling us what to look for," he said. "We've already discovered sodium and water in the atmospheres of exoplanets and will look for other signs of chemicals similar to those of Earth's atmosphere, such

as carbon dioxide. With Webb, we can look at debris from the formation of our own solar system, such as Kuiper belt objects."

During the question-and-answer session, Mather was asked about the shape of the universe. "We don't know — we are in the middle. As far as we can tell, the universe is infinite," he said. "Stay tuned. In a few billion years, we may know more." 



John Mather, senior project scientist for the James Webb Space Telescope at NASA's Goddard Space Flight Center, addressed a packed house at the Aerospace Presentation Center in Redondo Beach, Calif.

Photos by Alex Evers

## Good as Gold: NORTHROP GRUMMAN T-38 TALON Honored for 50 YEARS of Service

### TOM HENSON

There are aircraft, and then there are icons.

Considering tens of thousands of the world's finest pilots have trained on the Northrop Grumman T-38, the Talon clearly fits into the latter category.

Another indication of the T-38's quality, performance and longevity came on March 17, when Northrop Grumman joined representatives of the U.S. Air Force in celebrating the golden anniversary of the first delivery of the Talon.

At an event held at Randolph Air Force Base in Texas, the Northrop Grumman-built aircraft was celebrated as the primary trainer for generations of Air Force pilots. The event occurred nearly two years after the then-new Strike and Surveillance Systems division (SSSD) marked the 50th anniversary of the T-38's first flight.

Northrop Grumman produced 1,187 T-38s between 1959 and 1972, the year the production program ended. Approximately

half of those aircraft remain in service today with the U.S. Air Force, U.S. Navy, NASA and air forces around the world. Since 1961, more than 70,000 Air Force pilots have earned their wings in the T-38. The average T-38 has flown 15,000 hours, and the high-time aircraft has flown 19,000 hours.

Northrop Grumman has continued to maintain the aircraft, producing replacement wings and new structural components to extend the service life of the platform.

Duke Dufresne, sector vice president and general manager of SSSD, noted that the word "icon" should not be used lightly but that it simply and accurately describes the T-38.


"This aircraft's unparalleled history and ongoing importance speak volumes about its quality, and the fact that so many of the world's finest pilots trained on the T-38 is a legacy to be proud of," he said. 



Photo by Northrop Grumman Corp.

Fifty years to the day: Northrop Grumman San Antonio Sector Lead Executive Tony Imondi presents a plaque to U.S. Air Force Gen. Edward A. Rice Jr., commander of Air Education and Training Command, during the March 17 celebration. The T-38 in the background was painted in the original delivery colors to mark the occasion.

## SECTOR OUTREACH

### Scientists Share Insights during CLIMATE SYMPOSIUM

#### LARRY WHITLEY

During a symposium event at Space Park in Redondo Beach, Calif., on May 2, top scientists, including 2007 Nobel Peace Prize recipients from the Intergovernmental Panel on Climate Change, shared insights on how changes in climate are projected to further affect Southern California. "Keeping Our Heads above Water — Adapting to Climate Change in Southern California" was co-hosted by Aerospace Systems and the city of Hermosa Beach, Calif.

The event, according to Dr. Aaron Swanson, Northrop Grumman climate scientist and the prime organizer of the symposium, provided a forum for exploring avoidance, mitigation and adaptation strategies for climate change impacts. "Through the presentations and discussions, participants were able to identify and capture ways the scientific community, public sector and industry can support each other in facilitating effective climate adaptation and vulnerability assessments," Swanson said. "Discussing alternative approaches, available resources, collaborations and next steps was the objective, and I believe this forum provided for a collective way forward."

Fritz VanWijngaarden, systems engineer with Northrop Grumman Information Systems, talks about climate and weather data with attendees at the Climate Adaptation Symposium held May 2 at Space Park in Redondo Beach, Calif.



Photo by Northrop Grumman Corp.



Photos by Northrop Grumman Corp.

Awardees gather at the Asian-American Engineer of the Year (AAEOY) ceremony. Amy Lo, an Aerospace Engineering systems engineer (pictured third from right, wearing red), won the prestigious 2011 AAEOY Award.

Bryan Green receives the "Most Promising Engineer" award at the Black Engineer of the Year Award Conference. Bob Klein, vice president of Aerospace Engineering, Battle Management and Engagement Systems division, joins Green for his special recognition.

## SALUTING the Award-winning ENGINEERS among Us

### DEBBIE BOHACS AND KIMBERLY PRATO

Aerospace Engineering employees were honored by institutions across the country in several engineering recognition ceremonies representing various categories during National Engineers Week earlier this year.

"The achievements of these outstanding engineers are a result of their collaboration, dedication and ongoing commitment to advance the field of engineering," said Gene Fraser, sector vice president of Aerospace Engineering. "These professionals are an asset to the Northrop Grumman team, and many of their achievements help foster our future workforce."

"Their understanding and application of engineering ultimately takes form in the products we are able to offer the warfighter and commercial customer alike," he added.

Eric Garvin and Bryan Green, both from Aerospace Systems, received awards at the Black Engineer of the Year Award (BEYA) Conference held in Washington, D.C.

Garvin, manager for Global Hawk Business Development in the Arlington, Va., office, received the Black Engineer of the Year Community Service Award for demonstrating strong leadership in the minority science, technology, engineering and math

community through various volunteer activities. He currently serves on the board at the Fishing School in Washington, D.C. The school provides a safe haven and academic support for vulnerable children ages 6 to 12. Garvin earned his bachelor's degree in finance with a minor in engineering from the U.S. Air Force Academy and a master's degree in national security strategy from the National War College.

Green received the award for most promising engineer. Located in Melbourne, Fla., Green is a systems engineer for the Maritime and Tactical Systems integrated product team. Green earned a bachelor's degree in computer information and systems engineering from Tennessee State University.

"It was an honor to receive the special recognition award and be one of the many representatives of Northrop Grumman at the BEYA conference. I greatly appreciate all of the opportunities I have received since starting my career with the company," Green said.


In addition to awards given to Green and Garvin, seven Aerospace Systems engineers were named BEYA Modern Day Technology Leaders. They are: Carl Banks, William Beckett, Chris Deering, Esther Jean-Pierre, Michael

Moore, Jamesha Parks and Herbert Yu.

The 2011 Asian-American Engineer of the Year (AAEOY) Award was presented to Amy Lo for her outstanding work and dedication to the engineering field. The AAEOY award is given to outstanding American scientists, engineers and corporate leaders with Asian ethnicity in recognition of their exceptional contributions in their fields of expertise.

Lo is a systems engineer at the Integrated Engineering Center in Redondo Beach, Calif. She is responsible for developing the NASA-funded New Worlds Observer concept. The mission involves the use of a starshade to block out the harsh, direct light from a star, enabling possible detection of Earthlike planets.

"I am honored to join the distinguished list of fellow awardees. I am grateful to Northrop Grumman for giving me the opportunity to develop challenging technology," Lo said.

Lo earned a Bachelor of Science in physics from Brown University and a doctorate in astrophysics from the University of California, Los Angeles. Lo also provides career guidance to her fellow peers and co-workers in Aerospace Systems. 



## GISH Elected into National Academy of Engineering

### DEBBIE BOHACS AND KIMBERLY PRATO

Jacqueline Gish, an Aerospace Systems research development engineer and Technical Fellow, will formally become a member of the National Academy of Engineering (NAE) this October. Gish was elected into the NAE earlier this year for her technical and programmatic contributions to high-powered, diode-pumped solid-state (DPSS) lasers for defense applications.

"I was stunned by my election. It is an immense honor to be part of the NAE. I am humbled by it. This was a team effort by a group of people, and I was honored to be part of that team," Gish said.

The academy recognized Gish's development of high average-power, high-quality solid-state lasers. The benefits of her work are seen in the rapid transition of commercial solid-state lasers to diode pumping. All of the systems Gish helped develop exhibited both excellent beam quality and long run time. In addition, Gish's team increased the efficiency and reliability of solid-state lasers, including records in fiber lasers (highest-power, polarization-maintaining fiber amplifier) and highest-power coherent beam combination of fibers.


Working on the development of high-power and high-brightness DPSS lasers, Gish achieved a successive series of "firsts" for more than 20 years. She developed the first 100-watt DPSS laser (short pulse) with integrated phase conjugation, the first master oscillator, power amplifier kilowatt DPSS laser (short pulse) and the first continuous wave 25-kilowatt DPSS laser using high-power adaptive optics. Gish also assisted in developing and demonstrating the highest-power supersonic chemical oxygen iodine laser (COIL) at that time. Her significant contributions to COIL and solid-state lasers remain notable.

"An election into the NAE speaks volumes to the caliber, drive and technical expertise Jackie has achieved while advancing the state of the art of

solid-state lasers. Her contributions both in the engineering arena as well as the legacy of people she has mentored will serve Aerospace Systems well in the years to come. We are proud to have her on our Northrop Grumman team and as a mentor to others in this field," said Tom Romesser, chief technical officer and vice president of Technology Development, Aerospace Systems.

Gish attended the University of California, Los Angeles as a math major. She had the opportunity to do research with a physical chemist professor at UCLA during a summer and began exploring science courses. By her junior year, Gish changed majors from math to physical chemistry, which allowed her to further her knowledge in both fields. After graduation, she obtained her doctorate from Caltech and did postdoctoral studies at UCLA. In 1978, she began working for TRW, which was later acquired by Northrop Grumman. Gish spent the majority of her time specializing in different types of lasers.

In addition to her professional experience, Gish is involved with a mentoring program called MOSTE (Motivating Our Students through Experience). The organization matches professional women with middle school-aged girls who want to be mentored. "I have been mentoring two girls for three and a half years and it has been rewarding and fun. I believe everyone should do some type of giving back, and this is one of the ways I give back. My hope with this election is to be able to contribute in some way to what the academy does," Gish said.

The NAE election ceremony in October will welcome 68 new members, bringing the total U.S. membership to 2,290. The NAE has 10 previously elected members from Northrop Grumman. Gish joins fellow Aerospace Systems colleagues Drs. Tom Romesser and Dale Burton, who were elected in 2003 and 2007, respectively. 

# Centennial

## of Naval Aviation Celebrations Continue at NAS Pensacola

**DIANNE BAUMERT-MOYIK**

*"Let it inspire us to be brave in the face of adversity; to go above and beyond the call of duty in service to our nation; and never forget the courage of the brave men and women who have fought and died so that we may live in freedom."* -Rep. Jeff Miller (Fla.)

These stirring words were spoken this spring by U.S. Congressman Jeff Miller as the National Naval Aviation Museum (<http://www.navalaviationmuseum.org/>) marked its third annual national Medal of Honor ceremony at Naval Air Station Pensacola, Fla. Our Northrop Grumman team was on hand to help honor the 44 naval aviation recipients, including eight who flew Grumman-made aircraft.

Vice Adm. Gerald L. Hoewing, U.S. Navy (retired) and president of the Naval Aviation Museum Foundation, said the "Medal of Honor is bestowed upon a few but revered by many. It is the distinction between heroism and selfless sacrifice.

"The Medal of Honor is the highest award that can be bestowed to a member of the armed forces for valor in action against an enemy force. It is awarded by the president, in the name of the Congress, to members of the armed forces who have distinguished themselves conspicuously by gallantry and

intrepidity' at the risk of their lives above and beyond the call of duty," Hoewing said. Of the millions of men and women who have served in the armed forces, only 3,454 have thus far been awarded this distinction, including:

- Lt. Col. Harold Bauer, U.S. Marine Corps — Grumman F4F Wildcat
- 1st Lt. Jefferson DeBlanc, U.S. Marine Corps — Grumman F4F Wildcat
- Capt. Joseph Foss, U.S. Marine Corps — Grumman F4F Wildcat
- Maj. Robert Galer, U.S. Marine Corps — Grumman F4F Wildcat
- Cmdr. David McCampbell, U.S. Navy — Grumman F6F Hellcat
- Lt. Edward "Butch" O'Hare, U.S. Navy — Grumman F4F Wildcat
- Maj. John Lucian Smith, U.S. Marine Corps — Grumman F4F Wildcat
- Lt. James Swett, U.S. Marine Corps — Grumman F4F Wildcat

During Operation Iraqi Freedom and Operation Enduring Freedom, nine more U.S. troops have been awarded the Medal of Honor. The United States will forever be in debt to the recipients of the Medal of Honor for their bravery and sacrifice in times of war or other armed conflict. [AN](#)

**Editor's note: The Medal of Honor was first awarded on March 25, 1863, during the Civil War. But in 2007, 144 years later, by a resolution passed by Congress, March 25 was designated as National Medal of Honor Day.**

*To see video highlights of this year's ceremony and to view Northrop Grumman's Medal of Honor WEAR-TV Channel 3 Salutes, please visit us online at [www.northropgrumman.com/naval100](http://www.northropgrumman.com/naval100). See our July issue of Aerospace Now for the grand opening of the National Flight Academy ([www.nationalflightacademy.com](http://www.nationalflightacademy.com)), sponsored in part by a major grant from the Northrop Grumman Foundation.*

Photos by Edgar Mills

Pensacola, Fla., residents, veterans and active duty military fill the museum atrium for the third annual Medal of Honor ceremony.

U.S. Rep. Jeff Miller is chairman of the House Committee on Veterans' Affairs and a member of the House Armed Services Committee and House Permanent Select Committee on Intelligence. Miller also serves on the NATO Parliamentary Assembly, where he is vice chairman of the subcommittee on Transatlantic Defense and Security Cooperation.



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