The Precision Strike Digest

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"From Cruise Missiles Association to Precision Strike Association we have been dedicated to advancing the art and science of precision engagement concepts and technology for more than 25 years."

PSA
PRECISION STRIKE ASSOCIATION
Affiliate, National Defense Industrial Association

VISION STATEMENT

We aspire to be the premier association dedicated to advancing the art and science of precision engagement concepts and technology. To accomplish this, we will promote the development of systems and procedures in order to locate, fix, track, target, and attack fixed, moving, and relocatable targets. We recognize that battlespace management, the network within which it functions, and the adjunct command and control requirements are crucial to success on the battlefield. PSA has a global perspective and welcomes international participation.

MOVING FORWARD IN THE NEW STRATEGIC ENVIRONMENT

By Ginny Sniegon — PSA Programs Chair

Achieving Dominance through Technological Innovation is the theme of the Precision Strike Annual Review (PSAR-15) scheduled for **March 17-18, 2015** at the Waterford at Springfield, Springfield, VA.

Since the late 1970s, precision concepts and technology have ensured that the U.S. military keeps its strategic advantage. But emerging threats are jeopardizing this advantage – and in this new strategic environment, the United States faces significant challenges to maintain our global leadership role both now and into the future.

It remains imperative that we ensure the DoD has the systems it needs to effectively deter and decisively win future conflicts. This will undoubtedly require precision strike engagement across all spectrums of conflict. The Defense Industry team must continue our focus on developing new technologies for emerging capabilities, promoting innovative concepts and investing in critical technological modernization while refining our federal acquisition processes.

Please join us for the "must attend" Precision Strike Annual Review as distinguished leaders characterize the new strategic environment, define the national security agenda, and address requirements for future conflicts.

PSA is honored to feature four leaders who will address PSAR-15 – **Honorable Katrina McFarland**—Assistant Secretary of Defense for Acquisition; **Representative Rob Wittman** (R-VA, 1st District)—Member of the House Armed Services Committee; **Al Shaffer**—Principal Deputy Assistant Secretary of Defense (Research & Engineering); and, **Rear Admiral Mark Darrah, USN**—PEO for Unmanned Aviation & Strike Weapons.

Honorable Katrina McFarland

Representative Rob Wittman

Alan Shaffer

Rear Admiral Mark Darrah, USN

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Chairman's Column

As the new Precision Strike Association Chairman, I would like to take a moment to thank our outgoing Chairwoman, Suzy Kennedy. Suzy's steady leadership carried PSA through the tumultuous uncertainty driven by sequestration, as well as the unavoidable cancellation of the 2013 Precision Strike Technology Symposium due to Hurricane Sandy. As a result of her dedication, PSA weathered the storm and continues to deliver a valuable forum for DoD, Industry, Academia, and Laboratories to collaboratively solve today's difficult precision strike challenges. Thank you Suzy!

2015 rang in the new year with a vengeance. International turmoil, economic uncertainty and geopolitical pressures continue to present a more complex and stressing environment. Meanwhile, technology is opening up capabilities heretofore unattainable. As we react and adapt to these realities, this year promises to be an exciting time in the Precision Strike Community.

Please join us as we examine these challenges at the 2015 Precision Strike Annual Review (PSAR-15), March 17-18, 2015 at the Waterford at Springfield, Springfield, VA. Given recent events, this year's theme, Achieving Dominance through Technological Innovation is apropos. PSAR-15 will be conducted at the UNCLASS classification level. For more information and to register, please visit our website: www.precisionstrike.org

PSA is honored to have a remarkable selection of senior leadership at this year's event. Keynote and honored speakers include:

- Rear Admiral Mark Darrah, USN – PEO for Unmanned Aviation & Strike Weapons
- Honorable Katrina McFarland – ASD (Acquisition)
- Honorable Rob Wittman – R-1st District, VA,
- Mr. Alan Shaffer – Principal Deputy ASD, R&E

A highlight of the 2015 Precision Strike Annual Review will be the 19th annual presentation of the William J. Perry Award during a luncheon ceremony on Tuesday, March 17th.

PSA offers attendees the opportunity to interact with DoD Precision Strike thought leaders, national laboratory, academia and industry partners during PSAR-15 and an evening reception.

This year's theme will, in context of the strategic environment and national security agenda, strive to delineate Precision Strike requirements for our community. Please register early and consider who across your organization would benefit and contribute to this important conversation.

There remain sponsorship opportunities for those organizations interested in financially supporting the Precision Strike Association. As a non-profit organization, PSA facilitates communication on topics critical to the Precision Strike Community. Financial support from our member organizations allows us to host these important events; our mission success is dependent on your support. Please consider sponsoring PSAR-15. Click the below link to download the sponsorship form:

See **Chairman,** Cont. on pg. 6

PSTS-14 Wrap-up

The three-day SECRET/NOFORN Precision Strike Technology Symposium (PSTS-14), conducted at the JHU/APL Kossiakoff Center on Oct. 21-23, 2014, once again delighted the precision strike community with an abundance of critical topics that showcased opportunities and innovations for the future of warfare.

PSTS-14 was orchestrated by the PSA Co-Chairs **Ginny Sniegon** and **Captain Steven "Sonic" Hejmanowski, USN**. **Dr. John Walter, Captain (Ret.) Larry Burt, USN** and **Ken Masson** served as Tri-Chairs with assistance from numerous **PSA Board Members** and the **PSA Advisory Council**. Then Chairperson of the Board **Suzy Kennedy** welcomed the participants and the JHU/APL official welcome was given by the JHU/APL Assistant Director for Programs **Tim Galpin**.

The theme for PSTS-14 ***Strength Through Investment—Decisive Strike Capabilities*** provided us the opportunity to structure the program to highlight several hot topics including Intelligence & Cyber Challenges, NATO's Role in the New Security Environment, Russian Military Power in Europe, concerns in the Middle East and Africa, Asia-Pacific Rebalance, Bomber Force Structure, Conventional Prompt Global Strike, and Nuclear Deterrence. Key highlights addressed during this engaging technology symposium follow:

Chris Inglis—Former Deputy Director of the National Security Agency—opened the official PSTS-14 program by addressing the ***Cyber Threat***. He said that Cyberspace is a mix of technology and people and critical processes. Everything is connected to everything. For those who think they have an offline system or some barrier firewall—some protection that holds them harmless—their hearts generally are broken. It is not possible to secure this space. Why? Because you want to connect to transactions, to people who essentially generate revenue for your companies or hostile entities that you want to do business with, even in the military realm. The very fact that you are connecting to them make it such that you're taking risk, by design. So, the goal of trying to find a way to make this statically, enduringly secure—we need to give up on that. We need to presume breach. We need to presume that these things are deficient by design and defend them accordingly. It is possible to do that, but it requires a fundamentally different approach to cyberspace—one that protects the Mission Critical Information. Mission success must be the goal. In addition, there is a lot of discussion about a cyber-Pearl Harbor. That misses the fact that this problem is already with us. What we actually are suffering at this moment is this insidious sapping of our strength, whether it's through the theft of intellectual property or the confidence that these systems will be resilient against some strident threat in the future. They will not be, because we have not made the necessary investments. We should stop trying to secure the internet and act to defend it.

Rear Admiral Mat Winter—PEO for Unmanned Aviation & Strike Weapons, NAVAIR—kicked off the opening day of PSTS-14 by focusing on ways for meeting precision strike challenges and opportunities. He

Rear Admiral Mat Winter

addressed the warfighters' demands and stressed the need of finding smarter ways to provide capability as he reflected on the future environment for the integrated battlespace.

Vice Admiral William Hilarides—Commander, Naval Sea Systems Command—presented the **Opening Keynote Address** and talked about his role as the acquisition owner of many of the naval strike platforms and capabilities from sea frames to weapon systems that play a key role in all potential conflicts from the Asia-Pacific AOR to the Arabian Gulf to the Med. Further, he illustrated the variety and effectiveness of the surface and submarine now and into the future for above and below water operations. He also cited examples of the use of maritime robotic systems to augment the warfighting offensive and defensive capability of our manned ship assets.

Vice Admiral William Hilarides

Rick Smith—Intelligence Session Chair from DIA—set the scene for the Intelligence Session and talked about concerns that keep him up at night. Then, Mr. Smith presented his session's speakers who addressed sensitive issues related to Foreign Threat Trends, Worldwide Ballistic Missile Programs, Middle East Underground Facility Program, and

an East Asia Update. As always, Mr. Smith's session was extremely informative. He plans to return for PSTS-15 in his new role at USEUCOM, so please mark your calendars for PSTS-15 scheduled for October 27-29, 2015.


Peter Huessy

Peter Huessy—President, Geostrategic Analysis—addressed ***Resurrecting Peace Through Strength*** during the luncheon on the first day of PSTS-14. He gave his perspective of how the U.S. military performs and noted that the military universally gets the job done. However, he warned that the security of the United States cannot be maintained within the defense budgets currently being discussed in Washington. Peter noted that as we are learning, the forces of totalitarianism have not been asleep. The forces unleashed by the 1917 Russian revolution and with the rise of Nazism in Europe in 1933 remain alive and unfortunately "on the march," in Eastern Ukraine, in Syria, in Northern Iraq, in Afghanistan and the Federally administered regions of Pakistan, in Iran, in Moscow and Peking, in North Korea, and in a growing number of areas of Central and South America fed by the petrodollars of Iran and Venezuela. All of this is occurring while America has withdrawn from many parts of the globe while also significantly reducing the size of its military forces.

Frank DiGiovanni –Acting DASD (Readiness) & Director, Force Readiness and Training—reflected on ***Operational Readiness of Joint Forces*** and focused on his policy and oversight responsibilities related to joint training, training innovation and capability modernization. Mr. DiGiovanni also talked about the impact on the ability of the Department to conduct readiness training activities due to the budget environment.

Dyke Weatherington—now the DASD for Space, Strategic & Intelligence Systems—addressed Strategic ISR in a changing DoD environment. Mr. Weatherington talked about how ISR complements precision weapons and cited examples of defense strategy adjustments.

Dr. Artie Mabbett—Director of the LRASM Deployment Office at DARPA—highlighted the ***Long Range Anti-Ship Missile (LRASM)*** program that aims to reduce dependence on intelligence, surveillance and reconnaissance platforms, network links, and GPS navigation in electronic warfare environments. Dr. Mabbett noted that autonomous guidance algorithms should allow the LRASM to use less-precise target cueing data to pinpoint specific targets in the contested domain. Further, he brought the audience up to speed on air- and surface-launched flight tests and other risk reduction efforts including electromagnetic compatibility testing of the missile and follow-on captive carry sensor suite missions.

Doug Storsved—Principal Weapons Engineer with ATK Armament Systems—briefed ***Precision Miniature Munitions—Effects and Applications***. Mr. Storsved presented a very informative technical brief that highlighted an area of expertise in the armaments systems arena that is crucial for those who could benefit by this emphasis on dynamical systems.

Martin Kindl—DIO for Sub-Saharan Africa—closed the first day's presentations by rendering a fascinating account of his experiences working with people in this region of Africa. He talked about his responsibility for driving integration across the full spectrum of intelligence functions related to Africa, maximizing defense intelligence support to senior level customers throughout the U.S. government, guiding relationships with foreign partners, expanding outreach to academia, and advising on workforce posture and resourcing. Mr. Kindl functions as the defense counterpart to the National Intelligence Manager for Africa.

The second day's symposium review focused on numerous critical topics of importance to the precision strike community. First to present was **Colonel Eric Forsyth**—PEO, Fixed Wing, USSOCOM. Colonel Forsyth addressed Special Operations Forces Perspectives on Precision Strike and discussed the development, fielding and SOF support of unique fixed wing aircraft and subsystems while emphasizing precision strike concepts.


Alan Shaffer

Alan Shaffer—Principal Deputy Assistant Secretary of Defense, Research & Engineering—talked about ***Technology Surprise***. Mr. Shaffer focused on the need for rebalance of R&E investments. He articulated that a key element of the Defense Strategic Guidance is to "protect and prioritize key investments in technology and new capabilities, as well as our capacity to grow, adapt and mobilize as needed." Further, he talked about the strategy, pace of technology, A2/AD priorities, electronic warfare sophistication, hypersonic research successes, and complexities of our national security

environment. He reiterated that "Asia-Pacific rebalance is the foundation of our R&E strategy."

Dr. Steve Blank—Senior Fellows for Russia from the American Foreign Policy Council—presented a very sobering talk about ***Russian Military Power in Europe***. He discussed in detail the intentions, doctrine and capabilities of this power. Further, Dr. Blank highlighted policy implications of Soviet/Russian, U.S., Asian, and European military and foreign thinking. He also presented his perspective on NATO's role in the new security environment.

Dr. Steve Woodall—President and CEO, Strategic Synthesis—presented the ***SLAAD Study on IAMD***. Dr. Woodall remarks on this Strike, Land Attack, and Air Defense study reflected a tremendous amount of very beneficial knowledge about the state of the Integrated Air And Missile Defense program.

During the luncheon on the second day of PSTS-14, the sixth annual ***Richard H. Johnson Technical Achievement Award*** (the Johnson Trophy) was presented to **Chris Geswender** –retired from Raytheon & currently an advisor to several small technology companies—for his outstanding technical achievements resulting in his significant contribution to precision strike systems.

Richard H. Johnson Technical Achievement Award (the Johnson Trophy) was presented to Chris Geswender

Following the award ceremony, the session on ***Conventional Prompt Global Strike*** took place. **Colonel Jim Colebank**—Deputy for Strategic System, Deterrence & Global Response in OUSD(AT&L)—presented the Scene Setter Overview. He was followed by **Mark Kniskern**—Sandia National Laboratories—who briefed ***Hypersonic Glide Body Aero Model Development for AHW Flights 1A and 2***. Then, **Susan Hurd**—Special Assistant for Conventional Prompt Global Strike, Strategic Systems Program for the US Navy—briefed ***Conventional Prompt Global Strike Warhead Development***. Since this session was classified, highlights cannot be addressed here.

The next three briefings by **Dr. Bruce Carlsten**—Laboratory Fellow, Los Alamos National Laboratory—who briefed ***High Energy Laser Technologies and Applications***; **Jay Kistler**—Director for Electronic Warfare & Countermeasures, ASD(R&E)—w ho discussed ***The Converging Technologies of Electronic Warfare***; and, **Commander KY Croxson**—PMA-234 NGJ IPT Lead & EA-6B Military Class Desk—who addressed ***Next Generation Jammers Technologies*** were classified and sensitive and cannot be discussed here.

Mark Munsell—National Geospatial Intelligence Officer for Targeting Issues at NGA—was the last briefer on the second day. Mr. Munsell talked about ***Web-Based Point Mensuration***.

The third day's symposium was kicked off by **Dr. Larry McMichael**—Associate Program Leader at Lawrence Livermore National Laboratory. Dr. McMichael brief was deeply technical as he expounded on the ***Potential of Multiphase Blast Weapons to Enhance Near Lethality in Precision Strike***.

Next, **Joe Letsinger**—Munitions Directorate, Eglin AFB—briefed on ***Arming Current & Next Generation Aircraft—Counter A2/AD***. This was a very informative classified briefing that cannot be covered in this article.

Colonel Thomas "Walrus" Lennon—Air Force Global Strike Command—provided an insightful overview of the **Standoff Munitions Application Center (SMAC)** created at Air Force Global Strike Command to address the emerging problem set of integration, synchronization, and de-confliction required in standoff munitions employment. The presentation highlighted a multitude gaps and seams, and possible solutions for operational action involving large scale standoff munitions employment in the evolving Anti-Access / Area Denial (A2/AD) environment.

Gregory Weaver—Principal Director for Nuclear Missile Defense Policy in OSD—talked about ***Changing Strategic Interests***. Mr. Weaver's remarks on shaping strategic interests were highly sensitive and cannot be addressed in this article.

Major General Garret Harencak—Assistant Chief of Staff, Strategic Deterrence & Nuclear Integration, Headquarters, USAF—presented the keynote address on the 3rd Day and delighted the audience with his vision about the ***United States Strategic Interests and Current Triad Requirements***. However, General Harencak also explained that this country went on both a "Procurement" and "Policy" holiday after the Cold War ended. While the General was speaking specifically about our nuclear deterrent, his underlining point could easily be

Major General Garrett Harencak

applied to the rest of the US military whether space, missile defense, cyber or other key areas.

Colonel Jekyll Brunner—Deputy Director for Force Application Requirements, Headquarters USAF—highlighted the ***Bomber Force Structure***, but was not permitted to discuss future plans.

Don Marcotte—S&T Lead, Airborne Electronic Attack Expendable Project, PMA-234—presented an in-depth discussion of ***Stand-In Jammers***, but that discussion cannot be addressed here due to the classification.

Dr. Bob Hastie—Technical Director for Counter-WMD Technologies at DTRA—presented a lot of in-depth research and analysis on ***Modular Autonomous Counter-WMD System Development & Roadmap + Future Counter-WMD Test Capabilities***. Dr. Hastie requested assistance from the test community as future work continues related to countering WMD Test Capabilities.

Colonel Mike Flaherty—Commander, Air Force Targeting Center, Air Combat Command—addressed sensitive classified aspects of ***Global Reachback for Targeting Support***.

The closing briefer of the symposium was **Bill Dries**—Air Force Air-Sea Battle Implementation Lead. He updated the participants on the ***Air-Sea Battle Implementation Plan***. Further, Mr. Dries addressed anti-access / area denial threat systems and delved into a description of the concepts by detailing how the Air-Sea Battle concept addresses capabilities.

As in the past, several midshipmen joined us all three days and very much appreciated the opportunity to be engaged in PSTS-14.

US Naval Academy Midshipmen

They found the symposium to be highly educational and extremely beneficial on-the-job training. The midshipmen who are now seniors are especially looking forward to participating in PSAR-15 scheduled for March 17-18, 2015.

Numerous speakers and participants were grateful to the Precision Strike Association for providing the opportunity to display the enormous government teamwork that is taking place. Many expressed their thanks to PSA for conducting another superb symposium. ■

Johnson Trophy Winner

Chris E. Geswender is the recipient of the 2014 Richard H. Johnson Technical Achievement Award, the sixth individual to be so honored. He is a technical innovator who worked for more than 40 years in national security and defense, helping shape a generation of precision systems, and in particular, a wide range of guidance systems.

He is a pioneer in challenging the cost of hi-G launched weapons. He provided technical leadership and innovation to the HARM missile, the Self Protect Weapon (SPW), the AGCW IIR guided bomb, JSOW, the EXCALIBUR Guided Projectile, Medium Range Munition (MRM) tank launched dual mode SAL/IIR guided projectile, the AI3, SAM for low level rockets, as well as a number of other programs.

Chairman, Continued from page 2

http://www.precisionstrike.org/Events/5PPR/PDFs/5PPR_SPNSR_012315.pdf

A valuable benefit of PSA membership is exclusive access to the PSA Executive Roundtable series. These luncheons provide unique access to senior DoD leaders. Designed for intimate, not-for-attribution discussions, these events provide direct insights into the challenges and focus areas facing the Precision Strike Community.

There were three Executive Roundtables in 2014 featuring: Dr. William LaPlante, Assistant Secretary of the Air Force (Acquisition); USN VADM David "Decoy" Dunaway, Commander, Naval Air Systems Command; and Mr. Jose Gonzalez, Deputy Director, Land Warfare and Munitions OSD(AT&L). We are planning three more in 2015 with the first in the early spring; I encourage members to sign up early. The PSA Executive Roundtables historically fill up quickly.

I encourage PSA members to provide feedback and help us to provide the topics and speakers that are most important to the Precision Strike Community. Please don't hesitate to contact us at info@precisionstrike.org

Thank you for your participation and support of the Precision Strike Association. We look forward to another productive and fulfilling year! Please add PSAR-15 to your calendar.

Ken Masson
Chairman of the Board
Precision Strike Association

Revolutionary Weapon in the Works

The U.S. Navy's Electromagnetic Railgun program continues to move toward scheduled at-sea testing in 2016.

Its revolutionary technology relies on electricity instead of traditional chemical propellants, with magnetic fields created by high electrical currents launching projectiles at distances over 100 nautical miles — and at speeds that exceed Mach 6, or six times the speed of sound.

Chief of Naval Research Rear Adm. Mat Winter, moderates a research, development, test, and evaluation panel during the Naval Future Force Science and Technology Expo. Panel members included Sean J. Stackley, Assistant Secretary of the Navy for Research, Development and Acquisition, Gen. John Paxton, Assistant Commandant of the Marine Corps, and Adm. Michelle Howard, Vice Chief of Naval Operations. (U.S. Navy photo by John F. Williams/Released)

One of two electromagnetic railgun prototypes on display aboard the joint high speed vessel USS Millinocket (JHSV 3) in port at Naval Base San Diego. (U.S. Navy photo by Mass Communication Specialist 2nd Class Kristopher Kirsop/Released)

EM railgun technology uses an electromagnetic force - known as the Lorenz Force - to rapidly accelerate and launch a projectile between two conductive rails. Magnetic fields created by high electrical currents accelerate a sliding metal conductor, or armature, between the two rails to launch projectiles at 4,500 mph to 5,600 miles per hour.

That velocity allows the weapon's projectiles to rely on kinetic energy for maximum effect, and reduces the amount of high explosives needed to be carried on warships. It also minimizes the dangers of unexploded ordnance remaining on battleground.

The Railgun will play a significant role in the future of the U.S. Navy and it was displayed to the public for the first time on the East Coast at the Naval Future Force Science and Technology (S&T) EXPO in Washington, D.C. on Feb. 4-5.

Chief of Naval Research (CNR) Rear Adm. Mat Winter says "the Electromagnetic Railgun is among several disruptive capabilities that the Naval Research Enterprise is championing to ensure a dominant, capable and relevant naval force for the future."

Roger Ellis, Railgun program manager at ONR, says "as the system moves forward along its planned schedule from the laboratory launcher, we've achieved breakthroughs in compact power and gun design."

Winter led a panel discussion at the EXPO featuring Sean J. Stackley, Assistant Secretary of the Navy for Research, Development and Acquisition; Gen. John Paxton Jr., Assistant Commandant of the Marine Corps; and Adm. Michelle Howard, Vice Chief of Naval Operations.

They said the Naval S&T Strategy's nine focus areas would guide technological breakthroughs for decades to come and assure access to the maritime battlespace;

An artist rendering shows the electromagnetic railgun installed aboard the joint high-speed vessel USNS Millinocket (JHSV 3). The railgun is a long-range weapon that launches projectiles using electricity instead of chemical propellants and is currently undergoing testing at Naval Sea Systems Command, Dahlgren Division. (U.S. Navy photo illustration/Released)

autonomy and unmanned systems; electromagnetic maneuver warfare; expeditionary and irregular warfare; information dominance-cyber; platform design and survivability; power and energy; power projection and integrated defense; and warfighter performance.

Howard emphasized the need for the Navy to continue exploring alternative sources of power and energy for ships, installations and revolutionary weapons like the Laser Weapon System and Electromagnetic Railgun that don't require gunpowder.

The U.S. Navy will install and test a prototype railgun aboard a Joint High Speed Vessel (JHSV), marking the first time an EM railgun will be demonstrated at sea.

High-energy EM railguns are expected to be lethal and effective against multiple threats, including enemy warships, small boats, aircraft, missiles and land-based targets. EM railgun technology will complement current kinetic weapons currently onboard surface combatants and offer a few specific advantages.

A final decision has not been made on which ship classes will receive a fully operational railgun. ■

All Systems Go for Navy Laser Weapon

One of the latest weapons in the Pentagon's vast arsenal is a laser that zaps and burns, delivering destruction by the kilowatt.

Under development for years by the U.S. military and the defense industry, lasers have moved from science fiction, to the military laboratory and now to the Persian Gulf.

For months, sailors tested a $40 million, 30-kilowatt laser mounted on the deck of the amphibious transport ship USS Ponce in the Persian Gulf. They practiced taking out drones and small boats. But now the naval laser weapon, which resembles a giant telescope, is ready to take out real threats, if necessary.

The USS Ponce conducts an operational demonstration of the Office of Naval Research sponsored Laser Weapon System (LaWS) while deployed to the Arabian Gulf.

Navy leaders have made directed-energy weapons a top priority to counter what they call asymmetric threats, including unmanned and light aircraft and small attack boats that could be used to deny U.S. forces access to certain areas. High-energy lasers offer an affordable and safe way to target these threats at the speed of light with extreme precision and an unlimited magazine, experts say.

"Our nation's adversaries are pursuing a variety of ways to try and restrict our freedom to operate," said former Chief of Naval Research Rear Adm. Matthew Klunder. "Spending about $1 per shot of a directed-energy source that never runs out gives us an alternative to firing costly munitions at inexpensive threats. With affordability a serious concern for our defense budgets, this will more effectively manage resources to ensure our sailors and Marines are never in a fair fight. We ran this particular weapon, a prototype, through some extremely tough paces, and it locked on and destroyed the targets we designated with near-instantaneous lethality," he added.

The Laser Weapon System (LaWS) temporarily installed aboard the guided-missile destroyer USS Dewey (DDG 105) in San Diego, CA is a technology demonstrator built from commercial fiber solid-state lasers. LaWS can be directed onto targets from the radar track obtained from a MK 15 Phalanx Close-In Weapon system or other targeting source.

The Navy already has demonstrated the effectiveness of lasers in a variety of maritime settings. In a 2011 demonstration, a laser was used to defeat multiple small boat threats from a destroyer. In 2012, LaWS downed several unmanned aircraft in tests.

Working under the ONR Quick Reaction Capability program, a team of Navy engineers and scientists upgraded LaWS and proved that targets tracked with a Phalanx Close-In Weapon can be easily handed over to the laser's targeting and tracking system.

The result is a weapon system with a single laser weapon control console, manned by a surface warfare weapons officer aboard USS Ponce who can operate all functions of the laser-and if commanded, fire the laser weapon. Using a video game-like controller, that sailor will be able to manage the laser's power to accomplish a range of effects against a threat, from disabling to complete destruction.

The deployment on USS Ponce is crucial as the Navy continues its push to provide laser weapons to the fleet at large.

Data regarding accuracy, lethality and other factors from the Ponce deployment will guide the development of even more capable weapons under ONR's Solid-State Laser - Technology Maturation program.

Under this program, industry teams led by Northrop Grumman, BAE Systems and Raytheon have been selected to develop cost-effective, combat-ready laser prototypes that could be installed on vessels such as guided-missile destroyers and the Littoral Combat Ship in 2016. ■

Mortar Making Saves Money, Improves Precision

The U.S. Army is seeking to implement a new mortar manufacturing process to provide improved weapons at a lower cost.

The Army introduced a nickel super-alloy called Inconcel to produce mortars in 2008, but its properties make it challenging to manufacture. Researchers have been working on an alternative method to overcome the difficulties, said Chris Humiston, a mechanical engineer with the Armament Research, Development and Engineering Center at Watervliet Arsenal, NY.

Current processes to manufacture 60mm mortar tubes rely on traditional mechanical cutting and grinding of material to achieve the required geometry, he said. Tough materials that are good for weapons are inherently difficult to machine. Inconcel is becoming more common because of its high strength, corrosion resistance and high survivability in extreme environments.

It's difficult to machine because it's a strong, tough material that has a very high temperature resistance. When you cut it with conventional tools, you get a high amount of tooling wear. It can lead to deficiencies in the component.

"Since the tube is thin-walled, during the machining process, we would get a large amount of residual stress in the wall of the tube. Occasionally it would cause the tube to go out of round, and the part would have to be scrapped," said Humiston.

The team at ARDEC turned to electrochemical machining technology (ECM) as a potential solution. General Electric developed and patented an electro-erosion process called Blue Arc for the production of aircraft engines. ARDEC partnered with GE, licensed the technology and adapted it for use on mortar manufacturing.

"We were looking for an alternative manufacturing process that would not have any of these issues that would contribute to the deficiencies in production. The ECM process reduces the manufacturing variability, which increases the precision of the rounds. This allows for a more consistent process," Humiston said. ■

Smart Grenade Attacks Behind Barriers, Walls

The Small Arms Grenade Munition (SAGM) round — a 40mm counter-defilade, air-bursting grenade designed for both the M203 and M320 launchers — will undergo evaluation in July 2015.

The SAGM allows a soldier to target an enemy who is protected behind a barrier and have the munition explode, in the air, above the target. The SAGM does not require the soldier to conduct any kind of pre-fire programming sequence. The soldier aims the weapon and fires, and the round detects where a wall is and then explodes, in the air, after passing the wall.

The SAGM round has been under development by the Joint Service Small Arms Program at the U.S. Army Armament Research, Development and Engineering Center, or JSSAP-ARDEC since early 2012. ARDEC says that if the SAGM round is successful in the demonstration, it will transition to Project Manager-Maneuver Ammunition Systems, or PM-MAS, by the end of fiscal year 2015 for integration into an official Army program of record.

The weapon is similar to the effects of the XM-25 weapon, which is already in development by the Army. The XM25, a direct-fire weapon, launches a programmable air-burst round that determines the distance it must travel. The system includes the weapon, ammunition rounds, and fully-integrated day/night fire control. SAGM is indirectly fired.

The Small Arms Grenade Munition round, a 40mm counter-defilade, air-bursting grenade designed for both the M203 and M320 launchers.

SAGM senses defilade or walls or anything that somebody will be hiding behind and detects it without the need of a laser range finder.

A 10-person engineering team is integrating the fuse in the SAGM with other technology components so that when the time comes, the system will demonstrate the appropriate level of technology readiness to be accepted by PM-MAS. ■

Advanced Guidance for Tomahawk

A synthetically guided Tomahawk cruise missile successfully hit its first moving maritime target Jan. 27 after being launched from the USS Kidd near San Nicolas Island in California.

The Tomahawk Block IV flight test demonstrated guidance capability when the missile in flight altered its course toward the moving target after receiving position updates from surveillance aircraft.

Navy Capt. Joe Mauser, Tomahawk Weapons System program manager, said "the test demonstrated the viability of long-range communications for position updates of moving targets. This success further demonstrates the existing capability of Tomahawk as a netted weapon, and in doing so, extends its reach beyond fixed and re-locatable points to moving targets."

The Naval Air Warfare Center Weapons Division (NAWCWD) team leveraged existing Tomahawk strike communications frameworks to develop this solution. This joint venture between NAWCWD at China Lake, PMA-280 and Raytheon Missile Systems received major contributions from the Office of Naval Research Advanced Sensors Technology Program and the surface warfare centers at Dahlgren, VA and Port Hueneme, CA.

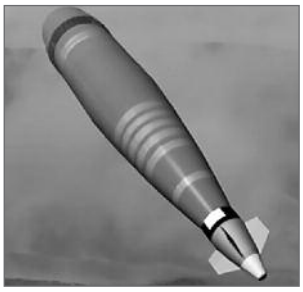
Advanced Tomahawk Under Test

Scott O' Neil, NAWCWD executive director, said "this is a project that increases warfighting capability, reduces cost and can be added to other existing technologies out in the field." ■

155mm Artillery Projectile Now Precision Weapon

ATK says the Artillery Precision Guidance Kit (PGK) has passed First Article Acceptance Tests for both performance and safety during testing recently conducted at Yuma Proving Grounds in Arizona. Having passed the acceptance testing, PGK is now approved for low-rate initial production.

The PGK transforms existing, conventional artillery projectiles into precision weapons that can significantly reduce dispersion to 30 meters or less, enabling precise targeting, while also reducing engagement time.



155mm Artillery PGK

Dan Olson, vice president and general manager of ATK's Armament Systems division, said "we have now proven this technology's performance and safety during rigorous acceptance testing."

PGK is a guidance fuze that fits within the fuze well of 155mm high explosive artillery projectiles and performs in-flight course corrections to enable significantly improved precision, greatly reducing artillery dispersion.

During the testing, PGK demonstrated consistent, reliable performance in both extreme heat and cold environments. Additionally, PGK-fuzed rounds were fired from both the M109A6 Paladin 155mm Self-propelled Howitzer and the M777A2 155mm Lightweight Towed Howitzer to ensure consistent performance across platforms.

In March 2013, PGK proved its capability to deliver precision fires for soldiers when it was fielded via an urgent materiel release to U.S. Army and Marine Corps artillery units for training and tactical operations in Afghanistan.

PGK also is compatible with current 155mm artillery stockpiles and provides an accurate, responsive and flexible capability to reduce dispersion normally experienced with today's conventional inventories.

During a September 2014 demonstration, PGK proved its compatibility and performance with the German Army's DM111, 155mm round fired from their self-propelled howitzer, PzH2000. During this demonstration, PGK delivered 90 percent of rounds fired within five meters accuracy of the target positioned 27 kilometers from the gun position.

ATK also has proven that PGK technology commonality in terms of application and manufacturing processes provides a scalable and affordable precision capability to multiple conventional platforms. Previously, ATK has proven this concept with standard mortar munitions. ■

News Briefs

$78M Contract For ATACMS Modernization

Lockheed Martin recently received a $78 million contract from the U.S. Army for upgrades to the Army Tactical Missile System (ATACMS).

The program will take hardware from early-production ATACMS Block 1 missiles and develop an enhanced and affordable weapon system capable of eliminating targets without the risk of unexploded ordnance, which meets the U.S. Army's long-range precision strike requirement. The program's first phase will include flight tests, followed by production beginning in 2016.

As the U.S. Army's only tactical long-range precision strike surface-to-surface weapon, ATACMS provides critical military capabilities. More than 560 ATACMS missiles have been fired in combat and the system has demonstrated extremely high rates of accuracy and reliability. Each ATACMS missile is packaged in a Guided Missile Launch Assembly pod and is fired from the Multiple Launch Rocket System (MLRS) family of launchers. Lockheed Martin has produced more than 3,700 ATACMS missiles. ■

FY16 Budget Request Targets Modernization

President Barack Obama's fiscal year 2016 budget request for the Defense Department is strategy-driven and resource-informed, and will meet the 21st century national security needs of the U.S., said Deputy Defense Secretary Bob Work.

The Pentagon's request for FY 2016 is $534 billion, $36 billion above FY 2016 sequestration caps. In addition to the base budget, DoD is

Deputy Defense Secretary Bob Work and Navy Adm. James A. Winnefeld Jr., vice chairman of the JCS, discuss the president's fiscal year 2016 budget request during a news conference at the Pentagon.

requesting $51 billion in overseas contingency funds to support the drawdown in Afghanistan and continue forward operations in the U.S. Central Command area of responsibility.

"At the requested levels," Work said, "we believe quite strongly that this budget is the best balance of ends, ways and means that we could possibly achieve, given the level of resources."

The defense strategy as outlined in the 2014 Quadrennial Defense Review calls for a joint force to defend the nation, conduct a partner-centric global counter-terrorism campaign and to operate forward in multiple theaters, Work said. "This is a strategy that is designed to preserve U.S. global leadership and to help preserve global peace in the 21st century," the deputy secretary said.

Modernization is protected under the budget with DoD buying 57 Joint Strike Fighters, for $10.6 billion; 16 Navy P-8 aircraft, for $3.4 billion; and five E-2D aircraft for $1.3 billion.

The budget puts $1.2 billion into development of the long-range strike capability. There is $821 million put toward MQ-9 Reaper remotely piloted aircraft.

The budget funds two Virginia-class submarines, two DDG-51 destroyers and three littoral combat ships. It also provides $678 million toward the overhaul of the aircraft carrier USS George Washington. The Army gets $4.5 billion for helicopter modernization.

By major funding group, procurement is set at $107.7 billion and Research, development, test and evaluation is set at $69.8 billion. ■

New Standoff Missile for F-35

Roketsan and Lockheed Martin late last year signed a teaming agreement for collaboration on the SOM-J, a new generation air-to-surface Standoff Cruise Missile for the F-35 Lightning II .

The SOM system will be an autonomous, long-range, low-observable, all-weather, precision air-to-surface cruise missile. The SOM-J variant is tailored for internal carriage on the F-35 aircraft. The companies will jointly develop, produce and market it. ■

G-CLAW Achieves Successful Live-Fire Demo

Textron says its G-CLAW precision-guided weapon successfully completed a live-fire demonstration recently at the U.S. Army's Yuma Proving Ground in Arizona. The GPS-guided G-CLAW struck within four meters of the designation spot and detonated on the target as intended, proving the weapon's guidance, warhead and its fuzing capability.

G-CLAW is a lightweight precision guided glide weapon with a scalable blast fragmenting warhead designed to be highly effective against vehicle and personnel targets.

The Textron Systems team demonstrated G-CLAW by dropping it from an altitude of 10,000 feet out

G-CLAW

of a Cessna Caravan aircraft equipped with a U.S. Special Operations Command (USSOCOM) Common Launch Tube (CLT) dispenser.

Textron Systems Weapon & Sensor Systems is conducting G-CLAW testing and development as part of a Cooperative Research and Development Agreement (CRADA) with the USSOCOM Program Executive Office (PEO) Fixed Wing.

G-CLAW incorporates a Height of Burst sensor for optimal effects against a broad target set. It can be integrated onto an array of aircraft including Unmanned Aerial Vehicles and light attack aircraft. ■

Boeing Laser Demonstration Successful

Boeing and the U.S. Army have proven the capabilities of the High Energy Laser Mobile Demonstrator (HEL MD) in maritime conditions, successfully targeting a variety of aerial targets at Eglin AFB in Florida.

HEL MD

"Under windy, rainy and foggy weather conditions in Florida, these engagements were the most challenging to date with a 10-kilowatt laser on HEL MD," said Dave DeYoung, Boeing Directed Energy Systems director.

In these recent demonstrations, HEL MD used a 10-kilowatt, high energy laser installed on an Oshkosh tactical military vehicle. The demonstrator is the first mobile, high-energy laser, counter rocket, artillery and mortar (C-RAM) platform to be built and demonstrated by the U.S. Army.

Throughout the two series of demonstrations, Boeing achieved all performance objectives on schedule, successfully engaging more than 150 aerial targets including 60 mm mortars and unmanned aerial vehicles. The next step will be to install a 50 or 60-kilowatt laser on HEL MD to demonstrate counter RAM and UAV capability at this tactically significant power level. ■

F/A-18 Super Hornet IRST System OKed for Production

The F/A-18 Super Hornet infrared search and track (IRST) system, developed and integrated by Boeing and Lockheed Martin, has received approval from the U.S. Navy to enter low-rate initial production. IRST is expected to deploy on the F/A-18 Super Hornet in 2017.

The IRST system consists of Lockheed Martin's IRST21 sensor, the GE Aviation FPU-13 Fuel Tank Assembly and the Meggitt Defense Industry Environmental Control unit. The system demonstrated its production readiness through a series of extensive assessments and reviews, including flight tests.

The long-range IRST21 sensor uses infrared search and track technology to detect, track and enable the Super Hornet to engage threats with air-to-air weapons.

IRST

In addition to detecting airborne threats, IRST significantly enhances multiple target resolution compared to radar, providing greater discrimination of threat formations at longer ranges. Data from the IRST21 sensor is fused with other on-board F/A-18 sensor data to provide maximum situational awareness to the warfighter.

JASSM-ER Production

The U.S. Air Force has approved full rate production for Lockheed Martin's Joint Air-to-Surface Standoff Missile – Extended Range (JASSM-ER).

JASSM-ER successfully completed U.S. Air Force Initial Operational Test and Evaluation (IOT&E) flight testing in 2013.

Armed with a dual-mode penetrator and blast-fragmentation warhead, JASSM and JASSM-ER cruise autonomously day or night in all weather conditions. Both missiles share the same powerful capabilities and stealthy characteristics, though JASSM-ER has more than two-and-a-half times the range of the baseline JASSM for greater standoff margin. These 2,000-pound cruise missiles employ an infrared seeker and Global Positioning System receiver to dial into specific target aim points.

JASSM and JASSM-ER are critical weapons for the USAF. Extremely effective against high-value, well-fortified, fixed and relocatable targets, the stealthy JASSM-ER is integrated on the USAF's B-1B. JASSM is integrated on the USAF's B-2, B-52, F-16, F-15E, and internationally, on the Royal Australian Air Force's F/A-18A/B.

More than 1,500 JASSM cruise missiles have been assembled for testing and operational use toward a total USAF objective of 4,900. ■

Network-Enabled Weapon Completes Developmental Test

The Navy successfully completed integrated test and evaluation of its first maritime, network-enabled weapon, the Raytheon Joint Standoff Weapon (JSOW) C-1, Jan. 7 at the Sea Range at Point Mugu, CA.

The final developmental free flight test of the JSOW C-1 demonstrated the weapon's effectiveness against maritime moving targets, an essential capability to support the Navy's anti-surface warfare mission.

"Our capability to employ networked precision strike across our kill chains and engage in offensive anti-surface warfare is key to maintaining our strategic dominance," said Capt. Jaime Engdahl, the Navy's Precision Strike Weapons (PMA-201) program manager.

JSOW C-1

An update to the JSOW-C, the C-1 variant incorporates a two-way strike common weapon datalink enabling a moving maritime target capability. It is equipped with an imaging infrared seeker and an autonomous target capability to attack targets with precision accuracy.

The weapon is slated for delivery to the fleet in 2016 after the successfully completion of operational testing. ■

Pentagon Tests NextGen Anti-Ship Missile

The Navy, Air Force and Defense Advanced Research Projects Agency completed a successful test of the Long-Range Anti-Ship Missile (LRASM) Feb. 4, marking a significant step in maturing key technologies for the future operational weapon system.

The joint-service team, known as the LRASM Deployment Office (LDO), conducted the test to evaluate LRASM's low-altitude performance and obstacle avoidance as part of the program's accelerated development effort.

"We are very pleased with how LRASM performed today and we are looking forward to continuing integration efforts on the Air Force B-1, followed by our Navy F/A-18, over the next few years," said Navy Capt. Jaime Engdahl, the LDO's Navy program manager.

During the flight from the Sea Test Range in Point Mugu, CA, a B-1 bomber released the LRASM, which navigated a series of preplanned waypoints to verify aerodynamic performance. In the final portion of the flight the missile detected, tracked and avoided an object that was deliberately placed in the flight pattern to demonstrate its obstacle avoidance algorithms.

LRASM being loaded onto B-1

Since completing two successful test flights in 2013, LRASM has rapidly transitioned from a DARPA demonstration to a formal, U.S. Navy program of record, with fielding set for 2018.

Lockheed Martin is developing LRASM as an air-launched offensive anti-surface warfare weapon to counter the growing maritime threats in an Anti-Access/Area Denial (A2/AD) environment. ■

CALENDAR OF EVENTS

Precision Strike Annual Review (PSAR-15)

Date: March 17-18, 2015

Theme: *Achieving Dominance through Technological Innovation*

Location: Waterford at Springfield, Springfield, VA

Precision Strike Technology Symposium (PSTS-15)

Date: Oct. 27-29, 2015

Theme: *Precision Strike Priorities to Meet Global Challenges*

Location: Johns Hopkins University/Applied Physics Laboratory – Laurel, MD

This symposium will be conducted at the SECRET//NOFORN Classification Level

Sponsorships and exhibit opportunities available for all events—for more information email info@precisionstrike.org or visit our website: www.precisionstrike.org

PSAR-15, Continued from page 1

Mrs. McFarland will focus on ***Better Buying Power 3.0*** and she will highlight acquisition opportunities in meeting precision strike challenges in the new strategic environment. Representative Wittman is expected to present the congressional perspective on Acquisition Improvements and Reforms that is the focus of the House Armed Services Committee, and he will discuss pertinent initiatives for improvement that are on-going in the HASC. Al Shaffer will address the development of new technologies for emerging capabilities, and he will talk about the science and technology required for emerging capabilities to promote innovative concepts and investments in critical technological modernization. Rear Admiral Darrah—new PEO for Strike Weapons—will join us for the first time and will kick off the Review on Opening Day by presenting his vision of precision strike opportunities.

They are four of a host of numerous leadership visionaries and strategy experts who will talk about the Administrations' priorities, policies and strategies that impact precision engagement to help us better define the future of precision strike. Other wide-ranging focus areas will provide an in-depth look into specific topics and will showcase critical challenges related to ***National Military Strategy, SOF Persistent Operations in Support of Precision Engagement, Program Protection & Cyber Security Challenges, Vertical Program Management, Area Effects Munitions, Precision Weapons Testing Challenges, Capabilities Gap Assessment Process, and M-Code GPS for Precision Guided Munitions.***

Further, the Military Departments and the International arena will present several key topics during precision weapons sessions and **Keith Webster** will focus on ***OSD's Direction for International Cooperation***. Additionally, **Rear Admiral Randy Mahr**—Deputy PEO for the F-35—will brief ***Precision Strike Aspects of the Joint Strike Fighter***. Also, many of you will be delighted that Peter Huessy will enlighten us with his perspective on the ***Broken Window Theory of National Security Policy***.

A special feature of PSAR-15 will be the presentation of the **William J. Perry Award** to a very deserving individual who has made significant contributions to the development and support of precision strike systems that have led to the strengthening of our vial national security interests.

Please review page 15 of this Digest for a snapshot of major topics to be addressed at PSAR-15. ■

And the Winner is…..

The Precision Strike Association is pleased to announce that the 2015 William J. Perry Award winner is Dr. Paul Kaminski, former Chairman of the Defense Science Board.

The Perry Award recognizes public or private sector leadership or achievement that results in significant contributions to the development, introduction or support of precision strike systems. It is named after the former U.S. Defense Secretary and precision strike weapons advocate.

Dr. Kaminski has made major and enduring contributions that have led to the strengthening of our national security by direct application of precision strike capabilities to DoD systems and to the enhancement of our industrial technology base for application to precision strike technology.

Dr. Kaminski is currently Chairman and Chief Executive Officer of Technovation, Inc., a consulting company dedicated to fostering innovation and the development and application of advanced technology.

From 1994 to 1997, Dr. Kaminski served as the Under Secretary of Defense for Acquisition and Technology. In this position, he was responsible for all matters relating to DOD acquisition, including research and development, procurement, acquisition reform, dual-use technology, and the defense technology and industrial base.

Dr Kaminski will be presented the Nineteenth Annual William J. Perry Award at a special Precision Strike Annual Review (PSAR-15) luncheon on Tuesday, March 17, 2015.

Please plan to join us!

PRECISION STRIKE ANNUAL REVIEW (PSAR-15)

17-18 March 2015

Waterford at Springfield – Springfield, VA

Theme: ***Achieving Dominance through Technological Innovation***

Confirmed Key Leadership Speakers Include

Honorable Katrina McFarland – ASD (Acquisition)
Representative Rob Wittman – R-1st District, VA
Alan Shaffer – Principal Deputy ASD, R&E
Keith Webster – Director, International Cooperation, OUSD(AT&L)
Paul Manz – Chief Scientist, PEO Ammo, Picatinny Arsenal
Rear Admiral Randy Mahr, USN – Deputy PEO for the F-35
Rear Admiral Mark Darrah, USN – PEO for Strike Weapons
Peter Huessy – President, Geostrategic Analysis

Showcasing

Moving Forward in the New Strategic Environment
Precision Strike Opportunities & Key Military Strategy Challenges
Innovation & S&T for Emerging Capabilities
Broken Window Theory of National Security Policy
Military Departments & International Precision Weapons Sessions
Congressional Perspectives on Acquisition Improvements
Better Buying Power 3.0
SOF Persistent Operations in Support of Precision Engagement
Program Protection & Cyber Security Challenges
Precision Strike Aspects of the Joint Strike Fighter
Precision Weapons Testing Challenges—Ranges, Training, M&S, Costs
Capabilities Gap Assessment Process
M-Code GPS for Precision Guided Munitions
Area Effects Munitions
Vertical Program Management

Special Highlight

Presentation of 19th Annual William J. Perry Award

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The Precision Strike Digest is an important vehicle for the Precision Strike Association to share information and to engage in discussion. You have an opportunity to share your passion about a particular Precision Strike topic. *The Precision Digest* is published three times a year. Please contact PSA Chair for Communication John Sordyl (jsordyl@williams-int.com), if you would like to have an article included in *The Precision Strike Digest*.

Membership Application – Precision Strike Association

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