WAVES

April 2014

The official online publication of the Naval Surface Warfare Center, Carderock Division

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The Maneuvering and Seakeeping Basin (MASK) facility during the ribbon-cutting ceremony, Dec. 19, 2013 (U.S. Navy photo by Ryan Hanyok/Released).

FROM THE TOP

Capt. Richard Blank NSWC Carderock Division Commander

This month we celebrate Earth Day. The April 22nd Earth Day, founded by Sen. Gaylord Nelson of Wisconsin, was first organized in 1970 to promote ecology and respect for life on the planet, as well as to encourage awareness of the growing problems of air, water and soil pollution. The Navy prides itself on being a good steward of the environment. I'd like to focus this article on our engineers and scientists here at Carderock who contribute in large measure to that stewardship by providing the fleet with the tools and technology necessary to meet strict environmental standards.

The Environmental Quality Division develops and implements on-board and pierside pollution prevention, waste management and safety processes and systems, including radiation detection technologies and personal dosimetry. Their efforts include concept development, research, development, testing and evaluation, equipment selection, acquisition, logistics support, maintenance, repair and disposal.

Hundreds of Carderock men and women have made contributions to the warfighter and continue to build a more affordable future fleet. Ten from the Environmental Quality Division are featured below.

Tina Lerke, NSWCCD chemical engineer and technical area leader of Code 63, has 14 years of service with Carderock and is leading RDT&E in shipboard non-oily wastewater treatment for the Navy. She is a recognized technical expert on marine sanitation devices (MSD) and international and domestic environmental regulations and standards, and has led many MSD evaluations. She also has led shipboard and pierside studies to optimize shipboard wastewater simulation in the laboratory. She recently expanded the Carderock laboratory wastewater simulation capabilities to include forward operating base wastewater treatment, leading the evaluation of U.S. Army treatment systems at Carderock.

Jim Mann, NSWCCD mechanical engineer of Code 634, has 14 years of service with Carderock and provides evaluation, testing and analysis of shipboard solid waste and thermal destruction equipment to allow the fleet to meet the environmental regulations with minimum Sailor effort and life-cycle cost. He currently contributes to the program to provide a suite of equipment to allow the future LX(R) class to process and store solid waste for 30 days because only food waste will be allowed to be discharged overboard.

Jim Higgins, NSWCCD mechanical engineer, has 15 years of service with Carderock. He leads strategic planning efforts for the full spectrum of technologies and processes in the Environmental Quality Division, serving as the Division's technical interface with principal NAVSEA sponsors, and manages tasking for the NAVSEA technical warrant holder. He recently expanded his role by becoming the engineering manager for the technical warrant holder for ozone-depleting substances (ODS), engine air emissions and oil-spill prevention initiatives, and was named chair of the ODS Subcommittee under the DOD Clean Air Act Services Steering Committee.

Paul Schwegler, NSWCCD mechanical engineer and technical area leader of Solid Waste Systems and Incineration Group, Code 6350, has 15 years of service with Carderock. He supports in-service engineering agent for solid waste systems providing full-spectrum support necessary to equip Navy ships and shore operations with solid waste management, and discharge procedures, equipment and systems that are best suited and/or designed to meet the requirements of the warship environment. He provided the project management to develop, test and back-fit the surface fleet with more than 300 MOD I plastics waste processors on approximately 140 ships.

Rita Schuh, NSWCCD environmental engineer and the technical area leader for ballast water management and uniform national discharge standards (UNDS), Code 633, has 18 years of service with Carderock. She is responsible for RDT&E regulations development and implementation and procedure development for environmental requirements for U.S. Armed Forces vessels, and for treatment systems and technologies involving ballast water exchange and treatment. Schuh began working at Carderock's Environmental Quality Division developing suites of pollution prevention equipment designed to reduce the life-cycle cost of hazardous materials to the fleet.

Kiet Ung, NSWCCD scientist with the Hazardous Material Control and Management/Pollution Prevention RDT&E Group, has 18 years of service with Carderock. He currently manages and directs a diverse range of R&D projects in the areas of hazardous material elimination/minimization and pollution prevention afloat. He also supported the development of the submarine hazardous material inventory and management system (SHIMS), a software application designed to assist the submarine force in meeting Chief of Naval Operations/NAVSEA/submarine type commander/hazardous material control and management requirements.

Karen Schull, NSWCCD chemical and environmental engineer, Code 635, has 21 years of service with Carderock leading efforts to improve the safe storage and handling of shipboard hazardous materials by identifying material with less hazardous properties and improving storage requirements to account for unique shipboard conditions. She also developed and championed equipment improvements to shipboard oil pollution abatement systems.

Stephan Verosto, NSWCCD mechanical engineer and liquid waste RDT&E manager, Code 63, has 24 years of service with Carderock and is currently leading research efforts in liquid waste management and treatment, including oily, blackwater, greywater and ballast water science, as well as a legislative program to develop uniform liquid waste discharge standards for the U.S. Armed Forces, jointly executed with the Environmental Protection Agency (EPA). Verosto has conducted research and scientific investigations in the areas of pollution prevention (P2), hazardous material and waste management and liquid waste management.

Ramon Morales, NSWCCD environmental engineer of Code 63, has 27 years of service with Carderock and is leading efforts to ensure that Navy and other U.S. Armed Forces ships meet oil pollution environmental compliance. He established the Oil Content Monitor Technical Support and Calibration Program to ensure that oil content monitor systems installed on board Navy ships and other U.S. Armed Forces, including the Army, the Coast Guard, and Military Sealift Commands (MSC), are properly maintained, calibrated and modified as required for fail-safe operation and to meet present and future environmental regulations. No illegal overboard discharge of oily wastewater has been reported since the program was established.

Mary Jo Bieberich, NSWCCD Environmental Quality Division branch head and chemist, Code 6301, has 35 years of service with Carderock. She manages and executes programs in shipboard hazardous material minimization and pollution prevention and more recently in ship system safety and radiation safety.

As Carderock Division's past has shown, the technical excellence conducted by our Carderock Division men and women will continue to shape the Navy of tomorrow and sustain our core mission capabilities for generations to come.

I encourage you to reach out to these subject-matter experts to learn more about their technical contributions to the warfighter. If you have questions or concerns, you can submit them to my captain's All-Hands email at NSWCCD_Leadership.

FROM THE TOP

Capt. Walter A. Coppeans III NSWCCD-SSES Commanding Officer

At the beginning of March, I had the privilege to attend the Commissioning of USS SOMERSET (LPD 25) at Penn's Landing. This is the third ship of the class named in honor of the many victims of 9/11 terrorist attacks. The Somerset honors the 40 crew members and passengers of United Airlines Flight 93 who prevented an attack on our Nation's capital. Somerset County in rural central Pennsylvania is where the plane crashed shortly after those now famous words, "Let's Roll!" were uttered by one of the passengers in their valiant refusal to be victimized by terrorists. Those words are now proudly emblazoned on the helicopter hangar door of the ship.

It was great to be at the ceremony and know that NAVSSES played a huge role in getting the ship to her day of Commissioning. From Navigation systems on the bridge, to Main Engines, cargo weapons handling, controls, environmental systems, coatings and everything in between the bow and stern – our people helped bring that ship to life for the Navy! You should be rightfully proud of your efforts – the Ship looked fantastic! I know many of you took advantage of the rare opportunity to attend the ceremony or just take a public tour of the Somerset while she was moored here in Philadelphia. I hope you all came away with a great appreciation for the outstanding work you do in support of our Sailors and Marines.

Coming up in late April, we will have another opportunity to show members of your families what you do when we participate in Take Our Daughters and Sons to Work Day. The national theme for this year is "Plant a Seed, Grow a Future." This day inspires future generations of girls and boys by helping bring them into the workplace to explore the many life choices they have. This is our opportunity to plant the STEM seed with our children as we show them the fantastic things we do at NAVSSES. We are inviting children ages 8-18 to come to work with their mothers and fathers on April 24. I highly encourage everyone to participate in the exciting opportunity! Even if you do not have children, I would ask you to please consider volunteering for this event – this is a great way for you to learn more about the organization and make richer connections within the NAVSSES family.

We also have the annual Greater Philadelphia SeaPerch Challenge April 25-26 coming up. Many of our employees help organize this competition for middle and high school students each year. Others serve as mentors to competing schools, and some help out as judges. I am looking forward to being poolside this year and taking in all the excitement and atmosphere as our future engineers and leaders compete to see whose robot will be the best!

April will be another exciting month at NAVSSES! As always, be safe in all you do!

USS Somerset (LPD 25) Commanding Officer Capt. Thomas Dearborn extends thanks to his crew for their efforts throughout the construction of the ship after officially assuming the title as the ship's CO following the commissioning of the amphibious transport dock March 1. The Somerset's namesake recognizes the heroic actions of the 40 passengers and crew of United Airlines Flight 93 on Sept. 11, 2001 who sacrificed their lives to thwart a terrorist attack bringing down their would be hijackers and plane in a field in Somerset County, Pa. saving countless innocent lives in the process (U.S. Navy photo by Chief Mass Communication Specialist Peter D. Lawlor/Released).

TECHNICAL DIRECTOR'S CORNER

Dr. Joseph T. (Tim) Arcano Jr. NSWC Carderock Division Technical Director

To ensure that whatever entity they lead – be it a large corporation, a medium-sized division, or a small team — good leaders do everything they can to encourage potential successors and embrace their development and success – thus, knowingly or not, they prepare to leave a legacy.

Many of these individuals were fortunate – as was I – to have not only one, but many mentors throughout my career – mentors who not only showed me how to do the job at hand, but who also played a part in the development of MY core values, which shape the way I behave, live, and handle responsibility.

A dictionary definition of "mentor" is a "wise and trusted guide" and I was fortunate to have wise and trusted people watching out for me, and evaluating me, and nudging me where I needed it! These people provided insight, guidance, and constructive candid advice.

One of the earliest mentors in my naval engineering career was the legendary submarine designer, the late CAPT Harry Jackson. When I was stationed in Groton, CT, CAPT Jackson took me under his wing, spending numerous hours discussing the finer points of submarine design and how I could serve the future sailor as a naval engineer. He conveyed to me the need for technical excellence and due diligence as a naval engineer based on his convictions resulting from the tragic loss of the USS THRESHER (SSN 593), for which he had played a major role in the class design.

Another mentor was Mr. John Leadmon who had played significant roles in the designs of the Los Angeles Class, the OHIO Class, the SEAWOLF and the VIRGINIA Class submarines. Mr. Leadmon always had the highest standards of excellence in design and engineering, always encouraging the highest level of due diligence. He and I spent myriad hours in discussion and he was always there when I needed advice, especially during challenging issues, though he always expected and allowed me to make my technical decisions.

Another of my mentors was Vice Admiral Paul Sullivan, NAVSEA's 41st Commander of the Navy's largest Echelon II Command, from July 2005 until August 2008. Admiral Sullivan was the toughest of all on me, also demanding the utmost in technical excellence and due diligence, but always making the time to talk when we needed to and caring for my development as a naval engineer.

A common thread among all of my mentors was that they cared, they were willing to share their wisdom learned over many years and they always made the time to meet with me. They also had the keen sense to call me out and challenge me when I needed it, but continually encouraged me as well. (Perhaps, this is the start of a list of the attributes of a good mentor!)

As Technical Director and Ship Design Manager for VIRGINIA Class in October 2005, VADM Sullivan and Rear Admiral Kevin McCoy, issued a Technical Authority Warrant to me. This document, which I keep in my office, "entrusted and empowered" me to carry out my responsibilities, but to me it also represented a formal mentoring relationship. It did not circumvent my responsibilities to my operational chain of command, but it did give me the freedom to talk with Admirals McCoy and Sullivan "without fear of administrative repercussion" in issues affecting technical performance, operational readiness, and safety. This ensured that I exercised due diligence in everything I did and I did my best to see that everything we did adhered to a standard of technical excellence, all things that my informal mentors had encouraged me to do. It also gave me the freedom to question anything that I thought did not maintain to the high standards we set or place anyone at risk.

That technical warrant was signed in 2005, but I refer to it often. When I came to Carderock Division, though no longer Ship Design Manager for VIRGINIA Class, I brought a copy of the warrant document and reflect frequently on seven critical competencies. I think it is worthwhile repeating them here, and think of how each applies to us here at Carderock:

- Setting technical standards – as part of myriad Technical Authority Pyramids, Carderock Division has a reputation for technical excellences in setting appropriate standards.
- Technical area expertise – ensuring that we have a mix of people with the right backgrounds and experiences, encouraging our people to pursue additional challenging experiences and education, and offering opportunities to attend professional conferences to hone skills and exchange information, all priorities which we are able to do once again.
- Ensuring safe and reliable operation –this is of utmost criticality for any ship, system or component we design to ensure that the sailors are safe.
- Systems engineering expertise – this is the big-picture design and engineering know-how that helps us develop excellent ships, systems and components, applying appropriate technical requirements.
- Judgment in making technical decisions – being technically excellent isn't enough. We need to use good judgment to ensure we are good enough without going overboard; we must provide our customers with risk-based options when possible. In sum, as per the NAVSEA Strategic Business Plan, we must demand technical excellence AND judiciousness!
- Stewardship of engineering capabilities – this is where the mentoring and investing in the people who do the work comes in. Making sure we have the right people in the right job. But it's not enough to hire good people, we need to mentor their development.
- Accountability and technical integrity – this is all about doing the right thing. We need to follow the rules, but we also need to speak up when we see something that doesn't seem right. Leaders must have an open ear to such concerns, and there must be open and transparent communication at all levels.

For non-technical personnel, I think there are strong business, administration and organizational analogies that apply here as well (e.g., if you remove the word "technical" from the seven attributes).

There are at least six people who continue to mentor me, still providing sage advice; I mentor at least a dozen people, trying to also provide sound advice. Every leader in this organization plays a critical role in mentoring, motivating and encouraging our people.

Even if you are not involved in one-on-one mentoring, you greatly benefit Carderock Division when you work with students who interact through the Science, Technology, Engineering and Mathematics (STEM) program or as interns. Who knows how many students take another look at their potential careers based on hearing one of you talk with enthusiasm and expertise about what you do here? (Talk about leaving a legacy!)

We build a reputation of excellence not only by the quality of the work we do, but most especially by the quality and dedication of the people who work here. Mentoring that has permeated Carderock Division over the years has played a big part in this.

I often say we are living in the future. It's here. No doubt about it. And it gives me great pride to look over my shoulder and see so many talented, capable, and dynamic people right behind me.

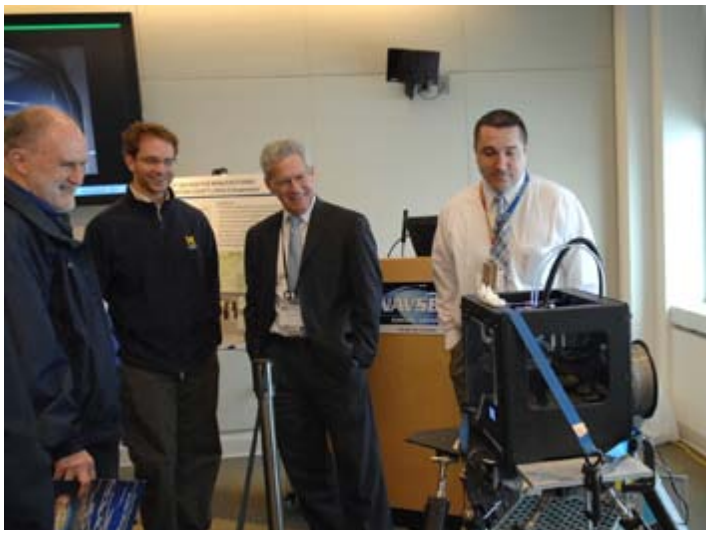
My thanks to you for all you do.

NSWCCD hosts Naval Additive Manufacturing Technology Interchange meeting

By Nicholas Malay, NSWCCD Public Affairs

Naval Surface Warfare Center, Carderock Division (NSWCCD) hosted the first of its kind Naval Additive Manufacturing Technology Interchange (NAMTI) meeting Feb. 25-26 in the Maritime Technology Information Center in West Bethesda, Md.

The Office of Naval Research (ONR 35) sponsored the meeting, which drew nearly 200 participants from industry, academia, the U.S. Navy and other government agencies.



NSWCCD personnel and NAMTI guests gather around the NAMTI additive manufacturing demonstration in the USS Columbia Room Feb. 25 (U.S. Navy photo by Neubar Kamalian/Released).

"There is a distinct need within the Navy to enhance operational fleet readiness, reduce energy consumption and reduce total ownership cost," said NSWCCD Technical Director Dr. Tim Arcano. "Additive manufacturing is a disruptive technology capable of helping to achieve these goals. This meeting will help define the path forward for use of additive manufacturing throughout the component lifecycle, from design to sustainment."

Additive manufacturing is the process of building three-dimensional objects layer by layer using a variety of materials, including structural metals.

"The purpose of this meeting is to accelerate the implementation of additive manufacturing into Navy weapon systems," said Dr. Jennifer Wolk, NSWCCD engineer and event organizer. "We'll assess the state-of-the-art technology, identify the science and technology challenges, and explore approaches to inserting additive manufacturing into naval platforms."

Five breakout areas included design innovations; rapid response and fielding to the warfighter through additive manufacturing; advanced materials, qualification and certification of technology; and materials and life-cycle sustainment. These sessions were facilitated by subject-matter experts from a cross section of the naval community.

The broad goals of the meeting were to:

1. Identify opportunities for additive manufacturing that will enhance operational fleet readiness; reduce energy consumption; and enable parts-on-demand manufacturing by defining the warfighter payoff and enhanced naval capabilities.
2. Facilitate the exchange of expertise in additive manufacturing to promote collaboration and leveraging of Navy resources by identifying existing additive manufacturing naval applications and organizational capabilities. The current state of the technology will be assessed through technology cost-benefit analysis and case studies.
3. Identify additive manufacturing science and technology (S&T) challenges and define the approaches needed to address these challenges. Results will be used to develop a Navy roadmap and S&T investment strategy designed to accelerate the introduction of innovative, high-impact additive manufacturing technology into Navy weapon systems.

The next step is to complete the action plans of the session chairs to be incorporated in the NAMTI strategic planning and roadmapping effect. The NAMTI roadmap deliverable is scheduled to be completed by end of April. NAMTI follow-on planning has begun in two phases: within the next three months planning briefings of the Navy's current additive manufacturing capabilities at the various facilities to provide the naval communities with leverage opportunities, and within six months planning a second NAMTI meeting at NSWCCD to incorporate industry, academia and other agencies' contributions to the five breakout sessions.

Malinda Pagett, ONR Air Vehicle Technologies FNC program officer, said she has received overwhelming feedback that these communities want to collaborate with the Navy on this effort.

While there have been significant advances in additive manufacturing since its inception in the 1980s, successful implementation of additive manufacturing for naval applications requires leveraging available technology, assets and expertise. "Though many technical obstacles remain and need to be explored, many successful case studies demonstrate the value of additive manufacturing and the need for accelerated certification of new materials and processes to meet current component demands," Dr. Wolk said.

John Rice, a systems engineer with NAVSEA Technology Office, said one view of additive manufacturing is that the Navy can create expendable unmanned structures rapidly in theater, which he said "can become a game-changer in irregular and asymmetric warfare."

Dr. Tim Arcano NSWCCD, technical director, welcomes NAMTI guests in the Maritime Technology Information Center Feb. 25 (U.S. Navy photo by Neubar Kamalian/Released).

"This approach can facilitate swarm robotic behaviors by way of rapidly shortening procurement and contracting time," Rice said.

"Until now, making things was capital intensive and required special machines and learning. Additive manufacturing promises to make it so the Defense Department

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Naval Surface Warfare Centers conduct first integrated combat and power system test over secure live network

By Joseph Battista, NSWCCD-SSES Public Affairs

On June 28, 2013, Engineers at Naval Surface Warfare Center Carderock Division – Ship Systems Engineering Station (NSWCCD-SSES) and Naval Surface Warfare Center Dahlgren Division (NSWCDD) completed the first test of an integrated combat and electric power control system over a live, secure network between the two sites. This is the first step in developing a connection capable of on-demand testing of the integrated systems and expanding the distributed laboratory test network to more fully support Total Ship Systems Engineering (combat and hull, mechanical and electrical) during development.

The proof-of-concept tests included more than 300 scenarios where engineers at NSWCDD determined engagement profiles for electric weapons systems. The data was sent over a secure network to a server at NSWCCD-SSES where a software program analyzed the amount of power requested, compared the requested power to the amount of power available, and provided an almost instantaneous response back to NSWCDD indicating whether the power was or was not available to support an electric weapon engagement.

Testing utilized Naval Innovation for Science and Engineering (NISE) funds. The NISE program provides the DoD science and engineering organizations the capability to develop and transition technology, as well as develop the workforce and enhance laboratory facilities and equipment.

NSWCDD is the Navy's expert on emerging electric weapons such as the Laser Weapons System (LaWS), Solid State Laser (SSL), and Electromagnetic Rail Gun (EMRG). Testing and integrating these emerging weapons into advanced Combat Systems requires NSWCDD engineers to know if the electric power on a ship is capable of meeting mission requirements. NSWCCD-SSES is the Navy's expert on ship hull, mechanical, and electric (HM&E) machinery control systems (MCS), which monitor, manage, and control shipboard electric power. NSWCCD-SSES engineers are responsible for the equipment, which determines if the required electrical power to the combat system is available, as well as how to manage and redirect the ship's electric power to accommodate a request.

"Laser and rail gun integration into Navy combat systems represent a new class of weapons, the electric weapons," said Eric Schroeder, combat systems engineer at NSWCDD. "They are 'power elastic' in the sense that their capability is tied to and varies with the amount of power supplied. That's why the connection between combat systems and power systems aboard Navy combatants is so important." This is a paradigm shift from the traditional chemistry based warhead weapons such as missiles and traditional Naval gunnery.

At about 175 miles apart, making the secure connection between the two sites was a barrier, but Schroeder and Matthew Bosack, electrical engineer with Automation and Controls Research and Development Branch at NSWCCD-SSES, were able to link the sites through a secure virtual private network (VPN). Information assurance (IA) managers and network infrastructure personnel at both sites helped ensure IA requirements were fully met.

According to Bosack, the connection between the two Warfare Centers was only open for the duration of sending the information back and forth. Once a scenario was completed, the connection was terminated.

"Our goal in this first phase of testing was to prove we can establish a secure connection between the sites and transmit the data required," said Bosack. "Unfortunately, we only have a short time window for each test, but our goal is to be able to test on demand using a permanent connection."

"The network connection between Dahlgren and Philadelphia sets the foundation for follow-on testing and experimentation as we continue to mature the combat system-to-power system interface," said Schroeder. "By proving that a secure connection can be established, we are opening the door to a wide range of applications that extend beyond supporting electric weapons."

Schroeder said this step toward achieving "total ship systems engineering" through distributed testing began last year when Dahlgren combat system engineers visited Philadelphia machinery control engineers to discuss future power needs and the possibility of interfacing combat and power systems.

Dahlgren previously laid the foundation for distributed testing by establishing local connections at NSWCDD between radars, command and control systems, and weapons.

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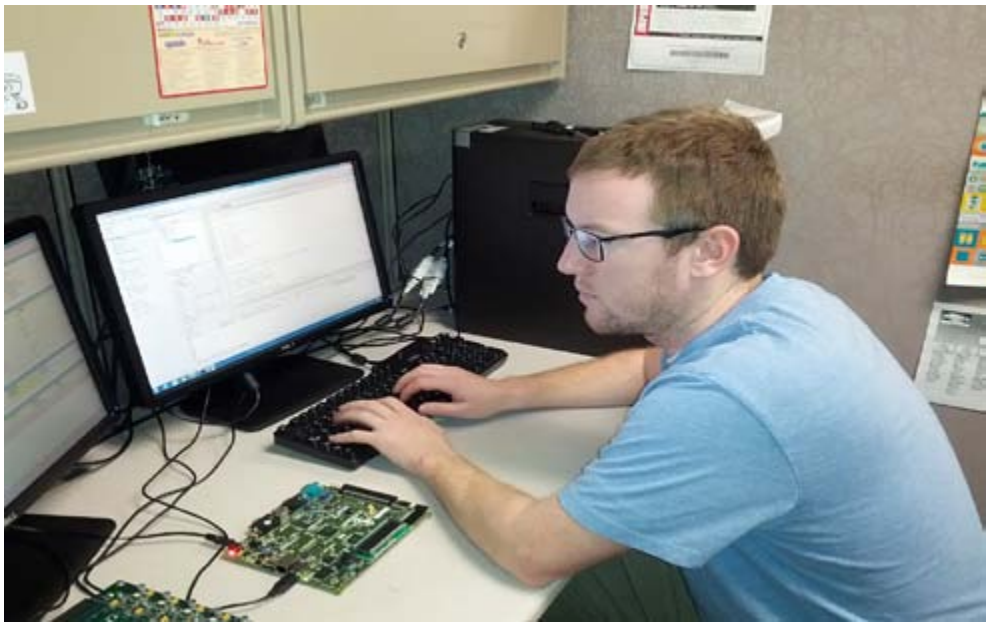

Matthew Bosack, electrical engineer with Automation and Controls Research and Development Branch at Naval Surface Warfare Center Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES) in Philadelphia, works on hardware being used in an upcoming integrated combat and electric power control systems test (Official U.S. Navy photo/Released).

NSWCCD-SSES completes first tests at new submarine buoy tow cable test site

By Joseph Battista, NSWCCD-SSES Public Affairs

Naval Surface Warfare Center Carderock Division – Ship Systems Engineering Station (NSWCCD-SSES) engineers completed the first submarine communications buoy tow cable test at the newly constructed Tow Cable Test Site (TCTS) March 10. The new facility provides the Navy the capability to test and evaluate prototype synthetic and steel electrical, optical, and mechanical cables used in submarine communications buoy systems such as the AN/BRR-6/6B.

"This test site will allow us to learn more about the tow cable failure mechanisms in order to develop better designs for our submarine force," said Jason Delisser, electrical engineer with Antenna Engineering and Sail Systems Branch, who oversaw the construction of the test site. "The tow cable is the most critical component in the system and the one that fails most often. This test site will allow us to understand how and why the cable fails during operation so that we can design out the most common failure modes. The ultimate goal is to significantly improve system reliability."

The AN/BRR-6 and the AN/BRR-6B towed buoy systems provide real-time tactical Command and Control receive-only communications. The AN/BRR-6/6B supports Fleet Ballistic Missile Submarine Strategic Operations for the SSBNs by providing Radio Frequency receive-only communications capability in the Very Low Frequency, Low Frequency and Medium Frequency/ High Frequency bands.

The AN/BRR-6/6B is a towed buoy deployed near the surface while the ship remains below periscope depth. The system allows the SSBNs to receive communications without compromising the ships location by surfacing – providing the least amount of vulnerability risk for the ship and crew. Failure of the BRR-6 system can significantly affect the ability of an SSBN to meet their mission.

The TCTS was funded by PEO C4I PMW 770 Undersea Integration Program Office as part of a Lean Six Sigma (LSS) initiative to increase system reliability.

Similar testing was previously accomplished by only a handful of qualified vendors in the U.S. The addition of this capability to the Navy will reduce costs, test and other lead times, as well as reduce dependence on outside contracting.

"In the past, we had to ship the cables to and from vendors, sometimes waiting several months to a year to receive final test results," said Delisser. "Combined with the high costs, it became apparent that an in house facility would be much more cost effective and allow us to better meet our systems engineering development schedule."

The Tow Cable Test Site (TCTS) incorporates two separate test fixtures - (foreground) the tension test fixture capable of exciting loads up to 25,000 pounds and the Bend Over Sheave (BOS) fatigue test fixture, which utilizes a belt driven actuator to drive a tow cable around a set of two fixed sheaves while under tension in order to assess the bending fatigue life of a cable (U.S. Navy photo by Public Affairs Specialist Joseph Battista/Released).

The Bend Over Sheave (BOS) fatigue test fixture utilizes a belt driven actuator to drive a tow cable around a set of two fixed sheaves while under tension in order to assess the bending fatigue life of a cable (U.S. Navy photo by Public Affairs Specialist Joseph Battista/Released).

This test site can also be leveraged for other systems like towed arrays, mast antenna cables, ROV cables and many more.

The TCTS incorporates two separate test fixtures. The first fixture is a tension test fixture capable of exciting loads up to 25,000 pounds. This test fixture is primarily used to assess the tensile properties of the cable including breaking strength, cable strain and torque balance.

The second fixture is a Bend Over Sheave (BOS) fatigue test fixture. This fixture utilizes a belt driven actuator to drive a tow cable around a set of two fixed sheaves while under tension in order to assess the bending fatigue life of a cable. The bending fatigue life can often be the most important determinant for the expected lifecycle of a tow cable design.

During all mechanical testing the cable core is connected electrically to a dielectric analyzer, and optically to a fiber spectrometer and light source. The dielectric analyzer measures the insulation resistance and continuity of the electrical lines, and the fiber spectrometer measures the continuity of up to two fiber optic lines. Understanding the relationship between the structural component of the cable and the cable core is critical in tow cable design.

One of the most important design aspects for this site was the requirement for safe operation. Delisser recognized this early on.

"We realized that applying high tensions at a fast rate could create potentially dangerous situations for the test operators if all safety measures weren't incorporated in our design."

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DDG 1000 crew completes training on integrated power systems at NSWCCD-SSES

By Joseph Battista and Kate Hogarth, NSWCCD-SSES Public Affairs

The pre-commissioning crew of future USS Zumwalt (DDG 1000) completed training in March 2014 at Naval Surface Warfare Center Carderock Division – Ship Systems Engineering Station (NSWCCD-SSES) where they learned to operate the unique systems of the U.S. Navy's first all-electric ship. This was the first opportunity for the crew to get hands-on experience operating and maintaining the Integrated Power System (IPS).

"The overall objective for the training program is to provide hands-on operational training to the crew on the IPS system. This enables them to become proficient in operating and maintaining the equipment," said Ed Harvey, DDG 1000 IPS Land Based Test Site (LBTS) test manager. "The Navy Program Office and ship's chain-of-command made a significant commitment to bring all of the officers and crew to NSWCCD-SSES for training."

The IPS includes the ability to provide power to propulsion, ship services, and combat system loads from common gas turbine generators. This power flexibility allows for potentially significant energy savings and is well suited to enable future high-energy weapons and sensors.

The crew trained on components including main and auxiliary turbine generators, propulsion motors and drives, dynamic braking resistors, auxiliary control panels, and high-voltage switchboards. They also spent time working with harmonic filters, neutral ground resistors, the Integrated Fight-Through Power System (IFTP), power conversion modules, and the emergency diesel generator.

Equipment operation was conducted at the local control level, as well as the remote supervisory Engineering Control System (ECS). The ECS system provides a significant advancement in machinery control with automation for system transitions and power management to support the reduced manning concept for DDG 1000.

"The systems of the DDG 1000 are totally different than any other ship I've been on," said Electrician's Mate 1st Class Donald Goldsberry, who has served tours on four other ships. "Up to this point it's been all classroom training, so I'm enjoying getting the hands on experience. When you can touch it and operate it with your own two hands you get a better understanding of the equipment."

The DDG 1000 ship class utilizes a smaller crew size, therefore cross-training and inter-division support was an integral part of the training program developed by NSWCCD-SSES engineers, Naval Sea Systems Command Program Office PMS 500L, and Bath Iron Works (BIW).

"You have some top notch folks engineers here," said Lt. j.g. Jesse W. Packard, from Union, Maine. "They are great teachers. Ask them any question and they have the answer. They are a great wealth of knowledge."

"The engineers training us are very knowledgeable," said Machinist Mate 3rd Class Juan Torres from Houston, Texas. "I've learned more in just a few days of training here than I ever did in the classroom."

Sailors from the pre-commissioning crew of the future USS Zumwalt (DDG 1000) train to use the common display system console and engineering control system screen navigation at Naval Surface Warfare Center Carderock Division – Ship Systems Engineering Station (NSWCCD-SSES) in Philadelphia (U.S. Navy photo by Public Affairs Specialist Joseph Battista/ Released).

The crew divided into two training groups. Each group trained for three weeks. Week one included equipment familiarization; review of electrical, mechanical and controls related to the technical manuals; and initial operation of equipment. Week two focused on remote operation with engineering control systems (ECS). Week three concentrated on equipment maintenance, local troubleshooting exercises, and borescope inspection of the MT-30 gas turbine engine.

"It's extremely important to have the knowledge of the ship's capabilities and limitations," said Lt. John Weaver, the ship's weapons officer. "Our operators need to have an understanding of the procedures and maintenance of the ship."

Harvey said the goal is to transfer as much equipment knowledge, experience and lessons learned from his team of engineers to the crew so they are ready to handle any situations that might arise when they set sail.

The LBTS test team, who conducted the training, is comprised of engineers and technicians from various NSWCCD-SSES branches. They are Joe Kingsley and Jack Goodwin from Auxiliary Ships/Acquisition Support Branch; Kevin McMaster, Neil Hiller, Kosmas Yiantsos, and Tom Liolios from Advanced Electrical Power Systems Branch; Pat Kane from 2S Cog/Gas Turbine Life Cycle Support Branch; Carl Rosenbusch from Machinery Information Systems Technology Branch; and Joseph DiStefano, Charles Clapp and Jim Pensabene from Major Programs Branch.

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NSWCCD's Maneuvering and Seakeeping Basin in the news

The Maneuvering and Seakeeping (MASK) Basin is featured in the most recent issues of SeaPower Magazine (April 2014) and Popular Mechanics (April 2014). Link to the SeaPower article here:
http://www.seapower-digital.com/seapower/april_2014#pg84

(U.S. Navy photos by Nicholas Malay/Released)

NBC 4 Storm Team's Doug Kammerer, features Naval Surface Warfare Center, Carderock Division's MASK Basin on March 28 and again March 29. For further details and video footage:
http://www.nbcwashington.com/video/#!/weather/Massive-Indoor-Ocean-Prepares-Ships-For-Sea/252689611

NSWCCD's Bob Kollars receives Department of the Navy Test and Evaluation Lifetime Achievement Award

By Nicholas Malay, NSWC Carderock Division Public Affairs

NSWCCD Signatures Analysis and Characterization Division Head Robert D. Kollars of the Signatures Department will be presented the 2013 Department of the Navy Test and Evaluation Lifetime Achievement Award at the Command Awards Ceremony on May 6 in West Bethesda, Md.

Kollars is a recognized national and international authority on acoustic radiated noise signature and submarine silencing efforts. As part of his nearly 30 years of service to the country, he has made numerous contributions in the development of technology that have ensured U.S. dominance in the area of anti-submarine warfare.

Kollars said he was extremely surprised and honored to receive the award. "I feel like I have so much more that I want to do in my career," Kollars said. "I hadn't considered all of the things that I have had the privilege to be involved with in the past."

"Bob's technical leadership and vision have been instrumental in assessing near-term and long-range implications of technology and signature characteristics on acoustic stealth, which has allowed for completion of quantitative signature vulnerability assessments and technical trade-off studies critical to future submarine mission effectiveness," said NSWCCD Signatures Department Head Dr. Paul Shang. "He has also played a key role in developing innovative data measurement techniques and data analysis tools that have improved the capability to understand acoustic signatures and optimized the conduct of the associated full-scale acoustic test efforts, thereby resulting in a significant cost savings to several Team Submarine Program Offices, including that of the Ohio Replacement Program."

"Working in a technical field test position, I have been given innumerable opportunities to work in challenging yet exciting situations and locations – regularly having direct interaction with the fleet," Kollars said. "When I heard I had been selected, I immediately thought of all the incredible mentors I have had over my career and how much they invested in the Navy and in me personally."

Kollars began his career at Carderock nearly 30 years ago. With a bachelor's degree in electrical engineering and a master's degree in acoustics, he provided immediate and significant technical benefits to the organization. Over his career, his ability to clearly communicate complex technical issues was recognized, and he began to spend more time leading test efforts, documenting the results and briefing the outcomes. Later, he assumed the duties as director of NSWC Carderock Division, Detachment Puget Sound, a position he held for 10 years. Currently Kollars is the division head for the Signatures Characterization and Analysis Division, a group of approximately 110 personnel whose efforts directly contribute to the acoustic superiority of the U.S. submarine and surface ship fleets.

"The people that I have the privilege to work with every day are simply amazing, and I feel this award really reflects the effort, skill and knowledge of the team I am part of," Kollars said.

Kollars continues to provide vision and leads the integration of signature issues into effective and affordable ship acquisition programs. His most recent accomplishments include guiding the signature measurements and assessment efforts of the Virginia-class submarines during ship design, construction and initial operational deployments. Additionally, working with the leading acoustic signature experts at NSWC and NAVSEA, he was able to find existing historical data and leverage planned acoustic tests to fill knowledge gaps to support the design of the Ohio Replacement submarine. By gaining this knowledge early in the design process, conservatism in the design can be removed, leading to reduced ship construction costs and total ownership costs over the life cycle of the submarine for the Ohio Replacement Program Office (PMS397).

It is his philosophy that the management team (including himself) should be willing and able to participate technically alongside the personnel of the division during completion of test events. Kollars also contributes to a number of classified programs in the area of signature interpretation and design trade-offs critical to future submarine mission effectiveness efforts.

Another area where Kollars focuses his attention pertains to development of the division's technical capabilities and ensuring that they are properly aligned with current and future customer needs. In support of this goal, and due to his leadership and vision, he was able to secure funding for Division 71 (in Fiscal Years 2011 through 2013), which allowed for the creation of an acoustics signatures technical compendium. The purpose of the technical compendium is to define

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NSWCCD Signatures Analysis and Characterization Division Head Bob Kollars participating in a coordinated signatures evaluation of a Virginia-class submarine with a P3 aircraft off the coast of Florida, April 2007 (U.S. Navy photo provided/Released).

American Society of Mechanical Engineers selects NSWCCD's Dr. Paul Shang as ASME Fellow

By Nicholas Malay, NSWC Carderock Division Public Affairs

Naval Surface Warfare Center Carderock Division (NSWCCD) is pleased to announce Dr. Paul Shang was selected as an American Society of Mechanical Engineer Fellow (ASME) — the attainment of which recognizes exceptional engineering achievements and contributions to the engineering profession.

"Dr. Shang is a trailblazing example of the technical expertise that Carderock Division provides to the arena of ship signature technology," said Capt. Richard Blank, NSWCCD Division Commander.

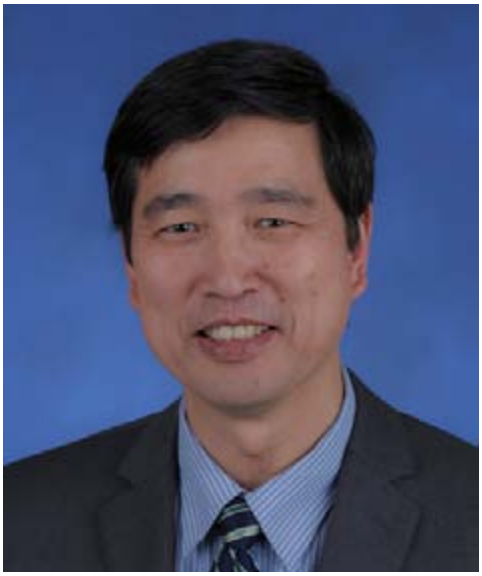
Dr. Shang has been a continuous and active member of the ASME since graduating in 1977 from Rutgers University with a Bachelor of Science in mechanical engineering. Over that time, his most significant contributions to the Society have been his strong advocacy of ASME through his mentoring and counseling younger members of his staff to join and participate in Society activities. This advocacy extends to working aggressively with Carderock Division administration to ensure members of the Signatures Department are able to attend and participate in ASME-related activities.

"I've been Dr. Shang's deputy since 2011 and during this time, Paul has consistently displayed both the technical depth and management skills required to lead the Signatures Department in addressing the platform stealth challenges for today's and the future Navy," said NSWCCD Ship Signatures Department Deputy Steve Wilson. "It's an honor serving with him."

The contributions Dr. Shang has made to ASME extend as well to the profession of engineering as a whole. Over his many years as an ASME member his level of responsibility and demonstrated capabilities as an engineering Program Manager has progressed to his assuming the lead role for all Signatures Integration for the U.S. Navy's newest submarine design. This position required he lead and provide oversight to a wide range of signature-related technology development programs within the Signatures Department.

"His exceptional performance in such roles is the principal reason Dr. Shang has been asked to assume progressively increasing managerial responsibilities leading to his current position as head of the nearly 500 member Signatures Department at NSWCCD," said Dr. Tim Arcano, NSWCCD Technical Director. "Dr. Shang's accomplishments in program management, his demonstrated organizational leadership, and his membership in ASME serve well to illustrate the standing of ASME as a premiere professional engineering society."

Since starting employment with the U.S. Navy in 1984, Dr. Shang has progressively advanced in responsibility both as a program manager for the development of naval technologies and as an organizational leader. His career-long achievements as a program manager are internationally recognized and demonstrated by the superior stealth



performance of today's U.S. naval fleet. As the Head of the Signatures Department, Dr. Shang oversees 500 scientists, engineers and support staff; manages an annual budget of nearly $250 million, and is responsible for five large support detachments located across the United States.

Upon receiving his doctorate in mechanical engineering from Rutgers University in 1984, Dr. Shang joined NSWCCD as a research engineer in the Signatures Department where he was responsible for the conduct of hydroacoustic and structural-acoustics analysis in support of technology development for the Seawolf-Class submarine that was then under design. This work included technical activities that ranged in scope from basic research to review and interpretation of results from at-sea testing, and required involvement with a broad spectrum of people, ranging from scientists and engineers, to naval personnel. The overall success of these efforts was borne-out by the superior stealth performance demonstrated during post-construction sea trials.

Based on the technical and organizational skills Dr. Shang demonstrated during the Seawolf-Class design period he was assigned head of the Flow-Noise Branch. As branch head he led and managed a group of approximately 25 scientists and engineers who provided engineering analysis, performance predictions, and design support for the development of signature control technologies.

This work required formulation of complex research and development programs, which entailed the development of analytical modeling capabilities, the design and conduct of large-scale model tests, and the design of full-scale measurement approaches needed to verify performance. These activities required he establish programmatic direction, set priorities, and periodically review performance and schedules. During a consolidation period, and based on his demonstrated programmatic and organization capabilities, Dr. Shang's portfolio was expanded to include technology initiatives related to structural acoustics and propulsor acoustics, which doubled the branch's work force.

In 2000, Dr. Shang accepted the position as head of the Acoustic Signatures Technology Division. This position further expanded his responsibilities of program management and organizational leadership. As division head, his responsibilities included providing technical and organizational oversight to more than 150 scientists, engineers and support staff; managing a broad spectrum of projects supporting various aspects of naval platform development; and serving as a steward for, and managing a number of the Navy's unique large-scale test assets used to support research and development activities.

Collateral to his division head duties, Dr. Shang assumed the position of primary Carderock Division point-of-contact for submarine and surface ship acoustic design. These combined duties required he maintain close liaison with the various Navy Program Offices and shipbuilders to ensure division activities properly supported development of the broad range of design activities

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Ken Virtue accepted into Defense Civilian Emerging Leadership Program

By Joseph Battista, NSWCCD-SSES Public Affairs

In March 2014, Ken Virtue, financial management specialist with Auxiliary Machinery Automation Branch at Naval Surface Warfare Center Carderock Division – Ship Systems Engineering Station (NSWCCD-SSES), began his pursuit of completing the Defense Civilian Emerging Leadership Program (DCELP). He is one of only 31 Department of the Navy civilian employees chosen to participate in this highly competitive program, which accepts only 144 participants from the DoD and intelligence agencies each year.

The training program focuses on developing leaders from the entry-level civilian workforce (GS-7 through GS-11) in the acquisition, financial management, and human resources career fields. They attend six one-week residential courses at the Department of Defense Executive Management Training Center (EMTC) in Southbridge, Mass. The courses: Leadership Assessment, Team Building, Effective Writing in the Federal Government and DoD Research, Conflict Resolution, and Leadership for Non-Supervisors.

"This is a great opportunity for me to meet other people from other agencies and share experiences," said Virtue, who earned three bachelor's degrees in accounting, finance, and marketing from Rutgers University in Camden, N.J. "I will learn how NAVSSES fits into the DoD process, and I should gain a solid understanding of acquisition at the macro level."

Virtue learned about his selection in a November 2013 email. However, he admits the acceptance into the program was a surprise. "I really didn't think I would get accepted because I literally waited until the last minute to apply," Virtue said. "I saw an announcement about it in the NAVSEA Observer the day before the deadline and decided to give it a shot."

Virtue, who began his federal government service in June 2011 and began working at NSWCCD-SSES in November 2012, already knew of the program before applying, but lost track of the application deadlines when training budgets were reduced last year.

"I always felt this program would help me advance my career," said Virtue.

Students are required to participate in an online course of instruction, as well as the six residence seminars. In addition, Virtue will do two formal research papers, numerous reading assignments, and traditional homework exercises.

"I believe Ken will gain a greater understanding of acquisition and DoD procurement and bring back new ideas of how Philadelphia may be able to grow," said Matthew Douglass, Auxiliary Machinery Automation Branch head who approved Ken's initial application.

The approval process was not as simple as Douglass' signature. Ana Maria Gulian, Steam Auxiliary Systems Division head, was next to review and approve the application. Virtue's application then went to Naval Sea Systems Command where he competed against many others to have their application forwarded to the Dept. of the Navy for final approval.

Ken Virtue, financial management specialist with Auxiliary Machinery Automation Branch at NSWCCD-SSES, speaks at the State of New Jersey's Voice of Experience National Disabilities Employment Month program in 2012. Virtue began his pursuit of completing the Defense Civilian Emerging Leadership Program (DCELP) in March (Photo provided by Ken Virtue).

"Ken shows a great deal of dedication to work within the branch, and in the short time he's been with us, he has become a key asset," said Douglass. "Knowing that he is monitoring the financial aspects of projects and that funds are being distributed as required has allowed the project engineers in this branch focus their attention on providing qualified products."

"I really like working with the engineers here," said Virtue. "I get to see all of their products I'm writing contracts for or moving funding for. I'm always getting to solve problems for people and it's different every day."

CFD predicting impact loading of a hydrodynamic wave on a submarine

CFD expert explains how he modeled wave impacts on submarines

Provided By engineering.com

Traditionally, submarines are quite stealthy and hydro-dynamically sleek. This is imperative for a vessel designed to operate underwater; however, like surface vessels, a submarine will pitch and roll when it surfaces. This means submarines face similar risks as surface ships when it surfaces in extreme weather conditions.

Dr. Minyee Jiang of the Naval Surface Warfare Center studies the effect of hydrodynamic waves on submarines using computational fluid dynamics (CFD) simulation software.

"Lab experiments are expensive and time consuming," Jiang said. "CFD simulations of free surface and wave interactions can be used to model the submarine while operating near the free surface."

For his analysis, Dr. Jiang chose STAR-CCM+. The decision was based on the program's ability to model higher order irregular Stokes waves and irregular waves as opposed to a basic sinusoidal wave. "These are more realistic," explains Dr. Jiang. "The program was also chosen for its robust meshing tool which needs little user interaction, and the volume of fluid (VOF) solver which is good for wave-impact and wave-ship interactions."

The VOF approach assumes that the grid cells near the free surface are filled part way with air and water. Within each computational cell the VOF, pressure, velocity and gravitational force acting on the fluid is calculated. The ocean waves and the free surface are tracked by using the VOF values in the domain. The ship then interacts with this oncoming wave resulting in impact loads on the vessel surfaces which are analyzed," explains Dr. Jiang.

To perform the simulation, you must first create a mesh for the computational model which will be used to compute the physic variables and properly outline the complex wave field and the vessel geometry.

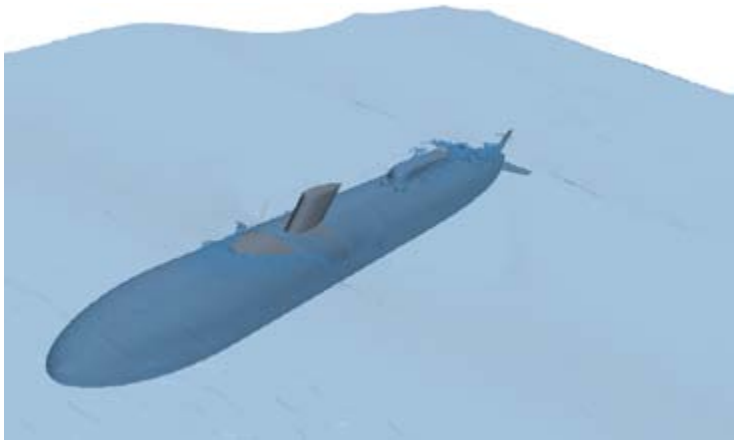
Due to the viscous fluid traveling around the submarine an appropriately fine grid must be used to resolve the flow physics. In addition, a small time step size must be used for accurate prediction of the impact loads. Dr. Jiang further explains that, "the time step size and grid size are interrelated for numerical accuracy and stability and a balance must be maintained between them to achieve a practical time step size for running the problem without sacrificing accuracy. These impact loads are then provided to structural engineers for determining the critical impact loading."

The initial conditions of the wave field are then specified at the inlet boundaries. During the simulation, the waves are propagated into the computational domain. "The pressure and velocity are solved using a RANS solver and k-ω turbulence model," said Dr. Jiang.

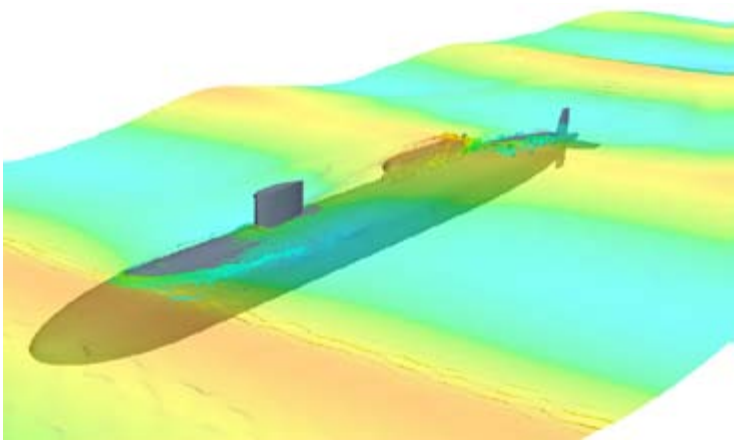
NSWCCD CFD SME Minyee Jiang explains an animation of head sea waves impacting a sub, colored with wave elevation (red indicates crest and blue indicates trough) (U.S. Navy photo by Nicholas Malay/ Released).

When compared to lab tests, Dr. Jiang's results were very accurate, meaning the simulation can now be used to improve the vessel's design for near surface maneuvers. "External payloads may need to be modified to reduce the impact load. Based on this total impact loading and bending moment, further structural analysis and redesign may be required. Any structure connected to the impacted surface, which exceeds high wave impact loads, needs to be strengthened. Many iterations of CFD wave impact simulation, structural analysis, structure/geometry redesign are required to ensure safe operations."

Since Archimedes, man has understood the physics of buoyancy. In the 20th Century the technology took off and led to the submersible marvels we all know today. As simulation technology improves, however, who knows how submarines will change?



Head sea waves impacting a submarine



Head sea waves impacting a submarine, colored with wave elevation (red indicates crest and blue indicates trough).

The Technical Director's Innovation Challenge enters phase II

By Kate Hogarth, NSWCCD-SSES, Public Affairs and Nick Malay, NSWCCD Public Affairs

Technical Director Dr. Joseph (Tim) Arcano created the Technical Director Innovation Challenge (TDIC) program to spark creativity, inspiration and invention in engineers at the Naval Surface Warfare Center Carderock Division (NSWCCD).

The program challenges engineers to innovate in areas related to NSWCCD's mission. Thirty four proposals were submitted into the challenge for consideration. The proposals were peer reviewed by a select cross-division team and evaluated based on the compelling nature of the problem statement, anticipated stakeholder need, innovative approach and impact if successful.

"Because of the caliber of the projects submitted, I elected to increase the planned budget from $300,000 to $390,000 to allow 13 investigators to participate in these efforts," Dr. Arcano said.

The TDIC is broken up into three phases, concept exploration, concept maturation, and concept implementation. For each phase, the "plank owners" are awarded $10,000 and a 15-week time frame to research their project and look at different solutions to their problem.

At the end of each phase, plank owners will brief a panel with their progress. The panel will be made up of division leadership and science and technology professionals from Defense Advanced Research Projects Agency (DARPA), Office of Naval Research (ONR), NAVSEA Technology Office (SEA 05T), and Program Executive Office (PEO) and Chief Technology Officers (CTO).

Phase two, the concept maturation phase, is scheduled to conclude April 25. Planks owners will be given their last increment of $10,000 to begin the concept implementation phase.

The NSWCCD Public Affairs Office caught up with a few plank owners to see how they were progressing.

Pinkesh Bharatia: 3-D printing radar bearing for submarine sails

Pinkesh Bharatia, mechanical engineer for Naval Surface Warfare Center Carderock Division – Ship Systems Engineering Station (NSWCCD-SSES) and his team in the Advanced Data Acquisition, Prototyping Technology & Virtual Environments (adapt.ve) Lab, want to create submarine sail bearings using a combination of laser metrology scanning and 3-D printing technologies.

"Submarine sails consist of many sensors that need to be perfectly aligned to the frames through the use of bearings, which allow the masts to cycle from stowed to raised conditions," Bharatia said in his proposal to the TD. "Bearings frequently need to be realigned due to the caustic conditions they are exposed to on a daily basis."

Bharatia, the recipient of two Magnificent 7 awards in 2013 said, "If we could combine the laser metrology technology we are currently developing with a metal additive printing technology, we may be able to scan and print a form fitting bearing that would create a solution that would save time, money, and extend the life of the masts through less premature failures and wear."

The use of 3-D printing is exploding in the private industry. During phase one of the TDIC, Bharatia, who holds a master's degree in international business from Drexel University and a bachelor's degree in mechanical engineering from Rutgers University, continues to research the advances in 3-D printing with various materials. He wants to keep pace with the private industry in his knowledge and skills of 3-D printing. "We either adopt it or pay for it." Bharatia believes if NSWCCD-SSES does the research and learns the technology, NSWCCD-SSES can keep the technology in house.

Pinkesh Bharatia, mechanical engineer for NSWCCD-SSES and part of the Advanced Data Acquisition, Prototyping Technology & Virtual Environments (adapt.ve) lab, is investigating the use of 3-D technology and laser metrology scanning to create submarine sail bearings for the 2014 Technical Director's Innovation Challenge (Official U.S. Navy photo by Joseph Battista/Released).

Bharatia has also been utilizing his time researching scanning software. The software will allow for the scanned surfaces to be accurately converted into the 3-D models needed to create the bearings.

Bharatia fears when budgets get cut, research and development is the first to go. He is glad the TD is having this challenge to promote research, development and innovation. "We have to look long term, constantly innovate, or our enemies will surpass us."

Consulting with other 3-D printing experts has kept Bharatia's project on schedule. "I have met with some of the experts in the field, such as Naval Undersea Warfare Center Keyport and representatives from 3D Systems, one of the leading additive manufacturing companies in the world, to see what is possible within additive manufacturing," Bharatia said.

Bharatia and the adapt.ve team are working on a strategy for validating materials to have a bearing modeled and printed. Once the team has a prototype, it will be put through a cycling test site to simulate fatigue and stresses. The goal is to one day print bearings instead of machining them.

"For NSWCCD-SSES to become a driver of this potential, material properties need to be vetted to ensure compliance with all requirements," Bharatia said. "There will be many opportunities to apply this to other systems and beyond. The radar bearing could be a great pilot program to begin the development of this technology."

John Almeter: Use of rotating cylinder to produce high planing forces for heavily loaded craft

John Almeter, a naval architect with the Naval Surface Warfare Center Carderock Division in Virginia Beach, initially investigated the use of planing rotating and non-rotating cylinders to provide lift for boats and amphibious vehicles. This effort evolved into a longitudinally concave/convex hull concept.

"A simple planing rotating cylinder ended up not being so simple, but a byproduct of the research was the development of a longitudinally concave/convex hull, the "wiggle" hull, and it is showing promise," Almeter said.

Almeter a graduate from the University of Michigan with a degree in marine engineering and author of numerous papers on small high speed craft performance has been with Carderock Division for 30 years. His career focused on high performance small craft.

The wiggle hull requires simple geometry changes to a typical planing hull bottom. The wiggle hull is being analyzed and comparatively tested against a simple flat planning hull. The lift and the drag ratios are significantly greater than an equivalent flat planing hull.

"If this concept can work some of our boats and amphibious vehicles will be able to achieve higher performance at a lower cost," Almeter said.

Almeter found inspiration in an English-translated old Soviet text book that briefly addresses planing cylinders and from "The Dam Busters," a 1955 movie about the development of bouncing bombs to destroy German dams during WWII.

> "If this concept can work some of our boats and amphibious vehicles will be able to achieve higher performance at a lower cost"

The results from phase one are encouraging for Almeter. The project is staying in budget, progressing well and exceeding expectations.

"I have to admit to a few cheats and luck," Almeter said. "Key to the effort was obtaining test reports and other technical references. Several key references were obtained early in the effort. Without these references, the research would have stalled."

The TD Innovation Challenge is an opportunity for Almeter. "If it was not for the TDIC, I don't know if the current effort would have happened. There aren't but a few rare opportunities outside of Carderock to fund small, risky investigations such as the one I am performing," Almeter said. "The TDIC gives Carderock employees an opportunity to perform some foundational research on an idea or concept in order to better articulate a hypothesis or test one."

The plan for phase two is to develop, analyze and test additional wiggle hull configurations.

It is not currently know if the wiggle hull is practical, but this study is intended to either put the matter to rest, or evolve into a practical and cost-saving opportunity for transition.

Ian Peek and David Nordham: Low pressure desalination

Ian Peek with the Energy Conversion Research and Development Branch and David Nordham with the Auxiliary Systems Branch are investigating low pressure desalination techniques that may be appropriate for shipboard desalination efforts.

Shipboard desalination is typically accomplished through one of two means – either by distillation or reverse osmosis (RO). RO separates freshwater from seawater via a membrane and uses high pressure (up to 1,200 pounds per square inch). The use of a low pressure desalination technique would allow for the elimination of high pressure system with high energy use, often requiring intensive maintenance. It would also enable a significant reduction in maintenance, weight, and energy usage, even over new advanced shipboard desalination systems currently under development, and would leverage ongoing energy recovery efforts.

Several low pressure desalination techniques exist, and this phase of the innovation effort seeks to investigate them and their efficacy for shipboard desalination.

Two technologies include membrane distillation and forward osmosis. Membrane distillation is a thermal separation process where heated feed-water is contacted with a permeable hydrophobic membrane. Fresh water vapor permeates through the membrane and is condensed on the other side. Membrane distillation is typically operated with so-called "waste heat", which could be recovered from prime mover exhaust or any other heat sources. Recent developments in energy recovery would be leveraged as a basis for efficacy calculations.

Forward Osmosis is another type of low pressure process where the driving force behind the separation is based on the osmotic pressure difference between the feed-water and a draw solution. An additional separation step may be required to remove the fresh water from the draw solution and it may be possible to combine multiple technologies for added efficacy.

"There are current efforts to reduce the energy usage and maintenance requirements in shipboard desalination plants," Peek said. "This project is an attempt to realize even more improvements in shipboard desalination."

In the second phase, the plan is to select the most promising technologies and refine the calculations further. While some technologies might be promising for land-based applications, they might not be appropriate for shipboard use.

Overall, the focus is placed on applicability towards shipboard desalination systems, with the objectives of energy savings, reduced acquisition costs, as well as reductions in weight and maintenance requirements.

Dr. James Roche: Enhancing organization decision cycles

NSWCCD engineer Dr. James Roche of the Signatures Measurement Technologies & Systems Division (Code 7320) is expanding the research started by John Boyd in 1995 who proposed his Observe Orient Decide Act (OODA) decision cycle to describe individuals and organizations competing to survive on their own. The four functions of observation, orientation, decision and action are ongoing, simultaneous, continuous processes which are recursive. The algorithm is based on implementing a double loop learning process over all of the connected functions and specifically, implementing a second double loop learning process within the orientation function. Within this algorithm, the orientation of an organization is the most critical function. The orientation function would include Technical Workforce Development and Motivation.

To some degree, each engineering team or program has its own common mental model of its engineering tasks, its own decision cycle related to its work and a mental model of how these fall within the shared vision of the center and sponsor.

- How does the Division reinforce the shared technical/cultural vision of the center within its workforce?
- How does the Division ensure that sufficient technical and cultural knowledge is available for transfer between engineers to propagate the decision cycle and ensure sponsor support?

Dr. Roche's proposed innovative solution is to use the OODA algorithm as a starting point. He proposes to examine the Division's opportunities for knowledge and cultural management engagement with the Carderock Division engineers. The initial objective is to assess current knowledge management processes and existing cultural management initiatives in relation to the decision cycle.

Common practices of knowledge management as articulated by the DoN CIO will be employed. Technical and cultural management includes but is not limited to the Scientist and Engineer Development Plan (SEDP) and its impact on the Carderock Division and initiatives such as knowledge stewardship. Additionally, advances in neuroscience understanding as applied to the OODA algorithm will be examined to identify any potential future opportunities for cross application to our organization.

"With respect to the Concept Exploration Phase, I shall deliver a presentation explicating an examination of parts of the NSWC Carderock Division organization OODA decision cycle across multiple levels of management," said Dr. Roche.

Dr. Roche is also working closely with NSWC Carderock Division subject matter experts: Dr. Jack Price, Dan Goodwin, Dr. Mike Robert and Garth Jensen. He has also discussed aspects of the technical work with DARPA, ONR, NAVSEA and MCCDC.

Concept Maturation would involve socializing potential enhancements to Division level knowledge management and technical and cultural management capabilities/tools and assessing accomplishable objectives to form action plans.

Concept Implementation would not necessarily involve mandatory implementation of a plan but rather focus on an incentive based approach to implementation of alternative plans that could be tailored to a user's needs.

Dr. Noel Guardala: Development of a highly forward directed fast neutron source for the active interrogation of improvised explosive devices and other high-explosive threat items

NSWCCD nuclear physicist Dr. Noel Guardala of the Environmental Quality Division investigates technology in Carderock Division's Positive-Ion Accelerator Facility.

The use of a highly directional fast neutron beam has been advocated and explored extensively by a number of research and development groups in the United States and United Kingdom for applications involving neutron active-interrogation techniques for fissile materials and also for High Explosive (HE) threat items such as Improvised Explosive Devices (IEDs) of various dimensions and arrangements and Special Nuclear Material (SNM).

Dr. Noel Guardala (above) checks on the gas stripper control system which is vital to the production of a 2 MeV C beam, essential to producing kinematically compressed fast neutrons (U.S. Navy photo by Nicholas Malay/Released).

"Up to the present time, there exists a clear and very complex set of situations and conditions related to the use of fast neutron beams for active interrogation of SNM, HE and IED threat items by Department of Defense (DoD) personnel with serious issues arising related to the accumulation of excessive fast neutron radiation doses," said Guardala. "Over the years myself and a number of my colleagues involved in nuclear physics research related to fast neutron interactions have been considering the possibilities of constructing and operating an accelerator-based source of fast, mono-energetic neutrons that was highly directional in comparison to the standard sources available for experimental purposes in this area."

By using the principles of inverse kinematics and kinematic compression, in which the projective mass A1 is considerably larger than the target mass A2, a reversal of the typical bombarding conditions with the incoming ion-beam composed of particles of A1 is tuned to a kinetic energy (measured in MeV units) for a desired neutron-

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The Technical Director's Innovation Challenge enters phase II

Dr. Noel Guardala: Development of a highly forward directed fast neutron source for the active interrogation of improvised explosive devices and other high-explosive threat items

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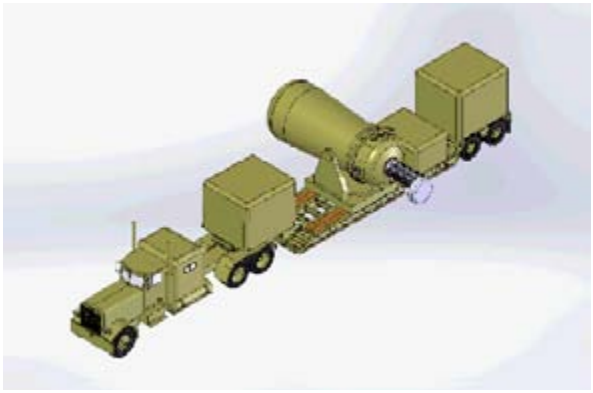
producing reaction that has a fixed energy threshold for neutron emission slightly greater than the threshold energy for that process.

"The neutrons emitted from a nuclear process with those characteristics will be highly forward directed spatially and also have a relatively small energy spread in the subsequent forward-emitted neutron beam," said Guardala. "This angular divergence for the fast neutron beam produced under these bombarding conditions will be quite small ca. 0.5-1.0 degrees in the forward direction co-linear with the incoming beam of projectile ions with mass, A1."

The production of a forward-directed fast neutron beam of ca. 250 keV in energy for the D(12C,n) reaction with a 2 MeV 12C beam incident on a thin target of LiD2studies of the neutron production flux as a function of 12C beam energy and its effect on the observed angular distribution of forward-directed neutrons.

"The construction of a prototype accelerator system capable of producing forward-directed fast neutron beams for testing and evaluation in field situations and eventually for use by Navy personnel in a variety of CONOPS while being incorporated into a number of Navy platforms," said Guardala. "A fully funded effort for this project could result in a fully working prototype in a three-year time frame."

Guardala currently has preliminary data taken about three and a half years ago that was presented at a conference for uses of accelerators and accelerator-based research. Since that time Carderock Division "has been involved in some more detailed modeling and simulations as well as having serious discussions with possible industry partners in designing, testing and building the final working prototype of the system of producing forward-directed fast neutrons," said Guardala.



Artist's Conception of working full scale model of a Forward-Directed Neutron System for the Standoff Active Interrogation of HE Threat items, Chemical Agents of Mass Destruction and also for SNM and smuggled Nuclear Weapons. This is a potential rendering of a final configuration for the system that would be built as a working prototype to find HE and SNM. Dr. Guardala's goal is to make it about half the size as shown in the picture -- he believes that is a reasonable milestone to achieve.

In Phase II, "we plan to continue to seek major sources of funding from sponsors in the Navy and to partner with Navy colleagues at NSWC/Indian Head in PMS 408 as well as at ONR," said Guardala.

Guardala also felt the that success in this area of producing forward-directed fast neutron beams would be extremely valuable in the methods of active standoff interrogation of IED's and HE threat items as well as for Special Nuclear Materials either as part of smuggled nuclear weapons or as the primary fissile component for assembling weapons to be used against either the U.S. itself or assets associated with the U.S. civilian or military, as well as possibly being used against U.S. allies overseas.

The ability to identify threat items at a safe distance is very important in all areas of force protection and consequence management for Navy and Marine Corps operations. The Navy also has the mission to ensure that weapons of mass destruction are intercepted and identified on the high seas and also in other types of maritime environments.

Guardala is awaiting significant sources of funding to procure the important major components to produce a working prototype and significant experimental results. A total cost just for the hardware for an operating system to produce large quantities of forward-directed neutrons is roughly $7 million.

"We have not yet received anything like that in order to construct the necessary working system. A small experimental program here at NSWCCD' tandem accelerator lab would require at least $200k in funding to produce a meaningful amount of experimental results needed to go to the next step of building a full working prototype that could be in principle field tested and evaluated for deployment," said Guardala.

Dr. Stephen Potashnik: Remote atmospheric magnetometry

NSWCCD subject matter expert, Dr. Stephen Potashnik joined Carderock in 2009 and is assessing the possibility of using nitrogen gas in the atmosphere to measure magnetic fields. Previous work has considered schemes using high intensity laser pulses to align nuclear spins in atmospheric Xenon gas. Recent advances have achieved backward propagating lasing in air, which could provide a significantly enhanced return signal (see DOI: 10.1126/science.1199492). He calculated an optimistic sensitivity possible for remote magnetic sensing with nitrogen. He chose this project because it would have a significant impact on detection ranges for the Navy's submarines and the neat physics involved because "it would overcome natural magnetic noise sources that hide our submarines," said Potashnik.

The fact Navy submarines have a magnetic signature is well known, but the detection range of our platforms is limited by a variety of environmental noise sources. The capability to remotely sense magnetic fields, closer to our platforms, would overcome these noise limitations. ONR Codes 321 and 331 are responsible for magnetic sensing and underwater magnetic signature silencing respectively. Potashnik is detailed to ONR 321 half-time and this proposal would enable him to perform the technical work described below.

"I tried to think about what would make a significant impact for the Navy. For example, what constraints could be removed that would have a significant impact," said Potashnik. "The question then becomes how to physically achieve that goal. I initially asked experts for their thoughts during meetings on other topics in FY13. They identified specific fundamental challenges, such as there are no atoms that can be used for magnetometry in the atmosphere. Then Jon Davis knew of Will Happer's reports for NAVAIR in the late 1970's that considered using nuclear spins. DARPA reexamined this possibility in FY02 and recommended abandoning the hope of lasing with atmospheric Xenon.

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Dr. Stephen Potashnik: Remote atmospheric magnetometry

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Nitrogen lasing in air was demonstrated in 2013."

Optical magnetometers measure the coherent precession of atomic spins in vapor cells and are presently unmatched in the sensitivity with which they can measure magnetic fields. Historic work by the Navy (NAVAIR) in collaboration with universities throughout the 1980s has examined the possibility of using atoms in the atmosphere to make remote magnetic measurements. The most promising path focused on probing hyperfine states of naturally occurring 129Xenon gas, which was estimated to have a nuclear spin lifetime of ~10 seconds at atmospheric pressure even with the high rate of collisions, but quenching of the fluorescent return signal could not be overcome. In 2002, a DARPA seedling reexamined remote magnetic sensing in light of advances in laser technology. The higher intensity pumping was found to ionize the 129Xe but again no return signal could be created at atmospheric pressure. ONR supported funding my MURI on this topic last year, but OSD thought feasibility at an individual investigator level was needed first.

"Rather than using atoms with long lifetimes, this innovative solution proposes to use a large number of atoms such as 15nitrogen for remote atmospheric magnetometry," said Potashnik. "This will include performing a literature search to estimate the lifetime of atomic nitrogen, then reading the REMUS Source Book and using similar calculations to speculate on the possibility of measuring magnetic fields in the atmosphere with these atoms."

In the last few years, several papers have reported achieving backward propagating lasing with atmospheric gases (including atomic nitrogen). The fundamental noise floor of optical magnetometers is proportional to $\sqrt{(\Gamma/N\tau)}$, where Γ is the spin-relaxation rate, N is the number of atoms, and τ is the measurement time (this is really just noise reduction by averaging). Rather than focusing on achieving long lifetimes (small Γ) at atmospheric pressure to collect many photons over time, this innovative solution will speculate on the sensitivity possible by using nitrogen (with many atoms - large N) to collect a similar number of photons.

"If these results look potentially promising, I will include this speculation in a workshop I am hosting on Remote Atmospheric Magnetometery this fall for consideration by experts in the field," said Potashnik.

Potashnik has also organized a workshop for distinguished scientists to speculate on the possibility of remote atmospheric magnetometry.

"It lets people who know the Navy's needs, consider innovative solutions and this project will give NSWCCD expert contacts in the area of high energy lasers and magnetometers," said Potashnik. "Letting the community know what would be of interest to the Navy could have future rewards – I would love to see someone submit a proposal to explore such a concept even if it is not this year."

American Society of Mechanical Engineers selects NSWCCD's Dr. Paul Shang as ASME Fellow

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associated with ship design. Examples of major platform/program initiatives that the division supported during Dr. Shang's tenure include: DD(X), Virginia-Class, DARPA TANGO BRAVO, CVN21, and SSBN(X). Of particular note is the support the division provided to the design of the Virginia-Class submarine.

Building on his experience from Seawolf-Class design efforts, Dr. Shang stood up and managed the Virginia-Class Design Program within the Signatures Department that provided multi-disciplinary research, development, design and testing to ensure the platform would meet all stealth-related performance objectives He directed particular focus to identifying and developing enabling technologies to achieve significant cost reductions without sacrificing stealth objectives. The success of this program is borne out by the overall stealth performance of Virginia-Class submarines, as demonstrated by results of at-sea testing, and by costs being controlled such that funding for the construction of two ships per year was authorized.

Dr. Shang's tenure as Division Head ended in 2007 when he was asked to stand up and lead a Signatures Integration Group within the Signatures Department. The guiding purpose for establishing the group was to streamline program execution processes by optimizing the full assets of the Signatures Department to cost-effectively provide the best product to Navy program offices and the Fleet. As head of the Signatures Integration Group, he provided the vision and leadership for better aligning the Signatures Department with Navy goals and objectives and was directly responsible for integrating work efforts and programs across physical locations, signature types, and platforms, as well as with the Fleet. While group head, Dr. Shang took on the added responsibilities of formulating and standing up the Ohio Replacement (SSBN(X)) Signatures Technology Development and Design Office within the Signatures Department. This office coordinates all NSWCCD signature-related support for the design of the new ballistic missile submarine, which currently is a significant fraction of the Signatures Department's workload. Once the office was fully staffed, funded, and functioning, Dr. Shang turned over daily operational responsibilities to others.

In 2011 Dr. Shang was selected as head of the NSWCCD Signatures Department. The mission of the Signatures Department is to assure that surface ships, submarines and other Navy vehicles have signature characteristics that ensure their operational superiority. In support of the department mission, he leads research and development efforts to measure, understand and control all forms of ship signature, which include acoustic, vibration, magnetic, electro-magnetic, radar, infrared and electro-optic. Full-scale signature measurements are made on ships and submarines to both quantify their mission effectiveness and determine areas of research that are needed to further enhance vehicle stealth. To effectively accomplish these tasks he established an integrated departmental structure that develops advanced techniques and data acquisition systems for measuring the characteristics of ship signatures, and has a highly skilled work force that provides advanced signature analysis.

Dr. Shang's contributions have not been limited to his technical and management activities. Dr. Shang served on NSWCCD's Science and Technology Council, which coordinates S&T efforts across the division and has made a significant commitment to the recruitment and development of future engineers and scientists into the Navy research and development community to ensure there is a highly qualified and diverse work force that meets current and future needs. He established a successful mentoring program to match junior engineers with senior personnel on major programs. These efforts resulted in increased involvement of new hires in important scientific and engineering work early in their careers – leading to increased productivity and retention.

NSWCCD-SSES increases testing and training capability for DDG and LPD classes through design of steering/propulsion control system simulator

By Joseph Battista, NSWCCD-SSES Public Affairs

Engineers at Naval Surface Warfare Center Carderock Division – Ship Systems Engineering Station (NSWCCD-SSES) installed a new Landing Platform Dock (LPD) 17 class steering control system simulator to train Sailors at the Training Lab in Norfolk, Va., Feb. 28. The unit is modeled after a prototype DDG 51 Arleigh Burke class steering control system simulator built by NSWCCD-SSES engineers and funded by Naval Sea Systems Command Fleet Support – Amphibious and Auxiliary Division (PMS 470).

The amphibious transport dock ship USS San Antonio (LPD 17) returns to Naval Station Norfolk after completing an eight-month deployment. San Antonio was part of the Kearsarge Amphibious Ready Group supporting maritime security operations and theater security cooperation efforts in the U.S. 5th and 6th Fleet areas of responsibility (U.S. Navy photo by Mass Communication Specialist 1st Class Julie Matyascik Released).

"Our skilled engineers and technicians built the prototype in its entirety and successfully tested it at a significant cost savings to the Navy," said Jonathan Scott, DDG Integrated Bridge Systems in-service engineering agent and Project Lead for these Engineering efforts with the Navigation Systems and Integrated Bridge Controls Branch.

Both simulator prototypes emulate the respective ship class' rudder, rudder angle transmitter units, hydraulic pump units, and hydraulic pump unit motor controllers. The prototypes process inputs of speed, position, wind speed, course direction and current, allowing the Navy to simulate destructive and dangerous conditions without having to use actual shipboard equipment. The DDG prototype consists of more than 2,500 solder points and four miles of wiring, carefully laid out in a space not much bigger than a standard desktop computer, which then relays the information to the graphic user interface (GUI). When building the LPD simulator, Scott's team replaced many of the hand laid wires with custom designed printed circuit boards.

"The prototypes help NSWCCD-SSES engineers recreate the exact conditions a ship experienced when a mishap occurred," said Scott. "It also helps our engineers quickly identify problems and develop solutions, which is something we could not do before we built these prototypes."

Although the steering systems for DDG and LPD-class ships are based on the same steering architectures, DDGs have four hydraulic pump units that can all operate independently, while LPDs have two coupled hydraulic pump units.

"We have to calibrate the software with the different characteristics for each ship class we build for," said Scott. "Eventually, we see this as something we can easily extend to all ship classes at a relatively low cost."

Due to the success of the LPD unit, a third steering control system simulator, also for the LPD 17 class, is being proposed to PMS 470 by Scott for construction at NSWCCD-SSES as an in-service engineering tool to troubleshoot steering problems in the fleet. Additionally, the prototypes can be used to test new steering equipment slated for installation aboard Navy ships.

"We will install new equipment here, test it with the simulator to make sure it works properly, then send it out to the ship for installation," said Scott. The simulators allow us to ensure we are installing new control systems that work properly and most importantly, are safe for the sailors using them."

NSWCCD-SSES completes first tests at new submarine buoy tow cable test site

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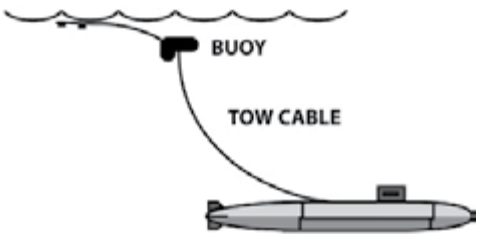
The test site is configured with multiple levels of safety including structural guards against cable whipping, multiple emergency stops and a control system that prohibits operation of any mechanical equipment if the test area is not secured. The test site also utilizes solenoid locks on the gates to further prevent access to the test area during testing or if power is unexpectedly lost. In addition, eight cameras are stationed within the test area in order to allow test operators to safely set-up and perform testing without entering the test area.



The AN/BRR-6/6B is a towed buoy deployed near the surface while the ship remains below periscope depth.

The establishment of the TCTS is tied to the Carderock Division technical capability of Undersea Vehicle Sail Systems and Deployed Systems, which provides full spectrum support for hull, mechanical and electrical for submarine sail and deployed systems used to communicate, navigate, and conduct surveillance and intelligence in an undersea littoral environment.

NSWCCD Observes African American Black History Month

By Nicholas Malay, NSWC Carderock Division Public Affairs

Naval Surface Warfare Center Carderock Division's (NSWCCDs) Equal Employment Opportunity (EEO) office held the African American Black History Month Observance in the Maritime Technology Information Center, Feb. 4 at West Bethesda (video teleconferenced to Silverdale, Wash.; Bayview, Idaho,; and Norfolk, Va.) and again on Feb. 24 in Philadelphia with keynote speaker Dr. Laura Stubbs, Director of Science and Technology and STEM Development Office OASD (R&E) Research Directorate.

The 2014 National Black History Month theme was Civil Rights in America in honor of the 50th anniversary of the Civil Rights Act and how it honors the contributions of more than 186,000 African Americans who served in the Union Army and Navy during the Civil War.

Capt. Richard Blank, NSWCCD division commander, and Joe Wigfall, NSWCCD EEO Advisory Committee member, honored African American Black History Month Observance guest speaker Dr. Laura Stubbs, director of Science and Technology and STEM Development Office OASD (R&E) Research Directorate with a certification of appreciation (U.S. Navy photo by Harry Friedman/Released).

Black History Month pays tribute to the generations of African Americans who struggled against adversity to achieve equality.

"Each year, the Navy joins the nation in the observance of African American Black History Month," said NSWCCD EEO Advisory Committee member Joe Wigfall. "Established as Negro History Week in 1926 by Dr. Carter G. Woodson, it was later expanded by President Gerald R. Ford in 1976, when he proclaimed February as Black History Month."

Capt. Richard Blank, NSWCCD division commander, delivered the African American Black History Month opening remarks and introduced keynote speaker, Stubbs.

Before assuming her current role, Stubbs was the Chief Learning Officer for the Carderock Division where she provided the overarching strategy for technical learning and workforce development initiatives for 3,200 employees.

Stubbs shed light on her upbringing, career path, the role of mentorship throughout her tenure and how she has supported the warfighter. "Mentoring is facilitated to help you bounce ideas off other people and enables an individual to discover what is out there that they do not know about and to be open to new ideas," said Stubbs. She also advised to always do follow-ups when you are given a lead for mentoring opportunities.

Before her Philadelphia presentation, Stubbs met with Science, Mathematics and Research for Transformation (SMART) Program graduates working at Naval Surface Warfare Center Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES). Stubbs is an integral part of the development of the SMART Program.

"I appreciate all who are able to support the mission of the Navy and the mission of Carderock with moving the needle forward as it relates to technical excellence," Stubbs said. "Technical excellence is something that I have always strived to accomplish where ever I have been."

Black history is, and always has been, a vital part of American society. Learning and understanding cultural differences are important aspects in the concept of teamwork and, essentially, in America.

"Teamwork and having a diversity of ideas by allowing people to collaborate and facilitate knowledge transfers allow technical excellence to blossom," said Stubbs. "It enables you to change the equation so much because there is such synergy in moving forward."

DDG 1000 crew completes training on integrated power systems at NSCCD-SSES

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"We developed a series of exercises that each crew member can perform independently at their own pace to learn the local operating screens and controls," said Harvey. "The operational portion, coupled with the inspections of each piece of equipment appears to have provided a good mix to maintain the training tempo."

The crew will continue to interact with the engineers at NSWCCD-SSES through shipboard activation, pier side testing and underway trials.

"It is a real honor to be one of the first Sailors on the DDG 1000," said Lt. j.g. Andrew Bankhead, antisubmarine warfare officer from Portland, Ore. "It is a great opportunity to be on the production side – learning about the ship and the people behind the ship."

NSWCCD supports DC FIRST robotics competition

By Nicholas Malay, NSWCCD Public Affairs

Naval Surface Warfare Center Carderock Division (NSWCCD) scientists and engineers participated in the third annual DC FIRST (For Inspiration and Recognition of Science and Technology) Robotics Competition (FRC) at the Patriot Center in Fairfax, Va., March 27.

Nick Pacheco, an 11th-grader on Team Kilroy from Stafford, Va., adjusts the arms of his team's robot at the DC FIRST Robotics Competition in Fairfax, Va., March 27 (U.S. Navy photo by Nicholas Malay/Released).

This competition allowed students to design, build and test competitively, which is a part of NSWC Carderock Division's larger outreach efforts designed to spark students' interest in STEM (science, technology, engineering and math). The event featured opportunities to see future scientists and engineers testing their own creative and modernized design concepts.

"First Robotics has helped me get involved in technology and engineering," said Kiara Gross, an 11th-grader on Team Vulcan from E.L. Haynes High School in the District of Columbia. "It makes me feel confident to be one of the only women on my school's team. For a while, I was thinking about going into a STEM field. Now I am really positive STEM is right for me."

"Since I was really little I have always loved engineering aspects behind building cars and machines. I loved seeing how things worked," said Nick Pacheco, an 11th-grader on Team Kilroy at Colonial Forge High School in Stafford, Va. "Being able to learn everything that I have—from using power tools to designing robots through computer programs—has been one of the most influential experiences of my life."

Pacheco was exposed to the FRC when his older sister started the program in high school. He attended many of her FRC competitions and was hooked from that point forward. "I have fun working with my friends and learning new skills I can apply after high school, which has really enforced my choice to enter the field of mechanical engineering," he said.

Kiara Gross, an 11th-grader on Team Vulcan from the District of Columbia, fine-tunes the team's design to launch a large ball into bins on the arena at the DC FIRST Robotics Competition in Fairfax, Va., March 27 (U.S. Navy photo by Nicholas Malay, Released).

Pacheco said he is an aspiring Virginia Tech engineer because they have the top mechanical engineering program. "After college I plan on spending the rest of my life doing what I do now—building and developing machines," he said.

NSWCCD hosts Naval Additive Manufacturing Technology Interchange meeting

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does not have to pay industry to make our small parts—today we can make them ourselves," said ONR Director of Research Dr. Lawrence Schuette. "For our Sailors, the ability to produce parts afloat may allow them to take better ownership of the systems they maintain routinely. This ability to innovate on the fly will pay dividends as cultural modification."

Schuette discussed some impediments to having additive manufacturing reach its fullest potential, including S&T investment; required changes to Navy processes; and legal or intellectual property right issues.

NSWCCD additive manufacturing experts and NAMTI guests gather in a panel discussion to chart the path for Naval application (U.S. Navy photo by Neubar Kamalian/Released).

He said one end-state goal is the use of locally produced parts both in construction and as spare parts on an as-needed basis without the need to replicate the original processes used to create the part. The ability to manufacture parts organically shortens the supply line to the warfighter and reduces the timely delay between needing a part and installing it aboard a naval vessel.

Once noncritical parts have been manufactured, the ability to make more critical parts that have long lead times will begin to be made in-house, Schuette said. "Eventually we will either grow accustomed to making our own parts or be forced to do so," he said. "Either way, it will require active engagement to allow additive manufacturing to reach fruition step by step."

A report detailing the outcomes and results of the NAMTI meeting will be widely disseminated.

Supporting our technical workforce

By Tony Santini, NSWCCD Human Resources

By all accounts, the Naval Surface Warfare Center Carderock Division (NSWCCD) is a scientific and engineering organization providing research and development, test and evaluation, engineering and fleet support for the Navy. The mission is supported by a professional contingent of operations and administration staff who provide expertise in human resources, financial planning and analysis, timekeeping, material acquisition, data processing, and facility maintenance just like any strong organization.

At NSWCCD, the mission is also supported by a group of "blue collar" employees covered under local wage grade pay plans who provide mission critical work. This cadre of men and women are involved in different aspects of mission support dependent on the site where they work.

West Bethesda: (from left to right) West Bethesda wage grade employees Charles Mele, Benny Ricketts, Akiel Smalley, William Hussong, and Michael Hunter (Official U.S. Navy photo by Devin Pisner/Released).

Joe Hatzai is currently a rigger work leader at the Philadelphia site for Major Programs Branch. He is also the vice president of the International Federation of Professional and Technical Engineers, Metal Trades Council (IFPTE/MTC) Local 3. Hatzai said that approximately 20 years ago Naval Ship Systems Engineering Station (NAVSSES) had about 300 wage grade employees. These employees supported the testing and modification work that was done on-site in Philadelphia, and they also logged plenty of hours serving as members of "Tiger Teams" that were deployed to ships, shipyards and other sites to conduct ship alterations, machinery modifications and/or field testing of new ship systems components. Much of their work centered on a Navy initiative called the Improved Performance Machinery Program (IPMP) and around-the-clock testing was done at the test sites in Philadelphia.

DSC04996s: (left to right) Louis Chavez, Richard Spencer, Mark Heimsoth, and Curtis Vogt at Bayview, Idaho (Official U.S. Navy photo/Released).

Approximately 10 years ago, with reorganizations, realignments, commercial activity studies, early retirement incentives and an evolving mission, the NSWCCD wage grade workforce was reduced to about 100 employees division wide.

Today, the total number of NSWCCD wage grade employees is 40 with one in Ft. Lauderdale, Fla.; four in Bayview, Idaho; seven in West Bethesda, Md.; and 28 in Philadelphia all providing essential mission support on a daily basis.

At the NSWCCD Detachment in Dania Beach Fla., Rigger Mechanic James Wright, handles the deployment of test gear and equipment from the shop, to the ship, to the floor of the ocean and anywhere in between if needed.

At the NSWCCD Detachment in Bayview, Idaho, four research lab mechanics are multi-skilled across various blue-collar jobs with two of the wage grades holding a Coast Guard Captain license. Their function is to provide trades support at the Navy's Acoustic Research Detachment where the work involves the design and testing of acoustic silencing technologies

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Naval Surface Warfare Centers conduct first integrated combat and power system test over secure live network

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But the connection with power systems in Philadelphia represents a new dimension of added capability.

Ideally, follow-on efforts will use increasingly more-realistic system representations. Starting with simulations and message generators, the goal is to eventually perform the design and prototyping necessary to involve hardware-in-the-loop and full-up systems (e.g. AEGIS Combat System and HM&E Machinery Control System) in order to provide increasing levels of realism and operational validity during total ship systems engineering endeavors.

Schroeder and Bosack set a goal to establish a permanent secure connection by the end of the fiscal year, and bring more networked hardware into the equation by fiscal year 2016.

NSWCCD's Bob Kollars receives Department of the Navy Test & Evaluation Lifetime Achievement Award

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basic underwater acoustic knowledge data sets required for U.S. submarine acoustic signature analysis and capture the skills and analysis techniques required to properly assess the data. Information gathered from the beginning stages of the effort have already increased the acoustic "intellectual property" within the division – supporting pipeline development of the workforce and enabling more advanced and efficient data analysis efforts to be completed. This type of initiative enables employees to better focus on completion of their core tasking and best leverages the talents of the right people to do the right work.

As the Navy's recognized technical leader in acoustic signature data analysis, Kollars used a system engineering approach to optimize the data measurement techniques and data analysis tools to improve the capability of understanding acoustic signatures. This resulted in a significant reduction in total time and funding required to characterize the Virginia-class submarine acoustic signature.

"Bob's vast knowledge of the test and evaluation process, combined with his outstanding leadership and technical expertise, result in a uniquely packaged skill set that sets him apart from others. It is this rare combination of skills that enables him to greatly contribute to the ability of the Navy to effectively and efficiently complete its mission," said NSWCCD Signatures Characterization and Analysis Division Deputy Division Head Paul Luehr.

Kollars is also a recipient of the Navy Meritorious Civilian Service Award; author of more than 80 scientific and technical publications regarding acoustic and electromagnetic signatures of submarines and advanced ocean engineering; a regular lecturer at Massachusetts Institute of Technology signatures course; a member of the Institute of Electrical and Electronics Engineers; and a member of the Acoustic Society of America.

Supporting our technical workforce

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and fleet sonar capabilities. They help ensure a signature advantage for the Navy submarine and surface fleet by operating large-scale test models at unique test ranges in the very quiet and deep test environment provided by Lake Pend Oreille.

The wage grades at Bayview work with visiting test groups that travel to the lake for its unique testing platforms and consistent water depth and water temperature. The wage grades work with these visiting scientists and engineers to make sure their test is a success. Towed Array testing is conducted at the lake with the use of the 60-foot Chinook Research Vessel that is manned and operated by the division's wage grade employees.

At NSWCCD Bethesda, seven wage grade employees work as machinists, welders, sheet metal mechanics, riggers and model makers in support of the many facets of design and testing of technologies associated with surface ships and submarines utilizing small models in laboratories to larger models in the basin or pressure tanks, as well as operational ships in the ocean environment.

Although computer models and analysis techniques are continually refined, the Navy still relies on the facilities needed to validate the models/techniques and the wage grade employees who bring concepts to reality by crafting the models, systems and components to ensure new ships meet performance specifications on delivery and operational units continue to perform as they were designed to do.

At NSWCCD Ship Systems Engineering Station in Philadelphia there is a contingent of 28 wage grade employees in the Operations and Industrial Support Group who are locally referred to as the "Shop."

This group supports all test operations conducted in Philadelphia. This group includes marine machinery mechanics, electricians, instrument mechanics, boiler plant operators, sheet metal mechanics, riggers, a welder, pipefitter, equipment cleaner, and a woodcraftsman.

The shop also has two planners and estimators who coordinate the work and two supervisors who oversee the work. When an engineer, scientist or technician designs a new piece of ship systems component for the Navy, this contingent of wage grade employees take that component and install it on a platform or in a mock-up environment at one of the test sites so it can be evaluated for shipboard operation under simulated conditions. The shop fabricates steel foundations, routes piping and electric power and controls, and provides all construction support needed for equipment installation. The shop personnel will run it, test it, and push it to the point of failure mode so Engineers can gather the data and make whatever modifications are necessary to ensure the component performs as desired. Testing in a controlled site is essential to ensure that newly designed equipment will function as designed when placed into operation.

As trained and qualified operators, the men and women of the Shop run the full-scale, Land Based Engineering and Test Sites (LBTS) in Philadelphia in accordance with test plans and procedures put forth by the site engineers and test directors. The operations often demonstrate integrated operational performance of entire engineering plants and validate the computer programs of the machinery control systems. Prior to lite off, the Shop personnel support site engineers in grooming, testing and commissioning systems so they are ready for service and full plant testing.

As NSWCCD Commander Capt. Richard Blank, NSWCCD-SSES Commanding Officer Capt. Walter Coppeans, and NSWCCD Technical Director Dr. Tim Arcano have stated in their all-hands messages: All NSWCCD employees are essential to the mission in some way. The blue collar workforce is an important part of the team at NSWCCD.