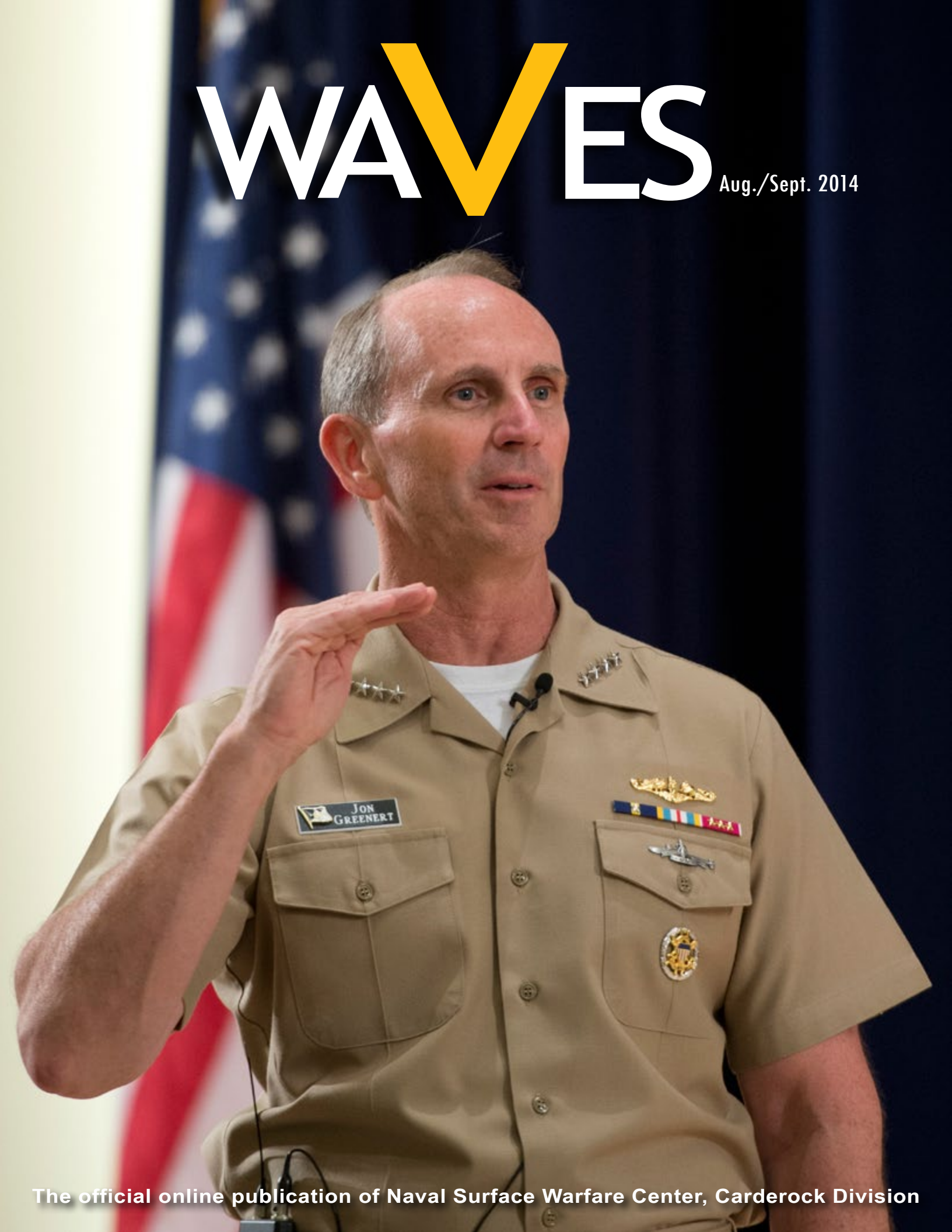
WAVES

Aug./Sept. 2014



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Suzanna Brugler
Katie Ellis-Warfield
Rebecca Grapsy
Kate Hogarth
Timothy Hunt
Margaret Kenyon
Nicholas Malay
Roxie Merritt
Margaret Zavarelli

COVER

Chief of Naval Operations Adm. Jonathan Greenert speaks to Naval Surface Warfare Center Carderock Division employees during an all-hands call in West Bethesda, Md., Aug. 19, 2014. (U.S. Navy photo by Devin Pisner/Released)

FROM THE TOP

Capt. Richard Blank

Commanding Officer of NSWC, Carderock Division

In August, Carderock had the honor of welcoming some of the most distinguished guests in the Navy to visit our facilities, learn about our technology and speak to the team here on site at West Bethesda, Maryland, as well to Philadelphia and to our Detachments by video teleconference.

First, on Aug. 19, we hosted Chief of Naval Operations (CNO) Adm. Jonathan Greenert for an All-Hands call with the Navy civilian employees who directly impact the designing of our fleet's ships and ship systems. Adm. Greenert toured the installation, spoke one on one with our scientists, engineers and technicians, and visited both the David Taylor Model Basin and the Maneuvering and Seakeeping Basin (MASK) before the All Hands.

During his remarks, the CNO gave an update on the status of our Navy and how ships are deployed forward to maintain the security of the seas and to help secure trade routes critical to our nation's, and the world's, economy. Adm. Greenert also answered questions on the littoral combat ship, the new America-class amphibious assault ship and the DDG 1000 program. His question-and-answer period also addressed questions from Carderock employees on the pivot to the Pacific and its impact on the budget, as well as future signatures requirements.

I was thrilled that Adm. Greenert took the time during his question-and-answer period to acknowledge Carderock's own Dr. Jennifer Wolk, and her work and expertise in the area of additive manufacturing, or 3-D printing. Adm. Greenert discussed the "Print the Fleet" initiative and how the future of additive manufacturing will continue to impact the Navy's readiness.

Then, on Aug. 27, Adm. Michelle Howard, vice chief of naval operations (VCNO) and the first woman to achieve the rank of four-star admiral, joined us in West Bethesda and via video teleconference to Philadelphia and the Detachments to address the Carderock work force in observance of Women's Equality Day. Adm. Howard's remarks reflected the importance of equality for women in the work force, how women compare to men in today's 20-percent female military, and shared some of her own experiences throughout her career.

The VCNO engaged with our employees on word associations and how powerful they can be, and at the prompting of one employee, shared a vignette from her childhood about how her mother had instilled leadership in her and her siblings. Adm. Howard's short story and remarks made it clear that she learned that good leaders set standards; that they hold their people accountable; that they take care of their people; and that most important, they know when to test their people, knowing they will succeed.

Having the opportunity to not just tell, but to show, senior Navy leadership what we do at NSWCCD underscores the importance of our role in the Navy team in making sure our fleet is ready to take on whatever mission they are assigned.

Next month, Carderock-West Bethesda will undergo the final inspection and evaluation for the Voluntary Protection Program (VPP). NAVSESS in Philadelphia was awarded this certification in 2011 and was recertified in May. The VPP is a voluntary partnership with OSHA to underscore the cooperation between government, industry and labor to address worker safety and health issues and expand worker protection.

We have been preparing for our VPP certification over the last several years, implementing the four key elements of the partnership: management leadership and employee involvement; worksite analyses; hazard prevention and control; and safety and health training. Now that we are down to the final weeks, I know the safety culture we have created at NSWCCD will serve us well through the process and that we will join the 2,500 companies worldwide with their VPP "star."

You have rights and responsibilities when it comes to safety. If you see something, say something. Safety is a team effort.

The visits from the CNO and the VCNO highlighted the work that all members of the team do at all our locations. The upcoming VPP inspection is another chance to show that we are best-in-class on all fronts. Keep doing the great work you do and do it safely!

TECHNICAL DIRECTOR'S CORNER

Dr. Joseph T. (Tim) Arcano Jr.

NSWC Carderock Division Technical Director

We had the honor of showcasing our world-class talent, technical excellence and facilities to Chief of Naval Operations Adm. Jonathan Greenert on Aug. 19 when he visited our base in West Bethesda, Maryland, to hold an All-Hands call with employees and to tour our facilities. And he was duly impressed!

During his All-Hands call, the CNO reiterated that because we live in such an unpredictable world, the Navy needs to be where it matters, when it matters. He said Carderock Division helps decide what matters – we develop ships. As he said, the Navy needs a forward presence: We must be at the crossroads around the world to react.

As we fit in with the bigger Navy and its mission to protect our country, we must ensure that our work continues to align with the Navy's mission priorities. The same day Adm. Greenert visited, he released the CNO's "Navigation Plan 2015-2019." The plan outlines how the Navy will "define the course and speed we will follow to organize, train and equip our Navy over the next several years."

At Carderock Division, we have been working over the past several months to refine our Strategic Planning Process. This planning process, and its associated eight strategic vectors, will help us look ahead three, five and even 10 years out to execute our current work and prepare for future challenges. It is aligned with the CNO's "Sailing Directions" and also the NAVSEA "Strategic Business Plan," including its new cyber security pillar. I strongly note that ALL of US need to be concerned with cyber security in our products throughout their lifecycle and with the information systems that we use on a daily basis.

During his All-Hands call, which was video teleconferenced to Philadelphia and to our seven Detachments across the U.S., the CNO discussed the challenging budget climate that the Navy, and indeed the entire Department of Defense, faces, to include funding the Ohio replacement ballistic missile submarine (SSBN) program, which Adm. Greenert has testified to Congress is the Navy's highest-priority program.

Under these conditions, we must continue to be efficient and effective and, as he stressed, to innovate. Fostering a culture of technical and business innovation is the third of our eight strategic vectors, and as part of the Navy's Ohio replacement program team, Carderock Division's "hull, mechanical and electrical" experts are providing innovative design solutions leading to large-scale prototyping and testing and analysis to ensure this new class of submarine is the best in the world.

During his tour of the base, the CNO visited the Magnetic Fields Laboratory, where some of the Ohio replacement work is being conducted. We also showed him our Maneuvering and Seakeeping Facility (MASK). With its new wave-making upgrades, this 12-million gallon basin can replicate wave conditions found anywhere around the globe and is the most advanced test facility of its kind in the world.

At the David Taylor Model Basin we discussed our work on concepts to reduce vehicle resistance and thereby reduce acquisition costs. He also was briefed about our work on aluminum alloys, which have become more prevalent in marine applications with the Navy's need to build lighter, faster ships. We're involved with composite patch technology, which helps restore water-tight integrity to structures and can be one tenth the cost of comparable weld repair. Our work on additive manufacturing, or 3-D printing, will help the Navy fabricate parts at sea. Finally, we discussed acoustic superiority and ship concept design.

I am proud of all the knowledge the Carderock team applies to all our tests, experiments and designs. During the All-Hands call, an employee asked Adm. Greenert how we can continue to build such technical excellence that will ensure the Navy's strength. This technical and business workforce development, along with modern knowledge transfer, are two more of our eight strategic vectors. The CNO answered, among other factors, that Navy civilians must be challenged, empowered and feel their work is relevant.

No plan will be successful without the willingness of people charged with the mission to carry it out. Adm. Greenert recognized the key roles all of us at Carderock Division play. In his words, "You are all our civilian shipmates. We'll never sustain the greatest Navy in the world without your help." I wholeheartedly agree. Thank you for all you do.

Carderock Division Mission: To provide research, development, test and evaluation, analysis, acquisition support, in-service engineering, logistics and integration of surface and undersea vehicles and associated systems. Develop and apply science and technology associated with naval architecture and marine engineering, and provide support to maritime industry.

Carderock Division Vision: A high-performing technical business recognized as a world-class innovator for advanced ships and ship systems, and for providing technical solutions that keep our fleet at sea with proven in-service engineering.

CNO conducts All-Hands call at NSWCCD

By NSWCCD Public Affairs

Chief of Naval Operations (CNO) Adm. Jonathan Greenert visited Naval Surface Warfare Center, Carderock Division (NSWCCD) and hosted an All Hands call to address employees in West Bethesda, Maryland, Aug. 19.

"I am truly honored to be here, and I want to talk about what it is that we, big Navy, do with the things that you design and test for us," Greenert said.

During his visit, Greenert met with NSWCCD leadership, Commanding Officer Capt. Richard Blank and Technical Director Dr. Tim Arcano.

"We are thrilled to have the top leader of our Navy visit Carderock and see first-hand what we do, from ship design and integration technology to develop hull forms and propulsors," Blank said.

Greenert spoke one on one with NSWCCD's scientists and engineers during his tour of the facilities. Greenert also watched a demonstration in the Maneuvering and Seakeeping (MASK) wavemaker facility as well as toured the David Taylor Model Basin.

Chief of Naval Operations (CNO) Adm. Jonathan Greenert holds an all-hands call with Naval Surface Warfare Center Carderock Division employees in West Bethesda, Md., Aug. 19, 2014. Greenert toured the facilities while on base to gain a greater understanding of the site's test and development resources, capabilities and key projects. (U.S. Navy photo by Devin Pisner/Released)

"Technology is moving fast, and some of that technology is being grabbed and put into military systems," Greenert said. "What you do here, make no mistake, is a major part of our advantage. When I talk to the folks who design and test the technology, what you do is astounding; it not only is good ship building, but it's also good ship design."

Mechanical Engineer Alan Becnel (blue shirt) gives a presentation to the Chief of Naval Operations (CNO) Jonathan Greenert (left), aide-de-camp to the CNO Maj. John Giannella (center), NSWCCD Commanding Officer Capt. Rich Blank (right) and NSWCCD Technical Director Dr. Tim Arcano (far right) on Carriage 3 in the J-Basin of the David Taylor Model Basin in West Bethesda, Md., Aug. 19, 2014. (U.S. Navy photo by Devin Pisner/Released)

The highlight of the CNO's visit was an All-Hands call he hosted. During the call, Greenert received questions from the audience and discussed topics such as the littoral combat ship (LCS), the new America-class amphibious assault ship, the joint high speed vessel (JHSV), and the DDG 1000 program.

During the question and answer period, Greenert was asked about his "Print the Fleet" initiative concerning additive manufacturing, or 3-D printing. Greenert took the opportunity to applaud the NSWC 3-D printing efforts that are being coordinated at Carderock.

"It was a great honor to be recognized for our efforts in additive manufacturing," Dr. Jennifer Wolk said, a materials engineer who leads the additive manufacturing program at NSWCCD. "The CNO's vision for innovation in this new technology will enable us to better support the fleet in developing new materials, designs and standards for future use."

"It is a testament to the great work at NSWC Carderock, and across the Navy enterprise, that he sees the future impact of this technology on our fleet," Wolk said.

Adm. Howard speaks at Carderock on women's equality

By Katie Ellis-Warfield, NSWCCD Public Affairs

Vice Chief of Naval Operations Adm. Michelle Howard speaks to NSWCCD employees at Women's Equality Day in West Bethesda, Md., Aug. 27, 2014. Howard is the first female four-star admiral in the Navy's 238-year history. (U.S. Navy photo by Ryan Hanyok/Released)

Vice Chief of Naval Operations (VCNO) Adm. Michelle Howard spoke to Naval Surface Warfare Center, Carderock Division (NSWCCD) employees about women's equality in West Bethesda, Maryland, on Aug. 27.

The first female four-star admiral in the Navy's 238-year history, Howard discussed key historical moments for women's equal rights. "This has been a very long journey for women in our country and it is important for both men and women," she said.

Howard highlighted women's rights advocate Elizabeth Cady Stanton and her contributions to the Constitution's 19th Amendment that gave women the right to vote, as well as President Barack Obama's signing of the Lilly Ledbetter Fair Pay Act in 2009. "Anyone of you can be a pioneer if you choose to be," Howard said.

While a lieutenant commander, Howard heard Adm. Elmo Zumwalt Jr. give a talk on being a part of the historic promotion of Rear Adm. Alene Duerk in 1972. Duerk was the first woman flag rank in the Navy. "It was a treat to hear him and his perspective of what it was like," Howard said.

Howard's presentation paid homage to Hollywood actress Hedy Lamarr's contribution to engineering with her patent on frequency hopping, technology used today in Bluetooth and Wi-Fi. DuPont chemist Stephanie Kwolek was also recognized for her invention of Kevlar. "We need more women's perspectives in engineering, and we are not there yet," Howard said.

NSWCCD Technical Director Dr. Tim Arcano congratulated Howard on her historic promotion and asked her to discuss what important attributes her women mentors possessed. "When you are looking at a mentor/protégé relationship, it's a lot about leadership, taking care of your people," Howard said. "When you take care of your people, you set the foundation so that they can be successful."

Howard said that it was her mother who taught her the importance of leadership. "Leadership is about accountability. Leadership is also about being that safety net," Howard said. "When you ask your people to perform, if they fail they, know that you will still take care of them."

Howard was appointed as the 38th VCNO on July 1, during a ceremony at the Women in Military Service for America Memorial at Arlington National Cemetery. She is a 1982 graduate of the United States Naval Academy and a 1998 graduate of the Army's Command and General Staff College with a master's degree in military arts and sciences.

Howard received the Navy League Capt. Winifred Collins Award in 1987 while serving aboard USS Lexington (AVT 16). This award is given for outstanding leadership.

In 1999 Howard took command of USS Rushmore (LSD 47), marking the first time an African-American woman would command a ship in the Navy. She is also the 2011 USO Military Woman of the Year and the 2013 NAACP Chairman's Image Award recipient.

NSWC Carderock Division prints the fleet of the future

By Nicholas Malay, NSWCCD Public Affairs

Principal investigators from Naval Surface Warfare Center, Carderock Division (NSWCCD), NSWC Corona and the Naval Postgraduate Dental School (NPDS) conducted at-sea additive manufacturing (AM) trials June 20-23 aboard USS Essex (LHD 2) in San Diego, in support of the Chief of Naval Operations Rapid Innovation Cell Print the Fleet effort. The team fabricated more than 45 test specimens to examine the effects of ship motion and environment on AM mechanical properties and build quality.

The goal of the NPDS-led Print the Fleet Essex effort was to encourage innovation at the deckplate level by providing workforce development using Computer Aided Drawing (CAD) software and AM training for the Sailors.

The at-sea testing focused on analyzing the material properties and manufacturing in a shipboard environment.

AM, or 3-D printing, describes the process of building three-dimensional objects, layer-by-layer, using a variety of materials including structural metals and polymers. The at-sea testing used a polymeric AM system (Stratasys uPrint), on-loan from the Defense Advanced Research Projects Agency (DARPA), via the NPDS at Walter Reed National Military Medical Center in Bethesda, Maryland.

"There is a distinct need within the Navy to enhance operational fleet readiness, reduce energy consumption and reduce total ownership cost throughout the 21st century maintenance and rapid prototyping domain," NSWCCD Technical Director Dr. Tim Arcano said.

Test specimens and sample specimens fabricated aboard USS Essex (LHD 2) included tensile tests, tested by Naval Surface Warfare Center, Carderock Division, and geometric, dimensional and tolerance specimens, tested by Naval Surface Warfare Center, Corona. Sample specimens were designed and fabricated aboard Essex with support from the Naval Postgraduate Dental School. (U.S. Navy photo provided by USS Essex public affairs/Released)

Dr. Jennifer Wolk with USS Essex (LHD 2) crewmembers discussing prior at-sea additive manufacturing technical data aboard USNS Choctaw County (JHSV 2). (U.S. Navy photo provided by USS Essex public affairs/Released)

"Additive manufacturing is a disruptive technology capable of helping to achieve these goals. This type of testing will help define the path forward for use of additive manufacturing throughout the component lifecycle, from design to sustainment," said Arcano.

The testing was conducted in conjunction with Essex's calm-water powering and maneuvering sea trials led by NSWCCD Surface Ships Hydromechanics specialists.

The sea trials data will be correlated with the fabricated test specimens. This research provides technical data to expand on an ongoing Office of Naval Research (ONR)-sponsored initiative to examine current at-sea printing capability. Under the ONR effort, similar experiments were also conducted by NSWCCD aboard USNS Choctaw County (JHSV 2) in October 2013.

"There have been significant advances in AM since its inception in the 1980s. However, successful implementation of AM for naval applications requires leveraging available technology, assets and expertise," NSWCCD Welding, Processing and Nondestructive Evaluation Branch Principal Investigator Dr. Jennifer Wolk said.

"Utilizing additive manufacturing in a forward-deployed environment can have a large impact on logistics and availability, but there needs to be a fundamental understanding of what is occurring in the AM process while in motion—the impact of an at-sea environment on the end properties of components. This work provides a necessary step to that understanding," said Wolk.

The at-sea AM trials ties to NSWCCD's technical capability in providing naval architectural and integrated surface ship and submarine design analysis expertise to the technical capability in naval materials.

Wolk is coordinating an AM working group meeting at NSWCCD in September. It will be comprised of members from the Warfare Centers to ensure technical capabilities, knowledge areas and future plans are clearly identified.

The working group will also define a strategic vision for the Naval Sea Systems Command (NAVSEA) Warfare Centers in AM to ensure that vision will contribute to, and will fill, technology gaps in the Navy's AM strategic plan. This AM working group will enable broad collaboration across the NAVSEA Warfare Centers.

Naval Ship Systems Engineering Station installs coupling prototype upgrade on USS Essex (LHD 2)

By Joseph Battista,
NAVSSES Public Affairs

Naval Ship Systems Engineering Station, Naval Surface Warfare Center Carderock Division (NAVSSES) engineers recently oversaw the installation of dry flexible couplings on the lube oil service pumps and main feed pumps on USS Essex (LHD 2), which replace grease lubricated versions and essentially eliminates three pounds of hazardous waste and quarterly maintenance requirements for Sailors.

Brett Franks, mechanical engineer and Machinery Alteration (MACHALT) Program manager with the Technology Deployment Branch at NAVSSES, said the dry flex couplings, a device used to connect two moving parts of a system, replaced grid couplings that required more than three pounds of grease to keep each of the eight on board lubricated. There are four couplings on the ship's lube oil service pumps and four on the main feed booster pumps.

"The point is to reduce labor for Sailors, and remove the three pounds of grease it takes to keep the old couplings lubricated," said Franks. "The dry flex couplings are better environmentally, and it takes away the need for Sailors to perform quarterly maintenance."

The maintenance includes replacing the 24 pounds of grease on the eight grid couplings.

Franks said the maintenance of grid couplings is cumbersome work on amphibious ships and requires Sailors to work with hazardous materials. The dry flex coupling is much easier to assemble – they slide and lock into place – no lubrication is required.

"We have a lot of faith in these prototypes because they are already installed and working well on most destroyers and cruisers," said Franks. "We are going to let the new couplings run for about a year on the Essex just to be sure before we move forward with installation on other amphibious ships."

Lube oil service pump before installation of the dry flexible coupling. (U.S. Navy photo by Brett Franks/Released)

Lube oil service pump after installation of the dry flexible coupling. (U.S. Navy photo by Brett Franks/Released)

Mission module innovation cell briefs results

By NSWC Panama City Division Public Affairs

Thirty-four scientists, engineers and logisticians representing 10 Naval Sea Systems Command (NAVSEA) Warfare Centers gathered for a series of workshops earlier this year in Panama City, Florida where they brainstormed new and innovative mission packages for use aboard the Littoral Combat Ship (LCS), Mobile Landing Platform and other Navy platforms. (Official U.S. Navy photo/Released)

What if the Navy had a mission package that could deploy a saturation fly away dive locker? Does the Navy need a mission package that could offer shipboard medical capabilities? These are just two of the questions a team of 34 scientists, engineers and logisticians representing 10 NAVSEA Warfare Centers contemplated during a series of workshops earlier this year in Panama City, Florida where they brainstormed new and innovative mission packages for use aboard the Littoral Combat Ship (LCS), Mobile Landing Platform and other Navy platforms.

It all started in March 2014 when the Naval Surface Warfare Centers (NSWC) were challenged by the Program Executive Office Littoral Combat Ships (PEO LCS) to identify alternative mission packages.

"Based on the technical expertise within the NAVSEA Warfare Centers, we asked them to offer innovative options for multiplatform mission package concepts for potential future use," said Carl Siel, PEO LCS executive director.

The result was more than 200 ideas for potential mission packages.

"Some of our best and brightest came together here in Panama City to collaborate on ways to apply existing technologies," said Ed Stewart, NSWC Panama City Division technical director. "The depth and breadth of the ideas generated was truly impressive."

By the end of the five-day Phase I, the NAVSEA Multi-Platform Mission Module Innovation Cell culled the list of 200 ideas into 16 viable packages, with six proposed ideas for further investigation and planning in an upcoming Phase 2. The six mission package ideas proposed for future investigation span various U.S. Naval mission areas ranging from offensive mining to humanitarian assistance/ disaster response.

"One of the NAVSEA Warfare Centers' core roles is to provide unbiased technical advice to Navy program offices," said Don McCormack, executive director for Naval Surface and Undersea Warfare Center. "The NAVSEA Warfare Centers are in the best position to look across the portfolios of all of the program offices we work with, identify new mission packages based on existing technologies and systems, and propose collaborative technical solutions."

The cell applied NAVSEA initiatives such as commonality, reducing total ownership cost and maximizing savings through collaboration in developing the mission package ideas. For maximum flexibility, the cell also looked at how both mission packages and mission modules could be quickly and easily scaled to suit size of the platform and mix of capabilities required.

"A key goal of this Innovation Cell was to maximize commonality at the mission module and system level to enable interchangeable, flexible mission packages that are operationally relevant and able to be demonstrated in three to five years," said Stewart. "The team more than met this goal."

The NAVSEA Multi-Platform Mission Module Innovation Cell is sponsored by the NAVSEA Warfare Centers and the Program Executive Office Littoral Combat Ships Executive Director, Carl Siel. The participants represented NAVSEA Warfare Center commands Panama City, Carderock, Corona, Crane, Dahlgren, Indian Head Explosive Ordnance Disposal Technology, Keyport, Newport, Port Hueneme, and Naval Sea Logistics Center.

NAVSSES engineers complete first install of new submarine Central Atmosphere Monitoring System (CAMS) IIA

By Joseph Battista,
NAVSSES Public Affairs

Engineers at Naval Ship Systems Engineering Station, Naval Surface Warfare Center Carderock Division (NAVSSES) recently completed the installation of the first Central Atmosphere Monitoring System (CAMS) IIA on an in-service submarine – USS Pasadena (SSN 752).

"The CAMS IIA is a more capable atmosphere analyzer that provides improved monitoring, is cheaper to produce and maintain, and is easier for a Sailor to operate," said NAVSSES mechanical engineer Matthew Smith, the alteration installation lead for CAMS IIA with Life Support Compressed Air Systems Branch at NAVSSES.

The new monitor, manufactured by United Technologies Aerospace Systems (UTAS), replaces the CAMS MkI – developed in the 1970s and the CAMS MkII from the 1990s.

The CAMS IIA development program was initiated and managed by Audrey Bauer, Energy Conversion Research and Development Branch head. The effort transitioned to Life Support Compressed Air Systems Branch as the technology matured and was readied for initial production. The involvement of both branches resulted in a fleet-ready product with significant technology upgrades.

According to Josh Manney, chemical engineer with Life Support and Compressed Air Systems Branch at NAVSSES, the CAMS IIA requires less operator intervention through the use of digital interfaces and automatic sequencing.

"It will be much easier for the Sailor to operate and monitor," said Manney. "The CAMS IIA is more reliable and allows for much easier modifying of the atmospheric constituents being monitored than previous versions. The hardware and software upgrades of the CAMS IIA eliminate the spurious and erroneous refrigerant alarms, which was an issue with the CAMS Mk I. This allows sailors to better trust an alarm of the primary submarine analyzer allowing them to correct any problems if they arise."

The CAMS IIA is a centrally located unit from which sample tubes run to selected spaces in all compartments of the submarine. The tubes carry atmosphere samples to the CAMS IIA where analysis for life gasses and trace contaminants takes place.

Matthew Smith (left), alteration installation lead for CAMS IIA, and John Crockett, onsite installation coordinator for CAMS IIA, stand next to the Central Atmosphere Monitoring System (CAMS) IIA before installing it on USS Pasadena (SSN 752). (U.S. Navy photo by Matthew Smith/Released)

According to Smith, within the next few years all Los Angeles class submarines will receive the CAMS IIA. Installation takes approximately three days and can be done pier side. In addition, all Block III and future Virginia Class submarines will receive the new analyzer.

John Crockett, chemical engineer with Life Support Compressed Air Systems Branch, served as the onsite installation coordinator (OSIC) for the CAMS IIA installation on Pasadena. During development of the alteration, Crockett coordinated integrated logistics support (ILS) changes with the planning yard and training impacts with Naval Sea System Command's Undersea Warfare Directorate (SEA 07). NAVSSES engineers make up the alteration installation teams (AIT), serve as the onsite installation coordinators (OSIC), and are the in-service engineering agents (ISEA) for CAMS IIA.

Scott Storms (left), from Advanced Machinery Systems Integration Branch, Joshua Barrett (center), and Nicholas Cifelli (right), both from Sail Systems Engineering Branch, test their laser metrology equipment before boarding USS Texas (SSN 775) at Pearl Harbor Naval Shipyard. (U.S. Navy photo by David Tomiyama/Released)

NAVSSES engineers create 3-D computer model of submarine for emergency responders

By Joseph Battista, NAVSSES Public Affairs

A team of engineers from Naval Ship Systems Engineering Station, Naval Surface Warfare Center, Carderock Division (NAVSSES), recently completed a 3-D computer animation model of the interior of Virginia-class submarine USS Texas (SSN 775) to help emergency response personnel navigate the ship during a flood or fire.

Training exercises revealed the difficulty emergency personnel face combatting fires aboard submarines because of not knowing how to access particular spaces. This caused them to lose valuable time while hazardous conditions increased.

According to Pinkesh Bharatia, mechanical engineer for Sail Systems Engineering Branch, the virtual walkthrough helps crews plan how to get to spaces efficiently during training and real emergency situations.

Bharatia and his colleagues Nicholas Cifelli, Caitlin Swec and Joshua Barrett from Sail Systems Engineering Branch, along with Scott Storms and Patrick Violante, from Advanced Machinery Systems Integration Branch, are part of the Advanced Data Acquisition, Prototyping Technology & Virtual Environments (adapt.ve) Lab where they use laser metrology to create virtual environments of existing shipboard spaces.

The team spent three weeks in January at Pearl Harbor Naval Shipyard scanning the submarine followed by a few months in post-production at their Philadelphia lab to create the virtual environment. During post-production, they removed all the extraneous data points from more than 650 scans to create a clean, seamless virtual walkthrough.

“Most scans we’ve done up until now were in the 100-150 scan range. This project went well beyond that point,” said Storms. “This project utilized more than 10 billion points.”

The final computer-generated model is an animated walk-through of multiple pre-planned paths from the submarine’s main hatch to areas on all three platforms forward of the watertight door. The team created six virtual routes, of which one is the path to get to the engine room where the threat of fire is much higher.

“The videos give the emergency personnel a true awareness as to where they are on the ship and the equipment around them,” said Swec, who assisted with the post-production work. “We were able to create an immersive environment that should help train the emergency personnel to get to the proper space in the most efficient manner.”

The goal is for emergency responders to receive guidance from their counterparts using the computer model to get to the shipboard incident quickly, suppress the problem, and minimize damage to the submarine.

NSWC Carderock Division bolsters STEM Awareness through Summer Teacher Institute

By Nicholas Malay, NSWCCD Public Affairs

Carderock Division Educational Outreach Coordinator Toby Ratcliffe (center) trains Montgomery County first-grade teachers on the "Engineering is Elementary" curriculum during Carderock's two-day Elementary School Teacher STEM Institute, in West Bethesda, Md., July 30, 2014. (U.S. Navy photo by Nicholas Malay/ Released)

Naval Surface Warfare Center, Carderock Division (NSWCCD) hosted a weeklong summer institute for Science, Technology, Engineering and Mathematics (STEM) elementary school teachers, July 28-Aug. 1.

"It was after the first day, I knew this course would provide me with resources and activities that would excite and inspire my first graders to become our future 21st century engineers," said Allison Bohn, a Flower Hill Elementary School first-grade teacher.

For the fourth year in a row, Carderock has held a Summer STEM Institute for elementary school teachers. This year, 17 first-grade elementary school STEM teachers from Montgomery County Public Schools (MCPS) were invited to West Bethesda to tour the facilities in which the scientists and engineers work, and to learn how to incorporate the engineering design process into their classrooms. The institute was also designed to bring teachers into the world of naval engineering for a week.

"If we want scientists and engineers in our society, we have to start with our youngest students," said Candice Marshall, Park Wood Elementary School first-grade teacher.

Carrie Zimmerman, science and engineering content specialist with Montgomery County Public Schools (MCPS), is one of six science, engineering and technology instructional specialists for Montgomery County. Her position includes developing curriculum, providing professional development opportunities throughout the year and supporting curriculum and instruction at the schools K-12.

"The Summer STEM Institute, using the Engineering is Elementary (EiE) has been restructured since my first year with Toby Ratcliffe, as we now have targeted an audience and matched the EiE materials and curriculum to the targeted grade level," Zimmerman said. "In 2012 we had 23 third-grade teachers participate and engage in two different EiE units, and this summer we had 17 first-grade teachers also participate and engage in two units that align with the MCPS Elementary Integrated Curriculum."

"The goal of the institute is to expose teachers to the real world of engineering so that they can bring relevance to the material that they are teaching their students," said Ratcliffe. "We also want to introduce the teachers to project-based engineering ideas, which the teachers can either use in after-school engineering and science clubs or as extensions to their curriculum."

During the institute, teachers worked with NSWC scientists and engineers on school-based engineering design projects. The week was comprised of the EiE curriculum developed at the Museum of Science in Boston. Ratcliffe is an endorsed professional development provider for EiE. A focus on additive manufacturing was continued through a materials engineering EiE unit.

"I believe the summer institute for elementary school STEM teachers allows the teachers to bring a higher level of relevancy of use and applications of the technology to the students," NSWCCD Materials Engineer Dr. Jennifer Wolk said. "While the scientists and engineers in the lab may touch only handfuls of students, teachers impact hundreds of students. The relationship between scientists and engineers and teachers allows us to reach even more students by bringing our excitement and our applications to their classroom studies."

Additive manufacturing builds a part layer by layer and is often used in traditional manufacturing processes to develop tooling and molds. "Best training ever," said Sara Stern, a Rock View Elementary School first-grade teacher.

After attending the institute and getting a better appreciation of local science and technology facilities, the teachers were encouraged to bring their students for curriculum-based tours of NSWCCD facilities, including the David Taylor Model Basin (DTMB), to meet scientists and engineers. Carderock will also provide science and engineering mentors and volunteers in the Montgomery County classrooms.

During the week, teachers toured the DTMB, electromagnetics field lab and the welding fabrication lab. "Students will be excited to become their own engineer while understanding the scientific principles and technology involved," said Michelle Schiller, a Flower Elementary School first-grade teacher.

"It is very rewarding for our scientists and engineers to work with teachers who inspire students each day – we look forward to the partnerships, which have been initiated during the elementary school STEM institute," Ratcliffe said. "With a majority of the teachers already teaching science and math, Carderock mentors hope all of the teachers learned several interesting engineering design principles from the institute, which will assist and encourage them in embracing the elementary school students' interest in science and engineering."

All students achieve full STEM literacy through seamlessly integrated instruction that is project/problem and standards-based. STEM literate students are critical thinkers who are able to solve non-routine problems in a globally competitive society. "The work of the Science, Technology and Engineering Team supports achieving this vision," Zimmerman said.

"Seeing the engineers, where they work and interacting with them, has given me a better understanding of what happens here at Carderock Division, at NAVSEA and across the nation," said Joanne Robbin, a Georgian Forest Elementary School first-grade teacher.

NAVSSES engineers test fluid emissions from submarines in Arctic Testing Chamber

By Joseph Battista, NAVSSES Public Affairs

The Virginia-class attack submarine USS New Mexico (SSN 779) surfaces through the arctic ice during Ice Exercise (ICEX) 2014. ICEX 2014 is a U.S. Navy exercise highlighting submarine capabilities in an arctic environment. (U.S. Navy photo by Mass Communication Specialist 2nd Class Joshua Davies/Released)

Engineers at Naval Ship Systems Engineering Station (NAVSSES), Naval Surface Warfare Center Carderock Division (NSWCCD)'s Submarine Life Support RDT&E Facility completed testing of the performance characteristics of submarine atmosphere constituent elimination in an arctic environment in late July.

The testing concluded with a seven-day continuous operation test utilizing the Arctic Testing Chamber – which recreates an arctic sea environment so NAVSSES engineers can study the effects of sub-freezing temperatures on specific shipboard systems without having to conduct testing on a deployed submarine operating in the Arctic.

"We are able to mimic actual arctic seawater salinity and temperature to a tenth of a degree," said Joshua Manney, lead test engineer and chemical engineer. Manney and his team create saltwater using commercially available ocean salt substitute that includes the various minerals found in ocean water. "Basically, we create seawater similar to what a saltwater aquarium uses."

The most recently conducted test validated the conditions under which atmosphere constituents are effectively eliminated from a submarine in an arctic environment, which is seawater at or near 28.6 degrees Fahrenheit.

Manney and Alan McCarrick, a lead test engineer with the Life Support and Compressed Air Systems Branch at NAVSSES, placed atmospheric constituent discharge equipment equivalent to the actual shipboard configuration in the Arctic Testing Chamber to study what happens to the constituent as it exits the submarine into the cold Arctic water.

The operator sets the internal air temperature of the chamber using a control panel located outside the commercial refrigerator-sized device. Modifying the interior air temperature controls the water temperature. "With this device we control the water temperature by raising or lowering the air temperature," said McCarrick.

They can keep the temperature above the freezing point of seawater or just below it – creating a thin layer of ice on top similar to true arctic conditions. McCarrick explained how the frozen layer is pure water, and not seawater, like artic ice, which is also only a layer of frozen pure water. The salt from the seawater closest to the air sinks to create a layer of fresh water, which is what actually freezes, and which raises the salinity of the localized seawater below it.

"One goal with this test is to validate the proper elimination of the atmosphere constituents from the submarine under arctic conditions without impacting submarine performance," said Manney. "We are fortunate to be able to utilize actual submarine shipboard systems in our submarine life support test facility so we can be certain that conditions tested do not generate excessive noise or vibrations that might compromise a submarine during its mission."

Manney, McCarrick, and John Crockett developed the test plan for the elimination tests, sponsored by Naval Sea System Command (NAVSEA), starting in June 2013 and received funding in late FY13 to begin execution of the proposed tests. Significant effort was put into ensuring the test setup properly mimicked the shipboard configuration and operation, which included involvement and confirmation with the planning yard.

The outcome was the successful seven-day continuous run eliminating atmosphere constituents from a submarine in arctic conditions while evaluating performance characteristics of the atmosphere constituents under different operating conditions.

NAVSSES hosts first ever visit from school for the Deaf

By Joseph Battista, NAVSSES Public Affairs

Naval Ship Systems Engineering Station, Naval Surface Warfare Center Carderock Division (NAVSSES) hosted the first ever visit from the Marie Katzenbach School for the Deaf July 16.

Approximately 40 Deaf high school students and teachers from the Trenton, New Jersey state-funded school toured test sites, learned about career opportunities, and met with NAVSSES' only Deaf employee Jorge Flores, a logistics management specialist with Technical Manuals Branch.

This was the first time in his 23 years Flores said he could recall a school for the deaf coming to NAVSSES. "This was the first time I've ever had to do a presentation for a group," said Flores, who attended the Model Secondary School for the Deaf in Washington, D.C. "I was very nervous and hope in the future I can present better by using visual aids."

Flores expressed his appreciation to Scott Storms, from Advanced Machinery Systems Integration Branch, for organizing the visit. Storms and other engineers at NAVSSES have visited the Katzenbach School in recent years, but felt this year the students should have the opportunity to see first-hand what they have only heard about.

"The students loved Jorge's presentation," said Storms. "I know that witnessing his success will encourage them to be successful in their own careers. One student already inquired about Jorge being his mentor."

Jorge Flores, from Technical Manuals Branch, uses sign language to speak to students from the Marie Katzenbach School for the Deaf during their visit to Naval Ship Systems Engineering Station, Naval Surface Warfare Center Carderock Division (NAVSSES) July 16, 2014. The visit was part of the school's annual Technology and Invention Week Summer School Program. Flores is a Deaf employee who has worked at NAVSSES for 23 years. (U.S. Navy photo by Joseph Battista/Released)

Jorge Flores, logistics management specialist from Technical Manuals Branch, uses sign language to interpret what Charles Gilligan, from Power Transmission Branch, is describing to students from the Marie Katzenbach School for the Deaf during their tour of Naval Ship Systems Engineering Station, Naval Surface Warfare Center Carderock Division (NAVSSES) July 16, 2014. (U.S. Navy photo by Joseph Battista/Released)

Flores, who was born in Puerto Rico, told the students about how he started as a summer intern at NAVSSES and strived to work his way up through the organization to where he is now – in a logistics management role. He described his current position as similar to a person who writes the manual that describes how to operate and maintain a bicycle. Only he does it for Navy ships.

He explained to them that the journey has not always been easy. He has faced many obstacles, but strives to improve his work environment so future Deaf employees can more easily integrate into the workforce – establishing a better network for access to interpreters, improving the visual alert system in buildings, and setting up video phone technology are just a few of the improvements he has influenced.

In addition, Flores and his Deaf colleagues, 10 of them, at NSWCCD in West Bethesda, Maryland, established a monthly VTC meeting to discuss accessibility issues for the Deaf within the division.

"It's been tough at times for me, but all this will help any Deaf student who want to work here someday make the transition," said Flores. "Having the students here is a great recruiting tool. It's important for the student's future to see what is available to them in the workforce."

The students were very appreciative Flores and Capt. Walter Coppeans, NAVSSES commanding officer, took the time to speak to them – they put their hands in the air and waved them – sign language for clapping.

Flores said the visit was also an opportunity for NAVSSES engineers to learn about the Deaf culture.

"I'm the only Deaf employee at NAVSSES," said Flores. "Most people here have never worked with a Deaf person, and this was an opportunity for them to learn about that interaction."

At one point during the test site tours, an engineer doing a presentation strayed away from the interpreter making it difficult for her to hear what he was saying. She had to ask him to remain close to her and in sight of the students.

Flores said trying to make the interaction between the Deaf and hearing as relaxed and normal as possible is the goal. He said there is a tendency for people to want to talk to the interpreter instead of the Deaf person.

"It's polite to look at the Deaf person you are speaking with, just like you are speaking to someone who can hear," said Flores who earned a certificate in computer operation from Camden County Community College and a certificate in computer aided drafting (CAD) from the Technical Institute of Camden County.

"I just want to thank everyone who was involved for taking the time to ensure the tours went smoothly and the students stayed involved," said Storms. "The students were in awe after seeing how massive the machinery is on a Navy ship."

Flores said he hopes he and the command can do more outreach to the local Deaf community in the future.

NREIP presents cutting-edge technologies for the fleet of tomorrow

By Nicholas Malay, NSWCCD Public Affairs

The Center for Innovation in Ship Design (CISD) hosted the Naval Research Enterprise Intern Program (NREIP) final presentations at the Naval Surface Warfare Center, Carderock Division's (NSWCCD) Maritime Technology Information Center in West Bethesda, Maryland on July 29-30.

The review featured six presentations from the CISD intern teams and 20 from the NREIP interns. A variety of topics were presented focusing on ship concept development, model experiments and systems designs.

NREIP provides competitive research internships to approximately 275 college students (200 undergraduate students and 75 graduate students) each year. Participating students typically spend 10 weeks during the summer doing research at one of 29 Department of the Navy laboratories.

"It never ceases to amaze me how capable these college students are," Steve Ouimette NSWCCD Naval Architecture and Engineering director of operations and intern coordinator said. "Their enthusiasm and professionalism really show through their presentations of the research performed each summer. The intern program has become a key recruitment tool for the Warfare Center and it's good to know our future pipeline is filled with such capable people."

Turner Meeks – Cost analysis

Turner Meeks, a student at Washington and Lee University in Lexington, Virginia, and NSWCCD NREIP cost analyst, researched the integration of Vertical Launching System (VLS) on T-AKE. Meeks said this research is a perfect example of how NREIP interns utilize studies from the CISD and provide a cost range in order to inform decision makers. T-AKE is a dry cargo/ammunition ship operated by Military Sealift Command (MSC) to supply the fleet.

Turner Meeks, a student at Washington and Lee University in Lexington, Virginia, and NSWCCD Naval Research Enterprise Intern Program (NREIP) cost analyst, presents his research on the integration of Vertical Launching System (VLS) on T-AKE through the NREIP at the Naval Surface Warfare Center, Carderock Division in West Bethesda, Md., July 29-30, 2014. (U.S. Navy photo by Nicholas Malay/Released)

"For my NREIP final review, I wanted to provide engineers with a high-level overview of the basics of the cost-estimating process and give an example of a typical project that a cost analyst would do," Meeks said. "The cost team must work hand in hand with the design team to deliver the best possible product to the fleet."

Meeks said the scope of this study was very high level, but it conveys that Carderock Division can take a basic feasibility study and deliver a rough order of magnitude (ROM) estimate to shed light on how feasible this solution would be.

"I learned a great deal this summer about how cost analysis is performed in the Navy, and I can only learn more in the future," Meeks said. "This internship has been valuable because I began to learn the skill of balancing several different tasks and quickly providing deliverables for frequent briefs."

"One of the most important aspects I have taken from my summer internship is fine-tuning the ability to pull the important information out of piles of data and form a cohesive story of the estimate," Meeks said. "It is very easy to get lost in the numbers in cost analysis, but it is vital to be able to describe sound methodology that validates the estimate."

Meeks said he is excited about the prospect of coming back to Carderock after he graduates and working in cost analysis.

"The analysis is fascinating and I enjoy the opportunities to frequently present my work in briefs to senior leadership," Meeks said. "NREIP has been a wonderful experience and there are several incredible leadership opportunities that may grow out of my budding career in cost analysis."

Grant Sandlin – Lithium, ion battery heat generation model

Grant Sandlin, a student from Virginia Tech in Blacksburg, Virginia, presents his research on developing a model of thermal characteristics of a small lithium ion battery during discharge by accounting for resistive heat generation, convection, conduction, and radiation through the Naval Research Enterprise Intern Program (NREIP) at the Naval Surface Warfare Center, Carderock Division in West Bethesda, Md., July 29-30, 2014. (U.S. Navy photo by Nicholas Malay/Released)

Grant Sandlin, a student from Virginia Tech in Blacksburg, Virginia, researched developing a model of thermal characteristics of a small lithium ion battery during discharge by accounting for resistive heat generation, convection, conduction and radiation.

"To me, batteries in themselves out of context can seem vague and sometimes, a little dry," Sandlin said. "There is a great deal of math and general understanding required to wrap your head around batteries, how they work and how they safely use them."

The model was validated experimentally by measuring cell surface temperatures of various 18650 li-ion cells under varying discharge currents.

"What make them interesting to me are the systems they power and the capabilities they offer," Sandlin said. "In naval applications, they can offer near-silent propulsion and power devices in remote locations in conjunction with renewable energy. Military use of batteries lends itself to very interesting and groundbreaking projects and providing the technology to power those projects is where my interest lies."

The model was intended to predict cell surface temperature under transient and steady state conditions.

"The people at Carderock Division are excellent to work with," Sandlin said. "They are smart, fun and always ready to help," Sandlin said. "I have enjoyed my time here, first and foremost, because of the people who work here."

"Mentoring science and engineering students is an important part of developing the technical leaders of tomorrow," said Eric Shields, NSWCCD naval scientist and Warfare Center mentor. "Our group is proud to mentor these individuals and provide learning and developmental opportunities in support of this national goal."

Sofia Calicchio – Modeling sounds fields and acoustic properties within enclosures

Sofia Calicchio, a mechanical engineering student at Duke University in Durham, North Carolina, and NREIP intern, researched predictions of broadband interior noise using an energy-intensity boundary element method (EIBEM), which were compared to experimental measurements.

"This project allowed me to challenge myself through extensive coding in MATLAB and urged me to discover new, more efficient ways of designing a compatible tool for the existing model," Calicchio said. "This project allowed me to flex my creative capacity while still maintaining a firm analytical and scientific approach to my task."

The sensitivities of the predictions to various assumptions, geometries, anomalies and experimental uncertainties were explored.

"This internship has expanded my view of national security and brought the workings of my government to a more personal level," said Calicchio. "I have come into contact with civilian personnel that work tirelessly to make our Navy the best in the world and they have inspired me to work to do the same."

"The NREIP program provides students with challenging, real world problems that develop their knowledge of NAVSEA's mission within the science and engineering fields," said Dr. Krista Michalis, Calicchio's NSWCCD mentor. "My hope while guiding Sofia's summer project and offering her insight into post-education opportunities is that she'll be inspired to choose a career at NSWC Carderock."

Sofia Calicchio, a student at Duke University in Durham, North Carolina, majoring in mechanical engineering and Naval Research Enterprise Intern Program (NREIP) intern, presents her research on predictions of broadband interior noise using an energy-intensity boundary element method (EIBEM), which were compared to experimental measurements through the NREIP at the Naval Surface Warfare Center, Carderock Division in West Bethesda, Md., July 29-30, 2014. (U.S. Navy photo by Devin Pisner/Released)

Mark Parsons and Frank Zerofsky – Surface ship resistance experiments

Mark Parsons, a student at the University of New Orleans studying naval architecture and marine engineering, and Frank Zerofsky, a student at Virginia Tech in Blacksburg, Virginia, studying ocean engineering, were assigned to the Hullform and Propulsor Testing Branch of the Surface Ship Hydromechanics Division. Their mentors were Gabor Karafiath and Kenneth Forgach.

"Our goal was to conduct a standard bare hull resistance experiment with a model that was a notional design for a new ship and report our findings," Parsons said. "The purpose of this experiment is to provide data to determine if the addition of an elliptical bulbous bow reduces the resistance over a wide range of displacements, trims and speeds."

Throughout the summer, Parsons and Zerofsky gained hands-on experience and a practical sense of the engineering research process. Their main task was to participate and provide assistance on a model test.

"Our task was to assist in the model test of a notional ship design," Zerofsky said. "The objective of the model test was to uncover the potential fuel savings of a bulbous bow. Bare hull resistance tests were performed to gather the necessary information for various ship operating conditions."

Both students participated in a bare-hull surface ship resistance experiment on a surface ship model, which represented a notional hull form. The model had two interchangeable bows. One bow was a notional stem bow design, and the other had an elliptical bulb. The model was tested to determine if the addition of a bulbous bow reduced the resistance over a wide range of displacements, trims and speeds.

Their initial task was to become familiar with the model testing procedures of NSWCCD while contributing to other side projects. The interns were responsible for configuring the model.

"The surface ship resistance experiment was done to determine the hydrodynamic resistance data of a newly designed bulbous bow," Zerofsky said. "From the data collected it was determined that the bulbous bow performed very well and is expected to save an immense quantity of fuel which ultimately results in a lower cost of operation."

Additional tasks included: marking the model number, installing turbulence stimulators on the bows, changing bows during testing, trimming the model and adding ballast to simulate different displacements. The interns were also responsible for the photographic coverage of the testing.

Mark Parsons, a student at the University of New Orleans studying naval architecture and marine engineering, and Frank Zerofsky, a student at Virginia Tech in Blacksburg, Virginia, studying ocean engineering present their research on model testing of a notional ship design through the Naval Research Enterprise Intern Program at the Naval Surface Warfare Center, Carderock Division in West Bethesda, Md., July 29-30, 2014. (U.S. Navy photo by Nicholas Malay/Released)

Zerofsky said, without the displacement and speed profile of the ship, specific conclusions about the quantity of fuel saved cannot be made, but based on the data analyzed from testing, the bulbous bow showed great potential in hydrodynamic performance for saving fuel ability.

"Without the ship displacement and speed profiles, it is difficult to draw any specific conclusions as to whether or not this elliptical bulb will reduce the annual fuel consumption," Parsons said. "However some general and very encouraging trends were observed."

Parsons said, at the full load condition, the elliptical bulb reduced the resistance over the entire speed range tested and greatly reduced the resistance in the higher speeds. "These results look very encouraging for the adoption of an energy-saving bulb on the new ship design."

During each run, the interns took photos of each condition at the designated speeds. After model testing concluded, the interns worked closely with the test engineer to analyze the results, perform data reduction and prepare the preliminary report of the model test.

"What started out as a model test evolved into the evaluation of a bulbous bow that exceeded the performance of all previous bulbous bows," Parsons said. "The Navy now has a baseline design for a refined bulbous bow that out-performs any current designs. This bulbous bow could potentially become the new standard that all future bulbous bows are compared to. My mentor, Gabor Karafiath, has shown me that the value is in the details. The addition of a few key details can make a good project a great project."

Zerofsky said that by performing this model test, the Navy now has information that will help save money on the annual fuel costs of the ship potentially fitted with this bulbous bow. The Navy will also be able to add this data to their knowledge base to assist in future research projects of similar hull forms.

"On behalf of myself and the test engineer Kenneth Forgach I wish to say that we greatly appreciated the assistance of Mr. Parsons and Mr. Zerofsky in helping us execute this model test program," said Karafiath, NSWCCD mentor and senior staff naval architect. "Their participation was an integral part of the data collection during the test and the subsequent data analysis and report preparation phases."

Hannah Stahl – Safeguard computer simulation post-processing tools

Hannah Stahl, a student at Cornell University's computer science program and Naval Research Enterprise Intern Program (NREIP) intern, presents her research on developing SAFEGARD computer simulation post-processing tools through the NREIP at the Naval Surface Warfare Center, Carderock Division in West Bethesda, Md., July 29-30, 2014. (U.S. Navy photo by Devin Pisner/Released)

The Military Effectiveness Group at Carderock is supporting development of a new Integrated Air and Missile Defense simulation for the Naval Operations (OPNAV) staff. This software, called SAFEGARD, models multiple layers of ship defense against oncoming missile attacks. Because the software is still in the development phase, it does not yet have any means of post-processing; it currently just outputs millions of lines of raw data.

Hannah Stahl, a student at Cornell University's computer science program and NREIP intern, researched and developed SAFEGARD computer simulation post-processing tools through the Naval Research Enterprise Intern Program (NREIP).

"This summer I created two post-processing tools that engineers can use to easily see and analyze what happened during a SAFEGARD simulation, instead of reading through hundreds of pages of data," Stahl said.

The first tool she created is a plotting interface that takes no more than a few minutes to process all data from a simulation and then allows the user to select assets (ships, aircrafts or missiles) and data parameters (altitude, speed, etc.), then generate plots with a simple click of a button. The user can view trajectories, sensor tracking data and more.

The second tool she created is a web dashboard that shows more of an overview of what happened during an entire simulation. The dashboard home-page shows hierarchies of assets on both sides of the fight, as well as wind-conditions and total assets lost.

"With these two SAFEGARD post-processing tools, analysts can now more efficiently and effectively analyze simulation output and make important trade-off decisions as a result," Stahl said.

Clicking on an asset takes the user to a summary of that asset's performance during the simulation including its tracking history and sensor energy status.

Stahl said, this project taught her how to code with purpose. "I created computer tools that will help improve our country's security, which is more meaningful than anything I've done with code before."

"Working at the Warfare Center, I got the opportunity to collaborate with, learn from and even present to accomplished engineers and analysts. I improved not only my computer skills, but also my knowledge of the government, naval warfare and what it's like to work in the real world," Stahl said.

"Hannah's work has or will be distributed to Carderock, Dahlgren, NAVAIR and SPAWAR analysts to support analyses and trades studies of future programs and technologies in the Integrated Air and Missile Defense (IAMD) regime made across the OPNAV staff," said Troy Hendricks, an NSWCCD Military Effectiveness Group naval architect and Warfare Center mentor. "The tools she has produced will significantly reduce the burden on analysts resulting in higher quality, faster and lower cost assessments."

"Hannah was able to take high-level requirements and apply a broad set of programming and software development techniques to develop these tools in a short time frame," Hendricks said. "Her ability to quickly learn, evaluate, select and implement these technologies was critical to the success of the project."

NAVSEA and Norfolk Naval Shipyard integration of virtual shelf and standard parts catalog saves time and money

By Joseph Battista, NAVSSES Public Affairs

Naval Sea Systems Command's (NAVSEA) Commonality Program integrated its Virtual Shelf – a repository of standard architectures, design guidelines, specifications, and approved parts list – with Norfolk Naval Shipyard's (NNSY) Standard Parts Catalog (SPC) to upgrade the Virtual Shelf to version 3.0. VS 3.0 will help shipyard design engineers trim program development time, as well as reduce the Navy's total ownership cost. VS 3.0 is scheduled to be operational before the end of the fiscal year and available to general users in early fiscal year 2015.

VS 3.0 is a usable tool for shipyard designers to find approved parts at the best price when developing drawings for ships. The Commonality Program, now under the command of the newly formed NAVSEA Acquisition and Commonality Directorate (SEA 06), is tasked with reducing the proliferation of unique systems, subsystems, and components introduced into the fleet inventory for new ship construction and major modernizations.

"It has been a long-term goal to introduce this vehicle where shipyards can go to easily retrieve parts information," said Bill Moss, the Commonality Project Team lead with Naval Ship Systems Engineering Station, Naval Surface Warfare Center Carderock Division (NAVSSES). "Combining the Virtual Shelf with Norfolk's Standard Parts Catalog is the first major step."

Norfolk Naval Shipyard, in Portsmouth, Virginia, is one of the largest public shipyards in the world specializing in repairing, overhauling, and modernizing ships and submarines. Simple access for design engineers to an allowed parts list (APL) is a vital need at NNSY.

The enhanced VS 3.0 will be hosted by the Defense Information Systems Agency (DISA) on milCloud – a cloud service featuring an integrated suite of capabilities designed to drive agility into the development, deployment, and maintenance of DoD applications. Simply, VS 3.0 is accessible from anywhere in the world via an Internet connection.

Government employees will be able to access the database with the proper certificates on their common access card (CAC), however, non-CAC holders can only access the system by obtaining the proper permission from the Commonality Program and the DON-CIO required Public Key Interface (PKI) certificate.

"The Commonality team at NAVSSES monitors who will be granted access," said Moss. "Because VS 3.0 will be hosted by DISA, it is compliant with all government security requirements."

VS 3.0 assists the shipyards in finding Navy approved parts to incorporate in drawings. For example, an engineer at NNSY needs to identify a bolt for a ship design. The engineer does a search for a bolt in VS 3.0 and is directed to a Navy approved bolt that meets the required specifications. The engineer no longer needs to look at a list of bolts and self-identify the one that meets their need – Virtual Shelf 3.0 does the work for engineers.

"Virtual Shelf 3.0 gives engineers an unprecedented ability to select parts directly from the SPC that have been identified by the Commonality Team as cost savers due to their cross-platform characteristics," said Moss. "This integration helps the Navy achieve its goal of a 50 percent reduction in parts variation. By allowing engineers to select these preferred parts, the Navy can expect to lower costs and thus increase savings fleet-wide over the lifespan of their ships."

According to Nick Mangraviti, from Provisioning and Supply Support Branch at NAVSSES, an advantage to the shipyards, is knowing the items listed in the integrated database have National Stock Numbers (NSNs) and are already tested and approved for use on Navy ships.

"Sometimes items listed in the shipyards SPC have not gone through qualification testing, which costs the Navy money," said Mangraviti. "Reducing total ownership costs is not only a good idea, but a mandate for the NAVY. VS 3.0 is a great tool for doing this."

The Commonality Team believes the success of this integration could lead to future SPC integration with other public shipyards.

NAVSSES' high safety standard garners VPP recertification

By Joseph Battista, NAVSSES Public Affairs

The Occupational Safety and Health Administration (OSHA) recertified Naval Ship Systems Engineering Station (NAVSSES), Naval Surface Warfare Center Carderock Division (NSWCCD) as a Voluntary Protection Program (VPP) Star site on May 27 – becoming the first Naval Sea Systems Command (NAVSEA) Warfare Center to become recertified. The VPP Star certification is reserved for organizations that have achieved injury and illness rates at or below the Bureau of Labor Statistics' (BLS) national average, which NAVSSES has maintained for the past three years after receiving its initial VPP certification in February 2011.

VPP is a voluntary partnership with OSHA that demonstrates cooperative action among government, industry and labor to address worker safety and health issues and expand worker protection. NAVSSES incorporated OSHA's VPP management system to enhance the command's safety and health program. The main purpose of VPP is to embed the safety culture throughout the organization, with accountability and involvement at all levels.

"Ensuring the safety and health of personnel is inherent to the command's vision and guiding principles and is essential to its mission readiness," said Nick Kutufaris, NAVSSES safety manager.

Approximately 2,500 companies worldwide have achieved this recognition from OSHA and in the Philadelphia region there are 54,000 facilities – only 10 are VPP certified – placing NAVSSES in a select group. OSHA requires a three year recertification to maintain VPP Star status. This includes a site visit and safety inspection of all NAVSSES facilities, which occurred May 13-15.

According to Kutufaris, the command reduced mishap rates by 93 percent over the last five years in part by implementing the four key elements of VPP: management leadership and employee involvement; worksite analyses; hazard prevention and control; and safety and health training.

NAVSSES spent the last three years maintaining VPP standards of excellence by incorporating into daily decision making processes and work habits the Mission Readiness Panel (MRP) and the Workplace Inspection Program.

The MRP is an independent panel that performs safety hazard analyses of every test conducted at NAVSSES. The MRP process documents to the command leadership the careful and deliberate planning process that accompanies a prudent engineering effort. All tests conducted at NAVSSES must be reviewed through the MRP process before initial light off to ensure the tests are carried out safely, under sufficient control, and in such conditions to minimize the risk of personal injury or machinery/equipment failure. The panel recently approved the Material Conditioning Test Site and Tow Cable Test Site to begin operation after going through the rigorous MRP process.

VPP participation requires a comprehensive safety and health management system with active management leadership and employee involvement to prevent and/or control hazardous conditions at the worksite.

Nick Kutufaris (right), safety manager for Naval Ship Systems Engineering Station (NAVSSES), Naval Surface Warfare Center Carderock Division (NSWCCD), raises the Voluntary Protection Program (VPP) Star flag with John Garrity (left), International Federation of Professional and Technical Engineers (IFPTE) Local 3 President, at the VPP flag raising ceremony on May 10, 2011. (U.S. Navy photo by Public Affairs Specialist Joseph Battista/Released).

NAVSSES partners with Hispanic Association of Colleges and Universities to provide student summer employment

By Joseph Battista, NAVSSES Public Affairs

Naval Ship Systems Engineering Station, Naval Surface Warfare Center Carderock Division (NAVSSES) partnered with the Hispanic Association of Colleges and Universities (HACU) to provide four Hispanic college students with summer engineering internships – an ethnic group that is underrepresented in the engineering field.

Laura Carrasco, Patricia Gomez, Carlos Lozano, and Lucas Sisro spent the summer working with NAVSSES engineers on projects ranging from data analysis of sewage vacuum collection, holding and transfer (VCHT) systems and calibration of oil content monitors (OCM) to creating drawings of machinery spaces on ships to calibrating ultrasonic flow meters. The work was real and has a real impact on the fleet.

"It feels good to do something that directly affects the Sailors in the fleet," said Lozano, a junior electrical engineering student at New Mexico State University.

Lozano, from Las Cruces, New Mexico and who came to the United Stated from Mexico when he was 15 years old, discovered an error in the manual of a new portable pressure calibrator he was using to validate calibration procedures on equipment. The calibrator is currently being distributed to ships throughout the Navy. He brought the error to the attention of his mentor Shawn Egnak, a 31-year NAVSSES engineer with Shipboard Instrumentation and Systems Calibration (SISCAL) Branch. They reported the finding to the original equipment manufacturer (OEM) so they could revise the manual and ensure Sailors who use the calibrator operate it properly.

"Carlos is a very quick study," said Egnak. "He's very self-directed and very organized. I gave him minimal direction and he was able to go off on his own show he is capable of doing the work."

Tony Morales, Wastewater In-Service Engineering Branch head, said he feels the same way about Patricia Gomez who he mentored.

"It has been a pleasure having her work with us this summer," said Morales. "We are very appreciative of the support she has given us. We're in a growing mode right now in our branch and having students like Patricia gives us an opportunity to see what new talent is out there. Patricia is definitely someone who can fit in with our organization when she is done with school."

Gomez, a senior mechanical engineering student at the University of California Santa Barbara, said she was nervous about working for the summer so far from her home in Santa Paula, California, but she saw this as a an opportunity.

"I never expected to be sent across the country when I applied for the program," said Gomez who heard about the program from a friend who was a participant. "I liked math and science when I was in middle school, and then I got interested in engineering in high school when I was part of the California Mathematics, Engineering and Science Achievement (MESA) Program."

Gomez said being a female and minority going into the engineering field was intimidating at first, but she realized she could not keep that from accomplishing her goal of becoming an engineer.

"We put our students to work with an engineer and try to give them a fruitful experience so they will want to come back," said Morales. "We hope Patricia will want to come back."

Lucas Sisro, a mechanical engineering student from California, said he is extremely grateful for the opportunity to finally put the knowledge he gained in the classroom to practical use, but the distance from his friends and family would be a factor in returning to Philadelphia

"I'm from Los Angeles, so Philadelphia seems small to me," said Sisro, a senior at California State Polytechnic University Pomona. "I like the history and that it is community oriented. It's been great to experience a new place."

Sisro, who was born in Argentina and came to the United States when he was five years old, learned about the HACU program through his best friend's sister. He also knew something about the Navy – a friend worked at Naval Surface Warfare Center Corona.

"The work has been interesting. I've learned a lot about ships and the Navy," said Sisro. "It's good to be able to apply the concepts I've learned in the classroom."

Sisro worked with Tara Bolton, mechanical engineer with Auxiliary Ships/Acquisition Support Branch, on arranging machinery spaces on ships.

One person who did decide to make Philadelphia his permanent home after participating in the program is Ezequiel Ortiz, an electrical engineer with Advanced Electrical Power Systems Branch. Ortiz interned at NAVSSES during the summer 2011 while studying at the University of Turabo in Puerto Rico.

"NAVSEA (Naval Sea Systems Command) always had a good reputation at my university so I applied for the program," said Ortiz, who is now working on his master's degree in electrical engineering at Villanova University. "I preferred working with power systems and NAVSSES offered me that opportunity."

Carlos Lozano, an electrical engineering student at New Mexico State University, adjusts a portable pressure calibrator, with his mentor Shawn Egnak, with Shipboard Instrumentation and Systems Calibration (SISCAL) Branch. (U.S. Navy photo by Joseph Battista/Released)

Ortiz said his experience was difficult at times because of the cultural differences and being away from his family for the first time, but it ended up being a positive experience. He said part of his decision to accept a full-time position with NAVSSES is the opportunity to grow.

"Now that I'm here working full-time I'm confident I'm doing the right thing," said Ortiz. "I've made friends with other employees who are from Puerto Rico through the Latin American Employee Resource Group and my mentors Martin Quiñones and Jaime Calderon."

Ortiz said Quiñones and Calderon, with Surface Combatant/Gas Turbine Engineering Branch and Machinery Controls Systems respectively, helped him get acclimated – they even called him before he arrived to help him prepare for the transition.

According to Tony Santini, the program's coordinator, the students spend 10 weeks at NAVSSES and are assigned a mentor who works with them daily on technical work. This is the seventh year of the program, and the fourth working with HACU to find participants.

"They've been great to work with," said Santini. "HACU is very familiar with working with the federal government and do a great job providing us with quality students."