

CTMA CONNECTOR

FALL 2024



Marines Go Global with AM to Support Readiness in Remote Locations

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About NCMS

The National Center for Manufacturing Sciences (NCMS) is a cross-industry technology development consortium, dedicated to improving the competitiveness and strength of the US industrial base. As a member-based organization, it leverages its network of industry, government, and academic partners to develop, demonstrate, and transition innovative technologies efficiently, with less risk and lower cost.

About CTMA

The CTMA Program offers a unique contracting vehicle for industry, academia, and the DOD sustainment community to work collaboratively. Through these efforts they promote the demonstration, evaluation, and validation of new and innovative technologies that enhance warfighter readiness at optimal value and lowest risk. This non-FAR based contracting vehicle is the only DOD-wide program focused solely on maintenance and sustainment.

UPCOMING EVENTS

October 2, 2024; 10-11 AM EDT

[CTMA Webinar Series: The Future of Rapid Sustainment](#)

November 6 & December 4, 2024; 1-2 PM EST

[CTMA Webinar Series: The Future of Rapid Sustainment](#)

December 10-13, 2024

[Department of Defense Maintenance Symposium](#)

Salt Lake City, UT

January 21-23, 2025

[NCMS Technology Showcase: Pearl Harbor](#)

Honolulu, HI

February 25-27, 2025

NCMS Technology Showcase: US Naval Shipyard Repair Facility & Japan Regional Maintenance Facility – Save the Date
Yokosuka, Japan

June 16-18, 2025

CTMA Partners Meeting – Save the Date

Jacksonville, FL

All NCMS events are subject to change. Please check the [NCMS Events Page](#) for the latest updates. Don't hesitate to email eventsupport@ncms.org with any questions.



Marine Corps machinists with 1st Maintenance Battalion, 1st Marine Logistic Group assemble a 3D printer on Navy Landing Craft Utility 1665 in preparation to demonstrate expeditionary 3D printing capabilities. A recent CTMA project is working to streamline the advanced manufacturing hardware and software risk management process, to enhance manufacturing of replacement parts while in theater. (US Marine Corps photo by Sgt. Anabel Abreu Rodriguez.)

Accelerating the Authority to Operate (ATO) Process for Advanced Manufacturing

As industry and the Department of Defense (DOD) continue to expand the use of advanced manufacturing, which includes additive manufacturing and other emerging technologies, to address supply chain challenges through acquisition and sustainment, there is an underlying requirement to ensure that all the devices and information are managed in a secure manner. With significant strides in the capabilities of many of these devices to manufacture polymers, metals, ceramics, and even biological tissues, maintaining the cybersecurity of these devices must maintain pace with the evolving capabilities that are coming to market.

The National Institute for Standards and Technology (NIST) prescribes a series of requirements that allow

for the assessment of risks and their impact on specific missions to safeguard national security information. The DOD's Chief Information Officer owns the Risk Management Framework (RMF) (DOD Issuance 8510.01) for DOD Systems that establishes policy, responsibilities, and procedures for executing and maintaining RMF. An important facet of 8510.01 is the guidance on reciprocity, the ability to share authorization and assessment decisions within the DOD and federal agencies. The ability to successfully come through these assessments can yield an Authority to Operate (ATO) that requires ongoing monitoring to ensure efficacy of the network and hardware. While policies advocate for "reciprocity," this continues to prove elusive given the variations in the DOD networks and evolving threats. In

many cases the rigorous assessments, using many of the same cyber controls, can frequently take in excess of 12 months, significantly slower than the pace of hardware evolution.

Recognizing the need to accelerate this ATO process and enable greater reciprocity, the CTMA Program launched a collaboration titled Sustainment of Forward Operations Using Advanced Manufacturing.

“We engaged across the OSD, each of the services, and several industry partners in the advanced manufacturing community,” said Tim Donoghue of BMNT, Inc., the industry partner on the project. “We identified key challenges in the ATO process that create bottlenecks and focused on how to make advanced manufacturing hardware approval more expedient by modeling a streamlined process.”

“We wanted to create a process that can be used at the OSD level to facilitate and increase the likelihood of reciprocity,” said Donoghue. “Reciprocity enables one service to leverage a previous ATO from another service. For example, if the Navy has assessed an ATO to a software platform, and the Army wants to use it, then the Army can take the package that was put together by the Navy and approved by the authorizing official and integrate that into their process.”

Consulting over 80 SMEs, the team crafted three analytical products to capture the current state of how ATOs are pursued—a stakeholder map, a workflow map, and a mind map (see adjacent box for further explanation). These products formed a foundation for the workshop held in February where a team developed recommendations on how to accelerate these efforts and decrease the labor and cost burden associated with the current approaches.

Leveraging concepts from Operation Vulcan Logic (the OSD Chief Digital and Artificial Intelligence Office RMF process) as well as policies related to reciprocity from the OSD Chief Information Office, the team devised a minimum list of cybersecurity controls and crafted the initial design of an Approved Products List (APL) for advanced manufacturing hardware.

“One of the biggest successes of this project was the workshop, which brought people together very quickly, from disparate groups,” said Donoghue. “They all met on the first day, and by the end of day three, it was a cohesive team. Bringing people together to collaborate and to do it quickly was phenomenal.”

The team continues efforts with the Office of the DOD Chief Information Officer to create, house, and maintain the advanced manufacturing APL in a manner that will improve reciprocity across the DOD and federal services.

Donahue offered, “Were it not for the CTMA Program and our ability to partner with members from across the military services, OSD, and industry, this project would not have had the ability to address

a challenge that affects the entire DOD in its need to forward manufacture various classes of supply.” ■

“We identified key challenges in the ATO process that create bottlenecks and focused on how to make advanced manufacturing hardware approval more expedient by modeling a streamlined process.”

— Tim Donoghue of BMNT, Inc.

Analyzing the ATO Process

Through consultation with SMEs, the project team compiled three tools to help analyze the ATO process:

Stakeholder map: Represents the complex ecosystem of key actors (government and industry) involved in the DOD ATO process.

Mind map: Details six main themes, each with recommendations, to improve the ATO process for advanced manufacturing hardware.

Workflow map: Captures the work across the military services concentrating on similarities in process and execution.

AM Innovation Enables Low-Cost, Rapid Forming of Thermoplastic Composites for Vehicle Lightweighting

The DOD's [Additive Manufacturing Strategy](#) (2021) emphasizes that the creation of innovative lightweight structures translates to the ability to create better-performing systems. Lightweighting—the [process](#) of reducing the weight of a product or component for the purpose of enhancing performance capability, operational supportability, and survivability—is a high priority across the DOD and in many commercial industries, especially automotive and aerospace.

A recent CTMA project, Large-Scale Thermoplastic Composites Manufacturing, brought together a team of experts from the US Army Ground Vehicle Systems Command and the University of Maine's Advanced Structures and Composites Center (ASCC). The team developed a low-cost tooling technology for rapid prototyping of high-temperature thermoplastic composites. This technology was used to develop prototype composite cargo shells for the high mobility multipurpose wheeled vehicle (HMMWV), as a replacement to existing components, and was demonstrated to significantly reduce component weight.

“There has been a big push for decades to replace metallic vehicle components with composites, but those composites have typically been thermoset [matrix] composites, which are not as recyclable as thermoplastic [matrix] composites,” explained Benjamin Dwyer, Senior R&D Program Manager at the University of Maine's Advanced Structures & Composites Center. “Thermoplastics are generally more environmentally friendly because they are more recyclable and can be repurposed more easily for other applications.”

Yet the creation of thermoplastic structures has historically been more difficult than thermoset structures, which can increase their cost. This is especially true for fabrication of prototypes, where the upfront tooling cost to develop a thermoplastic structure can be prohibitive, stagnating progress necessary to maintain competitive advantage.

“In order for thermoplastic composites to be suitable for vehicle structures, they must maintain their properties

at elevated temperatures in the field, up to 180 degrees Fahrenheit, which requires high-temperature thermoplastic materials,” said Dwyer. “Creating high-temperature, thermoplastic structures typically requires high-temperature-capable molds that are expensive, both at a material level and at a fabrication level, and have long lead-times. In this project, we were able to use low-temperature polymer to quickly additively manufacture a set of molds that compression-formed high-temperature thermoplastic composite components for the HMMWV.”

The team fabricated two types of compression-forming mold sets: one traditional-type mold using metal and



A CTMA project is improving the processes required to design and prototype high-temperature thermoplastic composites to be used in lightweighting of components for the HMMWV without sacrificing performance. (US Army Photo by Sgt. Samuel Hartley.)

subtractive manufacturing methods, and the other utilizing additive manufacturing. Meeting the delivery date for the cargo shell components was a requirement for their being evaluated in the field. Fabrication lead-time of the metallic molds represented a high risk to meeting the delivery date, so to reduce that risk, they developed and used the AM mold. This approach created an opportunity to compare metrics of the two molds in terms of lead time, cost, and energy consumption.

A major technical innovation for this project that allowed the AM molds to be successfully used was the design of precision-formed metal cladding placed on the AM mold surfaces. With the metal cladding process, more readily available, lower-

performance AM polymers could be selected, which simplified the printing process and reduced cost and lead times. When comparing the manufacturing steps of a typical metallic mold, numerous steps were saved by using the metal-clad AM mold, which reduced lead time and cost (see Figure 1).

To determine the most effective material for the composite cargo shells, the team compared properties of six different commercial grades of pre-consolidated, unidirectional, reinforced thermoplastic tape materials. Through testing of material coupons and finite element analysis (FEA) of the vehicle structures, the team determined that carbon-fiber reinforced polyphenylene sulfide (PPS) was sufficient to manufacture the cargo shell test articles. PPS is resistant to flames, chemicals, and corrosion, and it maintains its strength even at temperatures above 300 degrees Fahrenheit.

The team successfully utilized additive manufacturing to form two high-temperature thermoplastic polymer composites with a low-temperature, AM polymer (ABS) mold. The use of carbon-fiber reinforced PPS in the composite cargo shells reduced the component's weight by 37 percent.

The team achieved even greater lightweighting with their design of a lightweight, composite floating crew vehicle floor, designed to withstand the severe operating environment of a combat vehicle, including dynamic loads (mobility + blast), varying thermal loads (from arctic to desert climates), as well as resistance to flammability, smoke generation, and toxicity (FST). The materials selected for the composite crew floor were carbon- and glass-fiber reinforced polyphenylene sulfide (PPS). The team employed dynamic structural finite element analysis to design the floor's geometry and laminate, and to predict deformation and strength.

“What was novel about the design of the vehicle floor was how we used a combination of materials and geometry to handle the loads and meet performance needs while reducing the weight,” said Dwyer.

“We demonstrated that thermoplastic composites can be successfully designed to support highly loaded structures and handle dynamic events, like a blast. We used high-temperature, thermoplastic materials to achieve a 55 percent weight reduction from the original, metallic floor,” said Dwyer.

Throughout this project, the team performed durability-testing on the six thermoplastic tape materials, which produced a database of properties for continuous fiber thermoplastic materials.

“The durability testing we conducted enabled a further understanding of how thermoplastic materials degrade,” said Dwyer. “This database includes environmental effects such as elevated temperature, moisture, and ultraviolet radiation exposure. A better understanding of material properties will enable design of lighter-weight and longer-lasting vehicles. This provides a direct benefit for not only automotive manufacturers, but also industries that are replacing materials with thermoplastics which are subject to environmental conditions.”

Overall, this project established low-cost tooling, with short manufacturing lead-times, enabling the production of high-temperature thermoplastic polymer (PPS) composites with a reinforced low-temperature, AM polymer (ABS) mold. This technology provides an advantage not only to the Army and the DOD, but to any manufacturer seeking to rapidly prototype thermoplastic components. ■

Mold Fabrication Step Comparison

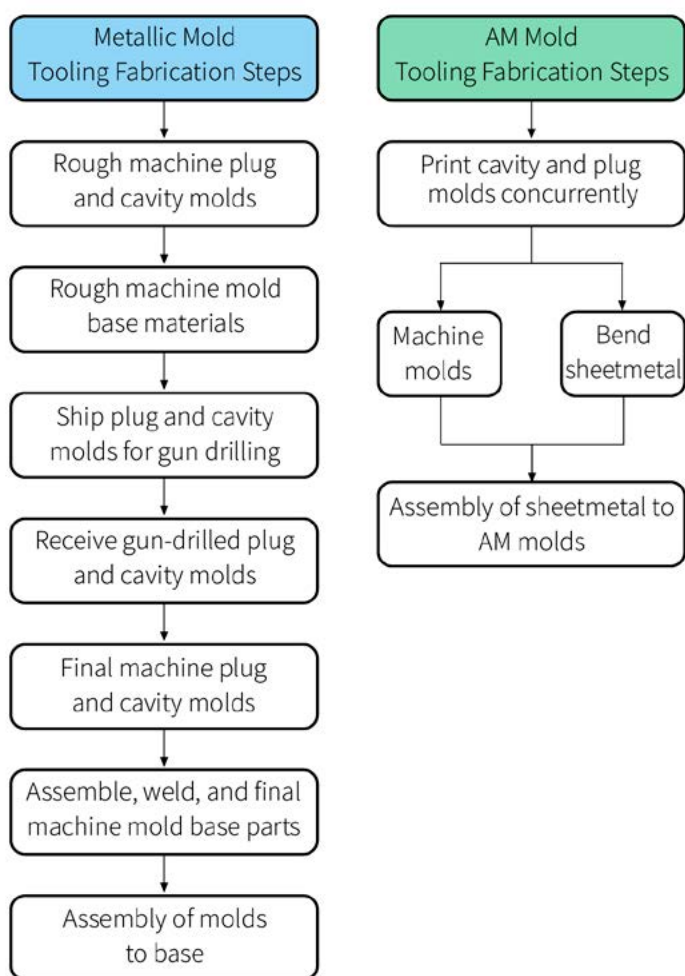


Figure 1. Comparison of primary mold fabrication steps for (subtractive) metallic molds and polymer AM molds. Significantly fewer manufacturing steps are required for the AM molds, enabling a shorter lead-time.



A machinist with the 2nd Maintenance Battalion demonstrates a large-build 3-D printer in a self-contained, transportable additive manufacturing (AM) lab. A current CTMA project is working to ensure the digital architecture for such facilities can offer a distributed and disconnected AM (DDAM) capability, which provides secure, standardized access to technical data packages from anywhere in the world. (US Marine Corps photo by Kaitlin Kelly.)

Marines Go Global with AM to Support Readiness in Remote Locations

A current CTMA project sponsored by the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness (ODASD-MR) has successfully demonstrated the capability to additively manufacture replacement service parts in remote locations. By creating a digital architecture, the team demonstrated a distributed and disconnected advanced manufacturing (DDAM) capability in concert with industry, allies, and partners.

The project—Sustainment of Forward Operations using Advanced Manufacturing—leverages the combined expertise of Siemens, Guidehouse, Amazon Web Services (AWS), and others. Siemens furnished the hardware and software for the solution, while Guidehouse served as the system and business integrator responsible not only for the prototype deployment but also for providing subject matter expertise and guidance on related business process and change management impacts for advanced manufacturing (AM). AWS provided cloud and edge computing support that allows devices in remote locations to process data at the “edge” of the network, either by the device or a local server.

“In phase one, we hosted Siemens’ Xcelerator industrial software platform in an AWS GovCloud environment that managed Technical Data Packages (TDPs) that were then able to be accessed in any location globally, where network connectivity is available, to additively manufacture parts in remote locations,” said Aaron Johns, Technical Strategy and Pre Sales Director at Siemens Government Technologies. “We successfully demonstrated the DDAM capability at two locations: at a Marine Corps detachment in Okinawa, Japan, and at Fort Gregg-Adams in Virginia. We were able to additively manufacture five parts in each location.”

The project in its second phase will focus on scaling the DDAM capability.

“Phase two is taking the minimum viable product of the solution and starting to deploy hardware in multiple locations, up to 20 forward operating bases, up to 3 original equipment manufacturers (OEMs), and up to 100 parts,” said Alex Henry, a Director at Guidehouse. “As the business integrator on the project, we are focused on the people, process, and technology needed for full adoption of this capability across the DOD.”

To accelerate the DDAM capability's adoption, the Guidehouse team conducted in-depth interviews across the AM community, across all the services and multiple agencies. "One aspect we have identified as a best practice is flexibility in training options," said Helen McCarthy, an Associate Director at Guidehouse.

Another common response during the interviews was a desire for more disciplined coordination, innovation adoption, process optimization, governance, and support across the services to make AM work. "This solution will support AM capabilities in the current global threat environment," said Henry. "We need to get capabilities into the field, but it's just as critical that other factors in the ecosystem are addressed to assure user adoption—business process optimization, interoperability, change management, and training."

The Guidehouse team also developed a roadmap for how the DDAM capability will work in a sustainable future state. "We looked at the process and human capital, starting with OSD-level guardrails," said Henry. "Using human-centered design, we looked at change management, the appropriate distributed authorities, the different types of organizations and personas across the DOD—leadership, users, and OEMs."

In a future phase three, the team will scale the DDAM capability much more substantially in terms of number of locations, number of parts, and number of users. "Phase three will also extend the DDAM capability to allies and partners," said McCarthy.

Also in this third phase, the Guidehouse team will address some of the business challenges associated with the DDAM capability. "One major issue to address is enabling the capability to compensate OEMs for printing their parts, their intellectual property—without them manufacturing and shipping that part," said Henry.

Future plans for the DDAM capability include developing the ability to support multiple manufacturing processes including computer numerical control (CNC) machining, robotic sheet metal forming, and metal selective laser

melting (SLM). Additionally, a quality feedback feature will be added, allowing shop floor personnel to properly inspect and certify critical parts.

The team is optimistic about the future state. "The biggest success is that we have the technology and the capability to 3D print parts at scale across the services and in an unlimited amount of forward operating locations," said Johns.

“The biggest success is demonstrating 3D printing of parts can be done without having to create all kinds of new processes—by using existing TDPs, existing technology, and on-the-ground manufacturing capability.”

- Alex Henry, Guidehouse

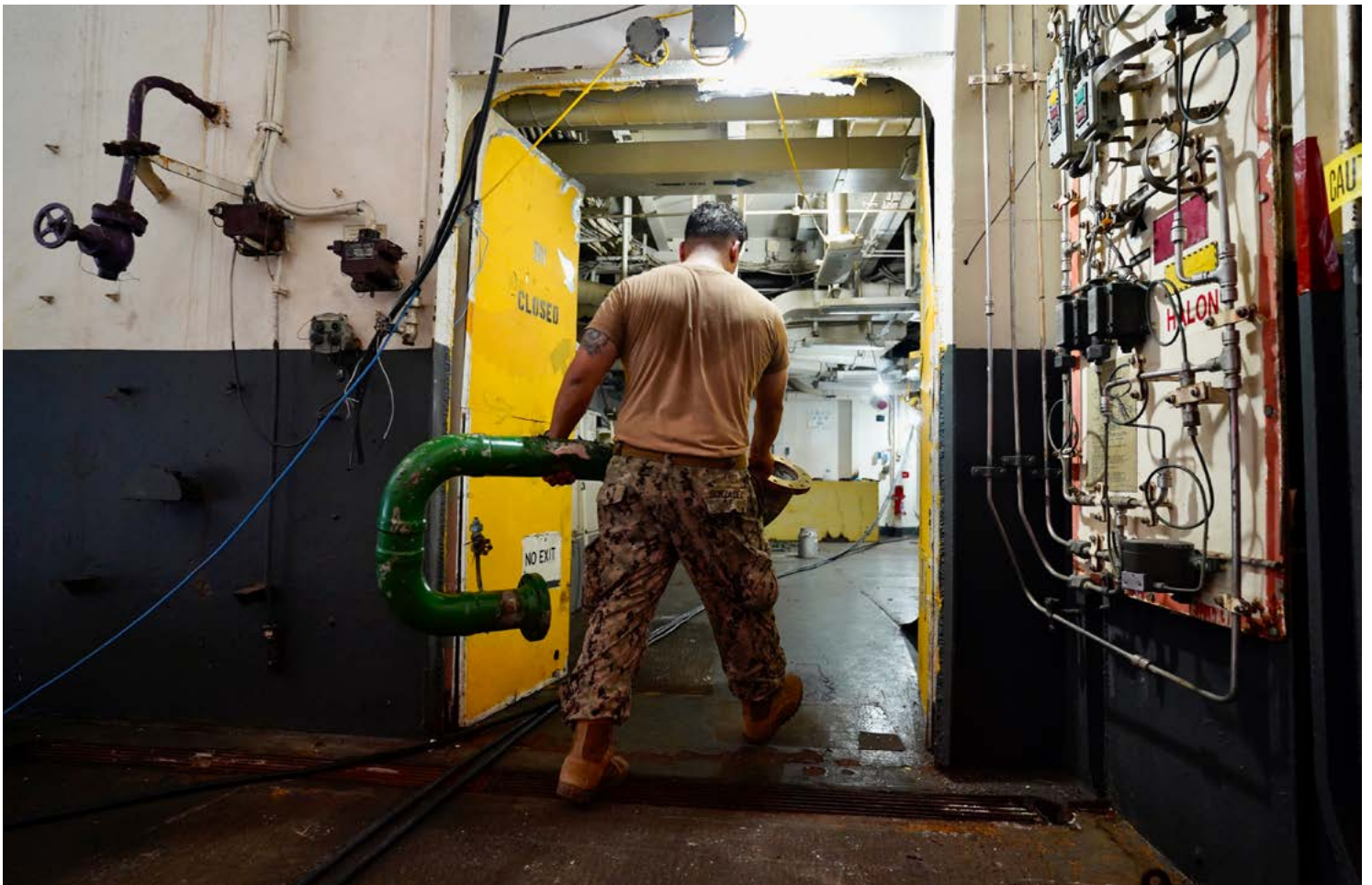
The team at Guidehouse agreed. "I think the biggest success is demonstrating that 3D printing of parts can be done without having to create all kinds of new processes—by using existing TDPs, existing technology, and on-the-ground manufacturing capability," said Henry, who also emphasized that the project is larger than the technology solution.

"We have taken a step back and looked at how AM can be operationalized," he said. "The requirement is for capabilities in multiple geographies, so the solution has to be a mature operational solution. That requires considering people, process, and technology. Putting all those pieces together, bringing them into the spotlight, and understanding what

it will take to truly institutionalize this capability, I think that's the biggest thing that we've done."

Cal Bassford, a Partner with Guidehouse who is overseeing the project, said, "Our goal, from the start, has been to focus on the end-users: our service members. This project aims to provide them an advantage over our adversaries. The principles we operate within, accelerating our use of this rapidly evolving technology, creating interoperability between joint forces, allies, and partners as well as Military-Civil fusion will continue to give our warfighter an edge."

Johns reflected on the public good facilitated by NCMS's CTMA Program: "The real value that we see in partnering with NCMS is the ability to get advanced technology into the hands of the folks that need it, whether it's across the services, in industry, or anywhere in the federal government, to solve real-world problems." ■



Petty Officer 1st Class Daniel Gonzalez carries a repaired pipe back to an installation location during a REPTX Salvage Exercise (SALV-EX) aboard the decommissioned amphibious assault ship USS Tarawa in Pearl Harbor, Hawaii. During the two-week event, Sailors and industry and academic participants collaborated on developing repair solutions for simulated battle damage using emerging technologies. (US Navy photo by Claudia LaMantia.)

REPTX 2024 Salvage Exercise (SALV-EX) at Pearl Harbor Accelerates Battle Damage Repair Solutions

The most recent Repair Technology Engagement Exercise (REPTX), co-sponsored by NCMS, NAVSEA 05T1, and Pearl Harbor Naval Shipyard (PHNSY), took place on and near the base May 20-31, 2024. Approximately 250 people—partners from academia and industry, Sailors, and observers—came together to test out innovative solutions for expeditionary repair work.

“REPTX SALV-EX was the latest event hosted on board the ex-USS Tarawa by the NAVSEA 05T1 NESAR Team,” said Mathew VanRavenhorst of Navy Expeditionary Sustainment and Repair (NESAR), NAVSEA 05T1. “Building upon past events, REPTX SALV-EX was designed and executed to not only validate today’s technology, but also how reservists, civilians, and industry assess and react in a dynamic repair environment where ‘good enough’ is the standard.”

Throughout this two-week event, industry and academic participants trained reservists on equipment and technologies, who then executed those capabilities to complete multiple battle damage repair scenarios.

“The team executed a number of successful and unconventional repairs that leveraged a variety of technology including but not limited to composite patches, cold spray, in-place machining, and advanced abrasives,” said VanRavenhorst.

Participants were gratified to note how the demonstration accelerated the Navy’s ability to perform expeditionary maintenance operations.

“The 2024 REPTX SALV-EX event was such a fantastic opportunity for private industry to highlight

emerging technologies in real-world scenarios on the USS Tarawa,” said Dave Davis, Director of Naval Operations, ENFASCO, a certified distributor of fastener products, tools, and hardware used in aerospace, industrial, and commercial industries. “Trade shows and tabletop displays have their place, but engaging with Ship’s Force, NAVSEA, Regional Maintenance Centers, and private industry on an actual US Navy ship to showcase our #nohotwork technologies was terrific. In my 24-year career supporting the US Navy, 2024 REPTX SALV-EX is an event I will never forget.”

Another industry partner remarked on the effective combination of both new and legacy repair methods.

“SALV-EX was a one-of-a-kind event that allowed US Navy active-duty shipboard personnel to utilize PlasmaBlast surface preparation in a wide variety of genuine battle-damage assessment and repair situations aboard the USS Tarawa, incorporating it with other emerging technologies and traditional methods to achieve quick and effective repairs with little-to-no outside intervention,” said Jason Stimson,

Product Applications Engineer, Atmospheric Plasma Solutions. “We were honored to work alongside the sailors as well as all the DOD and industry partners during this successful training exercise that NAVSEA and NCMS put together.”

Collaboration was the foundation of REPTX SALV-EX, and the use of public-private partnership between the Navy and industry highlighted technologies, equipment, and products ready to transition into ship maintenance.

“This event has paved the way for a genuinely sailor-driven evolution of the Repair Technology Exercises (REPTX),” said Brett Anderson, Deputy Sustainment Technology Program Manager, NAVSEA 05T1. -“By bringing together the Navy Expeditionary Sustainment and Repair (NESAR) team, leading industry partners, and our dedicated service members, we are committed to ensuring that impactful technology reaches the right place at the right time to address Navy challenges worldwide. We will stay dedicated to refining and growing REPTX events to give our warfighters the edge they need to stay in the fight.” ■

NCMS Technology Showcase Held in Conjunction with Organic Industrial Base Commanders & Leaders Peer-to-Peer Meeting

NCMS partnered with Marine Depot Maintenance Command to host a Technology Showcase June 10-12 on base at Marine Corps Logistics Base Albany in Albany, GA. This exclusive Technology Showcase was held in conjunction with the Organic Industrial Base (OIB) Commanders & Leaders Peer-to-Peer (P2P) Meeting. The annual event allows senior leadership to collaborate on advancing the readiness of government-owned facilities vital to warfighter readiness including maintenance depots, shipyards, fleet readiness centers, air logistics centers, and manufacturing arsenals.

“Twenty world-class industry partners demonstrated multiple capabilities including advanced manufacturing and additive manufacturing solutions, real-time location services, state-of-the-art product lifecycle management (PLM) systems, reverse engineering services, industrial coatings and automation solutions, and many more,” said Debbie Lilu, NCMS Vice President of Maintenance & Sustainment, Business Development.

Exhibitors at the showcase had the opportunity to meet with artisans and leadership from the depot maintenance

complex, which provides worldwide expeditionary logistics support as well as depot-level maintenance support for rebuild, repairs, engineering solutions, modifications, and more. They also had a unique opportunity to meet with leaders responsible for maintenance and sustainment policies and programs in support of major weapon systems and military equipment.

“Participating in this Technology Showcase alongside the OIB Commanders & Leaders Peer-to-Peer (P2P) Meeting enabled us not only to emphasize our strengths in asset maintenance and sustainment but also to demonstrate the effectiveness and precision of the PB-7000M firsthand,” said Jeff Piascik of Atmospheric Plasma Solutions. “Achieving this demonstration through conventional means would have taken us six to nine months to potentially showcase to the entire group.”

Technology Showcase exhibitors participated in an extensive tour of the Marine Corps Logistics Base Albany’s facilities, which informed their ability to share capabilities and solutions. ■



Attendees at the NCMS Technology Showcase: Fleet Readiness Center East listen as a representative of exhibitor Keyence Corporation discusses their products' capabilities. (Photo by NCMS Staff.)

Successful Technology Showcase with Fleet Readiness Center East Attracts Over 1,000 to Collaborate on Sustainment Improvements

The NCMS Technology Showcase co-sponsored by the US Navy's Fleet Readiness Center East (FRCE) July 15-18 was a huge success, drawing an unprecedented 1,900 attendees to engage with 47 exhibitors. These organizations presented new technologies that could help speed solutions for FRCE personnel who provide maintenance, engineering, and logistics support for Navy and Marine Corps aviation, as well as other armed services, and federal agencies.

"NCMS was honored to partner with Fleet Readiness Center East, the [NavalX Eastern North Carolina Tech Bridge](#), and [Craven County Economic Development](#) to support FRCE and transform how USMC aviation assets and other systems will be sustained going forward," said NCMS President and CEO Lisa Strama.

Held at the Riverfront Convention Center of Craven County in New Bern, North Carolina, the Technology Showcase

brought together senior leaders from FRCE, along with shop floor artisans and their managers, providing an opportunity for attendees to deep-dive solutions needed to innovate and modernize sustainment operations.

Industry participants demonstrated solutions across multiple sustainment needs including advanced/additive manufacturing.

"We had constant traffic and met several key people that we were able to engage with," said Mark Mohr, President of DMG MORI Federal Services. "We shared our advanced manufacturing and additive manufacturing solutions that shorten the repair time of critical components."

Other industry partners demonstrated solutions including business IT and analytics; CBM+/predictive maintenance; coatings and corrosion prevention; enhanced inspection;

energy, environmental, health, and safety; facilities and industrial process modernization; reliability improvement (hardware); and workforce development/ visualization.

“We’ve participated in a large number of NCMS events, and this was one of the best,” said Doug Wilson, Founder and CTO, FiberQA, which provides automated robotic fiber optic inspection and integrated cleaning systems, cutting down the process of inspecting a large channel count (37 fibers) connector from 2.5 hours manually to 30 minutes with the AVIT system. “It was amazing that NCMS could help connect us to the right people, and we got several really good leads.”

Expanding on the range of opportunities for networking, Wilson said, “The event with the Tech Bridge on the last day put us in position to advance our company even faster because of the connections they have across the services and within the SBIR offices. There is a great opportunity to do collaborative work at the Tech Bridge, with their space enabling longer-term demonstrations of our systems.”

This Technology Showcase was unique in welcoming participants from the Coast Guard.

“Sustainers from the Coast Guard’s Aircraft Repair and Sustainment Center in Elizabeth City, NC participated and engaged with industry innovators,” said Debbie Lilu, NCMS Vice President of Maintenance and Sustainment, Business Development.

Along with collaboration between multiple organizations, the event coincided with the opening of a new [NavalX Tech Bridge](#).

“The NCMS team facilitated industry participation in the ‘soft opening’ of the new Eastern NC Tech Bridge facility adjacent to the New Bern Airport,” said Lilu.

NCMS collected feedback from showcase participants and is currently in the process of analyzing and organizing the information to provide to FRCE and Eastern NC Tech Bridge leadership for action. ■

2024 Advanced Manufacturing Workshop Operationalizes AM from Factory to the Front Line

The 2024 Advanced Manufacturing Workshop, “Operationalizing AM from Factory to the Front Line,” brought together over 130 experts from across the DOD, industry, academia, and nonprofits to accelerate the implementation of advanced manufacturing in the DOD. Held at the Lockheed Martin Center for Leadership Excellence in Bethesda, MD, July 16-18, 2024, the workshop provided a unique opportunity for AM leaders and functional stakeholders to collaborate on key issues that pertain to leveraging AM capabilities to sustain DOD equipment throughout a theater of operations.

This workshop was organized by the DOD Manufacturing Technology Program, under the Office of the Deputy Assistant Secretary of Defense for Science and Technology (DASD-ST) and by the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness (DASD-MR), with facilitation by the National Center for Manufacturing Sciences (NCMS) and support from DOD’s Joint Additive Manufacturing Working Group, and America Makes.

“The 2024 Advanced Manufacturing Workshop continued the partnership among government, industry, and academia to further the adoption of advanced manufacturing at all echelons, from tactical units in the field to DOD-owned regional manufacturing capabilities together to the global industrial base,” said Marilyn Gaska, Ph.D., a Senior Fellow with Lockheed Martin. “The event leveraged both workshop and wargame approaches for this ninth annual event in addition to providing the opportunity for stakeholder collaboration.”

The event kicked off with a welcome from John Wilczynski, Executive Director of America Makes, followed by remarks from senior leaders including Tracy Frost, Director, Technology Industrial Innovation Base, and Steven J. Morani, Principal Deputy Assistant Secretary of Defense for Sustainment. Participants then contributed to one of four working groups: Data Management, Business Models and Contracting, Standards and Guidance, and Sustainment.

“At the 2024 Advanced Manufacturing workshop, participants continued developing the digital infrastructure, standards, and contracting efforts and processes needed to sustain and accelerate global DOD and coalition AM implementation,” said Lisa Strama, NCMS President and CEO.

Data Management

The data management working group focused on the digital thread that supports additive manufacturing. This group explored bringing AM data to the entire enterprise from the domestic industrial base and the DOD’s own organic industrial base (OIB) to in-theater fabrication cells, and to allies and their industrial bases. Subtopics included command and control of advanced manufacturing through a common operating picture (COP), data repositories/exchanges, workflows, program manager/cognizant engineering approvals, cybersecurity, the role of artificial intelligence/machine learning, intellectual property, and training on the use of enterprise systems.

Business Models and Contracting

Operationalizing advanced manufacturing technology requires a look at how the DOD does business. This working group looked at agile contracting, flexible business models, growing the supply chain, intellectual property rights, specially negotiated license rights, engineering change processes, life cycle sustainment plans, coalition agreements, international partners, and sustaining AM systems (materials, technical support, and training).

Standardization and Guidance

AM standardization is needed across the defense industrial base and operational forces. The working group addressed qualification, certification, inspection, materials, AM Guidebook, education, training, decision logics and tools, and standardized BDAR part categorization.

Sustainment

The final working group looked at how AM could be leveraged across the entire theater of operations to sustain DOD equipment. Topics included digitizing the process, capability and capacity identification and visibility, establishing international agreements, command and control, and training the way we fight to include exercises with allied partners.

This was the ninth annual DOD AM Workshop, and it culminated in an AM Wargame.

“The participants built upon the work from previous AM Workshops and identified numerous capabilities and actions required to employ AM across the theater,” explained Ray Langlais, Senior Consultant, LMI. “Then they took part in a fast-

paced simulated AM operational scenario where they successfully developed plans on how those capabilities and actions could be developed and employed.”

Elisa Peters, DOD AM Workshop lead and JAMWG facilitator, said the results from this workshop will be invaluable in further developing plans and procedures to perform AM operations in the future. “We need to outpace our adversaries, and joint and coalition distributed AM operations can support the supply chain resilience needed to do that,” Peters said. ■

“The event leveraged both workshop and wargame approaches for this ninth annual event in addition to providing the opportunity for stakeholder collaboration.”

- Marilyn Gaska, Ph.D., Lockheed Martin



A representative from exhibitor Atmospheric Plasma Solutions demonstrates repair techniques to Puget Sound Naval Shipyard personnel at the NCMS Technology Showcase: Puget Sound Naval Shipyard & Intermediate Maintenance Facility. (Photo by NCMS Staff.)

Fifth Technology Showcase at Puget Sound Naval Shipyard Attracts Huge Crowd

The fifth NCMS Technology Showcase at Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) continued its distinction of being one of the most highly attended NCMS events, attracting nearly 750 attendees to view the sustainment solutions demonstrated by 50 exhibitors.

Held July 30-August 1 at the Kitsap Conference Center in Bremerton, WA, the event enabled industry partners to meet with key Navy decision-makers and showcase their innovative technologies that can support and improve maintenance and sustainment best practices for fleet readiness. Exhibitors demonstrated their products and services and learned about opportunities for collaboration among the leading technology experts who serve the Navy's maintenance community.

Industry partners found that this technology showcase provided an effective opportunity to interact with key decision-makers.

"NCMS has allowed us to get in front of a lot of different people – either at the showcases or just being able to present our information at Partners

Meetings," said John Feeny, Principal Research Engineer at Aptima, which provides solutions that help measure, assess, inform, and augment human performance in defense and other industries. "We have used the CTMA vehicle to let the Navy evaluate current technologies and identify gaps in what's needed to push it forward and make it an improved system for use across the Navy. We're still working that process, but it's been invaluable with NCMS's help."

Another industry partner remarked on the benefits of NCMS's experience since the organization's founding in 1986 to strengthen American manufacturing.

"NCMS itself brings a certain amount of credibility to the government customer," said Steven Williams, Director of Growth, Angliotech, a veteran-owned small business with a decade of experience optimizing global supply chains for defense customers. "They know NCMS and it allows them a contract vehicle to get access to people like ourselves and other technology vendors rather than typical FAR-type procurements." ■

FEATURED NEW MEMBERS

Defense Engineering Services (DES)

DES is a Service-Disabled Veteran-Owned Small Business (SDVOSB) and Nontraditional Defense Contractor (NDC) providing high-value engineering and manufacturing services for the defense and aerospace industries. DES's engineers and technicians design and build weapons systems and vehicles from scratch. The company has special competencies in combat vehicles, tactical trucks, armor/survivability, automotive, commercial armored vehicles, power electronics, and manufacturing.

DES delivers full life-cycle engineering, technical solutions, test services, prototype fabrication, and low-rate manufacturing for projects large and small. The company has decades of experience in circuit design for military and commercial power applications, SiC MOSFET SSCB PCB/CCA design and development, power analyzer chip testing and integration for VAC applications, fully electric amphibious vehicle design and prototype development, harness design and fabrication, and more.

DES has successfully completed many projects. Some recent examples include missile defense re-engineering for US manufacturing and designing a production facility; AAVSU powertrain redesign, cooling system, and design and testing of suspension, steering, and brake systems; Mamba redesign for US production, armor design, and prototype vehicle build; solid state circuit breakers for US Army Aviation SSCBs designed for 270VDC and 115VAC@400Hz; HDT armored cab design and testing; ARV design of automotive systems, high-voltage hybrid electrical system, and vehicle chassis design; and more.

For full profile, see: <https://www.ncms.org/news/defense-engineering-services-des-member-spotlight/>.

DIT-MCO

DIT-MCO International has provided complete cable and wire harness test solutions for 70+ years. Their solutions serve a wide range of industries, such as aerospace, defense, rail, maritime, VTOL & EVTOL, and more. From hardware, software, and adaptation solutions, DIT-MCO ensures end-use products have golden harnesses with electrical connections that will perform in the sky, in battle, or on the tracks.

DIT-MCO's cable testers and wiring harness analyzers test for continuity, open, shorts, and mis-wires. They offer various hardware solutions for low and high voltage and for small and large point counts.

DIT-MCO also offers software solutions for tests between the analyzer and UUT. NETS, a software test suite, allows users to create and execute test programs while filtering through numerous test and retest options. Aside from software, DIT-MCO has an in-house team dedicated to adaptation. An often-forgotten step in cable testing is adaptation from the analyzer to the UUT. The Special Products Group (SPG) specializes in creating adapter cables and interfacing solutions, ensuring no time is lost connecting adapter cables and no points are wasted in the test process.

For full profile, see: <https://www.ncms.org/news/dit-mco-member-spotlight/>.

Industrial Coating Services

Industrial Coating Services (ICS), a Service-Disabled Veteran-Owned Small Business (SDVOSB), has been providing industrial finishing solutions for over 30 years. Specializing in advanced finishing line technologies, ICS is a trusted partner to major manufacturers across the United States. ICS offers a comprehensive suite of services, including engineered conveyor and assembly lines, laser cleaning pretreatments, advanced robotics, MIL-SPEC coatings, and more.

Beyond ICS's diverse service offerings, the company is renowned for providing customized solutions tailored to meet the unique challenges of each client. Their engineered conveyor and assembly lines are meticulously designed to increase throughput and streamline production, while their advanced robotics and automation systems deliver precision and reliability in even the most complex environments. With laser cleaning pretreatments, they provide an eco-friendly, efficient alternative to traditional surface preparation methods. ICS's expertise in MIL-SPEC coatings further enables them to meet the stringent demands of the defense and aerospace industries, ensuring durable, high-performance finishes that enhance product longevity and resilience.

With a commitment to excellence, ICS consistently exceeds expectations by delivering solutions that drive operational efficiency while strengthening clients' competitive edge. Through their strategic partnership with NCMS, they are proud to support the DOD's modernization efforts.

For full profile, see: <https://www.ncms.org/news/industrial-coating-services-member-spotlight/>. ■