# CTMA CONNECTOR SPRING 2025

New Cold Spray ystem for Rotor Blade Erosion Guards to Protect DOD's Large Helicopter Fleet

### **IN THIS ISSUE**

#### P3

<u>New Radar Capability Protects</u> <u>Vehicles from Drone Attacks</u>

#### P5

Redesigned Platform Repair Process Streamlines Sustainment, Accelerates Predictive Maintenance

#### **P7**

New Cold Spray System for Rotor Blade Erosion Guards to Protect DOD's Large Helicopter Fleet

#### P10

31 Exhibitors Demonstrate Technologies at Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility (PHNS&IMF)

#### P11

<u>NCMS Holds First Sustainment Accelerator</u> <u>Event at Navy SRF-JRMF in Japan</u>

P12

Update on the 2025 CTMA Partners Meeting

P13 Member Spotlight - AGFM Corp.

**P14** Founding Member Spotlight -<u>Kinefac Corporation</u>



# CTMA Connector

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## **UPCOMING EVENTS**

<u>CTMA Technology Competition</u> Submission Deadline: April 25, 2025

#### 2025 CTMA Partners Meeting

Postponed due to Government travel restrictions. A new site location in the Washington DC Metro will be announced soon. Please stand by for additional updates.

July 8-10, 2025 <u>NCMS Sustainment Accelerator: COMFRC—Save the Date</u> Lexington Park, MD

#### STRATO-Next 2025

Postponed due to Government travel restrictions. Please stand by for additional updates.

All NCMS events are subject to change. Please check the <u>NCMS Events Page</u> for the latest updates. Don't hesitate to email <u>eventsupport@ncms.org</u> with any questions.

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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.

# New Radar Capability Protects Vehicles from Drone Attacks



This 3D rendering shows an Iranian-designed Shahed 136—also known by its Russian variant, Geran-2—attack drone in flight. (Graphic provided by Adobe Stock.)

The impact of drone attacks in the Russia-Ukraine war has made the protection of military vehicles an urgent priority not only for Ukraine but also for the armed forces of the United States. A current CTMA project has created and successfully demonstrated a capability that protects vehicles from attacking unmanned aircraft systems (UASs).

The Multi-Threat Radar Installation & Characterization (MTRIC) project is a collaboration between industry partner DRS RADA Technologies a subsidiary of Leonardo DRS and several US Army organizations: Combat Capabilities Development Command; Program Executive Office Ground Combat Systems; Ground Vehicle Systems Center (GVSC); Ground Vehicle Survivability & Protection (GVSP); and Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR).

The project team is collaborating to protect service members from drone attacks, which emerged as a significant threat even before the Russia-Ukraine war.

"In 2020, during the Nagorno-Karabakh war, the world saw new uses of drones to attack not only combat vehicles, but also logistics vehicles, troop transports, and individuals," said Joe Mollo, Director of Advanced Programs, DRS RADA Technologies. "We recognized that high-value vehicles like a Bradley or Abrams have an active protection system or armor to protect them from attacks, and combat units have short-range air defense (SHORAD). But everyone else on the battlefield needs protection from drone attacks."

This project designed a system for vehicles that alerts the operator if they're about to be attacked.

"This system looks at the behavior of the drone that's in the area and based on its altitude, its speed, and all the kinematics, the system uses Artificial Intelligence models to determine whether the drone is a threat. If so, it alerts the operator of the vehicle," said Mollo.

The system consists of a continuous 360° sensing capability that is easily integrated with multiple combat support vehicles via a B-kit, integration hardware (A-kit), prototype threat interception capabilities, and softwarethat supports autonomous/semi-autonomous operation to reduce the workload, training, and maintenance activities for the vehicle crew.

"The system is a roof rack kit that can be put on any vehicle," said Mollo. "We created a B-kit concept consisting of shortrange radars, a small processor assembly, and user interface that alerts occupants to help the survivability of the crew." The A-kit was designed in collaboration by the team at DRS RADA Technologies and by a team from the Keweenaw Research Center, then built by Keweenaw Research Center. The system is platform-agnostic, so it can be used for many different types of vehicles and even watercraft.

"It's a self-contained frame that has four small radars hard mounted to the platform," said Chris Burgy, MTRIC Program Manager, DRS RADA Technologies. "Vehicles or aircraft would just have to have the A-kit installed. For the demonstration, we installed the kit on an Infantry Squad Vehicle (ISV). The kit successfully provides real-time situational awareness for that truck, whether it's driving or stopped. The system will survey everything flying and classify whether it's a drone or a nuisance target and only alert if it's a drone and it is threatening the vehicle."

The radars utilize state-of-the-art, small, multi-mission, high-performance active electronically scanned array (AESA) radar.

mode file that was made for them. The radars can detect out to 6-7 kilometers to see a Group 1 drone-sized target."

The system also integrates an Artificial Intelligence program developed by DRS RADA Technologies.

"Our AI program looks at how the drone is behaving and assigns a threat value to it between 1 and 4, with 4 being the greatest threat," said Burgy.

The team partnered with GVSC to demonstrate the system at Camp Grayling in Michigan.

"We had a very successful two-week test," said Burgy. "Our team worked well with the GVSC and Camp Grayling teams. The Army has been very proactive, and this was a great opportunity for us to get involved with the Michigan ecosystem to create a commercial-off-the-shelf product."

The DRS RADA team has also partnered with the Navy to

These remnants of an Iranian drone comprised a portion of a multi-national collection of evidence showing the proliferation of Iranian weapons in violation of UN regulations. (DOD photo by EJ Hersom.)

install the system on an asset.

"It's been installed on an unmanned system that senses threats far away from the main fleet, to prevent the main fleet from having to respond," said Mollo.

The system can also be combined with other capabilities including an optical component or an effector with a protective device for a vehicle such as a gun, a missile, or an electronic countermeasure."

With the growing threat from drones, there will be a strong need for vehicle protection going forward.

"With what we've seen in Ukraine,

"The RADA AESA radars are software defined and operate based on a set of parameters that you plug into the radar," said Burgy. "Operators can create what we call mode files, which are pre-planned mission sets that enable users to specify whether they want to focus on drones that are far into the distance, close to the horizon, at the whole air picture, or very close to the vehicle. For the test we conducted in this project, the Army was very concerned about drones coming directly overhead, so that was the

drones are becoming much more lethal, and the threat is not going to go away," said Mollo.

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# Redesigned Platform Repair Process Streamlines Sustainment, Accelerates Predictive Maintenance

A growing number of DOD maintainers will no longer have to rely on outdated maintenance procedures, twodimensional drawings, and legacy data collection methods. A recent CTMA project has established a new, state-ofthe-art digital platform—called the Redesigned Platform Repair Process (RPRP)—for maintaining and collecting data on military systems. This platform provides maintainers with interactive 3D models, along with AR/VR capabilities to support virtual simulations that enable personnel to interact with a digital twin for training and real-time repairs.

This project brings together the Office of Naval Research (ONR) and capabilities from multiple industry partners. The RPRP solution combines four software technologies— PHM Technology's Maintenance Aware Design Ecosystem (MADE), Edlore's AR/VR tools, Siemens Digital Industries' Teamcenter, and Mendix's Studio Pro—to create an advanced digital platform for managing and maintaining military systems.

"This project is far reaching but at the same time has practical applications to the military logistics community," said Peter DeSalva, an Office of Naval Research (ONR) Support Contractor, Subject Matter Expert, and Senior Advisor for Peraton, a national security and technology firm. "We wanted to reduce the amount of maintenance effort that's required by changing the platform designs incrementally. To do this, we had to understand what activities are currently used to maintain platforms. We wanted to gather the data to figure out where we would get the most return on design changes. We decided to use virtual reality and digital twins to create a duplicate of a particular platform, or a component of the platform, to capture the activities that go into keeping that component up and running."

The RPRP platform is a digital ecosystem that works in the following way. Edlore software, a mobile work order management solution, takes the technical orders and maintenance procedures and transforms them into interactive 3D models. These models are integrated into the RPRP platform to allow for visual, step-bystep maintenance tasks. Edlore also incorporates AR/



Participants in an NCMS and Navy event, Repair Technology Exercise (REPTX) Distance Support, held in Port Hueneme, California, test out an augmented reality (AR) headset provided by Edlore Inc. (US Navy photo by Eric Parsons.)

VR capabilities to support virtual simulations, enabling personnel to interact with a digital twin for training or real-time repairs.

Siemens' Teamcenter, a product life-cycle management software, serves as the backbone, centralizing design and maintenance data. It manages the product life cycle, including engineering data, bills of materials (BoM), and technical documentation. Teamcenter synchronizes these data with the digital twin models of the physical systems.

The MADE data modeling software provides detailed analytical insights, including failure mode effects analysis (FMEA) and reliability-centered maintenance (RCM) strategy. It monitors the health of systems, predicts maintenance needs, and identifies potential system failures before they occur, feeding this data back into the platform for proactive, rather than reactive, maintenance.

The Mendix software serves as the user interface layer, allowing users to easily interact with the system through a low-code/no-code interface. Mendix connects the analytical insights from MADE, the lifecycle data from Teamcenter, and the visual models from Edlore to



A screenshot shows an interactive 3D model depicted by Edlore Inc.'s Asset Explorer software, which has been integrated with other software technologies for the Redesigned Platform Repair Process system being developed by a CTMA project. (Photo courtesy of Edlore, Inc.)

present users with an intuitive dashboard for managing maintenance workflows, reviewing tasks, and monitoring system performance in real time.

The project focused on one vehicle: the Joint Light Tactical Vehicle (JLTV) and specifically addressed the challenge of maintaining line replaceable units (LRUs), essential support items that are removed and replaced at field level to restore an end item to an operationally ready condition. LRUs require efficient management and replacement to ensure operational effectiveness in harsh environments.

"For this project, we looked at the JLTV, specifically the 3D renderings of one of the drive components, to show how it is put together and how it operates," said DeSalva. "What is impressive to me is how quickly the team was able to take some very basic two-dimensional drawings and turn them into 3D renderings. These can be applied anywhere there is an expectation of performing maintenance activities, ranging from a truck driver who doesn't have a mechanic with him but has to execute a mechanic-type task in order to get his vehicle back up and running, to the very highly trained mechanic back at the Marine Corps Logistics Base Albany where they're doing major overhauls of entire fleets of vehicles, and everything in between."

Along with 3D visualizations, maintenance personnel can visualize repair tasks with virtual replicas (digital twins) of equipment using AR/VR. The use of these visualizations it can be utilized for many different military systems, from ground vehicles to aircraft. The platform is scalable across the DOD to support warfighters' sustainment of assets in the field.

DeSalva reflected on the benefits of the RPRP platform: "I spent 30 years in the Marine Corps, first as an infantry officer, then 20 years as a logistician. When warfighters operate inside the likely enemy combatants' long-range fires, they're not going to have continuous support. They're going to have at best intermittent support, and any support they have may be interdicted and eliminated before it gets to them. I know this kind of technology will be very beneficial to folks in the field."

The long-term objective of the project is to collect data on sustainment activities to make military platforms more robust, longer lasting, and require less maintenance.

"If we simplify the designs, it will be easier to keep platforms maintained and make them more reliable," said DeSalva.

Beyond the DOD, the RPRP platform has numerous potential public benefits, as it can be adapted for use in multiple commercial industries including oil and gas, mining, manufacturing, and transportation.

Editor's Note: This article has been deemed Distribution A—approved for public release, distribution is unlimited. Release identifier DCN: 2024-11-8-319.

in training and task execution helps to minimize human errors, enhancing safety and reducing the need for corrective maintenance.

The RPRP platform also combines historical and realtime data on maintenance actions to facilitate predictive maintenance and actionable insights for repair teams. The rapid identification of issues ensures immediate repairs and/or replacements to reduce maintenance cycle times and enhance mission readiness.

Because the RPRP platform is

cloud-based and adaptable,

# New Cold Spray System for Rotor Blade Erosion Guards To Protect DOD's Large Helicopter Fleet

A helicopter repairer from the US Army 82nd Combat Aviation Brigade conducts preflight inspection on the rear rotor blade of a CH-47 Chinook helicopter. (US Army photo by Sgt. Steven Galimore.)

Maintenance professionals who work to sustain the DOD's fleet of over 5,000 helicopters experience a common challenge with helicopters, especially those operating in desert environments: sand and dust quickly erode rotor blades. Maintaining rotor blades is costly, up to \$220,000 for a single UH-60 (Black Hawk) helicopter rotor blade and even more for a CH-47 (Chinook) rotor blade. Protective erosion guards of various kinds have been developed and tested, and the highest-performing ones are manufactured using cold spray. To date, this manufacturing has been done at a prototype level using standard cold spray booths with commercial off-the-shelf robot arms. However, mass-manufacturing the guards requires a dedicated manufacturing process, developed specifically for that task.

A current CTMA project has created a Cold Spray Additive Manufacturing (CSAM) technology that produces erosion guards for rotor blades that extend up to 10 feet in length. The Army Research Laboratory (ARL) is leading the project and collaborating with four industry partners: VRC Metal Systems, Siemens Energy, Solvus Global, and Boeing.

"In this project, we've had different types of expertise coming together to solve an important technical problem," said Marius Ellingsen, Ph.D., Process Engineering Manager – Cold Spray, VRC Metal Systems.

"What's really unique about this project is we're making erosion guards, via cold spray, that will have a much longer life, and better performance, than the current erosion guards," said Brad Richards, Co-founder & CEO, Powders on Demand, a division of Solvus Global.

The CTMA project team took the existing GEN IV® High-Pressure Cold Spray System, manufactured by VRC Metal Systems, and added a new and improved helium recovery system. The GEN IV® system uses helium as a process gas, which creates excellent deposits of the cold spray on surfaces; however, helium is very expensive and there are disruptions in the market.

"To mitigate that we have a helium recovery system that captures the helium that has been used for the deposit," said Ellingsen. "In this project, we upgraded the recovery system we had in place before. With the upgrades that we performed under this CTMA project, we installed a pressure swing absorption system, which is excellent for getting rid of air and other impurities when you have a gas that's fairly well concentrated. The pressure swing absorption system can achieve an incredibly high purity level relatively quickly; we're talking 99.9 percent or better. Helium is being captured on an ongoing basis, purified, and put into storage so that we can use it again. We can get something like 90 percent of the helium back."

The CTMA project team integrated VRC Metals' GEN IV<sup>®</sup> High-Pressure Cold Spray System, along with the new and improved helium recovery system, into a large robotics system created by Siemens Energy.

"The Siemens Energy team designed and built a highly specialized booth with robotics and advanced controls,"



US Army Soldiers from the 40th Combat Aviation Brigade attach rotor blades to a CH-47 Chinook. (US Army photo by Sgt. William Griffen.)

said Ellingsen. "We're putting VRC Metals' GEN IV® system inside the booth and hooking it up to a helium recovery system so that we can do these sprays with the best process gas in an economical fashion."

The integration of the systems created by VRC Metals and Siemens will also improve the precision of using cold spray to produce rotor blade erosion guards.

"We built a robotics system that moves the cold spray applicator along a 10-foot span that follows the curvature of rotor blades," said Joshua DeAscanis, Program Manager, Siemens Energy. "This is a highly accurate system that enables spraying onto components with extremely complex geometries that were previously difficult to spray."

For the material needed to operate the cold spray machine—Niobium powder—Solvus Global secured a domestic supplier.

"Of course, right now there is huge motivation for anything and everything really, especially with respect to critical weapons platforms, to be produced as domestically as conceivably possible," said Richards.

"The domestic supplier of the powder has been a huge achievement of this project," said Carlee Schmidt, Senior Materials Engineer, Solvus Global.

The Solvus Global team also focused on ensuring that the domestic supplier can produce enough of the Niobium powder to be able to feed the system as it moves into higher levels of technology maturity.

"For this effort, we verified and started to scale up a process that had already been developed by ARL," said Schmidt.

Additionally, the Solvus Global team integrated their APEX manufacturing intelligence software with VRC Metals' GEN IV® High-Pressure Cold Spray System.

"APEX receives data from the GEN IV<sup>®</sup> system and leverages machine learning to optimize cold spray processes," said Schmidt.

"The APEX software is a machine learning tool and also a production process and management tool," said Richards. "APEX is designed to capture KPIs from the process itself to ensure that process performance can be routinely tracked as a function of the critical process variables. It's basically a bolt on software tool to allow for enhanced production control."

The Boeing team identified the CH-47 Chinook engineering requirements and testing data required to validate the material for use with the selected component, and worked closely with the DOD customer to approve the qualification test plan. Boeing tested cold spray powder and process improvements under development, designed and manufactured fabrication tooling for the rotor blade erosion guards, and performed lab evaluations of part specimens. Boeing is working closely with ARL and the project partners to perform trials to determine optimal tooling release methodology and surface finishing and will help integrate a sensing system with the GEN IV® cold spray system for monitoring powder feed rate in real time.

"Rotor blade design and maintenance must address a large number of requirements to satisfy safety and quality while proving to be cost-effective and timely for the warfighter," said Ken Young, Associate Technical Fellow, Materials & Processes – Boeing Vertical Lift.



US Army Soldiers from the 3rd Combat Aviation Brigade remove a rotor blade to replace rotor heads on a CH-47 Chinook helicopter. (US Army photo by Capt. H Howey.)

"Rotor blades are extremely complicated structures that have a combination of different material types. The component we're working on for the repair technology must protect the composite structure underneath and must be able to survive very severe environments with sand and rain erosion, along with other types of impacts."

The Boeing team started by identifying all the aircraft and component requirements, then determining all the test data that needed to be generated to show that the new component and repair processes are at least as good as the existing repair system.

"We worked very closely with the DOD customer. It was extremely important to get them involved early in the process," said Young.

After the DOD approved the qualification test plan, the Boeing team began the complex testing process.

"We worked closely with ARL and the other project partners to develop the powder and the cold spray deposition technology," said Young. "ARL sent cold spray deposited Niobium, and we fabricated test coupons from that material to test in static and fatigue environments. We also focused on verifying how the metal protection is bonded onto the rotor blades." "The erosion guards are sprayed onto what we call a mandrel, which is a hard metal piece that has the same shape as the rotor blade," said Ellingsen. "Once the guard has been sprayed, we release it from that mandrel, and then it will be adhesively bonded onto the rotor blade."

Working closely with ARL, the Boeing team identified Chinook blades to use as qualification articles. They will install the prototype components, inspect the component installations, and perform track and balance testing, along with sand and rain erosion testing, to make sure all requirements are met.

"Our development testing has already showed that both the Niobium and the adhesive system can survive in harsh, extreme-temperature environments," said Young. "Currently, cold spray additive manufacturing is competing with electroformed Nickel. The cold spray additive manufacturing process we developed in this project to produce erosion guards has been shown to be a more erosion-resistant material than electroformed Nickel. Cold spray additive manufacturing is a near-net process and enables the manufacturing of erosion guards more efficiently."

In March, the team integrated the Siemens Energy component with the GEN IV® High-Pressure Cold Spray

System and helium recovery system. The team spent several weeks conducting a final acceptance test, to make sure that the system worked as intended.

"The cell that Siemens Energy integrated with the GEN IV® system is the pinnacle achievement of demonstrating that we can create a system with a very high degree of complexity to manufacture these unique components," said Richards. "To my knowledge, this project developed the first airworthy cold spray AM part for a highly complicated shape."

The project will have a broad impact across an entire class of platforms. Although the team started with the Chinook, other Army helicopters will benefit from this technology.

"While erosion guards for different helicopters will require different geometries, fundamentally you can use the same material and manufacturing technology for all of them," said Richards.

Currently the project is moving into another phase focused on making the powder more robust.

"In aerospace, establishing a controlled and consistent process is extremely important, and for this work that starts with the powder," said Young. "We're working closely with our partners to establish a consistent process for each step of this work."

All project partners remarked on the team's effective collaboration on an extremely complex project.

"We worked well as a team," said DeAscanis. "We designed a new system and made it as small as it could be so that it's efficient when it comes to running it, because it uses helium, which is expensive. We went with a very small design so it can operate as cost effectively as possible."

Young reflected on the overall value of the project: "Rotor blades are expensive to both maintain and to replace. This repair process will ultimately make rotor blades last longer, reducing maintenance costs."

Ellingsen commented on the public benefit of the work done on this project: "These erosion guards will provide a safety improvement not just for military aircraft, but also for civilian helicopters and propeller aircraft."

## 31 Exhibitors Demonstrate Technologies at Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility (PHNS & IMF)

A successful Technology Showcase at Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility (PHNS & IMF), held January 21-23, 2025, gathered 31 exhibitors and more than 450 attendees to demonstrate cutting-edge M&S technologies that are critical to the PHNS & IMF mission. This event provided a unique venue where exhibitors, program managers, engineers, maintenance personnel, and base leadership gathered in an ideal networking environment. This technology showcase enabled shipyard personnel to evaluate new products and services, and to provide exhibitors with firsthand experience of their technology needs and challenges.

Exhibitors G.C. Lasers and FONON Technologies performed demonstrations of their laser-powered corrosion removal solutions to attendees. In addition, Boston Engineering demonstrated one of their robotic technologies to the Joint Robotics Organization for Building Organic Technologies (JROBOT) meeting held in conjunction with the event. Other exhibitors found the steady stream of attendees beneficial.

"The Pearl Harbor Technology Showcase was a fantastic experience for our company," said Brian Anderson, Director of Sales, Frham Safety Products, Inc, which supplies nuclear and industrial safety equipment to North American government and commercial facilities. "We were thrilled to connect with so many people over just a few days and share our latest advancements. The enthusiasm and genuine interest from attendees made the event truly special, and it was exciting to see such strong engagement with the newest innovations in our industry. We look forward to future opportunities to showcase our cuttingedge solutions."

To view the exhibitor directory, please visit: <u>https://ncms.org/events/ncms-technology-showcase-phnsy#exhibitors</u>.



Attendees test out an AR headset during the NCMS Sustainment Accelerator event held in February at the US Naval Shipyard Repair Facility and Japan Regional Maintenance Facility (SRF-JRMC) in Yokosuka, Japan. (Photo courtesy of US Navy SRF-JRMC.)

## NCMS Holds First Sustainment Accelerator Event at Navy SRF-JRMF in Japan

NCMS hosted its first-ever Sustainment Accelerator at the US Naval Shipyard Repair Facility and Japan Regional Maintenance Facility (SRF-JRMC) in Yokosuka, Japan February 25-27, 2025. The event connected US Fleet Activities Yokosuka to companies and organizations whose technologies can benefit shipyard operations at the installation.

Seventeen companies demonstrated capabilities across seven critical areas: advanced/additive manufacturing; business IT and analytics; CBM+/predictive maintenance; coating and corrosion prevention; energy, environmental, health, and safety; enhanced inspection; and workforce development/visualization.

"As an NCMS member who has attended several Technology Showcases in the past, and now the new Sustainment Accelerators, I can confidently say that these events are invaluable for showcasing technologies like Edlore directly to the DOD," said Javid Vahid, President Edlore. "NCMS events eliminate the exhausting process of identifying the right contacts within the DOD who need these solutions. The Yokosuka event was no exception, and Edlore greatly benefited from the exposure and connections made there."

Almost 500 shipyard personnel attended the event.

Participants demonstrated their capabilities and met directly with DOD personnel to learn about opportunities for collaboration directly from the leading technology experts who serve the Navy's maintenance community.

"The Sustainment Accelerator in Yokosuka proved to be a great opportunity to meet a significant number of base support technicians and supervisors to demonstrate our new Agile Cable Repair Solution (ACRS)," said Kent Williams, Director of Sales and Marketing, DIT-MCO. "We also appreciated the NCMS team making introductions to key Navy and Marine leadership on the base and other key stakeholders attending the Accelerator that was very beneficial for our team."



A representative of exhibitor EFCO USA, Inc. discusses their products with attendees at the NCMS Sustainment Accelerator event held in February at the US Naval Shipyard Repair Facility and Japan Regional Maintenance Facility (SRF-JRMC) in Yokosuka, Japan. (Photo courtesy of US Navy SRF-JRMC.)

In addition to networking with DOD leaders, the Sustainment Accelerator provided an opportunity for demonstrators to learn about current market trends and needs.

"The NCMS Sustainment Accelerator in Yokosuka was an excellent experience for the Shape Waterblast Group," said Victor A. Lugo, Global Sales Director. "It gave us the opportunity to learn about the latest trends, connect with industry experts, and identify market needs. We also left feeling inspired with new ideas and strategies to enhance our work. Overall, attending the conference was a fantastic opportunity for our growth."

To view the complete exhibitor directory, please visit: https://ncms.org/wp-content/uploads/2025/02/2025-Sustainment-Accelerator-Yokosuka-Final5.pdf.

# **Update on the 2025 CTMA Partners Meeting**

Please Note: Due to Federal Government travel restrictions, a decision has been made to move the 2025 Partners Meeting to the Washington, DC Metro to enable key Government Partners to attend. New dates and site location will be announced soon.

The 2025 CTMA Partners Meeting, the only forum dedicated to advancing M&S capabilities across the DOD. This year's event will include a wide range of informative, dynamic presentations and panel discussions on such topics as digital transformation advancements, expanding the implementation of new technologies, ways to benefit from the CTMA Program, and more. New this year are project-focused Q&A panels called "Project Tracks," to enable hearing directly from CTMA project partners on areas including advanced manufacturing, AI enabled maintenance, digital sustainment, and robotics and automation.

The CTMA Partners Meeting offers many opportunities for DOD M&S leaders, industry, and academia to engage, facilitating valuable networking and collaborations aimed at addressing pressing M&S challenges. Attendees are presented with the latest information on M&S technology developments and receive guidance on leveraging the CTMA process for rapid technology implementation. The event also offers industry representatives the chance to showcase their M&S innovations to interested parties and to potentially participate in—or learn from—the CTMA Technology Competition finalist presentations.

Beyond the professional opportunities, the meeting



Attendees at the 2024 CTMA Partners Meeting watch a presentation held in the main ballroom of the Graduate Hotel Providence in Providence, RI. (Photo by Tricia Billiau.)

is an energizing experience, with many attendees declaring it the best conference they've attended all year, fostering a spirit of camaraderie among like-minded M&S innovators.

"The dynamics of the group at the CTMA Partners Meeting is very unique," said Dr. Aaron Birt, CEO of Solvus Global, after attending the 2024 event. "The event has an atmosphere of welcoming and connectivity that I think makes this event feel special in comparison to many other conferences and meetings. It makes folks want to come back and be part of the 'family' that NCMS has created."

To get the latest information on this year's CTMA Partners Meeting, please visit: <u>https://ncms.</u> <u>org/events/2025-ctma-partners-meeting</u>.

#### MEMBER SPOTLIGHT

## AGFM Continues Advancement of Automated Composites Repair Systems

The trend toward lighter and stronger composite materials in modern weapon systems, which began in earnest in the 1960s, has progressed exponentially for a wide range of commodities including aircraft, ships, and ground systems. Even so, the maintenance, inspection and repair of these novel materials is largely an artform that has not changed much since the early days of composite usage.

A longstanding NCMS member, AGFM Corp., which started in Chesapeake, VA, in 1978, began to develop processes and equipment for composites manufacturing in alignment with their Austrian parent company GFM. In 1990, they began developing ultrasonic ply cutting machines, which led to the development of both 4-axis ultrasonic ply cutting machines as well as a combination of 5-axis and 6-axis ultrasonic cutting and 5-axis routing machines.

Today, AGFM is a supplier of automated ultrasonic ply cutters with aerospace giants such as Boeing, Bell Helicopter, Lockheed, Sikorsky, and General Dynamics on its customer rolls. With over 80 AGFM automated composite material processing systems in facilities worldwide, AGFM has designed and supplied some of the world's largest composite manufacturing cells, many of which cover 50 meters x 70 meters.

As these systems were being developed and implemented in the commercial aerospace industry, AGFM began its initial work with DOD, leveraging the CTMA Program on a project titled "Automated Composite Repair Systems—Inspection and Repair Preparation Cell (IRPC)." This Air Force-sponsored effort developed and demonstrated an automated C-130 Nose Radome inspection and repair cell where a robot arm combined with advanced NDI end effectors accurately identified and documented composite material irregularities such as voids, delaminations and damage. The same robot prepared the repair site by changing end effectors and scarfing the affected areas, removing the non-compliant composite material.

Despite these successful projects for automated inspection and repair of composite components, wider implementation



AGFM's robotic 5-axis computer numerical control (CNC) tool with a scarfing end effector removes damage from a section of a helicopter blade. (Photo courtesy of AGFM.)

of robotics and automation in production at DOD organic maintenance depots was a "bridge too far" in the 2006 timeframe. However, the DOD has since chartered the Joint Composite Advanced Maintenance and Sustainment (JCAMS), and then later the Joint Robotic Organization for Building Organic Capabilities (JROBOT), to address this gap in automated composite repair capability in DOD maintenance depots.

Fast forward to today, with the maturity and commercial experience of the robotics and automation space, and the implementation framework created by these focused DOD working groups, AGFM and automated composite inspection and repair is back in the spotlight. Recently, Fleet Readiness Center East personnel in Cherry Point, NC, collaborated with AGFM to develop and demonstrate automated inspection and repair on a section of a Navy helicopter blade. Before now, the existing process was manual, extremely timeconsuming, and many times caused blades to be scrapped from over-scarfing of affected areas. This resulted in the need for new blades along with the added expense and lead time for procurement. In response to this and other requests, AGFM has recently been developing and demonstrating a range of automated repair processes at their Chesapeake, VA, facility.

Situated at the forefront of composite manufacturing and repair, AGFM stands poised to aid the DOD and commercial industry with the capabilities needed to manufacture and sustain composite structures into the next century.

To learn more about AGFM, visit: <u>https://www.agfm.com/</u>.

## **Kinefac Corporation**

Kinefac Corporation manufactures high-precision metal forming equipment and technology. Since 1962 the company has specialized in metal forming machinery, dies, and systems with specific focus on cylindrical die rolling. As a founding member of NCMS, Kinefac played a key role in its establishment. Throughout the 1980s, American global leadership in manufacturing was being challenged and its industrial base was shrinking. Japanese and other foreign manufacturers were making significant inroads in industries like automobiles and electronics leading to concerns about US competitiveness in commercial markets and resulting trade imbalances. In the machine tool industry, imports had grown to 40%. And with shrinking manufacturing capability, America's ability to quickly mobilize its defense industrial base was at risk. and CEO of Kingsbury Machine Tool Company; James Bakken, Vice President of Operations at Ford Motor Company; and George Siegal, Vice President of Engineering at Allied Signal. These individuals understood that basic research was the cornerstone of innovation and new manufacturing technology. They emphasized that the translation of research knowledge to manufacturing companies—large and small—was critical to rebuilding the American industrial base. Guided by their shared leadership, NCMS was formally incorporated in 1986 and opened its doors in Michigan.

Kinefac has remained at the forefront of rapidly changing industry trends and continues to put innovation into practice, meeting customer needs for custom solutions with the latest in automation and digital technologies.



Kinefac's 60-TON CNC PowerBox™ Spline and Groove Rolling System for Precision Cold-Formed Drive-Line Components. (Photo courtesy of Kinefac Corp.)

As new markets have emerged the company has expanded its capabilities to other metal forming and processing technologies such as extrusion, radial forming, center-drive turning, and coiling. Kinefac has achieved considerable success globally by identifying distinct market niches for its products in the automotive, aerospace, defense, linear motion, infrastructure, power generation, and medical industries. Kinefac equipment can be found on all seven continents, including Antarctica.

Recognizing that restoring US manufacturing leadership was a national imperative and required collective action, four industry leaders came together to establish NCMS and served as its first board of directors—Howard Greis, Kinefac's founder and President; James Koontz, President Today, Kinefac machine tools are making everything from high-precision exotic alloy fasteners for the aerospace industry and large diameter threaded studs for nuclear containment vessels to bone screws and micro-sized metal coils for the medical industry. For vehicle parts manufacturers, Kinefac equipment produces power transmission shafts, steering columns, and ball screws for power steering, as well as a range of actuation screws for EVs. Over its multi-decade history, Kinefac has also supported defense customers such as Northrop Grumman, Frankford Arsenal, and Rocky Flats in the manufacture of a range of armament components.

Kinefac equipment maintains high standards of precision, repeatability, and control. The company's unique PowerBox design for cylindrical die thread and form rolling, available with servo-electric control and maximum rolling force of <image>

MC-9 CNC KineRoller™ for High-End Aerospace Fasteners. (Photo courtesy of Kinefac Corp.)

330 tons, guarantees superior rolling stability and rolled form thread quality. Kinefac has continued to develop its PowerBox product line, recently introducing a 60-ton dual station spline rolling machine for the automotive and agricultural industries and a 50-ton three-die thread rolling machine for the aerospace and precision fastener industries.

Kinefac continues to bring innovation to practice for new defense applications. Fast forward to today and Kinefac is rolling threads on 3D printed bolts for lightweighting in the defense industries and exploring applications of rolling for post-processing of additively produced parts. And Kinefac's unique thrufeed-and-cutoff process for the production of rotating bands continues to serve US and allied defense needs across the globe.

To learn more about Kinefac Corporation, please visit <u>www.</u> <u>kinefac.com</u> and the Kinefac YouTube page: <u>@kinefaccorporation2956</u>.

