Issue #02

CTMA

Commercial Technologies for Maintenance Activities

MAY 2014

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Annual Partners Meeting

Focused Technology Transition

2014

JTEG - a forum for new technology exchange
Growing the RARE Parts Team
Composite Material Repair
Automatic Test Equipment (ATE)
Point of Maintenance Aid Tools
Model Based Enterprise

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NATIONAL CENTER FOR MANUFACTURING SCIENCES

CTMA is a partnership between National Center for Manufacturing Sciences and the Department of Defense

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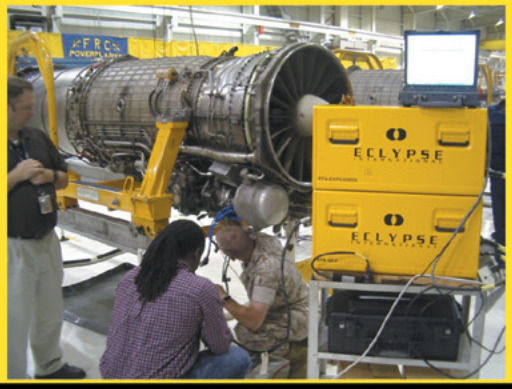

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Annual Partners Meeting

Focused Technology Transition

CTMA

Commercial Technologies for Maintenance Activities

The CTMA program is a joint Department of Defense/National Center for Manufacturing Sciences effort promoting collaborative technology development between industry and the DoD maintenance and repair facilities.

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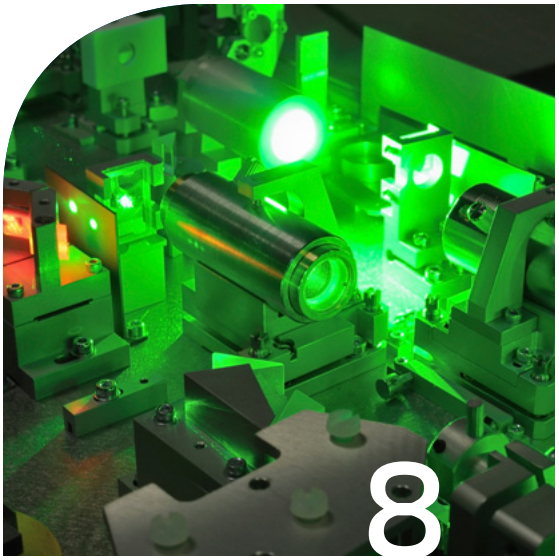

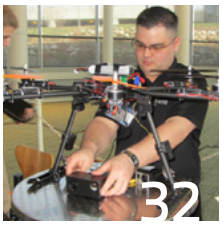

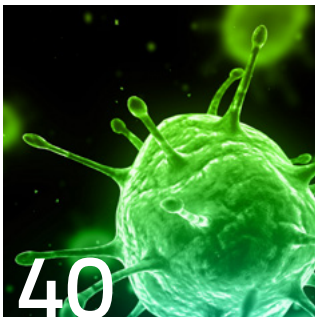

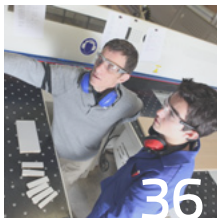

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Welcome & Opening Remarks

Greg Kilchenstein & Tony Haynes

NCMS CTMA Partners Meeting Participants:

The National Center for Manufacturing Sciences and the Department of Defense, Maintenance Policy & Programs would like to welcome you to the 2014 CTMA Partners Meeting. Travel restrictions have eased from last year but travel remains problematic for many so we have elected to again hold a hybrid virtual/physical meeting. For our Partners able to travel, we have invited them to NCMS Headquarters in Ann Arbor during the Partners Meeting to showcase their technologies, and network with others. For all others, we are connecting live via Defense Connect Online (DCO) and a conference line for audio. In addition, the Partners Meeting is being recorded for future viewing.

This virtual/physical event features twelve panel discussions featuring panelists from both industry and government and focused on high priority technology needs that cross all branches of service. Panel topics were selected in collaboration with DoD's Joint Technology Exchange Group (JTEG). Also two completed CTMA projects will be briefed, both Maintenance Challenge winners. Several CTMA Partners have table top displays or booths displaying project technology that will be accessible for the full three days of the meeting. I invite you to visit the booths and talk with Partner representatives.

I'd like to extend a special thanks to Eclypse and Siemens, two of our Partners who have elected to sponsor our evening receptions. Both are extremely active in CTMA projects and have contributed to the overall success of the program. NCMS now owes them a debt of gratitude for expressing their support in this most concrete of means.

Through the CTMA cooperative agreement with the Office of the Secretary of Defense, NCMS forms and manages timely collaborative R&D projects that address the needs of the maintainers. Over the past 16 years, the CTMA program has successfully demonstrated the ability to manage technologies at lower cost, and has an unparalleled track record for deploying technology within DoD maintenance facilities and within industry.

Thank you for your participation in the 2014 CTMA Partners Meeting and our continuing interactions.

President & CEO
Richard Jarman

Sr. Vice President
Rebecca Taylor

Vice President, Digital Manufacturing
Jon Riley

Sr. Program Managers
Bill Chenevert
Dana Ellis
Michael Fancher
Steve Hale
Tony Haynes
Debra Lilu
Connie Philips

Directors of Strategic Projects
Phil Callihan
Manish Mehta

Project Manager
Jeff Walker

Business Development Manager
Danielle Jones

The lifesaving CTMA program is a DoD-supported initiative that ensures American troops and their equipment are ready to face any situation, with the most up-to-date and best-maintained platforms and tools on earth.

Under CTMA, NCMS forms collaborative partnerships between the DoD and private industry to enhance the readiness of our warfighters by providing new and innovative sustainment solutions and research on existing or legacy weapons platforms. Our primary role within CTMA is to facilitate technology development, deployment and validation for use with the DoD's sustainment activities and at NCMS member companies. NCMS forms and manages the project teams to ensure compliance with CTMA guidelines and requirements. By combining North American manufacturing ingenuity with military needs, CTMA projects get critical tools and solutions into the hands of the warfighters without the added cost and reinvention that would be necessary in a non-collaborative model.

NCMS fuels innovative solutions for manufacturers. A nonprofit, member-based consortium, the organization's objective is to drive the global competitiveness of North American manufacturers through collaboration, innovation, and advanced technologies.

If you are interested in learning more or becoming a member, please visit us at www.NCMS.org

Facilities Manager
Mark Carver

Accounting
Cindi Bousley
Lori Hartung
Susan Mills
Rachel O'Donohue

Contracts
Beth Bolog
Chester Ray

Executive Assistant
Alissa Roath

Meeting Coordinator
Melissa Sullivan

Administrative Assistant
Anita Tolen

Art Director
Christopher Fick

Media Production Specialist
Matt Heddle

Global Brand Manager
Matthew Sakey

NCMS WORLD HEADQUARTERS
3025 Boardwalk
Ann Arbor, MI 48108
(800) 222-6267

NCMS WEST
245 4th Street
Suite 405
Bremerton, WA 98337
(360) 782-1370

NCMS EAST
1000 Connecticut Ave NW
Suite 928
Washington, DC 20006
(202) 822-5025

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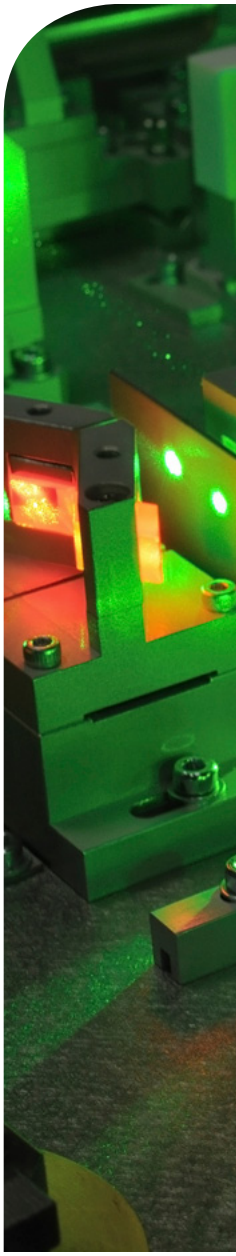
Industry Perspective

Rick Jarman
President & CEO
NCMS

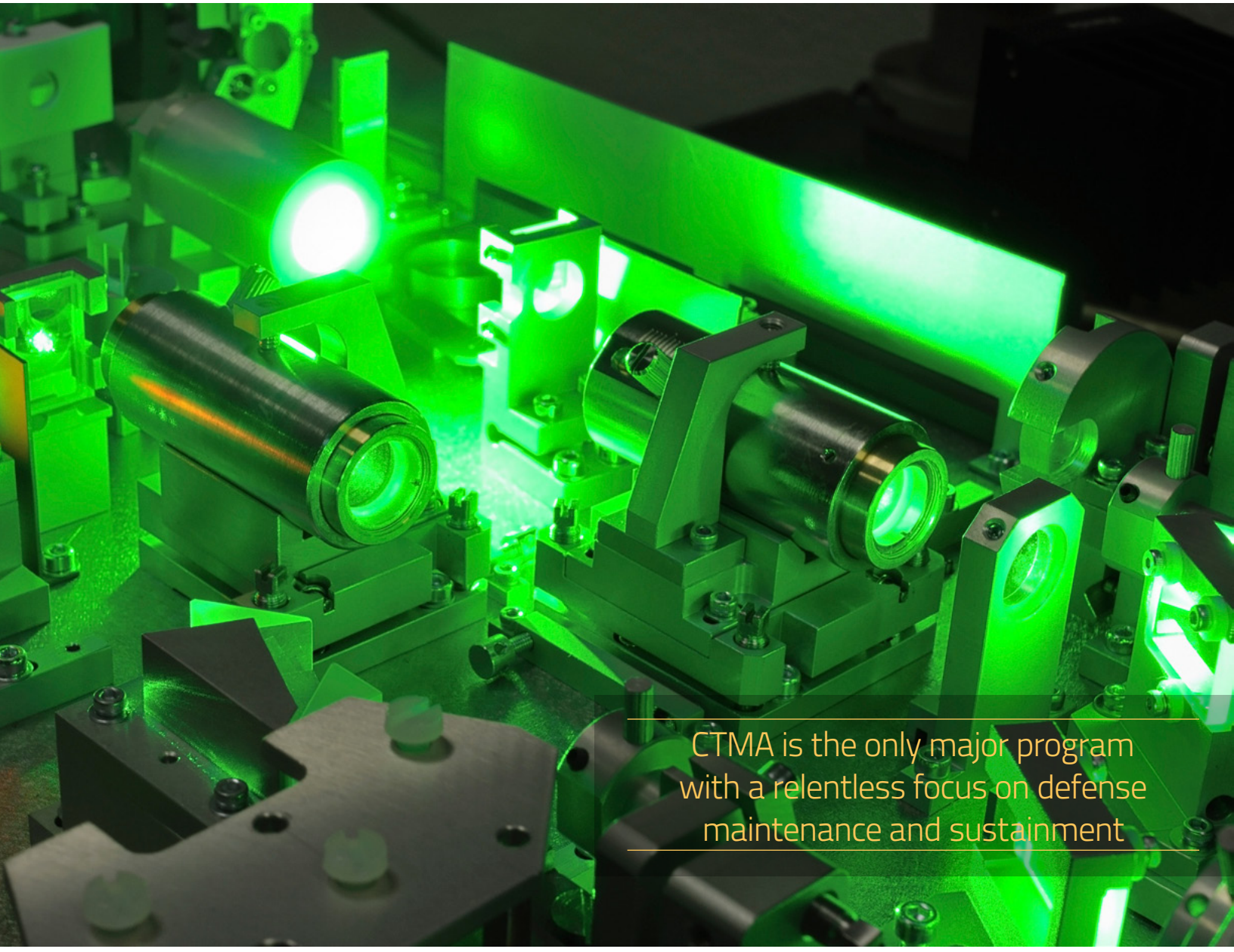


Welcome to the 2014 CTMA Partners Meeting. This hybrid virtual/physical meeting format, with both industry and government partners meeting and presenting live here in Ann Arbor while those who can't travel participate via DCO, is driven by tight travel budgets for both industry and defense. There is one positive about this year – for the first time since 2008 DoD is operating under a budget rather than a continuing resolution.

The CTMA program has since 1998 proven its value to both NCMS and DoD. CTMA is the only major program with a relentless focus on defense maintenance and sustainment and has resulted in over $700M cost savings to date. As an ample demonstration of the value of the program, NCMS in 2013 was awarded a new CTMA contract by OSD.

CTMA funding remains through direct service funding via MIPRs to the new CTMA award. Budget reductions make that scenario difficult but it is important to all that direct funding continue because budget reductions also mean that legacy weapons must be sustained even longer.

Over the past year NCMS and OSD have introduced something new to the CTMA program, a series of virtual forums presented over DCO and focused on topics of major interest to the defense maintenance/sustainment community and to industry. These forums have proven extremely successful. The last, on April 29-30, focused on the Model Based Enterprise, a topic of major interest to NCMS outside the CTMA environment.



CTMA is the only major program with a relentless focus on defense maintenance and sustainment

NCMS' strategic thrust into digital manufacturing has caught the attention of commercial industry in a big way. NCMS has established a center in Virginia focused on vehicle crash simulation and is working with the Department of Transportation.

Please feel free to ask any of the NCMS staff participating in this Partners Meeting how to discover more about NCMS and its programs.

Thank you for attending.

~Rick Jarman

Tuesday, 20 May 2014

Joint Technology Exchange Group (JTEG) Panel

0830-1000

Department of Defense (DoD) Depot Maintenance Activities are constantly under pressure to become more efficient. One of the most effective ways to improve efficiency is to identify and insert new technologies, which all of the Services do through various Service and DoD technology programs such as CTMA. The JTEG was created to better leverage technology improvements in depot maintenance through the collaboration of the Services, Joint Staff, OSD, and industry. The JTEG serves as a forum for the exchange of information on new technology, processes, and equipment developments and is a strong advocate for new technology with cross-service potential. The panel will highlight the JTEG objectives and recent activities, while the Service representatives will present key technology insertion actions they are conducting as well as review their overall technology needs with respect to maintaining and upgrading depot maintenance capabilities.

Moderator

Greg Kilchenstein
Office of the Assistant Deputy Under Secretary of Defense for Maintenance Policy & Programs

JTEG Joint Technology Exchange Group
Joint Solutions for Depot Maintenance

Mr. Kilchenstein is an Action Officer with the Office of the Assistant Deputy Under Secretary of Defense for Maintenance Policy & Programs working technology enablers that focus on sustaining materiel readiness at best cost. Having completed his undergraduate work in aerospace engineering and graduate level studies in systems engineering at the University of Maryland, Greg began working for the Naval Sea Systems Command in 1987 as a mine warfare simulation modeler. After joining the Naval Air Systems Command in 1989, Greg was assigned as a propulsion engineer for the V-22, P-3, C-130, E-2/C-2 and had the privilege of witnessing... See full bio on page 72.

Panelists

Steve Morani
Logistics Directorate
Mr. Morani is the Deputy Chief, Maintenance Division, Joint Staff Logistics Directorate (J-4). Prior to assuming his current duties, he spent over 28 years on active duty in the United States Air Force...
See full bio on page 91.

Kurt Doehnert
NAVSEA
Mr. Doehnert is a senior Industrial Engineer with the Naval Sea Systems Command (NAVSEA) in Washington, DC. He is employed in the Naval Shipyard Management Group (SEA 04X), Process...
See full bio on page 78.

Robert (Yogi) Kestler
FRC East
Mr. Kestler has held the position of Science & Technology Lead at Fleet Readiness Center - East (FRC East) within the Naval Air System Command (NAVAIR) since 2007. He also serves as the liaison to...
See full bio on page 85.

Greg Russell
Marine Depot Mx Cmd.
A native of Flora, IL, Mr. Russell graduated from Flora Township High School. After graduation, he enlisted in the US Navy Marine Corps where he served 8 years with the US Navy from 1973 to 1981 as a Machinist...
See full bio on page 94.

Thomas Naguy
HQ Air Force Materiel Cmd.
Mr. Naguy is currently the Deputy Division Chief and Technical Advisor for AFMC's Life Cycle Management Division. In this position, Mr. Naguy develops life cycle product support policy and...
See full bio on page 91.

Eric Hoover
Redstone Arsenal
Mr. Hoover joined the Edgewood Chemical Biological Center (ECBC) in 2004 and has approximately 30 years of Federal Service as a Department of the Army Civilian and United States Army Officer...
See full bio on page 83.

The New CTMA Agreement

Debra Lilu,
Sr. Program Manager
NCMS

The Commercial Technologies for Maintenance Activities (CTMA) program is administered through a Cooperative Agreement between the Department of Defense (DoD) and the National Center for Manufacturing Sciences (NCMS). The program has been in existence since 1998. The Cooperative Agreement was renewed in 2013 and now extends to 2023.

The CTMA program was established for the research, development, and deployment of technologies to support weapon system and component sustainment, maintenance, obsolescence management, and other relevant technologies that ultimately support the warfighter.

A primary mission of the CTMA program is to provide technology development and insertion in support of the reliability and sustainment of ships, submarines, aircraft, land vehicles, non-traditional weapons systems and warfighter support systems. The CTMA Cooperative Agreement provides the mechanism for the CTMA program to provide research, development, and deployment of new technologies to improve a broad range of DoD sustainment and warfighter support operations. The primary goal of the Cooperative Agreement is to leverage commercial developments for application to DoD issues — to reduce costs, improve system/platform operational availabilities, increase weapon system reliability, improve logistical support efficiency and effectiveness, improve environmental compliance and increase sustainment personnel safety.

Another key goal of CTMA is the establishment of a robust collaborative environment with private industry participants to perform research, development, and deployment that is relevant to both industry and the military. To accomplish these objectives, NCMS develops and manages collaborative project teams from private industry, research organizations, government and academia with the intent of improving processes and technologies used by the DoD and fully transferable to commercial applications for the overall public good.

The CTMA program is one of the most successful initiatives at NCMS. To date over the last 16 years, NCMS has managed over 130 multi-participant projects amounting to $75 million of DoD funds coupled with $120 million in industry cost share. The results have been spectacular with over $350 million in savings to date

by deployed technologies in DoD. This does not include the incremental savings achieved by the industry partners by offering similar technologies to the commercial markets.

To substantiate and reinforce the success of CTMA, NCMS project teams have won a myriad of recognition awards including:

- Ten Defense Manufacturing Excellence Awards
- Three "Great Ideas" Awards
- One R&D 100 Award
- Air Force Chief of Staff Team Excellence Award
- NAVAIR Innovation Award
- American Helicopter Society Jensen Award
- OSD Foreign Comparative Technology of the Year Award
- 2013 Presidential Green Chemistry Challenge Award

One key feature of the CTMA program is its ability to cut through "red tape" and launch a new project within 45 days of receiving approval to proceed with project or initiative. Another feature is NCMS' unique ability to quickly develop a collaborative team, typically made up of a technology provider (many times small entrepreneurs), a technology integrator (oftentimes integrating several technologies into a system) and a user who has defined a need (typically a DoD maintenance depot with manufacturing/rehab responsibilities of weapons systems).

Some examples of successful CTMA initiatives benefitting both military and commercial industry include:

Enhanced Wiring Integrity Systems (EWIS)

(DoD participants: Navy FRC-SE; Portsmouth Naval Shipyard; Tobyhanna Army Depot; Warner Robins Air Logistics Complex; Dyess AFB; Ellsworth AFB; Seymour Johnson AFB; Ogden Air Logistics Complex; and Marine Corps Maintenance Center Barstow)

Deployment of the EWIS technology has included testing EA-6B circuit breaker panel repairs, analysis of electrical problems on cranes, shelter wiring repair, automated vehicle electrical checks, and a wide variety of wiring faults on weapon systems. Benefits accrued from deployment include:

Cost Savings: Wide variety of DoD applications yielding over $18M in benefits to date with growing annual benefits currently at $5M/year.

Readiness: Increased quality of inspection and repair of wiring increases weapon systems availability and performance.

Reliability: Wiring reliability is notoriously poor. Vastly improved inspection of wiring integrity has led to reduced failures in operational use.

Cycle Time: Wiring inspection and repair time

reduced by 50% due to fast test setup, inspection, and teardown times.
Safety: Improved wiring reliability has reduced catastrophic field failures and a safer operational environment for the warfighter.

Erosion/Corrosion Resistant Coatings for Gas Turbine Engine Compressor Systems Operating in both Sand and Maritime Environments (EC/RC)

(DoD participants: NAVAIR Patuxent River; Navy FRC-E; Oklahoma City Air Logistics Center; Army TARDEC; and Anniston Army Depot)

As a result of a CTMA project development, erosion/corrosion resistant coating systems are being used for gas turbine engine operations in both desert and maritime environments such as Honeywell, T55, Rolls Royce T56 and GEA T700 engines. Benefits to the DoD for the deployment of the developed technology include:

E-2: 1.5X engine time on wing (ETOW) increase results in $2M/year savings.

C-130: 1.5X ETOW increase results in $8M/year savings. 1-2% reduced fuel consumption results in $12M/year savings.

M1A Abrams Tank: 1.5X MTBR results in $13M/year savings.

MH47: 2X ETOW increase results in $6M/year savings.

SH-60, AH-1, UH-1: 1.5X ETOW increase results in $10M/year savings.

No Mask Tooling for Plating Operations

(DoD participants: Army ARDEC – Benét Labs; Corpus Christi Army Depot; Navy FRC-E; and Navy FRC-SW)

No-mask conforming anodes replaces tedious and time consuming hand masking of parts to be plated and subsequent removal of highly toxic masking materials after plating. Both hard chrome and nickel plating are relatively slow processes involving extensive labor (to mask and unmask parts) and disposal of toxic chemicals. The result is loss of plating capacity and weapons systems availability. This project developed and deployed no-mask conforming anodes that replaces tedious and time consuming hand masking of parts to be plated with subsequent removal of highly toxic masking materials after plating. DoD benefits resulting from the deployment of this technology include:

Cost Savings: At CCAD and FRC-SW a total immediate savings from all pilots is $2.2M. Total savings since project inception have accrued to $7.4M at CCAD and FRC-SW. Other depots have picked up the technology and ordered similar tooling. Total current annual savings is $5.9M across all 7 depots with metal finishing. Additionally, Benét Labs at Watervliet Arsenal funded a follow-on CTMA project to develop conforming anode tooling to eliminate a serious corrosion issue on the 155mm Howitzer breech spindle.

Readiness: The higher quality and faster plating process reduces any bottlenecks imposed by the plating operation and contributes to improved component performance and reliability in relevant weapon systems.

Reliability: Higher quality and more consistent plating process reduces post process machining of parts and a more

Collaborate to Innovate

Rapid Transition of Proven Technologies

reliable remanufacturing of components.

Cycle Time: Plating process time reduced 30-50%; increasing plating shop throughput and improving the overall cycle time for weapon system repair.

Safety: Vastly improved process (eliminated hand masking), reducing artisans' exposure to plating baths and elimination of hazardous waste (masking material) disposal.

Rapid Manufacturing and Repair

(DoD participants: Trident Refit Facility, Kings Bay, NUWC Keyport; Anniston Army Depot; Naval Foundry and Propeller Center, Philadelphia; NAVAIR China Lake, Portsmouth Naval Shipyard; Pearl Harbor Naval Shipyard; Oklahoma City Air Logistics Center; Tobyhanna Army Depot; Navy FRC-E; Navy FRC-SW; Corpus Christi Army Depot; and Picatinny Army Arsenal)

Over the course of this program NCMS deployed 28 additive manufacturing (AM) machines to participating DoD maintenance facilities and collaborating industry partners' facilities. As DoD participants have begun adopting AM technologies, they purchased and installed an additional 22 machines through 2012. This level of acquisition of AM capability by our DoD participants represents a 100% increase over the past 3 years. To date, a total of 111 parts or applications have been or are being piloted in the DoD sustainment community. Deployment of AM technology is providing over $7M in annual cost savings, and has reduced repair cycle times by a cumulative 1,403 weeks over legacy production time schedules. These cost benefits, along with the cost share devoted by private industry created a 6:1 ROI on this project. CTMA's AM programs spurred DoD's involvement and elevated it to key technology designation within DoD's disruptive technology agenda.

Fast Field Fluid Assessment Tools (3FAST)

(DoD participants: Joint Oil Analysis Program Technical Support Center; Naval Facilities Engineering Service Center; Langley AFB; Navy FRC-E; Army Redstone Arsenal, RAM Division; U.S. Navy Military Sealift Command; 160th SOAR; Letterkenny Army Depot; Army Aviation Directorate, U.S. Marine Corps, NAVAIR, and the Coast Guard)

This project developed portable, handheld analytical tools providing a lab-quality assessment suitable for real-time in-field use. The unit gives a soldier or mechanic the ability to determine oil quality on a real-time basis before or during a mission without messy and time-consuming sampling. Deployment has provided the following benefits:

Cost Savings: $48M/year reduced logistics supply chain in theatre; $2M/year from the ensured use of correct fluid types in components; $1M/year reduced labor burden for analysis; $1M/year cost savings from reduced use of fluids and disposal.

Readiness: Faster response to fluid changes, ensuring availability of properly serviced weapon systems.

Reliability: Assured use of correct fluids, reducing maintenance issues and increased reliability of system.

Cycle Time: Reduced time for fluid analysis from 30 days+ to minutes.

Safety: Reduced fluid usage due to unneeded fluid changes lowers the need to truck fluids to the forward operations, with less exposure of DoD personnel to enemy fire.

Fastener Removal Improvement Technology Adoption Program

Mervyn Rudgley
Perfect Point EDM
See full bio on page 94.

Fastener Removal Improvement Technology Adoption (FRITA) initiative is a collaborative effort between Perfect Point EDM, NCMS, and several aircraft maintenance depots across the DoD. The initiative introduces a new technology for the optimization of aircraft fastener removal procedures, and presents a plan to streamline the adoption of this technology into DoD.

The current approach to aircraft fastener removal is extremely labor intensive and has traditionally resulted in high damage rates, requiring the use of standard twist drills to separate the fastener head and body. The commonly accepted side effects of the existing method include low productivity, structure damage, noise, repetitive motion and eye injuries, and the FOD hazard to equipment and personnel resulting from thousands of drill shards.

A new technology known as the e▪drill has been developed by Perfect Point EDM to address and mitigate the disadvantages associated with fastener removal using conventional methods. A handheld implementation of EDM (Electro-Discharge Machining) technology, the e▪drill uses spark erosion to cut a circular groove into the head of a fastener to a depth corresponding to the head thickness. After cutting, a thin fillet of material is left which is easily fractured when struck with a hammer and punch. The cutting process produces fine particulate debris that is flushed away and captured by a closed-loop fluid handling system, resulting in a fast clean cut whose only remnants are the fastener head and body. The effectiveness and cost savings attributable to e▪drill implementation have been conservatively estimated at better than a 50% reduction in labor, a 75% reduction in damage rate and associated costs as well as tremendous ergonomics and safety benefits.

While a limited number of military locations have put the e▪drill into service, the DoD has yet to realize the benefits of the system on an extensive scale. Currently, the engineering analysis and training development required for narrow local approvals have been largely inconsistent and have required redundant efforts. The objective of FRITA is to address these issues by coordinating the efforts of multiple locations to develop a common set of Engineering, Process and Training specifications pertaining to e▪drill deployment that will be applicable across multiple facilities and Services within the DoD.

Industrial Human Augmentation System Prototype Redesign for Affordability

Keith Maxwell
Lockheed Martin
Missiles & Fire Control
See full bio on page 90.

Jamie Mattern
NAVSEA, NSWC
Carderock
See full bio on page 89.

In November 2012, OSD and NCMS sponsored a two week evaluation of the second generation (2G) iHAS prototypes at PSNS&IMF. In addition, the zeroG arm alone, without an exoskeleton lower extremity, was evaluated for two more weeks. To create the mobile, mechanical load transfer system prototypes, the battery and hydraulics were removed from three HULC units and with some other relatively minor design changes, Lockheed Martin produced three Multi-Attachment Non-Tethered Industrial System (MANTIS) lower extremity exoskeletons. The data substantiates the improved productivity and quality, and the reduced strain and fatigue experienced when using the iHAS. The collaboration with Lockheed Martin Missiles & Fire Control (LMMFC), NCMS and the U.S. Navy, Naval Sea Systems Command, Carderock has accelerated the advancement of both the science of human augmentation and the engineering of an advanced exoskeleton.

The collaboration has already demonstrated benefits in the Puget Sound Naval Shipyard where the technology proved to increase productivity and reduce musculoskeletal injuries across a range of heavy industrial occupations. The testing in the shipyard and elsewhere has provided beneficial design efforts, which has enabled LMMFC to design a more optimal human augmentation solution, the MANTIS 2G.

The MANTIS 2G design concept leverages the innovative design of the original MANTIS exoskeleton which leveraged the development of the HULC exoskeleton. Our focus for the second generation development was threefold:

1. Preserve and enhance the system's ability to augment the human to dramatically increase productivity across a broad range of tasks.
2. Protect the human from musculoskeletal injuries caused by muscle over exertion.
3. Reduce the cost to manufacture the system to enable wide technology adoption; thereby maximizing the savings to customer organizations.

With those three goals, leveraging 10 years of exoskeleton development knowledge and two years of intensive engagement with the U.S. Navy and other industrial customers, LMMFC commenced the MANTIS 2G Design Concept.

Tuesday, 20 May 2014

Additive Manufacturing Partnerships Panel

1230-1400

Moderator

Carl Dekker
MET-L-FLO

The benefits of an Additive Manufacturing (AM) user-based program to DoD and other federal agencies have been clearly demonstrated by the RARE Parts team through the CTMA program. This partnership reduces learning curves required to design and to manufacture using AM. Members come from industry & government users of AM – membership is open to all branches of DoD, DOE, NASA, and other entities of the federal government having a need to use AM in their mission, manufacturing, maintenance or repair operations.

Now, the DoD Metals Additive Manufacturing Qualification and Certification Working Group, chartered under the JDMTP Metals Subpanel, and the CTMA RARE Parts team are working together to further the adoption and use of AM throughout DoD and other government agencies in their maintenance and manufacturing operations. At an initial meeting on 4 March 2014, this joint initiative was proposed and ultimately undertaken under the auspices of the JDMTP Metals Subpanel AM Charter. This public- private working group aims to proliferate AM skills and knowledge base throughout the DoD, other federal agencies, and our supply chain communities and to realize the benefits of leveraging resources and expertise through collaboration and cooperation.

Mr. Dekker serves as the President of MET-L-FLO, Inc., a growing Service Center for Additive Manufacturing located in Sugar Grove, IL. He has been actively involved in research and product development using current technologies and innovative methods.

Mr. Dekker has presented his work at various conferences globally, including those sponsored by 3DSNASUG, Amerimold, ANTEC... See full bio on page 78.

Panelists

Dr. William Frazier
NAVAIR
Dr. Frazier received his BS, MS, and Ph.D. degrees in Materials Engineering from Drexel University in 1981, 1984, and 1987 respectively. In 1998, he graduated the Naval Aviation Executive Institute's Senior ...
See full bio on page 81.

Terry Kreplin
Baxter Healthcare
Mr. Kreplin is a Senior Engineering Specialist with Baxter Healthcare Corp., responsible for the (RPD) Rapid Product Development and (CAM) Computer Aided Manufacturing Groups. The RPD/CAM Group is dedicated to compressing...
See full bio on page 86.

Matthew Donovan
UTC Aerospace
Mr. Donovan is an experienced engineer with a broad background in aerospace manufacturing technologies and materials. He is currently staff engineer for new product development and advanced manufacturing in various...
See full bio on page 79.

Stacey Kerwien
Army ARDEC
Ms. Kerwien is the Deputy Chief of the Materials, Manufacturing and Prototype Technology Division at the US Army ARDEC located at Picatinny Arsenal in Dover, NJ. ARDEC is the Army's key armaments...
See full bio on page 84.

Do it in Digital

A Blueprint for Tomorrow's Manufacturing

Jon Riley
VP of Digital Manufacturing
NCMS

Throughout history, changes in manufacturing have driven changes in society. The rise of Mass Production in the early 1900s made it possible to build many identical products quickly, reliably, affordably, resulting in an economic shift that's still felt today. Think of our lives today: computers, air travel, telecommunications, medicine. Practically everything we depend on, everything that defines modern life, exists because of Mass Production.

A new revolution is on the horizon, changing how we build and how we live. Its tools are big data, high performance computing, process virtualization, predictive analytics, and advanced simulations. It's Digital Manufacturing, and it's going to change the way we design and build. Computer models will replace classical processes – what had been done physically will be done virtually. Products will be designed, tested, and optimized digitally, iterated and optimized millions upon millions of times before a single physical prototype is made. Terabytes of data will be transformed into predictive models and advanced forecasts. The most complex systems will become predictable tools, and even the smallest manufacturers will exist as much in the virtual world as they do in the physical.

At the end of the day, the outcome is still products we can touch and work with. But how those products are designed, optimized, and built is going to change radically. Just as Mass Production made the goods and services of the 20th Century accessible even for those of limited means, Digital Manufacturing will usher in a new generation of safe, efficient, affordable products. The revolution is coming. It's just a matter of when, and how quickly American manufacturers of all sizes can take advantage of it.

At NCMS, our job is to make collaborative innovation easy; to build opportunities that empower industry. Our job is to tell

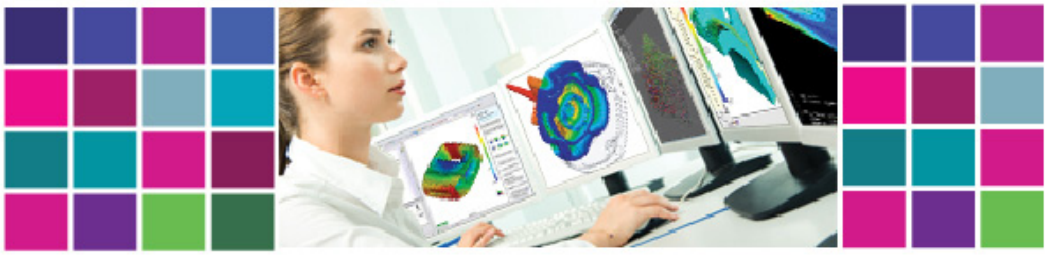
GRID
do it in digital™

which way the wind is blowing by seeing trends and patterns where others see nothing at all, and we believe the Industrial Revolution is going to be a footnote in history compared to the Digital one. We also know that seismic shifts are never easy – not for big manufacturers or small ones. Together, we can seize this opportunity and change the way America builds.

The Grid Initiative™ is our vision for a national innovation network that combines the power of physical and virtual collaboration, and makes it easy for manufacturers of all sizes to access the software, hardware, and expertise that powers Digital Manufacturing. The tools of tomorrow, made available today. Manufacturing is about to enter a new realm of innovation – a virtual realm where enterprises can predict and optimize far beyond the physical limits of today. Do it in Digital. Get on the Grid.

Visit www.DoItInDigital.com for more information.

CHANGING THE WAY WE BUILD



The Conferences @ NCMS

Networking Reception & Table Top Displays every evening after panel discussions.

NCMS will be hosting a Welcome and Networking Reception for all of the attendees and participants who made it to Ann Arbor.

A big thank you goes out to all of the CTMA partners. Without you none of this would be possible.

THANK YOU ALL!

For more information about booking or leasing office space, please contact Mark Carver at (734) 995-3049 or MarkC@ncms.org

Tuesday, 20 May 2014

Environment, Energy, Health, and Safety Panel

1415-1545

This panel will present key issues facing the Services regarding compliance with national mandates to preserve the precious resources of our planet including its most important asset, the health and safety of its workforce. Each Service will have the opportunity to articulate its progress towards meeting its HSE objectives. Additionally, several NCMS/CTMA initiatives will be highlighted that directly impact meeting those objectives. They include: Trichrome (Replacement for Hexavalent Chromium), Conforming Anodes for Electroplating, eDrill (FRITA), and SAVES, an exciting new technology (Aerovoltiac) that converts wind energy to electrical generation without large, complex wind turbine systems.

Moderator

Bill Chenevert
NCMS

Mr. Chenevert is the Senior Program Manager for NCMS. He has managed several successful R&D projects developing new manufacturing technologies including in-depth analysis of nanoparticulate additives in diesel fuels, new trivalent chromium technologies replacing highly toxic hexavalent chromium, modernization of electroplating techniques and advanced gaming and simulation-based technical training. Given a successful career of over 34 years in senior manufacturing management positions with Ford Motor Company, Mr. Chenevert also has extensive experience in quality management (process improvement/ Lean/Six-Sigma), vehicle and component manufacturing, electroplating, plastics composites, sustainable manufacturing and technical training.

Mr. Chenevert is actively managing several NCMS sustainability initiatives including an NCMS project on energy efficiency. He also directs 12 Compliance Assistance Centers (CACs) funded by EPA... See full bio on page 77.

Panelists

George Cushnie
Advanced Tooling
Mr. Cushnie is co-founder and current Vice President of Advanced Tooling Corporation, a company that has participated in CTMA projects for 10 years. ATC designs and manufactures metal finishing tooling for industry and DoD...
See full bio on page 78.

Dr. Dawn White
Accio Energy
Dr. White is creative engineering executive with extensive experience in technology start-up company formation and financing, manufacturing science, additive manufacturing, automotive, and contract R&D...
See full bio on page 97.

Thomas Naguy
HQ Air Force Materiel Cmd.
Mr. Naguy is currently the Deputy Division Chief and Technical Advisor for AFMC's Life Cycle Management Division. In this position, Mr. Naguy develops life cycle product support policy and...
See full bio on page 91.

Jamie Mattern
NAVSEA, NSWC Carderock
Mr. Mattern joined the Naval Surface Warfare Center, Carderock Division (NSWCCD) in 1990 and spent the first 13 years of his career executing and managing research, development, test...
See full bio on page 89.

Mark Feathers
Army EQT
Mr. Feathers is an Environmental Engineer with the US Army Aviation and Missile Command located at Redstone Arsenal, AL. He has worked the last 16 years to develop and integrate sustainable...
See full bio on page 79.

Table Top Displays (1 of 2)

in alphabetical order

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Adapx demonstrated digital pen and paper technology that can be used to digitize handwritten data at the point of maintenance. The data populates a server, where it can be validated, and then sent automatically to Engineering or other customers. Pilot results showed a savings of 80% of an artisan's data entry time, and a potential 4-7 day cycle time improvement. For more information visit www.adapx.com

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Eclypse International is a leading developer of Automated Test Equipment (ATE) and total test solutions for today's competitive manufacturing and maintenance environments. We specialize in circuit analyzers for use in both controlled and harsh environments. Our equipment is currently in operation throughout the United States and abroad, with both military and commercial organizations. To learn more about Eclypse and our products and services visit www.eclypse.org

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J Chadwick Co provides portable solutions for depth measurement and visual inspection. Our products are designed to quickly and accurately assess the severity of surface damage where other methods are time consuming and inconclusive. When specific tolerances apply to surface damage, exact measurements are essential. Make "repair or replace" maintenance decisions with confidence, improve safety and quality control by preventing the use of substandard parts, and save money by avoiding scrapping parts that are still within safety and tolerance limits. Learn more at www.jchadwickco.com

LOCKHEED MARTIN

The Lockheed Martin Virtual Prototyping group has been empowering people with a unique portfolio of visualization, simulation, and human computer interface approaches aimed at improving how people understand complex systems and ideas, informed decision making, fluid communication, and reduced cost/schedule/risk to assist programs in winning new business, performing on existing business, and keeping programs sold.

Sustainability

Bill Chenevert
Sr. Program Manager
NCMS

Sustainability means the capacity to endure. Sustainable Manufacturing is a cornerstone initiative at NCMS. The word "sustainability" describes how biological systems remain diverse and productive over time. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. For humans, sustainability is the potential for long-term maintenance of wellbeing, which has environmental, economic, and social dimensions. In a manufacturing context, sustainability is the ability of a company to provide enduring value to its shareholders, the community and our planet.

NCMS has several programs in place supporting Sustainable Manufacturing. One of our most popular and well known programs are the Compliance Assistance Centers (CACs). Developed in partnership with the Environmental Protection Agency, the CACs are independent websites managed by NCMS through EPA grants.

NCMS developed and currently manages eleven industry-specific CACs that include among others:

- Construction
- Paints and Coatings
- Transportation (road, rail, water, air)
- Metal Finishing
- Import/Export
- Port Operations
- Border Compliance
- Healthcare
- Veterinary

Additionally, NCMS developed and manages 24 State Resource Locators (SRLs) that provide specific state by state compliance information (contacts, downloadable permits, etc.) on a myriad of environmental topics including waste management (hazardous, regulated medical, solid, electronic, universal), industrial and construction stormwater management, green building, storage tanks, and endangered species.

Some CACs have been online for more than 15 years, providing guidance, information, access to regulations and forms, and community for stakeholders in these sectors. These websites provide key environmental compliance and best management practices information free of charge to help organizations better understand their impact on the environment on how best to comply with Federal, State and Local regulations. See www.assistancecenters.net

Enormous potential opportunities and payoffs exist when lifecycle thinking is consistently applied by manufacturers, both in business terms and in technology development; but requires the materials industries, manufacturers and stakeholders to re-think product design, analyses and material selection strategies. NCMS, in cooperation with EPA, DOE and multiple industry stakeholders, developed several unique sustainability assessment tools to assist product and manufacturing design engineers. These tools and guides can help users assess and minimize the environmental impacts of products through their entire product lifecycle (design to end-of-life disposal) based on the raw materials, and their related manufacturing processes, chosen early in the design stage.

If you would like further information on these or other NCMS sustainable initiatives please contact:

Bill Chenevert (734) 995-7989
BillC@ncms.org or

Dr. Manish Mehta (734) 995-4938
ManishM@ncms.org

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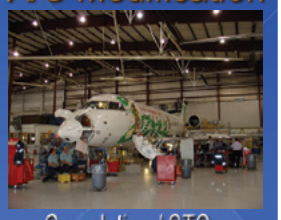
Completion / STC

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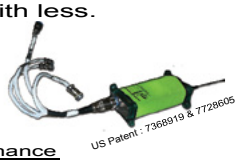
Whether you operate a fleet of new fly-by-wire aircraft on commercial flights or legacy aircraft on military operations,electrical sub-systems (LRU/wiring/components) are critical to flight safety. Any failure is unacceptable and requires immediate attention.With the increasing pressure to build, maintain and modernize them efficiently, THS offers automation and innovative maintenance processes to provide you with new capabilities to do more with less.



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Wednesday, 21 May 2014

Education and Training Panel

0830-0945

Moderator

Matt Sakey
NCMS

The aging workforce (at least 50% of federal workers will be eligible for retirement within five years) coupled with the impact of inconsistent, unstructured OJT, translates into all DoD Maintenance Activities having to face a severe shortage of skilled workers being able to maintain military assets passing through the depots. In addition, as new technologies emerge, the introduction of those new technologies becomes increasingly difficult when the workforce has only superficial process knowledge. Finally, process improvement training such as Lean Manufacturing and Six Sigma from industry is needed at the depots to improve workflow and throughput to increase warfighter readiness.

A key fact to consider when planning effective workforce training is to consider how it is developed, who the target audience is and how it is deployed. A large group viewing a poorly prepared Power Point without any hands-on exercises just to get a check mark in a worker's file is not very useful technical training. There are new, innovative educational technologies available that addresses that issue and will be considered in this panel discussion. They include on-site, hands-on training (Virtual Workplace Simulator), Computer Based Training (CBT) for Metal Finishers (NCMS developed via CTMA) as well as several other unique training programs developed locally by the military depots. Industry experts offering innovative technical training technologies and depot representatives will make up the panel.

Mr. Sakey, a life-long media nerd with an extensive background in training and education, Matt is an internationally published theorist on games-based... See full bio on page 95.

Panelists

Dr. Hossien Nivi Pendaran

Dr. Nivi is an accomplished executive, engineer, and academic with experience in operations, leadership development, and educational methods As an executive, he has built one of the top leadership development systems...

See full bio on page 92.

Marc O'Brien
Lockheed Martin

Mr. O'Brien has more than 15 years of experience working within the Lockheed Martin Skunk Works®. During his tenure, Marc has been applying virtual technology solutions to Lockheed Martin programs including F-22, X-35, F-35...

See full bio on page 93.

Jeremy Smith
US Army, CCAD

Mr. Smith worked for 5 years as an analytical chemist at a consulting firm in San Antonio, TX where he was the lead chemist in charge of metals and wet chemical analysis. Upon arrival at the Depot in 1988 Mr. Smith spent...

See full bio on page 96.

Kurt Doehnert
NAVSEA

Mr. Doehnert is a senior Industrial Engineer with the Naval Sea Systems Command (NAVSEA) in Washington, DC. He is employed in the Naval Shipyard Management Group (SEA 04X), Process Engineering Division...

See full bio on page 78.

Diane Ryan
Siemens

Ms. Ryan is a Business Development Consultant for Siemens PLM Software Inc, Maritime Solutions. She served 8 years in the United States Army as a Signals Intelligence Analyst and Russian Linguist. Diane graduated from Oakland...

See full bio on page 95.

MI Robotics Day 2014

Celebrating Michigan's Robotics Industry

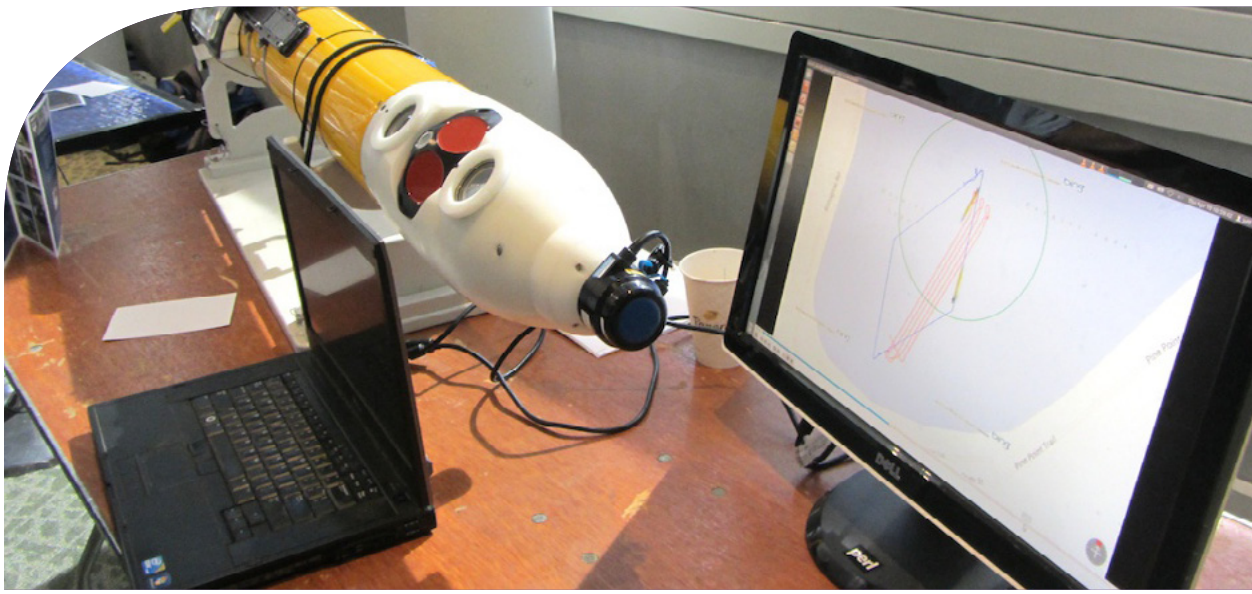
Phil Callihan
Director of Strategic Projects
NCMS

Driverless vehicles prowl a cordoned section of parking lot, under the watchful eyes of their inventors. Each is loaded with racks of space-age equipment, scanning the asphalt ahead, beaming back hundreds of updates a second from laser rangefinders, cameras, and positioning sensors. Inside, the air hums with the buzz of drones as quadcopters and other unmanned aerial vehicles roam inside a netted-off area, keeping an eye on attendees as they thread their way from display to display or listen to remarks from high-profile speakers. National Robotics Week was in full swing, nowhere more so than at Michigan Robotics Day 2014. In Building 18 of the University of Michigan's North Campus Research Complex, it's a robot-lover's heaven.

NCMS has organized Michigan Robotics Day since 2010, and the event gets bigger every time. We held the first one at NCMS headquarters here in Ann Arbor. It's a good-sized building and we were bursting at the seams. But that was pretty modest, compared to today. Robotics is big business in Michigan. Big jobs, big growth, big opportunities for the economy. Michigan Robotics Day is like an open house for the whole industry.

Co-hosted by NCMS and the University of Michigan, the event showcases the latest advancements in robotics technology. Over 500 registered for the event, which is open to the public. Enthusiasts, scientists, business leaders, students, and government officials mingle among displays that would have been science fiction just a few years ago. More and more, public policy reflects the speed of innovation. Late last year, Governor Rick Snyder signed Bill 169, which sets rules for driverless vehicle testing on Michigan highways, making it one of only

three states with such legislation. Robotics is already big business in Michigan, and supporters of the bill believe that 169 will produce further economic ripples, as



autonomous vehicle innovators are lured in by the promise of real-world road testing of driverless cars and trucks.

"If you're serious about autonomous vehicle testing, Michigan is really the only choice," explained Callihan. "A couple other states have similar laws, but they're not ideal environments to torture test a vehicle. Robotics companies need Michigan's new laws, but they also need Michigan's rain, Michigan's snow, and Michigan's salt. You don't get that stuff in southern California."

Left- Students prepares a UAV for display. Upper right- submersible robotic vehicle on display. Above- Robofest team sets up their robots for competition

For Rick Jarman, President and CEO of NCMS, events like Michigan Robotics Day and the passage of 169 validate a trend he knew was coming. "People who watch manufacturing knew robotics was about to cross a threshold," Jarman said. "The question was just how, and when. Defense robotics is a multi-billion dollar industry, and we've only scratched the surface of what robotics will mean in the commercial sector."

During his keynote speech earlier, Kiva Systems co-founder and Chief Technical Officer Pete Wurman was equally enthusiastic. His company, a wholly-owned subsidiary of Amazon.com, provides some of the drone technology that makes the online retailer's fulfillment centers so efficient. "It's only the beginning," Wurman promised.

Gesturing up at the drone area, Jarman said, "these are all designed and built by companies in Michigan. They deserve a chance to show off some of what they've accomplished, and that's what today is about. A chance to show the public where robotics is going, and what it's already done, economically, for the state."

"We are in Michigan," Jarman added with a smile. "Maybe we should start with autonomous snowplows."

Michigan's celebration of National Robotics Week continued on April 13 with Tech Night at the Palace. Co-hosted by the Detroit Pistons, NCMS, and the Engineering Society of Detroit, the Saturday evening event featured more robotics demonstrations and family-friendly activities at the Palace of Auburn Hills.

To find out about future Michigan Robotics Day events go to www.mirobotics.org.

Wednesday, 21 May 2014

Composite Material Repair Panel

0945-1100

Composite material part replacement is both difficult to remove and expensive to replace. Solutions are needed to repair rather than replace composite components in DoD aircraft. OEM engineers are now considering the repairability of structural and secondary composite components during the initial design phase of a project. This panel will address new technologies designed to improve composite repair techniques that satisfy OEM requirements.

Moderator

Dr. Golam Newaz
Wayne State University

Issues facing composite repair include:

- Damage to composite components is not always visible to the naked eye. The extent of damage is best determined for structural components by suitable non-destructive test (NDT) methods.
- The quality of the repair, compaction of the repair patch and integrity of the bond line in adhesively bonded repairs becomes critical requiring a range of new technologies.
- Standardized training and certification for the repair technician is needed
- Manual repairs are time-consuming, and expensive. Development of automated repair technologies and techniques are needed to not only reduce time and cost but also the risk of human error.
- Repaired components are expected to meet the original specification and mechanical performance requirements. This requires extensive and costly testing and validation.

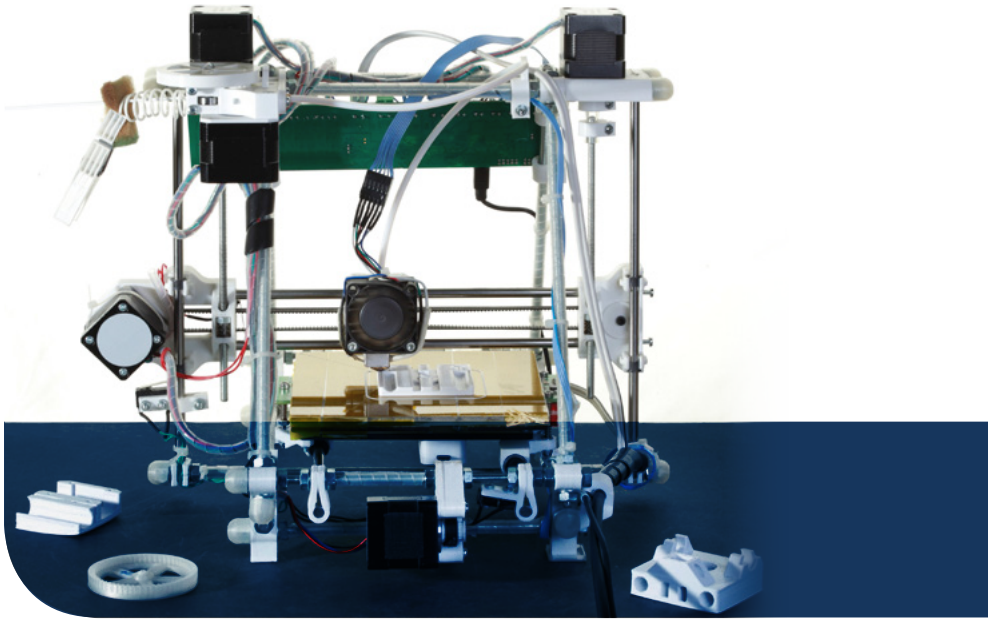
Dr.Newaz, has released an Executive Summary of his research project "Ultra-Lightweight Sandwich Composite Constructions for Auto Body Applications." The research is a part of the NCMS...

See full bio on page 92.

Panelists

Justin Massey
NAVAIR, FRC Southwest
Mr. Massey is a Materials Engineer for the polymers/ composites branch at the North Island Materials Engineering Laboratory located at Fleet Readiness Center Southwest in San Diego, CA. He has previously worked as an aerospace...
See full bio on page 89.

Bradley Hartman
NAVAIR, FRC East
Mr. Hartman has been employed by Fleet Readiness Center-East as a Materials Engineer since January 2011. Various duties have included production and maintenance support for the Naval Air Depot Cherry Point...
See full bio on page 83.



Rapid Prototyping to Additive Manufacturing

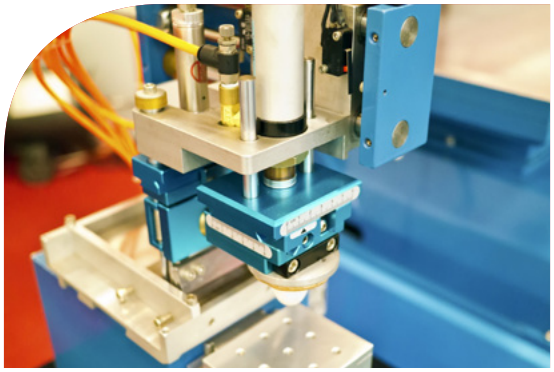
Cost-Effective Readiness, One Piece at A Time

Connie Philips
Sr. Program Manager
NCMS

You've heard all the terms, all the buzzwords. You've heard how it's the next big thing. That soon it will be as common as a microwave oven, standard equipment in a family home. Whatever it's called – 3D Printing, Additive Manufacturing, Rapid Prototyping – it has the potential to be the most disruptive innovation in manufacturing and maintenance in half a century or more. For all its promise, there's still a lot to learn and understand.

A dedicated collaborative team managed by NCMS has been developing the opportunities and working on the challenges associated with Additive Manufacturing since 1991. The Rapid Access to Readiness-Essential (RARE) Parts program is a dynamic collective of energetic thinkers in industry and government. They're the people who actually use Additive Manufacturing technologies, and with RARE, they're dedicated to advancing its potential as a maintenance tool within the Department of Defense, where the capabilities of Additive technology can realize significant cost and readiness benefits.

Some of the DoD's most significant problems with legacy, obsolete, and unavailable parts can be solved with RARE, which is introducing Additive technology solutions to drive as-needed manufacture of parts that aren't readily available by other means. The RARE team continues to facilitate the deployment of Additive Manufacturing technologies, which now range from TRL/MRL 8 to 9, throughout the DoD organic maintenance base. And RARE's commitment to collaborative innovation isn't just deploying the technology as it exists today, it's actively improving it, capitalizing on advancements for tomorrow.



RARE means readiness. It means cost avoidance. It means improved quality and less duplication of work. It means modernization of legacy designs and drawings for future part production and acquisition. The collaborative project leverages knowledge gained in industry and academia for the benefit of all team members, and its commitment to focused technology transition means outcomes from the RARE program will find their way into the DoD's hands quickly and reliably. America's warfighters may not know what goes into making their equipment work – and they shouldn't have to care, either. What they want is confidence that their tools will be available and will perform as expected, every time.

The DoD enjoys more than six to one return on investment from the RARE program. Cycle time for repair and replacement of RARE parts is down 50-70% compared to non-RARE efforts. Castings can be turned around in one fifth the time. Part availability is quoted in weeks, not months or years common with traditional methods. To date, parts made by the NCMS RARE program have saved 1,479 weeks, or 80% delivery time, with 50-75% raw material and labor cost avoidance, and a staggering 90% cost avoidance per part. For almost 30 years, the RARE team has dedicated itself to maximizing the benefits of Additive technology for the DoD – and they're just getting started.

For more information on the RARE program, contact: Connie Phillips at conniep@ncms.org

Wednesday, 21 May 2014

Advanced Electronics Wiring Diagnostics Panel

1100-1215

Moderator

Ray Langlais
LMI

Modern weapon systems can have thousands of wiring circuit paths as well as multiple complex electronic LRUs/WRAs. Frequent handling, maintenance actions, aging, and extreme operational environments can all cause progressive deterioration of the performance of wiring systems and LRU/WRA circuit paths. These oftentimes result in solid state opens or shorts, premature failures of a system, degradation of system function, or intermittent faults with the potential for a safety concern. It is therefore very important that all wiring and circuit path faults present be detected, isolated and repaired.

Industries such as aircraft, aerospace, telecommunications, and transportation have long recognized automated testing of electrical systems as the optimal way to ensure the integrity of complex, critical systems. Automated test programming and execution quickly and consistently identify opens, shorts, and other wiring problems in cables, harnesses, subassemblies, and final products. It is imperative that the military continue "up its game" in Advanced Electronics and Wiring Diagnostics.

This panel will examine the military Services' needs for wiring and LRU/WRA circuit path testing and the variety of approaches and technologies they are pursuing to meet their requirements. The panel will focus on technologies that have been deployed and others that are currently under investigation through CTMA.

Mr. Langlais is a senior consultant with the Maintenance and Readiness Group at LMI. He spent over 25 years on active duty with the US Army serving in various leadership and logistics positions at the field and depot levels. He came to... See full bio on page 87.

Panelists

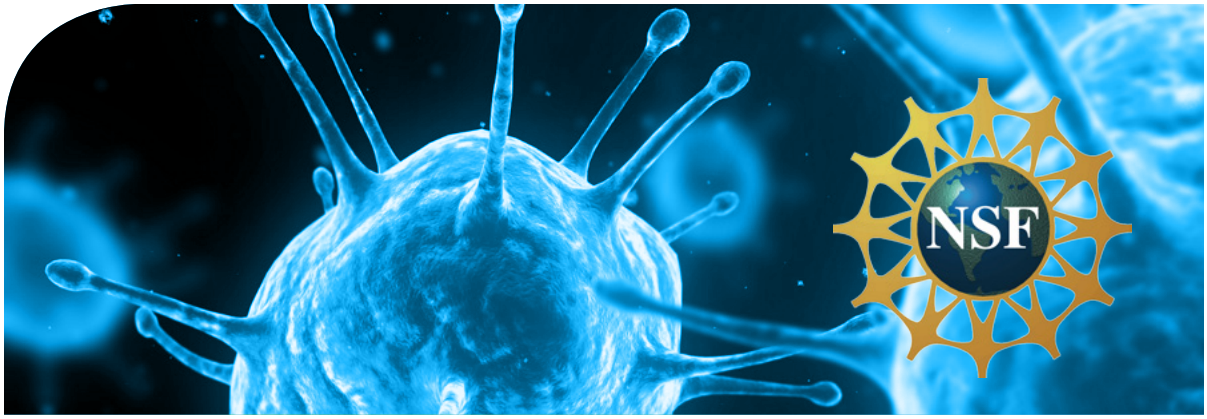
Chris Teal
Eclypse International
Mr. Teal is currently the Marketing Director at Eclypse International, responsible for world-wide activities. Previously Mr. Teal was a Systems Support Engineer for Hughes Aircraft Company, responsible for SATCOM support in...
See full bio on page 97.

Alain Lussier
Solavitek
Mr. Lussier graduated from McGill in 1985 with a Bachelor of Commerce and became a chartered accountant. But in search of new excitement and challenges, he reoriented his career in business turnaround and...
See full bio on page 89.

Frank Zahiri
Air Force, Warner Robins
Mr. Zahiri is the Small Business Innovation Research (SBIR) Program Manager, Air Force Sustainment Center (AFSC), Robins Air Force Base, Georgia.
See full bio on page 98.

Steve Blasey
Army, 160th SOAR Special Operations
Mr. Blasey is responsible for logistics and sustainment of the Army's only Special Operations Aviation Force consisting of over 200 highly modified manned...
See full bio on page 75.

Joe Lombardi
NAVAIR
Mr. Lombardi is the Lead Systems Engineer (LSE) for the NAVAIR Aircraft Wiring Support Equipment Commodity (AWSEC) at the Naval Air Warfare Center in Lakehurst, New...
See full bio on page 88.



NCMS-NSF Nanomanufacturing Survey

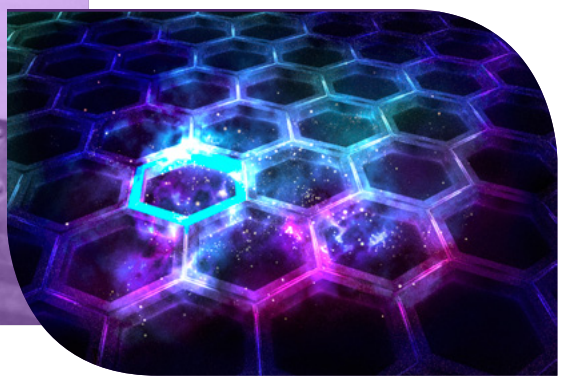
Dr. Manish Mehta
Director of Strategic Projects & Sustainability
NCMS

Over 300 executives from across the United States have taken the NCMS-NSF Survey on Nanomanufacturing for achieving sustainable nanotechnology-enabled products and processes for military applications. NCMS has partnered with the National Science Foundation under the National Nanotechnology Initiative (NNI) on its 2014 study of commercialization trends and challenges in nanotechnology and nanofabrication. The goal of this study is to document best practices in nano-product development and integration, and identify the common challenges faced in transitioning nano-scale advances from the laboratory into sustainable commercial or defense applications. Senior engineers, researchers, and executives in all defense manufacturing stakeholder organizations were invited to share their experience and opinions.

Individual responses were kept confidential and the data was only used in the aggregate. NCMS' reports are widely distributed to federal and state agencies, and our elected representatives. All survey respondents will receive the insightful study results in advance of its public release this fall. The survey was hosted at www.usnanosurvey.org.

The survey results will be presented at the 2014 NanoTechnology for Defense Conference (NT4D) being held November 17-20, 2014 in Chantilly, VA. For more information about this event goto www.usasymposium.com

What is the future of nanotechnology-based solutions?



2014 NanoTechnology for Defense Conference
17 – 20 November 2014 Chantilly, VA

The response to this survey has been overwhelmingly positive and we are very excited about the publication of our findings. The public release of the information collected is scheduled for the fall of 2014.

The topics covered in this survey range from:

- Advanced Coatings & Films Using NanoMaterials/Processes
- Nanostructured Materials
- Platform Capabilities Enhancement via Nanotech Solutions
- Advanced Manufacturing Using Nano-Scale Materials/Processes
- Nano-Biology & Biotechnology for Health and Environmental Remediation
- Energetic NanoMaterials for Propulsion & Power
- Specifying Nanotechnology for Warfighter Life Cycle Capabilities
- Advanced Electronics
- Energy Storage & Conversion
- NanoTechnology Commercialization, Certification & Insertion

For questions, contact Manish Mehta, Ph.D., Principal Investigator – 2014 NCMS-NSF Nanotechnology Commercialization Readiness Study, (734) 995-4938, manishm@ncms.org.

Wednesday, 21 May 2014

Cold Spray Panel

1330-1445

Moderator

Victor Champagne
Army Research Laboratory

Cold spray is a low-temperature, solid state consolidation process, whereby metal or combinations of metallic and non-metallic particles are injected into a high-velocity gas stream and are directed upon a suitable substrate where they impact and consolidate to form a coating or freestanding structure, without melting. Cold spray is used to form corrosion and wear resistant coatings, and can also be used to provide dimensional restoration and a means to repair worn and/or corroded parts fabricated from a variety of materials including aluminum, titanium, magnesium and steel.

A similar "cold" process, Kinetic Metallization spray technology, is different from the typical cold spray technology. The deposition process operates at sonic speeds at lower pressures than other cold spray equipment. Kinetic sprays can successfully spray heavy metals such as Tungsten Carbide or Niobium.

This panel will explore both cold and kinetic spray repair.

Mr. Champagne is a team leader for the Innovative Materials and Processes Team for the US Army Research Laboratory-Weapons and Materials Directorate, located in Aberdeen, MD. He is recognized internationally as one of the foremost authorities on Cold Spray. He has held numerous positions throughout his career including those with industry and academia. Mr. Champagne has been an associate researcher at Worcester Polytechnic Institute (WPI) in the Materials Engineering Department since 1985 and is a thesis advisor and research associate at WPI and the Pennsylvania State University. In his 29 years of materials research and development experience, he has been responsible... See full bio on page 76.

Panelists

Greg Russell
Marine Depot Mx Cmd.
A native of Flora, IL, Mr. Russell graduated from Flora Township High School. After graduation, he enlisted in the US Navy Marine Corps where he served 8 years with the US Navy from 1973 to 1981 as a Machinist Mate aboard FBM...
See full bio on page 94.

Wally Birtch
Centerline
Mr. Birtch is currently Senior Sales Engineer for Supersonic Spray Technologies at Centerline Windsor Ltd, one of North America's premier designers and manufacturers of metal forming and welding equipment supplying...
See full bio on page 74.

Fred Lancaster
NAVAIR
Mr. Lancaster is the AIR 4.3.4 Materials Engineering Division Science and Technology Lead. He holds a BS in Physics from FSU and a Masters in Systems Engineering from the US Naval Postgraduate School with over 25 years of...
See full bio on page 87.

Robert Hrabe
H.F. Webster Eng, Services
Mr. Hrabe is currently the CEO of VRC Metal Systems and H.F. Webster Engineering Services (HFW/ES) both of Rapid City South Dakota. VRC Metal Systems develops and manufactures cold spray equipment...
See full bio on page 84.

West Coast Operations

Jeff Walker
Program Manager
NCMS

Since 2003, NCMS West has had a presence in the Pacific Northwest on 4th Street in Downtown Bremerton, Washington. Our initial programs addressed security at Navy Region Northwest installations, including vulnerability and risk assessment, emergency management processes and infrastructure, evaluation of credentialing, camera and alarm technologies.

NCMS has since expanded its activities in the Pacific Northwest to include industrial/maintenance technology projects at Puget Sound Naval Shipyard and Naval Undersea Warfare Center Keyport, including ground-breaking laser-deposition repair process development resulting in previously unheard-of return on investment potential for the Navy customer.

In all our projects, we work with government, manufacturers, and technology companies to bring innovations out of the exploratory phase and into commercial implementation. Our cohesive team of professionals has a passion for identifying, developing, and testing innovative technology solutions for high priority challenges.

We have a number of active projects across the United States with DoD, DoT, and large and small businesses. Locally, NCMS West partners with the Navy in supporting Kitsap County school districts through STEM training. We are now in our third year of providing the logistical support needed for remote operated vehicle (ROV) construction designed for underwater applications by junior high and high school students countywide.

NCMS West holds expertise in Manufacturing and Transportation related technology development, sustainability and security technology and processes. In the last year we have grown notably in presence in Intermittent-Fault Detection System development and Human Augmentation System development and implementation. We leverage our member company's expertise to address problem solving and solution finding needs not only for DoD, but for the automotive, industrial and aviation industries as well; many of our

new technology implementations have applicability for a variety of industry.

NCMS West is strongly positioned in Washington State in the development and adoption of Advanced Composites, an expanding industry which links numerous manufacturers and suppliers in aviation, transportation, clean energy and other sectors and holds extreme growth potential for employment and the economy.

NCMS West Future Strategy is to continue to integrate local and regional service provider expertise with area military installations, and expand across DoD installations within the state and across the U.S. And bring knowledge and working relationships from the military setting into the commercial realm of the Puget Sound area, and throughout the State of Washington, contributing to the growth of an even stronger State economy.

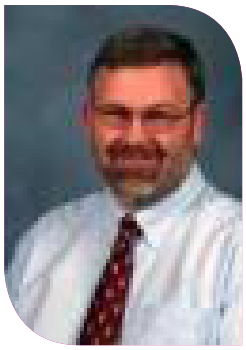
NCMS West seeks active collaboration with local partners to promote technology infusion in the industries of Puget Sound and across the nation. NCMS actively promotes business growth and new employment opportunities for its served communities.

Make a point of calling Michael Fancher, Dana Ellis or Jeff Walker soon, at (360) 782-1370 and discover the resource we can be for you!

Wednesday, 21 May 2014

Automatic Test Equipment (ATE) Panel

1500-1615



Moderator

Paul Frantz
Army, Tobyhanna

Automatic Test Equipment is crucial to the maintenance and sustainment of DoD's inventory of electrical/electronic/computational systems. Virtually all defense systems other than small arms contain electronic command, control, and communications systems. ATE is used to test individual circuit cards for debug and repair purposes and also to test reassembled systems before they are returned to service. Historically, OEMs specified and often produced proprietary test equipment necessary for M&S of the systems they designed and delivered, which led to a lack of commonality in ATE components and software. This in turn drives a large logistics footprint and increased issues with DMSMS.

In recent years, DoD has begun to experiment with adapting commercial ATE to military use, Performance Based Logistics (PBL) agreements to minimize the logistics footprint, and synthetic instrumentation to emulate complex test modules and reduce the number of different test modules required to support a given system. ATE is a pervasive, cross-service issue. This panel will address issues in the current ATE domain, current and emerging best practices, and trends for the future.

Mr. Frantz is the Branch Chief of Test Program Development Team at Tobyhanna Army Depot, Tobyhanna Pennsylvania.

As a Branch Chief, Mr. Frantz coordinates the day-to-day activities of the engineers and technicians that make up the development team as well as manages projects that span many DoD organizations. His responsibilities included development of new test program sets for future depot workload as well as supervises... See full bio on page 80.

Panelists

Brian Blair
Navy, Keyport
Mr. Blair currently serves as a Lead Electronics Engineer supporting the Torpedo Electronics Depot at the Naval Undersea Warfare Center (NUWC) Division located in Keyport, WA. He has worked as an...
See full bio on page 74.

Tom Campbell
Navy, Keyport
Mr. Campbell currently serves as a Lead Electronics Engineer supporting the Electronics Depot at the Naval Undersea Warfare Center (NUWC) Division located in Keyport, WA. He has worked as an...
See full bio on page 75.

Tim Winquist
AIDI
Mr. Winquist attended the University of South Florida where in 2000 he received a Bachelor of Science in Electrical Engineering. He now has over 14 years of software, simulations and test related experience...
See full bio on page 98.

Dr. Kyle Ferrio
Ridgetop Group
Dr. Ferrio is Vice President of Advanced Research for Ridgetop Group, responsible for innovation across a broad product roadmap. Dr. Ferrio is an accomplished technical leader with a consistent record of bringing relevant solutions to...
See full bio on page 80.

NCMS Membership

Future of the U.S. is not made, it is Manufactured

Danielle Jones
Business Development Manager
NCMS

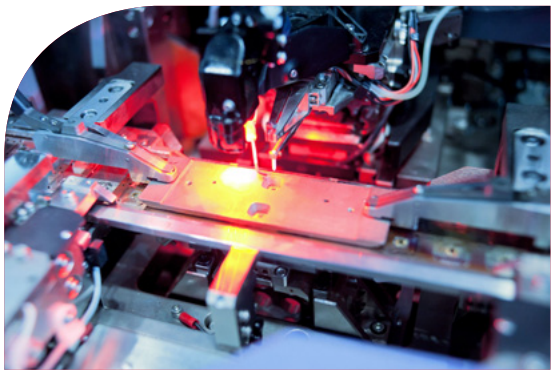
NCMS membership is comprised of almost 400 North American corporations and organizations committed to manufacturing. Working with collaborative project teams, the NCMS focus is to bring new technologies and capabilities to the manufacturing community in order to improve their competitiveness and produce more robust systems quickly, economically, and with higher quality.

NCMS provides a full complement of program support capabilities:

- Program Management
- Finance and Accounting
- Contract Administration
- Communications & Public Relations
- Electronic Collaboration
- Audio Visual Education Training and Communication Services

NCMS works closely with federal agencies, leading OEMs, entrepreneurial technology companies, and small and medium-sized manufacturers (SMMs) in all industrial sectors. Both industry and government agencies reach out to NCMS and our cross-industry network of members to ensure that their new technology efforts are focused on real-world applications with inherent and immediate viability. We serve as a "trusted third party" for these groups in order to accomplish their research and development goals. An example is the Robotics Technology Consortium, RTC, in which NCMS manages the U.S. Army investments in ground robotics systems.

Program management and contract administration at NCMS are noted for their speed and flexibility. Once projects are approved, contracts with our industry and university participants can be prepared



and issued within a month or less of time. Our financial and accounting system has been audited and approved by the Defense Contract Audit Agency (DCAA), and our contract administration can be specifically designed to meet the needs of specific programs. NCMS does not have in-house R&D capabilities, but collaboratively manages our member companies, universities, and government participants at their locations with the needed expertise and capabilities to develop and implement the targeted technologies. This neutral, third-party position enables NCMS to be a trusted partner whose sole objective is to meet the program needs of the participants and to smooth the technology transition and deployment into commercialization and use.

NCMS recognizes the need to address technology requirements that one company alone could not tackle, and is currently developing a shared infrastructure of high performance computing (HPC) centers designed to revolutionize the engineering approach to product design, and optimize manufacturing and total product lifecycle. The primary focus will be on U.S. SMMs who most need the HPC capabilities. Leveraging the resources of industry, government, and academia these centers will bridge the digital manufacturing gap and accelerate our innovation pace.

Recognized for collaboration, product development, and sustainability, NCMS offers the cutting edge programs and approaches that will drive the success and innovation of manufacturing and technological research and development well into the 21st Century.

For more information about becoming a member visit www.ncms.org or call Danielle Jones at (734) 995-0496.

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Ncompass-Voyager™ is the global leader in IFD, NFF and integrity testing solutions. It has already saved one US client over $60M, and in Europe it has enjoyed a wide range of successes in testing EWS (Electrical Wiring and Interconnection System) wiring components across business jets, helicopters, airliner flight deck display unit and military craft. To learn more contact Universal Synaptics at http://USynaptics.com or (801) 731-8508

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Thursday, 22 May 2014

Model-Based Enterprise (MBE) Panel

0830-1000

Moderator

John Schmelzle
Naval Air Warfare Center Lakehurst

Model-Based Enterprise (MBE) is an integrated and collaborative environment, founded on 3D product definition shared across the enterprise, enabling rapid, seamless, and affordable deployment of products from concept to disposal. It represents a fundamental shift to 3D from 2D which is a major perturbation from the normal behavior. Several case studies have documented significant savings generated when implementing MBE. Toyota has shown a 50% reduction in costs. Boeing and BAE Systems have documented similar savings. NAWCAD Lakehurst has shown that it can eliminate a full 30% of the labor required for part fabrication. The purpose of the forum is to identify challenges, research, implementation issues, and lessons learned in manufacturing and quality assurance where a digital 3D model of the product serves as the authoritative information source for all activities in the product's lifecycle.

A native of Massapequa, NY, Mr. Schmelzle accepted a position with the Naval Air Engineering Center in September of 1986 after earning his B.E. in Mechanical Engineering from the State University of New York at Stony Brook. After working with the Tool Control Program for a year, he accepted a systems engineering position in the Support Equipment (SE) Engineering Department.

In June of 1992, Mr. Schmelzle was transferred into the newly created Product Development Department where he worked as a design engineer. During his time in the Product Development Department, he worked as the lead design engineer for several major SE projects including the KC-130 In-Flight Refueling Hose Reel Test Stand. Mr. Schmelzle was also the lead SE design engineer on multiple aircraft... See full bio on page 96.

Panelists

Angela Padgett
Navy, FRC East
Ms. Padgett is currently the Technical Team Manager for Automated Test Equipment/Test Program Set (ATE/TPS) In Service Engineering Technical Team at MCAS Cherry Point. As a collateral duty she has been leading several Model...
See full bio on page 93.

Randy Langmead
Siemens
Mr. Langmead is Director of Business Development for Siemens PLM Software's Marine/Federal Division. He has been involved with the PLM NeXt project at Newport News, the IPDE at Electric Boat, and the DDG-1000 IDE...
See full bio on page 88.

Chris Garcia
Anark Corporation
Mr. Garcia is a 3D CAD and PLM industry visionary and veteran with over 25 years of design, manufacturing and inspection experience. Chris directs the company's 3D MBD/MBE business development activities which includes the...
See full bio on page 81.

Mark Haines
ITI
Mr. Haines graduated from the University of Cincinnati in 1988 with a Bachelor of Science degree in Mechanical Engineering Technology. Mark took part in the university's cooperative education program which...
See full bio on page 82.

Robotics Technology Consortium

Bill Thomasmeyer
Executive Director
RTC

The Robotics Technology Consortium (RTC) is a nonprofit, 501(c)3 organization that functions as the Department of Defense's primary industry partner for developing prototype robotics technology solutions. Through its contractual relationship with the DoD, the RTC uniquely enables its member organizations to conduct applied research and development projects to adapt, harden, and/or integrate various ground robotics technologies. These projects contribute towards developing and fielding working, prototype solutions that can be transitioned to DoD warfighters for demonstration and experimentation purposes. As a result, users:

- are able to better understand and more fully envision how ground robotics systems can be used to improve their operational capabilities;
- can begin to devise realistic operational concepts, tactics, and procedures that integrate such systems; and
- can begin to develop the operational requirements needed to transition prototype systems into fielded solutions.

Activities

The RTC serves several major functions. One is to better understand the needs of the DoD regarding ground robotics technology. A second is to funnel leading edge ideas and concepts to DoD program and technical managers so they gain the broadest possible insight as to what's possible in regards to ground robotics technology. And a third is to propose and undertake projects in response to government requests for proposals for those ideas and concepts that the DoD deems to be the most promising. RTC member organizations submit proposals individually or oftentimes enter into teaming agreements with one or more other members for the purpose of submitting joint proposals. Once the government determines which proposals to award, the selected member companies and organizations are put under contract to perform the proposed work according to the terms and conditions of a pre-negotiated master agreement between the RTC and the government.

History, Organization and Membership

Initially formed in 2008 at the request of the Office of the Secretary of Defense Joint Ground Robotics Enterprise, the RTC is an industry-run organization open to any and all large and small for-profit companies, academic institutions, and nonprofit organizations that:

- have robotics technology capabilities;
- wish to determine whether and how their technology might serve the interests of the DoD and other government organizations; and
- are interested in potential partnering opportunities with other member companies and organizations offering synergistic capabilities.

While many of these member organizations are traditional defense suppliers, a specific purpose of the RTC is to solicit and engage non-traditional suppliers, companies and organizations that have not historically performed much if any work for the DoD and other government organizations. Since its inception, the RTC has awarded over 70 projects totaling nearly $80 million and government responsibility for the RTC has transitioned to the Defense Ground Robotics Alliance (DGRA), a joint initiative between the Army's Tank and Automotive Research, Development, and Engineering Center (TARDEC) and Program Executive Office for Ground Combat Systems – Robotics Systems Joint Program Office (RS-JPO). For a list of RTC members or to learn more go to www.roboticstechc.org

Thursday, 22 May 2014

Point of Maintenance Aid Tools Panel

1000-1130

Moderator

Greg Kilchenstein
Office of the Assistant Deputy Under Secretary of Defense for Maintenance Policy & Programs

MRO (Maintenance, Repair, and Overhaul) maintenance within DoD has many challenges not seen within other industries. Because of the age of the assets and their many different operating environments, there is no such thing as a standard repair. Each asset requires a technical inspection (TI) to determine the level of maintenance required. Because the assets are often deployed, the TI must be something that is easily portable and requires minimal training since a wide variety of personnel need to be able to accurately perform the TI. Ideally all data collected about the asset would be transferred to the Program Office enabling fleet wide trend and root cause analysis. Because these assets are often used in direct support of the troops, delays in deployment or long inspection/repair cycles are not possible.

This panel will focus on the unique requirements of MRO maintenance, the challenges that exist within the existing infrastructure, and brainstorm opportunities for solving these challenges in the 21st Century.

Mr. Kilchenstein is an Action Officer with the Office of the Assistant Deputy Under Secretary of Defense for Maintenance Policy & Programs working technology enablers that focus on sustaining materiel readiness at best cost. Having completed his undergraduate work in aerospace engineering and graduate level studies in systems engineering at the University of Maryland, Greg began working for the Naval Sea Systems Command in 1987 as a mine warfare simulation modeler. After joining the Naval Air Systems Command in 1989, Greg was assigned as a propulsion engineer for the V-22, P-3, C-130, E-2/C-2 and had the privilege of witnessing... See full bio on page 72.

Panelists

Michael Oestmann
Army, Red River
Mr. Oestermann is the Quality Assurance Specialist in Computer Software for the Directorate of Quality at Red River Army Depot. He assumed this position in September 2009...
See full bio on page 93.

Stephanie Wright
USAF/AFMC, Engineering SPO Perspective
Ms. Wright is the lead flight control system engineer for the Air Force B-1 System Program office at Tinker Air Force Base. Ms. Wright is responsible for the sustainment of the...
See full bio on page 98.

Randy Kirk
Aspire Solutions
Mr. Kirk is the President and CEO for Aspire Solutions, Inc (ASI). ASI was founded in 2003 and provides business re-engineering and niche products focused on the MRO (Maintenance Repair...
See full bio on page 86.

Phil Cohen
Adapx
Dr. Cohen is Founder, Director, and Executive Vice President of Research at Adapx Inc. Cohen was previously professor and co-director of the Center for Human-Computer Communication...
See full bio on page 77.

Pete Aragon
NAVY, FRC Southwest
Mr. Aragon is a Continuous Process Improvement Lead at Fleet Readiness Center Southwest at Naval Air Station North Island in San Diego. Pete is a Navy certified Lean Six Sigma Black Belt and..
See full bio on page 73.

NCMS & Related

Upcoming Events

Cold Spray Action Team Meeting – June 18-19, 2014

The 2014 Cold Spray Action Team (CSAT) summer meeting is scheduled for Wednesday, June 18-19 on the campus of Worcester Polytechnic Institute, in Worcester, Massachusetts. The agenda has now been finalized and we have participation from the Air Force, Army and Navy, as well as from industry and academia. CSAT attendees will learn how Cold Spray can be used to produce bulk Nanostructured Materials. Visit www.coldsprayteam.com/registration to register for this event.

JTEG Technology Forums

Casting & Forging Process – June 24, 2014

Casting and forging are both widely used in industry and DoD. The purpose of this forum is to connect DoD needs with the industrial base and to exchange information on casting and forging technologies currently in use. The overarching DoD need is to improve the ability to obtain cast or forged parts in a timely manner without sacrificing quality. Some of the technologies will discuss include 3D printing of sandcasts and molds, and digital radiography inspection.

Engine Erosion\Corrosion Coatings – July 29, 2014

DoD is conducting demonstrations of protective coatings that are designed to reduce wear on compressor airfoils in gas turbine engines, significantly increase fuel efficiency, and reduce overhaul and maintenance requirements. The purpose of this forum is to exchange information amongst the DoD and industry partners on the benefits, challenges, and results of using these engineered coatings.

New Technologies to Train the Workforce – August 26, 2014

There are new, innovative educational technologies available that include on-site, hands-on training (Virtual Workplace Simulator), Computer Based Training (CBT) for Metal Finishers as well as several other unique training programs developed locally by the military depots. This forum will consist of industry experts and depot representatives offering innovative technical training technologies.

Automatic Test Equipment (ATE) – September 30, 2014

The use of proprietary OEM test equipment has led to a lack of commonality in ATE components and software. In response, DoD has begun adapting commercial ATE to military use, is using Performance Based Logistics (PBL) agreements to minimize the logistics footprint, and uses synthetic instrumentation to emulate complex test modules and reduce the number of different test modules required to support a given system. This forum will address issues in the current ATE domain, current and emerging best practices, and trends for the future.

Composite Inspection & Repair – October 28, 2014

Composite material part replacement is both difficult to remove and expensive to replace. Solutions are needed to better inspect and repair, rather than replace, composite components. OEM engineers are now considering the repairability of composite components during the initial design phase of a project. This forum will discuss new technologies designed to improve composite inspection and repair techniques that satisfy OEM requirements.

Electronic Point of Maintenance Repair – November 25, 2014

DoD assets are often deployed and require technical inspections (TI) to be performed on site. Assets used to perform the TI must be easily portable and require minimal training since a wide variety of personnel need to be able to accurately perform. Ideally all data collected about the asset would be transferred to the Program Office enabling fleet wide trend and root cause analysis. This forum will examine new technologies that provide these capabilities, such as Adapx's Digital Pen and Aspire Solutions' Automated Process Inspection Guide (AP&IG).

Exoskeleton: MANTIS & Zero-G Arm – December 16, 2014

The collaboration of Lockheed Martin Missiles & Fire Control (LMMFC), National Center for Manufacturing Sciences (NCMS) and the U.S. Navy, Naval Sea Systems Command, Carderock has accelerated the advancement of both the science of human augmentation and the engineering of an advanced exoskeleton. The collaboration has already demonstrated benefits in the Puget Sound Naval Shipyard where the technology proved to increase productivity and reduce musculoskeletal injuries across a range of heavy industrial occupations. LMMFC has designed a more optimal human augmentation solution - the MANTIS 2G. The focus for the MANTIS 2G development is to dramatically increase productivity across a broad range of tasks, protect the human from musculoskeletal injuries, and reduce the cost to manufacture the system.

Digital Manufacturing Upcoming Events

Predictive Analytics World: Manufacturing – June 17-18, 2014

The role of data in manufacturing has traditionally been understated. Manufacturing generates about a third of all data today, and this is certainly going to increase significantly in the future. Data forms the backbone of all Digital Manufacturing technologies, which will be the centerpiece of the strategy for advancing Manufacturing in the 21st Century.

Predictive Analytics World Manufacturing focuses on real-world examples of deployed predictive analytics. Attend and hear how some of the world's largest and most forward-thinking manufacturers are tapping the powering predictive modeling to improve business outcomes.

Lunch and Learn With Bala and Terry – June 24, 2014

NCMS will be hosting SimaFore, a data analytics company in Ann Arbor, for a free lunch and learn focused on small and medium sized manufacturers who wish to generate value by leveraging analytics for key decisions. Topics include:

- Establishing your Key Performance Indicators (KPIs)
- Assessing your company's data availability
- Lack of key data – filling gaps
- Stay out of the "weeds" focus on a clean the user interface for clear decisions
- Tools and approaches to analytics that won't bust your budget
- Live presentation of Small and Medium Manufacturing analytics

Please register by emailing danielleJ@ncms.org or calling (734) 709-3093.

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www.NCMS.org

Thursday, 22 May 2014

Joint Intermittent Testing (JIT) Panel

1300-1430

Moderator

Dr. Russ Shannon
NAVAIR Lakehurst

The DoD experiences a $2-10 billion annual impact due to removal and replacement of Line Replaceable Units (LRUs)/ Weapon Replaceable Assemblies (WRAs) which subsequently test No Fault Found (NFF) during depot testing, and are turned right back around to the field. Visual inspection is ineffective in detecting the intermittent faults (IFs), the root cause of this high NFF rate. Military weapon system verification and validation results indicate three out of four aircraft in a mission-ready status contain electrical interconnect issues.

A modern avionics system has thousands of internal and external circuit paths. These systems are subject to hostile operating environments and will likely fail intermittently long before they fail permanently. IFs occurs randomly in time, place, amplitude and duration. Electromechanical devices go into a long and frustrating period of low-level intermittency as their mechanical tolerances change. Even a single undetected and hence unrepaired circuit in an electronic box may cause random malfunction. It is vital that all intermittent circuits present in these boxes be detected, isolated and repaired. With the proper test equipment it is now possible to detect and repair these intermittent circuits.

Dr. Shannon is the Lead Systems Engineer of the Integrated Diagnostics and Automated Test Systems (IDATS) Team, at the Naval Air Warfare Center in Lakehurst, New Jersey. He holds a Ph.D. in Acoustics from Oxford University and a BSEE from the University of Hartford. He is the author of fourteen papers on avionics diagnostics, testability, supportability and net-centric diagnostics. See full bio on page 96.

Panelists

Gregory Kilchenstein
Office of the Assistant Deputy Under Secretary of Defense for MP&P
Mr. Kilchenstein Having completed his undergraduate work in aerospace engineering and graduate level studies in systems engineering at...
See full bio on page 72.

Don McClenny
Air Force, Hill
Mr. McClenny is the Implementation Lead for the Air Force Sustainment Center Engineering Directorate's Innovation and Technology Insertion (ITI) Team. Mr. McClenny received his Bachelor of...
See full bio on page 90.

Shane Campana
NAVAIR Lakehurst
Mr. Campana is the Navy Support Equipment (SE) Integrated Product Team Leader for Aircraft Wiring, Global Positioning Systems, and Survival Electronics at the Naval Air Warfare Center in Lakehurst, New...
See full bio on page 75.

Ken Anderson
Universal Synaptics
Mr. Anderson is Universal Synaptics Vice President, Sales & Business Development. Mr. Anderson is a frequent Key Note Speaker and featured presenter at Aerospace, Defense and Maintenance..
See full bio on page 73.

Joint Technology Exchange Group (JTEG)

The purpose of the Joint Technology Exchange Group (JTEG) is to improve coordination in the introduction of new or improved technology, new processes, or new equipment into Department of Defense depot maintenance activities. The JTEG will seek ways to better leverage technology improvements in depot maintenance through collaboration to support the higher DoD goals of improving effectiveness and efficiency. Composed of representatives from the military Services, the Defense Logistics Agency, the Joint Chiefs of Staff, and the Office of the Deputy Assistant Secretary of Defense for Maintenance Policy & Programs – (ODASD-MPP), the JTEG is a strong advocate for new solutions with the potential to increase efficiency or effectiveness across the Services.

The JTEG collects, analyzes and disseminates depot maintenance requirements, makes information exchange easier, and serves as an advocate for new technologies and efficiency-improving opportunities that facilitate joint service technology development.

The JTEG community includes anyone in DoD or industry interested in exchanging information associated with DoD maintenance. Overseen by a panel of representatives from each of the military Services, OSD (Maintenance), and DLA, the JTEG's core activities include:

- Compiling information on the Services' current and future technology insertion projects, initiatives, and depot maintenance technology needs
- Formatting and disseminating relevant technology information for use throughout the depot maintenance enterprise and all relevant activities
- Review of maintenance requirements and capabilities to assist cross-Service coordination and knowledge sharing for efficiency improvement
  - » Consider technologies applicable to like or similar platforms
  - » Minimize technology duplication
  - » Promote emerging technologies that meet current and future joint requirements
- Conduct gap analysis on the Services' technology needs and existing capabilities
- Advocate for projects that improve industrial processes, increase efficiencies, and/or reduce the environmental impact of depot maintenance.

JTEG Joint Technology Exchange Group

Joint Solutions for Depot Maintenance

On 4 April, ODASD (MPP) launched the new JTEG website, providing a forum for the exchange of information on new technology, processes, and equipment developments involving depot maintenance. Industry and DoD personnel can use the site to share technology ideas and needs. Visitors are welcome to review new and exciting technology projects posted on the website, or submit project ideas of their own.

The JTEG plays a key role in facilitating methods of communication amongst maintenance activities and supporting industry partners:

- Focused Technology Forums conducted virtually on a monthly basis
- Strategic partnerships
- Service programs and newsletters
- Maintenance/Logistics Conferences such as the annual CTMA Partners Meeting
- JTEG Website
- CTMA Venues – CTMA Connector
- Joint Group on Depot Maintenance (JGDM) Briefings.

The following is a list of focused technology forums conducted or scheduled by the JTEG:

- Nov 2013 – Additive Manufacturing
- Nov 2013 – Laser Shot Peening
- Dec 2013 – Robotic Laser De-coating
- Jan 2014 – Cold Spray Repair
- Feb 2014 – Advanced Wiring Test Systems
- Apr 2014 – Model-Based Enterprise
- Jun 2014 – Casting & Forging Process
- Jul 2014 – Engine Erosion\Corrosion Coatings
- Aug 2014 – New Technologies to Train the Workforce
- Sep 2014 – Automated Test Equipment
- Oct 2014 – Composite Inspection & Repair
- Nov 2014 – Electronic Point of Reference Repair
- Dec 2014 – Exoskeleton: MANTIS & Zero-G Arm

For more information on the JTEG, or to submit a technology project idea, visit the website at http://jteg.ncms.org.

Thursday, 22 May 2014

Non-Destructive Inspection Panel

1445-1615

Finding and identifying hidden flaws in a structure or damage often requires the ability to see through an object or under coating layers. Numerous technologies are used to good advantage but strengths and weakness are most often application dependent. Technologies currently in widespread use include eddy current, x-ray, phased array ultrasonics, radiography, thermography and so forth. Applications include weld inspection, fatigue crack detection, corrosion detection, bond quality, hidden damage, delamination, voids, and so forth.

NDI needs are pervasive and cross service, more specifically a cross section of ships, airplanes and ground systems. This panel will discuss NDI technologies, novel applications, and emerging trends.

Panelists

John Chadwick
J Chadwick Co.
Mr. Chadwick is a rare individual from a family of American problem-solvers and entrepreneurs. He was woodworking, machining and welding by age 10. John and his father were always busy fabricating the latest projects for...
See full bio on page 76.

Dr. Kirsten Green
NAVSEA
Dr. Green received her formal education in the field of Materials Science and Engineering receiving a Bachelor's degree and PhD from The Johns Hopkins University in 1987 and 1994, respectively, and a Master's degree from Brown...
See full bio on page 82.

Wrap-up & Adjourn

First, a word of thanks to all those who made the past three days work —the team that planned and made it happen: Debbie Lilu who was the chief architect; Bill Chenevert, Connie Philips, Steve Hale, Dana Ellis, Jeff Walker, Mike Fancher, Matt Heddle, Mark Carver, Phil Callihan, Anita Tolen, Melissa Sullivan, and Christopher Fick. I commend all of you on a job well done. And I would be remiss if I failed to extend a very special thanks to the one guy without whom the CTMA program wouldn't even exist, Greg Kilchenstein. I would also like to thank all the panelists who participated. I want to extend a special thanks to those who traveled to Ann Arbor to participate in person. I extend my sincerest thanks to them and to all who dialed in to view and listen. All of you have my sincerest and most heart-felt thanks.

All the planning, practice, and technology produced a high quality event that unfolded almost exactly as planned and for that I am very proud of the work of the NCMS team. Personal interaction between government and industry that was for so many years a key factor in the success of CTMA Symposia returned to some extent this year. We will continue to strive to improve networking opportunities but budget constraints are real and likely long-lasting so some sort of virtual CTMA Partner Meeting format will be with us for the foreseeable future. I want to make future events even better than this one so I ask all of you feed me your ideas on how we might use the technology so successfully demonstrated in this event to augment that personal interaction and, while you are at it, please give me your feedback on this event – like, dislikes, suggestions for improvement, whatever. My email address is tonyh@ncms.org.

As all of you know, 2013 was a transition year for CTMA. The original 1998 agreement expired 31 December 2013 after 15 successful years but was replaced by a new agreement in June 2013, shortly after the 2013 Partners Meeting. The new agreement is patterned after the old one and the defense maintenance community, has adopted it without skipping a beat. For 2014 we have 17 new projects totaling over $15 million in federal funds plus over $5 million in industry cost share. We are off to a rousing good start. We can close this Partners Meeting in full assurance that the CTMA program is alive and well and will continue to deliver benefits for many years to come.

~Tony Haynes

Biography Appendix

Rick Jarman

Rick Jarman is the President & CEO of the National Center for Manufacturing Sciences (NCMS) located in Ann Arbor, Michigan. NCMS is the largest cross-industry collaborative manufacturing research consortium in the United States devoted exclusively to manufacturing technologies, process and practices. Formed in 1986, the NCMS mission is focused on the development of strategic initiatives and programs aimed at sustaining and enhancing the global competitiveness of North American manufacturing.

Prior to his position at NCMS, Mr. Jarman was Director of Technology Partnerships at Eastman-Kodak Company. He was a driving force to forge alliances with industry and government in order to improve commercialization processes through innovation and new technology. Rick was responsible for managing these global relationships and programs with policy makers, partners, and consortia management in order to leverage these synergistic, strategic partnerships.

Rick serves on several industry boards and advisory groups related to his work in building collaborative alliances. Rick is the co-author of the book "Collaborative R&D: Manufacturing's New Tool" published by John Wiley & Sons N.Y. in April 1999.

In 2001, working with management from several major corporations including Kodak, and elected officials in federal, state, and local offices he co-founded the Infotonics Technology Center in upstate N.Y. The goal of the Center was to establish a unique, world-class research and development center in the area of photonics and related micro-systems. In support of this endeavor, a state-of-the-art prototype and pilot fabrication facility was built to enable innovation and the rapid commercialization of new products.

Mr. Jarman joined Eastman Kodak Company in 1978 with the Business Systems Markets Division where he held a number of advancing roles in field and staff marketing and management positions. In 1986 he was appointed Executive Agency Manager in Washington D.C. This position was established to integrate the strategic planning and markets development for the federal government market.

In 1988 he was selected to represent Kodak on the President's Commission on Executive Exchange. During the year he participated in the commission's program at Harvard University examining the roles of private industry and government. He played a key role on the trade committee during the Commission's meetings in the USSR and Western Europe. Issues discussed included US/USSR joint ventures and the European Community plans for 1992. For the remainder of 1988, Mr. Jarman served as Special Assistant to the Assistant Secretary of Defense for Production and Logistics in the Pentagon. Here he provided executive counsel on issues such as Total Quality Management and Bolstering the Defense Industrial Base.

Returning to Kodak, Rick was named Director of International Planning for the Business Imaging Systems Division. In this role he developed alternative business strategies for Europe and provided analysis of competitors and potential alliances for marketing, manufacturing, and design in Europe and Asia.

Mr. Jarman holds a degree in Business Administration from Bloomsburg University and has performed graduate work at Penn State University in the Executive Management Program.

Thomas (Tony) Haynes

Tony is Senior Program Manager at the National Center for Manufacturing Sciences. Mr. Haynes holds a BS degree in Electrical Engineering (with honors) from Southern Methodist University and has completed postgraduate work in computer science and digital signal processing. Mr. Haynes has also completed extensive training in company-sponsored business and management courses.

Prior to joining NCMS, Mr. Haynes was with Texas Instruments (TI). Prior to 1980, Mr. Haynes served as a Senior Design Engineer in TI's Semiconductor Division, working with both circuit and process design. His design successes included radiation hardened integrated circuits for the guidance control system of the Trident missile, the manufacturing process and basic circuitry design for TI's family of bipolar schottky PROMs, a data parser and display controller for the British CFAX system, and the control system for the Polaroid Sun 660 camera.

In 1980, Mr. Haynes transferred to TI's Industrial Systems Division where he led a team of 27 engineers and technicians designing custom and application specific integrated circuits to reduce parts count in industrial automation products. His team designed a hardware emulator for the 802.5 Token Ring interface chip set, used by IBM to refine protocols for that network which competed with the now much better known Ethernet LAN. That body of work earned Mr. Haynes peer recognition as a Senior Member Technical Staff (SMTS), an honor reserved to the top 5% of technical contributors to TI. After that he filled the role of Senior System Architect, responsible for overall system design for several industrial automation control systems; the TI 505 Series, the TI 575, and the Comau C3G robot control system designed by TI under contract to Comau, SPA.

After taking an early retirement option from TI, Mr. Haynes joined NCMS in 1992 as a Program Manager. His duties include forming and managing a diverse set of collaborative projects that range from advanced software systems for manufacturing applications to extremely high performance machining. He has been involved in the Commercial Technologies for Maintenance Activities (CTMA) Program in a Sr. Program Manager capacity since its inception in 1998, leading more than 30 projects over that period. In 2002, leveraging his strategic planning and business management training, he was a member of a leadership team reporting to the NCMS President that sought additional lines of business for NCMS. For three months in CY 2009 he served as interim CTMA Program Director while Dr. Charles Ryan, CTMA Program Director, was on medical leave.

Mr. Haynes is the author of several articles published in industry association technical journals, including Industrial Engineer, Modern Machine Shop, and SAE's Aerospace Engineering and Manufacturing.

Mr. Haynes' major project successes at NCMS, measured by deployment and quantifiable benefit to both DoD and industry, include: PLM for Six Sigma Part Quality, Smart Machines, High Throughput Production Processing of Five Axis Aluminum Parts (winner of the Defense Manufacturing Excellence award), and Volumetric Accuracy of Large Machine Tools (R&D 100 and Defense Manufacturing Excellence Award winner).

Greg Kilchenstein

Greg is an Action Officer with the Office of the Assistant Deputy Under Secretary of Defense for Maintenance Policy & Programs working technology enablers that focus on sustaining materiel readiness at best cost. Having completed his undergraduate work in aerospace engineering and graduate level studies in systems engineering at the University of Maryland, Greg began working for the Naval Sea Systems Command in 1987 as a mine warfare simulation modeler. After joining the Naval Air Systems Command in 1989, Greg was assigned as a propulsion engineer for the V-22, P-3, C-130, E-2/C-2 and had the privilege of witnessing the first flight of the V-22 in his first week with NAVAIR. Over the next 16 years with NAVAIR, Greg was the program manager for the T400 engine and Propellers Program, the Basic Design Engineer for T58 and T64 engines, the Propulsion and Power Systems Engineer for H-53, H-46, H-3 and the Presidential VH-3D, and the Propulsion and Power competency lead for vertical lift propulsion systems. Greg is married and he and his wife, Stephanie, have two children.

Debra Lilu

Senior Program Manager, NCMS Operations Director, CTMA Program; Education: MS Marketing Management, Rensselaer Polytechnic Institute, BS Business Administration (Marketing & Management), Eastern Connecticut State University.

Ms. Lilu has over 29 years of experience in the automotive and aerospace industries and working with the Department of Defense (DoD). Ms. Lilu has extensive expertise in managing complex, collaborative technical projects and understands how to bring new technology to commercialization. She has identified and developed new funding sources augmenting program resources and monitoring project performance through implementation and commercialization. Ms. Lilu also has strong experience directing all aspects of contract administration including presentation of company position of various contractual related matters, negotiation of contract changes and recommended disposition of rejected material. Ms. Lilu has led and continues to lead several collaborations with the DoD sustainment community.

Over the past several years Ms. Lilu has planned and orchestrated numerous workshops, ribbon cutting ceremonies, technology showcases and symposiums. A series of workshops were held across all services including: Air Force Tinker Workshop, Army Tobyhanna Workshop, Pacific Northwest Naval Shipyard, and Marine Corps Quantico. The workshops were designed to bring industry together with DoD maintenance principals to discuss DoD-specific technology needs. These workshops focused on particular operation/process needs at other DoD maintenance facilities with the personnel responsible for these applications presenting a list of their technology needs.

The following biographies are in alphabetical order

Ken Anderson

Mr. Ken Anderson is Universal Synaptics Vice President, Sales & Business Development. Mr. Anderson is a frequent Key Note Speaker and featured presenter at Aerospace, Defense and Maintenance Conferences.

Mr. Anderson has authored and co-authored numerous news articles and technical white papers on the effects of intermittent faults and its connection to No Fault Found (NFF) that have been published in the American Society of Naval Engineers Journal, Military Logistics Magazine, Aerospace Manufacturing & Design Magazine, HeliMX Magazine, Avionics Magazine and Aircraft Maintenance Technology Magazine – some of his work has also been published by the Wall Street Journal, The New York Times and The Washington Post.

Mr. Anderson served in the United States Army; he is a member of the Army Aviation Association of America, and a member of the American Legion.

Mr. Anderson is also on the Board of Directors for the Defense Industry Alliance (DIA).

In 2014, Mr. Anderson was selected as a "Sales and Marketer of the Year" in Utah, honored as a "Forty Under 40" Business Professional and selected as a "Top 100 Industry Expert in America – Aerospace Category".

Mr. Anderson has conducted business and built positive relationships with key businesses and governments in the United States.

Pete Aragon

Pedro "Pete" Aragon is a Continuous Process Improvement Lead at Fleet Readiness Center Southwest at Naval Air Station North Island in San Diego. Pete is a Navy certified Lean Six Sigma Black Belt and a trained Lean Six Sigma Master Black Belt from Villanova University. As a member of the Navy AIRSpeed Division, "AIRSpeed" is the Naval aviation term for continuous process improvement (CPI), he has led or facilitated CPI projects saving the Navy over $20 million in labor and material. Pete has been an Aircraft Design Engineer for Wagner Aeronautical where he was part of initial design team to develop the first ZERO-G plane, the only opportunity on Earth, at the time, for civilians to experience true "weightlessness" (zero gravity) without going into space. Pete has been a Structures Engineer for Naval Air Systems Command. He was a Liaison Engineer for the F/A-18 Hornet Fleet Support Team and has been the Site Engineer for Naval installations at North Island CA, Lemoore CA, Virginia Beach VA, Beaufort SC, and Jacksonville FL. Pete is a graduate of UCLA in Aerospace Engineering. When not supporting the Fleet, Pete is a Certified Barbeque Judge with the Kansas City Barbeque Society.

Wally Birtch

Mr. Birtch is currently Senior Sales Engineer for Supersonic Spray Technologies at Centerline Windsor Ltd, one of North America's premier designers and manufacturers of metal forming and welding equipment supplying many of the world's leading vehicle manufacturers. Centerline created in 2003 "Supersonic Spray Technologies" to develop and manufacture systems for the revolutionary portable cold spraying technology.

Mr. Birtch holds a degree in Mechanical Engineering Aerospace Technology from the Ryerson University. He has over 40 years experience in engineering, manufacturing, welding and materials processing technology and has, for the last 10 years, committed to developing and manufacturing equipment for the cold gas dynamic spray technology. Prior to Centerline, Mr. Birtch worked as Engineering Manager for Tower Automotive Inc. after his previous appointment as Engineering Manager for Fabricated Steel Products. Mr. Birtch is member of SAE, ASM, AWS, NFPA, and SME.

Brian Blair

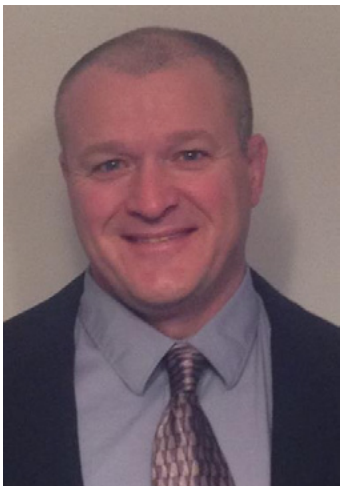
Brian Blair currently serves as a Lead Electronics Engineer supporting the Torpedo Electronics Depot at the Naval Undersea Warfare Center (NUWC) Division located in Keyport, WA. He has worked as an Electronics Engineer at NUWC Division, Keyport since November 1986. His entire career has been dedicated to supporting the NUWC Division, Keyport Depot for various programs, mainly focused on support for depot repair of Heavyweight Torpedoes (MK48 Mods 4/5/6/7) and Lightweight Torpedoes (MK46, MK54), but also involved with supporting other programs for the US Navy and Air Force. For over seven years (2001-2009), he was the Depot Engineering Branch Head with responsibility to manage 15-19 engineers and technicians. From 2009-2013, he served as the Depot Systems Engineer which is the technical focal point for the NUWC Division, Keyport Depot.

Brian Blair has experience at all levels within the NUWC Division, Keyport Depot developing repair and test procedures, developing and supporting test equipment, supporting the annual Torpedo Certification Evaluation Board (TCEB) inspections, recommending and managing Capital Improvement Projects, developing and managing Depot ISO processes and policies, leading the Depot Failure Reporting and Corrective Action (FRACA) process, developing and authorizing Automated Test Equipment (ATE) hardware and software changes, developing and authorizing new depot tooling, and developing and executing plans for continuing ATE modernization and/or replacement.

Steve Blasey

Mr. Blasey serves as the Deputy Director of the Aviation Maintenance Support Office with in the Army's Special Operations Aviation Command. Responsible for logistics and sustainment of the Army's only Special Operations Aviation Force consisting of over 200 highly modified manned and unmanned aircraft continuously deployed in various countries and areas of interest. Mr. Blasey has served the Army Aviation Community for over 34 years in various positions while on active duty and as an Army Civilian. In his current position Mr. Blasey is directly responsible for the operational readiness rate, total operating cost, RESET, flying hour modeling, maintenance structure and logistics engineering for the command.

Mr Blasey's earned a Master's Degree in Management of Technology from Murray State University, and undergraduate degrees in Aviation Maintenance Management and Logistics from Embry Riddle Aeronautical University.



Shane Campana

Shane Campana is the Navy Support Equipment (SE) Integrated Product Team Leader for Aircraft Wiring, Global Positioning Systems, and Survival Electronics at the Naval Air Warfare Center in Lakehurst, New Jersey. He has a Bachelors Degree in Business Administration, is DAWIA Level III Certified in Program Management, and is a Defense Acquisition Corps member. He is the SE program manager and author of multiple performance specifications for the Combat Survivor Evader Locator (CSEL). His primary responsibilities are leading his team in the procurement of the next generation of aircraft wiring support equipment to include Intermittent Fault Detection, Fiber Optics, and MIL-STD-1553. He is a recipient of the NAVSTAR GPS Joint Program Office Team Excellence Award. He is currently serving as the NAVAIR Support Equipment lead for the Joint Intermittent Testing (JIT) Working IPT (WIPT).

Tom Campbell

Tom Campbell currently serves as a Lead Electronics Engineer supporting the Electronics Depot at the Naval Undersea Warfare Center (NUWC) Division located in Keyport, WA. He has worked as an Electronics Engineer at NUWC Division, Keyport since February 1988, dedicated to supporting the development of test and repair capability and procedures for a wide variety of electronic components, assemblies and sub-assemblies. This includes evaluating and quoting potential new projects, training and supporting junior engineers, maintaining Automatic Test Equipment (ATE), design of test fixtures and test programs used on ATE, maintaining existing ATE Test Program Sets (TPS), and providing technical support for the Depot and for multiple programs.

Tom is considered a Subject Matter Expert (SME) in the digital electronics test development and ATE development, maintenance, training and TPS development. He has experience at all levels within the NUWC Division, Keyport Depot developing repair and test procedures, developing and supporting test equipment, recommending, planning and executing Capital

Improvement Projects, developing Depot ISO processes and policies, developing and executing plans for continuing ATE modernization and replacement.

Tom has recently started a program to achieve a Master's Degree in Systems Engineering at the Naval Post Graduate School. The completion date for the program will be March of 2016.

John Chadwick

John Chadwick is a rare individual from a family of American problem-solvers and entrepreneurs. He was woodworking, machining and welding by age 10. John and his father were always busy fabricating the latest projects for Chadwick-Helmuth, Inc., the innovative company that brought dynamic propeller, rotor and engine balancing to the aircraft industry.

John's passions have always been in outdoor expeditions and engineering. For two years, he had the perfect job with Caltech on a glacial ice-drilling study in Antarctica. Returning to Southern California, in 1990 John bought the Rene Corporation, which made analog optical micrometers. He changed the company's identity to J Chadwick Co., boosted product support, and transformed the product line to a modern digital format.

John and his wife Judy enjoy traveling the world and visiting with customers along the way.

Victor Champagne

Victor Champagne is a team leader for the Innovative Materials and Processes Team for the US Army Research Laboratory-Weapons and Materials Directorate, located in Aberdeen, MD. He is recognized internationally as one of the foremost authorities on Cold Spray. He has held numerous positions throughout his career including those with industry and academia. Mr. Champagne has been an associate researcher at Worcester Polytechnic Institute (WPI) in the Materials Engineering Department since 1985 and is a thesis advisor and research associate at WPI and the Pennsylvania State University. In his 29 years of materials research and development experience, he has been responsible for the advancement of emerging technologies for the Department of Defense, which has also led to applications in the commercial market. As an advocate of the environment, his research has helped to lower hazardous waste and other pollutants associated with materials and manufacturing processes. In 1998, his achievements were honored by President Clinton and by the Pentagon in 2007 and 2009, where he received the US Army R&D Achievement Award. One of his most significant achievements, that has brought him international notoriety, is the establishment of the ARL Cold Spray Center which is devoted toward research, development and implementation of cold spray. Currently, he is continuing to make extraordinary advances in cold spray technology and this past year he has been featured on several television networks and newspaper articles across the country for his achievements. Mr. Champagne was part of a research team that received the DMC Award in 2007 for cold spray and was awarded an Industry Achievement Award at the North American Cold Spray Conference in October 2011, as well as a Mantech award in 2013 for

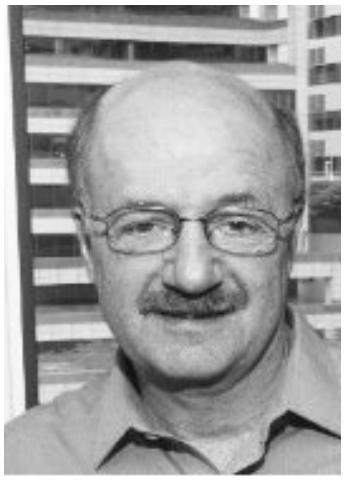
the transition of cold spray. Mr. Champagne was editor of the first comprehensive reference book on cold spray entitled, "The Cold Spray Materials Deposition Process". He is known throughout DOD and the private sector, as someone who "gets things done", working diligently to transition emerging technologies throughout the defense industry.

Bill Chenevert

Mr. Chenevert, Senior Program Manager for NCMS has managed several successful R&D projects developing new manufacturing technologies including in-depth analysis of nanoparticulate additives in diesel fuels, new trivalent chromium technologies replacing highly toxic hexavalent chromium, modernization of electroplating techniques and advanced gaming and simulation-based technical training. Given a successful career of over 34 years in senior manufacturing management positions with Ford Motor Company, Mr. Chenevert also has extensive experience in quality management (process improvement/Lean/Six-Sigma), vehicle and component manufacturing, electroplating, plastics composites, sustainable manufacturing and technical training.

Mr. Chenevert is actively managing several NCMS sustainability initiatives including an NCMS project on energy efficiency. He also directs 11 Compliance Assistance Centers (CACs) funded by EPA. CACs are unique industry-specific websites that provide assistance understanding environmental regulatory requirements at the federal and state levels and a myriad of best management practices.

Mr. Chenevert holds a MA in Industrial Management and a BS in Mechanical Engineering.



Dr. Phil Cohen

Dr. Philip R. Cohen is Founder, Director, and Executive Vice President of Research at Adapx Inc. Cohen was previously professor and co-director of the Center for Human-Computer Communication in the Department of Computer Science and Engineering at the Oregon Health and Science University, and a Sr. Computer Scientist and Director of the Natural Language Program in the Artificial Intelligence Center of SRI International. Adapx Inc was founded to commercialize natural interface technology, in particular digital paper and pen and multimodal interface technology. Cohen is engaged in research in the areas of natural user interfaces, multimodal interaction, multiagent systems, and human-computer dialogue. At Adapx, he co-led the development of the Sketch-Thru-Plan system for multimodal course of action creation sponsored by DARPA and RDECOM/STTC, which is now being deployed by the US Army and US Marine Corps. He also led projects on digital paper applications for maintenance data capture, sponsored by NCMS, and for field medical data collection and traumatic brain injury assessment, supported by the US Army Medical Command. At SRI International, his conceptualization and leadership of the Open Agent Architecture led ultimately to the development of Siri (now offered by Apple Computer). He is a Fellow of the American Association for Artificial Intelligence, and has been President of the Association for Computational Linguistics, and a member of DARPA's Information

Science and Technology (ISAT) panel. Cohen has more than 100 journal and conference publications. He is the recipient (with Prof. Hector Levesque) of an inaugural Influential Paper award by the International Foundation for Autonomous Agents and Multi-Agent Systems for his research on the theory of intention.

George Cushnie

George Cushnie is co-founder and current Vice President of Advanced Tooling Corporation, a company that has participated in CTMA projects for 10 years. ATC designs and manufactures metal finishing tooling for industry and DoD. Mr. Cushnie is also Technical Director of the National Metal Finishing Center, where he has served for 19 years. He has owned and operated a metal finishing company and consulted to industry and DoD for 35 years. He holds two advanced engineering degrees and has authored and coauthored numerous books covering metal finishing and related environmental topics.

Carl Dekker

Carl K. Dekker serves as the President of Met-L-Flo, Inc., a growing Service Center for Additive Manufacturing located in Sugar Grove, IL. He has been actively involved in research and product development using current technologies and innovative methods.

Mr. Dekker has presented his work at various conferences globally, including those sponsored by 3DSNASUG, Amerimold, ANTEC, National Mfg Week, RAPDASA, RP&M, and SME. He has also provided training and installations at Abbott Laboratories, Delphi, Motorola and numerous other locations. Mr. Dekker's work has been published in industry journals including Prototyping Technology, Rapid Prototyping Report, Time Compression Technologies, and the Wohlers Report (2003-8,13-14) to mention a few.

A Past Chairperson of the SME's Rapid Technologies and Additive Manufacturing (RTAM) Community (formerly the RPA), he currently serves as the Chair of the Direct Digital Manufacturing Tech Group of the RTAM. Being actively involved in fostering education he teaches the Rapid Technologies and Additive Manufacturing Technologies Certificate Programs and also remains active in the Bright Minds Program as a member and Past Co-Chair. He holds a Master Certificate in Rapid Prototyping and is a proud recipient of the SLA 'Dinosaur" award.

Kurt Doehnert

Kurt Doehnert is a senior Industrial Engineer with the Naval Sea Systems Command (NAVSEA) in Washington, DC. He is employed in the Naval Shipyard Management Group (SEA 04X), Process Engineering Division. His responsibilities include program and project management for technology development and application for ship maintenance and repair in the four Naval Shipyards (Portsmouth, Norfolk, Puget Sound, and Pearl Harbor). He represents NAVSEA on the Navy Repair Technology (REPTECH) Working Group, has been a

JTEG Principal for over 10 years, and is an active participant with CTMA.

Kurt received a BS Industrial Engineering from the State University of New York at Buffalo. He started his career at the [former] Mare Island Naval Shipyard in Vallejo, CA.

Matthew Donovan

Mr. Donovan is an experienced engineer with a broad background in aerospace manufacturing technologies and materials. He is currently staff engineer for new product development and advanced manufacturing technologies at the Research and Development Laboratory for UTC Aerospace Systems Engine Components Division. Mr. Donovan has worked for the company since 1998 in various roles, all directly involved in aerospace materials and their applications.

As the senior engineer for New Product Development and Additive Manufacturing, Mr. Donovan's primary responsibility has been developing and implementing new technologies for complex geometry fuel delivery components. He has been leading UTC Aerospace development of using Powder Bed Fusion, such as DMLS® components for use in production gas turbine engines, including developing the material and process qualification and validation. He has also been leading UTC Aerospace's program developing Laser Additive Deposition repair for gas turbine components. Mr. Donovan is also responsible for new research programs and development for initial builds of new products such as fuel injectors, fuel cell reformers, and burner rig hardware.

Mark Feathers

Mark Feathers is an Environmental Engineer with the U.S. Army Aviation and Missile Command located at Redstone Arsenal, AL. He has worked the last 16 years to develop and integrate sustainable materials into Army aviation and missile weapon system maintenance processes. He is a frequent participant in projects funded by the Army Pollution Prevention Technology Team, Strategic Environmental Research and Development Program (SERDP)/Environmental Security Technology Certification Program (ESTCP), National Defense Center for Energy and Environment and the Defense Logistics Agency. Mr. Feathers' current focus is replacement of nPB used in vapor degreasing operations and hexavalent chrome and cadmium used in plating shop processes performed at Corpus Christi Army Depot.

Dr. Kyle Ferrio

Dr. Kyle Ferrio is Vice President of Advanced Research for Ridgetop Group, responsible for innovation across a broad product roadmap. Dr. Ferrio is an accomplished technical leader with a consistent record of bringing relevant solutions to market by building and leading high-performance multi-disciplinary product teams. Dr. Ferrio has more than 15 years of professional experience, spanning business development, technical project management, algorithm development, and hands-on engineering. Previously, Dr. Ferrio was Vice President of Software Development at Breault Research Organization, where he provided the vision and technical leadership for the APEX 3D optical system modeling software, which was honored with the 2010 Arizona Governor's Celebration of Innovation Award. Prior to joining Breault, Dr. Ferrio led a multidisciplinary engineering team at Kaman Aerospace, which achieved unprecedented wavefront accuracy in a large optical test system for next-generation satellite imaging. Prior to joining Kaman, Dr. Ferrio was a Senior Process Engineer with Corning, where he made key contributions enabling the commercial viability of 10 gigabit/second multimode optical fiber, long-haul dispersion-compensated optical fiber, and specialty optical fiber. Dr. Ferrio was also a National Science Foundation Post-Doctoral Fellow with the Army Research Office. Dr. Ferrio holds a Bachelor's degree in Electrical Engineering from Bucknell University and earned his Ph.D. in Electrical Engineering and Computer Science (Optical Physics) from the University of Michigan, Ann Arbor. Dr. Ferrio is a member of the IEEE, the Optical Society of America, Tau Beta Pi, and Sigma Xi.

Paul Frantz

Mr. Paul M. Frantz is the Branch Chief of Test Program Development Team at Tobyhanna Army Depot, Tobyhanna Pennsylvania.

As a Branch Chief, Mr. Frantz coordinates the day-to-day activities of the engineers and technicians that make up the development team as well as manages projects that span many DoD organizations. His responsibilities included development of new test program sets for future depot workload as well as shop floor support for ongoing operations. He supervises the use of the Army's latest automated test station, the Next Generation Automatic Test System as well two previous generations of Army test stations that are still in use by depot production personnel. He is a member of the U.S. Army Legacy Test Program Set IPT that has been charged with providing tools to the development community to re-host programs from aging hardware to more modern supportable test platforms. In addition to Army automated test systems he directs test program set re-host efforts being performed on the US Air Force's Versatile Depot Automatic Test Station at Tobyhanna.

Dr. William Frazier

Dr. William E. Frazier received his BS, MS, and Ph.D. degrees in Materials Engineering from Drexel University in 1981, 1984, and 1987 respectively. In 1998, he graduated the Naval Aviation Executive Institute's Senior Executive Management Development Program, and the Defense Systems Management College's Advanced Program Management Curriculum; he also became a Level III certified member of the DoD Acquisition Professional Community.

Dr. Frazier was inducted in July 2005 as The Navy Senior Scientist for Materials Engineering. The position is located in the Research and Engineering Sciences Department at the Naval Air Systems Command, Patuxent River, MD. Dr. Frazier serves as the Chief Scientist of the Air Vehicle Engineering Department at NAVAIR. He has 34 years of experience in naval aviation materials engineering and science. Dr. Frazier provides technical direction and develops strategic plans for the research, development, and transition of naval aviation technologies. He serves as the Command's primary scientific advisor and consultant in the discipline of materials science and is responsible for performing, stimulating, planning, coordinating and reviewing the scientific value of RDT&E of all materials and processes.

Dr. Frazier served as head of NAVAIR's Metals, Ceramics, and Nondestructive Evaluation Competency from 1995 to 2005. In that capacity, he was the NAVAIR authority responsible for safety-of-flight issues involving metals, ceramics, and NDE. Dr. Frazier is a recognized expert in (i) materials selection, qualification and certification, (ii) materials processing, (iii) additive manufacturing technology, (iv) aircraft durability technologies, (v) strategic planning, and (vi) nanotechnology. He has authored more than 90 technical publications, edited six books, and holds two U.S. Patents. Dr. Frazier is an ASM Fellow and a NAVAIR Esteemed Fellow; he also served as a Trustee of ASM International (2003-2007). Dr. Frazier is a Key Reader for Materials Transaction A., and an Associate Editor for the Journal of Materials Engineering and Performance.

Chris Garcia

Chris Garcia is a 3D CAD and PLM industry visionary and veteran with over 25 years of design, manufacturing and inspection experience. Chris directs the company's 3D MBD/MBE business development activities which includes the formation of strategic alliances, channel partnerships and helping to set the company's strategic direction. Before joining Anark, Chris was Vice President of R&D at Dassault Systems SolidWorks Corporation, a position he held for 5 years. At SolidWorks, Chris led a staff of over 300 engineers located in offices spread over 6 countries, focusing on the research, development and release of the world class SolidWorks product offerings. Prior to SolidWorks, Chris was the VP of software development for Brown & Sharpe Inc. a metrology and CMM manufacturing company. Prior to B&S, Chris was VP of Engineering at Tecnomatix Technologies (a division of Siemens PLM), and was the founder of their Valisys product line.

Chris has received two (2) patents. The first in the area of 3D GD&T Mathematization and automated generation of CMM inspection programs (upon which the Valisys Company was

founded) and the second in the area of automatic generation of 3D CAD GD&T tolerance schemes (upon which the SolidWorks DimXpert technology was founded). Chris earned a master's degree in business administration at Santa Clara University, a bachelor's degree in computer science and general engineering from San Jose State University, and holds an accreditation from the MIT Sloan Executive Education program.

Chris has been married to his wonderful wife Kathy for 36 years and they have been blessed with 8 children (6 of them girls).

Dr. Kirsten Green

Dr. Kirsten Green received her formal education in the field of Materials Science and Engineering receiving a Bachelor's degree and PhD from The Johns Hopkins University in 1987 and 1994, respectively, and a Master's degree from Brown University in 1990. In 2000, Dr. Green was hired by the Naval Surface Warfare Center Carderock Division where she worked in the Welding and Nondestructive Evaluation Branch serving as Group leader and technical liaison (lead engineer) for the NAVESA NDT&E Technical Warrant Holder from 2004-2008. During her tenure at NSWC, Dr. Green was awarded a Master of Science in Engineering Management from George Washington University in August of 2007. In December 2008, Dr. Green began working at Naval Sea Systems Command as the Technical Warrant Holder for Nondestructive Testing and Evaluation. As Technical Warrant Holder for NDT&E, Dr. Green is responsible for developing, selecting, implementing, maintaining and enforcing technical requirements for nondestructive testing and evaluation as related to the design, fabrication, maintenance, and overhaul and repair of ships, subs, and carriers for non-nuclear applications. Dr. Green's presentation today provides a NAVSEA perspective of the challenges encountered and the achievements that are possible when trying to transition new nondestructive inspection technologies for use by the Navy.

Mark Haines

Vice President, Director North American Business Development
International TechneGroup Incorporated (ITI)

Mark Haines graduated from the University of Cincinnati in 1988 with a Bachelor of Science degree in Mechanical Engineering Technology. Mark took part in the university's cooperative education program which introduced him to International TechneGroup, Inc. (ITI). Mark has gained nearly thirty years of industry experience working at ITI since his cooperative education days.

In his initial years at ITI, Mark was a software engineer developing mechanical CAD (MCAD) translators for ITI. He was also part of a team at ITI which contributed to the development of the Initial Graphics Exchange Specification (IGES) and the Standard for the Exchange of Product Model Data (STEP). Mark was later appointed to Business Unit Manager of the CAD, CAM Integration (CCI) Business. He and his team designed and implemented critical

interoperability solutions for end-user companies across industries such as automotive, aerospace, and defense. Mark was responsible for operational management of the business unit functions, service offering development, project delivery, financial planning, management, and staff development.

In 1997, Mark was promoted to Technical Director of North American Operations. In this role Mark was responsible for technology growth and the impact of technology on overall sales and revenue goals across North America. He staffed and managed Application Engineers and brought together multiple technology disciplines in order to respond to customer requirements and grow business.

In 2000, Mark was promoted to Regional Director of Business Development. In this capacity Mark developed new business and maintained partnerships with key accounts. He also cultivated resources for marketing, prospecting and technical presentations while driving product development through business opportunities.

Now, Mark is the Vice President and Director of North American Business Development for ITI. His team focuses in the areas of CAD, CAM and CAE business development. Mark is responsible for leading a team of Subject Matter Experts, Application's Engineers and Consultants to provide comprehensive Interoperability solutions to Advanced Manufacturing Companies in North America.

Bradley Hartman

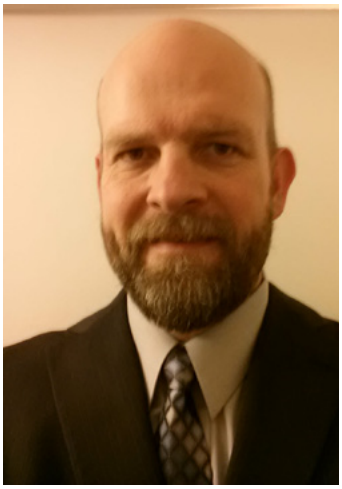
Mr. Hartman has been employed by Fleet Readiness Center-East as a Materials Engineer since January 2011. Various duties have included production and maintenance support for the Naval Air Depot Cherry Point Composite Shop. This has involved interaction and guidance of shop artisans with regard to various composite repair issues. In addition, I have performed sealant and adhesive testing and analysis. I also routinely perform plastic and composite failure analysis. I am also the aerospace transparency restoration subject matter expert for AV-8B subsystems. I oversee all polymeric elastomer issues at FRC-East including collapsible rubber fuel cell maintenance. I am the FRC-East Rubber Shop engineering liaison. I participate in new composite technology initiatives. I am currently involved in a research program investigating composite heat damage with Laser Induced Fluorescence as well as cold spray of rotary component metal liners. I graduated from North Carolina State University with both a BS (2001) and MMSE Masters of Science in Materials Engineering in 2005.

Eric Hoover

Mr. Eric D. Hoover joined the Edgewood Chemical Biological Center (ECBC) in 2004 and has approximately 30 years of Federal Service as a Department of the Army Civilian and United States Army Officer. He currently serves as the Supervisor for the ECBC Industrial Base Team, which provides support to the Joint Program Executive Office -Chemical Biological Defense (JPEO-CBD), Army Materiel Command's (AMC) Industrial Base Capabilities Division,

and other Department of Defense Agencies. He also serves as the Executive Agent for Deputy Assistant Secretary of Defense Manufacturing and Industrial Base Policy's Industrial Base Analyze and Sustainment Fund Program. Mr. Hoover's primary customer responsibilities include the development of program management, project plans, Committee on Foreign Investment in the United States, procurement package input, JPEO-CBD Industrial Base Plan, and interagency coordination.

Previously, as a Career United States Army Officer, Mr. Hoover served in various staff and command positions during his years of service. Beginning his career in the United States Army as an Officer Candidate at the US Army Infantry School at Fort Benning, his assignments include positions in Germany, United States, and as a Company Commander during Desert Storm in Southwest Asia.



Robert Hrabe

Robert H. Hrabe is currently the CEO of VRC Metal Systems and H. F. Webster Engineering Services (HFW/ES) both of Rapid City South Dakota. VRC Metal Systems develops and manufactures cold spray equipment and automation systems. The VRC Gen 3 is the only portable, high pressure handheld cold spray equipment available on the market today. HFW/ES specializes in technology development and management. HFW/ES manages the development and qualification of emerging technologies for DoD and commercial applications. HFW/ES conducts research, development and commercialization activities associated materials processing and joining technologies including supersonic cold spray, plasma additive manufacturing, and friction stir welding. HFW/ES is a primary developer of the OSD Mantech Cold Spray Repair and Rebuild Technology (CSRRT) automated repair system based on Flexible Robot Environmen® technology. In 2007, Mr. Hrabe retired from 22 years of service in the United States Air Force. He was commissioned through United States Air Force Officer Training School in 1985. A senior pilot with more than 2,500 flying hours, he began his career as a mechanical engineer and acquisition officer on the Peacekeeper Missile program at Norton AFB, CA. He had various engineering and flying assignments between 1991 and 2006 including combat tours in Operations Deliberate Forge (Kosovo), Operations Enduring Freedom (Afghanistan) and Iraqi Freedom. Mr. Hrabe retired from the USAF in 2007 to become the co-founder and CEO of H. F. Webster Engineering Services and VRC Metal Systems both in Rapid City.

Stacey Kerwien

Stacey Kerwien is the Deputy Chief of the Materials, Manufacturing and Prototype Technology Division at the US Army ARDEC located at Picatinny Arsenal in Dover, NJ. ARDEC is the Army's key armaments research, development and engineering center reporting to RDECOM. Since 2009, she has been responsible for more than 120 engineers and technicians performing materials engineering and prototype technology, business development, and management of human capital. In addition, her duties include the

technology transfer of additive manufacturing, nanotechnology and M&S of advanced materials and designs. She coordinates ARDEC's materials engineering efforts with numerous Program Managers, Program Executive Offices, NASA, DOE, academia, and industry.

From May 2002 – March 2009 she served as the Branch Chief of the Advanced Materials Technology Branch at ARDEC. In this capacity she led efforts to enlarge and enhance the materials laboratory facilities and established the creation of the Nanotechnology Lab in B-1090. In November 2008, Mrs. Kerwien served as a subject matter expert in ammunition/ materials engineering for the Army Judge Advocate General (JAG) in the case USG v. Martinez. In this case, Mrs. Kerwien used her experience to identify ammunition used in the incident by analyzing metal fragments. She supported the Marine Corps JAG in a Court of Inquiry (Oct. 2007) and the Army JAG in USG v. Akbar (April 2005).

From April 1989 – May 2002, as a materials engineer, Mrs. Kerwien conducted over 50 ammunition failure analyses on the full spectrum of US Army ammunition. Specifically, determining the causes of short round failures in the 81mm M853 Illuminating Cartridge (Fall 2001); the cause of a fatal, catastrophic failure of a 120 mm mortar at Ft. Irwin during training exercises (April 2002); and, an analysis of the wounds caused by different air rifles and ammunition for the Lehigh Valley Medical Examiner's Office (Dr. Isidore Mihalakis, M.E., July 1997).

Robert (Yogi) Kestler

Mr. Robert Kestler has held the position of Science & Technology Lead at Fleet Readiness Center - East (FRC East) within the Naval Air System Command (NAVAIR) since 2007. He also serves as the liaison for the Fleet Readiness Centers to the Naval Aviation Enterprise Chief Technology Office. In this capacity, Mr. Kestler is responsible for providing and overseeing the Science & Technology portfolio for the Fleet Readiness Centers, assisting in the implementation of new technologies, identifying new technology requirements for the FRCs, interfacing and collaborating with universities, private industry, DoD Laboratories, and other DoD services concerning Sustainment needs. Many of his current efforts are in the area of additive manufacturing, advanced composite repair, and corrosion.

Mr. Kestler has held various in-service engineering roles during his twenty-two year tenure with NAVAIR. Mr. Kestler earned a Bachelor of Science degree in Materials Science and Engineering from North Carolina State University in 1990 and a Masters of Business Administration from Boston University in 2001. He began his professional career as a Materials Engineer in the Metal and Ceramics Branch at Fleet Readiness Center - East where he worked in the areas of failure analysis, welding, heat treating, and electroplating. Mr. Kestler assumed the role of Inorganic Coatings Team Lead for FRC East in 2000. In this capacity, he served as the senior engineer responsible for coordination of inorganic coating processes at FRC East with respect to coating application science, evaluation

and development of new coatings and application technologies, and coordination of implementing technologies in Production. He was responsible for the engineering and chemistry of inorganic coatings, corrosion protection, material compatibility, and the science of coating application with respect to substrate characteristics and the operating environment of military aircraft. Mr. Kestler's more notable efforts were his work with high velocity oxy-fuel thermal spray, cold spray, and alternative technologies to cadmium and chromium electroplating. In addition he served as a subject matter expert in the area of inorganic coatings for the F-135 engine program.

Randy Kirk

Mr. Randall "Randy" G. Kirk is the President and CEO for Aspire Solutions, Inc (ASI). ASI was founded in 2003 and provides business re-engineering and niche products focused on the MRO (Maintenance Repair & Overhaul) environment. Mr. Kirk has over 20 years experience in MRO and supply chain management including the design and implementation of many types of projects/applications. Mr. Kirk has worked with over thirty different organizations including AutoZone, Celestica, Coca-Cola, and Texas Instruments, and has significant experience within the government with the Federal Aviation Administration and DoD experience within the Army, Air Force, and Marine Corp depot maintenance and field maintenance environments.

Previously, he served as the Vice President of Engineering for Global Concepts, Inc where his team performed supply chain development for many large organizations including Walmart, Proctor and Gamble, and JB Hunt. Mr. Kirk holds a Bachelor of Science degree from Murray State University in Mathematics and Computer Science and a Master of Science degree in Industrial Engineering/Operations Research from the University of Arkansas.

Mr. Kirk actively volunteers in the community and is involved with numerous youth sports and charities. He serves or has served on several corporate and charity boards. Personally, he enjoys the outdoors including hunting and fishing.

Terry Kreplin

Terry Kreplin is a Senior Engineering Specialist with Baxter Healthcare Corp., responsible for the (RPD) Rapid Product Development and (CAM) Computer Aided Manufacturing Groups. The RPD/CAM Group is dedicated to compressing the manufacturing time, using databases and new/traditional production techniques to deliver products to the marketplace.

Terry joined the company's CAD/CAM Group in 1983, and is responsible for the product, toolpathing, and system designs, to advance manufacturing while lowering required time to market. Terry holds a BS of Industrial Technology from Southern Illinois University and additionally holds Senior Mold Maker status, an AS of Technology from Triton College, and AS of Engineering from Elgin College. Terry is involved in both the National Center for Manufacturing Sciences (NCMS), Rapid Access to Readiness Essential (RARE) Parts consortia, and The Georgia Tech RPMI.

Fred Lancaster

Mr. Lancaster is the AIR 4.3.4 Materials Engineering Division Science and Technology Lead. He holds a BS in Physics from FSU and a Masters in Systems Engineering from the US Naval Postgraduate School with over 25 years of domestic and international engineering experience in technical knowledge, leadership and management for Department of Defense products and systems as a DoD employee and civilian. National and international experience and recognition in corrosion control, materials and related technologies. Extensive background in DoD weapons systems, products, and materials of construction leading to the successful development, testing, and transitioning of new technologies and is a recognized Subject Matter Expert in materials science for NAVAIR.

As the Division S&T Lead, he has constructed and directly manages a Science and Technology portfolio of over $5M annually of non-program funds and oversees, provides guidance, vision and leadership for the Materials Division S&T/RDT&E efforts to align with the Naval Aviation Enterprise goals and the NAVAIR Chief Technology Officer Science & Technology Roadmap. He facilitates RDT&E projects that develop and transition new and/or improved materials, products or processes for aircraft construction and maintenance. By gathering and defining fleet needs in relation to materials issues, refines requirements, develops and recommends solutions to engineering requirements for complex or specialized projects or systems, forms teams and obtains funding to ensure that design objectives are met. Introduces and coordinates the transition of those products into naval aircraft design with the FRC's and fleet maintenance activities.

In relation to cold spray metallization since 2006 he has developed, led S&T efforts, and managed the transition of new metal repair process using cold spray metallization across the Fleet Readiness Centers teams through material and scientific analysis support as well as cross service and academic coalition support. These efforts have led to the transition of repair processes for the F-18 to allow the return of critical parts to fleet inventory at a significant cost savings to the US Navy as well as developing repairs for other platforms.

Ray Langlais

Mr. Ray Langlais is a senior consultant with the Maintenance and Readiness Group at LMI. He spent over 25 years on active duty with the US Army serving in various leadership and logistics positions at the field and depot levels. He came to LMI from the Office of the Secretary of Defense (Acquisition, Technology and Logistics), Advanced Systems and Concepts. There he provided OSD level oversight to Joint Capability Technology Demonstrations including the Joint Modular Intermodal Distribution System, the Joint Enhanced Theater Access – SeaPort of Debarkation, the Coalition Mobility System, and the Critical Runway AssessmenT and Repair demonstrations. Prior to that assignment, Mr. Langlais served in the Office of the Deputy Chief of Staff, Logistics, Army, where he conducted strategic planning and analysis of the Army prepositioned stocks program. While on the research staff of the LMI Maintenance and Readiness Group, he has been involved with maintenance technology insertion initiatives and other efforts involving the analysis of various maintenance issues.

Mr. Langlais has a bachelor's degree in biology from Norwich University, a master's degree in business administration from Babson College, a master's in human resources from Golden Gate University, and a master's in national security and strategic studies from the Industrial College of the Armed Forces.

Randy Langmead

Randy Langmead is Director of Business Development for Siemens PLM Software's Marine/Federal Division. He has been involved with the PLM NeXt project at Newport News, the IPDE at Electric Boat, and the DDG-1000 IDE at Ingalls Shipbuilding since their inception. He leads a team that supports Army, Air Force, Navy, Marine Corps, NASA, and Federal Agency interests in Lifecycle Management.

Randy has been with Siemens PLM Software since 1997. He was EAI's Executive Program Manager for Aerospace and Federal Services, and managed EDS PLM Federal business development. Before that he was a business process consultant with Intergraph Federal Systems, and lead a team deploying a PDM solution for JLSC at Wright Patterson Air Force Base.

Randy received a BS in Aerospace Engineering from the United States Naval Academy in 1980, and an MS in Aeronautical Avionics from the Naval Postgraduate School in 1988. A former Naval Aviator, Randy served as a carrier-based ASW Helicopter pilot and held a wide variety of O-Level Aircraft Maintenance positions. He managed a DPMA for LPH-7 at Metro Machine shipyard, and retired from NAVAIR as APM for Test And Evaluation for PEO(A).

Joe Lombardi

Joe Lombardi is the Lead Systems Engineer (LSE) for the NAVAIR Aircraft Wiring Support Equipment Commodity (AWSEC) at the Naval Air Warfare Center in Lakehurst, New Jersey. He has a BS in Electrical Engineering and is DAWIA Level-III certified in Systems Planning, Research, Development and Engineering (Systems Engineering). Most recently, Joe was the lead systems engineer for the Automatic Wire Test Set (AWTS), the Handheld Aircraft Wire Tester (HAWT), and the Fiber-Optic Common Support Equipment suite of inspection and test gear. Currently he is the LSE for the Fiber-Optic Repair Set (FORS), Fiber-Optic Cleaning System (FOCS), Automatic Coaxial Wire Stripper (ACCS), and Wire Braiding Machine (WBM). Before joining the AWSEC team, Joe worked as the V-22 systems engineer for avionics support equipment and in various roles on the Consolidated Automated Support System (CASS) program, including LSE and IPT Lead for the CASS Software Support Activity.

Alain Lussier

Mr. Lussier graduated from McGill in 1985 with a Bachelor of Commerce and became a chartered accountant. But in search of new excitement and challenges, he reoriented his career in business turnaround and insolvency from 1990 to 2000, which provided him with new skills in finance, legal and operations which required one to learn the industry quickly and develop creative solutions to solve complex problems. The lessons learned provided him with leadership and humility to develop an entrepreneurship model based on team work. After 10 years, he realized it was nice to help others and concerned that the North American industrial base was losing ground to free trade economy. It was time to go into business with something that would change the world. Ziota Technology, Technologies Harness Scanner and Solavitek are a group of companies dedicated to the in-situ maintenance of electrical sub-system in all types of commercial and military vehicles. Mr. Lussier and his team of talented individuals are fully engaged to developing original solutions that are cost effective and practical to industry, with a roadmap that is going to be a game changer in the way electrical maintenance is done. The project that he will present to you today reflects his passion for aviation—he loves to fly and restore his 2 aircrafts—and his determination to create value with outstanding innovation. If you care and are passionate to change the way things are done, then act now and join his network.

Justin Massey

Justin Massey is a Materials Engineer for the polymers/composites branch at the North Island Materials Engineering Laboratory located at Fleet Readiness Center Southwest in San Diego, CA. He has previously worked as an aerospace engineer performing composite structural analysis on in-service Naval aircraft. The last 4 years his main focus has been as the new technology lead and in-service sustainment materials and process engineer for Naval aircraft polymer and composite materials. He holds a MS in engineering (advanced structural materials) from the University of California, Los Angeles and a BS in mechanical engineering from the University of California, Santa Barbara.

Jamie Mattern

Mr. Mattern is the Human Augmentation Manager & Mechanical Engineer at the Naval Surface Warfare Center, Carderock Division (NSWCCD), West Bethesda, MD. Jamie joined the NSWCCD in 1990 and spent the first 13 years of his career executing and managing research, development, test, evaluation and transition of numerous shipbuilding and manufacturing technologies into the DoD industrial base. His work supported projects sponsored by the Office of Naval Research (ONR) Manufacturing Technology Program (ManTech) and the National Shipbuilding Research Program (NSRP). Over the next 9 years, Jamie held the following positions in technology management as a NSWCCD employee:

- ONR Program Officer-The Institute for Manufacturing & Sustainment Technologies
- ONR Program Officer-The Navy's Repair Technology Program (REPTECH)

- Naval Sea Systems Command (NAVSEA) ManTech Deputy Program Manager
- LHA(R) Ship Design Producibility Manager
- PEO Carriers Deputy Director for Technology & Innovation
- CVN21 Technology Manager
- NSRP Deputy Program Manager
- NSRP Program Manager
- NSWCCD Energy Conservation BAA Manager

Jamie currently works as the NSWCCD Human Augmentation Technology Manager, supporting the test, evaluation, optimization and introduction of Industrial Human Augmentation System (iHAS) exoskeletal tool holders and related devices. The iHAS is a prototype exoskeleton body with a tool holding exoskeleton arm. Jamie is working towards the commercial availability of iHAS units in 2015 and the development of other human augmentation technologies that would benefit the DoD Industrial Base.

Keith Maxwell

Mr. Maxwell is the Program Manager for Exoskeleton Systems at Lockheed Martin, Missiles and Fire Control. During his career, Keith has been responsible for cutting edge technology development, insertion, and operations for the military and intelligence communities. Prior to his current assignment, he led the US Special Operations Command UTB, a test and integration center for revolutionary intelligence collection and information systems. He was Vice President of Skyline Software, a 3D geospatial intelligence rendering tool. Prior to that, he was the Business Development Director for Honeywell's Space Systems, Special Programs organization. Keith served as a National Intelligence Officer during the first four years of Operation Enduring Freedom, and received an intelligence commendation for his team's work to deliver the first complete high resolution map of the country of Afghanistan. Keith has built a reputation for delivering revolutionary technologies from re-breather systems for Navy SEALs, to uncooled infrared imagers for weapon systems, to systems architectures for satellite imagery, and exoskeletons for military and industrial use. He taught at the Industrial College of the Armed Forces and at the Defense Intelligence Agency College. Today his team is building a system to augment people, our most important asset.

Don McClenny

Mr. Don McClenny is the Implementation Lead for the Air Force Sustainment Center Engineering Directorate's Innovation and Technology Insertion (ITI) Team. Mr. McClenny received his Bachelor of Science from the Rochester Institute of Technology, Rochester, NY. Mr. McClenny's career in DoD RDT&E includes staff and management positions developing aerial, surface and sub-surface image and data collection and data analysis systems for the Navy's Surface Warfare Center at White Oak, aerial and ground optical data collection at the Air Forces Utah Test and Training Range (UTTR) and Regional Government Program management with Eastman Kodak. Mr. McClenny is currently the Air Force member and

subject matter expert (SME) for the Joint Intermittence Testing Working IPT (JITWIPT) and the Air Force team member of the DoD's Joint Intermittent Fault Emulator (JIFE) development team. Mr. McClenny's determination to identify, characterize and develop technology solutions for the DoD's $2Bn-$10Bn annual No Fault Found (NFF) burden is driven, in part, by his responsibility as ITI Implementation Lead, to increase warfighter readiness by successfully implementing innovative technologies developed using public funds.

Steve Morani

Mr. Morani is the Deputy Chief, Maintenance Division, Joint Staff Logistics Directorate (J-4). Prior to assuming his current duties, he spent over 28 years on active duty in the United States Air Force and retired at the grade of Colonel in July 2011. He is a career logistician with experience in Department of Defense, joint and coalition logistics. He has held a variety of leadership positions in logistics at the headquarters, depot, and field levels to include aircraft and munitions maintenance, program management, and materiel support. He also has extensive experience leading and developing both maintenance technical training, and advanced maintenance training and education. While on active duty, Mr Morani was responsible for establishing the Joint Staff J-4, Maintenance Division in 2006 and was the first J-4 Maintenance Division Chief. Prior to assuming his current duties, he was the Chief of the Materiel Support Division, Headquarters U.S. Air Force.

Thomas Naguy

Mr. Tom Naguy is currently the Deputy Division Chief and Technical Advisor for AFMC's Life Cycle Management Division. In this position, Mr. Naguy develops life cycle product support policy and enterprise sustaining engineering technology integration policy in Air Force weapon systems. Previously he was the Program Manager for the Environmental and Energy Program and the Advanced Power Technology Office at the Air Force Research Laboratory. Mr. Naguy is responsible for executing over $42M per year in the post S&T program. Within his office, his group executes environmental programs focused on the reduction of use of hazardous materials and a reduction in the sustainment costs of weapon systems that use hazardous materials. Mr. Naguy's expertise is in the area of materials and process engineering. In addition, Mr. Naguy is a member of the DoD Pollution Prevention R&D panel and the Strategic Environmental Research & Development Program's Technical Committees for Weapon Systems and Platforms and Energy and Water. He is also the lead Air Force technical representative to the National Defense Center for Environmental Excellence (NDCEE).

Mr. Naguy earned a BS and an MS in Chemical Engineering. Professional military education includes the Air War College, National Defense University's National Security Course, Air Command & Saff College, and Squadron Officer School.

Dr. Golam Newaz

Dr. Newaz has released an Executive Summary of his research project "Ultra-Lightweight Sandwich Composite Constructions for Auto Body Applications." The research is a part of the National Center for Manufacturing Sciences' (NCMS) Lightweight Automotive Materials Program (LAMP). The multi-year LAMP program seeks to drive innovation in advanced lightweight materials development for the automotive industry.

Newaz and Wayne State University partnered with MAG-IAS, LLC.; Nimbis Services, Inc.; the U.S. Department of Energy; and NCMS on the research project. The project looks to develop strategies for sandwich composite construction technologies for significant weight reduction for automotive applications and to develop computationally efficient models to predict the behavior of sandwich composites using model-based brokerage portals.

Dr. Newaz was also featured in an LA Times article about the debut of Ford's 2015 F-Series truck at the North American International Auto Show. In the article, Newaz commented on the use of aluminum in the construction of the vehicle.

Dr. Hossien Nivi

Founder and CEO, Pendaran Inc.

Dr. Hossein Nivi is an accomplished executive, engineer, and academic with experience in operations, leadership development, and educational methods. As an executive, he has built one of the top leadership development systems in the world, has significant operations leadership role, transformed Ford's plant training model, and co-established two globally competitive universities. As an engineer and academic, he has received two Henry Ford Technology Awards, received 3 patents, and published 30 papers on work that has contributed tens of millions of dollars to Ford's bottom line.

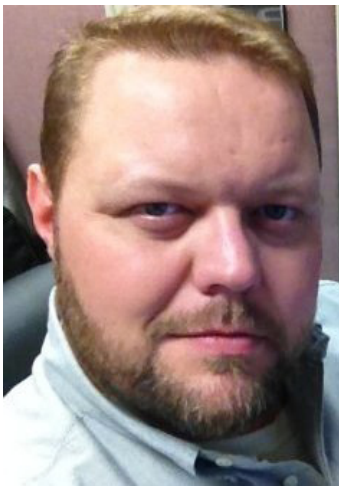
Hossein founded Pendaran in 2006, to develop a revolutionary training model for transfer of knowledge and experience at the same time. He implemented this concept of a holistic/systemic approach to business transformation. Dr. Nivi was also Dean, College of Business Administration at the University of Detroit Mercy from 2006 to 2008. Prior to this appointment he had been the Dean of Ford Design Institute. He was also the Director of Global Product Development and Manufacturing Leadership Programs at Ford Motor Company. He had a number of managerial and executive positions at Ford Motor Company over 25 years. Hossein also served on the Industrial Advisory Boards of the MIT and Stanford business and engineering schools.

From 1966 to 1978, Hossein helped build two globally competitive universities in Tehran and Isfahan in Iran. He also served as a Professor of Mechanical Engineering Dept. Hossein received his Ph.D. in Mechanical Engineering in 1975 from the University of London in England where he pioneered the field of computerized automotive diagnostics. He has also received his MS degree in Mechanical Engineering and an MS degree in Electronics and Computer Control Systems.

Marc O'Brien

Marc O'Brien has more than 15 years of experience working within the Lockheed Martin Skunk Works®. During his tenure, Marc has been applying virtual technology solutions to Lockheed Martin programs including F-22, X-35, F-35, U-2, F-117, X-33, C-130, and many other Skunk Works programs. Marc is now the Virtual Prototyping Group Manager focused on leading, managing, and providing vision to a specialty support/service organization of artists and engineers. The group's mission is to provide competitive advantage to Lockheed Martin programs through the application of state-of-the-art digital simulation, visualization and human computer interfaces. Marc is frequently called upon to lead special projects, consult with other Lockheed Martin organizations and vendors, speak at technology forums, interface with academia, demonstrate virtual concepts, and share his passionate beliefs in the benefits of visualization, simulation, and human computer interfaces.

Marc O'Brien is a graduate of Kent State University where he earned a bachelor's and master's degree in technology.



Mike Oestmann

Michael Oestmann is the Quality Assurance Specialist in Computer Software for the Directorate of Quality at Red River Army Depot. He assumed this position in September 2009. In this position he is responsible for maintaining and developing data systems and to consult higher management on recurring and major systemic issues analyzed from the captured data. He also is designated as an Information Assurance Support Officer (IASO) for Red River Army Depot.

Before holding the QAS Computer Software position, Michael was a lead auditor conducting process audits in accordance with ISO 9000 standards as well as reviewing and developing inspection guidance for final product at Red River Army Depot from 2002-2009.

Angela Padgett

Angela Padgett is currently the Technical Team Manager for Automated Test Equipment/ Test Program Set (ATE/TPS) In Service Engineering Technical Team at MCAS Cherry Point. As a collateral duty she has been leading several Model Based Engineering Projects for FRC East, such as the CTMA Team Center Project.

Mrs. Padgett has a Bachelor's Degree in Electrical Engineering from University of NC at Charlotte and has spent her last 20 years at FRC East in various positions across Engineering, Program Management, and Industrial Processes and Technology. She has experience on multiple Navy and Marine Corps aircraft platforms such as H-46, V-22, H-60, and AV-8.

During her career she has attained DAWIA SPRDE Level III and PM Level III certification and is a member of the Acquisition Professional Community (APC). She is a graduate of the Executive Leadership Program (ELP) and the Senior Executive Management Development Program (SEMDP). She is also a trained NAVAIR AIRSPEED Black Belt and Project Sponsor.

Mrs. Padgett grew up in Roanoke Rapids, North Carolina and currently resides in Swansboro, North Carolina. She is married to Mr. Russell Padgett, whom also works at FRC East Cherry Point as the AIR-4.1 Systems Engineering Department Head. They have two children, one at East Carolina University and the other in middle school. Mrs. Padgett is also very active in her Church and Women's Ministry.

Mervin Rudgley

Vice President, Product Management and Product Development, Perfect Point EDM
Mr. Rudgley is the inventor and developer of the E-Drill and more recently S-Blaster products. One of the first employees of PPedm, he has nearly 40 years of Engineering Professional experience, and is an internationally recognized expert in CNC Machining, Rapid Prototyping, Digital Manufacturing and associated product development and commercialization.

Prior to joining Perfect Point, Mervyn was Vice President, Digital Manufacturing Technology for the largest Dental Lab organization in the western hemisphere. He was a pioneer in Reverse Engineering, Digital design and Digital Manufacturing in the Dental Industry.

Earlier in his career, Mervyn held a number of Product Management positions at 3D Systems Inc., where he developed rapid prototyping and manufacturing equipment, materials and software. He was instrumental in launching 3D Systems' SLA 7000, SLA Viper, Actua, ThermoJet and Invision Systems; as well as applications ranging from aerospace parts to custom hearing aids. Mervyn has a BS degree in Mechanical Engineering from the University of Salford, Manchester, UK.

Greg Russell

Greg has worked as a defense contractor with several companies and has 25+ years of experience in technology insertion. Industrial Engineer/Program Manager, United States Marine Corps Provided program management support to USMC Logistics Command (LOGCOM, Albany GA, Barstow CA, and Blount Island, FL {USMC Prepositioning Fleet}) for the LOGCOM Technology Insertion Program.

This support included the identification of problem areas in the maintenance depots and the resultant concept development of new technical projects to resolve the problems. This support included the development and submittal of funding requests from various funding arms of the DoD (MANTECH, OSD, ONR, SERDP, ESTCP, CPP, CTMA, etc.). These requests also required the development of a business case analysis, and in the case of new unproven technologies/processes, the identification of research and evaluation resources (NAVSEA, Army Research Lab, Penn State, Mercer University, SBIR, NDCEE, etc.). Support also included the management of outside contractors, time schedules, budgets, development of test parameters, and technology insertion. Other taskings included supporting the Inspector General in conducting surveys of USMC industrial facilities in numerous locations to assess safety, moral, technical and environmental conditions.

Diane Ryan

Diane E. Ryan is a Business Development Consultant for Siemens PLM Software Inc, Maritime Solutions. She served 8 years in the United States Army as a Signals Intelligence Analyst and Russian Linguist. Diane graduated from Oakland University in 1998 beginning a career in the IT sector. In 2001, she hired into Tecnomatix Technologies Inc., which specialized in Digital Manufacturing, focusing on part and process planning and validation through 3D simulations of robotics, assemblies, and ergonomics in the automotive industry. Tecnomatix Technologies Inc. was then acquired by UGS, which was subsequently acquired by Siemens Industry Software. It was through this acquisition that Diane began to expand into the aerospace, heavy machinery and finally Shipbuilding and US Navy Shipyard sustainment areas. Over the past several years, Diane has assisted in defining and managing the implementation of the PLM solution in support of improving the shipbuilding lifecycle management processes from construction to sustainment.

Matt Sakey

Global Brand Manager, NCMS

A life-long media nerd with an extensive background in training and education, Matt is an internationally published theorist on games-based learning, human cognition, and experiential systems. He's also a refugee from the advertising world and a sought-after thought leader in the global video games industry, so when he's not thinking about how people learn, he's thinking about how people buy and how they play. These combined disciplines form a unique, experience-driven outlook on learning, design, and interactive.

Matt began his career making Powerpoints at Doner Advertising. After getting promoted to Lead Designer for Business Development, he picked up about 20 years of branding knowledge in just three or four by virtue of spending most of his time trapped on a tiny airplane with a dozen of the brightest minds in advertising. The Agency's annual billings shot from $300M to $1.2B during that period, as prestigious clients like Mazda, Blockbuster, and FTD joined its roster.

An independent consultant for several years, Matt provided expertise in education, marketing, and game design. By combining the best of each of three disciplines – which are more alike than different – he developed an innovative, experiential model for e-Learning development that is still applied today. He joined NCMS in 2005 as Creative & Instructional Design Supervisor, managing the company's award-winning e-Learning activities. In 2013 he was promoted to Global Brand Manager, to curate the company's image and develop messaging that supports its vision for the future of American manufacturing. Matt remains a leader in interactive entertainment, as a scholar, speaker, and games industry analyst. Reach him at matts@ncms.org.

John Schmelzle

A native of Massapequa, NY, Mr. John Schmelzle accepted a position with the Naval Air Engineering Center in September of 1986 after earning his BE in Mechanical Engineering from the State University of New York at Stony Brook. After working with the Tool Control Program for a year, he accepted a systems engineering position in the Support Equipment (SE) Engineering Department.

In June of 1992, Mr. Schmelzle was transferred into the newly created Product Development Department where he worked as a design engineer. During his time in the Product Development Department, he worked as the lead design engineer for several major SE projects including the KC-130 In-Flight Refueling Hose Reel Test Stand. Mr. Schmelzle was also the lead SE design engineer on multiple aircraft platforms including the Joint Strike Fighter and F/A-18. In addition to performing his design engineer duties during the work day, Mr. Schmelzle attended a two-year night school program, earning his MS in Mechanical Engineering from Drexel University.

Dr. Russ Shannon

Dr. Russell Shannon is the Lead Systems Engineer of the Integrated Diagnostics and Automated Test Systems (IDATS) Team, at the Naval Air Warfare Center in Lakehurst, New Jersey. He holds a Ph.D. in Acoustics from Oxford University and a BSEE from the University of Hartford. He is the author of fourteen papers on avionics diagnostics, testability, supportability and net-centric diagnostics. His main focus is leading his team in the development of the next generation of advanced automatic test equipment and finding novel ways to leverage net-centric technologies and wireless technologies for aircraft maintenance. He is the recipient of the 2009 US Navy Top Scientists and Engineers of the Year Award, as well as two NAWCAD Innovation Awards. He currently holds three patents for a variety diagnostics technologies.

Jeremy Smith

Division Chief, Materials & Process Engineering Division, Corpus Christi Army Depot

Prior to coming to the depot Mr. Smith worked for 5 years as an analytical chemist at a consulting firm in San Antonio, TX where he was the lead chemist in charge of metals and wet chemical analysis. Upon arrival at the depot in 1988, Mr. Smith spent the next 19 years (as a chemist & materials engineer) providing hands-on support and process improvements at the depot's plating and metal finishing shop. During his tenure there, he made significant contributions in designing the new plating facility, and plating shop laboratory. Through several DoD technology insertion projects, he improved multiple plating processes, and developed an on-line electroplater training and troubleshooting course. In 2007 he assumed the role of Branch Chief for the Chemical Process Branch, and then moved into the role of the Materials & Process Engineering Division Chief in 2011. In his current role, Mr. Smith engages and mentors the next generation of scientists and engineers, and is involved with seeking out, introducing, and embedding better processing technology at the depot.

Chris Teal

Chris Teal is currently the Marketing Director at Eclypse International, responsible for world-wide activities. Previously Mr. Teal was a Systems Support Engineer for Hughes Aircraft Company, responsible for SATCOM support in the country of Turkey in preparation for Desert Storm. He specialized in Tactical Data Systems for Combat Information Centers (CIC). Mr. Teal has been a technical writer for Hughes Technical Publications Division, contributing to the development of the systems level troubleshooting manuals for complex weapons systems. He spent over a decade supporting overhaul & refurbishment of electronic systems at NAVSEA shipyard operations. While on active duty with the US Navy he was a maintenance supervisor both over Fleet Combat Training Center Pacific (Pt. Loma, CA) and was stationed onboard the USS Kinkaid, DD-965, responsible for maintenance of combat systems in direct support to the US Naval Pacific Fleet which included joint exercises with participating NATO vessels. Mr. Teal has published numerous articles for various technical journals and magazines related to aging electrical systems.

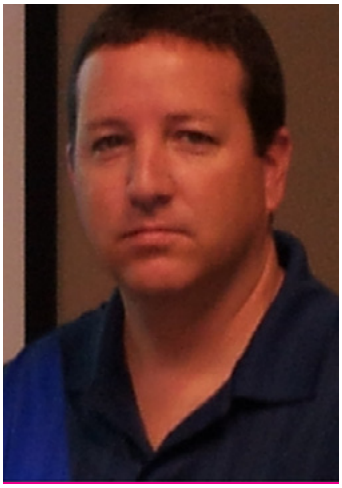
Dr. Dawn White

Dr. Dawn White is creative engineering executive with extensive experience in technology start-up company formation and financing, manufacturing science, additive manufacturing, automotive, and contract R&D. She has a continuous record of commercial innovation in a range of materials processing fields, including welding and joining science, metal spray forming, intelligent processing of materials and rapid prototyping and tooling. Dawn is currently founder and President/CTO of Accio Energy, a wind energy start-up developing non-turbine based, no moving parts wind energy technology. Previously she founded the VC-backed, Ann Arbor-based Solidica, Inc. in January 2000 based on the Ultrasonic Consolidation direct metal additive manufacturing process, which Dr. White invented and commercialized as the Form-ation™ rapid prototyping machine.

Before starting Solidica, Dr. White was a serial "intrapreneur." She initiated research and development programs internal to Ford Research Laboratory in the area of welding and joining and rapid tooling, and moved spray formed rapid tooling, and a novel glass to metal joining technology into production. At MTS Systems, she developed a new business area in advanced material processing; redeploying existing technical capabilities and resources in novel applications to create new business worth tens of millions of dollars to the company. She has a BS and MS in Materials Science and Engineering, and a PhD in Mechanical Engineering from the University of Illinois. She has published dozens of technical papers, and is a productive inventor, having been awarded 23 US Patents with several patents pending.

Stephanie Wright

Ms. Stephanie Wright is the lead flight control system engineer for the Air Force B-1 System Program office at Tinker Air Force Base. Ms. Wright is responsible for the sustainment of the weapon system and serves internal and external customers, to include operating bases both domestic and in forward operating locations. Ms. Wright also supports depot maintenance activities and modification programs for the sustainment and upgrades to the aging fleet.
Ms. Wright has 12 years of experience working for the United States Air Force. During that time she has worked extensively in Supply Chain and Logistics support for flight controls across eight Air Force weapon systems. Prior to moving to B-1, she worked in Engineering Policy focusing on mechanical system integrity programs and serialized asset marking and tracking (IUID). Ms. Wright also spent three years working for the Pacific Air Force command in Okinawa, Japan.
Ms. Wright holds a Bachelor of Science degree from the University of Oklahoma in Industrial Engineering and a Master of Science degree in Engineering Management from Oklahoma State University.
Ms. Wright enjoys spending time with her husband and two children, traveling, and playing golf.



Tim Winquist

Tim Winquist attended the University of South Florida where in 2000 he received a Bachelor of Science in Electrical Engineering. He now has over 14 years of software, simulations and test related experience. He has worked as a hardware and software design engineer at Teleflex-Morse_Hynautic in Sarasota, Florida. In 2003 he moved to Melbourne, Florida, where he worked for Support Systems Associates Incorporated (SSAI). His primary focuses at SSAI were ATE system design, self-test software design, and digital simulation.
In 2006, Tim became a principal in forming Analysis, Integration and Design Inc. (AIDI).
Tim is the Chief Technical Officer and engineering manager at AIDI. His team performs software development, research, systems development, test integration and related project management.

Frank Zahiri

Mr. Frank Zahiri is the Small Business Innovation Research (SBIR) Program Manager, Air Force Sustainment Center (AFSC), Robins Air Force Base, Georgia.

WHAT YOU DO MATTERS.
WHO YOU KNOW MATTERS MORE.

Here's how to change the world: get some people. Mix it up a little. Reach across industries and disciplines, make new connections. Sit aerospace down next to food packaging. Have academics and end users share a table. Introduce everybody around, give them some sandwiches, lock the door, and don't let them out until they've done something innovative. Together they accomplish things none could accomplish alone. Collaboration kills risk, cuts cost, and supercharges the process. The trick is building and managing collaborations that work. That's what we do. We're professional puzzle-solvers. We know how all the pieces fit together. We're the network. We know a guy who knows a guy. We see the puzzle. We see the picture. It's more than just making sure everybody plays nice (we do that too). We connect people — introduce big companies to little companies, help out with scary stuff like government contracting, protect everybody's intellectual property, and ensure that the collaboration is working. Alone, each of us lives in this world. Together, we can change it.

WE'VE GOT YOU COVERED.

COLLABORATIVE MANAGEMENT

Risk? Cost? Collaboration is their Kryptonite. Managed properly, it enhances innovation, protects IP, and provides new opportunities for networking and growth.

DIGITAL MANUFACTURING

The Industrial Revolution was a blip compared to what's next. The age of Big Data and virtualization has begun. It's up to us to decide where the journey goes.

INDUSTRY INTELLIGENCE

A "big picture" view won't reveal much without the connections that make it work. Connections are kind of our thing, though. We look for the pattern, not the process.

NETWORK & MARKET ADVANCEMENT

In business, you have to know people... or know people who know people. Cross-industry collaborations extend the network beyond what's possible alone.

COLLABORATION THAT WORKS.

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