

METALWORKING TECHNOLOGY

Update

Fall 2005



All Engines Ahead Flank

ONR Awards
Navy Metalworking Center
Contract to CTC



Advanced Metalworking Solutions for Naval Systems that Go in Harm's Way

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Concurrent Technologies Corporation (CTC) operates the Navy Metalworking Center (NMC) for the U.S. Navy Manufacturing Technology (ManTech) Program. The NMC serves as a national resource for developing and implementing advanced technologies for metalworking products and processes. The NMC applies these technologies to improve cost and performance in support of Navy and Department of Defense needs.

The NMC offers extensive expertise in metalworking technologies, materials, and related processes. If you are interested in pursuing a project consistent with the capabilities listed below, please contact Dan Winterscheidt at 814-269-6840 or winter@ctc.com.

- metals and advanced metallic materials
- metal-based composites
- ceramics
- metallic materials-based systems
- metal/non-metal interface issues
- primary metal materials manufacturing processes
- shape-making processes
- joining techniques
- surface and heat treatments
- metalworking systems engineering activities
- materials characterization and testing
- process design and control
- product design and structural performance
- environmental issues and recycling
- information and data handling and transfer
- manufacturing technology/industrial base infrastructure

For further information about topics in this publication, please contact 717-565-4405.

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Page 4: Casting photo courtesy of Engineered Casting Solutions magazine and Ruger Investment Castings.

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Metalworking Technology Update

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Edward J. Coyle

**NCEMT Program Officer,
Metal Dude, Mentor, Friend
1948-2005**

Undoubtedly, if you met Ed Coyle, you would remember. If nothing else, he had presence. But those who knew Ed recognize that there was so much more, and appreciate the abundant character behind his colorful persona. He was dedicated, hard-working and principled. He understood that people were important, believed in the sanctity of “your word,” and knew that trust was earned by action and not taken lightly. He was loyal and an avid admirer of

unflinching candor. He wasn't afraid to state his convictions in not-politically-correct ways to ensure that he made—and you remembered—his point of view.

He took his role as Program Officer seriously, ensuring that the government's best interests were first and foremost. He was a great proponent of the NCEMT and believed in the CTC staff that supported the Program—always maintaining that they could improve, that the NCEMT could be the model for every ManTech Center of Excellence. No one was a bigger champion of the NCEMT.

He embraced his role as mentor—sometimes advising behind the scene, frequently fighting for what he believed in—government programs that operated efficiently and optimally and the well-being of the people who worked for him.

He was a good friend to ManTech and the NCEMT. Like all good friends, he may be gone, but he will not be forgotten, and most assuredly, he will be missed. He recently spoke of his desire to retire in 2006. He outlined his thoughts for the future and what he wanted to accomplish. While his plans have been abridged by his unexpected death, his spirit remains in the many friends that he had in the Navy and ManTech community.

Today, our hearts are heavy, contemplating our loss, the tragedy and futility of his death, and the uncertainty of a future without him. But the greatest tribute we can pay to Ed is to persevere, to emulate his commitment and integrity, and to carry forth his plan for excellence and nothing less.

John U. Carney
ManTech Program Director



A Face Behind the NMC Name: Kevin Stefanick

In this continuing series, the Navy Metalworking Center (NMC) is recognizing the people who solve current metalworking problems,

work everyday to improve weapons systems for the U.S. Navy and DoD and are committed to the success of the Program.

Kevin Stefanick is a Senior Project Manager with CTC and is the Project Manager for several ongoing NMC projects in support of CVN-21, including “High Strength and Toughness Naval Steels” and “Application Development for Use of LASCOR Panels.”

With over 10 years of progressive engineering experience, a sharp attention to detail and the ability to maintain a positive attitude in difficult situations, Kevin has been able to successfully manage some of the NMC’s most technically challenging projects. He sees his role with ManTech’s Integrated Project Teams as one of “facilitator,” working to ensure that all the resources are working together toward common goals. In addition to playing a critical role with existing projects, he also assists in the development of new project proposals and oversees the equipment resources for the NMC Program.

Before joining CTC in 2003, Kevin worked at SKF USA, Inc. where he implemented capital improvement projects related to cold form ring rolling with polymer fixture-quenching heat treatments, turning and drilling processes for bearing rings, flexible furnace systems, automated conveyor systems, manufacturing process and assembly machines and elevator equipment, among other areas. At Universal Dynamics Inc., he engineered non-standard projects by preparing electrical and mechanical designs of industrial gas-fired heat exchangers, plastic drying systems, pneumatic conveying systems, weighing and mixing systems, and large structural hoppers and stands.

Kevin earned a B.S. in Mechanical Engineering and a Masters of Manufacturing Management (MMM), Quality and Manufacturing Management, both from Penn State University. He is a member of the Project Management Institute (PMI) and the American Society for Quality (ASQ). He is also certified as a Project Management Professional (PMP) and is pursuing the ASQ Six Sigma Black Belt certification. ■

ONR Awards Navy Metalworking Center Contract to CTC

The Office of Naval Research has awarded Concurrent Technologies Corporation (CTC) a five-year Indefinite Delivery Indefinite Quantity contract, valued up to \$150 million, to manage and operate the Navy Metalworking Center. The change in the center name supports ManTech’s goals for efficient operations and continued focus on practical metalworking processes and applications. The center will continue to develop and implement advanced metalworking solutions for key naval weapon systems, such as CVN-21, DD(X), the Joint-Unmanned Aircraft System, the Littoral Combat Ship, and the M777 Lightweight Howitzer.

“The primary goal of the Navy Metalworking Center is to transition advanced metalworking technology to naval weapon systems,” said Dr. Daniel L. Winterscheidt, the Program Director. “Based on our long-standing relationships with Navy installations, prime contractors, universities and other organizations, we are well positioned to continue leading the development and implementation of these critical technologies.” ■

Gregory D. Woods Named New Navy Metalworking Center COR and Program Officer

The Office of Naval Research has appointed Gregory D. Woods the new Contracting Officer’s Representative (COR) and Program Officer for the Navy Metalworking Center. This new assignment continues Greg’s long-standing association with the Navy ManTech Program. He currently serves as the Program Officer for the Institute for Manufacturing and Sustainment



Technologies and is the former Program Officer for the Center for Naval Shipbuilding Technology. Greg has over 20 years of experience working with NAVSEA and the Naval Surface Warfare Center, Carderock Division, with emphasis on surface ship structural integrity and materials design and application issues. He holds a BS in mechanical engineering from Tennessee State University and an Engineering Management and Systems Engineering graduate certificate from George Washington University. ■

Metalworking Technology Update Debuts Electronically

This issue represents the electronic debut of Metalworking Technology Update—an initiative designed to reduce program costs and streamline communication efforts. The Navy Metalworking Center (NMC) replaced the printed version of the quarterly Update with an e-mail-friendly Portable Document Format (PDF) version. The new electronic edition will ultimately accommodate a wider distribution of the quarterly newsletter.

Coinciding with this effort, the NMC developed a web-based application that allows individuals to register for the electronic mailing list and to receive materials via e-mail by creating a profile on the center’s Web site (www.nmc.ctc.com). On the profile, registrants can designate specific “areas of interest” that will allow them to receive focused communications related to NMC projects, events and publications. The new mailing list provides those interested in the center with the ability not only to update their own contact information, but also to control the type of communications they receive. ■

Investment Casting Reduces Part Count, Reaps Significant Benefits

The high part count on many military vehicles can result in high manufacturing costs. Complex components comprised of many individual parts can also result in longer manufacturing lead times and the added cost to track and maintain replacement parts.

As the U.S. military strives to reduce costs while still providing the most benefit to the warfighter, DoD contractors and Centers of Excellence are being tasked with identifying innovative ways to reach these goals. The use of investment casting to reduce part count is just one method being employed.

In investment casting, dies are created in the form of the required components. The dies are injected with wax, and once the individual wax components solidify, they are assembled into a model of the final work piece. The wax is then coated several times with ceramic slurry until a shell of sufficient thickness is formed. The wax model is then melted and removed from the shell to form the mold for the casting. Molten metal is poured into the mold and once the metal has solidified, the ceramic shell is removed. Finally, the components undergo the appropriate heat treatment and inspection. If necessary, defects are repaired via welding, and machining can be performed to achieve final dimensions.

Although investment casting is one of the oldest forms of casting, innovations in manufacturing technology have increased its efficiency. Rapid prototyping using technologies such as Stereolithography (where a 3-D model of a part is created by machine from resin layer by layer) is making the visualization of the cast components easier. Computer-Aided Engineering can be used in virtually every step of the process, from determining the proper dimensions to simulating the casting process. New equipment is making it possible to cast increasingly larger parts. Contamination during the melting process and defects caused by shrinkage and gas can be mitigated by Vacuum Arc Remelting (VAR) and Hot Isostatic Pressing (HIPing), respectively.

Benefits

The benefits of replacing fabricated parts with investment castings are numerous:

- **Reduced manufacturing costs** — Although some castings are complex and large, they typically require less labor and raw material to create than their fabricated counterparts. In addition, overall system assembly and inspection can be simplified.
- **Decreased manufacturing lead time** — The casting process can take less time than traditional fabrication methods, allowing systems to be produced more rapidly and system readiness to be increased.
- **Increased reliability** — Fewer joints and fasteners mean fewer replacement components to track, increased reliability, and ultimately, less likelihood for structural failure in the middle of a battlefield.
- **Reduced weight** — In some cases, the system may also benefit from a reduced structural weight if the castings can be formed from lighter materials.

Applications

Investment castings can be used in a variety of military applications beyond structural components, including armament, airframes, projectiles and propulsion systems, to name just a few. The Navy Metalworking Center recently employed investment casting to reduce the part count for the spade component on the M777 Lightweight Howitzer. By replacing the previously fabricated components with investment castings, the part count on the spade was reduced from 60 to 1. ■



Molten metal being poured into an investment casting mold.

In Use In Industry



Hull Treatment training will benefit the production of DD(X). Northrop Grumman's DD(X)

Navy Metalworking Center Hosts Hull Treatment Installation Overview

The Navy Metalworking Center (NMC) hosted a Hull Treatment (HT) installation demonstration and training seminar at Concurrent Technologies Corporation in Johnstown, PA, April 26–28, 2005. The three-day workshop was designed to prepare shipyards for future projects by introducing them to HT tile installation processes and best practices.

The training was conducted by personnel from the Naval Surface Warfare Center, Carderock Division (NSWCCD). Approximately 30 people attended the seminar including representatives from Bath Iron Works; Northrop Grumman Ship Systems - Ingalls; NSWCCD; the Navy Joining Center; Northrop Grumman Newport News; the NMC; and BBN Technologies. ■

Letter from the Program Director

Daniel L. Winterscheidt



“Our new contract charts another milestone in the 17-year ManTech/CTC partnership and brings with it a new Center name, a new Program Officer and Contracting Officer’s Representative (COR), and greater opportunity to work with new Program Offices and government agencies to develop and transition advanced metalworking technologies.”

New beginnings are motivating. They inspire and invoke the belief that possibilities are endless, that the potential for success is unlimited. On October 14, 2005, ONR awarded Concurrent Technologies Corporation (CTC) a five-year contract to manage and operate the Navy Metalworking Center. Our new contract charts another milestone in the 17-year ManTech/CTC partnership and brings with it a new Center name, a new Program Officer and Contracting Officer’s Representative (COR), and greater opportunity to work with new Program Offices and government agencies to develop and transition advanced metalworking technologies.

The new, succinct name—Navy Metalworking Center—reinforces ManTech’s emphasis on lean, efficient operations and the continued focus on practical metalworking processes and applications. Over the past year, we’ve addressed some key issues for DD(X), CVN-21 and the M777 Lightweight Howitzer, including weight reduction, manufacturing process improvements, welding enhancements and cost savings. We’ll continue to identify projects that meet critical naval needs and maximize return on investment.

Greg Woods, the new Program Officer and COR of the Navy Metalworking Center, is a long-time supporter of the ManTech Program (see Page 3). He’s the current Program Officer for the Institute for Manufacturing and Sustainment Technologies and was the Program Officer for the Center for Naval Shipbuilding Technology until he took on this new assignment. We’re looking forward to working with Greg and benefiting from his NAVSEA experience.

Over the past several months, we’ve worked closely with weapon systems integrators and Program Offices to identify manufacturing issues and to develop project planning documents for projects that can begin in government fiscal year 2006. Potential projects for PEO Carriers address alloy formability, distortion control, coating preparation improvements, weight reduction and fire resistance; while projects for PEO Ships focus on specialized coatings, improved welding processes and forgings and fatigue life enhancement.

We’re establishing new partnerships with PEO Integrated Warfare Systems. Potential projects include the low-cost pallet system for the Advanced Gun System and metal matrix applications for the Long Range Land Attack Projectile. We’re also looking forward to developing projects for PEO Subs and addressing NAVAIR and Marine Corps needs. Any DoD or federal government agency can utilize our contract to sponsor projects with technical objectives consistent with the broad scope of the Navy Metalworking Center. I encourage you to contact me with project ideas, and I will be happy to discuss the steps required to carry out your project under our contract.

The future is wide open for the Navy Metalworking Center. We’re looking forward to accomplishing great things for the ManTech Program and executing our charter to implement advanced metalworking solutions for naval systems that go in harm’s way.

Daniel L. Winterscheidt

Daniel L. Winterscheidt, Ph.D.
Program Director
Navy Metalworking Center

Navy Metalworking Center Hosts Joint CVN-21/DD(X) LIPT Meeting

The Navy Metalworking Center (NMC) hosted a joint review meeting of the CVN-21 and DD(X) Leadership Integrated Project Teams (LIPTs) in Johnstown, Pennsylvania, August 2-4. Approximately 55 people participated in the three-day meeting. Organizations included the Office of Naval Research; the CVN-21 and DD(X) Program Offices; the Naval Sea Systems Command; the Naval Surface Warfare Center, Carderock Division; Northrop Grumman Ship Systems; Northrop Grumman Newport News; Bath Iron Works; the NMC; the Navy Joining Center; the Institute for Manufacturing and Sustainment Technologies; the Composites Manufacturing Technology Center; the Center for Naval Shipbuilding Technology; the Electronics Manufacturing Productivity Facility; the Best Manufacturing Practices Center of Excellence; and Noesis, Inc. Project teams met separately to conduct their quarterly project reviews and then convened in a joint session to discuss technologies and initiatives that have the potential to cross platforms and benefit future projects on both CVN-21 and DD(X). The NMC gave presentations on eight CVN-21/DD(X) initiatives that it is currently supporting. ■

Materials Science & Technology 2005

The NMC was an exhibitor and presenter at the Materials Science and Technology 2005 Conference and Exhibition, September 25-28 at the David L. Lawrence Convention Center in Pittsburgh, Pennsylvania. Organized by five leading materials-related societies, MS&T'05 was one of the year's largest technical gatherings focused on the latest developments in materials research and applications. The NMC gave three presentations, including "Single-Melt PAM Processed Forged Ti-6Al-4V Bell Housings for Lightweight 155mm Howitzer," "Extrusion Processing of Ti-6Al-4V" and "Residual Stresses in Flowformed Ti-6Al-4V Alloy Tubes." ■

High Speed/High Performance Ships and Craft Symposium 2005

Representatives of the NMC attended and exhibited at the High Speed/High Performance Ships and Craft Symposium 2005 in Everett, Washington, July 19-20, 2005. Sponsored by the American Society of Naval Engineers' Puget Sound Section, this year's symposium theme was "The Shape of Things to Come." The event included a tour of the X-Craft or Sea Fighter, the Navy's new Littoral Surface Craft - Experimental, which was developed by ONR and used friction stir welding to manufacture the deck and bulkhead. ■

ShipTech 2006 Set for January 24-25 in Panama City Beach, Florida

The Navy Metalworking Center will facilitate its eighth *ShipTech* conference on January 24-25, 2006. Due to Hurricane Katrina, the location for ShipTech 2006 has been changed to the Edgewater Beach Resort in Panama City Beach, Florida. The Office of Naval Research's Manufacturing Technology (ManTech) Program and the National Shipbuilding Research Program (NSRP) co-sponsor this annual event, which brings together representatives from the domestic shipbuilding industry, its supplier base, the U.S. Navy Program Offices, ManTech and the U.S. Navy-sponsored shipbuilding research programs to exchange information and discuss innovations in shipbuilding technology.



The theme of this year's event is "Advanced Technologies to Meet Shipbuilding Capability and Affordability." Rear Admiral Charles S. Hamilton, Program Executive Officer for Ships, will serve as the keynote speaker. Other speakers include Rear Admiral Patrick M. Stillman, Program Executive Officer, Integrated Deepwater System, U.S. Coast Guard; Arthur W. Divens, Executive Director, New Construction - Amphibious & Auxiliary Ships, Program Executive Office Ships; and Captain Robert M. Verbos, NAVSEA 05N - Fleet Naval Engineering Maintenance Process Improvement.

Technical sessions will address four topics: Production Processes, Product Design, Materials and Business Processes/Systems Technologies. To register for ShipTech 2006, visit www.nmc.ctc.com. ■

Advanced Materials Conference Returns to Baltimore

The Navy Metalworking Center (NMC) will hold the Advanced Materials Conference (AMC) April 18-19, 2006, at the Marriott Inner Harbor at Camden Yards in Baltimore, Maryland. As in past years, the conference will provide industry and government organizations with a forum to discuss the use of advanced materials for ship and ground applications. The goal of the conference is to explore opportunities for and potential obstacles to implementing advanced materials, identify future R&D needs of the military and promote collaboration to reduce overall ownership costs while enhancing domestic manufacturing capabilities and competitiveness. More information on AMC will be posted on the NMC's Web site (www.nmc.ctc.com) in the near future. ■

Defense Manufacturing Conference 2005

The Navy Metalworking Center will exhibit (Booth 709) and give four presentations at DMC 05, November 28-December 1, 2005, in Orlando, Florida. The presentations include "Application Development for Use of LASCOR Panel," "Manufacturing Large-Diameter, High-Strength Fasteners for Marine Applications," "Comparison of Friction Stir Weldments and Submerged-Arc Weldments in HSLA-65 Steel" and "Near Net Shaped Components to Decrease Cost for the Titanium Intensive M777 Lightweight Howitzer." More information can be accessed at www.dmc.utcdayton.com. ■

