For over fifty years, the DoD Manufacturing Technology (ManTech) Program has been the Department’s investment mechanism for staying at the forefront of defense-essential manufacturing capability. This 2013 brochure highlights the Warfighter impact of products implemented by the ManTech projects of the Office of the Secretary of Defense, Army, Navy, Air Force, and Defense Logistics Agency. The pages of the brochure show the ongoing benefits of the ManTech Program to provide cost savings, improve technology implementation with an early focus on manufacturing, reduce manufacturing lead time, provide faster surge capabilities, improve manufacturing processes for greater reliability, and rapidly respond to Warfighter requirements.

This portfolio represents a careful balance of the individual mission-driven needs of the program Components with ManTech’s joint requirements identified through the collaborative efforts of the Joint Defense Manufacturing Technology Panel (JDMTP) and the Office of the Deputy Assistant Secretary of Defense for Manufacturing and Industrial Base Policy (ODASD(MIBP)).

The center section of this brochure highlights how the DoD is working to address innovation in manufacturing through the President’s National Network for Manufacturing Innovation (NNMI). As an initial step 15 months ago, we established the National Additive Manufacturing Innovation Institute (NAMII), now known as America Makes, a private-public partnership of industry, academia, the government, and workforce development resources - all collaborating with a shared vision of transitioning additive manufacturing technology to mainstream U.S. manufacturing. Building on the momentum of America Makes, in 2013 we announced two new institutes: “Digital Manufacturing and Design Innovation (DMDI),” and “Lightweight and Modern Metals Manufacturing Innovation (LM3I).” We are also working with the Department of Energy that will lead one new institute on “Next Generation Power Electronics Manufacturing” - while addressing a diminishing DoD supply-base, long lead times and high lifecycle costs.

The mission of the MIBP office is to ensure robust, secure, resilient, and innovative industrial capabilities upon which the Department of Defense (DoD) can rely to fulfill Warfighter requirements. ManTech is a key partner in this mission and continues its rich history of advancing manufacturing technologies so the Department maintains affordable technological advantage. It is a prime driver for our Department’s innovation engine and ensures our Nation maintains its competitive edge on the battlefield.

Sincerely,

Ms. Elana Broitman
Acting DASD (MIBP)
MANTECH MISSION

A responsive world-class manufacturing capability to affordably and rapidly meet Warfighter needs throughout the defense system life cycle.

FOCUS

An important focus of ManTech is on the processes, and enabling production capabilities that reduce the acquisition and sustainment cost of weapon systems, and provide direct benefit to the Warfighter. Measures of effectiveness include improved mission capability, improved readiness, and reduced total ownership costs. Timely transition of the technology consistent with acquisition and operational requirements is essential.

STRATEGY

The 2012 DoD Strategic Plan prepared by the Office of the Deputy Assistant Secretary of Defense for Manufacturing and Industrial Base Policy (MIBP), in close collaboration with the Joint Defense Manufacturing Technology Panel (JDMTP), contains four strategic thrusts:

• Thrust 1: A responsive and balanced manufacturing technology investment portfolio to meet DoD requirements
• Thrust 2: Active support for a highly connected and collaborative defense manufacturing enterprise
• Thrust 3: Active support for a strong institutional focus on manufacturability and manufacturing process maturity
• Thrust 4: Active support for a healthy, sufficient, and effective defense manufacturing infrastructure and workforce

The ManTech Program Strategy supports the broader defense industrial base to deliver maximum value to the warfighter and the nation. The strategy is executed by the Component ManTech programs within the Army, Navy, Air Force, DLA, and OSD (e.g., Defense-Wide Manufacturing Science and Technology (DMS&T)) and includes projects of the Industrial Base Innovation Fund (IBIF),

This brochure highlights eleven ManTech Program successes of the Component ManTech programs and DMS&T program. The center two pages of this document focus on how the DoD is partnering with industry and others to build a national network of manufacturing with efforts such as the America Makes Institute, Digital Manufacturing and Design Innovation Institute (DMDI), Lightweight and Modern Metals Manufacturing Innovation Institute (LM3I), and a DoE-led institute on Next Generation Power Electronics.

MANTECH MISSION

The DoD Manufacturing Technology (ManTech) Program anticipates and closes gaps in manufacturing capabilities for affordable, timely, and low-risk development, production and sustainment of defense systems.
The Challenge:
The armor worn by Army, Marines, Air Force, and Special Operations Forces is the best that can possibly be given to them, however, the number one request is to make the armor lighter. There are technologies to reduce the weight of body armor, but these technologies were impractical for mass production and fielding or beyond any one manufacturer’s risk to develop.

ManTech Response:
- The Defense-Wide Manufacturing Science and Technology Program and Army ManTech invested $10.5M to develop and refine manufacturing technologies and integrate manufacturing and multi-component assembly techniques to reduce weight and cost of improved body armor
- Used multiple data exchange mechanisms across six manufacturers to inform industry of technology goals, including small and large entities and alternative technology suppliers

Impact:
- Reduced weight of Enhanced Small Arms Protective Inserts (ESAPI) from 7.0 pounds per square foot to 6.3 pounds per square foot (over one half pound per plate)
- Improved capacity through ramp up/ramp down processes with acceptable cycle times (e.g., 50-100 units/day/operation)
- Return on Investment is estimated at 12 to 1 with a cost benefit of $71M
- Transitioned the improved processes directly to the industrial base for production
- Body-armor improvements transition directly into PM SPIE’s Soldier Protection System initiative

Enabled 10% lighter weight body armor

PARTICIPANTS

Defense-Wide Manufacturing Science and Technology, Army ManTech, Army Research Laboratory, Verco, CoorsTek, Accudyne, MCUBED, Ceradyne, PM Soldier Protection and Individual Equipment (PM SPIE)
**ManTech Improves Affordability of the F-35 Canopy with Automated Thermoforming Process**

**The Challenge:**
The outer ply for the F-35 canopy system is formed from a continuous flat sheet of stretched acrylic using a vacuum thermoforming process consisting of several steps over multiple days to gradually shape the compound curvature of the canopy. Manually manipulated support guides and clamping fixtures are used requiring highly skilled labor and resulting in significant variability and high cost.

**ManTech Response:**
• Navy ManTech developed an automated thermoforming process to meet the demanding optical and dimensional requirements of the F-35 canopy
• Characterized the manual clamping operation by integrating load cells into the manual clamps to determine clamp forces and times
• Identified automation components able to survive a 200°F oven
• Developed prototype clamping mechanisms to determine the most effective clamping arrangement
• Created baseline control algorithms to automate the thermoforming process
• The full scale prototype system successfully formed more than 10 canopies to program specifications
• Navy ManTech investment of $1.3M

**Impact:**
• Reduced the number of forming ovens and tooling sets for full rate production from 10 to 6
• Reduced the variability in thickness and optical quality of the canopy by increasing the Process Capability Index (Cpk) from 0.6 to 1.33
• Achieved a 30% reduction in forming and post-forming labor hours

**Estimated cost savings of $74M**
**ManTech Reduces Cost of Data Link Systems Using Affordable Diplexer Technology**

**The Challenge:**
The Warfighter needs real time networked data in theater. However, cost grows as bandwidths become more crowded. Data link systems found in Unmanned Arial Vehicles (UAVs) such as the Predator, Global Hawk, Hunter, and other airborne platforms are expensive, have long lead times due to exotic materials, and require extensive skilled touch labor with long cycle times.

**ManTech Response:**
- Air Force ManTech developed and produced a tuneless diplexer using additive manufacturing to reduce material waste, cycle time, cost and to increase yield
- Utilized highly-developed software simulation and advanced manufacturing techniques to create the Advanced Tuneless Diplexer that delivers superior performance at significantly reduced cost
- Implemented the following manufacturing improvements into new Mini Data Link product to improve overall data link lead time and cost:
  - Replaced complex precision machined parts with inexpensive die cast components
  - Eliminated gold plating, tuning and re-tuning
  - Incorporated automated test to assess twenty units at a time
- AFRL ManTech investment of $5.4M

**Impact:**
- Reduced unit cost of Mini Data Link Diplexer from ~$20,000 to ~$2,000 each
- Increased performance and reliability of diplexer by reducing manufacturing variability
- Reduced lead time from 13 months to 3 months
- Provides the Warfighter with affordable, capable, real time networked data

~65% cost savings In Mini Data Link
The Challenge:
High performance Infrared Focal Plane Arrays (IR FPAs) used in most Army Forward Looking Infrared (FLIR) applications are expensive. Their costs are dominated by yield limits in growth, fabrication processes and by current limits on number of die per wafer. Enabling transition to an alternative substrate material (either Gallium Arsenide (GaAs) or Silicon (Si)) would substantially reduce FPA acquisition costs due to the large size of these commercially supported substrates.

ManTech Response:
• An Army ManTech effort enabled high definition, dual band format focal plane arrays at comparable cost to standard definition, single band format focal plane arrays
• Demonstrated the first high definition focal plane array on silicon substrate to meet program requirements and have established two domestic sources now ready for implementation
• Increased wafer size from less than 50 cm2 to ~ 200 cm2, with concomitant increase in number of die per wafer
• Improved growth yield from 25% to 70%
• Army ManTech investment of $21.8M with additional $11.1M industry cost share

Impact:
• Improved warfighting capability in urban environments using wide-area persistent surveillance from tactical unmanned aerial vehicles
• 5X reduction in cost
• Multi-band performance at less cost than single band cost
• Transitioned to PM Forward Looking Infrared common sensor payload during FY13 for production

5X Reduction in Cost
The Challenge:
Every year, tens of millions of dollars are invested in Government Furnished Material (GFM) that is acquired and provided to manufacturers for production of critical military uniform items for the Warfighter. The sole supplier of GFM, Burlington Industries, and the DLA 3rd party logistics provider (3PL) expend thousands of hours in shipment, warehousing, inventory and receipt processes to account for the millions of yards of GFM fabric produced annually. Accountability of this material depended on time-consuming and error-prone manual processes to record the key characteristics – such as type, quantity, and unit cost - of this valuable commodity.

ManTech Response:
• DLA's Customer Driven Uniform Manufacture (CDUM) program designed and implemented Radio Frequency Identification (RFID) technology solutions at the GFM supplier, Burlington, and the DLA 3PL to automatically capture GFM information without manual intervention
• Shipment, inventory and receipt processes were re-designed and streamlined to reduce process steps, eliminate manual recording of data, and automate data transfer between information systems at Burlington and the 3PL
• DLA CDUM ManTech investment of $500K

Impact:
• Receipt processing was reduced from 5 hours per shipment to less than 30 minutes
• The time to conduct a physical inventory was reduced from 3 or 4 days to 4 hours
• Accounting for GFM in a storage bin was reduced from 30 minutes to 15 seconds
• Burlington Industries, at their own expense, continued to implement the demonstrated technology for GFM after the R&D effort was complete, and plans to implement the technology on their commercial product line

Time to perform key supply chain processes reduced by 90% or more
ManTech Improves VIRGINIA Class Submarine Affordability Through Innovative Shipyard Material Flow Processes

The Challenge:
Shipyard material movement activities require multiple hand-offs to provide just-in-time parts to support the VIRGINIA Class Submarine (VCS) construction facilities at the General Dynamics Electric Boat (GDEB) Groton and Quonset Point shipyards. Improvements in material handling processes and technologies significantly reduce construction cost.

ManTech Response:
- Navy ManTech conducted technology assessments to determine industry best practices for material flow processes and technology at select commercial companies (GD Gulfstream, IKEA, NASSCO & Toyota)
- Mapped GDEB ‘As-Is’ processes, identified desired ‘Future State’ processes, and developed an actionable technology implementation strategy
- Piloted innovative technologies to validate new processes including:
  - Wireless Issuance Technology
  - RFID Material Tracking
  - Automated Dispensing at point-of-use
- Implemented process improvements that align point-of-use material delivery with VCS build strategy
- Navy ManTech investment of $1.2M

Impact:
- Realized initial cost savings of $270K per hull with zero implementation cost prior to project completion
- Reduced cost, cycle & wait times, and transaction errors
- Streamlined delivery processes and improved material movement through shipyard

Total savings estimated at $1.86M/VCS hull
In March 2012, President Obama proposed the formation of up to 15 Institutes of Manufacturing Innovation and directed the use of existing funds to launch a pilot institute. By August 2012, the Defense-Wide Manufacturing Science and Technology (DMS&T) program in partnership with the Army, Air Force, DOE, NSF, and NASA, established the pilot Institute, the National Additive Manufacturing Innovation Institute or NAMII. One year later, in 2013, this pilot institute adopted a new name – “America Makes”. The continued focus of America Makes is to accelerate the adoption of additive manufacturing (AM) technologies – a suite of emerging technologies to fabricate metallic, plastic, ceramic, and electronics parts using a layer-by-layer technique, where material is placed precisely as directed from a 3D digital file – in the U.S. manufacturing sector and to increase domestic manufacturing competitiveness. This is accomplished by: fostering a highly collaborative infrastructure for the open exchange of AM information and research; facilitating the development, evaluation, and deployment of efficient and flexible AM technologies; engaging with educational institutions and companies to supply education and training in AM technologies to create an adaptive, leading workforce.

In the first year, America Makes created an organizational model; recruited key staff; opened an Innovation Factory with AM equipment entrusted by leading manufacturers; defined its technology investment strategy; used innovative and highly effective methods to engage the community at workshops and conferences; awarded initial R&D projects; and began developing a web-based environment for innovation and collaboration. For more information, go to www.americamakes.us or contact the DoD Lead, Jennifer Fielding, Jennifer.Fielding@us.af.mil.
Building a National Network

In 2013, the Obama Administration announced a competition to create three more manufacturing innovation institutes with a Federal commitment of over $200 million across five Federal agencies – Defense, Energy, Commerce, NASA, and the National Science Foundation. These new institutes will build off the initial success of “America Makes” as highlighted in the President’s February State of the Union address. The Department of Defense will lead two of the new 2013 Institutes, focused on “Digital Manufacturing and Design Innovation” or DMDI, and “Lightweight and Modern Metals Manufacturing Innovation,” or LM3I. The Department of Energy will lead one new institute named “Clean Energy Manufacturing Innovation Institute.”

Digital Manufacturing and Design Innovation Institute

Advanced design and manufacturing tools that are digitally integrated and networked with supply chains can lead to ‘factories of the future’ forming an agile U.S. industrial base with significant speed to market advantage. A national institute focusing on the development of novel model-based design methodologies, virtual manufacturing tools, and sensor and robotics based manufacturing networks will accelerate the innovation in digital manufacturing increasing U.S. competitiveness.

Lightweight and Modern Metals Manufacturing Innovation Institute

Advanced lightweight metals possess mechanical and electrical properties comparable to traditional materials while enabling much lighter components and products. A national institute will make the U.S. more competitive by scaling-up research to accelerate market expansion for products such as wind turbines, medical devices, engines, armored combat vehicles, and airframes, and lead to significant reductions in manufacturing and energy costs.

DoE-led Clean Energy Manufacturing Innovation Institute

Wide bandgap semiconductor based power electronic devices represent the next major platform beyond the silicon based devices that have driven major technological advances in our economy over the last several decades. Wide bandgap technology will enable dramatically more compact and efficient power electronic devices for electric vehicles, renewable power interconnection, industrial-scale variable speed drive motors and a smarter more flexible grid; in addition to high-performance defense applications (e.g. reducing the size of a sub-station to a suitcase).
The Challenge:
Navy ships use thousands of lights for illumination and signaling. Obsolete incandescent and high intensity sources generate and disperse unwanted heat, and routine light replacement is costly and unsafe. In addition, electrical cables used to power remote light fixtures are heavy and introduce loss.

ManTech Response:
• Navy ManTech targeted improvements in Remote Source Lighting (RSL) systems that send light through an optical fiber from an accessible source unit to a remote luminaire
• Replaced electrical cables with optical fibers to carry light over long distances with minimal loss
• Integrated control systems with shipboard lighting controls
• Developed LED sources to greatly increase reliability
• Optimized illumination spectra so personnel can see better with less glare
• Optimized signal lighting for controlled visibility at specified distances
• Navy ManTech investment of $1.92M

Impact:
• Personnel no longer have to reach inaccessible (mastheads) or hazardous (chemical storage) locations to change light bulbs
• 33% fewer lights required for illumination
• Systems currently being installed on Navy ships:
  – LPD 17 class – 50 systems installed
  – DDG 1000 – 84 systems installed or on order
• LPD 17 being upgraded to LED sources that have 20X – 30X longer life

Estimated $185K cost avoidance per hull

PARTICIPANTS

Navy ManTech, Penn State Electro-Optics Center,
RSL Fiber Systems, Ingalls Shipbuilding
The Challenge:
Colorimetric Reconnaissance Explosive Squad Screening (CRESS) kits allow warfighters to accurately detect homemade explosive components. However, tool complexity and long fabrication lead times make prototyping (with production representative materials) and design iterations for testing purposes lengthy and cost-prohibitive.

ManTech Response:
• Army ManTech demonstrated new fabrication techniques that enabled rapid development of prototypes to drive down cost and design iteration times
• Used additive manufacturing and rapid prototyping technology to build injection molding tooling from plastic (Krypton Green), ceramic (Nanotool), and metal (Maraging Steel)
• Fit the injection molding tooling into Master Unit Die (MUD) Frames
• Produced production-representative parts using MUD Frame in an injection molding machine
• Army ManTech investment of $660K

Impact:
• Reduced cost of producing an injection molding tool from $7400 to $575
• Reduced time to fabricate new injection molding tooling from 72 hours to 8 hours
• Reduced Mean Time to Repair (MTTR) injection molding tools by 89%

75% Cost Avoidance Per Component Insert
The Challenge:
Critical internal features of many high performance turbine airfoil parts cannot be effectively measured using the current ultrasonic wall measurement technology. X-ray Computed Tomography (CT) has the capability to measure wall thickness and internal features of many turbine airfoil components, however, the cost of CT equipment is 30 to 50 times greater than that of the ultrasonic equipment and product throughput is considerably slower.

ManTech Response:
• Air Force ManTech worked with industry to implement an improved CT system with production throughput increase to 30 parts per hour while maintaining dimensional measurement accuracies of +/- 5% or 0.001" for at least 68% of required measurements
• Instituted an industry guidelines document outlining process and personnel requirements for taking dimensional measurements using CT
• Developed a “Design for CT Inspectability” course for training engineers and measurement technicians on principles of use and implementation
• Air Force ManTech and Metals Affordability Initiative combined investment of $1.8M with $0.7M industry cost share

Impact:
• Reduced inspection cycle time from 20 minutes per airfoil to two minutes per airfoil
• Facilitated adoption of CT technology for metrology in aerospace supply base; four companies are procuring CT systems for implementation in production
• Enabled design and production of advanced components for increased cooling efficiency and reduced specific fuel consumption

$6M cost savings annually with improved airfoil performance
**ManTech Develops Production Capability for Lighter, Higher Energy Soldier Batteries**

**The Challenge:**
Soldiers are relying on more batteries to meet the rising energy demands of their soldier-carried equipment, which adds weight and reduces mobility and effectiveness. Current non-rechargeable military battery chemistries include lithium manganese dioxide (Li/MnO2) and lithium sulfur dioxide (Li/SO2). New higher energy density lithium carbon monofluoride (Li/CFx) technology has been demonstrated to reduce the number of batteries and weight carried by the warfighter, but there is no domestic manufacturing capability to produce this technology in military batteries.

**ManTech Response:**
- DLA’s Battery Network (BATTNET) program developed and implemented manufacturing technology on existing fabrication lines to enable production of hybrid Li/CFx-MnO2 batteries that meet military requirements
- Produced high performance BA-5790 and half-size batteries for testing and qualification by U.S. Army Communications and Electronics Research Development and Engineering Center (CERDEC)
- DLA (ManTech) investment of $450K

**Impact:**
- Introduced the next generation technology to military batteries
- Established a U.S. source for a lighter battery to lessen the soldier carried load during missions
- Reduced the number of batteries required through a higher performance chemistry:
  - 110% increase in energy capacity compared to Li/SO2 BA-5590 and 40% increase compared to Li/MnO2 BA-5390
  - Half-size battery is 31% lighter with 7% more energy than BA-5590 and 50% lighter than BA-5390
- Increased shelf life from 5 years to 15 years
- Improved industrial base responsiveness by establishing an additional supply capability for one of the most common form factor batteries

110% Increase in soldier battery energy
ManTech Improves Manufacturing Processes and Affordability of Chip Scale Atomic Clocks

The Challenge:
C4ISR systems derive critical synchronization from GPS. To perform effectively, GPS requires precise time for rapid signal re-acquisition. When GPS is lost, C4ISR capability (e.g., communication) is lost. The DARPA-developed Chip Scale Atomic Clock (CSAC) provided precision timing and frequency, however, the manufacturing of the physics packages in CSAC relied primarily on manual assemblies that resulted in low production capability and a high unit cost.

ManTech Response:
• DMS&T, Army ManTech, and Air Force GPS Directorate program offices worked with industry to produce the CSAC at a higher yield and lower cost
• Developed batch/automated processes and testing for manufacturing the physics package:
  – Batch processes for atomic cell filling and sealing, and vacuum sealing
  – Robotic assembly of the physics package components/subassemblies
• Lowered the unit cost by improving the Vertical Cavity Surface Emitting Laser yield, redesigned the physics package and electronics with less expensive parts without sacrificing performance, and improved the physics package assembly yield
• Fostered competing manufacturing technologies and alternative solutions to ensure reduced final cost
• DMS&T and Army ManTech joint investment of $10.7M (DMS&T) and $13.2M (Army) with an additional $2.2M provided by the user at Air Force GPS Directorate

Impact:
• Improved manufacturing processes and affordability to enable critical communication capabilities
• Maintained the integrity of the network (per TRADOC Pamphlet 525-66 Section 4-9. FOC-01-06: an Agile, Ubiquitous Network)
• Plan is to integrate CSACs into miniaturized, robust Position Navigation and Time systems
• Unit cost reduction from over $10K per CSAC to $300 per CSAC
• Increased manufacturing capacity to 20K units per year

42:1 return on investment for critical communication capability
DoD ManTech developed the original numerically controlled machine tool and the associated programming language (APT) to advance military aircraft manufacturing – now used globally in countless manufacturing applications.

The DoD ManTech program developed the technology that became the foundation for the current microelectronics industry.

DoD ManTech developed processes for the production of the forerunners of precision laser guided missiles and munitions.

DoD ManTech developed a process for reverse engineering thousands of obsolete microcircuits that support weapon systems still in service – use and mission benefits continue to expand today.

DoD ManTech program developed magneto-rheological finishing for advanced military optics. The process is now also used by all manufacturers of photolithographic optics.

In the 21st century, DoD ManTech:

– Provided revolutionary electronics such as Micro Electro-Mechanical Systems (MEMS) for field artillery systems and Focal Plane Arrays (FPAs) for sensor systems
– Enabled manufacturing of interceptor body armor currently used by our forces
– Manufactured next generation of enhanced combat helmets to replace 30-year old technology
– Developed automated processes for lighter, durable and more comfortable composite prosthetics
– Provided improved combat rations with high quality, safer, and surge-capable production
– Implemented higher power, longer duration batteries across weapon systems
– Applied model-based manufacturing and CAD in aeronautical and maritime construction for greater affordability
The Defense Manufacturing Technology Achievement Award (DMTAA) is awarded to ManTech teams who demonstrate outstanding performance in executing and delivering ManTech solutions for DoD. This year, 7 teams were nominated for their work on the projects listed below. The Joint Defense Manufacturing Technology Panel would like to recognize these teams for their hard work and congratulates the winners of this year's DMTAA, to be announced at the Defense Manufacturing Conference.

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Organization</th>
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<td>* F-35 Canopy Thermoforming Automation</td>
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<td>* Restoration of Aerospace Parts by Cold Spray</td>
<td>DMS&amp;T Navy</td>
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<td>* Advanced Body Armor</td>
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<td>Meals Ready to Eat (MRE) Assembly Improvement Project – “MRE Fit”</td>
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<td>* Plate Edge Preparation Improvements</td>
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<td>* Chip Scale Atomic Clock</td>
<td>DMS&amp;T Army</td>
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* Finalist
Defense Manufacturing Technology Achievement Award

The Joint Defense Manufacturing Technology Panel (JDMTP) seeks to recognize and honor those individuals most responsible for outstanding technical accomplishments in achieving the vision of the Department of Defense (DoD) ManTech Program. That vision is to realize:

“A responsive world-class manufacturing capability to affordably and rapidly meet Warfighter needs throughout the defense system life cycle.”

To this end, the Defense Manufacturing Technology Achievement Award was established in the Fall of 1999.

AWARDEES

2012 – Fastener Insertion Live Link System (FILLS)
2012 – Customer/Supplier Interoperability During Collaborative Design
2012 – 3D Technical Data Package and Certification
2011 – Use of Digital Radiography for Final Part Acceptance of Aerospace Casting
2011 – Prosthetics & Orthotics Manufacturing Initiative (POMI)
2011 – Automated Fiber Placement of Carbon Fiber Bismaleimide Materials
2010 – High Power, High Energy Density Lithium-Ion Batteries
2010 – Seal Extrusion Development and Demonstration (SEDD)
2010 – Weld Seam Facing and Back Gouging
2009 – F-35 Inlet Duct Robotic Drilling
2009 – Low Cost Manufacturing of Materials for Improved Warfighter Protection
2008 – Laser-Welded Corrugated-Core (LASCOR) Panel Evaluation
2008 – Low Observable Paints for Aircraft
2007 – Lean Battery Initiative
2007 – Low Cost SiC-N Ceramic Tile
2007 – Translational Friction Stir Welding
2006 – Uncooled Focal Plane Array Productivity
2006 – Engine Rotor Life Extension
2005 – Large Aircraft Infrared Countermeasures
2005 – Large Marine Composite-to-Steel Adhesive Joints
2004 – Lean Depot Repair
2004 – Uniform Cannon Tube Reshaping
2003 – Laser Additive Manufacturing
2003 – Laser Shock Peening
2002 – Composites Affordability Initiative
2002 – Apparel Research Network
2001 – Enhanced Manufacturing Processes for Body Armor
2000 – Advanced Optics Manufacturing
2000 – Flexible Manufacturing of Microwave Vacuum Devices
1999 – Advanced Fiber Placement