

ACCELERATING AMERICA'S MANUFACTURING ADVANTAGE TO WIN THE GREAT POWER COMPETITION



2024 DoD Manufacturing Technology Program
December 2024

The Department of Defense Manufacturing Technology Program

WHAT? The Department of Defense Manufacturing Technology (DoD ManTech) Program was originally created in 1956, and falls under Section 4842 of Title 10, United States Code (USC), to further national security objectives through the development and application of advanced manufacturing technologies and processes. The Program is composed of the Military Service and DoD Agency (or “Component”) ManTech investment programs executed by the Army, Navy, Air Force, Defense Logistics Agency (DLA), and the Office of the Secretary of Defense (OSD).

WHY? The U.S. Military capability depends on our ability to ensure technological advantage over our adversaries. We must constantly respond to world military challenges in a manner that is innovative, agile, robust, resilient, and affordable. The DoD ManTech Program meets these challenges with a focus on cost-effective, risk-mitigated manufacturing development, and sustainment of defense systems.

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

HOW? Although DoD ManTech has a singular mission and shared strategic vision across the military services, defense agencies, and OSD, each component uses its own organization-specific processes, mandates, and procedures to select programs and execute its investments and initiatives.

MISSION: The DoD ManTech Program anticipates and closes gaps in manufacturing capabilities for affordable, timely, and low-risk development, production, and sustainment of defense systems.

The directors and senior managers of these programs coordinate through the auspices of the Joint Defense Manufacturing Technology Panel (JDMTP). The JDMTP is chartered to identify and integrate requirements, conduct joint program planning, and develop joint strategies. The OSD ManTech Office administers the DoD ManTech Program by providing central guidance, direction, and support to the components ManTech Programs.

The OSD ManTech Program also manages Manufacturing Education and Workforce Development (M-EWD), the Manufacturing Science & Technology Program (MSTP), and the DoD Manufacturing Innovation Institutes (DoD MIIs). The brochure includes a special insert to provide updates and recognizes over 10 years of the DoD’s public-private partnership with its nine DoD MIIs: America Makes (the national additive manufacturing institute), Manufacturing Times Digital (or MxD, digital manufacturing and cybersecurity institute), LIFT (lightweight materials institute), the American Institute for Manufacturing Integrated Photonics (AIM Photonics), NextFlex (the flexible hybrid electronics institute), Advanced Functional Fabrics of America (AFFOA), BioFabUSA (advanced regenerative manufacturing institute), Advanced Robotics Manufacturing (ARM institute), and BioMADE (bioindustrial manufacturing institute).

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Convening ManTech Programs to Build a Joint Force through Cross-Service Collaboration

The DoD ManTech Program bridges the ManTech programs under a unified framework. By bringing together representatives from each Service and agency, the program ensures that the U.S. defense manufacturing community operates as a collaborative and coordinated joint force. This collective approach helps streamline decision-making, foster innovation, and drive the adoption of advanced manufacturing technologies.

The Joint Defense Manufacturing Technology Panel (JDMTP) is the leading coordination body for this effort. Comprised of representatives from all ManTech components, the JDMTP facilitates regular engagement among the Service and Agency ManTech programs. It serves as a forum to share technical challenges, progress, and best practices without interfering with the Service's mission priorities. This ongoing dialogue ensures that each branch and agency can access the latest technological developments and collaborate effectively on joint projects, thereby enhancing the overall defense manufacturing capabilities.

The DoD ManTech Program has spearheaded several initiatives to enhance cross-service collaboration and drive joint investments in manufacturing technologies critical to future defense capabilities. Some of the vital collaborative initiatives include the following:

Additive Manufacturing for Sustainment: This cross-service initiative focuses on using 3D printing technologies to improve the sustainment and readiness of military systems. By collaborating across services, this initiative accelerates the development of advanced manufacturing processes to repair or replace parts more efficiently, reducing downtime and costs.

Navy ManTech is developing a qualified in-situ repair process that monitors a family of parts, including knife-edge seal teeth features on rotating engine components. It is utilizing power-blown L-DED additive manufacturing with Inconel 718®.

Defense Logistics Agency (DLA) ManTech is collaborating with the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness (ODASD-MR) to integrate advanced manufacturing technologies at the edge with the Organic Industrial Base. This partnership aims to facilitate the rapid deployment of additive manufacturing produced parts and their technical data packages on the Secured Unclassified Network, allowing for collaboration with NATO partners. Furthermore, as this capability evolves, it addresses the challenges posed by contested logistics and potential threats to the global supply chain.

OSD MSTP-funded Joint Cold Spray project performs two distinct functions to repair equipment at forward locations: mobile 3D printing and direct-to-surface bonding. The system can use various metal powders to produce parts to specific tolerances and application demands. At maturity, it can achieve widespread use as a tool to repair a vast array of military platforms for both point-of-need applications and sustainment. Its implementation would drastically reduce equipment downtime, circumvent lengthy replacement part lead times, and provide substantial cost savings.

Directed Energy: These systems will allow the Services to counter various current and emerging threats with rapid responses and engagement at the speed of light. High-energy laser (HEL) and high-power microwave (HPM) technologies offer new ways to counter these diverse threats.



Cold spray technology

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The Army, Navy, and OSD ManTech programs have matured the industrial base in manufacturing process improvements, supply chains/management, and alternative materials of critical DE components. These combined efforts have yielded substantial improvements for DE systems through automation and the reduction of touch labor to meet future demand and get these strategic combat capabilities into the Warfighter's hands. These efforts have also been instrumental in establishing domestic suppliers to eliminate reliance on non-domestic sources for these DE materials, components, subsystems, and systems of systems. Joint Air Force and Navy ManTech programs also address needs in novel fibers and phase arrays for HEL systems while developing novel sources and components for HPM systems.



Advanced Composites for Lightweight Structures: The Services work together on advanced composite materials for lightweight, high-strength structures. This collaboration aims to improve the performance and durability of defense platforms while reducing weight, which is particularly valuable for aircraft and unmanned systems.

Navy ManTech developed an alternative method to fabricate non-flight-critical parts using previous data to validate HexPEKK® material and demonstrated performance against F-35 Lightning II specifications. New designs for candidate non-flight-critical parts, such as ducts and equipment trays, were developed, printed, and shown through full-scale testing. The technology's benefits include estimated acquisition cost savings of \$28.6M for the joint-Service F-35 Program, additional potential weight savings, and application to other programs. Navy ManTech anticipates that Lockheed Martin and Northrop Grumman will implement the technology in FY25.

Digital Manufacturing and Cybersecurity: As defense systems become increasingly digitized, the DoD ManTech Program is driving collaboration across services to integrate cybersecurity measures into manufacturing processes. This joint initiative ensures digital manufacturing technologies are secure and resilient against cyber threats.

Navy ManTech applied digital thread to ship and submarine processes to locate and install paint masking and hanger stud positions. General Dynamics Electric Boat and General Dynamics Bath Iron Works have implemented the new process. The technology reduces hull construction costs and provides five-year cost savings of nearly \$13M for the VIRGINIA and COLUMBIA Class submarine and DDG 51 Class destroyer.

MSTP's Quality Control, Quality Assurance Companion (QQComp) project is a Joint effort to augment human workers' inspection activities with an advanced, DoD-specific computer vision toolkit for object detection to support maintenance activities and develop a standards-based infrastructure for industrial XR. The QQComp team has demonstrated a viable path towards a file format-agnostic approach to model-based quality assurance by maturing open-source standard data translation tools. A standards-based approach will result in government-developed open-source software that can be reused and shared by the larger community, resulting in efficiency gains within the industrial base, error reduction and detection, and cost savings by avoiding vendor lock-in.

The DLA ManTech digital twin/digital thread initiative has made significant strides through successfully completing a pilot project. This project focused on utilizing process mining capabilities to enhance the enterprise-wide digitization strategy and support business process re-engineering. It also aims to improve the ability to audit the DLA's global supply chain transactions. The advancements brought by this initiative will profoundly impact various aspects of the nation's defense strategy.



Enhancing Joint Force Efficiency: By fostering cross-service and cross-agency collaboration, the DoD ManTech Program enhances the overall efficiency of defense manufacturing efforts. This unified approach reduces duplication of effort and maximizes the impact of investments in advanced manufacturing technologies. The shared expertise and resources enable the U.S. to address complex challenges more effectively, ensuring the U.S. develops, produces, and sustains cutting-edge capabilities.

The DoD ManTech Program is vital to creating a unified defense manufacturing force that leverages the strengths of each Service and agency. Through the JDMTP and its subpanels, the program fosters collaboration, drives innovation, and accelerates the transition of critical technologies into defense systems. By coordinating efforts across services and agencies, the DoD ManTech Program ensures the U.S. maintains its competitive edge in the Great Power Competition, strengthening national security and advancing America's manufacturing advantage.

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Army Manufacturing Technology Program Overview

The **U.S. Army Manufacturing Technology (ManTech)** program's mission is to support Army readiness and modernization priorities by improving and maturing manufacturing technologies to ensure strategic overmatch and fulfill national security objectives. Funded via Budget Activity 7, the Army ManTech Program addresses manufacturing solutions that enable and improve manufacturing and producibility processes to advance the Army's technological capabilities while reducing life-cycle costs for current and future Army acquisition programs. Army ManTech advances manufacturing technology and processes from a Manufacturing Readiness Level (MRL) 4 through MRL 7.

The program has three objectives:

- (1) Promote material development to meet performance requirements
- (2) Improve manufacturability and reduce the cost to programs of record (PoR)
- (3) Advance the organic industrial base (e.g., arsenals)

The Army ManTech Program accomplishes critical technology maturation and transition by leveraging effective, efficient, affordable, and adaptable manufacturing processes resulting from coordinated efforts between the Program Executive Office (PEO) and its supporting Program Manager (PM), the Army Science and Technology (S&T) community, key industry and academic partners, and the organic industrial base.

ORGANIZATION

The Army ManTech Program supports Army-wide manufacturing requirements through coordinated efforts across the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)); U.S. Army Materiel Command (AMC); U.S. Army Futures Command (AFC); U.S. Army Space and Missile Defense Command (SMDC); U.S. Army Medical Research and Development Command (MRDC); and the U.S. Army Corp of Engineers (ACE). The Deputy Assistant Secretary of the Army for Research and Technology (DASA(R&T)) provides oversight and management of the Army ManTech program on behalf of the ASA(ALT).

INVESTMENT STRATEGY

The U.S. Army Manufacturing Technology (ManTech) Program is an industrial preparedness program that seeks solutions to address end-item efficiency and affordability of manufacturing processes to advance the Army's technological capabilities. These improved processes are intended to reduce life-cycle costs for current and future Army acquisition programs within the following portfolio areas:

- Network Command, Control, Communications & Intelligence (NC3I)
- Ground
- Aviation
- Soldier
- Weapons

The Army ManTech Program coordinates with key partners across the defense industrial base to develop manufacturing processes and apply manufacturing technologies that will reduce acquisition and sustainability costs, as well as repair cycle times, of defense weapons systems in direct support of Army warfighting capabilities critical for our Soldiers' success.

Navy Manufacturing Technology Program Overview

The **U.S. Navy Manufacturing Technology (ManTech)** program is an industrial preparedness program focused on affordability improvements for key naval platforms as well as capability acceleration to get capabilities to the Fleet faster. Navy ManTech works closely with the Program Executive Offices (PEOs), Program Offices, key industry partners, and the Navy ManTech Centers of Excellence to identify manufacturing affordability challenges; develop affordable manufacturing technology; and transition that technology to the industry partners for implementation. Once implemented, the developed technology results in substantial affordability improvements — measured as either cost savings or cost avoidance — and strengthens the industrial base.

ORGANIZATION

Navy ManTech executes through seven Centers of Excellence (COEs), which provide a focal point for the development and transfer of new manufacturing processes and equipment in a cooperative environment with industry, academia, and the Naval Research Enterprise.

- Center for Naval Metalworking (CNM)
- Composites Manufacturing Technology Center (CMTC)
- Electronics Manufacturing Center (EMC)
- Electro-Optics Center (EOC)
- Energetics Manufacturing Technology Center (EMTC)
- Institute for Manufacturing and Sustainment Technologies (iMAST)
- Naval Shipbuilding and Advanced Manufacturing (NSAM) Center

INVESTMENT STRATEGY

Navy ManTech will execute an investment strategy in FY24 – FY28 based on the direction of Office of Naval Research (ONR) leadership and determined by total acquisition funding; stage in acquisition cycle; platform cost-reduction goals; cost-reduction potential for manufacturing; and other factors primarily associated with the ability of ManTech to deliver the technology when needed. Over the next five years, Navy ManTech will continue to improve the affordability of Navy platforms critical to the future force, focusing resources on the VIRGINIA Class submarine (VCS), COLUMBIA Class submarine (CLB), DDG 51 Class destroyer, CVN 78 Class aircraft carrier, FFG 62 Class frigate, and F-35 Lightning II aircraft, as well as select manufacturing technology projects that accelerate the delivery of capabilities to the Navy. The eight capability acceleration thrust areas include Sustainment Technology, Energetics Production Support, Advanced Submarine Technology Fabrication, Future (Major) Acquisition Platform Support, Unmanned / Autonomous Vehicle Production, Directed Energy, Hypersonics Fabrication, and Other ONR Manufacturing Maturation. Navy ManTech will also focus efforts on PEO IWS weapon systems that support the ship platforms in its investment strategy.

Navy ManTech investment in platforms typically ranges from \$3M-8M annually and varies from year to year based on many factors, such as funding required for existing projects, past implementation record, cost savings, and potential of planned projects. Strategic planning for Navy ManTech is an ongoing effort. Navy ManTech annually analyzes acquisition scenarios and plans to determine major acquisition programs for potential investment. As the current platforms that ManTech supports mature through their respective acquisition cycles, ManTech's investment targets change. In FY24 – FY28, Navy ManTech will develop enabling manufacturing technology – new processes and equipment – for implementation on Navy weapon system production lines.

Department of the Air Force Manufacturing Technology Program Overview

OVERVIEW

Throughout its rich history, the **Department of the Air Force (DAF) ManTech** program has served a foundational role in maturing critical technologies and modern business practices for the defense industrial base, including numerically controlled machining, organic matrix composites, lean manufacturing, and manufacturing readiness levels. DAF ManTech has also worked closely with Programs of Record such as F-16, B-1, F-22, B-2, F-35, and B-21 to deliver billions of dollars in acquisition and sustainment cost savings and avoidance. Over the last twenty years, the cost of computing power, data storage, and internet bandwidth have all fallen exponentially, dramatically reshaping the manufacturing sector, and DAF ManTech remains at the forefront of the 4th Industrial Revolution (or Industry 4.0), characterized by an infrastructure built on digital manufacturing tools, such as robotics, Industrial Internet of Things (IIoT), and additive manufacturing.

ORGANIZATION

The DAF ManTech program is managed by the Air Force Research Laboratory's Manufacturing, Industrial Technologies and Energy Division within the Materials and Manufacturing Directorate. Sources used to build the program include strategic policy documents, DAF Programs of Record, AFRL's technical directorates and the AFRL Transformational Capabilities Office (TCO), industry roadmaps, the Joint Defense Manufacturing Technology Panel (JDMTP), and technical interchange meetings (TIM) with government/industry/academia stakeholders. All DAF ManTech projects are captured in technology roadmaps that are reviewed throughout the year to ensure alignment with our Warfighters. The program is funded with core 6.3 funds and by leveraging resources of other partners, such as the OSD Manufacturing Science & Technology Program, Manufacturing Innovation Institutes (MIIIs), and the Industrial Base Assessment program that is executed on behalf of the Secretary of the Air Force for Acquisition. The Division also acts as the Defense Production Act (DPA) Title III Executive Agent Program Office, effectively executing over \$1B in DPA funding as directed by the Director, Manufacturing Capability Expansion and Investment.

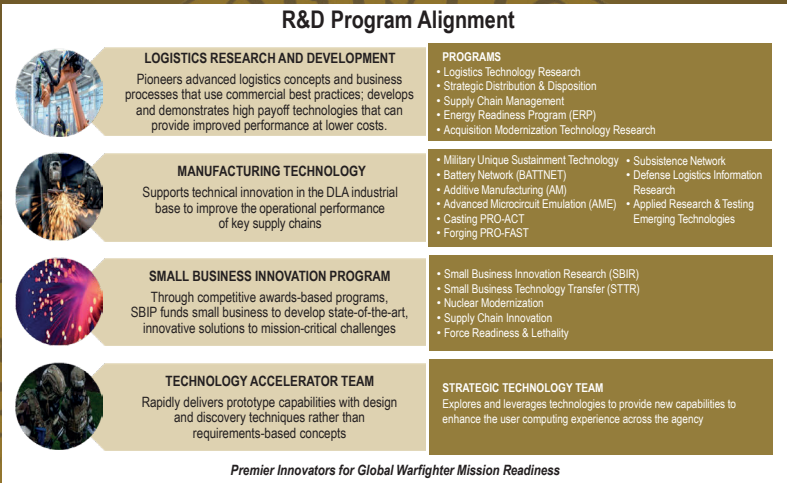
INVESTMENT STRATEGY

Based on both the DoD demand signals and the technology trends driving rapid manufacturing innovations, DAF ManTech uses five technology pillars in its investment strategy. **Advanced Concepts** includes programs that address procurement and sustainment needs of Programs of Record to provide a new capability to the weapons platform or substantial return-on-investment (ROI) in the form of reduced cost and/or increased platform availability. **Hypersonic Strike, Autonomous Collaborative Systems, Space Systems, and Networked C3 Systems** generally include enabling technologies that are more pervasive in nature and therefore impact multiple weapons platforms and are often directed at emerging operational capabilities for which there isn't currently a baseline technology.

The DAF ManTech investment portfolio also includes two crosscutting emphasis areas, Advanced Manufacturing Technologies (AMT) (TRL/MRL 4-7) and Digital Manufacturing Research (TRL/MRL 2-4). These represent pervasive opportunity areas that deliver capabilities across all the technology pillars at reduced cost and timelines in the high mix, low volume aerospace manufacturing environment. DAF ManTech efforts in AMT and Digital Manufacturing Research heavily leverage the Manufacturing Innovation Institutes as well as partnerships with academia and industry to meet Warfighter needs.

DLA Manufacturing Technology Program Overview

The **Defense Logistics Agency (DLA) ManTech** program mission is to develop and deliver new capabilities through applied technologies and innovative solutions to enhance warfighter sustainment. Working with its diverse supply chain, the DLA ManTech Program funds the advanced technology development needed to improve manufacturing capability throughout a product's life cycle. As illustrated, DLA's R&D programs deliver responsive, innovative solutions that improve DoD readiness, support current strategies and operations, and anticipate future logistics and manufacturing needs at lower cost and risk.



DLA ManTech developments provide the crucial link between invention and application by maturing, scaling up, and validating advanced manufacturing technology in “real-world” environments. The program goal is to provide a path to low-risk technology implementation by small businesses, defense unique suppliers, and to the military depots and shipyards. By anticipating and addressing production and sustainment problems before they occur, readiness levels increase, and sustainment costs are decreased.

ORGANIZATION

The DLA ManTech Program is aligned under the Office of the Under Secretary of Defense (OUSD) Acquisition and Sustainment, Assistant Secretary for Sustainment, as the nation's combat logistics support agency. Within DLA's Information Operations (J6), DLA R&D (J68) improves Warfighter support by addressing military needs, internal business processes, and industrial base manufacturing challenges. DLA ManTech works with the Military Engineering Support Activities to conduct annual strategic assessments to identify, and fund needed efforts to meet Warfighter needs.

INVESTMENT STRATEGY

The DLA ManTech program uses two lines of effort (LOE) to guide its investments. The first DLA R&D LOE 1, Industrial Base and Aging Weapon System Support, ensures a viable and responsive defense industrial base; addresses obsolescence using trusted manufacturing sources of qualified microcircuits to

sustain legacy DoD weapon systems; and introduces advanced manufacturing concepts into the DoD supply chain, such as AM replacement parts.

The 2nd DLA R&D LOE 2, 3D Technical Data Modernization/ Model Based Enterprise Technologies, transforms data into 3D machine usable formats to support DoD's digital modernization efforts for significantly improved readiness. MBE systems enable DLA, the military services and industry to specify accurate requirements and deliver high-quality material/end-items throughout the supply chain.

The DLA ManTech program portfolio areas are:

- (1) Advanced Microcircuit Emulation
- (2) Battery Network
- (3) Castings/Forgings
- (4) Military Unique Sustainment Technology (MUST)
- (5) Subsistence Network
- (6) Defense Logistics Information Research, and
- (7) Additive Manufacturing

Manufacturing Science and Technology Program Overview

The **OSD'S Manufacturing Science and Technology Program (MSTP)** focuses on cross-cutting defense manufacturing needs — those that are beyond the ability of a single service to address. The program stimulates the early development of manufacturing processes and enterprise business practices concurrent with science and technology (S&T) development to achieve the largest cost-effective impact and to facilitate the developments enabling capabilities to our warfighters. The program focuses heavily on satisfying the manufacturing technology needs for the DoD's critical technology areas including: trusted artificial intelligence and autonomy, biotechnology, integrated network systems-of-systems, directed energy, microelectronics, quantum science, hypersonics, space technology, renewable energy generation and storage, advanced computing and software, human-machine interfaces, future generation wireless technology (FutureG), advanced materials, and integrated sensing and cyber.

ORGANIZATION

The OSD ManTech office is located under the Assistance Secretary of Defense for Science and Technology, within the Office of the Undersecretary of Defense for Research and Engineering. MSTP is one of three components of the OSD ManTech Office, the other two being the DoD Manufacturing Innovation Institutes (MIIs) and Manufacturing Education and Workforce Development (M-EWD).

INVESTMENT STRATEGY

The MSTP focuses its research and development investment portfolio on cross-cutting defense manufacturing needs using a set of identified joint, defense-critical, and sometimes high-risk manufacturing technology areas. JDMTP helps identify the defense manufacturing technology gaps and assists MSTP in determining potential joint investment opportunities. MSTP then assesses these opportunities against R&E critical technology areas and then issues a call for project proposals that must feature a Governmental office lead. Project tenets must include:

- DoD Enterprise-wide issues
- Joint service applicability
- Enhanced manufacturability and producibility of a process or component
- Risk beyond reasonable and normal industry and program office
- Defense-essential or defense-unique requirement

Technology transition and joint-service or multi-system application are key factors in selecting MSTP projects. All potential MSTP projects are required to have a clear technology transition plan and target along with endorsement from the potential project team's program office. Funding is typically a combination of MSTP investment, component ManTech program investments, program office or transition office investments, and industry cost share. Technical experts are recruited from the DoD Services or Agencies to serve as government program managers and are responsible to support technical execution, conduct financial management, and ultimately transition the technology to fielded systems.

The MSTP investment portfolio is broken down into 4 categories: Advanced Electronics and Optics, Advanced Materials and Manufacturing, Enterprise and Emerging Processes, and Advanced Energetics Manufacturing.

