

D. DoD Manufacturing Technology Program



DoD's Manufacturing Technology (ManTech) Program develops and matures key manufacturing processes to accelerate technology improvements in the acquisition and sustainment of DoD weapon systems and components. Ensuring that technology is affordable and producible remains imperative to make our forces more agile, deployable, sustainable, lethal, and dominant anywhere in the world. The Program addresses process technology issues early in the design process, in development, in production, and into sustainment. ManTech

investments enable industry to develop and provide defense-essential, affordable, low-risk manufacturing processes that effectively transition technology into new and existing equipment for the warfighter. Teaming with industry, ManTech provides the crucial links from technology invention to production of defense-critical needs that are beyond the normal investment risk of industry. ManTech improvements generally translate into affordability improvements or cycle time reduction. However, investments also focus on developing "new" capabilities that actually may result in a more expensive component, but will provide dividends in system performance or life cycle cost that far outweigh the initial cost. The Program is structured around three major thrust areas:

- *Processing and Fabrication* activities develop affordable, robust processes and capabilities for metals, composites, electronics, and energetic and munitions critical to defense applications over the full life cycle. These projects create improvements to manufacturing processes on the shop floor and in repair and maintenance facilities (depots, logistics centers, and shipyards).
- *Advanced Manufacturing Enterprise* activities accelerate defense industrial enterprise progress toward implementation of world-class industrial practices as well as advanced design and information systems that support weapon system development, production, and sustainment.
- *Sustainment* projects coordinate common DoD requirements for maintenance, repair and overhaul technologies and advancements to affordably facilitate the use of current weapon systems far beyond their intended operational life.

Although the requirement to submit a Five-year Plan for the ManTech Program has been repealed with the deletion of 10 U.S.C. Section 2521(e), the Department continues to monitor the status of transition and implementation. The most recent Plan is available on the Internet at:

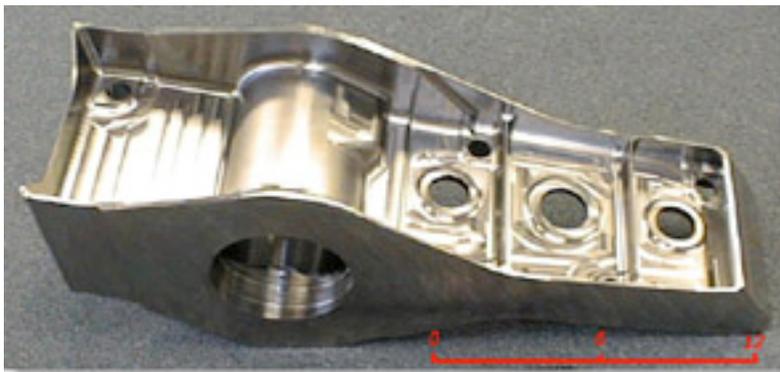
<http://www.dodmantech.com/pubs/pubs.shtml>.

Technology Transfer & Dual Use

ManTech program success is measured by the transitioning of advanced technology from research and development to implementation into new or existing systems. ManTech works with the commercial industrial base as early in the process as possible, by either adopting its best practices or transferring results of military processes to the commercial arena.

Here are examples of the two projects that received the 2003 Defense Manufacturing Technology Achievement Award presented on December 2, 2003, at the Defense Manufacturing Conference, Washington, DC. Award recipients included government and industry technologists responsible for the success of the Laser Additive Manufacturing project, and the Laser Shock Peening Initiative.

The Laser Additive Manufacturing project was a joint Army/Air Force/DLA project that contributed to an entirely new manufacturing process for titanium structure fabrication. This process was recently applied to aluminum F-15 Strike Eagle pylon ribs that were failing prematurely. Action in the Iraq war had depleted the inventory. Ship sets made from titanium replaced the failed components in only two months and have a life extension of five times that of aluminum, thereby significantly increasing the safety of the structure and increasing the mission availability of the aircraft. Awards were presented to team members from the Army Research Laboratory; the Air Force Research Laboratory; the Defense Logistics Agency; Pratt & Whitney; AeroMet Corporation; Lockheed Martin Corporation; The Boeing Company; the Office of Naval Research; Northrop Grumman Corporation; and MTS.



LaserAdditive Manufacturing (LAM) is based on a stereo lithography approach to manufacturing. Using software to convert a CAD file to a sliced format, parts with properties in the class of forgings are built one layer at a

time, making LAM a true manufacturing-on-demand process. Cycle time is reduced by up to 80%; the cost of many components is reduced by 10% to 30%; and the process is environmentally friendly and provides tremendous surge capability.

This project also exemplifies the “jointness” aspect of the ManTech Program, demonstrating the impact that can be realized through joint investment. The Army funded the development of the production system for LAM. The Air

Force funded the refinement of the process and the development of aviation applications. The Navy provided funding for application to F/A-18 components. DLA funding is supporting full qualification of weapon system applications from all services and the development of a next generation capability. And, finally, most of the work was cost shared by the companies involved.



The Air Force ManTech Program, working with General Electric Aircraft Engines and LSP Technologies, Inc., developed an emerging technology, laser shock peening, as a potential solution to increase the durability of titanium fan blades and decrease the sensitivity to foreign object damage. Laser shock peening uses a

high-energy laser pulse to impart an intense shock wave into the surface of metal parts. The shock wave creates deep compressive residual stresses, greatly improving fatigue properties and toughness.

For the Air Force, application of laser peening to the engine blades of the B-1B Lancer, F-16 Falcon, and F/A-22 Raptor has already avoided over \$59 million in costs through reduced turbine engine airfoil failures, blade replacement costs, and reduced secondary damage engine repair costs. Aircraft crew safety and mission readiness have been vastly enhanced.

The Laser Shock Peening process is being evaluated for a number of other DoD weapon system applications such as transmission gears in the CH-47 helicopter, turbine engine blades in tanks and other ground vehicles, and aircraft landing gear components.

Recent Management Initiatives & Accomplishments

The annual Defense Manufacturing Conference continues to be a premier event for DoD, other government agencies, and industry to network and share achievements in technology transition and manufacturing programs. The 2003 conference was held in Washington, DC and drew more than 600 attendees. This year's session focused on gaining senior leader participation across industry and the Department, with the conduct of several panel sessions, concurrent

forums, and high-level keynote addresses promoting the exchange of technical information. Congressional representatives highlighted issues involving the ongoing debate on the health of US manufacturing and the industrial base, the impact to DoD, and actions underway across the government to promote attention and visibility to the issues. Over 110 exhibits and poster sessions provided a showcase for the latest manufacturing technologies.

