

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

BUDGET ACTIVITY		PE NUMBER AND TITLE							
7 - Operational system development		0708045A - End Item Industrial Preparedness Activities							
COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	109335	87338	69084	69630	70186	71745	73360		616374
E25 MFG SCIENCE & TECH	65369	66471	69084	69630	70186	71745	73360		485845
EA2 MANTECH INITIATIVES (CA)	43966	20867							130529

A. Mission Description and Budget Item Justification: This program element (PE) funds the Army Manufacturing Technology (ManTech) program. The goal of the ManTech program is to enable producibility and affordability of advanced and enabling technologies by developing reliable manufacturing processes and increasing production yields, which result in cost savings and reduced risk of transitioning military-unique manufacturing processes to production. The ManTech program assists the Army in meeting the goals and timelines of the Future Combat Systems (FCS), the Future Force and, where feasible, the Current Force. The program also fosters the transfer of new/improved manufacturing technologies to the industrial base. This PE comprises two projects. Project E25 includes manufacturing efforts that have potential for high payoff across the spectrum of Army systems and/or significant impact on national manufacturing issues. Major investment areas include Aviation, Armor/Survivability, Sensors, Electronics/Power Systems, Precision Munitions/Armaments, and Flexible Displays. Project EA2 funds congressional special interest items. Work in this program is related to and fully coordinated with on-going Army Science and Technology efforts such as the third generation Forward-Looking Infrared Technology (FLIR) effort in PE 0603710A, projects K70 and K86; Low Cost High G, Micro-Electro-Mechanical-Systems (MEMS) Inertial Measurement Units (IMU) in PE 0602303A, project 214; FCS Armor Development effort in PE 0602105A, project H84; PE 0602618A, project H80; PE 0602601A, projects C05 and H91; and PE 0603005A, project 221; and the Flexible Display Initiative in PE 0602705A, project H94. This PE contains no duplication of effort within the Military Departments.

The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan, the Army Science and Technology Master Plan, the Army Modernization Strategy, and the Army Posture Statement. The US Army Research, Development, and Engineering Command manages this PE and efforts are executed by the appropriate Army Research Laboratory and Research, Development, and Engineering Centers.

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<u>B. Program Change Summary</u>	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008/2009)	112223	66869	69495
Current BES/President's Budget (FY 2009)	109335	87338	69084
Total Adjustments	-2888	20469	-411
Congressional Program Reductions		-531	
Congressional Rescissions			
Congressional Increases		21000	
Reprogrammings	147		
SBIR/STTR Transfer	-3035		
Adjustments to Budget Years			-411

Twelve FY08 congressional adds totaling \$21000 were added to this PE.

- (\$400) Specialized Compact Automated Mechanical Clearance Platform (SCAMP)
- (\$1000) Advanced Materials Processing for Ultra-Efficient Power Systems
- (\$1000) Legacy Aerospace Gear Drive Re-eng Initiative
- (\$1600) Aging Weapons Systems Structural Repair
- (\$1600) Electrodeposited Coatings Systems for Munitions
- (\$1600) Laser Engineered Net Shaping (LENS) Mftg Qualifica
- (\$1600) National Center for Defense Manufacturing and Machining
- (\$1600) SuperPulse Laser System Development for Turbine Engine Applications
- (\$2000) High Temperature Structural Ceramic Materials
- (\$2400) Next Generation Combat Helmet
- (\$3000) Smart Machine Platform Initiative
- (\$3200) Improved Manufacturing Process for SAPI

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COST (In Thousands)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
E25 MFG SCIENCE & TECH	65369	66471	69084	69630	70186	71745	73360		485845

A. Mission Description and Budget Item Justification: The goal of this Army Manufacturing Technology (ManTech) project is to reduce costs and risks of manufacturing technologies that enable the affordable production and sustainment of future weapon systems for the Future Combat Systems (FCS) and other Future Force systems, as well as the affordable transition of new technologies that can enhance capabilities of Current Force systems. Objectives address advanced manufacturing processes, equipment, and systems that enhance the quality and/or quantity of products while achieving reductions in cost and/or the transfer of improved manufacturing technologies to the industrial base. ManTech assists the Army in meeting FCS and Future Force performance, sustainability, and reliability goals and timelines and has potential to reduce risks and costs of new technologies for weapons systems. Efforts have potential for high payoff across the spectrum of Army weapon systems and significant positive impact on national manufacturing issues and the US industrial base. Current investment areas are: Aviation, Armor/Survivability, Sensors, Electronics/Power Systems, Precision Munitions/Armaments, and Flexible Displays. In aviation the Embedded Sensor Processes for Aviation Composite Structures effort advances the manufacturing technology process of placing embedded sensors that provide information to extend the life of the into the Apache vertical stabilizer. The goal is to capture data that may allow the PM to extend airframe life from 10,000 hours to 10,800, thus reducing the cost of the airframe when amortized into the cost per flight hour. In Armor/Survivability, the efforts in armor address manufacturing/production of vehicle protective systems. The objective of Low Cost Manufacturing of Materials for Improved Warfighter Protection improves the current manufacturing processes for headgear and body armor to enable a new generation of improved ballistic materials and multifunction fiber architectures to be introduced. In Sensors, the third generation forward looking infrared (FLIR) Dewar/ Cooler Aperature (IDCA) effort, which complements the third generation FLIR technology effort conducted in PE 0603710A, projects K70 and K86, is focused on improving manufacturing and assembly processes of the variable aperture and compact Dewar components. This allows the FLIR to do either wide area search scanning or long range identification with the same IDCA. In Electronics/Power Systems, Software Defined Radio (SDR) Components matures manufacturing processes to provide the Joint Tactical Radio System (JTRS) with SDR standardized modules that can be used across all variants to reduce production costs. The Phase Shifters Phased Arrays effort focuses on refining, manufacturing process that drive down costs and increase performance for on-the-move line of sight and beyond line of sight communications and missile seeker applications. The Silicon Carbide (SiC) Switches effort matures fabrication processes for compact, power-dense SiC devices for Army systems; the High Energy Density (HED) Capacitor effort matures pulse power component manufacturing processes for advanced protection systems and weapons; and the Very High Power (VHP) Batteries effort matures manufacturing processes for compact energy/storage systems. In Precision Munitions/Armaments, the Low Cost, High G, Micro-Electro-Mechanical Systems (MEMS) Inertial Measurement Unit (IMU) effort, which complements an effort in PE/project 0602303A/214, focuses on achieving improved manufacturing processes to produce an affordable IMU system and deeply integrated guidance and navigation unit for missiles and armaments. MEMS Safe and Arm (S&A) matures MEMS wafer-based manufacturing processes that provide miniature, high-G "inertial mechanical logic" to control the position of explosive charges for weapon systems applications. The Throttling Propulsion Component Manufacturing and Assembly for Missiles enables cost effective manufacturing of throttling components (pintle and throat) that are used to provide enhanced energy management for the Non Line of Sight-Launch Systems (NLOS-LS) solid rocket propulsion; and the Optimization of PAX-41 Formulation and Loading effort develops and matures the loading qualification process of PAX-41 explosives to meet new DoD regulations. The Flexible Display Initiative (FDI) effort in this project, which is fully coordinated with and complements the FDI effort in PE/project 0602705A/H94, provides manufacturing technologies required to enable the production of lightweight and rugged flexible displays that reduce size and weight of computer displays for individual Soldiers and vehicle applications.

<u>Accomplishments/Planned Program:</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>

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Aviation Systems - Low Cost Lightweight Structures (LCLWS): In FY07, completed evaluation of tail cone performance, integration onto platform and flight qualification. Affordable Drive Train Housing (ADTH): In FY07, completed gearbox-housing manufacturing, performed system integration, conducted gearbox housing performance evaluation. Embedded Sensor Processes for Aviation Component Structures (ESPACS): In FY09, will produce prototype stabilizer, develop composite manufacturing processes for sensors with flexible substrate and adhesive binding techniques. LCRCFS: In FY09, will optimize the process used to manufacture Survivable Affordable, Repairable Airframe components.	688		4000
Base Structural Armor: In FY07, automated and streamlined subassembly processes and produced solid-state titanium plates; demonstrated ability to integrate dissimilar material structures and optimized assembly to maximize the strength of the combined materials. Developed a ceramic tile encapsulation process. In FY08, evaluate and qualify integrated subassembly processes for Future Combat Systems (FCS) armor structure and hybrid mine floor. In FY09, will demonstrate process improvements for the fabrication of full-up upper and lower hull for select protective armor structures in a production environment.	14778	14712	14092
Overlay Armor: In FY07, designed and developed manufacturing technology for hybrid 3-D weave composites; benchmarked and developed low cost manufacturing of high performance metal encapsulated armor; developed low cost manufacturing of ultra-high performance Aluminum metal matrix composite armor; developed manufacturing technique for 2nd Generation Underbelly mine kit. In FY08, continue addressing advanced armor solution affordability and initiate the development of manufacturing technologies for producing novel armor materials critical to 3rd Generation Ballistic and Underbelly armor; deliver a multi-materials kit and supporting processes to include prepreg, particulate metal-matrix composites, nano-bonds, and backing that enable affordable production of armor solutions. In FY09, will integrate stiffening materials and demonstrate producible, affordable armor manufacturing processes that include hybridized fibrous metal matrix composites and 3-D composites backing. Will develop low cost grinding methods for transparent armors.	6404	19271	14000
Low Cost Manufacturing of Materials for Improved Warfighter Protection: In FY07, enabled net shape pre-forms to reduce touch labor by 40 percent, reduced scrap waste of ballistic fibers and enabled simultaneous processing of ballistic, structural, and multifunction materials for improved helmet performance. In FY08, begin a prototype fabrication process for next generation helmet shell development and manufacturing. In FY09, will combine hydrostatic, multiple tow deposition, and multifunctional material technologies and start full-scale implementation of these technologies into a variety of manufacturing lines. Will begin manufacturing process optimization for protective materials used on combat, combat support and aviation platforms.	1773	1320	3796
Sensors - Command: In FY09, will develop production line and Indium-Tin-Oxide process for 8-in substrates. IPSFPA: In FY09, will develop high volume, high yield process and transition read out integration circuit for design/optimization.			4814
Third Gen Infrared Dewar/ Cooler Aperature: In FY07, initiated manufacturing process improvement of Variable Aperature components to optimize sensor performance for either wide area search scanning or long range identification; began precision assembly, motor pre-tension and production process of motor supply base for high reliability motors. In FY08, develop Variable Aperature coating deposition processes, fabricate precision tooling, and test smaller motors to verify improved manufacturability of the Variable Aperature Mechanism while maintaining performance and improving reliability and survivability in the dewar vacuum environment. In FY09, will integrate improved manufacturing components and processes for variable aperture and compact cold stage components to validate tooling documentation and perform manufacturing demonstration.	2365	2935	3500
Software Defined Radio (SDR) Components: In FY07, fabricated and matured manufacturing sub-process for common core transceiver. In FY08, demonstrate efficient manufacturability of the Silicon Germanium RF Integrated Circuit providing a 60 percent size, 75 percent weight, and 40 percent power reduction. In FY09, will begin system integration of improved manufacturing technologies and processes for RF chipset, power amplifiers and wideband tunable filter for low rate production.	8866	7500	6000

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Phase Shifters for Phased Arrays (PSPA): In FY07, improved processes to reduce packaging and assembly cost, eliminated electrical malfunctions, for the phase shifter design of the Warfighter Information Network-Tactical (WIN-T). In FY08, optimize manufacturing processes for components of the NLOS-Mortar and Aviation Common Modular Missile systems.	3874	2315	
Silicon Carbide Switches: In FY07, improved processes to reduce switch and diode costs from \$1.20/Ampere (Amp) to \$0.45/Amp for switches and from \$5/Amp to \$0.60/Amp for diodes. In FY08, improved processes to reduce thickness of SiC material and improve doping uniformity. In FY09, will improved manufacturing techniques to produce 4" substrates and reduce the manufacturing cost of low voltage diodes and switches.	6076	6480	4270
High Energy Density (HED) Capacitor: In FY07, increased operating voltage on dielectric film with scale-up units leading to demonstrated capacitor for high energy FCS applications. In FY08, increase operating voltage on film and increase shot life from <200 to 1,000.	3645	800	
Very High Power (VHP) Batteries: In FY07, designed and implemented improved cell processing; conducted cell trials; assembled and evaluated performance of battery modules. In FY08, improve battery pack manufacturing time from 950 hours to 350 hours and reduce cost from \$115 to \$58 per pack. In FY09, will develop and demonstrate efficient manufacturing process that increases cell performance from 1 kilowatt to 3 kilowatts while reducing cell capacity loss from 40 percent to 20 percent.	4532	4200	3800
The Low Cost High G MEMS IMU: In FY07, completed transition of the Gyro 4" line to the 6" line and initiated design verification tests and production acceptance tests for delivery of 36 IMU units and demonstrated integrated design and automation enhancements of final prototype IMUs.	2954		
Micro Electro-Mechanical Systems (MEMS) S&A: In FY07, evaluated fabrication, loading, and automated assembly technologies safety and reliability, and conducted qualification of the MEMS-based munitions fabrication procedures.	2759		
Precision Munitions/Armaments - Throttling Propulsion Component Manufacturing and Assembly for Missiles: In FY07, developed manufacturing processes to reduced production lead time by six weeks, and reduced component weight; validated thin coating process. In FY08, begin the development of manufacturing technologies and processes for the efficient production of missile qualification components. Optimization of PAX 41: In FY07, established a Six Sigma loading process for the manufacture of grenade bodies and optimized processing parameters for both energetic and munitions components. In FY08, improve processes to reduce manufacturing production costs. LCZSMD: In FY09, will develop extensive flow model and improve Zinc Sulfide Chemical Vapor Deposition processes. LIMT: In FY09, will develop metal-to-ceramic brazing process and manufacturing methodology for Artillery Laser ignition system (LIS) components. Programming, Administration and Execution System (PAX)-3: In FY09, will evaluate prototype process and manufacturing of PAX- 3 explosive suitable for dual purpose munitions.	1729	230	4812
Lightweight Laser Designator: In FY09, will begin manufacturing optimization of lightweight laser components for use in small air and ground vehicles.			1000
Flexible Displays: In FY07, began qualifying the GEN II manufacturing line for fabricating reflective and emissive displays; integrated and fabricated flexible displays up to 7.5" diagonals from the 15" diagonal line. In FY08, integrate reflective laminates and manufacture pilot line processes into GEN II production line. In FY09, will demonstrate pilot production lines to manufacture GEN II reflective and emissive 7.5" displays.	4926	4950	5000
Small Business Innovative Research/Small Business Technology Transfer Programs		1758	
Total	65369	66471	69084

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PROJECT

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B. Other Program Funding Summary Not applicable for this item.

C. Acquisition Strategy Not applicable for this item.