ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE
7 - Operational system development	**0708045A - End Item Industrial Preparedness Activities**

COST (In Thousands)		FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost		100349	111788	68075	68639	69603	70081	70635	0	620829
E25	MFG SCIENCE & TECH	62459	67528	68075	68639	69603	70081	70635	0	600271
E71	SINGLE ISSUE TASKS	0	986	0	0	0	0	0	0	0
EA1	VENTURE CAPITAL	14270	0	0	0	0	0	0	0	0
EA2	MANTECH INITIATIVES (CA)	23620	43274	0	0	0	0	0	0	20558

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 improve readiness and reduce total ownership costs for current and future weapons systems by providing essential manufacturing technologies that will enable affordable production and sustainment of components, subsystems and systems. The ManTech program assists the Army in meeting the goals and timelines of the Future Combat System (FCS), the Future Force and, where feasible, the Current Force by reducing manufacturing risks and/or costs associated with transitioning advanced and enabling technologies into Army systems. The program also fosters the transfer of new/improved manufacturing technologies to the industrial base. This program element contains three projects. The Manufacturing Science and Technologies (E25) project includes efforts selected for funding that have potential for high payoff across the spectrum of Army systems; as well as, significant impact on national manufacturing issues. Currently, the main focus of this project is on reducing manufacturing costs and risks of FCS enabling technologies. Major investment areas include Aviation Systems, Fire Support Systems, Armor and Armaments, Sensors, Electronics/Power Systems and Precision Munitions. The Army Venture Capital initiative (EA1) is an opportunity provided by Congress to engage small innovative companies that normally do not do business with the Army. Project EA2 funds Congressional special interest items. This PE contains no duplication with any effort within the Military Departments. The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). The Assistant Secretary of the Army for Acquisition, Logistics and Technology through the U.S. Army Material Command and the U.S. Army Research, Development and Engineering Command manages this PE, and the Army laboratories and Research, Development and Engineering Centers execute efforts.

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B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2006)	88120	68505	73273
Current BES/President's Budget (FY 2007)	100349	111788	68075
Total Adjustments	12229	43283	-5198
Congressional Program Reductions		-490	
Congressional Rescissions		-1127	
Congressional Increases		44900	
Reprogrammings	12229		
SBIR/STTR Transfer			
Adjustments to Budget Years			-5198

FY 05 increase due to Venture Capital.

Twenty FY06 Congressional adds totaling $44900 were added to this PE.

FY06 Congressional adds with no R-2A (appropriated amount is shown):
($2250) Advanced Modeling Technology - Large Structure Titanium Machine Initiative
($1250) Center for Optics Manufacturing
($1000) Durable Gun Barrel Steel
($2400) Electrodeposited Coatings Systems for Munitions
($2100) Laser Engineered net Shaping (LENS) Manufacturing Qualification
($1800) Laser Peening for Army Helicopters
($2250) Lean Munitions
($2000) Legacy Aerospace Gear Drive Re-engineering Initiative
($2800) Low Cost Domestic Titanium Reduction to Powder Initiative
($1000) Manufacturing Metrology for Weapon System Production and Sustainment
($2800) Manufacturing Systems Demonstration
($1800) Materials Joining for Army Weapons Systems
($4300) National Center for Manufacturing and Machining
($2600) Reactive Atom Plasma (RAP) Processing
($1000) Small Manufacturers (SMD) Initiatives
($2000) Smart Machine Platform Initiative
($6000) Spring Suspended Airless Tires for Convoy Protection
($1750) Super-Pulse Laser Processing Technology

($1400) Vehicle Common Armor - Affordable Modular Manufacturing Process (VCAMP)
($1400) Virtual Parts Engineering Research Center

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February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
7 - Operational system development	**0708045A - End Item Industrial Preparedness Activities**	**E25**

COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
E25 MFG SCIENCE & TECH	62459	67528	68075	68639	69603	70081	70635	0	600271

A. Mission Description and Budget Item Justification: The major thrust of the Army Manufacturing Technology (ManTech) project is to reduce costs and risks of manufacturing technologies that will enable the affordable production and sustainment of future weapon systems for 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 can enhance quality of products while achieving reductions in cost and/or that can transfer 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. Tasks have potential for high payoff across the spectrum of Army weapon systems; as well as significant positive impact on national manufacturing issues and the U.S. industrial base. Other factors considered in selection of efforts include cost share with both industry and the acquisition program managers and return on investment. The current investment areas are: Aviation Systems, Fire Support Systems, Armor and Armaments, Sensors, Electronics/Power Systems and Precision Munitions. In the Aviation Systems area, Low Cost Light Weight Structures (LCLWS) matures processes for lightweight composite structures for aviation systems; Affordable Drive Train Housing, (ADTH) develops advanced manufacturing processes and technologies using composites, metals, and coatings to reduce weight and increase performance of helicopter and Unmanned Air Vehicle drive trains. In the Fire Support area, the Large Caliber Cannon Life Extension (LCCLE) effort develops manufacturing processes to extend the service life and reduce the logistic burden of Army indirect fire systems. In the Armor and Armaments area, the Armor effort provides manufacturing processes for producing lightweight armor for vehicles; Durable Gun Barrel (DGB) matures manufacturing processes for ultra high strength steel, composite over-wrap and explosive coating applications for Army gun barrels; and the Titanium effort provides material and manufacturing processes for titanium used in M777 Howitzer and FCS. In the Sensors area, the Dual Band Focal Plane Array Manufacturing (DBFM) effort develops manufacturing processes for producing detector/electronic cooling assemblies for focal plane arrays (FPAs); Uncooled Focal Plane Array Producibility (UFPA) improves processes to make high-resolution uncooled infrared sensors. In the Electronics/Power Systems area, the Silicon Carbide Switches (SiCS) effort matures the fabrication processes for compact, power-dense SiCS devices for Army systems; the High Energy Density (HED) Capacitor effort matures pulse power manufacturing processes for advanced protection systems and weapons; the Very High Power (VHP) Batteries effort matures manufacturing processes for compact energy/storage systems; the Software Defined Radio (SDR) effort matures manufacturing processes to provide the Joint Tactical Radio System embedded SDR commodities and full rate production capability; the Phase Shifters for Phased Arrays (PSPA) effort provides manufacturing processes for On-The-Move line of sight and beyond line of sight communications and missile seeker applications; and the ManTech portion of the Flexible Display Initiative (FDI) provides manufacturing technologies required to enable the production of lightweight and rugged flexible displays. In the Precision Munitions area, Low Cost High-G Micro-Electro-Mechanical Systems (MEMS) Inertial Measurement Units (IMU) effort provides the manufacturing processes for a prototype IMU that will survive launch accelerations at the required accuracy and a deeply integrated guidance and navigation unit; MEMS Safe and Arm (S&A) matures MEMS wafer-based manufacturing processes and provides, miniature, high-G "inertial mechanical logic" to control position of explosive charge for S&A applications.

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
Aviation Systems - LCLWS: In FY05, designed and manufactured tooling for fabricating composite tail cones/pylons; fabricated and evaluated composite tail cone articles and forward pylon. In FY06, evaluate second tail cone, integrate tail cone onto test aircraft and conduct ground testing. In FY07, will complete testing and evaluation of tail cone and complete flight qualification. ADTH: In FY05, analyzed and evaluated repair procedures and coating schemes for magnesium housings; completed material properties characterization	1737	1175	801

and tool design for gearbox housings. In FY06, finalize tooling design and initiate manufacturing of the outer gearbox housing. In FY07, will complete gearbox-housing manufacturing; will perform system integration, conduct testing and evaluation of gearbox housing, and complete flight qualification.			
Fire Support Systems - The LCCLE : In FY05, demonstrated manufacturing processes to deposit high performance coatings on the interior (bore) of large caliber cannons to extend the service life and reduce logistic burdens. Also, delivered full scale 120mm XM36 FCS MCS gun barrel for live fire testing; and completed post-firing of 120mm XM36 FCS MCS barrels and transitioned processes for making barrels to producers.	1854	0	0
Armor and Armaments - Armor : In FY05, demonstrated improvements in fabrication of ceramic materials that resulted in reduced cycle time and cost; and matured processes to bond tiles, which required joining dissimilar materials. In FY06, demonstrate a prototype production line and scale up the low cost titanium plate process and demonstrate processes to grind both sides of ceramic tiles without loss of material strength. In FY07, will automate and streamline subassembly processes and produce solid-state titanium plates; will demonstrate ability to integrate dissimilar material structures and will optimize assembly to maximize the strength of the combined materials and develop a ceramic tile encapsulation process. DGB: In FY05, scaled-up process to fabricate barrels with high strength steels; and completed fabrication of composite prototypes and clad barrels. In FY06, construct and evaluate the performance of full-scale demonstration barrels utilizing advanced steel. Titanium: In FY05, demonstrated automated laser hybrid welding process. In FY06, demonstrate ability to meet the stated manufacturing, cost and weight goals of $11.65 per pound and a 40% weight reduction.	15774	19671	20919
Sensors - Military Lasers: In FY05, improved uniformity of epitaxial growth on 4" wafers, automated bar stacking and handling for coating processes and delivered final laser diode arrays. DBFM: In FY05, increased thickness of Molecular Beam Epitaxy (MBE) growth on substrate sizes from 16cm2 to 50 cm2; improved pixel processing yield from 2 to 8 usable pixels per wafer. In FY06, increase MBE yield to 60%, small pixel to 60%, with an acceptance of 25%; and reduce cost to $60k per dual band FPA. UFPA Producibility: In FY05, increased FPA yield to greater than 30% with a package yield of 90% for a unit cost less than $5K. The ManTech portion of FDI: In FY05, qualified the 6" display line and integrated flexible display technologies to produce 2.5" diagonal test displays, began installation of Generation II (GEN II) equipment. In FY06, mature technology to enable 4" displays on flexible substrates, and continue GEN II qualification of manufacturing processes for 15" diagonal backplane display drivers. In FY07, will qualify the GEN II line for reflective and emissive displays; and integrate and fabricate flexible displays up to 7.5" diagonals from the 15" diagonal line.	22546	18301	7761
Electronics/Power Systems - SiCS: In FY05, demonstrated process to manufacture SiC diodes. In FY06, mature manufacturing processes for diodes and switches. In FY07, will reduce switch and diode costs from $1.20/AMP to 40 cents/AMP for switches and from $5/AMP to 60 cents/AMP for diodes. VHP Battery: In FY05, matured manufacturing processes for improved electrodes; evaluated cell construction automation; and initiated process, packaging and design improvements. In FY06, increase battery safety with improved electrode and electrolyte materials. In FY07, will design and implement improved cell processing, conduct design trials, assemble and test battery modules. HED Capacitor: In FY05 demonstrated producible capacitor films with high energy density. In FY06, improve packaging design for 5-fold increase in capacitor life. In FY07, will increase operating voltage on film with scale-up units leading to demonstration for high energy FCS applications. SDR: In FY05, completed engineering design analysis; defined a common SDR core transceiver and matured power management architecture. In FY06, complete analysis of manufacturing process and define methodology for qualification test. In FY07, will prototype and mature manufacturing sub-process for common SDR core transceiver. PSPA: In FY05, initiated automated manufacturing process improvements. In FY06, improve automated processes to increase operational switch life, process yields, throughput and reliability. In FY07, will reduce packaging and assembly costs, eliminate electrical malfunctions, and transition improved phase shifter design to WIN-T.	14556	21726	29002
Precision Munitions - The Low Cost High G MEMS IMU MTO: In FY05, matured packaging and manufacturing processes to improve	5992	6655	9592

performance parameters, meet volume, cost and yield goals. In FY06, produce smaller pre-production IMUs and begin performance testing. In FY07, will validate and demonstrate manufacturing processes for transition to production. The MEMS S&A MTO: In FY05, selected fabrication and loading processes and tested integrated MEMS S&As on the XM25 weapon. In FY06, implement micro-fabrication process, combined with explosive direct loading and test under XM29 and XM307 load conditions. In FY07, will evaluate fabrication, loading and automated assembly technologies safety and reliability, start qualification of the MEMS-based munitions and transition common MEMS S&A integrated with fuze electronics to Low Rate Initial Production. Will demonstrate integrated Guidance and NAV MEMS IMU			
Total	62459	67528	68075

C. Acquisition Strategy Not applicable for this item