Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 7: *Operational Systems Development*				R-1 ITEM NOMENCLATURE PE 0708045A: *End Item Industrial Preparedness Activities*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	106.259	61.098	59.297	-	59.297	70.390	75.135	90.745	74.527	Continuing	Continuing
E25: *MFG SCIENCE & TECH*	65.926	61.098	59.297	-	59.297	70.390	75.135	90.745	74.527	Continuing	Continuing
EA2: *MANTECH INITIATIVES (CA)*	40.333	-	-	-	-	-	-	-	-	0.000	40.333

Note

FY12 funding realigned to higher priority efforts.

A. Mission Description and Budget Item Justification

This program element (PE) demonstrates manufacturing processes that enable producibility and affordability of emerging and enabling technologies. Initiatives within the PE result in cost savings and reduced risk of transitioning military-unique manufacturing processes into production. This PE also fosters the transfer of new/improved manufacturing technologies to the industrial base, including manufacturing efforts that have potential for high payoff across the spectrum of Army systems and/or significant impact on national manufacturing issues (project E25). Major investment areas include Aviation Systems, Armor and Survivability, Sensors, Electronics and Power Systems, Precision Munitions and Armaments, and Flexible Displays. Project EA2 funds congressional special interest items.

Work in this PE is related to, and fully coordinated with, PE 0603710A (Night Vision Advanced Technology), PE 0602303A (Missile Technology), PE 0602105A (Materials Technology), PE 0602618A (Ballistics Technology), PE 0602601A (Combat Vehicle and Automotive Technology), and PE 0603005A (Combat Vehicle and Automotive Advanced Technology) and PE 0602705A (Electronics and Electronic Devices).

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM) and efforts are executed by the Army Research Laboratory (ARL) and appropriate Army Research, Development, and Engineering Centers (RDECs).

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B. Program Change Summary ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**
Previous President's Budget	102.867	61.098	74.193	-	74.193
Current President's Budget	106.259	61.098	59.297	-	59.297
Total Adjustments	3.392	-	-14.896	-	-14.896
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	5.575	-			
• SBIR/STTR Transfer	-2.183	-			
• Adjustments to Budget Years	-	-	-14.896	-	-14.896

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COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
E25: *MFG SCIENCE & TECH*	65.926	61.098	59.297	-	59.297	70.390	75.135	90.745	74.527	Continuing	Continuing
Quantity of RDT&E Articles											

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced manufacturing processes, equipment, and systems that enhance the quality and/or quantity of products, while achieving reductions in cost and/or transfer of improved manufacturing technologies to the industrial base. Efforts within this project 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 include: Aviation, Armor and Survivability, Sensors, Electronics and Power Systems, Precision Munitions and Armaments, and Display Technology.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM) and efforts are executed by the Army Research Laboratory (ARL) and appropriate Army Research, Development, and Engineering Centers (RDECs).

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM) and efforts are executed by the Army Research Laboratory (ARL) and appropriate Army Research, Development, and Engineering Centers (RDECs).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Title: Aviation Systems	11.898	5.000	11.579
Articles:	0	0	
Description: Aviation Systems domain consists of manned and unmanned platforms, power systems, missile systems, maintenance and support systems and modeling and simulation systems.			
FY 2010 Accomplishments: Demonstrated lamination production compatibility for embedding sensors with airframe fabrication on the aft fuselage, composite vertical stabilizer, and composite tail boom for the Apache Block II. Demonstrated integrated materials, design, and manufacturing			

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
process controls for producing and integrating low cost cabin floor structures onto the UH-60 Blackhawk airframes. Manufactured blade assembly production line for the anti-corrosion coating processes. Evaluated new ceramic technologies for fabrication of shroud components for T-700 helicopter engines. Developed new manufacturing processes which will achieve greater fuel efficiency for unmanned aerial vehicle (UAV) heavy fuel engines. ***FY 2011 Plans:*** Automation of Blade Erosion Coating: Increase manufacturing yield and efficiency of anti-corrosion spray coating processes that increase blade life and quality over current manual coating processes. Advanced Ceramic Manufacturing and Machining: Evaluate high yield manufacturing processes enabling application of new Ceramic Matrix Composite technologies that significantly improve thrust, fuel consumption, and reliability compared to current T-700 helicopter engine. Validate low cost manufacturing solutions for structural components and transition to program of record. ***FY 2012 Plans:*** Will apply erosion coating materials onto UH-60 and AH-64 rotor-blades which will decrease the number of blades repaired from 48 ? 24 a year and reduce coating costs from $18K - $14K per rotor-blade. Will develop novel tooling approaches and manufacturing processes to increase UAV heavy fuel engine performance, fuel efficiency and reliability, which reduces overall UAV life cycle costs. Will integrate improved heavy fuel engine manufacturing processes into UAV platforms to demonstrate effectiveness. Will develop cost effective processes for manufacturing nano-composite coatings which increases performance, durability and reliability of UH-60 and AH-64 components. Will automate nano-composite application processes and equipment to reduce coating costs. Will manufacture high performance flexible airborne antennas substrates using both chemical and riveting techniques. Will improve auto clave, bonding lines and joints to increase yield rates which reduce antenna manufacturing costs. Will demonstrate improved cost effective Environmental Barrier Coating (EBC) deposition methods and combine materials, process improvements to reduce fabrication labor and weight for T-700 helicopter engine shrouds.			
Title: Base Structural Armor	14.695	13.293	-
Articles:	0	0	
Description: Funding is provided for the following efforts ***FY 2010 Accomplishments:*** Demonstrated manufacture of ballistic armor using hot pressed silicon carbide tiles, advanced ceramic composite lamination, and process controls to lower the cost, weight and material flaws for low rate production of combat vehicle modular armor. ***FY 2011 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Show production yield for ballistic and blast armors suitable for combat vehicles and add on protective modules with scalable protection requirements. Show suitable base and add-on armor production facilities to begin transition of production protocols to Ground Combat Vehicle and other platform programs of record with these ballistic requirements.			
Title: Ground Systems	4.666	13.293	6.368
Articles:	0	0	
Description: The Ground Systems domain consists of Survivability (armor), Power and Mobility, Intelligent Ground Systems (robotics and unmanned systems)			
FY 2010 Accomplishments: Developed the automated specifications and process controls to demonstrate encapsulation of ceramic tiles for armored structures. Manufactured ballistic armor using hot pressed silicon carbide tiles, advanced ceramic composite lamination, and process controls to lower the cost, weight and material flaws for low rate production of combat vehicle modular armor.			
FY 2011 Plans: Demonstrate and qualify ballistic and blast armors, add on protective modules and limited production of build-to-print armor with automated specification controls. Demonstrate low yield automated assembly of ceramic composites suitable for the fabrication of Ballistic, Hull & Turret, and high yield production of affordable Silcon Carbide (SiC) and Titanium (Ti). Transparent Spinel Armor: Show high yield fabrication capability for ceramic composites with reduced weight and improved ballistic protection. Demonstrate manufacture process of spinel armor plates in sizes up to 600 square inch which will reduce cost and weight for tactical vehicles.			
FY 2012 Plans: Will develop aluminum oxide manufacturing processes for sintered Spinel powder applications. Will improve transparent armor production using a sintered technique which lowers the cost from $3k to $1.2k a square foot. Will developed improved manufacturing processes and process controls to lower the cost, weight and material flaws for low rate production of combat vehicle modular armor.			
Title: Sensors	2.023	5.000	-
Articles:	0	0	
Description: Funding is provided for the following efforts.			
FY 2010 Accomplishments: Infrared Focal Plane Arrays: Demonstrated high yield processes for infrared systems.			
FY 2011 Plans:			

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Color 1280x1024 Micro-Displays: Demonstrate 4 inch wafer line with increased production yield. Use new pixel manufacturing line to produce 6 inch wafers with increased display contrast and color performance. Produce initial lots of wafers to conduct tradeoff and selected initial process improvements. Demonstrate production line of variable lot size, with increase in wafer yield and reduced surface defects.			
Title: Third Gen Infrared (IR) Dewar / Cooler Aperture ***Articles:*** ***Description:*** Funding is provided for the following efforts. ***FY 2010 Accomplishments:*** Reduced weight and manufacturing costs of Third Generation Infrared Dewar/Cooler Aperture which also increased reliability and range for the optics used on guided weapons and surveillance sights. ***FY 2011 Plans:*** Third Gen Infrared (IR) Dewar / Cooler Aperture: Begin transition of optimized production process and configurations to combat and combat support program of record.	2.706 0	3.000 0	-
Title: Sensors, Electronics and Communications Systems ***Articles:*** ***Description:*** The Sensors, Electronics and Communications Systems domain consists of Intelligence, Surveillance, Reconnaissance and Targeting Systems, Mission Command Systems, Electronic Warfare Systems and Improvised Explosive Device (IED) Detect/Defeat Systems. ***FY 2010 Accomplishments:*** Demonstrated high yield processes for focal plane array production (FPA). Collected and baselined substrate materials for fabrication of CdZnTe substrates for high definition FPA material. Baselined the process for the calibration of common time modules between GPS systems. Used new micro display pixel manufacturing line to produce 6 inch wafers with increased display contrast, resolution and color performance for Color Micro Displays. Produced initial lots of wafers to conduct tradeoff and selected initial process improvements for Infrared Focal Plane Arrays (FPA). Demonstrated production line of variable lot size, with increase in wafer yield and reduced surface defects for FPA's. ***FY 2011 Plans:*** Increase focal plan array substrate diameter and growth yield, improve growth yield; increase material growth and pixel fabrication processes to enable affordable large format, multi-color focal plane arrays for high definition infrared sensors that improve situational awareness and target detection. Demonstrate low volume production of array and wafer size of 80 square centimeters	6.909 0	5.119 0	18.400

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Demonstrate vacuum environment manufacturing processes for components package including small rubidium atomic power sources, transducers, electronic circuits, and ballistic housings that support for the chip scale atomic clock deployment concept. ***FY 2012 Plans:*** Will develop a production capacity for low cost, very large, affordable infrared (IR) focal plane arrays (FPA) using III-V epitaxial materials. Will improve HgCdTe pilot lines by increasing the diameters of substrates and reduce material waste, decreasing costs for FPA production. Will develop single-layer crystal yield and demonstrate improved polishing processes for more uniformed FPA substrates. Will reduce propagate density and decrease surface roughness of FPA substrate and transition to PEO. Will manufacture the final components package, demonstrate limited production of chip scale atomic clock power sources and begin transition to Air Force GPS Wing and PEO C3T. Will develop full color organic light emitting diodes (OLEDS) from a fully integrated flexible display pilot production line for demonstrations to system integrators. Will manufacture processing station for night vision sensor optimization to reduce costs and increase reliability from 1200 to 10000 hours per sensor.			
Title: Very High Power (VHP) Batteries: ***Articles:*** ***Description:*** Funding is provided for the following efforts. ***FY 2010 Accomplishments:*** Completed battery certifications and transitioned production capabilities to support of combat vehicles and/or weapon systems. ***FY 2011 Plans:*** Demonstrate and transition efficient production line with reduced flaws and automated specifications and process controls.	2.807 0	2.500 0	-
Title: Low Cost Zinc Sulfide Missile Dome ***Articles:*** ***Description:*** Funding is provided for the following efforts. ***FY 2010 Accomplishments:*** Developed manufacturing process for improved zinc sulfide (ZnS) chemical vapor deposition processes, and improved ZnS dome blank growth processes for long range missile domes. ***FY 2011 Plans:*** Optimize post-deposition treatments and scale-up reactor production for transition to PM JAGM.	3.006 0	3.000 0	-
Title: Precision Munitions and Armament Systems ***Articles:***	5.638 0	2.893 0	9.678

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Description: The Precision Munitions and Armament Systems domain consists of Advanced Weapon Systems, Fire Control, Logistics, Emerging Technologies and Advanced Energetics and Warheads. ***FY 2010 Accomplishments:*** Demonstrated large scale production run of PAX-3 environmentally compliant explosive. Developed automated manufacturing processes for spider grenade initiation module scale up. Conducted fabrication of warhead case and assembly of forging and molding processes. Optimized new generation insensitive munitions (IM) processes for 155mm and 60mm mortars. ***FY 2011 Plans:*** Develop automated process for the assembly of the Grenade Initiation Module (GIM) that eliminate the manual processes and validates reliability of the automatic process. Demonstrate molybdenum fast jet manufacturing improvements and refine charge process. Show reduced cost production processes for solvent less propellant. Improve processing technology using modeling and simulation to enable the production of new generation insensitive munitions formulation. Install equipment and demonstrate lowered production cost (from $5.00/lb to $4.25/lb) and improve yield of key ingredients used in explosive formulations for 155mm artillery, 60 mm mortar and Spider munitions. ***FY 2012 Plans:*** Will develop a manufacturing process for molding the frag-sleeve into a warhead body for decreased manufacturing time and cost. Will develop field assisted spark technology and embedded tungsten fragment molding processes which will reduce production man-hours and lower cost. Will develop processes for residence time, temperature, agitation rate and order of feeds to optimize IMX 104 manufacturing process and transition to PM-CAS. Will manufacture a crown breach design using a hexavalent chromium free cladding process for large and medium caliber gun barrels. Will develop a tantalum tungsten alloy protective bore coating to enable higher performance ammunition. Will demonstrate M-Charge liner improvements, billet fabrication and warhead case fabrication which reduces costs from $6K to $5K per warhead and increases yield to from 75% to 98%.			
Title: Laser Ignition	2.904	3.000	-
Articles:	0	0	
Description: Funding is provided for the following efforts. ***FY 2010 Accomplishments:*** Demonstrated prototype laser ignition diodes using a new manufacturing process. Demonstrated Phase I laser diodes production lines and crystal assembly production controls. ***FY 2011 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Complete transition of production specifications, methodology and brazing process controls. Demonstrate manufacturing protocols for compact crystal assembly and electronics to facilitate full scale production of modular assembly accessed at MRL 8.			
Title: Flexible Display Technology ***Articles:*** ***Description:*** Funding is provided for the following efforts. ***FY 2010 Accomplishments:*** Increased yield, and demonstrated improved processing for higher resolution micro displays. ***FY 2011 Plans:*** Demonstrate sensor manufacturing processes and demonstrate flexible electronics integrated with flexible displays for reduced sensor power and improved computational performance. ***FY 2012 Plans:*** Will develop full color OLEDS from fully integrated GEN II pilot line for demonstrators to system integrators.	4.927 0	5.000 0	5.000
Title: Soldier Systems ***Articles:*** ***Description:*** The Soldier Systems domain consists of Combat Feeding, Aerial Delivery, Expeditionary Basing, Soldier Sensors, Clothing and Protective Equipment and Expeditionary Base Camp initiatives. ***FY 2010 Accomplishments:*** Developed mixing, calendaring and cutting/sealing processes for MRE chemical heating packs to improve packaging and throughput to reduce cost and pollution. Demonstrated fabric substrates bonding, coatings and sealing processes for AEROGEL insulations of shelters. Demonstrated high yield fabrication capability for ceramic composites with reduced weight and improved ballistic protection for body armor. ***FY 2012 Plans:*** Will develop manufacturing processes for nano-pigment and additives and will improve dispersion of the resins to increase performance and reliability of chemical/biological (CB) resistant shelters. Will fabricate and demonstrate multiple 600 ft tent structures that meet joint expeditionary collective protection requirements. Will develop new generation of scalable and affordable manufacturing processes for lightweight body armor. Will demonstrate stacked tooling which reduce costs for bulk manufacturing of organic composite materials and co-curing processes for the X-SAPI system.	1.959 0	-	3.378
Title: Advanced Manufacturing Initiatives	-	-	3.073

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Description: The Advanced Manufacturing Initiatives domain includes the following areas: Model Based Manufacturing, Network Centric manufacturing data environments, Collaborative Manufacturing Modeling and Simulation, and advanced manufacturing technologies. ***FY 2012 Plans:*** Will develop fully annotated 3D digital technical data packages (TDP) for vehicle passive and protective armor systems that can be used in design and manufacturing production lines. Will port the digital capabilities to depots and labs to facilitate integration, refit and rebuild operations. Will develop advanced manufacturing environment.			
Title: Small Business Innovative Research/Small Business Technology Transfer Programs	1.788	-	1.821
Articles:	0		
Description: Small Business Innovative Research/Small Business Technology Transfer Programs ***FY 2010 Accomplishments:*** Small Business Innovative Research/Small Business Technology Transfer Programs ***FY 2012 Plans:*** Small Business Innovative Research/Small Business Technology Transfer Programs			
Accomplishments/Planned Programs Subtotals	65.926	61.098	59.297

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

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COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
EA2: *MANTECH INITIATIVES (CA)*	40.333	-	-	-	-	-	-	-	-	0.000	40.333
Quantity of RDT&E Articles											

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Mantech Initiatives.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2010	FY 2011	FY 2012
Title: Congressional Interest Item funding for Mantech Initiatives.	40.333	-	-
Articles:	0		
Description: Funding is provided for the following effort			
FY 2010 Accomplishments: Congressional Interest Item funding for Mantech Initiatives.			
Accomplishments/Planned Programs Subtotals	40.333	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.