FY 2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2006
Exhibit R-2

BUDGET ACTIVITY: 07
PROGRAM ELEMENT: 0708011N
PROGRAM ELEMENT TITLE: INDUSTRIAL PREPAREDNESS

COST: (Dollars in Thousands)

Project Number & Title	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total PE	59,095	59,286	55,048	57,328	58,764	60,081	61,409
1050 MANUFACTURING TECHNOLOGY	55,465	56,886	55,048	57,328	58,764	60,081	61,409
9999 CONGRESSIONAL PLUS-UPS	3,630	2,400	0	0	0	0	0

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Manufacturing Technology (ManTech) program is intended to improve the productivity and responsiveness of the U.S. defense industrial base by funding the development of manufacturing technologies. The ManTech program is executed through a Center of Excellence (COE) strategy. A majority of the COEs are consortium based with only a small group of technical and management personnel at the center. ManTech projects are primarily performed by industry participants that bill the COE which, in turn, bills the Navy which causes a non-traditional execution profile for the program. The program therefore does not meet traditional execution benchmarks. The ManTech program, by providing seed funding for the development of moderate to high risk process and equipment technology, permits contractors to upgrade their manufacturing capabilities. Ultimately, the program aims to produce high-quality weapon systems with shorter lead times and reduced acquisition costs.

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B. PROGRAM CHANGE SUMMARY:

	FY 2005	FY 2006	FY 2007
FY 2006 President's Budget Submission	59,775	57,753	58,001
Congressional Action	0	2,400	0
Congressional Undistributed Reductions/Rescissions	-46	-867	0
Execution Adjustments	735	0	0
FY 2005 SBIR	-1,370	0	0
Program Adjustments	1	0	-3,180
Rate Adjustments	0	0	227
FY 2007 President's Budget Submission	59,095	59,286	55,048

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Not applicable.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.

E. PERFORMANCE METRICS:
The ManTech program's overall goal is to transition leading edge technology for the production of Navy weapons systems. Individual project metrics are tailored to the needs of specific acquisition programs. Example metrics include: enabling a 400 ton weight reduction for CVN 21 as a result of the High Strength and Toughness Naval Steels for Ballistic Protection Project; and a 60% cost reduction from the original baseline, for the Large Marine Composite to Steel Adhesives Joint Project, bolted joint effort.

FY 2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: Feb 2006
Exhibit R-2a

BUDGET ACTIVITY: 07
PROGRAM ELEMENT: 0708011N PROGRAM ELEMENT TITLE: INDUSTRIAL PREPAREDNESS
PROJECT NUMBER: 1050 PROJECT TITLE: MANUFACTURING TECHNOLOGY

COST: (Dollars in Thousands)

Project Number & Title	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
1050 MANUFACTURING TECHNOLOGY	55,465	56,886	55,048	57,328	58,764	60,081	61,409

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The ManTech project is intended to improve the productivity and responsiveness of the U.S. defense industrial base by funding the development of manufacturing technologies. Major areas of endeavor both underway and planned include: advanced manufacturing technology for electronics assembly, laser metalworking, flexible computer manufacturing, composites, metal working, and welding technology. The ManTech project is being integrated into the Seapower 21 and Joint Warfare Operational Capability process and will utilize the results of these initiatives as appropriate in the program planning process. The ManTech project is aimed at assisting acquisition programs in meeting performance and affordability goals by inserting manufacturing process solutions early into the design phase.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2005	FY 2006	FY 2007
METALS PROCESSING AND FABRICATION	19,500	18,988	19,725

The objective of the Metals Processing and Fabrication activity is to develop affordable, robust manufacturing processes and capabilities for metals and special materials critical to defense weapon system applications. Major areas that support this objective include: processing methods, special materials, joining, and inspection and compliance. These efforts directly impact the cost and performance of future aircraft, rotorcraft, land combat vehicles, surface and subsurface naval platforms, space systems, artillery and ammunition, and defense industry manufacturing equipment. Near-term efforts are focused on the Integrated Systems Investment Strategy platforms: DD(X); CVN 21; and Joint-Unmanned Combat Air Systems (J-UCAS). Future concentration will include projects applicable to Littoral Combat Ship development, submarines, and the Joint Strike Fighter (JSF).

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FY 2005 Accomplishments:

- Continued process improvements to DD(X) Program for surface hull treatment application processes to support critical design review schedule. (DD(X) Advanced Bonding Methods for Steel Structures)
- Continued to pursue manufacturing process improvements supporting CVN 21 and J-UCAS.
- Established manufacturing development teams and initiated projects in support of submarines. (Advanced Metalworking Technology)
- Continued rapid response and teaching factory activities.
- Continued development and testing of methods for selecting most viable collarless construction techniques for DD(X) fabrication. (Collarless Construction)
- Continued effort on ceramic coatings for corrosion protection in Allison 501 engines. (Hot Section Corrosion Protection for 501-K34 Gas Turbine)
- Continued Improved Affordability of Titanium Parts for Marine Corps M777 Lightweight 155MM Howitzer effort.
- Continued Modeling and Simulation for Carrier Construction Planning and Sequencing effort to support CVN 21.
- Continued Laser Welded Lightweight Panel Structure Fabrication and Application to CVN 21, developed inter-panel joint concepts and preliminary design concept to improve productivity.
- Continued development of Cost-Effective, Low-Manganese Flux Core Welding Electrode for joining High-Strength Steels for CVN 21 applications.
- Continued development of preliminary designs and manufacturing concepts, identifying material changes and specific processes to be improved. (Advanced Surface Ship Watertight Closures)
- Continued Manufacturing Process Development for Elimination of Weld Distortion of CVN 21 heavy plate erection units.
- Continued evaluation of material properties of small-scale production heat of 10% Nickel (Ni) material for CVN 21. (High Strength and Toughness Naval Steels for Ballistic Protection (Ballistic 10% Ni Steel))
- Continued Automated Thermal Plate effort by demonstrating a system for automated thermal plate forming of complex steel shapes to reduce fabrication cost and signature of the DD(X).
- Continued analysis with Naval Surface Warfare Center (NSWC) and Northrop Grumman Ship Systems (NGSS) of key components and substructures that can be converted to low-cost titanium for center of gravity and structural weight savings on CVN 21. (Issues associated with Fabrication of Titanium Components for CVN 21)
- Continued the Laser Welded Corrugated Core (LASCOR) Fabrication for CVN 21, (Application Development of LASCOR), effort: Design, fabrication, testing, and final application demonstration for various repair, stud attachment, and joining technologies.

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- Completed testing and validation of adhesive bonded joints to support critical design review and technical insertion to reduce radar cross section, weight, and life-cycle costs for DD(X) program. (Large Marine Composite-to-Steel Adhesive Joints)
- Completed transition of high-productivity, cost-effective welding processes for large, thick-section, high-strength steel structures to shipyard production to enhance the survivability of DD(X). (Manufacturing Large Marine Structures)
- Completed development of optimal welding procedures for 10% Ni steel to reduce weight and cost of the CVN 21 aircraft carrier. (Welding Development for 10% Ni Steel)
- Completed manufacture and testing of 1/8 inch and 5/32-inch electrodes and revised procurement specification for CVN 21. (Availability of Submergible Arc Weld (SMAW) Electrode (Mil-10718-M) Required for Ballistic Performance Requirements)
- Completed development of cost-effective joining processes for titanium structures and bimetallic transition joints for application to CVN 21 aircraft carriers. (Fabrication of Titanium Components for CVN 21)
- Completed effort on Amphibious Assault Vehicle (AAV) Enhanced Applique Armor Kit (EAAK) effort by evaluating armor sets upon return from deployment and provided process details to Marine Corps. (AAV EAAK Product Improvement)
- Completed Propulsor Affordability Initiative by pouring of a large, cored blade and section of hub and installed high speed machining capability at the Navy Foundry.
- Completed Translational Friction Welding (TFW) of titanium engine blisks to improve affordability, readiness, and time-on wing for aircraft engines in support of F/A-18E/F and JSF programs.
- Initiated J-UCAS Metallic Manufacturing Technology Transition effort to integrate with the Composites-J-UCAS Systems Design and Manufacturing Development (SDMD), Boeing St. Louis.
- Initiated and completed extended metallurgical and manufacturing evaluation for 10% Ni steel implementation for use in the CVN 21 program.
- Initiated and completed implementation of Steel Investment Castings effort to enhance reliability and decrease cost for the M777 Lightweight Howitzer.
- Initiated Hybrid Laser Beam Welding effort.
- Initiated and completed Optimization of Virginia Class Submarine Facility Utilization effort.
- Initiated Erosion Resistant Coatings for Stage I Compressor Blisks effort.
- Initiated Weld Quality Improvement/Distortion Reduction effort for CVN 21 carriers.
- Initiated metalworking/joining manufacturing process improvements supporting CVN 21, J-UCAS, and Littoral Combat Ship.
- Initiated Turbine Inspection Techniques effort.
- Initiated and completed Structural Testing for the Collarless Construction project.

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FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete Hot Section Corrosion Protection for 501-K34 Gas Turbine effort.
- Complete Modeling and Simulation for Carrier Construction Planning and Sequencing effort for CVN 21.
- Complete the Laser Welded Lightweight Panel Structure Fabrication and Application to CVN 21 effort.
- Complete DD(X) Collarless Construction effort.
- Complete Development of Cost-Effective, Low-Manganese Flux Core Welding Electrode for Joining High-Strength Steels effort with shipyard verification of trial production advanced weld wire.
- Complete Improved Affordability of Titanium Parts for Marine Corps M777 Lightweight 155MM Howitzer effort by implementing flow formed titanium tubes into full rate production.
- Complete J-UCAS Structural Welding effort.
- Complete Weld Quality Improvement/Distortion Reduction effort for CVN 21 carriers.
- Initiate Friction Stir Welding (FSW) effort for Littoral Combat Ship.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete Manufacturing Process Development for Elimination of Weld Distortion of CVN 21 Heavy Plate Erection Units by construction of a superlift assembly.
- Complete Automated Thermal Plate effort by demonstrating a system for automated thermal plate forming of complex steel shapes to reduce fabrication cost and signature of the DD(X).
- Complete process improvements to DD(X) effort for surface hull treatment application processes to support critical design review schedule. (DD(X): Advanced Bonding Methods for Steel Structures.)
- Complete High Strength and Toughness Naval Steels for Ballistic Protection (Ballistic 10Ni Steel) effort.
- Complete the Laser Welded Lightweight Structure Panel Fabrication for CVN 21, (Application Development of LASCOR), effort: Design, fabrication, testing, and final application demonstration for various repair, stud attachment, and joining technologies.
- Complete specifications for the manufacture of an interior, watertight door for the CVN 21. (Advanced Surface Ship Watertight Closures)
- Complete Turbine Inspection Techniques effort.

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- Initiate testing and certification of alternative concepts and materials developed for the DD(X) program on SSN-774 class applications. (DD(X) Tile Bonding Alternative Concepts)
- Initiate identification of requirements, candidate materials, and application techniques for an improved interior treatment on SSN-774 class subs and initiate testing. (Virginia-Class SSN Improved Damping Tile)
- Initiate assessment of the potential applications for LASCOR technology to reduce weight and add value for programs, such as the Littoral Combat Ship (LCS), DD(X), and Landing Ship, Helicopter Assault (LHA). (Future Applications for LASCOR)
- Initiate feasibility/source study for production of large-size extrusions for LCS Panel applications. (LCS Large Extrusions for Panels)
- Initiate identification of several weight reduction technologies of interest to the Landing Ship, Helicopter Assault-Replacement (LHA-R) program, possibly including LASCOR, aluminum LASCOR, Ti components, aluminum panel extrusions, FSW aluminum, low-distortion welding techniques, or other technologies identified. (LHA-R Weight Reduction Project)
- Initiate development of issues related to tank application of Ultra-High Solids (UHS) coatings among shipyard user base, investigate new equipment and techniques to improve performance and challenge current application requirements to reduce application total costs. (UHS Coatings)
- Initiate project to explore novel methods for low-pressure piping system construction using mechanical attachments, including cryogenic pipe fittings, for SSN-774 applications. (SSN Mechanical Pipe Joining)

	FY 2005	FY 2006	FY 2007
OTHER (REPAIR TECH, ENERGETICS, GULF COAST, AND TECHNICAL ENGINEERING SUPPORT)	12,556	10,400	10,945

The “Other” activity includes repair technology, energetics, and technical engineering support. Repair technology addresses repair, overhaul, and sustainment functions that emphasize remanufacturing processes and advancing technology. Energetics efforts concentrate on developing energetics solutions to ensure the availability of safe, affordable, and quality energetics products largely in support of Program Executive Office (PEO) Integrated Warfare Systems (IWS).

In FY 2004, ManTech embarked on a new Naval Investment Strategy by focusing its efforts on only the most critical manufacturing efforts identified by a few, select acquisition programs. Execution of FY 2005 funds differed from the plan reflected in the prior submit. Funding was realigned to reflect actual execution. The increase in funding between FY 2006 and FY 2007 reflects realignment from other activities to more closely align funding with planned program requirements.

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FY 2005 Accomplishments:

- Continued to provide technical engineering support for the ManTech program.
- Continued project to identify technologies to reduce the time and costs of alignment and inspection procedures associated with the maintenance of submarines. (Alignments and Inspections)
- Continued work with ATK Thiokol Propulsion to scale-up and implement the alternative manufacturing process. (Alternative Manufacture of Energetic Material 1,3,5-triamino-2,4,6-trinitrobenzene (TATB))
- Continued Virginia-Class structural fabrication facility design effort to incorporate Product Centric manufacturing principles and robotic processes into self-sufficient and self-governing product lines. (Product Centric Facility Design)
- Continued development of a man-portable Gas Metal Arc (GMA) welder for shipyard applications. (Ultra-light Welding System)
- Continued wireless automated diagnostics/prognostics, monitoring diesel engines of mobile yard equipment, in coordination with the National Shipbuilding Research Program, implement on mobile diesel engines in shipyards.
- Continued evaluation of feasibility of welding High-Strength Low-Alloy (HSLA)-100 steel with reduced preheat, specifically for submerged arc welding of plates more than 1 5/8 inch thick and pulsed Gas Metal Arc Welding (GMAW-P) welding of plates more than one inch thick. (High Heat Input Welding of Thick HSLA-100 with Reduced Pre-Heat)
- Continued use of “Super Finishing Process” to salvage helicopter gears and reduce procurement and maintenance costs. Designed modifications for test stands to allow testing of CH-46 gears and defined an acceptance test plan for approval by NAVAIR. (CH-46 Gear Repair)
- Continued development of a safer, repeatable, cost effective and environmentally sound alternative to live fire testing of M198, M777 and M1A1 recoil assemblies. (M198 Howitzer Mechanism Recoil Testing)
- Continued HAZMAT Analyzer effort to build and evaluate hand-held analyzer that can provide test results for determining presence of Poly-Chlorinated Biphenyl (PCB) contamination.
- Continued Polycan Fabrication effort to develop a manufacturing process to reduce the cost and lead-time associated with polycan fabrication.
- Continued project to provide PEO(Carriers) with a portable device for aircraft carrier propulsion system health monitoring.
- Completed the creation of a methodology to track the Cost of Poor Quality system being used by Northrop Grumman Ship Systems. Eliminating poor quality can reduce cost by 25 – 30%. (Institutionalizing Corporate Initiatives: The Northrop Grumman Cost of Poor Quality System)

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- Completed development of a predictive capability for analysis and design for avoidance of excessive high-speed catamaran cross-deck slamming. (Wet-Deck Slamming of High-Speed Catamarans)
- Completed investigation into solutions for documenting, modeling, and standardizing assembly processes for interim products used in U.S. ship construction. (Improving Shipyard Assembly)
- Completed development and demonstration of a continuous co-extrusion process for the manufacture of co-layered propellants. (Co-Layered Propellant Manufacturing)
- Completed demonstration of integrated assembly and packaging techniques for miniature explosive train components contained in Safety and Arming (S&A) Devices and transition optimized processes to industry for implementation and production of the canistered countermeasure anti-torpedo. (Low Cost, Reliable Packaging & Integration of Miniaturized Explosive Components)
- Completed project to evaluate and determine optimal joining method for thin steel insert welds that minimizes thermal distortion and buckling. (Low Heat Input Welding)
- Completed development of a modeling and simulation-based framework for a shipyard Manufacturing Process Planning System to improve the effectiveness of shipyard production planning. (DD(X): Manufacturing Process Modeling and Fabrication)
- Completed development of an international standard of equipment boundaries and identifiers for collecting and exchanging performance data for shipbuilding.
- Completed development of environmentally and worker-health sensitive de-painting processes for helicopter main rotor blades. (Helicopter Blade Refurbishment)
- Completed development of a nonlinear dynamics based analysis approach for advanced hulls which can be used to supplement the current Navy simulation and model testing analysis approach. (Combined Seakeeping and maneuvering Survival Analysis of Advanced Naval Hull Forms)
- Completed the development of a new salinity indicating system to measure and control salinity levels associated with propulsion and distillation plants on CVN carriers. (Development of Next Generation Salinity Indicating System for CVN Carriers)
- Completed development of alternative manufacturing procedures for cable end sockets used to arrest aircraft aboard carriers. (Aircraft Carrier Arresting Gear Poured Cable End Sockets)
- Completed effort to determine material procurement schedule that optimizes tradeoff between advance investment and the storage cost and risk of costly construction delays caused by late delivery of construction materials. (Optimization of Carrier Material Procurement)
- Completed development of process and equipment to install and repair long-lasting durable non-skid features on flight decks. (Long Life Non-Skid Coatings)

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- Completed development of integrated automated Structural Measurement and Analysis System to enable collection and analysis of dimensional data to improve control of fabrication processes and achieve neat construction of ship structures for the first DD(X) hull. (DD(X): Dimensional and Accuracy Control Automation)
- Completed development of process parameters for manufacturing large diameter steel alloy MP-98T fasteners to achieve desired corrosion resistance and other properties to ensure these bolts can be used for the life of the submarine. (High Strength Marine-Grade Fasteners Extended Development)
- Completed project demonstrating virtual reality as a viable technology to train welders for submarine manufacture. (Shipbuilding Initiative: Virtual Training for Welding)
- Completed development of prototype flexible fixturing and joining technology concepts required for Product-Centered Manufacturing for submarine construction. (Shipbuilding Initiative: Automated Materials Joining and Flexible Fixture Design to Support Product-Centered Structural Fabrication)
- Initiated project to develop Waterborne Tank and Void Preservation process using new long-life high-solids coatings and Ultra-High Pressure Water Jet (UHPWJ) surface preparation for tanks and voids on CVN 21 carriers. (Carrier Tank Coatings)
- Initiated effort to evaluate finite element analysis methods to determine if they apply to thick Navy structures of CVN 21 ships. (Predictive Weld Distortion in Thick Navy Structures, Northrop Grumman Newport News (NGNN))
- Initiated program to develop standards and processes for digital radiography of piping and plate welds supporting CVN 21 and Virginia-Class construction non-destructive testing. (Digital Radiography)
- Initiated effort to minimize distortion and resulting re-work and costs in Virginia-Class hull ring manufacturing. (Weld Distortion Prediction Initiative)
- Initiated and completed development of a ship product design and development process that leverages Six Sigma program benefits. (Ship System Design for Six Sigma)
- Initiated development of a pre-production laser/GMA hybrid pipe welding system. (Hybrid Pipe Welding System)
- Initiated development of a comprehensive technical training and data collection program for structural welders and fitters, applying elements of Best Practices Lean technologies. (Technical Training and Data Collection Northrop Grumman Ship Systems (NGSS))
- Initiated re-engineering internal supply chain/material delivery process. (Re-engineer Internal Supply Chain (NGSS))
- Initiated Repair Technology projects based on high priority depot needs.
- Initiated energetics efforts to support PEO IWS and other acquisition programs.
- Initiated shipbuilding efforts for Littoral Combat Ship, CVN 21, and others.

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- Initiated development of new weld size and inspection criteria based on fitness for service. (Portable Weld Inspection Management System)
- Initiated the development and implementation of transient thermal tensioning of thin steel ship panel structures at Northrop Grumman Ship Systems for use in the construction of LPD, DDG, LHD, and DD(X). (Thermal Tensioning of Thin Steel Ship Panel Structures)
- Initiated predictive weld distortion in submarine structures.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete Virginia-Class structural fabrication facility design effort to incorporate product centric manufacturing principles and robotic processes into self-sufficient and self-governing product lines. (Product Centric Facility Design)
- Complete development of a man-portable GMA welder for shipyard applications. (Ultra-light Welding System)
- Complete wireless automated diagnostics/prognostics project and implement on mobile diesel engines in shipyards.
- Complete evaluation of feasibility of welding HSLA-100 steel with reduced preheat, specifically for submerged arc welding of plates more than 1 5/8 inch thick and GMA welding of plates more than one inch thick.
- Complete development of “Super Finishing Process” to salvage helicopter gears and reduce procurement and maintenance costs. (CH-46 Gear Repair)
- Complete project to identify technologies to reduce the time and costs of alignment and inspection procedures associated with the maintenance of submarines. (Alignments and Inspections)
- Complete development of a safer, repeatable, cost effective and environmentally sound alternative to live fire testing of M198, M777 and M1A1 recoil assemblies. (M198 Howitzer Mechanism Recoil Testing)
- Complete effort to evaluate finite element analysis methods to determine if they apply to thick Navy structures of CVN 21 ships. (Predictive Weld Distortion in Thick Navy Structures, NGNN)
- Complete program to develop standards and processes for digital radiography of piping and plate welds supporting CVN 21 and Virginia-Class construction non-destructive testing. (Digital Radiography)
- Complete effort to minimize distortion and resulting re-work and costs in Virginia-Class hull ring manufacturing. (Weld Distortion Prediction Initiative)
- Complete building and evaluation of hand-held analyzer that can provide test results for determining presence of PCB contamination. (HAZMAT Analyzers)

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- Complete development of a manufacturing process to reduce the cost and lead-time associated with polycan fabrication. (Polycan Fabrication)
- Complete development of new weld size and inspection criteria based on fitness for service. (Portable Weld Inspection Management System)
- Complete project to develop Waterborne Tank and Void Preservation process using new long-life high-solids coatings and UHPWJ surface preparation for tanks and voids on CVN 21 carriers. (Carrier Tank Coatings)
- Complete predictive weld distortion in submarine structures.
- Initiate FY 2006 Repair Technology projects based on high priority depot needs.
- Initiate FY 2006 energetics efforts to support PEO(IWS) and other acquisition programs.
- Initiate FY 2006 shipbuilding efforts for Littoral Combat Ship, CVN 21, and others.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete development of a pre-production laser / GMA hybrid pipe welding system. (Hybrid Pipe Welding System)
- Complete development of a comprehensive technical training and data collection program for structural welders and fitters, applying elements of Best Practices Lean technologies. (Technical Training and Data Collection (NGSS))
- Complete re-engineering internal supply chain / material delivery process. (Re-engineer Internal Supply Chain (NGSS))
- Complete project to provide PEO(Carriers) with a portable device for aircraft carrier propulsion system health monitoring.
- Initiate FY 2007 Repair Technology projects based on high priority depot needs.
- Initiate FY 2007 energetics efforts to support PEO IWS and other acquisition programs.
- Initiate FY 2007 shipbuilding efforts for Littoral Combat Ship, CVN 21, and others.

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	FY 2005	FY 2006	FY 2007
ELECTRONICS PROCESSING AND FABRICATION	10,600	10,000	10,690

Electronics Processing and Fabrication efforts develop and deploy affordable, robust manufacturing processes and capabilities for electronics critical to defense applications over their full life cycle. Efforts create new and improved manufacturing processes on the shop floor, as well as repairing and maintaining facilities such as depots and logistics centers, with a strong emphasis on process maturation. Near-term efforts are focused on the Integrated Systems Investment Strategy platforms: DD(X), CVN 21, and J-UCAS. Future concentration will include efforts applicable to the Littoral Combat Ship, EA-18G, and JSF.

FY 2005 Accomplishments:

- Continued Navy Advanced Infrared Focal Plane Arrays effort to develop two color focal plane arrays.
- Continued Electro-Optics Rapid Response efforts such as fiber optic training and troubleshooting efforts to support integration of fiber into new and legacy aircraft and ships.
- Continued Teaching Factory Outreach, Rapid Response.
- Continued MicroElectroMechanical Systems (MEMS) Affordability Program.
- Completed second phase of the Swimmer Deliver Vehicle (SDV) Energy Storage Improvement Program.
- Completed Fiber Optic Ultra-Thin Line Towed Array effort for the Unmanned Surface Vehicle (USV) and other Navy towed array applications.
- Completed MK48 Advanced Capability (ADCAP) Torpedo Fiber Optic Guidance Tether effort to verify integrity and functionality of fiber data link to torpedo.
- Completed Fiber Optic Interconnect Technology effort.
- Completed Microwave Monolithic Integrated Circuit (MMIC) Flip Chip Attach Production Processing.
- Initiated Lead-Free & Environmentally Safe Manufacturing project to reduce the risk of implementing current environmentally safe components and materials.
- Initiated Hermetic Sealing of Transmit/Receive (T/R) Modules to provide significant improvement in affordability of T/R Modules for SPY-3 radar through use of more commercial packaging and manufacturing methods.
- Initiated Manufacturing & Packaging of Power Systems for Program Executive Office (PEO) Carriers and PEO Ships: Developed packaging methodologies for transmission and storage of switching devices and subsystems for pulsed power systems.
- Initiated ALQ-99 Band 4 Jammer effort.
- Initiated and completed DD(X)/CVN 21 Manufacturing of Opto-Electronic Sensors effort.

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- Initiated F-18/DD(X) MMIC Flip Chip Second Source validation and transfer effort.
- Initiated and completed effort on Helmet Mounted Displays to reduce cost and improve durability of F/A-18 and Joint Strike Fighter (JSF) helmet mounted visor.
- Initiated effort to bring current and voltage sensors designed for high power applications from Technical Readiness Level 4 up to Technical Readiness Level 6 through a series of development phases for the manufacture of the sensor systems and develop a test bed for qualification of the system.
- Initiated effort on High Power Electronics with three vendors to facilitate implementation of silicon carbide into solid-state power systems for the Navy.
- Initiated effort to conduct the technology improvements needed for a manufacturing line that will produce Light Activated Semiconductor Switch (LASS) for CVN 21. These are ultra fast, high current switches used in a DoD mission-critical system. These switches support a rate of current rise, dI/dt, greater than 50 kA/ìs, and conduct more than 100 kA.

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete F-18/DD(X) MMIC Flip Chip Second Source validation and transfer effort.
- Complete ALQ-99 Band 4 Jammer effort to increase production yields.
- Complete Hermetic Sealing of T/R Modules to provide significant improvement in affordability of T/R Modules for SPY-3 radar through use of more commercial packaging and manufacturing methods.
- Complete Manufacturing & Packaging of Power Systems for PEO Carriers and PEO Ships: Develop packaging methodologies for transmission and storage of switching devices and subsystems for pulsed power systems .
- Complete MEMS Affordability Program.
- Complete effort to bring current and voltage sensors designed for high power applications from Technical Readiness Level 4 up to Technical Readiness Level 6 through a series of development phases for the manufacture of the sensor systems and develop a test bed for qualification of the system.
- Complete Lead-Free & Environmentally Safe Manufacturing project to reduce the risk of implementing current environmentally safe components and materials.
- Initiate advanced electronics and electro-optics efforts geared towards improvements for the Littoral Combat Ship, EA-18G, and JSF.
- Initiate Fiber Optics effort for J-UCAS.

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FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete Light Activated Semiconductor Switch (LASS) for CVN 21.
- Initiate Light Detection and Ranging (LIDAR) project for sensor applications related to radar performance and real time wind speed reporting on DD(X).
- Initiate Fiber Laser effort for reducing the cost and improving the reliability of fiber lasers for applications such as LIDAR.
- Initiate FY 2007 advanced electronics and electro-optics efforts geared towards improvements for the LCS, F/A-18, EA-18G, DD(X), and CVN 21.

	FY 2005	FY 2006	FY 2007
COMPOSITES PROCESSING AND FABRICATION	6,750	6,000	6,863

The primary technical goal of the Composites Processing and Fabrication activity is improving weapon systems affordability, enhancing weapon system effectiveness and improving reliability/war-fighter readiness through the increased utilization of composite materials and structures. This is being achieved through the development and maturation of affordable, robust manufacturing and assembly processes that fully exploit the benefits of composite materials. Near-term efforts are focused on the Integrated Systems Investment Strategy platforms: DD(X), CVN 21, and J-UCAS. Future concentration will also include efforts applicable to the Littoral Combat Ship and JSF.

In FY 2004, ManTech embarked on a new Naval Investment Strategy by focusing its efforts on only the most critical manufacturing efforts identified by a few, select acquisition programs. Execution of FY 2005 funds differed from the plan reflected in the prior submit. Funding was realigned to reflect actual execution. The increase in funding between FY 2006 and FY 2007 reflects realignment from other activities to more closely align funding with planned program requirements.

BUDGET ACTIVITY: 07
PROGRAM ELEMENT: 0708011N PROGRAM ELEMENT TITLE: INDUSTRIAL PREPAREDNESS
PROJECT NUMBER: 1050 PROJECT TITLE: MANUFACTURING TECHNOLOGY

FY 2005 Accomplishments:

- Continued development of manufacturing processes for embedding conformal antenna elements into composite sandwich construction. (Affordable Integrated Structural Apertures)
- Completed engine qualification testing at General Electric Aircraft Engines and implemented ManTech technology as baseline production process. (Manufacturing Technology for Silicon Carbide Flaps and Seals)
- Completed qualification testing of improved stator for Advanced SEAL Delivery System (ASDS) using Naval Sea Systems Command funds, installed deliverable improved stator as baseline unit on Boat #1 and follow-on hulls, and transitioned technology to production vendor during manufacture of second improved stator. (ASDS Stator)
- Completed investigation and refinement of low-cost composite manufacturing approaches for key vehicle areas identified under concept exploration phase. (J-UCAS System Design and Manufacturing Demonstration Phase)
- Completed remaining DD63 article fabrication using automated insertion process and transitioned the technology into F/A-18E/F. (Automation of Z-Fiber for Complex Shape)
- Completed validation testing at Naval Surface Warfare Center (NSWC) Philadelphia Detachment for new coating candidate systems for propulsion shaft coatings and initiated transition of technology to Northrop Grumman Ship Systems, Puget Sound Naval Shipyard, Portsmouth Naval Shipyard, and Norfolk Naval Shipyard. (Propulsion Shaft Composite Surface Treatment)
- Completed effort with manufacture of two composite impellers to be used in pump loop qualification testing funded by Submarine Program Office PMS 450. (Composite Marine Impellers)
- Completed effort by transitioning generic, multi-functional composite panel processing techniques to the shipyard, with a focus on specific CVN 21 applications such as sponsons, multi-functional radar house, deck edge elevator doors, etc. (CVN 21 Weight Reduction)
- Initiated Phase 1 to develop advanced manufacturing techniques for alternate JSF Weapons Bay Door (WBD) design that employs integrated structure concepts to reduce both weight and cost. (Weapons Bay Door)
- Initiated development of a domestic, low cost capability for manufacture of composite propeller blades, and development of a robust erosion coating application technique for lift fan paddles and propeller blades for the Landing Craft Air Cushion (LCAC) platform. (Composite and Erosion Coating Manufacturing Technology for LCAC Components)
- Initiated project to develop low cost manufacturing and joining processes for skin panels that can be incorporated into a deckhouse design for the Advanced Electric Ship Demonstrator (AESD) that would allow the testing of future topside concepts. The proposed deckhouse would be an aluminum structural frame that is designed to support removable weather boundary panels. In the future, as new signature reduction concepts are developed, panels can be economically manufactured, easily installed on the deckhouse frame and tested. The

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use of the AESD also allows more realistic signatures testing since the craft can be tested in the marine environment. (AESD Deckhouse)

- Initiated development of manufacturing processes to produce high temperature organic polymer radomes for the Phase III and IV Advanced Medium Range Air-to-Air Missile (AMRAAM) with required surface finish, tolerance control, quality control, and mounting methodology. (Development of Manufacturing Processes to Produce High Temperature Capable Composite Radomes)
- Initiated and completed effort to develop and implement bonded steel-to-composite joint technology that is producible and cost effective while meeting the functional requirements of structures, signatures and longevity for the DD(X). (DD(X): Large Marine Composite Steel Bonded Joint Project, Phase 4)
- Initiated project to develop a robust cost effective composites manufacturing process that incorporates current hardware interfaces so that Lock-In Lock-Out Composite (LIOC) hatches can be fabricated from lightweight materials for the ASDS, reducing overall weight and maximizing effectiveness of the ASDS. (Manufacturing Technology for ASDS LIOC Hatch).

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete development efforts on Advanced Hawkeye satellite communications antenna and initiate application of technology to advanced antennas being developed by PEO Integrated Warfare Systems (IWS) for CVN 21 application. (Affordable Integrated Structural Apertures)
- Complete development of a domestic, low cost capability for manufacture of composite propeller blades, and development of a robust erosion coating application technique for lift fan paddles and propeller blades for the LCAC platform. (Composite and Erosion Coating Manufacturing Technology for LCAC Components)
- Complete project to develop low cost manufacturing and joining processes for skin panels that can be incorporated into a deckhouse design for the AESD that would allow the testing of future topside concepts. (AESD Deckhouse)
- Complete development of manufacturing processes to produce high temperature organic polymer radomes for the Phase III and IV AMRAAM. (Development of Manufacturing Processes to Produce High Temperature Capable Composite Radomes)
- Complete project to develop a robust cost effective composites manufacturing process that incorporates current hardware interfaces so that LIOC hatches can be fabricated from lightweight materials for the ASDS. (Manufacturing Technology for ASDS LIOC Hatch).

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• Initiate projects in support of the Littoral Combat Ship and JSF and establish manufacturing development teams. Pursue manufacturing process improvements supporting CVN 21 and J-UCAS. (Advanced Composites Manufacturing)

FY 2007 Plans:

• Continue all efforts of FY 2006 less those noted as completed above.
• Complete full scale WBD manufacturing demonstration and testing. (Weapons Bay Door)
• Initiate/Continue projects in support of the Littoral Combat Ship and JSF and establish manufacturing development teams. Continue to pursue manufacturing process improvements supporting CVN 21 and J-UCAS.

	FY 2005	FY 2006	FY 2007
CORPORATE INVESTMENTS	6,059	11,498	6,825

The Corporate Investments area is focused on accelerating 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. Key emphasis areas include: 1) Benchmarking and accelerating the implementation of world-class industrial practices throughout the contractor base; 2) Demonstrating and validating advanced business practices and information technologies capable of streamlining management functions in all industrial base tiers; and 3) Leveraging information technologies in pursuit of tighter coupling of all defense industrial enterprise elements. Corporate Investment efforts create improvements to cost and cycle time for weapon system development, production, and repair.

In FY 2004, ManTech embarked on a new Naval Investment Strategy by focusing its efforts on only the most critical manufacturing efforts identified by a few, select acquisition programs. Execution of FY 2005 funds differed from the plan reflected in the prior submit. Funding was realigned to reflect actual execution. The decrease in funding between FY 2006 and FY 2007 reflects realignment to other activities to more closely align funding with planned program requirements.

BUDGET ACTIVITY: 07
PROGRAM ELEMENT: 0708011N PROGRAM ELEMENT TITLE: INDUSTRIAL PREPAREDNESS
PROJECT NUMBER: 1050 PROJECT TITLE: MANUFACTURING TECHNOLOGY

FY 2005 Accomplishments:

- Continued Best Manufacturing Practices efforts in surveys, the Program Manager's WorkStation, and Collaborative Work Environment.
- Completed Supply-Chain Practices for Affordable Navy Systems (SPANS) efforts in supply chain development and management technologies to improve the agility of the Navy manufacturing base and enhance the affordability of Navy weapon systems.
- Completed Tin Whisker Mitigation effort to develop a method to recoat lead-free component finishes with tin-lead alloy to avoid the electrically conductive hair-like filaments that can cause electrical shorting failures and mechanical damage.
- Completed Lean Pathways (LPW) effort with DDG 51 Program Office and seven suppliers to improve deliveries, improve quality, and reduce cost.
- Completed LPW engagements with two CVNs to introduce lean concepts and improve sortie rate.
- Completed Technology Refresh for Navy Information (TRENT) effort to identify a solution for optimizing technology refresh for Navy weapons systems by identifying a timely and cost-effective plan for each individual system based on anticipated parts obsolescence and technology road mapping.
- Initiated and completed Aegis Ballistic Missile Defense (BDM) Weapons Control Systems (WCS) Computer Processors effort to aid in the integration of state-of-the-art, non-developmental item processors into the Aegis upgrade to meet deployment schedule.
- Initiated and completed effort to develop Navy Capability for Analytical Computing Engineering Trade Studies for a resident analytic computing center to support Navy acquisition programs.
- Initiated and completed effort on Lean Six Sigma for Naval Air Systems Command.
- Initiated J-UCAS Structural Welding effort.
- Initiated LASCOR/10% Ni Steel CVN Tails effort.
- Initiated and completed Mid-Tier Shipyard Capability Assessment effort.
- Initiated development of decision support system. (Gulf Coast Region Maritime Technology Center, NGSS LPD-17, potentially DD(X))
- Initiated Packaging Reconfigurable Antenna Solutions for Improved Mission Adaptability for the Littoral Combat Ship effort.
- Initiated development of low cost Vacuum Assisted Resin Transfer Mold (VARTM) process to produce Virginia-Class "Special Feature" parts that do not require significant post processing/machining and meet drawing and performance specifications. (Composite Manufacturing Technology for "Special Feature")

BUDGET ACTIVITY: 07
PROGRAM ELEMENT: 0708011N PROGRAM ELEMENT TITLE: INDUSTRIAL PREPAREDNESS
PROJECT NUMBER: 1050 PROJECT TITLE: MANUFACTURING TECHNOLOGY

FY 2006 Plans:

- Continue all efforts of FY 2005 less those noted as completed above.
- Complete LASCOR/10% Ni Steel CVN Tails effort.
- Complete development of decision support system. (Gulf Coast Region Maritime Technology Center, NGSS LPD-17, potentially DD(X))
- Complete the development of a low cost VARTM process to produce Virginia-Class “Special Feature” parts that do not require significant post processing/machining and meet drawing and performance specifications. (Composite Manufacturing Technology for “Special Feature”)
- Initiate efforts to continue to improve the Navy industrial base through above-the-factory-floor enhancements and supply chain processes/technology improvements for Navy weapon system acquisition programs such as the Littoral Combat Ship (LCS), CVN 21 carrier program, and others.

FY 2007 Plans:

- Continue all efforts of FY 2006 less those noted as completed above.
- Complete J-UCAS Structural Welding effort.
- Complete the Packaging Reconfigurable Antenna Solutions for Improved Mission Adaptability for the Littoral Combat Ship effort.
- Initiate efforts to continue to improve the Navy industrial base through above-the-factory-floor enhancements and supply chain processes/technologies improvements for Navy weapon system acquisition programs such as the LCS, CVN 21 carrier program, and others.

C. OTHER PROGRAM FUNDING SUMMARY:
RELATED RDT&E:
Major Acquisition programs, such as: DD(X), LPD-17, LCS, V-22, EFV, F/A-18, and CVN-21.

NON-NAVY RELATED RDT&E:
PE 0708011F Industrial Preparedness (USAF)
PE 0708011S Industrial Preparedness (DLA)
PE 0708045A End Item Industrial Preparedness Activities (ARMY)

D. ACQUISITION STRATEGY:
Not applicable.

BUDGET ACTIVITY: 07
PROGRAM ELEMENT: 0708011N PROGRAM ELEMENT TITLE: INDUSTRIAL PREPAREDNESS
PROJECT NUMBER: 9999 PROJECT TITLE: Congressional Plus-Ups

CONGRESSIONAL PLUS-UPS:

	FY 2005	FY 2006
IMPROVE MANUFACTURABILITY DEMO OF EXHAUST COMPONENTS FOR MILITARY AIRCRAFT	955	0

This project improved the manufacturability (and therefore reduced production costs) of silicon carbide – carbon composite (SiC-C) exhaust flaps and seals on the GE F414 engine for the F/A 18 E/F Super Hornet fighter jet. The projected results of this effort are savings of more than $30M over the remaining life of the F414 production program.

	FY 2005	FY 2006
NANO-IMPRINT AT A MANUFACTURING SCALE	2,675	1,400

FY 2005: This project developed the imprint lithography process relating to fluid delivery, imprinting, and in-liquid alignment while keeping the constraints of interferometric mag-lev stages in mind. This project built on unique capabilities in the motion systems area that were previously developed.
FY 2006: This effort supports nano-imprint at a manufacturing scale research.

	FY 2005	FY 2006
NAVAL APPLICATION OF LASER PEENING TECHNOLOGY	0	1,000

This effort supports research into the Naval application of laser peening technology.