PE NUMBER: 0603211F
PE TITLE: Aerospace Technology Dev/Demo

Exhibit R-2, RDT&E Budget Item Justification

DATE: February 2006

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603211F Aerospace Technology Dev/Demo

	Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	34.717	53.657	27.424	57.925	114.655	117.057	122.232	Continuing	TBD
486U	Advanced Aerospace Structures	12.341	28.882	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4920	Flight Vehicle Tech Integration	22.376	24.775	24.624	57.090	114.189	116.564	118.718	Continuing	TBD
99SP	Advanced Structures Space Vehicles	0.000	0.000	2.800	0.835	0.466	0.493	3.514	Continuing	TBD

Note: In FY 2006, efforts from Project 486U transfer into Project 4920 within this PE. Funds for the FY 2006 Congressionally-directed National Aerospace Leadership Initiative in the amount of $20.7 million are in the process of being moved to PE 0601102F, Defense Research Sciences, from PE 0603211F, Aerospace Technology Dev/Demo, for execution. Funds for the FY 2006 Congressionally-directed Next Generation Helmet Tracking and Display Technology in the amount of $0.986 million are in the process of being moved to PE 0603231F, Crew Systems and Personal Protection Technology, from PE 0603211F, Aerospace Technology Dev/Demo, for execution. Funds for the FY 2006 Congressionally-directed Hybrid Radio Frequency - Optical Communications Terminal in the amount of $0.986 million are in the process of being moved to PE 060789F, C3I Advanced Development, from PE 0603211F, Aerospace Technology Dev/Demo, for execution. Funds for the FY 2006 Congressionally-directed Design Manual for Titanium Honeycomb Sandwich Composite in the amount of $3.253 million are in the process of being moved to PE 0603211F, Aerospace Technology Dev/Demo from PE 0603112F, Advanced Materials for Weapon Systems, for execution. In FY 2007, Project 6399SP, Advanced Structures for Space Vehicles, efforts were transferred from PE 0603500F, Multidisciplinary Advanced Space Technology, Project 635062, Advanced Structures for Space Vehicles, order to effectively manage and provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This program demonstrates advanced aerospace vehicle technologies. Advanced aerospace structures are demonstrated to sustain and enhance the capability of current and future aerospace vehicles, such as a next generation bomber. Flight vehicle technology integration is accomplished through integration of various technologies to include avionics, advanced propulsion, and weapon systems for demonstration in near-realistic operational environments. Note: In FY 2006, Congress added $4.2 million for Capabilities Planning Support Phase 2, $2.1 million for Fly-By-Light, $1.0 million for Hybrid Radio Frequency - Optical Communications Terminal, $1.0 million for Next Generation Helmet Tracking and Display Technology, and $21.0 million for National Aerospace Leadership Initiative. This program is in the Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing aerospace vehicle system upgrades and/or new system developments that have military utility and address warfighter needs.

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603211F Aerospace Technology Dev/Demo

(U) B. Program Change Summary ($ in Millions)

		FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	38.602	25.133	24.345
(U)	Current PBR/President's Budget	34.717	53.657	27.424
(U)	Total Adjustments	-3.885	28.524	
(U)	Congressional Program Reductions			
	Congressional Rescissions	-0.029	-0.776	
	Congressional Increases		29.300	
	Reprogrammings	-2.848		
	SBIR/STTR Transfer	-1.008		

(U) Significant Program Changes:

Not Applicable.

(U) C. Performance Metrics

Under Development

Exhibit R-2a, RDT&E Project Justification

DATE: **February 2006**

BUDGET ACTIVITY: **03 Advanced Technology Development (ATD)**

PE NUMBER AND TITLE: **0603211F Aerospace Technology Dev/Demo**

PROJECT NUMBER AND TITLE: **486U Advanced Aerospace Structures**

Cost ($ in Millions)		FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
486U	Advanced Aerospace Structures	12.341	28.882	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2006, efforts from Project 486U transfer into Project 4920 within this PE. Funds for FY2006 Congressionally-directed National Aerospace Leadership Initiative in the amount of $20.7 million are in the process of being moved to PE 0601102F, Defense Research Sciences, from PE 0603211F, Aerospace Technology Dev/Demo, for execution. Funds for the FY 2006 Congressionally-directed Next Generation Helmet Tracking and Display Technology in the amount of $0.986 million are in the process of being moved to PE 0603231F, Crew Systems and Personal Protection Technology, from PE 603211F, Aerospace Technology Dev/Demo, for execution. Funds for the FY 2006 Congressionally-directed Hybrid Radio Frequency - Optical Communications Terminal in the amount of $0.986 million are in the process of being moved to PE 060789F, C3I Advanced Development, from PE 0603211F, Aerospace Technology Dev/Demo, for execution. Funds for the FY 2006 Congressionally-directed Design Manual for Titanium Honeycomb Sandwich Composite in the amount of $3.253 million are in the process of being moved to PE 0603211F, Aerospace Technology Dev/Demo, from PE 0603112F, Advanced Materials for Weapon Systems, for execution.

(U) A. Mission Description and Budget Item Justification

This project develops and demonstrates affordable aerospace vehicle technologies to sustain the existing fleet, reduce the cost of aircraft ownership, and enhance the capability of current and future aerospace vehicles. Sustainment of the existing fleet through extended operational service life with innovative technology application will lead to reduced operations and support costs, and increased operational readiness. Analytical certification will reduce the cost associated with component replacement by allowing and certifying new designs under reduced test requirements. Development of capability enhancing technologies will expand the operational envelope and increase survivability in high threat environments. Demonstration of these technologies will restore structural integrity, extend structural life, enhance the capability, and reduce the life cycle costs of fielded aircraft.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and demonstrate technologies related to improved munitions separation enhancement and acoustic reduction in current and future aircraft. Note: In FY 2006, this effort was the only remaining effort in Project 486U and was transferred back to Project 4920 within this PE.	3.373	0.000	0.000
(U) In FY 2005: Continued to develop active flow control devices to significantly increase and expand the separation envelope for miniature munitions and reduce weapon bay acoustics to minimize damage at speeds in excess of Mach 1.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Not Applicable.			
(U)			
(U) CONGRESSIONAL ADD: Three-Dimensional Bias Woven Preforms Development Program.	1.839	0.000	0.000
(U) In FY 2005: Continued Congressionally-directed effort for Three-Dimensional Bias Woven Preforms Development Program.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603211F Aerospace Technology Dev/Demo**	PROJECT NUMBER AND TITLE **486U Advanced Aerospace Structures**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Capabilities Planning Support. Note: In FY 2005, two Congressional Adds were appropriated for this effort; both are being managed as a single effort.	6.191	4.140	0.000
(U)	In FY 2005: Initiated Congressionally-directed effort for capabilities planning support.			
(U)	In FY 2006: Continue Congressionally directed effort for capabilities planning support.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Haleakala Laser Communications Testbed.	0.938	0.000	0.000
(U)	In FY 2005: Initiated Congressionally-directed effort for Haleakala laser communication testbed.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Fly-By-Light.	0.000	2.070	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Continued Congressionally-directed effort for fly-by-light.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Hybrid Radio Frequency - Optical Communications Terminal.	0.000	0.986	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Initiate Congressionally-directed effort for hybrid radio frequency - optical communications terminal.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Next Generation Helmet Tracking and Display Technology.	0.000	0.986	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Initiated Congressionally-directed effort for next generation helmet tracking and display technology.			
(U)	In FY 2007: Not Applicable.			
(U)	CONGRESSIONAL ADD: National Aerospace Leadership Initiative.	0.000	20.700	0.000
(U)	In FY 2005: Initiated this Congressionally-directed effort in PE 0601102F, Defense Research Sciences.			
(U)	In FY 2006: Continue Congressionally-directed effort for national aerospace leadership initiative.			
(U)	In FY 2007: Not Applicable.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **03 Advanced Technology Development (ATD)**	PE NUMBER AND TITLE **0603211F Aerospace Technology Dev/Demo**	PROJECT NUMBER AND TITLE **486U Advanced Aerospace Structures**

(U) B. Accomplishments/Planned Program ($ in Millions)

	FY 2005	FY 2006	FY 2007
(U) Total Cost	12.341	28.882	0.000

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost

(U) Related Activities:

(U) PE 0602201F, Aerospace Vehicle Technologies.

(U) PE 0604015F, Next Generation Bomber.

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2006
BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE: 0603211F Aerospace Technology Dev/Demo	PROJECT NUMBER AND TITLE: 4920 Flight Vehicle Tech Integration	

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
4920 Flight Vehicle Tech Integration	22.376	24.775	24.624	57.090	114.189	116.564	118.718	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2006, efforts from Project 486U transfer into Project 4920 within this PE.

(U) A. Mission Description and Budget Item Justification

This project integrates and demonstrates advanced flight vehicle technologies that will improve the performance and supportability of existing and future manned and unmanned aerospace vehicles. System level integration brings together the aerospace vehicle technologies along with avionics, propulsion, and weapon systems for demonstration in a near-realistic operational environment. Integration and technology demonstrations reduce the risk and time required to transition technologies into operational aircraft. This program provides proven aerospace vehicle technologies for all-weather, day/night operations with improved performance and affordability.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop autonomous flight controls for safe flight operations between manned and unmanned air platforms.	8.054	7.201	5.239
(U) In FY 2005: Developed and demonstrated control automation techniques, components, and algorithms to enable the safe and inter operable application of unmanned vehicle systems. Completed the integration and test of key autonomous control component technologies. Demonstrated fully integrated, adaptive, fault tolerant, autonomous control system suite to provide significantly increased reliability and mission effectiveness for unmanned vehicle systems. Demonstrated key photonic sensing and control elements for flight critical control.			
(U) In FY 2006: Complete hardware-in-the-loop simulation assessments of integrated, adaptive, fault tolerant, autonomous control system suite to verify significantly increased reliability and mission effectiveness for unmanned vehicle systems. Complete environmental testing of key photonic sensing and control elements for flight critical control. Prepare key photonic sensing and control elements for flight-testing. Flight demonstrate automated see and avoid capability for unmanned air vehicles.			
(U) In FY 2007: Complete ground simulation and flight demonstration of key hardware and software systems for adaptive, fault tolerant, autonomous unmanned air vehicle airborne control. Initiate development of situational awareness and control technologies for automated airbase ground operations for unmanned air vehicles.			
(U)			
(U) MAJOR THRUST: Develop an Automated Aerial Refueling capability for unmanned and manned air platforms. Note: In FY 2005, Automated Aerial Refueling efforts described in the autonomous flight controls thrust area were broken out to allow for increased visibility for this effort.	4.698	0.000	0.000
(U) In FY 2005: Completed development of automated aerial refueling sensing, communication, and control algorithm components. Completed integration, simulation, and analysis verifying safe autonomous operation in proximity of			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603211F Aerospace Technology Dev/Demo	PROJECT NUMBER AND TITLE 4920 Flight Vehicle Tech Integration

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
manned tankers. Conducted flight demonstrations of initial automated aerial refueling capability for unmanned aerial vehicles using existing fleet tankers, operational procedures, and unmanned combat air vehicles.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Not Applicable.			
(U)			
(U) MAJOR THRUST: Develop, simulate, and demonstrate integrated technologies to improve the performance of manned and unmanned platforms. Note: The FY 2006 increase in funding is the direct result of incorporating the remaining effort from Project 486U into this thrust. The FY 2007 decrease is due to completion of a majority of the thrust objectives in FY 2006.	3.132	6.149	1.443
(U) In FY 2005: Developed advanced aerodynamic/structural integration concepts to enable increased system performance at reduced cost. Demonstrated an actively controlled conformal inlet system for increased propulsion system performance for unmanned air vehicles.			
(U) In FY 2006: Complete initial demonstration of an actively controlled conformal inlet system for increased propulsion system performance for unmanned air vehicles. Continue demonstration of active flow control devices to significantly increase and expand the separation envelope for miniature munitions and reduce weapon bay acoustics to minimize damage to the aircraft at speeds in excess of Mach 1.			
(U) In FY 2007: Continue development of a simulation environment to enable evaluation of network centric technologies for improved capabilities for high speed operational concepts.			
(U)			
(U) MAJOR THRUST: Develop analytical certification methods and capability to reduce the need for physical testing in the certification of structural components resulting in reduced acquisition cost for new systems and reduced support costs for future and legacy systems. Demonstrate reduced support costs for future systems by incorporation of advanced monitoring capabilities. Note: Funding increase is due to increased emphasis being placed on diagnostic and prognostic health monitoring tool development for future aircraft systems.	0.452	3.475	8.704
(U) In FY 2005: Developed improved sustainment technologies for existing aging aircraft and future aerospace vehicle structures to reduce operations and support costs and extend usable structural lives. Developed real-time diagnostic and prognostics health monitoring tools of thermal protection systems, tanks, structures, and subsystems to enable rapid turn around and high temperature operations. Completed the demonstration of approaches to reliably use virtual and analytical methods to substantially reduce the need for physical testing in the certification of structural components resulting in reduced acquisition cost for new systems and reduced support costs for legacy systems.			
(U) In FY 2006: Continue development and initiate demonstration of improved sustainment technologies for existing aging aircraft and future aerospace vehicle structures to reduce operations and support costs and extend usable			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603211F Aerospace Technology Dev/Demo	PROJECT NUMBER AND TITLE 4920 Flight Vehicle Tech Integration

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	structural lives. Continue development and initiate demonstration of real-time diagnostic and prognostics health monitoring tools for thermal protected systems, tanks, structures, and subsystems to enable rapid turn around and high temperature operations of high-speed aircraft.			
(U)	In FY 2007: Continue demonstration of improved sustainment technologies for existing aging aircraft and future aerospace vehicle structures to reduce operations and support costs and extend usable structural lives. Continue demonstration of real-time diagnostic and prognostics health monitoring tools for thermal protected systems, tanks, structures, and subsystems to enable rapid turn around and high temperature operations.			
(U)				
(U)	MAJOR THRUST: Develop aircraft structures that have embedded components, which have previously been separate components that were attached to the air platforms.	3.803	4.378	6.173
(U)	In FY 2005: Continued development of multi-functional integrated structures to reduce acquisition and support costs, weight, and volume and increase performance of air vehicles. Completed demonstration of concepts with high multi-element antenna arrays embedded in load-bearing structure to increase antenna performance improvement and reduced vehicle weight, cost, and volume. Continued development of concepts of very large, low frequency antenna arrays embedded in load-bearing structure to enable new antenna capabilities and increased performance, while reducing vehicle weight, cost, and volume.			
(U)	In FY 2006: Continue development of multi-functional integrated structures to reduce acquisition and support costs, weight, and volume and increase performance of air vehicles. Initiate flight demonstration of concepts with high multi-element antenna arrays embedded in load-bearing structure to increase antenna performance improvement and reduced vehicle weight, cost, and volume. Continue development and initiate demonstration of concepts for very large, low frequency antenna arrays embedded in the aircraft load-bearing structure to enable new antenna capabilities and increased performance, while reducing vehicle weight, cost, and volume.			
(U)	In FY 2007: Continue and assess results from flight demonstration of concepts with high multi-element antenna arrays embedded in load-bearing structure to increase antenna performance improvement and reduced vehicle weight, cost, and volume. Continue demonstration of concepts for very large, low frequency antenna arrays embedded in load-bearing structure to enable new antenna capabilities and increased performance, while reducing vehicle weight, cost, and volume.			
(U)				
(U)	MAJOR THRUST: Develop adaptive structures to provide in-flight modifications offering improved performance over a wide range of flight conditions and mission profiles.	2.237	3.572	3.065
(U)	In FY 2005: Developed integrated thermal airframe structures, including thermal protection systems, attachments, seals, joining technologies, hot primary structure, and structural health monitoring for high speed vehicle			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 03 Advanced Technology Development (ATD)	PE NUMBER AND TITLE 0603211F Aerospace Technology Dev/Demo	PROJECT NUMBER AND TITLE 4920 Flight Vehicle Tech Integration

(U) B. Accomplishments/Planned Program ($ in Millions)

		FY 2005	FY 2006	FY 2007
	applications.			
(U)	In FY 2006: Continue development and initiate demonstration of integrated thermal airframe structures including thermal protection systems, attachments, seals, joining technologies, hot primary structure, and structural health monitoring for high-speed vehicle applications. Continue development and initiate demonstration of highly efficient wing concepts integrating active aeroelastic design concepts, adaptive structures, and aerodynamic flow control technologies to enable viable long-range and long-endurance air vehicle concepts.			
(U)	In FY 2007: Further refine integrated thermal airframe structures including thermal protection systems, attachments, seals, joining technologies, hot primary structure, and structural health monitoring for high-speed vehicle applications. Continue development and demonstration of highly efficient wing concepts integrating active aeroelastic design concepts, adaptive structures, and aerodynamic flow control technologies to enable viable long range and long endurance air vehicle concepts.			
(U)				
(U)	Total Cost	22.376	24.775	24.624

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost

(U) Related Activities:

(U) PE 0602201F, Aerospace Vehicle Technologies.

(U) PE 0604015F, Next Generation Bomber.

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

BUDGET ACTIVITY: 03 Advanced Technology Development (ATD)

PE NUMBER AND TITLE: 0603211F Aerospace Technology Dev/Demo

PROJECT NUMBER AND TITLE: 99SP Advanced Structures Space Vehicles

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
99SP Advanced Structures Space Vehicles	0.000	0.000	2.800	0.835	0.466	0.493	3.514	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2007, Project 6399SP, Advanced Structures for Space vehicles, efforts were transferred from PE 0603500F, Multidisciplinary Advanced Space Technologies, Project 635062, Advanced Structures for Space Vehicles, in order to effectively manage and provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project identifies, develops, and demonstrates the technologies to enable advanced access-to-space aerospace vehicles that deliver revolutionary capability, operability, responsiveness, and cost-effectiveness. Enabling technologies include thermal protection, structures, vehicle systems, configurations, aerodynamics, and controls. Technology demonstration includes multi-disciplinary system level integration of the enabling technologies.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop the airframe and payload technologies required to enable horizontal launch of reusable high altitude aerospace vehicles.	0.000	0.000	2.800
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Continue developing the airframe and payload technologies required to enable next generation reusable access to space systems including the thermal protection, structural, configuration, and vehicle and payload system technologies that enable aerospace vehicles to exhibit revolutionary capability, operability, responsiveness, and cost-effectiveness.			
(U) Total Cost	0.000	0.000	2.800

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) PE 0602201F, Aerospace Vehicle Technology									

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.