

<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)</b>	DATE <b>February 1999</b>
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<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>	<b>PE NUMBER AND TITLE</b> <b>0603112F Advanced Materials for Weapon Systems</b>
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COST (\$ In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	25,826	32,900	25,890	25,702	23,971	25,219	25,928	27,144	Continuing	Continuing
2100 Laser Hardened Materials	9,205	10,959	11,242	11,260	11,675	11,947	12,197	12,451	Continuing	Continuing
3153 Non-Destructive Inspection Development	6,383	4,492	4,352	3,890	4,038	4,412	4,759	5,108	Continuing	Continuing
3946 Materials Transition	10,238	17,449	10,296	10,552	8,258	8,860	8,972	9,585	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0	0

**(U) A. Mission Description:** This Advanced Technology Development program demonstrates materials technology options for application into Air Force weapon systems. Developing materials technologies for the broadband laser protection of aircrews and sensors from a variety of threats is a high priority of the Air Force. The Non-Destructive Inspection/Evaluation (NDI/E) techniques for fighter, bomber, and transport aircraft are critical to the logistics centers as well as the operational fleet as the service lives of these systems increase. This program provides critical data for prospective users to make engineering decisions on both structural and non-structural materials for air and space. Reducing risk in materials technology improves the affordability, supportability, reliability, survivability, and operational performance of current and future warfighting systems. Note: In FY 1999, Congress added \$3.0 million for the Aerospace Metals Program, \$5.0 million for the National Center for Industrial Competitiveness, and \$4.0 million for advanced low-observable coatings which explains the perceived decrease in FY 2000 and out.

**(U) B. Budget Activity Justification:** This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

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<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>			<b>PE NUMBER AND TITLE</b> <b>0603112F Advanced Materials for Weapon Systems</b>		
<b>(U) C. <u>Program Change Summary (\$ in Thousands):</u></b>					
	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total</u>
(U) Previous President's Budget/FY 1999 PB	26,503	21,006	22,629	22,792	Cost
(U) Appropriated Value	28,096	33,006			Cont
(U) Adjustments to Appropriated Value					
a. Congressional/General Reductions	-952	-106			
b. SBIR	-565				
c. Omnibus/Other Above Threshold Reprogrammings	-181				
d. Below Threshold Reprogrammings	-572				
(U) Adjustments to Budget Year Since FY 1999 PB			3,261	2,910	
(U) Current Budget Submit/FY 2000 PB	25,826	32,900	25,890	25,702	Cont
 (U) Significant Program Changes: The adjustments in FY 2000 and FY 2001 reflect increased emphasis on implementation of Integrated Product Process Development (IPPD) and support of Air Expeditionary Force (AEF) operations.					
FY1999: \$977 identified as a source for SBIR.					

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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)</b>								DATE <b>February 1999</b>		
<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>				<b>PE NUMBER AND TITLE</b> <b>0603112F Advanced Materials for Weapon Systems</b>					<b>PROJECT</b> <b>2100</b>	
<i>COST (\$ In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
2100 Laser Hardened Materials	9,205	10,959	11,242	11,260	11,675	11,947	12,197	12,451	Continuing	Continuing
<p><b>(U) A. <u>Mission Description:</u></b> This project develops new materials and concepts for protecting Air Force assets such as aircrews, munitions, sensors, and structures against laser radiation. The goal is to ensure mission capability before, during, and after laser exposure. The world laser market is rapidly expanding with easy export to any nation. Survivability solutions must account for a variety of lasers facing a mission. Current protection schemes are activated by intensity or color and are only capable of countering a specific portion of the laser threat. To harden systems against all potential lasers, a combination of approaches is required. Concepts are demonstrated to provide hardening options for transition to Air Force systems.</p> <p><b>(U) <u>FY 1998 (\$ in Thousands):</u></b></p> <ul style="list-style-type: none"> <li>- (U) \$1,360      Developed and demonstrated advanced materials technologies that enhance laser hardening of Air Force aircraft and spacecraft structures to ensure safety, survivability, and operability in a laser threat environment.</li> <li>- (U) \$3,914      Developed and demonstrated advanced materials technologies that enhance laser hardening for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in a laser threat environment.</li> <li>- (U) \$3,931      Developed and demonstrated advanced materials technologies that enhance laser hardening for sensors, avionics, and components to increase survivability and mission effectiveness of electronic systems.</li> <li>- (U) \$9,205      Total</li> </ul> <p><b>(U) <u>FY 1999 (\$ in Thousands):</u></b></p> <ul style="list-style-type: none"> <li>- (U) \$1,563      Develop and demonstrate advanced materials technologies that enhance laser hardening of Air Force aircraft and spacecraft structures to ensure safety, survivability, and operability in a laser threat environment.</li> <li>- (U) \$4,563      Develop and demonstrate advanced materials technologies that enhance laser hardening for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in a laser threat environment.</li> <li>- (U) \$4,507      Develop and demonstrate advanced materials technologies that enhance laser hardening for sensors, avionics, and components to increase survivability and mission effectiveness of electronic systems.</li> <li>- (U) \$326          Identified as a source for SBIR.</li> <li>- (U) \$10,959      Total</li> </ul>										
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<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>	<b>PE NUMBER AND TITLE</b> <b>0603112F Advanced Materials for Weapon Systems</b>	<b>PROJECT</b> <b>2100</b>
<p>(U) <u>FY 2000 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$1,654     Develop and demonstrate advanced materials technologies that enhance laser hardening of Air Force aircraft and spacecraft structures to ensure safety, survivability, and operability in a laser threat environment.</li> <li>- (U) \$4,823     Develop and demonstrate advanced materials technologies that enhance laser hardening for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in a laser threat environment.</li> <li>- (U) \$4,765     Develop and demonstrate advanced materials technologies that enhance laser hardening for sensors, avionics, and components to increase survivability and mission effectiveness of electronic systems.</li> <li>- (U) \$11,242    Total</li> </ul> <p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$1,656     Develop and demonstrate advanced materials technologies that enhance laser hardening of Air Force aircraft and spacecraft structures to ensure safety, survivability, and operability in a laser threat environment.</li> <li>- (U) \$4,832     Develop and demonstrate advanced materials technologies that enhance laser hardening for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in a laser threat environment.</li> <li>- (U) \$4,772     Develop and demonstrate advanced materials technologies that enhance laser hardening for sensors, avionics, and components to increase survivability and mission effectiveness of electronic systems.</li> <li>- (U) \$11,260    Total</li> </ul>		
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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)		DATE
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>3 - Advanced Technology Development</b>	<b>0603112F Advanced Materials for Weapon Systems</b>	<b>2100</b>
<p>(U) <b>B. <u>Project Change Summary - Description of Significant Changes:</u></b> Not Applicable.</p> <p>(U) <b>C. <u>Other Program Funding Summary:</u></b></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none"><li>- (U) PE 0602102F, Materials.</li><li>- (U) PE 0602202F, Human Effectiveness Applied Research.</li><li>- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.</li><li>- (U) PE 0604706F, Life Support System.</li><li>- (U) Coordinated through the Tri-Service Laser Hardening Materials and Structures Working Group and the Joint Service Agile Laser Eye Protection Program.</li><li>- (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</li></ul> <p>(U) <b>D. <u>Acquisition Strategy:</u></b> Not Applicable.</p> <p>(U) <b>E. <u>Schedule Profile:</u></b> Not Applicable.</p>		
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<b>RDT&amp;E BUDGET ITEM JUSTIFICATION SHEET (R-2A Exhibit)</b>								DATE <b>February 1999</b>		
<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>				<b>PE NUMBER AND TITLE</b> <b>0603112F Advanced Materials for Weapon Systems</b>				<b>PROJECT</b> <b>3153</b>		
<i>COST (\$ In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
3153 Non-Destructive Inspection Development	6,383	4,492	4,352	3,890	4,038	4,412	4,759	5,108	Continuing	Continuing
<p>(U) <b>A. <u>Mission Description:</u></b> Develops and demonstrates advanced Non-Destructive Inspection/Evaluation (NDI/E) methods and procedures to monitor performance integrity and to detect failure causing conditions in weapon systems components and materials. NDI/E capabilities greatly influence and/or limit many designs, manufacturing, and maintenance practices. Reduction in the number of fighter wings and the need for rapid sortie generation demand an ability to perform real-time NDI/Es faster than current capability. This project provides technology to satisfy critical Air Force requirements to extend lifetimes of current systems through increased reliability and cost-effectiveness at field and depot maintenance levels, as well as assuring manufacturing quality, integrity, and safety requirements.</p> <p>(U) <u>FY 1998 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>– (U) \$5,385      Developed advanced technologies for improved capabilities in materials corrosion and fatigue monitoring and testing of aging aircraft to reduce operation and maintenance costs and to guarantee full operability and safety of the aircraft fleet.</li> <li>– (U) \$320        Developed advanced inspection technologies supporting low-observable and space systems to enhance affordability and ensure full performance and survivability of low-observable systems and rapid turnaround of space systems.</li> <li>– (U) \$678        Developed advanced technologies for improved NDI/E capabilities in materials and process testing, monitoring, inspection, and maintenance to reduce cost and increase reliability of advanced materials.</li> <li>– (U) \$6,383      Total</li> </ul> <p>(U) <u>FY 1999 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>– (U) \$2,939      Develop advanced technologies for improved capabilities in materials corrosion and fatigue monitoring and testing of aging aircraft to reduce operation and maintenance costs and to guarantee full operability and safety of the aircraft fleet.</li> <li>– (U) \$592        Develop advanced inspection technologies supporting low-observable and space systems to enhance affordability and ensure full performance and survivability of low-observable systems and rapid turnaround of space systems.</li> <li>– (U) \$828        Develop advanced technologies for improved NDI/E capabilities in materials and process testing, monitoring, inspection, and maintenance to reduce cost and increase reliability of advanced materials.</li> <li>– (U) \$133        Identified as a source for SBIR.</li> <li>– (U) \$4,492      Total</li> </ul>										
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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>3 - Advanced Technology Development</b>	<b>0603112F Advanced Materials for Weapon Systems</b>	<b>3153</b>
<p>(U) <u>FY 2000 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$1,560 Develop advanced technologies for improved capabilities in materials corrosion and fatigue monitoring and testing of aging aircraft to reduce operation and maintenance costs and to guarantee full operability and safety of the aircraft fleet.</li> <li>- (U) \$2,170 Develop advanced inspection technologies supporting low-observable and space systems to enhance affordability and ensure full performance and survivability of low-observable systems and rapid turnaround of space systems.</li> <li>- (U) \$622 Develop advanced technologies for improved Non-Destructive Inspection/Evaluation (NDI/E) capabilities in materials and process testing, monitoring, inspection, and maintenance to reduce cost and increase reliability of advanced materials.</li> <li>- (U) \$4,352 Total</li> </ul> <p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$1,439 Develop advanced technologies for improved capabilities in materials corrosion and fatigue monitoring and testing of aging aircraft to reduce operation and maintenance costs and to guarantee full operability and safety of the aircraft fleet.</li> <li>- (U) \$1,849 Develop advanced inspection technologies supporting low-observable and space systems to enhance affordability and ensure full performance and survivability of low-observable systems and rapid turnaround of space systems.</li> <li>- (U) \$602 Develop advanced technologies for improved NDI/E capabilities in materials and process testing, monitoring, inspection, and maintenance to reduce cost and increase reliability of advanced materials.</li> <li>- (U) \$3,890 Total</li> </ul> <p>(U) <b>B. <u>Project Change Summary - Description of Significant Changes:</u></b> Not Applicable.</p> <p>(U) <b>C. <u>Other Program Funding Summary:</u></b></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none"> <li>- (U) PE 0602102F, Materials.</li> <li>- (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</li> </ul> <p>(U) <b>D. <u>Acquisition Strategy:</u></b> Not Applicable.</p> <p>(U) <b>E. <u>Schedule Profile:</u></b> Not Applicable.</p>		
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<b>BUDGET ACTIVITY</b> <b>3 - Advanced Technology Development</b>				<b>PE NUMBER AND TITLE</b> <b>0603112F Advanced Materials for Weapon Systems</b>					<b>PROJECT</b> <b>3946</b>	
<i>COST (\$ In Thousands)</i>	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
3946 Materials Transition	10,238	17,449	10,296	10,552	8,258	8,860	8,972	9,585	Continuing	Continuing
<p>(U) <b>A. <u>Mission Description:</u></b> Develops data to accelerate the time to scale-up new defense-related materials and achieve their acceptance by designers. The goal is to reduce risk, improve confidence, and reduce cost of the incorporation of new materials into weapons, airframes, engines, and space applications. Advanced materials and related processes that have matured beyond applied research are characterized and critical data is developed to reduce the risk of demonstrating these technologies in Air Force applications. Critical evaluations of materials in the proposed design environment are performed. This design and scale-up data provides confidence to transition new materials to upgrades and future Air Force systems as well as provide the initial incentive for their industrial development.</p> <p>(U) <b><u>FY 1998 (\$ in Thousands):</u></b></p> <ul style="list-style-type: none"> <li>- (U) \$6,897      Developed technologies and databases to facilitate timely transition of advanced structures, propulsion, and subsystems materials to warfighters, industry, and academia.</li> <li>- (U) \$2,924      Developed technologies and databases to facilitate timely transition of advanced materials for high power radars, space-based sensors, and infrared countermeasure materials to warfighters, industry, and academia.</li> <li>- (U) \$417        Developed technologies and databases to facilitate timely transition of advanced materials for improved systems support and operational support to warfighters, industry, and academia.</li> <li>- (U) \$10,238    Total</li> </ul> <p>(U) <b><u>FY 1999 (\$ in Thousands):</u></b></p> <ul style="list-style-type: none"> <li>- (U) \$13,634    Develop technologies and databases to facilitate timely transition of advanced structures, propulsion, and subsystems materials to warfighters, industry, and academia.</li> <li>- (U) \$2,879    Develop technologies and databases to facilitate timely transition of advanced materials for high power radars, space-based sensors, and infrared countermeasures to warfighters, industry, and academia.</li> <li>- (U) \$418      Develop technologies and databases to facilitate timely transition of advanced materials for improved systems support and operational support to warfighters, industry, and academia.</li> <li>- (U) \$518      Identified as a source for SBIR.</li> <li>- (U) \$17,449    Total</li> </ul>										
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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
<b>3 - Advanced Technology Development</b>	<b>0603112F Advanced Materials for Weapon Systems</b>	<b>3946</b>
<p>(U) <u>FY 2000 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$1,356 Develop advanced materials technologies for air vehicles and subsystems to enhance lift, propulsion, and low-observable performance and affordability of manned and unmanned air vehicles.</li> <li>- (U) \$3,486 Develop advanced materials technologies for space vehicles and subsystems to provide enhanced surveillance and sensing capabilities and improved access to space.</li> <li>- (U) \$1,408 Develop advanced materials technologies that enhance sustainability of Air Force air and space systems to lower operations and maintenance costs and to ensure full operability and safety of aircraft and personnel.</li> <li>- (U) \$1,156 Develop methods, processes, and technologies that support the continued implementation of Integrated Product Process Development (IPPD) concepts into the Science and Technology (S&amp;T) environment by expanding education and training across a large Air Force scientist and engineer population.</li> <li>- (U) \$2,890 Develop technologies (i.e., utilities and shelters) that improve air mobile systems performance and reduce airlift requirements in support of Air Expeditionary Force (AEF) operations.</li> <li>- (U) \$10,296 Total</li> </ul> <p>(U) <u>FY 2001 (\$ in Thousands):</u></p> <ul style="list-style-type: none"> <li>- (U) \$1,376 Develop advanced materials technologies for air vehicles and subsystems to enhance lift, propulsion, and low-observable performance and affordability of manned and unmanned air vehicles.</li> <li>- (U) \$3,656 Develop advanced materials technologies for space vehicles and subsystems to provide enhanced surveillance and sensing capabilities and improved access to space.</li> <li>- (U) \$1,494 Develop advanced materials technologies that enhance sustainability of Air Force air and space systems to lower operations and maintenance costs and to ensure full operability and safety of aircraft and personnel.</li> <li>- (U) \$1,156 Develop methods, processes, and technologies that support the continued implementation of IPPD concepts into the S&amp;T environment by expanding education and training across a large Air Force scientist and engineer population.</li> <li>- (U) \$2,870 Develop technologies (i.e., utilities and shelters) that improve air mobile systems performance and reduce airlift requirements in support of AEF operations.</li> <li>- (U) \$10,552 Total</li> </ul>		
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<b>3 - Advanced Technology Development</b>	<b>0603112F Advanced Materials for Weapon Systems</b>	<b>3946</b>
<p>(U) (U) <b>B. <u>Project Change Summary - Description of Significant Changes:</u></b> Changes to this project since the previous President's Budget are due to higher priorities within the Science and Technology (S&amp;T) Program.</p> <p>(U) <b>C. <u>Other Program Funding Summary:</u></b></p> <p>(U) <u>Related Activities:</u></p> <ul style="list-style-type: none"><li>- (U) PE 0602102F, Materials.</li><li>- (U) PE 0603211F, Aerospace Structures.</li><li>- (U) PE 0603202F, Aerospace Propulsion Subsystem Integration.</li><li>- (U) PE 0603203F, Advanced Aerospace Sensors.</li><li>- (U) PE 0603216F, Aerospace Propulsion and Power Technology.</li><li>- (U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.</li></ul>		
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		PROJECT <b>3946</b>
<p>(U) <b>D. <u>Acquisition Strategy</u></b>: Not Applicable.</p> <p>(U) <b>E. <u>Schedule Profile</u></b>: Not Applicable.</p>		
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