Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force											Date: March 2024	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603112F / *Advanced Materials for Weapon Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
Total Program Element	-	53.164	30.372	29.661	0.000	29.661	31.291	32.873	34.938	35.734	Continuing	Continuing
632100: *Laser Hardened Materials*	-	19.545	15.957	13.580	0.000	13.580	13.689	14.034	14.654	15.026	Continuing	Continuing
633153: *Non-Destructive Inspection Development*	-	5.134	5.178	4.573	0.000	4.573	4.725	4.822	4.996	5.101	Continuing	Continuing
633946: *Materials Transition*	-	28.485	9.237	11.508	0.000	11.508	12.877	14.017	15.288	15.607	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program develops and demonstrates advanced materials and process technologies to satisfy Department of the Air Force requirements in areas such as survivability, readiness, affordability, and new processes and materials. These projects ensure the Department of the Air Force weapon systems are ready and able when needed.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science and technology capabilities. The use of program funds in this PE would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602020F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 1206601SF, and 0602298F.

This program element may include necessary expenses to support the operation and maintenance of facilities to manage, execute, and deliver science and technology capabilities.

This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force	Date: March 2024
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603112F / *Advanced Materials for Weapon Systems*

B. Program Change Summary ($ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	49.765	30.372	32.704	0.000	32.704
Current President's Budget	53.164	30.372	29.661	0.000	29.661
Total Adjustments	3.399	0.000	-3.043	0.000	-3.043
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	6.042	0.000			
• SBIR/STTR Transfer	-1.478	0.000			
• Other Adjustments	-1.165	0.000	-3.043	0.000	-3.043

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Project: 632100: *Laser Hardened Materials*		
Congressional Add: *Program increase - advanced aerospace materials technology development and testing*	9.703	0.000
Congressional Add Subtotals for Project: 632100	9.703	0.000
Project: 633946: *Materials Transition*		
Congressional Add: *Program increase - Metals Affordability Research*	9.703	0.000
Congressional Add: *Program increase - polymer printing technology for additive manufacturing*	4.851	0.000
Congressional Add Subtotals for Project: 633946	14.554	0.000
Congressional Add Totals for all Projects	24.257	0.000

Change Summary Explanation

Decrease in FY 2025 funding is due to movement of some work to Unites States Space Force Research, Development, Test & Evaluation program.

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603112F / *Advanced Materials for Weapon Systems*	Project (Number/Name) 632100 / *Laser Hardened Materials*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
632100: *Laser Hardened Materials*	-	19.545	15.957	13.580	0.000	13.580	13.689	14.034	14.654	15.026	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced materials technologies that enhance protection for Department of the Air Force personnel to ensure safety and to enable them to perform required missions in threat environments. Advanced materials technologies also enhance protection for Department of the Air Force sensors and systems to ensure safety, survivability, and operability in threat environments.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Aerospace Systems Protection	5.466	10.372	8.442
Description: Develop and demonstrate materials technologies that enhance hardening for sensors, avionics, and components to increase survivability and mission effectiveness of Department of the Air Force systems. ***FY 2024 Plans:*** Continue validating and assessing the demonstrated results and transition the use of protection technologies for future sensor designs and strategies to mitigate directed energy damage for visual/near, short-wave, and mid-wave infrared detectors. Continue transitioning technologies and integrate the developments into light, operator friendly survivable electro-optic sensors that provide full spectrum protection for missile warning. Continue analyzing the high-performance properties of damage limiting semiconductor materials designed to harden electro-optic imaging sensors. Continue transitioning developed laser countermeasures for survivability of dynamic electro-optic/infrared imagers. Continue advancing the employment and integration of evolved computational materials science to model materials characteristics to increase accuracy and shorten design cycle time of coatings development for use in sensor hardening. Continue development of materials for survivable next generation aircraft sensor systems. ***FY 2025 Plans:*** - Continue validating and assessing the demonstrated results and transition the use of protection technologies for future sensor designs and strategies to mitigate directed energy damage for visual/near, short-wave, and mid-wave infrared detectors. - Continue transitioning technologies and integrate the developments into light, operator friendly survivable electro-optic sensors that provide full spectrum protection for missile warning. - Continue analyzing the high-performance properties of damage limiting semiconductor materials designed to harden electro-optic imaging sensors. - Continue developing of materials for survivable next generation aircraft sensor systems.			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603112F / *Advanced Materials for Weapon Systems*	**Project (Number/Name)** 632100 / *Laser Hardened Materials*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
- Complete development of laser countermeasures for survivability of dynamic electro-optic/infrared imagers. - Complete employment and integration of evolved computational materials science to model materials characteristics to increase accuracy and shorten design cycle time of coatings development for use in sensor hardening. - In FY 2025 and beyond work in hardening for space-based platforms will be accomplished in 3620F: Research, Development, Test & Evaluation, Space Force; Program 1206616SF: Space Advanced Technology Development/Demo; Project 633834: Project Integrated Space Technology Demonstrations; Effort: Advanced Materials for Spacecraft Resilience ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 funding decreased compared to FY 2024 by $1.930 million. Funding decrease is due to increased emphasis on agile protection technologies and movement of $3.102 million of hardening of spaced based platforms research to USSF program as shown in FY 2025 plans.			
Title: Aircrew Protection ***Description:*** Develop and demonstrate materials technologies that enhance protection for Department of the Air Force personnel to ensure safety and to enable crews to perform required missions in a threat environment. ***FY 2024 Plans:*** Continue developing, validating, demonstrating, and transitioning laser protection materials and technologies for personnel protection. Complete validation and development of light-weight helmet-mounted sensor hardening materials focusing on next-generation nighttime specialized sensors. Continue advancing transition efforts and development of visor based aircrew protection materials with agile protection. Continue evaluating and assessing materials and advances in characterization and demonstration of eye protection technologies using computational materials science tools. Continue transitioning, validate, mature, and test improvements to functionality and performance of personnel protection technologies in expected operational conditions. Continue development and testing of materials technologies to protect against nuclear flash blindness. ***FY 2025 Plans:*** - Continue developing, validating, demonstrating, and transitioning laser protection materials and technologies for personnel protection. - Continue advancing transition efforts and development of visor based aircrew protection materials with agile protection. - Continue evaluating and assessing materials and advances in characterization and demonstration of eye protection technologies using computational materials science tools. - Continue transitioning, validate, mature, and test improvements to functionality and performance of personnel protection technologies in expected operational conditions. - Continue development and testing of materials technologies to protect against nuclear flash blindness. ***FY 2024 to FY 2025 Increase/Decrease Statement:***	4.376	5.585	5.138

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603112F / *Advanced Materials for Weapon Systems*	**Project (Number/Name)** 632100 / *Laser Hardened Materials*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2025 funding decreased compared to FY 2024 by $0.447 million. Funding decrease is described in the above plans.			
Accomplishments/Planned Programs Subtotals	9.842	15.957	13.580

	FY 2023	FY 2024
Congressional Add: Program increase - advanced aerospace materials technology development and testing	9.703	0.000
FY 2023 Accomplishments: Conducted Congressionally directed efforts.		
FY 2024 Plans: Not applicable		
Congressional Adds Subtotals	9.703	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
• RDTE 03 0603112F: *Advanced Materials for Weapon Systems*	0.000	0.000	-	-	-	-	-	-	-	0.000	0.000

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603112F / *Advanced Materials for Weapon Systems*	Project (Number/Name) 633153 / *Non-Destructive Inspection Development*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
633153: *Non-Destructive Inspection Development*	-	5.134	5.178	4.573	0.000	4.573	4.725	4.822	4.996	5.101	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced nondestructive inspection and evaluation technologies to monitor performance integrity and to detect failure causing conditions in weapon systems components and materials. Nondestructive inspection and evaluation capabilities greatly influence and/or limit many design, manufacturing, and maintenance practices. This project provides technology to satisfy Department of the Air Force requirements to extend the lifetime of current systems through increased reliability and cost-effectiveness at field and depot maintenance levels. Equally important is assuring manufacturing quality, integrity, and safety requirements are built in.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Special Material Inspection Technologies	1.380	1.295	1.143
Description: Develop and demonstrate advanced inspection technologies supporting special material systems to enhance affordability and ensure full performance and survivability.			
FY 2024 Plans: Continue the transition process to depots and flight lines for improved methods to acquire and analyze data to facilitate improved characterization, registration, and tracking of degradation and damage to special materials that enables/ensures more affordable coatings assessment. Continue validating tools to improve characterization and failure modes of specialty multilayer coatings. Continue developing automation for robotic technologies for visual inspections that will realize human-assisted inspection capabilities and provide capabilities for automated multi-spectral characterization.			
FY 2025 Plans: - Continue the transition process to depots and flight lines for improved methods to acquire and analyze data to facilitate improved characterization, registration, and tracking of degradation and damage to special materials that enables/ensures more affordable coatings assessment. - Continue validating tools to improve characterization and failure modes of specialty multilayer coatings. - Continue developing automation for robotic technologies for visual inspections that will realize human-assisted inspection capabilities and provide capabilities for automated multi-spectral characterization.			
FY 2024 to FY 2025 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603112F / *Advanced Materials for Weapon Systems*	**Project (Number/Name)** 633153 / *Non-Destructive Inspection Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
FY 2025 funding decreased compared to FY 2024 by $0.152 million due to transitioning to depots.			
Title: Advanced System Monitoring Technologies	3.754	3.883	3.430
Description: Develop and demonstrate advanced systems status monitoring technologies to provide on-board and embedded sensing to gain continuous awareness of the state of key subsystems. ***FY 2024 Plans:*** Continue demonstrating advanced analytical methods to more accurately assess the location, and register spatial location, of damage detected using nondestructive inspection data and results. Develop augmented reality technologies to improve the process of performing non-destructive evaluation tasks, acquiring and archiving data and reporting results, and enabling improved inspector guidance and visualization. Continue development and transition of novel approaches to collect, analyze, transport, archive, and use digital nondestructive inspection data and information. Continue enhanced methods for compiling, reporting, collecting and rapidly analyzing digital nondestructive testing and evaluation data necessary for improved damage detection and characterization. Demonstrate and transition technologies to locate damage to composite structures without coating removal and to inspect composite structures with complex geometry. Continue the transition and integration of computational materials science tools to provide data necessary for life prediction methods to enable risk-based life management. ***FY 2025 Plans:*** - Continue demonstrating advanced analytical methods to more accurately assess the location, and register spatial location, of damage detected using nondestructive inspection data and results. - Continue to develop augmented reality technologies to improve the process of performing non-destructive evaluation tasks, acquiring and archiving data and reporting results, and enabling improved inspector guidance and visualization. - Continue development and transition of novel approaches to collect, analyze, transport, archive, and use digital nondestructive inspection data and information. - Continue enhanced methods for compiling, reporting, collecting and rapidly analyzing digital nondestructive testing and evaluation data necessary for improved damage detection and characterization. - Continue demonstrating and transitioning technologies to locate damage to composite structures without coating removal and to inspect composite structures with complex geometry. - Continue the transition and integration of computational materials science tools to provide data necessary for life prediction methods to enable risk-based life management. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 funding decreased compared to FY 2024 by $0.453 million due to decreased emphasis on sustainment for aging aircraft.			
Accomplishments/Planned Programs Subtotals	5.134	5.178	4.573

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603112F / *Advanced Materials for Weapon Systems*	**Project (Number/Name)** 633153 / *Non-Destructive Inspection Development*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force			Date: March 2024
Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603112F / *Advanced Materials for Weapon Systems*	Project (Number/Name) 633946 / *Materials Transition*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
633946: *Materials Transition*	-	28.485	9.237	11.508	0.000	11.508	12.877	14.017	15.288	15.607	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced materials and processing technologies for fielded and planned Department of the Air Force weapon, airframe, aerospace structure, protection, and propulsion applications. Advanced materials and processes that have matured beyond applied research are characterized, critical data are collected, and critical evaluations in the proposed operating environment are performed. This design and scale-up data improves the overall affordability of promising materials and processing technologies, providing needed initial incentives for their industrial development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Air Vehicle Materials Technologies	13.931	5.237	6.508
Description: Develop and demonstrate materials and processes technologies for air vehicle and subsystems to enhance lift, propulsion, power generation management, survivability, and affordability of air vehicles. ***FY 2024 Plans:*** Complete development of technologies for organic engine lifing analysis for enhanced engine component risk management capability. Continue development and characterization for transitioning materials to protect next generation hardened assets. Complete microstructure sensitive lifing methodologies that lower life cycle cost and advance performance characteristics of airframe and engine components in order to start development of next generation modeling tools that incorporate residual stress effects on component life. Continue development and characterization of materials for next-generation hardened assets. ***FY 2025 Plans:*** Continue development and characterization of materials for next-generation hardened assets. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 funding increased compared to FY 2024 by $1.271 million due to increased emphasis on hardening for structures.			
Title: Counter Intelligence, Surveillance, and Reconnaissance Technologies	0.000	4.000	5.000
Description: Develop and demonstrate multiple intelligence technologies to degrade adversarial Intelligence, Surveillance, and Reconnaissance (ISR) collection and analysis to cause enemy decisions and actions which favor Department of the Air Force mission goals. This work directly supports both passive airbase defense and overall theatre operations. ***FY 2024 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force		Date: March 2024
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603112F / *Advanced Materials for Weapon Systems*	**Project (Number/Name)** 633946 / *Materials Transition*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Initiate developmental efforts in counter ISR technologies across multiple collection domains in a tactically coordinated way that considers all relevant operational environments. Initiate development of a closed-loop simulation in a digital test environment with a human in the loop and quantify the utility of techniques incorporating cost, size, weight and power requirements. ***FY 2025 Plans:*** - Continue developmental efforts in counter ISR technologies across multiple collection domains in a tactically coordinated way that considers all relevant operational environments. - Continue development of a closed-loop simulation in a digital test environment with a human in the loop and quantify the utility of techniques incorporating cost, size, weight and power requirements. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY 2025 funding increased compared to FY 2024 by $1.000 million due to increased emphasis on counter ISR technologies.			
Accomplishments/Planned Programs Subtotals	13.931	9.237	11.508

	FY 2023	FY 2024
Congressional Add: Program increase - Metals Affordability Research ***FY 2023 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2024 Plans:*** Not applicable	9.703	0.000
Congressional Add: Program increase - polymer printing technology for additive manufacturing ***FY 2023 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2024 Plans:*** Not applicable	4.851	0.000
Congressional Adds Subtotals	14.554	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A