Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
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 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	44.099	60.086	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
632100: *Laser Hardened Materials*	-	15.442	18.307	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
633153: *Non-Destructive Inspection Development*	-	3.994	8.501	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
633946: *Materials Transition*	-	24.663	33.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

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

In the FY 2021, the Air Force is consolidating its existing thirteen Advanced Technology Development (ATD), Research Development Test and Evaluation (RDT&E), Budget Activity 03 (BA 03) PEs into five new capability focused RDT&E BA 03 PEs to better align with the Air Force Science and Technology (S&T) Strategy signed by the SECAF in April 2019. This consolidation will improve and accelerate delivery of integrated transformational, multidisciplinary, collaborative technology solutions necessary to enable new Air Force warfighting capabilities that support of the National Defense Strategy. This new structure will provide the Air Force and Congress with a clearer understanding and increased transparency of integrated technology solutions and demonstrations key to enabling the Air Force future force design.

In FY 2021, PE 0603112F, Advanced Materials for Weapon Systems and associated Projects will be transferred to PE 0603030F, AF Foundational Development/ Demos, as part of the Air Force RDT&E BA 03 PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept, and Air Force S&T Strategy, April 2019. This work will continue to be executed by the Air Force Research Laboratory Materials and Manufacturing Technology Directorate located in Wright Patterson AFB, Ohio. This is an administrative realignment for consolidation, and not a new start.

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, 0602102F,0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 1206601SF, and 0602298F.

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 2021 Air Force	Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	47.426	36.586	38.181	0.000	38.181
Current President's Budget	44.099	60.086	0.000	0.000	0.000
Total Adjustments	-3.327	23.500	-38.181	0.000	-38.181
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	23.500			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.215	0.000			
• Other Adjustments	-2.112	0.000	-38.181	0.000	-38.181

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: 632100: *Laser Hardened Materials*		
Congressional Add: *Advanced ballistic eyewear*	0.000	2.500
Congressional Add Subtotals for Project: 632100	0.000	2.500
Project: 633153: *Non-Destructive Inspection Development*		
Congressional Add: *Artificial intelligence enhanced life cycle management*	0.000	2.000
Congressional Add Subtotals for Project: 633153	0.000	2.000
Project: 633946: *Materials Transition*		
Congressional Add: *Program increase - Materials Transition of Metals for Hypersonics*	2.923	0.000
Congressional Add: *Program increase - Metals Affordability Research*	9.744	10.000
Congressional Add: *Program Increase - Composites technology*	0.000	9.000
Congressional Add Subtotals for Project: 633946	12.667	19.000
Congressional Add Totals for all Projects	12.667	23.500

Change Summary Explanation

Decrease in FY 2019 in Other Adjustments of $2.112 million is due to realignment of funds to PE 0602212F to support Research and Development Projects, 10 U.S.C. Section 2363, an amendment to PL 110-417, 10 U.S.C. Section 2358 and 10 U.S.C. 2805(d)(1)(B).

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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*

Decrease in FY 2021 of $38.181 million is due to the following:
1) Civilian pay reprice adjustments
2) Reduced emphasis in materials transition based on higher Air Force priorities
3) Realignment of the Pervasive and Affordable Metals Technologies effort to PE 0602102F, Materials, Project 624347, Materials for Structure, Propulsion and Subsystems
4) The rest of PE 0603112F, Advanced Materials for Weapon Systems, and associated Projects being transferred to PE 0603030F, AF Foundational Development/Demos, as part of the Air Force RDT&E BA 03 PE consolidation to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept, and the Air Force S&T Strategy, April 2019.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
632100: *Laser Hardened Materials*	-	15.442	18.307	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

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

In FY 2021, the entirety of Project 632100, Laser Hardened Materials, will be transferred to 0603030F, AF Foundational Development/Demos, Project 632100, Laser Hardened Materials, as part of the Air Force Research Development Test and Evaluation (RDT&E), Budget Activity 03 (BA 03) PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept and Air Force Science and Technology Strategy, April 2019. The Project and associated efforts will continue to be executed by the Air Force Research Laboratory Materials and Manufacturing Technology Directorate located in Wright-Patterson AFB, OH. This is an administrative realignment for consolidation, and not a new start.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Aerospace Systems Protection	7.258	7.429	0.000
Description: Develop and demonstrate materials technologies that enhance hardening for sensors, avionics, and components to increase survivability and mission effectiveness of aerospace systems.			
FY 2020 Plans: Assess demonstrated protection materials for visual/near infrared Intelligence, Surveillance, and Reconnaissance sensors. Assess 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. Transition gained 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. Transition developed laser countermeasures for survivability of dynamic electro-optic/ infrared imagers. Advance 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. Transition and continue technology development and maturation to develop defensive capability for air systems airframe and anti-access munitions hardening assessments and solutions.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
In FY 2021, this work is performed under the Aerospace Systems Protection effort in PE 0603030F, AF Foundational Development/Demos, Project 632100, Laser Hardened Materials. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $7.429 million. Funding decreased due to the transfer and realignment of this work to the Aerospace Systems Protection effort in PE 0603030F, AF Foundational Development/Demos, Project 632100, Laser Hardened Materials, as part of the Air Force RDT&E BA03 consolidation.			
Title: Aircrew Protection ***Description:*** Develop and demonstrate materials technologies that enhance protection for Air Force aircrews to ensure safety and to enable aircrews to perform required missions in a threat environment. ***FY 2020 Plans:*** Continue to develop, validate, demonstrate, and transition laser protection materials and technologies for personnel protection. Continue to validate and develop light-weight helmet-mounted sensor hardening materials focusing on next-generation nighttime specialized sensors. Advance transition efforts and development of visor based aircrew protection materials with agile protection. Evaluate and assess new materials and advances in characterization and demonstration of eye protection technologies using computational materials science tools. Transition, 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 2021 Plans:*** In FY 2021, this work is performed under the Aircrew Protection effort in PE 0603030F, AF Foundational Development/Demos, Project 632100, Laser Hardened Materials. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $8.378 million. Funding decreased due to the transfer and realignment of this work to the Aircrew Protection effort in PE 0603030F, AF Foundational Development/Demos, Project 632100, Laser Hardened Materials, as part of the Air Force RDT&E BA 03 consolidation.	8.184	8.378	0.000
Accomplishments/Planned Programs Subtotals	15.442	15.807	0.000

	FY 2019	FY 2020
Congressional Add: Advanced ballistic eyewear	0.000	2.500

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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*

	FY 2019	FY 2020
FY 2019 Accomplishments: Not Applicable ***FY 2020 Plans:*** Conduct Congressionally directed efforts.		
Congressional Adds Subtotals	0.000	2.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
633153: *Non-Destructive Inspection Development*	-	3.994	8.501	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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 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.

In FY 2021, the entirety of Project 633153, Non-Destructive Inspection Development, will be transferred to 0603030F, AF Foundational Development/Demos, Project 633153, Non-Destructive Inspection Development, as part of the Air Force Research Development Test and Evaluation (RDT&E), Budget Activity 03 (BA 03) PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept and Air Force Science and Technology Strategy, April 2019. The Project and associated efforts will continue to be executed by the Air Force Research Laboratory Materials and Manufacturing Technology Directorate located in Wright-Patterson AFB, OH. This is an administrative realignment for consolidation, and not a new start.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Advanced Engine Inspection Technologies	0.999	1.625	0.000
Description: Develop and demonstrate advanced technologies to improve capabilities to inspect for cracks and other damage to extend the total safe life of turbine engines.			
FY 2020 Plans: Continue development of nondestructive inspection/evaluation approaches to include additive manufacturing and to assess materials and damage state of critical turbine engine components for the purpose of extending the useful life without increasing risk of in-flight failure of fracture critical to gas turbine engine components. Advance the validation process for model prediction, accuracy, and effectiveness of digital nondestructive inspection technologies and demonstrate tool automation for high confidence repeatable results, to include advanced manufacturing processes.			
FY 2021 Plans: In FY 2021, this work is performed under the Advanced Engine Inspection Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633153, Non-Destructive Inspection Development.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
FY 2021 decreased compared to FY 2020 by $1.625 million. Funding decreased due to the transfer and realignment of this work to the Advanced Engine Inspection Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633153, Non-Destructive Inspection Development, as part of the Air Force RDT&E BA 03 consolidation.			
Title: Special Material Inspection Technologies ***Description:*** Develop and demonstrate advanced inspection technologies supporting low-observable (LO) systems to enhance affordability and ensure full performance and survivability. ***FY 2020 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 of special materials that enables/ensures more affordable coatings assessment. Validate tools to improve characterization and failure modes of specialty multilayer coatings. Continue to develop automation for robotic technologies for visual inspections that will realize human-assisted inspection capabilities and begin to provide capabilities for automated multi-spectral characterization. ***FY 2021 Plans:*** In FY 2021, this work is performed under the Special Material Inspection Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633153, Non-Destructive Inspection Development. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $1.235 million. Funding decreased due to the transfer and realignment of this work to the Special Material Inspection Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633153, Non-Destructive Inspection Development, as part of the Air Force RDT&E BA 03 consolidation.	0.759	1.235	0.000
Title: Advanced System Monitoring Technologies ***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 2020 Plans:*** Continue to demonstrate advanced analytical methods to more accurately assess the location, and register spatial location, of damage detected using nondestructive inspection data and results. Enhance the automated robotic nondestructive inspection methods with augmented reality technologies to minimize disassembly and reduce maintenance burden to perform inspections of aircraft structures. 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/evaluation data necessary for improved damage detection and characterization. Continue	2.236	3.641	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
the transition and integration of computational materials science tools to provide data necessary for life prediction methods to enable risk-based life management. ***FY 2021 Plans:*** In FY 2021, this work is performed under the Advanced Systems Monitoring Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633153, Non-Destructive Inspection Development. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $3.641 million. Funding decreased due to the transfer and realignment of this work to the Advanced System Monitoring Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633153, Non-Destructive Inspection Development, as part of the Air Force RDT&E BA 03 consolidation.			
Accomplishments/Planned Programs Subtotals	3.994	6.501	0.000

	FY 2019	FY 2020
Congressional Add: Artificial intelligence enhanced life cycle management	0.000	2.000
FY 2019 Accomplishments: Not Applicable		
FY 2020 Plans: Conduct Congressionally directed efforts.		
Congressional Adds Subtotals	0.000	2.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
633946: *Materials Transition*	-	24.663	33.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced materials and processing technologies for fielded and planned Air Force weapon, airframe, 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.

In FY 2021, with the exception of the Pervasive and Affordable Metals Technologies activities which are transferring to PE 0602102F, Materials, Project 624347, Materials for Structure, Propulsion and Subsystems, the entirety of Project 633946, Material Transition, will be transferred to 0603030F, AF Foundational Development/ Demos, Project 633946, Material Transition, as part of the Air Force Research Development Test and Evaluation (RDT&E), Budget Activity 03 (BA 03) PE consolidation in order to realign technology areas to better support the National Defense Strategy, Air Force Future Operating Concept and Air Force Science and Technology Strategy, April 2019. The Project and associated efforts will continue to be executed by the Air Force Research Laboratory Materials and Manufacturing Technology Directorate located in Wright-Patterson AFB, OH. This is an administrative realignment for consolidation, and not a new start.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Air Vehicle Materials Technologies	10.006	8.136	0.000
Description: Develop and demonstrate materials and processes technologies for air vehicle and subsystems to enhance lift, propulsion, Low-Observable (LO) performance, power generation management, and affordability of air vehicles.			
FY 2020 Plans: Continue development and transition of advanced directed energy protection technologies. Continue development of advanced technologies for electromagnetic hardening acquisition and field support. Assess date, compile, report and continue development of technologies for organic engine lifing analysis for enhanced engine component risk management capability. Transition development of materials to protect infrared apertures on next generation hardened assets. Validate and verify results of microstruture-sensitive lifing methodologies that lower life cycle cost and advance performance characteristics of airframe and engine components in order to initiate development of next generation modeling tools that incorporate residual stress effects on component life.			
FY 2021 Plans: In FY 2021, this work is performed under the Air Vehicle Materials Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633946, Material Transition.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
FY 2021 decreased compared to FY 2020 by $8.136 million. Funding decreased due to the transfer and realignment of this work to the Air Vehicle Materials Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633946, Material Transition, as part of the Air Force RDT&E BA 03 consolidation.			
Title: High Temperature Material Technologies ***Description:*** Develop and demonstrate affordable, novel high temperature materials/structures and thermal management concepts to enable future defense capabilities for prompt global strike concepts. ***FY 2020 Plans:*** Continue to work on multimaterial structures that optimally address operational temperature zones for hot structure and expendable thermal protection systems made out of advanced ceramics, ceramic matrix composites, hybrids, advanced and affordable metals, and intermetallics. Continue to transition 2700-degree Fahrenheit ceramic matrix composites for turbine hot section components to industry. Continue to develop high performance and affordable metals for next-generation turbine disk and low cost propulsion, aerostructure and munitions components. Continue development and demonstrate advanced materials and process control to enable complex structural components via additive manufacturing. Initiate establishment of a metallic additive design center. Continue development of low cost metallic turbine engine disks made via powder processing technologies for use in high temperature, aggressive environment. Transition computational and data analytics tools that enable production of affordable, complex shape metal components made via additive manufacturing. ***FY 2021 Plans:*** In FY 2021, this work is performed under the High Temperature Material Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633946, Material Transition. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $2.142 million. Funding decreased due to the transfer and realignment of this work to the High Temperature Material Technologies effort in PE 0603030F, AF Foundational Development/Demos, Project 633946, Material Transition.	1.990	2.142	0.000
Title: Pervasive and Affordable Metals Technologies ***Description:*** Develop and demonstrate affordable, novel high temperature powder processing materials/structures and additive metals technology concepts to enable future defense capabilities air vehicle propulsion and computational prediction models. In FY 2019 and prior, this work is performed under multiple efforts and projects within PE 0603112F, Advanced Materials for Weapons Systems. ***FY 2020 Plans:***	0.000	4.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
Continue to demonstrate affordable metallic turbine engine disks made through powder processing technologies through high temperature, aggressive environment testing. Continue to develop low cost, complex shape metallic component made through additive manufacturing for advanced weapon system component prototypes. Continue to develop computational methodologies that incorporate impact of surface residual stress on ability to extend life and lower life cycle cost of air vehicle propulsion system components. ***FY 2021 Plans:*** In FY 2021, this effort will move to the Pervasive and Affordable Metals Technologies effort in PE 0602102F, Materials, Project 624347, Materials for Structures, Propulsion, and Subsystems. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decreased compared to FY 2020 by $4.000 million. Funding decrease is due to transfer and realignment of this effort to the Pervasive and Affordable Metals Technologies effort in PE 0602102F, Materials, Project 624347, Materials for Structures, Propulsion, and Subsystems.			
Accomplishments/Planned Programs Subtotals	11.996	14.278	0.000

	FY 2019	FY 2020
Congressional Add: Program increase - Materials Transition of Metals for Hypersonics ***FY 2019 Accomplishments:*** Conducted Congressional directed efforts. ***FY 2020 Plans:*** Not Applicable	2.923	0.000
Congressional Add: Program increase - Metals Affordability Research ***FY 2019 Accomplishments:*** Conducted Congressional directed efforts. ***FY 2020 Plans:*** Conducted Congressional directed efforts.	9.744	10.000
Congressional Add: Program Increase - Composites technology ***FY 2019 Accomplishments:*** Not Applicable ***FY 2020 Plans:*** Conduct Congressionally directed efforts.	0.000	9.000
Congressional Adds Subtotals	12.667	19.000

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 3	**R-1 Program Element (Number/Name)** PE 0603112F / *Advanced Materials for Weapon Systems*	**Project (Number/Name)** 633946 / *Materials Transition*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A