Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force											Date: April 2022	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603680F / *Manufacturing Technology Program*							
COST ($ in Millions)	**Prior Years**	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
Total Program Element	-	143.334	176.200	47.759	0.000	47.759	43.332	43.907	44.503	44.975	Continuing	Continuing
635280: *Manufacturing Technologies*	-	143.334	176.200	47.759	0.000	47.759	43.332	43.907	44.503	44.975	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program executes technical efforts to develop and maintain an affordable and reliable industrial base and manufacturing capability responsive to Department of the Air Force warfighter needs. The program develops and improves manufacturing technologies and processes to reduce transition risk, enable cost reduction, improve component and system quality, increase readiness and affordable mission availability, enhance industrial capability and promote transformation through the industrial base. Value stream modifications and manufacturing throughput improvements are implemented to shorten weapon system cycle times during design, development, production and sustainment. Cost savings are realized through early engagement with stakeholders to promote producible designs, ensuring the industrial base will be ready to manufacture at the needed quantities. Manufacturing technologies objectives are conducted through industrial partnerships that enable targeted investment of manufacturing technologies and reduce risk in the industrial supply chain for existing weapon system upgrades and new warfighter systems. Efforts in the program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

The Department of the Air Force technologies in this program are both enabling and enduring as we invest in maturing emerging technologies that address established mission gaps, and transformational technologies that address integrated enterprise capabilities intended to reshape the future force across air, space, and cyber warfighting domains. Development of transformational operational capabilities through advanced technology solutions focuses on five strategic capabilities: Global Persistent Awareness; Resilient Information Sharing; Rapid, Effective Decision-Making; Complexity, Unpredictability, and Mass; and Speed and Reach of Disruption and Lethality.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & 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 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.

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B. Program Change Summary ($ in Millions)	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**
Previous President's Budget	138.748	45.259	0.000	0.000	0.000
Current President's Budget	143.334	176.200	47.759	0.000	47.759
Total Adjustments	4.586	130.941	47.759	0.000	47.759
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	-1.810			
• Congressional Adds	0.000	132.751			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	9.663	0.000			
• SBIR/STTR Transfer	-3.461	0.000			
• Other Adjustments	-1.616	0.000	47.759	0.000	47.759

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2021**	**FY 2022**
Project: 635280: *Manufacturing Technologies*		
Congressional Add: *Program increase - F-35 Battery Technology*	9.361	0.000
Congressional Add: *Program Increase - Modeling Technology for Small Turbine Engines*	6.825	0.000
Congressional Add: *Program increase - Low cost manufacturing methods for hypersonic vehicle components*	7.800	0.000
Congressional Add: *Program increase - Technologies to repair fastener holes*	4.875	5.000
Congressional Add: *Program increase - Manufacturing technology for reverse engineering*	4.875	5.000
Congressional Add: *Program increase - Hybrid manufacturing for rapid tooling and repair*	4.875	10.000
Congressional Add: *Program increase - cost reduction for aerospace composite structures*	9.751	0.000
Congressional Add: *Program increase - flexible thermal protection systems for hypersonics*	9.751	10.000
Congressional Add: *Program increase - alternative domestic rubber production*	4.875	0.000
Congressional Add: *Program increase - large scale additive manufacturing for hypersonics*	5.850	0.000
Congressional Add: *Program increase - manufacturing readiness for hypersonic propulsion systems*	9.751	0.000
Congressional Add: *Program increase - thermoplastic material systems*	6.825	4.751
Congressional Add: *Program increase - automated fiber placement for composite structures*	4.875	5.000
Congressional Add: *Program increase - hypersonic manufacturing capability and supply*	5.850	0.000
Congressional Add: *Program increase - massive area additive manufacturing*	9.663	10.000

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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Congressional Add: *Program increase - academic-industry partnerships for advanced materials and manufacturing processes*	0.000	6.000
Congressional Add: *Program increase - adaptive modeling for low-cost titanium*	0.000	5.000
Congressional Add: *Program increase - beryllium additive manufacturing*	0.000	3.000
Congressional Add: *Program increase - component 30 online demonstration*	0.000	10.000
Congressional Add: *Program increase - MRO advanced process technology development*	0.000	10.000
Congressional Add: *Program increase - sustainment and modernization research and development*	0.000	10.000
Congressional Add: *Program increase - virtual augmented mixed reality readiness*	0.000	8.000
Congressional Add: *Program increase - affordable manufacture of resistive films*	0.000	10.000
Congressional Add: *Program increase - rapid large format metal additive manufacturing to optimize scramjet production*	0.000	5.000
Congressional Add: *Program increase - universal robotic controller*	0.000	6.000
Congressional Add: *Program increase - hypersonics supply chain research*	0.000	10.000
Congressional Add Subtotals for Project: 635280	105.802	132.751
Congressional Add Totals for all Projects	105.802	132.751

Change Summary Explanation

Increase in FY 2021 reflects adjustments and reprogramming 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).

The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Affordable Mission Availability	10.241	13.578	14.328
Description: Develop and transition pervasive manufacturing technologies for affordable mission availability of Department of the Air Force components and systems.			
FY 2022 Plans: Continue to advance high demand specialized manufacturing technologies to develop cost effective conventional production, overhaul, and specialty material repair technologies to enable affordable sustainment of aircraft systems. Continue to develop			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
cost-effective manufacturing and repair processes to meet specific needs of Programs of Record and depots. Continue to develop manufacturing methods to meet the needs of the next generation hypersonic platforms. Continue to develop and demonstrate the manufacturability of materials, processes and devices for command and control communication technologies, intelligence, surveillance and reconnaissance systems, and RF, digital and power management components. Initiate manufacturing repair technologies for turbine engine components. ***FY 2023 Plans:*** Continue to advance high demand specialized manufacturing technologies to develop cost effective conventional production, overhaul, and specialty material repair technologies to enable affordable sustainment of aircraft systems. Continue to develop cost-effective manufacturing and repair processes to meet specific needs of Programs of Record and depots. Continue to develop manufacturing methods to meet the needs of the next generation hypersonic platforms. Continue to develop and demonstrate the manufacturability of materials, processes and devices for command and control communication technologies, intelligence, surveillance and reconnaissance systems, and RF, digital and power management components. Continue manufacturing repair technologies for turbine engine components. Initiate manufacturing technologies for high temperature sensors and windows. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2023 funding increased compared to FY 2022 by $0.750 million. Funding increased due to increased emphasis on manufacturing technologies and repair processes to meet specific needs of Programs of Record and depots.			
Title: Advanced Manufacturing Technologies	27.291	22.630	23.880
Description: Develop and transition affordable advanced manufacturing for Department of the Air Force fielded and future platforms. ***FY 2022 Plans:*** Continue to enable and promote advanced manufacturing processes, techniques, and equipment availability for reducing materiel acquisition, maintenance and repair costs. Continue to develop and demonstrate intelligent robotics and digital engineering concepts into manufacturing processes. Continue to develop, demonstrate and evaluate additively manufactured aerospace components and subcomponents. Continue to develop and demonstrate technologies enabling factory of the future, digital supply chain management, industrial internet of things to provide improvements in production, delivery and support of warfighter capabilities. ***FY 2023 Plans:*** Continue to enable and promote advanced manufacturing processes, techniques, and equipment availability for reducing materiel acquisition, maintenance and repair costs. Continue to develop and demonstrate intelligent robotics and digital engineering concepts into manufacturing processes. Continue to develop, demonstrate and evaluate additively manufactured aerospace components and subcomponents. Continue to develop and demonstrate technologies enabling factory of the future, digital			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
supply chain management, industrial internet of things to provide improvements in production, delivery and support of warfighter capabilities. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2023 funding increased compared to FY 2022 by $1.250 million. Funding increased due to increased emphasis on advanced manufacturing processes and techniques for reducing total cost of systems			
Title: Manufacturing for Transformational Technologies ***Description:*** Develop and transition manufacturing technologies that enable advanced technology solutions that will shape the future force across the air, space and cyberspace domains. ***FY 2022 Plans:*** Refine development of high demand manufacturing technologies including low cost and attritable systems, thermal protection materials for high temperature applications and other manufacturing technologies geared toward realizing the future force and to provide a cost-imposing strategy against adversarial forces. ***FY 2023 Plans:*** Continue development of high demand manufacturing technologies including low cost and attritable systems, thermal protection materials for high temperature applications and other manufacturing technologies geared toward realizing the future force and to provide a cost-imposing strategy against adversarial forces. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2023 funding increased compared to FY 2022 by $2.310 million. Funding increased due to scaling investment toward the Department of the Air Force target outlined in the Air Force 2030 Science and Technology (S&T) Strategy.	0.000	7.241	9.551
Accomplishments/Planned Programs Subtotals	37.532	43.449	47.759

	FY 2021	FY 2022
Congressional Add: Program increase - F-35 Battery Technology ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable	9.361	0.000
Congressional Add: Program Increase - Modeling Technology for Small Turbine Engines	6.825	0.000

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	FY 2021	FY 2022
FY 2021 Accomplishments: Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable		
Congressional Add: Program increase - Low cost manufacturing methods for hypersonic vehicle components ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable	7.800	0.000
Congressional Add: Program increase - Technologies to repair fastener holes ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	4.875	5.000
Congressional Add: Program increase - Manufacturing technology for reverse engineering ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	4.875	5.000
Congressional Add: Program increase - Hybrid manufacturing for rapid tooling and repair ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	4.875	10.000
Congressional Add: Program increase - cost reduction for aerospace composite structures ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable	9.751	0.000
Congressional Add: Program increase - flexible thermal protection systems for hypersonics ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	9.751	10.000
Congressional Add: Program increase - alternative domestic rubber production ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable	4.875	0.000
Congressional Add: Program increase - large scale additive manufacturing for hypersonics	5.850	0.000

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	FY 2021	FY 2022
FY 2021 Accomplishments: Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable		
Congressional Add: Program increase - manufacturing readiness for hypersonic propulsion systems ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable	9.751	0.000
Congressional Add: Program increase - thermoplastic material systems ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	6.825	4.751
Congressional Add: Program increase - automated fiber placement for composite structures ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	4.875	5.000
Congressional Add: Program increase - hypersonic manufacturing capability and supply ***FY 2021 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2022 Plans:*** Not applicable	5.850	0.000
Congressional Add: Program increase - massive area additive manufacturing ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	9.663	10.000
Congressional Add: Program increase - academic-industry partnerships for advanced materials and manufacturing processes ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	6.000
Congressional Add: Program increase - adaptive modeling for low-cost titanium ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	5.000
Congressional Add: Program increase - beryllium additive manufacturing	0.000	3.000

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	FY 2021	FY 2022
FY 2021 Accomplishments: Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.		
Congressional Add: Program increase - component 30 online demonstration ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - MRO advanced process technology development ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - sustainment and modernization research and development ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - virtual augmented mixed reality readiness ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	8.000
Congressional Add: Program increase - affordable manufacture of resistive films ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - rapid large format metal additive manufacturing to optimize scramjet production ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	5.000
Congressional Add: Program increase - universal robotic controller ***FY 2021 Accomplishments:*** Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.	0.000	6.000
Congressional Add: Program increase - hypersonics supply chain research	0.000	10.000

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	FY 2021	FY 2022
FY 2021 Accomplishments: Not applicable ***FY 2022 Plans:*** Conduct Congressionally directed efforts.		
Congressional Adds Subtotals	105.802	132.751

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A