Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force												Date: March 2023
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 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	-	169.459	270.959	44.422	0.000	44.422	44.256	44.999	45.411	48.042	Continuing	Continuing
635280: *Manufacturing Technologies*	-	169.459	270.959	44.422	0.000	44.422	44.256	44.999	45.411	48.042	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.

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 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.

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B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	176.200	47.759	43.332	0.000	43.332
Current President's Budget	169.459	270.959	44.422	0.000	44.422
Total Adjustments	-6.741	223.200	1.090	0.000	1.090
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	223.200			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-6.270	0.000			
• Other Adjustments	-0.471	0.000	1.090	0.000	1.090

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: 635280: *Manufacturing Technologies*		
Congressional Add: *Program increase - Technologies to repair fastener holes*	4.873	5.000
Congressional Add: *Program increase - Manufacturing technology for reverse engineering*	4.873	5.000
Congressional Add: *Program increase - Hybrid manufacturing for rapid tooling and repair*	9.747	0.000
Congressional Add: *Program increase - flexible thermal protection systems for hypersonics*	9.747	10.000
Congressional Add: *Program increase - thermoplastic material systems*	4.631	0.000
Congressional Add: *Program increase - automated fiber placement for composite structures*	4.873	0.000
Congressional Add: *Program increase - massive area additive manufacturing*	9.747	0.000
Congressional Add: *Program increase - academic-industry partnerships for advanced materials and manufacturing processes*	5.848	6.000
Congressional Add: *Program increase - adaptive modeling for low-cost titanium*	4.873	5.000
Congressional Add: *Program increase - beryllium additive manufacturing*	2.924	3.000
Congressional Add: *Program increase - component 3D online demonstration*	9.747	0.000
Congressional Add: *Program increase - MRO advanced process technology development*	9.747	10.000
Congressional Add: *Program increase - sustainment and modernization research and development*	9.747	0.000
Congressional Add: *Program increase - virtual augmented mixed reality readiness*	7.797	8.000
Congressional Add: *Program increase - affordable manufacture of resistive films*	9.747	10.000

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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *Program increase - rapid large format metal additive manufacturing to optimize scramjet production*	4.873	7.500
Congressional Add: *Program increase - universal robotic controller*	5.848	0.000
Congressional Add: *Program increase - hypersonics supply chain research*	9.747	0.000
Congressional Add: *Program increase - additive manufacturing qualification*	0.000	5.000
Congressional Add: *Program increase - composites for advanced air mobility*	0.000	10.000
Congressional Add: *Program increase - digital engineering work cell*	0.000	5.000
Congressional Add: *Program increase - gallium oxide for high power electronics*	0.000	5.000
Congressional Add: *Program increase - vertical integration of scramjet supply chain*	0.000	10.000
Congressional Add: *Program increase - low-cost rapid aerospace fabrication technology*	0.000	6.500
Congressional Add: *Program increase - smart manufacturing digital thread initiative*	0.000	10.000
Congressional Add: *Program increase - trusted metal additive manufacturing*	0.000	10.000
Congressional Add: *Program increase - additive manufacturing industrial base and capability expansion*	0.000	10.000
Congressional Add: *Program increase - agile Factory Floor for Depot Sustainment*	0.000	5.300
Congressional Add: *Program increase - F-35 agnostic battery development*	0.000	9.800
Congressional Add: *Program increase - high temperature hypersonic aeroshell*	0.000	6.000
Congressional Add: *Program increase - large -scale metal 3D printing*	0.000	10.000
Congressional Add: *Program increase - low cost manufacturing methods for hypersonic vehicle components*	0.000	5.000
Congressional Add: *Program increase - tools and processes for affordable high temperature composites*	0.000	9.000
Congressional Add: *Program increase - nanocomposite coatings advanced research*	0.000	10.000
Congressional Add: *Program increase - digital engineering enabled workforce development*	0.000	7.000
Congressional Add: *Program increase - alternative domestic rubber production*	0.000	5.100
Congressional Add: *Program increase - hypersonic manufacturing capability and supply*	0.000	5.000
Congressional Add: *Program increase - advanced air mobility in NEO environment*	0.000	10.000
Congressional Add Subtotals for Project: 635280	129.389	223.200
Congressional Add Totals for all Projects	129.389	223.200

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Change Summary Explanation

Increase in FY2024 is due to increased emphasis on affordable manufacturing at scale for future force systems.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Affordable Mission Availability	12.021	14.328	13.327
Description: Develop and transition pervasive manufacturing technologies for affordable mission availability of Department of the Air Force components and systems. ***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 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 2024 Plans:*** Continue advancing 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 developing cost-effective manufacturing and repair processes to meet specific needs of Programs of Record and depots. Continue developing manufacturing methods to meet the needs of next generation hypersonic platforms. Continue developing and demonstrating 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. Continue manufacturing technologies for high temperature sensors and windows. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 funding decreased compared to FY 2023 by $1.001 million. Funding decreased due to decreased emphasis on manufacturing technologies for optical components.			
Title: Advanced Manufacturing Technologies	20.035	23.880	22.211
Description: Develop and transition affordable advanced manufacturing for Department of the Air Force fielded and future platforms. ***FY 2023 Plans:***			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
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, and industrial internet of things to provide improvements in production, delivery and support of warfighter capabilities. ***FY 2024 Plans:*** Continue enabling and promoting advanced manufacturing processes, techniques, and equipment availability for reducing materiel acquisition, maintenance and repair costs. Continue developing and demonstrate intelligent robotics and digital engineering concepts into manufacturing processes. Continue developing, demonstrating and evaluating additively manufactured aerospace components and subcomponents. Continue developing and demonstrating technologies enabling factory of the future, digital supply chain management, and industrial internet of things to provide improvements in production, delivery and support of warfighter capabilities. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 funding decreased compared to FY 2023 by $1.669 million. Funding decreased due to decreased emphasis on manufacturing automation.			
Title: Manufacturing for the Future Force ***Description:*** Develop and transition manufacturing technologies that enable advanced technology solutions that will shape the future force across the air, space and cyberspace domains. Prior to FY2024 this effort was titled, "Manufacturing for Transformational Technologies." ***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 2024 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 2023 to FY 2024 Increase/Decrease Statement:***	8.014	9.551	8.884

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
FY 2024 funding decreased compared to FY 2023 by 0.667 million. Funding decreased is due to the above plans.			
Accomplishments/Planned Programs Subtotals	40.070	47.759	44.422

	FY 2022	FY 2023
Congressional Add: Program increase - Technologies to repair fastener holes ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	4.873	5.000
Congressional Add: Program increase - Manufacturing technology for reverse engineering ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	4.873	5.000
Congressional Add: Program increase - Hybrid manufacturing for rapid tooling and repair ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable	9.747	0.000
Congressional Add: Program increase - flexible thermal protection systems for hypersonics ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	9.747	10.000
Congressional Add: Program increase - thermoplastic material systems ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable	4.631	0.000
Congressional Add: Program increase - automated fiber placement for composite structures ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable	4.873	0.000
Congressional Add: Program increase - massive area additive manufacturing	9.747	0.000

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	FY 2022	FY 2023
FY 2022 Accomplishments: Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable		
Congressional Add: Program increase - academic-industry partnerships for advanced materials and manufacturing processes ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	5.848	6.000
Congressional Add: Program increase - adaptive modeling for low-cost titanium ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	4.873	5.000
Congressional Add: Program increase - beryllium additive manufacturing ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	2.924	3.000
Congressional Add: Program increase - component 3D online demonstration ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable	9.747	0.000
Congressional Add: Program increase - MRO advanced process technology development ***FY 2022 Accomplishments:*** Conduct Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	9.747	10.000
Congressional Add: Program increase - sustainment and modernization research and development ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	9.747	0.000
Congressional Add: Program increase - virtual augmented mixed reality readiness ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	7.797	8.000
Congressional Add: Program increase - affordable manufacture of resistive films	9.747	10.000

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	FY 2022	FY 2023
FY 2022 Accomplishments: Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable		
Congressional Add: Program increase - rapid large format metal additive manufacturing to optimize scramjet production ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	4.873	7.500
Congressional Add: Program increase - universal robotic controller ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable	5.848	0.000
Congressional Add: Program increase - hypersonics supply chain research ***FY 2022 Accomplishments:*** Conducted Congressionally directed efforts. ***FY 2023 Plans:*** Not applicable	9.747	0.000
Congressional Add: Program increase - additive manufacturing qualification ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	5.000
Congressional Add: Program increase - composites for advanced air mobility ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - digital engineering work cell ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	5.000
Congressional Add: Program increase - gallium oxide for high power electronics ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	5.000
Congressional Add: Program increase - vertical integration of scramjet supply chain	0.000	10.000

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	FY 2022	FY 2023
FY 2022 Accomplishments: Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.		
Congressional Add: Program increase - low-cost rapid aerospace fabrication technology ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	6.500
Congressional Add: Program increase - smart manufacturing digital thread initiative ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - trusted metal additive manufacturing ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - additive manufacturing industrial base and capability expansion ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - agile Factory Floor for Depot Sustainment ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	5.300
Congressional Add: Program increase - F-35 agnostic battery development ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	9.800
Congressional Add: Program increase - high temperature hypersonic aeroshell ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	6.000
Congressional Add: Program increase - large -scale metal 3D printing	0.000	10.000

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	FY 2022	FY 2023
FY 2022 Accomplishments: Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.		
Congressional Add: Program increase - low cost manufacturing methods for hypersonic vehicle components ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	5.000
Congressional Add: Program increase - tools and processes for affordable high temperature composites ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	9.000
Congressional Add: Program increase - nanocomposite coatings advanced research ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Add: Program increase - digital engineering enabled workforce development ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	7.000
Congressional Add: Program increase - alternative domestic rubber production ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	5.100
Congressional Add: Program increase - hypersonic manufacturing capability and supply ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Program increase - hypersonic manufacturing capability and supply	0.000	5.000
Congressional Add: Program increase - advanced air mobility in NEO environment ***FY 2022 Accomplishments:*** Not applicable. ***FY 2023 Plans:*** Conduct Congressionally directed efforts.	0.000	10.000
Congressional Adds Subtotals	129.389	223.200

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D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A