Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Office of the Secretary Of Defense	Date: March 2023
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and 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	-	251.105	747.442	252.965	-	252.965	163.036	156.663	161.328	157.451	Continuing	Continuing
680: *Manufacturing Science and Technology Program*	-	100.154	195.165	135.136	-	135.136	34.590	35.338	36.077	36.863	Continuing	Continuing
350: *Manufacturing Innovation Institutes*	-	146.958	542.098	112.728	-	112.728	123.348	116.224	120.044	115.267	Continuing	Continuing
351: *Manufacturing Education and Workforce Development*	-	3.993	10.179	5.101	-	5.101	5.098	5.101	5.207	5.321	Continuing	Continuing

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

This program supports the Department's initiatives to Build Sustainable and Long-Term Advantage, and Build a Resilient Joint Force Defense Ecosystem.

The Defense-wide Manufacturing Science and Technology (DMS&T) program is the joint, defense-wide component of the Department of Defense (DoD) Manufacturing Technology (ManTech) Program directed in Title 10 U.S.C. Section 2521. DMS&T addresses joint, cross-cutting, and high-risk/high payoff technologies; manufacturing challenges within the DoD critical technology areas; and many of the recommendations in the Executive Order Report “Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States” September 2018.

The DMS&T program objective is to increase the speed at which innovation, inventions, and scientific discoveries are turned into equipment and capabilities through advances in manufacturing technologies and processes. The DMS&T program created and is sustaining a manufacturing innovation ecosystem via activities within three Program Element (PE) Project Codes: 680 - Manufacturing Science and Technology Program (MSTP), 350 - DoD Manufacturing Innovation Institutes (MIIs), and 351 - Manufacturing Education and Workforce Development (M-EWD).

Project Code 680, Manufacturing Science and Technology Program (MSTP):
MSTP projects focus on cross-cutting defense manufacturing advancements and stimulates early development of manufacturing processes and enterprise business practices.

Project Code 350, DoD MIIs:
This project supports nine DoD-led MIIs within the national Manufacturing USA network, in accordance with mission requirements. MII technology domain focus areas are: (1) additive manufacturing; (2) digital manufacturing, design, and manufacturing cybersecurity; (3) lightweight materials; (4) integrated photonics; (5) flexible hybrid electronics; (6) smart fibers and textiles; (7) advanced tissue biofabrication; (8) advanced robotics for manufacturing; and (9) bioindustrial manufacturing. Each MII

is a public/private partnership with members from industry, academia, and federal and state governments that together mature manufacturing processes, build out a supporting ecosystem, and provide manufacturing education and workforce development. The consortia match DoD funding at a one to one ratio (or greater). They include small and medium as well as large manufacturers and state-of-the-art pilot facilities.

Project Code 351, Manufacturing Education and Workforce Development (M-EWD):
M-EWD provides strategic leadership of advanced manufacturing talent development within the Defense Industrial Base (DIB) with three mission objectives: (1) invest in strategic education and workforce development capabilities, (2) expand the talent acquisition pool to promote diversity equity and inclusion (DEI), (3) modernize manufacturing EWD by driving action within DIB-critical regional economies with a focus on Career & Technical Education (CTE).

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	255.244	256.142	248.589	-	248.589
Current President's Budget	251.105	747.442	252.965	-	252.965
Total Adjustments	-4.139	491.300	4.376	-	4.376
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	491.300			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.100	-			
• Program Adjustments	-0.039	-	4.376	-	4.376

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: 680: *Manufacturing Science and Technology Program*		
Congressional Add: *Advanced Composites for Hypersonics Aided by Digital Engineering (MACH-ADE)*	0.000	5.000
Congressional Add: *Automated Manufacturing Technologies for Very High Temperature Composites*	0.000	5.000
Congressional Add: *Custom Electrolytes for Military Lithium-Ion Batteries*	0.000	10.000
Congressional Add: *Engineered Resilient Systems*	0.000	10.000
Congressional Add: *Microelectromechanical Systems (MEMS) Mirror-Based LiDAR Sensor*	0.000	3.000
Congressional Add: *Advanced Materials and Materials Manufacturing Processes*	6.000	6.000
Congressional Add: *High Temperature Composite Material Manufacturing*	3.000	10.000
Congressional Add: *Large Scale Manufacturing (formerly High Performance Computing (HPC) Enabled Advanced Manufacturing)*	25.000	25.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Office of the Secretary Of Defense	Date: March 2023
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603680D8Z *I Defense Wide Manufacturing Science and Technology Program*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *Automation Engineering Technology Program*	1.981	0.000
Congressional Add: *Difficult to Copy Manufacturing*	7.000	0.000
Congressional Add: *Carbon Composites for Hypersonics*	3.000	0.000
Congressional Add: *Virtual Reality-Enabled Smart Installation Experimentation*	5.000	0.000
Congressional Add: *Natural Gas Pipeline Pilot Study*	5.000	0.000
Congressional Add Subtotals for Project: 680	55.981	74.000
Project: 350: *Manufacturing Innovation Institutes*		
Congressional Add: *Direct Ink Writing of Advanced Thermoset Materials*	0.000	5.000
Congressional Add: *Additive Manufacturing Sustainability*	0.000	10.000
Congressional Add: *Flexible Hybrid Electronics*	0.000	6.000
Congressional Add: *Scalable Comprehensive Workforce Readiness Initiatives in Bioindustrial Manufacturing*	0.000	5.000
Congressional Add: *Bioindustrial Manufacturing Institutes*	0.000	300.000
Congressional Add: *Bioindustrial Manufacturing Matrix Development*	0.000	7.000
Congressional Add: *Multifunctional Bioindustrial Database Capability*	0.000	9.600
Congressional Add: *Operational Technology (OT) and Internet of Things (IoT) Asset Identification and Management*	0.000	5.000
Congressional Add: *Cybersecurity Maturity Model Certification (CMMC) Compliance for Cybersecurity in Manufacturing*	0.000	6.000
Congressional Add: *Supply Chain Adaptation of Artificial Intelligence (AI) and Robotics*	0.000	12.500
Congressional Add: *Difficult to Copy Manufacturing*	0.000	7.000
Congressional Add: *Next Generation Textiles (formerly "Domestic Textile Manufacturing")*	7.500	10.000
Congressional Add: *Data Analytics and Visualization System*	12.000	12.000
Congressional Add: *Hypersonics Enabling Manufacturing*	10.000	12.000
Congressional Add: *Additive Manufacturing Training (formerly El Paso Makes Contract Support for El Paso Manufacturers)*	0.964	5.200
Congressional Add: *Advanced Robotics and Automation Training*	2.000	0.000
Congressional Add: *Cybersecurity Manufacturing Innovation Park*	1.000	0.000
Congressional Add: *Certification Based Workforce Training Programs for Manufacturing (Jobs of the Future)*	6.200	0.000
Congressional Add: *Program Increase*	9.000	0.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Office of the Secretary Of Defense	Date: March 2023
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603680D8Z *I Defense Wide Manufacturing Science and Technology Program*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *Advanced Manufacturing*	2.000	0.000
Congressional Add: *Silicon Based Lasers*	10.000	0.000
Congressional Add: *Hypersonics and Thermal Management*	5.000	0.000
Congressional Add Subtotals for Project: 350	65.664	412.300
Project: 351: *Manufacturing Education and Workforce Development*		
Congressional Add: *Manufacturing Industrial 4.0 Training Program*	0.000	5.000
Congressional Add Subtotals for Project: 351	0.000	5.000
Congressional Add Totals for all Projects	121.645	491.300

Change Summary Explanation

The FY 2024 increase of $4.376 million is comprised of a realignment of $5.410 million to support the Historically Black Colleges and Universities/Minority Serving Institutions program, which is a priority of the Under Secretary of Defense for Research and Engineering (USD(R&E)), $3.220 million to support departmental priorities, and increases of $9.750 million to explore alternatives to traditional casting and forging manufacturing processes, $1.900 million to expand additive manufacturing for logistics, and an economic assumption increase of $1.356 million.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense			Date: March 2023
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	Project (Number/Name) 680 / *Manufacturing Science and 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
680: *Manufacturing Science and Technology Program*	-	100.154	195.165	135.136	-	135.136	34.590	35.338	36.077	36.863	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Office of the Secretary Defense (OSD) Manufacturing Science and Technology Program (MSTP) concentrates on cross-cutting defense manufacturing needs that are beyond the ability of a single service to address. The MSTP invests in broad technology initiatives within Advanced Electronics and Optics, Advanced Materials and Composites, Advanced and Emerging Manufacturing Processes, and Advanced Energetics Manufacturing.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Electronics and Optics	11.750	11.341	10.650
Description: Advanced Electronics and Optics is a series of efforts addressing advanced manufacturing technologies for a wide range of applications such as sensors, radars, power generation, switches, and optics for defense applications. Focal points are productivity and efficiency gains in the defense manufacturing base to accelerate delivery of technical capabilities to impact current warfighting operations, and manufacturing technologies to reduce the cost, acquisition time and risk to our major defense acquisition programs. Future efforts will focus on advances in fuel cells, lasers, enhanced acuity micro-displays, and transparent ceramics for opto-mechanical and armor applications. ***FY 2023 Plans:*** Fund Year 3 of 4 for Improved Photovoltaic Power for Space Applications, Year 2 of 3 for High Power Magnetron and Advanced High Yield Infrared Focal Plane Arrays, and Year 2 of 5 for Transmit/Receive Integrated System On a Chip (TRISoC) project. Initiate foundational assessment of Defense Advanced Battery Supply Chain. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2024 Plans:*** Fund Year 4 of 4 for Improved Photovoltaic Power for Space Applications, Year 3 of 3 for High Power Magnetron and Advanced High Yield Infrared Focal Plane Arrays, and Year 3 of 5 for TRISoC project. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $0.691 million between FY 2023 and FY 2024 reflects a minor re-phasing of Advanced Electronics and Optics projects.			
Title: Advanced Materials and Composites	15.755	99.112	114.227

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024

Description: Advanced Materials and Composites is a series of efforts addressing advanced manufacturing technologies for a wide range of materials such as composites, metals, ceramics, nanomaterials, and metamaterials. Through productivity and efficiency gains, these manufacturing technologies will accelerate delivery of technical capabilities to impact current warfighting operations, while reducing the cost, acquisition time and risk of our major defense acquisition programs. Advanced materials manufacturing technologies undergoing development include materials for ballistic survivability and ballistic protection, survivability and rapid fabrication of structural components.

FY 2023 Plans:
Fund final year of the Manufacturing of Carbon-Carbon Composites for Hypersonic Applications (MOC3HA) initiative, Year 2 of 5 for Self-Damping Structural Materials, and Year 3 of 4 for Advanced Aeroshell Technology. Initiate non-recurring engineering (NRE) Research Development Test & Evaluation (RDT&E) in conjunction with existing propulsion Industrial Base, DoD Additive Manufacturing Working Groups, and Manufacturing Innovation Institutes to extrapolate hypersonics lessons-learned and scale to relevant hypersonic cruise missile (HCM) (e.g., Scramjet) propulsion production. Coupon production, Design of Experiments, and Integration activities will prove out design parameters and build techniques for reduced-complexity and improved performance Scramjet combustor componentry. This effort will set the stage for Year 2 scramjet RDT&E in FY 2024 to install and provide for the maintenance of large-format printers to meet capacity requirements. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas.

FY 2024 Plans:
Fund Year 3 of 5 for Self-Damping Structural Materials and Year 4 of 4 for Advanced Aeroshell Technology. Continue NRE RDT&E with existing propulsion Industrial Base, DoD Additive Manufacturing Working Groups, and MIIs to extrapolate hypersonics lessons-learned and scale to relevant HCM propulsion production. Extend coupon production, design of experiments, and integration activities for promising design parameters and build techniques for less complex but improved performance Scramjet combustor componentry. Fund Year 2 scramjet RDT&E to install and provide for the maintenance of large-format printers to meet capacity requirements. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas.

FY 2023 to FY 2024 Increase/Decrease Statement:
The increase of $15.115 million completes initial assessment and strategy development for the hypersonics industrial base. Funding will also provide for more manufacturing design and build projects for HCM and scramjet propulsion component production in conjunction with projects in Program Elements (PE) 0605518N (Conventional Prompt Strike (Navy)), 0607210D8Z (Industrial Base Analysis and Sustainment Support), 0603680F (Manufacturing Technology Program (Air Force)), and

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
0902199D8Z (Title III/Defense Production Act Purchases) to reduce the cost of hypersonics weapons materials and production in ongoing development programs.			
Title: Advanced and Emerging Manufacturing Processes ***Description:*** Advanced and Emerging Manufacturing addresses advanced manufacturing technologies and business practices for defense applications. Key focus areas include direct digital (or additive) manufacturing, advanced manufacturing enterprise, machining, robotics, assembly, and joining. Projects selected will accelerate delivery of technical capabilities to impact current warfighting operations while reducing cost, acquisition time, and risk of major defense acquisition programs. ***FY 2023 Plans:*** Fund final year of Deformable Mirrors for High Energy Lasers and Year 2 of 5 for Direct-Write Manufacturing for Conformal Antennas. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2024 Plans:*** Fund Year 3 of 5 for Direct-Write Manufacturing for Conformal Antennas. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $0.314 million between FY 2023 and FY 2024 reflects a minor re-phasing of Advanced and Emerging Manufacturing Processes projects.	9.550	6.481	6.167
Title: Advanced Energetics Manufacturing ***Description:*** Advanced Energetics Manufacturing develops improved manufacturing capabilities for safer, low cost, high quality production of existing and newly developed ingredients and composites used in energetic materials production. Develops techniques such as additive manufacturing, microfluidics, continuous processing, resonant acoustic mixing, robotics, etc. for production of critical energetics and supporting ingredients to ensure Department access to these materials and enable development of new, highly advanced energetic systems for improved range and performance. ***FY 2023 Plans:*** Fund final year of DBX-1 project. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2024 Plans:***	7.118	4.231	4.092

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Identify advanced manufacturing RDT&E solutions for energetics community manufacturing challenges informed by DBX-1 project outcomes. Utilize the annual project call to select and initiate projects that support the National Defense Strategy and DoD critical technology areas. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $0.139 million between FY 2023 and FY 2024 reflects a minor re-phasing of Advanced Energetics Manufacturing projects.			
Accomplishments/Planned Programs Subtotals	44.173	121.165	135.136

	FY 2022	FY 2023
Congressional Add: Advanced Composites for Hypersonics Aided by Digital Engineering (MACH-ADE) ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Execution plan is being formulated in tandem with other hypersonic investments.	0.000	5.000
Congressional Add: Automated Manufacturing Technologies for Very High Temperature Composites ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Execution plan is being formulated in tandem with other hypersonic investments.	0.000	5.000
Congressional Add: Custom Electrolytes for Military Lithium-Ion Batteries ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Support the development of domestic manufacturing for Lithium-Ion battery electrolytes to remove reliance on foreign sources.	0.000	10.000
Congressional Add: Engineered Resilient Systems ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Execution strategy is being formulated.	0.000	10.000
Congressional Add: Microelectromechanical Systems (MEMS) Mirror-Based LiDAR Sensor ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Execution plan is being formulated with support from Army Research Lab.	0.000	3.000
Congressional Add: Advanced Materials and Materials Manufacturing Processes	6.000	6.000

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 680 / *Manufacturing Science and Technology Program*

	FY 2022	FY 2023
FY 2022 Accomplishments: Cold spray efforts awarded with industry partners and the LIFT Manufacturing Innovation Institute in late FY 2022. Execution has recently started. ***FY 2023 Plans:*** Continue efforts initiated in FY 2022 and work through development and implementation of Cold Spray technologies within the Department of Defense.		
Congressional Add: High Temperature Composite Material Manufacturing ***FY 2022 Accomplishments:*** Initiated development of thermal processing to yield necessary mechanical properties at operating temperatures. Additional work to provide C-C and C-SiC feedstock materials to specific manufacturing trials. ***FY 2023 Plans:*** Execution plan is being formulated in tandem with other hypersonic investments.	3.000	10.000
Congressional Add: Large Scale Manufacturing (formerly High Performance Computing (HPC) Enabled Advanced Manufacturing) ***FY 2022 Accomplishments:*** Funding was provided to the University of Maine to couple high performance computational modeling and simulation with in-situ sensing to enhance understanding of factors that impact quality throughout the Large-Scale Additive Manufacturing print lifecycle. Focus is on pre-design modeling, materials and their expected effects, anticipated output performance and form, print processes and execution variables, along with the collection of destructive and non-destructive testing results of printed outputs through the use of a data storage framework for analysis and documentation of prototype development. Applied cybersecurity architectures that mimic an operational environment. ***FY 2023 Plans:*** Execution strategy is being formulated, but initial plan is to continue efforts already underway with previous year funding. Effort being performed with support from Army ERDC and University of Maine.	25.000	25.000
Congressional Add: Automation Engineering Technology Program ***FY 2022 Accomplishments:*** Funding was provided to the Kansas City Kansas Community College (KCKCC) for the purchase of state-of-the-art equipment for its new Automation Engineering Technology Program. This equipment will allow KCKCC students/graduates to train on real-life automation equipment that is currently used in the industry. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)	1.981	0.000
Congressional Add: Difficult to Copy Manufacturing ***FY 2022 Accomplishments:*** This add funded key projects, including: (1) National Defense Authorization Act (NDAA) Section 354 effort to Assess the Digital Optimization of Marine Corps Logistics Base (MCLB) Albany &	7.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
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	FY 2022	FY 2023
Watervliet Arsenal (WVA) manufacturing processes; (2) developed a Joint Additive Manufacturing Materials and Process (JAMMP) Workbench as a top additive priority; (3) initiated three stages of a Remote Automated Animal Protein Production processes for BioFabUSA including Prototype Demonstration, Market Analysis for Reagent Characterization, and System Design; and (4) provided seed funding for a multi-MII Phase 1 Other Transaction-Prototype project to bring multiple disciplines to specific manufacturing challenges. ***FY 2023 Plans:*** Project moved to P350 for FY 2023 execution. Strategy is being formulated.		
Congressional Add: Carbon Composites for Hypersonics ***FY 2022 Accomplishments:*** Supported automation of manufacturing of 2D and 3D Carbon-Carbon composites and accelerated processing of Carbon-Carbon materials. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)	3.000	0.000
Congressional Add: Virtual Reality-Enabled Smart Installation Experimentation ***FY 2022 Accomplishments:*** Funding was provided to the University of Tulsa to conduct R&D to advance resilience by developing a digital modeling framework including virtual reality that focuses on cyber threats, incidence response, and smart installation operation efficiency. The objective is to gain an increased understanding of security threats, their mitigation, and the potential for propagation throughout the enterprise. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)	5.000	0.000
Congressional Add: Natural Gas Pipeline Pilot Study ***FY 2022 Accomplishments:*** Funding was provided to the University of Tulsa to create a pilot natural gas infrastructure facility that can be used to explore physical and operational aspects of natural gas gathering, transmission, and distribution systems. The project will collect and examine the operational technology data generated by the process control system, study the effects of cyber-attacks (by exposing the control networks to the internet in a manner that eliminates the risk of damage to the production facility), and support development of cost-based analysis tools to determine appropriate network defense mechanisms. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)	5.000	0.000
Congressional Adds Subtotals	55.981	74.000

C. Other Program Funding Summary ($ in Millions)

N/A

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C. Other Program Funding Summary ($ in Millions)

Remarks

N/A

D. Acquisition Strategy

ManTech projects are awarded competitively through the DoD Service Laboratories. Approximately 1/3 of the total active topics are awarded to new initiatives annually.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense											Date: March 2023	
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*				Project (Number/Name) 350 / *Manufacturing Innovation Institutes*			
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**
350: *Manufacturing Innovation Institutes*	-	146.958	542.098	112.728	-	112.728	123.348	116.224	120.044	115.267	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) supports nine Manufacturing Innovation Institutes (MIIs), public/private partnerships that address both commercial and defense manufacturing needs within specific, defense-relevant technology areas. MIIs receive active participation and support from the military departments and defense agencies and their members. The MIIs' flexible business models and strong focus on enabling highly collaborative research and development (R&D) are catalyzing important new organizational relationships across government, industry, and academia. MIIs bring together both traditional defense and non-traditional sectors to accelerate key innovation cycles, expand U.S. industrial capability, and assist in creating resilient supply chains that will support innovative defense products.

DoD's nine MIIs are: (1) America Makes (for additive manufacturing); (2) MxD (Manufacturing times Digital, for digital manufacturing, design and cybersecurity); (3) LIFT (Lightweight Innovations For Tomorrow, for innovative processes to lightweight materials); (4) AIM Photonics (American Institute for Manufacturing Integrated Photonics, for photonic device manufacturing and packaging); (5) NextFlex (for flexible hybrid electronics manufacturing); (6) AFFOA (Advanced Functional Fabrics of America, for smart fibers and textiles); (7) BioFabUSA (for regenerative tissue manufacturing); (8) ARM (Advanced Robotics Manufacturing, for smart collaborative robotics for manufacturing); and (9) BioMADE (for biomanufacturing of non-medical materials and products).

MII funding is focused on:
• Conducting pre-competitive applied research and development projects to reduce the cost, time, and technical uncertainty related to new manufacturing technologies and to improve existing technologies, processes, and products.
• Developing and implementing education, training, and workforce recruitment courses, materials, and programs.
• Developing innovative methodologies and practices for supply chain integration and introduction of new technologies into supply chains.
• Engaging with small and mid-sized manufacturers, including women and minority-owned manufacturing enterprises, and larger-sized manufacturing firms.

Each MII has a different model, with the following core tenets:
• Each MII is a public/private partnership with representatives from industry, academia, state and local governments, and the DoD that co-invest in world-leading technologies and capabilities.
• Each MII provides facilities to allow collaborative, precompetitive development of promising technologies and to promote the creation of stable and sustainable innovation ecosystems for advanced manufacturing.
• The partnership forming the MII must commit non-federal resources that equal or exceed the federal commitment.
• Each institute participates in the national Manufacturing USA network.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: America Makes (Additive Manufacturing)	5.114	26.616	20.004
Description: America Makes' mission is to accelerate the adoption of additive manufacturing (AM) in the United States industrial base. Additive manufacturing (i.e., 3D printing) is a process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies such as traditional machining. Additive manufacturing benefits the DoD by enabling lifecycle cost savings and enhanced capabilities including: distributing supply chains to enable the right part in the right place at the right time; improving mission readiness by producing work aids for DoD depots; replacing long-lead time and out of production spares, and enhancing lethality through production of lighter weight and higher performing parts than could otherwise be achieved with traditional manufacturing. ***FY 2023 Plans:*** America Makes will continue to execute its mission by strategically advancing the development of AM design, material, process, and value chain technology, will secure human capital to deploy additive manufacturing, and will expand and support the AM ecosystem through standards development and targeted networking opportunities. Key new initiatives include a project for sustainable AM to mitigate climate change by improving engine thermal management, eliminating toxic, long-lead, and expensive materials like Beryllium in the production of optical components, or exploring novel application of AM technologies; Diversity, Equity, and Inclusion (DEI) in the AM workforce; and orientation of institute activity to increase support to Space, Power, and Energy sector stakeholder needs. Advance AM for castings by creating a castings roadmap and executing a certification-focused direct to metal AM for casting replacement project, studying effects of hybrid manufacturing adoption on casting capacity and cost, and demonstrating AM as an alternative to casting select parts. Explore AM for forging applications by creating a forgings roadmap, collecting data for AM state of practice, and maturing AM processes as an alternative to forging select parts. ***FY 2024 Plans:*** Expand application of additive manufacturing methods and standards to address critical defense advanced manufacturing requirements and expand the additive manufacturing workforce. Leverage lessons learned from the FY 2023 castings and forgings efforts. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $6.612 million between FY 2023 and FY 2024 is the result of a one-time increase in FY 2023 for castings and forgings research not continued in FY 2024.			
Title: MxD – Manufacturing times Digital (Digital Manufacturing, Design and Cybersecurity)	5.938	10.783	8.623
Description: MxD focuses on implementation of the Digital Thread; the unencumbered flow of data across the lifecycle of a manufactured product encompassing data from design, production, supply, sourcing, inventory, assembly, quality, maintenance, and sustainment. It includes analysis of data to reduce the time and cost of bringing new products to market. MxD eliminates			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
barriers between design, manufacturing, and sustainment by using both product data and process data in a way that is seamless and transparent. ***FY 2023 Plans:*** MxD will conduct proposal calls approximately every other month resulting in five new projects with a planned value of $10.000 million including cost share. MxD will conduct proposal workshops for each call and award projects in the technology thrust areas identified in the 2021-2023 Strategic Investment Plan. MxD plans to announce the commercialization of new digital manufacturing and design technologies and industry capabilities. MxD will significantly scale up commercialization, skill improvement, and workforce development efforts and expand DEI via research projects and relationships with other government agencies. ***FY 2024 Plans:*** Continue projects to support the adoption and application of advanced digital and cybersecurity manufacturing solutions across the defense industrial base and grow the digital manufacturing workforce. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $2.160 million between FY 2023 and FY 2024 reflects the re-phasing of manufacturing digital thread and cyber protection projects at the MxD MII.			
Title: LIFT – Lightweight Innovations for Tomorrow (Lightweight Innovations – materials and processes) ***Description:*** Advanced lightweight material can retain properties comparable to heavier, traditional materials, and can enable weight reduction in a variety of components and products with significant energy savings and increased payloads. Scale-up research across multiple areas to accelerate market expansion by applying an integrated materials and manufacturing approach, will address a lack of design guides and certifications as well as affordability and scale-up challenges. The goal is to catalyze the development of an advanced lightweight material U.S. supplier base and to enable DoD to realize greater speed and agility of manned, unmanned, and Warfighter systems as well as benefits for commercial applications. ***FY 2023 Plans:*** LIFT will continue its focus on advanced R&D/insertion of materials and manufacturing technologies, growing capability within the structural manufacturing ecosystem, and education and workforce development. Efforts will support defense, commercial, and dual-use, priorities. Specific technology activities include hypersonic materials/manufacturing; lightweighting of defense and commercial systems/ components; advanced materials development; advanced fabrication and manufacturing methods such as cold spray and large-scale, wire-assisted additive manufacturing; and integrated computational materials engineering. LIFT will maintain and operate its Learning/Talent Development Lab, which includes benchtop equipment for training in key manufacturing	6.242	11.139	8.942

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
competencies. LIFT will continue workforce development projects, expanding Diversity, Equity and Inclusion (DEI) while targeting K-12, university students, current workforce, and separating military personnel. ***FY 2024 Plans:*** Continue advanced materials and materials manufacturing R&D and materials workforce development. Support defense, commercial, and dual-use technology development via specific activities including hypersonic materials manufacturing, lightweighting of defense and commercial systems/components, advanced materials development, and advanced fabrication and manufacturing methods. Sustain LIFT's Learning/Talent Development Lab, expand DEI, and continue workforce development projects while targeting K-12, university students, current workforce, and separating military personnel. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $2.197 million between FY 2023 and FY 2024 reflects the re-phasing of innovative materials and Integrated Computational Materials Engineering (ICME) research projects at the LIFT MII.			
Title: AIM – American Institute for Manufacturing Photonics (Integrated Photonics Device Manufacturing and Packaging)	11.472	20.818	17.858
Description: Integrated photonics manufacturing advances the promise of unprecedented interconnection between electronics and photonics that will deliver world-class performance in speed, density, and power consumption. Photonics provides differentiating benefits for defense applications such as high-speed signal processing; electronic warfare; position, navigation, and timing; information transport and computation; sensing; imaging; and targeting. AIM Photonics has established an end-to-end U.S. 'ecosystem' for advancing domestic integrated photonics manufacturing, including access to a responsive integrated photonics fabrication foundry. AIM Photonics provides the world's only 300 mm silicon photonics multi-project wafer service, state-of-the-art photonics-electronics integrated design tools, and a highly advanced packaging, assembly, and testing user facility. ***FY 2023 Plans:*** AIM will continue to offer its core capabilities including silicon photonics multi-project wafer runs. These runs are enabling AIM Photonics to grow the U.S.-based integrated photonic circuit ecosystem and simultaneously offer a low risk opportunity to train new designers (which speaks to educating new talent). AIM will also continue to grow its packaging capabilities in the Rochester, NY-based test, assembly, and packaging facility and will offer services that include attaching optical fibers to their integrated photonic circuits. AIM will continue to improve integrated photonic circuit components and the process design kit that enables a diversified set of would-be users to rapidly adopt new components offering improved and/or different performance. This work will also target providing a packaging design kit to enable designers to develop prototype systems within this MII and reduce overall prototyping costs while cutting development times. AIM will expand Diversity, Equity and Inclusion (DEI) in its manufacturing workforce development efforts. An Integrated Photonic Circuits climate change mitigation project will improve silicon photonics packaging, develop and demonstrate efficient digital transceivers for communications applications to pave the way to reduce			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
input-output power consumption in data centers by approximately 30%, and develop and demonstrate highly efficient optical switches for data communications applications to reduce power consumption in data centers by as much as 50% by reducing system idle time and mitigating system architecture inefficiencies. ***FY 2024 Plans:*** Continue to advance integrated photonics manufacturing R&D, microelectronics packaging solutions, and application design opportunities for the integrated photonics workforce. AIM will offer core capabilities including silicon photonics multi-project wafer runs, train new designers while seeking greater DEI, leverage the New York TAP facility, and extend photonics based climate change projects to strengthen the integrated photonic circuit ecosystem and workforce. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $2.960 million between FY 2023 and FY 2024 reflects the re-phasing of test, assembly, and packaging activities and silicon photonics multi-project wafer runs at the AIM Photonics MII.			
Title: NextFlex Manufacturing Innovation Institute (Flexible Hybrid Electronics Manufacturing)	5.214	11.705	9.659
Description: Flexible hybrid electronics manufacturing involves highly tailorable devices on non-traditional, compliant substrates that combine thinned components manufactured from traditional processes with components added via “printing” processes. NextFlex invests in prototyping and scale-up of manufacturing processes for high speed pick-and-place, printed circuits, and hybrid fabrication to enable defense and commercial applications in wearable electronics, unattended sensors, integrated array antennas, medical devices, and soft robotics devices. NextFlex is also committed to continuous improvement in SWAPC (Size, Weight And Power plus Cost) for electronic systems. ***FY 2023 Plans:*** NextFlex will continue expanding the U.S. hybrid electronics manufacturing industrial base executing 14 ecosystem-funded projects with an increased focus on reliability and yield enhanced manufacturing. NextFlex will update its manufacturing and technical roadmaps based on reliability performance of manufacturing processes leading to commercial standards. The program will deliver DoD-relevant prototypes such as large area electronics on UAVs, wearable sensor for organic industrial base, and integrated manufacturing robotic sensors for sustainment manufacturing. The workforce development programs will expand Diversity, Equity and Inclusion (DEI) as they continue their six regional FlexFactor education programs and expand Flex Pro, the professional training program, to involve 300 engineers. NextFlex is pursuing environmentally sustainable FHE device development and a project to develop a cold chain monitor as a demonstrator focused on climate change and environmental sustainability. The technology could support environmentally-friendly production and monitoring of shipping packages. ***FY 2024 Plans:*** Continue to advance manufacturing methods for flexible hybrid electronics to address defense critical technology areas and provide solutions to help grow the microelectronics workforce. NextFlex will adapt its roadmaps to improve manufacturing process			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
reliability and performance standards, deliver DoD-relevant prototypes, expand FlexFactor education programs while leveraging DEI, and continue pursuit of sustainable FHE to mitigate climate change. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $2.046 million between FY 2023 and FY 2024 reflects the re-phasing of research consistent with a new roadmap for flexible hybrid electronics research at the NextFlex MII.			
Title: Advanced Functional Fabrics of America (Smart Fibers and Textiles) (AFFOA)	3.514	8.877	7.074
Description: AFFOA accelerates transformation of the manufacture of traditional fibers, yarns, and textiles into highly sophisticated, integrated, and networked devices and systems. It is helping to convert the domestic textile industry into one differentiated by Intellectual Property (IP) and value-added technology. AFFOA mission outcomes will lead to highly functional fabrics that provide valuable services: fabrics that see, hear, sense, communicate, store and convert energy, regulate temperature, monitor health, and change color. AFFOA is translating these outcomes into new and improved textiles that benefit the warfighter as well as the commercial consumer. ***FY 2023 Plans:*** AFFOA will advance R&D efforts focused on integrating member and/or DoD technologies into functional prototypes for dual use DoD and commercial applications, with project calls focused on manufacturing and commercialization. AFFOA will expand it innovation and manufacturing ecosystem to enable small companies, DoD labs, and Defense Industrial Base partners increased access to AFFOA's organic fabric prototyping and advanced textile system integration capabilities. It will cultivate membership supply chains to support the DoD capability needs and critical technology areas. Education and Workforce Development (EWD) efforts will expand Diversity, Equity and Inclusion (DEI) and include developing strategic workforce development training, internships, and other activities with domestic universities and regional vocational training centers. To mitigate climate change, AFFOA will explore and select clothing and textile fibers (organic and synthetic) that meet military uniform performance criteria and can be disposed of or recycled without negative ecological impacts, such as clogging waterways, contaminating soil, or polluting the air. ***FY 2024 Plans:*** Continue to improve manufacturing methods for highly functional fabrics that benefit the warfighter and expand training opportunities for an advanced fiber and textile manufacturing workforce. AFFOA will continue to enable DoD and DIB partners increased access to AFFOA's organic fabric prototyping and advanced textile system integration capabilities; cultivate membership supply chains to support DoD capability needs; develop strategic university education, internships, and regional vocational training while leveraging DEI; and conduct select clothing and textile fiber projects to mitigate climate change. ***FY 2023 to FY 2024 Increase/Decrease Statement:***			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
The decrease of $1.803 million between FY 2023 and FY 2024 reflects the re-phasing of research into highly functional fabrics development at the AFFOA MII.			
Title: BioFabUSA Manufacturing Innovation Institute (regenerative tissue manufacturing) ***Description:*** BioFabUSA advances state-of-the-art human tissue manufacturing innovations in cell and biomaterial processing, bioprinting, automation, and non-destructive testing technologies. BioFabUSA is establishing a collaboration to mature tissue-related technology across manufacturing readiness levels (MRL) 4-7, enabling post-delivery assurance of tissue identity, viability, function, and efficacy. This MII is assembling a diverse and currently fragmented collection of industry practices and institutional knowledge across many disciplines (e.g., cell biology, bioengineering, materials science, analytical chemistry, robotics, and quality assurance). ***FY 2023 Plans:*** BioFabUSA will focus on expanding manufacturing process development of institute member-derived tissue engineered medical products. BioFabUSA will integrate additional sensor and automation technologies into current versions of the manufacturing platform. BioFabUSA will fund technology projects, therapeutic development projects, and education and workforce development (EWD) projects that expand DEI in the biomanufacturing workforce. BioFabUSA will roll out pilot-phase EWD certification and credentialing programs regionally and nationally. ***FY 2024 Plans:*** Continue to improve manufacturing methods for tissue engineered medical products and expand certification and credentialing programs for the biomanufacturing workforce. BioFabUSA will add sensor and automation technologies to improve the manufacturing platform and fund technology, therapeutic development, and education and workforce development (EWD) projects. BioFabUSA will leverage DEI to expand the biomanufacturing workforce and accelerate emerging EWD certification and credentialing programs. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $0.915 million between FY 2023 and FY 2024 reflects funding for completion of the final year of the establishment cooperative agreement and transition to a lower threshold funding level in FY 2024 to maintain the Department's strategic partnership with BioFabUSA.	16.300	10.992	10.077
Title: Advanced Robotics Manufacturing (Smart Collaborative Robotics for Manufacturing) ***Description:*** Improve U.S. manufacturing competitiveness through advancements in the smart collaborative robotics field. Technologies developed via Advanced Robotics Manufacturing (ARM) support advanced robotics capabilities to address DoD requirements and improve U.S. manufacturer competitiveness with robotics. ARM is focusing on technologies enabling human robot interaction, and perfecting robotic adaption, learning, manipulation, autonomy, mobility, and perception.	10.500	5.259	8.991

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
FY 2023 Plans: ARM will continue technical project-level investments to advanced industrial robotic technologies for the development of novel automated manufacturing capabilities. Specific technical areas will include intelligent robotics, human-robot interaction, autonomous operation, dexterous manipulation, and rapid system development/configurability. Other investments will produce education and workforce initiatives to develop robotic competencies, credentialing, apprenticeships, and a nationwide training identification toolset while seeking to expand Diversity, Equity and Inclusion (DEI) in the robotics manufacturing workforce. Target transitions are for OUSD(R&E) S&T priorities, Service-level Organic Industrial Base, and the related Defense Industrial Base. ***FY 2024 Plans:*** Continue R&D investments in advanced robotics manufacturing that support defense critical technology areas and develop a competent robotics workforce. ARM will invest in technical projects to improve automated manufacturing capabilities and facilitate adoption by the organic and industrial base. AIM will also develop robotic competencies, credentialing, apprenticeships, and tools for the robotics manufacturing workforce while seeking to expand DEI. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The increase of $3.732 million between FY 2023 and FY 2024 completes the DoD's funding commitment for the final year of the establishment cooperative agreement and funds additional technical and workforce development projects for robotics manufacturing.			
Title: BioMADE Manufacturing Innovation Institute	17.000	23.609	21.500
Description: The BioMADE MII promises to deliver a new class of manufacturing with domestic capabilities to manufacture critical resources with increased supply chain security. Bioindustrial manufacturing also has the potential to create entirely new classes of products with primary defense applications, such as chemicals and materials with advanced properties for use in austere environments. Bioindustrial manufacturing addresses defense priorities and offers commercial potential for innovations in food, agriculture, fuels, industrial chemicals, and other consumer products that will create new opportunities for U.S. manufacturers. ***FY 2023 Plans:*** BioMADE intends to spur biomanufacturing innovation by investing in technical project calls to reduce barriers to scale-up and commercialization of bio-manufactured products, accelerate technology deployment, investigate novel downstream processing techniques, and de-risk the process of bringing new products to market. BioMADE will accelerate the DoD biotechnology critical technology areas by promoting biotechnology innovation and securing the domestic bioindustrial base. BioMADE will conduct a university design challenge for distributed manufacturing enabled by modular bioindustrial and reusable (MEMBR) assets. Education and workforce development project calls will build awareness of bioindustrial manufacturing careers and address workforce gaps through innovative educational strategies that increase DEI to expand the workforce. Safety, security, sustainability, and social responsibility (4S) programs will guide bioethics, biosecurity, biosafety, and related topics. BioMADE			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
will continue its technology development program to establish secure domestic supply chains and novel material capabilities including, but not limited to, the domestic production of latex rubber, manufacturing of acrylic acid from waste products, and the development of new downstream processing capabilities. BioMADE will conduct an open project call to positively impact climate change through de-risking innovative green bioindustrial techniques and food security. ***FY 2024 Plans:*** Increase bioindustrial technical project calls to overcome scale-up, commercialization, and deployment challenges for bio-manufactured products. Continue maturing defense applicable biomanufactured products which could align with future distributed manufacturing enabled by modular bioindustrial and reusable (MEMBR) assets to prepare for the construction and operation of regional facilities to demonstrate bioindustrial solutions for defense critical products. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $2.109 million between FY 2023 and FY 2024 is the result of a one-time add in FY 2023 in the amount of $1.391 million not carried forward into FY 2024 and an increase of $3.500 million for climate/green technology manufacturing projects.			
Accomplishments/Planned Programs Subtotals	81.294	129.798	112.728

	FY 2022	FY 2023
Congressional Add: Direct Ink Writing of Advanced Thermoset Materials	0.000	5.000
FY 2022 Accomplishments: N/A ***FY 2023 Plans:*** America Makes partner JuggerBot 3D LLC, located in Youngstown Ohio, has developed an innovative industrial 3D printing solution with proprietary programming that incorporates a state-of-the-art ink extrusion method known as Direct Ink Write. This technology is uniquely capable of processing advanced thermoset materials like epoxies, polyurethanes, polyesters, silicones, and can vary the printed part composition to suit the functional need of the design (e.g., softer sealing material on a hard cover). The program to be executed via the America Makes MII will focus on achieving an efficient and stable production with thermoset materials and equipment at scale, integrating automation to mitigate operator interference and enable smart manufacturing. By optimizing the process and materials for Direct Ink Write 3D printing, the project will facilitate a more streamlined process for transferring technology and knowledge to commercial users.		
Congressional Add: Additive Manufacturing Sustainability	0.000	10.000
FY 2022 Accomplishments: N/A ***FY 2023 Plans:*** The additive manufacturing ecosystem enabled by the America Makes Manufacturing Innovation Institute (MII) will lead a multi-phased effort to develop statistically relevant materials data sets for the		

	FY 2022	FY 2023
top three materials which exhibit the greatest impact for aerospace, automotive, defense, energy and medical sectors. In addition, this ecosystem will address additive manufacturing process repeatability and product transferability leveraging a parallel multi-pronged approach.		
Congressional Add: Flexible Hybrid Electronics ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** The NextFlex Manufacturing Innovation Institute (MII) will execute additional projects to enhance technology at the intersection of flexible hybrid electronics (FHE), semiconductor packaging, and electronics assembly. The projects will include increased support for the NextFlex Regional Nodes (including in New York and Massachusetts). NextFlex will share results and manufacturing know-how with the U.S. FHE ecosystem through its consortium activities, including transitioning manufacturing processes from developers and the NextFlex Technology Hub to U.S. manufacturers. To support workforce development, NextFlex will build FHE curriculum modules and execute hands-on workshops (in collaboration with university partners) targeted at training incumbent workers to accelerate adoption and deployment of the technology.	0.000	6.000
Congressional Add: Scalable Comprehensive Workforce Readiness Initiatives in Bioindustrial Manufacturing ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Address the skilled technical labor required for a growing biomanufacturing industrial base by using a modular and scalable approach executable across multiple regions. It includes: (1) Design, development, and expansion of skilled technical workforce training programs in biomass, upstream, and downstream bioprocessing. These will capitalize on existing instructional facilities, resources, and capabilities of BioMADE members in target regions to enhance existing programs in upstream and downstream bioprocessing. Support instructional content creation, reagents, supplies, teaching, and support staff to create and assess instruction for technical education and programming in bioindustrial manufacturing. (2) Soldier to Scientist: Develop instructional modules covering bioprocessing topics such as extraction, fermentation, upstream, downstream, and instrumentation. (3) Community-to-Career tiered-mentoring in science and technology (S&T) for a resilient and sustainable workforce in bioindustrial manufacturing. Build a network of community-based organizations, educators, scientists, industry representatives, and other subject matter experts to guide science and technology-interested students towards careers in the bioindustrial manufacturing sector. Includes regional partners from the Engineering Biology Research Consortium and other stakeholders actively engaged in cross-disciplinary science, technology, engineering, and mathematics (STEM) education and mentoring. (4) Professional Development biomanufacturing training programs for workforce educators, incumbent, and adult learners. These efforts support equipment acquisition for training educators (train-the-trainer) for incumbent and	0.000	5.000

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	FY 2022	FY 2023
adult learners. Instruction in the biomanufacturing lab will offer hands-on training and real-world exposure to operational procedures and technical skills development through retraining, retooling, and upskilling.		
Congressional Add: Bioindustrial Manufacturing Institutes ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** The BioMADE Manufacturing Innovation Institute (MII) will initiate the development of a network of pilot-scale industrial biomanufacturing facilities to conduct research and development to improve the ability of the industrial base to assess, validate, and scale new, innovative bioindustrial manufacturing processes for the production of chemicals, materials, and other products necessary to support national security or secure fragile supply chains, thereby implementing Section 215 of the NDAA for FY 2023. Conduct an industry analysis to refine specific biomanufacturing infrastructure gaps (e.g., fermentation capacity, feedstock development, and downstream processing). Concurrently, establish multiple pilot-scale industrial biomanufacturing facilities across the United States to begin to resolve critical infrastructure shortages and to facilitate the transition from laboratory scale research to pilot-scale production of biomanufactured materials. Facilities will be available to the Department and the nation's bioindustrial manufacturing network – industry partners, their suppliers/customers, and the academic community – all with an eye towards hardening the defense industrial base, and further, catalyzing innovation and investment in this sector of the economy.	0.000	300.000
Congressional Add: Bioindustrial Manufacturing Matrix Development ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Develop and pilot a bioindustrial product supply chain database and analysis system to enable BioMADE and its members to fully leverage domestic supply chains. The system portal will enable ad-hoc searches of a database representing the current and relevant capabilities, projects, and partners of all BioMADE members across local, state, and national scales. By enhancing the visibility of key capabilities within the ecosystem, the portal will facilitate collaborations between BioMADE members to strengthen bioindustrial manufacturing innovation and workforce development. Once BioMADE firmly establishes its value, this multi-sourced pilot portal can be enhanced with additional features including resiliency gap identification, cybersecurity self-assessment, compliance tracking, and customized opportunity identification. Subsequently it could be expanded to the other eight DoD Manufacturing Innovation Institutes.	0.000	7.000
Congressional Add: Multifunctional Bioindustrial Database Capability	0.000	9.600

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	FY 2022	FY 2023
FY 2022 Accomplishments: N/A ***FY 2023 Plans:*** Establish a secure, digital ecosystem for collaborative data exchange across the bioindustrial manufacturing community (industry, research and development labs, and DoD). The system will feature a flexible data core specialized to address the diverse data sharing, analysis, and search needs of the bioindustrial manufacturing community. Core database capabilities are (1) Secure data exchange (between industry, academia, and military service labs), (2) data warehousing (including chemical, biological, process data, and associated metadata), and (3) advanced analytics (artificial intelligence (AI) and machine learning (ML)), omics, biological and biomanufacturing models, techno-economic analysis, asset tracking, unit operation analysis, etc.). Phase 1 includes a functional data store with a secure application programming interface (API) to serve the diversity of data exchange and data storage needs expressed by the bioindustrial manufacturing community. Phase 2 establishes compute pipelines, automated data ingestion, user web interfaces, and analytical algorithms to produce a fully-featured data exchange solution for the industry. This enables International Organization for Standardization (ISO)-27001 certification to help foster adoption, and supports DoD and Service laboratory requirements for quality assured and sustainable access to a bioindustrial manufacturing ecosystem with capabilities to support critical national security needs.		
Congressional Add: Operational Technology (OT) and Internet of Things (IoT) Asset Identification and Management ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Operational Technology (OT) and Internet of Things (IoT) devices lack sufficiently rich fingerprint databases that can be used to support asset identification and management. While large databases exist to identify operating systems and even enumerate services running over Transmission Control Protocol/ Internet Protocol. (TCP/IP), a common communications protocol, they do not offer the level of granularity needed to identify OT/IoT devices that may be running partial implementations of a TCP/IP stack or not even running an operating system. As OT and IoT environments proliferate, these assets may create a significant vulnerability to broader cyber attacks. The University of Tulsa, in cooperation with the Army Engineer Research and Development Center (ERDC), will develop a new hydro-electric testbed connected to the existing scaled electric power substation located the University of Tulsa's Critical Infrastructure Protection Lab to evaluate tools for asset identification in a combined electric power generation (new hydro-electric testbed) and distribution network (substation) environment over a wide range of use-cases. The project will investigate methods to detect,	0.000	5.000

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	FY 2022	FY 2023
identify, and inventory components and services in a networked system and evaluate existing databases (e.g., nmap) to determine their accuracy in fingerprinting OT/IoT devices.		
Congressional Add: Cybersecurity Maturity Model Certification (CMMC) Compliance for Cybersecurity in Manufacturing ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** MxD, as the DoD-designated National Center for Cybersecurity in Manufacturing (NCCM), will create impactful, easy-to-acquire CMMC compliance resources to help small and medium-sized manufacturers (SMMs) achieve appropriate CMMC status, evaluate their current cyber posture by identifying opportunities to improve cyber hygiene, and provide appropriate tools to react to additional requirements from DoD and the Cyber Accreditation Body (formerly the CMMC-AB). MxD will provide a suite of resources for free to Small and Medium Manufacturers (SMMs) and Small and Medium Enterprises (SMEs) to help them comprehensively achieve and maintain all levels of CMMC compliance. MxD will work with the DoD, Department of Homeland Security, and Department of Commerce help SMMs and SMEs across the nation's industrial base to navigate cybersecurity compliance requirements.	0.000	6.000
Congressional Add: Supply Chain Adaptation of Artificial Intelligence (AI) and Robotics ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Advanced Robotics for Manufacturing (ARM) Manufacturing Innovation Institute (MII), ARM members, and Carnegie Mellon University (CMU) will develop a new, core competency for identifying and extracting key data sets and developing in-depth, high quality, relevant abstractions of data across multiple robotics platforms that can be used as a service to advance the intelligence of machines. They will establish a Learning Laboratory in the Hazelwood Green Mill 19 facility operated by the CMU Manufacturing Futures Institute (MFI) and ARM. Catalyst Connection will work with project partners to establish the business model, equipment list, training programs, and communications and recruitment strategies for Small and Medium Manufacturers (SMMs) and their workers to take advantage of and utilize the learning lab. MFI and ARM will purchase and install equipment, hire staff to operate the learning laboratory, and provide trainers and related support.	0.000	12.500
Congressional Add: Difficult to Copy Manufacturing	0.000	7.000

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Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603680D8Z / *Defense Wide Manufacturing Science and Technology Program*	**Project (Number/Name)** 350 / *Manufacturing Innovation Institutes*

	FY 2022	FY 2023
FY 2022 Accomplishments: Project moved from P680 to P350 for FY 2023 execution. See P680 for FY 2022 accomplishments. ***FY 2023 Plans:*** Execution strategy is being formulated.		
Congressional Add: Next Generation Textiles (formerly "Domestic Textile Manufacturing") ***FY 2022 Accomplishments:*** The "Establishing the Textile Industry of the Future" (ETIF) FY 2022 project will advance the Advanced Functional Fabrics of America (AFFOA) Manufacturing Innovation Institute (MII) technology roadmap by addressing key infrastructure gaps in soft-system integration, flexible power and data, fiber and textile devices, and design rules for soft systems. The project will design and prototype a means of integrating electrodes into stretchable fibers and fabrics that would reduce the weight burden on the warfighter by integrating power, data, and sensor capabilities into the textiles that would also be rugged enough to survive use in the field. The next step in this phase is to develop and qualify equipment critical for the processing of advanced silica material to increase efficiency and reduce the cost of fire-retardant materials for the U.S. Navy. ***FY 2023 Plans:*** During the second year of the ETIF project, in FY 2023 AFFOA will prototype and field test fabric shelter systems and a warfighter ensemble kit with fabric-integrated power, data, and environmental sensors with demonstrated low radio frequency (RF) signatures. Members of the AFFOA ecosystem will prototype and field test underwater tether systems with embedded sensors (temperature, pressure, salinity) for improved undersea situational awareness in support of critical Navy missions. The third ETIF project activity for FY23 will identify the technical specification of other high-temperature materials applications, such as hypersonics, to access further cost savings and utility of silica fabric technology.	7.500	10.000
Congressional Add: Data Analytics and Visualization System ***FY 2022 Accomplishments:*** The Engineer Research and Development Center (ERDC) Vicksburg in partnership with Mississippi State University (MSU) is conducting projects on cybersecurity and additive manufacturing. Provided funding to Mississippi State University to execute research required to increase the maturity levels of additive manufacturing (AM) engineering models and software algorithms to add confidence in AM's ability to quickly manufacture quality critical parts at remote locations. Includes an end-to-end methodology to showcase novel capabilities obtained by integrating advanced monitoring, artificial intelligence (AI)/ machine learning (ML) analysis techniques and Finite Element Analysis (FEA) model execution, specifically to provide assurance that AM parts manufactured in austere environments could meet quality and reliability requirements. The effort includes development of an end-to-end integrated solution providing capabilities to manage, analyze, and visualize exceptionally large datasets. This would be a framework to digest large amounts of diverse data types ranging from data collected by arrays of different sensors, images from thermo-cameras, and object	12.000	12.000

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	FY 2022	FY 2023
models generated by 3-D scanners to allow stakeholders to visualize data as part of a digital thread and use that data set to optimize decision making. ***FY 2023 Plans:*** The execution strategy is being formulated and will expand on FY 2022 project goals.		
Congressional Add: Hypersonics Enabling Manufacturing ***FY 2022 Accomplishments:*** America Makes seeks to advance the technology/manufacturing readiness level (TRL/MRL) of advanced manufacturing technologies to enable precise spatial control of material, material composition, and functionality as structures are created layer-by-layer to provide fully customizable, high value products via additive manufacturing methods that address design challenges of hypersonic flight, accelerate acquisition time, and reduce cost relative to conventional manufacturing methods. The project will conduct research on critical high temperature flight vehicle components by providing ground testing and evaluation (GT&E) campaigns tailored to specific focus areas. Task 1 will continue to advance the TRL/MRL for state of the art additively manufactured copper alloy rocket engine components. Task 2 will demonstrate technical solutions for thermally-managed, shape-stable leading edge designs under extreme heat loads. Task 3 will identify and evaluate intumescent coatings that can provide a thermal protection barrier to advanced composite materials. Task 4 will design, develop, and test lattice materials potentially suitable to replace and enhance incumbent thermal insulators. Task 5 identifies domestic replacement materials, such as structural or ablative insulators, with performance properties comparable to or exceeding rayon based high temperature composites to improve coemption in the solid rocket motors sector. Task 6 will continue to develop a universal process-structure database for refractory alloys under additive manufacturing conditions for hypersonic nozzle materials. Task 7 seeks to measurably improve the performance of additively manufactured nickel superalloy components. ***FY 2023 Plans:*** Advanced Manufacturing and Applied Research Innovation Institute (AMARII) plans to advance enabling technologies for hypersonic activities by providing prototype development of various elements required for hypersonic missions by establishing a prototyping facility for hypersonic applications. This facility would concentrate on developing and testing new enabling technologies for various elements of a hypersonic vehicle. The proposed effort would also seek to expand curriculum for undergraduate and postgraduate courses for hypersonic-related technologies. AMARII has assembled the National Center for Defense Manufacturing and Machining (NCDMM)/America Makes; the National Additive Manufacturing Innovation Institute; Youngstown State University (YSU) for additive manufacturing assistance and potential support of educational aspects; Ursa Major Technologies, the developer of an additively manufactured rocket engine that has already been successfully implemented on the X-60A hypersonic test vehicle; NASA Glenn, to provide wind tunnel capabilities; and University of Texas at El Paso (UTEP), to provide expertise in additive manufacturing of refractory materials and research efforts in other material systems. The Army's Long Range	10.000	12.000

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	FY 2022	FY 2023
Precision Fires group will support in an advisory capacity and as a transition partner. They have recommended that future research topics include thermal management solutions for high-speed trajectories, affordable high temperature capable structural materials, modeling of material solutions in demanding environments and highly integrated, conformal sensor systems. The Army has also requested the program investigate potential additional topics including material modeling, analysis for air-breathing missile systems, ultra-high temperature insulation materials, affordable ceramic matrix composites (CMCs), joining of CMC structures with functionally graded refractory high entropy alloys, complex thermal management solutions, printable electronics and radio frequency structures for highly integrated array sensor systems, reconfigurable antennas enabling multi-frequency operation, and Carbon/Silicon-Carbide (C/SiC) pre-impregnated (pre-preg) material development.		
Congressional Add: Additive Manufacturing Training (formerly El Paso Makes Contract Support for El Paso Manufacturers) ***FY 2022 Accomplishments:*** The Innovation Network for Manufacturers, El Paso Chamber, and National Center for Defense Manufacturing and Machining (NCDMM) are partnered in the development of defense-related business within the El Paso business community. Schmitt Consulting Group (SCG) will evaluate companies in the El Paso Manufacturing base for market readiness and process maturity. In consultation with the America Makes regional affiliate, El Paso Makes, SCG will provide companies in the El Paso Makes ecosystem with support, processes, and tools for manufacturers to do business with the DoD, including training on best business practices, to prepare them to identify, compete, and win opportunities in the Huntsville DoD and aerospace market as sub-tier suppliers to OEMs, other defense manufacturers, and the Defense Logistics Agency (DLA) via the DLA Internet Bid Board System (DIBBS). ***FY 2023 Plans:*** Driving Research, Innovation, and Value through Education in Additive Manufacturing (DRIVE AM) Youngstown, a partnership between the Youngstown State University (YSU), the University of Texas at El Paso (UTEP), Open Additive, LLC and the Youngstown Business Incubator (YBI), will be an extension of an established UTEP program created and implemented to produce a superior AM-educated military, domestic manufacturing workforce, and defense supply chain. DRIVE AM training offerings have varying levels of proficiency, each targeting soldiers, technicians, operators, engineers, Department of Defense (DoD) support personnel, personnel transitioning from the military, or veterans that are in active roles in the military or DoD, or in support of DoD through the defense manufacturing supply chain. DRIVE AM courses to be delivered under this project include: Introduction to Industrial Additive Manufacturing, Introduction to Additive Manufacturing Workflow, Laser Powder Bed Fusion Foundation, and Material Extrusion Foundation.	0.964	5.200
Congressional Add: Advanced Robotics and Automation Training	2.000	0.000

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	FY 2022	FY 2023
FY 2022 Accomplishments: Advanced Robotics for Manufacturing (ARM) Manufacturing Innovation Institute (MII) initiated development of a national, comprehensive, publicly accessible online repository of Robotics and Automation training programs (launched as www.roboticscareer.org). This website seeks to become the National model for robotics training, standards, and core competencies, serving as an employer placement repository covering every state and territory in the nation. This ongoing effort is developing the needed, robotics-ready workforce by identifying and standardizing required competencies and skills, promoting and enhancing educational resources, and sharing available jobs in a comprehensive, easily accessible manner. The ARM system will dynamically analyze and upgrade the required skill competencies via an online platform addressing the field of robotics, automation, and Artificial Intelligence (AI). It will incorporate the ARM MII's Endorsement Program to facilitate work with training entities to improve and upgrade their programs and equipment, including rural or underserved programs, by leveraging ARM's world-class consortium. ***FY 2023 Plans:*** N/A (Not funded in FY23)		
Congressional Add: Cybersecurity Manufacturing Innovation Park	1.000	0.000
FY 2022 Accomplishments: The Department of Energy's Cybersecurity Manufacturing Innovation Institute (CyManII) has been awarded $1M for Period 1 2022-2023 to support training and education initiatives to support the mission of upskilling and reskilling workers in cybersecurity and cybersecurity awareness through development and use of the Cybersecurity Manufacturing Innovation Park. CyManII is conducting skills and readiness assessments to determine individualized training needs for Small to Medium Manufacturers (SMM). They are working with specific training partners to create varying levels of training from basic cyber hygiene to advanced/progressive hygiene. They have initiated training for University of Texas (UT) system students, and will increase their physical footprint to provide live, instructor led training via a "TxMx Hub Training Center" in San Antonio that will provide classroom, hands-on training, and a Mobile Training Vehicle to provide training and training resources to underserved geographic locations. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)		
Congressional Add: Certification Based Workforce Training Programs for Manufacturing (Jobs of the Future)	6.200	0.000
FY 2022 Accomplishments: Manufacturing x Digital (MxD) Manufacturing Innovation Institute (MII) is initiating MxD Learn CAPITAL to develop certification-based training in digital manufacturing and cybersecurity for manufacturing to strengthen the defense industrial base. The six phase project will: (1) identify and engage relevant stakeholders, including target populations, subject matter experts, industry and academia; (2) create a Workforce Development Advisory Committee composed of manufacturing workforce thought leaders from key industry, academic, and government partners to drive execution of the MxD Learn CAPITAL strategy and		

	FY 2022	FY 2023
outcomes; (3) identify and prioritize the most in-demand skills by engaging MxD's partner network; (4) outline Career Pathways for curriculum development by enumerating the set of competencies, and generate a union of these competencies across roles of interest through a rigorous review process to ensure industry-validation; (5) develop industry-backed courses from outlined career pathways that integrate one or more industry-recognized and/or academic credentials determined to bring the highest value to both employers and workers in the career pathway; and (6) port courses onto the video teleconference (VTC) platform to optimize virtual content delivery and reach a diverse and geographically dispersed audience. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)		
Congressional Add: Program Increase ***FY 2022 Accomplishments:*** This add funded key projects, including: (1) Manufacturing Innovation Institute (MII) Network investment projects for contested logistics, robotics and fabrics manufacturing, and qualification/ certification for fabric device process design kits); (2) establishment of a Lightweight Innovations for Tomorrow (LIFT) MII affiliate in Puerto Rico; and (3) a series of manufacturing education and workforce development projects including stakeholder awareness building and communications, Workforce Readiness Level framework and mapping to Technology Readiness Levels (TRLs)/Manufacturing Readiness Levels (MRLs), an additive manufacturing incumbent workforce micro-learning pilot, and a workforce building effort with LIFT in the Detroit Region. The general program increase also funded the DoD strategic investment to the full threshold requirement and provided MII and Cyber program support to the Office of the Secretary of Defense. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)	9.000	0.000
Congressional Add: Advanced Manufacturing ***FY 2022 Accomplishments:*** America Makes and the University of Texas at El Paso (UTEP) provide advanced manufacturing training focused on additive manufacturing (AM) via the Driving Research, Innovation, and Value through Education in Additive Manufacturing (DRIVE AM) program. DRIVE AM trains active duty, transitioning Soldiers, and DoD personnel to: (1) best utilize AM to support maintenance and sustainment activities, and (2) leverage AM to maintain superiority within DoD operations and technologies and the defense industry supply chain. DRIVE AM also includes a Science, Technology, Engineering, and Mathematics (STEM) K-PhD pipeline program to sustain workforce needs and an AM business creation ecosystem to support the defense supply chain. The DRIVE AM team is also working with existing AM companies and defense supply chain to help keep up with emerging technology, maintain economic competitiveness, and expand the technical workforce. The planned DRIVE AM Phase 3 effort will enable partners to: (1) continue insertion of the DRIVE AM Foundation program throughout DoD and expand virtual asynchronous content; (2) focus on development of the DRIVE	2.000	0.000

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	FY 2022	FY 2023
AM Knowledge Base; (3) continue developing awareness throughout DoD on UTEP's unique approach in using a specific laser powder bed fusion (LPBF) qualification test artifact for deepening understanding throughout the LPBF workflow to benefit DoD; and (4) advance the DRIVE AM STEM K-PhD pipeline and economic development initiatives. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)		
Congressional Add: Silicon Based Lasers ***FY 2022 Accomplishments:*** This project incorporates integrated Silicon-based Lasers to dramatically improve the performance and reliability of photonic integrated circuits while significantly reducing size, weight, and power consumption. This add will be obligated in FY 2023 to build on an FY 2020 investment used to initiate two projects focused on providing access to on-chip laser sources for users of AIM Photonics' multi-project wafer (MPW) offerings. AIM Photonics has successfully demonstrated the viability of growing quantum-dot lasers directly on AIM's silicon photonics platform. Work is directed to optimizing integration approaches and obtaining solutions that offer high yields by (1) developing a manufacturable solution that can be scaled up to be cost effective for AIM MPW users; and (2) bonding existing lasers (which offers the freedom to select different wavelengths and/or laser types) onto AIM's MPW platform via specialized trenches while minimizing the optical loss encountered through this approach. DoD platforms and commercial applications will benefit from higher bandwidth, faster data transmission, lower energy loss, lower weight, and less costly optical methods which integrated photonic circuits can enable when intimately integrated with a laser source. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)	10.000	0.000
Congressional Add: Hypersonics and Thermal Management ***FY 2022 Accomplishments:*** This add continues an FY 2021 add by the same name which saw the commissioning of an additive manufacturing printer for this application and ongoing modeling, printing, and testing of multiple alloys. The FY 2022 funds will be obligated via a grant in FY 2023 under the Science and Technology for Advanced Manufacturing Projects (STAMP) BAA by the Office of Naval Research (ONR). The objective is to progress the technology readiness level/manufacturing readiness level of metallic materials and associated manufacturing processes used in the high-temperature thermal application in hypersonic vehicles, which includes material property assessment, alloy development, and multi-layered material optimization. The project will focus on developing integrated computational materials engineering (ICME) models for functionally graded materials systems allowing for agile and fast deployment in various component geometries and uses. ***FY 2023 Plans:*** N/A (Not funded in FY 2023)	5.000	0.000
Congressional Adds Subtotals	65.664	412.300

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C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Each Manufacturing USA institute is established through a competitive selection process. The executing military department or agency, in close and continuous coordination with Office of the Under Secretary of Defense for Research and Engineering Manufacturing Technology Office (ManTech), publishes a formal solicitation (funding opportunity announcement) for proposals describing the scope of required activities and extensive proposal evaluation criteria. Non-Profit Organizations (including universities) are eligible to bid, and each bidder forms a broad consortium of industry and academic partners. The executing military department or agency, in close coordination with the Office of the Secretary of Defense (OSD), uses a team of government experts to evaluate each proposal against the evaluation criteria and selects a winning consortium. The final terms of the cooperative agreement/technology investment agreement between the selectee and the federal government are then negotiated and the Cooperative Agreement (CA) or Technology Investment Agreement (TIA) is signed. Throughout and after completion of this process, the federal government makes clear that members of non-selected teams are encouraged to join the selected consortium as conditions permit.

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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
351: *Manufacturing Education and Workforce Development*	-	3.993	10.179	5.101	-	5.101	5.098	5.101	5.207	5.321	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Office of the Secretary Defense (OSD) promotes equity and inclusion in manufacturing careers, drives regional action to modernize manufacturing Career & Technical Education (CTE) for the U.S. industrial base, invests in strategic education and workforce development capabilities, and expands strategic leadership of advanced manufacturing human capital development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Manufacturing Education and Workforce Development	3.993	5.179	5.101

Description: The Manufacturing Education and Workforce Development (M-EWD) program builds on activities from FY 2019-2021 resourced by Project 350 and congressional interest items including the Manufacturing Engineering Program. Key M-EWD accomplishments include development of a strategic framework for DoD leadership of advanced manufacturing talent development, eight MII-led regional initiatives informed by labor market data profiles of regional economies, start of a pilot effort to develop an automated real-time labor market data portal, and launch of ManufacturingWorkforce.org, a dual-use digital learning platform with advanced manufacturing course offerings.

FY 2023 Plans:

The M-EWD program will sponsor a project to expand the pool of talent and promote equity and inclusion in manufacturing careers by building upon Minority-Serving Institution (MSI) and Historically Black Colleges and Universities (HBCU) partnerships developed beginning in FY 2021. A second key effort will be a pilot project to build regional economic and talent development alliances. The program will also continue to sustain and enhance the Open edX digital learning platform for industry and DoD personnel, as well as the labor market data portal projects.

FY 2024 Plans:

Support development of whole-of-government EWD solutions applicable to the defense advanced manufacturing workforce. Expand Diversity, Equity, and Inclusion (DEI) in the manufacturing workforce by developing and adapting tailored curricula to expand participation opportunities and increasing the availability of instructional platforms and materials.

FY 2023 to FY 2024 Increase/Decrease Statement:

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
The decrease of $0.078 million between FY 2023 and FY 2024 reflects a minor re-phasing of manufacturing education platform content development.			
Accomplishments/Planned Programs Subtotals	3.993	5.179	5.101

	FY 2022	FY 2023
Congressional Add: Manufacturing Industrial 4.0 Training Program ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** This Community Project Funding (CPF) add is for the University of Maine (UMaine) Advanced Manufacturing Center to establish three Manufacturing Training Innovation Centers (MTICs) at Orono, Brunswick, & South Portland, Maine. The proposed MTICs will coordinate efforts and leverage existing UMaine Advanced Manufacturing Center and Southern Maine Community College resources to help Maine businesses utilize emerging technologies such as additive manufacturing and artificial intelligence (AI). The execution plan is being formulated.	0.000	5.000
Congressional Adds Subtotals	0.000	5.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A