Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force											Date: February 2018	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602201F / *Aerospace Vehicle Technologies*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	130.923	124.678	130.547	0.000	130.547	140.859	143.896	152.559	144.767	Continuing	Continuing
622401: *Structures*	-	40.397	42.925	43.501	0.000	43.501	46.953	50.062	52.003	49.349	Continuing	Continuing
622403: *Flight Controls and Pilot-Vehicle Interface*	-	28.216	30.130	31.402	0.000	31.402	32.411	33.225	38.610	36.638	Continuing	Continuing
622404: *Aeromechanics and Integration*	-	34.006	29.557	30.932	0.000	30.932	31.110	32.507	33.356	31.650	Continuing	Continuing
622405: *High Speed Systems Technology*	-	28.304	22.066	24.712	0.000	24.712	30.385	28.102	28.590	27.130	Continuing	Continuing

A. Mission Description and Budget Item Justification

This effort investigates, develops, and analyzes aerospace vehicle technologies in the three primary areas of structures, controls, and aerodynamics for legacy and future aerospace vehicles. Advanced structures concepts are explored and developed to exploit new materials, fabrication processes, and design techniques. Vehicle, inter-vehicle, and intra-vehicle control technologies are developed and simulated for aerospace vehicles. Advanced aerodynamic vehicle configurations are developed and analyzed through simulations, experiments, and multi-disciplinary analyses. Resulting technologies improve performance of existing and future manned and remotely piloted air vehicles, sustained high speed, and space access vehicles. Improvements include, but are not limited to, reduced energy use by efficient air platform designs, use of lightweight composite structures, and improved sustainment methods based on the condition of the platform and sub-systems. Projects in this effort have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this PE would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602202F, 0602203F, 0602204F, 0602601F, 0602602F, 0602605F, 0602788F, 1206601F, and 0602298F.

This effort is in Budget Activity 2, Applied Research, because this budget activity includes studies, investigations, and non-system specific technology efforts directed toward general military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force	Date: February 2018
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	122.831	124.678	128.303	0.000	128.303
Current President's Budget	130.923	124.678	130.547	0.000	130.547
Total Adjustments	8.092	0.000	2.244	0.000	2.244
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	10.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.908	0.000			
• Other Adjustments	0.000	0.000	2.244	0.000	2.244

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2017	FY 2018
Project: 622405: *High Speed Systems Technology*		
Congressional Add: *Program Increase-Hypersonic vehicle structures*	9.846	0.000
Congressional Add Subtotals for Project: 622405	9.846	0.000
Congressional Add Totals for all Projects	9.846	0.000

Change Summary Explanation

Increase in FY 2019 due to Department of Defense (DoD) civilian pay repricing adjustment.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602201F / *Aerospace Vehicle Technologies*	Project (Number/Name) 622401 / *Structures*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
622401: *Structures*	-	40.397	42.925	43.501	0.000	43.501	46.953	50.062	52.003	49.349	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops advanced structures concepts to exploit new materials and fabrication processes and investigates new concepts and design techniques. New structural concepts include incorporating subsystem hardware items and adaptive mechanisms into the aerospace structures and/or skin of the platform.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Aircraft Service Life Technologies	21.063	22.381	22.681
Description: Develop an economic service life analysis capability comprised of analysis tools, methodologies, and structural health monitoring technologies. ***FY 2018 Plans:*** Complete development of engineered residual stress methods for airframe life extension. Initiate methods for achieving lifing credit in advanced & enhanced metallic airframe components to extend structural life. Complete efforts in certification of advanced composite for aircraft structures. Complete efforts in Airframe Digital Twin to develop an integrated system of data, models, and analysis tools that enable better decisions regarding fleet lifecycle management and sustainment. Initiate demonstration of Aircraft Digital Twin models and tools on legacy fleet aircraft. ***FY 2019 Plans:*** Continue methods for achieving lifing credit in advanced & enhanced metallic airframe components to extend structural life. Continue demonstration of Aircraft Digital Twin models and tools on legacy fleet aircraft. Initiate development of impact damage analysis criteria and methods for advanced composite structures. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.300 million. Justification for the increase is described in the plans above.			
Title: Vehicle Design Technologies	11.840	12.581	12.750
Description: Develop methodologies to reduce the cost and time involved from design to full-scale testing of structural concepts and aircraft systems. ***FY 2018 Plans:*** Continue the development of advanced high fidelity aircraft design analysis tools. Continue parametric modeling methods for integrated multidiscipline collaborative design. Continue the development of design methods for low cost attritable aircraft			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622401 / *Structures*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
concepts. Continue evaluation of control effector concepts for supersonic tailless aircraft. Initiate the development of integrating cost, mission effectiveness, and affordable manufacturing methods into the aircraft design analysis tools. ***FY 2019 Plans:*** Continue the development of advanced high fidelity aircraft design analysis tools. Complete parametric modeling methods for integrated multi-discipline collaborative design. Complete the development of design methods for low cost attritable aircraft concepts. Complete the evaluation of control effector concepts for supersonic tailless aircraft. Continue the development of integrating cost, mission effectiveness, and affordable manufacturing methods into the aircraft design analysis tools. Initiate the development of control effector designs for supersonic tailless aircraft. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.169 million. Justification for the increase is described in the plans above.			
Title: Structural Concepts ***Description:*** Develop design methods, processes, and lightweight, adaptive, and multifunctional structural concepts to capitalize on new materials, multi-role considerations, and technology integration into aircraft systems. ***FY 2018 Plans:*** Continue innovative energy efficient conformal load bearing antenna structural concepts. Continue development and verification of low cost attritable airframe concepts and manufacturing methods. Continue development of lightweight aircraft structural concepts to support Air Superiority 2030 requirements. ***FY 2019 Plans:*** Complete innovative energy efficient conformal load bearing antenna structural concepts. Continue development and verification of low cost attritable airframe concepts and manufacturing methods. Continue development of lightweight aircraft structural concepts to support Air Superiority 2030 and Advanced Mobility requirements. Initiate development of innovative structural design methods to dramatically reduce weight and complexity of aircraft structures. Initiate the development of fail-safe technologies for bonded unitized composite structures applicable to Mobility aircraft. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.107 million. Justification for the increase is described in the plans above.	7.494	7.963	8.070
Accomplishments/Planned Programs Subtotals	40.397	42.925	43.501

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622401 / *Structures*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602201F / *Aerospace Vehicle Technologies*	Project (Number/Name) 622403 / *Flight Controls and Pilot-Vehicle Interface*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
622403: *Flight Controls and Pilot-Vehicle Interface*	-	28.216	30.130	31.402	0.000	31.402	32.411	33.225	38.610	36.638	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops technologies that enable maximum affordable capability from manned, remotely-piloted and autonomous aerospace vehicles. Advanced control technologies are developed for maximum vehicle performance throughout the flight envelope and simulated in virtual environments. Resulting technologies contribute significantly towards the development of reliable autonomous remotely piloted air vehicles, hypersonic aircraft, and extended-life legacy aircraft.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Advanced Flight Controls Technologies	11.535	6.905	7.196
Description: Develop technologies for advanced control-enabled capabilities, including flight controls, components, integrated vehicle management systems and software and system certification techniques for both manned and remotely piloted aircraft. ***FY 2018 Plans:*** Continue the development, demonstration, and assessment of advanced flight control mechanization technologies for trusted and certifiable operations under adverse and contested environments. Continue the development of survivable and health-adaptive control system architecture. Continue the development of advanced automation capabilities for mobility aircraft, including air drop and air refueling automation technologies. Initiate development of trusted autonomy approach, integrating certification processes and autonomy development. ***FY 2019 Plans:*** Continue the development, demonstration, and assessment of advanced flight control mechanization technologies for trusted and certifiable operations under adverse and contested environments. Continue the development of survivable and health-adaptive control system architecture. Complete the development of advanced automation capabilities for mobility aircraft and transition to advanced development. Continue the development of trusted autonomy approach, integrating certification processes and autonomy development. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.291 million. Justification for the increase is described in the plans above.			
Title: Manned and Unmanned Teaming Technologies	9.921	17.941	18.699
Description: Develop technology for flight control systems that will permit safe interoperability between manned and remotely piloted aircraft and effective teaming in adverse and contested environments..			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622403 / *Flight Controls and Pilot-Vehicle Interface*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
FY 2018 Plans: Continue development, demonstration, and assessment of advanced control automation techniques. Continue the development of mixed initiative control techniques for teams of remotely piloted aircraft and/or manned-unmanned teams in contested, dynamic mission environments, as well as for the integration of unmanned systems into controlled airspace and airbase operations. Continue the development of robust, affordable Unmanned Air Systems (UAS) operations in a terminal airspace environment. Initiate development of autonomous behaviors for safe, loyal wingman. ***FY 2019 Plans:*** Continue development, demonstration, and assessment of advanced control automation techniques. Continue the development of mixed initiative control techniques for teams of remotely piloted aircraft and/or manned-unmanned teams in contested, dynamic mission environments, as well as for the integration of unmanned systems into controlled airspace and airbase operations. Continue the development of robust, affordable UAS operations in a terminal airspace environment. Continue the development of autonomous behaviors for safe, loyal wingman. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.758 million. Justification for the increase is described in the plans above.			
Title: Flight Controls Technologies Modeling and Simulation ***Description:*** Develop tools and methods for capitalizing on simulation-based research and development of future aerospace vehicles. ***FY 2018 Plans:*** Continue modeling and simulation efforts to evaluate emerging autonomous and robust flight control technologies and concepts, as well as assess mission-level performance of integrated aerospace systems. Continue analyses of automated unmanned air systems and manned-unmanned teams in controlled airspace and airbase operations, as well as in adversarial mission environments. Continue trade studies of vehicle concepts for strike, mobility and reconnaissance. Continue manned-unmanned teaming evaluations. Continue development of autonomy for tactical aircraft operations. ***FY 2019 Plans:*** Continue modeling and simulation efforts to evaluate emerging autonomous and robust flight control technologies and concepts, as well as assess mission-level performance of integrated aerospace systems. Continue analyses of automated unmanned air systems and manned-unmanned teams in controlled airspace and airbase operations, as well as in adversarial mission environments. Continue trade studies of vehicle concepts for strike, mobility and reconnaissance. Continue manned-unmanned teaming evaluations. Continue development of autonomy for tactical aircraft operations. ***FY 2018 to FY 2019 Increase/Decrease Statement:***	6.760	5.284	5.507

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622403 / *Flight Controls and Pilot-Vehicle Interface*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
FY 2019 increased compared to FY 2018 by $0.223 million. Justification for the increase is described in the plans above.			
Accomplishments/Planned Programs Subtotals	28.216	30.130	31.402

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602201F / *Aerospace Vehicle Technologies*	Project (Number/Name) 622404 / *Aeromechanics and Integration*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
622404: *Aeromechanics and Integration*	-	34.006	29.557	30.932	0.000	30.932	31.110	32.507	33.356	31.650	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops aerodynamic configurations of a broad range of revolutionary, affordable aerospace vehicles. It matures and applies modeling and numerical simulation methods for fast and affordable aerodynamics prediction and integrates and demonstrates multi-disciplinary advances in airframe, propulsion, weapon and air vehicle control integration.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Aerodynamic Systems Technologies	8.994	7.818	8.181
Description: Develop aerodynamic assessment prediction methods centered on expanding the design capabilities of future air vehicles. ***FY 2018 Plans:*** Complete development and assessment of aerodynamic technologies that enable future revolutionary manned and unmanned air vehicles. Continue development and assessment of low cost attritable Unmanned Aircraft Vehicle (UAV) concepts. Continue assessment of efficient airfoil flow control and distributed propulsion concepts. Initiate design assessments of distributed propulsion concepts for next generation Mobility. ***FY 2019 Plans:*** Continue development and assessment of low cost attritable UAV concepts. Complete assessment of efficient airfoil flow control and distributed propulsion concepts. Continue design assessments of distributed propulsion concepts for next generation Mobility. Initiate the development of a high fidelity aerodynamic analysis tool for the design of lasers turrets applicable to Air Superiority 2030 requirements. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.363 million. Justification for the increase is described in the plans above.			
Title: Next Generation Aerodynamic Technologies	10.840	9.422	9.860
Description: Develop and assess technologies for the next generation of multi-role large aircraft. ***FY 2018 Plans:*** Continue development of high fidelity aerodynamic analysis and method development for future Air Superiority 2030. Continue development of practical laminar flow technologies for highly swept wings. Continue next generation tanker maturation and assess			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622404 / *Aeromechanics and Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
promising configurations in high and low speed wind tunnels. Complete wind tunnel test of natural laminar flow for Mobility hybrid wing body configuration. Initiate distributed embedded propulsion wind tunnel test. ***FY 2019 Plans:*** Complete development of high fidelity aerodynamic analysis and method development for future Air Superiority 2030. Complete development of practical laminar flow technologies for highly swept wings. Continue next generation tanker maturation and assess promising configurations in high and low speed wind tunnels. Complete distributed embedded propulsion wind tunnel test. Initiate wind tunnel tests of practical laminar flow treatments and coatings for highly swept wings applicable to Mobility applications. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.438 million. Justification for the increase is described in the plans above.			
Title: Aircraft Integration Technologies ***Description:*** Develop enabling technologies to allow efficient and effective integration of propulsion, weapons, and subsystems into current and future air vehicles. ***FY 2018 Plans:*** Complete the development of aerodynamic and propulsion integration technologies that enable future mobility and fighter aircraft. Complete advanced inlet and exhaust systems subscale tests for future air superiority. Continue development of advanced kinetic and directed energy weapons integration technologies for future air superiority. Continue the design of an integrated full flow path demonstration of a medium bypass embedded engine for next generation mobility. ***FY 2019 Plans:*** Continue development of advanced kinetic and directed energy weapons integration technologies for future air superiority. Complete the design of an integrated full flow path demonstration of a medium bypass embedded engine for next generation mobility. Initiate integrated full flow path demonstration of a medium bypass embedded engine for next generation mobility. Initiate propulsion integrations component wind tunnels tests for Air Superiority 2030 requirements. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.574 million. Justification for the increase is described in the plans above.	14.172	12.317	12.891
Accomplishments/Planned Programs Subtotals	34.006	29.557	30.932

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622404 / *Aeromechanics and Integration*

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 2	R-1 Program Element (Number/Name) PE 0602201F / *Aerospace Vehicle Technologies*	Project (Number/Name) 622405 / *High Speed Systems Technology*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
622405: *High Speed Systems Technology*	-	28.304	22.066	24.712	0.000	24.712	30.385	28.102	28.590	27.130	Continuing	Continuing

A. Mission Description and Budget Item Justification

This effort investigates, analyzes, and develops high speed/hypersonic aerospace vehicle technologies. Advanced high temperature structures concepts are explored and developed to exploit new materials, fabrication processes, and design techniques. Advanced aerodynamic vehicle configurations are developed and analyzed through simulations, experiments, and multi-disciplinary analyses. Advanced flight control technologies are developed and simulated for hypersonic vehicles. These technologies will enable future high speed; weapons, intelligence, surveillance, and reconnaissance systems; and space access vehicles.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: High Speed/Hypersonics Structures	10.641	12.828	14.366
Description: Develop high speed, high temperature structural analysis methods and technologies for extreme operating conditions in current and future air vehicles. ***FY 2018 Plans:*** Continue development of innovative structural concepts for high speed/hypersonic air vehicles. Continue development of analytical methods for predicting structural response needed for design and evaluation of hot primary structure for hypersonic vehicles. Continue to assess the impact of path dependent structural behavior on the service life prediction for hot structures encountering extreme environments. Continue to develop and integrate model uncertainty methods into multi-disciplinary simulations and quantify its impact on the structural margin. Continue development of structural analysis methods and technology for hot structure concepts under extreme environment loading conditions. Continue the assessment of the aerospace community to quantify the structural margins for extreme environment hot structure through experimental validation of ground test articles. Continue development of structural life prediction methodology for extreme environment structures and thermal protection systems. ***FY 2019 Plans:*** Continue maturation of innovative structural concepts for high speed/hypersonic air vehicles. Continue development of analytical methods for predicting structural response needed for design and evaluation of hot primary structure for hypersonic vehicles. Continue to assess the impact of path dependent structural behavior on the service life prediction for hot structures encountering extreme environments. Continue to develop and integrate model uncertainty methods into multi-disciplinary simulations and quantify its impact on the structural margin. Continue development of structural analysis methods and technology for hot structure concepts under extreme environment loading conditions. Continue the assessment of the aerospace community to quantify the structural margins for extreme environment hot structure through experimental validation of ground test articles. Continue			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622405 / *High Speed Systems Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
development of structural life prediction methodology for extreme environment structures and thermal protection systems. Initiate development on novel designs and demonstration of integrated hot structures for hypersonic reusable air platforms. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $1.538 million. Justification for the increase is increased emphasis in hypersonic structures.			
Title: High Speed Vehicle Aeromechanics and Integration	7.817	9.238	10.346
Description: Develop new and improved components, concepts, and designs for sustained flight of high-speed/hypersonic expendable and re-useable vehicles. Conduct analyses of high speed/hypersonic vehicles to enable revolutionary capabilities. ***FY 2018 Plans:*** Complete Critical Design Review (CDR) for Hypersonic International Flight Research Experimentation (HIFiRE) 5c, begin manufacturing of flight vehicle hardware. Evaluate interactions between air flow and structural deformations for a complex built-up hypersonic inlet. Continue to mature critical technologies for high speed/hypersonic flight. Continue development of design/ analysis techniques/ tools and experimental approaches to enable enhanced high-speed air induction system starting, operability, and performance for propulsion integration concepts over a wide range of flight conditions. Continue development of high speed system concepts that provide revolutionary capabilities. Continue investigation of aeromechanic technologies to reduced drag and enable robust stability and control at low dynamic pressure flight conditions. Continue efforts to characterize high-speed phenomena and develop and validate fundamental high- speed technologies through experimental testing. As part of international collaborative effort, complete flight testing of Mach 6 adaptive guidance and control flight experiment and initiate boundary layer transition flight experiment program. Continue assessment of mission-level effectiveness and refinement of definition of preferred high speed weapon alternatives and limited life hypersonic intelligence, surveillance, and reconnaissance vehicles. Continue assessment of campaign-level benefits of preferred high speed weapon alternatives. ***FY 2019 Plans:*** Complete the manufacturing of flight vehicle hardware for HIFiRE 5c. Continue to mature critical technologies for high speed/ hypersonic flight. Continue development of design/analysis techniques/ tools and experimental approaches to enable enhanced high-speed air induction system starting, operability, and performance for propulsion integration concepts over a wide range of flight conditions. Continue development of high speed system concepts that provide revolutionary capabilities. Continue investigation of aeromechanic technologies to reduced drag and enable robust stability and control at low dynamic pressure flight conditions. Continue efforts to characterize high-speed phenomena and develop and validate fundamental high- speed technologies through experimental testing. Continue assessment of mission-level effectiveness and refinement of definition of			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622405 / *High Speed Systems Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
preferred high speed weapon alternatives and limited life hypersonic intelligence, surveillance, and reconnaissance vehicles. Continue assessment of campaign-level benefits of preferred high speed weapon alternatives. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $1.108 million. Justification for the increase is increased emphasis in high speed vehicle aerodynamics.			
Accomplishments/Planned Programs Subtotals	18.458	22.066	24.712

	FY 2017	FY 2018
Congressional Add: Program Increase-Hypersonic vehicle structures	9.846	0.000
FY 2017 Accomplishments: Conducted Congressionally-directed efforts.		
FY 2018 Plans: N/A		
Congressional Adds Subtotals	9.846	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.