Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force											Date: February 2015	
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 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
Total Program Element	-	117.724	105.673	123.438	-	123.438	122.766	129.556	133.505	142.228	Continuing	Continuing
622401: *Structures*	-	43.346	32.756	52.257	-	52.257	49.685	53.509	55.185	57.812	Continuing	Continuing
622403: *Flight Controls and Pilot-Vehicle Interface*	-	34.663	29.478	27.578	-	27.578	28.465	29.921	30.480	31.107	Continuing	Continuing
622404: *Aeromechanics and Integration*	-	39.715	27.287	28.674	-	28.674	28.691	29.579	29.617	29.780	Continuing	Continuing
622405: *High Speed Systems Technology*	-	-	16.152	14.929	-	14.929	15.925	16.547	18.223	23.529	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program 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. Flight 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. Efforts in this program 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 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 2016 Air Force					Date: February 2015
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 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**
Previous President's Budget	119.624	105.747	121.690	-	121.690
Current President's Budget	117.724	105.673	123.438	-	123.438
Total Adjustments	-1.900	-0.074	1.748	-	1.748
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-0.074			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.900	-			
• Other Adjustments	-	-	1.748	-	1.748

Change Summary Explanation

FY16 increase due to higher DoD priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force			Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
622401: *Structures*	-	43.346	32.756	52.257	-	52.257	49.685	53.509	55.185	57.812	Continuing	Continuing

Note

In FY2015, Project 622401 Structures, Extreme Flight Technologies major thrust efforts, were moved to Project 622405 High Speed Systems Technology to better align efforts.

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 2014	FY 2015	FY 2016
Title: Aircraft Service Life Technologies	27.779	24.934	23.717
Description: Develop an economic service life analysis capability comprised of analysis tools, methodologies, and structural health monitoring technologies.			
FY 2014 Accomplishments: Completed development of engineered residual stress concepts, analysis, and applications. Continued the technology development concepts for risk informed decision-making. Continued technology efforts for condition-based maintenance of structural integrity. Continued the technology development of failure criteria tools for advanced aircraft composite and metallic components. Continued efforts in certification of advanced composite for aircraft structures. Developed an integrated system of data, models, and analysis tools that enable better decisions regarding fleet lifecycle management and sustainment.			
FY 2015 Plans: Complete technology development concepts for risk informed decision-making. Complete technology efforts for condition-based maintenance of structural integrity. Initiate development of engineered residual stress methods for airframe life extension. Continue the technology development of failure criteria methods and tools for advanced aircraft composite and metallic components. Continue efforts in certification of advanced composite for aircraft structures. Continue 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.			
FY 2016 Plans: Continue development of engineered residual stress methods for airframe life extension. Continue the technology development of failure criteria methods and tools for advanced aircraft composite and metallic components. Continue efforts in certification			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
of advanced composite for aircraft structures. Continue 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.			
Title: Vehicle Design Technologies ***Description:*** Vehicle Design Technologies Develop methodologies to reduce the cost and time involved from design to full-scale testing of structural concepts and aircraft systems. ***FY 2014 Accomplishments:*** Continued development of multi-disciplinary methodologies that will allow for lower cost advanced structures. Continued the development of advanced high fidelity aircraft design analysis tools. Continued development of high fidelity multidisciplinary design methods to enable efficient supersonic air vehicle technologies. Completed development of a design framework for design of small Remotely Piloted Aircraft (RPA) including noise. ***FY 2015 Plans:*** Complete high fidelity multidisciplinary design methods to enable efficient supersonic air vehicle technologies. Complete development of multi-disciplinary methodologies that will allow for lower cost advanced structures. Continue the development of advanced high fidelity aircraft design analysis tools. Initiate design methods for innovative control of supersonic tailless aircraft. Initiate parametric modeling methods for integrated multidiscipline collaborative design. ***FY 2016 Plans:*** Continue the development of advanced high fidelity aircraft design analysis tools. Continue design methods for innovative control of supersonic tailless aircraft. Continue parametric modeling methods for integrated multidiscipline collaborative design. Continue high-fidelity technology assessment and design of next generation mobility concepts.	2.641	3.656	15.709
Title: Structural Concepts ***Description:*** Structural Concepts. 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 2014 Accomplishments:*** Completed the development of low-cost technologies to increase the survivability and performance of future systems. Developed innovative energy efficient conformal load bearing antenna structural concepts. ***FY 2015 Plans:***	2.816	4.166	12.831

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
Continue innovative energy efficient conformal load bearing antenna structural concepts. Initiate development of lightweight, adaptive, and efficient structural concepts for mobility and special operations. Initiate ultra low cost airframe design and manufacturing methods. ***FY 2016 Plans:*** Continue innovative energy efficient conformal load bearing antenna structural concepts. Continue development of lightweight, adaptive, and efficient structural concepts for mobility and special operations. Continue ultra low cost airframe design and manufacturing methods. Initiate development of lightweight aircraft structural concepts for future air dominance.			
Title: Extreme Flight Environment Technologies ***Description:*** Develop technologies that will permit the structural development of platforms that can operate at an extreme altitude, while at sustained speeds greater than Mach 2. ***FY 2014 Accomplishments:*** Continued to develop structural design concepts that incorporate promising materials and components for the creation of an integrated vehicle structure that can withstand extreme flight environments. Validated extreme environment prediction methods to develop key hot structure design data. Continued development of analytical methods for predicting structural response needed for design and evaluation of hot primary structure for hypersonic vehicles. ***FY 2015 Plans:*** In FY2015, Project 622401 Structures, Extreme Flight Technologies major thrust efforts, were moved to Project 622405 High Speed Systems Technology to better align efforts. ***FY 2016 Plans:*** N/A	10.110	-	-
Accomplishments/Planned Programs Subtotals	43.346	32.756	52.257

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not Applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
Appropriation/Budget Activity 3600 / 2	**R-1 Program Element (Number/Name)** PE 0602201F / *Aerospace Vehicle Technologies*	**Project (Number/Name)** 622401 / *Structures*

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 2016 Air Force			Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
622403: *Flight Controls and Pilot-Vehicle Interface*	-	34.663	29.478	27.578	-	27.578	28.465	29.921	30.480	31.107	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops technologies that enable maximum affordable capability from manned and remotely piloted aerospace vehicles. Advanced flight 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 2014	FY 2015	FY 2016
Title: Advanced Flight Controls Technologies	14.650	10.846	12.152
Description: Develop technologies for advanced control-enabled capabilities, including flight controls, components, and integrated vehicle monitoring systems for both manned and remotely piloted aircraft. ***FY 2014 Accomplishments:*** Continued the development, demonstration, and assessment of advanced flight control mechanization technologies for trusted and certifiable operations under adverse and contested environments. Continued development of survivable and health-adaptive control system architectures. Completed the assessment of adaptive guidance and control technologies for fault/damage tolerance in unmanned space access systems. Completed development of control configurations for small remotely piloted aerospace systems. Initiate development of adaptive guidance and control technologies for small-scale hypersonic air vehicles ***FY 2015 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; developing new methods and expanding to include more aircraft systems. ***FY 2016 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; developing new methods and expanding to include more aircraft systems. Complete the development of adaptive guidance and control technologies for small-scale hypersonic air vehicles.			
Title: Manned and Unmanned Teaming Technologies	13.792	13.297	10.101
Description: Develop technology for flight control systems that will permit safe interoperability between manned and remotely piloted aircraft.			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
FY 2014 Accomplishments: Continued development, demonstration, and assessment of advanced control automation techniques. Continued the development of mixed initiative control techniques for multiple remotely piloted aircraft teams in dynamic mission environments, as well as for the integration of unmanned systems into controlled airspace and airbase operations. Developed and assessed manned-unmanned aircraft teams in tactical environments. Completed proof of concept demonstration of autonomous aircraft operations on an airfield. ***FY 2015 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. Complete study of airbase infrastructure options and implications, and initiate systems prototype development. ***FY 2016 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. Complete development of airborne control of Unmanned Air Systems (UAS) in preparation for flight test activities.			
Title: Flight Controls Technologies Modeling and Simulation	6.221	5.335	5.325
Description: Develop tools and methods for capitalizing on simulation-based research and development of future aerospace vehicles. ***FY 2014 Accomplishments:*** Continued 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. Continued analyses of automated unmanned air systems in controlled airspace and airbase operations, as well as in adversarial mission environments. Continued trade studies of vehicle concepts for strike, mobility and reconnaissance. ***FY 2015 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			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
environments, initiating development of testbed for emerging technologies. Continue trade studies of vehicle concepts for strike, mobility and reconnaissance. Complete autonomy in mobility testbed and begin evaluations. ***FY 2016 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. Complete manned-unmanned teaming testbed and begin evaluations.			
Accomplishments/Planned Programs Subtotals	34.663	29.478	27.578

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 2016 Air Force			Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
622404: *Aeromechanics and Integration*	-	39.715	27.287	28.674	-	28.674	28.691	29.579	29.617	29.780	Continuing	Continuing

Note

In FY2015, Project 622404 Aeromechanics and Integration, Concepts, Designs, and Analysis of High Speed Technologies major thrust efforts, were moved to Project 622405 High Speed Systems Technology to better align efforts.

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 2014	FY 2015	FY 2016
Title: Aerodynamic Systems Technologies	8.506	10.245	8.689
Description: Develop aerodynamic assessment prediction methods centered on expanding the design capabilities of future air vehicles. ***FY 2014 Accomplishments:*** Continued to develop and assess aeronautical technologies that enable broad use of unmanned aircraft. Completed demonstration of flow control techniques to enable unsteady load suppression for unmanned ISR platforms and future fleet mobility aircraft to increase aerodynamic efficiency. Continued development of innovative aerodynamic control methods for integrating high bypass propulsion for unmanned ISR platforms and future mobility aircraft. ***FY 2015 Plans:*** Continue to develop and assess aerodynamic technologies that enable future revolutionary manned and unmanned air vehicles. Continue to develop and assess advanced aircraft configurations for Mobility and Future Air Dominance. Complete technology assessments on Future Air Dominance vehicle concepts. Initiate technology assessments on next generation tanker systems. ***FY 2016 Plans:*** Continue to develop and assess aerodynamic technologies that enable future revolutionary manned and unmanned air vehicles. Complete development and assessment of advanced aircraft configurations for Mobility. Continue to develop and assess advanced aircraft configurations for Future Air Dominance. Complete technology assessments on next generation tanker systems.			
Title: Concepts, Designs, and Analysis of High Speed Technologies	8.447	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
Description: Develop new and improved concepts, designs, and analysis of technologies to enable revolutionary capabilities for sustained high-speed re-useable high altitude vehicle efforts. ***FY 2014 Accomplishments:*** Continued to develop technologies to enable high-speed flight. Continued development of analysis/design techniques and tools to enable shock/boundary layer interaction flow control and enhanced stability for high-speed propulsion concepts. Continued efforts to characterize high-speed phenomena and develop and validate fundamental high-speed component technologies through experimental testing in a relevant environment. ***FY 2015 Plans:*** In FY2015, Concepts, Designs, and Analysis of High Speed Technologies major thrust efforts, were moved to Project 622405 High Speed Systems Technology to better align efforts. ***FY 2016 Plans:*** N/A			
Title: Next Generation Aerodynamic Technologies ***Description:*** To develop and assess technologies for the next generation of multi-role large aircraft. ***FY 2014 Accomplishments:*** Continued high fidelity aerodynamic analysis and method development for Mobility and Future Air Dominance. Continued development of practical laminar flow technologies for highly swept wings. Completed studies and analysis to investigate more extensive legacy fleet fuel savings opportunities for drag reduction and formation flight. ***FY 2015 Plans:*** Continue development of high fidelity aerodynamic analysis and method development for Mobility and Future Air Dominance. Continue development of practical laminar flow technologies for highly swept wings. Initiate aerodynamics technologies to enable control of supersonic tailless aircraft. ***FY 2016 Plans:*** Continue development of high fidelity aerodynamic analysis and method development for Mobility and Future Air Dominance. Continue development of practical laminar flow technologies for highly swept wings. Continue development of aerodynamics technologies to enable control of supersonic tailless aircraft. Initiate development of flow control techniques to increase the efficiency of practical laminar flow technologies for highly swept wings.	22.762	9.929	11.415
Title: Aircraft Integration Technologies	-	7.113	8.570

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
Description: Develop enabling technologies to allow efficient and effective integration of propulsion, weapons, and subsystems into current and future air vehicles. ***FY 2014 Accomplishments:*** N/A ***FY 2015 Plans:*** Develop aerodynamic and propulsion integration technologies that enable future mobility and fighter aircraft. Develop analyses and experiments to investigate propulsion integration flow control to enhance Mobility and Future Air Dominance vehicle performance. Develop innovative aerodynamic design methods for integrating high bypass propulsion for future mobility aircraft. Develop advanced kinetic and directed energy weapons integration technologies for Future Air Dominance. ***FY 2016 Plans:*** Continue to develop aerodynamic and propulsion integration technologies that enable future mobility and fighter aircraft. Continue to develop analyses and experiments to investigate propulsion integration flow control to enhance Mobility and Future Air Dominance vehicle performance. Continue innovative aerodynamic design methods for integrating high bypass propulsion for future mobility aircraft. Continue development of advanced kinetic and directed energy weapons integration technologies for Future Air Dominance.			
Accomplishments/Planned Programs Subtotals	39.715	27.287	28.674

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 2016 Air Force			Date: February 2015
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 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
622405: *High Speed Systems Technology*	-	-	16.152	14.929	-	14.929	15.925	16.547	18.223	23.529	Continuing	Continuing

Note

In FY2015, Project 622401 Structures, Extreme Flight Technologies major thrust efforts, were moved to Project 622405 High Speed Systems Technology to better align efforts.

In FY2015, Project 622404 Aeromechanics and Integration, Concepts, Designs, and Analysis of High Speed Technologies major thrust efforts, were moved to Project 622405 High Speed Systems Technology to better align efforts.

A. Mission Description and Budget Item Justification

This program 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 2014	FY 2015	FY 2016
Title: High Speed Systems Technology	-	6.231	8.425
Description: Develop high temperature structural analysis methods and technologies for extreme operating conditions in current and future air vehicles.			
FY 2014 Accomplishments: N/A			
FY 2015 Plans: Initiate development of innovative structural concepts for high speed/hypersonic air vehicles. Initiate development of analytical methods for predicting structural response needed for design and evaluation of hot primary structure for hypersonic vehicles. Initiate the impact of path dependent structural behavior on the service life prediction for hot structures encountering extreme environments. Initiate the development and integrate model uncertainty methods into multi-disciplinary simulations and quantify its impact on the structural margin. Initiate development of structural analysis methods and technology for hot structure concepts under extreme environment loading conditions. Initiate the assessment of the aerospace community to quantify the structural			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
margins for extreme environment hot structure through experimental validation of ground test articles. Complete fabrication and initiate testing of representative vehicle structures for combined aero, thermal, and acoustic loads. ***FY 2016 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. Complete testing of representative vehicle structures for combined aero, thermal, and acoustic loads. Validate combined loads methodology to predict structural response.			
Title: High Speed Vehicle Aeromechanics and Integration	-	9.921	6.504
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 2014 Accomplishments:*** N/A ***FY 2015 Plans:*** Mature critical technologies for high speed/hypersonic flight. Begin 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. Begin development of high speed system concepts that provide revolutionary capabilities. Investigate aeromechanic technologies to reduced drag and enable robust stability & control at low dynamic pressure flight conditions. Initiate efforts to characterize high-speed phenomena and develop and validate fundamental high-speed technologies through experimental testing. As part of international collaborative effort, conduct flight tests boundary layer transition experiment. Develop design of multi-functional terminal sensor integrated flight experiment. Assess mission-level effectiveness and refine definition of preferred high speed weapon alternatives. Develop campaign-level modeling and simulation of high speed weapon alternatives. Assess campaign-level benefits of preferred high speed weapon alternatives ***FY 2016 Plans:*** 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. Complete performance and operability ground testing			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
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 2014	FY 2015	FY 2016
of advanced high contraction ratio inlets. Continue development of high speed system concepts that provide revolutionary capabilities. Investigate 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, conduct flight tests of Mach 6 adaptive guidance and control flight experiment. Assess mission-level effectiveness and refine definition of preferred high speed weapon alternatives and limited life hypersonic intelligence, surveillance, and reconnaissance vehicles. Assess campaign-level benefits of preferred high speed weapon alternatives.			
Accomplishments/Planned Programs Subtotals	-	16.152	14.929

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.