

Flightdeck/Maintenance/System Integration Human Factors Research Areas (Core)

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Next**GEN**

Flightdeck/Maintenance/System Integration

Human Factors Research Areas (Core)

Research Area	Requirement Num.	Requirement Title
Training and Procedures	A11G.HF.1	Enhancing Aviation Safety Through Advanced Procedures, Training & Checking Methods, to include Loss of Control Detection, Avoidance, and Recovery
	A11G.HF.6	General Aviation Safety Improvements Research – A Multi-Method Approach to Accident Reduction
Avionics	A11G.HF.2	Avionics & New Technologies: Certification and Operational Approval Criteria
Maintenance	A11G.HF.3	Human Factors Maintenance Risk Management
	A11G.HF.10	Human Factors to Support Risk-Based Decision Making (RBDM) and Maintenance Safety Culture
Advanced Vision	A11G.HF.4	Advanced Vision Systems (EFVS, EVS, SVS, and CVS), Head Up Displays (HUD), Head Mounted Displays (HMD): Certification and Operational Approval Criteria
Rotorcraft Safety	A11G.HF.7	Human Factors R&D for Improved Rotorcraft Operational Safety
Fatigue	A11G.HF.8	Fatigue Mitigation in Flight Operations

Core Research Areas – Training and Procedures

Requirement	Performers	Past	FY 2018	Future	Transition
Enhancing Aviation Safety Through Advanced Procedures, Training & Checking Methods, to include Loss of Control Detection, Avoidance, and Recovery (A11G.HF.1)	Auburn University, University of Central Florida		Identifying CRM Training Techniques in the Airline Industry	<p>Distance Learning:</p> <ul style="list-style-type: none"> - Conduct review to document current airline distance learning programs as well as current research and recommended practices on pilot training effectiveness [Complete in FY19] - Identify training techniques and technologies that are or may become effective with pilots [Complete in FY19] - Collect data from airline programs and to determine the methods and metrics for evaluating training effectiveness [Complete in FY19] - Conduct a study comparing task training using technologies such as virtual/augmented reality and traditional flight training devices for skill transfer evaluated in full-flight simulators [Complete in FY20] - Summarize findings and make recommendations to the agency for updated guidance [Complete in FY21] - Technical report providing scientific and technical data to support recommendations for distance learning [Complete in FY21] 	Recommendations for updates to the guidance material for both the FAA inspectors and the operators.

Core Research Areas – Training and Procedures (cont.)

Requirement	Performers	Past	FY 2018	Future	Transition
Enhancing Aviation Safety Through Advanced Procedures, Training & Checking Methods, to include Loss of Control Detection, Avoidance, and Recovery (A11G.HF.1)	Auburn University, University of Central Florida			<p>Training the Emerging Pilot Workforce:</p> <ul style="list-style-type: none"> - Review the learning science and best practices on effective training for millennials and future generations and provide recommendations [Complete in FY19] - Examine emerging issues and trends for the emerging pilot workforce and identify training programs to address these issues [Complete in FY19] - Field test new methods for training the emerging pilot workforce with select certificate holders [Complete in FY20] - Summarize results and propose new methods for training and checking the new pilot workforce [Complete in FY20] - Technical report providing scientific and technical data on new methods of training and checking and recommendations for FAA guidance materials [Complete in FY20] 	Recommendations for new methods for training and checking the new pilot workforce.

Core Research Areas – Training and Procedures (cont.)

Requirement	Performers	Past	FY 2018	Future	Transition
General Aviation Safety Improvements Research – A Multi-Method Approach to Accident Reduction (A11G.HF.6)	Auburn University, University of Central Florida	Enhancing Aviation Safety through Advanced Procedures, Training & Checking Methods, to include Loss of Control Detection, Avoidance, and Recovery– Integrated Angle Of Attack [Completed in FY17]			The research is intended to produce recommendations for minimum integrated Angle Of Attack indicator display requirements

Core Research Areas – Avionics

Requirement	Performers	Past	FY 2018	Future	Transition
Avionics & New Technologies: Certification and Operational Approval Criteria (A11G.HF.2)	CAMI, COE, Volpe	General Guidance for Multi-Function Displays [Complete in FY17]		Avionics and New Technologies - Certification and Operational Approval Criteria: <ul style="list-style-type: none"> - Update General Guidance Document - Identify features that contribute to compellingness - Display of Ownship in Weather Depiction - Instrument Scan with Recommendations for Training 	AC 120-76D, Authorization for Use of Electronic Flight Bags

Core Research Areas – Maintenance

Requirement	Performers	Past	FY 2018	Future	Transition
Human Factors Maintenance Risk Management (A11G.HF.3)	CAMI		Human Factors Maintenance Risk Management – Fatigue (CAMI FY18 PD Task RMAC 5)		<p>Provide industry with empirically tested approaches/tools to proactively manage maintenance safety risks. It will consist of fatigue risk management approaches modified for maintenance operations. The research will also provide the FAA with a scientific basis for guidance and future requirements pertinent to effective risk management strategies in maintenance operations.</p> <p>AC 120-115, Maintainer Fatigue Risk Management</p>
Maintenance Human Factors to Support Risk-Based Decision Making (RBDM) and Maintenance Safety Culture (A11G.HF.10)				<p>Safety Culture Report</p> <p>Risk-Based Decision Making (RBDM) Report</p> <p>SMS-HF Integration Report</p> <p>GA Maintenance Error Report (CAMI FY18 PD Task RMAC 4) [Complete in FY19]</p>	<p>Support the publication of policies, standards, and guidance materials.</p> <p>AC 120-115, Maintainer Fatigue Risk Management</p>



Core Research Areas – Advanced Vision

Requirement	Performers	Past	FY 2018	Future	Transition
Advanced Vision Systems (EFVS, EVS, SVS, and CVS), Head Up Displays (HUD), Head Mounted Displays (HMD): Certification and Operational Approval Criteria (A11G.HF.4)	CAMI			<p>Advanced Vision Systems: Evaluating human factors considerations for using HUD with localizer guidance in lieu of required infrastructure (CAMI FY18 PD Task AV 5) [Complete in FY20]</p> <p>Evaluation of human factors and crew coordination aspects of dual HUD CAT III operations compared to single HUD CAT III operations (CAMI FY18 PD Task AV 3) [Complete in FY22]</p>	<p>Support operational credit changes that would allow additional reduced visibility takeoffs.</p> <p>Support the development of human factors regulatory and guidance material for the use of dual HUD during approach in low visibility conditions where required visual references and critical information from the surrounding environment is difficult or impossible to see using natural vision</p>

Core Research Areas – Advanced Vision (cont.)

Requirement	Performers	Past	FY 2018	Future	Transition
Advanced Vision Systems (EFVS, EVS, SVS, and CVS), Head Up Displays (HUD), Head Mounted Displays (HMD): Certification and Operational Approval Criteria (A11G.HF.4)	CAMI		Literature review and survey of market technologies. (CAMI FY18 PD Task AV 4) [Complete in FY18]	<p>Preliminary report on first phase of research comparing pilot performance with HUD versus Out the Window (OTW) view (CAMI FY18 PD Task AV 4) [Complete in FY19]</p> <p>Executive report on SVS improvement/decrements to human performance for head down to head up transition and acquisition of the landing environment on SA CAT I and SA CAT II approaches (CAMI FY18 PD Task AV 4) [Complete in FY20]</p> <p>Executive report on synthetic vision comparison of HDD and HUD differences (CAMI FY18 PD Task AV 4) [Complete in FY20]</p> <p>Executive report on minimum training, recent flight experience, and proficiency requirements for SVS on SA CAT I approaches (CAMI FY18 PD Task AV 4) [Complete in FY20]</p>	The executive reports will help provide operational criteria and guidelines for evaluating head up, head down, and head mounted displays for use in Part 121 operations

Core Research Areas – Rotorcraft Safety

Requirement	Performers	Past	FY 2018	Future	Transition
Human Factors R&D for Improved Rotorcraft Operational Safety (A11G.HF.7)	CAMI	<p>Conduct literature review and develop research plan to evaluate pilot decision making on onboard weather aiding resources and off-nominal event training (CAMI FY18 PD Task RMAC 1) [Completed in FY17]</p> <p>Conduct literature review on helicopter crew resource management for part 91 and 135 including HAA operators. Develop research plan to evaluate CRM (CAMI FY18 PD Task RMAC 1) [Completed in FY17]</p>	<p>Conduct Literature Review for Scenario Based Training and Identify HF affecting pilot workload in rotorcraft ops. Provide recommendations for operating limitations and other mitigations such as RNAV/RNP for helicopters. (CAMI FY18 PD Task RMAC 1)</p>		<p>To identify criteria for evaluating equipment, implementations, and procedures which are not presently contained in applicable regulations that address proper function, intuitive use, and potential hazards. Findings will be used to update policy and guidance as appropriate.</p> <p>FAA Order 8900.1, Flight Standards Information Systems (FSIMS)</p>



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Core Research Areas – Fatigue

Requirement	Performers	Past	FY 2018	Future	Transition
Fatigue Mitigation in Flight Operations (A11G.HF.8)	CAMI	<p>Identify operationally relevant fatigue & performance measures for inclusion in AFS-200's development of an FRMS database for tracking approved exemptions and trend analysis. (CAMI FY18 PD Task BPD 1) [Completed in FY16]</p> <p>Evaluate AFS-220 FRMS exemption review and analysis procedures for standardization and scientific validity. (CAMI FY18 PD Task BPD 1) [Completed in FY17]</p>	<p>Complete a report that will be used to develop and update policy for 14 CFR § 117 and 121 and OpSpec A318, Authorization to Conduct Operations Under a Fatigue Risk Management System. (CAMI FY18 PD Task BPD 1)</p>	<p>Continue relevant data collection and entry into the FRMS database and develop pertinent research questions that will improve the FAA's understanding of pilot fatigue during flight operations exceeding the limitations of the 14 CFR part 117 regulations [Complete in FY20]</p> <p>Develop and refine a research study during FY2020 to characterize human factors/pilot performance considerations in flight operations involving short haul multiple segment workload and cumulative sleep loss across trip pairings [Complete in FY20]</p> <p>Develop and refine a research study to systematically evaluate the behavioral adaptation of pilots to multiple time zone shifts associated with long-haul and ultra long-range flight operations. This research will better inform development of operational requirements, standards, conditions, limitations, mitigations, and FRMS authorizations relevant to these flight operations issues [Complete in FY20]</p>	<p>Research will be used to develop and update policy for:</p> <p>14 CFR Part 117, Flight and Duty Limitations and Rest Requirements: Flightcrew Members</p> <p>14 CFR Part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations</p> <p>OpSpec A318, Authorization to Conduct Operations Under a Fatigue Risk Management System</p>