

Task 3: A Multi-Disciplinary Approach to Fatigue Risk Management in Aircraft Maintenance – Near Term and NextGen Time Frame (Maintenance Fatigue; Avers)

Program Manager:

Glen Gallaway, AJP-61, (202) 267-3173

Task Stakeholders/Sponsors

John J. Hiles, Aviation Safety Inspector / Human Factors National, AFS-330, (202) 385-6421
Dr. Bill Johnson, CSTA Human Factors Maintenance, AIR-200, (770) 458-7921

Performing Organization:

Katrina Avers, Ph.D, AAM-510, (405) 954-1199, katrina.avers@faa.gov

University/Contract Performing Organization:

NASA

Barbara G. Kanki, (650) 604-5785, barbara.kanki@nasa.gov

NASA/San Jose State University

Alan Hobbs, (650) 604-1336, alan.hobbs@nasa.gov

Project Start Date: 10/1/09

Anticipated End Date: 9/30/2011

Requirements Statement

Operational Shortfall or Knowledge Gap

It is believed that fatigue is a major contributor to human error in aircraft maintenance but there is no one place that this issue can be evaluated in the context of safety risk. Currently there is no one place that has brought together our current knowledge on the maintenance fatigue topic in the FAA context so that this knowledge can be used to reduce fatigue related maintenance error. This research will use previous research and other available data from sources such as the Federal Aviation Administration (FAA), the Aviation Safety Reporting System (ASRS) and National Transportation Safety Board (NTSB) to identify potential fatigue related maintenance issues and solutions.

Benefit in Closing the Shortfall or Gap

Since human error is the leading cause of aviation accidents, it is only fitting that fatigue and duty time be addressed in all aspects of aviation maintenance. If periods of rest have a profound effect on aviation maintenance technician performance, then we will explore the actions that must be taken to reduce the potential link between fatigue-related maintenance errors leading to aviation incidents, accidents and events.

Description of the Desired Product

CAMI personnel and workgroup members will research and develop the tools necessary for a practical and useful fatigue risk management system (FRMS). Tools will ultimately be compiled and published in a operator's manual.

Interagency agreement recipient will deliver a technical review of international best practices with regard to fatigue risk management in maintenance operations.

Future efforts will develop both FAA recommendations and oversight guidance of industry fatigue management systems.

Schedule

FY10 First Quarter

- Develop and distribute fatigue awareness materials
- Beta-test accident/incident reporting form for objective assessment of fatigue
- Update HF website for mx fatigue
- Begin developing educational/training materials

FY10 Second Quarter

- Continue distribute of fatigue awareness materials
- Continue to improve reporting for fatigue related incidents
- Begin developing senior management interventions
- Begin investigating scheduling and workload tool recommendations
- Update HF website for mx fatigue

FY10 Third Quarter

- Begin developing Just Safety Culture for FRMS materials
- Beta-test fatigue education/training materials
- Analyze available return on investment data provided by workgroup members
- Submit report on scheduling tools
- Update HF website for mx fatigue

FY10 Fourth Quarter

- Distribute fatigue educational/training material
- Develop proposal on how FRMS will optimally operate within SMS
- Begin compiling operator's handbook
- Update HF website for mx fatigue
- Coordinate distribution of R&D products
- Test return on investment model with available data

Research Objective

This research is focused on finding viable, practical, and implemental means of prevention/reduction of fatigue for maintenance personnel. This research should provide the FAA with a springboard to develop effective aviation maintenance fatigue management strategies. This research will be performed by a Fatigue Working Group. This research is to take known processes and knowledge about aircraft maintenance fatigue and its regulation in the airline industry (and other industries as it applies to the airline industry) and develop a viable prototype of an Aircraft Maintenance Fatigue Risk Management System for the FAA. A resulting product will be an operator's manual for companies to develop practical and useful Fatigue Risk Management Systems. Future efforts will develop both FAA recommendations and oversight guidance of industry Fatigue Risk Management Systems.

Background

Because aircraft maintenance work environment is a leading problem area for high levels of physical and cognitive fatigue in many forms there are a wide range of issues to cover. Problem areas are as follows: poor lighting, bad weather, long shifts, night shift, changing shifts, multiple shifts worked, chemical issues, difficult physical work locations, time pressure, complex work, economic restraints, etc., many times applied in combination with one another. This has become a focal point of recent FAA conferences. The aircraft maintenance fatigue issues were highlighted in FAA's special Conference on fatigue Challenges in Aviation, held in Vienna, VA on June 17-19, 2008.

Previous Activity on this Task

- Initiated Inter-Agency agreement with NASA-Ames
- Established multi-disciplinary workgroup to address aviation MX fatigue problems and solutions
- Began identifying international best practices for managing fatigue in aviation maintenance
- Met with workgroup members to establish objectives

Workgroup identified cultural norms/practices relevant to success of FRMS
 Developed and distributed fatigue awareness materials
 Developed reporting tool for fatigue related incidents/accidents
 Completed development of Human Factors MX Fatigue website

Proposed or Planned Research

Current fatigue management processes used by Transport Canada, Australia, EASA, and other regulatory organizations will be analyzed. Best practices from those organizations will be selected and evaluated in a prototype Maintenance Fatigue Risk Management System that could be employed by the FAA. The fatigue research knowledge and the airline/maintenance research organization's operations will be tested against the prototype system design to ensure that the system can effectively manage maintenance fatigue.

This research will initially target airlines but will potentially expand to general aviation and Unmanned Aircraft Systems in future years. The NASA Investigator will be expected to document what the Civil Aviation Safety Authority (Australia) and/or European Aviation Safety Agency currently have in place regarding regulations and fatigue. Further, they will document what companies, under these regulatory bodies, have in place to address fatigue-related issues (i.e., training, scheduling). CAMI must document the cultural norms/practices that are relevant to a successful implementation.

Research Question(s)

What type of fatigue management processes are used by other regulatory agencies?
 What type of fatigue management processes would work best for the FAA?
 Can a Maintenance Fatigue Risk Management System be effectively incorporated by the FAA?

Technical Approach

Current Year

1. Collect and analyze data on fatigue related maintenance accidents
2. Improve reporting systems to more accurately assess influence of fatigue
3. Develop tools necessary for a successful fatigue risk management system
4. Investigate costs and benefits associated with fatigue risk management system

Out-Years

1. Develop an operational handbook describing "Fatigue Risk Management in Aviation Mx" which includes a summary of best practices
2. Assist AFS in developing regulation requirements for addressing fatigue in aviation maintenance

Air Traffic Resources Required

None

Information Technology Resources Required

Will need Contractor support for software application development

Calibration

None

FY10 Milestone Schedule		
Description	Proposed Start Date	Proposed Completion Date
Submit technical report on international FRMS best practices	FY09 Q1	FY10 Q4
MX Fatigue Working Group will submit short-term fatigue risk management methods that could be effective immediately.	FY09 Q2	FY10 Q1
Develop training and education program	FY09 Q4	FY10 Q4
Identify fatigue management methods used by other regulators	FY09 Q4	FY10 Q2
Fatigue awareness material (calendar, quarterly newsletter, posters)	FY09 Q3	FY10 Q2
Complete beta test of fatigue assessment tool	FY09 Q4	FY10 Q3
Beta test fatigue countermeasure training	FY10 Q2	FY10 Q3
Develop senior management interventions	FY10 Q2	FY10 Q4
Investigate scheduling and workload tools	FY10 Q2	FY10 Q4
Develop operational handbook	FY10 Q2	FY11 Q3
Review and develop fatigue auditing tools	FY10 Q2	FY11 Q3
Develop and update HF website for mx fatigue	FY09 Q4	FY10 Q4

FY10 Deliverables		
Description	Proposed completion date	Actual completion date
Final technical report on fatigue management methods used by other regulators	FY10 Q4	
Publish fatigue awareness material (calendar, posters)	FY10 Q2	
Complete beta test of fatigue assessment tool	FY10 Q3	
Submit report on workload and scheduling tools	FY10 Q3	
Complete beta test of fatigue countermeasure training	FY10 Q3	
Update HF website for mx fatigue quarterly	FY10 Q4	
Training and education program	FY10 Q4	
Submit proposal on how FRMS will optimally operate within SMS	FY10 Q4	
Submit report on just culture development	FY10 Q4	