

# Challenges and Solutions for Maintenance Human Factors: 2007 Status Report

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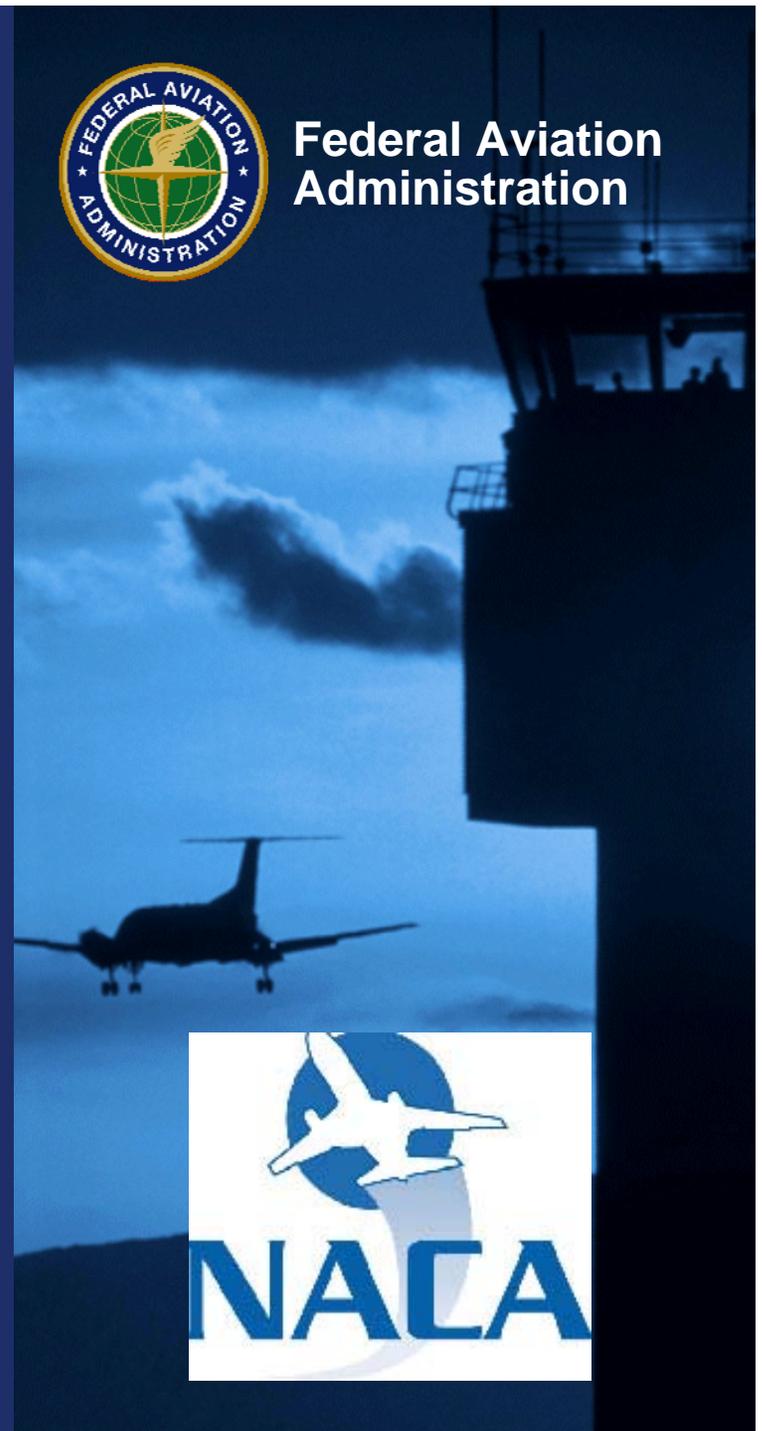
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NACA MAINTENANCE COUNCIL MEETING  
Arlington, VA  
October 25, 2006



Federal Aviation  
Administration



# Agenda

Human Factors?

Considerations & Topics for FAA HF Attention

Selected 2005-2006 Accomplishments

Future Challenges and Plans



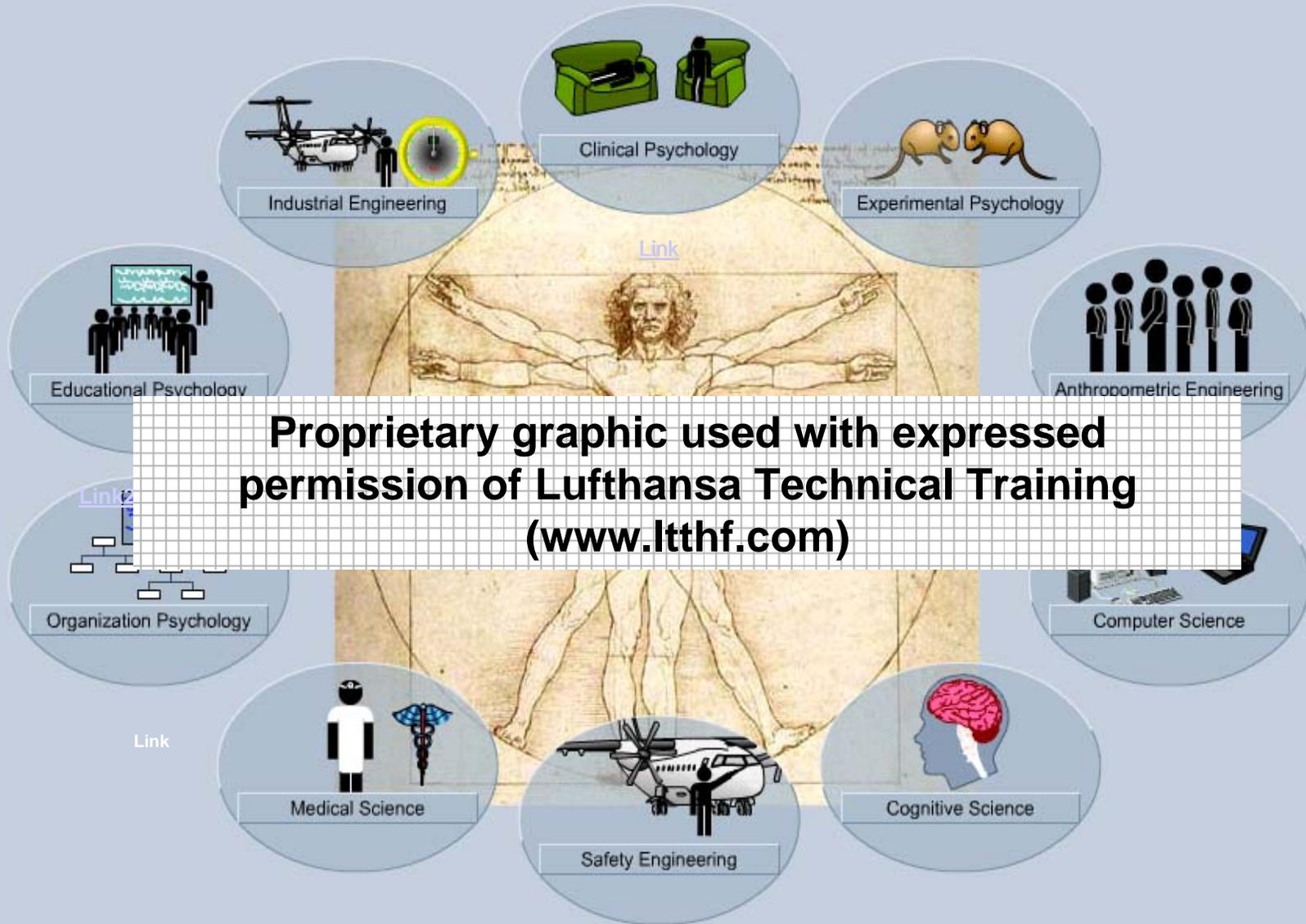
# Human Factors Spectacles



# Human Factors Goal – Simply Stated

Ensure continuing safety and efficiency by paying attention to issues surrounding human performance.





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# How to define topics for Mx HF Attention

- Apply resources to high payoff opportunities
- Ensure that R&D can be applied, but do not ignore good science
- Attack present challenges with an eye to the future
- Communicate in plain language



# How to Accomplish the Human Factors Goals

Attention to:

- people,
- the environment in which they work,
- the actions they perform,
- and the resources necessary to perform the work.



# PEAR Details: People

- **Physical Factors**
- **Physical size**
- **Sex**
- **Age**
- **Physical characteristics**
- **Strength**
- **Sensory limitations**
- **Physiological Factors**
- **Nutrition**
- **Health**
- **Lifestyle**
- **Fitness for Duty**
  - **Alertness**
  - **Chemical Dependence**
- **Workload**
- **Experience**
- **Knowledge**
- **Training/Certification**
- **Attitude**
- **Mental or emotional state**
- **Interpersonal conflicts**
- **Personal loss**



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# Selected 2005 Activity

- *The Operator's Manual for Human Factors in Aviation Maintenance* ([www.hf.faa.gov/opsmanual](http://www.hf.faa.gov/opsmanual))
  - Plain Language Award
  - Published in 3 Languages
  - Widely – adopted by industry
  - Many website hits with document downloads 3000+
- Support of FAR 145 Rule with Guidance Material
- Study of language-related error in maintenance



# FAA HF Guidance for Part 145

- FAA AC 145-10, Ch. 3, §301(c)

- The FAA **concur**s with European Authorities in that human factors training related to maintenance practices would provide an additional margin of safety to the repair industry;
- A human factors training program should be related to **maintenance practices** where possible;

- At this time it is recommended. It is not an FAA regulation.
- EASA Certificate holder's must follow EASA rules

# Language Error Study

1000 participants: Asia, Latin America, Europe and US.



## Main Findings

- Language errors exist but typically found early
- High Accuracy everywhere: Non-native English speakers typically go slower but maintain accuracy

## Main Recommendations

- Deliver more specialized language training.
- Provide and translation (full & partial).

# Selected 2006 Activity

- **International Conference (ATA)**



- **Unmanned Aerial Systems (NASA)**



- **International Survey on HF in Maintenance (CAMI)**

## Survey Goals and Methods

- ❖ **Purpose:** Assess status of maintenance HF
- ❖ **Focus:** program support and motivation, organizational policies, fatigue management, error management, and training.
- ❖ **Distribution:** Online survey (80 items) 630 addresses.
- ❖ **Returns:** 414 respondents (66%) from 54 countries.
- ❖ **Experience:** 65% > 20 yrs. maintenance experience.



# Respondent Representation



54 Countries

414 Total Respondents

NACA MAINTENANCE COUNCIL MEETING

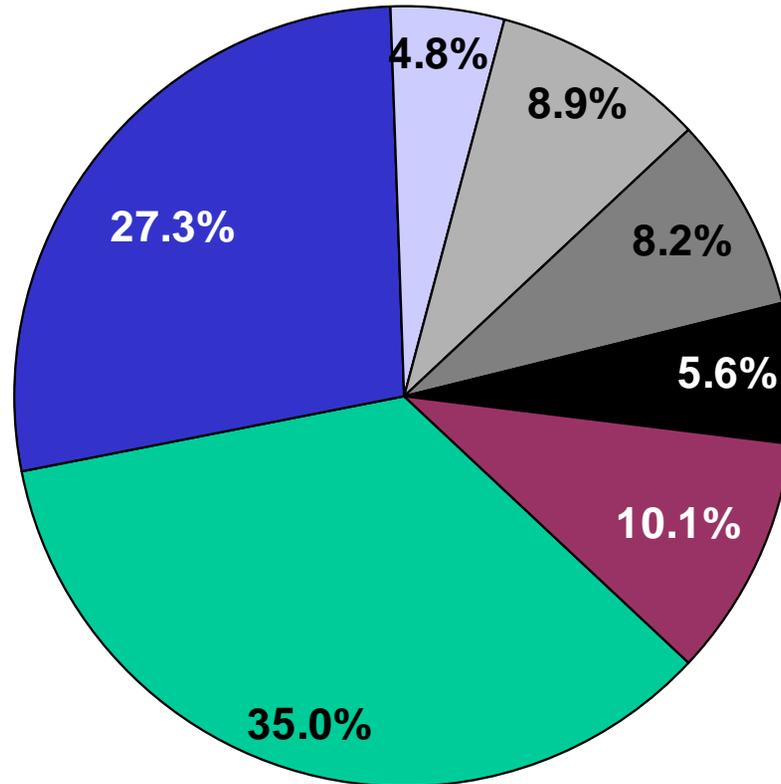
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## Where do you work?



**Air Maint**  
**GA/BIZ**  
**Other**

**Repair Stn**  
**Mil/Govt**

**Manufacturer**  
**School/Trn**

# Regulatory Compliance

Which is the primary regulatory authority your maintenance operations are designed to be in compliance with? **N=404**

Civil Aviation Safety Authority (CASA) N=19	4.7%
European Aviation Safety Agency (EASA) N=95	23.5%
Federal Aviation Administration (FAA) N=182	45%
Transport Canada N=36	8.9%
Other National Aviation Authority N=72	17.8%

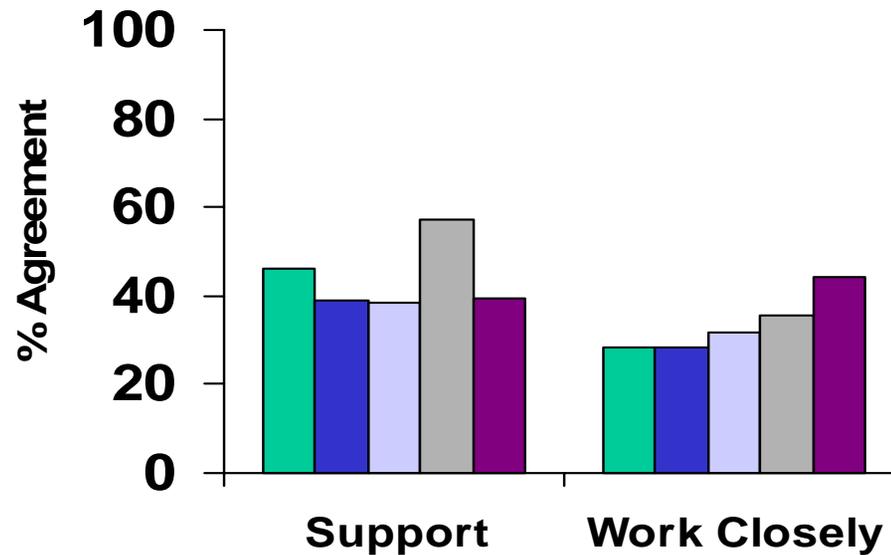


## FAA has the fewest Human Factors requirements

Topic	ICAO	EASA	TC	FAA
HF for Initial Certification	Annex 1	145.A.30(e) incl AMC&GM 145.A.30(i)	CAR 573.06	No
Continuation Training for HF	Annex 6	145.A.35 (d)	CAR 573.06	Recommended in ACs
Error Management System	Guidance	145.A.60	CAR 1	Rec, 145.211
Fatigue Management System	Guidance	145.A.30(d) incl. AMC	Proposed, now awaiting consul.	Guidance in Tech Pubs 121.377
Accountable Executive	No	145.A.30	CAR 106	145
Published HF Guidance Materials	Doc 9683-AN/950	GM145.A.30 (e) &Part 66 Appendix I M9	TP 13459	AC120-72, Ops Manual, FAA Website
Documentation Reporting Requirement	Guidance	145.A.45	CAR 573.08	145.109 121.369
Safety Culture/Safety Management System	Under development Annex 6	145.A.65	CAR 573.30	Continuing Analysis and Surveillance System
Procedural Non-compliance	Guidance	145.A.65 (c)	CAR 571.05	ASAP
Planning of tasks, equipment, and spares	Guidance	145.A.47	No	145.109
Shift and task handover	Guidance	145.A.47	CAR 573.08	121.369 (b) 9 135.427(b) 9
Error capturing (duplicate inspections)	Guidance	145.A.65 (b)3	CAR 571.10	121.371

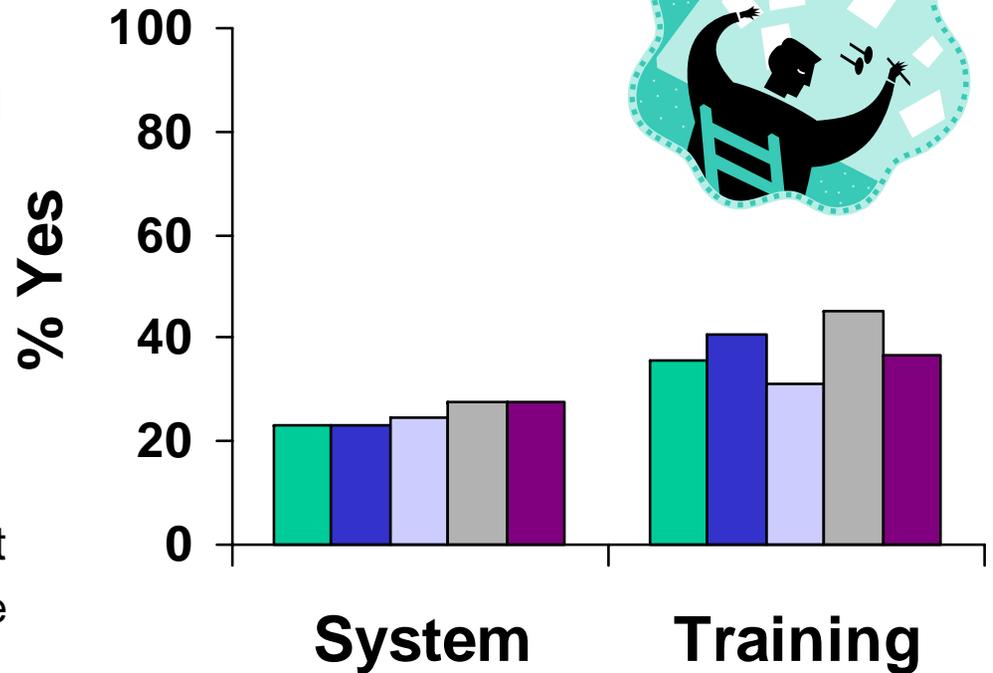


# Regulatory Support and Close Work

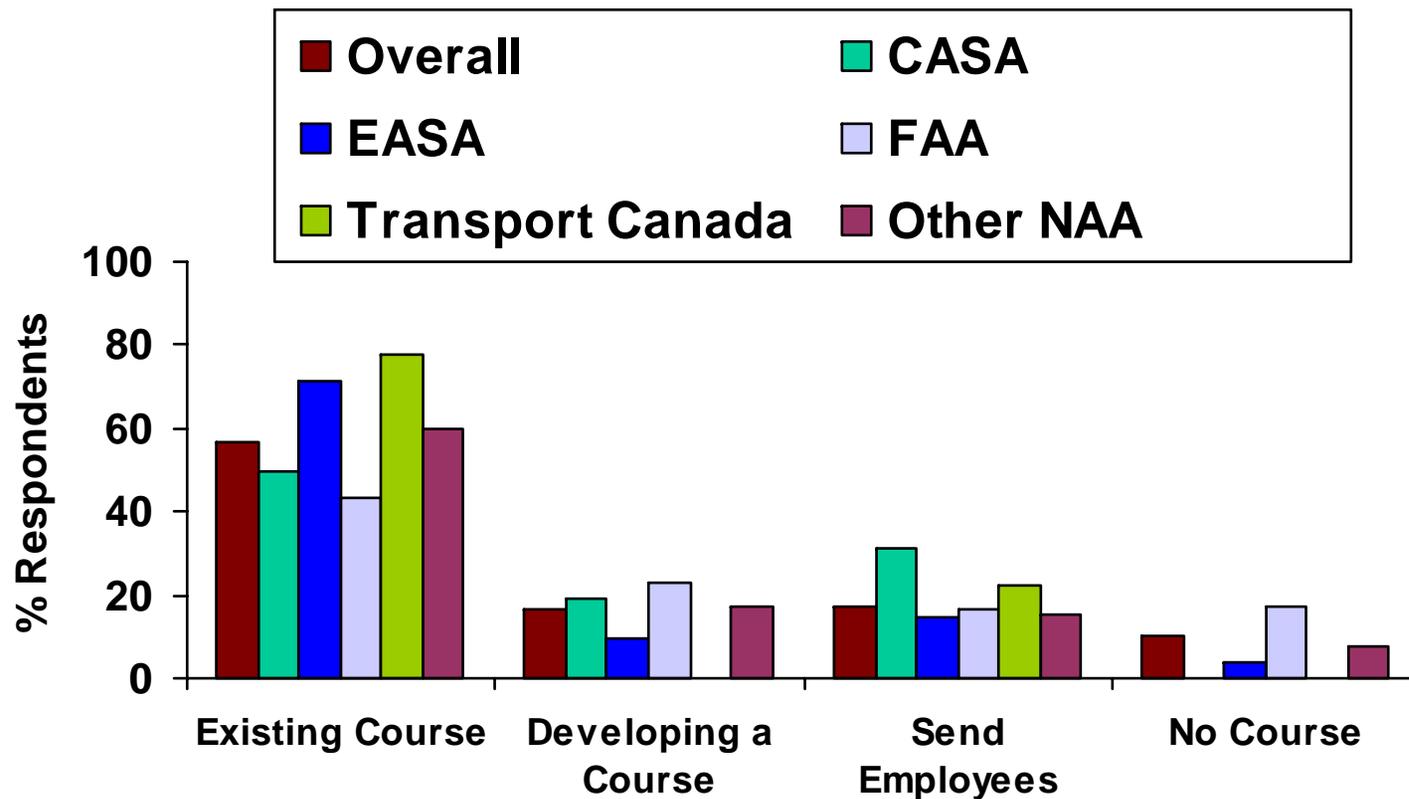


# Fatigue is “Important” but few programs

- ❖ Impact of fatigue was recognized by 82.1%.
- ❖ Fatigue Management System
  - ❖ Overall, 25% have a fatigue management system.
- ❖ Training on Fatigue Management
  - ❖ 35.9% provide training on fatigue management.

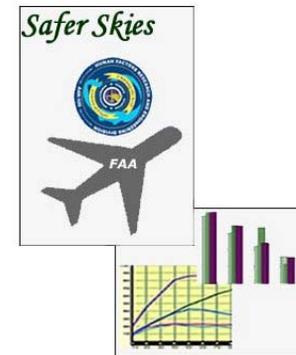


# Transport Canada and EASA have HF Training



# Additional Selected 2006 Activity

- **Web-Based Surveillance and Auditing Tool (WebSAT)**



Analyze Aircraft Maintenance Data  
...Improve Airline Safety

Welcome to Login Screen

Username

Password

[Change Password](#)

[Forgot Password?](#)

- **Revised Training Course for FAA Inspectors**

2 Days  3 Days  
Highly Revised!

# Additional Selected 2006 Activity

- Rewrite of “*Human Factors Guide for Maintenance and Inspection.*”



- Revive “hfskyway.faa.gov”



- AFS Mx Human Factors Plan



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Describe an ideal HF Mx & Ramp Safety Conference

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# Challenges

- **Maintenance HF Regulations: 65, 121, 135,145, 147.**
- **Fatigue R&D? Guidance? Regulation?**
- **Advanced Technologies, VLJs, Rotorcraft, UAVs, Avionics, Commercial Space travel, Aging Aircraft, .....**
- **Ensuring Quality & Safety in all Maintenance Organizations**
- **General Aviation Maintenance HF**
- **SMS in Maintenance**



# Plans (“On the books”)

- *The Human Factors Guide for Aviation Maintenance and Inspection*
- Maintenance of Unmanned Aerial Systems
- Maintenance Implications of Advanced Technologies
- Website: [hfskyway.faa.gov](http://hfskyway.faa.gov)



# More Plans (“On the books”)

- Future of the aviation mechanic/engineer
- Defining qualifications for Aviation HF personnel
- Survey of Human Factors Issues for US FAA Inspectors
- Evolve Flight Standards MX HF Plan to Office of Aviation Safety Plan



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Q&A (Time permitting)

*Thank you*

