Assessing Naval Aviation Maintenance Safety: Error Reporting, Data Management, and Trend Analysis

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Naval Aviation Flight Mishap Rate

FY50-99

776 aircraft destroyed in 1954

23 aircraft destroyed in 1999

Class A Flight Mishaps /100,000 Flight Hours

Angled Carrier Decks
Aviation Safety Center
Naval Aviation Maintenance Program
FRS Concept Initiated
Squadron Safety Program
Designated Aircraft
Engineering & Administrative Controls have Impacted Hardware Reliability, but....

22 Class A FMs in 1999
17 Had Human Error Involvement!
### Human Factors Intervention Strategy Matrix

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Most Mishap Recommendations Fall into Just Two Categories!!!!!!!
### Human Factors Intervention Strategy Matrix

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Most Mishap Recommendations Fall into Just Two Categories!!!!!!!
“We Need to Start Thinking Out of the Box”

Most Mishap Recommendations Fall into Just Two Categories!!!!!!!
Human Factors
Quality Management Board

Watershed Event
Naval Aviation Safety Program (OPNAV 3750)

- Specifies Reporting Requirements (3 W’s)
- Covers Major Mishaps to Minor Hazards: Supervisory, Aircrew, Maintenance, Material, & Facility (Focus ENG & ADM, touches HF Issues)

Naval Safety Center Safety Information Management System (SIMS)

- Relational Database Structured IAW 3750.6Q
- Permits Structured Reports & On-line Queries
Mishap Data Analysis: Reason’s “Swiss Cheese” Model

Organizational Factors

Unsafe Supervision

Unsafe Act Preconditions

Failed or Absent Defenses

HFACS - Human Factors Analysis & Classification System

Mishap
Mishap Data Analysis: Reason’s “Swiss Cheese” Model

HFACS-
Human Factors Analysis & Classification System

Organizational Factors

Unsafe Supervision

Unsafe Act Preconditions

Unsafe Acts

Failed or Absent Defenses

Active Failure

Mishap
Mishap Data Analysis: Reason’s “Swiss Cheese” Model

Organizational Factors
- Latent Condition

Unsafe Supervision
- Unsafe Act Preconditions

Unsafe Acts
- Unsafe Act Preconditions

Failed or Absent Defenses

Latent Condition

Active Failure

HFACS-
Human Factors Analysis & Classification System

Mishap
Mishap Data Analysis Focus:
Naval Aviation Class A FM Causal Factors

Initial emphasis on “Pilot Error”; but to reach goal of cutting human factors mishaps in half the focus.
HFACS-ME Model

ORGANIZATIONAL CLIMATE

- Supervisory Conditions
- Maintainer Conditions
- Working Conditions
- Maintainer Actions
- Maintenance Conditions
- Aircrew Actions

MISHAP/INJURY
HFACS- Maintenance Extension

3 ORDERS
Human Error in Maintenance Related Mishaps (FY 90-97)

- 470 Maintenance Related Mishaps Were Analyzed For Human Errors
- Classification Process Performed by Naval Maintenance Personnel
General Findings

Poor/Non-existent maintenance procedures
Inadequate/Poor Supervision of Maintenance Evolutions
Miscommunication - supervisor to subordinate, pass-down, or shift turnover
Not using, lack of, or outdated Violations - not following policy, procedures, checklists, etc.
HFACS-ME Implementation

- HFACS-ME Adopted for Inclusion in 3750.6R
- Results Influencing the Naval Aviation Maintenance Program Policies (4790.2G)
- Tailored Training Materials for Users
- Data Collection/Analysis Tool Development
- Interim Construction of HFACS-ME Database (training, intervention, & ROI)
Supporting Agencies/Sponsors

Medical Specialties Division
FAA Office of Aviation Medicine

Dr. Barbara Kanki
Crew Factors System Safety Branch
NASA Ames Research Center
Moffett Field, CA

CAPT Jim Frazier MC USN
Aeromedical Division
Naval Safety Center
Questions?