Simple Ways to Recall Human Factors in Maintenance

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13th Annual SAE-PAMA Coastal Empire – IA Renewal
Savannah
March 24, 2007

Agenda – Easy to Recall Information

- Why bother with Human Factors: Data Review
- Put on your HF Spectacles
- PEAR: People-Environment-Action-Resources
- The Operator’s Manual for Human Factors
- Discussion as time permits
World Airline Accidents and Fatalities 1997-2006

US Air Carrier Accident Rates/Targets

Comparison of Air Carrier Fatal Accident Rates/Targets
(Air Carrier includes all Part 121 and Scheduled 135 Carriers)
FY 2007 (as of January)

Baseline = 0.051

Annual - 12 Month Lookback
3 Yr Avg - 36 Month Lookback
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GA Fatal Accidents

COMPARISON of GENERAL AVIATION FATAL ACCIDENTS/TARGETS
(General Aviation includes General Aviation and Unscheduled Part 135)

<table>
<thead>
<tr>
<th>Year</th>
<th>Target (not to exceed)</th>
<th>GA Fatal Accidents</th>
<th>YTD thru January</th>
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<td>1990</td>
<td>133</td>
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<td>2006</td>
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<td>2007</td>
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</table>

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Human Factors #1 Causal Factor

FATAL AIRLINE CRASHES BY ACCIDENT CATEGORY/MAIN CAUSAL FACTOR

Number of accidents

- 11 Human Factors
- 4 Controlled flight into terrain
- 6 Technical/maintenance
- 5 Unknown
- 3 Maintenance

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2007 HF Symposium

Human Factors in Maintenance and Airport Service Safety

September 5-6, 2007
Hyatt Regency Orlando International Airport Hotel
Orlando, Florida, USA
### Events where Maintenance was a Factor

<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Model</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>1979</td>
<td>American Airlines DC-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>Eastern Airlines L1011</td>
<td></td>
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</tr>
<tr>
<td>1988</td>
<td>Aloha Airlines B737</td>
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<td></td>
</tr>
<tr>
<td>1989</td>
<td>United Airlines DC-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>Continental Express FMR120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>Lufthansa A320</td>
<td></td>
<td></td>
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</tbody>
</table>

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### Example Maintenance Error

<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2000</td>
<td>Alaska Airlines</td>
<td>Boeing MD-80</td>
<td>Jackscrew for Elevator Control</td>
</tr>
<tr>
<td>Mar 2001</td>
<td>Lufthansa Airbus A320</td>
<td></td>
<td>Mis-wired side stick</td>
</tr>
<tr>
<td>Apr 2001</td>
<td>Emery Worldwide DC-8</td>
<td></td>
<td>Reversed hyd. check-valve</td>
</tr>
<tr>
<td>Aug 2001</td>
<td>Air Transat A310</td>
<td></td>
<td>Fuel exhaustion over Atlantic</td>
</tr>
<tr>
<td>May 2002</td>
<td>China Airlines B747-200</td>
<td></td>
<td>In flight break-up at 35K Ft.</td>
</tr>
<tr>
<td>Jan 2003</td>
<td>Air Midwest Beech1900D</td>
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<td>Trim Rigging</td>
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<tr>
<td>Aug 2003</td>
<td>Colgan Air Beech 1900D</td>
<td></td>
<td>Trim Rigging</td>
</tr>
<tr>
<td>Jan 2006</td>
<td>Continental B737-500</td>
<td></td>
<td>Engine Run-up</td>
</tr>
<tr>
<td>July 2006</td>
<td>Spectrum Aircraft Spectrum 33</td>
<td></td>
<td>Mis-Rigging</td>
</tr>
</tbody>
</table>
Implications of the 2005-2006 Safety Stats for Mx HF

- There are “opportunities for improvement”
- Maintenance and technical issues are areas of concern
- Technical manuals!!
- Human factors challenges are ever present

Human Factors Goal – Simply Stated

Ensure continuing safety and efficiency by paying attention to issues that affect human performance.
The Disciplines of Human Factors

Agenda – Easy to Recall Information

Why bother with Human Factors: Data Review

Put on your HF Spectacles

PEAR: People-Environment-Action-Resources

The Operator’s Manual for Human Factors

Discussion as time permits
Put on your “Human Factors Spectacles”

The 12 Common Human Errors

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Lack of Communication
Lack of Teamwork
Norms

Lack of Awareness
Lack of Resources
Distraction
Assentiveness
Fatigue
Stress
But first, look at the “Person in the mirror”

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PEOPLE

Physical Factors
- Physical size
- Gender
- Age
- Strength
- Sensory limitations

Psychological Factors
- Workload
- Experience
- Knowledge
- Training
- Attitude
- Mental or emotional state

Physiological Factors
- Nutritional factors
- Health
- Lifestyle
- Fatigue
- Chemical dependency

Psychosocial Factors
- Interpersonal conflicts
- Personal loss
- Financial hardships
- Recent divorce

What does this mean?

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7 days per week  X  24 hours per day  X  365 days per year

FACTORs INFLUENCing PERFORMANCE AND WORK SATISFy
Timing is Everything?

Presentation Time!!

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Types of Fatigue

Acute Fatigue
- Intense
- Short Duration
- Cured with a good night’s sleep

Chronic Fatigue (harder to fix)
- Frequent recurrence
- Long duration
- Slow recovery
- Often a physical sickness or mental stress causing chronic fatigue.
An Excellent Website about Sleep

Regarding sleep: Do what your mama told you.

www.nationalsleepfoundation.org
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Environment

Physical
- Weather
- Location inside/outside
- Workspace
- Shift
- Lighting
- Sound level
- Safety

Organizational
- Personnel
- Supervision
- Labor-management relations
- Pressures
- Crew structure
- Size of company
- Profitability
- Morale
- Corporate culture

Actions

Steps to perform a task
- Sequence of activity
- Number of people involved
- Communication requirements
- Information control requirements

Knowledge requirements
- Skill requirements
- Attitude requirements
- Certification requirements
- Inspection requirements
Actions - What can you do today?

How do you communicate error events?

Are there enough people to do the job?

Do personnel understand the cost of A/C damage?

How can you motivate one another to care more?

Are you responsible for the things that others do?

Resources

- Procedures/work cards
- Technical manuals
- Other people
- Test equipment
- Tools
- Computers/software
- Paperwork/signoffs
- Ground handling equipment
- Work stands and lifts
- Fixtures
- Materials
- Task lighting
- Training
- Quality systems
Please Offer your Example of Resources

- Are resources ever a problem?
- What are the solutions?
- Give an example?
- What advice can you offer?

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The Spectacles

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Spectacles & PEAR

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Introduction

This manual is in response to the industry's request for a simple and manageable list of actions to implement a Maintenance Human Factors (MHF) program. A panel of experts selected the following six topics for such a program to be successful:
Key References for Each Chapter

6.0 Sustaining & Justifying an HF Program

6.0.1 Key References

A. Sustaining & Justifying an HF Program presentation [Download Document]


Spectacles & PEAR

Thank You

You are Invited!

2007 HF Symposium

Human Factors in Maintenance and Airport Service Safety

September 5-6, 2007
Evening “Kick-off” Reception on September 4, 2007
Hyatt Regency Orlando International Airport Hotel
Orlando, Florida, USA

Go to www.airlines.org