

# The Basics of Maintenance Event Investigation

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Little Rock Repair Station Human Factors Seminar  
Little Rock, AK  
April 12, 2007



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## Agenda

- Why is Event Investigation Important
- How to Implement a Event Investigation Program
- How to know the Event Investigation program is working
- Key References
- Discussion as Time Permits

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## 1.0 Event Investigation



*"Jackscrew assembly failure caused by excessive wear resulting from insufficient lubrication... contributing factors included extended lubrication and end-play check intervals, lack of available parts, organizational norms, regulatory oversight issues, etc."*

NTSB AAR-02/01 FINAL REPORT

EVENT INVESTIGATION  
Chapter 1

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## Maintenance-Related Events



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## Maintenance-Related Events



Photo by Julio C. Infante - Aviation Photography Of Miami  
AIRCRAFTERS.NET

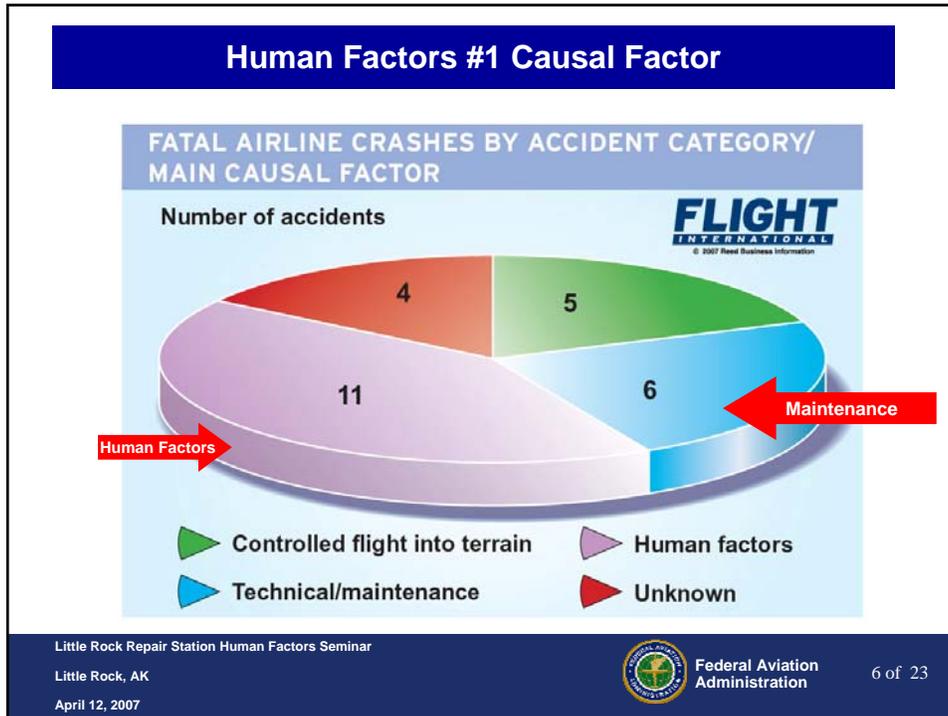
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- ## Maintenance-Caused System Failures as a Contributing Factor to Accidents
- **International Air Transport Association (IATA) Safety Report 2003**
    - **Total of 92 accidents in 2003**
      - 42 Western-built jets
      - 32 Western-built turboprops
      - 7 Eastern-built jets
      - 11 Eastern-built turboprops
    - **Found that in 24 accidents (26%) a maintenance-caused event started the accident chain.**
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### Iceberg Model

The Iceberg Model

Time  
People  
Money

Tools  
Manuals  
Computer

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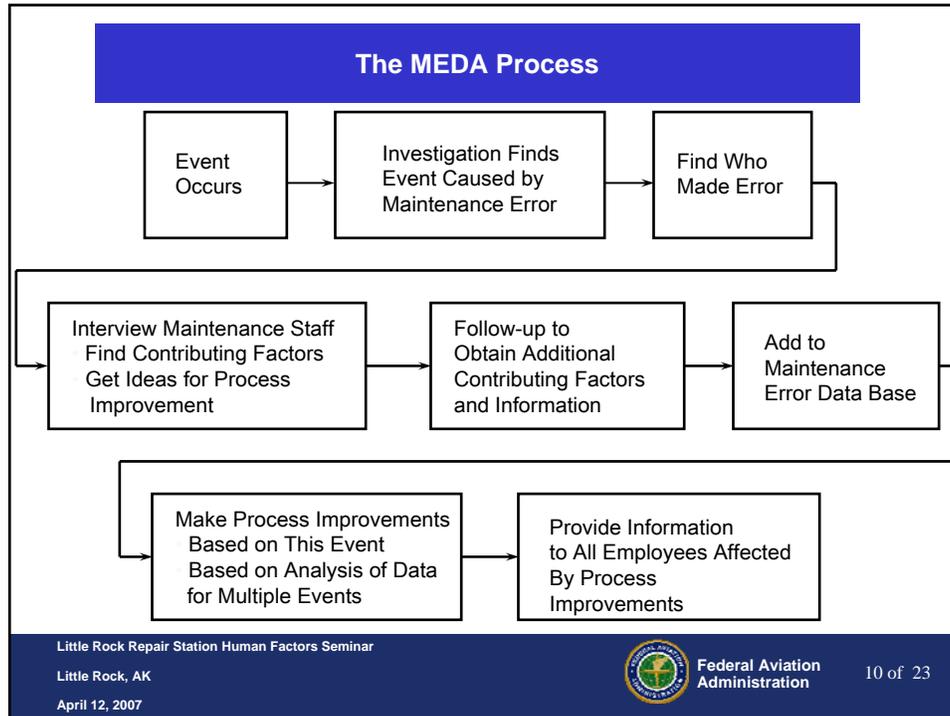
### Traditional Error Investigation Process

(a.k.a., Your system?)

```
graph LR; A[Event Occurs] --> B[Event Caused by Maintenance Error]; B --> C[Find Who Made Error]; C --> D[Punish Mechanic]
```

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### Philosophy of Error Reporting (Boeing-MEDA)

- Staff do not make errors on purpose
- Maintenance errors are made because of a series of related contributing factors
- Most of the contributing factors are part of maintenance organization processes and can be changed

Slide provided by Boeing, Dr. Bill Rankin



## More MEDA Philosophy

- Maintenance program must be viewed as a system, where the mechanic is one part of the system
- Addressing lower level events helps prevent more serious events

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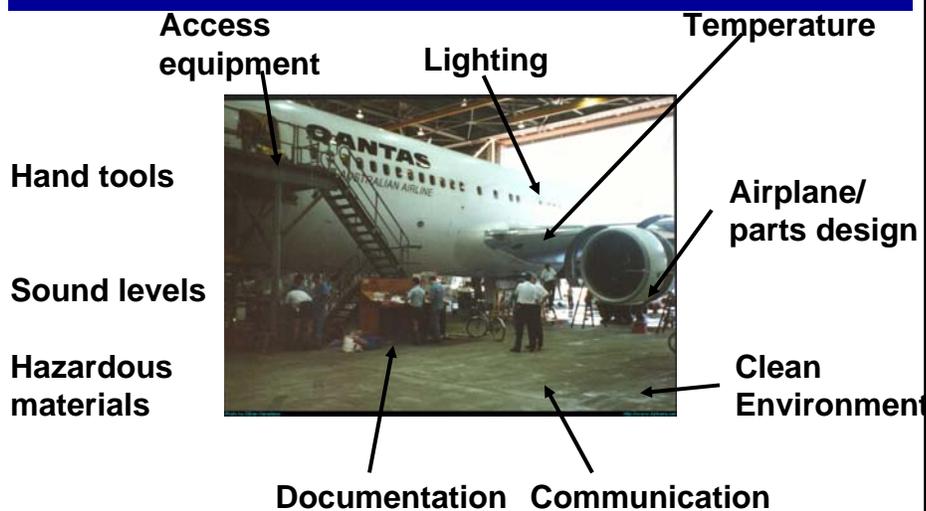
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## Contributing Factors: Anything that affects how a mechanic does his/her job.



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## Event Investigation – Why is it Important

- Event investigation helps manage the risks caused by mechanic or inspector actions.
- Event investigation helps identify and understand multiple contributing factors cause events.
- Knowing and addressing the contributing factors reduces the likelihood of future, similar events.
- Identification of lower level events helps prevent higher level events.



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## Event Investigation - How to implement

- Select a manager/department to be responsible for the process.
- Determine whether the investigations will be carried out in the context of ASAP (Aviation Safety Action Program).
- Cooperative endeavor between labor and management and regulator.
- Select an investigation process.
- Write policies and procedures needed to implement process.
- If necessary, implement a “just” disciplinary policy.

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## Event Investigation - How to implement

- **Select the events to be investigated.**
- **Select and train the event investigators.**
- **Establish a management team to review the investigation findings in order to decide what improvements to make.**
- **Follow up to insure the improvements are being made.**
- **Inform all personnel about the improvements that are being made on the basis of the event investigation findings.**
- **Analyze the findings using risk assessment techniques and trend analysis.**
- **Evolve the system so that personnel report “near events.”**

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## Event Investigation - How to know it is working

- Events are being investigated.
- Contributing factors to errors and to procedural deviations are being uncovered.
- These contributing factors are being corrected.
- The number of events caused by mechanic/inspector performance decreases over time.
- The operator saves time and money.
- Mechanics/inspectors begin to self report "near events."

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## Event Investigation - Key References

- Aviation Safety Action Plan (ASAP) AC 120-66B
- Maintenance Error Decision Aid (MEDA) User's Guide and Results Form
- Ramp Error Decision Aid (REDA) User's Guide and Results Form
- Human Factors Analysis and Classification System—Maintenance Extension (HFACS-ME)



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2007 HF Symposium



19th FAA/ATA International 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

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## Summary

- Event Investigations can be used to understand the causes (contributing factors) to these events and to make improvements to prevent future, similar events.
- M&E organization must implement process by
  - Selecting responsible manager/dept.
  - Writing policies and procedures
  - Implementing "just" discipline policy
  - Training staff
  - Carrying out investigations
  - Making improvements.
- Use the data!



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