Aviation Fire Dynamics

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• Fire is one of the many causes that result in aircraft loss and fatalities.

Figure 1. Safety Perspective - Example Breakout of Some Catastrophic Mishap Causal Factors
• A Boeing study\(^1\) indicates fire is responsible for over 4% of the commercial aircraft accidents/fatalities.

\[\text{Figure 2. Study of Fatal Accidents in Worldwide Commercial Jet Fleet, 1987 – 2004 [1]}\]

(Fire-NF denotes non-impact fire events.)

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• A European study\(^2\) indicates fire is responsible for over 3.2% of accidents/fatalities involving commercial aircraft.

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\(1/22/2019\)

1/22/2019 Why!!!

Why!!!

1/22/2019
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When fire occurred in rotary or fixed-wing aircraft:

- Aircraft Not Lost or Destroyed by Fire: 91%
- Aircraft Lost or Destroyed by Fire: 9%

Of the 9%, Engine APU fire suppression accounted for:
- 14% of suppressed fixed-wing aircraft fires
- 27% of suppressed rotary aircraft fires

Figure 4. USN Fire Mishaps and Incidents: Aircraft Destroyed or Not Destroyed Due to Fire, 1977-1993 [3,4]

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- No significant occurrence of safety-related dry bay fires; no occurrence of safety-related aisle fire explosions

Figure 5. USN Fire Mishaps and Incidents by Aircraft Compartment, 1977-1993 [5]
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• Did you ever wonder what happened to TWA Flight 800 that fatal day in 1996, off of Long Island, New York, and how it can be avoided?
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• How about Air France Flight 4590 outside of Paris, which resulted in the grounding of the Concorde supersonic airliner?

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• Or what can happen if an aircraft suffers a brake fire on landing?
• B-2 bomber crash landed in Guam (2008?)
• Small fire rapidly spread and destroyed the composite airframe.

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FedEx DC10-10F fire, Memphis, Tennessee, 18 December 2003

Aluminum skinned cargo flight
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787 flammable material locations

2. Veiligheidstatistieken luchtvaart 1980-2001, Civil Aviation Safety Data
3. A REVIEW OF THE HISTORY OF FIRE SUPPRESSION ON U.S. DOD AIRCRAFT
   Donald Bein, Naval Air Systems Command (NAVAIR), To be Published

References