FAA
Accident Lessons Learned Course

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Flight Test Safety Workshop
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Lessons Learned From Large Transport Airplane Accidents

-An Overview of 10 Key Accidents-

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Overview

- Purpose
  - Inform flight test safety professionals about the FAA Accident Lessons Learned on-line course
  - Maybe stimulate similar efforts?
- Outline
  - History
  - Safety Challenges
  - Safety Benefits
  - Application to Industry
  - Course Description and Demonstration

History

TWA Flt 800 ('96)
ALA Flt 261 (2000)

http://www.ifairworthy.org/CACPS-Doc/

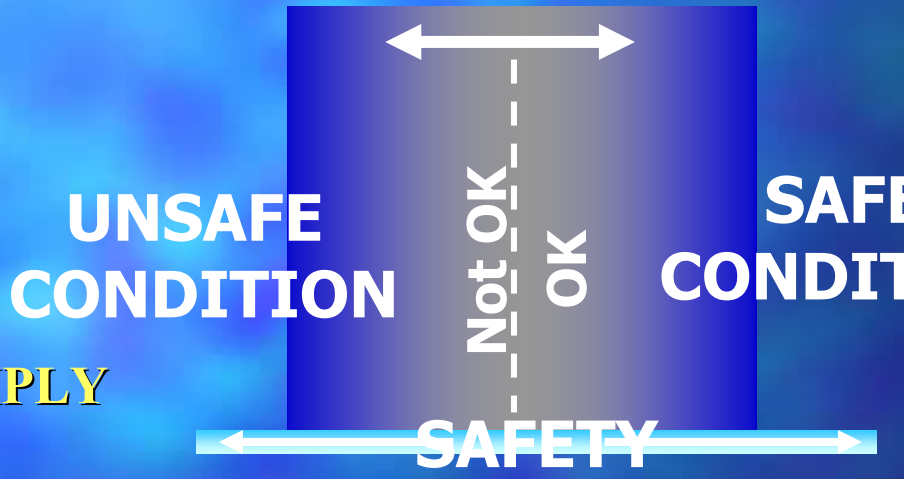
History

- Finding #8 of the CPS Study:

  "Adequate processes do not exist within the FAA or in most segments of the commercial aviation industry to ensure that the lessons learned from specific experience in airplane design, manufacturing, maintenance, and flight operations are captured permanently and made readily available to the aviation industry. The failure to capture and disseminate lessons learned has allowed airplane accidents to occur for causes similar to those of past accidents"

- FAA Course is a first step, but a rather major one
  - Provides method by which inexperienced engineers gain required "baseline" knowledge
  - Provides consistent knowledge within certification workforce
  - Should be used by DERs and delegated organizations to attain/maintain currency and consistency in certification related work

Safety Challenge



- Safety is a continuum (but most safety decisions are digital)
- Our work is often in the "gray" areas
- Where this line is?
- What tools can help us determine it's location?

Safety Challenge

- In the area of aviation safety, we do a pretty good job training/analyzing the elements of "safe condition"
  - Complies with regulations/policies
  - Same as previous program
  - Does not result in accident/incident
  - Satisfies customer needs

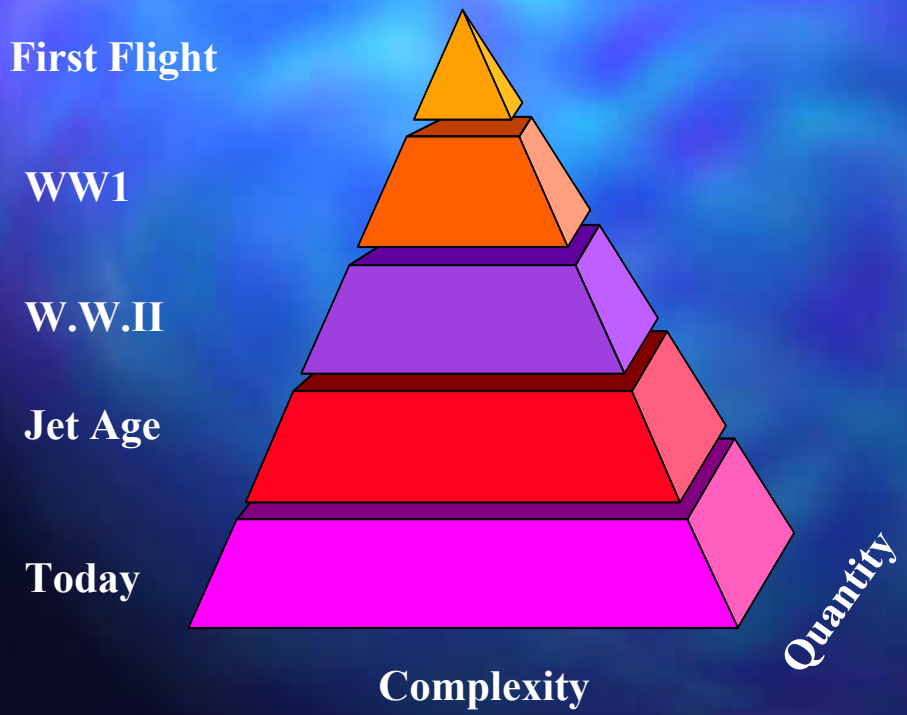
Safety Challenge

- As an industry, we spend far less time training/analyzing elements of "unsafe"
  - Often poorly understood
  - FAR Part 39 uses "unsafe condition" only in relation to ADs
  - Many times only discovered after an accident
    - Only "need to know" basis during accident investigation
    - Can be extremely time consuming process
    - Often painful to focus on

Safety Challenge

- In order to help understand where the safety "decision line" lies we need to understand the elements of both *safe* condition and *unsafe* condition
  - Having knowledge of lessons learned helps us understand past unsafe conditions and helps to avoid future repeats

Safety Challenge



- The dynamic nature of the information
  - "Lessons Learned" and "corporate knowledge" continuously growing (geometrically)
  - Turnover in key personnel make "corporate knowledge" difficult to retain
  - Challenges of new technology
    - No service history
    - Unknown human factors effects
    - Hard for regulations to keep up

Safety Challenge

- The “Lessons Learned" of all aviation safety information now transcends several generations
  - It is getting harder for comprehensive knowledge to be exchanged from experienced individuals to the next generation through OJT alone

Safety Challenge

- A more rigorous approach to “Lessons Learned" training is needed
  - Training is easier and more cost effective with modern information management tools that now exist such as the internet.
  - A Comprehensive “Accident Lessons Learned" database does not exist, either within government, or industry
    - You can “mine” databases such as NTSB, but they do not call out lessons learned.

Safety Challenge

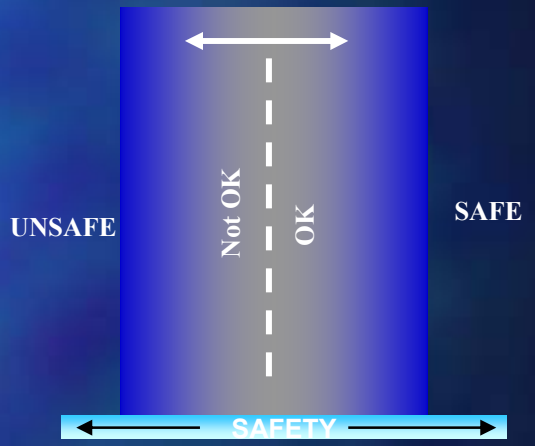
- The workforce, including managers and senior engineers, is generally unfamiliar with, and in many cases unaware of, the majority of historical transport airplane accidents, and their significance.
- Within the industry, there are “pockets” of high familiarity with accidents, but generally, overall knowledge is low

Safety Benefits

- Areas benefiting from aviation safety "Lessons Learned" include:
  - SAFETY OVERSIGHT of in-service products
  - DESIGN AND CERTIFICATION of current and future products
  - REGULATION AND POLICY development
  - TRAINING for any safety related positions

Safety Benefits

- In the area of *safety oversight*, safety managers required to "make the call" will be better prepared to understand the "gray area" by understanding more about the unsafe area



Safety Benefits

- In the area of *design and certification* of products, expanded "Lessons Learned" knowledge will result in:
  - Better understanding of the regulations that resulted from the accidents
  - More consistent application of the regulations by knowing why a regulation exists
  - Better direction to changes the requirements (e.g., new rules, special conditions, equivalent safety findings, etc.) by knowing why the existing regulations are in place

Safety Benefits

- In the area of *training* of personnel in safety related jobs, expanded “Lessons Learned" knowledge will result in:
  - Better understanding of past unsafe conditions in case they are seen again
  - Better ability to see ‘trends’ in unsafe conditions

Application to Industry

- Certain critical mistakes or omissions can be linked, in part, to poor awareness of intent of the technical requirements and where they originated.
- Error corrections can be very expensive and time consuming, in addition to added risk.
  - Lost confidence, sales, wasted resources

Application to Industry

- Lessons Learned awareness should exist at every level in the industry, particularly among designees
- Managers and senior engineers have a duty to impart lessons learned information to less senior personnel
- Technical workforce expected to train designees
  - Do they have the information to do this?
- The FAA training course is a start, but in the area of transport airplane safety, there are at least 50-75 significant accidents which should be a part of everyone's "working knowledge"

Vision for Industry

- Workforce with greater understanding of the intent and "why" of the requirements
- Enhanced "airplane level awareness"
- Fewer compliance and safety escapes
- An infrastructure that continues the Lessons Learned mining and training process
- Useful to ALL parts of the aviation industry (e.g. military)

Accident Inventory (in flux)

2005 (complete)	2006	2007	2008	2009
Chicago DC-10	Los Angeles 727	KAL 747 (Stansted)	Mt Berrymore 727	747 Nairobi (LE flaps)
Albuquerque DC-10	Air Florida 737	Mt. Erebus DC-10	Eastern L-1011 (Miami)	DC-8 Portland
Paris DC-10	757 Cali	Cranbrook 737	PSA 727 (San Diego)	TACA Panama
Sioux City DC-10	Lauda 767	UAL 747 (Hawaii)	Elkton 707	SAAB 340 inflight Beta
Salt lake City 727	Roselawn ATR-72	Value Jet DC-9	Madrid 747	AAL 587 (If report out)
Aloha 737	Dan-Air 707 (and Taiwan 737)	Manchester 737	Taiwan and Amsterdam 747 struts	757 (multiple) static ports
Swissair DC-10	USAir 427 and UAL585	Concorde (Paris)	BOAC Comet (3)	A320 (Bangalore)
Alaska 261	Strasbourg A320	British Midland 737	DC-10 LAX Brakes	A320 (Airshow)
Japan Airlines 747	TACA 737 and Southern 252	China Airlines 747	USAir 767 Rotor Burst	Embraer 120 (Senator Tower)
TWA 800	Lockheed Electra	Delta L1011	SwissAir MD-83	Pensacola MD-80

FAA Accident Lessons Learned Course

- Each accident has the following format:
  - Overview and detailed summary
  - Accident board findings and recommendations
  - Discussions of:
    - Unsafe conditions
    - Design and safety assumptions
    - Accident precursors
    - ADs issued
    - Lessons Learned
    - Final thoughts
  - Training format (will be removed in future)

FAA Accident Lessons Learned Course

DEMO:

Alaska Flt 261, 2000

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Questions ?

- http://faalessons.workforceconnect.org/

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