

Widespread Fatigue Damage Public Meeting

Draft Final Rule & Regulatory Evaluation

December 11, 2008



Federal Aviation
Administration



Why are we here?

The purpose of this meeting is to allow public comment on the information contained in the technical document posted to the WFD rulemaking docket



Agenda

- **Opening Remarks**
- **Introduction of FAA Panel**
- **FAA Presentations**
 - Overview of Draft Final Rule
 - Overview of Draft Regulatory Evaluation
 - Questions and Answers
- **Audience Presentations or Comments**
- **Questions and Answers**
- **Closing Remarks**



Meeting Ground Rules

- **When speaking, please identify yourself and your industry association or affiliation**
- **We cannot discuss whether or how the draft final rule will be modified to address the comments received today**
- **We can address requests for clarification of the points being made, but cannot address requests to revise the draft final rule**
- **When asking questions, please wait until the end of the presentations**



Widespread fatigue damage (WFD) is age-related structural fatigue cracking

- Damage can appear at multiple sites
- Cracking cannot be reliably detected
- Undetectable cracks “link up” and grow rapidly together

WFD is inevitable

Overview of WFD Rulemaking Initiative

- **Recommendations of the 2001 and 2003 Aviation Rulemaking Advisory Committee**
- **Notice of proposed rulemaking (NPRM) for WFD**
- **Changes made since WFD NPRM**
- **Current draft final rule**



2001 ARAC Recommendation

- **FAA should issue an operational rule requiring operators to incorporate:**
 - A “structural maintenance program” into their maintenance programs with a “limit of validity” (LOV) for the structural maintenance program
 - If extended service is needed, a revised structural maintenance program with a revised LOV in order to continue safe operation
 - A program to address existing and new repairs and alterations



2003 ARAC Recommendation

- **FAA should issue a revision to § 25.571 and Appendix H of Part 25 requiring applicants to:**
 - Show that the airplane will be free from WFD up to the “limit of validity” (LOV) of the maintenance program
 - Incorporate the LOV into the Airworthiness Limitations section of the Instructions for Continued Airworthiness (ICA)



WFD NPRM

The WFD NPRM was published on April 18, 2006. Its purpose was to preclude catastrophic failure due to WFD.

- **DAH requirements**

- Establish an initial operational limit, stated as a number of total accumulated flight cycles or flight hours or both, by 12/18/07
- Evaluate certain existing and future repairs and alterations for WFD
- Develop guidelines for repairs and alterations
- Establish an extended operational limit (optional)

- **Operator requirements**

- Incorporate initial operational limit into maintenance program by 6/18/08
- Incorporate extended operational limit into maintenance program (optional)



Changes Since WFD NPRM

- **Term “initial operational limit” replaced with “limit of validity of the engineering data that supports the maintenance program” (LOV)**
- **Applicability revised**
 - Draft final rule applies to transport category, turbine powered airplanes with a maximum takeoff gross weight greater than 75,000 lbs. and a type certificate issued after 1/1/1958
 - Airplanes have been added to the exclusion list
- **Requirements for repairs and alterations eliminated**



Changes Since NPRM (cont.)

- **Requirement for establishing LOV and LOV extensions clarified**
 - NPRM: Determine when WFD is likely to occur
 - Final rule: Show freedom from WFD up to LOV
- **Design approval holder and operator compliance dates extended**
 - Dates based on age/risk (oldest first)
- **Default LOVs added**



Draft WFD Final Rule

- **Requires design approval holders and applicants to establish a limit of validity (LOV), stated as a number of total accumulated flight cycles or flight hours or both:**
 - For existing airplanes: applies to transport category airplanes with a maximum takeoff gross weight over 75,000 lbs. (part 26)
 - For future airplanes: applies to all transport category airplanes (part 25)
- **Requires operators to incorporate LOVs into their maintenance programs**
 - For existing airplanes: applies to parts 121 and 129
 - For future airplanes: applies to all transport category airplanes
- **Permits extension of LOV**



Overview of Draft Final Regulatory Evaluation

- **Industry comments about the NPRM resulted in significant rule changes**
- **Since the NPRM regulatory evaluation, industry has aggressively retired older airplanes, thus reducing the size of affected fleet**
- **Design approval holders now are in voluntary compliance**

The above changes result in substantially lower operator costs and the draft final regulatory evaluation reflects these changes. Note this analysis is based on flight cycles, not flight hours.



Changes to Regulatory Evaluation

Costs and benefits declined from NPRM to draft final rule (benefits > costs)

NPRM	Draft Final Rule
Assumed Initial Operational Limit = Design Service Goal (DSG)	Assumed Limit of Validity = 30% - 180% over DSG
Included repairs and alterations	Eliminates repairs and alterations requirements
Required compliance within 18 months	Extends compliance time
Assumed 27 airplanes retired in 1 st year	Assumes 1 airplane retired in 1 st year
Assumed 1,016 airplanes affected in 20-year analysis interval	Assumes 2 airplanes retired in 20-year analysis interval



DSGs and Anticipated LOVs

Airplane Type	Fleet Leader	DSG	LOV
Airbus A300 (B4-100)	40,000 Flt cycles	40,000 Flt cycles	57,000 Flt cycles
Airbus A310-200	29,000 Flt cycles 79,000 Flt hours	40,000 Flt cycles 60,000 Flt hours	45,000 Flt cycles 105,000 Flt hours
Airbus A320-100	39,000 Flt cycles	48,000 Flt cycles	48,000 Flt cycles Extension in review
Boeing 727	80,000 Flt cycles	60,000 Flt cycles	100,000 Flt cycles
Boeing 737 Classics	92,000 Flt cycles	75,000 Flt cycles	100,000 Flt cycles
Boeing 747 Classics	37,000 Flt cycles	20,000 Flt cycles	35,000 Flt cycles
Boeing 757	47,000 Flt cycles	50,000 Flt cycles	75,000 Flt cycles
Boeing 767	50,000 Flt cycles	50,000 Flt cycles	75,000 Flt cycles
DC-9	105,000 Flt cycles	40,000 Flt cycles	110,000 Flt cycles
MD-80	55,000 Flt cycles	50,000 Flt cycles	110,000 Flt cycles
DC-10	46,000 Flt cycles	42,000 Flt cycles	60,000 Flt cycles
MD-11	13,000 Flt cycles 71,000 Flt hours	20,000 Flt cycles 60,000 Flt hours	30,000 Flt cycles Flight hours in review



Number of Affected Airplanes

**January 2008 US Operator Fleet
DSG & LOV Status
(Does Not Include Airbus Airplanes)**

	Passenger	Cargo	Total
Number of Airplanes	3,626	712	4,338
Airplanes over DSG	3	45	48
Airplanes over LOV	0	1	1
Airplanes over 90% of LOV	2	1	3
Airplanes over 80% of LOV	2	3	5
Airplanes over 75% of LOV	2	8	10



Estimated Cost Assumptions

- **DAHs' costs are \$0**
 - Airbus: in compliance
 - Boeing: minimal cost
 - Lockheed: minimal cost
- **Operators' costs are \$4 Million**
 - We assume no LOV extensions
 - At LOV we estimate the full loss of retiring an airplane
 - Based on flight cycles, we assume only 2 airplanes are retired
 - There are no repairs and alterations expenses
 - Maintenance actions would be required with or without rule
 - Maintenance actions based on rule would be planned – less expensive
 - Maintenance actions based on in-service findings would be done on emergency basis – more expensive



Estimated Costs Summary (Present Value)

	NPRM (Millions)	Draft Final Rule (Millions)
DAH	\$36	\$0
Operator – Maintenance Program	\$164	\$0
Operator – Retirement	\$160	\$4
Total	\$360	\$4

Benefits

Rule represents \$12.9M in benefits with a present value of \$7.2M

- Near elimination of emergency ADs
- Avoidance of 1.5 days of out-of-service downtime for each airplane
(In 10 of the 15 emergency ADs issued for WFD so far, we identified 2,356 affected airplanes. Each of these airplanes lost an average of 1.5 days of service. This rule will prevent such emergency maintenance downtime.)
- Potential accident avoidance - current maintenance programs have missed WFD
- Without rule, 2 airplanes would fly beyond LOV



Summary

- **Changes from the NPRM to the draft final rule and changes to assumptions about airplane retirement are reflected in substantially lower costs and benefits**
- **Present value costs fell from \$360 million to \$4 million**
- **Improved maintenance programs will result in less out-of-service costs**
- **Benefits > Costs**

