Public Comment Table

Draft AC 91-82A – Fatigue Management Programs

#	Company or Group	Page and Paragraph	Comment	Rationale	Recommendation	Disposition
1.	INDIVIDUAL Steve Swift	General	Promise Could the Advisory Circular increase its appeal by more clearly promising, like other ACs, the reward of approval to those who follow it? And, which approvals?			Non-concur. No action required. The AC clearly states in the purpose, paragraph 1, that the AC is guidance only. The FAA cannot "promise" in an AC that if it is followed the FAA will automatically approve it. FMPs can be complex documents and each one is different. Therefore, it would be impossible for the FAA to propose such blanket approvals. The normal approval process requires FAA and applicant discussions to determine what they need to do to follow the guidance and thus gain approval. Paragraph 11 covers this in great detail, especially 11c.
2.	INDIVIDUAL Steve Swift	General	Application Will this be the standard for corrective actions for unsafe fatigue conditions for future FAA ADs?			Partially concur. No action required. The FAA intends to use this AC as the standard when addressing unsafe fatigue conditions. However, the FAA always determines what the proper corrective action is and acts accordingly. There may be situations where a full FMP per this AC is overkill, so the FAA may determine a simple action is all that is needed. Also, there may be situations when the FAA determines an existing FMP needs to be adjusted, but not to the full extent for all the FMP elements described in this AC.

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3.	INDIVIDUAL Steve Swift	General	Duplication Could the AC be shorter and clearer if there were more references and less duplication of material from Airworthiness Standards and other Advisory Circulars?			Non-concur. No action required. When the FAA wrote this AC (both the original version and this revision) we decided to include certain technical aspects to aid developing an FMP to address a demonstrated risk. (Paragraph 9 contains the preponderance of technical guidance.) Other guidance addresses how to comply with fatigue related certification criteria for new type designs. That guidance explains how to address potential fatigue cracking rather than in-service findings. No single reference contains all the aspects needed to develop an FMP to address a demonstrated risk, so we decided to pull all those aspects together in the AC. Having all the pertinent information in one AC makes this AC useful and clearer. The FAA believes that having references to other documents throughout the AC would not make it clearer, but rather make it more difficult to understand and use. We did use appendices to include technical information without cluttering the body of the AC.
4.	INDIVIDUAL Steve Swift	General	Conflict How do these terms in the AC: ●'demonstrated risk' ●'catastrophic failure'... ...relate to these criteria for an AD in FAR 39.5? ●unsafe condition' ●'exists' ●'is likely to exist or develop' Could it confuse and potentially conflict if an AC defines and uses different terms to the rule for which it is a means of compliance?			Non-concur. No action required. The FAA disagrees with the commenter's premise that this AC could confuse and potentially conflict with terms used in part 39. The definitions in the AC clearly explain "unsafe condition" and "demonstrated risk" within the context of part 39. The AC's definitions and various passages provide clear guidance to enable a straightforward determination when addressing a fatigue related concern. Appendix 2.3 provides detailed guidance regarding the delineation between an unsafe condition and a demonstrated risk of catastrophic failure due to fatigue. The FAA has no definition of "unsafe condition." The definition in the AC is "for the purposes of this AC" and provides clarity for someone trying to determine if a fatigue cracking situation is an unsafe condition. Further, in the AC's definition of "demonstrated risk" it clarifies that it is an "unsafe condition and likely to exist or develop in other airplanes of the same or similar type design."

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5.	INDIVIDUAL Steve Swift	General	Style Why does the AC not use the Q&A style the FAA promotes on its web site? FAR 39 and AC 23-13A are good examples.			Non-concur. No action required. When the FAA started writing the original version of this AC, we deliberately decided to use the classical format rather than the Q&A format. Because of the AC's complexity, using the classical format was the more straightforward writing approach. To reconfigure this revision of the AC to a Q&A format would require immense additional effort and delay its release to the public with little or no value added.
6.	INDIVIDUAL Steve Swift	General	Service history based inspections Is the term meaningful enough? The AC says what they are *not*. But, is what they *are* clear enough to be enforceable? As you know, Eastin and I argued in *Rough Diamond* that *all* the elements of damage tolerance are essential to assure an inspection's effectiveness. If not checked directly, as part of a damage tolerance evaluation, the only indirect check is a long service history of finding only sub-critical cracks. But, the AC seems to permit service history based inspections where there is not yet a history of cracking. How does that work?		I would prefer you drop 'service history based inspections' as a special term and instead encourage using crack forensics, if available, even if crude, for a damage tolerance evaluation.	Non-concur. No action required. While the FAA understands the commenter's position, we recognize that requiring a damage tolerance assessment (DTA) based inspection program for other structure is unrealistic in some situations (especially for small airplanes with little or no OEM support.) Therefore, we believe that "service history based inspections" is an appropriate term and an acceptable approach for proactive vigilance for additional fatigue related problems. The primary objective of the AC is to encourage applicants to inspect other potential critical locations regularly. These are defined in paragraph 10d(4). In addition to help provide guidance for developing a good service history based inspection program, we list in paragraph 10d(3) what consists of a good service history review. We do explain in 10a(2)(a) and 10d(2) that service history based inspections do not provide as high a level of safety as DTA based inspections. If there is service history evidence that allows for "crack forensics," that may provide the information to determine that a demonstrated risk is present. We explain this in Appendix 2.
7.	AIRBUS	§4f	The definition of *fatigue critical structure* should be brought in line with FAR26.41.	Fatigue critical structure is defined in FAR26	The definition of fatigue critical structure should be brought in line with FAR26.41. There should also be made a reference to FAR26.43b1 to use the defined and published FCBS list for those transport category aircraft that have to comply with FAR26.43.	Non-concur. No action required. Maintain current definition of fatigue critical structure. This definition aligns with other existing AC definitions (AC 120-93, AC 25.571-1D) and is consistent with Appendix 4 of 25.571-1D.

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8.	CESSNA AIRCRAFT	Page 4 j. Residual Strength. The capability of structure to carry static load with fatigue damage present.	To avoid modifying the broader meaning of the term, Cessna suggests that it is sufficient to say "with damage present" without the qualifier "fatigue" with the understanding, of course, that this AC is directed at fatigue related failures.			Partially Concur. The definition will be adjusted to clarify that *for the purpose of this AC*, the intent is to address only fatigue damage. Accidental and environmental damage are not typically addressed via a directed inspection identified in the Airworthiness Limitations Section (ALS). This type of damage is more appropriately evaluated under the ATA Maintenance Steering Group process MSG-3 and incorporated into the Instructions for Continued Airworthiness (ICA) by way of a maintenance planning document (MPD).
9.	AIRBUS	§8 Page 7	This paragraph requires that for aircraft that have experienced a demonstrated risk, any replacement or modified structure should comply with the latest fatigue or damage tolerance requirements because it will materially contribute to the product level of safety is a requirement in itself, not an acceptable means of compliance. Airbus does not agree with this.	It is not in line with the general requirements published in Part 21.101b how to designate applicable requirements for changes to Type Certificate.	The correct text is stated in the current AC 91-82 §10.a.1.a that "*Any part replacement/modification program should demonstrate compliance to the applicable regulations. This includes any subsequent inspection requirements*." Applicable is to be interpreted as the ones applicable for the Type Design as listed in the certification basis. Please reintroduce this text.	Non-concur. We have maintained the noted text in the current revision of the AC, paragraph 10b. We added the referenced text to paragraph 8 to specifically address concerns with 14CFR part 21.101, without evoking a protracted discussion of significant or non-significant associated to the project classification. This is an AC and is presented as a means of compliance. The guidance in the AC for type designs that do not have a fatigue certification basis is that they "*should*" comply with the latest fatigue rules, not "*must.*" This is consistent with intent of the noted text in paragraph 10b which states that "the modification program should demonstrate compliance to the applicable regulations." Further, for those type designs that have fatigue as a part of the certification basis compliance, they "*must*" comply with the existing certification basis, not "*should*" comply as the AC currently states. We changed paragraph 8 accordingly.
10.	CESSNA AIRCRAFT	Page 18 10.b.(6)	The applicant is encouraged to do a fracture-based crack growth analysis to set the inspections (as is appropriate). However, there are several instances in the draft AC where it is implied that a classic fatigue analysis will also suffice. Cessna suggests that further discussion on how this type of analysis might be used would be helpful. It is mentioned that a 1-in-1000 probability might be acceptable to define the scatter factors used for the threshold inspection, but little is presented on recurring inspections.			Partially concur. We believe paragraph 9(c)(1) may confuse readers into thinking classic fatigue methods may be used to develop damage tolerance inspection programs. This was not our intent. Classic fatigue may be used to establish inspection thresholds as described in paragraph 10(b)(6)(a) and (b). Fatigue should not be used to determine repeat inspection thresholds. We have reworded 9(c)(1) to match our intent.

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11.	AIRBUS	§10.b.8 Page 19	Wording used in this paragraph is not clear: Rather than utilize current certification DT requirements, adjustment to those requirements are likely necessary.	Airbus does not agree with this statement if it means that the CS25.571 amendment level to be applied to address a demonstrated risk is different as the one that has been used to certify the complete aircraft. If the aircraft has been originally certified including DT principles, there would be no need to apply any later DT requirement. If this is the intent, it would mean that major portions of the aircraft including other fatigue critical structure might need to be recertified with a requirement that is not part of the original certification basis.	We suggest to remove the text that is covered by above reintroduced text related to §8	Concur. For clarification we revised paragraph 10b8 to read as follows: **(8)** Criteria for Developing a Damage Tolerance Based Inspection Program. When a demonstrated risk is identified in a type design, the criteria used for developing an inspection program need to be tailored to the demonstrated risk being considered. These criteria may deviate from the criteria specified in the certification basis for that type design. This is because at the time of certification, criteria apply to potential fatigue not yet realized in service and its probability of occurrence should be relatively low when the inspections start. This is not the case for a demonstrated risk. Therefore, the applicant should work with the FAA to establish tailored criteria appropriate for the demonstrated risk being addressed. Items to address include, but are not limited to, the residual strength that must be assured, inspection threshold methodology, establishment of the inspection interval, and inspection POD.
12.	AIRBUS	§10.b Page 15	No reference is made to MSG-3.	MSG-3 is an industrial process, which is recognized by the FAA (and other aviation Authorities) as an acceptable means for the development of maintenance/inspection programs. It should be considered therefore as the standard approach, and only where an applicant does not elect the MSG-3 process, the guidance of this AC should be used for the development of DT inspection programs	Therefore it is proposed to add the following wording: *"MSG-3 provides an acceptable means for the development of an effective and applicable inspection program. Only if the MSG-3 approach is not selected the follow-on explanation of this paragraph can be used as a guide for the inspection program development."*	Non-concur. No action required. We recognize that MSG-3 is one industry process recognized by the FAA and industry. This AC is another means to provide operators assistance who have no experience or knowledge on how to develop a Damage Tolerance Based Inspection Program. Referencing MSG-3 in this AC would not add any value.

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13.	AIRBUS	All 10a.1 – pg 14 10.d – pg 21	Along the AC, wording of FMP is confused with other existing maintenance programs	Use of wording FMP: the definition links an FMP to a demonstrated risk when an unsafe condition due to fatigue exists. Along the AC, wording of FMP is confused with other existing maintenance programs. For instance: - §10 a.1.d refers to an existing FMP as component life limits, life extending modifications or SIP. These examples are not to be considered as FMP as they do not address a demonstrated risk for an unsafe condition. - §10.d states ....*If the affected Type Design has an FMP with DT based inspections, these inspections should be reviewed for necessary revisions....* FMP should not be confused with existing maintenance programs that are part of the ICA addressing fatigue/accidental damage/ corrosion	It is suggested to verify the complete AC for consistent use of the wording FMP	Concur. We changed several areas of the AC to address the comment. There was inconsistency in how we referred to FMPs. The primary intent of the AC is to provide guidance for developing an FMP to address a demonstrated risk of catastrophic failure. However, the AC does refer to FMPs that have been developed for other reasons, including as part of the type design's original certification. Because of this potential confusion regarding the purpose of this AC, we changed the title of the AC so that it is clear that the AC is for FMPs for in-service issues. We also shortened the definition such that it now refers to FMPs broadly, and not just those addressing a demonstrated risk. We also added clarifying words in several locations that delineate between an existing FMP and one that is developed to address a demonstrated risk. These minor changes are in 1a, 9c, 10a, 10a(1)(d)(i)/(ii)/(iii), 10d, 10d(2), 10e, and 11a. In addition, we clarified the intent of the AC with added text in the Background paragraph, 7.
14.	AIRBUS	Appendix 2	Appendix 2 "Investigation of in-service findings" is too specific and too detailed for the purpose of this AC, and it does not fit within the scope of the AC.	The AC is supposed to provide guidance on developing and implementing a FMP. When establishing a FMP, the investigation has already been performed and the conclusions of this investigation confirm that a demonstrated risk needs to be addressed by a FMP.	Therefore we suggest to delete the Appendix 2	Non-concur. No action required. The FAA specifically included the information contained in Appendix 2 to assist FAA and applicants with determining if an in-service finding is an unsafe condition that may require an FMP. Paragraph 9b explains how the FAA does this. Determining if a finding is an unsafe condition, and the determining how to correct that unsafe condition is a critical aspect of continued operational safety. Guidance to help determine the most appropriate corrective action is always helpful.

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15.	DASSAULT-AVIATION	Appendix 4§1	DASSAULT comment about Appendix 4§2 a. apply also to §1: Referring to figure 4-1with the following coefficients: -A limit a validity of the inspection as being the fatigue safe-life duration of the structure MLP detail said N divided by a factor not less than 2; -An inspection threshold as being $N_S = N_{det}+L$ divided by a factor not less than 3 -An inspection interval as being $L = (N_S - N_{det})$ divided by a factor not less than 3			Non-concur. No action required. The first Dassault recommendation is not applicable because there is no "period of applicability" needed for single load path structure. The second is not applicable because Appendix 4 does not include guidance for setting inspection thresholds. Establishing thresholds is discussed in the main body of the AC in 10b6. The third recommendation suggests that a larger factor should be used for establishing inspection intervals for single load path structure than has been generally accepted. Consistent with FAA philosophy minimum expected standards are noted. Applicants can always exceed minimum expectations.
16.	CESSNA AIRCRAFT	Page A4-1 …The applicant may determine that a simple analysis using conservative assumptions and scatter factors produces an acceptable inspection interval.	The referenced sentence is contained within a paragraph (and appendix) that is entirely about crack growth. However, this single sentence seems to refer to a classic fatigue analysis using scatter factors.		It might clarify things to address separately how a conventional fatigue analysis (of damage accumulation) could be used to define the inspection intervals (if that is accepted as an approach).	Concur. We changed the text in the opening paragraph of Appendix 4 to read as follows: "The applicant may determine that a simple *damage tolerance* analysis using conservative assumptions and *inspection safety factors* produces an acceptable inspection interval." We also made it clearer that the appendix's intention is to provide guidance for a more detailed analysis. We broke up the opening paragraph into two paragraphs and changed the wording slightly to clarify the guidance. We also made consistent use of the inspection safety factor, K_1. We added the subscript to K on page A4-1, subparagraph 1.

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17.	DASSAULT-AVIATION	Appendix 4 § 2. a. (i), (ii), (iii) and b	DASSAULT AVIATION suggest to use: -A limit a validity of the inspection as being the fatigue safe-life duration of the structure MLP detail said N divided by a factor not less than 2; -An inspection threshold as being $N_S = N_F + L_S$ divided by a factor not less than 3 -An inspection interval as being $L_S = (N_S - N_F)$ divided by a factor not less than 2.			Non-concur. No action required. The first suggestion is applicable to establishing a "period of applicability" for the inspection interval established for a multiple load path structure when the total crack growth life is a function of the residual life of the structure after a load path failure. For this case, there will be a "period of applicability" beyond which the inspection interval will be unconservative because the residual life is inversely proportional to the time at which the load path failure occurs (denoted N_F in the AC). Dassault suggests that the period of applicability should be the "fatigue safe-life duration" divided by a factor of not less than 2. The FAA non-concurs. The period of applicability should be a function of the time to load path failure and the factor should depend on whether the evaluation is by test or analysis and, if by analysis, the supporting assumptions. The second Dassault suggestion is not applicable because Appendix 4 does not include any guidance for setting inspection thresholds. Dassault's third suggestion is consistent with the existing guidance for determining the inspection interval from L_S which is provided in the AC in Appendix 4 section 2a(i), (ii) and (iii) except for the expectation on the factor to be applied. The FAA determined that it is more appropriate to keep it stated as "2.0 or greater" rather than "not less than 2" as suggested because in some cases a factor of greater than 2.0 may be appropriate. The third suggestion is not correct for Appendix 4 section 2b since the interval here is based on the life in the primary load path (L_P) and secondary load path (L_S) combined.
18.	NTSB Crookshanks	General	I like the inclusion of provisions to examine other fatigue critical structure in an FMP not just the unsafe condition.			Concur. No action required.

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19.	NTSB Crookshanks	Section 5 page 4	For applicability, section 5, why is it only primary and restricted category? What about all the other categories?			Non-concur. No action required. All categories are covered in the applicability. Parts 23 and 25, and their predecessor regulations, are specified with the first two bullets. Since primary and restricted categories are addressed only in part 21, and can have a certification basis of mixed requirements, it is appropriate to include those categories with a separate bullet.