Comment Response Document (CRD)
to Notice of Proposed Amendment (NPA) 05/2006

for amending the Executive Director Decision No. 2003/12/RM of 5 November 2003 on general acceptable means of compliance for airworthiness of products, parts and appliances
(« AMC-20 »)

Ageing Aeroplane Structures

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA) 05/2006, published 25 April 2006 was to propose an amendment to Decision N° 2003/12/RM of the Executive Director of the Agency of 05 November 2003 on general acceptable means of compliance for airworthiness of products, parts and appliances (« AMC-20 »)[1].

II. Consultation

2. By the closing date of 25 July 2006, the European Aviation Safety Agency (the Agency) had received 89 comments from 11 National Aviation Authorities, professional organisations and private companies.

III. Publication of the CRD

3. All comments received have been acknowledged and incorporated into this Comment Response Document (CRD) with the responses of the Agency.

4. In responding to comments, the following standard terminology is used:

   - **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
   - **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
   - **Noted –** The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
   - **Not Accepted** - The comment or proposed amendment is not shared by the Agency.

   The resulting text highlights the changes as compared to the current rule.

5. The Agency's Decision will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.

6. Such reactions should be received by the Agency not later than 12 December 2007 and should be sent by the following link: CRD@easa.europa.eu;

IV. CRD table of comments, responses and resulting text

[1] Decision as last amended by Decision 2006/12/R of the Executive Director of the European Aviation Safety Agency of 22 December 2006.

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
1.	C. Proposal AMC 20-20 Paragraph 12, Implementation	Aer Arann	Section beginning "A period of up to one year may be allowed to incorporate..." The proposal is to amend this text to include the following statement, or a similar statement. "The programme must be implemented within 4 years from the date of NPA incorporation into the regulations OR before the relevant fraction of the aircraft models' DSG/ESG is reached." This will allow operators adequate time to schedule the lengthy inspections and associated tasks of this programme to coincide with already existing tasks. Justification: For operators with aircraft close to or beyond the relevant fraction of the DSG/ESG, this programme would have to be implemented at relatively short notice. This could place a large additional financial burden on operators. The possibility of arranging this programme to coincide with already scheduled inspection and maintenance tasks would greatly reduce this financial burden.	**Partially Accepted** Allowing for a period of incorporation of these large and detailed programmes into the operators maintenance programme is a necessary practicality. Incorporation of the programme should not be confused with its implementation. This is AMC only so it is not appropriate to mandate implementation times. However, the text has been further clarified to reflect the fact that a grace period for implementation may be proposed for aircraft already beyond the suggested fraction of DSG.	(See revised text in Appendix to this document)
2.	CHAPTER C-PROPOSAL / AMC 20-20 Paragraph 12-IMPLEMENTATION Page 24 of 88	Air France	This paragraph provide implementation time for operator to amend their maintenance program (Part M requirement) in order to operate an aircraft beyond original DSG. These items are given in fraction of the aircraft model's DSG/ESG. We request those values to by given on a calendar basis (i.e. SB Review – mid of 2008 ; RAP – end of 2008) Justification: Reason for that request is : 10% of our A320 fleet has reached or is about to reach ¾ DSG (our oldest aircraft is over 80% DSG). We noticed that a one year period is proposed for implementation and fully agree with the Agency to recognize that additional grace period may be necessary. Change request is to allow the TCH/DAH to match with implementation schedule by providing data's before operators have reached the deadline. Operators are willing to concur with new program embodiment but don't want their aircraft to be grounded if new and/or modified maintenance instructions (such as	**Not Accepted** Implementation times will be established by the TCH and approved by the Agency. The Agency is participating in the STG working group for the A320 and will ensure that safe and practical solutions for implementation of the programmes are developed.	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			SSID / SSIP / SB Review / RAP / WFD / CPCP / …) are not available at implementation time.		
3.	Proposals – Chapter 12 IMPLEMENTATION Implementation time for maintenance programme dedicated to preclude operation with WFD	ATR (Avions de Transport Regional)	The proposed programme implementation time related to WFD should be lower than 1 DSG/ESG Justification: As stated in present NPA, Appendix 2, chapter 3, third paragraph, despite "the small probability of occurrence of MSD/MED in aircraft operation up to its DSG", it is our opinion that dedicated maintenance programme would be more efficient to preclude WFD if implemented before DSG is reached. This would be coherent with what is stated in chapter 10 of this proposal, third paragraph: "such a programme must be implemented before analysis, tests, and/or service experience indicates that widespread fatigue damage may develop in the fleet."	**Partially Accepted** The highest risk aircraft i.e. pre-Amdt 45 are already beyond DSG. While the Agency would encourage earlier implementation of maintenance programmes to prevent WFD, a 1 DSG limit is seen as an absolute limit. For this reason ESG is removed as some ESG's may have been established without a rigorous WFD evaluation having been conducted. Furthermore as it is based on the lead aircraft, the majority of the fleet will be well below DSG by the time the evaluation has been completed. The 1 DSG is retained in the AMC but will be subject to further review during the following rulemaking task. Any occurrence of WFD that is believed likely to occur before DSG will be addressed by AD action.	(See revised text in Appendix to this document)
4.	Proposals 5. Way Of Working a.) General	German Air Rescue / EHAC	*On the initiative of the TCH, a STG should be formed for each aircraft model for which it is decided to put in place an ageing aircraft programme. The STG should consist of the TCH* ***and a representative from the Agency****. The objective of the STG is to complete all tasks covered in this AMC in relation to their respective model types, including following :* Justification: Most TCH published specific structural inspection-, repair- and corrosion prevention programmes for their models. Nevertheless, if those programmes are insufficient or not available, it must be noted that the vast majority of small and medium sized operators do not hold the required competence or technical know how to develop such a programme. Those programmes should be developed exclusively by the TCH and the Agency.	**Not Accepted** The AMC already recognises that participation in the STG by all parties is not always possible. Nevertheless, the STG is seen as an effective forum for experiences to be presented and to facilitate the development of ageing aircraft programmes that are practical to implement. The operator therefore has a pivotal role to play.	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			During development of those programmes, and in case in-service experience is required, the operator should make his experience available to the TCH. Operators are able to act only as a technical consultant and can not be involved in the primary developing process, as normally not capable, due to lack of experience, manpower and know how. One should never forget: The operator is a user, not a design- or structural engineering organisation.		
5.	Proposals 6. Supplemental Structural Inspection Programme (SSIP)	German Air Rescue / EHAC	*In the absence of a damage-tolerance based structural maintenance inspection programme (e.g. MRB documents, ALS), the TCH, ~~in conjunction with the operators~~, is expected to initiate the development of a SSIP for each aircraft model. Such a programme must be implemented before analysis, tests, ~~and/or service experience indicates that a significant increase in inspection~~ and/or modification is necessary to maintain structural integrity of the aircraft. This should ensure that an acceptable programme is available to the operators when needed. The programme should include procedures for obtaining service information, and assessment of service information, available test data, and new analysis and test data. A SSID should be developed, as outlined in Appendix 1 of this AMC, from this body of data.* Justification: Only the TCH has the essential knowledge to create a SSIP for a specific aircraft. Except for maybe large airlines, small and medium operators lacking sufficient backround knowledge to develop an acceptable inspection programme. Service experience from operators should be included in the SSIP. The operator should only cooperate with the TCH as technical consultant if service experience is required. The TCH in conjunction with the Agency should be responsible for developing of the SSIP. One should never forget: The operator is a user, not a design- or stuctural engineering organisation.	**Partially Accepted** Proposed change in text not accepted. However, clarification is provided on the TCH and Operators' responsibilities.	**6.** SUPPLEMENTAL STRUCTURAL INSPECTION PROGRAMME (SSIP) In the absence of … from this body of data. The role of the operator is principally to comment on the practicality of the inspections and any other procedures defined by the TCH and to implement them effectively. …
6.	Proposals	German Air	*The TCH~~, in conjunction with operators,~~ is expected to*	**Not Accepted**	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
	7. Service Bulletin Review and Mandatory Modification Programme	Rescue / EHAC	*initiate a review of all structurally related inspection and modification SBs and determine which require further actions to ensure continued airworthiness, including mandatory modification action or enforcement of special repetitive inspections.* Justification: Except for maybe large airlines, small and medium operators lacking enough background knowledge to evaluate SB's in regards to the proposed actions. Only the TCH has the experience and structural background knowledge to evaluate and review the issued SB's. This SB review requirement and Mandatory Modification Programme should be issued by the TCH and the Agency. In case of required in-service experience in relation of issued SB's, the operator should be act as technical consultant. One should never forget: The operator is a user, not a design- or stuctural engineering organisation.	Responsibilities are clearly established in the text of AMC Section 7.	
7.	Proposals 8. Corrosion Prevention and Control Programme (CPCP)	German Air Rescue / EHAC	*An operator has to adopt the baseline programme from the TCH or an approved CPCP accepted by the TCH and the Agency.* Justification: Most TCH published their own CPCP (Manual integrated) or refer to an approved CPCP by the TCH for continued airworthiness. The TCH should expand his CPCP and include missing actions and programmes for a sufficient CPCP. Small and medium sized operators are not able to create their own CPCP, due to lack of enough technical know how. The missing know how could result in incomplete or insufficient CPCP, which would counteract the intend to increase safety. Therefore the development of a qualified CPCP should be the task of the TCH in conjunction with the Agency. After creation of a CPCP, the operator should implement the programme in his maintenance programme. One should never forget: The operator is a user, not a	**Not Accepted** The AMC provides acceptable options for developing a CPCP. Approval of the CPCP will be undertaken by the competent authority when it is included in the operator's maintenance programme.	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			design- or stuctural engineering organisation.		
8.	Proposals 10. Evaluation for Widespread Fatigue Damage (WFD)	German Air Rescue / EHAC	*The TCH~~, in conjunction with operators, and in some cases the operators themselves are~~ is expected to initiate development of a maintenance programme with the intent of precluding operation with WFD. Such a programme must be implemented before analysis, test, and/or service experience indicates that widespread fatigue damage may develop in the fleet.* Justification: The operator should only work as technical consultant in the developing process of WFD, as small and medium sized operators are missing knowledge and experience for the basic structural design properties. The TCH in conjunction with the Agency should develop a programme to evaluate widespread fatigue damage. In case of required in-service experience, the operator should provide his experience to the evaluation process of WFD. After creation of that programme, the operator should implement the programme in his maintenance programme. One should never forget: The operator is a user, not a design- or structural engineering organisation.	**Partially Accepted** Roles clarified in revised text.	(See revised text in Appendix to this document)
9.	General Comment	UK-CAA	The UK CAA fully supports this NPA	**Noted.**	N/A
10.	General Comment on Disposition of In-service Findings	FAA	The proposed AMC would benefit by inclusion of a separate chapter/appendix that addressed and set some standards on how to handle in-service findings. Criteria could be included similar to that used for service bulletin reviews. This would be used to determine when it would be acceptable to continue with inspections and when termination action should be required. For determining those cases where a terminating modification should be mandated, the following guidance could be included: 1. The problem it corrects would have catastrophic consequences if it goes undetected; 2. The problem must be one that could occur anywhere in the fleet (not just an isolated case); and 3. The affected area is difficult to inspect, that is: a. The area is hard to reach, making detection	**Noted** This is a general issue that goes beyond Ageing Aircraft issues and could be an area which needs further development in a separate task. The continued need for SB review will be assessed under new Agency rulemaking task MDM.028, taking into account progress in current STG SB review activity and TCH and NAA practice when reviewing findings. This comment will be considered further at that time.	N/A

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			of fatigue cracking, corrosion, etc. difficult or unreliable; b. The detection method is handicapped by intervening structure or is otherwise unreliable in this case; c. The sheer size of the area covered or the physical demands on the inspector make detection unreliable; or d. The reliability of the inspection is low, or the likelihood of a discrepancy being missed is high. Justification: The service bulletin review and mandatory modification program was needed because there was not sufficient standardization/guidance relative to how in-service findings should be dealt with and in many instances continued inspection was specified when it shouldn't have been. Having this should preclude having to review any future service bulletins that address findings that are developed using this criteria.		
11.	Justification for JAA NPA 20-10 Item 1. Page 4, "Content of Draft Decision" Page 5, "Brief statement of the objectives of the NPA:" Item 2. Page 18, "WAY OF WORKING"	FAA	Page 4. "The objective of this AMC-20 is primarily to provide technical guidance to aid development of an ageing aircraft structures programme required by Part M. It is relevant to design approval holders, operators, maintenance organisations, and competent authorities" Page 5. "The purpose of this NPA is to provide technical guidance to be used by industry in developing continuing structural integrity programmes, with the objective of ensuring that ageing aircraft structure is adequately maintained throughout the aircraft's operational life." "Compliance with this AMC is not in itself mandatory, but may become so if subsequently referenced through an appropriate Book 1 rule or through specific Airworthiness Directive action." 5. <u>WAY OF WORKING</u> e) Responsibilities (i) The TCH is responsible for developing the ageing aircraft structures programme for each aircraft type, detailing the actions necessary to maintain airworthiness. Other DAH should develop programmes or actions appropriate to the	**Noted** There are currently no mandatory requirements that dictate the need for DAHs to develop the elements of an Ageing Aircraft programme. These requirements will be developed separately in EASA Rulemaking task MDM.028. While no policy decision has yet been taken by EASA on the need for manufacturers to develop ageing structures programmes for aircraft other than large aircraft, all stakeholders are encouraged to consider the technical guidance material contained in the AMC. However, whenever an ageing aircraft programme is required, the TCH will be responsible for its development.	N/A

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			modification/repair for which they hold approval, unless addressed by the TCH. The TCH/DAH will also be responsible for monitoring the effectiveness of their specific programme, and to amend the programme as necessary. Justification: While the referenced NPA text in above item 1) states that the objective of the AMC-20 is to provide technical guidance to aid design approval holders in the development of an aging aircraft structures programme, it relies on voluntary application of this guidance by TCHs. In addition, the referenced NPA text in above item 1) also states that the TCH is responsible for developing the ageing aircraft structures programme for each aircraft type, detailing the actions necessary to maintain airworthiness. It is recommended that a process be developed that would ensure DAHs develop the data necessary to support the various elements of an aging aircraft structures programme as specified in this NPA (SSIP, CPCP, Service Bulletin Review and Mandatory Modification programme, and WFD programme). It is understood that at this time EASA has been working through the Airbus Structural Task Group (STG) meetings to discuss and come to agreement on various aspects of these above noted programs. The Airbus "Program Planning Document" (PPD) for example is being used by Airbus to document in part processes that Airbus will follow to develop the elements of the Aging Airplane Program for each of its models. It is expected that this PPD will be reviewed and accepted by the authorities. Perhaps attention can be placed on the development of the PPD to ensure the proposed guidance in AMC-20 is documented and considered a binding agreement between Airbus and the authorities. The process in the U.S. would differ in that the FAA has issued DAH rules to mandate TCHs to develop data that supports an aging airplane program. Attention should be given, however, to harmonization between this EASA NPA and FAA regulations and guidance. EASA has stated that the NPA will be reviewed and changed to support harmonization.	In the meantime, as noted by the commenter, the Agency is working closely with Industry in the development and approval of type specific ageing aircraft programmes that reflect the intent of the AMC. The Agency will consider a variety of approaches to assure development and implementation of ageing aircraft programmes. In all cases harmonisation will be a prime consideration.	
12.	Proposals Page 22, Section 10,	FAA	General Comment: This NPA is advisory material that outlines EASA's aging		N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
	Evaluation for WFD Page 23, Section 10, paragraph #4 Page 24, section 11 Page 24, section 12 Page 32 final paragraph		aircraft program and provides guidance for the DAHs to develop Corrosion Prevention and Control Programs (CPCP), Supplemental Structural Inspection Documents (SSID), Service Bulletin reviews, Repair Assessment Programs (RAP) and Widespread Fatigue Damage (WFD) programs. While it provides good background on the various issues, there are no implementation times or corresponding operational rules for implementation. The assumption is that due to Sub Part M, an operator will incorporate these programs. There is no equivalent to the proposed DAH rule (Sub Part I) in the U.S. Many sections utilize the word should in reference to what a DAH is to provide. This is subjective language relative to the word shall. Page 23, Section 10, paragraph #4 states that " in the event an acceptable WFD evaluation cannot be completed in a timely manner, the Agency may impose a service life or other limitation". It is not understood how this will be accomplished. The NPA should describe the proposed process. Page 23, further speaks to a new or extended Limit of Validity (LOV) but nothing other than Sub Part M will require the incorporation of this new LOV. Again, how will the TCHs be required to develop LOV? Page 24, section 11, STC, leaves the operator dependant on the STC holder to develop data to support the aging program. Will there be a corresponding STC holder rule to require that they make data available? Page 24, section 12, the table assigns a value being a subset of Design Service Goal (DSG) for the implementation of the programs. This presupposes that LOV will be set at DSG, which may not be the case. Page 32 final paragraph states that the SSID should be reviewed periodically against service experience but there is no suggested time interval.	**Not Accepted** The Agency will use existing practices, including the issuance of ADs, to assure the continued airworthiness of the type. **Noted** This will be developed as part of Agency rulemaking task MDM.028. Note also that many EU TCHs already have LoV or equivalent limits in their ALS. **Noted** This will be evaluated as part of Agency rulemaking task MDM.028. **Not Accepted** As stated, and in the absence of other information, the LOV will be taken as the DSG. For all practical purposes, the TCH will always strive to support a LOV in excess of the DSG. **Noted** This paragraph is retained in the AMC in its current form to promote good practice. The periodic review will be a	

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
				function of a number of factors, including size and age of the fleet, type of operation, utilisation, etc. Further guidance may be developed as part of the activities of task MDM.028.	
13.	Explanatory Note V. Regulatory Impact Assessment: 1. Purpose and intended effect: a. Issue which the NPA is intended to address:	FAA	"Commission Regulation (EC) No. 2042/2003 (Part M), stipulates, inter alia, that maintenance programmes should be developed and updated to incorporate specific structural maintenance programmes where issued by the type certification holder (TCH) (see Appendix 1 to AMC M.A.302 and M.B.302). However, there are currently no rules that mandate the TCH, or other design approval holder (DAH), to develop ageing aircraft structures programmes and limited guidance material is available on how to develop programmes that would be acceptable to the Agency." Comment: It should be emphasized in this section that EASA will be coordinating and developing necessary regulatory requirements and guidance to provide a means to ensure TCH action and ensure that appropriate guidance is in place to support development of the aging airplane programme. It should also be noted that EASA will be coordinating with other authorities and may establish an industry working group to support this effort. Such action is mentioned on page 8, section VI. "Information on Future Ageing Aircraft Rulemaking Developments". Justification: Need for clarification to reader	**Noted** (See response to comments 11& 12)	N/A
14.	Explanatory Note Page 8, VI. "Information on Future Ageing Aircraft Rulemaking Developments"	FAA	"Rulemaking task MDM.028 "*Development of an Ageing Aircraft Structure Plan*" is an EASA initiative to develop European rules to reflect work currently on-going elsewhere, most notably in the USA, and to provide an opportunity to contribute to all aspects of this subject. A joint task to ensure full harmonisation of rules is not possible due to the different regulatory framework within each country. However, close coordination is being maintained to ensure that technical and procedural requirements are closely aligned. Rulemaking task MDM.028 will establish a Working Group to develop the technical elements to be incorporated in the regulatory	**Noted** The working group will be formed in accordance with EASA's rulemaking procedure. Harmonisation with FAA will be a consideration in defining the group's composition.	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			framework (e.g. proposals for CS modifications, proposals for mandatory actions or not, implementation dates, affected aircraft and operations) and aims to complete this task in the 2008/2009 timeframe." Comment: Who will make up this task group? It should be noted that while a joint task to ensure full harmonization of rules is not possible, it is anticipated that the safety objective of the Aging Airplane Program, with the various elements will be harmonized. Justification: Clarification on harmonization		
15.	General comment	FAA	General comment on NPA: There is no program specified in the NPA that is complimentary to the FAA Aging Airplane Safety Final Rule (AASFR) with respect to DT requirements for repairs and alterations (particularly to section 121.370a & 129.16). EASA should define whether it plans to address the subject of DT requirements for repairs and alterations and whether it intends to establish a program that will ensure repairs and alterations that affect fatigue critical structure are assessed for damage tolerance. On April 21, 2006, the FAA published draft AC 120-XX, "Damage Tolerance Inspections for Repairs," to propose guidance material on how to address evaluating repairs for damage tolerance. The AAWG has recommended action to revise this document to also address alterations. EASA should identify in this NPA those areas that differ from the proposed FAA guidance (i.e., draft AC 120-XX) that address aging airplane structural issues, such as that required in AASFR. Justification: Need to clarify to reader where differences exist, and whether EASA's plans to address these differences.	**Partially Accepted** Part-M includes requirements for maintenance programmes, including repair assessment programmes. Revisions to Part M and new DAH requirements will be considered as part of task MDM.028 to ensure repairs and modifications have appropriate procedures in place for their continued airworthiness up to the LOV of the maintenance programme. Section 11 of the proposed AMC and elements of the appendices, provides guidance for modifications and STCs to address all aspects of ageing aircraft structures programmes. This material will be developed further, as necessary, as part of task MDM.028. Appendix 3 addresses repair assessment programmes and has been revised to incorporate the concepts of FAA AC 120-xx.	(See revised text in Appendix to this document)
16.	Explanatory Note p. 5, V., 1., a., 1st paragraph, first sentence	FAA	Sentence could be misleading as written and needs deletion or revision. Justification: We don't believe that a TCH would claim they "designed" structure to meet continuing airworthiness requirements indefinitely. The prevalent thinking appears to have been	**Accepted**	N/A (The text of the explanatory note is not reproduced in the final publication).

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			that the design combined with "proper maintenance" would allow for safe indefinite operation. The fallacy with this thinking is the implicit assumption that one can adequately define the "proper maintenance" required for indefinite operation based on a finite knowledge base. Additionally, structure certified under "fatigue evaluation" requirements should have a specified life limit. Structure certified under "fail-safe evaluation" requirements has no life limits, however any deterioration was supposed to be readily detectable during normal maintenance. Likewise, structure certified under "damage tolerance evaluation" requirements has no life limits but cracking is supposed to be detected before it becomes dangerous. In all cases it is incorrect to say that the structure was "designed" for an indefinite period.		
17.	Justification for JAA NPA 20-10 p. 10, B., B.2, 1st paragraph, 1st sentence	FAA	Sentence is misleading as written and needs deletion or revision. Justification: We don't believe that a TCH would claim they "designed" structure to meet continuing airworthiness requirements indefinitely. The prevalent thinking appears to have been that the design combined with "proper maintenance" would allow for safe indefinite operation. The fallacy with this thinking is the implicit assumption that one can adequately define the "proper maintenance" required for indefinite operation based on a finite knowledge base. Additionally, structure certified under "fatigue evaluation" requirements should have a specified life limit. Structure certified under "fail-safe evaluation" requirements has no life limits; however, any deterioration was supposed to be readily detectable during normal maintenance. Likewise, structure certified under "damage tolerance evaluation" requirements has no life limits but cracking is supposed to be detected before it becomes dangerous. In all cases it is incorrect to say that the structure was "designed" for an indefinite period.	**Accepted**	N/A (The text of the explanatory note is not reproduced in the final publication).
18.	Justification for JAA NPA 20-10 p. 10, B., B.2, 1st paragraph, last sentence	FAA	"Maintenance programs must insure structural integrity. Key to this is maintaining ultimate strength capability. The intent of fatigue, fail-safe and damage tolerance requirements is to effectively manage the strength reducing effects of fatigue cracking."	**Accepted**	N/A (The text of the explanatory note is not reproduced in the final publication).

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			Justification: The fundamental requirement that must be met is strength. Loss of ultimate strength should be a rare event. Fatigue, fail-safe and damage tolerance requirements are a means to achieve that end. We propose the text be revised accordingly.		
19.	Proposals p. 18, 6., 2nd paragraph, 3rd sentence.	FAA	Revise sentence by changing "type of damage" to "fatigue cracking scenario". Justification: The type of damage being inspected for with the Supplemental Structural Inspection Program (SSIP) inspections will always be fatigue cracking but it is important to identify what cracking scenario has been addressed or not. For example, if Multiple Site Damage/Multiple Element Damage hasn't been addressed and it is a likely scenario, this should have some visibility and probably needs justification.	**Partially Accepted** Text amended to add the fatigue crack scenario, in addition. Note: The type of damage addressed by the supplemental programme may include different types of initial damage such as dents, or other accidental damage, in addition to normal fatigue scenarios.	6. SUPPLEMENTAL STRUCTURAL INSPECTION PROGRAMME (SSIP) … The recommended SSIP, … The SSID should include the type of damage being considered, in particular the resulting fatigue cracking scenario, and likely sites; inspection access, threshold, interval, method and procedures; applicable modification status and/or life limitation; and types of operations for which the SSID is valid. …
20.	Proposals p. 22, 2nd paragraph, last sentence.	FAA	Sentence is misleading as written and needs deletion or revision. Justification: This text improperly faults the requirements. It was the way compliance was shown by applicants and found by the authorities that was the problem and not the requirements themselves. The text should be rewritten to properly reflect the issue.	**Accepted** Text is deleted.	(See revised text in Appendix to this document)
21.	Proposals p. 22, 10., 1st paragraph, last sentence.	FAA	Sentence is misleading as written and needs deletion or revision. Justification: As written this implies that Supplemental Structural Inspection Programs (SSIP) only have to detect single site cracking. This conflicts with the Supplemental Structural Inspection Document guidance on p. 29, section 3.2, (1), (2) and (3) that sounds like Multiple Site Damage/Multiple Element Damage. We propose the statement reflect that, in general, existing SSIPs fell short of what they should have covered but we must correct that on a go forward	**Accepted**	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			basis.		
22.	Proposals p. 22, Section 10., 2nd paragraph.	FAA	Delete reference to large damage capability (LDC). Justification: LDC is problematic and unnecessary to address as long as we take a safe-life approach to fatigue cracking (e.g., fatigue cracking cannot be managed effectively with inspection). Additionally single site cracking will also reduce LDC. For example we believe that if a singular small crack in a frame outer cap was combined with a skin crack centered at the frame, the skin crack size that can be tolerated will always be smaller than what could be tolerated without the crack in the frame. So we should be concerned about the effect of single site cracking on LDC as well.	**Not Accepted** The inclusion of LDC is not made in relation to acceptable means of compliance. If WFD is precluded then the typical assumptions related to large damage capability made at certification will remain valid. Conceptually, large damage can be attributed to growth of a singular small crack or discrete source damage. The probability of large discrete source damage in conjunction with a singular crack large enough to affect the structural capability is considered extremely improbable provided all the elements of structural ageing programmes are complied with. However, LDC will be subject to review under EASA rulemaking task MDM.028.	N/A
23.	Proposals p. 22, 10., 2nd paragraph, last sentence	FAA	Delete word "routine". Justification: The maintenance program established during certification should have addressed Widespread Fatigue Damage (WFD) in some fashion. Does using the word "routine" mean global visual? If so it would not be surprising that Multiple Site Damage/Multiple Element Damage cannot be found before it results in WFD. Does "routine" include special directed inspections that may include Non-Destructive Inspections? If so then the last sentence begs the question "why not".	**Accepted**	(See revised text in Appendix to this document)
24.	Proposals p. 23, last paragraph.	FAA	Paragraph needs clarification. Justification: This could be interpreted to mean that repairs and modifications only need to be addressed for Widespread Fatigue Damage (WFD) if a person wants to operate beyond the initial Limit of Validity (LOV). Conversely if the initial LOV is acceptable to a person and they do not intend to operate beyond it, there is no concern about repairs and modifications. This conflicts with the last sentence in	**Accepted** This paragraph is intended to address only the actions required for repairs and modifications to allow operation beyond the initial LOV.	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			the paragraph that talks to the "current" LOV which would be the initial LOV if an extension had not been approved. Clarify what has to be done before the aircraft reaches the current LOV (e.g. WFD evaluation results presented or WFD precluded?).		
25.	Proposals p. 24, Section 12.	FAA	Add implementation requirements for existing and future STCs? Justification: Although section 11 says STCs need the same treatment as the baseline structure section 12 doesn't say when.	**Not Accepted** As stated in the final paragraph of Section 12, STCs will be treated as if they were part of the original build, unless data is available to identify an appropriate DSG for the STC.	N/A
26.	Proposals p. 25, Section 1.2, 3rd paragraph, 1st sentence	FAA	Revise to read, "One prerequisite for the successful application of the damage tolerance approach for managing fatigue is that crack growth and residual strength can be anticipated with sufficient precision to allow establishment of inspections that will detect cracking before it reaches a size that will degrade the strength below a specified level." Justification: Knowledge of "crack initiation" is not necessary for establishing inspection requirements but residual strength is.	**Partially Accepted** Intent retained, editorial changes added.	Appendix 1 … 1.2 Background … One prerequisite for the successful application of the damage tolerance approach for managing fatigue is that crack growth and residual strength can be anticipated with sufficient precision to allow inspections to be established that will detect cracking before it reaches a size that will degrade the strength below a specified level. When damage is discovered, airworthiness is …
27.	Proposals p. 25, Section 1.2, 3rd paragraph, last sentence	FAA	Delete. Justification: While "safety-by-inspection" may be effective "safety-by-retirement" may be more appropriate if inspections are questionable. This is allowed for under 25.571 with the words "….inspections or other procedures must be established…" Experience also indicates that in many cases modification/replacement is superior to inspection for maintaining continued airworthiness. This is where we find ourselves with the type of fatigue cracking we have labeled WFD. I propose that we should stop inferring that inspections are the best way forward.	**Partially Accepted** EASA agrees with the intent of the comment justification and the text has been amended to identify that modification and replacement are sometimes required.	Appendix 1 … 1.2 Background … Evidence to date suggests that when all critical structure is included, fatigue and damage-tolerance based inspections and procedures (including modification and replacement when necessary) provide the best approach to address aircraft fatigue. …

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
28.	Proposals p. 26, Section 2, 2nd paragraph, last sentence	FAA	Delete "primarily". Justification: Damage tolerance evaluations to support Supplemental Structural Inspection Programs lead to inspection for fatigue cracking only, even though there may be some benefit for other types of damage.	**Not Accepted** CS 25.571 requires accidental damage to be assessed. Some manufacturers address damage, such as dents, in their ALS/SSID either conservatively through the use of fracture mechanics or by test of representative damage. The resulting inspection would then address this type of damage.	N/A
29.	Proposals p. 31, first item (2), last two sentences.	FAA	Delete. Justification: Progressively increasing an inspection threshold until cracks are found is not technically justifiable.	**Accepted**	APPENDIX 1 … 3.4. Inspection programme … (2) For structure with no reported cracking, it may be acceptable, provided sufficient fleet experience is available, to determine the inspection threshold on the basis of analysis of existing fleet data alone. This threshold should be set such as to include the inspection of a sufficient number of high-time aircraft to develop added confidence in the integrity of the structure (see Chapter 1 of this Appendix 1).
30.	Proposals p. 57, Section 2.3, 2nd paragraph, last sentence	FAA	Delete. Justification: This provides an arguable definition of "damage tolerant structure" that is not needed.	**Accepted**	(See revised text in Appendix to this document)
31.	General Comment on Clarification of Scope of SSIP	FAA	The discussion of the SSIP/SSID in Chapter 6 and Appendix 1 should be revised to make it clear what kinds of maintenance actions are included. For example if the damage tolerance evaluation indicates that inspections are not viable and mandatory replacement/modification is required does this go into the SSIP/SSID? While Appendix 1 identifies this as a possible outcome (see "Note" on p. 30) it also contains text that implies that the SSIP only contains inspection requirements (e.g., p. 26, section 2, second paragraph). Justification: Scope of SSIP/SSID needs clarification.	**Accepted** The text of Appendix 1 Section 2 is amended.	APPENDIX 1 … 2. SUPPLEMENT STRUCTURAL INSPECTION PROGRAMME (SSIP) … This AMC is intended … operational usage. They lead to revised or new inspection requirements primarily for structural cracking and replacement or modification of structure where inspection is not practical.

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
32.	Explanatory Note Page 5: A., IV., item 12. (large aircraft) Also, identified on pages 9, 10, and 12.	FAA	Large and small aircraft should be defined. Justification: The terms should be defined to clarify the size of the airplane being addressed in the document. The document makes several references to large aircraft or aeroplanes, but it does not define them specifically.	**Not Accepted** The text uses standard EU/EASA definitions.	N/A
33.	Proposals Appendix 2: 3. General, Page 34, last sentence of last paragraph	FAA	The document cites FAA AC 25-571-1C Paragraph 6.C(4). The correct reference is AC 25.571-1C Paragraph 6C. Justification: There is not a 6C(4).	**Accepted**	(Editorial correction incorporated).
34.	Proposals Appendix 2: 4.2 Structure susceptible to MSD/MED, Page 35	FAA	The lead-in text should specify that the structural areas are examples of Multiple Site Damage/Multiple Element Damage. Justification: It should be noted that the list is not meant to be inclusive of all structure that might be susceptible on any given airplane model. The list should be used for general guidance only and not used to exclude any particular structure. There should be supporting rationale for including and excluding any areas. We propose the text be revised accordingly.	**Accepted**	APPENDIX 2 … 4.2 Structure susceptible to MSD/MED. Susceptible structure is defined as that which has the potential to develop MSD/MED. Such structure typically has the characteristics of multiple similar details operating at similar stresses where structural capability could be affected by interaction of multiple cracking at a number of similar details. The following list provides examples of known types of structure susceptible to MSD/MED. (The list is not exhaustive)
35.	Proposals Appendix 2: 4.3.1 Determination of WFD average behaviour in the fleet, Page 44	FAA	We propose the text in this section be revised to further explain WFD average behavior. The 1999 AAWG report includes a graph that could be used to help with this explanation. The text should also explain what constitutes a teardown inspection and what constitutes fatigue test evidence/data. Justification: Adding to the discussion would provide further clarification and identify an acceptable means of compliance relative to teardown inspections and fatigue test evidence/data.	**Accepted** Clarification is added by revising the text of Appendix 2 paragraph 4.3.1. (now renamed 4.3.2) Definitions in the main body of the AMC and Appendix 2 further explain terms used.	APPENDIX 2 … 4.3.2 Determination of WFD average behaviour in the fleet: The time in terms of flight cycles/hours defining the WFD average behaviour in the fleet should be established. The data to be assessed in determining the WFD average behaviour includes: • a review of the service history of

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
					the susceptible areas to identify any occurrences of fatigue cracking, • evaluation of the operational statistics of the fleet in terms of flight hours and landings, • significant production variants (material, design, assembly method, and any other change that might affect the fatigue performance of the detail), • fatigue test evidence including relevant full-scale and component fatigue and damage tolerance test data (see sub-paragraph 4.3.10 for more details), • teardown inspections, and • any fractographic analysis available. The evaluation of the test results for the reliable prediction of the time to when WFD might occur in each susceptible area should include appropriate test-to-structure factors. If full-scale fatigue test evidence is used, Figure A2-18, below, relates how that data might be utilised in determining WFD Average Behaviour. Evaluation may be analytically determined, supported by test and, where available, service evidence.
36.	Proposals Appendix 2: Figure A2-17, Aeroplane Evaluation Process	FAA	It appears the flow chart in the figure is not consistent with the text in the appendix. We suggest the figure be reviewed and changed to ensure consistency with the text in Appendix 2. Justification: The figure needs clarification.	**Accepted**	(Figure revised to align more closely with the text of Appendix 2).

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
37.	Proposals Appendix 2: Figure A2-18	FAA	Clarification of the figure is needed. Justification: No specific justification.	**Accepted**	(Minor changes to figure were introduced)
38.	Proposals Appendix 2: 4.4.1 Period of Evaluation Validity, Page 52	FAA	Clarification of the section is needed. We propose the text be revised to explain how this section fits with the minimum requirements for establishing Limit of Validity. Justification: The text is not clear relative to establishing a limit of validity. Appendix 2 discusses a limit of validity, an initial limit of validity, and a revised limit of validity.	**Accepted** New text added for clarification.	APPENDIX 2 … 4.4.1 Period of WFD Evaluation Validity: At whatever point the WFD evaluation is made, it should support the limit of validity (LOV) of the maintenance programme. Consistent with the use of test evidence to support individual SMPs, as described above in paragraph 4.3.10, the LOV of the maintenance programme should be based on fatigue test evidence. The initial WFD evaluation of the complete airframe will typically cover a significant forward estimation of the projected aircraft usage beyond its DSG, also known as the "proposed ESG." An evaluation through at least an additional twenty-five percent of the DSG would provide a realistic forecast, with reasonable planning time for necessary maintenance action. However, it may be appropriate to adjust the evaluation validity period depending on issues such as: … Upon completion of the evaluation and publication of the revised maintenance requirements, the "proposed ESG" becomes the Limit of Validity (LOV) Note: This assumes that all other aspects of the maintenance programme that are required to

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
					support the LOV (such as SSID, CPCP, etc.) are in place and have been evaluated to ensure they too remain valid up to the LOV.
39.	General comment	Airbus S.A.S.	Airbus note that EASA has made technical changes in NPA 05-2006 beyond the JAA NPA 20-10. JAA NPA20-10 had been developed by the JAA established European Ageing Aircraft Working Group (EAAWG) where JAA, European National Authorities, Industry and Operators closely worked together. Airbus regrets that this process has not been continued under the EASA regulatory system for development of this NPA 05-2006, and that Industry is now faced with changes it can not agree with. Moreover, as at the same time FAA issued several NPRM's/AC's dealing basically with the same subjects, the previous process with EAAWG would have been a necessary platform to review and update this NPA material.	**Noted** Rulemaking Group MDM.028 tasking will develop this material further, as considered appropriate and, where possible, align with FAA rules.	N/A
40.	Proposals All, and especially 9. Repairs Assessment Programme	Airbus S.A.S.	Structures affected might not be the same between FAA NPRM's/AC's and EASA NPA. This could result in different structures to be addressed. To avoid looking at different structures to comply basically with the same airworthiness issues, the applicability needs to be perfectly harmonized. As an example, FAA AC120-XX limits applicability to structure susceptible to fatigue cracking that could contribute to a catastrophic failure, while Chapter 9 request activities for all Primary Structure susceptible to fatigue. Airbus request EASA to make sure that affected structures throughout the NPA are perfectly inline with the FAA NPRM's/AC's. Justification: Rules harmonization, clarification to avoid undue burden.	**Partially Accepted** Section 9 had previously been amended to include the AAWG harmonised terminology. However, the change in terminology was not done thoroughly and some inconsistencies remained. These have now been removed. Note that in Appendix 3 the same structure is described using the abbreviated term "fatigue critical structure" (FCS)	(See revised text in Appendix to this document)
41.	Proposals All, and especially 12. Implementation	Airbus S.A.S.	Airbus request that EASA ensure that the affected structure in the NPA will not result in structure to be considered beyond the one which would be required by application of the latest airworthiness requirements. For example, FAR/CS25.571 limits the application of the fatigue and damage tolerance requirements to PSE's (i.e. a subset of primary structure), it is not clear whether the affected structure resulting from application of this NPA will be the same. It would be recommendable to introduce a separate paragraph in chapter 12 listing the affected structure for the different issues (SSIP, WFD, SB review, etc…).	**Partially Accepted** The Table in Section 12 has been expanded to summarise the applicable structure for each programme.	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			Justification: Rules harmonization, clarification to avoid undue burden.		
42.	Proposals 4. Definitions and Acronyms	Airbus S.A.S.	Damage-tolerance definition is slightly different from the one used in ATA MSG-3 and in CS-25 as well. It would be helpful to use an harmonized definition. Justification: Consistency	**Not Accepted** Definition is harmonised with FAA and is retained. No definition exists in CS-25.	N/A
43.	Proposals 4. Definitions and Acronyms	Airbus S.A.S.	Primary Structure definition is used among others in this NPA to define areas to be covered by the CPCP. Knowing the CPCP is developed using MSG-3, it would be useful to add the SSI definition in paragraph 4, and more correct to refer to SSI definition rather than "Primary Structure" in all CPCP related issues. The addition of a new structure categorization for CPCP is confusing. Justification: Consistency, clarification	**Not Accepted** This comment has previously been addressed in the response to JAA NPA 20-10. (See Section D, Appendix 4 of NPA 05/2006) MSG-3 in itself is not a complete means of compliance because it refers to the need for a CPCP and not all applicants chose to use MSG 3 in developing their CPCP. The role of MSG-3 as a part of an acceptable means of compliance is introduced into the text.	
44.	Proposals 4. Definitions and Acronyms	Airbus S.A.S.	Definition of Primary Structure is not in line with the usual one (structure which carries flight, ground or pressure loads). Justification: Consistency	**Partially accepted.** Proposed definition expanded for clarification. In the past, severe corrosion of internal structures has considerably reduced the capability of the structure below that required for certification, in particular in respect of crash loads. While not normally a concern in conjunction with fatigue loads, interior structures such as seat tracks that carry crash loads, as required by CS 25.561 are considered primary structure.	4. DEFINITIONS AND ACRONYMS **…** **Primary Structure** is structure that carries flight, ground, crash or pressurisation loads.
45.	Proposals 11. Supplemental Type-Certificates	Airbus S.A.S.	- "Primary Structure (e.g. PSEs)" is confusing, because Primary Structure is not equivalent to PSE. There is no added value to have PSE mentioned here, knowing	**Accepted**	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			Primary Structure is defined in §4. - Although paragraph 11 defines that STC's need the same consideration as the basic aircraft, STC Holders are not always referenced in the appendixes (see comment to appendix 5 for example). It is requested to verify consistency between paragraph 11 and the appendixes. Justification: Clarification		
46.	Proposals 12. Implementation	Airbus S.A.S.	The term DAH is introduced upfront this NPA as a generic term covering TCH and STCs, refer to page 15. In this context the term DAH is never used throughout this NPA, i.e. either the terms TCH and STC are used by itself or the term TCH is extended to read STC/DAH. From the above the question arises what is the added value of the term DAH, since for clarity of the responsibilities, in communication it is always distinguished between TCH and STC. The proposal is therefore either to use the term DAH consistently throughout the document or to delete the reference to DAH entirely. The latter is the preferred solution, for which a rewording would not be required Justification: Consistency, simplification	**Partially Accepted** The term DAH was originally introduced to align with FAA terminology. The commenter makes no mention of repair approval, for which there is also no common pre-existing term. DAH is retained as it usefully encompasses TCH, STC holder and repair approval holder. The document has been reviewed to be more consistent in its usage.	(See revised text in Appendix to this document)
47.	Proposals 6. Supplemental Structural Inspection Programme	Airbus S.A.S.	In 1st block, "MRB document" to be replaced by "MRB Report" Justification: Terminology consistency	**Accepted**	6. SUPPLEMENTAL STRUCTURAL INSPECTION PROGRAMME (SSIP) In the absence of a damage-tolerance based structural maintenance inspection programme (e.g. MRB report, ALS), the TCH, in conjunction with …
48.	Proposals Appendix 1 2. Supplement Structural Inspection Programme (SSIP)	Airbus S.A.S.	Change title of paragraph 2 to "Supplement***al*** Structural Inspection Programme (SSIP)" Bottom of page 26: "…to regularly review the MRB***R*** part…" Justification: Editorial	**Accepted**	APPENDIX 1 … 2. SUPPLEMENTAL STRUCTURAL INSPECTION PROGRAMME (SSIP) … Large transport aeroplanes … to regularly review the part of the MRB

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
					Report containing the structural inspections resulting from the fatigue and damage-tolerance analysis for effectiveness.
49.	Proposals Appendix 1, § 3.3, Information to be included in the assessment	Airbus S.A.S.	The continuing assessment of structural integrity for the particular aircraft type should be based on the principles outlined in paragraph 3.2 of this Appendix 1. The following information should be included in the assessment and kept by the TCH in a form available ***to Type Certification Airworthiness Authorities*** for reference: Justification: It is not Airbus intention to render any TC information available to operators. In addition, it is not relevant for the operators to know for instance the "structural loading conditions and the supporting test evidence".	**Partially Accepted** Intent retained but proposed wording amended.	APPENDIX 1 … 3.3. Information to be included in the assessment The continuing assessment of … The following information should be included in the assessment and kept by the TCH in a form available to the Agency. …
50.	Proposals Appendix 1, § 3.5, The supplemental structural inspection document	Airbus S.A.S.	~~(2) A summary of the operational statistics of the fleet in terms of hours and flights, as well as a description of the typical mission, or missions;~~ (then renumber sequence) Justification: There is no reason nor interest to put this information into the ALI Document / SSID.	**Accepted**	(Text amended as proposed in the comment)
51.	Proposals 9. Repairs Assessment Programme	Airbus S.A.S.	Paragraph 9 states that TCH's should further develop repair assessment programmes or similar documents, or create new ones to address all primary structure susceptible to fatigue for which existing repairs may not have been assessed for DT. This implies that TCH for any aircraft model, independent of its certification basis, needs to provide a RAG (see also title of §3 in Appendix 3). The FAA AC120-XX leaves room for a different approach for those aircraft that have a later certification basis. For these aircraft the DAH and operators are allowed to identify and perform a DTE of those repairs that have no DT data. The AC actually describes 2 possibilities: individual repair DTA data, or new repair evaluation guidelines. It also states that in developing the new guidelines, the percentage of existing repairs that could be addressed by the new repair guidance material should be weighed against the resources and time required to develop the guidance and have it approved. To harmonise the approaches, Airbus request	**Partially Accepted** Due to development of terminology, the term "Repair assessment programme" now has a more specific meaning. Repair Evaluation Guidelines help operators to evaluate the status of repairs on their individual aircraft These may facilitate the use of existing Agency approved data, new repair assessment procedures or individual repair DT data as the commenter describes. This was always the intent. Specifically for aeroplanes certified to Amdt 54 or later, if operators can confirm that all repairs are in compliance with the certification basis a REG document may not be required.	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			that EASA include a similar approach as the FAA has introduced in AC120-XX in the NPA paragraph 9 and Appendix 3. Justification: Flexibility in means of compliance, harmonisation	This approach for providing DT based inspections and procedures for repairs is harmonised with proposed FAA AC material. However, the schedules proposed in FAA AC material can not be directly adopted as they refer to specific FAA rules and associated dates. Clarification is provided in paragraph 9 and Appendix 3.	
52.	Proposals 9. Repairs Assessment Programme	Airbus S.A.S.	- Same term should be used everywhere (see FAA NPRM / draft AC): "Structure that is susceptible to fatigue cracking and could contribute to a catastrophic failure." - Not clear why the terminology "Repairs are to be reassessed" is used, this may be misleading. If repairs have been assessed once, they don't need necessarily to be re-assessed. Justification: Clarification	**Accepted** AMC adds "Fatigue Critical Structure FCS", which has the definition proposed by the commenter. **Accepted** Text revised	(See revised text in Appendix to this document)
53.	Proposals 9. Repairs Assessment Programme	Airbus S.A.S.	<u>Page 22:</u> "Repairs and modifications to this structure were also required to meet these same standards". Paragraph from ARAC Report should be used here: "The damage tolerance concept have generally only been applied to the baseline structure. No system was in place requesting that repairs to Principal Structural Elements on these aircraft be evaluated to damage tolerance principles. The majority of these repairs were designed to an equal or better static strength requirement." Justification: Improve explanation	**Partially Accepted** The proposed ARAC wording is unclear as it does not distinguish between pre- and post- Amendment 45. Paragraph 9 has been restructured to add clarity.	(See revised text in Appendix to this document)
54.	Proposals Appendix 3, § 1.1	Airbus S.A.S.	Paragraph explains that Appendix 3 provides guidance to type certificate holders. Then, paragraph 3.6 explains that "the current repair assessment guidelines provided by the	**Accepted** The guidance is applicable to TCH and STC holders. The text is changed to	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			TCH do not generally apply to structure modified by a STC". Is there any guidance planned for STC holders? Justification: Same treatment expected for any DAH.	clarify this point.	
55.	Proposals Appendix 3, § 2.1	Airbus S.A.S.	- Instead of speaking about repair assessment guidelines document, it is proposed to mention Repair Assessment Program. - - "….all repairs to the fuselage pressure boundary….". This is obviously not inline with the affected structure mentioned in paragraph 9. Justification: Clarification, consistency	**Not Accepted** For consistency with AAWG/FAA proposal the text now refers to REGs, which may include RAPs. **Accepted** Other Appendix 3 text revised to suit.	(See revised text in Appendix to this document)
56.	Proposals Appendix 3, § 2.3	Airbus S.A.S.	In the title it should be avoided to use the term SSIP, which is a specific program discussed elsewhere. Justification: Clarification	**Accepted**	(See revised text in Appendix to this document)
57.	Proposals Appendix 3, § 2.6	Airbus S.A.S.	Last sentence: "In this case, the assessment of repairs is extended to all Primary Structure". Terminology should be consistent wit the one used in 25.571 post-Amendment 25-45. Justification: See our other comments requesting consistency in the definition or description of affected structure.	**Accepted**	(See revised text in Appendix to this document)
58.	Proposals Appendix 3, § 3.1	Airbus S.A.S.	It is not clear what the intent is of point (1). Justification: Clarification requested.	**Accepted** Further clarification given.	(See revised text in Appendix to this document)
59.	Proposals Appendix 3, § 3.5	Airbus S.A.S.	This section should be separated from the RAG section.	**Accepted** Sub-paragraphs 3.4, 3.5 and 3.6 are addressed in separate paragraphs.	(See revised text in Appendix to this document)
60.	Proposals Appendix 3, § 3.6	Airbus S.A.S.	The word DAH in this paragraph is leading to confusion, it would be clearer if it was stated STC/DAH (see also our	**Accepted**	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			comment on AMC § 12, related to the use of the term DAH). Justification: Clarification		
61.	Proposals Appendix 4, § 1	Airbus S.A.S.	The FAA have withdrawn AC 120-CPCP (referenced as AC 120-XX in NPA No 05-2006) and therefore, all reference to this AC have to be deleted from the NPA. Justification: Consistency	**Accepted**	(All references have been removed from AMC 20-20)
62.	Proposals Appendix 4, § 1	Airbus S.A.S.	"Maintenance Programme Development Document MSG-3" to be replaced by "ATA MSG-3 Scheduled Maintenance Development" or "MSG-3 document" quite simply. Justification: Accuracy	**Accepted**	(Text Amended as proposed by the commenter)
63.	Proposals Appendix 4, § 2	Airbus S.A.S.	- Definition of Level 1 corrosion should be harmonized with MSG-3 definition. Anyway the second part of the NPA definition should be read: "Corrosion damage that is local ~~but~~ ***and*** exceeds" - The NPA refers to MSG-3 as an acceptable means for a CPCP development. Since MSG-3 contains only a definition for corrosion Level 1, the NPA should be amended with a definition for corrosion Level 2 & 3, which is compatible with the MSG-3 Level 1 definition. - The terms "local corrosion" and "widespread corrosion" definitions bring no added value for the CPCP development, and are even confusing (widespread corrosion is not even part of the corrosion level definitions, as it was the case in former definitions). Justification: Consistency with MSG-3	**Partially Accepted** Not all affected aircraft will use MSG-3. Proposed change in definition accepted. **Not Accepted** The definitions in this AMC are within themselves compatible and with numerous existing CPCPs. (See also comment 78). **Not Accepted** The definition of corrosion Level 2 is revised to include widespread corrosion. The terms are relevant to the understanding of operators, TCH and Authorities in establishing the effectiveness of the CPCP.	(Definition of Level 1 corrosion amended as proposed by the commenter)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
64.	Proposals Appendix 4, § 3.1.2, TCH Developed Baseline Programme	Airbus S.A.S.	In the beginning of the paragraph, the following is stated: "The TCH initially evaluates service history of corrosion available for aircraft of similar design used in the same operational environment. The TCH develops a preliminary baseline programme based on this evaluation." That might be not possible to issue a Baseline Programme only based on service history for a new aircraft, as part of ICA. Therefore this paragraph should be revised to highlight that the first Baseline Programme could be developed using Environment Deterioration analysis, as detailed in MSG-3 Document. Justification: Clarification to address all possible cases	**Partially Accepted** It is accepted that the MSG-3 Environment Deterioration Analysis may be used in addition to service experience to develop the Baseline Programme. However, it is not anticipated that an aircraft will enter service without the development of a CPCP being able to draw on experience with previous designs. MSG-3 refers to CPCP.	APPENDIX 4 … 3.1.2. TCH developed Baseline Programme During the design development process, the TCH should provide a baseline programme as a part of the instructions for continued airworthiness. The TCH initially evaluates service history of corrosion available for aircraft of similar design used in the same operational environment. Where no similar design with service experience exists those structural features concerned should be assessed using the environmental damage approach of ATA MSG-3. The TCH develops a preliminary baseline programme based on this evaluation. The TCH then convenes a working group consisting of operator technical representatives and representatives of the participating competent authorities. The working group reviews the preliminary baseline programme to assure that the tasks, implementation thresholds, and repeat intervals are practical and assure the continued airworthiness of the aircraft. Once the working group review is complete, the TCH incorporates the baseline programme into the instructions for continued airworthiness. (See Figure A4-2)
65.	Proposals Appendix 5	Airbus S.A.S.	Although paragraph 11 in the proposed AMC defines that STC's need the same consideration as the basic aircraft, appendix 5 makes no reference to STC holders Justification: Consistency, need to address all design approval holders	**Noted** EASA will evaluate this under its future rulemaking task MDM.028.	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
66.	Proposals 10. Evaluation For Widespread Fatigue Damage	Airbus S.A.S.	Page 23: "It is expected that the original recommended actions stemming from a WFD evaluation will be focused on those structural items that are soon expected to reach a point at which MSD/MED is predicted to occur. As the fleet ages, more areas of the aircraft may reach the life at which MSD/MED is predicted to occur in those details, and the recommended service actions should be updated accordingly." The paragraph quoted above is confusing. Actions for WFD shall be defined to reach the LOV. If operation beyond LOV is anticipated, further evaluations are required. Justification: Clarification needed.	**Accepted** Text is removed and paragraph revised to improve clarity.	(See revised text in Appendix to this document)
67.	Proposals 10. Evaluation For Widespread Fatigue Damage	Airbus S.A.S.	Bottom of page 23: "In order to operate beyond the initial LOV a WFD evaluation should be performed for all applicable modified or repaired structure to determine if any new structure or any structure affected by the change is susceptible to WFD." The sentence quoted above is confusing. It is not clear whether it is meant structure repaired or modified due to WFD only? Or repaired/modified structure in general? Justification: Clarification needed.	**Accepted** (See also response to Comment 66)	(See revised text in Appendix to this document)
68.	Part C:Proposals, Chapter 4: Definition and Acronyms Paragraph 2 (DAH definition)	DGAC-F	The whole document and appendix should be reviewed to check the consistence of the acronyms DAH use with the definition developed in Part C, Chapter 4 (a). Justification: The written DAH definition is the following: "Design Approval Holder (DAH) is the holder of any design approval, Including type certificate, supplemental type certificate or repair approval". In this definition the DAH includes the TCH (Type Certificate Holder). In the document, the DAH and STC use can lead to a misunderstanding.	**Accepted** Use of terms has been reviewed.	(Changes made throughout AMC 20-20 to provide consistent use of acronyms).

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			For examples: -Part A, Chapter V-1-(a), paragraph 2:"TCH, or other design approval holder DAH" -Part C, Chapter 5, paragraph e-(i): "TCH,/DAH" -Appendix 1, Chapter 2, paragraph 2: "TCHs and other DAHs"		
69.	Part C:Proposals, Chapter 5 (a): General. Paragraph 1 :"The STG shall consist of the TCH, selected operator members and a representative from the Agency »	DGAC-F	**"**The STG shall consist of the TCH, selected operator members and *required Agency representatives/ experts".* Justification: The on going Ageing aircraft process has shown that, on the Agency side, two representatives are necessary for the STG meeting: • A maintenance representative for non mandatory maintenance aspects (MRB, CPCP ….). • A Structure specialist for the engineering and mandatory maintenance aspects (ALS, RAP size and proximity criteria, WFD assessment….).	**Noted** Agency representation will be programme specific and subject to applicable Agency policy and procedures.	N/A
70.	Part C:Proposals, Chapter 6, 7 . Paragraph a	DGAC-F	In these chapters and the related appendix a paragraph should develop the checks to be performed specifically on composite structure.	**Not Accepted** At this time, the Agency has not identified composite structure to have a generic ageing problem that is not addressed by certification practice. The scope of work performed by the AAWG has, to date, been solely concerned with metallic airframe structure. The Agency will continue to monitor such issues as the use and experience with composite materials increases.	N/A
71.	Part C:Proposals, Chapter 9 . Paragraph 3.	DGAC-F	The RAP:" should be incorporated into the aircraft's maintenance programme according to Part M requirements". The AMC proposal should specify if the RAP guideline document has to be approved by the agency or endorsed by the TCH DOA. Justification:	**Noted** REG will be approved by the Agency, unless otherwise agreed	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			In TCH RAP Guideline define the methodology, repair size and proximity criteria which require the authority approval to be implemented.		
72.	Part C:Proposals, Chapter 11- Paragraph 1	DGAC-F	"The operator should seek support from the STC holder (who has primary Responsibility for the design/certification of the STC), or an approved Design Organisation. » It should be systematic for the STC holders to develop and monitor its ageing aircraft program in collaboration with the TCH. Justification: An Ageing aircraft program developed for an independently of the TCH can lead to a lack of consistence particularly for the size and proximity criteria for repair and modification. It will be difficult to asses the interaction between a repair /modification performed by the TCH, with a modification performed by the STC holder, if they are monitored under two different processes. Consequently the STC evaluation should systematically be performed in close relationship with the TCH.	**Accepted**	(See revised text in Appendix to this document).
73.	Part C:Proposal, Chapter 12-Table .	DGAC-F	The WFD implementation date should be reviewed. Justification: The WFD implementation date is scheduled at 1 DSG/ESG. This implementation date can not be consistent with a SMP or an inspection that need to be performed before the DSG/ESG.	**Partially Accepted** (See also response to comment 3)	(See revised text in Appendix to this document)
74.	Part C:Proposals, Chapter 12- . Paragraph 6	DGAC-F	"A period of up to one year may be allowed to incorporate the necessary actions into the operator's maintenance programme » The incorporation period allowed to the operator expressed in calendar is not suitable for fatigue tasks. Justification: The incorporation period must be indicated in cycles, hours, flight cycles or calendar period, to ensure a proper implementation as for short range, medium and long range aircrafts.	**Not accepted** The period of incorporation into the MM is in line with Part-M. Implementation of the inspections and other procedures is however addressed by the TCH in appropriate fractions of DSG.	N/A
75.	A. Explanatory Note IV. Paragraph 11.	British Airways	Suggest delete the phrase '…the technical advice provided in this proposed AMC is considered mature…'	**Noted** This text is not part of the proposed	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			Justification: The NPA is generally based on Advisory Circular (AC) and guidance material issued by the Federal Aviation Administration (FAA). Certain ageing aircraft issues are still in development by the FAA and Notice of Proposed Rule Making (NPRM) and accompanying AC's have recently been issued eg Damage Tolerance Data for Repairs and Alterations (Docket No. FAA-2005-21693: Notice No. 05-11 issued 21 April 2006) and Aging Aircraft Program: Widespread Fatigue Damage (Docket No. FAA-2006-24281: Notice No. 06-04 issued 18 April 2006). The information and guidance contained in the proposed AMC is significantly different from that contained in the NPRM's cited above and their accompanying AC's. British Airways is aware of the Agency's intention to '..reflect work going on elsewhere, most notably in the USA..' (AMC section A. VI) but as the information contained in the AMC predates the NPRM's and AC's, the statement that the technical advice contained in the AMC is 'mature' is considered to be inaccurate and misleading to industry.	AMC It is believed that the technical principles on which this AMC is based are mature, having been further revised to address specific aspects for repair evaluation.	
76.	Proposals Appendix 2	British Airways	Either, Withdraw Appendix 2 until industry wide guidance material is available. Or, Add the following note to Appendix 2, paragraph 1. Introduction, 'Although this appendix is based on FAA draft AC91-56B it is recognised this is not harmonised and will be subject to change'. Justification: Whilst British Airways supports the need for Ageing Aircraft Programmes, we believe the industry is best served by harmonised requirements. As stated in the NPA proposal, the AMC material is not currently harmonised with the proposals in the USA to preclude Widespread Fatigue Damage (WFD). Docket No. FAA-2006-24281: Notice No. 06-04 issued 18 April 2006 and AC120-YY refers. Appendix 2 is based on draft FAA Advisory Circular 91-56B which was not incorporated by the FAA. Until harmonised guidance can be established, we recommend Appendix 2 of the AMC to be withdrawn.	**Not Accepted** The guidance is principally provided to TCHs and other DAHs in order to allow them to perform WFD evaluations of their existing structure. The technical advice provided in the NPA is being published at this time to prevent any avoidable delay in making this material available within the public domain and to encourage its use by industry in developing ageing aircraft structures plans on a voluntary basis. Proposals for ISP/SMP and LOV submitted by a DAH that follow this AMC are acceptable to the Agency. Subject to publication of FAA rules, further harmonisation will be considered in the subsequent EASA rulemaking task MDM.028.	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
77.	Proposals Appendix 3	British Airways	Recommend amendment to the whole of Appendix 3 to reflect the guidance contained in FAA Advisory Circular AC120-XX. This should be prefixed with the statement 'This appendix follows FAA AC 120-73 and AC120-XX on the same subject and contains the same technical text.' Justification: Appendix 3 is very similar to FAA AC 120-73 – 'Damage Tolerance Assessment of Repairs to Pressurised Fuselages'. AC120-XX make reference to the Repair Assessment Guidelines documents (RAG's) developed under FAA AC120-73 as being acceptable as a means of compliance (pre CFR amendment 45 aeroplanes). Therefore the AC120-73 is supplemented by AC120-XX. The guidance provided by AC120-XX represents an industry level approach to the problem of Damage Tolerance analysis of repairs at an aircraft level not just the pressure boundary. The document was developed by an industry working group that included The Agency. For the AMC to provide a harmonised and more comprehensive guidance, the content of AC120-XX should be included in Appendix 3 or added in a new appendix to the AMC.	**Partially Accepted** Appendix 3 has been expanded to include elements of draft FAA AC 120-xx. However, due to differences in the rulemaking framework and FAA and EASA procedures, substantial editorial changes have had to be incorporated. The intent is to harmonise the essential technical content.	(See revised text in Appendix to this document)
78.	Proposals Appendix 4, Section 2	British Airways	Suggest the inclusion of Widespread corrosion in the definition for level 2 corrosion. Level 2 definition to read, '**Level 2 Corrosion**. *Level 2 corrosion* is that corrosion occurring between any two successive corrosion inspections task that requires a single rework or blend out which exceeds the allowable limit. OR, Corrosion occurring between successive inspections that is widespread and requires a single blend-out approaching allowable rework limits. A finding of *Level 2 corrosion* requires repair, reinforcement, or complete or partial replacement of the applicable structure.' Note: Added text is underlined. Justification:	**Accepted** Definition is further expanded to clarify the relationship with Level 1 corrosion. See also response to Comment 63	APPENDIX 4 … 2. DEFINITIONS … **Level 2 Corrosion**. *Level 2 corrosion* is … limit. OR, Corrosion occurring between successive inspections that is widespread and requires a single blend-out approaching allowable rework limits. i.e. it is not light corrosion as provided for in Level 1. …

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			For consistency with the ageing 11 models, (pre CFR amendment 45) mandatory corrosion programmes, and to address corrosion that is still within limits but has occurred at multiple locations, widespread corrosion should be added to the Level 2 definition. B747 FAA AD90-25-05 mandates Boeing Document Number D6-36022 'Aging Airplane Corrosion Prevention and Control Program, Model 747'. This document section 1.0 contains corrosion level definitions. The level 2 definition contains Widespread corrosion. It is noted that the same comment was made previously to NPA20-10 however the response comment (NPA section D. Appendix 4, paragraph 10) makes reference to FAA draft AC120-CPCP. British Airways points out that the AC has subsequently been withdrawn and therefore, in line with our previous comment, believe widespread corrosion should be added to the level 2 definition.		
79.	A. Explanatory Note V. 2. a. And V. 5. c.	British Airways	Option 3 discusses a further rulemaking task. British Airways supports the harmonisation of Ageing Aircraft programmes with those under development in the USA. British Airways requests the Agency consider detailing arrangements where operators and DAH's can use FAA guidance material as an alternative means of compliance to future Agency rulemaking associated with ageing aircraft where feasible. Justification: This will facilitate the transfer of aircraft between members of the European Union and the USA in addition to providing conditions where entities can trade and compete on equal terms.	**Noted** The mutual acceptance of AMC will be dependent on future developments in both EASA and FAA rulemaking.	N/A
80.	C. Proposal, Paragraph 10.	British Airways	'The TCH, in conjunction with operators, and in some cases the operators themselves are expected to initiate development of a maintenance programme with the intent of precluding operation with WFD'. British Airways believe operators are not in a position to develop the maintenance programme with the intent of precluding WFD and believe the statement '… and in some cases the operators themselves…' should be removed. If the Agency decides to retain the statement, British	**Accepted** (See also comment 8)	(See revised text in Appendix to this document)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			Airways suggests a more expansive statement is provided detailing the circumstances an operator would be expected to initiate development of the maintenance programme. Justification to delete the statement: British Airways believe there are limited resources available to operators, outside the Type Certificate Holder (TCH), that are approved to perform the required WFD analysis. British Airways propose the TCH produce a guideline document that would allow Design Approval Holders (DAH) to accomplish a WFD analysis. This would align with FAA draft AC120-YY. Justification for amendment to the statement: It is unclear when an operator would be expected to initiate development of a maintenance programme. If the intention of the statement was to address situations where the TCH will not or cannot support maintenance programme development, it is suggested that the Agency provide additional information to the paragraph to clarify.		
81.	Section C, Paragraph 9 – Repairs Assessment Programme	Transport Canada	TCCA proposes that guidance should also be provided with respect to safe life items such as landing gears.	**Accepted** Further clarification is provided in a note added to the table in paragraph 12.	(See revised text in Appendix to this document)
82.	Section C, Appendix 2, Paragraph 4.2 – Structure susceptible to MSD/MED	Transport Canada	TCCA proposes that the forward canopy/windshield area, which is critical for both fatigue and discrete source damage (bird strike), be included in the structural evaluation for WFD.	**Noted** The text of Appendix 2 has been elaborated to clarify that the examples are not exhaustive and it is the responsibility of the TCH to determine the potentially affected structural areas. Further examples may be considered for inclusion in future revisions of the AMC. (See also comment 34).	N/A
83.	Section C, Appendix 2, Paragraph 4.3.1 – Determination of WFD average behaviour in the fleet	Transport Canada	TCCA proposes that elaboration of the scope and intent of "Complete Review and Service History" is required.	**Accepted** The text is amended to add clarification	(See response to Comment 35)
84.	Section C, Appendix 2, Paragraph 4.4.1 –	Transport Canada	TCCA believes that fatigue testing is required to establish any aircraft model ESG. Analysis alone without support of	**Noted** Clarification has been provided on the	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
	Period of Evaluation Validity		test evidence is not considered adequate. For repairs, fatigue testing may not be required if OEM test data/guidelines allows for a conservative assessment.	importance of test evidence. (See also comment 89).	
85.	Section C, Appendix 3, Paragraph 3.2 - Repair assessment methodology	Transport Canada	Guidance should be provided for categorization of repairs in respect to its application to ESG.	**Accepted** Text added for clarification.	(See revised text in Appendix to this document)
86.	General Comment	Transport Canada	All regularly scheduled passenger aircraft should be the subject of the aging aircraft initiative regardless of the weight category. There are significant differences between the NPA and guidance material drafted by the FAA and the AAWG which are not based on regulatory structure. In respect to making compliance far less onerous on all effected parties, these differences should be reduced or eliminated if possible.	**Noted** Rules relating to this AMC will be developed separately in EASA Rulemaking task MDM.028. While no policy decision has yet been taken by EASA on the need for manufacturers to develop ageing structures programmes for aircraft other than large aircraft, all stakeholders are encouraged to consider the technical guidance material contained in the AMC. Amendments to the text have been made to enhance harmonisation.	N/A
87.	General Comment	Boeing Commercial Airplanes	Boeing appreciates the opportunity to comment on this important EASA Notice of Proposed Action (NPA). We generally support the concepts discussed in this document. We are concerned, however, that the NPA has not been harmonized with recent FAA initiatives. Specifically, the FAA has issued two significant notices of proposed rulemaking (NPRM) after this NPA was written that materially affect it: the Aging Airplane Safety Final Rule(AASFR)/Damage Tolerance NPRM and the Widespread Fatigue Damage (WFD) NPRM. Boeing recommends that EASA work closely with the FAA to ensure that the standards are harmonized Justification: Having two different standards to comply with is a substantial burden on the industry and could create a potential safety issue for operators seeking compliance.	**Noted** Amendments to the text have been made to enhance harmonisation. EASA rulemaking task MDM.028 will develop the rules governing ageing aircraft programmes in Europe and their applicability, and will consider harmonisation aspects with other regulatory authorities.	N/A
88.	Proposals Appendices 1, 3, 4,	Boeing Commercial	While we assume that that programs previously published by the Type Certificate Holders (TCH) in support of similar	**Not Accepted** The AMC is not the place to issue	N/A

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
	and 5:	Airplanes	FAA initiatives would be acceptable to demonstrate compliance to the programs outlined in Appendices 1, 3, 4, and 5, it is not expressly stated in the NPA. We request that a statement be added to address this. [We have excluded Appendix 2, which deals with programs to preclude Widespread Fatigue Damage (WFD), since the details of the WFD program have yet to be formalized.] Justification: Clarity of the NPA's intent.	statements of compliance. Previously published and approved SSIDs, CPCPs RAGs and SB review/mandatory modification documentation can be used to support an effective ageing aircraft programme. This will be subject to their currency, scope and the proposed operational life of the type.	
89.	Proposals Appendix 2, Paragraph 4.4.1, "Period of Evaluation Validity"	Boeing Commercial Airplanes	Boeing supports the development of operational limits when a high-time airplane reaches the Design Service Goal (DSG), and not before. We request that the NPA be revised to reflect that an airplane's "initial operational limit" (IOL) is developed based on Fatigue Test Evidence. Justification: Appendix 2, Paragraph 4.4.1, discusses developing an extension to the airplane's DSG, and using that extension for the determination of the necessary maintenance actions required for preclusion of WFD. Boeing notes that the concept, as presented in the NPA, has evolved significantly since this NPA was written. We consider that this concept, as written, may lead to airplanes being operated well past the point where fatigue test evidence supports continued safe operation. We recommend that EASA consider revisiting this important concept using the following information: There were two landmark events that focused on the manufacturers' and operators' response to mitigating the future threat of WFD. The first was a commitment by the industry during the "The International Conference on Aging Airplanes," held 1-3 June 1988. Several airline/manufacturer recommendations were presented, including Recommendation 3, which stated: *"Continue to pursue the concept of teardown of the oldest airline aircraft to determine structural condition, and conduct fatigue tests of older airplanes per attached proposal."* The second event was the National Transportation Safety Board (NTSB) Recommendation 89067 that requested the	**Partially Accepted** EASA sees the DSG as the latest point at which the results of the WFD evaluation should be implemented. The evaluation must have therefore been initiated well in advance of the lead aircraft reaching its DSG. The LOV of the maintenance programme, which EASA agrees should be developed based on fatigue test evidence, should be published as soon as the relevant test evidence has been processed.	APPENDIX 2 … 4.4.1 Period of WFD Evaluation Validity: At whatever point the WFD evaluation is made, it should support the limit of validity (LOV) of the maintenance programme. Consistent with the use of test evidence to support individual SMPs, as described above in paragraph 4.3.10, the LOV of the maintenance programme should be based on fatigue test evidence. The initial WFD evaluation of the complete airframe will typically cover a significant forward estimation of the projected aircraft usage beyond its DSG, also known as the "proposed ESG." An evaluation through at least an additional twenty-five percent of the DSG would provide a realistic forecast, with reasonable planning time for necessary maintenance action. However, it may be appropriate to adjust the evaluation validity period depending on issues such as: (Additional changes made to Paragraph 10 of the main body of AMC 20-20. See Appendix below for details)

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			FAA to pursue necessary tasks to ensure continued safe operations with probable WFD. The NTSB noted that WFD was a contributing cause to the April 1988 Aloha Airlines B737 accident. The NTSB specifically recommended extended fatigue testing for older airplanes. In November 1989, the FAA responded by issuing a draft Special Federal Aviation Regulation (SFAR) on "Two Lifetime Fatigue Test For Older Airplanes." As a result and in support of the FAA, the Airworthiness Assurance Working Group (AAWG) published three reports on the subject of WFD threat mitigation under tasks issued by the FAA's Aviation Rulemaking Advisory Committee (ARAC). These initiatives were instrumental in the FAA being able to withdraw the SFAR requiring older airplanes to have a two-lifetime fatigue test. In 2001, the AAWG provided ARAC and the FAA with a proposed rule and Advisory Circular (AC) on this subject. While it is not specifically spelled out in the submitted documents, the industry-supported and -proposed "Limit of Validity (LOV)" was based on the establishment of this value, apart from the WFD evaluation of the structure, using the objective standard of fatigue test evidence (FTE). The concept of FTE was developed in the three AAWG reports submitted to ARAC, and consists of data collected and analyzed from one or more of the following sources: 1. Full-scale fatigue test with or without tear down 2. Full-scale component tests with or without tear down 3. Tear down and refurbishment of a high time airplane 4. Less-than-full-scale component tests 5. Fleet Proven Life Techniques, including high-time airplane surveys 6. Evaluation of in-service problems experienced by other airplanes with similar design concepts 7. Analysis methods that have been parametrically developed to reflect fatigue test and service experience. The details concerning each of these approaches are contained in the AAWG reports mentioned earlier.		

Cmt #	Para	Comment provider	Comment/Justification	Response	Resulting text
			As indicated above, the AAWG did not offer a concise definition of LOV or how it was to be determined. In the process of developing the Boeing programs for preclusion of WFD, the following definitions were created: • LOV is a point (usually measured in cycles) in the structural life of an airplane where there is significantly increased risk of uncertainties in structural performance and the probable development of WFD. • LOV represents an operational limit based on the engineering data that supports the maintenance program. Therefore, all identified service actions are required for operation up to LOV. Boeing's position is that an IOL needs to be established based on fatigue test evidence, apart from the analytical work to determine maintenance actions. The manufacturers and operators, as a whole, support a limit that is both appropriate and correct, but not one that is arbitrarily based on the results of the analytical assessment of design details. There is concern that a limit set too low is just as problematic as a value set too high. In the first case, if the rules and requirements are set so as to make it extremely difficult to extend the limit, airplanes will be grounded needlessly. In the second case, the likelihood of another accident where WFD is assessed as a contributing cause may be increased. If the limit is established based on empirical fatigue test evidence, it has a technically firm base that has been established and has been used successfully for years. Further, it acts as a "safety net" for the analytical assessment. Boeing presented this approach both to airlines and the FAA on March 2003, and separately to the FAA on February 2003 and September 2004. The airlines involved in the March 2003 meeting provided very positive feedback on this concept and how it would be implemented.		

The following is revised text to AMC 20-20 Paragraphs 9-12 inclusive and Appendix 3 (+ its 5 Annexes), following disposition of public comments:

9. REPAIR EVALUATION GUIDELINES AND REPAIR ASSESSMENT PROGRAMMES

Early fatigue or fail-safe requirements (pre-Amdt 45) did not necessarily provide for timely inspection of critical structure so that damaged or failed components could be dependably identified and repaired or replaced before a hazardous condition developed. Furthermore, it is known that application of later fatigue and damage tolerance requirements to repairs was not always fully implemented according to the relevant certification bases.

Repair Evaluation Guidelines (REG) are intended to assure the continued structural integrity of all relevant repaired and adjacent structure, based on damage-tolerance principles, consistent with the safety level provided by the SSID or ALS as applied to the baseline structure. To achieve this, the REG should be developed by the TCH and implemented by the Operator to ensure that an evaluation is performed of all repairs to structure that is susceptible to fatigue cracking and could contribute to a catastrophic failure.

Even the best maintained aircraft will accumulate structural repairs when being operated. The AAWG conducted two separate surveys of repairs placed on aircraft to collect data. The evaluation of these surveys revealed that 90% of all repairs found were on the fuselage, hence these are a priority and RAPs have already been developed for the fuselage pressure shell of many large transport aeroplanes not originally certificated to damage-tolerance requirements. 40% of the repairs were classified as adequate and 60% of the repairs required consideration for possible additional supplemental inspection during service. Nonetheless, following further studies by AAWG working groups it has been agreed that repairs to all structure susceptible to fatigue and whose failure could contribute to catastrophic failure will be considered. (Ref. AAWG Report: Recommendations concerning ARAC taskings FR Doc.04-10816 Re: Aging Airplane safety final rule. 14 CFR 121.370a and 129.16.)

As aircraft operate into high cycles and high times the ageing repaired structure needs the same considerations as the original structure in respect of damage-tolerance. Existing repairs may not have been assessed for damage-tolerance and appropriate inspections or other actions implemented. Repairs are to be assessed, replaced if necessary or repeat inspections determined and carried out as supplemental inspections or within the baseline zonal inspection programme. A damage-tolerance based inspection programme for repairs will be required to detect damage which may develop in a repaired area, before that damage degrades the load carrying capability of the structure below the levels required by the applicable airworthiness standards.

The REG should provide data to address repairs to all structure that is susceptible to fatigue cracking and could contribute to a catastrophic failure. The REG may refer to the RAP, other existing approved data such as SRM and SBs or provide specific means for obtaining data for individual repairs.

Documentation such as the Structural Repair Manual and service bulletins needs to be reviewed for compliance with damage-tolerance principles and be updated and promulgated consistent with the intent of the REGs.

Where repair evaluation guidelines, repair assessment programmes or similar documents have been published by the TCH they should be incorporated into the aircraft's maintenance programme according to Part-M requirements.

This fatigue and damage-tolerance evaluation of repairs will establish an appropriate inspection programme or a replacement schedule if the necessary inspection programme is too demanding or not possible. Details of the means by which the REGs and the maintenance programme may be developed are incorporated in Appendix 3.

10. LIMIT OF VALIDITY OF THE MAINTENANCE PROGRAMME AND EVALUATION FOR WIDESPREAD FATIGUE DAMAGE

a) Initial WFD Evaluation and LOV

All fatigue and damage tolerance evaluations are finite in scope and also therefore in their long term ability to ensure continued airworthiness. The maintenance requirements that evolve from these evaluations have a finite period of validity defined by the extent of testing, analysis and service experience that make up the evaluation and the degree of associated uncertainties. **Limit of validity (LOV)** is the period of time, expressed in appropriate units (e.g. flight cycles) for which it has been shown that the established inspections and replacement times will be sufficient to allow safe operation and in particular to preclude development of widespread fatigue damage. The LOV should be based on fatigue test evidence.

The likelihood of the occurrence of fatigue damage in an aircraft's structure increases with aircraft usage. The design process generally establishes a design service goal (DSG) in terms of flight cycles/hours for the airframe. It is generally expected that any cracking that occurs on an aircraft operated up to the DSG will occur in isolation (i.e., local cracking), originating from a single source, such as a random manufacturing flaw (e.g., a mis-drilled fastener hole) or a localised design detail. It is considered unlikely that cracks from manufacturing flaws or localised design issues will interact strongly as they grow. The SSIP described in paragraph 6 and Appendix 1 of this AMC are intended to find this form of damage before it becomes critical. Unfortunately as aircraft have approached and exceeded their DSG only some SSIPs have also addressed Widespread Fatigue Damage (WFD) as described below.

With extended usage, uniformly loaded structure may develop cracks in adjacent fastener holes, or in adjacent similar structural details. The development of cracks at multiple locations (both MSD and MED) may also result in strong interactions that can affect subsequent crack growth, in which case the predictions for local cracking would no longer apply. An example of this situation may occur at any skin joint where load transfer occurs. Simultaneous cracking at many fasteners along a common rivet line may reduce the residual strength of the joint below required levels before the cracks are detectable under the maintenance programme established at time of certification. Furthermore, these cracks, while they may or may not interact, can have an adverse effect on the large damage capability (LDC) of the airframe before the cracks become detectable.

The TCH's role is to perform a WFD evaluation and, in conjunction with operators, is expected to initiate development of a maintenance programme with the intent of precluding operation with WFD. Appendix 2 provides guidelines for development of a programme to preclude the occurrence of

WFD. Such a programme must be implemented before analysis, tests, and/or service experience indicates that widespread fatigue damage may develop in the fleet. The operator's role is to provide service experience, to help ensure the practicality of the programme and to ensure it is implemented effectively.

The results of the WFD evaluation should be presented for review and approval to the Agency for the aircraft model being considered. Since the objective of this evaluation is to preclude WFD from the fleet, it is expected that the results will include recommendations for necessary inspections or modification and/or replacement of structure, as appropriate to support the LOV. It is expected that the TCH will work closely with operators in the development of these programmes to assure that the expertise and resources are available when implemented.

The Agency's review of the WFD evaluation results will include both engineering and maintenance aspects of the proposal. The Agency expects any actions necessary to preclude WFD (including the LOV) to be incorporated in maintenance programmes developed in compliance with Part-M. Any service bulletins or other service information publications revised or issued as a result of in-service MSD/MED findings resulting from implementation of these programmes may require separate AD action.

In the event an acceptable WFD evaluation cannot be completed on a timely basis, the Agency may impose service life, operational, or inspection limitations to assure structural integrity of the subject type design.

b) Revision of WFD evaluation and LOV

New service experience findings, improvements in the prediction methodology, better load spectrum data, a change in any of the factors upon which the WFD evaluation is based or economic considerations, may dictate a revision to the evaluation. Accordingly, associated new recommendations for service action should be developed including a revised LOV, if appropriate, and submitted to the Agency for review and approval of both engineering and maintenance aspects.

In order to operate an individual aircraft up to the revised LOV, a WFD evaluation should also be performed for all applicable modified or repaired structure to determine if any new structure or any structure affected by the change is susceptible to WFD. This evaluation should be conducted by the DAH for the changed structure in conjunction with the operator prior to the aircraft reaching its existing LOV. The results together with any necessary actions required to preclude WFD from occurring before the aircraft reaches the revised LOV should be presented for review and approval by the Agency.

This process may be repeated such that, subject to Agency approval of the evaluations, a revised LOV may be established and incorporated in the operator's maintenance programme, together with any necessary actions to preclude WFD from occurring before the aircraft reaches the revised LOV.

The LOV and associated actions should be incorporated in the ALS. For an aircraft without an ALS, it may be appropriate for the DAH to create an ALS and to enter the LOV in the ALS, together with a clear identification of inspections and modifications required to allow safe operation up to that limit.

In any case, should instructions provided by the DAH in their ICA (e.g. maintenance manual revision) clearly indicate that the maintenance

programme is not valid beyond a certain limit, this limit and associated instructions must be adhered to in the operator's maintenance programme as approved by the competent authority under Part-M requirements, unless an Agency approved alternative programme is incorporated and approved.

11. SUPPLEMENTAL TYPE-CERTIFICATES AND MODIFICATIONS

Any modification or supplemental type-certificates (STC) affecting an aircraft's structure could have an effect on one or all aspects of ageing aircraft assessment as listed above. Such structural changes will need the same consideration as the basic aircraft and the operator should seek support from the STC holder (who has primary responsibility for the design/certification of the STC), or an approved Design Organisation, where, for example an STC holder no longer exists. Appendix 3 provides further details.

STC holders are expected to review existing designs that may have implications for continued airworthiness in the context of ageing aircraft programmes and collaborate with operators and TCHs, where appropriate.

12. IMPLEMENTATION

In compliance with Part-M, operators must amend their current structural maintenance programmes to comply with and to account for new and/or modified maintenance instructions promulgated by the DAH.

From the industry/Agency discussions leading to the definition of the programmes detailed in paragraphs 6 to 10, above, appropriate implementation times have emerged. These programme implementation times are expressed as a fraction of the aircraft model's DSG.

Programme	**Affected Structure***	**Implementation**
CPCP	All Primary Structure	½ DSG
SSID	PSEs as defined in CS25.571	½ DSG
SB-Review	SBs that address a potentially unsafe structural condition	¾ DSG
REGs and RAPs	Repairs to fatigue critical structure (FCS).	¾ DSG
WFD	Primary structure susceptible to WFD	1 DSG

* Note: The certification philosophy for safe-life items under CS 25.571 necessitates no further investigation under ageing aircraft programmes that would provide damage tolerance based inspections. However, this does not exclude safe-life items such as landing gear from the CPCP and SB Review or from re-assessment of their safe-life if the aircraft usage or structural loading is known to have changed.

In the absence of other information prior to the implementation of these programmes the limit of validity of the existing maintenance programmes should be considered as the DSG.

Programme implementation times in flight hours, flight or landing cycles, or calendar period, as appropriate, should be established by the TC/STC Holder based on the above table.

A period of up to one year may be allowed to incorporate the necessary actions into the operator's maintenance programme once they become available from the DAH. Grace periods for accomplishment of actions beyond threshold should address the level of risk and for large fleets the practicalities of scheduling maintenance activities. Typically, for maintenance actions beyond threshold, full implementation of these maintenance actions across the whole fleet should be accomplished within 4 years of the operator's programme being approved by the competent authority.

Unless data is available on the dates of incorporation of repairs and modifications [STCs] they will need to be assumed as having the same age as the airframe.

APPENDIX 3

Guidelines for establishing instructions for continued airworthiness of structural repairs and modifications.

1. INTRODUCTION

With an SSID, CPCP and LOV in place an individual aircraft may still not meet the intended level of airworthiness for ageing aircraft structures. Repairs and modifications to aircraft structure also require investigation. For large transport aeroplanes, all FCS should be assessed using some form of damage-tolerance based evaluation. A regulatory requirement for damage-tolerance was not applied to aeroplane designs type certificated before 1978, and even after this time, implementation of DTE on repairs and modifications was not consistent. Therefore the damage-tolerance characteristics of repairs and modifications may vary widely and are largely unknown. In view of these concerns it is necessary to perform an assessment of repairs and modifications on existing aircraft to establish their damage-tolerance characteristics.

2. DEFINITIONS

For the purposes of this Appendix, the following definitions apply:

- **Damage Tolerance Data** are damage tolerance evaluation (DTE) documentation and the damage tolerance inspections (DTIs).

- **Damage Tolerance Evaluation (DTE)** is a process that leads to a determination of maintenance actions necessary to detect or preclude fatigue cracking that could contribute to a catastrophic failure. As applied to repairs and modifications, a DTE includes the evaluation of the repair or modification and the fatigue critical structure affected by the repair or modification. The process utilises the damage tolerance procedures as described in CS-25 AMC 25.571.

- **Damage Tolerance Inspections (DTIs)** are the inspections developed as a result of a DTE. A DTI includes the areas to be inspected, the inspection method, the inspection procedures, including acceptance and rejection criteria, the threshold, and any repetitive intervals associated with those inspections. The DTIs may specify a time limit when a repair or modification needs to be replaced or modified. If the DTE concludes that DT-based supplemental structural inspections are not necessary, the DTI documentation should include a statement that the normal zonal inspection programme is sufficient.

- **Fatigue Critical Baseline Structure (FCBS)** is the baseline structure of the aircraft that is classified as fatigue critical structure.

3. ESTABLISHMENT OF A DAMAGE-TOLERANT BASED INSPECTION PROGRAMME FOR REPAIRS AFFECTING FCS

Repairs are a concern on older aircraft because of the possibility that they may develop, cause, or obscure metal fatigue, corrosion, or other damage during service. This damage might occur within the repair itself or in the adjacent structure and might ultimately lead to structural failure.

In general, repairs present a more challenging problem to solve than the original structure because they are unique and tailored in design to correct particular damage to the original structure. Whereas the performance of the original structure may be

predicted from tests and from experience on other aircraft in service, the behaviour of a repair and its effect on the fatigue characteristics of the original structure are generally known to a lesser extent than for the basic un-repaired structure.

Repairs may be of concern as time in service increases for the following reasons:

As aircraft age, both the number and age of existing repairs increase. Along with this increase is the possibility of unforeseen repair interaction, failure, or other damage occurring in the repaired area. The continued operational safety of these aircraft depends primarily on a satisfactory maintenance programme (inspections conducted at the right time, in the right place, using the most appropriate technique or in some cases replacement of the repair). To develop this programme, a damage-tolerance evaluation of repairs to aircraft structure is essential. The longer an aircraft is in service, the more important this evaluation and a subsequent inspection programme becomes.

The practice of repair justification has evolved gradually over the last 20 plus years. Some repairs described in the aircraft manufacturers' SRMs were not designed to fatigue and damage-tolerance principles. (Ref. AAWG Report: Recommendations concerning ARAC taskings FR Doc.04-10816 Re: Aging Aircraft Safety Final Rule. 14 CFR 121.370a and 129.16.) Repairs accomplished in accordance with the information contained in the early versions of the SRMs may require additional inspections if evaluated using the fatigue and damage-tolerance methodology.

Damage-tolerance is a structural design and inspection methodology used to maintain safety considering the possibility of metal fatigue or other structural damage (i.e., safety is maintained by adequate structural inspection until the damage is repaired). One prerequisite for the successful application of the damage tolerance approach for managing fatigue is that crack growth and residual strength can be anticipated with sufficient precision to allow inspections to be established that will detect cracking before it reaches a size that will degrade the strength below a specified level. A damage-tolerance evaluation entails the prediction of sites where fatigue cracks are most likely to initiate in the aircraft structure, the prediction of the crack path and rates of growth under repeated aircraft structural loading, the prediction of the size of the damage at which strength limits are exceeded, and an analysis of the potential opportunities for inspection of the damage as it progresses. This information is used to establish an inspection programme for the structure that will be able to detect cracking that may develop before it precipitates a major structural failure.

The evidence to date is that when all critical structure is included, damage-tolerant based inspections and procedures, including modification and replacement, provide the best assurance of continued structural integrity that is currently available. In order to apply this concept to existing transport aeroplanes, the competent authorities issued a series of ADs requiring compliance with the first supplemental inspection programmes resulting from application of this concept to existing aeroplanes. Generally, these ADs require that operators incorporate SSIDs into their maintenance programmes for the affected aeroplanes. These documents were derived from damage-tolerance assessments of the originally certificated type designs for these aeroplanes. For this reason, the majority of ADs written for the SSIP did not attempt to address issues relating to the damage-tolerance of repairs that had been made to the aeroplanes. The objective of this programme is to provide the same level of assurance for areas of the structure that have been repaired as that achieved by the SSIP for the baseline structure as originally certificated.

The fatigue and damage-tolerance evaluation of a repair would be used in an assessment programme to establish an appropriate inspection programme, or a replacement schedule if the necessary inspection programme is too demanding or not possible. The objective of the repair assessment is to assure the continued structural integrity of the

repaired and adjacent structure based on damage-tolerance principles. Any identified supplemental inspections are intended to detect damage which may develop in a repaired area, before that damage degrades the load carrying capability of the structure below the levels required by the applicable airworthiness standards.

The following guidance is intended to help TCHs and operators establish and implement a damage-tolerant based maintenance programme for repairs affecting FCBS. Additional guidance for repairs to modified structure is provided in paragraph 4.

3.1 Overview of the TCH tasks for repairs that may affect FCBS

(a) Identify the affected aircraft model, models, aircraft serial numbers, and DSG stated as a number of flight cycles, flight hours, or both.

(b) Identify the certification level.

(c) Identify and develop a list of the FCBS to be made available to operators.

(d) Submit the list of FCBS to the Agency for approval, and make it available to operators.

(e) Review and update published repair data as necessary.

(f) Submit any new or updated published repair data to the Agency for approval, and make it available to operators.

(g) Develop Repair Evaluation Guidelines (REGs) and submit them to the Agency for approval, and make the approved REGs available to operators.

3.2. Certification Level

In order to understand what data is required, the TCH should identify the amendment level of the original aircraft certification relative to CS 25.571. The amendment level is useful in identifying what DT Data may be available and what standard should be used for developing new DT Data. The two relevant aircraft groups are:

Group A - Aircraft certified to CAR 4b or § 25.571, prior to Amendment 25-45 or equivalent. These aircraft were not evaluated for damage tolerance as part of the original type certification. Unless previously accomplished, existing and future repairs to FCBS will need DT Data developed.

Group B - Aircraft certified to § 25.571, Amendment 25-45 or later. These aircraft were evaluated for damage tolerance as part of the original type certification. As noted in the introduction, some of these repairs may not have repair data that includes appropriate DTI and the TCH and operators may need to identify and perform a DTE of these repairs and develop DTI.

3.3. Identifying Fatigue Critical Baseline Structure (FCBS)

TC Holders should identify and make available to operators a list of baseline structure that is susceptible to fatigue cracking that could contribute to a catastrophic failure. The term "baseline" refers to the structure that is designed under the original type certificate or amended type certificate for that aircraft model

(that is, the as delivered aircraft model configuration). Guidance for identifying this structure can be found in CS-25 AMC 25.571. This structure is referred to in this AMC as "fatigue critical baseline structure." The purpose of requiring identification and listing of fatigue critical structure (FCS) is to provide operators with a tool that will help in the evaluating existing and future repairs or modifications. In this context, fatigue critical structure is any structure that is susceptible to fatigue that could contribute to a catastrophic failure, and should be subject to a damage-tolerance evaluation (DTE). The DTE would determine if DTIs need to be established for the repaired or modified structure. For the purpose of this AC, structure that is modified after aircraft delivery from the TCH is not considered to be "baseline" structure.

CS 25.571(a) states "An evaluation of the strength, detail design, and fabrication must show that catastrophic failure due to fatigue…will be avoided throughout the operational life of the aircraft. This evaluation must be conducted…for each part of the structure which could contribute to a catastrophic failure (such as wing, empennage, control surfaces, fuselage, engine mounts, and their related primary attachments)…." When identifying FCBS, it is not sufficient to consider only that structure identified in the supplemental structural inspection document (SSID) or airworthiness limitation section (ALS). Some SSIDs or ALSs might only include supplemental inspections of the most highly stressed elements of the FCBS. A SSID and ALS often refer to this structure as a Principal Structural Element (PSE). If repaired, other areas of structure not identified as a PSE in the SSID or ALS may require supplemental inspections. The term PSE has, at times, been applied narrowly by industry. The narrow application of the term PSE could incorrectly limit the scope of the structure that would be considered relative to fatigue if repairs or modifications exist or are subsequently made. The relationship between PSE and FCS could vary significantly depending on the TCH's working definition of PSE. In addition, there may be structure whose failure would be catastrophic, but due to low operational loads on the part, the part will not experience fatigue cracking. However, if the subject part is repaired or modified, the stresses in the part may be increased to a level where it is now susceptible to fatigue cracking. These types of parts should be considered as fatigue critical structure.

TC Holders should develop the list of FCBS and include the locations of FCS and a diagram showing the extent of FCS. TC Holders should make the list available to STC Holders and to operators.

3.4. Certification Standard Applied When Performing a DTE

For Group A aircraft, the TC Holder should use the requirements of § 25.571, at Amendment 25-45, as a minimum standard. For Group B aircraft, the TC Holder should use the requirements that correspond to the original certification basis as a minimum standard. For each repair requiring a DTE, the DAH should apply not less than the minimum standard when developing new or revised DT Data. The certification standard applied by the TC Holder in performing a DTE for repairs should be included with the relevant approved documentation to the operator.

3.5. Performing a DTE on a Repair That Affects FCBS

When performing a DTE on a repair that affects FCBS, the DTE would apply to the affected FCBS and repair. This may consist of an individual analysis or the application of a DT-based process such as RAGs that would be used by an operator. The result of the DTE should lead to developing DTI that address any adverse effects the repair may have on the FCBS. If the DTE results determine that DTIs are not required to ensure the continued airworthiness of the affected FCBS, the TC Holder should note that in the DTE documentation.

The term ''adverse effects'' refers to a degradation in the fatigue life or inspectability of the affected FCBS. Degradation in fatigue life (earlier occurrence of critical fatigue cracking) may result from an increase in internal loading, while degradation of inspectability may result from physical changes made to the structure. The DTE should be performed within a time frame that ensures the continued airworthiness of affected FCBS.

3.6. Review of Published Repair Data

Published repair data are generally applicable instructions for accomplishing repairs, such as those contained in SRMs and SBs. TCHs should review their existing repair data and identify each repair that affects FCBS. For each such repair, unless previously accomplished, the TCH must perform a DTE and develop any necessary DTI for the affected FCBS and repair data. For some repairs, the results of the DTE will conclude that no new DTI will be required for the affected FCBS or repair. For these cases, the TCH should provide a means that informs the operator a DTE was performed for the subject repair. This may be accomplished, for example, by providing a statement in a document, such as an SRM, stating that all repairs contained in this manual have had a DTE performed. This should preclude operators from questioning those repairs that do not have DTIs. TCHs should provide a list of its published repair data to operators and a statement that a DTE has been performed on this data. The following examples of published repair data developed by the TCH should be reviewed and included in this list:

(a) SRMs,

(b) SBs,

(c) Documents containing AD mandated repairs, and

(d) Other documents available to operators (for example, aircraft maintenance manuals and component maintenance manuals) containing approved repair data.

3.7. Developing DT Data for Existing Published Repair Data

3.7.1. SRMs

The TCH should review the repair data contained in each SRM and identify repairs that affect FCBS. For these repairs, the TCH will need to determine if the SRM needs revising to provide adequate DTI. In determining the extent to which an SRM may need to be revised for compliance, consider the following:

(a) Whether the existing SRM contains an adequate description of DTIs for the specific model.

(b) Whether normal maintenance procedures (for example, the inspection threshold and/or existing normal maintenance inspections) are adequate to ensure the continued airworthiness (inspectability) equal to the unrepaired surrounding structure.

(c) Whether SRM Chapter 51 standard repairs have a DT evaluation.

(d) Whether all SRM specific repairs affecting FCBS have had a DTE performed.

(e) Whether there is any guidance on proximity of repairs.

(f) Whether superseded repairs are addressed and how a DTE is performed for future superseded repairs and how any DTI will be made available.

3.7.2. SBs

The TCH should review the repair data contained in its SBs and identify those repairs that affect FCBS. For those repairs, the TCH should then determine if a new DTE will need to be performed. This review may be done in conjunction with the review of SBs for modifications that affect FCBS.

3.7.3. ADs

The TCH should review ADs that provide maintenance instructions to repair FCBS and determine if the instructions include any necessary DT Data. While the maintenance instructions supporting ADs are typically contained in SBs, other means of documentation may be used.

3.7.4. Other Forms of Data Transmittal

In addition to SRMs, SBs, and documentation for ADs, the TCH should review any other documents (for example, aircraft maintenance manuals and component maintenance manuals) that contain repair data. Individual repair data not contained in the above documents will be identified and DT Data obtained through the Repair Evaluation Guidelines process.

3.8. Developing DT Data for Future Published Repair Data

Following the completion of the review and revision of existing published data any subsequent repair data proposed for publication should also be subject to DTE and DTI provided.

3.9. Approval of DT Data Developed For Published Repair Data

For existing published repair data that requires new DT Data for repairs affecting FCBS, the TCH should submit the revised documentation to the Agency for approval unless otherwise agreed. The DT Data for future published repair data may be approved according to existing processes.

3.10. Documentation of DT Data Developed for Published Repair Data

TCH should include the means used to document any new DTI developed for published repair data. For example, in lieu of revising individual SBs, the TCH may choose to establish a collector document that would contain new DTI developed and approved for specific repairs contained in various SBs.

3.11. Existing Repairs

TCHs should develop processes that will enable operators to identify and obtain DTI for existing repairs on their aircraft that affect FCBS. Collectively, these processes are referred to as the REGs and are addressed below.

3.12. Future Repairs

Repairs to FCBS conducted after the operator has incorporated the REGs into his maintenance programme must have a DTE performed. This includes blendouts, trim-outs, etc. that are beyond published TCH limits. For new repairs, the TCH may,

in conjunction with an operator, use the three stage approval process provided in Annex 1 of this Appendix. This process involves incremental approval of certain engineering data to allow an operator to return its aircraft to service before all the DT Data are developed and approved. The TCH should document this process for the operator's reference in their maintenance programme if it intends to apply it.

3.13. Repair Evaluation Guidelines

The REG provides instructions to the operator on how to survey aircraft, how to obtain DTI, and an implementation schedule that provides timelines for these actions. An effective REG may require that certain DT Data be developed by the TCH and made available to operators. Updated SRMs and SBs, together with the existing, expanded, or new RAG documents, form the core of the information that will need to be made available to the operator to support this process. In developing the REG the TCH will need to determine what DT Data are currently available for repairs and what new DT Data will need to be developed to support operator compliance. The REG should include:

(a) A process for conducting surveys of affected aircraft that will enable identification and documentation of all existing repairs that affect fatigue critical baseline structure;

(b) A process for obtaining DTI for repairs affecting FCBS that are identified during an aircraft survey; and

(c) An implementation schedule that provides timelines for:

(1) Conducting aircraft surveys,

(2) Obtaining DTI, and

(3) Incorporating DTI into the operator's maintenance programme.

3.13.1. Implementation Schedule

The TCH should propose a schedule for Approval by the Agency based on the guidance given in paragraph 12 of the main body of this AMC that takes into account the distribution of the fleet relative to ¾ DSG, the extent of the work involved and the airworthiness risk. The Agency notes that many fleets are currently approaching or beyond DSG and these should be given priority in the implementation schedule.

3.13.2. Developing a Process for Conducting Surveys of Affected Aircraft

The TCH should develop a process for use by operators to conduct aircraft surveys. These aircraft surveys are conducted by operators to identify and document repairs and repairs to modifications that may be installed on their aircraft. The survey is intended to help the operators determine which repairs may need a DTE in order to establish the need for DTI. Identification of repairs that need DTI should encompass only existing repairs that reinforce (for example, restore strength) the FCBS. This typically excludes maintenance actions such as blend-outs, plug rivets, trim-outs, etc. unless there are known specific risks associated with these actions in specific locations. The process the TCH develops to conduct surveys should include:

(a) A survey schedule.

(b) Areas and access provisions for the survey.

(c) A procedure for repair data collection that includes:

(1) Repair Dimensions,
(2) Repair Material,
(3) Repair Fastener Type,
(4) Repair Location,
(5) Repair Proximity to other repairs,
(6) Repairs covered by Published Repair Data, and
(7) Repairs requiring DTI.

(d) A means to determine whether or not a repair affects FCBS.

3.13.3. Developing a Process to Obtain DT Data for Repairs.

(a) The TCH must develop a process that operators can use to obtain DTIs that address the adverse effects repairs may have on FCBS. In developing this process, TCHs will need to identify all applicable DTIs they have developed that are available to operators. This may include updated SRMs and SBs, existing RAGs, expanded or new RAGs, and other sources of DTIs developed by the TCH. For certain repairs, the process may instruct the operators to obtain direct support from the TCH. In this case, the TCH evaluates the operator's request and makes available DTI for a specific repair or group of repairs, as needed. These may include operator or third-party developed/approved repairs, and repairs that deviate from approved published repair data.

(b) The process should state that existing repairs that already have DTIs developed and in place in the maintenance programme require no further action. For existing repairs identified during an individual aircraft survey that need DTIs established, the process may direct the operators to obtain the required DTIs from the following sources:

(1) TCH published service information such as DT-based SRMs, SBs, or other documents containing applicable DT Data for repairs.

(2) Existing approved RAG documents (developed for compliance with § 121.107).

(3) Expanded or newly developed RAG documents. In order to expedite the process for an operator to obtain DTI necessary to address the adverse affects repairs may have on FCBS, the TCH may determine that the existing RAG document should be expanded to address other FCBS of the aircraft pressure boundary. In addition, for aircraft that do not currently have a RAG, the TCH may determine that in order to fully support operators in obtaining DTI, a new RAG document may need to be developed. General guidance for developing this material can be found in Annex 2 below, which is similar to AC 120-73, *Damage Tolerance Assessment of Repairs to Pressurised Fuselages*. The RAGs or any other streamlined process developed to enable operators to obtain DTI without having to go directly to the TCH.

(4) Procedures developed to enable operators to establish DTIs without having to contact the TCH for direct support. These procedures may be similar in concept to the RAG documents.

(5) Direct support from the TCH for certain repairs. The operator directly solicits DTIs from a TCH for certain individual repairs as those repairs are identified during the survey.

3.14 Repairs to Removable Structural Components

Fatigue critical structure may include structure on removable structural parts or assemblies that can be exchanged from one aircraft to another, such as door assemblies and flight control surfaces. In principle, the DT Data development and implementation process also applies to repairs to FCS on removable components. During their life history, however, these parts may not have had their flight times recorded on an individual component level because of removal and reinstallation on different aircraft multiple times. These actions may make it impossible to determine the component's age or total flight hours or total flight cycles. In these situations, guidance for developing and implementing DT Data for existing and new repairs is provided in Annex 3 of this Appendix.

3.15 Training

The complexity of the repair assessment and evaluation may require adequate training for proper implementation. In that case, it is necessary that each TCH considers providing training for all operators of the aircraft considered by this AMC

4. MODIFICATIONS AND REPAIRS TO MODIFICATIONS

4.1. TCH and STC Holder Tasks – Modifications and Repairs to Modifications

The following is an overview of the TCH and STC Holder tasks necessary for modifications that affect FCBS. This overview also includes TCH and STC Holder tasks necessary for repairs that may affect any FCS of the subject modifications. These tasks are applicable to those modifications that have been developed by the TCH or STC Holder.

(a) Establish a list of modifications that may affect FCBS. From that list establish a list of modifications that may contain FCS.

(b) In consultation with operators, determine which aircraft have the modification(s) installed.

(c) STC Holders should obtain a list of FCBS from the TCH for the aircraft models identified above.

(d) STC Holders should identify:

- Modifications that affect FCBS, or
- Modifications that contain FCS.

(e) Determine if DT Data exist for the identified modifications.

(f) Develop additional DT Data, if necessary.

(g) Establish an implementation schedule for modifications.

(h) Review existing DT Data for repairs made to modifications that affect FCBS.

(i) Develop additional DT Data for repairs made to modifications that affect FCBS.

(j) Establish an implementation schedule for repairs made to modifications.

(k) Prepare documentation, submit it to the Agency for approval, and make it available to operators.

4.2. Specific Modifications to be Considered

The TCH should consider modifications and any STCs it owns for modifications that fall into any of the categories listed in Annex 5 of this Appendix. STC Holders should do the same for their STC modifications. For modifications that are not developed by a TCH or STC Holder the operator should consider whether the modification falls into any of the categories listed in Annex 5 of this Appendix.

4.3. Modifications that need DT data

Using the guidance provided in AMC 25.571 and the detailed knowledge of the modification and its affect on the FCBS, the TCH and STC Holder, and in certain cases the operator, should consider the following situations in determining what DT data need to be developed

4.3.1. Modifications that affect FCBS

Any modification identified in Annex 5 that is installed on FCBS should be evaluated regardless of the size or complexity of the modification. In addition, any modification which indirectly affects FCBS (for example, modifications which change the fatigue loads environment, or affect the inspectability of the structure, etc.) must also have a DT evaluation performed to assess its impact.

4.3.2 Modifications that contain new FCS

For any modification identified in Annex 5 of this appendix that affects FCBS, the TCH or STC Holder should identify any FCS of the modification. Any modification that contains new FCS should be evaluated regardless of the size or complexity of the modification. Examples of this type of modification may be a modification that adds new structural splices, or increases the operational loads causing existing structure to become fatigue critical. If a modification does not affect FCBS, then it can be assumed that this modification does not contain FCS.

4.4. Reviewing Existing DT Data for Modifications that Affect FCBS

Based on the CS 25.571 certification amendment level and other existing rules, the modification's approval documentation may already provide appropriate DT data.

The TCH or STC Holder should identify modifications that have existing approved DT data. Acceptable DT data contain a statement of DTE accomplishment and are approved. Confirmation that approved DT data exists should be provided to the operators.

Modifications that have been developed by a TCH may affect FCBS. These include ATCs and in some cases STCs. These changes to type design also require review for appropriate DT data.

4.5. Developing Additional DT Data for Modifications that Affect FCBS

The DT data may be published as follows:

(a) **STC modifications** – The additional DT data for existing modifications may be published in the form of an amended STC, a supplemental compliance document, or an individual approval.

(b) **TC Holder modifications** – The additional DT data for existing modifications may be published in the form of an amended TC, TCH service information, etc.

(c) **Modifications not developed by a TCH or STC Holder** – For modifications identified in Annex 5 of this appendix that affect FCBS and were not developed by a TCH or STC Holder, the operator is responsible for obtaining DT data for those modifications. For those existing individual modifications that do not have DT data or other procedures implemented, establish the DT data according to an implementation plan approved by the Competent Authority.

NOTE: The TCH and STC Holder should submit data that describes and supports the means used to determine if a modification affects FCBS, and the means used for establishing FCS of a modification.

4.6. DT Data Implementation Schedule then the TCH or STC Holder is no longer in business or a TC or STC is surrendered

For those modifications where the TCH or STC Holder is no longer in business or the TC or STC is surrendered, this paragraph provides guidance for an operator to produce a DT data implementation schedule for that modification. The operator's DT Data Implementation Schedule should contain the following information:

(a) A description of the modification;

(b) The affected aircraft and the affected FCS

(c) The DSG of the affected aircraft;

(d) A list of the modification FCS (if it exists);

(e) The 25.571 certification level for determining the DT data;

(f) A plan for obtaining the DT data for the modification; and

(g) A DT Data Implementation Schedule for incorporating the DT data once they are received.

5. DEVELOPMENT OF TCH AND STC HOLDER DOCUMENTATION AND AGENCY APPROVAL

TCH, STC Holders, operators and the airworthiness authorities should work together to develop model-specific documentation with oversight provided by those authorities and assistance from the ARAC AAWG. It is anticipated that TCHs will utilise structural task groups (STG) to support their development of model-specific documents. The Agency will approve the TCH or STC Holder submissions of the REGs and any other associated documentation required by the operator to provide appropriate DTI to all repairs and modifications to FCS whether submitted as separate documents or in a consolidated document.

6 OPERATOR TASKS – REPAIRS, MODIFICATIONS AND REPAIRS TO MODIFICATIONS

(a) Review the applicable Documents supplied by TCH and STC Holders.

(b) Identify modifications that exist in the operators' fleet that affect FCBS.

(c) Obtain or develop additional DT data for modifications not addressed by the TCH or STC Holder's documents.

NOTE: If the TCH or STC Holder no longer exists or is unwilling to comply with this request it becomes the responsibility of the operator to develop or obtain approved DT data. The data should be provided by a Design Organisation with an appropriate DOA.

(d) Incorporate the necessary actions into the Maintenance programme for Approval by the Competent Authority.

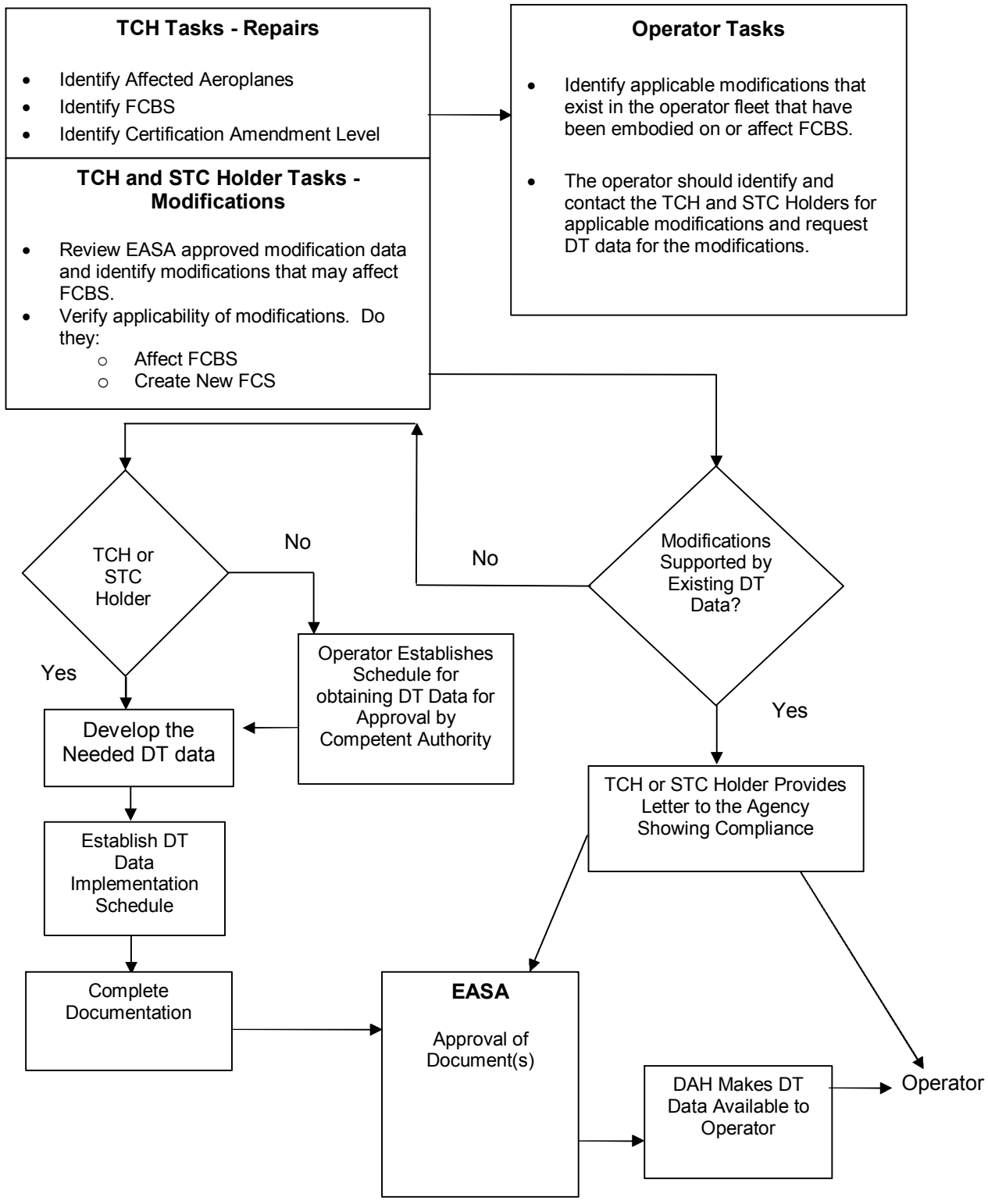

Figure A3-1 – Developing a Means of Compliance for Modifications

6.1. Contents of the Maintenance Programme

(a) The operator should include the following in their Maintenance Programme:

(1) A process to ensure that all new repairs and modifications that affect FCBS will have DT data and DTI or other procedures implemented.

(2) A process to ensure that all existing repairs and modifications to FCBS are evaluated for damage tolerance and have DTI or other procedures implemented. This process includes:

(i) A review of operator processes to determine if DT data for repairs and modifications affecting FCBS have been developed and incorporated into the operator's maintenance programme for the operational life of the aircraft. If an operator is able to demonstrate that these processes ensure that DT data are developed for all repairs and modifications affecting FCBS, then no further action is required for existing repairs and modifications.

(ii) A process to identify or survey existing repairs (using the survey parameters from Annex 3 of this Appendix) and modifications that affect FCBS and determine DTI for those repairs and modifications. This should include an implementation schedule that provides timing for incorporation of the DT data into the operator's maintenance programme, within the timeframe given in the applicable TCH or STC Holder's approved documentation.

(b) Figure A3-2, below, outlines one possible means an operator can use to develop an implementation plan for aircraft in its fleet.

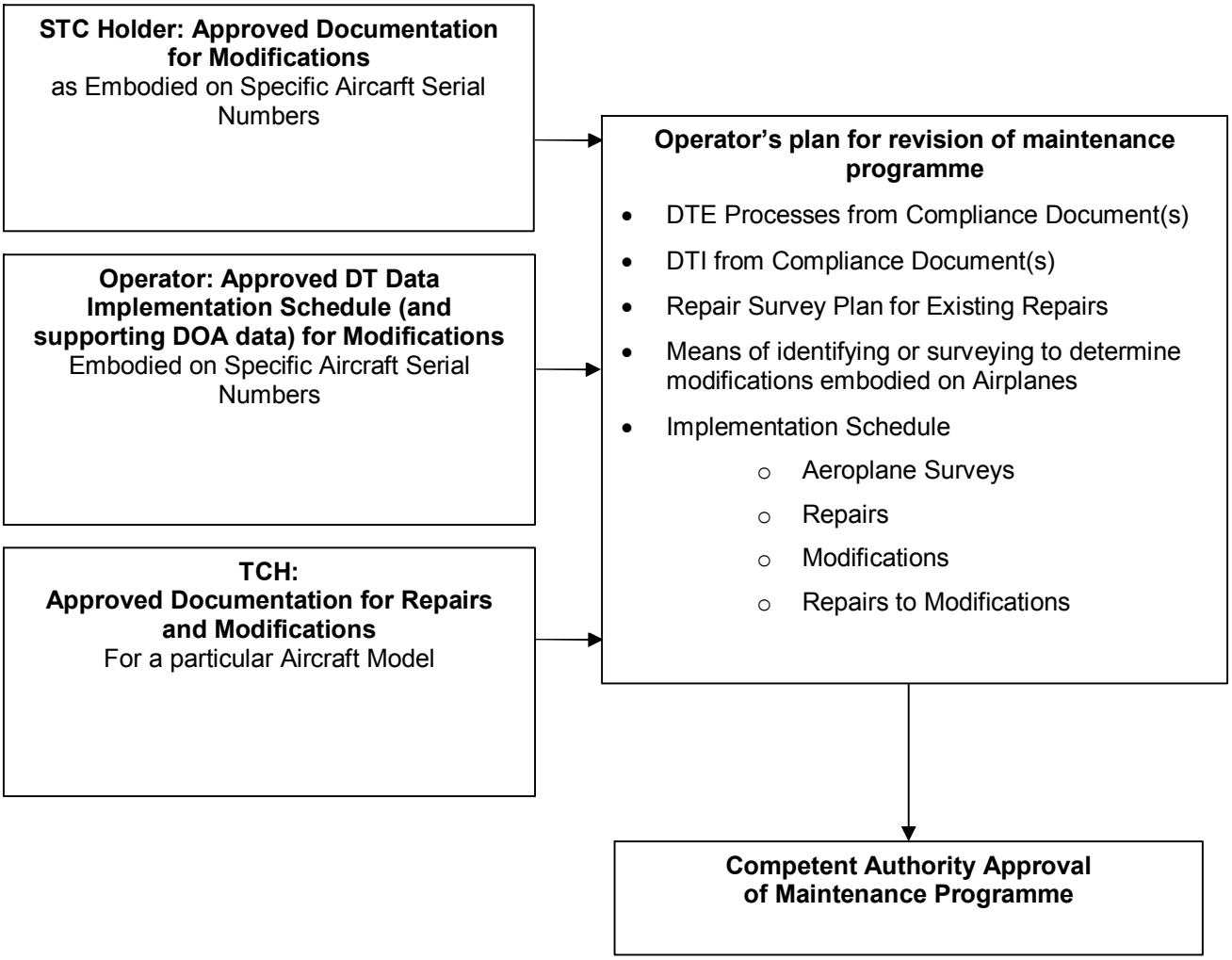

Figure A3-2 - Operator's Maintenance Programme Approval Process

6.1.1. Implementation Plan for Repairs

Repair Survey Plan. The maintenance programme should include a repair survey schedule to identify repairs that may need DT data developed. The TCH's REG may be used as a basis for this plan. (See Paragraph 3 above and Annex 2 for further information)

6.1.2. Implementation Plan for Modifications:

(a) The plan should include a process for producing a list of modifications that affect FCBS on an operator's aircraft. The list may be developed by obtaining data through a review of aircraft records and by a survey of the aircraft. If the means for identifying the subject modifications is by a records review, the operator will need to show its competent authority that the aircraft records are a reliable means for identifying modifications that affect the FCBS. Per the guidance in paragraph (3), below, the operator may identify modifications developed by TCH and STC Holders by performing a records review. A records review, however, may not be adequate to identify modifications not developed by a TCH or STC Holder. An aircraft survey may need to be conducted to identify such modifications. For each modification that affects FCBS, the process should document the means of compliance for incorporating DT data associated with that modification, whether through a TCH or STC Holder Compliance Document, an operator's DT data implementation schedule, or existing DT-based ICA.

(b) The plan should:

(1) Include the process for when and how to obtain DT data for those modifications included in a DT data implementation schedule,

(2) Include a means of ensuring that the aircraft will not be operated past the time limit established for obtaining DT data,

(3) Include DT data associated with an modification that is provided in a Compliance Document, and

(4) Identify how DT data will be incorporated into the operator's maintenance programme.

(c) To support identification of modifications that TCH and STC Holders need to address the operators should, concurrent with the TCH and STC Holders' tasks, identify the TCH or STC Holder-developed modifications that exist in its fleet of aircraft. This may be done by reviewing the operator's aircraft configuration records, if record keeping is complete. During the review the TCH and STC Holder of each specific modification should be identified. The operator should then establish which modifications have been installed on or are likely to affect FCBS and prepare a list of modifications by aircraft. Modifications not developed by a TCH or STC Holder that affect FCBS should be identified at the time the operator conducts its aircraft survey for repairs.

(1) Compile a listing of all TCH and STC Holder developed modifications that are currently installed on its active fleet;

(2) Delete from the listing those modifications that do not affect FCBS. Documents from the TCH may be used to identify the FCBS.

(3) The remaining modifications that affect FCBS on this list require a DTE and DT data, unless previously accomplished.

(4) The operator must review each modification to determine whether:

(i) The DT data already exist; or

(ii) The DT data need to be developed.

(5) Notify both the STC Holder and the Competent Authority and the Agency when STCs owned by the STC Holder are identified on the operator's fleet and that DT data are required.

NOTE: The operator should begin developing this modifications list as soon as the TCHs make their FCBS listing available.

(d) The operator should consider the list of modifications contained in Annex 5 of this AC in determining which modifications may affect FCBS on a model-specific basis.

(e) The operator should submit a letter that provides a list of modifications it has on its active fleet to the Competent Authority and a status on the TCH or STC Holders' support for developing required DT data.

(f) The operator should also contact the TCH or STC Holder for the applicable modification to determine if DT data are available for that modification. If the data do not exist, and the TCH or STC Holder intends to support the development of DT data, and this modification is likely to exist on other operators' fleets, the group of affected operators may wish to collectively meet with the TCH or STC Holder. If the TCH or STC Holder no longer exists, or is unwilling to support the modification, or if an modification affecting FCBS has not been approved under a TC or STC, it is the responsibility of the operator(s) to develop the data, either internally, or by using a third party with the appropriate design approval.

(g) Some individual modifications may not be easily identified through a review of aircraft maintenance records. In these situations, the means of compliance is a plan to survey the aircraft for modifications in the similar manner as repairs and repairs to modifications as given in paragraph 3 of this Appendix. The DT data for those modifications identified in the survey should be developed and implemented into an operator's maintenance programme. It is anticipated that most aircraft will need to be surveyed in order to ensure all modifications are identified. This survey can be conducted at the same time the survey for repairs is performed.

6.1.3. DT Data Implementation Process

(a) Use the regular maintenance or inspection programme for repairs where the inspection requirements utilise the chosen inspection method and interval. Repairs or modifications added between the predetermined maintenance visits, including Category B and C repairs (see Annex 2 of this Appendix) installed at remote locations, should have a threshold greater than the predetermined maintenance visit. Repairs may also be individually tracked to account for their unique inspection method and interval requirements. This ensures the airworthiness of the structure until the next predetermined maintenance visit, when the repair or modification will be evaluated as part of the repair maintenance programme.

(b) Where inspection requirements are not fulfilled by the chosen inspection method and interval, Category B or C repairs will need additional attention. These repairs will either require upgrading to allow utilising the chosen inspection method and interval, or individual tracking to account for the repair's unique inspection method and interval requirements.

6.2 Maintenance programme changes

When a maintenance or inspection programme interval is revised, the operator should evaluate the impact of the change on the repair assessment programme. If the revised maintenance or inspection programme intervals are greater than those in the BZI, the previous classification of Category A repairs may become invalid. The operator may need to obtain approval of an alternative inspection method, upgrade the repair to allow utilisation of the chosen inspection method and interval, or re-categorise some repairs and establish unique supplemental inspection methods and intervals for specific repairs. Operators using the "second technique" of conducting repetitive repair assessments at predetermined maintenance visits would evaluate whether the change to the predetermined maintenance visit continues to fulfil the repair inspection requirements in accordance with the guidance provided in Annex 2 of this AMC.

7. THE COMPETENT AUTHORITY

The competent authority is responsible for approving the means for incorporating the Agency Approved DT data for repairs and modifications into the operator's maintenance programme.

ANNEX 1: APPROVAL PROCESS FOR NEW REPAIRS

In the past, FAA AC 25.1529-1, *Instructions for Continued Airworthiness of Structural Repairs on Transport Aircraft*, August 1, 1991, described a two-stage approach for approving repairs to principal structural elements. The two-stage approach consisted of:

- Evaluating type design strength requirements per CS 25.305 before return to service.

- Performing a damage tolerance evaluation and developing DT Data to demonstrate compliance with CS 25.571 within 12 months of return to service.

The FAA guidance material in AC 25.1529-1 is now embodied in this AMC, and is modified to describe a three-stage approach now commonly used in the aviation industry. The three-stage approach is in lieu of the two-stage approach discussed above.

The DT Data include inspection requirements, such as inspection threshold, inspection method, and inspection repetitive interval, or may specify a time limit when a repair or modification needs to be replaced or modified. The required data may be submitted all at once, prior to the aircraft return to service, or it may be submitted in stages. The following three-stage approval process is available, which involves incremental approval of engineering data to allow an aircraft to return to service before all the engineering data previously described are submitted. The three stages are described as follows:

(a) The first stage is approval of the static strength data and the schedule for submittal of the DT Data. This approval is required prior to returning an aircraft to service.

(b) The second stage is approval of the DT Data. This should be submitted no later than 12 months after the aircraft was returned to service. At this stage the DT Data need only contain the threshold when inspections are required to begin as long as a process is in place to develop the required inspection method and repetitive intervals before the threshold is reached. In this case, the submittal and approval of the remaining DT Data may be deferred to the third stage.

(c) The third stage is approval of the inspection method and the repetitive intervals. This final element of the repair certification data in compliance with CS 25.571 must be submitted and approved prior to the inspection threshold being reached.

ANNEX 2: ASSESSMENT OF EXISTING REPAIRS

A DTI assessment process consists of an aircraft repair survey, identification and disposition of repairs requiring immediate action and development of damage tolerance based inspections, as described below:

1. AIRCRAFT REPAIR SURVEY.

A survey will be used to identify existing repairs and repair configurations on FCBS and provide a means to categorise those repairs. The survey would apply to all affected aircraft in an operator's fleet, as defined in the maintenance programme, using the process contained in the REG or similar document. The procedure to identify repairs that require DTE should be developed and documented using CS 25.571 and AMC 25.571 (dependent on aircraft certification level), together with additional guidance specific to repairs, such as:

(a) Size of the repair,

(b) Repair configuration,

(1) SRM standards

(2) Other

(c) Proximity to other repairs, and

(d) Potential affect on FCBS

(1) Inspectability (access and method)

(2) Load distribution.

See Paragraph 4 of this Annex for more details.

2. IDENTIFICATION AND DISPOSITION OF REPAIRS REQUIRING IMMEDIATE ACTION

Certain repairs may not meet minimum requirements because of cracking, corrosion, dents, or inadequate design. The operator should use the guidance provided in the Compliance Document to identify these repairs and, once identified, take appropriate corrective action. In some cases, modifications may need to be made before further flight. The operator should consider establishing a fleet campaign if similar repairs may have been installed on other aircraft.

3. DAMAGE TOLERANCE INSPECTION DEVELOPMENT

This includes the development of the appropriate maintenance plan for the repair under consideration. During this step determine the inspection method, threshold, and repetitive interval. Determine this information from existing guidance information as documented in the RAG (see Paragraph 4), or from the results of an individual damage tolerance evaluation performed using the guidance in AMC 25.571. Then determine the feasibility of an inspection programme to maintain continued airworthiness. If the inspection programme is practical, incorporate the DTI into the individual aircraft maintenance programme. If the inspection is either impractical or impossible, incorporate a replacement time for the repair into the individual aircraft maintenance programme. The three-stage approach discussed in Annex 1 of this AC may be used, if appropriate.

4. REPAIR ASSESSMENT GUIDELINES

4.1 Criteria to assist in developing the repair assessment guidelines

The following criteria are those developed for the fuselage pressure boundary, similar to those found in FAA AC 120-73 and previous JAA and Agency documentation. DAHs may find it appropriate to develop similar practices for other types of aircraft and areas of the structure.

The purpose is to develop repair assessment guidelines requiring specific maintenance programmes, if necessary, to maintain the damage-tolerance integrity of the repaired airframe. The following criteria have been developed to assist in the development of that guidance material:

(a) Specific repair size limits for which no assessment is necessary may be selected for each model of aircraft and structural location. This will enable the burden on the operator to be minimised while ensuring that the aircraft's baseline inspection programme remains valid.

(b) Repairs that are not in accordance with SRM must be reviewed and may require further action.

(c) Repairs must be reviewed where the repair has been installed in accordance with SRM data that have been superseded or rendered inactive by new damage-tolerant designs.

(d) Repairs in close proximity to other repairs or modifications require review to determine their impact on the continued airworthiness of the aircraft.

(e) Repairs that exhibit structural distress should be replaced before further flight.

4.2 Repair assessment methodology.

The next step is to develop a repair assessment methodology that is effective in evaluating the continued airworthiness of existing repairs for the fuselage pressure boundary. Older aircraft models may have many structural repairs, so the efficiency of the assessment procedure is an important consideration. In the past, evaluation of repairs for damage-tolerance would require direct assistance from the DAH. Considering that each repair design is different, that each aircraft model is different, that each area of the aircraft is subjected to a different loading environment, and that the number of engineers qualified to perform a damage-tolerance assessment is small, the size of an assessment task conducted in that way would be unmanageable. Therefore, a new approach has been developed as an alternative.

Since repair assessment results will depend on the model specific structure and loading environment, the DAHs should create an assessment methodology for the types of repairs expected to be found on each affected aircraft model. Since the records on most of these repairs are not readily available, locating the repairs will necessitate surveying the structure of each aircraft. A survey form is created by DAH that may be used to record key repair design features needed to accomplish a repair assessment. Airline personnel not trained as damage-tolerance specialists can use this form to document the configuration of each observed repair.

Some DAH have developed simplified methods using the information from the survey form as input data, to determine the damage-tolerance characteristics of the surveyed repairs. Although the repair assessments should be performed by well trained personnel

familiar with the model specific repair assessment guidelines, these methods enable appropriate staff, not trained as a damage-tolerance specialist, to perform the repair assessment without the assistance of the TCH. This methodology should be generated by the aircraft TCH. Model specific repair assessment guidelines will be prepared by the TCHs.

From the information on the survey form, it is also possible to classify repairs into one of three categories:

Category A: A permanent repair for which the baseline zonal inspection (BZI), (typical maintenance inspection intervals assumed to be performed by most operators), is adequate to ensure continued airworthiness.

Category B: A permanent repair that requires supplemental inspections to ensure continued airworthiness.

Category C: A temporary repair that will need to be reworked or replaced prior to an established time limit. Supplemental inspections may be necessary to ensure continued airworthiness prior to this limit.

When the LOV of the maintenance programme is extended the initial Categorisation of Repairs may need review by the TCH and operator to ensure these remain valid up until the new LOV.

4.3 Repair assessment process

There are two principal techniques that can be used to accomplish the repair assessment. The first technique involves a three-stage procedure. This technique could be well suited for operators of small fleets. The second technique involves the incorporation of the repair assessment guidelines as part of an operator's routine maintenance programme. This approach could be well suited for operators of large fleets and would evaluate repairs at predetermined planned maintenance visits as part of the maintenance programme. DAHs and operators may develop other techniques, which would be acceptable as long as they fulfil the objectives of this proposed rule, and are approved by the Agency.

The first technique generally involves the execution of the following three stages. (See Figure.A3(2)-1):

Stage 1 Data Collection

This stage specifies what structure should be assessed for repairs and collects data for further analysis. If a repair is on a structure in an area of concern, the analysis continues, otherwise the repair does not require classification per this programme.

Repair assessment guidelines for each model will provide a list of structure for which repair assessments are required. Some DAHs have reduced this list by determining the inspection requirements for critical details. If the requirements are equal to normal maintenance checks (e.g., BZI checks), those details were excluded from this list.

Repair details are collected for further analysis in Stage 2. Repairs that do not meet the minimum design requirements or are significantly degraded are immediately identified, and corrective actions must be taken before further flight.

Stage 2 Repair Categorisation

The repair categorisation is accomplished by using the data gathered in Stage 1 to answer simple questions regarding structural characteristics.

If the maintenance programme is at least as rigorous as the BZI identified in the TCH's model specific repair assessment guidelines, well designed repairs in good condition meeting size and proximity requirements are Category A. Simple condition and design criteria questions are provided in Stage 2 to define the lower bounds of Category B and Category C repairs. The process continues for Category B and C repairs.

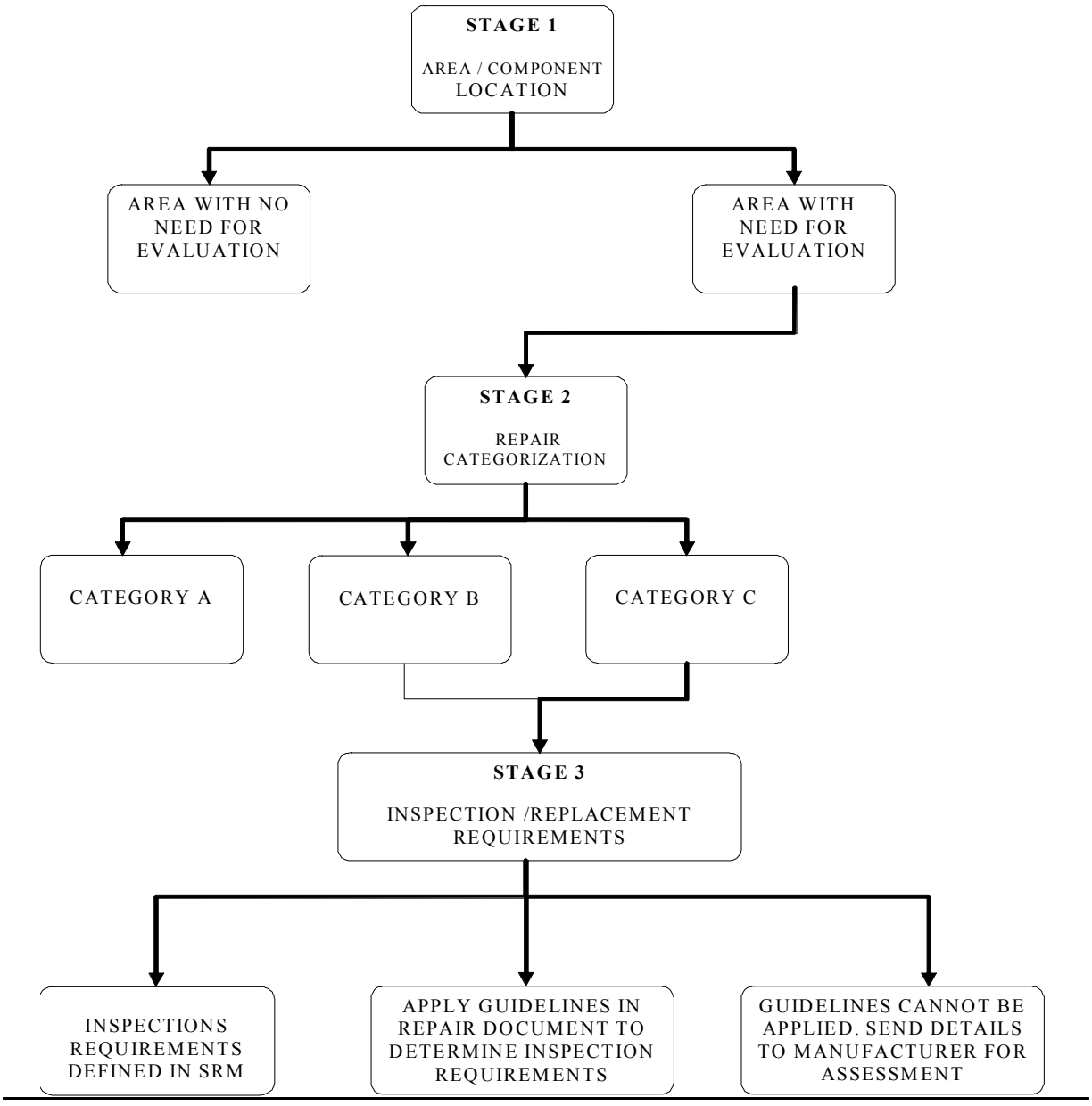

Figure A3(2)-1. Repair Assessment Stages

Stage 3 Determination of Structural Maintenance Requirements

The specific supplemental inspection and/or replacement requirements for Category B and C repairs are determined in this stage. Inspection requirements for the repair are determined by calculation or by using predetermined values provided by the DAH, or other values obtained using an Agency approved method.

In evaluating the first supplemental inspection, Stage 3 will define the inspection threshold in flight cycles measured from the time of repair installation. If the time of installation of the repair is unknown and the aircraft has exceeded the assessment implementation times or has exceeded the time for first inspection, the first inspection should occur by the next "C-check" interval, or equivalent cycle limit after the repair data is gathered (Stage 1).

An operator may choose to accomplish all three stages at once, or just Stage 1. In the latter case, the operator would be required to adhere to the schedule specified in the Agency approved model specific repair assessment guidelines for completion of Stages 2 and 3. Incorporating the maintenance requirements for Category B and C repairs into an operator's individual aircraft maintenance or inspection programme completes the repair assessment process for the first technique.

The second technique would involve setting up a repair maintenance programme to evaluate all applicable structure as detailed in paragraph 2.6 at each predetermined maintenance visit to confirm that they are permanent. This technique would require the operator to choose an inspection method and interval in accordance with the Agency approved repair assessment guidelines. The repairs whose inspection requirements are fulfilled by the chosen inspection method and interval would be inspected in accordance with the approved maintenance programme. Any repair that is not permanent, or whose inspection requirements are not fulfilled by the chosen inspection method and interval, would either be:

(a) Upgraded to allow utilisation of the chosen inspection method and interval, or

(b) Individually tracked to account for the repair's unique inspection method and interval requirements.

This process is then repeated at the chosen inspection interval.

Repairs added between the predetermined maintenance visits, including interim repairs installed at remote locations, would be required either to have a threshold greater than the length of the predetermined maintenance visit or to be tracked individually to account for the repair's unique inspection method and interval requirements. This would ensure the airworthiness of the structure until the next predetermined maintenance visit, at which time the repair would be evaluated as part of the repair maintenance programme.

5 Maintenance programme changes

When a maintenance or inspection programme interval is revised, the operator should evaluate the impact of the change on the repair assessment programme. If the revised maintenance or inspection programme intervals are greater than those in the BZI, the previous classification of Category A repairs may become invalid. The operator may need to obtain approval of an alternative inspection method, upgrade the repair to allow utilisation of the chosen inspection method and interval, or re-categorise some repairs and establish unique supplemental inspection methods and intervals for specific repairs. Operators using the "second technique" of conducting repetitive repair assessments at predetermined maintenance visits would evaluate whether the change to the predetermined maintenance visit continues to fulfil the repair inspection requirements.

6 SRM update

The general section of each SRM will contain brief descriptions of damage-tolerance considerations, categories of repairs, description of baseline zonal inspections, and the repair assessment logic diagram. In updating each SRM, existing location specific repairs should be labelled with appropriate repair category identification (A, B, or C), and specific inspection requirements for B and C repairs should also be provided as applicable. SRM descriptions of generic repairs will also contain repair category considerations regarding size, zone, and proximity. Detailed information for determination of inspection requirements will have to be provided for each model. Repairs which were installed in accordance with a previous revision of the SRM, but which have now been superseded by a new damage-tolerant design, will require review. Such repairs may be reclassified to Category B or C, requiring additional inspections and/or rework.

7 Structure modified by a STC

The current repair assessment guidelines provided by the TCH do not generally apply to structure modified by a STC. Nonetheless it is expected that all structure modified by STC should be evaluated by the operator in conjunction with the STC holder. The STC holder should develop, submit, and gain Agency approval of guidelines to evaluate repairs to such structure or conduct specific damage-tolerance assessments of known repairs and provide appropriate instructions to the operator.

It is expected that the STC holder will assist the operators by preparing the required documents. If the STC holder is out of business, or is otherwise unable to provide assistance, the operator would have to acquire the Agency approved guidelines independently. To keep the aircraft in service, it is always possible for operators, individually or as a group, to hire the necessary expertise to develop and gain approval of repair assessment guidelines and the associated DSG. Ultimately, the operator remains responsible for the continued safe operation of the aircraft.

ANNEX 3: REPAIRS AND MODIFICATIONS TO REMOVABLE STRUCTURAL COMPONENTS

1. DETERMINING THE AGE OF A REMOVABLE STRUCTURAL COMPONENT

Determining an actual component age or assigning a conservative age provides flexibility and reduces operator burden when implementing DT data for repairs and modifications to structural components. In some cases, the actual component age may be determined from records. If the actual age cannot be determined this way, the component age may be conservatively assigned using one of the following fleet leader concepts, depending upon the origin of the component:

(a) If component times are not available, but records indicate that no part changes have occurred, aircraft flight cycles or flight hours can be used.

(b) If no records are available, and the parts could have been switched from one or more older aircraft under the same maintenance programme, it should be assumed that the time on any component is equal to the oldest aircraft in the programme. If this is unknown, the time should be assumed equal to the same model aircraft that is the oldest or has the most flight cycles or flight hours in the world fleet.

(c) A manufacturing date marked on a component may also be used to establish the component's age. This can be done by using the above reasoning and comparing it to aircraft in the affected fleet with the same or older manufacturing date.

If none of these options can be used to determine or assign a component age or total number of flight cycles or flight hours, a conservative implementation schedule can be established by using the guidelines applied in paragraph 3. of this appendix, for the initial inspection, if required by the DT data.

2. TRACKING

An effective, formal, control or tracking system should be established for removable structural components that are identified as FCBS or that contain FCS. This will help ensure compliance with maintenance programme requirements specific to repairs and modifications installed on an affected removable structural component. Paragraph 4 of this appendix, provides options that could be used to alleviate some of the burdens associated with tracking all repairs to affected removable structural components.

3. DEVELOPING AND IMPLEMENTING DT DATA

(a) Repairs

Accomplish the initial repair assessment of the affected structural component at the same time as the aircraft level repair survey for the aircraft on which the component is installed. Develop the DT data per the process given in Step 3 of Appendix 6 and incorporate the DTI into the maintenance programme.

(b) Modifications

Accomplish the initial modification assessment of the affected structural component at the same time as the aircraft level modification assessment for

the aircraft on which the component is installed. Develop the DT data and incorporate the DTI into the maintenance programme.

If the actual age of the repairs or modifications installation, or the total number of flight cycles or flight hours is known, use that information to establish when the initial inspection of the component should be performed. Repeat the inspection at the intervals provided by the TCH or STC Holder for the repair or modification installed on the component.

If the actual age of the repairs or modifications installation, or the total number of flight cycles or flight hours is unknown, but the component age or total number of flight cycles or flight hours is known, or can be assigned conservatively, use the component age, or total number of flight cycles or flight hours to establish when the initial inspection of the component should be performed. Repeat the inspection at the intervals provided by the TCH or STC Holder for the repairs and modifications against the component.

As an option, accomplish the initial inspection on the affected component at the next C-check (or equivalent interval) following the repair assessment. Repeat the inspection at the intervals provided by the TCH or STC Holder for the repairs and modifications against the component.

4. EXISTING REPAIRS AND MODIFICATIONS – COMPONENTS RETRIEVED FROM STORAGE.

(a) If the time on the component (in flight cycles or flight hours) is known, or can be conservatively assigned, perform the following:

(1) Survey the component,

(2) Disposition the repairs and modifications,

(3) Implement any DTI in accordance with the approved schedule,

(4) Accomplish the initial inspection using the actual age of the repairs or modifications, or total number of flight cycles or flight hours, if known. If the age of the repairs or modifications is not known, use the component age. Repeat the inspection at the intervals given for the repairs or modifications against the component.

(b) If the time on the component (in flight cycles or flight hours) is unknown and cannot be conservatively assigned, perform the initial repair or modification assessment of the affected component prior to installation, perform the following actions:

(1) Develop the DT data per the process given in paragraph 3 or 4 of Appendix 3 of this AC as applicable.

(2) Incorporate any DTI into the maintenance programme.

(3) Accomplish the first inspection on the affected component at the next C-check (or equivalent interval) following the repair or modification assessment.

(4) Repeat the inspection at the intervals given for the repair or modification against the component.

5. IMPLEMENTATION OPTIONS TO HELP REDUCE TRACKING BURDEN

The following implementation techniques could be used to alleviate some of the burdens associated with tracking repairs to affected removable structural components. These techniques, if used, would need to be included in the Maintenance Programme and may require additional Agency approval and TCH or STC Holder input for DTI.

(a) Upgrading Existing Repairs

As an option, existing repairs may be removed and replaced to zero time the DTI requirements of the repair and establish an initial tracking point for the repair. Normally, this would be done at or before the survey for maximum benefit. The initial and repetitive inspections for the upgraded repair would then be accomplished at the intervals given for the repair against the component.

A repair could also be upgraded to one whose inspection requirements and methods are already fulfilled by an operator's maintenance or inspection programme. That repair would then be repetitively inspected at each routine inspection interval applicable to the repair. Specific tracking would not be required because that area of the aircraft would already be normally inspected on each aircraft in the fleet as part of the existing approved maintenance programme. If the operator's programme intervals were changed, the affect on requirements for specific tracking would have to be re-evaluated.

(b) Special Initial and/or Routine Inspections

As an option, existing repairs may have special initial inspections accomplished during the component survey. This initial inspection establishes an initial tracking point for the repair. Following this initial inspection, the DTI requirements (e.g., repetitive inspections) of the repair would be implemented.

In addition, special routine inspections could be defined for typical repairs that could be applied at a normal interval. In this case, an operator could check the affected components on each aircraft for this type of a repair at the defined interval. If the repair were found, the special inspection would be applied to ensure its airworthiness until the next scheduled check. This alleviates the need to specifically track affected components for every repair, especially typical ones.

The development of inspection processes, methods, applicability and intervals will probably require the assistance of the TCH or STC Holder for the FCS in question.

ANNEX 4. SERVICE BULLETIN REVIEW PROCESS

Guidelines for Following the Service Bulletin (SB) Flow Chart

NOTE: While it is believed that this guidance is fairly comprehensive, it may not address every possible situation. It is therefore incumbent on the user to use good judgment and rationale when making any determination.

Screening SBs to determine which ones require DT data is primarily a TCH responsibility.

The result of this screening is a list of SBs which require special directed inspections to ensure continued airworthiness. The SBs included on the list will be grouped into Type I and Type II SBs. Type I SBs have existing DT data and Type II SBs require developing DT data. The list is not comprehensive and will not include all of the SBs associated with an aircraft. Specifically, the list will not include those SBs where a BZI programme developed for the Repair Assessment Programme has been determined to be sufficient to meet the damage tolerance requirements for the FCBS that is affected by the SB. A note should be prominently placed somewhere in the Compliance Document stating that SBs not included in the list satisfy the DT data requirement.

> **"ALL SBs HAVE BEEN EVALUATED FOR DAMAGE TOLERANCE INSPECTION REQUIREMENTS; SERVICE BULLETINS NOT INCLUDED IN THIS LIST HAVE BEEN DETERMINED TO SATISFY THE DAMAGE- TOLERANCE REQUIREMENT BY INSPECTIONS COVERED IN THE BZI. THE BZI IS DOCUMENTED IN SECTION X.XXX.XX.X OF THE MAINTENANCE PLANNING DOCUMENT."**

Query 1 – Does the SB address a structural repair or a modification to FCS?

Historically, any SB, service letter or other document that lists ATA chapters 51 through 57 could provide repair or modification instructions that may require DT data. In addition, certain repairs or modifications accomplished under other ATA chapters may affect FCS. The first step in the screening process is to identify all such service instructions and develop a list of candidates for review (Q2).

Query 2 – Does the service instruction specify either a repair or modification that creates or affects FCS?

If it does, then the service instruction requires further review (Q3). If it does not, then the service instruction does not require further review.

Query 3 – Is the service instruction mandated?

Service bulletins and other service instructions that are mandated by an AD have requirements to ensure inspection findings (e.g., detected cracks or other structural damage/degradation) are addressed in an approved manner. If the TCH can demonstrate that it applies a process for developing inspection programmes for mandated SBs using DT data and/or service-based inspection results, and for continuously reviewing the SBs for their adequacy to detect cracks in a timely manner, the mandated SBs should then be considered as compliant with the intent of this process. Otherwise, the TCH will need to demonstrate the inspection programme in the mandated SB has been developed using DT data and/or appropriate service-based inspection results. The outcomes of Query 3 branch to two unrelated boxes (Q4 – if mandated by an AD) or (Q7- if not mandated by an AD).

Query 4 – Does the SB or service instruction contain terminating action?

Query 3 established that the inspection programme for the baseline configuration is acceptable.

Query 5 – Does the terminating action have DT data?

If the terminating action has a documented continuing airworthiness inspection programme based on damage tolerance principals, then no further review is required. The SB should be documented in the list. If the terminating action does not have DT data, or the status of the inspection programme cannot be verified, then further review is necessary (Q6).

Query 6 – Does the SB address a safe-life part?

If it does no further action is required. Otherwise, damage-tolerance based inspections will need to be developed and provided to the operators. The SB should be included in the list along with where to find the required continued airworthiness inspection programme.

Query 7 – In Query 3 a structural SB that was mandated by AD was identified.

Query 7 asks if a one-time inspection is required to satisfy the intent of the requirement. If it does, it is deemed that this is being done to verify that a condition does not exist and, on finding that condition, correct that condition to baseline configuration. As such, normal SSID programmes would then be expected to cover any required continued airworthiness inspections. If a repair is necessary, it is further assumed that this was done by reference to the SRM or other suitable means. No further action is required if this is the case and, if a repair was necessary, other means exist to determine the required DT data. If no inspections or multiple inspections are required, additional evaluation is required (Q8).

Query 8 – Is this a major structural design change (e.g., modification)?

This is a TCH decision that is part of the original certification process and is not a major/minor repair decision. If it is not a major design change then proceed to Q10, if not, proceed to Q9.

Query 9 – Does the change require non-destructive inspections to verify the integrity of the structure or are normal routine maintenance inspections (as delineated in the BZI) sufficient?

This is a subjective question and may require re-evaluating the change and determining where specific fatigue cracking might be expected. If normal maintenance inspections are adequate, no further action is required. Otherwise, proceed to Q10.

Query 10 – Does the SB contain DT data for both the baseline and modified aircraft configurations?

If so, the SB is satisfactory. Otherwise, damage tolerance-based inspections will need to be developed and provided to the operators. The SB should be documented in the list along with where to find the required continued airworthiness inspection programme.

Service Bulletin Screening Procedure

1. The TCH will perform the screening and the Structures Task Group will validate the results.

2. A list of all SBs requiring action will be included in the TCH Compliance Document. Those not requiring action will not be in the list.

3. Service Bulletins included on the list will fall into one of two general types:

Type I - SBs which have existing DT data.

Type II - Service Bulletins that require developing DT data.

4. TCH actions:

Type I – No action required.

Type II – Develop DT data and make it available to operators.

5. Operator actions (apply to both SB Types):

- Review SB incorporation on a tail number basis.
- For incorporated SBs that rely on BZI (i.e., no special inspections required based on DTE performed), reconcile any maintenance planning document structural inspection escalations.
- For incorporated SBs that require DTI, verify that DTI has been included in the operations specification and include it if it is missing.

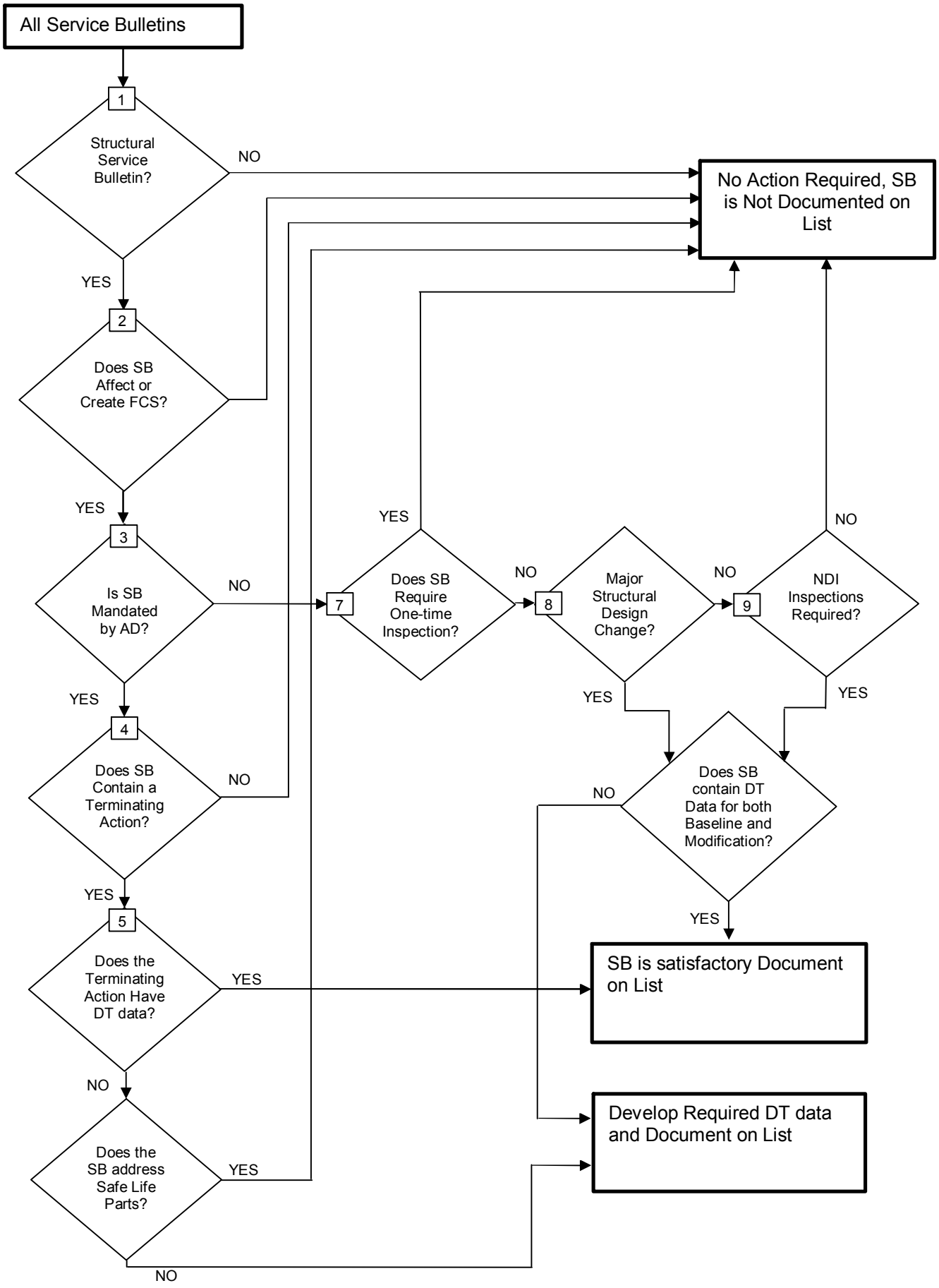

Figure A3(4)-1. Service Bulletin (SB) Flow Chart

ANNEX 5. LIST OF SIGNIFICANT STCs THAT MAY ADVERSELY AFFECT FATIGUE CRITICAL STRUCTURE

1. Passenger-to-freighter conversions (including addition of main deck cargo doors).

2. Gross weight increases (increased operating weights, increased zero fuel weights, increased landing weights, and increased maximum take-off weights).

3. Installation of fuselage cutouts (passenger entry doors, emergency exit doors or crew escape hatches, fuselage access doors, and cabin window relocations).

4. Complete re-engine or pylon modifications.

5. Engine hush-kits.

6. Wing modifications such as installing winglets or changes in flight control settings (flap droop), and modification of wing trailing edge structure.

7. Modified skin splices.

8. Antenna Installations.

9. Any modification that affects several stringer or frame bays.

10. A modification that covers structure requiring periodic inspection by the operator's maintenance programme.

11. A modification that results in operational mission change that significantly changes the manufacturer's load or stress spectrum (e.g., passenger-to-freighter conversion).

12. A modification that changes areas of the fuselage that prevents external visual inspection (e.g., installation of a large external fuselage doubler that results in hiding details beneath it).

13. In general, attachment of interior monuments to FCS. Interior monuments include large items of mass such as galleys, closets, and lavatories.