European Aviation Safety Agency
Rulemaking Directorate

EXPLANATORY NOTE

AMC-20 Amendment 2

Executive Director Decision 2007/019/R amends Decision No 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»). It represents Amendment 2 of AMC-20 and incorporates the output from the following EASA rulemaking tasks:

Rulemaking Task No.	TITLE	NPA No.
20.001	Certification of Aircraft Propulsion Systems Equipped with Electronic Engine Control Systems	04/2005
20.004	Airworthiness and operational approval for on-board equipment	11/2005
20.005	Ageing Aircraft Structures	05/2006

Each NPA has been subject to consultation in accordance with Article 43 of the Basic Regulation[1] and Article 15 of the Rulemaking Procedure established by the Management Board[2]. The Agency has addressed and responded to the comments received on each NPA. The responses are contained in a comment-response document (CRD) which has been produced for each NPA and which is available on the Agency's web-site.

Detailed changes incorporated in the NPA are summarised in the following pages for ease of reference.

[1] Regulation (EC) No 1592/2002 of the European Parliament and of the Council of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, *OJ L 240, 7.9.2002, p.1.* Regulation as last amended by Regulation (EC) No 334/2007 *(OJ L 88, 29.3.2007, p. 39)*.
[2] Decision MB/08/2007 of the Management Board of the Agency of 13 June 2007 amending and replacing Decision MB/07/2003 concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material ("Rulemaking Procedure").

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TITLE: AMC-20 Amendment 2

Rulemaking Task No.:	20.001
Title:	Certification of Aircraft Propulsion Systems Equipped with Electronic Engine Control Systems
NPA No.:	NPA 04/2005
CRD No.:	CRD 04/2005

LIST OF PARAGRAPHS AFFECTED

- Cover + Contents
- Change to AMC 20-1 (see Change Information for detailed changes)
- New AMC 20-3 added

In response to CRD 04/2005, the Agency received one substantive reaction, which is reproduced below together with the Agency's response:

UK-CAA
Comment 16

The response to the CAA comment is disappointing. – comment reproduced: (AMC 20-3, 6(e) Sub para (i) Declared levels – Electromagnetic Effects and Lightning. For HIRF considerations, - the words and environmental levels chosen are not consistent with the FAA / JAA agreed position as recorded at the EEHWG November 1998 meeting. Refer to the standard fixed wing JAA interim policies INT/POL/25/2 and corresponding interim policies for rotorcraft. For Critical systems these interim policies do not allow for laboratory testing and it is suggested that this aspect is deleted). It is still suggested that the paragraph (if none of the conditions defined above is available…) is deleted

Proposed Text:

Delete the last part of 6 (e) (i) declared levels such that option (if none of the conditions are available) is not suggested.

Justification:

If an engine manufacturer undertakes laboratory testing to the levels currently contained within the proposal there is a big risk that when the engine is offered for a particular airframe the levels undertaken will not be accepted and the whole engine HIRF testing for the engine will have to be repeated at great cost to the applicant.

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EASA Response: **Partially Accepted**

After further consideration, the Agency agrees that the last part of AMC 20-3, 6 (e)(i) may be misleading and could result in inappropriate engine HIRF testing being conducted that is not commensurate with aircraft level requirements.

Until such time as new requirements can be developed at aircraft level, previous practices (JAA Int/Pol) will continue to be applied using the CRI system. The text of AMC 20-3, 6 (e)(i) is therefore amended as follows:

(6) SYSTEM DESIGN AND VALIDATION

…

(e) Environmental conditions

…

(i) Declared levels

…

If none of the options defined above are available, it is recommended that the procedures and minimum default levels for ~~system laboratory~~ HIRF testsing ~~be as follows~~ are agreed with the Agency:

- ~~For frequencies from 10 kHz to 700 MHz, a minimum test level should be 100 volts per meter average.~~
- ~~For frequencies from 700 MHz to 18 GHz, the minimum test level should be 200 volts per meter average.~~
- ~~For rotorcraft installations, the minimum test level should be 200 volts per meter average over the entire frequency range from 10 kHz to 18 GHz.~~

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EXPLANATORY NOTE

TITLE: AMC-20 Amendment 2

Rulemaking Task No.:	20.004
Title:	Airworthiness and operational approval for on-board equipment
NPA No.:	NPA 11/2005
CRD No.:	CRD 11/2005

LIST OF PARAGRAPHS AFFECTED

- Cover + Contents
- New AMC 20-11 added

In response to CRD 11/2005, the Agency received no substantive reactions.

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EXPLANATORY NOTE

TITLE: AMC-20 Amendment 2

Rulemaking Task No.: 20.005
Title: Ageing Aircraft Structure
NPA No.: NPA 05/2006
CRD No.: CRD 05/2006

LIST OF PARAGRAPHS AFFECTED

- Cover + Contents
- New AMC 20-20 added

In response to CRD 05/2006, the Agency received several substantive reactions, which are reproduced below together with the Agency's responses:

CRD Comment No.	Reaction	Justification	EASA Response
10	FAA	The FAA comment was not about the continued need for service bulletin (SB) review. It was about establishing guidelines in the AMC for dealing with in-service findings regardless of whether or not a SB exists. Neither the FAA nor EASA have properly addressed this issue. There should be a harmonization activity on it.	**Noted** As stated in the EASA response, the processes related to disposition of in-service findings are an issue that goes beyond the confines of ageing aircraft programmes. EASA would welcome further dialogue with FAA on these issues.
19	FAA	Clarification is requested. Although "fatigue cracking scenario" was added, the resulting text is not clear on what is meant by "type of damage." In MSG context, we talk about fatigue damage (FD), environmental damage (ED) and accidental damage (AD). Are these the damage types EASA has in mind? If so, it should be mentioned in the AMC that normal FD must always be considered in the SSID while maintenance actions to address potential structural cracking as a result of ED and AD may be	**Partially Accepted** Appendix 1 already describes the type of damage to be considered. However, the following guidance is added to Appendix 1, para. 3.2, to further clarify this point: *The damage tolerance certification specification of CS 25.571 requires not only fatigue damage to be addressed but also accidental and environmental damage. Some types of accidental damage (e.g. scribe marks) can not be easily addressed by the MSG process*

		included somewhere else.	*and require specific inspections based on fatigue and damage tolerance analysis and tests. Furthermore, some applicants may chose to address other types of accidental damage and environmental damage in the SSID or ALS by modelling the damage as a crack and performing a fatigue and damage tolerance analysis. The resulting inspection programme may be tailored to look for the initial type of damage or the resulting fatigue cracking scenario, or both.*
19	Airbus	i) This EASA answer to FAA comment might be not appropriate from our point of view, because it is not the Airbus intention to dispatch "the resulting fatigue cracking scenario" to the operators via the SSID/ALI Document. The fatigue-cracking scenario should be part of this information kept by the TCH in a form available to the Agency, but not included in the SSID/ALI Document. This is the same rationale as the one used for Comment 49 of CRD 05-2006. ii) In addition, it should be left to the manufacturer's choice/initiative to include the procedures explaining in detail the inspections in the SSID: The development and availability of procedures linked to SSID inspections is not challenged, only the way and the place to make them available to operators and Authorities. **<u>JUSTIFICATION:</u>** i) The operator might focus on area targeted by the fatigue cracking scenario provided through the SSID, and not on the whole area to be inspected in accordance with the complete item	**Accepted** The Agency has revised the text to highlight what is essential in the SSID to enable the operator to detect damaged or cracking structure. The text of Section 6 para 2 is re-worded as follows:*The ~~recommended SSIP~~SSID, along with the criteria used and the basis for the criteria should be submitted to the Agency for review and approval. The SSIP should be adequately defined in the SSID. 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.~~ inspection threshold, repeat interval, inspection methods and procedures. The applicable modification status, associated life limitation and types of operations for which the SSID is valid should also be identified and stated. In addition, the inspection access, the type of damage being considered, likely damage sites and details of the resulting fatigue cracking scenario should be included as necessary to support the prescribed inspections.*

		description. ii) The procedures explaining in detail the inspections are recommended, in order to achieve the inspection in a proper and effective manner. However, they should not be treated at the same level as inspection method, threshold and interval, for which no deviation is permitted, unless Airbus and Authorities give specific allowance.	
21	FAA	The text was revised but the issue as stated was not corrected. It still says that the intent of the SSIP is to detect local cracking which conflicts with guidance provided in Appendix 1. The guidance has always stated that fatigue in general must be addressed in some way. It has never excluded any particular type or source. This is a very important issue that needs to be harmonized.	**Accepted** Text amended as follows: *10. LIMIT OF VALIDITY …* *a) Initial WFD Evaluation and LOV* *…* *The likelihood of the occurrence… The SSIP described in paragraph 6 and Appendix 1 of this AMC are intended to find all ~~this~~ forms of fatigue damage before they ~~it becomes~~ critical. ...*
22	FAA	The definition of "large damage capability" (LDC) is not clear. Because EASA does not intend on using LDC for compliance purposes, the FAA believes that it should be removed from the AMC. Should EASA wish to retain the text, the FAA suggests using the word "redundancy" or the phrase "structural damage capability" instead of LDC. This would convey the thought without implying any particular compliance requirement. Additionally, the FAA wants to clarify their comment about the effect of a single small crack on a structures capability to tolerate damage. For example, the residual strength capability of a fuselage lap splice with singular damage in it will be degraded if there is	**Not Accepted** LDC, as defined in Appendix 2, is an inherent aspect of many type designs. By precluding WFD, this capability is retained and it is considered worth noting this in Section 10, whatever the means of compliance chosen for WFD substantiation. **Noted** The FAA comment and its clarification are understood. Section 10 of the AMC addresses WFD and therefore the example given of the effect of single site cracking is considered inappropriate to

		normal fatigue cracking at multiple locations (MSD or MED) adjacent to it. Likewise the residual strength of a wing cover with singular skin damage will be degraded if there is normal fatigue cracking at a single location in the spar cap adjacent to it. In both cases the adjacent cracking can be just as hard to detect and just as detrimental although in one case we might label it MSD/MED and in the other case we wouldn't. The revised text only addresses the MSD/MED case as a concern. It should also address the other.	include. Scenarios such as the residual strength of a wing skin with concurrent damage in the wing spar are addressed by the current AMC 25.571 as might be used to develop a SSID or ALS.
25	FAA	The implementation schedule for certain tasks should require that the baseline airplane be addressed before STCs. For example, the TC holder should identify fatigue critical baseline structure first before STC holders identify fatigue critical structure for their alterations. This would allow the STC holder to have good understanding of what constitutes fatigue critical structure for the baseline airplane before it is determined for STC structure.	**Noted** Section 12 provides general guidance and relates to programme implementation by the operator. It is not the intent to stipulate scheduling for the provision of data by the STC and TC holders at this time.
28	FAA	The FAA requests further clarification from EASA. The word "primarily" is not needed because DT based inspections are to address structural cracking no matter what the source of cracking is.	**Not Accepted** As stated in Section 2 para 2, SSIPs are based upon a review of the damage tolerance characteristics of the aircraft structure. In the case of damage such as a scribe mark, the cracking phase may not provide adequate time for practical inspections. In these circumstances, the inspection may focus on timely detection of the initial damage itself.
41	Airbus	The result of the comment (Table in section 12) is that CPCP affect all primary structures. Primary Structure is *structure that carries flight, ground crash or pressurisation loads*. (Definition	**Noted** As detailed below in the response to CRD comment No.43 the ATA MSG-3 process identifies the CPCP to

		as per answer to comment 44) There might be some differences in comparison with the SSI list coming from MSG-3 document: SSI is "*any detail, element or assembly, which contributes significantly to carrying flight, ground, pressure or control loads and whose failure could affect the structural integrity necessary for the safety of the aircraft*." Is it the AMC intent to question the ATA MSG-3, regarding the structure category to be covered by the CPCP? Or does EASA consider that Primary Structures selection fit with SSI selection? In this last case, it should be clarified in the final document.	apply to the aircraft structure. EASA considers the definition of the affected structure provided in the AMC to be appropriate in the context of developing a CPCP. It is EASA's intent to further investigate this issue under the ToR of the MDM.028 WG.
43	Airbus	The EASA answer needs further explanation, because the ATA MSG-3 is obviously not the only means of compliance, but, it is considered as a complete means of compliance when developing the CPCP. Or does the EASA answer mean that the MSG-3 aims at covering all SSI, whereas the NPA CPCP will cover all Primary Structures (see comment 41)?	**Noted** As previously noted, ATA MSG-3 process itself refers to a CPCP and is therefore not necessarily a complete means of compliance. From the MSG-3 Glossary: *" Corrosion Prevention and Control Program (CPCP) A program of maintenance tasks implemented at a threshold designed to control an aircraft structure to Corrosion Level 1 or better."* The CPCP definition is not limited to SSIs. However, ATA MSG-3 does ensure that SSIs are properly addressed by the CPCP. EASA intends that the CPCP addresses all primary structure (including structure subject to crash loads), as a minimum. Note that CS 25.609 "Protection of Structure" applies to **all** structure. (See also comment 41 and 44).

44	Airbus	EASA added a reference to crash loads in their definition of primary structure. EASA consider that "interior structures such as seat tracks that carry crash loads as required by CS 25.561 are considered "primary structure". The proposed definition has now become: **Primary Structure** is structure that carries flight, ground, crash or pressurisation loads. Airbus would urge EASA to not change a definition which is worldwide accepted, but keep the traditional definition: **Primary Structure** is structure that carries flight, ground, or pressurisation loads. **<u>JUSTIFICATION:</u>** Airbus has no problem to treat seat tracks as primary structure, but it could become an issue if, based on the revised definition of primary structure, the application is widely extended to structural details like fixations of interior panels, galleys, or toilets for example. If EASA want to specifically address seat tracks, a note should be added in the appendix text to refer to consideration of seat tracks.	**Noted** Primary structure is not defined in the Airworthiness Requirements. EASA finds a variety of definitions exist elsewhere. For example, FAA have used the following definition for primary structure in policy documentation related to certification of composite secondary structure: *"The structure that carries flight, ground, crash or pressurisation loads, and whose failure would reduce the structural integrity of the aircraft or may result in injury or death to passengers or crew."* Note that this definition also includes crash loads but is even greater in its differences from the definition recognised by Airbus. It is not EASA's intent to be prescriptive in identifying affected structure (e.g. seat tracks), but to provide objective criteria to meet the safety intent. EASA considers that the definition of affected structure provided in the AMC is appropriate to meet the safety intent of the CPCP.
63 & 78	Airbus	The NPA will give a new definition of Corrosion Level 2, as defined in answer to Comment 78: ***Level 2 Corrosion****. is that corrosion occurring between any two successive corrosion inspections task that requires*	**Not Accepted** Corrosion that does not require structural reinforcement, yet is widespread and approaches allowable limits between successive inspections, requires similar consideration in the maintenance programme

		a single rework or blend out which exceeds the allowable limit. *OR,* *Corrosion occurring between successive inspections that is widespread and requires a single blendout approaching allowable rework limits. i.e. it is not light corrosion as provided for in Level 1.* The second definition is either too detailed or not enough. This definition adds confusion, because the word "approaching" is vague (or even always valid, whatever the corrosion finding), and nothing is said for instance for light blend out in conjunction with Widespread corrosion. If corrosion level 2 definition is kept as this, then corrosion level 1 definition should be reworded to include Widespread <u>and</u> light corrosion. Therefore Airbus propose the following definitions: **Corrosion Level 1** Refer to ATA MSG-3 definition **Corrosion Level 2** Corrosion damage that does require structural reinforcement or replacement but is not determined to be an urgent airworthiness concern. **Corrosion Level 3** Corrosion damage that does require structural reinforcement or replacement and is determined to be an urgent airworthiness concern. **Urgent Airworthiness Concern** An urgent airworthiness concern is a damage that could jeopardize continued safe operation of an aircraft. An urgent airworthiness concern typically requires	to that given to local corrosion exceeding limits. It is possible that, unless the maintenance programme is amended, widespread corrosion that has approached the limits in one inspection interval could significantly exceed limits over the next inspection interval; this may result in a Level 3 occurrence. The Level 2 corrosion definition is retained with a cross-reference to Level 1 definition (3) added for further clarification.

		correction before the next flight and expeditious action to inspect the other aircraft in the operator's fleet.	
General (Page 44, App.3)	DGAC-F	The 9 pages Appendix in the NPA has been replaced by a 33 page Appendix, including 5 new annexes. This seems a significant revision which could justify a new consultation, we thus would be interested in knowing why the Agency apparently decided not to proceed with a new consultation.	**Noted** The intention of this rulemaking task was to provide, without undue delay, guidance material to enable TC/STC Holders and operators to develop ageing aircraft programmes acceptable to the Agency. The decision not to re-issue the NPA was taken in the knowledge that material added was already harmonised and mature, having been developed by the AAWG, and that stakeholder reactions could be taken into account before publication.
General (page 69, Appendix 3, Annex 2, §7)	DGAC-F	According the second paragraph, "*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*". This situation does not seem compatible with Part 21 as according 21A.118A, the STC Holder shall be responsible for continuing airworthiness, and to 21.118B, the STC is not any more valid if the STC holder does not remain in compliance with Part 21, or if the certificate is surrendered or revoked under the applicable administrative procedures established by the Agency. As no rulemaking task is yet identified to adress the continuing airworthiness of aircraft with a TC/STC holder out of business, we would like to know if this part of the proposed AMC is a mistake or whether the Agency intends to launch a new rulemaking activity on this matter.	**Noted** Part M requires that at the moment of installation of a modification, the data is approved. When the STC is invalidated this does not affect compliance with that requirement. The consequence of invalidation of an STC is that from that moment on the STC can no longer be regarded as approved data for new installations, but it does not affect the airworthiness of aircraft already modified. Part M also clearly puts the responsibility of the continuing airworthiness of the aircraft with the aircraft owner (M.A.201(a)). In case the continuing airworthiness of a modification is no longer supported by the STC holder the owner of the modified aircraft will become responsible, hence the text in the AMC.

General (page 70, Appendix 3, Annex 3, §1(c))	DGAC-F	The methodology identified here does not seem accurate. When you compare the age of two aircraft manufactured at almost the same time, if they belong to two companies which fly differently (FC/FH very different, or VIP aircraft), the component's age cannot be determined simply by a comparison of the age of the aircraft.	**Partially Accepted** The methodology could be interpreted incorrectly. Text is amended for clarity as follows: ANNEX 3 1. DETERMINING THE AGE … … (c) A manufacturing date marked on a component may also be used to help establish the component's age in flight cycles or flight hours. 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.
General	Comment from MDM.028 WG	Appendix 1, paragraph 1, 3rd sentence. For clarification, add the following text: *"…For large transport aeroplanes, all repairs and modifications that affect FCS …"*	**Accepted**
General	Comment from MDM.028 WG	Appendix 3, Section 3.1. As information is repeated, it is recommended that (c) is deleted, and (d) is amended to read as follows: *"(c) Submit the list of FCBS to EASA for approval, and make it available to operators and STC holders."*	**Accepted**
General	Comment from MDM.028 WG	As JAR-OPS Subpart M was deleted in Amdt 12 dated December 2006, all references to operational requirements and to JAR-OPS Sub-part M in AC 20-20 should be removed and replaced with references to EC Regulation 2042/2003 (Part-M).	**Accepted**