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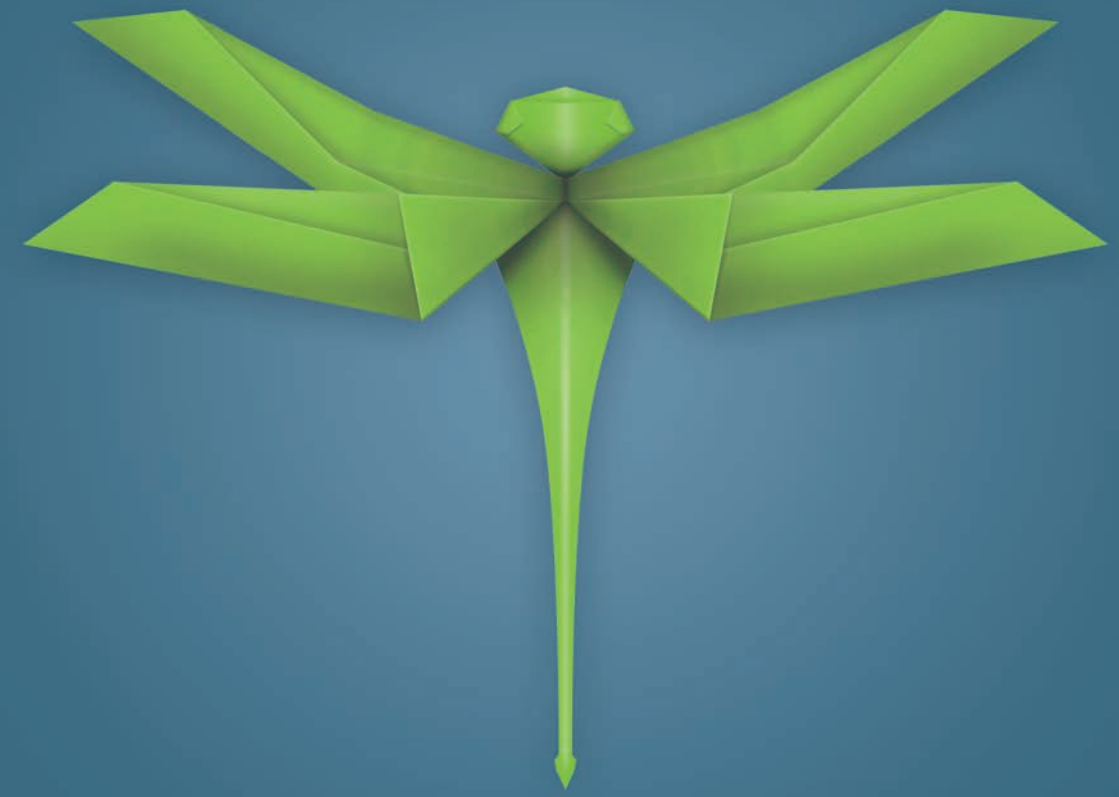
“J-NEWS”



Dear Madam, dear Sir,

I am delighted to share with you the second edition of the J-News for the year 2019. Once again, we took on board several proposals made by you, the Industry. I hope that the clarifications brought by the following articles will be of interest to you. As we received some questions on the nature of the J-News articles I would like to highlight that they are purely informational e.g. explain best practices and by no means should be considered as AMC/GM.

On the forthcoming pages, you will find useful information on the following topics[1]:

Item 1. DOA support for AD issue

Item 2. Interactions between TCH and STC Applicant for obtaining a STC Approval

Item 3. Additive Manufacturing

Item 4. Repair design errors detected on Maintenance

Item 5. AC 20-178 clarification

I would like to thank particularly Carlo CARDU, Enzo CANARI, Joaquin DURAN CEREZA, Alexandru ENACHE, Wolfgang HOFFMANN, Mariano LANDI, Ciro PIRONE, Olivier TRIBOUT and Raphaël AUBERT who proposed and contributed to the articles in this edition, especially as this is an additional task to their normal work.

All *Aircraft & Products* newsletters including the ***J-News*** bulletins are available on **our web site**.

Yours faithfully,
Markus GÖRNEMANN
Head of the Design Organisations & ETSO Department
Deputy Certification Director

1 As usual, should you need more information on any of the topics presented, please get in contact with the DOA Team Leader allocated to your DO.

Good practice

Item 2019/2/1
DOA support for AD issue

Part 21.A.3B(c) defines the obligations for the DOAH "*when an airworthiness directive has to be issued by the agency*". Usually this is accomplished by means of a Service Bulletin (or other similar publication).

EASA published a CM[2] promoting Design Approval Holder (DAH) Best Practices for drafting Service Bulletins (SBs) related to Airworthiness Directives (ADs), which is available in the EASA website (see link in the footnote).

While drafting AD, some common misunderstanding have been observed.

- A Service Bulletin (SB) which is expected to be referenced in an (P)AD must be issued and made available to operators before the (P)AD is issued. An AD usually requires what to do, and when, but does not specify "how to do" the action, just referring to the SB. If the SB is not available, affected operators cannot accomplish a complete review of the (P)AD and its required actions, nor issue comments/suggestions/request for clarification before the binding document (AD) is issued. Obviously, the SB must be available before the AD is issued in case of no AD preliminary consultation.

- There is no need to include the AD number in a SB. Including a statement that "*an AD is expected to be issued by EASA*" highlights the mandatory status of that SB, without delaying the issuance of the SB and giving more time to operators to plan and accomplish the actions. Once the AD is issued, the SB can, at DAH discretion, be revised to include reference to the AD number.

- Draft SB: draft SB should be clearly marked as such (e.g. using watermark), to avoid any possible misunderstanding on their status. Furthermore, it is recommended not to specify an "issue date" in a draft SB: issue date should be included immediately before the actual issuance of the SB; during drafting, it would be better replacing it with "xx/xxx/xxxx" or with a fictitious date (e.g. 01 January 1900).

- Compliance and accomplishment timescale section: it is recommended not to refer to the AD for compliance time (avoid sentences like "*accomplish this SB within the timescale provided in the AD*"). As the SB must be issued before the AD, on SB issue date operators have no access to the AD. Good practice is to include in the SB a proposed timescale (the one already agreed with the Agency, reflecting the risk assessment). Some DAH include a statement that "*an AD is expected to be issued by the EASA, confirming the proposed timescale. Reference must be made to the AD for confirmation of mandated*

2 **Certification Memorandum (CM) EASA CM-21.A-J-001 Issue 01**, dated 21st June 2013 on "Service Bulletin related to Airworthiness Directives".

accomplishment timescale": this approach allows anticipating a critical information to operators, letting them more time to plan and accomplish the actions.

- Revision of a SB mandated by an AD must be agreed with the Agency before its issuance. This allows EASA to include a statement that "*use of later approved revisions of the above-mentioned document is acceptable for compliance with the requirements of this AD*" (see also CM section 4.1.10).

- Flexibility: an AD does not include the "how to" accomplish an action. It usually requires "*accomplish the action in accordance with the instruction of (section X of) the SB*". This implies that any deviation to the instruction of (section X of) the SB, that an operator may need to apply, should be approved using the AMOC to AD process. Keeping that in mind, it is recommended to include flexibility provision in the instruction of (section X of) the SB: procedures that must be followed with no deviation to resolve the unsafe condition leading to the AD can be grouped in a single section of the SB and identified as critical, while other procedures (e.g. aircraft preparation for maintenance, reporting requirements), not related to the unsafe condition and for which deviation or alternative procedures may be acceptable, can be identified as recommended. The CM includes several other suggestions on flexibility.

- Compliance: only the compliance timeframe as identified in the AD is mandatory. Having that in mind, anyway, it is always a good practice avoiding a "SB compliance time" section ambiguous, or unnecessarily strict. This could lead to misinterpretation of the requirements.

Some examples:

> Some DAH define the SB effectivity as follows: "*This SB is applicable to all airplanes from 12 months after first flight*". In this case, it is recommended keeping the effectivity on all airplanes, requiring actions upon reaching 12 months since first flight. [***Risk***: the SB may be initially disregarded as the aeroplane, on the day when the SB effectivity is checked, has not yet accumulated 12 months since first flight].
> When the compliance is based on flight hours / calendar periods starting from a certain point (e.g., entry into service, first flight, since new), make sure that this information is clearly and easily available to operators. As an example, consider that – from an operator point of view – the first flight could be (mis)understood as the first flight after initial delivery, disregarding production flights accomplished before aircraft delivery.
> It is recommended to avoid requiring repetitive inspection at fixed intervals (e.g. "*repeat the inspection every 50 flight hours*"), since – in the vast majority of cases – no one can schedule an action exactly at 50 FH. Prefer "at interval not to exceed 50 FH", providing some flexibility to operators.

- Always include a list of acronym used in the SB, even those obvious. ***Tip***: prepare a SB template, including standard notes and sections, and add the list of common acronyms (part number P/N, serial number S/N, free of charge FOC, etc.).

Part 21 implementation

Item 2019/2/2
Interactions between TCH and STC Applicant for obtaining a STC Approval

In relation to the EASA expectation on the practical interaction between TC and STC Applicant for obtaining a STC Approval, it is worth to copy here below the applicable Part 21 requirements addressing the topic, which are 21.A.113 (referring to 21.A.93) and 21.A.115.

21. A.113 Application for a supplemental type-certificate[3]

(a) [...]

(b) An application for a supplemental type-certificate shall include the descriptions, identification, and changes to the operational suitability data required by point 21.A.93. In addition, such an application shall include a justification that the information on which those elements are based is adequate either from the applicant's own resources, or through an arrangement with the type-certificate holder.

21.A.93 Application

An application for approval of a change to a type-certificate shall be made in a form and manner established by the Agency and shall include:

(a) A description of the change identifying:

1. all parts of the type design and the approved manuals affected by the change; and

2. the certification specifications and environmental protection requirements with which the change has been designed to comply in accordance with point 21.A.101.

(b) Identification of any re-investigations necessary to show compliance of the changed product with the applicable certification specifications and environmental protection requirements.

(c) When the change affects the operational suitability data, the application shall include, or be supplemented after the initial application to include the necessary changes to the operational suitability data.

21.A.115 Issue of a supplemental type-certificate

The applicant shall be entitled to have a supplemental type-certificate issued by the Agency after:

(a) [...]

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3 Please note that the requirements quoted in this article will be modified as of 23rd March 2020, when **Commission Delegated Regulation (EU) 2019/897** will apply in its entirety.

(b) it is demonstrated that:

1. [...]
2. [...]
3. [...]

(c) [...]

(d) where, under point 21.A.113(b), the applicant has entered into an arrangement with the type-certificate holder,

1. the type-certificate holder has advised that it has no technical objection to the information submitted under point 21.A.93; and

2. the type-certificate holder has agreed to collaborate with the supplemental type-certificate holder to ensure discharge of all obligations for continued airworthiness of the changed product through compliance with points 21.A.44 and 21.A.118A.

An applicant for an STC, under Part 21.A.113(b), shall justify that the information on the basis of which the description of the change to TC (i.e. all affected type design parts and the applicable requirements they have been designed to comply with), and the identification of any re-investigation necessary to demonstrate compliance are established, is adequate either from the applicant's own resources, or through an arrangement with the type-certificate holder.

When the above justification is given via an arrangement with the TC Holder, the issue of the STC is subject to the availability of a no technical objection (NTO) by the TC Holder to the information which was used to establish those description and identification.

The NTO is not related to the compliance demonstration necessary to approve the STC, or to the design of the changed product, and cannot be used as a means of compliance with the applicable certification basis identified in accordance with Part 21.A.101.

It is expected that those information are made of one or more of the following, as necessary for the TC Holder to give his NTO:

- Design data as derived from TC holder design data set or pertinent ICA;
- TC Holder Certification Documents (e.g. certification programme, compliance documents, etc.) or extract of;
- In-service data, or extract of.

It is expected that the Design Assurance System of the STC applicant describes the procedure for the coordination with the TC Holder and the minimum content of the documents submitted to the TC Holder for his review, and of the NTO to be produced.

General DOA information

Item 2019/2/3
Additive Manufacturing

In additive manufacturing, the part is built layer by layer, typically being defined directly from 3D CAD data. As a result, very complex and integrated structures can be realized, allowing much customised prototype evolution and small batches to be produced at low unit costs within a reasonable time.

There are many AM material and process combinations available, including metallic, non-metallic, and hybrid material configurations. Developing applications include airframe, engine, systems, and interior parts.

As for any materials and processes to be used in certified products, AM products need to satisfy the same key CS applicable requirements (e.g. 2x.603 'Materials', 2x.605 ' Fabrication Methods' etc.),

However, AM technology involves many parameters, the 'engineering properties' being significantly governed by rate of energy delivery to the material (often presented in the form of the Power – Velocity (PV) window).

The rapid evolution of AM technology, and the associated changing knowledge balance between those involved in design and production, has required particular attention from those involved in many domains, as evident in the EASA AM Safety Strategy, which includes a Risk Matrix (RM) intended to enable EASA to properly identify potential safety and environmental risks, and define and implement means to mitigate those risks, largely possible by working closely with industry and NAAs.

This approach is supported by **EASA CM–S-008 Issue 01** 'Additive Manufacturing' and is aligned with the EASA Level of Involvement (LoI) strategy (**COMMISSION DELEGATED REGULATION (EU) 2019/897**), whereby resource priority is given to criticality and novelty. To date, certified applications have been of limited criticality, e.g. some interior parts and engine system parts, e.g. the LEAP fuel nozzle.

Process parameter management is critical to the success of the AM build, as it governs how the material will melt and solidify to form the component. Since each alloy powder absorbs laser energy, transmits heat, flows and solidifies in different ways, the choices must be tailored to the characteristics of the alloy that is being melted. One has to work within the capabilities of the AM machine to find an operating point in the middle of a wide operating window. This provides a safety margin to accommodate a range of local melting conditions. Even so, some part geometries may demand modified parameters to accommodate variations in retained heat. Borders and down-skin regions will also require different processing parameters and scanning strategies to deliver the required surface quality.

Material properties are finally dependant from a high number of key-parameters of pre-process-, process- and post process parameters. Below a parameter list for Laser Powder Bed Fusion (L-PBF) produced parts:

Pre-process (feed stock material)	Process (building)	Post-process (post treatment)
Purity of powder	Laser power	Stress relief
Particle size of powder	Spot size	Hot isostatic pressing (HIP)
Bulk reactive elements (C, S)	scanning velocity	Solution annealed (SA)
Surface reactive elements (O, N, H)	Hatch distance	Surface finish
Blended powder	Layer thickness	Geometrical tolerances
Reuse of powder	Built direction	
Reactive alloys	Built orientation	
Non-reactive alloys	Continuous wave laser	
Powder storage	Modulated laser	
	Support structure	

The SAE[4] (Society of Automotive Engineers) working group develops standards with key parameters for metallic and non-metallic AM feed stock materials and processes as for e.g.:

AMS7000	L-PBF 625 Material Specification
AMS7001	Alloy 625 Powder Specification
AMS7007	EBPBF Ti-6Al-4V Process Specification
AMS7009	Laser Wire DED Material Specification
AMS7016	Laser-Powder Bed Fusion (L-PBF) Produced Parts
AMS7019	Electro polishing of AM Parts

EASA CM–S-008 Issue 01 shares contacts across different technical domains at EASA and will evolve with industry application evolution across those domains. Please contact those identified in the domain of interest to you.

4 Other SAE standards can be found on the **SAE website**.

For the envisaged update of this **CM** we intend to provide further guidance on low criticality AM parts (metallic and non-metallic).

EASA has organised AM workshops since 2016, including broader informative events, more detailed 'working' workshops, and events co-ordinated with FAA.

- **2016 EASA AM Event**
- **2017 EASA** AM Event
- **2018 EASA AM Workshop**
- 2018 **EASA – CAAS AM Event**
- **2018 FAA – EASA AM Workshop**

The **2019 EASA-FAA AM** event is planned for 1st week of November at EASA headquarters.

Good practice

Item 2019/2/4
Repair design errors detected on Maintenance

EASA Maintenance Organisation Oversight Section (FS.1.4) is assigned with the oversight of EASA part 145 approved Maintenance Organizations (MO) located outside the EASA member states. During the surveillance activity of these organizations, the EASA surveyors have identified a number of DOA related issues. Here below is a brief description of some of them:

1. Quite often, a DOAH would provide advanced/preliminary information to the MOA, made of drawings or instructions that are not yet approved. Advanced information (i.e. not yet approved repair designs) should be clearly identified as such to avoid release into service before proper airworthiness approval.

2. Companies holding multiple approvals (DO, PO and MO) should always clearly identify the airworthiness status and make reference to the approvals in their internally published instructions and information. In particular, maintenance cards created to embody changes should clearly make reference to the minor changes and/or STC approving the design data.

3. Except when coming from a US organization, FAA Form 8110-3 are not a valid approval to release a change or a repair design in the EASA system. Changes and repair designs should be appropriately approved.

4. When proposing repair schemes on composite structures, DOAH should ensure that original functions are maintained, such as metallic mesh for lightning strike protection.

5. When, as part of a change or a repair, a DOAH raises the need for NDT inspections, the instructions to perform this/these NDT inspection(s) should be provided in details, including (when necessary) the type of inspections, the defects being searched, the standard practice reference, the type of equipment, the equipment parameters, etc. These pieces of information are even more relevant, when there is no NDTM available for the type.

Changes to Type Certificate

Item 2019/2/5
AC 20-178 clarification

AMC 25.853 allows the use of the guidance of FAA AC 20-178 (Flammability Testing of Aircraft Cabin Interior Panels After Alterations, dated 4.6.2012) as an Acceptable Means of Compliance to CS 25.853.

Refurbishing cabin interiors of existing airplanes often includes replacing the finish on existing panels, creating a new combination of layers that must be shown to be compliant with CS 25.853. When spare panels to which the new finish is applied are not available because they are no longer in production, the only source for panels is from the aircraft itself. This involves cutting the amount of panel material needed to manufacture the required samples directly from the affected aircraft interior components.

FAA AC 20-178 was developed with the objective to create conditions for refurbishment of cabin interiors in all cases in which it is not possible to purchase the panels needed to build the test samples needed to conduct the testing required in CS 25.853(a) and CS-25 Appendix F Part I . The AC clarifies how to design surrogate panels that could be used as support in combination with the new layers in the construction of the test samples.

As clarified in the AC, when spare original panels are available (without destructive testing of installed components), then it is not allowed to use a surrogate panel.

The AC provides 5 alternative options for the construction of samples and specifies the limitations and the conditions that must be met in order to use each option.

A DOA that is not able to strictly follow the guidance of the AC can propose to EASA an alternative means of compliance. The related design change will have to be classified as major[5]. The alternative MOC will be documented in a CRI.

Q&A

- **Q**: Which options given in the AC I am allowed to use if I have no spare panel and no data of the original panel construction?
  A: You can use option 2, option 4 or option 5.

- **Q**: What is a surrogate panel?
  A: A surrogate panel is a panel that represents to an acceptable extent the configuration of the originally certified panel, including:
  (1) Core type;
  (2) Resin and adhesive type;
  (3) Thickness, number and type of pre-preg or non pre-peg plies; and
  (4) All old finishes that will not be removed prior to applying the new finish.

  It is not acceptable to use options 3, 4 or 5 of the AC using panels that are not a surrogate of the originally certified panel.

5 As per GM 21.A.91 *Classification of changes to type certificate* points 3.4(b) and 3.4(c).

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