EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
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Proposed CM-S-003

Standard fasteners in critical installations

Industry meeting

3 June 2014

Your safety is our mission.

Proposed CM-S-003

Overview

- **Applicability and Intent of the CM**
- **Summary of comments and responses**
- **Continued Airworthiness Review Item**
- **Current status**

Applicability and Intent of the CM

- CM applies to new certification projects and interpretation of the existing requirements in the knowledge of the current quality of standard fasteners.
- Further inform DAHs and applicants for design approvals of the issue.
- Provide guidance to help ensure that appropriate measures are considered for initial certification, including associated continued airworthiness aspects, to
- Minimise the risk that the use of standard fasteners might compromise the intended level of safety.

Summary of comments and responses

- Comment
  - Clarify definition of qualified standard fasteners
- Response
  - Standard fasteners that require additional verification of compliance to specification and control of their source, by methods defined by the DAH.
- Comment
  - Critical installations/location/assemblies definitions?
- Response
  - Critical installations are structural/mechanical assemblies including fasteners the failure of which (single or multiple due to common cause) is classified as hazardous or catastrophic.

Summary of comments and responses

- Comment:
  - Is there a safety issue?

- Response:
  - The SIB has been updated to report recent ADs that have been issued to address specific known instances of defective parts.
  - Experience gathered in recent certifications has shown standard parts are being used in some very critical installations and further unsafe conditions may arise if no action is taken.

Summary of comments and responses

- Comment:
  - Activity described does not seem appropriate for a CM.
  - POA and quality issues should not be addressed via design CM.
- Response:
  - DAHs define and select component specifications based on their knowledge of the controlled level of integrity in comparison with the hazard classification of the associated failure effect.
  - For critical installations using standard parts this is directly a DAH issue as only the design organisation knows if additional conformity checks are necessary and what they should be.
  - In parallel, EASA is initiating rulemaking activity (RMT.0018 and .0571 ‘Installation of parts and appliances that are released without an EASA Form 1 or equivalent’), but considers that this would not provide an appropriate level of safety in the short term.

Summary of comments and responses

- Comment
  - Clarify approval process.
- Response
  - Compliance with the applicable requirements will be addressed in the certification / validation processes through a dedicated CAI or CRI.
- Comment
  - Is the CM retrospective?
- Response
  - No, retrospective action may be addressed by a CARI or AD.

Summary of comments and responses

- Comment
  - Provide examples of adequate design solutions

- Response
  - The criticality of adequate design solutions is dependent on both the design itself and the potential failure modes of the fastener. A fail safety criterion, for instance, by providing redundancy of fasteners, does not automatically negate the need to consider qualification of the fasteners, as all the fasteners on a joint could originate from a common defective batch.

Summary of comments and responses

- Comment
  - Ensure proposed solution is practical to implement and not an undue burden for DAH, Operators and Maintenance organisations.

- Response
  - The need to create a unique part number is envisaged to be limited to critical installations only.
  - Other solutions such as identifying fastener producers who apply the required checks to all the affected fasteners they produce may also be possible.

Summary of comments and responses

- Comment
  - Why address hazardous failures in addition to catastrophic as required by CS 27/29.602?

- Response
  - Unsafe conditions arise from hazardous as well as catastrophic failures.
  - CS 27/29.601(a) and CS 27/29.607(a) effectively address any fastener whose loss could jeopardise the safe operation of the rotorcraft and are therefore one of the relevant reference points for the CM needing to address both hazardous and catastrophic scenarios rather than just catastrophic ones.
  - It should be noted that this CM provides guidance for fixed wing applications in addition to rotorcraft.

Summary of comments and responses

- Comment
  - What is meant by deviations from standard?

- Response
  - The term “Deviations from the standard” is intended to primarily address manufacturing errors/flaws. However, it also has the objective of ensuring that the inherent variability associated to the standard is understood. Based on recent experience, consideration should be given to probable manufacturing flaws and errors that are not prevented or detected by the processes currently associated to the standard. The qualification of all parts should determine the acceptable manufacturing variability that is compatible with the intended function.

CARI

- EASA and other authorities have issued ADs in response to specific findings
- This approach does not address the much broader risk posed by some standard fasteners and the totality of their current critical applications
- The Agency is strongly considering the use of a CARI to anticipate and control the risk

CARI cont (1)

- In order to reduce the risk of critical locations/assemblies failing through the inadvertent use of defective standard fasteners, the Agency may request that TCHs perform a design review to ensure the risk posed by the continued use of standard parts is mitigated by:

  - Assessing the impact of the threats posed by standard fasteners to the aircraft systems and structures that may not have been foreseen during previous assessments.

CARI cont. (2)

- Creating a list of critical installations where only qualified standard fasteners (nuts and bolts) may be used. Redundancy of fasteners does not negate the need to qualify the fasteners as all the fasteners on a joint could originate from a common defective batch. Required double locking functions on fasteners may also need qualified standard fasteners to ensure the fail safe design philosophy is maintained in certain areas.

- Defining how the standard fastener is qualified wherever necessary.

CARI cont. (3)

- Clearly defining additional conformity checks as part of the design standard and specification requirements for approved suppliers and any other criteria necessary for acceptance and storage of standard fasteners that are appropriate for their use in the design.

- Ensuring through Maintenance Instructions that reuse of qualified and ordinary standard fasteners is controlled and that qualified standard fasteners can only be replaced by other qualified standard fasteners.

CARI cont.(4)

- Ensuring adequate precautions are taken when damaged fasteners are found; defining checks or replacement of adjacent fasteners and any other components that may have been overstressed.

- Considering introducing a part numbering system for qualified standard fasteners, at which point they would become aviation parts controlled under the POA. (Note: If such part numbering is implemented and further part marking is not feasible due to the part's size or for other reasons, other means such as regular appropriate batch controls should be established and documentation provided according to Part 21.A.804(b).)

Current Status on Standard Fasteners

- The CM and associated CRD are ready for publication
- EASA is considering the use of a CARI or possibly Part 26 in addition to ADs
- EASA is actively encouraging industry to address these issues through all means possible
- EASA welcomes further input from the industry