

**DISPOSITION OF FAA COMMENTS**  
**Policy Statement for Certification of Structural Elements in Systems**  
 Prepared by Todd Martin, ANM-115

Comment	Requested Change	Disposition
<b>Commenter: ANM-120S</b>		
<p>ANM-120S concurs in this draft, with no requested changes. It provides much needed discussion and clarification for the ACO. We offer the following comments for consideration:</p> <p>(a) The draft states that the terms “element,” “component,” and “part” are to be considered synonymous in the context of the document. In our experience, legal and regulatory writing typically eschews using synonyms for the same word. You might consider whether your departure from this practice can lead to confusion.</p> <p>(b) It is fine to choose several structural regulations that need to be applied to systems. It can appear that you are thinking about just a few FARs (e.g., §§ 25.571, 25.629, etc.) What the ACO will need to know is how should it apply the other structural and design and construction FARs to these systems? For example, § 25.613 makes reference to “elements.” Do we now apply § 25.613 to systems “components and parts” since they are also “elements?” What about special factors (§ 25.619). What about the foundational FARs used in structural design and analysis (i.e., 25.301-25.307)?</p>	<p>None requested.</p>	<p>With regard to comment (a):</p> <p>The terms “element,” “component” and “part” are used throughout the relevant FARs and advisory material. I don’t believe there is any difference between these terms as far as application of these FARs is concerned. Therefore, these terms are synonymous. I agree that synonyms should not be used for the same word, and so the policy uses the term “element” throughout. No change.</p> <p>With regard to comment (b):</p> <p>Sections 25.301 through 25.305 and 25.601 through 25.625 do apply to structural elements in systems. For example, the safety factor specified in § 25.303 applies to the control system loads specified in §§ 25.391 through 25.459 (which are already referenced in the memo). This example, and reference to these rules, will be added to the memo.</p> <p>A separate policy memo is being developed to address compliance with §§ 25.603, 25.605, and 25.613.</p>

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<b>Commenter: Ken Frey – ANM 130S</b>	<p><b>General comment to the “Draft Policy “Certification of Structural Elements in Systems.”</b></p> <p>1. From the initial review of this draft policy it appears to be general guidance that addresses certain Part 25 requirements for structural elements in systems. This draft policy includes the flutter requirements in § 25.629 without adding further guidance than what is already in AC 25.629-1A. The draft policy does not include any discussion about system failures that are included in § 25.672. This policy would be more useful if the scope were to be narrowed down to ‘structural elements subject to both structural strength and systems requirements’. This would provide guidance for system elements where §§ 25.571, 25.671, 25.1309 and the special condition for Interaction of Systems and Structures are applicable. There is no need to include §§ 25.629, 25.672, 25.901, 25.933 because the rule itself or existing ACs already provide a method to show compliance to these requirements for system failures.</p> <p>2. This policy memo should also state that the inspection interval established by § 25.571 may be used as a basis for the inspection interval required by a</p>	<p>With regard to general comment 1:</p> <p>It’s true that the policy includes reference to § 25.629 and AC 25.629 without adding any additional guidance. In fact, the policy includes material extracted from several ACs without additional comment. For this memo, restating existing guidance material is useful because (1) it puts all of the relevant material in one place, (2) it reinforces the idea that multiple regulations may apply to the same element, and (3) the ACs actually spell out the elements to which they apply.</p> <p>The memo does identify some of the “structural elements subject to both structural strength and systems requirements.” But I think it’s useful to also include discussion on how the rules themselves should be applied. No change.</p> <p>With regard to general comment 2:</p> <p>Any inspection interval <i>required</i> by § 25.571 must be documented in the Airworthiness Limitation Section, as specified in Appendix H. I don’t think this needs to be specifically mentioned in this policy memo. No change.</p>

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	<p>Certification Maintenance Requirements. AC 25-19 provides guidance for establishing CMRs.</p> <p><b>Specific comments are provided below for the Draft Policy “Certification of Structural Elements in Systems”.</b></p> <p>1. The first paragraph is written under Applicability of Requirements, under paragraph 1. General is written very well. This captures the intent of the requirements for system elements.</p> <p>2. Paragraph 4 “Applicability of System Safety Requirements” should also include a discussion of an acceptable way to show compliance to § 25.671(c)(3) when a jam will be alleviated through structural failure. This must include the requirement for continued safe flight and landing after the structural failure, including the collateral damage caused by the structural failure and account for the part departing the airplane.</p> <p>3. Paragraph 4.a. needs to correctly restate the requirements of § 25.671(c)(2). Section 25.671(c)(2) requires any <u>combination of failures</u> to be extremely improbable or when any <u>combination of failures</u> is not extremely improbable, it must be shown that airplane is capable of</p>	<p>With regard to specific comment 1: Thank you, we agree. ☺</p> <p>With regard to specific comment 2:</p> <p>I recognize the need for policy outlining acceptable method of compliance with § 25.671(c)(3) when a control surface jam will be alleviated through structural failure. However, I believe that discussion is outside the scope of this memo. This memo is focused on the confusion that exists between structural requirements and systems requirements and the elements to which they apply. No change.</p> <p>With regard to specific comment 3:</p> <p>Paragraph 4.a. is intended to summarize, but not quote, the failure requirements of §§ 25.671 and 25.1309, and seems to be sufficiently accurate. The paragraph does refer to “any combination of failures not shown to be extremely improbable.” The memo does not specify the examples in § 25.671(c)(2), because that level of detail is not needed. No change.</p>

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	<p>continued safe flight and landing. The <u>combination of failures</u> includes:</p> <ul style="list-style-type: none"> <li>o Dual electrical system failures</li> <li>o Dual hydraulic system failures</li> <li>o Any single failure combined with any probable hydraulic or electrical failure</li> </ul> <p>4. Paragraph 4.b.as written is confusing. Suggest the paragraph be revised to something like this: While § 25.1309 (b) and (c) does not apply to structural loads and strength requirements of Subparts (B) and (C), it does apply to any system on which compliance with any of those requirements is based. <u>This means that § 25.1309 (b) and (c) is applicable to components with the system, but system failures do not need to be included when demonstrating compliance to structural limit requirements in subparts (B) and (C).</u></p>	<p>With regard to specific comment 4:</p> <p>Agreed. The underlined sentence will be rewritten as follows:</p> <p>“This means that while system failures do not need to be included when complying with the referenced subpart B and C requirements, the failure and warning requirements of § 25.1309 do apply to any system used to show compliance with subparts B and C.”</p>
<b>Commenter: Doug Tsuji – ANM 130S</b>		
	<p>A discussion of § 25.671(c)(3) should be included in the Policy Memo. Specifically, in those areas where the means of compliance (MOC) for jam alleviation is via local structural failure instead of traditional jam alleviation methods such as override mechanisms or fuse pins, etc. Recent airplane cert programs such as the 787 and 747-8 had planned, or are planning, on using local structural failure as their MOC. The policy should also</p>	<p>As noted above:</p> <p>I recognize the need for policy outlining acceptable method of compliance with § 25.671(c)(3) when a control surface jam will be alleviated through structural failure. However, I believe that discussion is outside the scope of this memo. This memo is focused on the confusion that exists between structural requirements and systems requirements and the elements to which they apply. No change.</p>

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	<p>address the potential for parts departing the airplane (PDA) after such local structural failure.</p> <p>On the 787 program, we would have allowed the local structural failure as the method of jam alleviation, and the subsequent PDA, if the applicant could have shown there were no effects to CSF&amp;L. To allow this MOC, the applicant had to show there was no adverse effects in regards to handling qualities, local structural and system collateral damage effects, and farfield structural and system collateral damage effects. It was the farfield structural collateral damage effects that the applicant could not show adequate data to support their proposed MOC. This forced a redesign to include fuse pins and links and to retain the structure after jam alleviation.</p> <p>The above criteria should only be applied to those areas of structure where the intent is to show compliance to § 25.671(c)(3), i.e., for jam alleviation.</p>	
<b>Commenter: ANM-120L</b>		
	<p>It would be best to remove or re-write the criteria for § 25.571 for tab control rods. The current information is not completely consistent with past FAA and engineering best practices.</p>	<p>Agreed. The section will be rewritten to address the comments. Also, the referenced policy memo will be removed from this policy memo.</p>

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	<p>The following information was summarized by Bob Eastin from a conversation between him and Ron Atmur:</p> <ol style="list-style-type: none"> <li>1. The policy should just say that if there are any system elements that are susceptible to fatigue that could result in a catastrophic failure the applicant must comply with § 25.571. STOP THERE!</li> <li>2. If the policy must go further then the policy could observe that actuators are probably a lot like landing gear (e.g., materials used, manufacturing processes used) and consistent with this inspections will probably not be practical and therefore a safe-life approach in accordance with § 25.571(c) would be most appropriate. The policy as written presumes that inspection will be practical. This would be the exception rather than the norm for actuators.</li> <li>3. If policy must give direction on safety-by-inspection for dual actuator rods then the write up needs revision.             <ol style="list-style-type: none"> <li>a. The preferred way to determine the interval for an inspection for a completely failed load path would be a fatigue test that pre-conditions the structure with fatigue damage prior to disabling a member.</li> </ol> </li> </ol>	

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	<p>Doing this analytically should be discouraged.</p> <p>b. If the policy must address doing this analytically it should not prescribe the initial crack size (e.g. .005"). This detail should be up to the applicant to propose and substantiate. The damage tolerance CSTA knows of no data that supports .005" as generically applicable.</p> <p>c. Whether the inspection interval is determined by analysis or test it will only be valid for a finite period of time based on how much fatigue damage (or equivalent crack growth) was accounted for before the primary load path was disabled. This is a very important point that was left out of the discussion.</p>	
<b>Commenter: Bob Stegeman, ACE-111</b>		
	<p>While applicable specific structures/systems rules could and should be applied across disciplines, this policy leaves the possibility open that additional arbitrary requirements could be applied per the catch-all rules focused on in this document. The Small Airplane Directorate does not agree with this policy approach.</p>	<p>The policy memo does not add any requirements or expand the applicability of current requirements. The policy memo only summarizes the applicability of current requirements, largely by citing existing policy memos and ACs. No change.</p>
<b>Commenter: L. Taylor, ACE-111</b>		
	<p>General Comment: Memo conflicts with AGC opinion that general rules like</p>	<p>The policy does not use general rules to add requirements to specific rules. The</p>

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	<p>§§ 25.671 and 25.1309 cannot be used to add additional requirements to specific rules. Absent a change from AGC, suggest cancelling the memo.</p>	<p>policy does indicate that multiple rules should in some cases be applied to the same elements. However, this conclusion is based on existing rules and guidance and is appropriate. In addition, our legal counsel will review. No change.</p>
<b>Commenter: Mike Imbler, ACE-116W</b>		
	<p>Last sentence of paragraph 1. “AC 25-14 states that the control system ends where it attaches to “fixed structure.””  This is a little ambiguous. Suggest that it be clarified with an example or two. I.e. a hinge or lug on fixed structure I believe should be considered as part of the system, but applicants argue that the hinge half (or lug) on the structure side is fixed structure.</p> <p>Paragraph 4.c. shares the same ambiguity on hinges, but implies that stationary flap tracks would be treated as structure only. I would vote for flap tracks being considered as system, but that is just my opinion.</p>	<p>Agreed. Examples and additional discussion will be added.</p> <p>Flap tracks will be added as an example of an element subject to both systems and structures requirements.</p>
<b>Commenter: T. N. Baktha, ACE-118W</b>		
	<p>The following statement could be added to</p> <p><b>a. 5.b. AC 25.629-1A, Stability Substantiation of Transport Category Airplanes</b></p> <p>As an example, any failure of the underlying rear spar reinforcement could change the stiffness of the attachment of</p>	<p>Agreed. This sentence is included with additional words that it is referring to the preceding sentence and is referring to fatigue.</p>

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	<p>control surface actuator to the rear spar. This could give rise to new vibration modes that could couple with the control system modes and this could lead to flutter condition.</p> <p>This would make it more explicit the kind of failures we are referring to.</p>	
<p><b>Commenter: AIR-230</b></p>		
<p>The abbreviation “FAR” is used incorrectly.</p>	<p>Change FAR to CFR where appropriate.</p>	<p>The abbreviation “FAR” is used only where quoted in the title or text of existing documents. No change.</p> <p>Certain text in the memo is indented to indicate quoted material, but this is not clear to the reader. Therefore, quotation marks will be added to indicate quoted text.</p>