	DISPOSITION OF PUBLIC COMMENTS ON DRAFT POLICY STATEMENT ANM-115-05-10, POLICY STATEMENT ON AN ACCEPTABLE METHOD OF COMPLIANCE WITH § 25.562 FOR REPLACING RESTRAINT SYSTEMS ON FORWARD AND AFT FACING SEATS	
Commenter	Comment	Disposition
Mike Oleson, President, Oleson Technologies, Inc.	I would like to congratulate the FAA on publishing the proposed Memorandum ANM-115-05-10 for replacing restraint systems on aircraft seats. This is a giant step forward for the aviation industry in reducing the dynamic certification costs for aircraft seating. Having personally coordinated the certification activity between the applicant (a restraint system manufacturer who developed the methodology) and the FAA, I am fully aware of the positive impact that this proposed policy will have on the industry. I would like to further state that that this methodology and acceptance criteria have been used with successful results on a few programs to date. Having conducted the required testing and witnessed same as a § 25.562 DER for the FAA, I can say that the criteria are stringent enough to show adequate comparison of restraint systems and their performance. I am proud to have been part of the coordinated efforts of various FAA regional offices, CAMI, FAA TAD and the restraint system manufacture to create such a beneficial policy.	N/A
Mark Bathie, Airworthiness Standards Branch, Civil Aviation Safety Authority Australia	The proposed policy has been assessed and is supported.	N/A
Mark Bathie, Airworthiness Standards Branch, Civil Aviation Safety Authority Australia	Whilst it is appreciated that this is a policy generated by the Transport Airplane Directorate for Transport Category aircraft using research based on 16g dynamic tests, CASA would like to encourage the expansion of this policy, or alternatively generate new policies, to encompass replacement methods for restraint systems of Normal, Utility and Acrobatic categories	The proposed policy memo has been given to the Small Airplane and Rotorcraft Directorates so that they can assess its applicability to parts 23, 27 and 29. CASA's comment has also been provided to these organizations. The Small Airplane and Rotorcraft Directorates will issue separate policy if it is determined to be acceptable for demonstrating compliance with parts 23, 27 and/or 29.

	(Part 23) and Rotorcraft categories (Parts 27 & 29). CASA encourages all research and policies that endeavour to lower costs to the aviation industry whilst maintaining the required level of aviation safety.	
Tom Knott, Neenah, WI	I would like to comment in favor of this policy statement regarding replacement restraint systems. Like the Policy Statement on seat bottom cushions, this will provide much-needed clarification on the requirements for the refurbishment of aircraft interiors, and hopefully this will lead to aircraft that maintain their original level of occupant protection.	The FAA considers that the proposed criteria (+/- 6% peak restraint loads, +/-1 inch maximum ATD head excursion, etc.) will result in the level of protection established in part 25.
Tom Knott, Neenah, WI	One improvement would be to add a statement that replacing a restraint system with one of the same type from the same manufacturer, differing only in webbing color and/or metal plating, is a minor change.	Draft Advisory Circular (AC) 25.562-1X provides guidance on this issue and a more complete list of seat and restraint system changes that do not require analysis to certify. This draft AC is expected to be issued relatively soon. Since it provides guidance on this issue and since the focus of this memo is specifically to provide a component method for replacing restraint systems, the general guidance on this specific issue has not been repeated in this memo.
Tom Knott, Neenah, WI	A minor shortcoming is there is no reminder that the restraint system is part of the TSO'd (or TC'd or STC'd) article. The discussion about the TSO-C22g and TSO-C114 also could lead to the same confusion.	The introductory paragraph states that the purpose of this memo is to provide a method of compliance with § 25.562 for replacing restraint systems on previously approved seats. In other words, the original seat and restraint system has been approved in a Type Certificate (TC), Amended TC, Supplemental Type Certificate (STC), Amended STC or TSO program. The memo does not mention that the seat has a TSO, because a TSO is not required to certify the seat and restraint system to part 25. It is also understood by the words of the introductory paragraph, and the memo as a whole, that the restraint system is part of the seat.
Tom Knott, Neenah, WI	Though the test method proposed will definitely lower certification costs while maintaining the certificated level of safety, I believe that lower-cost static tests could also be used to substantiate the replacement of restraint systems. The key factor is the elasticity of the webbing, that is, how much load is transferred into the seat structure. This is covered by the +/- 6% in peak restraint load. As far as occupant displacement, the amount of "open" webbing (not doubled over near the attachments, or absent at the hardware) is not enough to cause drastic changes in occupant excursion. In one STC project I worked on, a static test of two very different webbing specifications led to a calculated difference of only 3/8 inch in head path, much less than the +/- 1.0 inch limit in the proposed policy. I am sure that as data is collected using the proposed policy, this will become apparent. Thank you for a very useful Policy Statement.	N/A

GAMA	The draft policy proposed that the peak restraint loads acceptance criteria to be within +/- 6% between the replacement and certificated restraint system. As noted in the policy statement, the basis of the acceptable criteria appears to have been derived from variances in restraint loads that occur in tests conducted in accordance with § 25.562(b) of same part number seats. However, the FAA has not published any of the data for review nor has the FAA made it available to the GAMA 16 G Seat committee to assess. Without access to such data, the 16G committee members are in no position to make a proper judgment on the validity of the acceptance criteria. However, such variances are not considered typical based on industry experience with dynamic tests. For example, one applicant in the past has justified a broader variance of +/-10% as a comparison of restraint loads based on their experience with seat dynamic testing and discussions held with FAA CAMI in 2000. The +/-10% range was accepted by the FAA on a certification program using a similar restraint replacement policy. Industry requests that FAA considers a range of +/-10% as reasonable acceptance criteria for restraint load comparison. We will provide test data, if requested, to support our position and would welcome further discussion on this issue.	The acceptability of this method is based on it providing a means to demonstrate that a proposed restraint is equivalent to a certificated restraint. A replacement restraint that performs equivalently to a certificated restraint will not change the performance of the seat and can be installed on the seat without it resulting in a non-compliance with §§ 25.562 or 25.785(b),(d). Installation of a non-equivalent replacement restraint could result in the seat not remaining attached to the floor, the occupant injury criteria of § 25.562(c) being exceeded, etc. during the dynamic conditions of § 25.562(b). (Note that another method may be acceptable which demonstrates that a replacement restraint is equivalent to or better than a certificated restraint, but that consideration is outside of the scope of investigation for this proposed method.) A test conducted in accordance with § 25.562(b) with same part number seats and restraint systems installed side-by-side on a common dynamic test sled will typically not produce identical peak loads in the restraints. Some variance in load data will occur due to factors such as anthropomorphic test dummy (ATD) positioning, design tolerances, etc. As such, the FAA considers that it is acceptable for this comparison method to include criteria with a performance range for determining if a replacement restraint is equivalent to a certificated restraint. However, the acceptable range should not be too large because the acceptability of this method is based on its criteria only allowing replacement of equivalent restraints. A supplemental type certificate applicant first proposed to use the +/- 6% criterion. The FAA determined that this criterion was acceptable for their project based on their proprietary data and some FAA data. This applicant conducted multiple programs using that criteria and found that proposed restraints can be designed within that range. Since the criteria is achievable, it should not be expanded to +/- 10% which would allow greater dissimilarity between restraints and conflict with the basis of this method of compliance, that is, to show that the restraints are equivalent. The FAA considered the amount of variance that can occur in restraint load data, but did not based the +/- 6% criterion on the largest variance that can occur. The amount of variance in dynamic test data is dependant on the amount of care taken in setting up the test and obtaining the data. For the reasons explained above, the FAA considers +/- 6% most appropriate for this method.

		The FAA Transport Standards Staff contacted the applicant that used the +/- 10% criterion on a certification program. The applicant indicated that the criterion was not used based on FAA policy, but was used based on it being documented in a test plan that was coordinated with their local Aircraft Certification Office. FAA policy has not been published allowing the use of the +/- 10% criterion. The FAA contacted GAMA about data they could provide regarding the amount of variance that can occur in peak restraint loads. A GAMA 16G Seat Committee team leader requested industry members to provide data from rigid seat tests comparing same part number restraints. These industry members did not provide any data. Regardless, the FAA considers +/- 6% most appropriate for this method for the reasons explained above.
GAMA	Industry proposes that restraint segments that are directly attached to the fuselage structure (i.e. not attached to the seat) should not be required to meet the peak restraint load criteria. The rational of requiring the peak restraint loads to be within limits is to ensure that the seat is not subjected to higher loads with the new restraint system. When some segments of restraints (such as shoulder harness) are directly attached to the fuselage structure, the loads transferred to the seat are through the segment of restraints that are directly attached to the seat. Therefore, the only valid peak restraint load comparison should be limited to the portions of restraint systems that are attached to the seat.	As explained above, this method is used to demonstrate that a proposed restraint system is equivalent to a certificated restraint system, and therefore may be substituted onto the certificated seat. The peak restraint load criterion is used to make this comparison. The commenters proposal would not evaluate the equivalency of the restraints or demonstrate that the change would comply with § 25.562. This proposal has not been accepted.
GAMA	The draft policy proposed that the difference between the replacement and certificated restraint system should not exceed +/- 1.0 inch for ATD maximum head excursion. Industry members have seen variations in dynamic testing such as initial belt placement on the ATD, initial restraint tension, leg articulation (foot drags on floor), ATD positioning, etc. that have affected the maximum ATD head excursion by greater than one inch on same seat tests. Industry proposes that the head excursion criteria be imposed based on the installation of the seat and the potential of headstrike. For example, if the seat installation is clearly free from any headstrike potential due to large seat offsets, the maximum head excursion need not apply. In addition, a shorter headpath produced by the replacement restraint should be acceptable (even if it falls below the –1.0 inch tolerance) if a proper analysis of the headpath shows that it is reduces or eliminates head contact.	As explained in the response to GAMA's first comment, the acceptability of this method is based on the pass/fail criteria ensuring that a replacement restraint will perform equivalently to a previously certificated restraint. The +/- 1 inch criterion is used to determine this equivalency. The limits of this criterion were determined in a similar manner as the peak restraint load criterion and has been determined to be achievable. The scope of this method is limited to demonstrating equivalency of restraint systems. Another method may be acceptable which demonstrates that a replacement restraint is equivalent to or better than a certificated restraint, but that consideration is outside of the scope of investigation for this proposed method. The FAA considers that the proposal, or a modification of the proposal, is an appropriate suggestion for consideration in a separate policy memo or issue paper. Some areas that would need to be investigated are as follows: - The actual head path produced with a replacement restraint can not be

		determined from the rigid seat comparison test. - A lap safety belt that produces a significantly greater headpath may perform differently in terms of its ability to remain on an occupant's pelvis during the impact. Additionally, this evaluation would need to be considered for its installation on the actual seat, not the rigid seat fixture. - A replacement restraint that produces a shorter head path and still allows head contact will affect other parameters that are critical in determining compliance with § 25.562, such as ATD head velocity/acceleration and HIC. This is not intended to be a complete list of issues that would need to be investigated.
GAMA	The inclusion of seat cushions in the test setup adds an additional variable to the testing that does not appear to be necessary when the test is making a side-by-side comparison of the restraint system performance. Elimination of as many variables as possible will lead to a more direct and clear comparison method between the performance to the replacement and certificated restraint system. Therefore, industry proposes that the seat cushions be eliminated from the test setup and require that the ATD's seating position during the test, in reference to the SRP, be similar to the production seat.	The intent of this method of compliance is to demonstrate that a replacement restraint system will perform equivalently to a certificated restraint system when it is installed on the certificated seat. The FAA studied the effects of allowing rigid seat fixtures to be used in lieu of actual seats to produce valid data, and as a result, the proposed method was established. The commenter is proposing that an additional variable be introduced to this method, i.e., to also allow testing without representative seat cushions. The effects of a seat bottom cushion on ATD movement and headpath is not clearly understood at this time, but could be significant. Data to determine the effects of eliminating cushions from the rigid seat should be generated before incorporating the proposed change into the method. As a result, the proposed change will not be incorporated at this time. If the proposed change is found acceptable at a later time, this policy memo can be revised then or the proposed change can be approved for use in an issue paper.
GAMA	The current draft policy requires that for torso restraint systems, individual segments of the belts be statically tested to failure and that the peak loads should be within +/- 6% or greater than the certificated restraint system. The policy states that the requirement to statically test each individual segment is based on FAA's data that the individual segments of a torso restraint system can be subjected to significantly lower dynamic load during test using a rigid fixture versus a test using a certificated seat. Without access to FAA's data, we do not know whether the conclusion was based on rigid tests at a significantly lower G level than the G level of the certificated seat. Contrary to FAA's assertion, industry's experience has always showed that when tested at the same G levels, the rigid seat restraint loads are higher than the actual seat. The rigid seat has no energy attenuation capability and therefore, the restraint has to react the occupant	The FAA agrees that the total load reacted by a restraint is greater during a test using a rigid seat than when using the actual seat. However, the ATD responds differently when a rigid seat is used in lieu of the actual seat. This different ATD response produces a different load distribution between the individual segments of torso restraint systems (e.g., pelvic restraint portion, upper torso restraint portion.) The FAA has learned from analyzing proprietary data that in some cases, individual segments of a torso restraint system can be subjected to a significantly lower dynamic load because of the difference in load distribution. Because the rigid seat dynamic test may not load all segments to the same or greater level than would occur in the actual seat test, the static test to failure is needed to ensure compliance with § 25.562. The FAA does not currently have data for determining a minimum strength criterion for a restraint that would ensure that it would not fail during § 25.562

	load exclusively, resulting in higher restraint loads. Dynamic testing of the restraint system, whether it is performed on a rigid or actual seat, is more representative and realistic measure of compliance than static tests of individual segments. AS 8043 already has established minimum strength requirements that is typically higher than what is recorded in dynamic tests. Industry recommends that the policy be revised to only require that the proposed restraint system meet TSO C-114 requirements in-lieu of static test, and that the dynamic rigid seat test should be sufficient.	testing. If future research determines a valid minimum strength value, this memo could be revised or an issue paper approved to accept restraints that meet that minimum strength in lieu of the current static comparative test criterion.
GAMA	On Page 3 (Additional Acceptance Criteria for Torso Restraint Systems, last para.), the policy states that "As an alternative to statically testing…", does the peak load of the proposed restraint segment have to be ≥ the certificated segment? A tolerance range, as used elsewhere, is appropriate.	Yes, the policy memo is correct. This alternate procedure can be used when the applicant has data for the restraint loads reacted by the certificated restraint segments in their certification testing. These loads represent the maximum loads demonstrated to not result in a restraint failure and a noncompliance with § 25.562. Hence, restraint segments that can react those loads are strong enough to comply with § 25.562; however, restraint segments of any less strength may not comply with § 25.562.
GAMA	On Page 5, last paragraph: Industry recommends a minor wording change to read as follows for better clarification "Replacing the restraint on a TSO-C127 seat is considered a minor change <u>to the TSO</u> when made by the original seat TSO approval holder.	Concur. The memo has been revised.
GAMA	Industry recommends that the FAA conduct a thorough review of draft AC25.562-1B to ensure that the proposed policy on restraint system replacement is compatible with the draft AC25.562-1B. In the event that there is a conflict, we request that the FAA notify the GAMA 16 G committee members of the nature of the discrepancy and proposed action prior to the final publication of this policy.	The FAA has determined that there are no discrepancy between this policy and the draft AC.
GAMA	Industry recommends the final policy include some flexibility in the use of sound engineering judgment and rational to determine the applicability of the proposed acceptance criteria or test methods. In reality, not all certification programs are the same and some seat/restraint system designs or installations may have different margins of safety. Industry believes that even though the content of this proposed policy should be relied upon as the core guidance, ultimately, the FAA should allow the applicant to discuss the relevance of each proposed criteria (acceptance criteria or test methods) with the local FAA ACO counterpart in the development of a final compliance document.	The policy memo explains in the section "Effect of Policy" that it identifies one means, but not the only means, of compliance. It also states that, "whenever an applicant's proposed method of compliance is outside this established policy, it must be coordinated with the policy issuing office, for example, through the issue paper process or equivalent." This promotes standardization that is not obtained from coordination with just one Aircraft Certification Office. Use of the coordination procedure in the "Effect of Policy" paragraph does allow some flexibility while retaining an appropriate level of standardization. The FAA considers that the proposed policy should not be revised.
GAMA	Industry recommends that this draft policy be coordinated with the FAA Small Airplane and Rotorcraft Directorates for Part 23, 27 and 29 applications. We believe that this policy should also be applicable for other certification categories.	The proposed policy memo has been given to the Small Airplane and Rotorcraft Directorates so that they can assess its applicability to parts 23, 27 and 29. The Small Airplane and Rotorcraft Directorates will issue separate policy if it is determine to be acceptable for demonstrating compliance with

		parts 23, 27 and/or 29.
GAMA	As previously stated, industry members of the 16G Seat Committee could not perform a thorough review of the draft policy, as the FAA conducted research used to develop this method of compliance has not been made accessible. Industry requests that the FAA make public in some fashion the research data, analysis, assumptions, and conclusions used in the formulation of this policy.	This method of compliance was developed by working with an STC applicant. Proprietary data generated by this applicant may only be provided based on their permission. The FAA and another applicant jointly generated data from four rigid seat tests which were considered. The FAA does not typically release this type of data without permission from the applicant. SAE report 1999-01-1609 "A Lumbar Spine Modification to the Hybrid III ATD For Aircraft Seat Test" contains data from repeated rigid seat tests that were used. The policy memo and the FAA responses to public comments in this document explain the basis for accepting the performance criteria.
H. Fujiwara, Special Assistant to the Director, Airworthiness Division, Engineering Department, Civil Aviation Bureau, Ministry of Land, Infrastructure and Transport, Japan	On Page3 "Acceptance Criteria" of draft Memorandum, there is a following sentence: "The Points of maximum ATD head excursion should be with ±1.0 inch each other" However, we think that ±1.0 inch difference influence Head Injury Criterion (HIC). In case original data approved by TSO is near the limits, it may be possible to exceed the limits of HIC which is prescribed in FAR 25.562. Question 1: In case the limits of HIC, which is prescribed in FAR 25.562, are exceeded, does it pass or fail the tests? Question 2: We are not sure of the reasons to decide "±1.0 inch". Please tell us the reason.	See the FAA response to the first GAMA comment. It explains that the purpose of this method is to demonstrate that a replacement restraint is equivalent to a certificated restraint. It also explains the reasons criteria with a performance range (+/- 1 inch, etc.) has been found acceptable for determining restraint equivalency with this comparison method. Response to Question 1: Replacement restraints that meet the +/- 1 inch criterion, in addition to the other criteria, are considered to be equivalent to the certificated restraint. As an equivalent restraint, it is considered to provide the same level of HIC protection as the certificated restraint. For installation where the certificated restraint results in compliance with the HIC requirement, installation of the equivalent replacement restraint is also compliant with the HIC requirement without further showing. Response to Question 2: The FAA reviewed SAE report 1999-01-1609 "A Lumbar Spine Modification to the Hybrid III ATD For Aircraft Seat Tests," Table 3 and other data generated with an applicant that showed data scatter of approximately +/- 0.5 inches in a carefully controlled environment. The FAA considered that other seats tested in this same controlled environment, and even more so in a typical certification test environment, could result in larger variances. The +/- 1 inch criterion was determined to be appropriate because it minimized the range to provide a valid measure of restraint equivalency, but is considered broad enough to be achievable in actual certification tests.