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Re: Proposed Advisory Circular AC 33-XX; Turbine Engine Repairs and Alterations--  
Approval of Technical and Substantiation Data, 69 Fed. Reg. 58,589 (September 30,  
2004)

Dear Ms. Mihail:

The Aeronautical Repair Station Association (ARSA) is pleased to submit the following comments on Advisory Circular (AC) 33-XX.

ARSA represents entities certificated under Part 145 of the Federal Aviation Regulations (FARs) and under similar regulations issued by National Aviation Authorities (NAAs) around the world. The Association's membership includes entities that distribute parts to international civil aviation businesses, as well as air carriers and manufacturers. Many of these entities are directly impacted by the FAA's proposed AC.

AC 33-XX proposes standards for approving technical and substantiation data for repairs and alterations to turbine engines that exceed the requirements of 14 CFR Part 33.<sup>1</sup> In addition, the AC has a significant effect on other regulations, including Parts 21, 43, 121, 135 and 145 that are beyond the scope of the Engine and Propeller Directorate's authority.

The proposed AC would create a tiered structure in the data approval process, based on the extra-regulatory classification of *Independent Repair Entity*. In conjunction with this classification, the AC attempts to limit the so-called Independent DER's ability to approve technical and substantiation data. The AC would also create part categories and establish procedures that are inconsistent with and, in some cases, directly contrary to, other regulations and guidance.

In particular, AC 33-XX fails to recognize the basic difference between repairs and alterations. As a result, the draft guidance impermissibly proposes that data supporting **repairs** and minor alterations to certain parts would require supplemental type certificates (STC).

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<sup>1</sup> Unless otherwise specified, all citations are to Title 14 of the Code of Federal Regulations (CFR).

The AC is also contrary to existing national guidance. AC 120-77, Maintenance and Alteration Data, addresses the procedures for collecting and evaluating technical and substantiating data used to perform repairs, alterations and continue in service conditions that are not contained in manufacturers' maintenance manuals or other service documents. One of the primary purposes of AC 120-77 was to resolve longstanding inconsistencies in FAA guidance that resulted in conflicting interpretations by different local offices. ARSA cautions the FAA that issuing another document that differs substantially from AC 120-77 would be most counter-productive.

Finally, the proposed AC's attempt to standardize substantiation requirements through the adoption of various "templates" does not reflect actual repair or alteration practices and does not track regulatory requirements closely enough to serve as a valuable tool in developing and evaluating repair and alteration data.

ARSA strongly recommends that the FAA redraft this AC in accordance with the following principles:

- Enhance DER training and oversight if necessary to ensure compliance with the applicable airworthiness standards for which the DERs are certifying compliance. This is a matter entirely within the FAA's control and supervision.
- Maintain a single compliance standard for data supporting repairs and alterations for all applicants and all DERs, regardless whether they are employed by or affiliated with a TC holder or an independent maintenance provider.
- Ensure that previously adopted national policy, such as AC 120-77, is not undermined by the issuance of conflicting local guidance.
- Recognize that draft AC 43-FAB provides guidance that can be used to fabricate any type of part in support of a repair or alteration. Draft AC 43-FAB has been under FAA and industry review for over two years and is consistent with existing national policy on the subject. As such, fabrication issues that arise during the course of repairs and alterations should be handled under AC 43-FAB. The draft AC references AC 43-FAB while also introducing new and conflicting concepts.
- Recognize that the Engine and Propeller Directorate can only issue policy on matters within its jurisdiction. Appendix 1 is an example of the issues within the Directorate's purview because it attempts to address the specific airworthiness standards of Part 33. In contrast, the issuance of general policy affecting the way data is collected, developed, evaluated, classified and substantiated is properly under the jurisdiction of the Aircraft Engineering Division in FAA headquarters.
- Recognize that the FAA has authorized independent repair stations to perform repairs and alterations consistent with their ratings. Many have developed highly sophisticated processes that have increased safety and reliability. Many of these repairs have been included in TC holders' manuals.

- Applicants for approval of technical data should not have to re-establish the original certification basis of the article being repaired or altered provided they can “base line” the original approved design. This can be accomplished by obtaining design data from the manufacturer, reverse engineering or other methods.
- Where a base line has been established, applicants should identify and evaluate the differences between their proposed repair or alteration and the original approved design. In such cases, compliance with the pertinent airworthiness standards can be established by showing that the differences introduced by the repair or alteration would not affect the original certification basis.
- Applicants that are unable to base line the original design would have to show that the repaired or altered part in its entirety complies with the pertinent airworthiness standards.
- Applicants should create ICAs if the existing ICAs for the product or article would no longer be valid with the repaired or altered part installed.

Following are the Associations section-by-section comments on the draft AC. Where appropriate, ARSA has recommended new language that is consistent with current regulations and guidance materials. Text from AC 33-XX is set forth in *italics* and where applicable, ARSA’s recommended changes or additions are set forth in **bold**.

### **1. PURPOSE.**

ARSA supports the intent of this paragraph.

### **2. APPLICABILITY.**

ARSA supports the intent of this paragraph.

### **3. DEFINITIONS.**

*For the purpose of this AC the following definitions apply:*

*a. Aircraft hazard: Any failure of a repaired or altered part that will cause the engine to:*

- (1) Catch fire;*
- (2) Burst (release hazardous fragments through the engine case);*
- (3) Generate loads greater than those ultimate loads specified in 33.23(a); or*
- (4) Lose the capability of being shut down.*

*b. Critical: A term applicable to parts, characteristics, processes, procedures, or inspections that when failed, omitted, or non-conforming, may cause significantly degraded airworthiness of the engine.*

*c. Independent DER: A consultant DER, or a company DER not associated with the TC holder of the product to be repaired or altered.*

*d. Independent repair entity: A repair station or person that proposes repairs not listed in the engine manuals and specifications, and does not have the TC holder agreement, or approval.*

**ARSA supports the definition for *Aircraft Hazard* and *Critical* included in this paragraph; however, the Association strongly opposes the definitions for *Independent DER* and *Independent Repair Entity* and therefore recommends their deletion.**

#### *Independent DERs*

The proposed AC creates a new designation for DERs outside of § 183.29 and Order 8110.37C, Designated Engineering Representative Guidance Handbook, dated September 30, 1998. The draft AC defines an *Independent DER* as a DER “not associated with the TC holder of the product to be repaired or altered.” This distinction has no basis in the regulations or guidance. The AC then applies this definition in later paragraphs to impermissibly restrict the activities of *Independent DERs* and *Independent Repair Entities* as a class.

Section 183.29 classifies DERs according to the technical fields in which they are authorized to approve engineering information. Order 8110.37C contemplates a classification based on whether a DER works for a particular employer (Company DER) or independently for various clients (Consultant DER). Neither § 183.29 nor Order 8110.37C make a distinction based on whether the company for which a DER works is a TC holder. AC 33-XX, however, introduces this distinction and then applies it in Paragraph 9 (Data for Repairs and Alterations – General), Paragraph 15 (Substantiation of Repairs and Alterations of Class 1 Parts That Are Life Limited or Life Assessed Parts) and Paragraph 23 (Fabrication during the Course of Repair). As described below, the proposed AC uses the *Independent DER* designation to restrict the activities of DERs and companies not associated with the TC holder in a manner that is contrary to Title 14 CFR.

#### *Independent Repair Entity*

Similarly, AC 33-XX applies the extra-regulatory category of *Independent Repair Entity* in various paragraphs. According to the proposed AC, an *Independent Repair Entity* is a repair station that, “proposes repairs not listed in the engine manuals and specifications, and does not have the TC holder [sic] agreement, or approval.” This definition exceeds any classification found in Parts 43 and 145 and creates data substantiation burdens for non-TC holders that do not apply to TC holders.

The maintenance performance rules of § 43.13(a) and (b) require that “each person performing maintenance” use the methods, techniques, and practices prescribed in the manufacturer’s maintenance manuals, ICAs or other methods, techniques and

practices acceptable to the FAA. In addition, the condition of the product or part repaired must be “at least equal to its original or properly altered condition.” Neither § 43.13 nor the regulations in Parts 121,135 and 145 (that require major repairs and major alterations to be performed in accordance with technical data approved by the Administrator) distinguish between whether the person performing the maintenance is the TC holder. These rules apply based on whether the Administrator makes a finding of compliance with the applicable airworthiness standards.

Unfortunately, AC 33-XX opts to create a new classification system for maintenance performed by *Independent Repair Entities*. In numerous paragraphs, the proposed AC directs the *Independent Repair Entity* to generate source substantiation requirements and obtain a supplemental type certificate (STC) for **repairs** to life limited parts. This is in contrast to a repair entity that has the TC holder’s agreement or approval, which is not required to make the same showings. As a result, the AC is contrary to the regulations, which requires all persons performing and approving data supporting repairs or alteration to meet the same standards.

In addition, AC 33-XX states in Paragraph 6 that the draft guidance is equally applicable to TC holders that develop repairs and alterations for their own products. Thus the distinctions proposed by the AC are superfluous. More importantly, the draft AC may not introduce concepts that are contrary to Title 14 CFR.

#### **4. BACKGROUND.**

*a. FAA has observed a significant increase in the number of gas turbine engine repairs and alterations that (1) are not in the manufacturer's maintenance manual, and (2) are developed by a non-TC holder of an engine. Increasingly, independent repair entities and their Designated Engineering Representatives (DERs) are asking the FAA to approve critical parts repairs and alterations requiring complex engineering analyses and critical processes. These repairs and alterations require the highest level of technical substantiation since their failure could result in hazardous or catastrophic consequences.*

*b. Given this changing environment, the FAA is concerned that engines reliability and safety may be degraded by inadequate repairs and alterations. Therefore, this AC provides technical and regulatory guidance for aircraft turbine engine repairs and alterations to ensure that, when developing technical and substantiation data, independent repair entities and TC holders apply uniform standards.*

ARSA supports the intent of this paragraph, but opposes certain language and unjustified conclusions that are included.

The proposed AC states that repairs and alterations of a turbine engine’s critical parts

requiring complex engineering analyses and critical processes require the highest level of technical substantiation. ARSA agrees that safety concerns warrant sufficient technical substantiation of such repairs. Indeed, the Association has consistently supported the proposition that adequate technical and substantiating data should be obtained for all repairs and alterations performed outside the manufacturer's manual or other approved or acceptable data, whether classified as major or minor.

ARSA also recognizes that independent maintenance providers typically develop technical and substantiation data independent of the type certificate holder. However, the regulations and existing guidance provide an adequate basis for the FAA to determine whether that data complies with the pertinent airworthiness standards without the need for artificial distinctions that appear to be based, at least in part, on commercial considerations. For these reasons, we strongly disagree with the statement that repairs developed by non-TC holders of an engine raise concerns, "that engines reliability and safety may be degraded by inadequate repairs." No evidence is presented that supports this statement.

**ARSA proposes the following change to subparagraph 4(b):**

**b. Given this changing environment, the FAA seeks to maintain engine reliability and safety by preventing inadequate repairs and alterations. Therefore, this AC provides technical and regulatory guidance for aircraft turbine engine repairs and alterations to ensure that uniform standards apply when developing technical and substantiation data.**

#### **5. RELATED STUDIES.**

**ARSA strongly opposes the intent and conclusions of this paragraph. Accordingly, it should be deleted from the draft AC.**

Comments submitted in response to the proposed AC by Chromalloy Gas Turbine Corporation explain in detail the FAA's misguided reliance on two studies to support the conclusion that so-called *Independent Repair Entities* 1) fail to establish critical process validation plans equivalent to the original part certification; 2) lack the engineering expertise to substantiate new or revised critical processes; and 3) fail to provide adequate documentation of new, revised or modified critical validation process validation plans. As Chromalloy states, the two reports upon which the FAA relies, the SAE Report SP-1270 and Commercial Airplane Certification Process Study (CPS), do not support the AC's conclusions.

In its explanation, Chromalloy makes clear that SAE Report SP-1270 cites the failures of maintenance personnel to perform the work in accordance with the approved data,

not the repair data itself, as a contributing cause of uncontained rotor failures in engines. As a result, reliance on this report to create increased data substantiation requirements is misplaced.

In addition, the CPS did not address turbine engine repairs specifically, but rather focused on the airline industry, the airframe maintenance organizations and commercial aircraft. As Chromalloy makes clear in its comments, "The CPS was directing its attention toward major aircraft modifications accomplished under FAA approved Supplemental Type Certificates. There was no CPS direct review, analysis nor interview conducted to support a connection between the CPS Finding and turbine engine component repairs and alterations." Thus, relying on that study to make conclusions about turbine engine repairs is specious.

Based on the inapposite findings in SAE SP-1270 and the broad findings in the CPS, the proposed AC asserts a need to issue guidance that places increased data substantiation burdens on non-TC holders performing repairs and alterations. It is not the Association's intent to cite any specific examples of compliance and safety issues experienced by TC holders. However, the FAA's willingness to issue this AC on the basis of these studies is most troubling because (1) they do not stand for the propositions cited, (2) the draft AC makes no attempt to define the scope of the perceived "problem" in any meaningful, statistical way, and (3) it ignores the fact that both TC holders and the independent providers are jointly responsible for industry's remarkable safety record (as well as the rare mistakes that inevitably occur in spite of our best efforts to be perfect).

## **6. DISCUSSION.**

ARSA questions why the FAA has adopted a two tiered system for evaluating data while at the same time acknowledging that the type certificate holders must follow the same practices outlined in the AC. In other words, the agency has created an unwarranted distinction between independent entities and TC holders and then appears to abandon it in paragraph (b).

**The Association agrees with the intent of paragraphs 6(a), (c) and (d). Paragraph 6(b) should be deleted because it is confusing, unnecessary and contrary to existing regulations and actual industry practices.** ARSA reiterates its recommendations that the extent of data required to support independently developed repairs and alterations will depend, in part, on whether the original design characteristics of an article can be adequately determined.

## **7. REPAIRS AND ALTERATIONS THAT AFFECT ENGINE EMISSIONS.**

ARSA supports this paragraph and notes that it is consistent with current practice.

## **8. REPAIRS AND ALTERATIONS THAT AFFECT ENGINE NOISE.**

ARSA supports this paragraph and notes that it is consistent with current practice.

## **9. DATA FOR REPAIRS AND ALTERATIONS – GENERAL.**

*a. Repairs and alterations are an integral part of maintaining a product in condition for safe operation. Comprehensive repair and alteration methods are needed throughout the service life of an engine to maintain the required level of safety for the flying public. Repairs and alterations of turbine engines and their parts must be properly assessed for criticality, and substantiated for compliance with the applicable requirements of 14 CFR part 33.*

*b. Independent DERs often approve data for operators and/or repair stations. In the study mentioned earlier, the FAA found that the documentation associated with DER-approved repairs or alterations often only contained the instructions for performing the repair (that is, methods, techniques, and practices), the engineering data was frequently incomplete, and the appropriate airworthiness standards were not fully identified or substantiated. These shortcomings are corrected when the DER evaluates each repair or alteration, develops the technical data needed to do the repair, and provides the supporting engineering data and substantiation data that address the effect on type design.*

*c. Data related to engine repairs and alterations is the sum of “technical data,” “substantiating data,” and “methods, techniques, and practices” that are discussed in more detail below. In addition, new or revised Instructions for Continued Airworthiness (ICAs) may be necessary when a repaired or altered part has deviated from its original type design and the original requirements for continued airworthiness no longer apply.*

**ARSA has no objections to subparagraphs (a) and (c) as they are generally consistent with current regulations and guidance.**

**ARSA opposes subparagraph (b) and recommends its deletion from the proposed AC.** Subparagraph (b) includes unfounded and inflammatory statements that serve to cast doubt on the reliability of DER approved repairs and alterations without any regulatory or factual basis. The FAA states that it has identified situations where DERs had certified compliance with the pertinent airworthiness standards without having an adequate basis. This either reflects poorly on the individual DER or, if systemic, establishes the need for improvements in the FAA’s administration of the DER program. ARSA strongly believes that the issues covered in this AC can be satisfactorily

addressed through the even-handed and consistent application of existing regulations and guidance.

#### **10. TECHNICAL DATA.**

Except for paragraph 10(c), ARSA supports the intent of this paragraph (see the Association's comments to paragraph 24.)

AC 120-77 was created to address the data collection, classification and substantiation requirements supporting maintenance and alterations outside the manufacturer's manual, ICA's or other approved or acceptable data. (See especially paragraph 12 of AC 120-77, Evaluating Proposed Changes to Data in Service Documents.) AC 120-77 also defines the terms technical data, substantiating data and methods, techniques and practices. **If the FAA intends to move forward with a substantially rewritten version of this document, ARSA strongly urges the agency to use these identical definitions.**

#### **11. SUBSTANTIATING DATA.**

ARSA supports the intent of this paragraph. However, see the Association's comments to paragraph 10 regarding the use of the same definitions as those contained in AC 120-77.

#### **12. METHODS, TECHNIQUES AND PRACTICES.**

ARSA supports the intent of this paragraph, except as it relates to the Association's objections to Paragraph 24. (See also comments to paragraph 10 regarding the use of the same definitions as those contained in AC 120-77.)

#### **13. DATA ASSESSMENT FOR A REPAIR OR ALTERATION.**

Except for subparagraph 13(c), ARSA generally supports the intent of this paragraph. However, the Association objects to the classification system in paragraph 14. In addition, paragraph 12 of AC 120-77 describes procedures for evaluating data under these circumstances.

#### **14. REPAIR OR ALTERATION CLASSIFICATION.**

*The classification of repaired and altered parts is used in two ways: first, to communicate the level of documentation necessary to show a repair or alteration design complies with the applicable 14 CFR part 33 requirements, and second, to ensure the proper level of FAA oversight is applied to the part repair or alteration. Repairs and*

*alterations are classified based on the part criticality and on the effect the repair or alteration has on the part.*

*b. Repaired or altered parts are classified in three categories:*

*(1) Class 1 parts, the failure of which could result in a hazard to the aircraft.*

*(2) Class 2 parts, the failure of which could adversely affect the engine operation, but would not likely hazard the aircraft, including, but not limited to, inflight shutdown, surge and stall, and loss of thrust control.*

*(3) Class 3 parts, the failure of which would have no measurable affect on engine operation. NOTE: Class 1 and class 2 examples are provided in figures 2 and 3, respectively. The examples are not exhaustive; other parts not listed may also be class 1 or 2. Class 3 parts are all those that are not class 1 or 2.*

*c. The effect of a repair or alteration on the part may change the part classification. A repair or alteration to a class 2 or 3 part, that has any of the following effects on part characteristics, will automatically place that part in the next higher category defined in paragraph 14b of this AC:*

*(1) Increases the part's failure rate in service.*

*(2) Changes the part's weight or center of gravity.*

*(3) Involves or replaces a major portion of the part's mass.*

*(4) Changes the part's physical properties, vibratory response, durability. (5) Changes the part's function.*

*(6) Changes to the running clearances and gas-path leaks beyond engine manual limits.*

ARSA strongly opposes this paragraph. Paragraph 14 seeks to create a multi-tiered part classification system. Such a system can be useful when assessing the criticality of proposed repairs and alterations and therefore the nature and extent of substantiation data required.

In general, it is not the nature of the part being repaired or altered but the manner in which it could appreciably affect airworthiness that determines whether it is major.

**However, if Class 1 is meant to describe the critical and life limited parts for which a DER may not approve technical data per Order 8110.37, the AC should use the terms critical and life limited parts to ensure consistency.**

In addition, the proposed part classification scheme is inconsistent with the part criticality categories defined in Order 8120.2 which are utilized in draft AC 43-FAB. **AC 33-XX should adopt the Category Parts List classifications if it believes that a classification system would be useful in establishing substantiation requirements that would apply equally to any applicant for approved data.** The definitions in the CPL serve the same purpose as those proposed in this paragraph; to determine criticality and the appropriate level of FAA oversight.

Paragraph 14(c) creates further inconsistency in that it proposes a list of repairs or alterations to Class 2 or 3 parts that automatically place those parts in Class 1 and 2, respectively. The Association questions the wisdom of establishing a classification scheme only to introduce uncertainty as to which classification applies in a particular situation.

For example, a repair entity may not be able to determine whether a part's failure rate in service will increase until the part is placed in service. It is unclear whether the burden lies with the person performing the repair to establish that the in service failure rate will increase. This could force persons to assume that a repair or alteration will increase the failure rate to avoid misclassifying a part. This would be potentially more significant when the part would move from Class 2 (where a DER could approve technical data) to Class 1 (where only the FAA may approve technical data).

Similar problems will arise with repairs that "replace **major portions** of the part's mass." This is reminiscent of the difficulties encountered by the FAA several years ago when it briefly adopted by policy a 2% rule as the distinguishing factor in determining whether an article was repaired or manufactured. The use of such a vague standard would require a person performing the repair and the FAA to make a highly subjective determination and create widespread inconsistencies in its application.

ARSA recommends the following to replace the current version of Paragraph 14:

- a. The classification of repaired and altered parts is used in two ways: first, to communicate the level of documentation necessary to show a repair or alteration design complies with the applicable 14 CFR part 33 requirements, and second, to ensure the proper level of FAA oversight is applied to the part repair or alteration. Repairs and alterations are classified based on the part criticality and on the effect the repair or alteration has on the product.**
- b. Repaired or altered parts are classified in three categories:**
  - (1) Category 1. Failure would prevent continued safe flight and landing; resulting consequences could reduce safety margins, degrade performance, or cause loss of capability to conduct certain flight operations.**
  - (2) Category 2. Failure could prevent continued safe flight and landing; however, resulting consequences may reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions or subsequent failures.**
  - (3) Category 3. Failure would have no effect on the continued safe flight and landing of the aircraft.**

**15. SUBSTANTIATION OF REPAIRS AND ALTERATIONS OF CLASS 1 PARTS THAT ARE LIFE LIMITED OR LIFE ASSESSED PARTS.**

*a. Repairs and alterations of life limited and life assessed parts that are not listed in the engine manual and are developed by an independent repair entity must be approved by a supplemental type certificate (STC), unless they are done under agreement with the TC holder. For the purpose of this AC, a life assessed critical part is a part evaluated for its low cycle fatigue life that does not have a safe life limit or a mandatory inspection requirement and is not listed in the Airworthiness Limitation Section of the ICAs. The independent DER should consult with the FAA advisor to determine whether a non-life limited part was life assessed when certified. For example, engine mounts, certain engine cases, or fan blades may have been assessed in low cycle fatigue but no life limit was required.*

*b. These repairs and alterations are major changes to type design since they require substantiation based on a life methodology approved by the FAA in accordance with 14 CFR 33.14 Start-Stop Cyclic Stress (low-cycle fatigue). The independent DER should consult with the FAA DER advisor to develop a fatigue life methodology that supports these repairs and alterations.*

ARSA strongly opposes this paragraph. Paragraph 15 seeks to require that persons performing repairs and alterations to life limited and "life assessed" parts obtain an STC. This is contrary to the regulations in that it fails to recognize the difference between repairs and alterations, and the circumstances under which the regulations require a person to obtain an STC.

An STC is only required when a product is altered as the result of a major change in type design. (See § 21.113). Order 8110.37 defines an alteration as the modification of a product from one sound state to another. A major change in type design is one that appreciably affects the weight, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the airworthiness of the product. (See § 21.93(b)). The type design for a product includes drawings and specifications necessary to define the configuration and the design features of the product. It also includes information on materials, dimensions and processes necessary to define the structural strength and other qualities affecting the airworthiness of the product. (See § 21.31).

As the FAA has recognized in Order 8300.10, a major alteration can be performed on a product without effecting a major change in type design. Although the data supporting a major alteration requires FAA approval in all cases, that approval can come via a field approval or an appropriately authorized DER if the change is not significant enough to require an STC.

In contrast, a repair is the restoration of a damaged airframe, powerplant, propeller, or appliance accomplished in such a manner and using material of such quality that its restored condition will be at least equal to its original (i.e., certification basis) condition.” When a product or part is *repaired*, an STC is inappropriate regardless whether the repair is major. Thus, Paragraph 15’s requirement that repairs to life limited and life assessed Class 1 parts require an STC is without regulatory basis and should be removed.

The proposed AC also attempts to create an exception to § 21.113 for TC holders and those with whom they have an agreement. Paragraph 15(a) states that an STC is not required for repairs and alterations to life limited and life assessed parts if they are “done under agreement with the TC holder.” Section 21.113, however, requires that “*any* person who alters a product by introducing a major change to type design... *shall* apply... for a supplemental type certificate.” The regulation makes an exception for the TC holder, but only to the extent that the TC holder can instead apply for an amendment of the original type certificate. In no circumstances can a TC holder or a person with whom it has an agreement circumvent the requirements for an STC or amended TC when a major change is introduced. Thus, paragraph 15 must clarify that an STC or amended TC must be applied for whenever a major change in type design is introduced to a product.

The paragraph also requires DER’s to submit technical data to the FAA relating to repairs and alterations on “life assessed parts” despite current guidance that limits DERs to recommending approval of technical data for repairs and alterations to critical and life limited parts. Since this is the current practice, the FAA should make certain that AC 33-XX is consistent with Order 8110.37.

If, as a matter of policy the FAA desires to extend the recommend-only limitation to life assessed parts, this policy should be applied consistently among all the Directorates. However, ARSA believes that the inclusion of the term “life-assessed” parts will create confusion since such parts are not defined in the regulations or in manufacturers’ service documents. Accordingly, the independent maintenance provider may be unable to reasonably determine whether the parts were life-assessed during certification.

ARSA recommends the following language to replace the current Paragraph 15.

- a. Alterations of critical or life limited parts that are not listed in the engine manual must be approved by a supplemental type certificate (STC).**
- b. The independent DER should consult with the FAA advisor to determine whether a non- life limited part was life assessed when certified. For example, engine mounts, certain engine cases, or fan blades may have been assessed in low cycle fatigue but no life limit was required. Alterations to such parts may**

**constitute a major change to type design if they require substantiation based on a life methodology approved by the FAA in accordance with 14 CFR 33.14 Start-Stop Cyclic Stress (low-cycle fatigue). In such cases, the independent DER should consult with the FAA DER advisor to develop a fatigue life methodology that supports these alterations.**

***16. SUBSTANTIATION FOR REPAIRS OR ALTERATIONS OF CLASS 1 PARTS OTHER THAN LIFE LIMITED OR LIFE ASSESSED.***

ARSA strongly opposes this paragraph for the reasons discussed in the comments to Paragraphs 14 and 15, and for the following additional reasons.

The AC's use of a classification system and its limit on an independent DERs ability to approve technical data for repairs and alterations not involving critical or life limited parts is in stark contrast with current regulatory requirements and guidance. In Paragraph 4, AC 33-XX states that its goal is to ensure uniform, adequate technical substantiation of repairs and alterations to turbine engines that are not in the manufacturer's maintenance manual. To the extent the FAA believes that improvements are needed in the administration of the DER program, the objectives cited above would be attained by addressing these deficiencies rather than targeting non-TC holders performing repairs and alterations.

The requirement that "independent repair entities" submit technical data to the FAA in these situations will undermine the goals of the designee program and impose administrative burdens on independent repair entities. The FAA does not have the resources to evaluate the numerous technical data submissions that would result from the issuance and application of the proposed AC. Consequently, approvals will take longer, prejudicing non-TC holder repair entities' ability to perform maintenance in a timely manner. Reliance on properly trained and authorized DERs ensures efficiency and expedites the approval of technical data. Removing the DERs authority, rather than focusing on proper DER training and oversight, will place an undue burden on non-TC holders without directly addressing the proper level of substantiation data required for all repairs or alterations.

***17. SUBSTANTIATION FOR REPAIRS OR ALTERATIONS OF CLASS 2 PARTS.***

ARSA supports the intent of this paragraph to the extent that adequate technical substantiation should be required for repairs and alterations to Class 2 parts. The Association reiterates its objections to Paragraphs 14 (parts classification), 15 and 24 (exclusion of TC holders from certain regulatory requirements), 16 (repairs to Class 1 parts) and Appendix 1 (repair templates) of the proposed AC.

**18. SUBSTANTIATION FOR REPAIRS OR ALTERATIONS OF CLASS 3 PARTS.**

- a. Any repair or alteration that does not fall within a part class 1 or 2, is classified as repair class 3 part, unless the repaired or altered part characteristics are affected as indicated in paragraph 14c of this AC.*
- b. Repairs and alterations of class 3 parts may be substantiated based on previously approved data, or any other data acceptable to the FAA. Data acceptable to the FAA are:
  - (1) Manufacturers' technical information, not approved by the FAA*
  - (2) Military specifications.*
  - (3) Previously accomplished FAA field approvals for same parts and similar installations on comparable makes and models.**
- c. Parts and engine service history, like service difficulties and incident and/or accident investigations must be adequately addressed.*

ARSA supports the intent of this paragraph. The Association reiterates its objections to Paragraph 14 (parts classification) of the proposed AC.

Paragraph 18(b) should include an additional category of acceptable data for repairs and alterations based on tests, analyses, computations, operational, service and maintenance experience and reliability data that shows compliance with the pertinent airworthiness standards. This is consistent with the definition of substantiation data and the data requirements described in Paragraph 16(c).

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ARSA suggests the following addition to paragraph 18(b)(4):

**b. Repairs and alterations of Category 3 parts may be substantiated based on previously approved data, or any other data acceptable to the FAA. Data acceptable to the FAA are:**

\* \* \* \*

**(4) Substantiation data described in paragraph 11 that demonstrates compliance with the pertinent airworthiness standards.**

**19. CONTINUE IN SERVICE CONDITION.**

*An applicant who proposes any serviceability criteria other than those identified in the TC holder manuals, must create unique ICAs that:*

- a. Maintain compliance with part 33 for engines, and*
- b. Follow the applicable guidance in this AC.*

**ARSA supports the general intent of this paragraph; however, we suggest that Paragraph 19 be eliminated and that ICAs be addressed in Paragraph 22.**

## **20. REPAIR OF ENGINE PARTS RECOVERED FROM ACCIDENTS.**

ARSA agrees that parts involved in accidents or incidents must be thoroughly evaluated to determine their eligibility for installation. It objects to the following sentence: "Parts not acceptable under these ICAs may be substantiated based on other data approved by the FAA or approved by the TC holder.

The regulations do not always require FAA approval in those cases where a manufacturer's ICAs do not authorize the use of a particular part. Moreover, the regulations do not ever require the approval of the TC holder.

As with any other repair, alteration or continue in service condition, the installer must first determine whether this will be a major deviation from the manufacturer's ICAs. If so, it will require FAA approval of the supporting technical data.

Even if FAA approval is not required, the installer should be expected to have adequate substantiating data showing that the repair or alteration met the pertinent airworthiness standards. Therefore, the sentence in this paragraph should be revised to read as follows:

**Parts not acceptable under these ICAs may be substantiated based on data approved by or acceptable to the Administrator.**

## **21. SOURCE SUBSTANTIATION REQUIREMENTS.**

*a. TC holder's source substantiation requirements ensure that repaired or altered parts meet the intent of the repair design and are airworthy. These requirements are usually generated by the TC holder for their repair vendors and may constitute proprietary data.*

*b. An independent repair entity may also need to generate repair source substantiation requirements for complex repairs and alterations if they do not have them or the requirements are not listed in the TC holder's manuals. In either case, the following guidance applies:*

*(1) If the independent repair entity is using the TC holder's manual but does not have source substantiation requirements, the DER should develop these requirements. The DER must assess all the steps in the repair or alteration process to identify those that are critical and that require further evaluation. The DER should consult with the FAA DER advisor before approving the repair or alteration.*

*(2) If the independent repair entity is making a repair or alteration that is not in the TC holder's manual, then the DER should assess the need for source substantiation requirements when seeking approval of class 1 parts repairs and alterations. Some class 2 parts may also require source substantiation.*

ARSA opposes paragraph 21. This provision injects unwarranted commercial considerations into regulatory decisions. It neither clarifies regulatory requirements nor addresses issues about which the FAA should properly concern itself.

A TC holder that elects to license and qualify certain sources to perform a specific repair makes a business decision outside the purview of Title 14 CFR. If such a repair is included in the manufacturer's ICAs, it may be performed by a certificated and appropriately rated entity regardless whether the manufacturer has qualified the source for its own purposes.

Under Part 183, a DER may review engineering information (i.e., technical data) and determine whether it complies with the pertinent airworthiness standards. If so, the data is approved by the Administrator. If testing is required to determine compliance (in addition to other kinds of substantiation data), the regulations provide an adequate basis for this activity.

The Flight Standards Service is responsible for determining whether a repair station or other maintenance provider has the housing, facilities, equipment, personnel and data to perform the work. The source approval process contemplated by this paragraph exceeds a DER's authority. It is also beyond the scope of the Engine and Propeller Directorate's jurisdiction which is limited to determining whether the data supplied complies with the applicable airworthiness standards. **Accordingly, this paragraph should be deleted.**

## **22. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS (ICAs).**

*a. The DER must assess the repaired and altered parts to ensure the continued applicability of the existing ICAs. Revised ICAs may be necessary if the repair or alteration changed the original part's structural strength, durability, reliability, inspectability (sic), or any other part capability. If revised ICAs are needed, the DER should recommend a maintenance and inspection plan for the repaired or altered part as applicable.*

*b. Repairs and alterations proposed by an independent repair entity and that necessitates changes to the Airworthiness Limitations Section of the ICAs, may be approved through a STC.*

ARSA supports the intent of subparagraph (a). However, subparagraph (b) must be revised since the STC process cannot be used for repairs or minor alterations. The Association suggests that repairs to critical parts would not generally require an amendment to the Airworthiness Limitations Section since the repaired article is being returned to its "original" condition (i.e., the certification basis). In the Association's view,

any workscope that necessitated a revision to the Airworthiness Limitations Section would typically constitute an alteration and a major change in type design. Therefore, it would be handled under the STC process.

ARSA reiterates its objection to the FAA proposal to create a separate extra-regulatory standard for independent repair entities. The Federal Aviation Regulations do not distinguish between independent repair entities and those affiliated with or licensed by the TC holder. Both have the same opportunity to show compliance with the pertinent airworthiness standards. Accordingly, subparagraph (b) should be revised as follows:

**Alterations that require changes to the Airworthiness Limitations Section of the ICAs would constitute a major change in type design. As such, it may be approved through an STC or amended type certificate.**

### **23. FABRICATION DURING THE COURSE OF REPAIR.**

*a. The independent DER must submit to the GACO the substantiation data, technical data, the methods, techniques and practices and the applicable ICAs discussed in this AC, in support of fabrication during a repair or alteration. The independent DER must identify the critical processes and the associated validation requirements that are discussed in paragraph 24 of this AC. Such critical processes apply to fabrications used during the repair or alteration of all class 1 parts and some class 2 parts, as discussed in paragraphs 16d, 17b and 24 of this AC.*

*b. Fabrications in the course of repairs and alterations of class 1 parts that are life limited or life assessed may be approved by STC, as discussed in paragraph 15 of this AC.*

*c. The fabrication aspect of a part repair or alteration is addressed in AC 43-FAB.*

ARSA supports the intent of this paragraph but believes the fabrication issues are adequately addressed by draft AC 43-FAB, which has undergone considerable FAA and industry review. Unfortunately, draft AC 33-XX addresses maintenance fabrication in a manner different from AC 43-FAB (while at the same time incorporating it by reference). The Association therefore reiterates the comments made earlier pertaining to AC 120-77 and draft AC 43-FAB. These documents address issues of national policy that are the primary responsibility of Aircraft Certification and Flight Standards in FAA headquarters.

The Engine and Propeller Directorate's authority is to establish policy relating to compliance with the airworthiness standards under its jurisdiction. That can be done in a manner consistent with national policy as reflected in existing guidance rather than injecting new concepts that will only confuse the public and FAA inspectors. Policies relating to the fabrication of parts and collecting, developing, classifying and evaluating

data should not vary from one directorate or region to another.

ARSA therefore suggests that the following language replace current Paragraph 23:

**Fabrication of parts without a PMA may occur under the provisions of Part 43 provided the entity is in the possession of data that complies with the pertinent airworthiness standards and that the fabrication occurs under an appropriate quality system. In addition, the fabricated part must be consumed in a specific repair or alteration and not sold separately. Accordingly, fabrication of parts during specific repairs and alterations contemplated by this AC should be handled under AC 43-FAB. The data issues for the complete repair or alteration performed should be evaluated under this AC.**

**24. CRITICAL PROCESS VALIDATION PLAN.**

*a. Critical processes (for example, laser drilling blocked cooling holes in turbine blades) may be needed to make some repairs or alterations, or when fabricating during the course of a repair (for example, fabricating a flange for a case repair). In these instances, a critical process validation plan is necessary to verify that repaired or altered parts meet the design intent for their particular repair or alteration. The TC holder may require a critical process validation plan during the process of source substantiation to verify that the repair entity can adequately and repeatedly perform the critical processes required by the repair or alteration drawings. The TC holder may also revise the validation plan when adding a new supply vendor, and when adding, or changing critical processes.*

*b. The independent repair entity should evaluate the processes involved in a repair or alteration. The DER should develop a plan and identify the validation requirements for the processes that are critical to the airworthiness of the part as repaired or altered, and to the engine. The validation plan must identify all critical processes, related specifications and performance parameters, as well as the associated validation requirements. A validation plan is necessary for all critical processes that involve class 1 parts repairs or alterations, and may be necessary for class 2 parts if the processes are complex, or if minor deviations to any process highly affect the results of a part repair or alteration. As a general rule, a critical process validation plan would be required for any repaired and altered part or assembly that contain critical airworthiness characteristics generated by critical processes, and that cannot be inspected by direct measurement or nondestructive test.*

ARSA supports the intent of this paragraph but suggests replacing current subparagraphs (b) with the following language:

***(b) Any applicant seeking the approval of design data in support of a repair or alteration should evaluate the processes involved and develop a critical process***

***validation plan, if necessary. The DER should identify the validation requirements for the processes that are critical to the airworthiness of the part as repaired or altered, and to the engine. The validation plan must include all critical processes, related specifications and performance parameters, as well as the associated validation requirements. A validation plan is necessary for all critical processes that involve Category 1 part repairs or alterations, and may be necessary for Category 2 parts if the processes are complex, or if minor deviations to any process highly affects the result of a part repair or alteration. Generally, a critical process validation plan would include any critical process that generates critical airworthiness characteristics in a part, which cannot be inspected by direct measurement or nondestructive testing.***

#### **25. PROCESS FOR AUDIT.**

ARSA supports the intent of this paragraph.

#### **APPENDIX 1.**

ARSA opposes the configuration of the templates as set forth in Appendix 1.

These comments will not address the templates exhaustively, although there are notable deficiencies. As Chromalloy indicates in its comments, the templates' categorization by *part* type fails to reflect the actual manner in which DERs must evaluate *repairs or alterations*. As a result, the checklists in the templates are of little value to a DER.

As it undertakes the significant revisions required to develop appropriate templates, ARSA urges the FAA to draw directly from part 33. Each section of the template should identify the applicable regulations that justify the particular inquiry. Connecting each inquiry to an applicable regulation will ensure that the templates will not demand greater substantiation than the regulations require.

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Thank you for considering our views on this extremely important proposal. Please contact the undersigned if you have any questions or desire additional information.

Sincerely,

A handwritten signature in cursive script, appearing to read "Marshall S. Filler".

Marshall S. Filler  
Managing Director & General Counsel

A handwritten signature in cursive script, appearing to read "Christopher Durocher".

Christopher Durocher  
Associate Counsel