



Federal Aviation Administration

Memorandum

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To: All Directorate Managers
All Aircraft Certification Office Managers

From: ^{For} David W. Hempe, Manager, Aircraft Engineering Division, AIR-100 *symCahler*

Prepared By: Mark Freisthler, Aerospace Engineer ANM-115

Supported By: Jim Kabbara, Dale Hawkins, AIR-120 and Larry Ilcewicz, AIR-100

Subject: Policy Memo on Guidance for Component Contractor Generated Composite Design Values for Composite Structure

Memo No.: PS-AIR-100-120-07

Regulatory Reference: 14 CFR §§ 23.307, 23.603, 23.605 and 23.613
14 CFR §§ 25.307, 25.603, 25.605 and 25.613
14 CFR §§ 27.307, 27.603, 27.605 and 27.613
14 CFR §§ 29.307, 29.603, 29.605 and 29.613
14 CFR § 33.15 & § 35.17 and § 21.8(d)

This policy memo prohibits the use of special projects for the purpose of gaining FAA approval of composite design values outside a product-specific certification project. This policy memo also provides guidance on the reuse of previously approved design values for composite structure. The appendix to this policy memo outlines guidance and clarification on the technical information and document processes that a component contractor would need to provide to an applicant to enable the applicant to use that component contractor's developed composite design values during compliance showing of the applicant's new certification project.

Definition of Key Terms

Key terms used in this policy memo and associated appendix are defined as follows:

- **Composite Design Value:** Structural properties that are determined from test data at the laminate or lamina level on a probability basis (e.g., A or B basis values, with 99% probability and 95% confidence, or 90% probability and 95% confidence, respectively). The amount of data required to derive these values is governed by the statistical significance (or basis) needed. Composite design values are developed to substantiate that the design meets applicable requirements.

- **Product:** An aircraft, aircraft engine or propeller consistent with Title 14 of the Code of Federal Regulations (14 CFR) 21.1 (b).
- **Component Contractor:** A company or manufacturer contracted by an applicant to design and build a component of the product being certified. The component contractor is not the applicant for type certification under 14 CFR part 21. For this memorandum, component contractor does not refer to the “material supplier” from whom the unprocessed material is purchased.
- **Production Process:** All the manufacturing or fabrication procedures used by a manufacturer to produce structural components for assembly into a product. For this memorandum, the production process included all phases of the manufacture (i.e., methods of assembling consistent materials, quality assurance methods, curing methods, post curing machining, etc.) that needs to be controlled in order to construct consistently sound structure. Per § 2X.605, these production processes need to be performed under documented control, normally referred to as process specifications.

Current Regulatory and Advisory Material

Sections 2x.603, 2x.605, and 2x.613, 33.15 and 35.17, relate to the control of structural properties of composite materials through defined material specifications and process specifications along with the development of associated design values. The relevant advisory material may be found in the following documents:

- Order 8110.4, *Type Certification*
- Advisory Circular (AC) 25.613-1, *Material Strength Properties and Material Design Values*, dated August 6, 2003
- AC 23-20, *Acceptance Guidance on Material Procurement and Process Specifications for Polymer Matrix Composite Systems*, dated September 19, 2003
- AC 20-107B, *Change 1 to Composite Aircraft Structure*, dated August 24, 2010
- AC 21-26A, *Quality System for the Manufacture of Composite Structures*, dated July 23, 2010
- Policy Statement (PS)-ACE100-2001-006, *Static Strength Substantiation of Composite Airplane Structure*, dated December 21, 2001

Background

Many applicants seeking a type certificate (TC) or supplemental type certificate (STC) are using component contractors to not only produce parts for their product, but to also assume more of the design responsibility in designing those parts. As most component contractors seek to

provide the same part for several different applicants, they find that they are often required to repeat the tests and analysis used to derive design values for the same materials and process specifications for each individual applicant. In order to help alleviate the financial burden this places on component contractors, they have sought a means to gain FAA approval of composite design values independent of any specific certification project.

In order to assist component suppliers, some aircraft certification offices (ACOs) have used special projects to allow the suppliers to gain access to the FAA resources required to demonstrate that design values they derive for their material and processes comply with the regulations even if they are directly connected to a specific certification project. By using a special project, component contractors gained access to FAA resources (mainly a designee) to approve test plans, conform specimens, and approve test reports. However, an ACO specialist is still required to supervise and approve each special project. It is FAA policy to only work directly with applicants who are in the process of certifying products as defined in 14 CFR 21.1 (aircraft, aircraft engine or propeller). As a result, the FAA will discontinue using special projects for those approvals.

It is also FAA policy to allow the use of data previously used to show compliance with the regulations on past certification projects to support certification of new products that use the same material and process specifications. Existing design values may be used to show compliance to §§ 2x.613, §§ 33.15 and 35.17 on new certification projects as long as the applicant can show that the values, along with associated analytical methods, are applicable to the new project. While showing the applicability of design values is the responsibility of the applicant, Appendix A provides guidance on the type of information a component supplier should provide to the applicant to show applicability.

Policy

Special projects will not be used for the purpose of testing or developing composite design values outside a product-specific certification project. Special projects already opened at the release of this policy may be completed, but no new special projects should be opened. All special projects opened prior to the release of this policy shall be completed within a specific period negotiated with the responsible ACO.

Appendix A provides a means for manufacturers to develop and reuse design values developed for their internal processes. Regardless of the source of any design values, it is FAA policy that the applicant is responsible for using those design values on their product.

Effect of Policy

The general policy stated in this document does not constitute a new regulation. The FAA individual who implements policy should follow this policy when it is applicable to a specific project. Whenever a proposed method of compliance is outside of this established policy, that individual has to coordinate it with the responsible certification office. The responsible certification office must notify the policy-issuing office of an approved method of compliance outside of this established policy. Similarly, if the implementing office becomes aware of

reasons that an applicant's proposal that meets this policy should not be approved, the office must coordinate its response with the policy-issuing office.

An applicant should expect that certificating officials will consider this information when making findings of compliance relevant to new certificate actions. In addition, as with all guidance material, this statement of policy identifies one means, but not the only means, of demonstrating compliance.

Implementation

This policy discusses compliance methods that should be applied to TCs, amended TCs, STCs, and amended STC programs. The compliance methods apply to those programs with an application date that is on or after the effective date of the final policy. Special projects already opened at the release of this policy may be completed, but no new special projects should be opened. All special projects opened prior to the release of this policy shall be completed within a specific period negotiated with the responsible ACO.

Conclusion

The FAA will discontinue issuing special projects to non-applicants to derive material design values not associated with a certification project. Design values derived by component suppliers and previously approved for showing compliance on a certified product may be used for showing compliance to another applicant's product as long as the applicant can show applicability to the product. Guidance for showing the applicability of design values is provided by this memo.

For questions regarding this memo, please contact Jim Kabbara at 202-385-6335, or via e-mail at Jim.Kabbara@faa.gov.

Appendix A: Reuse of Previously-Approved Design Values for Composite Structure

This appendix provides a means for a composite component contractor to avoid having to repeat design value development testing for established materials and process specifications. Component contractors who wish to develop composite design values for designs unique to their material and manufacturing processes may do so by working closely with an applicant certifying an FAA-recognized product. Once composite design values have been approved through a certification project, they may be used on other certification projects as long as it is demonstrated that they are being properly maintained and are applicable to the new project. This appendix identifies a method to verify that composite design values and process specifications used in a previous certification project are acceptable for use on other products based on proper development and control. Applicants who plan to use component contractor-designed composite components as part of their type design are responsible for submitting substantiating data that shows the applicability of composite design values, process specifications and analytical methods used to design components for their project. They are also responsible for providing evidence that component contractor-documented procedures were followed and remain compliant. The applicant may use existing composite design values from past certification projects for new projects as long as the applicant can demonstrate that the composite design values are applicable to the new project and that proper process controls are in place.

Acceptable Means of Compliance for Reuse of Previously-Approved Design Values for Composite Structure

Under the conditions described below, an applicant may use data previously used to show compliance with the regulations on past certification projects in order to support certification of new products that use the same material and process specifications. Design values may be used to show compliance to §§ 2x.613, §§ 33.15 and 35.17 on new certification projects as long as it can be shown that the values, along with associated analytical methods (see AC 20-107B), are applicable to the new project. A composite component contractor must provide applicants the data necessary to determine that the existing design values are applicable to their project. Applicants in this type of arrangement with component contractors must also be aware that regardless of the source of any design value, the applicants applying for the certification of a product retains final responsibility for any and all composite design values used to design and certify their product.

Regardless of the source, applicants remain responsible for showing that all components installed as part of their product are compliant with all regulatory requirements. In the event an applicant wishes to install a component designed by a component contractor, the applicant must include sufficient information to demonstrate compliance in the substantiation data. The applicant must demonstrate compliance via the contractor's analytical tools and the design values, provided the analytical tools and design values are appropriate for the product. Applicants who intend to use a component contractor's composite design values from past certification projects as part of their certification basis must:

1. Work closely with their component contractor to pass down pertinent design information to ensure the available composite design values are suitable for the operational requirements of their product.
2. Verify that the procedures used to develop and control the composite design values and analytical methods were followed.
3. Have sufficient knowledge of the component contractor's procedures used in developing and maintaining composite design values so that any questions the FAA might ask about the final composite design values used can be addressed.
4. If required, conduct supplemental tests to show that their product is in compliance with the applicable regulations.

Following the points above, applicants may use composite design values developed by component contractors specific to their material and manufacturing processes as part of the applicant's certification project (i.e., TC or STC). Also, composite design values previously used for a specific project may be used to show compliance for other products as long as the applicant can demonstrate the applicability of those design values and the analytical techniques used to design the component used in the product. In the case where applicants wish to use existing composite design values developed by a component contractor, they must have access to that data which details how the design values were derived and maintained along with their intended use.

In order for applicants to use the component contractor's composite design values developed for past certification projects, applicants need to obtain the following information from the component contractor:

1. A formal procedure for documenting how composite design values were derived and are maintained. These procedures are part of the information needed to show that the composite design values are applicable to the new design, including sufficient details so new applicants can assess whether the composite design values and associated analytical methods proposed by the component contractor are applicable to their product and comply with the regulations.
2. Details on the composite material properties for which design values were derived and the range of operational environmental conditions for which the design values are valid (e.g., temperature, moisture, etc.).

3. Specific details on the material and process specification for which the composite design values were derived.
4. The internal documented processes that were followed to derive composite design values, which comply with the statistical requirements outlined in the appropriate regulations (§§ 2x.603, 2x.605, 2x.613 along with §§ 33.15 and §§35.17).
5. Details on how the analysis methods are controlled for derived composite design values. Like the design values, the details on how the associated analytical methods were validated (per §§ 2x.307) and controlled need to be documented.
6. The method used in validating that the test facilities correctly conducted the prescribed testing in producing data used in deriving the design values.
7. The component contractor's internal organization for controlling changes to their documented material and process specifications. Take special care to describe internal procedures for controlling changes made to specifications after their approval to ensure that associated design values and approved designs are not affected (e.g., when a resin formulation is changed because the source of the ingredients has changed or when the location of a manufacturing facility has changed). The design approval holder is responsible for substantiating all changes to type design, including and resulting from changes to the material and process specifications.
8. Procedures to make available the composite design values to the applicant for pre- and post-product certification activities. This includes coordination with the applicant when changes are made to the materials (e.g., notification when a resin formulation is changed).

The composite design values generated by a component contractor are considered applicable to that component contractor's design and production processes and are only valid for that component contractor's internal use only. An applicant may use the guidance in this appendix to use design values generated by a component contractor, but this guidance does not authorize use of the design values independent from the component contractor's design and production processes.