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**DRAFT REGULATORY EVALUATION,
INITIAL REGULATORY FLEXIBILITY DETERMINATION,
INTERNATIONAL TRADE IMPACT ASSESSMENT, AND
UNFUNDED MANDATES ASSESSMENT**

**REVISED REQUIREMENT FOR
MATERIAL STRENGTH PROPERTIES
AND DESIGN VALUES
FOR TRANSPORT AIRPLANES**

**PROPOSED RULE
(14 CFR PART 25)**

**OFFICE OF AVIATION POLICY AND PLANS
OPERATIONS REGULATORY ANALYSIS BRANCH, APO-310**

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EXECUTIVE SUMMARY

This draft regulatory evaluation examines the impacts of the proposed rule to revise the requirements for material strength properties and material design values for transport category airplanes. The proposed rule would incorporate changes developed in cooperation with the Joint Aviation Authorities (JAA) of Europe and the U.S. and European aviation industry through the Aviation Rulemaking Advisory Committee (ARAC). The proposed amendments would harmonize FAA requirements with those proposed by the JAA.

There would be no incremental costs as a result of the proposed rule. Rather, the proposed rule would result in cost savings to manufacturers and the FAA by reinstating a provision that permits the Administrator to approve other material design values published in accepted military and industry handbooks. A draft Advisory Circular (AC) accompanies this proposed rule and describes the acceptable methods of compliance. As a result, in certain material design values cases, the FAA estimates that the proposed rule would result in cost savings to manufacturers of transport category airplanes of at least \$100,000 per initial aircraft certification. In addition, the FAA would realize an estimated administrative cost saving of approximately \$1,460 per certification. Finally, by harmonizing JAA and FAA requirements, the proposed rule would create a single set of requirements accepted in both the United States and Europe. This action would foster international trade and make the aircraft certification process more efficient. Accordingly, the FAA has determined that the proposed rule would be cost-beneficial.

Since the affected transport category airplane manufacturers are not considered small entities, the proposed rule would not impose a significant impact on a substantial number of small entities. The proposed amendments would harmonize with those proposed by the JAA and would not constitute a barrier to international trade. Furthermore, the proposed rule does not contain any Federal intergovernmental or private sector mandates; therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

I. INTRODUCTION

This draft regulatory evaluation examines the impacts of the proposed rule to revise the requirements for material strength properties and material design values for transport category airplanes. The proposed rule would incorporate changes developed in cooperation with the Joint Aviation Authorities of Europe and the U.S. and European aviation industry through the ARAC. The proposed amendment would harmonize FAA requirements with those proposed by the JAA.

II. BACKGROUND

The manufacturing, marketing, and certification of transport airplanes is increasingly an international endeavor. In order for U.S. manufacturers to export transport airplanes to other countries, the airplane must be designed to comply not only with the U.S. airworthiness requirements for transport airplanes (14 Code of Federal Regulations (CFR) part 25), but also with the transport airworthiness requirements of the countries to which the airplane is to be exported.

The European countries have developed a common airworthiness code for transport airplanes that is administered by the JAA of Europe. This code is the result of a European effort to harmonize the various airworthiness codes of the European countries and is called the Joint Aviation Requirements (JAR). It was developed in a format similar to 14 CFR part 25 (part 25) of the Federal Aviation Regulations (FAR). Although JAR-25 is very similar to part 25, there are differences in methodologies and criteria that often result in the need to address the same

design objective with more than one kind of analysis or test in order to satisfy both part 25 and JAR airworthiness codes.

Section 613 of part 25 (§ 25.613) prescribes requirements for material strength properties and design values. Prior to Amendment 25-72 (55 FR 29776, July 20, 1990), the rule required material strength properties found in certain military or industry handbooks¹ to be used unless specific FAA approval was granted to use other properties. Amendment 25-72 combined §§ 25.613 and 25.615 design properties into one requirement and removed the references to the handbooks. Instead, the requirement to use material strength properties of the handbooks was replaced by a more general requirement specifying probabilities and confidence levels for the properties, leaving test procedures and statistical methods unspecified.

In addition, Amendment 25-72 removed the provision that permitted the Administrator to approve “other design values.” The applicant whose transport category airplane’s material design values meet either the standards referenced in § 25.613 prior to Amendment 25-72 or comparable European standards², but has not shown that those values meet the probability and confidence level in current § 25.613(b), must now show an equivalent level of safety as part of the FAA’s certification of the airplane. This process has resulted in unnecessary costs to both the manufacturer and the FAA.

¹ The handbooks are: Military Handbook (MIL-HDBK)-5, “Metallic Materials and Elements for Flight Vehicle Structure;” MIL-HDBK-17, “Plastics for Flight Vehicles;” Army-Navy-Commerce (ANC)-18, “Design of Wood Aircraft Structures;” and MIL-HDBK-23, “Composite Construction for Flight Vehicles.”

III. DISCUSSION OF THE PROPOSED RULE

The proposed rule was developed by the ARAC and presented to the FAA as a recommendation for rulemaking. If adopted, the proposal would harmonize material strength properties and material design values with those being proposed by the JAA.

The heading of § 25.613 would be revised to read “Material Strength Properties and Material Design Values.” Section 25.613(a) would remain unchanged. Section 25.613(b) would be revised to clarify that the design values are material design values. Additionally, section 25.613(b) would reference proposed new § 25.613(f), described below.

The current rule at § 25.613(c) requires consideration of the effects of temperature on allowable stresses used for design. The proposed rule would require consideration of environmental conditions in general, including temperature and moisture, on material design values used in an essential component or structure, where those effects are significant within the airplane operating envelope. Moisture can affect material design values of composites. Although not required in the current rule, manufacturers already take into account the effect of moisture on design values. This proposed amendment would codify current industry practice.

Section 25.613(d) would be removed. It is addressed in § 25.571 Damage tolerance and fatigue evaluation of structure, and is not needed in this section.

² European standards include those of Euronorm (EN), International Standards Organization (ISO), and Defence

Section 25.613(e) would be revised to clarify that design values are material design values.

New section 25.613(f) would reinstate the provision that permits the Administrator to approve other design values. A draft Advisory Circular, AC 25.613-1, developed concurrently with the proposed rule, would describe acceptable methods of compliance, including those published in the handbooks referenced in the rule prior to Amendment 25-72 and other standards, such as those of American Society for Testing Materials (ASTM), the European Standards (EN), and International Standards Organization (ISO).

IV. COSTS AND BENEFITS

The FAA estimates that there would be no additional cost associated with this proposal. As discussed in the previous section, in addition to harmonizing § 25.613 and JAA requirements, the proposed rule would clarify the current rule, codify current practice, and reinstate the provision that permits the Administrator to approve other material design values. Consequently, manufacturers of transport category airplanes would not incur any additional cost. In fact, in certain cases, the manufacturer and the FAA would realize cost savings as a result of the revisions to the requirements for material strength properties and material design values. These cost savings are examined in further detail in the following paragraphs.

Under the current rule, there are three potential options on which to base material strength properties and material design values. First, a manufacturer could conduct a material properties

(DEF) Standard 00-932.

development program for each material, product form, and heat treatment. The FAA estimates that a program for a typical material (e.g., titanium, high-strength steels) would initially cost between \$300,000 and \$500,000. The total cost is a function of the number of materials, product forms, and heat treatments. Second, a manufacturer could test each aircraft structural part (on a sampling basis) to verify strength characteristics. Based on the cost of materials, testing, and analysis, the FAA estimates this recurring cost would be \$6,000 to \$60,000 for each aircraft structural part over an assumed 300-airplane production run. Again, the total cost is a function of the number of aircraft structural parts to be tested. Third, a manufacturer could use another method for establishing material design values and then request FAA approval of an equivalent safety finding³. The FAA estimates that the initial cost would be between \$100,000 and \$150,000.⁴

If the proposed rule were adopted, based on the provision permitting the Administrator to approve other material design values (such as those listed in the draft AC), there would be cost savings to the manufacturer and the FAA. First, under certain conditions, manufacturers of transport category airplanes would no longer need to employ one of the options, described above. If the material design values can be found in the accepted military or industry

³ For further details, see part 21, section 21(b)(1).

⁴ It is important to note that the first and third options incur an initial cost with minimal recurring costs (i.e., paperwork), whereas the second option incurs a noticeable recurring cost. In the long run, the second option would likely cost more than the third option.

handbooks⁵, the manufacturer would avoid the initial or recurring cost of establishing material design values. Based on the estimates of the available options described above, the FAA estimates that this cost saving would be at least \$100,000 per initial aircraft certification (the lower estimate of the least costly option).

Second, this provision would eliminate the need for an equivalent safety finding in the third option. The manufacturer would realize minimal cost saving through a reduction in some of their paperwork. For the FAA, the proposed rule would eliminate approximately 30 hours of paperwork per aircraft certificate for an FAA aerospace engineer (GS-14, step 5) to conduct an equivalent safety finding. As a result, the FAA would realize a cost saving of approximately \$1,460 in administrative costs per certificate.⁶

Finally, by harmonizing JAA and FAA standards, the proposed rule would create a single set of requirements accepted in both the United States and Europe. At present, airplane manufacturers must satisfy both the FAR and the European JAR certification standards to market transport category aircraft in both the United States and Europe. Harmonizing both sets of standards would foster international trade and make the aircraft certification process more efficient.

⁵ For example, the statistical methods specified in MIL-HDBK-5 and -17 would be acceptable for use in establishing material design values. Other statistical methods, amounts of data, and material property data may also be accepted by the FAA, including those specified in the European Standards (noted earlier).

⁶ $\$36.80/\text{hour}$ (GS-14, step 5, excluding locality rates of pay) \times 1.3245 (fringe benefits) \times 30 hours = \$1,462.25

The wage rate for a GS-14, step 5 can be found on the Office of Personnel Management (OPM) website.

The fringe benefits factor can be found in Table 4-5, page 4-22, Economic Analysis of Investment and Regulatory Decision--A Guide, FAA-APO-98-4, June 1998 (Analysis).

Based on the analysis presented above, the FAA has determined that the proposed rule would be cost-beneficial. The FAA solicits comments from affected entities with respect to this finding and determination and requests that all comments be accompanied by clear documentation.

V. INITIAL REGULATORY FLEXIBILITY DETERMINATION

The Regulatory Flexibility Act of 1980 (RFA) establishes “as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation.” To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency may so certify and a regulatory flexibility analysis is not

required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

This proposed rule would affect manufacturers of transport category airplanes. However, all United States transport-aircraft category manufacturers exceed the Small Business Administration (SBA) small-entity standard of 1,500 employees for aircraft manufacturers. United States part 25 airplane manufacturers include: Boeing, Cessna Aircraft, Gulfstream Aerospace, Learjet (owned by Bombardier), Lockheed Martin, McDonnell Douglas (a wholly-owned subsidiary of The Boeing Company), Raytheon Aircraft, and Sabreliner Corporation. Consequently, the Federal Aviation Administration certifies that the proposed rule would not have a significant economic impact on a substantial number of small entities. The FAA solicits comments from affected entities with respect to this finding and determination and requests that all comments be accompanied by clear documentation.

VI. INTERNATIONAL TRADE IMPACT ASSESSMENT

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards.

In accordance with the above statute, the FAA has assessed the potential effect of this proposed rule and has determined that it complies with the Act because this rule would use European international standards as the basis for U.S. standards.

VII. UNFUNDED MANDATES ASSESSMENT

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22, 1995, is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments.

Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in a \$100 million or more expenditure (adjusted annually for inflation) in any one year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a “significant regulatory action.”

This proposed rule does not contain such a mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.