

it is the airframe as a whole and its survivable living space that are the subject of these special conditions, the FAA does not intend to increase the strength requirements of § 25.561 by special condition. Therefore, the special conditions state explicitly that the attachments of items of mass need not be designed for static emergency landing loads in excess of those specified in § 25.561.

Since larger airframe structures typically have more volume within which to absorb energy, they normally provide occupants with reasonable protection from crash loads. Therefore, the effects of the A380 design on occupant loads are not expected to be significant. In order to confirm that this assumption is correct, these special conditions require an assessment of the effect of the design on the occupant loads. For the purposes of these special conditions, an analytical tool known as the Dynamic Response Index (DRI) is used to make the assessment. DRI was developed through research and is documented in USAA VSCOM TR 89-D-22B, "Aircraft Crash Survival Design Guide, Volume II, Aircraft Design Crash Impact Conditions and Human Tolerance." DRI approximates the effect of an impact on spinal load. Based on the results of the assessment using DRI, any additional, detailed occupant load considerations can be established.

Applicability

As discussed above, these special conditions are applicable to the Airbus A380-800 airplane. Should Airbus apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, these special conditions would apply to that model as well under the provisions of § 21.101(a)(1), Amendment 21-69, effective September 16, 1991.

Conclusion

This action affects only certain novel or unusual design features of the Airbus A380-800 airplane. It is not a rule of general applicability, and it affects only the applicant which applied to the FAA for approval of these features on the airplane.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Proposed Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for the Airbus A380-800 airplane.

In addition to the requirements of §§ 25.561, 25.562, 25.721, and 25.785, the following special conditions apply:

It must be demonstrated that the Model A380 provides a level of crash survivability equivalent to that of conventional large transport airplanes. This may be achieved by demonstrating by test or validated analysis that—at impacts up to a vertical descent rate representing the Limit of Reasonable Survivability—the structural capability of typical fuselage sections is equal to or better than that of a conventional large transport airplane.

(The Limit of Reasonable Survivability is defined as the level of structural degradation that would either directly or by exceedance of physiological limits of the occupants lead to a significant reduction in the probability of survival in an otherwise survivable incident.) The results of this demonstration must show the following:

- a. Structural deformation will not result in infringement of the occupants' normal living space.
- b. The occupants will be protected from the release of seats, overhead bins, and other items of mass due to structural deformation of the supporting structure. That is, the supporting structure must be able to support the loads imposed by these items of mass, assuming that they remain attached during the impact event, and the floor structure must deform in a way that would allow them to remain attached. However, the attachments of these items need not be designed for static emergency landing loads in excess of those specified in § 25.561.
- c. The Dynamic Response Index experienced by the occupants will not be more severe than that experienced on conventional large transport airplanes. (The Dynamic Response Index is described in USAA VSCOM TR 89-D-22B, "Aircraft Crash Survival Design Guide, Volume II, Aircraft Design Crash Impact Conditions and Human Tolerance.")

d. Cargo loading of the fuselage for this evaluation accounts for variations that could have a deleterious effect on structural performance.

Issued in Renton, Washington on July 25, 2005.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM322; Notice No. 25-05-17-SC]

Special Conditions: Airbus Model A380-800 Airplane, Transient Engine Failure Loads

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This notice proposes special conditions for the Airbus A380-800 airplane. This airplane will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. Some of these novel or unusual design features are associated with the high bypass engines used on the Model A380. For these design features, the applicable airworthiness regulations do not contain adequate or appropriate safety standards regarding transient engine failure loads. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards. Additional special conditions will be issued for other novel or unusual design features of the Airbus Model A380-800 airplane.

DATES: Comments must be received on or before September 23, 2005.

ADDRESSES: Comments on this proposal may be mailed in duplicate to: Federal Aviation Administration, Transport Airplane Directorate, Attention: Rules Docket (ANM-113), Docket No. NM322, 1601 Lind Avenue SW., Renton, Washington 98055-4056; or delivered in duplicate to the Transport Airplane Directorate at the above address. All comments must be marked: Docket No. NM322. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT: Holly Thorson, FAA, International Branch, ANM-116, Transport Airplane

Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98055-4056; telephone (425) 227-1357; facsimile (425) 227-1149.

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive as well as a report summarizing each substantive public contact with FAA personnel concerning these proposed special conditions. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the ADDRESSES section of this notice between 7:30 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive on or before the closing date for comments. We will consider comments filed late, if it is possible to do so without incurring expense or delay. We may change the proposed special conditions in light of the comments we receive.

If you want the FAA to acknowledge receipt of your comments on this proposal, include with your comments a pre-addressed, stamped postcard on which the docket number appears. We will stamp the date on the postcard and mail it back to you.

Background

Airbus applied for FAA certification/validation of the provisionally-designated Model A3XX-100 in its letter AI/L 810.0223/98, dated August 12, 1998, to the FAA. Application for certification by the Joint Aviation Authorities (JAA) of Europe had been made on January 16, 1998, reference AI/L 810.0019/98. In its letter to the FAA, Airbus requested an extension to the 5-year period for type certification in accordance with 14 CFR 21.17(c). The request was for an extension to a 7-year period, using the date of the initial application letter to the JAA as the reference date. The reason given by Airbus for the request for extension is related to the technical challenge, complexity, and the number of new and novel features on the airplane. On November 12, 1998, the Manager, Aircraft Engineering Division, AIR-100,

granted Airbus' request for the 7-year period, based on the date of application to the JAA.

In its letter AI/LE-A 828.0040/99 Issue 3, dated July 20, 2001, Airbus stated that its target date for type certification of the Model A380-800 has been moved from May 2005, to January 2006, to match the delivery date of the first production airplane. In accordance with 14 CFR 21.17(d)(2), Airbus chose a new application date of April 20, 1999, and requested that the 7-year certification period which had already been approved be continued. The part 25 certification basis for the Model A380-800 airplane was adjusted to reflect the new application date.

The Model A380-800 airplane will be an all-new, four-engine jet transport airplane with a full-length double-deck, two-aisle cabin. The maximum takeoff weight will be 1.235 million pounds with a typical three-class layout of 555 passengers.

Type Certification Basis

Under the provisions of 14 CFR 21.17, Airbus must show that the Model A380-800 airplane meets the applicable provisions of 14 CFR part 25, as amended by Amendments 25-1 through 25-98. If the Administrator finds that the applicable airworthiness regulations do not contain adequate or appropriate safety standards for the Airbus A380-800 airplane because of novel or unusual design features, special conditions are prescribed under the provisions of 14 CFR 21.16.

In addition to the applicable airworthiness regulations and special conditions, the Airbus Model A380-800 airplane must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36. In addition, the FAA must issue a finding of regulatory adequacy pursuant to section 611 of Public Law 93-574, the "Noise Control Act of 1972."

Special conditions, as defined in 14 CFR 11.19, are issued in accordance with 14 CFR 11.38 and become part of the type certification basis in accordance with 14 CFR 21.17(a)(2), Amendment 21-69, effective September 16, 1991.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual

design features, the special conditions would also apply to the other model under the provisions of 14 CFR 21.101.

Discussion of Novel or Unusual Design Features

The Model A380 will have very large high bypass ratio engines with 110 inch diameter bypass fans, representing the latest in a trend toward increasing engine size. Engines of this size were not envisioned when § 25.361 'pertaining to loads imposed by engine seizure' was adopted in 1965. Worst case engine seizure events become increasingly more severe with increasing engine size because of the higher inertia of the rotating components.

Section 25.361(b)(1) requires that for turbine engine installations, the engine mounts and the supporting structures must be designed to withstand a "limit engine torque load imposed by sudden engine stoppage due to malfunction or structural failure." Limit loads are expected to occur about once in the lifetime of any airplane. Section 25.305 requires that supporting structures be able to support limit loads without detrimental permanent deformation, meaning that the supporting structures should remain serviceable after a limit load event.

Since the adoption of § 25.361(b)(1), the size, configuration, and failure modes of jet engines have changed considerably. Current engines are much larger and are designed with large bypass fans. In the event of a structural failure, these engines are capable of producing much higher transient loads on the engine mounts and supporting structures.

As a result, modern high bypass engines are subject to certain rare-but-severe engine seizure events. Service history shows that such events occur far less frequently than limit load events. Although it is important for the airplane to be able to support such rare loads safely without failure, it is unrealistic to expect that no permanent deformation will occur.

Given this situation, the Aviation Rulemaking Advisory Committee (ARAC) has proposed a design standard for today's large engines. For the commonly-occurring deceleration events, the proposed standard requires engine mounts and structures to support maximum torques without detrimental permanent deformation. For the rare-but-severe engine seizure events (*i.e.*, loss of any fan, compressor, or turbine blade), the proposed standard requires engine mounts and structures to support maximum torques without failure, but

allows for some deformation in the structure.

The FAA concludes that modern large engines, including those on the Model A380, are novel and unusual compared to those envisioned when § 25.361(b)(1) was adopted and thus warrant a special condition. The proposed special condition contains design criteria as recommended by the ARAC.

The ARAC proposal would revise the wording of § 25.361(b), including §§ 25.361(b)(1) and (b)(2), removing the language pertaining to structural failures and moving it to a separate requirement that discusses the reduced factors of safety that apply to these failures. The revised wording of § 25.361(b) would also include non-substantive changes recommended by ARAC to clarify the existing requirement. The FAA is using this ARAC text in the proposed special condition, because it clarifies the supplementary conditions for engine torque.

Applicability

As discussed above, these special conditions are applicable to the Airbus A380-800 airplane. Should Airbus apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, these special conditions would apply to that model as well under the provisions of § 21.101(a)(1), Amendment 21-69, effective September 16, 1991.

Conclusion

This action affects only certain novel or unusual design features of the Airbus A380-800 airplane. It is not a rule of general applicability, and it affects only the applicant which applied to the FAA for approval of these features on the airplane.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

The Proposed Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration (FAA) proposes the following special conditions as part of the type certification basis for the Airbus A380-800 airplane.

a. In lieu of compliance with § 25.361(b), the following special condition applies:

For turbine engine installations, the engine mounts, pylons, and adjacent

supporting airframe structure must be designed to withstand 1 g level flight loads acting simultaneously with the maximum limit torque loads imposed by each of the following:

1. Sudden engine deceleration due to a malfunction which could result in a temporary loss of power or thrust; and

2. The maximum acceleration of the engine.

b. In addition to the requirements of 14 CFR part 25, the following special condition applies:

1. For engine supporting structure, an ultimate loading condition must be considered that combines 1 g flight loads with the transient dynamic loads resulting from:

(a) The loss of any fan, compressor, or turbine blade; and

(b) Separately, where applicable to a specific engine design, any other engine structural failure that results in higher loads.

2. The ultimate loads developed from the conditions specified in paragraph b. 1. above are to be:

(a) multiplied by a factor of 1.0 when applied to engine mounts and pylons; and

(b) multiplied by a factor of 1.25 when applied to adjacent supporting airframe structure.

Issued in Renton, Washington, on August 1, 2005.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM321; Notice No. 25-05-16-SC]

Special Conditions: Airbus Model A380-800 Airplane, Ground Turning Loads

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This notice proposes special conditions for the Airbus A380-800 airplane. This airplane will have novel or unusual design features when compared to the state of technology envisioned in the airworthiness standards for transport category airplanes. Many of these novel or unusual design features are associated with the complex systems and the

configuration of the airplane, including its full-length double deck. For these design features, the applicable airworthiness regulations do not contain adequate or appropriate safety standards regarding ground turning loads. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards. Additional special conditions will be issued for other novel or unusual design features of the Airbus Model A380-800 airplane.

DATES: Comments must be received on or before September 23, 2005.

ADDRESSES: Comments on this proposal may be mailed in duplicate to: Federal Aviation Administration, Transport Airplane Directorate, Attention: Rules Docket (ANM-113), Docket No. NM321, 1601 Lind Avenue SW., Renton, Washington 98055-4056; or delivered in duplicate to the Transport Airplane Directorate at the above address. All comments must be marked: Docket No. NM321. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4 p.m.

FOR FURTHER INFORMATION CONTACT:

Holly Thorson, FAA, International Branch, ANM-116, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington 98055-4056; telephone (425) 227-1357; facsimile (425) 227-1149.

SUPPLEMENTARY INFORMATION:

Comments Invited

The FAA invites interested persons to participate in this rulemaking by submitting written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data. We ask that you send us two copies of written comments.

We will file in the docket all comments we receive as well as a report summarizing each substantive public contact with FAA personnel concerning these proposed special conditions. The docket is available for public inspection before and after the comment closing date. If you wish to review the docket in person, go to the address in the **ADDRESSES** section of this notice between 7:30 a.m. and 4 p.m., Monday through Friday, except Federal holidays.

We will consider all comments we receive on or before the closing date for comments. We will consider comments filed late, if it is possible to do so