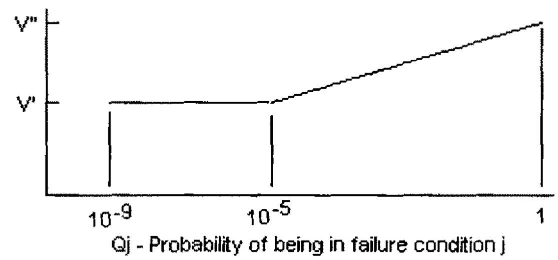
Figure 3

Clearance speed



V′ = Clearance speed as defined by § 25.629(b)(2).
V″ = Clearance speed as defined by § 25.629(b)(1).
$Q_j = (T_j)(P_j)$ where:
T_j = Average time spent in failure condition j (in hours)
P_j = Probability of occurrence of failure mode j (per hour)

Note: If P_j is greater than 10^{-3} per flight hour, then the flutter clearance speed must not be less than V″.

(6) Freedom from aeroelastic instability must also be shown up to V′ in Figure 3 above, for any probable system failure condition combined with any damage required or selected for investigation by § 25.571(b). Consideration of certain failure conditions may be required by other sections of part 25 regardless of calculated system reliability. Where analysis shows the probability of these failure conditions to be less than 10^{-9}, criteria other than those specified in this paragraph may be used for structural substantiation to show continued safe flight and landing.

4. Failure indications. For system failure detection and indication, the following apply:

(a) The system must be checked for failure conditions, not extremely improbable, that degrade the structural capability below the level required by part 25 or significantly reduce the reliability of the remaining system. As far as reasonably practicable, the flight crew must be made aware of these failures before flight. Certain elements of the control system, such as mechanical and hydraulic components, may use special periodic inspections, and electronic components may use daily checks, in lieu of detection and indication systems to achieve the objective of this requirement. These Certification Maintenance Requirements (CMRs) must be limited to components that are not readily detectable by normal detection and indication systems and where service history shows that inspections will provide an adequate level of safety.

(b) The existence of any failure condition, not extremely improbable, during flight that could significantly affect the structural capability of the airplane and for which the associated reduction in airworthiness can be minimized by suitable flight limitations, must be signaled to the flight crew. For example, failure conditions that result in a factor of safety between the airplane strength and the loads of subpart C below 1.25, or flutter margins below V″, must be signaled to the crew during flight.

5. Dispatch with known failure conditions. If the airplane is to be dispatched in a known system failure condition that affects structural performance, or affects the reliability of the remaining system to maintain structural performance, then the provisions of this special condition must be met, including the provisions of paragraph 2 for the dispatched condition, and paragraph 3 for subsequent failures. Expected operational limitations may be taken into account in establishing Pj as the probability of failure occurrence for determining the safety margin in Figure 1. Flight limitations and expected operational limitations may be taken into account in establishing Qj as the combined probability of being in the dispatched failure condition and the subsequent failure condition for the safety margins in Figures 2 and 3. These limitations must be such that the probability of being in this combined failure state and then subsequently encountering limit load conditions is extremely improbable. No reduction in these safety margins is allowed if the subsequent system failure rate is greater than 10^{-3} per hour.

Issued in Renton, Washington, on July 29, 2009.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. E9–19246 Filed 8–11–09; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. NM399; Special Conditions No. 25–387–SC]

Special Conditions: Boeing Model 747–8/–8F Airplanes; Additional Airframe Structural Design Requirements Related to Sudden Engine Stoppage Due to Fan Blade Failures

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions.

SUMMARY: These special conditions are issued for Boeing Model 747–8/–8F airplanes. These airplanes will have a novel or unusual design feature(s) associated with an increased engine size when compared to previous model airplanes. These larger engines with larger bypass fans are capable of producing higher and more complex dynamic loads than previously experienced in older designs. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These 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.

DATES: *Effective Date:* September 11, 2009.

FOR FURTHER INFORMATION CONTACT: Mark Freisthler, FAA, Airframe & Cabin

Safety Branch, ANM–115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue, SW., Renton, Washington 98057–3356; telephone (425) 227–1119; facsimile (425) 227–1149.

SUPPLEMENTARY INFORMATION:

Background

On November 4, 2005, The Boeing Company, PO Box 3707, Seattle, WA, 98124, applied for an amendment to Type Certificate Number A20WE to include the new Model 747–8 passenger airplane and the new Model 747–8F freighter airplane. The Model 747–8 and the Model 747–8F are derivatives of the 747–400 and the 747–400F, respectively. Both the Model 747–8 and the Model 747–8F are four-engine jet transport airplanes that will have a maximum takeoff weight of 970,000 pounds and new General Electric GEnx-2B67 engines. The Model 747–8 will have two flight crew and the capacity to carry 660 passengers. The Model 747–8F will have two flight crew and a zero passenger capacity, although Boeing has submitted a petition for exemption to allow the carriage of supernumeraries.

Type Certification Basis

Under the provisions of Title 14 Code of Federal Regulations (14 CFR) 21.101, Boeing must show that the Model 747–8 and 747–8F airplanes (hereafter referred to as the 747–8/–8F) as changed, continue to meet the applicable provisions of 14 CFR part 25, as amended by Amendments 25–1 through 25–117, except for earlier amendments as agreed upon by the FAA. These regulations will be incorporated into Type Certificate No. A20WE after type certification approval of the 747–8/–8F.

If the Administrator finds that the applicable airworthiness regulations (i.e., part 25) do not contain adequate or appropriate safety standards for the 747–8/–8F because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

In addition to the applicable airworthiness regulations and special conditions, the 747–8/–8F 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.

Special conditions, as defined in § 11.19, are issued under § 11.38, and become part of the type certification basis under § 21.101.

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 feature, the special conditions would also apply to the other model under § 21.101.

Novel or Unusual Design Features

The Boeing Model 747–8/–8F airplanes will incorporate the following novel or unusual design features: High-bypass engines with a fan diameter approximately twelve percent greater than those currently installed on other Boeing Model 747 airplanes.

Discussion

High-bypass engines with a fan diameter approximately twelve percent greater than those currently installed on other Boeing Model 747 airplanes, such as the 747–400 series, were not envisioned when § 25.361 was adopted in 1965. Section 25.361 addresses loads imposed by engine seizure. Because of the higher inertia of the rotating components, worst case engine seizure events become increasingly more severe with increasing engine size.

Typically, the design torque loads associated with typical failure scenarios have been estimated by the engine manufacturer. These loads are used by the airframe manufacturer as limit loads. Section 25.305 requires that supporting structure be able to support limit loads without detrimental permanent deformation, meaning that supporting structure should remain serviceable after a limit load event. Limit loads are expected to occur about once in the lifetime of any airplane. For turbine engine installations, § 25.361(b)(1) requires that the engine mounts and supporting structures be designed to withstand a ‘‘limit engine torque load imposed by sudden engine stoppage due to malfunction or structural failure.’’

Since § 25.361(b)(1) was adopted the size, configuration, and failure modes of turbine engines have changed significantly. Current engines are much larger and are designed with large bypass fans. In the failure event prescribed by § 25.361 they produce much higher transient loads on the engine mounts and supporting structure than previous designs. At the same time, the likelihood of such an event occurring in modern engines has become less. The service history of modern turbine engines shows that engine seizures are rare events, much less than what is typically expected for ‘‘limit’’ loads. While 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 would require engine mounts and structures to support maximum torques without detrimental permanent deformation. For the rare-but-severe engine seizure events such as loss of any fan, compressor, or turbine blade, the proposed standard would require engine mounts and structures to support maximum torques without failure, but allow for some deformation in the structure.

The FAA concludes that modern large engines, including those on the 747–8/–8F, are novel and unusual compared to those envisioned when § 25.361(b)(1) was adopted and thus warrant special conditions. These special conditions contain design criteria recommended by the ARAC.

Discussion of Comments

Notice of proposed special conditions No. 25–09–02–SC for the Boeing Model 747–8 and 747–8F airplanes was published in the **Federal Register** on April 8, 2009 (74 FR 15888). No comments were received and the special conditions are adopted as proposed.

Applicability

As discussed above, these special conditions are applicable to Boeing Model 747–8/–8F airplanes. Should Boeing apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design features, the special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features of the Boeing Model 747–8/–8F airplanes. It is not a rule of general applicability.

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 Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for the Boeing Model

747–8/–8F airplanes. The following special conditions are in lieu of § 25.361(b):

1. For turbine engine installations, the engine mounts, pylons and supporting airframe primary structure (such as the affected wing and fuselage primary structure) must be designed to withstand 1g level flight loads acting simultaneously with the maximum torque load, considered as limit load, imposed by each of the following:

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

(b) The maximum acceleration of the engine.

2. For auxiliary power unit installations, the power unit mounts and supporting airframe primary structure (such as the affected fuselage primary structure) must be designed to withstand 1g level flight loads acting simultaneously with the maximum torque load, considered as limit load, imposed by each of the following:

(a) Sudden auxiliary power unit deceleration due to malfunction or structural failure; and

(b) The maximum acceleration of the power unit.

3. For turbine engine installations, the engine mounts, pylons and supporting airframe primary structure (such as the affected wing and fuselage primary structure) must be designed to withstand 1g flight loads acting simultaneously with the transient dynamic loads, considered as ultimate load, imposed by each of the following:

(a) Sudden engine stoppage due to the loss of any fan, compressor, or turbine blade; and separately

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

4. The ultimate loads developed from the conditions specified in paragraphs 3(a) and 3(b) are to be multiplied by a factor of 1.0 when applied to engine mounts and pylons and multiplied by a factor of 1.25 when applied to the supporting airframe primary structure (such as the affected wing and fuselage primary structure). In addition, the airplane must be capable of continued safe flight considering the aerodynamic effects on controllability due to any permanent deformation that results from the conditions specified in paragraph 3, above.

Issued in Renton, Washington, on July 29, 2009.

Ali Bahrami,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. E9–19249 Filed 8–11–09; 8:45 am]

BILLING CODE 4910–13–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA–2009–0464; Directorate Identifier 2008–NM–189–AD; Amendment 39–15992; AD 2008–16–09 R1]

RIN 2120–AA64

Airworthiness Directives; Short Brothers Model SD3–60 Airplanes

AGENCY: Federal Aviation Administration (FAA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: We are revising an existing airworthiness directive (AD) for the products listed above. This AD results from mandatory continuing airworthiness information (MCAI) originated by an aviation authority of another country to identify and correct an unsafe condition on an aviation product. The MCAI describes the unsafe condition as:

There have been several occurrences of cracked elevator trim tab balance weight attachment brackets, on one occasion, the elevator trim tab mass balance weight bracket separated from the aircraft. The loss of an elevator trim tab mass balance weight bracket has the potential to cause damage to an aircraft, or cause serious injury to personnel.

* * * * *

We are issuing this AD to require actions to correct the unsafe condition on these products.

DATES: This AD becomes effective September 16, 2009.

The Director of the Federal Register previously approved the incorporation by reference of certain publications listed in this AD as of September 15, 2008 (73 FR 46543, August 11, 2008).

The Director of the Federal Register previously approved the incorporation by reference of a certain publication listed in this AD as of March 14, 2005 (70 FR 9212, February 25, 2005).

The Director of the Federal Register previously approved the incorporation by reference of a certain other publication listed in this AD as of September August 3, 2004 (69 FR 38813, June 29, 2004).

ADDRESSES: You may examine the AD docket on the Internet at *http://www.regulations.gov* or in person at the U.S. Department of Transportation, Docket Operations, M–30, West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue, SE., Washington, DC.

FOR FURTHER INFORMATION CONTACT: Todd Thompson, Aerospace Engineer, International Branch, ANM–116, Transport Airplane Directorate, FAA, 1601 Lind Avenue, SW., Renton, Washington 98057–3356; telephone (425) 227–1175; fax (425) 227–1149.

SUPPLEMENTARY INFORMATION:

Discussion

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to include an AD to revise AD 2008–16–09, amendment 39–15627 (73 FR 46543, August 11, 2008). The existing AD applies to the products identified in this AD. The NPRM was published in the **Federal Register** on May 20, 2009 (74 FR 23668). That NPRM proposed to correct an unsafe condition for the specified products.

Since we issued AD 2008–16–09, Short Brothers advised that SD3–07–6011xA brackets manufactured in 2005 or later have a life limit of 28,800 flight hours, per Section 5–00–02 of the Short Brothers SD360 Aircraft Maintenance Manual (AMM), and as noted in Appendix 1 of Shorts Alert Service Bulletin SD360–55–A21, Revision 1, dated March 29, 2007. In light of this, we have revised the existing AD to extend the life limit of any balance weight bracket from 1,750 flight hours to 28,800 flight hours. You may obtain further information by examining European Aviation Safety Agency Airworthiness Directive 2007–0107–E, dated April 18, 2007 (referred to after this as ''the MCAI''), in the AD docket.

In addition, we removed paragraphs (f) and (l)(1) of the existing AD from this AD. Those paragraphs defined the use of the term ''service bulletin,'' as used in the AD.

Comments

We gave the public the opportunity to participate in developing this AD. We received no comments on the NPRM or on the determination of the cost to the public.

Conclusion

We reviewed the available data and determined that air safety and the public interest require adopting the AD as proposed.

Differences Between This AD and the MCAI or Service Information

We have reviewed the MCAI and related service information and, in general, agree with their substance. But we might have found it necessary to use different words from those in the MCAI to ensure the AD is clear for U.S. operators and is enforceable. In making these changes, we do not intend to differ substantively from the information