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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2006-25609; Directorate Identifier 2005-NM-263-AD; Amendment 39-15335; AD 2008-02-05]

RIN 2120-AA64

Airworthiness Directives; Boeing Model 777-200 and -300 Series Airplanes Equipped With Rolls-Royce RB211-TRENT 800 Series Engines

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

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain Boeing Model 777-200 and -300 series airplanes. This AD requires revising the airplane flight manual to provide the flightcrew with new ground procedures for shedding core ice during long taxi periods in freezing fog with visibility of 300 meters or less. For airplanes unable to perform the shedding procedure after prolonged taxiing in freezing fog with visibility of 300 meters or less, this AD requires certain investigative and corrective actions. This AD results from reports of engine surges and internal engine damage due to ice accumulation during extended idle thrust operation in ground fog icing conditions. We are issuing this AD to prevent internal engine damage due to ice accumulation and shedding, which could cause a shutdown of both engines, and result in a forced landing of the airplane.

DATES: This AD becomes effective February 27, 2008.

ADDRESSES: For service information identified in this AD, contact Boeing Commercial Airplanes, P.O. Box 3707, Seattle, Washington 98124-2207.

Examining the AD Docket

You may examine the AD docket on the Internet at http://www.regulations.gov; or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The address for the Docket Office (telephone 800-647-5527) is the Document

Management Facility, U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Margaret Langsted, Aerospace Engineer, Propulsion Branch, ANM-140S, FAA, Seattle Aircraft Certification Office, 1601 Lind Avenue, SW., Renton, Washington 98057-3356; telephone (425) 917-6500; fax (425) 917-6590.

SUPPLEMENTARY INFORMATION:

Discussion

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to include an AD that would apply to certain Boeing Model 777-200 and -300 series airplanes. That NPRM was published in the Federal Register on August 18, 2006 (71 FR 47754). That NPRM proposed to require revising the airplane flight manual to provide the flightcrew with new ground procedures for shedding core ice during long taxi periods in freezing fog. For airplanes unable to perform the shedding procedure after prolonged taxiing in freezing fog, that NPRM proposed to require certain investigative and corrective actions.

Comments

We provided the public the opportunity to participate in the development of this AD. We have considered the comments received.

Requests To Reduce Visibility Requirements

Boeing, Rolls-Royce, the European Aviation Safety Agency (EASA), and Air Transport Association (ATA), on behalf of American Airlines, all request that we reduce the visibility requirements during a ground fog icing encounter. The commenters request that the current 1,000-meter or less visibility requirements be reduced to 300-meters or less visibility. Rolls-Royce has performed an analysis based on atmospheric data and service experience that demonstrates that freezing fog presents a threat to the engine only when the visibility drops below 300 meters; EASA has accepted this analysis. Boeing states that this change will minimize the need for the run-up to only those freezing fog conditions that are severe enough to pose a risk.

We agree with the commenters. Sufficient data have been presented to the FAA to justify a reduction from the 1,000-meter visibility requirement to a 300-meter visibility requirement. We have revised the statement in the Summary section, and paragraphs (f), (h) and (i) of the final rule to state "in freezing fog with visibility of 300 meters or less."

Requests To Remove Specific Airplane Maintenance Manual (AMM) Task References, and To Refer to Current Procedures

Boeing, Rolls-Royce, and ATA, on behalf of its members Delta Airlines and American Airlines, request that we refer to the Boeing 777 AMM for the de-icing procedures, rather than specific changes in the AMM. Rolls-Royce points out that the specified tasks are only examples of an acceptable inspection method; referring to a specific task/issue of the AMM in an AD will lead to many requests for alternative methods of compliance (AMOCs) from operators after AMM revisions. ATA states that the specific tasks do not exist in the AMM available to one of its members.

In addition, Boeing, Rolls-Royce, and American Airlines state that the AMM procedures for doing the engine core de-icing (referred to in paragraph (h) of the NPRM) are outdated. The commenters explain that Rolls-Royce and Boeing did testing to determine the best way to conduct the

procedure, and that the best solution is included in the latest AMM procedure. The commenters state that this is another example of why we should not refer to specific AMM tasks in the AD.

For the stated reasons, we agree with the commenters that we should refer to the Boeing 777 AMM, rather than specific tasks. Therefore, we have changed paragraphs (h) and (h)(2) of the AD to specify that Chapter 12-33-03 of the Boeing 777 AMM, rather than the specific tasks, provides acceptable methods of compliance. We also added a statement to paragraph (h)(2) of this AD indicating that the temperature of the air supplied cannot exceed 176 degrees Fahrenheit at any time during the manual de-ice process. Air that exceeds 176 degrees Fahrenheit can damage the engine.

Requests To Clarify Borescope Inspection Requirements

Boeing and Rolls-Royce request that we clarify and revise the requirements for the borescope inspection, and that we specify inspecting the intermediate pressure compressor (IPC) blades unless damage indicates that material has been released. The commenters state that inspection of other compressor stages would be necessary if the material has been released. Rolls-Royce explains that if no material has been released from the IPC stage 1 blades then there will be no secondary damage to the high pressure compressor (HPC), so inspection is not required. If material is missing from the IPC stage 1, the engine must have a full borescope inspection of both the IPC and the HPC. Damage to the IPC stage 1 blades without material release would be treated under the current AMM acceptance limits. Boeing and Rolls-Royce state that the borescope procedure to look for damage is conducted routinely by the airlines, and that it is not necessary to mandate the current borescoping method in the AMM.

We agree with the requests to clarify the borescope inspection procedures. The risk of engine failure is a direct result of HPC damage; if there is no material released from the IPC stage 1 blades, then there will be no resulting damage to the HPC. We have revised paragraph (i) of the AD to clarify the borescope procedures and to specify that Chapter 72-00-00 of the Boeing 777 AMM is one approved method for complying with the requirements of that paragraph. We acknowledge that the borescope procedure is conducted routinely by the airlines; however, an AD must specify a method of compliance for all required actions and, in cases where there is no relevant service bulletin as with this AD, we generally point to the AMM as an acceptable method of compliance.

Request To Place Core Ice Shedding Procedures in Operations Manual

Vincent Crow, a private citizen, would like to have the core ice shedding procedures (described in paragraph (f) of the NPRM) as a part of Operations Manual Volume 1 (OMV1) as a supplementary procedure in the adverse weather section. Paragraph (f) of the NPRM specifies publishing these procedures in the Airplane Flight Manual (AFM) as a certification limitation.

We disagree with the request to publish the procedures in OMV1. OMV1 is not approved or mandated by the FAA. The AFM limitations are approved and mandated by the FAA. In addition, all limitations in the AFM are required to be incorporated into the operations manual. We have not changed the AD in this regard.

Requests To Withdraw NPRM

Boeing, and ATA, on behalf of its member American Airlines, state that the NPRM is unnecessary because the freezing fog procedure (paragraph (f) of the NPRM) is already included in the FAA-approved AFM Limitations section.

We infer that the commenters would like us to withdraw the NPRM. We do not agree. Although the AFM has been revised to reflect the proposed requirements in the NPRM, the operators are not required to adopt the latest revision of the AFM. Therefore, the procedures in paragraph (f) of the NPRM would not be required unless we take AD action. We have not changed the AD in this regard.

Request To Address Risk of Sliding When Power Is Advanced

The National Transportation Safety Board (NTSB) is concerned that the environmental conditions that cause the engine core icing could also cause the taxiway surface to become icy and slippery, thereby increasing the risk of the airplane sliding off the taxiway or into another airplane when the crew advances the power to shed the core ice.

We infer that the NTSB would like us to add procedures to the AD to require actions that do not involve advancing engine power. We disagree that the procedures will result in the airplane sliding. The procedures mandated by the AD were developed with a reduced thrust setting to minimize the potential for sliding. Based on discussions with operators, we understand that the pilot will locate the airplane in a safe place to do the run-ups. We have addressed the possibility of the pilot not being able to perform the engine run-up by allowing operators to manually de-ice before takeoff, or to take off with the subsequent requirement of a borescope inspection. We have not changed the AD in this regard.

Request To Redesign the Engine

The NTSB suggests that, in the long term, the FAA require that engines be modified so that the airfoil surfaces where ice is building up are heated to prevent the buildup. The NTSB notes that early-generation gas turbine engines had inlet guide vanes that were pneumatically heated to prevent the formation of ice. The NTSB goes on to say that several safety recommendations have been issued concerning ice buildup on the stationary parts of the engine, causing engine core damage when shed.

We disagree with the suggestion to require modification to the engines to prevent ice buildup during extended exposure to ground fog icing. The Trent 800 series engine would require extensive testing and redesign to add additional anti-ice capability. History has shown that the frequency of ground icing encounters are rare and it would not be cost effective to redesign the engine given that there are operational procedures that adequately address the unsafe condition. The NTSB refers to safety recommendations that were issued as a result of dual engine high-altitude flameouts from ice buildup on the engine core. While extended exposure to ground fog icing does cause ice buildup in the engine core, the requirement of periodic engine speed run-ups is consistent with other ground-based icing operational procedures. We have not changed the AD in this regard.

Request To Include Costs of Run-Up, Manual De-Ice, and Borescope

Boeing requests that we include the cost of disruption to the airline when a run-up, manual de-ice, or borescope inspection is needed. Boeing points out that the AD mandates the procedure, and if the operator conducts the procedure it will require delay, and possibly maintenance action.

We disagree with the request to include these costs in the Costs of Compliance section. We recognize that this AD may impose certain additional operational costs. However, we cannot calculate those costs because we do not know how often the conditions occur and what additional time is necessary. Continued operational safety necessitates the imposition of these costs because of the severity of the unsafe condition. In addition, the cost analysis in AD actions typically does not include incidental costs such as the time required to gain access and close up, time necessary for planning, or time necessitated by other administrative actions. Those incidental costs, which might vary significantly among operators, are almost impossible to calculate. We have not changed the AD in this regard.

Requests To Provide Terminating Action

Boeing and Rolls-Royce request that we provide a clear terminating action for the actions proposed in the NPRM. Boeing states that the AD should be considered complied with and closed

once the procedure to perform the engine run-up is inserted in the AFM. Boeing points out that the engine procedures for inspecting for ice and manually de-icing should be part of the airlines' approved de-ice/anti-ice procedures, and like the wing de-ice procedures, the methods to accomplish them are not mandated by AD. Boeing and Rolls-Royce both suggest adding information to paragraph (g) of the NPRM that would specify that, once the procedures are incorporated into the operator's approved ground de-icing/anti-icing program, the AD should be considered complied with.

We disagree with the need to add terminating action to paragraph (g) of the AD. The Limitations section in the AFM includes maintenance actions that are not performed by the flightcrew and cannot be required without an AD. As discussed above, Boeing and Rolls-Royce do not plan to make an engine or airplane configuration change that would eliminate the need for the AFM and maintenance procedures mandated by this AD, and thus provide terminating action. We have not changed the AD in this regard.

Requests To Specify Lack of Events With Trent 800

Boeing and Rolls-Royce ask that we clarify the summary and paragraph (d) of the NPRM to specify that Trent 800 series engines (the subject of the proposed AD) have not experienced engine surges and internal engine damage due to ice accumulation during extended idle thrust operation in ground fog icing conditions.

We acknowledge that Trent 800 series engines have not experienced the stated events, as described in the "Discussion" and "Similar Engine Models" sections of the NPRM. As stated in the preamble of the NPRM, both the Trent 700 series engines and the Trent 800 series engines have a similar compressor design, and therefore may be subject to the same unsafe condition. We find that this information need not be added to the AD Summary section, or to any regulatory paragraphs of the AD.

Request To Clarify Paragraphs (f) and (h) of the NPRM

EASA requests that we clarify the wording of the AFM revision by revising the phrase "there is no run-up procedure" in paragraph (f) (sub-paragraph (c) of the AFM revision) of the NPRM to state, instead, "do not carry out a run-up." In that same paragraph, EASA also requests that we add after "then manually de-ice the engines" the phrase "or confirm ice is not present in the engine core before further flight." EASA also requests that we add "or 60 minutes since the last run-up" after the phrase "if take-off is not accomplished in freezing fog within 60 minutes total taxi time" in paragraph (h) of the NPRM.

We agree that clarification is necessary. However, we do not agree that it is necessary to revise the phrase as specified. After 60 minutes, there is no run-up procedure that will shed the ice. As a clarification, we have revised the AFM wording specified in paragraph (f) of the AD to read "Takeoff is not permitted if total taxi time in freezing fog with visibility of 300 meters or less exceeds 60 minutes without accomplishing the above core ice shed procedure. The engine core must be manually de-iced" instead of "If takeoff is not accomplished within 60 minutes total taxi time, then manually de-ice the engines."

Explanation of Revised Unsafe Condition

We have revised the unsafe condition to state that internal engine damage could result in a forced landing rather than in loss of control of the airplane. Upon further review of the regulations, we determined that a power loss in this case does not leave the airplane uncontrollable, but rather leads to a forced landing.

Explanation of Revised AMOC Paragraph

We have removed paragraph (j)(3) of the NPRM. That paragraph refers to alternative repair methods, and this AD does not include a repair.

Conclusion

We have carefully reviewed the available data, including the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously. We have determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Costs of Compliance

There are about 208 airplanes of the affected design in the worldwide fleet. This AD affects about 53 airplanes of U.S. registry. The actions take about 1 work hour per airplane, at an average labor rate of $80 per work hour. Based on these figures, the estimated cost of the AD for U.S. operators is $4,240, or $80 per airplane.

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, Section 106, describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the Agency's authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

We have determined that this AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

(1) Is not a "significant regulatory action" under Executive Order 12866;

(2) Is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979); and

(3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

We prepared a regulatory evaluation of the estimated costs to comply with this AD and placed it in the AD docket. See the ADDRESSES section for a location to examine the regulatory evaluation.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Safety.

Adoption of the Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39–AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

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

§ 39.13 [Amended]

2. The Federal Aviation Administration (FAA) amends § 39.13 by adding the following new airworthiness directive (AD):

2008-02-05 Boeing: Amendment 39-15335. Docket No. FAA-2006-25609; Directorate Identifier 2005-NM-263-AD.

Effective Date

(a) This AD becomes effective February 27, 2008.

Affected ADs

(b) None.

Applicability

(c) This AD applies to Boeing Model 777-200 and -300 series airplanes, certificated in any category, equipped with Rolls-Royce RB211 TRENT 800 engines.

Unsafe Condition

(d) This AD results from reports of engine surges and internal engine damage due to ice accumulation during extended idle thrust operation in ground fog icing conditions. We are issuing this AD to prevent internal engine damage due to ice accumulation and shedding, which could cause a shutdown of both engines, and result in a forced landing of the airplane.

Compliance

(e) You are responsible for having the actions required by this AD performed within the compliance times specified, unless the actions have already been done.

Airplane Flight Manual (AFM) Revision

(f) Within 14 days after the effective date of this AD, revise the Limitations Section of the Boeing 777 Airplane Flight Manual (AFM) to include the following statements. This may be done by inserting a copy of this AD in the AFM.

> "GROUND OPERATIONS IN FREEZING FOG WITH VISIBILITY OF 300 METERS OR LESS
>
> When freezing fog with visibility of 300 meters or less is reported and
> (a) The OAT is 0 degrees C to -6 degrees C then run up the engines to 50% N1 for 1 minute every 45 minutes taxi time, or
> (b) The OAT is -7 degrees C to -13 degrees C then run up the engines to 59% N1 for 1 minute for every 45 minutes taxi time, or
> (c) The OAT is colder than -13 degrees C and taxi time exceeds 45 minutes, there is no run-up procedure; the engines must be manually de-iced.

Regardless of temperature, if the core ice shedding procedure described above is not accomplished within 45 minutes total taxi time in freezing fog with visibility of 300 meters or less, but takeoff can be achieved within 60 minutes total taxi time in freezing fog with visibility of 300 meters or less, takeoff is permitted. A borescope inspection is required within 10 flights. Takeoff is not permitted if total taxi time in freezing fog with visibility of 300 meters or less exceeds 60 minutes without accomplishing the above core ice shed procedure. The engine core must be manually de-iced."

(g) When a statement identical to that in paragraph (f) of this AD has been included in the general revisions of the AFM, the general revisions may be inserted into the AFM, and the copy of this AD may be removed from the AFM.

Inspection for Ice

(h) If takeoff is not accomplished in freezing fog, with visibility of 300 meters or less, within 60 minutes total taxi time, before further flight, perform an inspection for ice of the variable inlet guide vanes (VIGVs), inspect the low pressure compressor (fan) for ice, and ensure that all fan, spinner, air intake splitter fairing, and VIGV surfaces are free of ice after engine operation in freezing fog with visibility of 300 meters or less, in accordance with a method approved by the Manager, Seattle Aircraft Certification Office (ACO). One acceptable method of compliance is Chapter 12-33-03 of the Boeing 777 Airplane Maintenance Manual (AMM).

(1) If no ice is detected, the time already completed in freezing conditions can be reset to zero for subsequent operation.

(2) If any ice is detected, before further flight, manually de-ice the engine core inlet. Upon completion of the manual de-ice process, the fan, spinner, air intake splitter fairing, and VIGV surfaces must be free of ice and all residual water removed. Two acceptable methods to manually de-ice the engine can be found in Chapter 12-33-03 of the Boeing 777 AMM. At no time during the manual de-ice process should the temperature of the air supplied exceed 176 degrees Fahrenheit.

Borescope Inspection for Damage

(i) For airplanes on which the core ice shedding procedure is not accomplished within 45 minutes total taxi time, but that achieve takeoff within 60 minutes total taxi time in freezing fog with visibility of 300 meters or less, regardless of temperature during ground operations in freezing fog with visibility of 300 meters or less: Within 10 flight cycles after takeoff, perform a borescope inspection to detect missing material of the intermediate pressure compressor (IPC) stage 1 blades. If any material is found to be missing, do a full borescope inspection of the IPC and high pressure compressor (HPC) before further flight. Do the actions in accordance with a method approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA. One acceptable method of compliance is to perform all applicable borescope inspections in accordance with Chapter 72-00-00 of the Boeing 777 AMM. If any damage is detected, further action in accordance with the current AMM limits must be taken before further flight.

Alternative Methods of Compliance (AMOCs)

(j)(1) The Manager, Seattle ACO, FAA, has the authority to approve AMOCs for this AD, if requested in accordance with the procedures found in 14 CFR 39.19.

(2) To request a different method of compliance or a different compliance time for this AD, follow the procedures in 14 CFR 39.19. Before using any approved AMOC on any airplane to which the AMOC applies, notify your appropriate principal inspector (PI) in the FAA Flight Standards District Office (FSDO), or lacking a PI, your local FSDO.

Material Incorporated by Reference

(k) None.

Issued in Renton, Washington, on January 10, 2008.
Ali Bahrami,
Manager, Transport Airplane Directorate, Aircraft Certification Service.
[FR Doc. E8-843 Filed 1-22-08; 8:45 am]