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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2012-1093; Directorate Identifier 2011-SW-020-AD; Amendment 39-17989; AD 2014-20-16]**

**RIN 2120-AA64**

#### **Airworthiness Directives; Brantly International, Inc. Helicopters**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

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**SUMMARY:** We are adopting a new airworthiness directive (AD) for Brantly International, Inc. (Brantly) Model B-2, Model B-2A, and Model B-2B helicopters with certain main rotor blades. This AD requires inspecting each main rotor (M/R) blade for a crack or delamination and removing the blade if a crack exists or if the delamination exceeds certain thresholds. This AD was prompted by multiple reports of M/R blade cracks and an incident in which a crack that originated near the M/R blade trailing edge resulted in the loss of a large section of the M/R blade. The actions of this AD are intended to prevent loss of the M/R blade and subsequent loss of control of the helicopter.

**DATES:** This AD is effective November 12, 2014.

The Director of the Federal Register approved the incorporation by reference of certain documents listed in this AD as of November 12, 2014.

**ADDRESSES:** For service information identified in this AD, contact Brantly International, Inc, 621 South Royal Lane, Suite 100, Coppell, Texas 75019, telephone (972) 829-4638, email [tarcher@superiorairparts.com](mailto:tarcher@superiorairparts.com). You may review a copy of the referenced service information at the FAA, Office of the Regional Counsel, Southwest Region, 2601 Meacham Blvd., Room 663, Fort Worth, Texas 76137.

#### **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov> or in person at the Docket Operations Office between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, any incorporated-by-reference service information, the economic evaluation, any comments received, and other information. The street address for the Docket Operations Office (phone: 800-647-5527) is U.S. Department of Transportation, Docket

Operations Office, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Marc Belhumeur, Senior Project Engineer, Rotorcraft Certification Office, Rotorcraft Directorate, FAA, 2601 Meacham Blvd., Fort Worth, Texas 76137; telephone (817) 222-5170; email 7-AVS-ASW-170@faa.gov.

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

On October 16, 2012, at 77 FR 63285, the Federal Register published our notice of proposed rulemaking (NPRM), which proposed to amend 14 CFR part 39 by adding an AD that would apply to Brantly Model B-2, Model B-2A, and Model B-2B helicopters, with an M/R blade, part number (P/N) 248-101, 248-202, or 248-404, installed. The proposed requirements were intended to prevent loss of the M/R blade and subsequent loss of control of the helicopter.

The NPRM was prompted by a 2007 incident in New Zealand in which a large inboard section of the M/R blade of a Brantly B-2B helicopter separated from the helicopter during flight. The pilot was able to land the helicopter without further damage. Laboratory analysis concluded that the M/R blade failure was caused by hydrocarbon contaminants inside the blade's skin-to-foam bond and that the fracture originated near the blade's trailing edge. There were three other reports of portions of M/R blades separating during flight and another five reports of M/R blades having cracks or other defects found during inspections.

### **Comments**

After our NPRM (77 FR 63285, October 16, 2012), was published, we received comments from 10 commenters.

### **Request**

#### **Allow Some Cracking, Delamination, and Imperfections**

Two commenters requested that the AD allow cracks in accordance with approved maintenance inspection procedures and criteria. Three commenters requested that the AD allow some delamination as provided for in Brantly's service information, which is up to 10 square inches of delamination outside of the inboard 12 inches of the M/R blade. Four commenters requested that some imperfections be allowed in the blades as listed in the approved factory maintenance inspection procedures. Some of these commenters stated that a small dent, nick, crease, wrinkle, or bend in the skin of the blade, especially in the middle or trailing edge, does not cause the blade to crack and is not necessarily a safety issue. These commenters expressed concern that many Brantly helicopters will be grounded because of slight imperfections in the main rotor blades that are not a safety issue.

We disagree with allowing any crack in a blade, but we agree the AD should allow some delamination and imperfections. A crack in a blade renders it unairworthy, and no data supports that any crack in these blades is a safe condition. Also, no supporting data justifies allowing 10 square inches of delamination to address the unsafe condition, and such a large area is not supported by any known industry standards. We are changing the AD, however, to allow up to 2 square inches of delamination outside of the inboard 12 inches. We are also removing the dent, nick, crease, wrinkle, bends, extra hole, and inadequate rivet spacing requirements from the AD. Although eliminating these conditions is good design practice, the data we have does not support that a crack in the Brantly rotor blade skins was caused by small dents, nicks, creases, wrinkles, bends, extra hole, or inadequate rivet spacing.

## **Remove Certain Blades From the Applicability**

Two commenters requested that we remove blade P/Ns 248-101 and 248-202 from the applicability of the AD. These commenters did not believe the unsafe condition applies to these blades because they are significantly different in composition and bonding agent than the P/N 248-404 blade. The commenters stated the -101 and -202 blades develop cracks from improper maintenance, rigging, and operation.

We disagree. Failures and fractures have occurred in the field in the P/N 248-202 blades, and we have been provided with no supporting data that shows they occurred because of improper rigging, maintenance, or operation of the aircraft. Brantly, with help from a laboratory report written by a metallurgical engineering company, concluded that the M/R blade failure was caused by hydrocarbons contamination inside the blades' skin-to-foam bond and that the fractures originated near the trailing edge. The P/N 248-101 and P/N 248-404 blades are similar in construction to the P/N 248-202 blades, and thus are included and addressed in this AD. The AD does, however, address the blades separately by not requiring inspecting the P/N 248-404 blades until after 10 years or 1,000 hours time-in-service (TIS), instead of within 8 hours TIS like the other blades.

## **Eliminate or Change the Eddy Current Inspection Requirements**

Eight commenters requested that we eliminate the eddy current inspection from the AD. Five commenters requested replacing the eddy current inspection with other types (visual, tap test, fluorescent or dye penetrant) of inspection. Some commenters said eddy current testing was impractical because it could not be done successfully at certain locations. Many commenters believed an eddy current inspection would not successfully detect a crack or would provide false readings. One commenter stated that the eddy current inspection would destroy the blade.

We disagree. An eddy current inspection is needed to detect a potential unsafe condition, and it is a reasonable, widely used, and cost-effective procedure. No alternate procedure has been provided that can address the unsafe condition as reliably. Visual or magnifying glass inspections are not as effective as eddy current inspections. The eddy current inspection procedure has been validated and is similar to other blade crack inspections. While there may be some false indication, these should be false positives, which can be re-evaluated. The procedure is a nondestructive inspection and if done correctly, will not destroy any blade. The procedure can be done in the field by a qualified inspector if the inspection area is clean, has proper lighting, and has the proper equipment. We have not been provided with any supporting data that justifies eliminating the eddy current inspection from the AD.

We do agree with one commenter who requested a visual inspection before the first flight of each day being performed by the helicopter owner or operator, since this is best accomplished as part of the other daily inspections and does not require tools. We also agree with reducing the scope of the eddy current inspection area to just the first inboard 12 inches because this is where the fractures have occurred. Eddy current inspecting the outboard area would not be effective in finding the unsafe condition. The AD reflects these changes.

## **Replace the Inspection Requirements**

Two commenters suggested replacing the AD requirements with different requirements. One commenter requested a mandatory inspection to identify those main rotor blades not produced or repaired using an FAA approved quality system or materials or processes. The commenter believed such blades alone may contain the unsafe condition due to unapproved blade spars and hinge blocks. Another commenter proposed a check of all used blades because the unsafe condition is caused by incorrect installation of the blade damper units.

We disagree. The lab report concluded that the M/R blade failure was caused by hydrocarbons contamination inside the blades' skin-to-foam bond and that the fracture originated near the trailing edge. No data supports a conclusion that the spar or hinge block were unapproved or that the rivet

hole edge distance or pattern caused the unsafe condition. Also, no data shows that the damper caused the unsafe condition and thus an initial check for improper damper installation is not merited. There is history that the incident helicopter may have had quick starts and that the dampers had to be replaced, but the quick starts and damper issues have not been substantiated to be the root cause.

### **Allow Routine Maintenance To Correct The Unsafe Condition**

Five commenters stated that routine maintenance inspections are sufficient to detect a crack in the blades. One commenter requested that a revision to the Brantly Service Bulletin would correct the blade problem and provided suggested content.

We disagree. The failures that have occurred in the field show that the blades have an unsafe condition and that the current routine maintenance and inspection procedures do not have adequate methods to address it. The procedures in the commenter's suggested revision of the service bulletin are also inadequate to address the unsafe condition because those procedures do not include a necessary eddy current inspection and allow too much duration between magnifying glass inspections. Additionally, the FAA does not have the authority to require Brantly to revise its service information with a specific maintenance procedure. Rather, we correct an unsafe condition by mandating certain actions through an AD.

### **Withdraw the NPRM Because There Is No Unsafe Condition**

One commenter requested we withdraw the AD for more analysis and testing of the blades. The commenter questioned the data and analyses relied upon to conclude an unsafe condition exists on these blades and suggested the FAA has insufficient information upon which to make its determination. The commenter stated the FAA should determine the precise root cause and the exact serial number series of affected blades before issuing an AD. Another commenter requested that we perform "a verification and validation on actual Brantly helicopter blades" before issuing the AD. Four commenters stated that no blade failures have caused an accident or loss of life and that the blade problem that prompted this AD resulted from the aircraft owner's improper maintenance.

We disagree. Improper maintenance and operation has not been shown to be the root cause of the blade failures. The root cause of the failures has been demonstrated by Brantly with help from a laboratory report written by a metallurgical engineering company. The report took into account stresses and loading and determined that skin fracture was propagated by corrosion fatigue and mechanical fatigue. The report concluded that the M/R blades failure was caused by hydrocarbons contamination inside the blades' skin-to-foam bond and that the fracture originated near the trailing edge.

Additional information about the data and analyses we relied upon in issuing this AD includes the following. The original blades were certificated using a crack initiation methodology (e.g., using the S-N curves and Miner's Rule). Shortly after certification, a fatigue test was accomplished on the mid-span of the spar and skin. Stereomicroscopy, wavelength dispersive X-ray spectroscopy, combustion testing, tensile testing, peel testing, scanning electron microscopy, micro Fourier infrared spectroscopy, and hardness testing were all performed to determine the causes of the delamination and crack propagation. An M/R blade failure analysis, risk analysis, cost analysis, and economic analysis were performed before we issued the NPRM. The failures were found in the skin-to-foam bond and in the skin and rivets at the rivet joints attaching the skin to the hinge block and/or spar. The cracks originated near the skins' trailing edge and propagated between rivet holes and into the leading edge rivet holes. These rivets carry shear between the hinge block and skin and the spar and skin. Per the laboratory report, the bonding material between the skin to foam was 3M 1239 & 3M 11239A, the foam core was Stafoam AA604, the type of rivets were AA1100, and the blade was P/N 248-202. No serial number sequence has been determined or is needed since only the part numbers are necessary to identify the applicable blades.

We also disagree that loss of life or significant damage to an aircraft must occur for us to determine that there is an unsafe condition. Because it is a critical component, failure of an M/R blade could have catastrophic consequences. However, the commenters are correct that the event in New Zealand was classified as an incident instead of an accident because the helicopter landed without further damage. We have revised the preamble of this AD to reflect this change.

### **Blade Repairs**

One commenter requested the FAA license a certified repair center to rebuild the blades if they crack before the spar and hinge-block have reached their life limit. Another commenter asked us to approve a blade re-skinning or repair process instead of the blade replacement requirement in the AD. Three commenters stated that no replacement blades exist, and therefore if the AD is adopted as proposed, it will ground all flying Brantly helicopters until a source for new blades is found or a facility is certified to re-build the blades.

We disagree. We are unaware of any approved process specification or data to rebuild or re-skin blades to an airworthy condition. Assuming such a process does exist, requiring a repair center to rebuild or re-skin the blades is beyond the authority of the FAA. To the extent spare blades may not exist to replace blades that fail the inspection requirements of this AD, the FAA cannot base its AD action on whether spare parts are available or can be produced. While every effort is made to avoid grounding aircraft, we must address the unsafe condition.

### **Issue an SAIB**

One commenter requested that we issue a special airworthiness information bulletin (SAIB) with certain visual inspection and maintenance procedures and provided proposed contents.

We disagree. An SAIB contains non-mandatory information and guidance for certain safety issues. The SAIB is an information tool to alert, educate, and make recommendations to the aviation community about ways to improve the safety of a product. An SAIB may not be issued where there is an unsafe condition. The FAA has data supporting its determination that an unsafe condition exists with the specified Brantly main rotor blades.

We also disagree with the proposed SAIB contents. No supporting data has been provided demonstrating how the proposed inspection and maintenance practices would stop the blade skins from cracking or delaminating from the foam core because of random overload events and improper operation. Also, no supporting data has been provided that shows that an improperly manufactured or installed hinge block caused the unsafe condition. The proposed SAIB content also eliminates the necessary eddy current inspection and reduces the 10x magnifying glass inspection, which we have determined are necessary to correct the unsafe condition.

### **Training Programs**

One commenter requested education and training for maintenance providers, operators, and owners with respect to the blades. Specifically, the commenter wanted the training to include the significance of the placards, type certificate data sheet (TCDS) instructions, and operating limitations. The commenter stated that Brantly helicopters are safe and attributed the blade failures to lack of education and proper maintenance and operation of the aircraft and its components.

We disagree. Individuals responsible for maintaining and operating an airworthy helicopter are required to know the significance of placards, TCDS instructions, and operating limitations. While additional training may be beneficial, we have no information to suggest that it would correct the unsafe condition.

## **FAA's Determination**

We have reviewed the relevant information, considered the comments received, and determined that an unsafe condition exists and is likely to exist or develop on other products of these same type designs and that air safety and the public interest require adopting the AD requirements as proposed with the changes described previously. We have also made minor editorial changes in referencing the service information to meet current publishing requirements. These changes are consistent with the intent of the proposals in the NPRM (77 FR 63285, October 16, 2012) and will not increase the economic burden on any operator nor increase the scope of the AD.

## **Related Service Information**

We reviewed Brantly International Inc. Service Bulletin No. 111, dated February 10, 2011 (SB 111). The bulletin describes procedures for inspecting the M/R blades at intervals not to exceed 300 hours TIS using Eddy Current Procedure ET002, performing a visual inspection using a 10X power magnifying glass, and conducting a tap test every 25 hours TIS and a visual inspection of the M/R blades before the first flight of the day.

## **Differences Between This AD and the Service Information**

SB-111 requires accomplishment of sections 1 and 2 before further flight. The AD requires them to be completed within 8 hours TIS. SB-111 allows up to 10 square inches of delamination outside of the inboard 12 inches of the M/R blade. The AD only allows up to 2 square inches of delamination outside of the inboard 12 inches of the M/R blade. SB-111 requires inspecting for nicks, creases, wrinkles, bends, additional holes, extra rivets, and inadequate rivet spacing and replacing the blade if any of these conditions are found. The AD only requires inspecting for a crack and delamination and replacing the blade if there is a crack or if there is delamination in certain areas or exceeding a certain amount. SB-111 calls for eddy current inspections of the entire blade. The AD requires eddy current inspections for cracks only within the inboard 12 inches. Lastly, SB-111 specifies a daily inspection of the M/R blade. We are making a change from the NPRM to allow an owner/operator (pilot) holding at least a private pilot certificate to perform a daily check of the M/R blade. The performance of the check is required to be entered into the aircraft's maintenance records showing compliance with this AD in accordance with applicable regulations. This authorization marks an exception to our standard maintenance regulations.

## **Costs of Compliance**

We estimate that this AD affects 76 helicopters of U.S. registry. We estimate the following costs to comply with this AD, using an average of \$85 per work-hour:

- For the visual check before the first flight of each day, we estimate that it requires about one half work-hour for a labor cost of about \$43 per inspection cycle. No parts are needed, so the total cost for the U.S. fleet is \$3,268.
- For the eddy current inspection, we estimate that it requires about three work-hours for a labor cost of \$255 per inspection cycle. No parts are needed, so the total cost for the 76-helicopter U.S. fleet is \$19,380 per inspection cycle.
- For the visual inspection with the magnifying glass and the tap inspection, we estimate that it requires about three work-hours for a labor cost of \$255 per inspection cycle. No parts are needed, so the total cost for the U.S. fleet is \$19,380 per inspection cycle.
- Replacing an M/R blade, if needed, requires about two work-hours for a labor cost of \$170. An M/R blade costs \$7,500 for a total cost of \$7,670 per helicopter, assuming one M/R blade is replaced.

## **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**

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);
- (3) Will not affect intrastate aviation in Alaska to the extent that it justifies making a regulatory distinction; and
- (4) 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 an economic evaluation of the estimated costs to comply with this AD and placed it in the AD docket.

## **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, 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 FAA amends § 39.13 by adding the following new airworthiness directive (AD):



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**2014-20-16 Brantly International, Inc.:** Amendment 39-17989; Docket No. FAA-2012-1093; Directorate Identifier 2011-SW-020-AD.

**(a) Applicability**

This AD applies to the Brantly International, Inc., (Brantly) Model B-2, Model B-2A, and Model B-2B helicopters, with a main rotor (M/R) blade, part number (P/N) 248-101, 248-202, or 248-404, installed, certificated in any category.

**(b) Unsafe Condition**

This AD defines the unsafe condition as a crack or delamination in an M/R blade. This condition could result in loss of an M/R blade and subsequent loss of control of the helicopter.

**(c) Effective Date**

This AD becomes effective November 12, 2014.

**(d) Compliance**

You are responsible for performing each action required by this AD within the specified compliance time unless it has already been accomplished prior to that time.

**(e) Required Actions**

(1) Before the first flight of each day, visually check the top and bottom of each M/R blade for a crack. Pay particular attention to the M/R blade root area, the area around the lead/lag damper mounting fork, and the trailing edge. These actions may be performed by the owner/operator (pilot) holding at least a private pilot certificate, and must be entered into the aircraft records showing compliance with this AD in accordance with 14 CFR 43.9 (a)(1) through (4) and 14 CFR 91.417(a)(2)(v). The record must be maintained as required by 14 CFR 91.417, 121.380, or 135.439.

(2) Within 8 hours time-in-service (TIS), for a helicopter with an M/R blade, P/N 248-101 or P/N 248-202, and for a helicopter with an M/R blade P/N 248-404 with 10 or more years or 1,000 or more hours TIS, whichever occurs first, remove each M/R blade and:

(i) Using an inspector qualified to the American Society for Nondestructive Testing (ASNT) Level II or equivalent, eddy current inspect each M/R blade for a crack in accordance with paragraph 4 and paragraphs 7 through 17 of Brantly International B-2 Main Rotor Blade Root Skin Inspection Technique Number ET002, dated November 2007 (technique), except this AD only requires you to inspect the inboard first 12 inches of the top and bottom of each blade.

Note 1 to paragraph (e)(2)(i) of this AD: A copy of the Technique is attached to Brantly International, Inc., Service Bulletin No. 111, dated February 10, 2011 (SB 111).



(ii) Thereafter, at intervals not to exceed 300 hours TIS or five calendar years, whichever occurs first, repeat the eddy current inspection in accordance with the requirements of paragraph (e)(2)(i) of this AD.

(iii) Using a metallic coin or tap hammer, tap inspect each M/R blade for delamination in the bonded areas as shown on SB-111, Section 4. Pay particular attention to the root area in the first 12 inches of the top and bottom of each M/R blade.

(iv) Using a 10X or higher power magnifying glass, visually inspect the top and bottom of each M/R blade for a crack.

(v) Thereafter, at intervals not to exceed 25 hours TIS, repeat the tap inspection in accordance with the requirements of paragraph (e)(2)(iii) of this AD and the visual inspection using a 10X or higher power magnifying glass in accordance with the requirements of paragraph (e)(2)(iv) of this AD.

(3) Before further flight, remove from service any M/R blade with a crack, delamination within the inboard 12 inches, or total delamination greater than 2 square inches outside the inboard 12 inches.

#### **(f) Alternative Methods of Compliance (AMOCs)**

(1) The Manager, Rotorcraft Certification Office, FAA, may approve AMOCs for this AD. Send your proposal to: Marc Belhumeur, Senior Project Engineer, Rotorcraft Certification Office, Rotorcraft Directorate, FAA, 2601 Meacham Blvd., Fort Worth, Texas 76137; telephone (817) 222-5170; email 7-AVS-ASW-170@faa.gov.

(2) For operations conducted under a 14 CFR part 119 operating certificate or under 14 CFR part 91, subpart K, we suggest that you notify your principal inspector, or lacking a principal inspector, the manager of the local flight standards district office or certificate holding district office before operating any aircraft complying with this AD through an AMOC.

#### **(g) Subject**

Joint Aircraft Service Component (JASC) Code: 6210, Main Rotor Blade.

#### **(h) Material Incorporated by Reference**

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Brantly International B-2 Main Rotor Blade Root Skin Inspection, Technique Number ET002, dated November 1, 2007.

(ii) Brantly International Inc., Service Bulletin No. 111, dated February 10, 2011.

(3) For Brantly service information identified in this AD, contact Brantly International, Inc., 621 South Royal Lane, Suite 100, Coppell Texas, 75019, telephone (972) 829-4638, email tacher@superiorairparts.com.

(4) You may view this service information at FAA, Office of the Regional Counsel, Southwest Region, 2601 Meacham Blvd., Room 663, Fort Worth, Texas 76137. For information on the availability of this material at the FAA, call (817) 222-5110.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued in Fort Worth, Texas, on September 19, 2014.  
Lance T. Gant,  
Acting Directorate Manager, Rotorcraft Directorate,  
Aircraft Certification Service.