FAA
Aviation Safety

SPECIAL AIRWORTHINESS INFORMATION BULLETIN

SUBJ: ENGINE COWLING SYSTEM,
Quarter-Turn Fastener Maintenance Information

SAIB: AIR-22-10
Date: April 29, 2022

This is information only. Recommendations aren't mandatory.

Introduction

This Special Airworthiness Information Bulletin (SAIB) informs pilots, owners, operators, and maintenance personnel of turbofan-powered airplanes produced by Textron Aviation Inc. (Textron) (previously Cessna Aircraft Company, Beechcraft Corporation, Hawker Beechcraft Corporation, Raytheon Aircraft Company, British Aerospace, Hawker Siddeley) of the hazards associated with the engine cowl system. The engine cowl system consists of engine nacelle cowl doors, and inlet, exhaust, and thrust reverser components. Some components use quarter-turn fasteners (often referred to by brand names such as Camloc® and Dzus®) to secure one component to another.

At this time, the airworthiness concern is not considered an unsafe condition that would warrant airworthiness directive action under Title 14 of the Code of Federal Regulations (14 CFR) part 39.

Background

Several incidents of engine cowl damage and resulting separations have occurred across the Textron turbofan-powered airplane product line. The separation incidents resulted in damage to the airplanes, and some incidents have marginally affected airplane handling capabilities. The FAA has not yet determined the root cause of these events but considers maintenance error to be the primary contributing factor.

The Textron turbofan-powered fleet uses quarter-turn fasteners to assemble the engine cowl system. The extent of the use of these fasteners varies depending on the airplane model. Failure to verify engagement of all quarter-turn fasteners can lead to cowl door damage and/or separation due to the aerodynamic loads. Cowl doors that separate from the airplane may strike empennage components, causing structural damage and potential loss of airplane control.

This SAIB is intended to advise of the safety hazards and potential dangers of inadequate and infrequent pre-flight inspections of the quarter-turn fasteners used to attach engine cowling system components, and of the need for routine preventive maintenance.

Figure 1: Examples of damage attributed to quarter-turn fastener problems

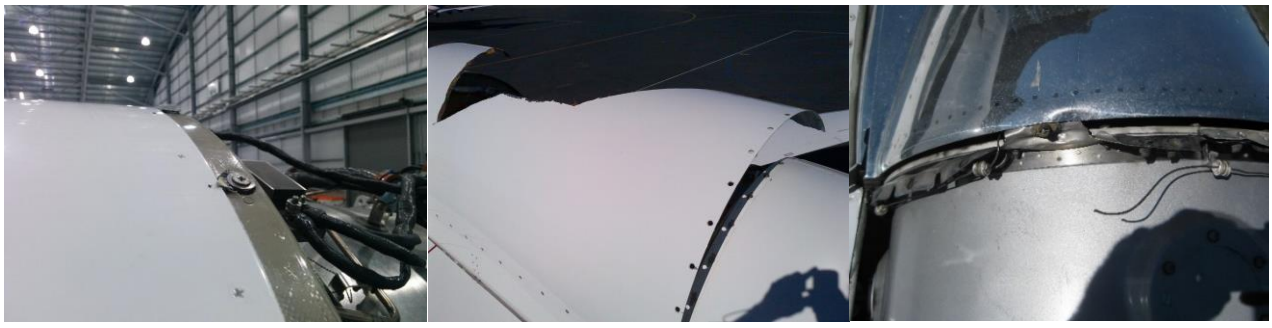
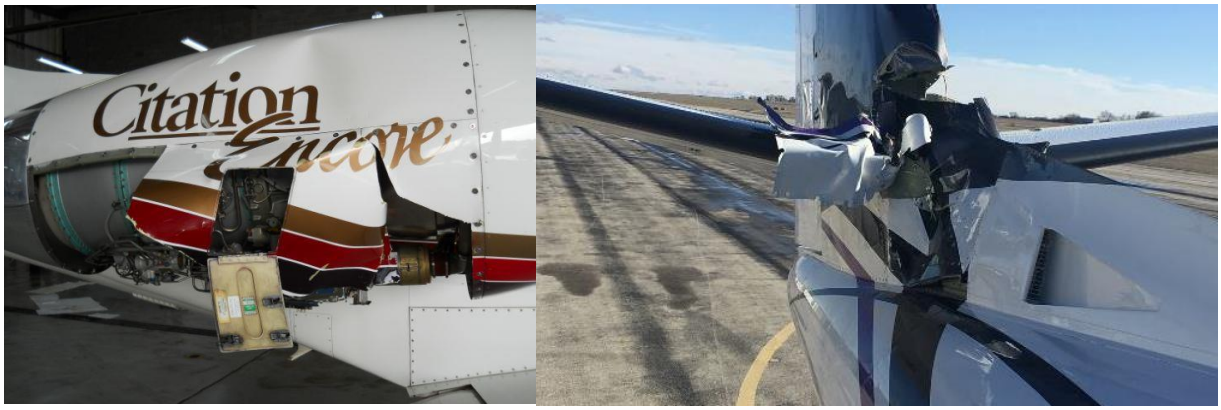


Figure 2: Additional examples of damage attributed to quarter-turn fastener problems



Recommendations

1. Inspections and Checks

All inspections, checks, and processes should be accomplished in accordance with the manufacturer's recommendations.

The FAA recommends thorough pre-flight by all pilots, and repetitive inspections of the quarter-turn fasteners on engine cowl components. All airplane owners and operators should acquaint themselves with the configuration of the airplane, including the components that use quarter-turn fasteners. Knowledge of the location and correct installation configuration of quarter-turn fasteners will assist in any pre-flight or repetitive inspection to identify fasteners that are not normal or that may have changed since the last inspection.

In addition, engine maintenance activities require frequent cowl removals. Our investigation indicates that a single inspection may not always reveal an incorrect cowl re-installation. The FAA recommends a second visual inspection of the complete engine cowl installation immediately after a cowl has been removed and prior to returning the airplane to service to ensure that all quarter turn fasteners have been secured properly. Simple tools such as a ladder, flashlight, or mirror may assist in the inspection process. A complete inspection should consist of checking that all quarter-turn fasteners are correctly seated and latched.

<u>Typical areas to check and potential problems are:</u>

- Improperly seated or improperly latched quarter-turn fasteners (most installations have some quarter-turn fasteners in which the installation cannot be viewed directly).
- Cowl doors with excessive forward edge gaps (distance to underlying surfaces that exceed aero-smoothness requirements. Excessive mismatch may result from quarter-turn fasteners with over- or undersized stud lengths or cowl door repairs that increase the door thickness).
- Cowl door cracks that weaken the area around quarter-turn fasteners.
- Cowl door contour anomalies.

2. Repairs and Overhaul

Textron recommends replacing any cowling system component that fails maintenance manual inspection procedures or that is found defective (Ref. 14 CFR part 43 Appendix D, (d) (11)). The FAA recommends verifying that each quarter-turn fastener has been correctly repaired and replacing

any fastener that has not been correctly repaired. Additional information can be obtained from Textron.

Each Textron airplane has aero-smoothness requirements that the cowl door quarter-turn fasteners maintain. Improper quarter-turn fastener installation, part replacements, etc., result in opportunities for the cowl door aerodynamic load to lead to fastener failures and door separation events.

Investigation by the National Transportation Safety Board, Textron, and the FAA determined that these quarter-turn fasteners are frequently repaired or replaced during the service life of the airplane. The investigation also found that replacement quarter-turn fasteners often do not conform to type design or an approved repair. These nonconformities commonly include substitution of alternate parts or combinations of different manufacture types, installation of quarter-turn studs of inappropriate grip-length, and stud replacement without commensurate receptacle replacement. It is also common for cowl doors to have cracks that extend to or from a quarter-turn fastener location.

The FAA strongly encourages consulting with a part 145 repair station that has experience and expertise in cowl door inspection and repair, prior to attempting the repair of any nacelle or cowl system component.

For Further Information Contact

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For Related Service Information Contact

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