European Union Aviation Safety Agency

Safety Information Bulletin

Airworthiness – Operations

SIB No.: 2025-06

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Subject: **Potential Risk Management Issue after Engine Load Reduction Device Activation**

Applicability:
Operators of aeroplanes powered by CFM International LEAP engines

Description:
The Boeing 737 Max aeroplanes and certain models of the Airbus A320 NEO family aeroplanes are powered respectively by the CFM International LEAP-1B and LEAP-1A engines, which are equipped with a Load Reduction Device (LRD). The LRD is a mechanical device that fuses to reduce the loads transmitted to the engine structure and the aeroplane during high fan unbalance events. The LRD is designed to activate at a given load; it is not a system that is controlled by the flight crew.

When the LRD is triggered (based on specific load thresholds), an oil leakage path is created, which allows leakage of both oil from the sump and oil from the oil supply tubes into the primary flow path. This releases oil into the core compressor upstream of the aircraft bleed ports contaminating the bleed air delivered to the Environmental Control System (ECS). This air is further distributed to the cabin and/or flight deck.

Two serious incidents involving LRD activation after engine bird strike, followed by propagation of oil into the ECS, occurred in the Boeing 737 Max aeroplanes powered by CFM LEAP-1B and are currently under investigation:

- First event: On 05 March 2023, a Boeing 737-8 aeroplane experienced a right engine bird strike after take-off and subsequent commanded in-flight shutdown (IFSD). The flight crew declared an emergency and returned to the airport, safely landing the aeroplane. The flight attendants reported heavy smoke in the cabin. No injuries were reported among the flight crew, one passenger sustained a minor injury during the evacuation process.

- Second event: On 20 December 2023, a Boeing 737-8 aeroplane experienced a left engine bird strike after take-off and subsequent IFSD. The flight crew declared an emergency and returned to the airport, safely landing the aeroplane. Pilots reported heavy smoke in the flight deck and donned oxygen masks. According to Federal Aviation Administration information, the smoke dissipated in approximately three minutes (based on National Transportation Safety Board report AIR-25-03, the smoke began to dissipate rapidly after the First Officer pulled the engine fire switch as directed by the Quick Reference Card). No injuries were reported among the flight crew or passengers.

There have been no in-service LRD activation events involving Airbus A320 NEO family aeroplanes.

To date, the investigations have identified the following hazards in the event of LRD activation and subsequent oil release into the aircraft ECS system:

- Smoke or fumes may develop in the flight deck at a concentration that can reduce vision and cause discomfort, which could lead to flight crew diminished operational performance in an already high-workload situation, including possible crew incapacitation, potentially affecting the safety of the aeroplane or its occupants.
- Smoke or fumes may develop in the cabin or flight deck, potentially causing personal injury to passengers or crew members.

In nominal configuration, the bleed air delivered to the flight deck is mainly taken from the left engine, while the bleed air delivered to the cabin is taken from both engines. Therefore, the smoke which can be generated after an LRD activation will be released either in the flight deck and cabin, or in the cabin only, depending on the affected engine.
It should be noted that ECS architecture differs between the Boeing 737 Max and Airbus A320 NEO family aeroplanes. Above nominal configuration description refers only to the source of fresh air (bleed air) for the cockpit and the cabin supply and identifies the occupied compartments affected by smoke/fume ingress versus the affected engine sides.

The duration of the smoke event following LRD activation depends on the time taken for the affected engine to be shut down or the affected engine bleed system to be isolated. When the affected engine speed falls below a given core speed threshold (for instance, when engine automatically shuts down) the engine bleed will automatically be isolated through the closure of the corresponding ECS valve without any crew action, and the smoke release will be stopped. If, however, the affected engine core speed does not immediately fall below the given threshold (i.e. the engine continues to operate), the engine bleed will not be automatically isolated, and the isolation will depend on the application of the appropriate procedures by the flight crew. In this latter case, where engine bleed is not automatically isolated, it is crucial that the flight crew promptly applies the corresponding procedures that result in an engine shutdown, or a commanded isolation of the ECS bleed from the affected engine.

In the Boeing 737 Max aeroplanes, with the application of the Quick Reference Handbook (QRH) “Engine Fire or Engine Severe Damage or Separation” and the “Smoke, Fire or Fumes” actions the pilots can isolate the affected engine which will mitigate the smoke contamination.
As a precautionary measure, Boeing issued a Flight Crew Operations Manual (FCOM) Bulletin to direct pilots to the engine fire or severe damage checklist first when engine problems/failure and smoke appear simultaneously. Boeing has also updated the QRH to incorporate this recommendation.

In the Airbus A320 NEO family aeroplanes, with the application of the QRH “Eng (x) Fail” and the SMOKE/FUMES/AVCS SMOKE procedures, with or without ECAM activation, the pilots can secure the affected engine and mitigate the smoke contamination following LRD activation.

This SIB is an interim measure, pending completion of safety assessments and availability of potential design changes which might be required for managing the oil leakage risks for engine damages leading to LRD activation.

Recommendation(s):

EASA recommends that:

- Operators provide their flight crew members with an identification of which aeroplanes in their fleet are equipped with CFM LEAP engines that include an LRD.

- In the event of severe engine damage or engine high vibrations, the flight crews should be prepared for a possible LRD activation and consequent dense smoke in the cockpit.

- The above scenario is properly emphasised during flight crew conversion and recurrent training so that pilots are made aware of the challenges of an LRD event, flight crews may be aware of LRD activation consequences, and appropriate mitigating actions may be implemented.

Contact(s):

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