



Terms of Reference

for rulemaking task RMT.0671

Engine bird ingestion

ISSUE 1

Issue/rationale

The objective of this task is to consider the need to improve the ability of aircraft engines to be able to cope with the ingestion of birds that can reasonably be expected to be experienced during the service life of the engine. This will be achieved by evaluating whether the current engine certification specifications (CS-E) that require demonstration of the ability of the engine to continue to operate following the ingestion of small and medium birds into the core of engines are sufficiently robust in the current environment. In addition, an evaluation of the current CS-E for the demonstration of large-flocking-bird ingestion to be applied to engines with an inlet area of 1.35-2.5 m² will be considered based on service experience. Amendments to CS-E will be developed and proposed as required based on this analysis, which will further mitigate the risk of an unsafe event resulting from an engine bird ingestion.

Action area:	Design and maintenance improvements		
Affected rules:	CS-E		
Affected stakeholders:	Manufacturers		
Driver:	Safety	Rulemaking group:	No
Impact assessment:	Light	Rulemaking Procedure:	Standard



1. Why we need to change the rules — issue/rationale

The United States (US) National Transportation Safety Board (NTSB) published several safety recommendations (SRs) to the European Aviation Safety Agency (EASA) following their investigation into the US Airways A320 Flight 1549 forced landing into the Hudson River on 15 January 2009. The ingestion of Canadian geese into the core of both engines during the climb phase of flight caused a significant loss of thrust.

Due to the fact that the birds were ingested into the core during a phase of flight for which the current CS do not require any testing, the NTSB concluded that the current bird tests would be more realistic if the lowest expected fan speed for the minimum climb rate were used instead of the current fan speed for 100 %-rated take-off thrust, which would allow more bird material to enter the core. This NTSB conclusion resulted in their recommendation to modify the small- and medium-bird certification test standard to require that the lowest expected fan speed for the minimum climb rate be used for the core bird ingestion demonstration:

SR UNST-2010-088 made to EASA by the NTSB:

‘Modify the small and medium flocking bird certification test standard in Joint Aviation Regulations — Engines to require that the test be conducted using the lowest expected fan speed, instead of 100-percent fan speed, for the minimum climb rate. (A-10-88)’.

In addition, the weight of the bird that was ingested into the engines of US Airways A320 Flight 1549 exceeded the weight of the bird specified for the engine inlet area range for this aircraft type in the current CS on flocking-bird demonstrations. The NTSB recommended the re-evaluation of the large-flocking-bird ingestion certification test standards, including core ingestion, to determine if they should apply to the size class of the engine powering single-aisle medium-range aircraft, such as the A320 and B737 models.

SR UNST-2010-089 made to EASA by the NTSB:

‘During the bird-ingestion rulemaking database (BRDB) working group’s reevaluation of the current engine bird-ingestion certification regulations, specifically reevaluate the Joint Aviation Regulations–Engines (JAR-E) large flocking bird certification test standards to determine whether they should

- 1) apply to engines with an inlet area of less than 3,875 square inches and
- 2) include a requirement for engine core ingestion. If the BRDB working group’s reevaluation determines that such requirements are needed, incorporate them into JAR-E and require that newly certificated engines be designed and tested to these requirements. (A-10-2-89)’.

In the US, the Federal Aviation Administration (FAA) responded to the aforementioned NTSB SRs by assigning a task to the Aviation Rulemaking Advisory Committee (ARAC) in order to address them. The Transport Airplane and Engine (TAE) Subcommittee accepted the tasking and agreed to provide recommendations to ARAC regarding the bird ingestion certification test standards. The TAE formed an Engine Harmonization Working Group (EHWG) to carry out the task and provide recommendations to the TAE. EASA actively participated in the working group. The EHWG completed its investigation and recommended to the FAA that the core ingestion standard be made more rigorous by adopting an additional core ingestion certification demonstration for turbofan engines. The EHWG also made a series of related recommendations, including the current large-flocking-bird provisions.



It is necessary for EASA to now evaluate the outcome of the EHWG activity, which is contained in the EHWG report 'Turbofan Bird Ingestion Regulation' of 19 February 2015, and to address the recommendations made to the FAA, which are also applicable to EASA.

In this context, it should be noted that there are no:

- exemptions pertinent to the scope of this RMT;
- relevant alternative means of compliance (AltMoC) considerations;
- direct references to International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs); and
- references to European Union (EU) regulatory material relevant to this RMT.

2. What we want to achieve — objective

The overall objectives of the EASA system are defined in Article 2 of Regulation (EC) No 216/2008. This project will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 1.

The specific objectives of this proposal are to:

- mitigate the safety effects of an engine bird ingestion event through the introduction of improved test parameters for engine bird ingestion testing based upon service experience; and
- maintain efficiency by minimising any differences between the EASA bird-ingestion-testing provisions and those of other certification authorities such as the FAA.

3. How we want to achieve it

In order to achieve the objectives described in Chapter 2, EASA will:

- review the EHWG 'Turbofan Bird Ingestion Regulation' report;
- evaluate the small- and medium-bird ingestion provisions relating to core ingestion to determine if the intended safety objectives of the current CS-E are appropriate;
- determine the threat from large-flocking-bird species and identify any deficiencies in the current CS-E;
- evaluate the current large-flocking-bird ingestion provisions to determine if there is a need for new large-flocking-bird provisions or acceptable means of compliance (AMC) for engines with an inlet area of 1.35-2.5m²;

determine the best approach to address and take into account the applicable SRs detailed in Chapter 1 (UNST-2010-088 and UNST-2010-089); and

- if considered appropriate, to utilise the outcome of the review for the development of a notice of proposed amendment (NPA) containing the proposed amendments to CS-E.

4. What are the deliverables

If found to be required, the deliverables of this rulemaking task (RMT) are:

- an NPA containing the proposed amendments to CS-E; and



- a Decision amending CS-E.

5. How we consult

No focussed consultation is foreseen and the normal NPA consultation process will be utilised with interested stakeholders providing their comments during the consultation period.

6. Interface issues

There are no direct interface issues foreseen with other RMTs except that bird ingestion aspects of open rotor engines will be addressed under RMT 0384.

7. Reference documents

7.1. Related regulations

Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1)

7.2. Affected decisions

Decision No. 2003/9/RM of the Executive Director of the Agency of 24 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for engines ('CS-E')

7.3. Reference documents

- EHWG report, 'Turbofan Bird Ingestion Regulation', 19 February 2015
- Aircraft Accident Report NTSB/AAR-10/03 PB2010-910403, 'Loss of Thrust in Both Engines After Encountering a Flock of Birds and Subsequent Ditching on the Hudson River', US Airways Flight 1549, Airbus A320-214, N106US Weehawken, New Jersey, 15 January 2009

