



# Terms of Reference

for rulemaking task RMT.0726

## Rotorcraft occupant safety in the event of a bird strike

ISSUE 1

### Issue/rationale

Bird strikes that cause damage to rotorcraft or harm their occupants (passengers or pilots) are random events. Several factors are involved, including the intersection of bird and rotorcraft flight paths, the mass of the bird, and the part of the rotorcraft struck by the bird.

During the last decade, there has been an upward trend in the number of bird strikes to the rotorcraft windshield area with significant impact forces. Such bird strikes, in some cases, directly endangered the rotorcraft occupants and increased the risk to safe operations. Bird penetration into the cockpit and cabin areas has become growingly common, elevating the probability of serious or fatal injuries to occupants. Moreover, in numerous cases, a bird directly impacting the pilot led to partial or complete incapacitation of the pilot, often raising the risk of rotorcraft loss of control, and consequent fatalities. All these risks can be managed:

- by controlling the design and testing of the rotorcraft, which is driven by the related certification specifications;
- by promoting operational mitigating recommendations (e.g. on speed limitations, the rotorcraft’s flight profile); and
- to a limited extent, by reducing bird populations near operation sites.

The specific objective of this rulemaking task is to improve rotorcraft occupant safety in the event of a bird strike. This objective can be achieved:

- by introducing a new risk-based certification specification to prevent windshield penetration on small rotorcraft (CS-27) with higher passenger capacities; the specification may be similar to CS 29.631 for safe landing, but would only be applicable to the windshield; (Subtask 1); and
- if assessed to be necessary, through a proportionate retroactive application of bird strike certification specifications to the existing rotorcraft fleets and/or to the future production of already type-certified rotorcraft (Subtask 2).

<b>Action area:</b>	Design and production		
<b>Related rules:</b>	CS-26, CS-27, CS-29, Annex I (Part-26) to Regulation (EU) 2015/640		
<b>Affected stakeholders:</b>	DOA and POA holders, rotorcraft operators (only for Subtask 2)		
<b>Driver:</b>	Safety	<b>Rulemaking group:</b>	Yes, only for Subtask 2
<b>Impact assessment:</b>	Yes	<b>Rulemaking Procedure:</b>	Standard

EASA rulemaking process milestones



SubT 1: 8.9.2020	2021/Q3	N/a	N/a	2022/Q3
SubT 2: 8.9.2020	TBC	TBC	TBC	TBC



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

### 1.1. Background

Bird strikes that cause damage to rotorcraft or harm their occupants (passengers or pilots) are random events. Several factors are involved, including the intersection of bird and rotorcraft flight paths, the mass of the bird, and the part of the rotorcraft struck by the bird. All these risks can be managed:

- by controlling the design and testing of the aircraft, which is driven by certification specifications;
- by promoting operational mitigating recommendations (e.g. on speed limitations, the rotorcraft's flight profile); and
- to a limited extent, by reducing bird populations near operation sites.

To mitigate the potential consequences of bird strikes on rotorcraft, the Joint Airworthiness Authorities (JAA) included a requirement for bird strike protection in the first release of the European requirements for large rotorcraft (Joint Aviation Requirements 29 (JAR-29)), issued in 1993.

JAR 29.631 required transport category/large rotorcraft to be designed to ensure continued safe flight and landing (CSFL) (Category-A rotorcraft) or safe landing (SL) (Category-B rotorcraft) following an impact with a 2.2-pound (1.0-kg) bird.

Less than 3 years later, in 1996, the Federal Aviation Administration (FAA) amended the Code of Federal Aviation Regulations (CFR) to incorporate the same requirement into 14 CFR § 29.631. The initial issue of Certification Specifications for Large Rotorcraft (CS-29) of 2003 included the JAR 29.631 content.

So far, no bird strike protection requirements have been introduced into European rules for small rotorcraft (CS-27), or into US rules, i.e. 14 CFR Part 27.

As a result, current rotorcraft in service and in production include:

- a majority of small/normal-category rotorcraft (CS-27, 14 CFR Part 27) without bird strike requirements in their certification basis (Population A);
- many large/transport category rotorcraft (JAR-29/CS-29, 14 CFR Part 29) without bird strike requirements in their certification basis (Population B); and
- very few large/transport category rotorcraft (JAR-29/CS-29, 14 CFR Part 29) certified to the bird strike requirements in force since 1993 (Population C); they represent 9 % of the European rotorcraft operated fleet (and 2 % of the US fleet).

### 1.2. Description of the safety issue

During the last decade, there has been an upward trend in the number of bird strikes to the rotorcraft windshield area with significant impact forces. Such bird strikes, in some cases, directly endangered the rotorcraft occupants and increased the risk to safe operations. As an order of magnitude, more than three bird strike occurrences every 100 000 flight hours have been recorded in recent years. As a result, bird penetration into the cockpit and cabin areas has become growingly common, with nearly two events per year, based on the available EU and US data, elevating the probability of serious or



fatal injuries to occupants. Moreover, in numerous cases, a bird directly impacting the pilot led to partial or complete incapacitation of the pilot, often raising the risk of rotorcraft loss of control, and consequent fatalities.

The upward trend in bird strike occurrences is confirmed by the data stored in the European Union Aviation Safety Agency (EASA) incident occurrences reporting system (IORS). A similar trend was recorded in the Rotorcraft Bird Strike Working Group Recommendations to the Aviation Rulemaking Advisory Committee (ARAC)<sup>1</sup>, which only contains occurrences in the US.

Comparing the available data on rotorcraft bird strikes, it emerges that:

- about 78.3 % of the reported bird strikes from 2009 to 2016 in the US involved Part-27 normal-category rotorcraft (55 % of the reported bird strikes from 2006 to 2016 in the European Union (EU));
- CS-27-/Part-27-certified rotorcraft account for approximately 80 % and 91 % of the reported bird strikes in the EU and US entire rotorcraft fleets, respectively;
- the number of bird strike occurrences in the EU is approximately one third of the US number; considering the anticipated future growth of the EU fleet<sup>2</sup>, it is expected that the number of bird strike occurrences on EU rotorcraft will further increase; and
- an increase in bird strikes raises the risk of potential serious or fatal injuries to occupants and of substantial damage to rotorcraft.

The above considerations have been confirmed by several studies, including the following:

- EASA/ATKINS — Bird Strike Damage & Windshield Bird Strike Final Report, 5078609-rep-03, Version 1.1<sup>3</sup>;
- Rotorcraft Bird Strike Working Group Recommendations to ARAC, Revision B, 8 May 2019; and
- ICAO-2008-2015 WILDLIFE STRIKE ANALYSES (IBIS), EB 2017/25, 12 May 2017<sup>4</sup>.

These observations also reinforce the previous findings from a study ('Wildlife Strikes to Civil Aircraft in the United States 1990-2005', Cleary, Dolbeer, & Wright, June 2006)<sup>5</sup> based on 15 years of data, which concluded that:

- rotorcraft are significantly more likely to be damaged by bird strikes than aeroplanes;
- windshields on rotorcraft are more frequently struck and damaged than windshields on aeroplanes; and
- rotorcraft bird strikes are more likely to lead to injuries to crew or passengers than aeroplane bird strikes.

<sup>1</sup> [https://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3324](https://www.faa.gov/regulations_policies/rulemaking/committees/documents/index.cfm/document/information/documentID/3324)

<sup>2</sup> Refer to the [ARAC Rotorcraft Bird Strike Working Group, Revision B, 8 May 2019](#).

<sup>3</sup> <https://www.easa.europa.eu/sites/default/files/dfu/Final%20report%20Bird%20Strike%20Study.pdf>

<sup>4</sup> [https://www.icao.int/safety/IBIS/2008%20-%202015%20Wildlife%20Strike%20Analyses%20\(IBIS\)%20-%20EN.pdf](https://www.icao.int/safety/IBIS/2008%20-%202015%20Wildlife%20Strike%20Analyses%20(IBIS)%20-%20EN.pdf)

<sup>5</sup> [https://digitalcommons.unl.edu/cgi/viewcontent.cgi?referer=http://www.google.it/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewi\\_pMWyvovqAhVQ6aQKHfuiCFIQFjACegQIBRAB&url=http%3A%2F%2Fdigitalcommons.unl.edu%2Fcgi%2Fviewcontent.cgi%3Farticle%3D1006%26context%3Dbirdstrikeother&usg=AOvVaw0vFnmuFgXkW96qFOvWVp\\_F&httpsredir=1&article=1006&context=birdstrikeother](https://digitalcommons.unl.edu/cgi/viewcontent.cgi?referer=http://www.google.it/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewi_pMWyvovqAhVQ6aQKHfuiCFIQFjACegQIBRAB&url=http%3A%2F%2Fdigitalcommons.unl.edu%2Fcgi%2Fviewcontent.cgi%3Farticle%3D1006%26context%3Dbirdstrikeother&usg=AOvVaw0vFnmuFgXkW96qFOvWVp_F&httpsredir=1&article=1006&context=birdstrikeother)

The second most impacted areas are the main rotor, nose, and fuselage.

### 1.3. Activities already launched by EASA

Considering the increased risk of bird strikes on rotorcraft and that some of the occurrences led to fatal accidents, in March 2016, the FAA assigned to ARAC the following tasks:

- produce recommendations on bird strike protection rulemaking, policy, and guidance for normal-category rotorcraft;
- evaluate existing bird strike protection standards for transport category rotorcraft; and
- issue recommendations for enhancement.

All the main rotorcraft manufacturers and leading authorities participated in the activities of the ARAC Rotorcraft Bird Strike Working Group (RBSWG), including EASA.

The RBSWG conducted an in-depth investigation of the issue and provided a list of recommendations for rulemaking and safety promotion, which are supported by a comprehensive cost-benefit analysis (CBA).

To mitigate the risks for rotorcraft operation until the completion of the rulemaking activity, EASA intends to adopt the RBSWG operational mitigating recommendations in a Service Information Bulletin (SIB) on bird strike safety procedures (publication is expected within 2020). EASA has also launched a safety promotion campaign (refer to safety promotion task (SPT).093) to promote the content of this SIB, wildlife hazard management in aviation, as well as a bird concentration map throughout Europe for operators' awareness.

### 1.4. Related safety recommendations to EASA

The UK Air Accidents Investigation Branch (AAIB) issued the following three reports after bird strike events on small rotorcraft (no safety recommendations as such):

- N109TK (AAIB Bulletin 3/2012);
- G-ODAZ (AAIB Bulletin 6/2014);
- G-BZBO (AAIB Bulletin 11/2016); and
- M-YMCM (AAIB Bulletin 6/2019).

The most recent reported event (6/2019) involved a Bell 429, M-YMCM, which experienced a bird strike in the UK. The windscreen shattered, and debris entered the cockpit, injuring the occupant in the left seat.

No specific safety recommendations were issued after those accidents. EASA considers that this is because most of the safety investigation authorities are relying on EASA RMT.0726, which is based on the RBSWG outcome, complemented by the EU study; for instance, RMT.0726 is mentioned in the UK AAIB 6/2019 report.



## 2. What we want to achieve — objective

The overall objectives of the EASA system are defined in Article 1 of Regulation (EU) 2018/1139<sup>6</sup>. This project will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 1.

The specific objective of this proposal is to improve rotorcraft occupant safety in the event of a bird strike, adopting cost-efficient measures.

## 3. How we want to achieve it

To ensure that the objectives identified in Section 2 are achieved, the following activities will be conducted:

- EASA will consider the introduction of a new risk-based certification specification to prevent windshield penetration on CS-27 rotorcraft with higher passenger capacities. The specification may be similar to CS 29.631 for safe landing, but would only be applicable to the windshield.
- EASA will also assess whether it is necessary to retroactively and proportionately apply bird strike certification specifications to the existing CS-27 and CS-29 rotorcraft fleets and/or to the future production of already type-certified rotorcraft (Populations A and B, see Section 1.1). This activity should be performed bilaterally by EASA and its respective partners.

To ensure an efficient process, the RMT.0726-related activities will be performed in two phases, under two different subtasks:

- **Subtask 1:** Introduce a new risk-based certification specification to prevent windshield penetration on CS-27 rotorcraft with higher passenger capacities, along with the associated acceptable means of compliance (AMC).
- **Subtask 2:** Assess the proportionate retroactive application of bird strike certification specifications to the existing rotorcraft fleets and/or to the future production of already type-certified rotorcraft (Populations A and B). If supported by the outcome of that assessment, a proportionate retroactive requirement will be proposed.

## 4. What are the deliverables

The expected deliverables of RMT.0726 for Subtask 1 are:

- a notice of proposed amendment (NPA) to propose amendments to CS-27, and based on experience gained in recent type certification projects, to CS-29 (Book 2 only); and
- an EASA Decision to amend CS-27 and CS-29 based on the outcome of the NPA public consultation.

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<sup>6</sup> Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1139&qid=1594133129469&from=EN>).

The expected deliverables of RMT.0726 for Subtask 2 are:

- A regulatory impact assessment (RIA) to assess the safety benefits of the retroactive implementation of measures to the future production of already type-certified products and/or a retrofit of the existing fleet in relation to the economic, environmental, proportionality, and social impacts of such a measure.
- If the above-mentioned RIA concludes that the safety benefits of the implementation of a retroactive measure outweigh the potential economic, environmental, proportionality, and social impacts:
  - an NPA to propose amendments to Annex I (Part-26) to Regulation (EU) 2015/640<sup>7</sup> and to CS-26 (including the associated guidance material (GM), as necessary);
  - an Opinion with a draft implementing rule to propose to the European Commission an amendment to Part-26, based on the outcome of the NPA public consultation; and
  - an EASA Decision to amend CS-26 (including the associated GM, as necessary), based on the outcome of the NPA public consultation.

## 5. How we consult

The two NPAs for Subtasks 1 and 2 respectively will be publicly consulted in accordance with Article 7 of the Rulemaking Procedure<sup>8</sup>.

## 6. Interface issues

N/a.

## 7. Profile and contribution of the rulemaking group

### Subtask 1

Subtask 1 is an 'Agency' task (no rulemaking group will be established) as EASA will consider the conclusions of the RBSWG.

### Subtask 2

A rulemaking group (RMG) RMT.0726 will be established, with the following objectives:

- (a) support EASA by providing the necessary data to carry out this RMT and in particular, support the RIA of the retroactive implementation of measures to existing designs and the in-service fleet;
- (b) provide advice to EASA;

<sup>7</sup> Commission Regulation (EU) 2015/640 of 23 April 2015 on additional airworthiness specifications for a given type of operations and amending Regulation (EU) No 965/2012 (OJ L 106, 24.4.2015, p. 18) (<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R0640&from=EN>).

<sup>8</sup> EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18 2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (<http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).

- (c) comment on the draft NPA prepared by EASA before the NPA public consultation is launched; and
- (d) support EASA as necessary in reviewing the comments received during the NPA public consultation.

The required expertise of the RMG RMT.0726 members should include at least one of the following:

- experience in the design of bird-strike-resistant rotorcraft components (windshield, main rotor, nose, fuselage, etc.);
- experience in planning and preparing bird strike tests;
- certification experience related to bird strikes;
- experience in impact dynamics tests and model correlation on bird-strike-resistant rotorcraft components;
- experience in the assessment of the costs and benefits of technical solutions or the capability to liaise with economics experts of companies/organisations to obtain such information, as appropriate; or
- experience in rotorcraft operation and maintenance practices related to the replacement of windshields, to dynamic components, and to structural repairs.

RMG RMT.0726 will be composed of:

- authority representatives from EASA and other civil aviation authorities (CAAs);
- rotorcraft manufacturers;
- rotorcraft operators;
- representatives from maintenance organisations; and
- windshield manufacturers.

Note: RMG RMT.0726 will be established through the publication of this ToR; however, it will start working only when Subtask 2 is launched.

## 8. References

### 8.1. Related Regulations

Commission Regulation (EU) 2015/640 of 23 April 2015 on additional airworthiness specifications for a given type of operations and amending Regulation (EU) No 965/2012 (OJ L 106, 24.4.2015, p. 18).

### 8.2. Related Decisions

- Executive Director Decision 2015/013/R of 8 May 2015 adopting Certification Specifications for additional airworthiness specifications for operations ('CS-26 — Issue 1');
- Decision No. 2003/15/RM of the Executive Director of the Agency of 14 November 2003 on certification specifications for small rotorcraft ('CS-27');
- Decision No. 2003/16/RM of the Executive Director of the Agency of 14 November 2003 on certification specifications for large rotorcraft ('CS-29').



### 8.3. Reference documents

Rotorcraft Bird Strike Working Group Recommendations to ARAC, Revision B, 8 May 2019.

