



# Terms of Reference

## for rulemaking task RMT.0713

### Human factors in rotorcraft design

ISSUE 1

#### Issue/rationale

Human factors may contribute either directly or indirectly to aircraft accidents and incidents, and the design of a flight deck and its systems can strongly influence the performance of the crew and the potential for crew errors.

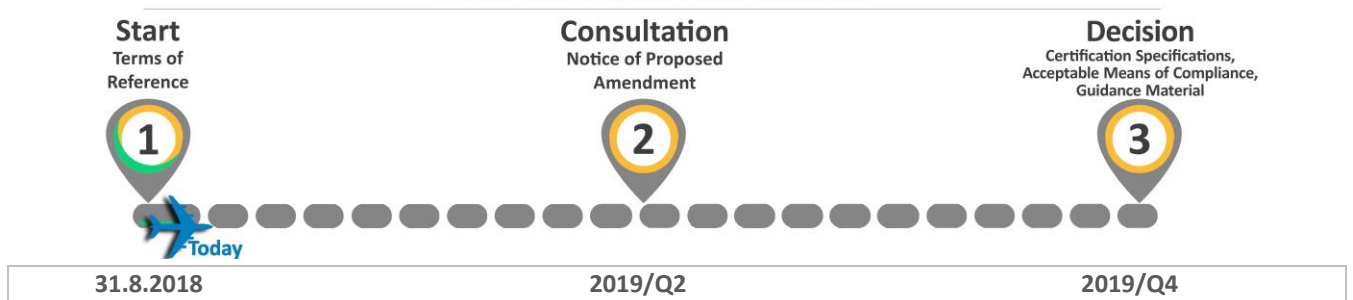
Currently, the certification specifications (CSs) for rotorcraft do not contain any specific provisions for a human factors assessment to be carried out. New generation helicopters are characterised by having a high level of integration of cockpit equipment, displays, controls and automation. It is also likely that future rotorcraft projects, embodying, for instance, fly-by-wire technology flight controls that include enhanced piloting control laws, will pose new and additional challenges from a human factors perspective.

Large transport aircraft have benefited from human factors assessments of the design of their flight decks and their associated systems. The purpose of this RMT is to deliver an effective and proportionate set of CS amendments that address human factors in rotorcraft design.

The availability of CSs for human factors in the design of new rotorcraft cockpits is expected to reduce the probability of human factors and pilot workload issues that could lead to an accident or incident.

<b>Action area:</b>	Rotorcraft operations	<b>Rulemaking group:</b>	No
<b>Affected rules:</b>	CS-VLR, CS-27 and CS-29	<b>Rulemaking Procedure:</b>	Standard
<b>Affected stakeholders:</b>	Design approval holders (DAHs)		
<b>Driver:</b>	Safety		
<b>Impact assessment:</b>	None		

● EASA rulemaking process milestones



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

It is recognised worldwide that human factors can either directly or indirectly contribute to aircraft accidents and incidents, and that the design of a flight cockpit and its systems can strongly influence the performance of the crew and the potential for crew errors.

New generation helicopters are characterised by a high level of integration of cockpit equipment, displays, controls and automation. It is also likely that future rotorcraft projects, embodying for instance fly-by-wire technology for flight controls, including enhanced piloting control laws, will pose new and additional challenges from the human factors perspective. There are a number of provisions in the CSs for rotorcraft that deal with specific or general flight deck and equipment designs that are intended to optimise the man-machine interface, but little or no guidance exists for the human factors assessment of an entire cockpit environment.

Therefore, a structured human factors assessment of the entire flight cockpit environment, including system automation, is expected to improve new designs from the human factors perspective, and to reduce the risk of design-related errors leading to an accident or an incident.

For large transport aeroplanes, JAA Interim Policy Paper INT/POL/25/14 '*Human Factors Aspects of Flight Deck Design*' was originally used as guidance material on performing human factors assessments during certification programmes. When CS-25 was published at Amendment 3 in September 2007, it incorporated the results of the Human Factors Harmonization Working Group in the form of CS 25.1302 and the associated Acceptable Means of Compliance (AMC) 25.1302.

Although they were derived primarily for large transport aeroplanes, the human factors principles applied to flight deck design are relevant to all aircraft types, including new generation complex rotorcraft types. Having recognised this, in recent CS-29 rotorcraft certification projects, the European Aviation Safety Agency (EASA) has recommended applicants to conduct human factors assessments so as to consider AMC 25.1302 during the demonstration of compliance with the CS-29 requirements.

Rotorcraft missions encompass many different activities (aerial work, medical services, private operations, public transport, firefighting, search and rescue, training, etc.) and the related operational scenarios are very different from those of large transport category aeroplanes. Additional consideration therefore has to be given to how the principles behind the CS-25 provisions for human factors can be applied to rotorcraft. This may also lead to specific considerations regarding the extent and the scope of the human factors assessment to include more than just the workstations of flight crew members.

Accident statistics show that a significant percentage of the accidents and incidents have human performance as a potential contributing factor. Although it is difficult to break down all the possible items affecting human performance, some human errors may be induced by the cockpit design and its equipment.

With relevance to the scope of this RMT, there are no:

- safety recommendations that directly address human factors;
- exemptions<sup>1</sup>;

<sup>1</sup> Exemptions that have an impact on the development on the content of this RMT and that refer to:

- Article 14.1: Measures taken as an immediate reaction to a safety problem



- ICAO Standards and Recommended Practices (SARPs); or
- other relevant EU regulatory material.

## 2. What we want to achieve — objectives

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:

- improve the efficiency of the rotorcraft certification process by developing human factors requirements upfront instead of adapting the existing fixed wing regulatory material and producing bespoke human factors requirements on a product-by-product basis;
- improve safety by addressing human factors and conducting human factors assessments in rotorcraft designs. According to the Preliminary Impact Assessment, human factors shortfalls in the design of rotorcraft have contributed to some accidents or incidents, so it is expected that adding specific human factors provisions to the certification specifications will help to reduce the probability of such accidents or incidents occurring; and
- transpose into the CS and the related AMC & GM the experience and lessons learned in the field of human factors from the certification of recent rotorcraft products, with the aim of improving the cockpit design of new rotorcraft from the human factors perspective, and reducing the likelihood of human errors that could contribute to, or be the root cause of, an accident or incident.

## 3. How we want to achieve it

To ensure the achievement of the objectives identified in Chapter 2, the following activities will be conducted:

- the establishment of an EASA human factors expert group made up of internal expertise;
- a detailed review of existing human factors provisions in other domains and from other partner certification authorities to capture the best practice;
- a detailed review of relevant Certification Review Items (CRIs) that have been applied to recent rotorcraft certification programmes;
- consideration and establishment of the best approach to the certification of human factors aspects for rotorcraft, taking into account the need for proportionality;
- an evaluation of the possibility of introducing a performance-based approach for human factors;
- the development of monitoring indicators to show the level of achievement of the safety benefits;

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- Article 14.4: Exemptions from substantive requirements laid down in the Basic Regulation and its implementing rules in the event of unforeseen urgent operational circumstances or operational needs of a limited duration;
  - Article 14.6: Derogation from the rule(s) implementing the Basic Regulation where an equivalent level of protection to that attained by the application of the said rules can be achieved by other means;
  - Article 22.2(b): Individual flight time specifications schemes deviating from the applicable certification specifications which ensure compliance with essential requirements and, as appropriate, the related implementing rules.



- a preliminary review of the draft NPA with the EASA stakeholders before proceeding with the public consultation. This will be achieved by means of a workshop to be held in the course of the 1st quarter of 2019.

#### 4. What are the deliverables

The deliverables of this RMT are:

- a notice of proposed amendment (NPA) that contains the proposed proportionate amendments to CS-29, CS-27 and, if considered necessary, CS-VLR; and
- an ED Decision that amends CS-29, CS-27 and, if considered necessary, CS-VLR.

#### 5. How we consult

A public consultation of the NPA will take place in accordance with Article 7 of the Rulemaking Procedure<sup>2</sup>.

Depending on the nature and the extent of the comments received on the NPA, the establishment of a review group may also be considered.

#### 6. Interface issues

N/A

#### 7. Reference documents

##### 7.1. Affected decisions

- Executive Director Decision ED Decision 2003/017/RM of 14 November 2003 amending Certification Specifications and Acceptable Means of Compliance for Very Light Rotorcraft (CS-VLR)
- Executive Director Decision 2003/15/RM of 14 November 2003 amending Certification Specifications and Acceptable Means of Compliance for Small Rotorcraft (CS-27)
- Executive Director Decision 2003/16/RM of 14 November 2003 amending Certification Specifications and Acceptable Means of Compliance for Large Rotorcraft (CS-29)

<sup>2</sup> [EASA Management Board Decision N°18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications, acceptable means of compliance and guidance material \('Rulemaking Procedure'\)](#)

