



# Terms of Reference for rulemaking task

## RMT.0739 — Issue 1

# Introduction of extended minimum-crew operations (eMCO)

### EXECUTIVE SUMMARY

The aviation industry continuously develops technology and automation that improve operational safety and efficiency. These technological developments have been shown to improve the aircraft systems’ resilience, and pilot tasks are better supported, increasing thus the overall performance.

The industry is currently developing technologies to enable the safe operation of large passenger aeroplanes by a single pilot during the cruise phase of the flight (extended minimum-crew operations (eMCO)). The integration of such technological developments needs to be accompanied by all the necessary measures to ensure an equivalent or higher level of safety for such operations, such as the presence of an advanced cockpit design with workload alleviation means, additional aids to improve the pilot’s decision-making, the capability to cope with crew incapacitation, effective fatigue management, and the prevention of security threats, as well as consider human factors, mental and psychological aspects.

However, transitioning from a two-pilot crew to a single-pilot one at the controls during specific periods of the cruise phase will undoubtedly require changes in operational procedures, crew coordination, use of automation, and in how the roles and responsibilities of the pilots, ATC and the operator are blended in order to maintain the expected high levels of safety. These modifications need a review of the roles and tasks that are required from the various actors in the operational environment.

From a regulatory perspective, the current EU Air Operations rules require, for CAT operations in aircraft with a maximum operational passenger seating configuration (MOPSC) above nine and for all turbojet aeroplanes, two pilots on duty at their station, meaning at the controls. The only aircraft that can be operated by a single-pilot crew under instrument flight rules (IFR) or at night are turbo-propeller aeroplanes with an MOPSC of nine or less.

This task aims at the development of a regulatory framework that allows a safe implementation of eMCO, while addressing its challenges and ensuring at least an equivalent level of safety to that ensured by today’s multi-crew operations.

#### — REGULATIONS INTENDED TO BE AMENDED

- [Regulation \(EU\) No 965/2012 \(Air OPS\)](#)
- [Regulation \(EU\) No 1178/2011 \(Aircrew\)](#)
- [Regulation \(EU\) 2015/340 \(ATCO\)](#)
- [Regulation \(EU\) 2017/373 \(ATM/ANS\)](#)
- [Regulation \(EU\) 2017/373 \(ATM/ANS\)](#)
- [Regulation \(EU\) No 923/2012 \(SERA\)](#)

#### RELATED EASA DECISIONS

ED Decisions providing AMC and GM to support the application of these Regulations

**AFFECTED STAKEHOLDERS** Pilots, aircraft operators, aircraft manufacturers, Member States and national competent authorities, air navigation service providers.

### WORKING METHOD(S)

Development	Impact Assessment(s)	Consultation
By EASA with the support of a Rulemaking Group.	Detailed	Public – NPA

**PLANNING MILESTONES:** see the latest edition of EPAS Volume II



## 1. OBJECTIVES

The general objective of this rulemaking task (RMT) is to enable the safe implementation of extended minimum-crew operations (eMCO) while addressing its challenges and ensuring the safety of these operations. For commercial air transport (CAT) operations, where Regulation (EU) No 965/2012 requires today two pilots at the controls, eMCO must ensure a level of safety as that ensured by those operations.

eMCO are defined as operations in which there are extended periods of the cruise phase with a minimum flight crew of one pilot at the controls while the other pilot(s) is(are) resting.

The specific objectives of this RMT are to:

1. **Ensure Safety.** Ensuring safety is the primary objective. The RMT should ensure that the transition from the traditional multi-crew operations (MCO) to eMCO maintains or even improves the level of safety.
2. **Mitigate Risks.** Identifying and mitigating risks associated with eMCO is a key objective. This includes addressing issues such as pilot incapacitation, mental health, security risks, etc.
3. **Enable the use of new technologies by providing the appropriate regulatory framework for eMCO.** This involves adapting the current regulatory framework to accommodate eMCO, especially for large aeroplanes operated in CAT. It includes developing new regulations or amending existing ones.
4. **Support the safe implementation of eMCO.** This includes defining appropriate conditions, limitations, and requirements that ensure at least an equivalent level of safety to today's MCO. It should include:
  - 4.1 **Ensuring that operators develop appropriate standard operating procedures (SOPs) for eMCO.** The SOPs should cover all aspects of eMCO, including:
    - crew coordination and communication, both between pilot and cabin crew, and between pilot and operations personnel;
    - workload management, since eMCO require a manageable pilot workload, especially when a single pilot is at the controls;
    - emergency procedures, both at the technical level (e.g. aircraft malfunction) and at the human level, such as pilot incapacitation;
    - coordination with air traffic control (ATC).
  - 4.2 **Ensure appropriate pilot training.** This means ensuring proper training of pilots operating in eMCO so that they are adequately prepared for this operational concept.
  - 4.3 **Ensure appropriate training of other aviation personnel.** This means ensuring proper training of the people involved in eMCO so that they are adequately prepared for this operational concept.
  - 4.4 **Ensure appropriate aero-medical assessment and requirements for eMCO.**
5. **Promote harmonisation with ICAO standards and recommended practices (SARPs).** This includes following any future ICAO work on this topic and, if applicable, contributing to the



development of ICAO standards and recommended practices (SARPS) and ensuring they are duly considered in the development of this task.

## 2. How do we want to achieve the objectives?

To achieve the objectives above, the RMT will perform the following activities (non-comprehensive list):

### For objective 1: Ensure safety

- Activity: Address the specific safety considerations of eMCO.

### For Objective 2: Mitigate risks

- Activity: Identify and assess risks associated with eMCO.
- Activity: Review the global safety assessment developed for certification of new eMCO-capable aircraft, including the ATM safety assessment. Where appropriate, propose improvements.
- Activity: Develop risk mitigation strategies in the regulatory framework. This should include specific provisions for eMCO in normal and abnormal or emergency conditions (i.e. diversion scenarios, emergency response plans, pilot incapacitation, mental health issues, etc.) and consider the introduction of new technologies (for example, health monitoring devices).

### For Objective 3: Enable the use of new technologies by providing the appropriate regulatory framework for eMCO:

- Activity: Identify and address regulatory gaps. As a minimum, the RMT should:
  - conduct a comprehensive review of Regulation (EU) No 965/2012 to identify where it does not adequately address eMCO.

In addition, the RMT should review:

- the flight crew licensing (FCL) requirements, to establish whether the requirements in Part-FCL are fit for eMCO pilots.
  - the medical (MED) requirements, to identify whether Part-MED addresses the medical considerations in relation to eMCO pilots.
  - the air traffic management (ATM) requirements, to ensure that the ATM system can safely accommodate eMCO.
  - any other regulations where gaps or needs for improvement are identified during the development of this task.
- Activity: Modify and adapt existing regulations to accommodate eMCO. As a minimum, it includes Regulation (EU) No 965/2012 defining the requirements for eMCO operators, their crew, and the competent authority overseeing such operations.

### For Objective 4: Support the safe implementation of eMCO

- Activity: Analyse and clarify existing regulatory concepts or develop new ones that directly or indirectly relate to eMCO (for example, to better define the condition of sleep inertia, and partial and total pilot incapacitation, based on the latest scientific evidence).



- Activity: Define conditions, limitations, and operational requirements for eMCO. For example, by implementing an enhanced operational control centre, or making use of enhanced electronic flight bags (EFBs), etc.
- Activity: Address crew coordination, workload management, decision-making, emergency procedures, and coordination with ATC.
- Activity: Analyse and develop regulations and provisions that ensure that eMCO operators develop appropriate SOPs for the safe conduct of eMCO.
- Activity: Develop regulations, provisions and standards on pilot training specific to eMCO, to ensure that pilots receive adequate training and preparation for eMCO.
- Activity: Develop a regulatory framework for training of aviation personnel involved in eMCO that ensures that they are adequately trained for this operational concept.
- Activity: Amend the aero-medical regulatory framework to ensure aircrew fitness for eMCO (e.g. operational multi-pilot limitation (OML), mental health assessment and support, etc.).

#### **For Objective 5: Promote harmonisation with ICAO SARPs**

- Activity: Ensure that the European regulatory framework is harmonised (when possible) with any new international SARPs set forth by the International Civil Aviation Organization (ICAO).
- Activity: Contribute to ICAO SARP development activities.

#### **2.1. Principles of the regulatory material to be developed**

The regulatory material should be developed considering the following:

- The concept needs to be adaptable to the diversity of flight operations: i.e. to the different types of aircraft (passenger-carrying, freight-carrying, air-taxi), types of operations (e.g. ETOPS/EDTO, Polar), routes, flight conditions (e.g. weather), air traffic services (ATS), etc.
- One pilot (called 'pilot flying') manages all or parts of the cruise phase alone in the cockpit.
- A solution needs to be provided to manage the physiological needs of the pilot flying during an eMCO shift.
- The eMCO pilot should be subject to a mental health screening and support programme.
- Reverting to conventional two-crew operations is possible at any time (except in case of pilot incapacitation).
- eMCO will require enhancements in the operators' organisation and the way they manage their personnel (for example, by requiring eMCO operators to implement fatigue management programmes for their pilots).
- Aircraft certification. eMCO is to be operated only on certified eMCO-capable aircraft offering specific design features to simplify pilot tasks and reduce workload, mitigate the risk of errors, enhance the aircraft resilience in abnormal events, offer advanced automation to manage aircraft failures and detect pilot incapacitation, among other factors.



- Execution of the eMCO flight is supported by an increased operational control (enhanced operator control centre) with specific route study, flight preparation, crew scheduling and flight dispatch focusing on specific eMCO means and needs.
- Pilot qualifications. The type rating course should, in principle, be valid for both MCO and eMCO. However, additional pilot qualifications and a minimum flying experience will be required for eMCO.
- Ideally, the same pool of pilots can operate both conventional MCO and eMCO flights on a given aircraft, including the possibility of mixed fleet operations.
- Safety and security protocols. eMCO operators are required to establish guidelines and protocols for preventing and addressing pilot incapacitation and other safety concerns, which have to be assessed by the competent authority. Robust contingency plans must also be developed to respond to pilot incapacitation and other emergencies when they occur.
- The novelty of eMCO as an operational concept and the complexity of factors and conditions essential for its safe implementation will require enhanced regulatory and oversight structures. The RMT should evaluate whether a specific approval under Part-SPA of Regulation (EU) No 965/2012 should be granted for eMCO.
- Integration into the ATM environment. eMCO must easily integrate into the current ATM environment and procedures. This includes proper coordination between pilots and air traffic controllers, as well as collaboration among the different ATS centres involved in an eMCO flight.

### 3. Other information

#### 3.1. EASA eMCO and related research activities

To support the assessment of the safety level of eMCO and ensure that it is at least equal to today's two-pilot operations in large aeroplanes, EASA has commissioned a research activity, RES.0028 'Extended minimum-crew operations (eMCOs) - single-pilot operations risk assessment Framework'. The main objective of this activity is to develop a reference risk-assessment framework and knowledge base for the characterisation and impact of the changes introduced by the application of eMCO on the safety of flight operations with a focus on the analysis of human factors issues considering both normal operations and specific issues, such as sleep inertia, fatigue risk management, or pilot incapacitation.

After being awarded the tender, the research project started in late 2022 and will last until Q3 2025 in accordance with the EPAS 2023-2025 timeline.

The outcome of this research will be considered as part of the eMCO safety assessment in the development of this RMT.

#### 3.2. Certification specification — Special Condition for eMCO-capable aircraft

EASA is publishing a Special Condition (SC) for eMCO-capable aircraft in Q1 2024. This SC should address issues such as aircraft design, systems redundancy, and maintenance requirements, and will be considered during the development of this rulemaking task.



### 3.3. Working methods and consultation

EASA will be supported by a rulemaking group in the development of this task. Additional external support may be sought to involve specific expertise not sufficiently covered by the rulemaking group members.

The RMT will be subject to public consultation through an NPA. In addition, considering the complexity of the task, focused consultation may be organised, such as workshops with stakeholders.

### 3.4. eMCO implementation

Considering the complexity and novelty of the concept of eMCO, complementary activities will be necessary to support its implementation, namely further research, safety promotion (such as the development of manuals and other material to raise awareness and understanding of this new operational concept) and implementation support (such as workshops, seminars or training) activities may need to be performed in parallel with or upon completion of this rulemaking task.

