

Introduction of extended minimum-crew operations (eMCO)

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

The continuous development of technology and automation has improved operational safety and efficiency. These innovations have been shown to improve aircraft systems' resilience, and pilot tasks are better supported, increasing thus the overall performance.

The industry is currently developing technologies that, in combination with appropriate operational procedures, crew training, and cockpit design, will support new operational concepts, such as extended minimum crew operations (eMCO). The progress made in automation, cockpit design and monitoring systems will probably allow to safely rely on one pilot at the controls during non-critical segments of the cruise phase.

This concept of operations is, in particular, relevant to large aeroplanes operated in commercial air transport (CAT), for which no less than two flight crew members are currently required as per Regulation (EU) No 965/2012 ('the Air OPS regulation').

It is envisaged that, provided that all the hazards generated by the reduction of the crew during the crew phase are adequately addressed, these new operational concepts would enhance safety by allowing, in a non-augmented flight crew composition (i.e. two pilots), better opportunities to rest on board in a qualified rest facility (during non-critical segments of the cruise phase) and consequently reducing the possibility of pilot fatigue during higher-workload phases.

Currently, a minimum of two pilots, a pilot flying (PF) and a pilot monitoring (PM), compose the flight crew. In flight, the PF takes responsibility for flying the aircraft, navigating in line with the approved flight plan and continuously monitoring the flight path for any deviations. The PM primarily focuses on assisting the PF with navigation, monitoring the aircraft flight path, radio communications, cross-monitoring the actions of the PF, assisting the PF in high-workload situations, and taking over flight tasks in case of PF incapacitation. Proper crew resource management (CRM) allows the workload to be shared effectively between the PF and PM with adequate levels of cooperation, communication, and coordination.

The transition from a two-pilot crew to a single-pilot one during some parts of the cruise phase is less straightforward than previous evolutions in crew composition (i.e. when moving from three crew members to two pilots) for two reasons:

- Firstly, the extended absence of the second flight crew member during portions of the cruise phase needs to be carefully considered. Compensating measures need to be identified to ensure that the current level of safety is maintained through the appropriate level of workload and situational awareness of the pilot flying alone.
- Secondly, the necessary mitigation measures against pilot incapacitation during eMCO phases need to be duly considered.

Transitioning from a two-pilot crew to one pilot at the controls during specific periods of the cruise phase will undoubtedly require changes in operational procedures, crew coordination¹, 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 set-up of the Air OPS Regulation requires, 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 stations, 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.

For non-commercial operations with complex motor-powered aircraft (NCC), the current regulatory framework does not require the addition of a second pilot when the aircraft is certified for a minimum crew of one pilot. Implementing eMCO in this segment of operations may require a more limited effort in addressing the hazards and risks associated with eMCO and deploying the necessary mitigations.

Related safety issues

Safety recommendations addressed to EASA

N/A

EASA identification of the safety issue

While this rulemaking task does not aim directly at addressing any existing safety issues, the following safety issues are related and should be considered.

According to the EASA 2023 Annual Safety Review (ASR):

- Crew resource management;
- Flight crew incapacitation;
- Experience, training and competence of flight crew.

In the European Plan for Aviation Safety (EPAS) Volume III 2023 edition:

- Aviation personnel fatigue (SI-5002);
- Decision-making in complex systems (SI-3016);
- Fatigue and quality of sleep (SI-3005);
- Heavy workload and misaligned tasks (SI-3006);
- Reduced attention and vigilance (SI-3015);
- Crew resource management (CRM) (SI-0009);
- Fatigue (FTL) (SI-0039);
- Flight crew incapacitation (SI-0049).

¹ Including the CRM philosophy.

2. Other information

2.1.1.1 EASA eMCO and other related Research Activities

Other related activities which are ongoing, and may be beneficial to the eMCO safety assessment are:

- RES.0046 Digital transformation - case studies to prepare the evolution of aviation standards (Final report 2024). The three research projects aim to evaluate a series of changes applied to aviation products, processes and operations resulting from the deployment of new digital solutions with a focus on measuring the impact on safety standards and regulatory materials as well as preparing their evolution. The project will build upon a series of case studies that will lead to the identification of key actions to be taken by safety regulators, service and solution providers, to streamline the deployment of such innovative digital applications. Lot 3: Data science applications may be relevant for RMT.0379 as it studies the use of flight training data to support the application of evidence-based and competency-based training concepts, the application of new techniques for fuel management, and data models for enhancing the use of operational or training data for safety.
- RES.0041 Mental health of pilots and ATCOs (Final report in Q2 2024). This research project aims at assessing the new medical developments for the early diagnosis as well as treatment of mental health conditions which could pose a safety risk to aviation and would consequently lead to pilot (and air traffic controller (ATCO)) unfitness or the limitation of their medical certificate for safety purposes. The results of this research activity will support the management of the risks related to mental health illness.
- RES.0036 Risk assessment tool (Final report in Q4 2025). This research project aims to develop the technical specifications for a risk assessment tool (RAT) that would assist EASA in identifying safety requirements, performance targets, and required constraints (including operational limitations for novel concepts of operation (ConOps), technologies and products. The results of this research task will support the global safety risk assessment performed for eMCO.
- RES.0006 Effectiveness of FTL rules (Final report in Q4 2024). This is the second phase of the continuous review of the effectiveness of the provisions concerning flight and duty time limitations and rest requirements as laid down in Regulation (EU) No 965/2012. This second phase focuses in particular on duties of more than 13 hours at the most favourable time of the day; duties of more than 11 hours for crew members in an unknown state of acclimatisation; duties including a high level of sectors (more than six); and on-call duties such as stand-by or reserve followed by flight duties.
- EVT.0011 Evaluation of the effectiveness of the provisions concerning staff support programmes, the psychological assessment of flight crews, and the systematic and random testing of psychoactive substances (Final report in 2023). This evaluation task aims at assessing the implementation and effectiveness of the provisions on support programmes, psychological assessment of flight crew and testing of psychoactive substances mandated for commercial air transport operators. The results of this evaluation task will support the management of the risks related to human performance and medical issues.

The outcome of these additional activities may be considered as part of the eMCO safety assessment in the course of developing regulatory provisions to enable it.