



ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety and Air Navigation Policy Standardization

EXTENDED MINIMUM CREW OPERATIONS

(Presented by the International Coordinating Council of Aerospace Industries Associations (ICCAIA))

EXECUTIVE SUMMARY

Progress made in automation, cockpit design and monitoring systems can enable, in part, safely reducing the flight crew composition, during non-critical segments of the cruise phase. Existing and new technologies, combined with enhanced operational procedures and cockpit design, will facilitate the introduction of the Extended Minimum Crew Operations (eMCO) concept.

However, global consensus will be needed on a concept of operations to gain buy-in by all stakeholders, in order to establish a plan for development of a globally harmonized framework of Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services (PANS) and related guidance material as well as establishing a roadmap for the concept.

Action: The Assembly is invited to:

- a) note the rapid development of digital technologies, increasing automation for flight management and improved aeroplane resilience and the applicability of these emerging technologies to support Extended Minimum Crew Operations (eMCO);
- b) instruct ICAO to work with States and the industry to:
 - 1) develop global consensus among applicable stakeholders on an operational concept (CONOPS) for eMCO that would facilitate its use in international operations. This common eMCO CONOPS should be built on the experience gained and progress already made by Aviation Authorities worldwide on the eMCO topic;
 - 2) identify gaps in SARPs, PANS and related guidance material that may hinder implementation; and
 - 3) develop an implementation roadmap to support the new concept; and
- c) direct the Council to report ICAO's progress in this work to the next Regular Session of the Assembly.

Strategic Objectives:

This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.

¹ English, Arabic, Chinese, French, Russian and Spanish versions provided by ICCAIA.

<i>Financial implications:</i>	The activities referred to in this paper will be subject to the resources available in the 2020-2022 Regular Programme Budget and/or from extra budgetary contributions. The financial implication to ICAO can be reduced through the advancements of studies and draft provisions prepared by the industry.
<i>References:</i>	Doc 7300, <i>Convention on International Civil Aviation</i> and its Annexes

1. INTRODUCTION

1.1 New concepts of operation are rapidly becoming available across the aviation sector. Many of these innovations are made possible through advancements in automation and their enablers. At the same time these innovations have shown to improve aircraft systems resilience, as well as to support the performance of pilot's tasks during various phases of flight, consequently, reducing pilot workload during some phases of flight.

1.2 Given these benefits, today's advances in automation can also enable the optimization of flight crew composition on long duty periods in accordance with flight time limitations. Built on the benefits and principles of automation and assistance to the pilot, the Extended Minimum Crew Operations (eMCO) concept aims to optimize flight crew composition and fatigue management during long haul flights.

2. DISCUSSION

2.1 Digital technologies and automation have improved operational safety and efficiency. From an automation point of view, there have been four distinct generations of aeroplanes. The two first generations – the early commercial jets and those with basic integrated auto-flight systems - are disappearing. The third and fourth generations, with glass cockpits and flight management systems, and the latest with fly-by-wire flight envelope protection, are demonstrating that the additional automation is effectively reducing the fatal accident rate. Flight envelope protections available in the latest generation of airliners are designed to reduce "Loss of Control in Flight" incidents, one of the primary contributing factors to fatal accidents.

2.2 Existing technologies, in combination with appropriate operational procedures, crew training and cockpit design can support new operational concepts, such as Extended Minimum Crew Operations (eMCO). Progress made in automation, cockpit design and monitoring systems can enable, in part, safely reducing the flight crew composition, during non-critical segments of the cruise phase, to one pilot at the controls. Available technologies, in combination with appropriate operational procedures, crew training and other mitigations can address and manage the challenges of these new operational concepts.

2.3 While the technologies and procedures to support eMCO are maturing rapidly, there is still much to be done to introduce these operations into the global aviation ecosystem. A global consensus on the characteristics of eMCO, from a user's perspective, or concept of operations (CONOPS), will be an essential underpinning to guide the further development of procedures, regulations and training needed to support its introduction. An eMCO CONOPS will need to consider all ramifications of these types of operations, including any operational measures that may need to be put in place to mitigate potential risks. The use of eMCO will also require a wide global consensus on a CONOPS that involves all applicable stakeholders. In respect of eMCO the stakeholders include regulators, airlines, air navigation service

providers, manufacturers, pilots and air traffic controllers. Moreover, acceptance of eMCO will also require engagement with civil society to build the necessary confidence and acceptance by the travelling public.

2.4 ICAO involvement in the establishment of a common eMCO CONOPS would be essential. ICAO would play a central role in building the global consensus among all stakeholders. Subsequently, ICAO Standards and Recommended Practices (SARPs), as well as global Procedures (i.e., Procedures for Air Navigation Services, PANS) and related guidance material will be needed to ensure interoperability, harmonization and to build a justifiable confidence in this emerging operational concept. Civil Aviation Authorities, Standardization Bodies, Aircraft and Systems manufacturers and Airlines will need to move forward in a coordinated manner. ICAO has a proven ability to galvanize the parties and to achieve consensus on shared objectives. The establishment of this common eMCO CONOPS will also serve to identify where there may be existing gaps or barriers in existing ICAO SARPs and PANS that would need to be addressed, and to establish a roadmap for the work needed to support eMCO worldwide implementation. In establishing this common eMCO CONOPS, due consideration should be given to the progress already made by Aviation Authorities worldwide on the eMCO topic, and to the experience built through this work.

2.5 The aircraft manufacturers have been at the forefront of the technological innovations needed to make eMCO a reality. At the same time, the manufacturers are cognizant of the implications and challenges to the entire international aviation system. In this respect, the manufacturers stand ready to assist in the establishment of this common eMCO CONOPS and the subsequent work needed to adapt and develop the SARPs, PANS and related guidance for these types of operations.

3. CONCLUSION

3.1 The rapid pace of innovation and emerging technologies are making advancements in new concepts of operations a reality. Existing technologies, or those being developed, combined with enhanced operational procedures and cockpit design, will facilitate the introduction of the Extended Minimum Crew Operations (eMCO) concept in the short term. However, global consensus will be needed on a CONOPS to ensure that there is “buy-in” by all stakeholders and that would effectively establish a plan for development of a globally harmonized framework of SARPs, PANS and related guidance material. The process of defining an eMCO CONOPS would also serve to establish a roadmap for the subsequent work and to build the global support needed to implement the concept.