



WORKING PAPER

ASSEMBLY — 42ND SESSION

TECHNICAL COMMISSION

Agenda Item 25: Other issues to be considered by the Technical Commission

**BEYOND THE COCKPIT: ICAO'S NEXT FRONTIER IN SIMULATION TRAINING
(PROGRESS AND EXPANSION)**

(Presented by Kazakhstan)

EXECUTIVE SUMMARY

This paper draws attention to the emerging need for formal ICAO guidance regarding the use of simulation training devices for non-flight aviation personnel. While ICAO Doc 9625, *Manual of Criteria for the Qualification of Flight Simulation Training Devices* provides comprehensive criteria for pilot training devices, simulation tools used for training and skill assessment of air traffic controllers, maintenance engineers, cabin crew, ground handling personnel, and especially unmanned aircraft systems (UAS) operators, however, remain outside ICAO's current scope.

These devices offer significant benefits for modern training systems and could play a valuable role in supporting States in licensing or certifying aviation personnel. The paper recommends that ICAO promote the use of such devices and develop appropriate guidance materials to help Member States integrate simulation into training frameworks, particularly in anticipation of growing UAS-related competencies.

Action: The Assembly is invited to:

- a) recognize the opportunity for ICAO to expand its support in the area of simulation training for non-flight aviation personnel through dedicated guidance;
- b) encourage the ICAO Council to initiate the promotion and development of non-binding guidance on the effective use and qualification of such simulation devices; and
- c) invite Member States and training providers to actively share best practices and expertise to foster a harmonized approach, particularly in emerging areas such as UAS operations.

<i>Strategic Goals:</i>	This working paper relates to <i>Every Flight is Safe and Secure</i> .
<i>Financial implications:</i>	The financial impacts will depend on approved decisions.
<i>References:</i>	Annex 1 — <i>Personnel Licensing</i> Doc 9625, <i>Manual of Criteria for the Qualification of Flight Simulation Training Devices</i>

1. INTRODUCTION

1.1 ICAO has long recognized the importance of simulation-based training in aviation safety and operational efficiency. The *Manual of Criteria for the Qualification of Flight Simulation Training Devices* (Doc 9625) provides detailed standards for the qualification of devices used in pilot training, including full flight simulators (FFS), flight training devices (FTD), and flight and navigation procedures trainers (FNPT).

1.2 However, simulation devices used in training or skill assessment for non-flight personnel—air traffic controllers, aircraft maintenance engineers, cabin crew, ground handlers, and unmanned aircraft systems (UAS) operators—are not yet addressed in ICAO’s existing documents. These are informally termed “other simulation training devices.”

1.3 While this absence does not currently pose an urgent regulatory concern, ICAO has an opportunity to support global harmonization by promoting the structured use of simulation for such roles, particularly as Member States adopt advanced tools including virtual reality (VR), augmented reality (AR), and artificial intelligence (AI).

1.4 This paper proposes that ICAO develop non-binding guidance materials—potentially under Annex 1 or associated manuals—that encourage the adoption of simulation training devices in support of licensing and certification processes, particularly in emerging areas like UAS operations.

2. BACKGROUND AND CONTEXT

2.1 Simulation has become a standard element of pilot training due to ICAO-endorsed qualification frameworks. Similar tools are increasingly used for skill development and testing in other aviation roles, but ICAO has yet to provide dedicated guidance for such applications.

2.2 Non-flight aviation personnel—especially in newer operational fields like UAS—would benefit from structured simulation training systems. Many States already employ such tools, but approaches vary, and international consistency remains limited. As simulation technologies evolve, particularly with the integration of VR, AR, and AI, there is value in ICAO proactively promoting harmonized approaches, rather than reacting to discrepancies later.

2.3 The goal is not to impose new requirements, but to offer practical guidance to help States develop modern and effective training systems.

3. DISCUSSION

3.1 Simulation is increasingly used for skill development across a wide range of aviation professions. However, the absence of ICAO guidance on its use for non-flight personnel leaves States without a common reference.

3.2 While this gap does not constitute an immediate risk, ICAO can play a leading role in promoting good practices. Establishing guidance would assist in aligning training standards and supporting the global recognition of qualifications.

3.3 The absence of unified standards also complicates the mutual recognition of training outcomes, limiting workforce mobility and international cooperation. Moreover, uncertainty regarding the regulatory acceptance of new technologies—such as virtual and augmented reality—may hinder their integration into training programs.

3.4 The development of ICAO guidelines for simulators used in the training of non-flight personnel would promote global harmonization, enhance training effectiveness, and strengthen safety. It would also provide States and training organizations with clear guidance on the design, implementation, and evaluation of such devices.

4. WAY FORWARD

4.1 To support the effective integration of simulation devices into training, skill testing, and certification of non-flight aviation personnel—particularly UAS operators—ICAO is encouraged to undertake the following actions:

4.2 **Development of non-binding ICAO guidance:** Initiate the creation of a global guidance document under Annex 1 or associated manuals that outlines voluntary criteria for simulation devices used in licensing and certification of non-flight aviation personnel.

4.3 **Formation of expert group:** Establish a working group of States, training organizations, and technical experts to identify best practices and define recommended use cases.

4.4 **Promotion of best practices and examples:** Compile and share successful models of simulation use across air traffic control (ATC) maintenance, cabin crew, ground operations, and UAS training programs.

4.5 **Capacity building and familiarization:** Conduct seminars, webinars, and instructor/assessor training to support implementation and use of simulation in regulatory frameworks.

4.6 **Support for emerging technologies:** Encourage the exploration and validation of VR/AR-based simulators and other innovations through pilot programs.

5. CONCLUSION

5.1 Simulation-based training is a proven, effective method for enhancing competency, safety, and efficiency in aviation operations. As technology advances and new domains like UAS continue to expand, the structured use of simulation in the training and licensing of non-flight personnel become increasingly relevant.

5.2 While there is currently no urgent regulatory gap, ICAO has a timely opportunity to lead by promoting harmonized use of simulation through the development of non-binding guidance. Such an initiative will support States in modernizing their training systems, ensuring consistency in personnel qualifications, and preparing the aviation workforce for the future.