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Agenda Item 24: Aviation Safety and Air Navigation Priority Initiatives

INTEGRATING DRONE TECHNOLOGIES INTO VISUAL AID FLIGHT CHECKS: TOWARDS ICAO HARMONIZATION

(Presented by Kazakhstan)

EXECUTIVE SUMMARY

This working paper presents the emerging concept of using drones to conduct flight checks of aerodrome visual aids and highlights the growing need to explore its regulatory and operational feasibility. As airspace complexity increases, drone technology presents a promising, efficient, and potentially safer alternative to traditional manned aircraft flight checks. This paper encourages ICAO to study the matter and consider whether existing provisions in Annex 14, Volume I — Aerodromes; Doc 9137, Part 8 — Airport Operational Services; and Doc 9157, Part 4 — Visual Aids may need to be updated to support this novel method.

<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 14 — <i>Aeronautical Telecommunications</i> , Volume I — <i>Aerodrome Design and Operations</i> Doc 9137, <i>Airport Services Manual</i> Doc 9157, <i>Aerodrome Design Manual</i>

1. INTRODUCTION

1.1 The verification of visual aids, such as precision approach path indicators (PAPIs), visual approach slope indicators (VASIs), and runway lighting systems, require regular flight checks to confirm alignment with ICAO standards and operational accuracy.

1.2 Current ICAO guidance on these procedures is primarily provided in Doc 9137 — *Airport Services Manual*, Part 8 and Doc 9157 — *Aerodrome Design Manual*, Part 4, with reference to the standards outlined in Annex 14 — *Aeronautical Telecommunications*, Volume I — *Aerodrome Design and Operations*.

1.3 Traditionally, these flight checks are conducted by piloted aircraft, often with dedicated inspection missions conducted annually or more frequently depending on national regulations.

2. DISCUSSION

2.1 Technological evolution and emerging need

2.1.1 Drone technology has matured significantly in recent years, offering high-precision flight control, data acquisition capabilities, and improved safety through remote operation. As traffic volume increases and access to controlled airspace becomes more constrained, drones offer a less disruptive and more cost-effective means to perform inspections.

2.2 Limitations of current guidance

2.2.1 Existing ICAO materials were developed with manned operations in mind. They do not provide procedures, performance criteria, or safety parameters specific to unmanned systems. Consequently, current documents are not directly applicable to drone-based flight inspections.

2.3 Operational benefits of drone-based flight checks

2.3.1 The use of drones presents several advantages:

- a) reduced operational cost and environmental impact;
- b) higher precision in collecting visual data;
- c) increased safety by removing personnel from potential hazards; and
- d) operational flexibility and minimal disruption to normal aerodrome activities.

2.4 Implementation challenges

2.4.1 Despite their advantages, integrating drones into visual aid inspection processes faces practical and regulatory barriers:

- a) lack of standardized procedures;
- b) airspace integration and safety management;

- c) absence of performance specifications; and
- d) unclear roles and responsibilities between airport authorities and air navigation service providers.

2.5 **Recommendation for ICAO engagement**

2.5.1 To unlock the full potential of this capability, ICAO may consider tasking its relevant panels or working groups (e.g., Aerodromes Panel, UAS Advisory Group) to:

- a) evaluate the operational feasibility and safety considerations of drone-based visual aid inspections;
- b) propose additions or revisions to existing Standards and Recommended Practices (SARPs) and guidance material; and
- c) promote the exchange of best practices among States already exploring or implementing such solutions.

3. **CONCLUSION**

3.1 The use of drones for flight checks of visual aids represents a modern, efficient, and technically feasible advancement that can enhance the safety and efficiency of aerodrome operations. However, implementation requires international regulatory clarity and standardized procedures.

3.2 ICAO is invited to explore this area further and support States in adopting such innovations through structured guidance, stakeholder engagement, and knowledge sharing.

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