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TECHNICAL COMMISSION

Agenda Item 24: Aviation Safety and Air Navigation Priority Initiatives

DEVELOPMENT OF GUIDANCE MATERIALS FOR CERTIFICATION AND OPERATIONS OF ELECTRIC VERTICAL TAKE-OFF LANDING (EVTOL) POWERED-LIFT AIRCRAFT FOR CROSS-BORDER OPERATIONS AND REGULATORY FRAMEWORK FOR DIFFERENT CATEGORIES OF UNMANNED AIRCRAFT SYSTEMS

(Submitted by China, Singapore and co-signed by Egypt)

EXECUTIVE SUMMARY

This paper examines the challenges posed by emerging electric vertical take-off and landing (eVTOL) capable powered-lift aircraft and unmanned aircraft system (UAS). While several States have made progress in certifying such novel aircraft types, the current ICAO Standards and Recommended Practices (SARPs) do not adequately address their unique operational characteristics and associated requirements. Despite ongoing work by the ICAO Advanced Air Mobility Study Group (AAM SG) and other regional initiatives such as Asia-Pacific Reference Materials for AAM, there remains a pressing need for comprehensive international standards, particularly for cross-border operations. This paper highlights two key areas requiring attention: the certification requirements and operations of eVTOL-capable powered-lift aircraft; and the regulatory framework for unmanned aircraft systems.

Strategic Goals:	This working paper relates to *Every Flight is Safe and Secure*, and *Aviation is Environmentally Sustainable*.
Financial Implications:	The activities referred to in this paper are expected to be undertaken with the resources available in the 2026-2028 Regular Budget and/or from extra-budgetary contributions.
Reference Documents:	Annex 6 — Aircraft Operations, Part IV – International Operations – Remotely Piloted Aircraft Systems Annex 7 — Aircraft Nationality and Registration Marks Annex 8 — Airworthiness of Aircraft

[1] English and Chinese versions provided by China.

1. INTRODUCTION

1.1 The aviation industry is witnessing unprecedented technological advancement, particularly in multi-rotor and powered-lift aircraft. These novel aircraft types, predominantly using electric propulsion systems, combine vertical take-off and landing (VTOL) and even remotely operated capabilities with the potential for extended operational range. Their reduced noise and emissions profile makes them particularly suitable for urban environments, whilst their ability to facilitate swift cross-border operations presents significant opportunities for regional economic integration and enhanced access to critical services.

1.2 Several States of Design have made substantial progress towards certification of these aircraft. The Archer's Midnight, Eve Air Mobility's Eve-10, Joby Aviation's JAS4-1, Aerofugia's AE200, Autoflight's V2000EM, Volant's VE25, TCab's E20 and Skydrive's SD-05 are currently undergoing type certification review in Brazil, Japan, China and the United States, whilst China has already granted type certification to the EHang's EH216-S and Autoflight's V2000CG. Numerous States of Operator are also developing corresponding operational frameworks, including rules for personnel qualifications and airworthiness validation.

1.3 While there is progress at the State level, there is an urgent need for ICAO's development of detailed guidelines as the current ICAO Standards and Recommended Practices (SARPs) does not adequately cover unique characteristics of these novel aircraft. Although the ICAO has established the Advanced Air Mobility Study Group (AAM-SG) in recognition of the growing potential of these aircraft for cross-border operations, there is a need to note industry development, particularly in unmanned aircraft systems, is outpacing the discussions at AAM-SG.

2. DISCUSSION

2.1 Powered-lift aircraft

2.1.1 These novel aircraft present unique certification and operational challenges due to their distinctive lift mechanisms, flight characteristics, and failure modes. Whilst ICAO's *Guidance on the Implementation of ICAO Standards and Recommended Practices for Tilt*-rotors (Doc 10103) addresses tilt-rotor operations, Annex 7 — *Aircraft Nationality and Registration* Marks have not been amended to specifically classify between powered lift aircraft and VTOL capable powered lift aircraft. Moreover, the existing Annex 6 — *Operation of* Aircraft and Annex 8 — *Airworthiness of* Aircraft do not adequately address the certification requirements and operational risks associated with electric propulsion systems, charging infrastructure, and integrated flight controls—all crucial elements of these novel aircraft.

2.1.2 These challenges are recognised and at the ICAO Airworthiness Panel, there is an ongoing discussion to review the classification and definition of VTOL capable powered-lift aircraft. This is much appreciated and sets a path for the further development of the relevant ICAO SARPs to address the certification and operation risks as mentioned in the preceding paragraph.

2.2 Unmanned aircraft systems

2.2.1 These novel aircraft types, by design architecture, allows the flexibility of remotely piloted operations, offering significant operational scalability and cost reduction potential, and even cross-border opportunities. To address domestic needs, States of Design have developed certification frameworks for unmanned aircraft systems (UAS). The Civil Aviation Administration of China (CAAC) has issued special

conditions for the V2000CG electric powered-lift UAS and the FP-981C hybrid powered-lift UAS. Similarly, the European Union Aviation Safety Agency (EASA) has established special conditions for light UAS below 600 kilograms for both medium-risk and high-risk specific-category operations.

2.3 However the lack of clear distinction between the different classes of UAS (i.e. drones, remotely piloted eVTOL capable aircraft, and other classes) creates challenges for States in determining appropriate distinction for certification and operational requirements. It also impedes the import and export of such aircraft across States. While regional initiatives such as the Asia-Pacific Bilateral Partner Unmanned Aircraft Certification Working Group (participated by the CAAC, the Federal Aviation Administration (FAA), the Civil Aviation Authority of Singapore (CAAS), and other Asia-Pacific regulators) and meeting of Asia-Pacific regulators on UAS and AAM facilitate regulatory cooperation, a comprehensive framework for aircraft classification in Annex 7, similar as the framework provided for in the foreword in Annex 6, Part IV – *International Operations – Remotely Piloted Aircraft Systems* of the Convention on International Civil Aviation remains necessary.

2.4 Furthermore, noting the high potential of cross-border operations for remotely piloted eVTOL capable aircraft, it would be beneficial for ICAO to develop specific airworthiness and operational requirements (including the associated remote pilot station) in Annex 6, Part IV and Annex 8 of the Convention on International Civil Aviation for such classes of aircraft. This will provide guidance to States of Design in establishing airworthiness requirements and to States of Operators in developing corresponding operational frameworks.

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