



**REMOTELY PILOTED AIRCRAFT SYSTEMS
SYMPOSIUM
23-25 March 2015**

**WORKSHOP 1
ICAO RPAS Panel
Working Group 1 – Airworthiness**

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Rapporteurs WG1



OUTLINE

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- 1.1 Unmanned Aircraft Systems Study Group (UASSG)
- 1.2 Remotely Piloted Aircraft Systems Panel (RPASP)
- 1.3 UASSG Airworthiness Group

2. The RPAS Manual at his 1st Edition

- 2.1 Purpose, intent and Scope
- 2.2 Governing Principles
- 2.3 Type Certification
- 2.4 Airworthiness Certificates and relationships
- 2.5 RPAS Future Considerations

3. Working Group 1 (Airworthiness) of the RPAS Panel

- 3.1 RPAS Manual to RPAS SARPs
- 3.2 Interrelations with other ICAO Panels
- 3.3 Tasks and organization
- 3.4 Schedule

4. Concluding remarks



1- INTRODUCTION

- 1.1 Unmanned Aircraft Systems Study Group (UASSG)**
- 1.2 Remotely Piloted Aircraft Systems Panel (RPASP)**
- 1.3 Airworthiness Group**

1.1 UAS Study Group (UASSG)

- **Established by ICAO Air Navigation Commission on 7 April 2007**
 - Serve as the focal point and coordinator of all ICAO UAS related work, with the aim of ensuring global interoperability and harmonization;
 - High level guidance to States for RPAS approvals and operations
 - Focus on RPAS intended for international operations to establish the basis for common recognition of approvals
 - Generally understood to be larger, more complex RPAS receiving relatively unrestricted Type Design (TC) and Airworthiness (CofA) approvals
 - Concept of Operation – international aircraft operations seamlessly traversing nation state borders for the purpose of international air commerce



1.2 Remotely Piloted Aircraft Systems Panel

- **Established by ICAO Air Navigation Commission on 6 May 2014**
 - serve as the focal point and coordinator of all ICAO RPAS related work, with the aim of ensuring global interoperability and harmonization;
 - develop an RPAS regulatory concept and associated guidance material to support and guide the regulatory process;
 - review ICAO SARPs, propose amendments and coordinate the development of RPAS SARPs with other ICAO expert groups;
 - assess impacts of proposed provisions on existing manned aviation; and
 - coordinate, as needed, to support development of a common position on bandwidth and frequency spectrum requirements for command and control of RPAS for the International Telecommunications Union (ITU) World Radio Conference (WRC) negotiations.

1.3 Airworthiness Group (WG-1)

- **Established to develop Airworthiness Concepts**
 - Describe the components of the RPAS (RPA, RPS, C2) envisioned to receive Type Design approvals with supporting rationale
 - Describe the components of the RPAS (RPA, RPS, C2) envisioned to receive a Certificate of Airworthiness with supporting rationale
 - Describe concepts and approach to continuing airworthiness
 - Describe the configuration control measures to be applied to the RPAS as a system for ensuring conformity to approved type design
 - Investigate implications of the C2 link and C2 service provision on the design and airworthiness of the RPAS
 - Decompose the responsibilities of the States of Design, Manufacture, Registry and Operator for the RPA, RPS and C2 provision



2- The RPAS Manual -1st Edition

2.1 Purpose, intent and scope

2.2 Governing Principles

2.3 Type Certification

2.4 Airworthiness Certificates and relationships

2.5 RPAS Future Considerations

RPAS Manual, Chapter 4 - Airworthiness

- 4.1 Introduction
- 4.2 General
- 4.3 Governing principles
- 4.4 Initial certification
- 4.5 C2 link
- 4.6 Flight manual
- 4.7 Continuing airworthiness
- 4.8 Configuration deviation list (CDL) and Master minimum equipment list (MMEL)
- 4.9 Design oversight
- 4.10 Design organization approval
- 4.11 Production
- 4.12 RPAS product integration
- 4.13 Airworthiness certification
- 4.14 RPAS configuration management records
- 4.15 Continuing validity of certificates
- 4.16 Operation
- 4.17 Responsibility of States of design, manufacture, registry and operator
- 4.18 Considerations for the future



2.1 Purpose, Intent and Scope

- **Purpose:** Provide guidance and information concerning selected aspects of aeronautical activity
 - Facilitate the uniform application of international Standards and Recommended Practices (SARPs)
- **Intent:** Develop the regulatory framework to support integration of unmanned aircraft systems into the existing non-segregated manned aviation environment, including at aerodromes
- **Scope:** Focus on international civil aviation, but only insofar as uniform application by all contracting States is necessary or desirable to ensure safety of international air navigation



2.2 Governing Principles

- **Only the RPA is recorded on the aircraft register**
- **The RPA is issued a Certificate of Airworthiness by the State of Registry**
 - Encompasses all required components of the RPAS (RPA, RPS, C2 link)
- **RPS should not control more than one RPA at a given time**
- **Remote pilot-in-command is expected to have continuous control over the RPA**
 - Interruption of the C2 link is considered an abnormal operating condition
 - RPAS Design should take into account potential interruption of the C2 link and failure consequences from the perspective of safety
 - Duration of the interruption or the phase of flight may elevate the situation to an emergency

2.2 Governing Principles (2)

- **The RPAS as a system, comprised of the RPA, approved RPS(s) and the C2 link(s), provided an implicit design approval through a Type Certificate issued to the RPA**
- **RPA receives an individual CofA which includes the RPS(s) and C2 link(s)**
- **RPA considered airworthy, when RPAS demonstrates conformity to approved type design and compliant with instructions for continuing airworthiness**
 - Regulatory inspections and applicable Airworthiness Directives should ensure the RPAS is maintained in a condition for safe operation
- **RPA equipped in accordance with applicable operational equipage requirements for operations in the type and class of airspace and flight rules e.g. VFR or IFR**

2.3 Type Certification

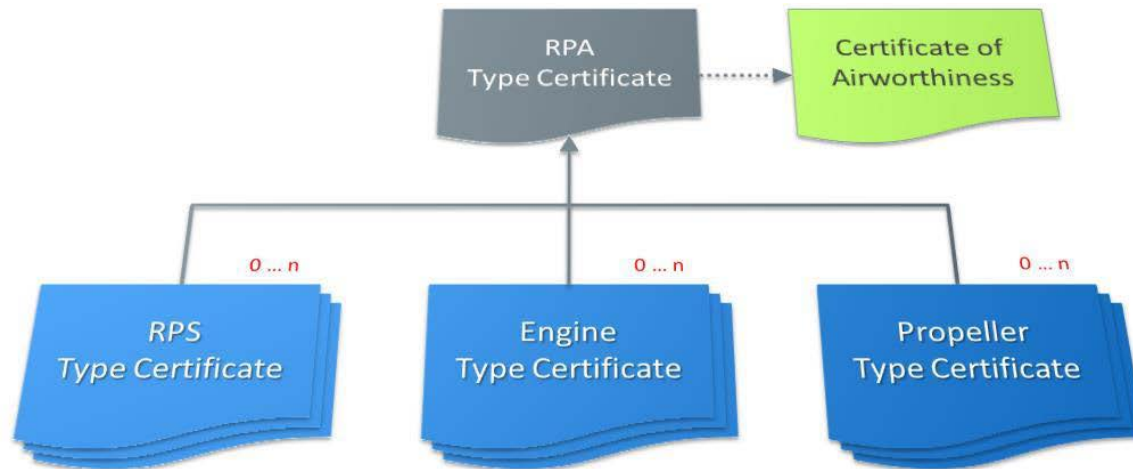
- **Issuance of an aircraft Type Certificate by the State of Design**
 - Provides evidence that the design has been found to comply with applicable design standards
- **Major components (e.g. engines, propellers) may also hold type certificates**
 - RPS may hold a Type Certificate
- **RPA TC holder is responsible for fully integrating all components**
- **The application for TC should be accompanied by all necessary documentation**
 - Design documentation
 - Flight manual
 - Instructions for continued airworthiness
 - Normal and emergency procedures
 - Applicable handover procedures between RPS
 - Details of the required C2 link(s)
- **The C2 link is not a “product” - it will not be independently type certificated**



2.4 Airworthiness Certificates

- **The RPA is the airborne component of the RPAS**
- **Certificate of Airworthiness required for Aircraft conducting international operations**
 - Article 31 of the Chicago Convention
- **The State of Registry issues Certificate of Airworthiness to the RPA**
 - Conditional on demonstration that RPA, RPS(s) and other components conform to the type design and are in a condition for safe operation
- **Configuration Management Record defines all components of the RPAS**
 - Provides traceability of reconfigurations or part changes
 - May require extension of existing processes to capture RPAS components and their integration

2.4 Airworthiness Certificates



Aeronautical Products That May Have a TC	
Manned Aircraft	Remotely Piloted Aircraft
Aircraft <i>(on which other products are mounted)</i>	RPA
Engine	Engine
Propeller	Propeller
-	RPS

2.5 RPAS Future Considerations

- **Chapter 4 does not provide specific guidance on procedures for type design and airworthiness certification (compliance demonstration and data)**
 - Lack of sufficient operational service history and certification experience with RPAS
- **States are encouraged to establish procedures which may be reflected by ICAO in future certification guidance and SARPs**
- **The complexity of the distributed RPAS system will be difficult to manage from both the operational and regulatory oversight requirements**
 - Configuration management focused at the aircraft level
- **Expect that developing RPAS industry will demand greater flexibility**
 - Need may arise to enable configuration management and maintenance management of RPS across multiple States based on international principles and standards.



3. RPASP Working Group 1 - Airworthiness

3.1 RPAS Manual to SARPs

3.2 Interrelations with other ICAO Panels

3.3 Tasks and organization

3.4 Schedule



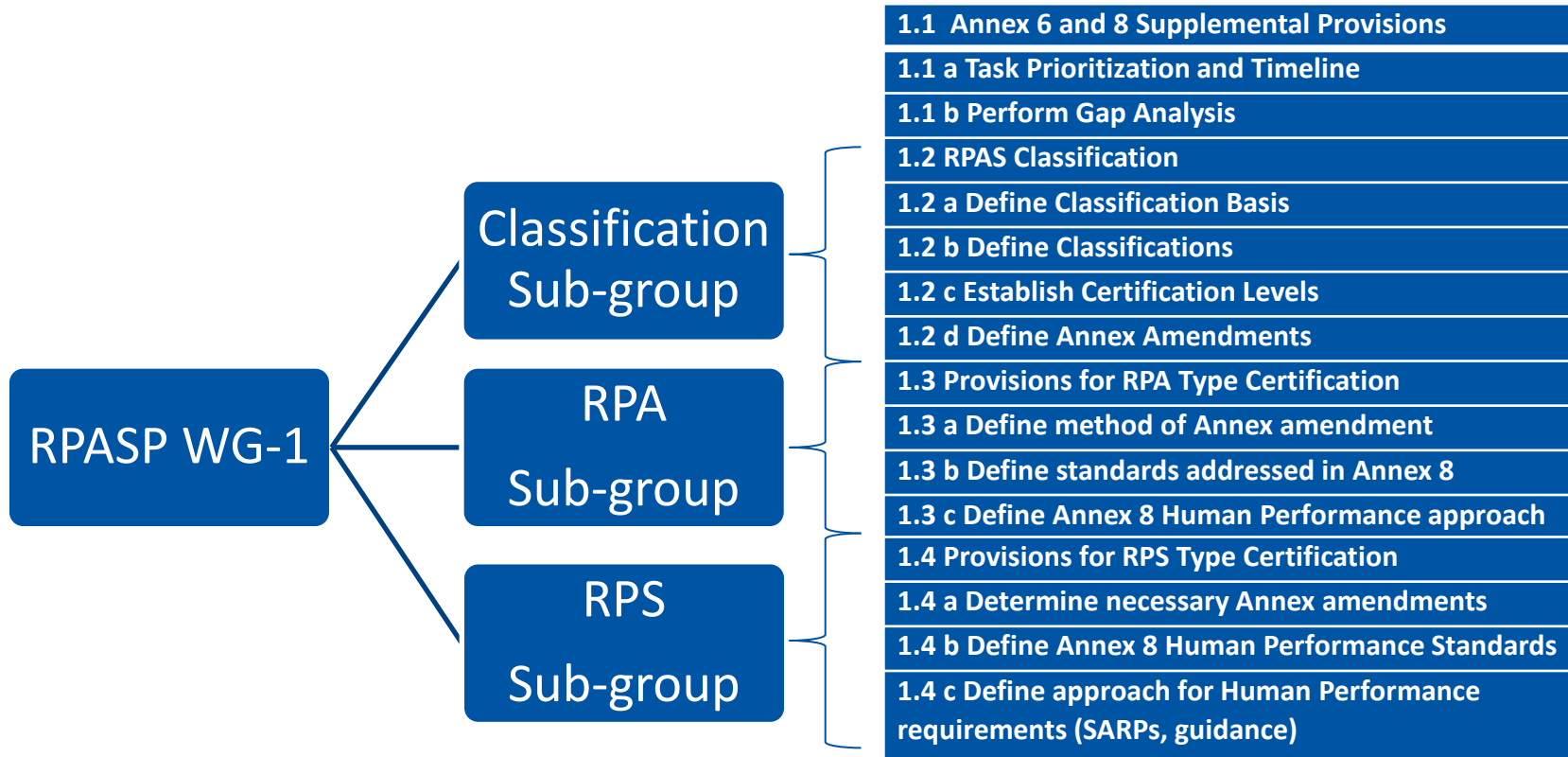
3.1 RPAS Manual to SARPs

- **RPAS Manual Chapter 4**
 - Manual content high level guidance to States for consideration for performing Type Design and Airworthiness Certification
 - Does not represent level of detail for Standards and Recommended Practices (SARPs)
 - Necessarily general in the absence of SARPs
- **RPASP WG-1 SARPs**
 - WG-1 to develop an approach to for amendment of Annex 6 and Annex 8 for RPAS Initial and Continuing Airworthiness
 - Categorization approach for RPA, RPS
 - Determination of RPS as an Aeronautical Product (e.g. receives Type Certificate)
 - Establish standards for issuing design and airworthiness approvals for RPA and RPS
 - Establish type design and airworthiness approach for C2 service provision

3.2 Relationship with other WG and ICAO Panels

Task Area	RPASP Working Group	External Panel
1.1 Annex 6 and 8 Supplemental Provisions	-	-
1.2 RPAS Classification	WG-4, WG-5, WG6	AIRP
1.3 Provisions for RPA Type Certification	WG-2, WG-3	AIRP
1.4 Provisions for RPS Type Certification	WG-2, WG-3	AIRP
1.5 Provisions for Continuing Airworthiness	WG-5	AIRP
1.6 Develop RPA Certificate of Airworthiness Template	-	AIRP
1.7 Develop C2 Airworthiness Provisions	WG-2, WG-3	AIRP

3.3 WG-1 Tasks and organization



3.4 Working Group 1 Schedule

ID	Task Name	Q4 14	Q1 15			Q2 15			Q3 15			Q4 15			Q1 16		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	1.1 Annex 6 and 8 Supplemental Provisions	▲															
2	1.2 RPAS Classification	▲	■										▲				
3	1.3 Provisions for RPA Type Certification	▲	■										▲				
4	1.4 Provisions for RPS Type Certification	▲	■										▲				
5	1.5 Develop provisions for Continuing Airworthiness									▲	■						▲
6	1.6 Develop RPA CofA Template										▲	■				▲	
7	1.7 Develop C2 Airworthiness Provisions									▲	■						▲
8	RPASP/WG-1 Meeting Schedules				▼	■										▼	
9	RPASP-1/mini				▲												
10	RPASP-2							▲									
11	RPASP-3															▲	
12	RPASP WG-1c						▲										
13	RPASP WG-2a										▲						

4. Concluding remarks – what we have covered

- **UASSG/RPASP History, Objectives and Transition**
- **The RPAS Manual - 1st Edition**
 - Purpose, intent and Scope
 - Governing Principles
 - Type Certification
 - Airworthiness Certificates and relationships
 - RPAS Future Considerations
- **RPASP Working Group 1 - Airworthiness**
 - From Guidelines to proposed' SARPs for RPAS's
 - Interrelations with other ICAO Panels
 - Tasks and organization
 - Schedule



ICAO

North American
Central American
and Caribbean
(NACC) Office
Mexico City

South American
(SAM) Office
Lima

ICAO
Headquarters
Montréal

Western and
Central African
(WACAF) Office
Dakar

European and
North Atlantic
(EUR/NAT) Office
Paris

Middle East
(MID) Office
Cairo

Eastern and
Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Sub-office
Beijing

Asia and Pacific
(APAC) Office
Bangkok



THANK YOU



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UNITING AVIATION

RPAS2015

Back-up Slides



3.3 WG-1 Work Tasks

1.1 Annex 6 and 8 Supplemental Provisions

1.1 a Task Prioritization and Timeline

1.1 b Perform Gap Analysis

1.2 RPAS Classification

1.2 a Define Classification Basis

1.2 b Define Classifications

1.2 c Establish Certification Levels

1.2 d Define Annex Amendments

1.3 Provisions for RPA Type Certification

1.3 a Define method of Annex amendment

1.3 b Define standards addressed in Annex 8

1.3 c Define Annex 8 Human Performance approach

1.4 Provisions for RPS Type Certification

1.4 a Determine necessary Annex amendments

1.4 b Define Annex 8 Human Performance Standards

1.4 c Define approach for Human Performance requirements (SARPS, guidance)

1.5 Develop provisions for Continuing Airworthiness

1.5 a Validity of Certificates

1.5 b Maintenance Requirements

1.5 c Configuration Control

1.6 Develop RPA CofA Template

1.7 Develop C2 Airworthiness Provisions

1.7 a Design Approval

1.7 b Airworthiness conformity approval

1.7 c Continued Airworthiness

1.7 d CofA Validity

1.7 e Operator Aspects

1.7 f Oversight Requirements