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The Impact of New International Standards for Remotely Piloted Aircraft

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Introduction

As per the International Civil Aviation Organisation (ICAO), a Remotely Piloted Aircraft (RPA) is an unmanned aircraft controlled from a remote pilot station. It is expected to be integrated into the air traffic management system on par with manned aircraft, and real-time piloting control is provided by a licensed remote pilot.[1]

This means that RPAs are a subset of Unmanned Aircraft Systems (UAS), where the flying pilot is not on board the aircraft. The RPA System consists of two elements:

(a) Human-Operated Remote Pilot Station(s): Remote pilot stations are operated by humans and are typically stationed on land or in ships, although they can also be found on other aerial platforms.

(b) A Command and Control System: It is a communication, command and control system and it includes data links and other system elements that connect the remote pilot station to the RPA, essentially the instruments, transponders and the cable network.

Current Applications of RPAs

The armed forces across the globe have been using the RPAs since the 90s. They are used in various roles like intelligence, Surveillance and Reconnaissance (ISR), combat in counter-terrorism operations and also in conventional wars as seen in the Russia-Ukraine war, electronic warfare, logistical support, security patrolling and communication relay, etc. These were generally flying in military airspace under the control of the armed forces. They were kept out of the civilian airspace and mostly did not cause any threat to the civilian population. This arrangement did not trouble the civilian Air Traffic Services or the aviation regulatory bodies.

The civilian usage of this technology was restricted due to the absence of regulations. After the release of liberalised Drone Rules in August 2021,[2] roughly 90 per cent of the airspace was designated as a 'Green Zone', and drones could only operate up to 120 meters (400 ft) vertically. The Yellow zone is further subdivided into outer and inner as per distance from high-security installations (Military Stations, Airfields, etc.). The flying of drones/RPAs in the red zone, which extends up to 5 Kilometres from the high-security installation, is prohibited unless special permission has been obtained from the Air Traffic Controller (ATC) or the relevant controlling authority.

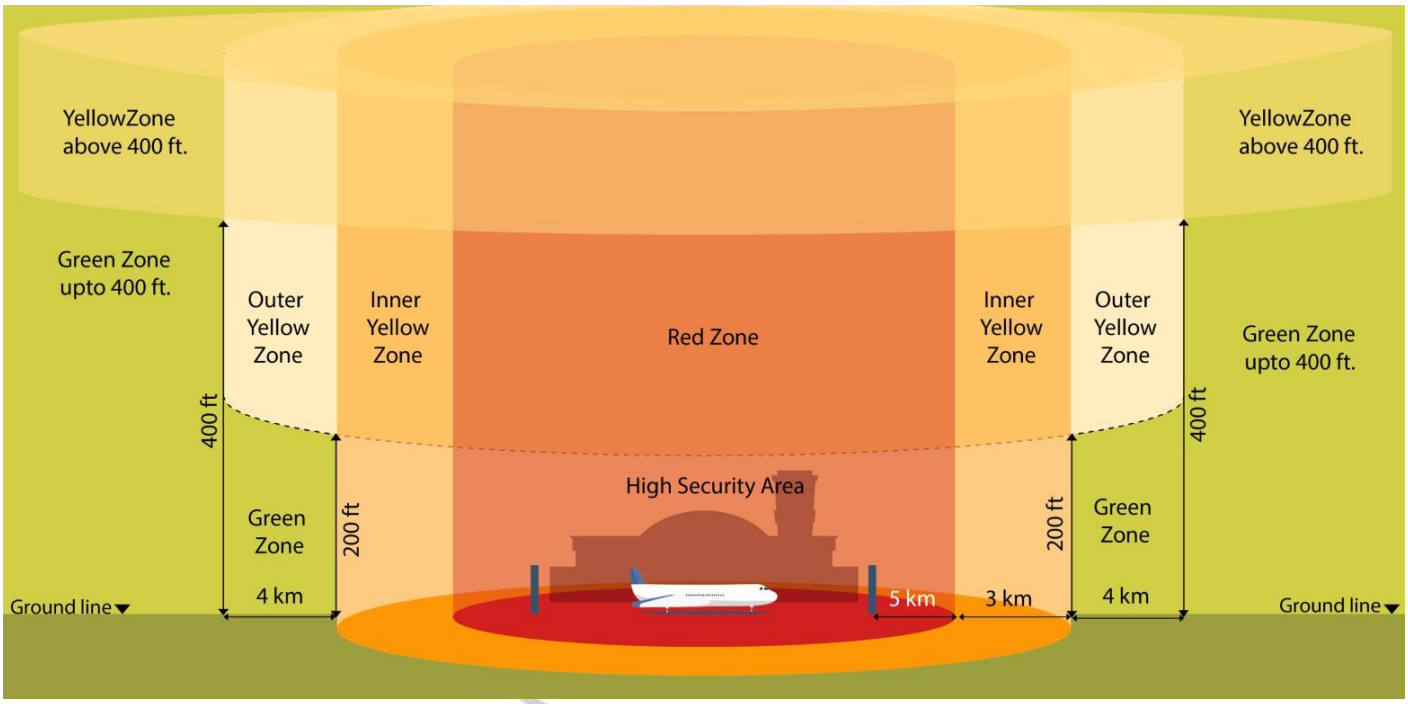


Figure 1: Demarcation of flying zones for RPA (Source: https://dronepilotsindia.com/drone-air-space-map-india/)

The requirement for registration and security clearances to operate non-commercial drones in the green zones was eliminated by these rules. Additionally, they did away with the need for a remote pilot license for nano and micro drones (up to 2 kg) used for non-commercial purposes such as research, teaching etc. The import and foreign ownership of Indian drone companies were also allowed, which acknowledged the growth need of startups.

The drones and the RPAs have great untapped potential for last-mile delivery solutions[3] and delivery of critical supplies during events such as drought, floods, earthquakes, and other disasters. The RPAs are regularly being used in a wide variety of missions, including

(a) Monitoring Security

(b) Responding to emergencies, including participating in search and rescue

(c) Delivering medicinal drugs and automated external defibrillators (AEDs)

(d) Enabling data communication and information broadcast in remote areas

(e) Transporting small packages and bulk cargo

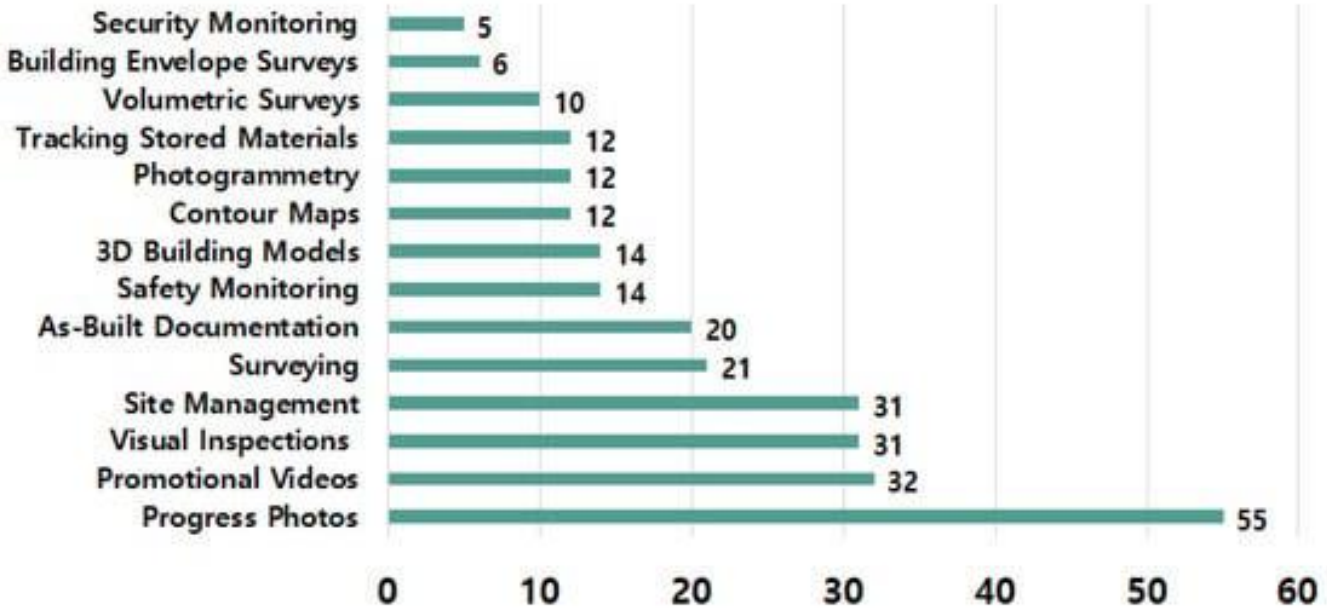
(f) Examining structures with spectral, visual, and thermal analysis

(g) Monitoring linear network infrastructure, such as pipelines, power lines, and railroad tracks

(h) Applying chemicals and fertilisers to agriculture

(i) Inspecting aircraft external maintenance and airport infrastructure

(j) Studying the atmosphere and recording the consequences of global warming.



Drone Application Results from Survey Companies (Source: https://www.mdpi.com/2504-446X/7/8/515)

Need for New International Standards

Due to the rapid growth of drones in the last few years, the potential risks involved have also increased. Various countries have addressed the operation of Unmanned Systems in their local regulations. The Ministry of Civil Aviation (MoCA) in India released new regulations for drone operations on August 26, 2021. On February 15, 2022, the Drone (Amendment) Rules 2022 revised the original regulations. The civilian purpose drones were being operated in the local areas, and there was hardly any need for them to cross one country's airspace and enter another country's airspace like the airliners, but now, with the increased ranges, these drones will surely be crossing airspaces as the airliners do. Aviation regulatory bodies like ICAO felt the need to address this issue. The new International Aviation Standards (SARPs) for Remotely Piloted Aircraft Systems (RPAS)[4] are aimed at:

(a) Safety Integration: Drones are increasingly sharing airspace with manned aircraft. Clear guidelines are needed to prevent collisions and ensure the safety of both.

(b) Standardisation: Without common rules, operating procedures for drones could vary from country to country. This could create confusion and hinder the development of a global drone industry.

(c) Operator Requirements: Just like traditional pilots, RPAS operators need proper training and certification to ensure they understand safety protocols and can handle their aircraft responsibly.

(d) Technical Specifications: Standards are needed for things like manufacturing, maintenance, and communication links to guarantee the airworthiness of drones and prevent technical malfunctions

New Standards and Recommended Practices (SARPs)

ICAO announced[5] these amendments on April 05, 2024, which include provisions for RPA's airworthiness requirements. Adoption of these new SARPs encompasses amendments to 15 of the 19 Annexes to the Convention on International Civil Aviation, along with the approval of a new Procedure for Air Navigation Services (PANS) on Information Management. The integration of Remotely Piloted Aircraft Systems (RPAS) into the aviation system has been advanced through the council's adoption of Part IV International Operations—Remotely Piloted Aircraft Systems to Annex 6–Operation of Aircraft.

S No	Annex No	Reference Document	Amendment No
1	1.	Personnel Licensing	179
2	2.	Rules of the Air	48
3	3.	Meteorological Service for International Air Navigation	81
4	4.	Aeronautical Charts	62

5	6.	Operation of Aircraft, Part I – International Commercial Air Transport – Aeroplanes,	49
6	6.	Part II – International General Aviation – Aeroplanes	41
7	6.	Part III – International Operations – Helicopters	25
8	6	Part IV – International Operations — Remotely Piloted Aircraft Systems	New Annex
9	8	Airworthiness of Aircraft	110
10	10	International Aeronautical Telecommunications, Volume II — Communication Procedures including those with PANS status	93
11	10	Volume III — Communication Systems	92
12	11	Air Traffic Services	53
13	12	Search and Rescue	19
14	13	Aircraft Accident and Incident Investigation	19
15	15	Aeronautical Information Services	43
16	-	New Procedures for Air Navigation Services — Information Management (PANS-IM, DOC 10199)	New Doc

Table 1: Summary of the Annexures Amended. (Source: The table has been created by the author based on the ICAO-approved amendments to Annexure 1 to Annexure 15 to the 'Convention on International Civil Aviation', https://www.icao.int/safety/airnavigation/NationalityMarks/annexes_booklet_en.pdf)

Impact in the Near Future

The aim of any aviation regulation should be to ensure safe, secure and efficient operations. The speed of the growth of the unmanned industry is much faster than that of the conventional aircraft industry. Modern UAS regulations were being addressed by the national aviation bodies so far and these systems were generally flying within the national airspace boundaries. With the enhanced battery efficiency, longer ranges have become possible.

Increased Accountability: Similar to an Air Operator Certificate (AOC), RPAS operators will need to possess a particular operator certificate (ROC). This is a significant step in the right direction for RPAS integration with the aviation system.

Proficiency Certification: The regulatory framework for the issuing of remote pilot licenses, the airworthiness standards unique to RPAS, and the guidelines for C2 links frequency bands, protocols, and systems were previously approved by the council.

Improved Navigational Performance: The remote pilot license, the airworthiness certificate, and the RPAS operator certificate are the three essential requirements for international air navigation that these rules collectively meet.

Enhanced Information Sharing: The risk of giving Air Traffic Management (ATM) service providers and operators erroneous or incomplete information is reduced by the new Standards.

Optimisation of Air Routes and Reduction in Carbon Footprint: The optimisation of air routes and networks will be made easier by the improved information sharing made possible by these standards, which will help lower the CO2 emissions associated with aviation.

Unification of Airspaces: The use of the "Flight and Flow—Information for a Collaborative Environment" (FF-ICE) idea is one of the major developments. Establishing a completely cooperative atmosphere that permits the sharing and optimisation of flight trajectories at every phase of flight is the ultimate goal. The FF-ICE idea is flexible enough to be implemented in phases and incrementally, meeting a variety of operational needs and deadlines in various countries and areas.

Notes:

[1] International Civil Aviation Organisation, "Rules of the Air", Annex 2 to the Convention on International Civil Aviation, July 2005, https://www.icao.int/Meetings/anconf12/Document%20Archive/an02_cons%5B1%5D.pdf. Accessed on April 10, 2024.

[2] Ministry of Information and Broadcasting, "The Drone Rules, 2021", PIB, January 28, 2022, https://static.pib.gov.in/WriteReadData/specificdocs/documents/2022/mar/doc202232932501.pdf. Accessed on April 5, 2024.

[3] Hee-Wook Choi et al., "An Overview of Drone Applications in the Construction Industry", Intelligent Image Processing and Sensing for Drones, *Drones*, 2023, https://www.mdpi.com/2504-446X/7/8/515.

[4] International Civil Aviation Organisation, "ICAO Council adopts new international aviation Standards and Recommended Practices for remotely piloted aircraft systems", https://www.icao.int/Newsroom/Pages/ICAO-Council-adopts-new-international-aviation-Standards-and-Recommended-Practices-for-remotely-piloted-aircraft-systems.aspx. Accessed on April 10, 2024.

[5] ibid.