



The DJI Phantom 4 drone – a much more updated version of the original Phantom 1

THE EVOLUTION OF CIVIL DRONE REGULATIONS

By Andre P Meredith

World Airnews guest columnist SAAF senior staff officer air certification and author of 'The Drone Safety Handbook' Andre Meredith looks at the new system of regulation of these unmanned aircraft and what it means for operators world-wide.

Drones started appearing on the civil market towards the latter half of the previous decade, but it could be argued that it was the appearance of the venerable DJI Phantom 1 in January 2013 that served as the catalyst for the drone revolution. Whether this is true is not, one thing is certain: civil drone use has soared and seen exponential growth during the last five years, and it seems there is no end in sight to this trend.

In fact, the last unofficial count indicated in excess of 45000 civil drones in South Africa alone, and in excess of a million in the USA. These figures would include all machines used for both commercial and recreational purposes.

This, of course, would be no cause for alarm if the objects of interest were earth-bound. But the fact is - drones are aircraft in their own right, and as such, regardless of what they are used for, they have the potential to be flown amongst other aircraft, over private property or close to unsuspecting bystanders. This, in turn, would suggest that irresponsible, ignorant or reckless use of a drone could put it on a collision course with another manned aircraft which could endanger the lives of members of the public. Neither of these scenarios have rosy endings.

It did not take long for national aviation regulators to figure this out and soon many started taking pro-active measures to try and keep the unthinkable from happening. This led to the creation of what could be called 'early drone regulations', between 2013 and 2017. It was underscored by the knowledge of drone

technology and operations at the time, and was often based on existing manned aviation legislation – simply because it was familiar territory with a proven and robust safety record.

The promulgation of formal drone regulations also gave rise to some new terminology, including the term Remotely Piloted Aircraft System, or RPAS, describing the drone system. It married the aircraft (the Remotely Piloted Aircraft, or RPA) with its ground-based elements, to take into account the complete Unmanned System.

In contrast, the term Remotely Piloted Vehicle, or RPV, had been used throughout the 1990s by some defence forces. The new term was quickly adopted by many aviation regulators, but this created a lot of confusion amongst drone operators.

Popular culture and the mainstream media had, by then, cemented the terms "drone" and "UAV" in the minds of drone operators throughout the world, and aviation regulators were soon battling to partner with their target audience – in no small part due to the use of a foreign term for the aircraft in question.

Be that as it may, the initial efforts to develop a regulatory framework for drone operations was in no small part spearheaded by the ground-breaking work performed by the Joint Authorities for Rulemaking on Unmanned Systems (JARUS). JARUS was formed by a small group of experts from national European Aviation Regulators facing a common problem: how to safely and effectively regulate the skyrocketing commercial drone sector. The small group of experts met and pooled their knowledge and started crafting practical guidelines for drone reg-



ulations, and fed this back to their respective national authorities.

The success of the initial work performed by JARUS soon spread and to date JARUS membership has expanded to 140 members across 59 countries. It includes membership and active participation by the South African Civil Aviation Authority (SACAA).

This active participation by the SACAA in international forums, including JARUS, played a significant role in the creation of the Part 101 RPAS Operating Regulations, which was promulgated in July 2015.

Although a water-tight, robust and effective system from a safety point of view, it was modelled (like many early drone regulations) on existing manned aviation regulations, and the complexity of the process placed undue pressure on both the Operator and the Regulator towards compliance.

This has had severe repercussions on the South African Commercial RPAS industry. As a result, many commercial RPAS operators simply elected to bypass the arduous, lengthy and costly Remote Operator Certificate or ROC application process and operate "under the radar" – at risk of being prosecuted, of course, but at least operating instead of being ground-

ed for up to two years waiting for approval.

South Africa was one of the 'early adopters' of drone regulations. Other countries (including the USA and the EU) opted to hold back on the promulgation of formal drone regulations - taking more time to prepare a workable and efficient system and perhaps even use the opportunity to learn from the mistakes others had made.

JARUS, in the meantime, progressed with the development and refinement of their proposed regulations - primarily in support of the European environment - but other nations have started to take notice of this. The JARUS-proposed Regulatory Model is risk-based, slotting all drone operations into three operational categories: Open, Specific or Certified. Each Operating Category delineates the type of operation (and associated limitations and restrictions) as a function of the level of risk to Third Parties. This is a great way to manage the safety of drone operations regardless of the technological advances being made.

Another major change being promoted by JARUS, ICAO and the European drone community is a new system for the naming of unmanned aircraft. In essence, all unmanned aircraft will be grouped as follows:

Group 1:	Remotely Piloted Aircraft Systems (RPAS)	
Group 2:	Unmanned Aircraft Systems (UAS) or Drones	Large Unmanned Aircraft Systems (LUAS)
		Small Unmanned Aircraft Systems (SUAS)

The regulations (once promulgated) will probably contain more details, but in essence small UAS will be "capped" at a mass ceiling of 25kg MAUW, while true RPAS will be only those systems requiring Type Certification, showing compliance with the requirements of ICAO Annex 8 – think "unmanned Airbus A320s." Large UAS will be everything in-between.

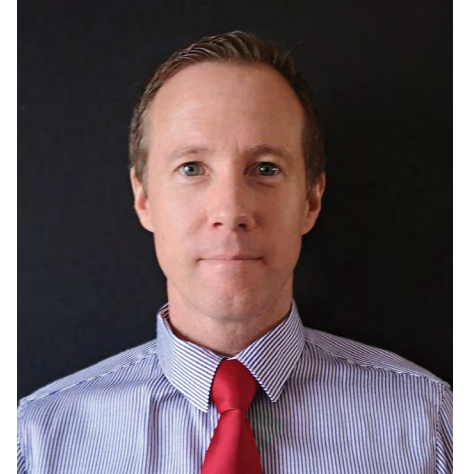
The proposed Operational Categorisation Model further addresses the operational nature of the Organisation and helps to define additional requirements such as drone registration, specific operating limits, pilot competency levels and overall level of rigour required towards the issuing of an appropriate flight authorisation.

The Open Category, for example, provides a set of predefined operating limitations (e.g. maximum aircraft take-off mass, maximum operating altitude, line-of-sight restrictions, time-of-day restrictions, limits regarding proximity to members of the public and so on). If your operating requirements fall within these pre-set conditions you may fly within the bounds of the Open Category without any additional oversight, authorisation or licensing from the Aviation Regulator. This would probably meet the needs of the entire recreational drone sector and even a major segment of the commercial sector. It could even meet the needs of as much as 90% of all civil drone operations, leaving only the remaining 10% for detailed oversight by the Regulator. It all depends how the Open Category is defined through individualised legislation.

The Certified Category will be reserved for large, complex operations utilising very large and highly complex Type Certified RPAS (as defined through the new nomenclature system). Operations within this Category will require operation by individuals having formal Remote Pilot Licenses and under auspices of Organisations having obtained Remote Operator Certificates (or equivalent). It will require full and formal oversight by the Aviation Regulator and will in all probability mirror existing manned aviation certification and accreditation processes.

All drone operations not falling within the either the Open or Certified Categories will be covered by the Specific Category. These operations will be flown by pilots requiring a remote pilot competency of sorts and be authorised through the issuing of a more simplistic flight authorisation by the Aviation Regulator.

In order to help facilitate categorisation and help Operators determine whether they fall within the Specific or Certified Categories, JARUS have developed a handy tool called the Specific Operations Risk Assessment, or SORA. Commensurate with the proposed legislative approach, the SORA is a risk-based tool and helps the user to determine the level of risk associated with the type of operations envisaged. Based on the result, the Operation is then either compartmentalised into the Specific or Certified Category. The Operator should then follow the regulatory instructions and guidelines to meet the requirements of the applicable Category.



WHO IS ANDRE P. MEREDITH?

Meredith is the author of The Drone Safety Handbook. He has extensive knowledge on the subject. He has recently launched a new website to expand his services beyond the Drone Safety Handbook - see here: <https://www.mysafedrone.co.za/>. In addition he has partnered with a UK drone consortium called Drone Major Group (see here: <https://dronemajor.net/brands/drone-safety-services>) who market services on behalf of drone service providers.

The new process developed by JARUS and being rallied for adoption by EASA, is but one of a series of changes being made to "early drone regulations" by other major aviation regulators. This includes the likes of Transport Canada and the FAA, where the lessons learned are being applied to improve and streamline existing processes. It is, however, the Categorisation system being prepared for the European operating environment which carries the most appeal, as it offers major fiscal and administrative benefits to commercial and recreational drone owners, whilst still managing the hazards associated with high-risk operations. It also has the potential to relieve pressure from the Aviation Regulator by significantly reducing the amount of "hands-on" oversight, inspections and overall administration.

EASA is set to promulgate the new Category-based drone regulations before the end of 2019. It would be advantageous for other authorities, including the SACAA, to investigate this model for possible adaptation to their operating environments.

It may still take some time to reach the optimal solution, but it is clear that world-wide aviation authorities, regulators and advisory bodies working hard towards the development of new regulatory models to enable more effective and efficient drone operations – without sacrificing safety. It is undoubtedly only a matter of time before the same processes are applied within context of the South African drone landscape. ➔