CONTRIBUTING STAKEHOLDERS

International Federation of Airline Pilots Associations

By Capt Thomas Milderberger

What is a DUO? Can you eat it? Is it a type of chocolate bar? In this case it's something less tasty, in NATO's nomenclature it's the definition for a UAS pilot or designated unmanned aerial vehicle operator, who happens to belong to the Army instead to the Air Force. So then do the armies of NATO think these soldiers unworthy of the title "pilot"? It seems to be the case.

But lets compare the duties of a DUO or a UAS pilot for that matter to those of a pilot of a manned aircraft. The International Civil Aviation Organisation (ICAO) defines an aircraft as «any machine that can derive support in the atmosphere from the reactions of the a ir other than the reactions of the air against the earth's surface.» Undoubtedly, this definition fits manned aircraft as to an UA. Let's look further into the issue.

ICAO defines for a responsible person civil aircraft thus: This person «shall, whether manipulating the controls or not, be responsible for the operation of the aircraft in accordance with the rules of the air». You'll notice that there is no exception on the basis of the aircraft's size or if it is operated by controls on board or remotely. This principle is not aviation specific. If you undertake an action, which bears a risk, like e.g. driving a car, operating a nuclear plant, or fly an aircraft, you are usually responsible in legal terms. In our world, ICAO defines this person, the «pilot-in-command" as the "The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.». Again, in ICAO's view there is no difference between manned and unmanned operation.

So then what does ICAO say about the qualifications a «pilot-in-command» must hold? Annex 1 defines the need to have a license for all aeroplanes (that is, 'power-driven aircraft', as well as for glider-, balloon-, helicopter- and powered lift-designs. The only exception is an airship below a certain size (less than 4600 cubic metres volume to be exact). No exception for size in the other categories. If a UAS-design fulfils these criteria, a license for the pilot-in-command seems to be necessary. To re-iterate, ICAO does not distinguish whether the UAS is operated by the Army, the Air Force, or a civilian operator.

The procedures to distinguish the necessary abilities and knowledge for the pilot-in-command focus to a large extend on the kind of operation, or, generally spoken, on the extent of 'possible damage' to third persons, be it passengers, other airspace users or people on ground. Obviously, most of the rules and regulations however have been written with the different aspects of manned aviation in mind. What are then the similarities, what the specifics of unmanned aviation as regards the pilot-in-command? Using the same airspace and following the same legal framework, obviously the same theoretical knowledge is necessary. Of course, this can be modified for the specifics of UAS operations: datalink-specifities, unusual launch-/recovery-methods, different and additional emergency-procedures, and so on. In any case there should be at least the same knowledge required than of a pilot-in-command of a manned aircraft in a similar type of operation.

The issue becomes tricky when we come to the practical skills. Not only do we have an experience of more than 100 years in manned aviation to determine the necessary practical skills, but also because modern air transport is such an important part of modern life, a lot of research goes into all aspects of human performance issues and how to optimise modern assistance systems for pilots in order to keep the system with its growing size 'safe'.

On the one hand, this research can to a large extent enhance safe operation of unmanned aircraft: As both, air transport as well as most UAS-operation involves more than one human (e.g. in the case of the UAS: pilot and observer, if not more), procedures like CRM, which are well established in manned aviation might very much help to ensure safe UAS-operation. CRM - Crew Resource Management - is «using all available human, informational and equipment resources towards the effective performance of a safe and efficient flight in an active process by crew members to identify significant threats to an operation, communicate them to each other and to develop and take measures to avoid or minimise the risk in order to provide a primary line of defense against threats to safety that exist in the aviation system and against human errors and its consequences». It also involves findings in error-management and decision-making.

On the other hand, the divergence regarding necessary skills to 'fly' the UA is much broader than in manned aviation.

Because the designs of all air transport aircraft and the required skills are so similar due to the underlying legal framework, it is in general no problem for a normal line pilot to transition from one type to another within 6 weeks.

If you however compare, the 2 flagships of unmanned flying and their underlying concepts, the RQ-4 Global Hawk and the MQ-9 Predator, a much bigger gap in the necessary skills appears: A «remotely flown» concept in the form of the Predator, where the UAS-pilot-in-command has to fly manually with the same skillset than a pilot of a manned aircraft, but having less spatial clues. On the other hand the Global Hawk, which cannot be flown manually at all. The only direct manipulation possible are some lower-grade autopilot-modes like heading, vertical speed or speed. Depending on your preparatory training, if you want to change from flying a Global Hawk to flying a predator, your practical flying skills need to go from 0 to 100%. As stated earlier, the missing clues might demand even more practical training than from a pedestrian to a pilot of a manned aircraft of similar complexity.

Flying an aircraft from a remote position implies some additional considerations. Even in today's airliners, pilots derive important parts of their situational awareness of basic sensations, such as sound, rumble, vibrations and accelerations, not to mention additional cues like smell or temperature. Many of these clues are not sensed or transmitted by current UA's. As a consequence, the pilot of an unmanned aircraft has to derive his situational awareness either without these cues or with cue conditioned by the system (e.g. translated into an optical indication) , which might make additional awareness or information processing skills necessary. This additional effort is intertwined with periods of boredom, where no action, but also no 'flying sensation' exists. Already do we observe a faster rate of fatigue for UAS-pilots compared to manned aviation.

Although the assertions above are aimed at bigger UAS, some considerations regarding the so called Micro-light UAS: As they are normally not intended to cross borders or fly in common airspace and might not pose a considerable danger in operation, the legal framework might not apply or only apply to a limited extent. It has to be understood however, that from a professional standpoint, this class has to be strictly limited regarding size and performance to allow for such relaxation of rulemaking.

To return to the original question: What is the difference between a UAS-pilot and a manned aviaiton-pilot? One thing is certain the difference is not as great as initially thought and training and licensing UAS pilots must reflect that.