

COMPARATIVE ASPECTS REGARDING THE REGULATION OF UNMANNED AERIAL VEHICLES

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Abstract. *The technology of unmanned aerial vehicles (UAV) has constantly developed in the last decade, becoming a key feature of the military programs and operations in Europe and the US, and the industry market has considerably grown. The vast majority of this growth is at the US level, whose military budget is bigger than of any other state in the world. On the other hand, with respect to the civil market, the sale of these kinds of aircrafts is in its initial stages, even though there are lots of fields in which it can be applied. In general, the states have begun to take legislative measures so that the unmanned flight of such an aircraft in areas open to civil aircrafts is controlled, so that any danger to the civil aircrafts should be avoided. The countries of the European Union that have not legislated this field are subject to Regulation 216/2008/EC regarding common norms in the civil aviation field and the Chicago Convention. Furthermore, all EU states are NATO members and thus apply in principle the norms established by the North-Atlantic Organization.*

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1. Introduction

The unmanned aerial vehicles, „the drones”, represent the most important innovation undertaken over recent years in the military field. If until recently the drones were used only in warfare, they might become as soon as possible ubiquitous. Starting with agriculture and archaeology and continuing with journalism, the drones promise to transform numerous fields in the coming decades, marking an unprecedented change in our everyday lives.

The unmanned aerial vehicles (UAV), also known as drones, are planes either controlled by the ground "pilots", either increasingly; have autonomy following a prescheduled mission. Although dozens of different types of drones exist, these are in principle falling into two categories: those

who are used for recognition and monitoring purposes and those who are armed with rockets and bombs [1].

At NATO level, taking into account the increasing number of military operations using UAV aircrafts, it was decided to set up a coordination structure of this field. In 2006, through the unification of the created institutions, already in 1990, the *Group of capabilities for the unmanned aerial vehicles* (JCGUAV) was created, governed by the Group for Naval Armaments (NNAG). Then the Agreement for standardization of fixed-wings UAV was drafted, weighting over 150 kg, the STANAG [2] regulation, in order to cover almost unrestrictedly the existing provisions in any NATO member state.

STANAG 4671 was published in 2009. In parallel, legislations have been developed for rotorcraft UAV weighting over 150 kg and for light aircrafts weighting less than 150 kg.

In civil aviation the insurance of a maintained high and uniform level of citizens' protection is necessary, by means of safety common rules and some measures which guarantee the complying of EU products, persons and organisations with these rules, as well as the rules adopted in the field of environmental protection. The free movement of goods, persons and organisations is facilitated as such in the internal market. It would not be appropriate to subject all aircraft to common rules, according to the specialists, in particular aircraft that are of simple design or operate mainly on a local basis, and those that are home-built or particularly rare or only exist in a small number. Such aircraft should therefore remain under the regulatory control of the Member States, according to the Regulation 216/2008/EC on common rules in the field of civil aviation [3]. The regulation lays down rules for the implementation on certification of airworthiness, for continued airworthiness, the operations undertaken, pilot licensing, air traffic and airports management, but does not cover the aircraft operating military, customs, police, search and rescue, fire fighting, coastguard or other similar activities.

2. The Regulation of unmanned aerial vehicles flight in EU member states

No aircraft capable of being flown without a pilot according to art. 8 of the Chicago Convention on international civil aviation shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft. In

European Union the member states which don't have a specific legislation for the flight of unmanned aerial vehicles apply the Regulation 216/2008/EC on common rules in the field of civil aviation and the Convention on International Civil Aviation done at Chicago on 7 December 1944, as well as the rules laid down by the North-Atlantic Organisation, as all EU states are NATO members.

Belgium has a significant experience on military UAV, attending missions of this type in Bosnia (2005) or Congo (2006).

In the civil sector, Belgium uses the unmanned aerial vehicles in its territorial waters for patrolling. Belgium also extended the use of unmanned aerial vehicles for pollution or fire detection. The unmanned aerial vehicles were integrated in the air traffic control systems, these being certified to fly over populated areas [4].

The commercial activities using an unmanned aerial vehicle cannot be authorised in the Belgian aerial space at present, but a specific legislation is in preparation [5]. Under strict conditions, The Directorate - General of aerial transport can nevertheless issue an authorization to carry out flying tests with unmanned aerial vehicles and flights for scientific purposes using such aircraft.

In **Denmark**, the Regulation BL 9-4 of the Civil Aviation Administration (*Statens Luftfartsvaesen*) refers to unmanned aircraft not weighting more than 25 kg and it applies both mainland as well as in Greenland and Faeroe Islands.

The larger the aircraft is the stricter restrictions are imposed; its certification is mandatory. The aeroplanes weighting between 25 and 150 kg are forbidden by law. Foreign operators may obtain a permit to fly if they are authorised in their country of origin and can fulfil any obligations imposed on them by Danish laws. Exceptions may be granted in situations involving search and search and rescue operations.

Unmanned aircraft weighting between 7 and 25 kg shall be individually certified, and the pilot shall also be authorized.

France's Directorate - General for Civil Aviation (DGAC) decided the amendment of the orders adopted in 2007 and 2009 on unnamed civil aircraft flight regulation. The existing regulations were deemed incomplete and targeted exclusively the airworthiness systems of the aeroplanes operating civil flights (2007), respectively the use requirements of the airspace (2009).

DGAC established the several principles, among them: military flights take precedence over the civil ones and all the flights of a aeroplanes weighting more than 25 kg must be authorized, according to the rules in force [6], among which the Decision of the Minister of ecology, sustainable development, transportations and housing, from April 11 2012 on the use of airspace by the aircraft flying without persons on board [7]. The Decision sets rules applicable to these types of aircraft within the aero modelling, private activities or testing flights, and not applicable to manned balloons, especially those used for the topographical or atmosphere survey, as well as to the missiles and kites. The private activities refer to agricultural, phyto sanitary or sanitary protection treatments; banners towing or any other type of advertising; photography, observations and aerial surveillance, included in the participation to fighting fires; any other activity which requires derogation from the aerial rules.

Briefly, the French Administration agrees to the use of drones for professional purposes on the express condition that they should not pose any threat for the others users of the airspace and the safety for those on ground to be maintained.

Currently, in **Germany**, the use of any civilian remotely piloted aircraft - RPA requires a special permit to fly. But, generally, the flights of remotely piloted aircraft are forbidden where they are not

performed with direct visual contact or their takeoff weight exceeds 25 kg.

Until 2012, the term of remotely piloted aircraft was classified in the category „other aircraft”, but the Parliament had introduced the term of „UAV” [unmanned aerial vehicle] in the Law on air navigation, as well as other related acts. This amendment did not imply the adoption of another treatment to the UAV flights, the above mentioned restrictions being in force.

All German military aeroplanes fall within the legal provisions, but derogations are allowed for the Ministry of Defence, federal and local police, where they need to use remotely piloted aircraft in order to solve the tasks. This does not mean that the German Army aircraft don't need certification, but it is actually done according to special regulations [8].

The Bundeswehr aircraft shall be subject to the inspection, in order to demonstrate the airworthiness and the capacity to participate in the air traffic. As far as airworthiness is concerned, all remotely piloted aircraft are checked, in the case of planned missions, outside of a military training or restricted flight area. For the unmanned aircraft with a takeoff weight of less than 5 kg, the Chief of airworthiness service decides if the certification is necessary.

Minimum operating conditions of remotely piloted aircraft are incorporated in STANAG 4671, the NATO rules applied also by Germany. According to the STANAG 4671 provisions, the UAV mass is limited to 8.618 kg. STANAG 4703 regulation applies to light-duty aircraft unmanned aerial vehicles and it is based on the imposed requirements for hybrid aircraft. Due to the intention not to be too restrictive, the airworthiness requirements imposed by STANAG 4703 are dependent on the expected operational spectrum for the UAV use.

The **Italian** Aviation Authority (ENAC) has published in 2013 a Regulation on

remotely piloted aircraft [9]. The regulation is based on art. 743 of Italian Code for air navigation, which provides that the remotely piloted aircraft - RPA are „aircraft”, as defined through special laws, ENAC regulations and through decrees of Ministry of Defence.

The regulation stipulates different special rules for the remotely piloted aeronautical systems and for the models of pleasure aircraft. The sections II and III of the regulation define the pre-conditions for obtaining the authorization to operate in the air space of Italy, the approved operations, the airworthiness certificate, where applicable, as well as the terms for special operations. The aircraft bellow 25 kg don't need an airworthiness certificate, and the operations are allowed through an authorization issued by ENAC at the request of an operator.

These operations are allowed only with direct visual contact (*Visual Line Of Sight* - VLOS), at a adequate safety horizontal distance from crowded areas, but no less than 150 m, and at a distance of at least 50 m from persons and properties, as well as at a minimum distance of 8 km from an airport, far from crowded areas, during day light and in good weather conditions (VFR/VMC - *Visual Flight Rules / Visual Meteorological Conditions*).

In the case of the aircraft of 25 kg or bellow, these have to be registered in a RPA special register held by ENAC and have to be identified through an appeal sign whose first letter is "I" for Italy, as with all conventional aircraft. The call sign has to be known by the RPA flight controllers broadcasting stations. For all these aircraft the airworthiness certificate is necessary, an authorization to fly shall also be necessary to a conventional aeroplane.

For the testing activity, RPA > 25 kg have to comply with stricter rules, which include: the presentation of detailed information concerning the project; the capacity of the pilot to control the flight in normal or emergency conditions; the

completion of the flight far from populated areas. The commander is responsible for flight operations, has a pilot license and the ENAC authorization, issued based on his qualifications and, where necessary, the results of the flight tests.

RPA are to comply with the flight rules and to be equipped with the necessary tools in order to carry out the authorised activity. The flight altitude is permitted at a distance of 150 meters from crowded areas, with the similar limitations set out for reduced mass RPA.

According to the Regulation of Air Navigation an aeroplane cannot fly inside or outside the territory of the **United Kingdom** [10] unless it is registered in a Commonwealth state, a Contracting State of any other state with which an Agreement concluded between Her Majesty's Government and he respective Government is in force, which provides the flight over the United Kingdom of the aeroplanes registered in this country.

A non-EASA [European Aviation Safety Agency] aircraft may fly unregistered if the fly begins and ends in the United Kingdom without flying over any other country, and the flight is not intended for public transportation or any other aerial activity, other than teaching or testing activities in a specialised club.

European regulations apply in the United Kingdom, which mention that certain categories civil aircraft are exempt from the necessity to comply with the European Regulation and its rules of application. These categories, listed in Annex II of EASA Regulation are: the specially designed or modified aircraft for research or scientific experiments and which could be produces in a very limited number; ex-military aircraft; unmanned aircraft with a take-off mass of 150 kg or less.

There are two regulatory regimes in the United Kingdom: civil and military. From a military point of view, the Ministry of Defence has to certify if an aircraft should be treated as a military aircraft. Any

aircraft which is not a military aircraft should be treated, under the British law, as a civil aircraft. There are no special provisions for other state aircraft, such as those used by the police, the vehicles used in search and rescue actions, for fire fighting, coastguard or other similar activities.

A civil state aircraft or an aircraft registered in the United Kingdom, which shall not be subject of the applicability sphere of the EASA Regulation, shall carry an airworthiness certificate or a flight authorization issued by CAA, unless it is: a remotely piloted aircraft weighting between 20-150 kg; or a small unmanned aircraft, as defined by Air Navigation Order [11] (that is any unmanned aircraft weighting less than 20 kg, without the fuel).

The conditions imposed to these aircraft are stipulated in the art. 166 and 167 of the Air Navigation Order. Hence, the prohibition of flights in the controlled air space or in an airport's traffic area, except if, in both cases, a permit to fly has been obtained of the air traffic controller, at a normal maximal height of 400 ft above the ground. The article 167 refers especially to the prohibition of small unmanned aircraft use for surveillance of personal data collection.

In **Romania**, the Civil Air Code defines the unmanned aircraft as being the guided aircraft either by an automated pilot at their board, either by remote control from a control centre from the ground or from another aircraft piloted by a human crew.

A civil aircraft may operate within the national air space according to art. 17 of the Air Code, if only it takes out a registration certificate according to the provisions of Chicago Convention, which is an in-flight mandatory document. By exception to the latter provision, the registration certificate shall be permanently at the person ensuring the flying of the unmanned aircraft.

Also, in the case of the unmanned aircraft, the personnel ensuring the flying of these aircraft according to art. 43¹, is responsible

from the beginning and until the end of the flight operations with the civil aircraft by the technical and safety management of the aircraft, and may adopt any measures to ensure the safety of the flight.

According to the provisions of the Order of the Ministry of Transportations no.8/2014 on establishing the operating conditions in the national air space of civil motor-powered unmanned aircraft, in order to perform air operations in the national air space, the operator of such aircraft shall hold the following documents: identification certificate, permit of national fly for aircraft with maximum take-off mass over 15 kg, insurance according to the law for damages produced to third parties, authorisations concerning operation, etc.

As far as the authorization for operation is concerned, the operator shall require and obtain the following documents:

- the reservation of segregated air space, in order to operate in the air space of Romania. According to art. 1 paragraph (3) of the Order of the Minister of Transportations no. 8/2014, which applies until 30 January 2016, the operating of engine-powered unmanned civil aircraft in the national air space is allowed only in the temporary segregated air space areas, created, allocated and activated according to the applicable regulations in force.
- the approval of the National Ministry of Defence in order to perform aerial film productions/orthophotos, requested in accordance with art. 4 paragraph (1) lett. f) from the Government Decision no. 912/2010 [12].
- the approval for flying under the minimal safety heights, requested in accordance with the Government Decision no. 912/2010, as subsequently amended and supplemented.

The Romanian Civil Aviation Authority shall prepare until the end of 2015 and submit for the approval of the minister of transportations the projects of the national

civil aviation regulations on the operation of national air space for the engine-powered civil unmanned aircraft and who have the maximum take-off mass of 150 kg or less.

3. Conclusions

If initially the drones were manufactured exclusively by the companies defence-related, their cost totalling a few million dollars, today numerous versions exist on the market, including small and cheap drones, which can be controlled via smart phone. Due to the reduced cost of purchasing a simple drone (or manufacturing it), these unmanned aerial vehicles start to be used more and more outside the armed forces.

Currently a continuous development of the aviation industry is noted as far as the manufacture and use of remotely piloted aircraft, provided that at an international level common standards of certification and

operation of such appliances were not set yet, and at the European Union level the regulations package for such civil aircraft, with maximal take-off mass exceeding 150 kg should be finalised by 2016. The unmanned civil aircraft with maximal take-off mass less than 150 kg remain governed by the national regulations issued by the member states of the European Union, in order to enable the operation in the national air space of these civil aircraft. Some EU member states have already issued rules in order to provide a regulatory framework for the experimental or commercial activities carried out by public or private entities. According to these, the unmanned fly of such aircraft in the regions opened for civil aircraft shall be controlled as to avoid any risk for the civil aircraft.

References

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