Finesse plus

How to clearly differentiate Model Aircraft from Drones

-

Philippe Rollet - Finesse Plus, Model Aircraft Association

In the frame of the development of new regulations for Unmanned Aircraft Systems (UAS) in Europe, the European Aviation Safety Agency (EASA) currently considers it is difficult to distinguish model aircraft from drones; this because of flight assistance now available on some recent model aircraft.

More precisely, EASA states in NPA 2017-05 (A): *"… a definition of model aircraft could be based on the absence of a flight control system that potentially allows a UAS to fly within the BVLOS range. In reality, certain model aircraft are indeed equipped with some form of assisted flight control system. This approach was therefore rejected. On the other hand, it is recognised that model aircraft activities have good safety records."*

The consequence of that is, although having good safety level, model aircraft activities should comply with requirements that have been developed for drones, which is very penalising and considered unfair by practitioners.

The approach proposed hereafter intends to demonstrate that contrarily to EASA statement, conventional model aircraft do not have the capability to fly Beyond Visual Line of Sight (BVLOS) and therefore can be distinguished from drones.

What means BVLOS flight in practice?

Definition of BVLOS flight is self-understandable; i.e. meaning the UA is flying beyond the visual range of the remote pilot who consequently can no longer see with his eyes how and where the UA flies. As a consequence, flying BVLOS requires mandatorily some kind of navigation capability otherwise the UA would be lost as soon as flying BVLOS; even if the UA is very stable, either naturally or thanks to stability augmentation, and able to stay airborne without pilot intervention.

Therefore, demonstrating that model aircraft are unable to navigate is also a way to demonstrate they cannot fly BVLOS, except in abnormal conditions leading irredeemably to lose the model.

Which kinds of BVLOS navigation an UA can perform

Navigation is the ability to follow a ground referenced flight path, or at least to reach a defined destination point. Essentially, four kinds of navigation may be used by UAs

1. **Visual navigation** based on a video image of the external environment transmitted in real time to the remote pilot, usually through a FPV headset. The visual cues in pitch, roll and yaw allow the pilot to control the UA provided it is naturally stable or stabilised by MEMS gyros and accelerometers. Like in manned aviation in good weather conditions (VFR flight), the pilot identifies the aircraft position from visual landmarks on ground (roads, paths, pylons…).

2. **Navigation by using GPS position** of the UA displayed on a synthetic map on the remote pilot's transmitter. The pilot steers manually the UA trajectory by looking at UA position on the synthetic map, like with a geo-localisation app on a smartphone. To achieve such kind of navigation, the UA shall mandatorily include a performing stabilisation system and in addition, an autopilot allowing the holding, without pilot intervention, of flight path parameters, in particular at least altitude and geographic heading of the UA.

3. **Automatic navigation** where the UA follows automatically a ground referenced flight path, defined either during the flight or on ground before take-off, to fly over one or several GPS waypoints. The remote pilot can nevertheless modify at any time the trajectory by transmitting new flight path data

FINESSE PLUS, ASSOCIATION FRANCAISE DE DEFENSE DU PLANEUR RC ET DE L'AEROMODELISME DE PLAINE, DU LITTORAL ET DE MONTAGNE.
220 bis avenue de Verdun 92130 Issy-les-Moulineaux, Association loi de 1901, déclarée le 2/11/ 2016 à la préfecture de Paris, sous le n° W751236177, publiée au JO du 12/11/2016

to the UA. Such kind of navigation requires, as in case 2, an autopilot with flight path hold capability but also in addition, a navigation module allowing the autopilot to steer the UA along prescribed trajectories. In manned aviation, this module corresponds to the Flight Management System (FMS) in which trajectory data (departure, en-route and approach procedures) are stored and where command orders to the autopilot are computed (e.g. bank angle orders to perform turns as required by the prescribed trajectory).

4. **Autonomous navigation** which also allows to follow automatically a ground referenced flight path but contrarily to case 3, without possibility of pilot intervention during the flight. Trajectory data is loaded in the UA before the flight and cannot be modified later, once the UA is airborne. Such kind of navigation requires similar flight control features as automatic navigation.

Definition of conventional model aircraft

Conventional model aircraft can be defined as those UAs unable to perform any of the four navigation options previously listed. This encompasses the very large majority of models used by aero-modelling practitioners.

In terms of technical attributes, conventional model aircraft can be defined as UAs without any of the following three features:

- Camera transmitting in real time a video image to the remote pilot (navigation option 1),
- Display in real time of GPS position on a synthetic map of the overflown area (navigation option 2),
- Autopilot including a navigation module allowing to follow prescribed ground referenced flight paths (navigation options 3 and 4)

Models complying with this definition are unable to navigate whatever the circumstances and subsequently, cannot be operated BVLOS. Nevertheless, this definition allows retaining as conventional model aircraft:

- Models with a stability augmentation system, even highly stabilised models for beginners able to automatically stay level or perform turns,
- Models with video camera recording images in flight and then downloaded on ground,
- Model with GPS module transmitting in real time only GPS coordinates to the remote pilot (no display on map).

The only model aircraft that are excluded from this definition are those fitted with FPV equipment, i.e. most of time modified airplane or powered glider models. However, the capabilities and use of such FPV models is more or less similar to those of drones, thus justifying not considering them as conventional model aircraft.

Philippe Rollet

Regulation advisor

Finesse Plus association

FINESSE PLUS, ASSOCIATION FRANCAISE DE DEFENSE DU PLANEUR RC ET DE L'AEROMODELISME DE PLAINE, DU LITTORAL ET DE MONTAGNE.
220 bis avenue de Verdun 92130 Issy-les-Moulineaux, Association loi de 1901, déclarée le 2/11/ 2016 à la préfecture de Paris, sous le n° W751236177, publiée au JO du 12/11/2016