



## European Aviation Safety Agency (EASA)

By Yves Morier

### The EASA A-NPA on UAV Way Forward

#### Background

EASA issued on 7 November 2005 the A-NPA (Advance-Notice of Proposed Amendment) 16/2005 on UAVs (unmanned aerial vehicles), based on the UAV Task-Force report, which was a JAA and EUROCONTROL joint initiative. The purpose of this A-NPA was to envisage a policy for unmanned aircraft systems (UAS) certification and to solicit comments on specific points. This document is still available on the EASA web-site, together with the corresponding report ([http://www.easa.europa.eu/ws\\_prod/r/r\\_archives.php](http://www.easa.europa.eu/ws_prod/r/r_archives.php)). The Comment Response Document (CRD-16-2005) was then published on 06/12/2007 and opened for reactions until 06/02/2008. It is still available at the same address as the A-NPA.

#### Inventory of main issues & replies relative to the A-NPA as published in the Comment response Document

##### Introduction

The Agency received and analysed comments from 45 organisations and individuals, including authorities such as UK, France (civil and military), FAA, Sweden (civil and military), Italy, Germany; and Stakeholders (e.g. UAS Industry, IFATCA, IFALPA).

The majority of these comments concurred that the option chosen by the Agency to develop a policy for UAS certification within the constraints described in the A-NPA is a step in the right direction. These comments can be divided between issues that are fully within the present EASA remit and issues that are outside the present EASA remit.

##### Issues that are fully within the present EASA remit

###### Conventional versus safety target approach for certification

The A-NPA presented two main options to address UAV certification:

- A conventional approach using as a starting basis manned certification specifications (e.g. CS-23; CS-25)
- A safety target approach setting an overall safety objective for the aircraft within the context of a defined mission and operating environment.

The Agency had chosen the conventional approach for the general case accepting the use of the safety target in specific cases (e.g. operations in remote areas). The two options were presented for transparency reasons and clarification about the Agency's choice. The purpose of asking comments was to identify if no major issue would result from this choice. In fact, the review of comments reflects a general support to the conventional approach.

The main idea is that the conventional approach leads to certificates of airworthiness as a pre-requisite to operate later on in non-segregated airspace and that the safety target approach leads to restricted certificate of airworthiness. The safety target approach is mainly meant for operations above remote areas and for operations in segregated airspace. This safety target approach could

be further studied.

###### The two alternatives for selecting the manned CS

In the conventional approach, one issue is the selection of the manned certification specification that will be used as a starting basis for a given UAS certification. Two methods were proposed in the A-NPA and the Agency indicated that it would retain only one after the comments' review:

- One method is based on kinetic energy consideration
- One method is based on safety objectives consideration.

The review of all comments relative to the appropriate method for selecting airworthiness codes indicates that a majority of the commentators prefers the kinetic energy method for the following reasons:

- The method based on safety criteria is not fully justified.
- The selected population density criterion of the safety objectives method does not reflect population densities in several countries of Europe.
- The criteria selected for the lethal crash area of the safety objective method does not reflect a forced landing.
- In addition, the safety objective method leads to unequal treatment of manned and unmanned aircraft of identical maximum take-off mass. Indeed, this method would allow certifying an UAV of 20 000kg using CS-23 when a manned aircraft of the same mass would use CS-25. Such a situation will be difficult to explain to the public.

As a conclusion, and in agreement with these views, the Agency has decided to include in the policy only the kinetic energy method. Nevertheless, a further study of the method based on safety criteria in cooperation with the EUROCAE WG-73 on UAV is planned.

###### UAV system safety analysis

The UAS safety analysis and its detailed objectives were also subject to comments.

The guidance relative to the safety analysis contained in attachment 2 of the policy envisaged by the A-NPA is expressed in qualitative terms. Such terms are applicable for all categories of UAS. Quantitative values to be used should be those used for the 1309 analysis contained into the manned CS that has been selected as a starting basis for the certification of a given UAS. As a result, numerical values will depend of the selected CS.

The Agency however accepts that the guidance provided with the policy needs to be improved. It will thus be kept as it is for the first issue of the policy, but EASA plans to ask EUROCAE WG-73 to further develop the guidance based on the comments received on the A-NPA.

###### Design Organisation Approval

The systematic requirement of a DOA (design organisation approval) for the designer in the policy envisaged by the A-NPA was questioned in some comments.

The use of CS-VLA can be accepted as a starting basis, and designers of CS-VLA aircraft can demonstrate their capability to design by using alternative procedures to DOA instead of a DOA. However, even if the air vehicle is of simple design, the UAS system (air vehicle, data-link,

control station) is not so simple and would justify the need for a DOA. Nevertheless, the Agency is ready to accept alternative procedures based on an appropriate substantiation by the designer. The policy will therefore be modified accordingly for UAS that would use CS-VLA or CS-VLR as a starting basis following application of the methodology retained to select the Certification Specification.

#### Certificate of airworthiness and control stations

There seem to be only one view fully in line with the present regulation: a certificate of airworthiness covering one flying vehicle-one control station. The policy will be modified to clarify this point. Since this leads to operational limitations, the policy may be re-evaluated in the future taking into account experience gained. It must be noticed however that the existing regulatory framework will then need to be modified.

#### Environment

There is no principal reason to distinguish between a manned and an unmanned aircraft when considering environmental protection measures. Therefore, as regards noise, the best solution at the moment might be to stick with the requirements of ICAO Annex 16, Volume I, having in mind that possible additional requirements for jet aircraft with take-off distances below 610 m have to be taken into account.

In addition, if it turns out that UAV, due to their special mission, cause additional annoyance to people, certain measures will have to be taken. If, for example, a reasonable number of «larger» UAS are intended to operate at low altitudes and/or stay for some time at a certain location, then more stringent source requirements and/or operational restrictions may have to be taken into consideration.

#### Which acronym: UAV or UAS?

The policy presented by the A-NPA uses the acronyms UAV and UAV system, which corresponds to the Agency policy's approach of UAV as a system. However, other bodies such as FAA or the EUROCAE WG-73 use UAS for Unmanned Aircraft Systems. Therefore, the Agency will align with other important partners and modify the policy accordingly.

#### The way forward for the issues within the EASA remit

The Agency is now reviewing the reactions received from five Manufacturers; one Association of Manufacturers; one Research Establishment; two Authorities and one Pilot Association. The reply provided by the Agency relative to safety target approach and target safety levels has been heavily commented. This review will take place in order to publish the policy in summer 2008. Further developments are then envisaged and several tasks have been proposed to EUROCAE WG-73.

#### **Issues that are outside of the present EASA remit**

##### 'Sense and avoid'

Many comments regret that EASA certification does not address 'sense and avoid'. However, although EASA recognises it as a critical issue for safety and operations, the criteria for 'sense and avoid' should be defined by the Authorities responsible for the safety regulation of ATM. When such criteria are developed, they can be complemented by specifications developed by standardisation bodies such as EUROCAE to help certifying the necessary equipment. Once such specifications will be available, EASA will be able to certify the systems.

The Agency also accepts that, to a certain extent, the certification specifications (CS) deals with 'anti-collision': anti-collision lights are specified in CS; pilot compartment view is also addressed and minimum crew considerations also take into account collision avoidance. These specifications reflect the concept of 'see and avoid'.

It is therefore expected that during the tailoring of manned certification specifications, such paragraphs will be taken into account: aircraft lights should be installed and the UAS crew should be provided with means or procedures to obtain a certain amount of situational awareness. However this will not achieve the necessary criteria to operate in non-segregated airspace: the limitations of the 'see and avoid' concept are well known even for slow aircraft.

The consequence of not considering 'sense and avoid' as part of the airworthiness certification will be a limitation to operate in segregated airspace only. This situation will be reflected by a statement in the flight manual indicating that operations are limited to segregated airspace only unless mitigating measures to the absence of 'sense and avoid' certification have been accepted by the Authority responsible for a specific airspace. Examples of such measures could be: a NOTAM creating a segregated airspace covering the zone of the UAS operation, the unmanned aircraft remaining constantly in line of sight of its pilot. The policy will be modified to clearly request the existence of a statement in the flight manual.

In addition, the Agency will request the EUROCAE WG 73 to start developing a Special Condition based on criteria of the recently adopted EUROCONTROL specification for the use of military UAS as operational air traffic outside segregated airspace.

#### Total system approach as proposed by Sweden

Sweden has proposed a total system approach (TSA) that reflects the constantly increasing integration of the Aviation system. It is introduced to a certain extent by the set of regulations implementing the Single European Sky. The total system approach is also reflected in the soon to be published Agency's opinion on ATM.

The Agency is of the opinion that this TSA is an attractive concept, which however goes beyond UAS certification with the applications as envisaged today. TSA may be considered in the long term when the applications described by the commentator have come to maturity. The Agency believes there is a need for an in-depth study of the TSA and based on this study will consider further actions including modifications to Regulation 216/2008.

#### Security

Many commentators regret that EASA certification does not address security issues. Unfortunately, although security is a key issue for UAS, the Agency cannot mandate security requirements.

However, if security systems are mandated by the appropriate authority or installed voluntarily, they should not impact safety. In such case, EASA would have to develop specifications so that safety is not impacted. For example, some failure cases of encryption devices could impact control commands.

The Agency draws the attention of the commentators to the work of the EUROCAE WG-72 Aeronautical System Security that is developing guidelines addressing security related to essentially aeronautical air borne systems. UAV designers may elect to voluntarily comply with this standard when adopted to improve the security of the data-link.

Coordination with military working group on UAV

Several commentators stressed the importance of the coordination between civil and military activities on UAV. It has been suggested that the code developed by the French military Authorities (USAR: Unmanned Systems Airworthiness Requirements) could also be used for civil purposes. The Agency recognises that USAR has been developed using a methodology closely related to the one described in the policy and accepts to consider USAR version 3 as an acceptable means of compliance to the policy provided that:

- Its applicability is limited to the scope of present CS-23;
- The safety targets included in the safety analysis reflect the ones resulting from the application of the EASA UAS policy.

As USAR has become the basis for the NATP STANAG 4671, such standard could also be used under the same conditions.

UAS below 150 kg

Several commentators requested that the Agency develops guidelines for the certification of small UAS. EASA is however only competent for UAS above 150 kg maximum take-off mass (MTOM). Member States are competent for UAS below that limit and are expected to regulate the activity of such UAS, and therefore complement the Agency's efforts. It is worth noting that the report of the joint JAA-EUROCONTROL initiative on UAS proposes a model for such a regulation based on the work done by the UK-CAA.

The Agency sees merit that Member States develop a harmonised approach and is ready to participate to share information and improve consistency.

Issues outside the EASA present remit: way forward

Many commentators regretted that EASA does not develop a comprehensive framework for UAS regulation (Option 3 of the A-NPA). However they accept as a first step the development of the Policy as envisaged in the A-NPA.

The Agency proposes that a group be created to identify building blocks and define a road map for a comprehensive framework for UAS regulation. It was however suggested at the workshop on UAS that was organised by the Agency on 1 February 2008, that Institutions should consider further coordination, rather than creating a new structure.

**Conclusion**

The Agency is committed to finalise the policy for UAS certification and to cooperate and contribute to the development of a comprehensive UAS regulatory framework, which is a key issue to the safe a successful development of this activity. Furthermore, the recent extension of scope of EASA will allow us to address operations and licensing issues for UAS in addition to the traditional ones of airworthiness and maintenance.

