

# UAS TYPE CERTIFICATION: **PREPARING FOR THE FLOOD**

By Mike Borfitz



The global acceptance of aerial taxis is closer than anyone might have imagined just a few years ago. There is much work to be done in several areas, but the industry is moving forward aggressively and with intent, and the Federal Aviation Administration is rising to the challenge, although not as quickly as some might wish.

In the very near future, any UAS manufacturer who wishes to have a commercially viable product must secure FAA design approval, or type certification, and the FAA will be faced with a flood of applications that will have the capacity

to overwhelm their relatively small numbers. This article identifies some challenges and proposes a path forward.

Regardless of where in the world commercial UAS manufacturers intend to market their products, they must successfully run the gamut of regulatory approvals, including type design, production, maintenance and continued operational safety, then they can be put into operation, which itself requires a separate regulatory compliance program. All of these processes demand significant effort and will take time, patience and expertise to navigate.

▼ The government of Dubai conducts a test of the Volocopter aerial taxi.  
**All photos: Mike Borfitz**



The current development of these aircraft is less about aerodynamics and inherent flying qualities, and almost all about automation and software. Aviation regulations have been developed over nearly a century and have evolved around mature aerodynamic concepts, with pilots in the loop. However, many UAS developers are not from the aviation industry, and these visionaries are entering aviation from a world that does not understand the intricacies of aviation regulatory compliance, so a dual cultural shift is unavoidable and is certain to be a difficult transition.

The time will come, in the very near future, for each UAS manufacturer to learn and understand the type certification requirements and begin the lengthy type certification process, and the FAA must find ways to approve these revolutionary design concepts.

It is not reasonable for any UAS development program to have deep knowledge of technical and regulatory requirements such as flammability, passenger emergency egress, safety reporting programs and standard fleet management concepts. Likewise, it is not reasonable to expect the FAA, or any other regulatory authority, to have regulations in place for challenges such as pilotless operations or battery endurance whose total available power may not even meet the minimum fuel reserve requirements for private aircraft operations.

In the United States, the FAA has been slow to move as quickly as the UAS industry desires. For example, in the March 30, 2015 edition of *The Guardian* newspaper, we find this statement: “Amazon is testing its drone delivery service at a secret site in Canada, following repeated warnings by the e-commerce giant that it would go outside the US to bypass what it sees as the U.S. federal government’s lethargic approach to the new technology,” a complaint that has been recently repeated. Despite industry wishes, the FAA will not simply step aside, but on the other hand they will certainly come under increasing political pressure to provide guidance that will facilitate UAS certification and operations as soon as possible.

On the flip side, the FAA has recently published a proposed set of regulations for type certification of the Schiebel Camcopter S-100, a small autonomous rotorcraft that would be operated by FlightScan Corp., and has approved type designs for the Insitu ScanEagle X200 and AeroVironment Puma AE. In these cases, the FAA has proposed or imposed operational restrictions that are obviously intended to preserve the current level of public safety. The Camcopter S-100, for example, is required to “define and submit a concept of operations [CONOPS] proposal describing the intended UAS operation in the National Airspace System. The CONOPS must be accepted by the FAA.”

The FAA design approval process is performing as intended, and we now have formal precedents that might be used for future type design approval programs.

The challenge facing both the UAS industry and the FAA is one of finding common ground. The UAS industry is moving forward aggressively and certainly has a strong desire to work with the FAA to assure safe operations, but many in the industry don't have a firm grasp of FAA requirements, which are quite complex. The FAA regulations are inherently designed to encourage and embrace innovation, but FAA processes can be agonizingly slow, especially with new technology as radical as a UAS.

The industry faces several challenges, including that existing regulations don't easily accommodate UAS technology, a gap exists; next, there is an unavoidable but natural cultural gap between FAA and the UAS industry; and FAA resources are severely stretched thin.

The first item, the regulatory gap, requires action that is inherently government, such as special conditions, equivalent levels of safety, exemptions, etc. The second and third challenges, however, can be eased with a combination of delegation and facilitation between industry and the FAA. The FAA Organization Designation Authorization (ODA) program allows the FAA to delegate certain findings of compliance on their behalf to a company that holds an ODA.

As a side benefit, the ODA can partner with the FAA to address the first item, improvements to regulations. Further,




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an ODA can explain FAA requirements in detail to a UAS manufacturer and offer significant assistance in planning their certification programs. The FAA also has a designee program for individual specialists. Assembling a full team of specialists is challenging but doable; an ODA typically offers full service, however.

There is little question that the FAA will be directly involved in the first few large UAS projects such as air taxis and autonomous aircraft that weigh 55 pounds or more. The agency must become familiar with the technology and understand what new regulations and policies should be developed as the UAS industry grows. Although the FAA strives to be as flexible and accommodating as possible, its primary accountability is to the flying public. The natural give and take that must occur between the FAA and each UAS applicant will certainly be a daunting task for the uninitiated UAS designers who have never dealt with the FAA.


Any UAS designer who is contemplating type and production certification, whether for private or commercial operations, should consider:

- Examining the proposed airworthiness criteria for the Camcopter S-100 as a model that is likely to be applied to future programs in some more mature form.
- Do everything possible to understand the regulations and how a UAS can be designed to comply with the intent of the regulations. A key concept to keep in mind is that the type certification regulations are minimum standards; a good design will exceed them, but a design that is driven to the minimum standards may be no more than a minimum aircraft.
- Each type certification program is unique to the design, and is literally customized, often with









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many aspects that are proprietary and competition sensitive. Thus, simply developing the body of requirements typically takes many months.

- The FAA, and most global regulatory agencies, allow three years for small aircraft program completion, and most programs need that much time. Patience, expertise and planning are absolutely necessary.
- Get help. Find a person or organization who fully understands the type and production certification processes and who can facilitate all interactions with the FAA or your regulatory authority. Entry into service is another major challenge that is likely to require a completely different skill set.
- Get involved. Stay engaged with other UAS designers and national/international organizations such as AUUSI. Watch what the FAA and EASA are doing, through their UAS web pages. Pay careful attention to new regulations, exemptions and related activities.
- Be mindful that separate certification programs are required for design, production, operation and maintenance of all aircraft, and may be a single integrated program owned by one company, or may be conducted separately, by any number of companies. In any case, a UAS manufacturer must have a business strategy that accommodates the complex realities of each type of certification.

The next few years will certainly see a revolution in personal and public transportation as the UAS industry grows and shakes out the designs and concepts that will provide the safest, most efficient and cost-effective autonomous aircraft.

A critical component of that exercise will certainly be the effectiveness of each designer's certification programs; it is likely to be a market differentiator. Interfacing and working with regulatory authorities is an unavoidable and required component that must be high on industry's agenda. If companies intend to market commercial aerial vehicles, a strong, strategic regulatory program is the key to their future.



▲ The Volocopter aerial taxi, which was demonstrated in Dubai.