



Fact Sheet on Unmanned Aircraft Systems (UAS)

The newest potential non-tower obstacle on the immediate horizon is that of unmanned aircraft systems (UAS). Today's unmanned aerial vehicles range in size from small hand-launched radio-controlled aircraft to highly sophisticated vehicles like the military's Predator and Global Hawk that are capable of staying in the air for 24-40 hours and are equipped with high-tech sensor systems and missiles. The commercial use of UAS for activities such as border patrol, tracking fugitives and shooting aerial scenes by filmmakers has already been occurring, albeit illegally in some cases, but now public law is mandating that federal officials regulate and oversee this rapidly developing industry. While there are indeed many positive uses for the technology, there are drawbacks to the aerial application industry from a safety standpoint and for small UAS to do the job effectively.

Background

The FAA Modernization and Reform Act of 2012 (also known as the FAA Reauthorization Act) provided the first delineation since a 1981 advisory circular (AC 91-57) on the difference between unmanned aircraft and model aircraft. Section 336 of the Act defines model aircraft as an unmanned aircraft capable of sustained flight, flown within visual line of sight of the person operating the aircraft, and flown for hobby or recreational purposes. The section also prohibits the FAA from regulating unmanned aircraft if the aircraft is used for hobby or recreational use (not commercial purposes) that are operated within the guidelines of a community based or national organization, limited to 55 pounds or less, operated in a manner that does not interfere with manned aircraft, and, if within 5 miles of an airport, the operator notifies the airport operator and the air traffic control tower (if the airport is towered).

The reauthorization also requires the FAA to provide for the safe integration of commercial, unmanned aircraft systems into the national airspace system as soon as practicable, but not later than September 2015 (2014 for UASs weighing less than 55 pounds). Under the requirements of the FAA Reauthorization Act, the agency has faced difficulty in reaching many of the deadlines, with several being missed. It has been acknowledged by the Administrator and other federal officials that the September 2015 deadline is unlikely to be met. The small (less than 55 pound) UAS rule is likely to be released before the end of 2014.

In December 2013 the FAA announced their selection of the six UAS test sites authorized in the FAA Modernization and Reform Act. The sites chosen were the proposals submitted by the University of Alaska, the State of Nevada, New York's Griffiss International airport (Utica, NY), the North Dakota Department of Commerce, Texas A&M – Corpus Christi, and Virginia Tech. The FAA announced in April 2014 that the first UAS test sites are online, which includes two areas from the North Dakota proposal located in Carrington, ND and Devils Lake, ND. Applicants in North Dakota have so far reported a good working relationship with the UAS personnel. As of November, 2014 all the test sites are operational. So far, two near-misses have been reported involving a UAS and a manned ag aircraft. NAAA is urging members to report any near-misses or impacts to the FAA and NAAA to ensure safety information is properly documented to the FAA.

In March 2014 a ruling was passed down from an administrative law judge saying the FAA lacks any clear-cut authority to regulate UAS. The FAA announced they are preparing to appeal the decision to the full National Transportation Safety Board (NTSB). This ruling stands as an unexpected development on the FAA's long path toward UAS integration.

The FAA Reauthorization Act contains a Section 333 "Certain Rules for Special Unmanned Aircraft Systems." Beginning in spring of 2014 various companies and organizations wanting to use UASs commercially filed petitions with the FAA under Sec. 333. The section requires the FAA to "determine if certain unmanned aircraft systems may operate safely in the National Airspace System before completion of [final rulemaking]." As of October, 2014 the FAA has received 108 of these petitions and expects them to continue to flow in. Of the petitions received, the FAA has made a handful available for public comment. NAAA has been, and will continue to comment on these petitions, stressing that many of the exemptions these entities have requested—which include exemption from aircraft certification requirements—should not be allowed. In its comments, NAAA has also pushed for UAS safety integration requirements that include equipping the UASs with strobes, ADS-B Out (discussed below in "Safety Concerns") and operation only within line of sight. Further, NAAA encouraged the FAA to require a pilot certificate for commercial operation of UASs, an "N number" to aid in identification of the aircraft in the event of an incident or accident, and, as aforementioned, for the FAA to establish airworthiness standards and require an airworthiness certificate before certifying UASs for commercial flight. In September, 2014 the FAA approved six Sec. 333 petitions, the first group ever. The petitions approved the use of specific UAS models on closed sets for aerial filmmaking. NAAA commented on the proposal, and while not granting all of NAAA's requests, the FAA did add a requirement at NAAA's urging requiring the UAV operators to file NOTAM 48 hours prior to flight. Additional requirements included requiring an "N-number," private pilot certificate, line of sight operation, and preflight inspection. The FAA also announced that the UAVs would be limited to daytime operation until nighttime visibility concerns are adequately addressed.

Safety Concerns

NAAA is concerned that the widespread use of UAS without proper safe integration, will result in conditions ripe for low-level aviation accidents.

UAS present a hazard to low-level pilots similar to that presented by birds and other low-level obstacles such as other aircraft and towers. According to a joint report by the FAA and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS), between 1990 and 2012 over 131,000 wildlife strikes occurred with civil aircraft, 97 percent of which were the result of collisions with birds, with 25 producing fatalities. Accident records maintained by NAAA, as taken from NTSB accident reports, show there were 10 collisions between aircraft, in which at least one of the aircraft was an ag aircraft during the last 10 years (2004-2013) and since 2004 there have been 12 accidents between ag aircraft and towers, resulting in 7 fatalities. The agricultural aviation industry places a great amount of importance on the ability to see and avoid obstructions and other aircraft in the airspace in which they operate. While this principal is the backbone of safety for our industry and all air traffic operating under visual flight rules (VFR), it can only be utilized effectively when other aircraft do their part in avoiding collisions.

The necessary technology to allow UAS to "sense and avoid" other aircraft is currently in the nascent stages of development and is nowhere near commercial viability. Furthermore, the U.S. Government Accountability Office (GAO), an independent federal agency, determined in September, 2012 that no adequate technology currently exists that would allow UAS to adequately sense and avoid other aircraft. NAAA believes until this technology is developed, UAS operators should be required to post a Notice to Airmen (NOTAM) 48-72 hours prior to their operations. Such a requirement is already in place by the FAA for the Certificates of Waiver or Authorization granted for current limited commercial operations. UAS operators should also be required to have radios on the

(See reverse side for more information)

ground tuned to a locally defined frequency, allowing them to monitor air traffic in the area, and alert local manned and unmanned aircraft operators to their presence.

NAAA believes UAS should also be painted in colors which make them readily distinguishable from the background. Strobe lighting should be required on the UAS itself, and to assist with identification of UAS operating areas, on the UAS operator's ground vehicle. Automatic Dependent Surveillance-Broadcast (ADS-B) Out technology is a key component of the FAA's Next Generation Air Transport System (NextGen) that allows the identification of aircraft based on transponder and GPS signals, and allows nearby aircraft with the proper reading equipment to identify their exact location. Proven, economically viable ADS-B systems designed for UASs are currently on the market and should be a requirement for commercial UAS operations.

Training and Medical Requirements

NAAA believes that in order to ensure the continued safety of the NAS, UAS pilots should be required to meet the same medical qualifications of manned commercial pilots, including the requirement of a Class 2 medical certificate and have a commercial pilot's license. Operators should also be required to have a second, equally medically qualified observer to ensure the UAS is operating free of manned aircraft, and UAS should be required to land immediately if the observer or operator see a manned aircraft within two miles of the UAS. UAS operators should also have an explicit requirement that requires them to be attentive and free of distractions when operating a UAS. Unmanned aircraft also need to be equally fit for operation within the NAS by undergoing the same rigorous flight safety evaluations manned aircraft are required to pass. Furthermore, the training and licensing of UAS operators who intend to spray chemicals should be equally as stringent as that for aerial application pilots in terms of obtaining commercial pesticide licenses; ensuring compliance with state regulations, 14 CFR Part 137 regulations, and EPA regulations. Commercial UAS operators should also be required to carry liability insurance, and ensure their UAS is properly maintained.

Security and "Lost Link" Concerns

In 2012 Professor Todd Humphreys of the University of Texas at Austin was able to successfully hack a UAS signal utilizing simple off the shelf components. By utilizing this signal "spoofing" technique, Humphreys was able to gain complete control of the aircraft and change its route. This experiment, along with others shows that the relatively simple ability to hack a UAS signal presents not only a safety concern, but also a national security concern as these aircraft can be rerouted to cause damage to structures, along with manned aircraft.

Neither technical nor regulatory guidance has yet been established regarding "lost link" occurrences—situations where the unmanned vehicle loses connection with its pilot. Many aircraft have no lost link procedure and simply continue flying until they run out of fuel or hit an obstacle. NAAA believes that a regulatory and technical framework needs to be established so that there is a consistent way to prevent collisions between manned and unmanned aircraft.

Concerns with UAV Efficiency Statements

One statistic frequently cited by the UAS industry regarding the potential for UAS in the National Airspace System (NAS) is that 90 percent of crop protection in Japan is done utilizing one UAS, the Yamaha RMAX. What many UAS proponents fail to mention is the fact that the average farm size is 3.7 acres in Japan compared to 441 acres in the United States. Further, the RMAX has a chemical capacity of 4.25 gallons of liquid compared to 300+ gallons in a manned agricultural aircraft and operates at 15 miles per hour compared to a 160 mph for a manned ag aircraft. Another point to consider when making an effective aerial application to protect a crop is that the amount of air pushed down to the crop canopy—either from a rotor or from a fixed wing—is exactly proportional to the weight of the aircraft that the air is holding up. A small aircraft—manned or unmanned—does not displace much air. While there are UASs that could likely be retrofitted to perform aerial application operations, they are the larger, more expensive aircraft that can cost millions to build and maintain compared to a manned ag aircraft costing between hundreds of thousands of dollars to \$1.5 million for the largest fully equipped models. Given these limitations, it is unlikely UAS will be utilized for mass aerial application in the US in the near future; however NAAA does acknowledge that UAS may be cost-effective in certain niche circumstances, such as small-scale vineyards and specialty crop situations, along with sensory applications.

NAAA Actions Regarding UAS

NAAA has been active in the discussion surrounding UAS, as the ability of ag pilots to see and avoid other aircraft and hazardous obstructions is paramount to ensuring the safety of low-level aircraft pilots. As such, NAAA has met several times with both the FAA Obstruction Evaluation Group (OEG) as well as the UAS Integration Office. The Association has submitted correspondence to both offices documenting low-level concerns as well as comments to the FAA regarding UAS test. Additionally, NAAA was contacted by the NextGen Institute and has participated in interviews regarding UAS and its impacts on agricultural aviation. NAAA submitted a letter to FAA Administrator Huerta urging the implementation of low-level marking, lighting and database development solutions for locating ground affixed and UAS obstacles. In addition, NAAA requested the FAA require strobe lighting and standout painting for UAS, making them easily visible to pilots of manned aircraft via a variety of forums, including in response to Section 333 petitions (discussed under "Background" above). NAAA has also been in contact with a number of congressional offices about its UAS concerns as well as the UAS trade association the Association for Unmanned Vehicle Systems International (AUVSI). NAAA is aware of the important functions which can be accomplished by UAS, including those to agriculture, but protecting the safety of current and future users of the NAS is mandatory and top of mind for the agricultural aviation industry.

Recent Congressional Action

Notwithstanding the positive hype and publicity surrounding UAS and its multitude of potential uses, the technology must still jump through several privacy and safety hurdles at the FAA and now possibly within Congress before full integration is possible. Safely incorporating unmanned aircraft systems into the national airspace is undoubtedly of utmost importance for manned aerial applicators since we will likely be working at similar altitudes. As aforesaid, NAAA has made our concerns known to the FAA and requested that to ensure safe coexistence, UAS will need to be well lit, marked and have their operational activities made known to manned pilots of low-level aircraft via ADS-B Out technology. NAAA is committed to working in tandem with UAS interests to ensure ag aviators are able to continue performing their jobs without the additional concerns of unidentified unmanned aircraft occupying the same airspace and potentially and unnecessarily endangering the safety of low-level ag pilots.

NAAA represents over 1,700 members in 46 states. NAAA member operator/pilots are licensed as commercial applicators that use aircraft to enhance food, fiber and bio-fuel production, protect forestry, and control health-threatening pests. Furthermore, through its affiliation with the National Agricultural Aviation Research & Education Fund (NAAREF), NAAA contributes to research and education programs aimed at enhancing the efficacy and safety of aerial application.

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