



October 22, 2014

U.S. Department of Transportation
Docket Management System
1200 New Jersey Ave. SE
Washington, DC 20590

Re: **Exemption Request Section 333 of the FAA Reform Act**

Dear Sir/Madam,

This petition is being submitted on our own behalf without legal counsel or consulting services. Pursuant to Section 333 of the FAA Modernization and Reform Act of 2012 (the Reform Act), and 14 C.F.R. Part 11, RoboFlight Systems (RFS), a Colorado based limited liability company operating a Small Unmanned Aircraft System (sUAS) equipped to conduct aerial photography and survey for various industries, hereby applies for an exemption from the Federal Aviation Regulations (FARs) listed below to allow operation of our sUAS commercially in airspace regulated by the Federal Aviation Administration (FAA) so long as such operations are conducted with and under the conditions outlined herein or as may be established by the FAA as required by Section 333.

The requested exemption would permit RoboFlight Systems LLC to pursue its commercial interests in providing services to consumers interested aerial data capture using a small advanced sUAS in the following areas:

- Agricultural Surveying
- sUAS Operator Training
- Real Estate Photography
- Product Demonstrations
- Research and Development

RFS states that all sUAS flights that will occur over private or controlled access property will do so with the property owner's prior consent and knowledge and that only people who have consented or otherwise have agreed to be in the area where photography and videography will take place will be captured.

Additionally, RFS pilots hold FAA Commercial and Private Pilot Licenses with Class II and Class III Medical Certificates and if observers are not qualified pilots, they will be trained by RFS pilots to understand the proper roles of an observer, communication procedures, proper visual scan techniques, operations at non-towered airports, and appropriate sections of the Aeronautical Information Manual.

Regulations from which the exemption is requested:

14 C.F.R. Part 21
14 C.F.R. 45.23 (b)
14 C.F.R. 61.113(a) and (b)
14 C.F.R. 91.7 (a)
14 C.F.R. 91.9 (b) (2)
14 C.F.R. 91.109
14 C.F.R. 91.119
14 C.F.R. 91.121
14 C.F.R. 91.151(a)
14 C.F.R. 91.203 (a) & (b)
14 C.F.R. 91.205 (b)
14 C.F.R. 91.215
14 C.F.R. (91.401 - 91.417)

Unmanned Aircraft System

sUAS are a feasible method to obtain information of agricultural cropland to determine optimum inputs that result in cost savings to farmers, yield security, and reduce environmental impact of excess fertilizers and chemicals in the soil.

We are petitioning for exemption to enable RFS to operate a DJI Phantom 2 Vision Plus multi-rotor equipped with a three-axis gimbaled camera, a DJI Inspire 1 multi-rotor equipped with a three-axis gimbaled camera, a DJI S-900 multi-rotor equipped with a three-axis gimbaled camera, and a RF-70 fixed wing sUAS equipped with a fixed position multi-spectral camera. These sUAS all weigh less than 25 lbs, have a built-in capability to limit the height it flies above the ground, to limit the radius of the distance it flies from the operator and to exclude it from Class B, C and D airspace including a no fly zone feature. Each system also has the failsafe function of the autopilot system, which means when the communication between the Main Controller and the transmitter is lost, the system will automatically trigger Return to Home and will land safely.

The above specifications meet standards listed below, some derived in accordance with the Model Aircraft Operating Standards:

- The petitioner will only operate its sUAS in line of sight of a pilot and/or observer and will operate at sites that are a 'sufficient distance' from populated areas within the sterile area described in the operators manual. Such operations will insure that the sUAS will "not create a hazard to users of the national airspace system or the public."
- When flying sUAV within 3 miles of an airport, airport operators will be notified and the operator will give the right of way to avoid flying in the proximity of full-scale aircraft.
- Maximum flight time for each operational flight will be 60 minutes.
- Flights will be terminated at 25% battery power reserve should that occur prior to the 60 minute limit.

- The sUAV will be programmed so that it will not be operated at an altitude of no more than 600 feet AGL, and not more than 200 feet above an elevated platform from which filming is planned.
- Minimum crew for each operation will consist of the sUAS Pilot and the Visual Observer.
- The sUAS PIC's (Pilot in Command) will be an FAA licensed airman holding a FAA Private Pilot or Commercial Certificate and second Class FAA Medical Certificate.
- The sUAS operated by the petitioner weighs less than 55 pounds, including the payload (i.e. camera, lens, and gimbal).
- The sUAS will operate at speeds of no more than 55 knots.
- Given the small size of the sUAS and the restricted sterile environment within which they will operate, our sUAS operations adhere to the Reform Act's safety requirements.

Additionally, the fact that the RFS pilots hold FAA Pilot certificates demonstrates that they have a high regard to safe operations with an understanding of FARs, pre-flight inspections, maintenance and repair, operations within airspace, as well as being trained to high safety standards .

Under the requested exemption RFS ensures that all operators have completed a small unmanned aircraft systems (UAS) education and training program including all applicable regulations and guidance documents; including aeronautical background information such as charts, NOTAMS and Aircraft Circulars; Radio Communications Procedures; Human Factors and Crew Resource Management; Basic Small UAS Aerodynamics; Weather factors; Airmanship and Decision-making and Safe Operating Procedures.

We respectfully request exemption under Section 333 to enable RFS to operate safe, low-risk commercial sUAV operations for the activities stated. RFS at all times will respect the space and privacy of citizens and property whilst keeping our skies safe.

Sincerely

A handwritten signature in blue ink that reads "Kirk Demuth". The signature is written in a cursive style and is positioned above the printed name and contact information.

Kirk Demuth
Chief Operating Officer
RoboFlight Systems LLC
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785-410-6823

EXEMPTION REQUESTS AND EQUIVALENT LEVEL OF SAFETY

RoboFlight Systems requests an exemption from the following regulations as well as any additional regulations that may technically apply to the operation of the sUAV System:

14 CFR Part 21, Airworthiness Certificates

This part establishes the procedures for the issuance of an airworthiness certificate. While the FAA continues to work to develop airworthiness standards for Unmanned Aerial Systems, we request an experimental certificate be issued for the DJI Phantom 2 Vision plus, DJI S-900, DJI Inspire, and RF-70 sUAS under either or both of the following provisions:

21.191 Experimental certificates.

Experimental certificates are issued for the following purposes:

- (a) Research and development.** Testing new aircraft design concepts, new aircraft equipment, new aircraft installations, new aircraft operating techniques, or new uses for aircraft.
- (b) Showing compliance with regulations.** Conducting flight tests and other operations to show compliance with the airworthiness regulations including flights to show compliance for issuance of type and supplemental type certificates, flights to substantiate major design changes, and flights to show compliance with the function and reliability requirements of the regulations. Since the experimental certificate can be used for commercial purposes such as market surveys, sales demonstrations, and customer crew training, we would expect that an experimental certificate would permit our commercial purpose as well. The aircraft will not carry persons or property, will not carry fuel, and will only fly under strict operational requirements. Combined with the UA's light weight, being constructed primarily of foam, carbon fiber, and/or plastic, we propose that the UA will be at least as safe, if not safer, than a conventionally certificated aircraft performing the same mission. If an experimental airworthiness certificate is not appropriate for this application, then we request an exemption of 14 CFR Part 21, Subpart H, and the requirement for an airworthiness certificate in general, citing the equivalent level of safety outlined in the previous paragraph.

14 CFR 45.23 Display of marks; general and 45.29 Size of marks.

These regulations provide that each aircraft must display "N" and the aircraft's registration number in letters at least 3 inches high. Additionally, the aircraft must display the word "EXPERIMENTAL" in letters at least 2 inches high near the entrance to the cabin, cockpit, or pilot station. The sUAV does not have an entrance in which the word "EXPERIMENTAL" can be placed, and may not have a registration number assigned to it by the FAA. We propose to achieve an equivalent level of safety by including the word "EXPERIMENTAL" in the placard on the top of the aircraft, as shown above, where the PIC, VO and others in the vicinity of the aircraft while it is preparing for launch will be able to see the designation. Additionally, we feel that the permanent placard discussed in the previous paragraph will provide the aircraft's registration information at the ground station. Finally, we will display at the ground station a high contrast flag or banner that contains the words "Unmanned Aircraft Ground Station" in letters 3 inches high or greater. Since the aircraft will operate within 3/4 NM of the ground station, the banner should be visible to anyone that observes the aircraft and chooses to investigate its point of origin.

14 CFR 61.113 Private pilot privileges and limitations: Pilot in Command and 61.133 Commercial pilot privileges and limitations.

The regulation provides that no person that holds a Private Pilot certificate may act as pilot in Command of an aircraft for compensation or hire. Subparagraph (b) allows a private pilot to act as pilot in command of an aircraft in connection with any business or employment if: (1) The flight is only incidental to that business or employment; and (2) The aircraft does not carry passengers or property for compensation or hire. Our proposed operations require that the PIC must hold at least a Private Pilot Certificate issued by the FAA and since the aircraft cannot carry passengers or property, we feel we meet the intent of 61.113 Subparagraph (b) even though the intent of this application is to conduct a business.

14 CFR 91.7 Prohibits the Operation of an aircraft without an airworthiness certificate.

As no such certificate will be applicable in the form contemplated by the FARs, this Regulation is inapplicable.

14 CFR 91.9 Civil aircraft flight manual, marking, and placard requirements.

This regulation provides that no person may operate an aircraft unless a current, approved flight manual is in the aircraft. We assume that the intent of this requirement is to ensure that flight manual information is available to the aircrew while operating the aircraft. We request an exemption to this requirement since the aircraft is not only too small to carry documentation, the documentation would not be available to the crew during flight operations. To obtain an equivalent level of safety and meet the intent of 91.9, we propose that a current, approved sUAS Flight Manual must be available to the crew at the ground station anytime the aircraft is in, or preparing for, flight.

14 CFR 91.109 Flight Instruction; Simulated instrument flight and certain flight tests

The regulation states that "No person may operate a civil aircraft that is being used for flight instruction unless that aircraft has fully functioning dual controls." The sUAS System ground-based control station consists of a small hand-held radio transmitter and while it does not offer a second set of "controls", both the student and instructor can, and will, operate the single set of controls simultaneously. With both student and instructor having "hands-on" the controls during flight, we feel that this technique meets the intent 91.109 and provides an equivalent level of safety.

14 CFR 91.119 Minimum safe altitudes: General.

The regulation states that over sparsely populated areas the aircraft cannot be operated closer than 500 feet to any person, vessel, vehicle, or structure. Since the typical mission of the sUAS would be photography or survey of persons, vessels, vehicles or structures it would be necessary to operate closer than 500 feet to the items listed. Operations will only be flown over property or persons where permission has been obtained and careful pre-planned has been performed. The aircraft will be operated at a low altitude allowing, if a power unit fails, an emergency landing without undue hazard to persons or property on the surface. Therefore we maintain that due to the small size of the UAS, the hazard to persons, vehicles and structures is minimal compared to manned aircraft, which should be considered in granting the exemption.

14 CFR 91.121 Altimeter settings.

The regulation requires that aircraft shall maintain cruising altitudes by reference to an altimeter setting available within 100 NM of the aircraft. The sUAS will always fly below 600 feet AGL and will not need to maintain cruising altitudes in order to prevent conflict with other aircraft. An Above Ground Level altimeter measurement above the takeoff point is transmitted via radio from the sUAS on-board computer to the display screen held by the PIC, providing a constantly updated AGL readout.

14 CFR 91.151 Fuel requirements for flight in VFR conditions.

The regulation provides that no person may begin a flight in an airplane under day-VFR conditions unless there is enough fuel to fly to the first point of intended landing and to fly after that for at least 30 minutes. We feel the intention of this paragraph is to provide an energy reserve as a safety buffer for delays to landing. The sUAS are battery operated and the maximum duration of flight from a single battery charge is 12-45 (depending on which sUAS) minutes with a 20% reserve. Since the aircraft will never fly more than 1/2 NM from the point of intended landing, a full battery charge at launch will ensure that we meet the reserve energy requirement of this paragraph. We request an exemption to the word "fuel" and ask for an equivalent interpretation with the word "energy". We also request exemption from the 30 min reserve and ask that our reserve will be to fly the mission to the point of intended landing and have at least a 20% battery reserve after that.

14 CFR 91.203(a) & (b) Civil aircraft: Certifications required.

The regulation provides that an airworthiness certificate, with the registration number assigned to the aircraft and a registration certificate must be aboard the aircraft. Additionally, subparagraph (b) provides that the airworthiness certificate be "displayed at the cabin or cockpit entrance so that it is legible to passengers or crew." With our largest vehicle, the RF-70, at a maximum gross weight of 13 pounds, the sUAS is too small to carry documentation, does not have an entrance, and is not capable of carrying passengers or crew. To obtain an equivalent level of safety and meet the intent of 91.203, we propose that documents deemed appropriate for this aircraft by the FAA will be co-located with the crew at the ground control station and available for inspection upon request. In order to identify the aircraft, we propose that the information found on airworthiness and registration certificates be permanently affixed to the aircraft via placard containing the following information plus the word "EXPERIMENTAL" to satisfy the requirement of 14 CFR 45.23.

14 CFR Subpart E (91.401- 91.417) - Maintenance, Preventive Maintenance, Alterations

The regulation provides that the operator is primarily responsible for maintaining the aircraft in an airworthy condition, including compliance with part 39 and 43. Paragraphs 91.407 and 91.409 require that the aircraft be "approved for return to service by a person authorized under 43.7" after maintenance and inspection. It is our intention that the PIC perform maintenance and inspection of the aircraft and "be authorized to approve the aircraft for return to service."

The PIC will ensure that the aircraft is in an airworthy condition prior to every flight and in addition, conduct detailed inspections after every two hours of flight. Maintenance performed by the PIC is limited to repairing small cracks, replacing a propeller, checking electrical connections and updating software and firmware for the on-board computer. All other maintenance will be performed by the manufacturer or their designated repair facility. The PIC will document work performed in accordance with 91.417. We feel that due to the size, construction, and simplicity of the aircraft, the PIC can ensure an equivalent level of safety.