




Flying UAS Commercially in the U.S.

Many obstacles remain:

- Public perception
- Privacy issues
- State & local regulation
- Safety
- Insurance cost
- FAA 333 requirements




Flying UAS Commercially in the U.S.

333 Exemptions – Do's & Don'ts

333 approval process slowed after accelerating from 120 to 60 days - 8 weeks posting and 120-day review.

FAA Exemption - May 29, 2015 – Property Drone Consortium, LLC - Use for aerial data collection w/select provisions:

- Visual line of sight (VLOS) of PIC at all times
- PIC needs pilot certificate, and FAA airman medical certificate or valid U.S. driver's license.
- No operations at night
- UA may not operate within 5 nautical miles of an airport reference point (ARP) or airports not denoted with an ARP, unless letter of agreement provided by airport management or otherwise permitted by a COA.



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333 Exemptions – Do's & Don'ts (cont.)

FAA Exemption, May 29, 2015 – Property Drone Consortium

- Operations must be 500 feet or more from non-participating persons, vessels, vehicles, and structures unless a) barriers and structures can protect non-participants...
- Operations are to be conducted over private or controlled-access property with permission obtained from owner, controller, or authorized representative for each flight
- Operations outside 333 / blanket COA require a new or amended ATO issued COA

Also, many reporting/documentation/safety provisions



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333 blanket COA

FAA Exemption – Property Drone Consortium

- No higher than 200 ft AGL
- 5 NM away from airports with a control tower
- 3 NM away from airports with no control tower or published instrument flight procedures
- 2 NM away from heliports with a published instrument flight procedure.

Also, many reporting/documentation/safety provisions



How many contract aerial or satellite photography for assessment or in a catastrophe ?

If you intend to do the work yourself you are now pilot, processor, imaging scientist, data manager, and lawyer

7



The type of UAS chosen will be based on mission requirements and rely heavily payload and area coverage

8



A sensors equipped UAV constitute a UAS: Unmanned Airborne System. Multi rotor are defined often by rotor configuration and number of motors

9



Sensors should be mounted on a vibration stabilized gimbal mount to insure high quality data capture

10




Sensors can see details when specified accurately. Focal length, field of view all work in conjunction with the operations envelope

11



Flight planning is a function of UAS type, duration, speed altitude, terrain sensor, camera station and coverage requirements

12



The human interface is critical to successful operation. Who will your operator be?




UAS operation may also involve a traditional RC controller mode 2 versus mode 1




Batteries are lithium ion. They must be treated with care. Multiples should be on hand

The Drone Attributes

Physical	Sensing
<ul style="list-style-type: none"> • Format <ul style="list-style-type: none"> —Fixed vs Rotary • Weight • Size 	<ul style="list-style-type: none"> • Spatial • Radiometric • Positional • Awareness




The Drone Attributes

Operational	
<ul style="list-style-type: none"> • Speed • Duration • Data storage • Communication • Autonomy • Security • Safety features • Shielding 	

The Property Attributes

Physical	Sensing
<ul style="list-style-type: none"> • Footprint • Height • Parcel 	<ul style="list-style-type: none"> • Material • Condition • Boundaries



The Property Attributes

Operational

- Access
- Capture process
- Occupancy
- Weather
- Region



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The Operator Attributes

Physical

- Drone access
 - Personal
 - Office
 - Regional
- Drone shipping

Sensing

- Line of sight
- Condition
- FPV



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The Operator Attributes

Operational

- Contractor
- In house
- Sites per day
- Ferry between sites
- Transportation
- Region
- Skill
- Best practices
- Privacy
- Client interaction



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Crew

Pilot

- FAA Licensed with Proper FAA medical certificate or valid drivers license

Visual Observer (VO)

- FAA medical certificate
- State-issued drivers license is okay in most cases

Non-Participants

- Maintain safe distance from UAV



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NOTAMs

Notice to Airmen: used to alert other aircraft of your activity.

- Includes location, altitude, time and nature of activity.
- Must be issued at least 24 hours in advance of flight
- Some locations close to airports may require a phone call to the local control tower (ATC) before flight



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On-site Inspection

- Walk around to inspect flight hazards.
- Trees and power lines can be serious hazards to flights
- Ensure protection of non-participants
- Find a safe takeoff and landing site that will remain clear throughout the flight



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Pre-flight

- Mechanical inspection of UAS
 - Battery check
 - Foil and frame check
 - Ensure proper GPS satellite coverage
 - Sensor check (batteries, lens caps & data storage)
- Weather check/ GPS Quality Check
- Ensure all paperwork for flight is on site.
 - Licenses, COAs, insurance and privacy/land use permissions
- ATC coordination (if applicable)
 - Maintain a list of radio frequencies for local airports



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Pre-flight

Participant Briefing

- Privacy
 - Aircrew responsibilities
 - Walkie talkies
 - Line of site
 - Hand-off procedure
 - Sterile cockpit
- Mission overview and flight profile
- Flight time and battery life
- Emergency procedures and contingency plans



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Flight

- Takeoff & control check
- GPS & transmitter link
 - Flying under structures will cause loss of GPS capability
 - Flying near electrical lines or radio towers can cause problems
- Battery life monitoring
- Maintaining line of sight
- Positioning of visual observer
- Landing and shutdown



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Emergency Procedures

- Air traffic
 - CTAF/Airport frequency
- Pedestrian interference and avoidance
- Lost link with transmitter
 - Climb to safe altitude
 - Return to takeoff site
- Low battery procedure
 - Land immediately or automatic return to landing site at certain level
- Flyaways
- GPS or Gyro loss
- Mechanical failure



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Post Flight

- Safe storage and charging of batteries
- Recording flight time
- Ensuring data collection
- Airframe and foil check



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333 Exemption UAS Platforms

Property Drone Consortium

- 3DR Iris +
- 3DR Solo
- Altura Zenith
- DJI Inspire 1
- DJI Phantom2 Vision+
- DJI Phantom 3
- md4-1000
- Parrot BeBop
- PrecisionHawk Lancaster
- sensefly eXom




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Case Study – Genesee Country Village & Museum

- Third largest collection of historic buildings in America – Mumford, NY (near Rochester)
- 700 acres, 68 relocated historic structures (mostly non-occupied), functioning brewery, art museum, nature center, trails, gardens
- Variety of roofing materials
- Admission May 7 – October 12 (closed Mondays) – occasional events remainder of year
- GCV&M / EVT agreed to UAS flights pending regulatory approval in return for sharing imagery of campus
- Special interest is the Hyde House – historic octagon shaped house in need of new roof – in order to qualify for grants must be replaced in original style – hand cut and nailed cedar - \$75,000 campaign



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Case Study – Genesee Country Village & Museum

SELECT 333 PROVISIONS:

- Operations must be 500 feet or more from non-participating persons.
 - Non-participating staff were instructed to remain indoors during duration of EVT presence. Volunteers were dismissed for the day
- Flying location well over 500 feet away from road
- Operations are to be conducted over private or controlled-access property with permission obtained from owner, controller, or authorized representative for each flight.
- Permission in writing from GCV&M
- AND CHECK ON LOCAL REGULATIONS



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Case Study – Genesee Country Village & Museum




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