



Unmanned Aircraft Systems (UAS)

Insurance Overview for Risk Managers and Pooling
Professionals

Association of Governmental Risk Pools

January 2015 Webcast



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A Short History

How did we get to where we are today?



Brief History of Unmanned Aircraft

Prehistoric times to WWII

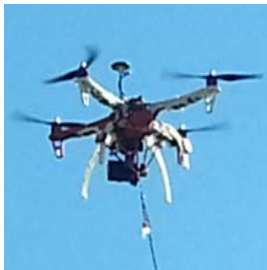
- Prehistoric man used stones as an aerial tool or weapon and the Chinese began launching rockets centuries ago.
- Focusing on lift producing/controllable aircraft, the kite may be the first true unmanned aircraft having cameras attached to them as early as the 1880s for reconnaissance.
- World War I saw the development of the Kettering Bug for the Army Signal Corps.
- 1924 saw the first successful radio controlled flight.
- 1931 saw first use of British remote controlled Queen Bee target aircraft.
- 1939 sees the formation of the Radioplane Company (precursor of Northrop Grumman) that goes on to manufacturer thousands of target drones during WWII.
- World War II spurs significant development



Brief History of Unmanned Aircraft

Vietnam War to Present Day

- Vietnam War sees first true successful uses of controllable UAVs for aerial recon; development continues into '70s.
- Rapid expansion from late '70s into the '90s occurs due to global events in Lebanon and the Balkans through the first Gulf War.
 - Birth of the General Atomics MQ-1 Predator
- Military development continues post 9/11 with operations in Iraq and Afghanistan.
- In roughly 2004 the sUAS industry is born as the civilian world starts adopting some of the more sophisticated technology on a limited basis.
- 2010-2013: sUAS technologies improve significantly while becoming smaller and cheaper.
- 2013-Today: Low cost/High capability UAVs available to almost any individual or business.



What is an Unmanned Aircraft *System?*

A description of some terms



The Relevant Acronyms

We love these in the aviation and insurance industries!

- First, (some) of the most common alternatives to the term *DRONE*...
 - UA – Unmanned Aircraft
 - UAV – Unmanned/Unpiloted Aircraft Vehicle
 - UAS – Unmanned Aircraft System – Next Slide
 - RPV – Remotely Piloted Vehicle
 - RPA – Remotely Piloted Aircraft
 - OPA – Optionally Piloted Aircraft
 - ROV – Remotely Operated Vehicle
 - RPAS – Remotely Piloted Aircraft System

- For the purposes of the aviation insurance product these are all essentially the same thing. We can provide coverage for the operation of a UA, or UAV, that is part of a UAS.



The Components of an Unmanned Aircraft System

Why our policy form is the UAS01

- The UA or UAV is only one part of the operation/risk.
- The “System” includes some/all of the following:
 - Unmanned Aircraft
 - The air vehicle itself
 - Payload
 - The business end of the system
 - The systems that collect or transmit data
 - Mission Support Equipment
 - Equipment needed to transport, maintain, launch, and recover the UA
 - The People
 - The pilot/operator, visual observer, payload operator, etc.
 - Data Link
 - The communications between the ground and UA
 - The Space
 - Airspace, Air Traffic Control, Weather, and Regulations applicable to a given flight
 - Command and Control
 - Internal/External



Commercial and Public Applications

Where we can expect to see UAS used





Primary Drivers of Use/Demand

The three, or four, “D”s

- Dull
 - Wildlife monitoring
- Dirty
 - Utility uses
- Dangerous
 - Hostile area/power plant disaster
- Duration
 - Humans have far more limitations
- **Economic**
 - Significantly less expensive per hour to operate in many instances



Public UAS Applications

Public Safety/Law Enforcement

- Crime scene investigation and image collecting
- Search and rescue
- Providing imagery for fire suppression and arson investigations
- Tactical advantage viewpoint / live imaging in hostile situations





Public UAS Applications

Research/Testing

- University research
- Weather monitoring
- Environmental monitoring
- Wildlife surveys and research



Public and Commercial UAS Applications

Infrastructure Inspections

- Power line surveys and inspections



- Bridge and building inspections





Public and Commercial UAS Applications

Film/Television



Public and Commercial UAS Applications

Disaster Response and Insurance





Public and Commercial UAS Applications

Other Uses

- Aerial mapping
- Communication
- Oil and gas exploration and infrastructure support
- Pipeline inspections
- Railroad inspections
- Security
- Construction
- Traffic Monitoring
- Aerial photography
- Delivery and cargo
- Benefits for nearly all industries

Commercial UAS Applications

Precision Agriculture

- It is estimated by the AUVSI that agricultural uses could account for 80% of the commercial market for unmanned aircraft.
- Agriculture is a very logical early UAV use as it involves operations in rural locations away from populated areas.
- Numerous possibilities/uses for agricultural industry including:
 - NDVI (Normalized Difference Vegetation Index)/multi-spectral imagery to determine plant health
 - Can be used to determine where more fertilizer, more water, or more nitrogen is needed on very localized basis.
 - Spot plant disease with temperature sensory imagery and ultraviolet photography
 - Pest/infestation spotting/Treatment
 - Irrigation analysis
- Highly targeted spraying
- Frost mitigation
- Livestock monitoring



Public and Commercial UAS Applications

Typical Octocopter



Status in the U.S. Today

Available Approval Options



Public/Private Operations

Certificates of Waiver or Authorization (CoAs)

- Provides opportunity for public operators (federal, state, and local governments, along with public universities) to gain specific approvals for the use of unmanned aircraft.
- Requires an application to the FAA and a comprehensive operational and technical review.
- Typically has specific use, location, and/or operational limitations, i.e. no blanket use approvals.
- Hundreds have been issued, though many are military related.
- Private Commercial Entities may also seek a CoA along with an airworthiness certificate.
 - Only three have been granted so far
 - Two for maritime survey work in the Arctic, and one for pipeline inspections on the North Slope of Alaska



Commercial Operations Today

Background Case

▪ Huerta vs. Pirker

- October 2011 FAA fines Pirker \$10,000. for “operating in a careless or reckless manner so as to endanger the life or property of another.”
- October 2013 Pirker appeals to the NTSB
- March 2014 judge grants motion to dismiss FAA order assessing original fine. FAA immediately appeals to NTSB.
- Late November 2014 NTSB reverses the March judicial decision
 - NTSB affirmed unmanned aircraft *are* aircraft
 - FAA can impose the \$10,000. civil penalty
 - Since unmanned aircraft are aircraft, FARs are applicable – no more “gray area”
- Another appeal?



Commercial Operations Today

Section 333

- Under the 2012 FAA Modernization and Reform Act, Congress mandated that the FAA integrate sUAS (Small UAS) into the NAS by September 2015.
- Section 333 refers to the section of the Modernization act and allows the FAA flexibility to allow some commercial entities to fly prior to final UAS rules.
- Commercial operators can use this to section to petition for exemptions to existing FARs in order to gain approval to operate by proposing alternative methods of compliance that will have an equivalent level of safety.
- For now, this is the process. Several companies have had their exemption requests approved to date, while the FAA has received 167 exemption requests (per www.regulations.gov as of 12/10/14).



Section 333 Exemptions

Common Attributes of Approved U.S. Operations



Sample of some items the FAA appears to be looking for

General Aircraft Requirements

- Aircraft weight < 55 pounds (25Kg), including power source(s) and attached equipment.
- Flown at ground speeds not exceeding 50 knots (exceptions possible) and at altitudes of no more than 400' Above Ground Level (AGL).
- Operated in visual line of sight (VLOS) of Pilot-In-Command (PIC) at all times (unaided other than by corrective lenses).
- Utilization of a visual observer (VO) who is able to communicate verbally with the PIC at all times.



Sample of some items the FAA appears to be looking for

Aircraft and Pilot Requirements

- Operator must follow UAS aircraft/component, maintenance, overhaul, replacement, inspection, and life limit requirements.
- PIC must possess at least a Private Pilot Certificate and a 3rd class medical certificate, and meet requirements of FAR 61.56.
- Minimum pilot experience and proficiency level
- PIC and VO must have successfully completed a qualification process by operator.

Sample of some items the FAA appears to be looking for

Public Safety

- The aircraft may not be operated directly over any person, except authorized and consenting personnel, below an altitude that is hazardous to persons or property on the surface in the event of a UAS failure or emergency.
- Regarding distance from non-participating persons, no persons allowed within 500 feet except those necessary for work involved. May be reduced to 200 feet if it would not adversely affect safety.



Sample of some items the FAA appears to be looking for

Emergency Procedures/Minimum “Fuel”

- In lost link scenario, aircraft returns to pre-determined location and lands, or is recovered in accordance with operator’s manual.
- UAS must abort flight in the event of unpredicted obstacles or emergencies.
- Each UAS operation must be completed within 30 minutes of flight time or with 25% battery power remaining, whichever occurs first.



Sample of some items the FAA appears to be looking for

Notifications

- At least three days prior to operations, a written Plan of Activities must be submitted to the local Flight Standards District Office (FSDO) - (may be waived by FSDO), that includes specific contact, aircraft and flight information.
- Any incident, accident, or flight operation transgression outside the approved lateral or vertical boundaries must be reported to FAA. Accidents must be reported to NTSB.

Sample of some items the FAA appears to be looking for

Other General Items

- The aircraft must remain clear and yield right of way to all other manned operations at all times.
- UAS operations may not be conducted during night. All operations must be conducted under Visual Meteorological Conditions (VMC)
- Aircraft may not operate in Class B, C, or D airspace without written approval from the FAA. The aircraft may not operate within 5 Nautical Miles (NM) of the geographic center of a non-towered airport unless a letter of agreement with that airport's management is obtained, and the operation is conducted in accordance with a NOTAM.

What Comes Next?

Public and Commercial UAS Operations in the U.S. Now Through 2016



Next Events in the U.S. Applicable to UAS Operations

Current Anticipated Timeline

- Congressionally mandated target of September 2015 will not be met.
- Awaiting FAA's Notice of Proposed Rulemaking and Draft Rules for Small UAS Operations.
- Once released a high comment volume is anticipated, which will push Final Rule out months, if not longer.
- Now hearing Final Rule may not be out until as late as 2017.
- Interim directive?



Exposures and Coverages

Why the need for Insurance? How are you covered today?
What might you need to change or modify?



Liability

Exposures

- Bodily injury and property damage
- Consequential losses
- Catastrophic loss potential
- Non-owned use of unmanned aircraft
- Personal Injury



Privacy

Exposures

- Unreasonable searches/surveillance
- Trespassing
- Invasion of privacy
 - Intrusion upon seclusion
 - Publication of private facts
- Stalking and harassment
- Business privacy
- Personal injury coverage can be considered, but operator should have policies, procedures and guidelines in place for the collection, storage, use, and destruction of data collected by the aircraft , AND have good preflight risk mitigation procedures in place.





Physical Damage

Exposures

- Aircraft
- Payload
- Ground control equipment
- Spare parts
- Normal deductibles are 5-10% of insured value



War

Exposures

- Unmanned aircraft can face war risks
 - Malicious attack
 - Hi-jacking
 - Spoofing
 - Sabotage
- Very different exposure potential than what we are used to as aviation underwriters
- Coverage can be considered, but only on a case by case basis.



Underwriting Considerations

What you can expect the underwriter to ask for





Underwriting Considerations

UAV underwriting is based on traditional aircraft underwriting foundation

- Almost all aviation underwriting stems from four basic points of risk analysis.
 - Operator experience
 - Make and model information
 - Purpose of Use
 - Location of Operations
- Values and limits required
 - Aircraft
 - Payload
 - Ground Equipment
- Operational procedures/risk mitigation items
- Training



Conclusions

The Future Starts Today



What Can We Anticipate As of Today?

Steady growth in 2015 and 2016 with a significant jump in 2017 and beyond

- Late 2016/Early 2017 adoption of formal regulations will have a big impact on this industry.
- FAA has estimated as many as 8,000 commercial UAVs could be flying in the U.S. by 2020.
- Public entity UAVs could mean thousands more.



Unprecedented Exposures Require “New” Insurance

Shaping the coverage for a truly new aviation exposure

- New technology, new environment, new aircraft, being used for new things = new challenge.
- We get the opportunity to rise to the occasion, and assist in the development of a new industry that can provide so many benefits.





The Final Message (for Now)

UAVs are Here to Stay

- The unmanned aircraft industry is here for good.
- The potential applications for this technology are almost limitless.
- Changes to existing regulations and/or new regulations are almost a certainty.
- Unapproved operations are extensive at this point.
- Final rules may still be years away.
- Laws, specifically with respect to privacy issues, will need to be adapted to this new technology.
- A great opportunity for us all.



Questions?





Bring on tomorrow

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