**TOOLBOX TALK: Basic sUAS Operational Safety**

RATTLIR Safety Series – "Strike Before It Bites"

## Purpose

Small Unmanned Aircraft Systems (sUAS) require disciplined operational practices to ensure safety, compliance, and successful mission outcomes. This toolbox talk provides a comprehensive overview of FAA Part 107 requirements, industrial inspection hazards, crew communication expectations, and human-performance considerations to establish a strong foundation for safe drone operations.
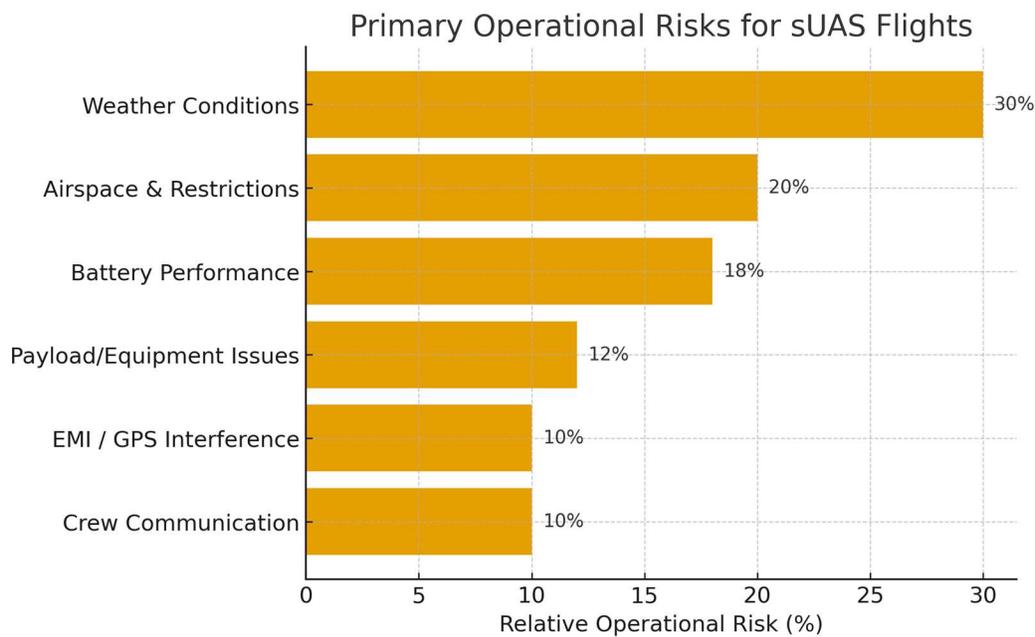


*Figure 1 – Primary Operational Risks for sUAS Flights*

## FAA Part 107 Operational Requirements

All sUAS operations must comply with federal aviation regulations under FAA Part 107:

- The Remote Pilot in Command (RPIC) is responsible for the safe operation of the aircraft.
- Visual Line of Sight (VLOS) must be maintained at all times
- Operations must remain below 400 feet AGL unless inspecting a structure.
- Night operations require anti-collision lighting visible for at least 3 statute miles.

- Preflight assessments are mandatory to ensure the aircraft is airworthy and safe for flight.

**Industrial and Utility-Inspection Hazards**

Industrial environments introduce unique hazards that can interfere with sUAS performance and situational awareness:

- Electromagnetic interference (EMI) from substations, transformers, breakers, and high-voltage equipment.
- GPS degradation or loss of signal near steel structures, tanks, powerlines, or dense equipment.
- Updrafts, downdrafts, and thermal plumes from boilers, HRSG vents, or process exhaust stacks.
- Metallic surfaces reflecting or distorting RC and video signals.
- Bird activity, wildlife, or overhead obstructions such as cranes and conveyors.

**Crew Coordination and Communication**

Structured communication between the Remote Pilot in Command (RPIC), Visual Observer (VO), and payload operator is essential for safe operation:

- Conduct a crew briefing before each mission covering hazards, airspace, and responsibilities.
- Use clear, standardized communication—avoid assumptions and ambiguous directions.
- Maintain continuous communication between RPIC and VO to monitor airspace and surrounding hazards.
- Use three-way communication for critical instructions such as takeoff, landing, or repositioning.

**Preflight Assessment and Airworthiness**

Comprehensive preflight checks ensure the sUAS, crew, and environment are ready for safe operation:

- Inspect the aircraft, propellers, motors, gimbal, and sensors for damage or wear.
- Verify battery charge, cycle health, and expected flight time for the mission.
- Confirm firmware and software updates have been applied and tested prior to mission day.

- Assess weather conditions including wind, temperature, precipitation, and cloud ceilings.
- Check airspace classifications and temporary flight restrictions (TFRs).

**In-Flight Operational Best Practices**

Safe operation during flight requires constant situational awareness, environmental monitoring, and aircraft control:

- Avoid sudden maneuvers or high-speed operations near structures or people.
- Maintain stable hover and controlled movements when inspecting equipment.
- Monitor battery levels and return-to-home thresholds to avoid forced landing.
- Keep adequate standoff distance from energized equipment and substation structures.

**Emergency Procedures**

Pilots must be prepared to respond quickly and effectively to unexpected events:

- Know how to initiate Return-to-Home (RTH) and when to override it.
- Identify safe emergency landing zones before launching.
- Respond to loss of GPS by switching to ATTI/manual modes only if trained and proficient.
- Report flyaways, crashes, or abnormal aircraft behavior immediately.

**Discussion Questions**

- Do you understand the FAA Part 107 requirements that apply to today's flight?
- Are you aware of industrial hazards such as EMI, GPS degradation, and thermal plumes in your flight area?
- Do you have a clear communication plan and crew roles defined before takeoff?

**RATTLIR Takeaway**

Safe drone operation requires disciplined planning, strong communication, and proactive hazard recognition. By integrating FAA requirements with industrial hazard awareness and robust crew coordination, pilots prevent incidents caused by interference, environmental conditions, or human error. RATTLIR strikes before it bites by promoting deliberate preparation, structured teamwork, and high-integrity flight practices.