UAS-Based Inspection of Infrastructure

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NP UAS TS Background

www.npuasts.com

• One of 7 FAA Selected UAS Test Site

• Mission

“Collaborate with FAA and industry partners to develop equipment, systems, rules, and procedures to safely integrate unmanned aircraft into the NAS without negatively impacting existing general or commercial aviation.”

• Customized COAs

• Services
  • Flight Operations
  • Flight Oversight
  • Training
  • Consulting
  • Credentialing/Certification
Infrastructure UAS Ops

**Application Types**
- Linear Infrastructure Inspections
  - Railway, powerlines, pipelines, roadways, etc.
- Point Infrastructure Inspections
  - Wind turbines, towers, building construction, etc.

**Operational Considerations**
- Rural vs Urban
- Distance from Structures
  - Horizontal and Vertical
- Environmental Conditions
  - Equipment and flight crew
  - Infrastructure
Linear Infrastructure Inspection

- Usually operated at altitudes above or adjacent to the infrastructure
- Increased UAS endurance requirements

- Pulse Vapor 55
  - Rotary wing
  - Small UAS (<55 lbs)
  - Daisy-Chained Visual Observers

- Elbit Hermes 450
  - ~1000 lbs
  - Chase Plane Visual Observer
Point Infrastructure Inspection

• Usually operated in and around the structures
• Requires stability and precision

• UND Powerline Inspection Research
  • Collaborate with regional utility industry partners
  • Conduct sensor trade study for component inspections
  • Assess performance for close-up inspections (2016)
  • Demonstrate beyond visual line of sight surveys (2017)

• Flights to date
  • Freefly Alta 8
    • Rotary wing
    • Top-mounted sensor
  • Visual Line of Sight Operations
  • Flown within 10’-15’ of structure, ~ 200’ tall, in winds up to 20 kts

* See poster presentation Wednesday, Booth 1635
Point Infrastructure Inspection

• Building Construction
  • Variety of sUAS (<55 lbs)
  • Rotary wing
  • Operated 20-25 ft from building
  • Reduced wind limits by ½

• Roof Inspection (Insurance)
  • Rotary wing
  • Small UAS (<55 lbs)
  • Operated 10-20 ft above roof
Pre-Flight Planning

• Evaluate operational environment
  • Urban vs Rural
  • Low Altitude vs High Altitude

• Monitor weather conditions to identify flight dates
  • Use standard online tools (~4-7 days in advance)

• Confirm flight conditions day prior
  • Ceilings, precipitation, wind, temperature

• Confirm UAS can operate in forecasted weather conditions
  • Onsite/nearest weather station conditions and pilot judgement determine go/no-go each flight
Weather Effects on UAS Infrastructure Ops

- Larger UAS – Plan for weather similar to manned aircraft
- Small UAS – Greater impact from weather
  - Wind eddies and microclimates in and around structures
  - UAS autopilot capability and excess power critical for stable flight in higher winds
- Adjust weather minimums
  - BVLOS flights
  - Flight close to structures
- Supporting equipment subjected to environmental conditions
  - Tablet/phones turn off during extreme weather
  - DAA/obstacle avoidance systems impacted by weather conditions
- Flight crew subjected to environmental conditions
Questions?