

TxDOT ROW

UTILITY WEEK

Partners in Coordination

TxDOT is Taking Action

Use of UAS (Drones) in Utilities

UAS Program

Day 2 - December 3rd
Track Rm 1, Session 1
1:30PM - 2:15PM



Presenter: Sergio Roman



Sergio serves as TxDOT's Director of Emerging Aviation Technology charged with the safe and efficient integration of UAS into TxDOT's daily operations. He has been flying drones and managing drone programs for 13 years cumulating over 6,000 flight hours for the US Army, major Defense contractors, and now TxDOT. His goal is to make the benefits of UAS attainable to TxDOT and its partners through collaboration, standardization, and the strategic application of UAS on TxDOT projects.

Introduction

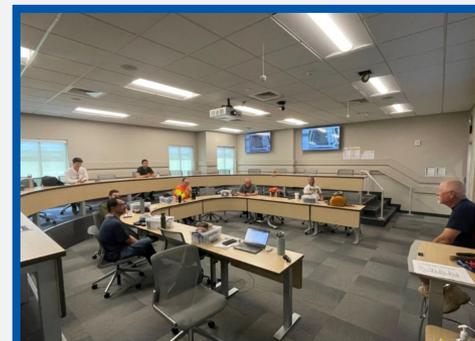
- The use of Unmanned Aircraft Systems (UAS), better known as drones, is becoming more common these days thanks to the multiple advantages that they offer: versatility, reliability, safety, time saving, among others.
- While we could largely talk about the different uses that an UAS offers, this presentation will be focused on the use of drones in the utilities industry.
- Utility providers have many opportunities to accomplish projects more economically and safely, especially for those related to pipelines and power lines: project inspections and image capture using UAS instead of more costly and time-intensive methods such as the use of helicopters and line inspection crews, offers a competitive advantage for them. Renewable energy providers use drones to inspect and monitor solar farms, wind farms, as well as search for places to convert into new farms. The interest in drone technology by electric, water and natural gas utilities is growing at a rapid pace, and this relatively new application for utilities seems positioned to eventually become a best practice as the usage is woven into more projects. It is easy to understand why there is a growing attraction to drones.

TxDOT's UAS Program

TxDOT developed the UAS training program to enable all districts and divisions within TxDOT to deploy drones on various projects. The goal of the program is to increase safety, efficiency, and lower the cost of data collection compared to traditional/legacy methods.

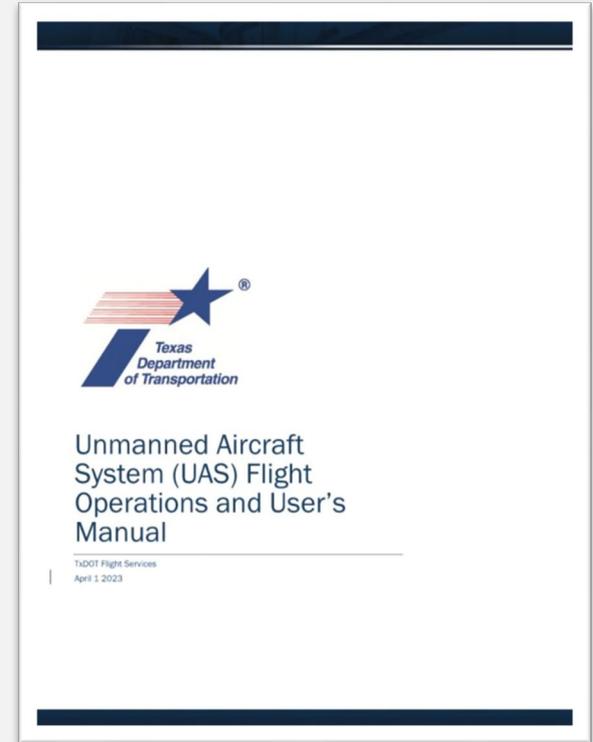
The training includes:

- 3-week on-line (remote) preparation of students to pass the Federal Examination (FAA Part 107).
- 6-week hands on training (hybrid): 1 week in-person training in Kyle, Tx; 4 weeks back at home district/division for self practice (must fly a drone daily); 1 week in-person in Kyle Tx.
- Sustainment training.
- Annual refresher training.



TxDOT UAS Flight Operations and User's Manual

- This manual describes the TxDOT's UAS program, including:
- Organization, administration and operation of the program.
- Ground operations.
- Air operations.
- The manual has been developed to guide users in the safe operations of UAS in compliance with all local, state, and federal regulations. Adherence to the policies, rules, and regulations contained in it is mandatory.

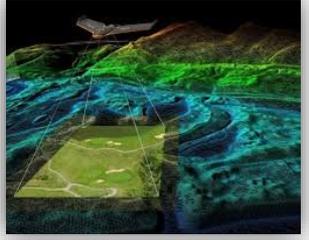
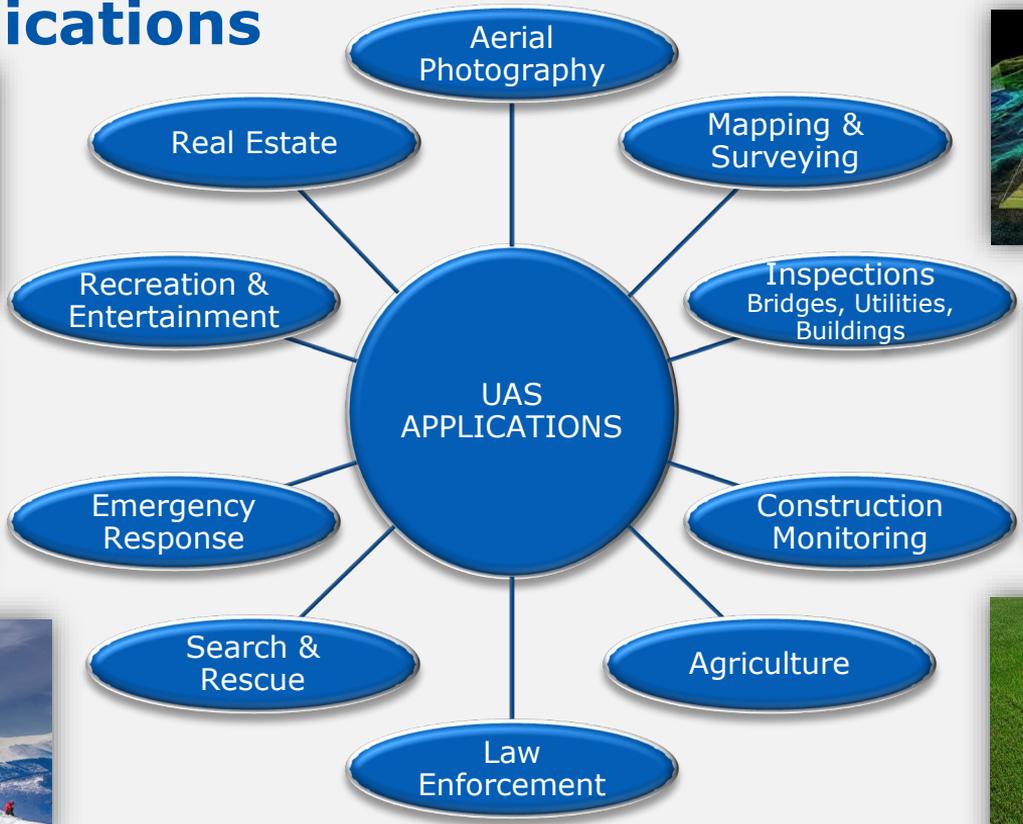


Drones

Uses and Applications



Drones Applications

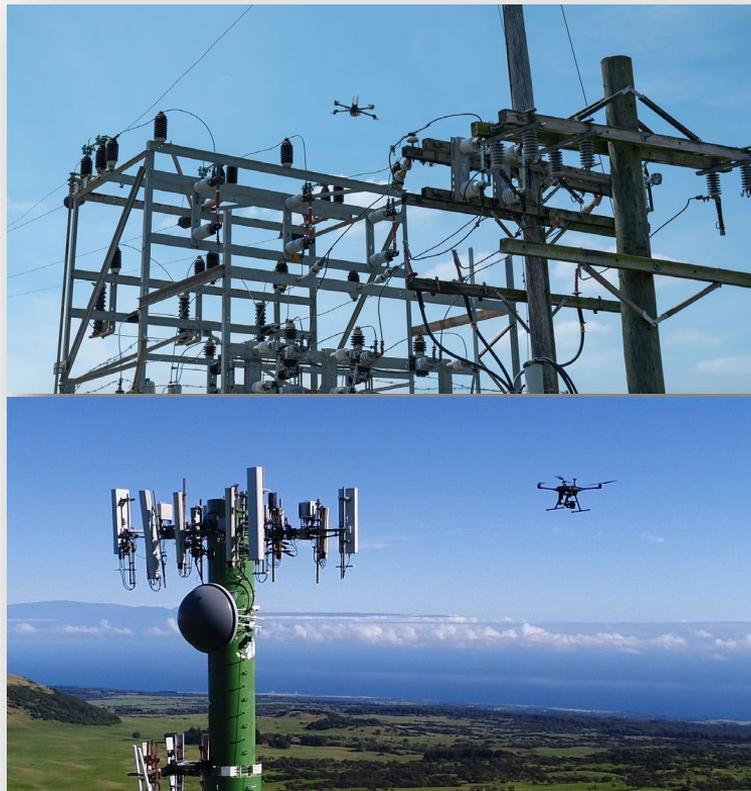


Benefits of using drones in the utility industry

Faster, Cheaper, Safer

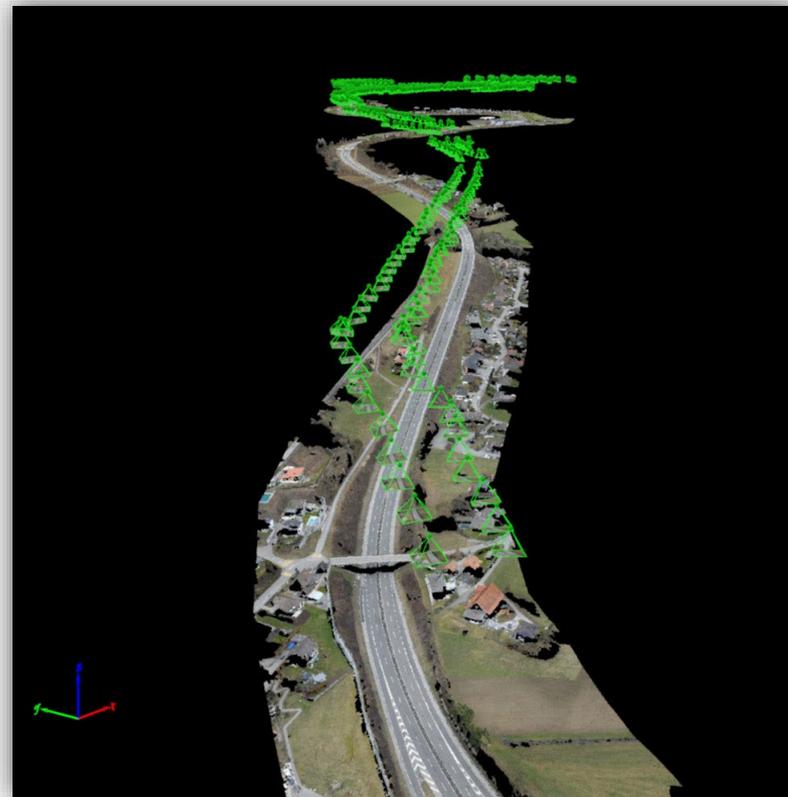
While SUE (Subsurface Utility Engineering) quality level C (information obtained by surveying and plotting visible above-ground utility features) might take days or weeks to be accomplished, the use of a drone can reduce the time significantly to only a few hours.

Drones can access dangerous or difficult to reach locations, which significantly decreases the chance of a person injuring themselves while performing the inspection. For example, power companies usually send inspectors in helicopters, the helicopter will hover near the power lines and electrical towers while the inspector uses binoculars and/or cameras to perform the inspection. Can you see the risk? Now you have a helicopter flying at low altitude near the power lines and there have been fatalities associated with that. Having a drone performing the work while the inspector remains at a safe place makes a big difference.



The example is not only applicable for power lines. Imagine inspecting a 400ft height communication tower: instead of sending a person to climb the tower which would be time consuming and putting his life at risk; the use of a drone would be not only safer but also more cost and time effective.

One of the biggest challenges of the construction industry, and most road construction, are time and production costs. Delays in construction means an increment in the final cost. The delay in work is often attributed to unexpected, incidental occurrences; this is especially true on roads with unexpected utilities. Drones may conveniently eliminate this with their speedy data collection, quick mapping, and time-sensitive results. This gives immediate results and saves time and cost.



The use of drones combined with other technologies like radar tomography, LiDAR, and additional mobile mapping applications have surfaced as a cost-effective method for mapping utilities above and below ground, capturing high-resolution surface imagery, and locating utilities and aging infrastructure.

Drones can cover large areas in a shorter time frame, which reduces the time required for inspections, repairs, and maintenance calls.



Construction and Utility Inspection Challenges

- Heavy workload
- Difficult to cover all locations where inspections are needed.
- Contractors backfill excavation sites quickly without waiting for inspector to arrive at the jobsite.
- Utility owners often do not inspect their own utility relocations.
- Inspectors often have limited access/training to use surveying equipment.

Drones Capabilities

Drones have the capability for autonomous flight and pre-planned missions to perform different tasks, from the inspection of oil & gas pipelines or power lines and bridge inspections, to mapping, emergency response, and search & rescue missions.

Drones Limitations

- **Flight time:** Most commercial drones have a flight time of 25–35 minutes, which may not be enough for large areas or extended missions.
- **Weather:** Drones are sensitive to weather conditions and high winds, and most are not sturdy enough to withstand storms.
- **Range and battery life:** The distance a drone can travel and the number of deliveries it can make in a single flight are limited by its range and battery life.
- **Legal limitations:** Drones cannot be flown in certain areas, such as within a 5–7 mile radius of most airports.
- **Safety:** Drones can distract, frighten, or endanger people and birds.
- **Liability and legal concerns:** Liability and legal concerns include personal injury, property damage, invasion of privacy, trespassing, property rights, or insurance issues.
- **Cost:** The initial cost of a drone can be very high depending on the type.
- **Data processing:** Drones have limitations in weight, size, and power consumption, which can make onboard processing difficult.

TxDOT is going in the right direction

With the assistance of the Texas A&M Transportation Institute (TTI), guidelines for the use of Unmanned Aircraft Systems (UAS) for Construction and Utilities Inspections are being developed.

Under TxDOT project research 0-7159 “Develop Guidelines for the Use of Unmanned Aerial Systems and Smartphones for Construction and Utility Inspections”, research teams are conducting a literature review of UAS-SfM and smartphone technologies; preparing a list of use cases and case studies to test relevant technologies; conducting field tests to document advantages, disadvantages, complementary capabilities, and potential implementation scenarios and costs; preparing recommended settings, procedures, use cases, and operational workflows to ensure repeatable data collection and processing; and preparing guidelines for quality assurance and control of inspections conducted with UAS and smartphone-based Sfm photogrammetry, as well as identify project suitability for the adoption of these technologies to support construction and utility inspection activities at TxDOT.

<https://library.ctr.utexas.edu/hostedpdfs/txdot/webinar/0-7159.mp4>

Questions





Thank You!