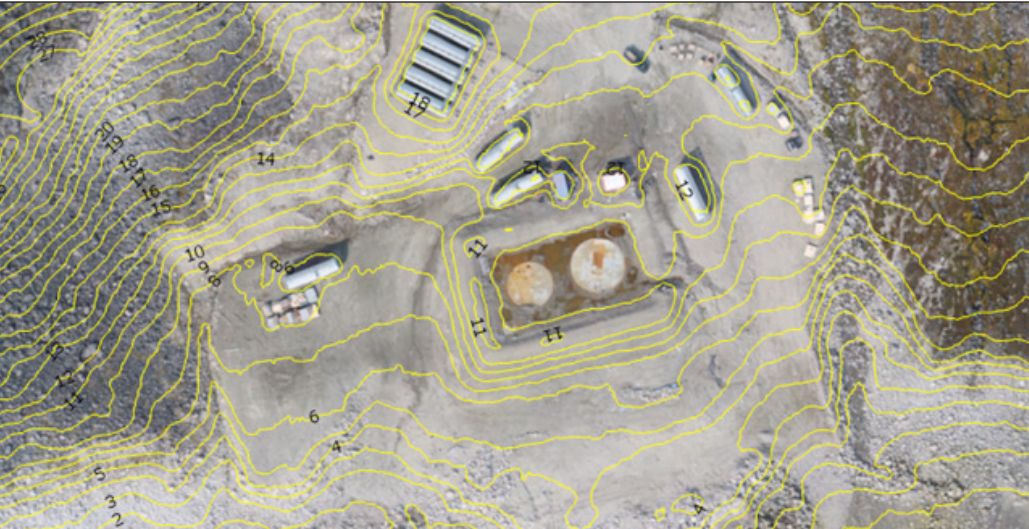


Reducing Risk, Protecting Employees and Improving Data Quality with Drone Technology



AECOM is uniquely positioned to pull the required technologies, tools, subject matter expertise together to innovatively solve data collection challenges more safely, more cost-effectively, and with higher quality.

Areas of Expertise

- **Inspection of High-Hazard Areas** - Stacks, confined spaces, mines, dams, high tension wires, roofs, sewers, high-rise construction, disaster areas, demolition/deconstruction areas
- **Marine Impact Assessment**

Overview

If a picture is worth a thousand words, think what a drone video can be worth? Organizations are trying to leverage innovative technologies for HSE needs such as collecting and using high volumes of quality data. The benefits of using unmanned aerial vehicles are numerous including reducing risk, expediting data retrieval, reducing operational downtime, providing high-quality imagery.

AECOM is working with partner vendors and clients to develop and validate use cases and pilot real world scenarios for these technologies.

Benefits

- More information from a different perspective on the job site
- More accurately estimate earth work before building starts
- On demand, near real time, less disruptive assessments of work progress
- Provides a low-cost alternative to laser-scanning
- Projects/sites can be inspected regularly, safely, efficiently, cost effectively and in more detail
- Capture as-built information in detail (conduits, rebar position)
- Leverage for more productive, shorter meetings
- View places where your personnel can not go without costly and uncomfortable equipment
- Share current details with remote stakeholders
- Monitor housekeeping on job sites without the need for on-site visits
- Conduct safety assessments in virtual reality
- Inventory management and asset tracking
- Tracking logistics - how materials flow onto the site
- Take advanced measurements of conditions on site
- Site modeling "as built" vs "as planned" in greater detail and with higher quality
- Creates a permanent, accurate record
- Ability to visualize work progress in third dimension



Most of these benefits can be achieved in one flight!

Our Approach

Example	Traditional Approach	AECOM Innovative Drone/UAV Approach
Stack Inspection Comparison, Protecting Your Resources	<ul style="list-style-type: none"> • Scaffolding • Rappelling • Visual inspection • Weeks to complete 	<ul style="list-style-type: none"> • 3 personnel - 1sUAS • High Definition, Archival Imagery • Completed within 3 hours of stack shutdown
Minimizing Exposure Comparison	<ul style="list-style-type: none"> • Several Weeks • Over 200 personnel • Small aircraft low level over shark infested waters • Poor quality photography • Handwritten notes 	<ul style="list-style-type: none"> • 2 aircraft, 3 personnel • 6 days, 60 hours of flight time • Captured > 1 terabyte of imagery • High Definition Imagery • Geo-Rectified and ortho-rectified data • Enabled robust analysis
Improving Quality, Reducing Risk, Saving Time and Money	<ul style="list-style-type: none"> • Bucket Truck • Climbers • Hand-held camera • 2 or 3 	<ul style="list-style-type: none"> • 2 personnel; 2 drones • Standoff zoom cameras • 12 to 20 inspected per day • Archival data

Key Attributes

- Experienced UAV personnel – Have been working with drone system for over 35 years and performed hundreds of projects
- AECOM has more than 20 staff members engaged in drone related services
- Diverse use of a variety of technologies brings broad experience base
- Enables a cost effective way to collect inspection/audit information
- Offers opportunities to collect "eyes on" information in areas that either never are reviewed or are checked so infrequently that this becomes a HSE risk
- Provides access and detailed observation opportunities to areas, systems, equipment that can be both complicated and high risk to auditors/inspectors
- Creates robust methods to collect the details that would be extremely difficult to record using notes and even still shots
- Delivers detailed supplemental information to an inspection or audit that helps facilitate corrective actions needed — pinpoints exactly WHERE and WHAT would be appropriate corrective action(s)

“Increasing work efficiency and productivity, decreasing workload and production costs, improving accuracy, refining service and customer relations, and resolving security issues on a vast scale are a few of the top uses drones offer industries globally. Adoption of drone technology across industries leapt from the fad stage to the mega-trend stage fairly quickly as more and more businesses started to realize its potential scope, and scale of global reach.”

Business Insider – July 13, 2017

AECOM DRONE SERVICES

Ty Moyers, PMP
702.277.7328
Ty.Moyers@AECOM.com
Alonso Morales
Drone Pilot
415.816.6933