Unmanned Aerial Systems
Drone Usage That Doesn’t Make the Headlines

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Highlights

- Nearly 100,000 employees operating in more than 150 countries
- US$19.5 billion of revenue for the 12 months ending on September 30, 2014
- Currently No. 332 on the *Fortune 500* list
- Ranked by Ethisphere as one of the world’s most ethical companies
- Recognized by the U.S. Chamber of Commerce’s Business Civic Leadership Center as honoree for Best Corporate Stewardship

*AECOM* designs, builds, finances, operates, and maintains the world’s infrastructure
Drones Ruin Everything for Everybody, Nobody Should be Using Drones
Unfortunate Drone Headlines

Drone crashes near the White House
Drone "attack" on German Chancellor Angela Merkel
Drone cuts off tip of photographer's nose
Drone injures Australian triathlete
Drone injures bystanders in Virginia crowd
Drone flies too close to a news helicopter
Drone nearly crashes into Airbus A320
Drone caught carrying drugs near the border
Drone flies over Bank of America Stadium
Drone flies over Comerica Park
Drone crashes into Grand Prismatic Spring
Drone attacked by hawk
Drone lands in neighbors goat pen

http://www.techrepublic.com/article/12-drone-disasters-that-show-why-the-faa-hates-drones/
What the Headlines Will Read

Drones Improve Safety, Reduce Pesticide Use, Find Missing Hiker, Monitor Endangered Species, etc., etc., etc.,
Current AECOM Interests in Drone Usage

- Replace Traditional Surveys
- Monitoring Forest Usage
- Aid Floodplain Mapping
- Perform As-built Inspection
- Detect Gas Leakage
- Mining Stockpile Volumetric Analysis
- Bridge Inspections
- Marketing Materials
- Pipeline Inspection/Monitoring
- Well Site Inspection
- Sea Turtle Nest Evaluation
- Wetland Restoration Monitoring
- Transmission Line Inspection
- Dam Removal Monitoring
AECOM Case Study

– Pulp Mill Waste Monitoring
  • Various landfill sites
  • Marsh like conditions
  • Traditional Survey

– Ash Pile
  • Constant usage
  • Potentially unstable
  • Volume needed
AECOM Case Study

Existing Workflow

– Survey Over 5000 Control Points
  • Multi-person team
  • Multiple days
  • Very hazardous
  • 1cm survey accuracy
  • Generate contours
  • Calculate Change
AECOM Case Study
Existing Ground Conditions
Alternate Workflow

– UAS Solution
  • Two person team
    o Pilot
    o Observer
  • Capture Imagery with a 2.5 cm Ground Sample Distance
  • Generate Surface Model
  • Create DEM
  • Generate Contours
  • Calculate Change
  • 5cm RMSE x, y, z (AECOM recommended)
    o ASPRS Digital Spec
  • 1.25cm RMSE ground control
AECOM Case Study

Risks

– UAS
  • Point and Shoot Sensor
    o Canon PowerShot S100
    o 3 – 5 meter GPS accuracy
  • No gimbal

– Site
  • High vegetation in places
  • Water
AECOM Case Study

- 16 ground control points
  - 5 - Area 1
  - 6 - Area 2
  - 5 - Ash Pile

- Area 1
  - 17 flight lines
  - 374 RAW images
  - 1.56 GB of data
Structure from Motion (SfM)
AECOM Case Study – 2.5cm GSD Orthophoto
RMSEz = 3.841cm
RMSEz @ 95% = 7.529cm
Thank You

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